



# **X-Analysis User Manual**

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# Preface

## ABOUT THIS GUIDE

This guide, X-Analysis User Manual, describes how to use X-Analysis and its other related modules. In particular it discusses the following topics:

- Configuring X-Analysis
- Using X-Analysis Client
- License Manager (V2 licensing)
- Application Library/Areas
- Diagramming features
- Screen Components
- Business Rules Analysis
- Audit Options
- Document Manager

## Version

This guide describes X-Analysis, software version 11.1.

## How to use this guide

The manual has 17 chapters. Each chapter throws light on one or more of the diverse X-Analysis features which adequately support advanced analysis and documentation tasks. The Appendices contain the other crucial technical details relevant to understanding and using X-Analysis. The topics progress from general ideas to more advanced concepts, building on the earlier chapters.

This guide will prove to be very useful for software professionals—from analysts and developers to architects and operations teams—intending to analyze, document, or modernize AS/400 IBM i applications. Explore this guide to gain insight into the inimitable facets of X-Analysis that equip users with rich understanding of existing legacy applications.

The X-Analysis suite of products contains a total of eight modules. This guide describes only the following module, X-Analysis. For information about the other modules, please contact your Fresche Legacy representative, or visit us at [www.freschelegacy.com](http://www.freschelegacy.com).

# Overview

A comprehensive, stepwise, illustrative guide that encapsulates the advantages of X-Analysis as a multipurpose software product suite!

X-Analysis comes fully equipped to address all analysis and documentation needs – from analyzing Metrics to decoding monolithic Business Rules and many more. In sum, X-Analysis is a power-packed toolset, designed to keep technical complexities at bay, making conversion of existing application designs into the latest format a much easier exercise.

## ACRONYMS USED IN THE MANUAL

Acronym	Full Form
APD	Access Path Diagram
DFD	Data Flow Diagram
DMD	Data Model Diagram
FFD	File Field Details
SCD	Structure Chart Diagram
HSC	Hierarchical Structure Chart
PSC	Program Structure Chart
OSC	Overview Structure Chart

# Introduction to X-Analysis

**X-Analysis**<sup>#</sup> is a proven world-leading tool used by analysts, developers, architects and operations teams for analysing, documenting, modernizing, and rebuilding of IBM i applications. It provides detailed analysis and interactive diagrammatic constructs that enable rich understanding of existing applications. It also has a set of powerful re-engineering facilities for automated database and application modernization which are integrated with the analysis and design extraction functions. Whether an application is poorly structured or highly structured (e.g. Synon / 2E applications), X-Analysis can extract the design logic of the application, providing an excellent base for efficient and effective design recovery.

X-Analysis is a suite of modules fully integrated with IBM Rational products (WDSc, RDp, RDi, etc.) and MyEclipseBlue. It also runs standalone on Eclipse without any other product dependencies. Individual modules are grouped together to provide useful solution sets that meet a number of requirements around a central theme.

## PROFILE AUTHORITY REQUIREMENTS

The initialization/refresh jobs make extensive use of various IBM i commands like CRTDUPOBJ, CRTPF, CRTLF, DLTF, RGZPFM, RTVMBRD, CRTLIB, CLRLIB, RSTLIB, DLTLIB, DSPFD, DSPFFD, DSPPGMREF, DSPDBR, CLRPFM, CPYF, CRTDTAARA, RTVOBJD, ALCOBJ, DFCOBJ, DLTUSRIDX, DSPOBJD, RTVSYSVAL, RTVDTAARA.

In order to run the X-Analysis jobs on an IBM i machine, it is recommended to use the **QPGMR** profile or the user profile having **QPGMR** as the group profile.

Regardless of the profile used, you should have the following authorities:

- The profile must have a **\*USE** authority to all of the commands listed above and also **\*SAVSYS** special authority.
- For the Source and the Object libraries specified during setup – The profile used requires object operational (**\*OBJOPR**) authority to all programs and files in these libraries. The profile also requires execute (**\*EXECUTE**) authority on all of these libraries.
- For the X-Analysis cross-reference library – The profile used must have full rights to this library. If you do not use the **QPGMR** profile, you must make sure the profile used has **\*ALL** rights to all objects in the supplied X-Analysis libraries.

For details, refer to **Initializing\_X-Analysis.doc**.

<sup>#</sup> X-Analysis release 10.x onwards is digitally signed.

# Configure Cross-Reference Library

Before the X-Analysis Client can be used, the cross-reference library i.e. the application repository has to be built. The initialization process takes care of the setting up of the cross-reference database.

This chapter presents the steps, specific command screens, and the command keys for building a cross-reference library.

## WORK WITH X-ANALYSIS FOR APPLICATIONS

On the IBM i, type the **X4WRKAPP** command and press **ENTER**.

### X4WRKAPP command screen

```

X-Analysis/4          Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP              12:58:51
                      21 Jan 2015

Enter options, press Enter.
1=Authorities 2=Change 3=Copy 4=Delete 5=Display 7=X-A Log 8=Libraries
9=Variable Calls 10=App areas 11=Reports 12=Initialise 13=Build data model
14=Refresh 15=Gen Business Rules 16=Exclusions 17=Objects 18=Pgm Stds

X-ref Lib   Text                               Company/division

XAN4CDXA    XAN4CDEM Tutorial System

F1=Help    F3=Exit  F6=Add    F10=Cmd Line    F12=Cancel    F24=More Keys
  
```

The **X4WRKAPP** is the master command menu of the X-Analysis Server. The first step is to add a new cross-reference library. Press **F6** to add a cross-reference library.

### X4WRKAPP – Add Application screen

```

X-Analysis/4          Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP              13:26:21
                      21 Jan 2015

X-ref Library. . . . .
Text . . . . .
Company/division . . . . .
Index src files. . . . . Y
Process var & bound calls. . . Y
Include obsolete source . . .
Build data model . . . . .
Data model match value . . .
TCPIP address . . . . .
User iD . . . . .

F1=Help          F3=Exit          F12=Cancel
  
```

This option will add an entry to the list of the X-Analysis/4 applications and create a new (empty) cross-reference library. You must specify the name of the cross-reference library (e.g. **XAN4CDXA**). You can optionally specify text and a company name.

**X4WRKAPP – Application added**

```

X-Analysis/4      Work with X-Analysis/4 Applications      Databorough Ltd.
XARWKAPP                                               13:26:21
                                                    21 Jan 2015

X-ref Library. . . . . XAN4CDXAT
Text . . . . . XAN4CEM1 Tutorial System
Company/division . . . . .
Index src files. . . . . Y
Process var & bound calls. . . . . Y
Include obsolete source . . . . .
Build data model . . . . .
Data model match value . . . . .
TCPIP address . . . . .
User iD . . . . .

F1=Help      F3=Exit      F12=Cancel
  
```

**LIBRARIES**

After successfully adding the cross-reference library, the next step is to provide libraries for the cross-reference library. These libraries are used when initializing the application and for various other commands which need this information.

Select **Option 8** to assign the Source, Object and Model (2E) Libraries.

**X4WRKAPP – Libraries screen**

```

X-Analysis/4      Work with X-Analysis/4 Application Libraries      Databorough Ltd.
XARWKLIB                                               13:28:28
                                                    21 Jan 2015

Selected x-ref Library -> : XAN4CDXAT

Enter options, press Enter.
2=Change      4=Delete      5=Display

Type Sequence Library

F1=Help      F3=Exit      F6=Add      F12=Cancel      F16=Print
  
```

**The sequence of libraries is important because the objects and the sources are given preference according to the order of the library they belong to. Only the first occurrence of the object/source gets reported. Subsequent occurrences are omitted.**

Press **F6** to add the names of the Source / Object / Model libraries associated with the application, and press **ENTER**. Repeat the step if application consists of multiple libraries. Press **F3** when all the libraries have been defined.

**X4WRKAPP – Add Library screen**

```

X-Analysis/4   Work with X-Analysis/4 Application Libraries   Databorough Ltd.
XARWKLIB                                           13:28:28
                                                    21 Jan 2015

X-ref library.      XAN4CDXAT
Type . . . . .      O          (O=Object,S=Source,M=2E Model)
Sequence . . .      1.00
Library . . . . .   XAN4CDEM1

F1=Help          F3=Exit          F12=Cancel
  
```

The Type may be any one of the following:

- O=Object
- S=Source
- M=Model

**Source & Object Libraries**

While the source library contains the un-compiled source files, the object library comprises the compiled objects for the same.

**Specify the libraries containing both source and object as O and S types. See the settings on the 'XAN4CDXA – Tutorial Application'. It has XAN4CDEM specified as 'O' and 'S' types.**

**Cool/2E (Synon Model) Libraries**

In order to analyze a Synon application, the Synon model library(s) can be specified by putting the library type as "M". The initialization process picks the data model information in the Synon model library(s) when creating the X-Ref library.

Before moving on to the initialization step, you should confirm that the X2E-specific Data Areas are set with appropriate values. For details, refer to **Appendix D**.

## EXCLUSIONS

The exclusions can be set up using the “**Exclusions**” option from the master command menu – **X4WRKAPP**. Select **Option 16** to do this and press **ENTER**.

### X4WRKAPP – Work with Exclusions screen

```

X-Analysis                               Work with Exclusions           Databorough Ltd.
XARWKXCS                                13:39:42
                                           21 Jan 2015

Enter options, press Enter.
5=Work with

  Program      Description
  XARWKSCE     Work with Diagram Exclusions
  XARWKSFE     Work with Source File Exclusions
  XARWKBRC     Work with Business Rule Call Exclusions
  XARWKHRE     Work with Hierarchy Exclusions
  XARWKUMLE    Work with UML Exclusions

F1=Help  F3=Exit  F10=Cmd line  F12=Cancel  F14=WRKSBMJOB  F24=More keys
  
```

The exclusions screen provides a menu for object exclusion. The options are:

- **XARWKSCE** – Work with Diagram Exclusions
- **XARWKSFE** – Work with Source File Exclusions
- **XARWKBRC** – Work with Business Rule Call Exclusions
- **XARWKHRE** – Work with Hierarchy Exclusions
- **XARWKUMLE** – Work with UML Exclusions

### **XARWKSCE – Work with Diagram Exclusions**

The objects which are excluded using this option will not appear in the following:

- Structure Chart Diagrams
- Data Flow Diagrams
- Object Where Used data
- Application Areas



**Note: The excluded programs will appear in the Program Structure Charts.**

You should specify an object name and any required descriptive text. The object name can be generic. If an individual object name is specified, then it is validated against all objects currently loaded into X-Analysis. If a file name is specified, then it must be a physical file name. All logical views built over an excluded physical file are also excluded.

### **XARWKSFE – Work with Source File Exclusions**

Use this option to exclude source files. Excluded source files will not be loaded into X-Analysis. Specify a particular or generic file name. You can specify a particular library name or **\*ALL**, or leave the name blank. A blank library name is equivalent to **\*ALL**.

### **XARWKBRC – Work with Business Rule Call Exclusions**

Use this option to set up Business Rule call exclusions. Specify program name which you wish to exclude.

### **XARWKHRE – Work with Hierarchy Exclusions**

The **Hierarchy Exclusion** option is used to prevent all the programs called by the excluded programs to be shown in the Structure Chart Diagram and the Overview Structure Chart. The excluded programs in SCD or OSC are highlighted by a green arrow next to it.

### **XARWKUMLE – Work with UML Exclusions**

Use this option to exclude objects for UML diagram. Specify the object name which you wish to exclude from the UML diagram.

## **INITIALIZATION**

The initialization can now be executed. From the master command (**X4WRKAPP**) screen, select **Option 12** against the cross-reference library for initialization.

```

Initialise X-Analysis/4 (XAXREF)

Type choices, press Enter.

X-Analysis Library . . . . . > XAN4CDXAT      Name
Object Libraries . . . . . *SPECIFIED      Name, *SPECIFIED
      + for more values
Source Libraries . . . . . *SPECIFIED      Name, *SPECIFIED, *NONE
      + for more values
Index Source Files . . . . . *CHG          *CHG, *NO, *ALL, *UPG
Build Data Model . . . . . *NO            *YES, *NO
Generate Business Rules . . . . *NO      *YES, *NO
Initialise X-Resize . . . . . *NO        *YES, *NO
Include obsolete source/object . *NO      *YES, *NO

```

Bottom

F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display  
F24=More keys

**You can change the default job queue (QBATCH) by changing the job description for XAOBJ/XAN4. Use the following command to change the job description:**

**WRKJOB JOB(XAOBJ/XAN4)**

**You should also change XAOBJ/XDMJOB, as this is used by Option 13=Build Data Model on X4WRKAPP (for XA4MODEL command).**

Press **ENTER** to submit a batch job, which executes the initialization steps.

Feature	Brief Description
X-Analysis Library	The X-Analysis cross-reference library name.
Object Libraries	Special value *SPECIFIED is selected by default. It means that X-Analysis will retrieve all object libraries you have previously specified (using <b>Option 8</b> ).
Source Libraries	Special value *SPECIFIED is selected by default. It means that X-Analysis will retrieve all source libraries you have previously specified (using <b>Option 8</b> ).
Index Source Files	Specify whether or not to create indexes over the source files. These indexes will allow the immediate display of "where used" data. They may be required for the generation of the data model, depending on which options are taken. If the indexes are not built now, they can be built for an individual Source Member at the time they are viewed through the X-Analysis browser. Select one of the following: <ul style="list-style-type: none"> <li>• <b>*CHG</b> – Only update current indexes. It will find newly added source members and remove deleted members. It will also index any source member that has changed since the last initialisation.</li> <li>• <b>*NO</b> – Do not build the indexes</li> <li>• <b>*ALL</b> – It is similar to *CHG when it comes to finding new members and removed members. It will index all source members without checking the change date.</li> <li>• <b>*UPG</b> – Upgrade the X-Analysis database and rebuild all data including all indexes (replacing current ones).</li> </ul>
Build Data Model	If you take the option to build the data model for your application then you can view it through X-Analysis. Select one of the following: <ul style="list-style-type: none"> <li>• <b>*YES</b> – Build the data model</li> <li>• <b>*NO</b> – Do not build the data model</li> </ul> <p><b>Should have the X-Analysis Professional set for this to work.</b></p>
Generate Business Rules	If you take the option to generate the business rules for your application then you can view it through X-Analysis. Select one of the following: <ul style="list-style-type: none"> <li>• <b>*YES</b> – Generate Business Rules</li> <li>• <b>*NO</b> – Do not generate Business Rules</li> </ul> <p><b>Should have the X-Rules set for this to work.</b></p>

Feature	Brief Description
Initialize X-Resize	<p>If you take the option to generate the X-Resize Project for your application then you can view it through X-Analysis. Select one of the following:</p> <ul style="list-style-type: none"> <li>• <b>*YES</b> – Initialise X-Resize Project</li> <li>• <b>*NO</b> – Do not initialise X-Resize Project</li> </ul> <p><b>Should have the X-Field Resize Module for this to work.</b></p>
Include obsolete source/object	<p>If you set this as:</p> <ul style="list-style-type: none"> <li>• <b>*YES</b> – It will pick the name of the same Object/Source from the Library List of the X-Ref.</li> <li>• <b>*NO</b> – Only the first instance of the same Object/Source from the Library List of the X-Ref will get picked.</li> </ul> <p>Obsolete source refers to source members for which there is another source member with the same or similar attributes higher up in the load library list.</p> <p>Obsolete objects are likewise defined as objects for which there is another object with the same or similar attributes higher up in the load library list.</p>

## GENERATING THE DATA MODEL

**You should attempt to build the data model only if you have purchased the Re-engineering Data Modelling Module.**

X-Analysis provides a data-modelling environment on IBM i. It can re-engineer a current application, and then automatically generate the data model and the process model. The (logical) data model or entity relationship diagram is derived from the physical data model implicit in the application.

The initialization procedure asks for generating the Data Model. If you have not generated the Data Model, then the next step is to generate it. To do this, select **Option 13** on the **Work with X-Analysis/4 Applications** menu.

```

X-Analysis/4          Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP                                     13:26:21
                                                21 Jan 2015

Enter options, press Enter.
1=Authorities 2=Change 3=Copy 4=Delete 5=Display 7=X-A Log 8=Libraries
9=Variable Calls 10=App areas 11=Reports 12=Initialise 13=Build data model
14=Refresh 15=Gen Business Rules 16=Exclusions 17=Objects 18=Pgm Stds

X-ref Lib    Text                                     Company/division
XAN4CDXA     XAN4CDEM Tutorial System
13 XAN4CDXAT XAN4CDEM Tutorial System
  
```

Press **ENTER**.

```

Generate Data Model (XA4MODEL)

Type choices, press Enter.

X-Analysis library . . . . . > XAN4CDXAT      Name
  
```

```
Data libraries . . . . . > XAN4CDEM1      Name
      + for more values
Model method . . . . . > *PGMLOGIC      *PGMLOGIC, *NAMES, *CA2E...
```

Press **ENTER** to run the modelling command. This principal command runs in batch and completes the modelling process.

Feature	Brief Description
X-Analysis Library	The X-Analysis cross-reference library name.
Object Libraries	Specify the data library names.
Model Method	<p><b>*PGMLOGIC</b> – Derive foreign keys from RPG/LE program logic. Relationships are only considered valid when foreign keys match all the components of the owning file's primary identifier.</p> <p><b>*CA2E</b> – The entire data model has been generated by Synon. Use only the Synon data model database to derive the data model.</p> <p><b>*NAMES</b> – Only derive foreign keys for owning relationships, taking into account the option specified in the 'Matching Method' parameter.</p> <p><b>*BOTH</b> – Derive foreign keys taking into account the Program Logic and the *NAMES OR Program Logic and *CA2E (in case of CA2E application).</p>

## REFRESH THE CROSS-REFERENCE LIBRARY

**Attempt the Refresh option only when you have modified Objects / Members.**

X-Analysis provides a refresh command to register changes in Objects/Members of the application library to the cross-reference library. The **XREFRESH** command refreshes the X-Analysis cross-reference database for the specified libraries for all the changed objects.

The refresh will have no effect unless there are changes to (at least) one of the source files registered in the cross-reference database. This command will update the Object and the Member lists immediately, and run a separate job to re-index the appropriate source code.

To run the refresh command from the **5250** screen, go to the master command menu (**X4WRKAPP**) and select **Option 14** against the cross-reference library.

```
X-Analysis/4          Work with X-Analysis/4 Applications      Databorough Ltd.
XARWKAPP                                     13:26:21
                                                21 Jan 2015

Enter options, press Enter.
1=Authorities 2=Change 3=Copy 4=Delete 5=Display 7=X-A Log 8=Libraries
9=Variable Calls 10=App areas 11=Reports 12=Initialise 13=Build data model
14=Refresh 15=Gen Business Rules 16=Exclusions 17=Objects 18=Pgm Stds

X-ref Lib   Text                                     Company/division
XAN4CDXA    XAN4CDEM Tutorial System
14 XAN4CDXAT XAN4CDEM Tutorial System
```

Press **ENTER** to invoke the **XREFRESH** command screen (displayed below):

```

Refresh Changed Objects (XREFRESH)

Type choices, press Enter.

X-Analysis Library . . . . . > XAN4CDXAT      Name
Refresh Application Areas . . . *NO          *YES, *NO, Y, N
Refresh Business Rules . . . . . *NO          *YES, *NO
  
```

Feature	Brief Description
X-Analysis Library	The X-Analysis cross-reference library name.
Refresh Application Areas	If you wish to refresh the Application Areas, select <b>*YES</b> . If you select <b>*NO</b> , the Application Areas will not be updated.
Refresh Business Rules	If you wish to refresh the Business Rules for each changed program, select <b>*YES</b> . If you select <b>*NO</b> , the Business Rules will not be updated and you will need to re-generate all Business Rules next time to bring them up-to-date.

## VARIABLE PROGRAM CALLS FROM FILES/PROGRAMS

RPG language allows the use of variables in the CALL statements where the variable would contain the name of the next program to be called at run-time. The variable might be getting the next program name through some database file or hard-coding in the program logic itself. In such cases, the display program references command shows the variable name instead of the actual program which would be called at run time. Therefore, some mechanism is required in X-Analysis to identify the possible programs which are called through variables at runtime.

In order to achieve this, **Option 9** has been provided on the **X4WRKAPP** screen where the variable calling setup can be done.

### X4WRKAPP command screen

```

X-Analysis/4          Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP              12:58:51
                      21 Jan 2015

Enter options, press Enter.
1=Authorities 2=Change 3=Copy 4=Delete 5=Display 7=X-A Log 8=Libraries
9=Variable Calls 10=App areas 11=Reports 12=Initialise 13=Build data model
14=Refresh 15=Gen Business Rules 16=Exclusions 17=Objects 18=Pgm Stds

X-ref Lib   Text                               Company/division

XAN4CDXA    XAN4CDEM Tutorial System

F1=Help   F3=Exit  F6=Add   F10=Cmd Line  F12=Cancel  F24=More Keys
  
```

This provides access to the following:

**Variable Program Calls from Files:** You can add the relevant file containing the info about the program names to be called. The files listed in this screen are called **Generic Files**. These files are read by the program(s) to determine which programs to call based on certain keys.

Work with Generic Files allows you to maintain the details of the files which are read by a program in order to determine which programs to call.

Press **F6** to add a Generic File.

The following data should be maintained:

**File name:** The name of the database file which is used to retrieve the name of the programs to be called (the generic file). The name entered can be either a physical or a logical file name but it must be a 'keyed' file.

**Key type** – This field indicates the type of data used to retrieve the 'called program' name. Choose from:

**\*ALL** – All records in the file are to be scanned to find the possible programs that can be called by the program.

**\*CONSTANT** – All records keyed by any value which is moved into the key field name (see below) within the calling program refer to programs which can be called by the program.

**Key field name** – This field **only** applies when the key type is specified as **\*CONSTANT**. It identifies the name by which the key field is 'referred to' in the calling program. This is the field which has values moved into it to determine which programs should be called.

**Variable Program Calls from Programs:** This case is for the generic programs which are called by the other program – to either return the names of the programs to call or call further programs directly. The purpose of this setup is to bypass the intermediate (generic) program and directly display the actual/second-level program.

Press **F6** to add a Generic Program.

The following data should be maintained:

**Program name** – The name of the program which is called to call further programs.

**Key Type** – This field indicates the method used by the generic program to determine which programs to call. Choose from:

**\*ALL** – All program references for the generic program are shown as references for the calling program.

**\*FILE** – The generic program uses a generic file to determine which programs to call. The references as defined through Work with Generic Files will be shown as references for the calling program.

**File name** – This field **only** applies when the key type above is specified as **\*FILE**.

The file name is validated against the files maintained through the **Work with Generic Files** screen

**Demo case**

The example illustrated below displays the generic program using the generic file to determine which programs to call.

In this instance, **PG\_V5** is a generic program called by **CL\_GEN\_PGM**. See **PG\_V5** as listed under the Generic Programs list.

**Work with Generic Programs screen**

X-Analysis/4 XARWKGPS	Work with Generic Programs	Databorough Ltd. 12:58:51 21 Jan 2015
Enter options, press Enter. 2=Change 4=Delete 5=Display		
Program	Type	File name
PG_V5	*FILE	PGNAME

The following screen shows **PGNAME** as listed under the **Generic Files** list.

X-Analysis/4 XARWKGFS	Work with Generic Files	Databorough Ltd. 12:58:51 21 Jan 2015	
Enter options, press Enter. 2=Change 4=Delete 5=Display			
File	Key type	Key field name	Called pgm field
PGNAME	*ALL		PGM1

**PGM1** field of **PGNAME** file is considered for variable program calls.

There are two options to specify the Key type –

**\*ALL:** All the program names for the **Called Program Field** (i.e. **PGM1**) existing in the generic file (i.e. **PGNAME**) will be added as the program references.

**\*CONSTANT:** It works differently because it tracks the actual constant key value moved in the key field name for selecting the database records matching the key value for the variable call selection.

As an example, below are the entries in the **PGMNAME** file:

```

X-Analysis/4                      Work with Generic Files                      Databorough Ltd.
XARWKGFS                          12:58:51
                                      21 Jan 2015

Enter options, press Enter.
2=Change 4=Delete 5=Display

      COND      PGM1      PGM2
000001  A        PG_V2K      PG_V1
000002  B        PG_V3K      PG_V4
***** ***** End of report *****

```

Considering the above setup and example, below program references are added once **XREFRESH** or the initialization process is executed on the X-Ref library:

```

X-Analysis/4                      Work with Generic Files                      Databorough Ltd.
XARWKGFS                          12:58:51
                                      21 Jan 2015

Enter options, press Enter.
2=Change 4=Delete 5=Display

WHPNAM      WHTXT      WHFNAM      WHOBTP      WUSAGE
CL_GEN_PGM  PG_V2K      P           I
CL_GEN_PGM  PG_V3K      P           I
***** ***** End of data *****

```

In this example, reference to **Generic Programs** has been deleted, and the references from relevant file/field listing on the "Work with Generic Files" screen has been added. The key type is specified as **\*ALL** in the generic file entry. All the program names under the **PGM1** field of **PGNAME** file are considered as dependencies of **CL\_GEN\_PGM**. Therefore, the object dependencies of **PG\_V5** are removed and the program names existing in **PGM1** field of **PGNAME** file are added as the dependencies of **CL\_GEN\_PGM** program. As a result, the Object Where Used displays the replaced dependencies.



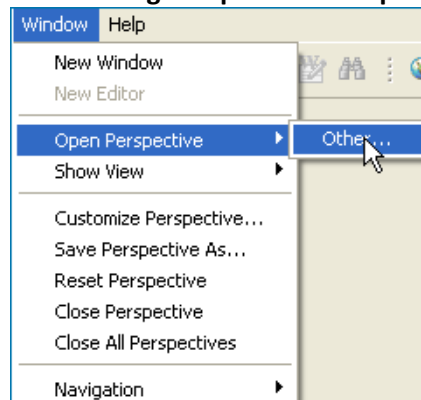
# Using X-Analysis Client

## SIGN-ON DIALOG

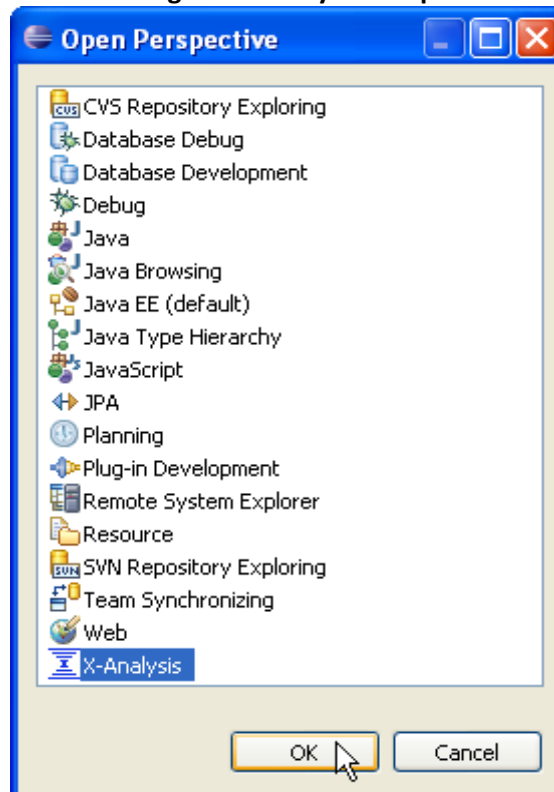
Start IBM's Rational products **7.5** and above or Eclipse **3.4** and above. Select:

**Window > Open Perspective > Other > X-Analysis**

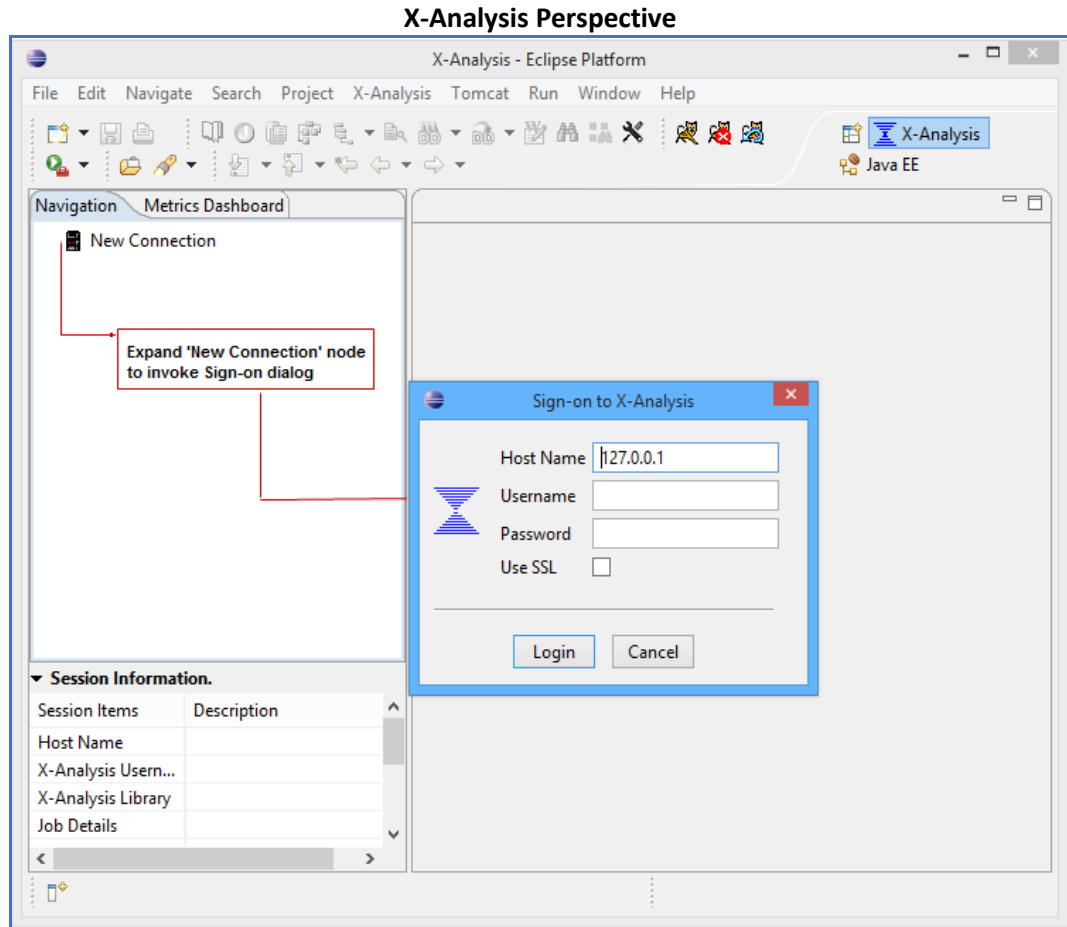
**Choosing Perspective in RDp**



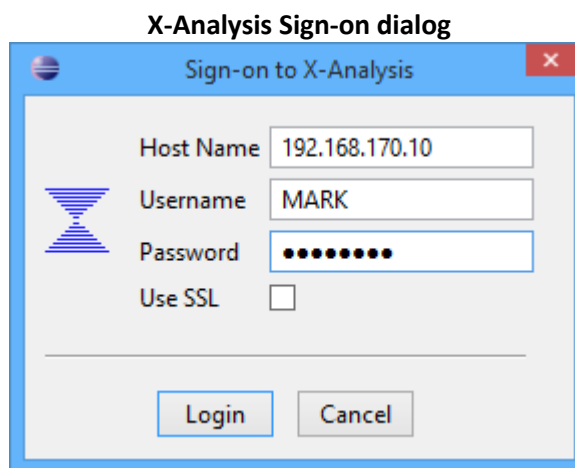
**Selecting the X-Analysis Perspective**



Click **OK** to start the X-Analysis Perspective.



Expand the **New Connection** node to bring up the Sign-on dialog.



Enter the following information to the **Sign-on** dialog:

1. Enter the TCP/IP address/Computer Name of the IBM i to be accessed.
2. Provide the username and the password of a valid IBM i profile.
3. Check the box for **'Use SSL'** feature for additional security. For details, refer to **Appendix K**.
4. Click **Login**.

After successful sign on, X-Analysis lists the application libraries which were initialized using the **X4WRKAPP** command on the IBM i.

## SESSION INFORMATION

The X-Analysis Client displays detailed session information about the connection in the associated Session Information view.

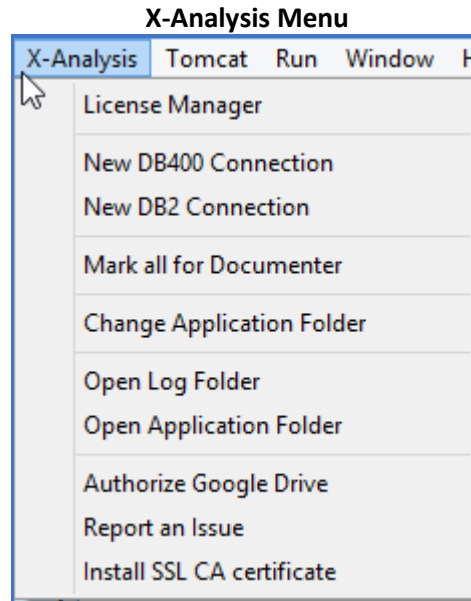
Session Information	
Session Items	Description
Host Name	192.168.170.10
X-Analysis Username	MARK
X-Analysis Library	XAN4CDXA
Job Details	243943/QZDASOINIT/QUSER
Database Library	
Application Area:	
Data Model Info.	Available
Library List	XAN4CDXA XAN4CDEM QGP...

The Session Information details are as follows:

- **Host Name:** Displays the IP or the web link of the connected IBM i.
- **X-Analysis Username:** Displays the user name which is connected to the IBM i.
- **X-Analysis Library:** Name of the cross-reference library, the user has currently selected.
- **Job Details:** Displays job details in format – Job Number/Job Name/Job User.
- **Database Library:** The Subset Library which is being used to get the data from where the Data View options are selected. This displays a value only when a subset library has been selected.
- **Application Area:** Displays the currently selected Application Area.
- **Data Model Info:** Informs the user whether Data Modelling is available or not.
- **Library List:** Displays the library list for the current job.

## X-ANALYSIS MENU

X-Analysis provides the **X-Analysis** toolbar menu on the Eclipse toolbar. The following screen displays options available on the X-Analysis menu:



The details of the options provided by the X-Analysis menu are discussed as under:

## LICENSE MANAGER

V2 is the new licensing mechanism which adds to the ease of both the new and existing X-Analysis users. Please contact Fresche Legacy at [license@freschelegacy.com](mailto:license@freschelegacy.com) to obtain the license file.

### Obtaining the License File

**Note: If you have already received the License File, please refer to [Applying the License File](#) section.**

The initial step is to download the **XALicenseManagerTool**.

It is important to know if you need the 32 or 64 bit version for the License Manager Tool. Determine this by running the **cmd.exe** command "**java -version**." If, for instance, the "**64-Bit Server VM**" appears, then download the 64-bit version. See the screenshot below:

```

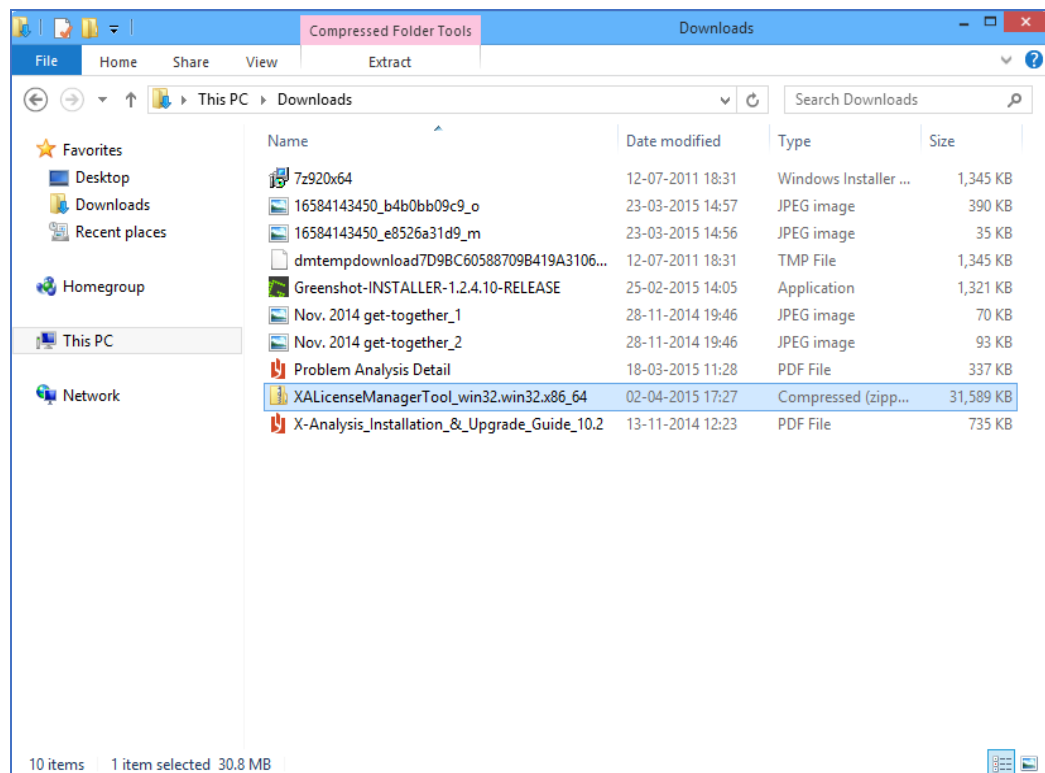
Administrator: Command Prompt
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Windows\system32> java -version
java version "1.7.0_55"
Java(TM) SE Runtime Environment (build 1.7.0_55-b13)
Java HotSpot(TM) 64-Bit Server VM (build 24.55-b03, mixed mode)
C:\Windows\system32>
  
```

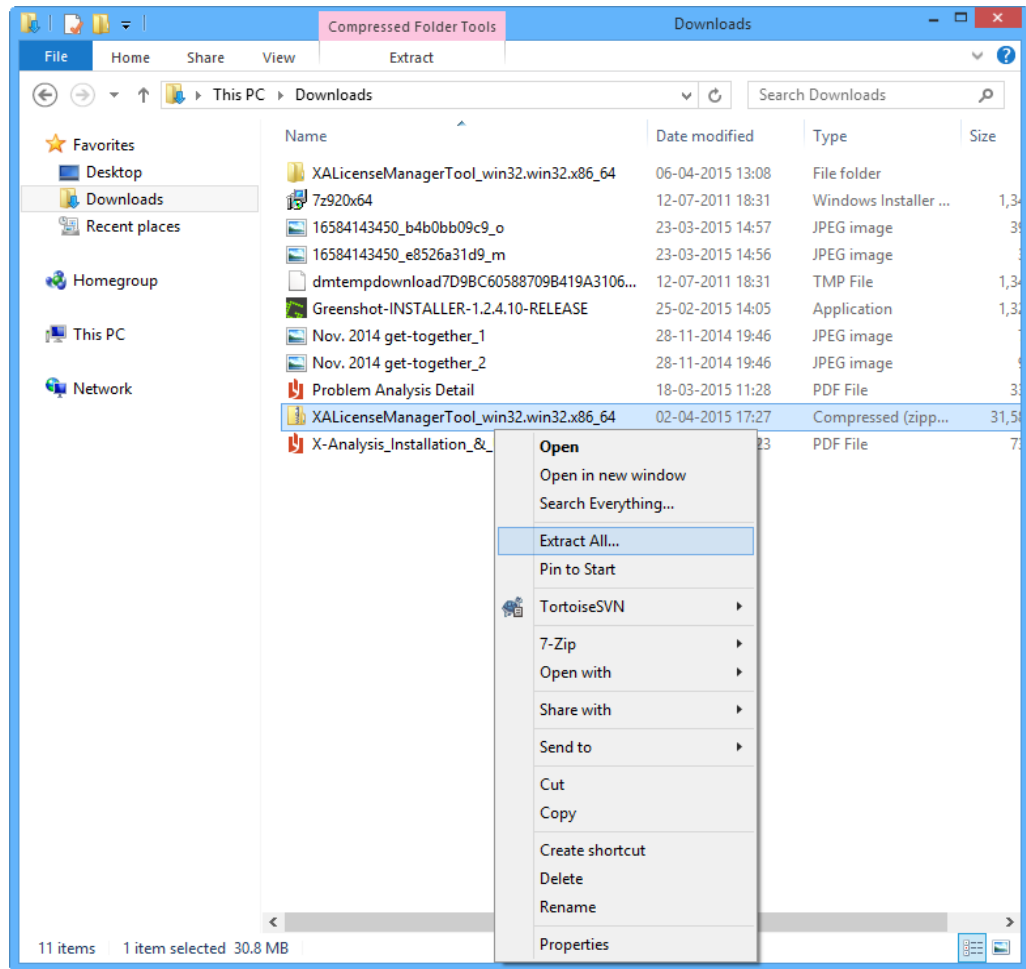
Select the appropriate version and click the corresponding link.

- [license.freschelegacy.com/XALicenseManagerTool\\_win32.win32.x86\\_64.zip](http://license.freschelegacy.com/XALicenseManagerTool_win32.win32.x86_64.zip)
- [license.freschelegacy.com/XALicenseManagerTool\\_win32.win32.x86.zip](http://license.freschelegacy.com/XALicenseManagerTool_win32.win32.x86.zip)

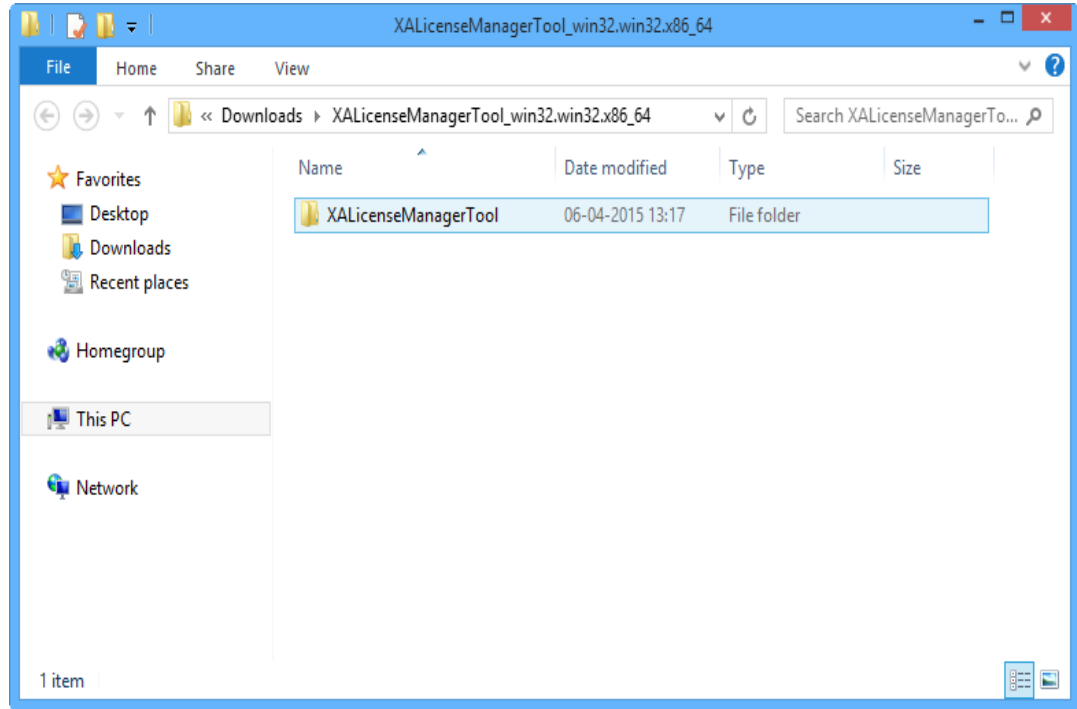
The **XALicenseManagerTool** (according to your selected version) will be downloaded as seen in the image below.



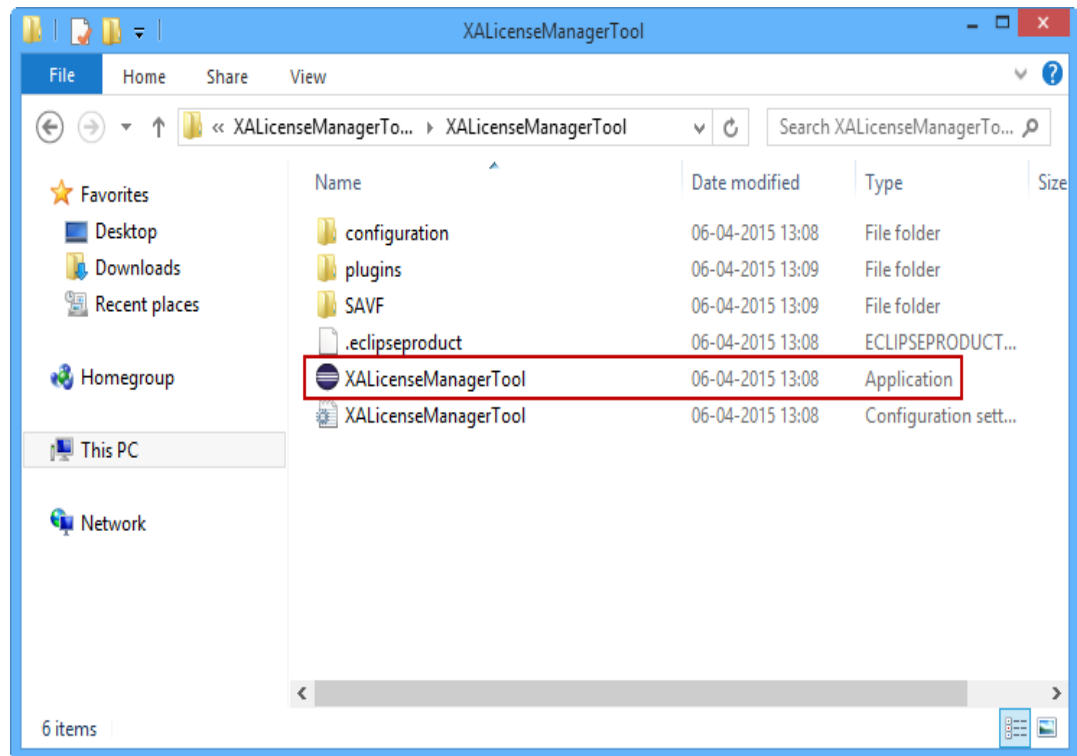
Right-click on the downloaded **XALicenseManagerTool** compressed folder and click **Extract All** from the right-click menu.



The following window will appear:



Double-click the **XALicenseManagerTool** file folder. The following window will appear:



Now, double-click on the **XALicenseManagerTool** application (marked above) to invoke the **License Manager View**.

### X-Analysis License Manager View

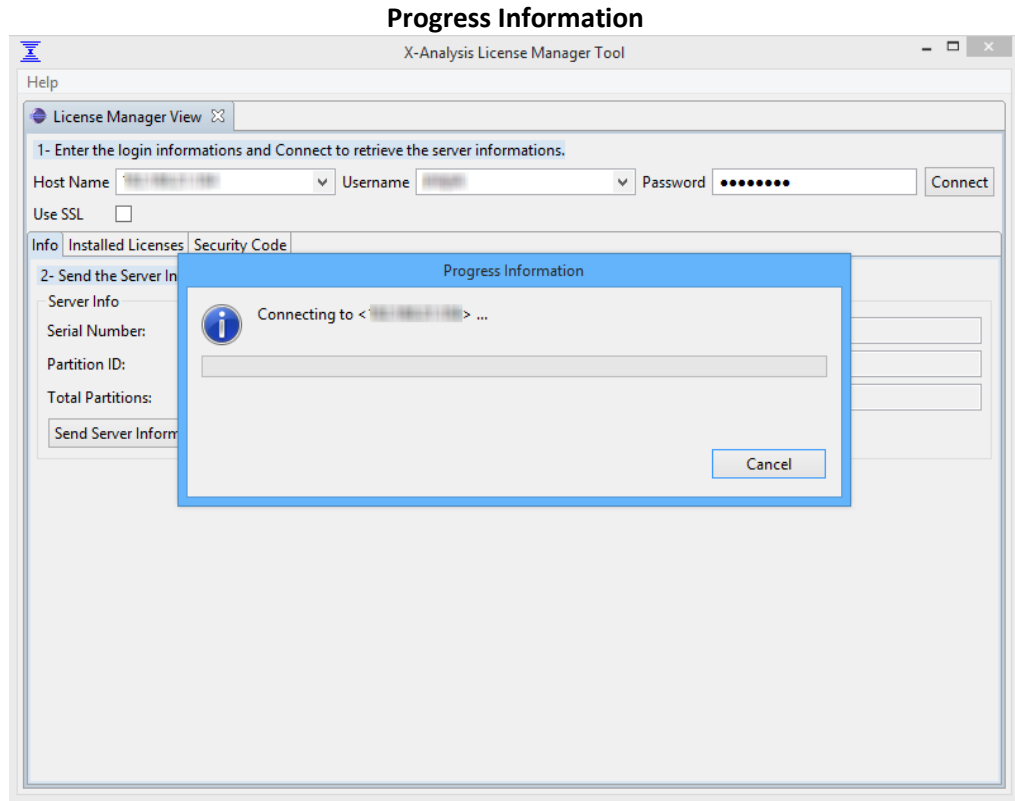
The screenshot shows the 'X-Analysis License Manager View' window. At the top, there is a 'Help' menu and a 'License Manager View' tab. Below the tab, there are two main sections. The first section is titled '1- Enter the login informations and Connect to retrieve the server informations.' and contains three input fields: 'Host Name', 'Username', and 'Password', each with a dropdown arrow. To the right of these fields is a 'Connect' button. Below these fields is a 'Use SSL' checkbox. The second section is titled '2- Send the Server Information to Fresche Legacy to receive your License file.' and contains a 'Server Info' sub-section. This sub-section has three input fields: 'Serial Number:', 'Partition ID:', and 'Total Partitions:'. Below these fields are two buttons: 'Send Server Information' and 'Copy to Clipboard'.

In the above view, provide the Host Name/IP address, Username and Password. Check the **Use SSL** box for the SSL security feature.

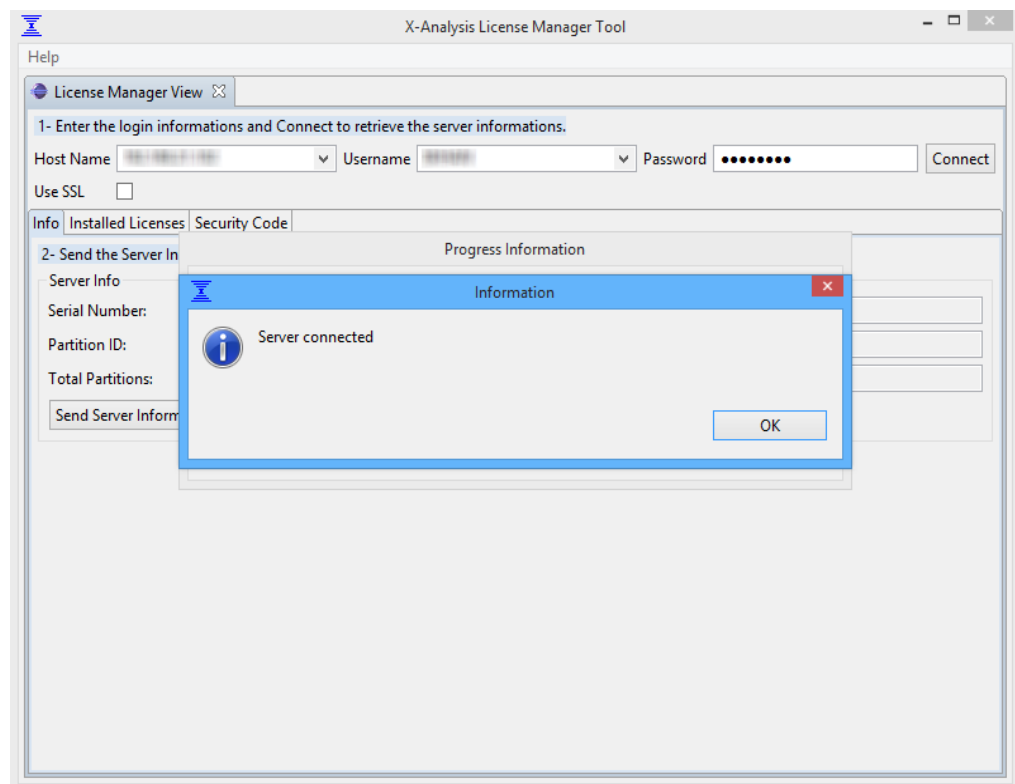
Click **Connect** to authorize the IBM i machine to provide the Serial Number and the Partition Number.

The following window displays the Progress Information.



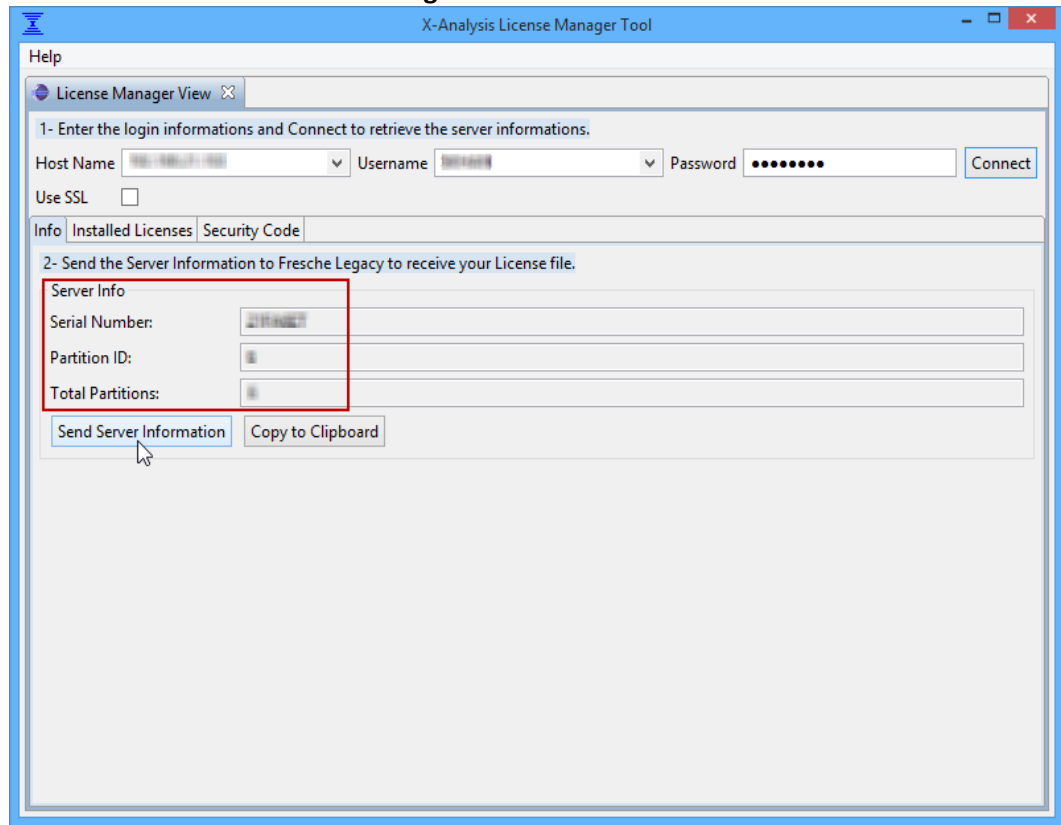


Once the connection is established, the following window is displayed:



Click **OK**. The Server Info will now show the Serial No., Partition ID, and Total Partitions.

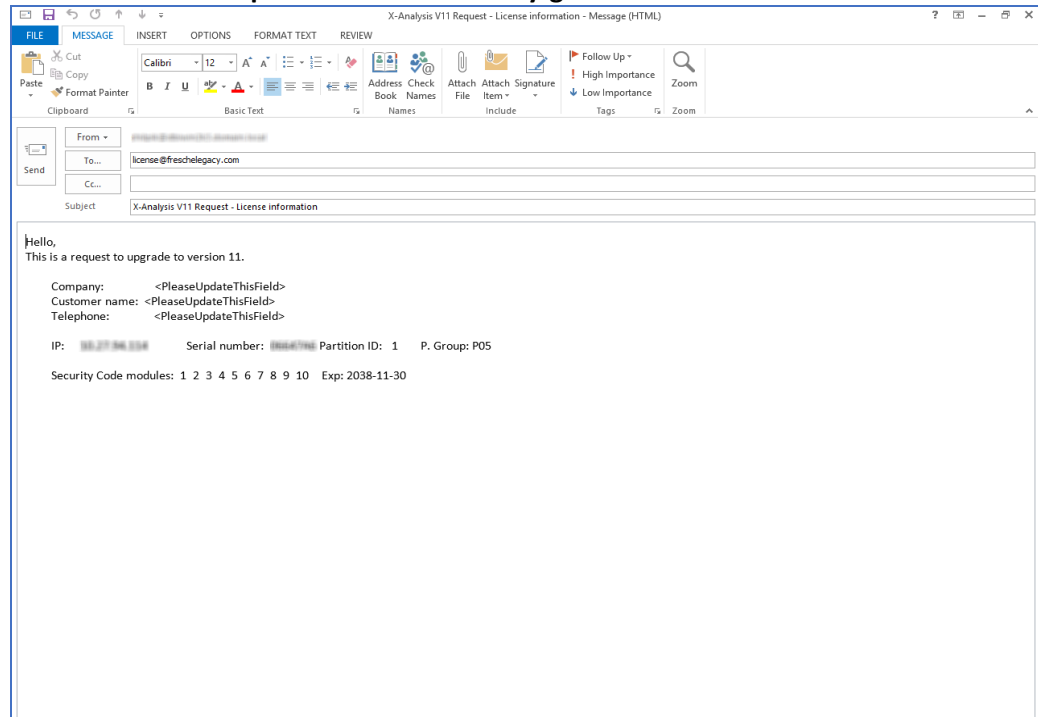
**License Manager window with the Server Info**



You must wait to receive the License file by Fresche.

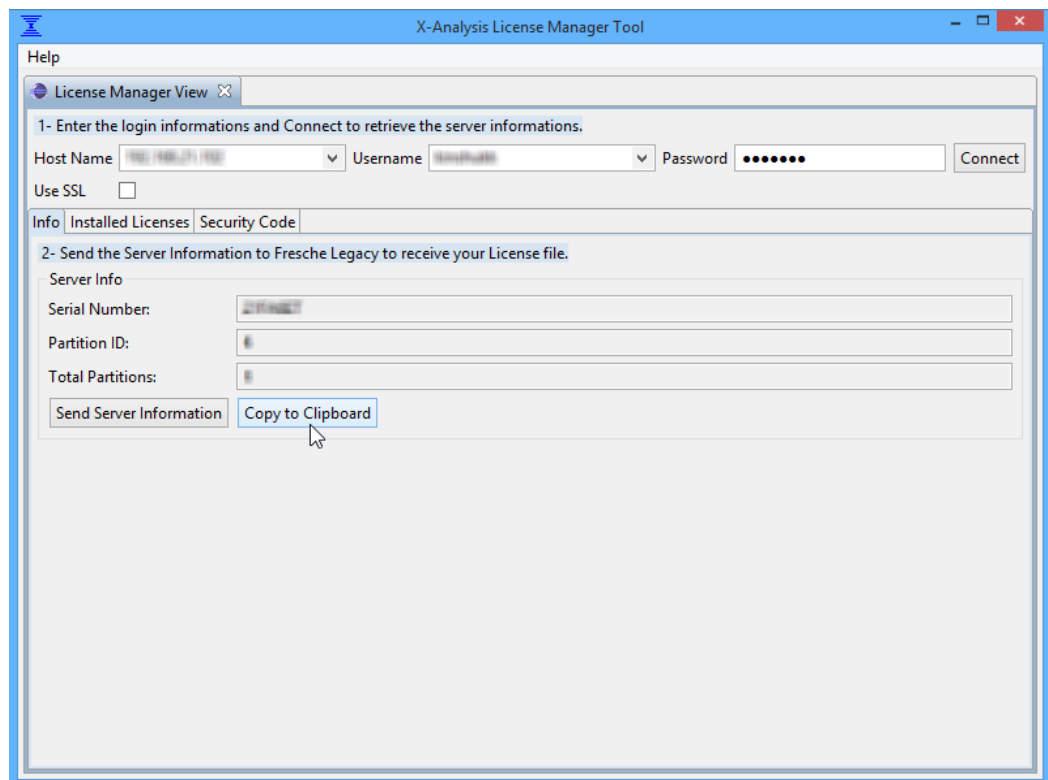
Click **Send Server Information** to send this information to the license team at Fresche prompting them to begin reviewing and processing the license request. An email will be automatically generated as is shown below.

### Sample of the automatically-generated Outlook email



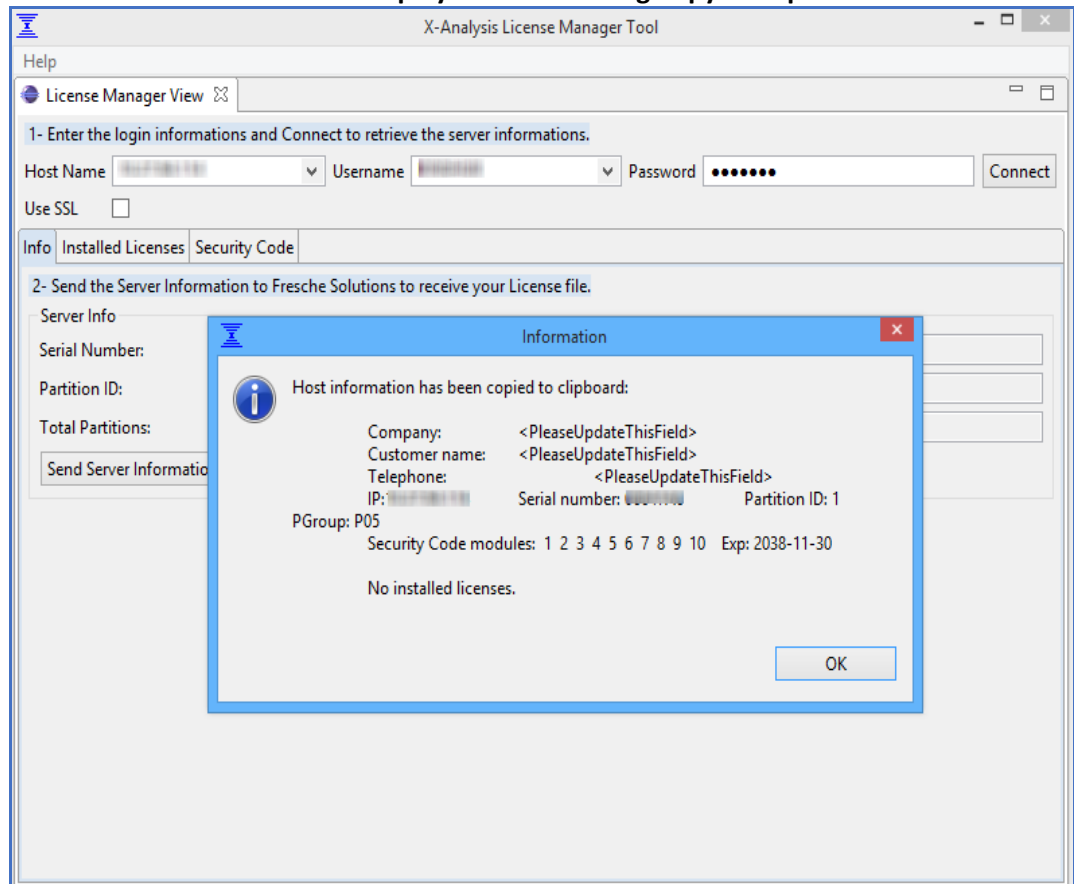
Click **Send**.

Alternatively, you can click **Copy to Clipboard**.



The information gets copied and is displayed as follows:

**Information displayed when clicking Copy to Clipboard**



Click **OK** to automatically copy the information to the clipboard. Now you will simply need to paste the information or take a screenshot of the above window and email it to [license@freschelegacy.com](mailto:license@freschelegacy.com) to get the License File.

**Applying the License File\***

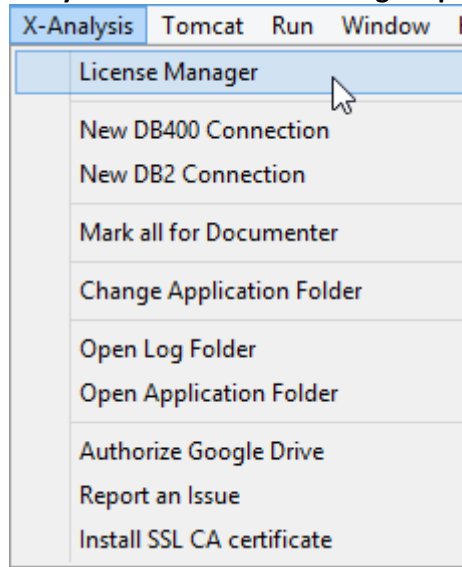
**Note: Proceed with installing the X-Analysis V11 client and server only when you have received the License File from support. Please store the new License file safely.**

**You can continue to use the old version till you receive the new file.**

**\*The following steps are to be taken on Eclipse/Rational where X-Analysis is installed.**

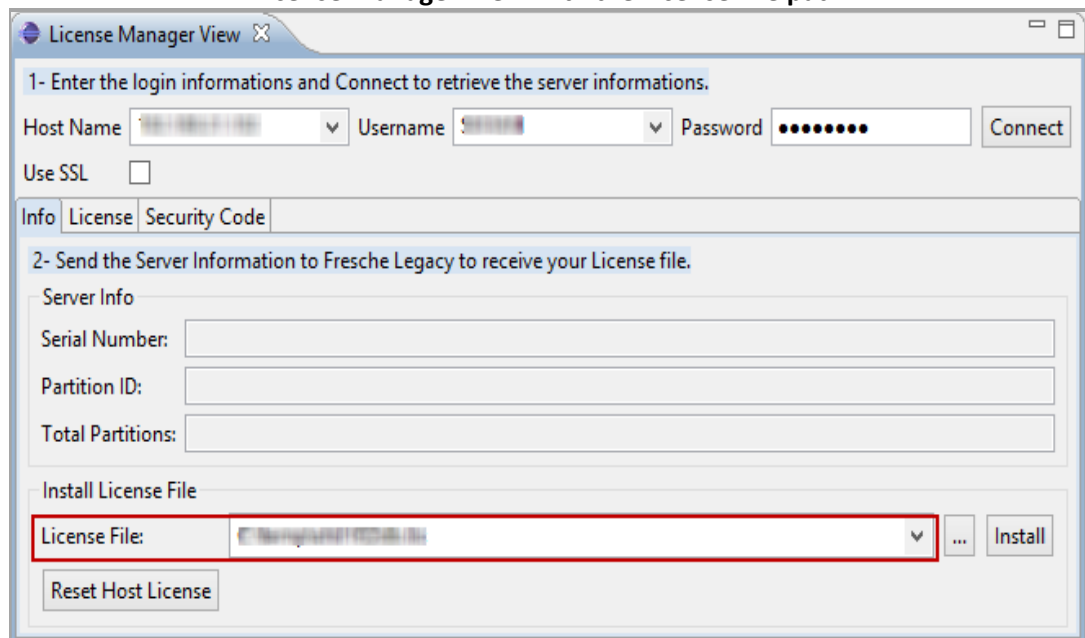
After you have received the License file, the next step is to install it. Select the **License Manager** option from the X-Analysis menu, as shown below.

**X-Analysis menu – License Manager option**



The **License Manager View** will be invoked. Browse and enter the License File path as shown below.

**License Manager View with the License File path**



Click **Install**. The Install log showing only the licenses included in the specified license file will appear.

Next, click the **License** tab to get a complete list of the installed licenses. It displays all information about the Product, Expiry Date, Status, Install Date, and License Type.

License Manager View – License tab

1- Enter the login informations and Connect to retrieve the server informations.

Host Name: [FRESH LEGACY] Username: [ADMIN] Password: [REDACTED] Connect

Use SSL

Product	Expiry Date	Status	Install Date	License Type
X-2E Analysis	Permanent	Valid	2015-02-15	Permanent
X-2E Migrate	Permanent	Valid	2015-02-15	Permanent
X-Analysis Lite	Permanent	Valid	2015-02-15	Permanent
X-Archive	Permanent	Valid	2015-02-15	Permanent
X-Audit	Permanent	Valid	2015-02-15	Permanent
X-Control	Permanent	Valid	2015-02-15	Permanent
X-DB Modernize	Permanent	Valid	2015-02-15	Permanent
X-Datatest	Permanent	Valid	2015-02-15	Permanent
X-Verify	Permanent	Valid	2015-02-15	Permanent
XA-Open	Permanent	Valid	2015-02-15	Permanent

The third tab is **Security Code** which displays any installed V1 modules based on the installed security code. In the absence of any security code, the page will display as empty as is seen in the following view.

License Manager View – Security Code

1- Enter the login informations and Connect to retrieve the server informations.

Host Name: [FRESH LEGACY] Username: [ADMIN] Password: [REDACTED] Connect

Use SSL

Info	License	Security Code
Expiry Date:	0001-01-01	
Module 1:	Not included	
Module 2:	Not included	
Module 3:	Not included	
Module 4:	Not included	
Module 5:	Not included	
Module 6:	Not included	
Module 7:	Not included	
Module 8:	Not included	
Module 9:	Not included	
Module 10:	Not included	

**Note:** A single license file will be required, regardless of the number of partitions you may have for a given machine identified by its serial number.

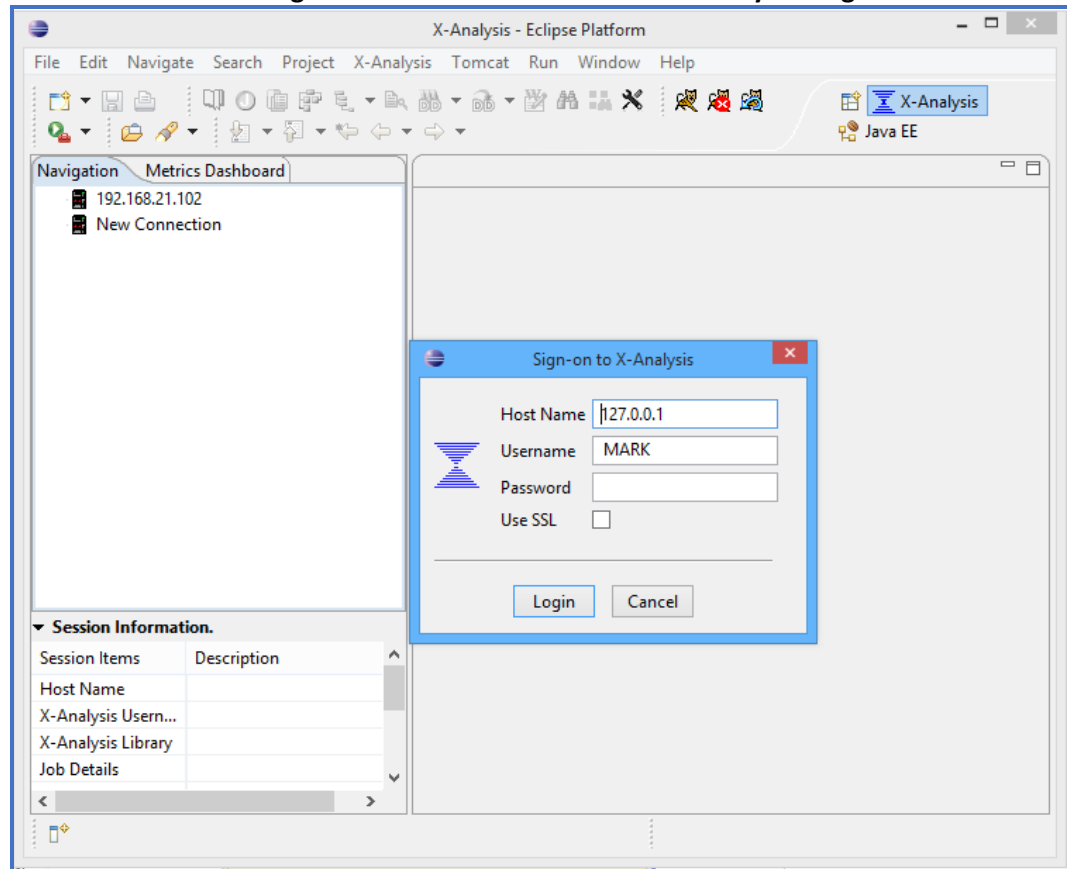
Install the license file on each distinct partition. Follow the same installation procedure for each partition.

If you decide to clone a partition where XA 11.0 (and onwards) has already been installed/configured, install the license file on the newly-created partition in order for XA to start working on it.

## New DB400 Connection

The X-Analysis menu provides the **New DB400 Connection** option. Through this option, you can create connections to different IBM i servers. Provide valid sign on information when you select the **New DB400 Connection** option. Upon successful sign on, X-Analysis adds a new IBM i node in the navigation view.

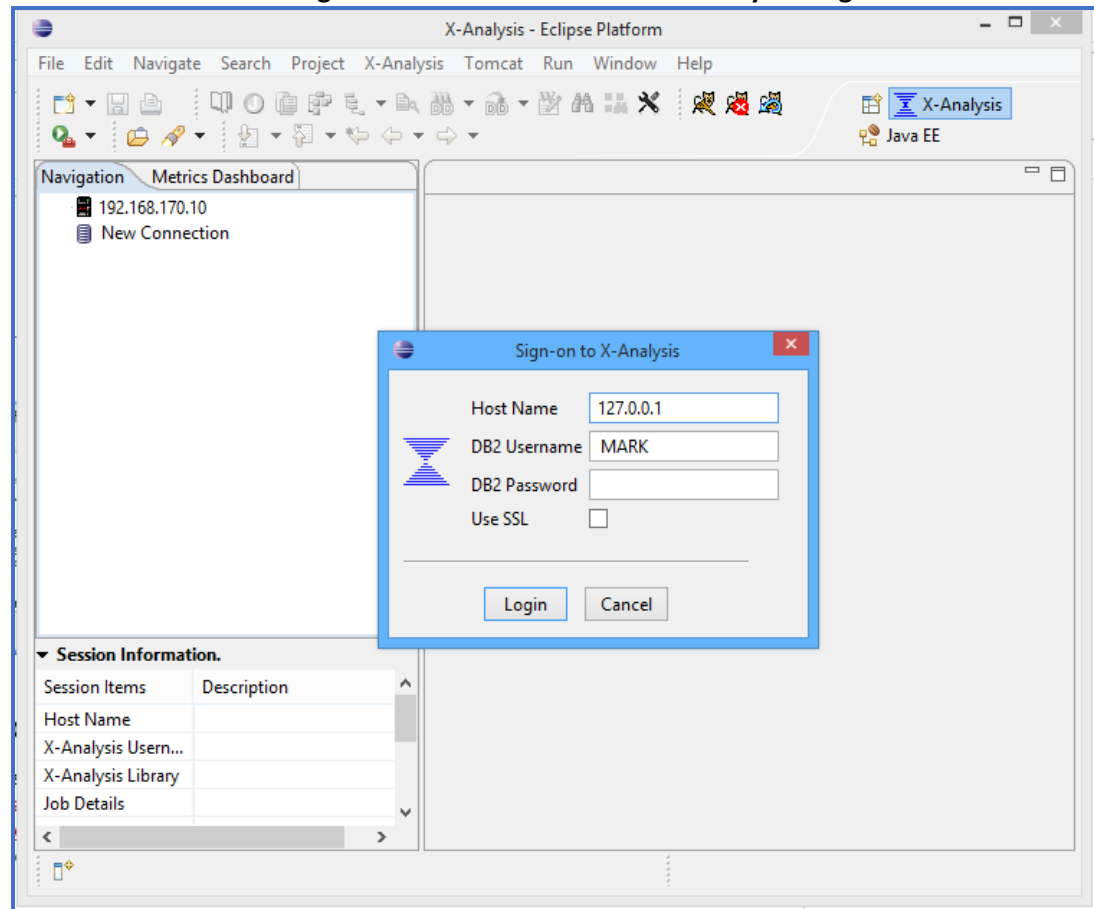
### Creating New DB400 Connection from X-Analysis Plugin



## New DB2 Connection

The X-Analysis menu provides the **New DB2 Connection** option. By selecting this option, you can create connections to use offline X-Analysis. Provide valid DB2 sign on information when selecting the **New DB2 Connection** option.

### Creating New DB2 Connection from X-Analysis Plugin



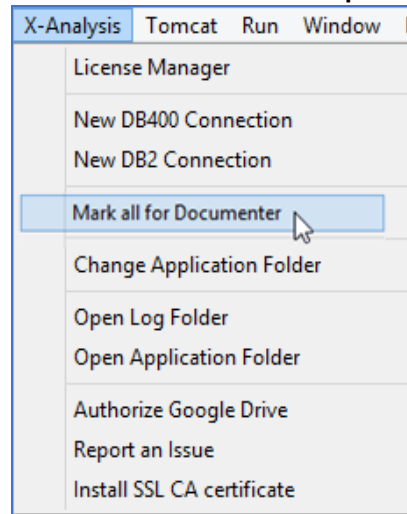
Refer to **Appendix A** for more details on X-Analysis Offline.

### Mark all for Documenter

Select the **Mark all for Documenter** option to mark all records for system documentation which are listed on the X-Analysis window.

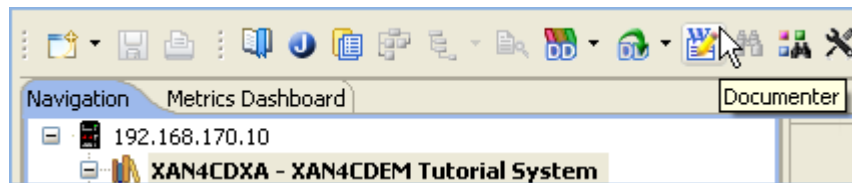


**Mark all for Documenter option**



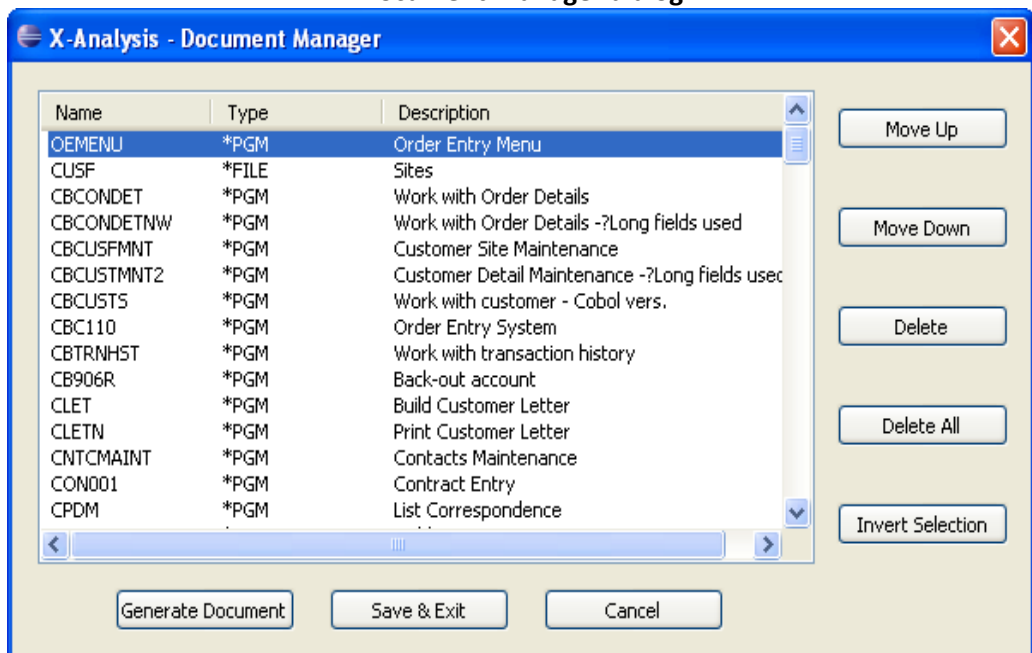
You can view the marked records through the **Documenter** icon on toolbar.

**Documenter icon**



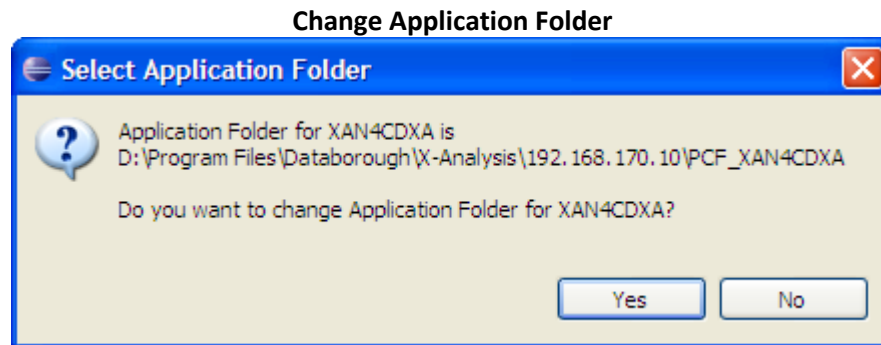
On clicking the **Documenter** icon, the **Document Manager** dialog will display all the marked records.

**Document Manager dialog**



## Change Application Folder

The default **Application Folder** for a specific application can be changed by selecting the **Change Application Folder** option from the X-Analysis menu (**X-Analysis>Change Application Folder**). The following dialog appears on selecting this option:

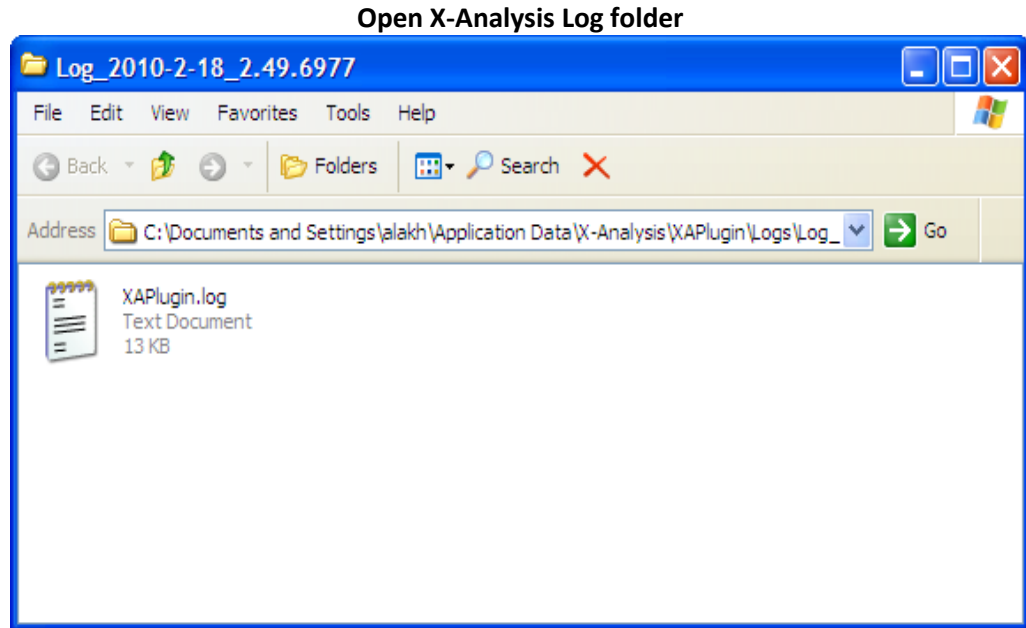


To select new Application Folder, click **Yes** in the dialog box. The following dialog appears prompting to specify location for the new Application Folder.



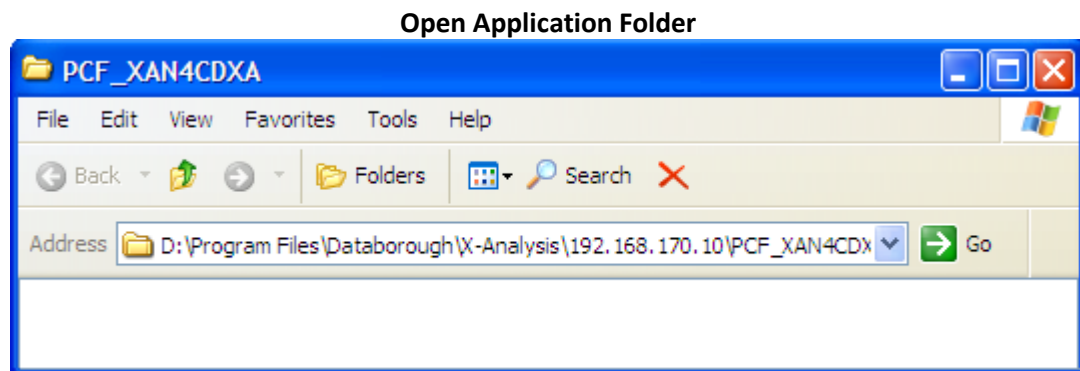
## Open Log Folder

This option opens the folder, currently used to record the log files of X-Analysis. The **XAPIugin.log** file can also be used for bug/error tracking. Select the **Open Log Folder** option from the X-Analysis menu (**X-Analysis > Open Log Folder**).



### Open Application Folder

Each application has its own Application Folder. This folder contains generated System Documents, Flowcharts, and DDL files. To view the Application Folder, select the **Open Application Folder** option from the X-Analysis menu (**X-Analysis > Open Application Folder**).



### Authorize Google Drive

The **Authorize Google Drive** option authorizes you in exporting the DOCX or XLSX files to Google Drive. For more details, refer to [Appendix M](#).

### Report an Issue

The **Report an Issue** option helps you in reporting an issue along with the log files. When you select this option, X-Analysis collects all the information required to sort out the bug/error which is being reported and generates a zip file. X-Analysis then invokes the mail client installed on the user's system and attaches the zip file with this mail.

## Install SSL CA certificate

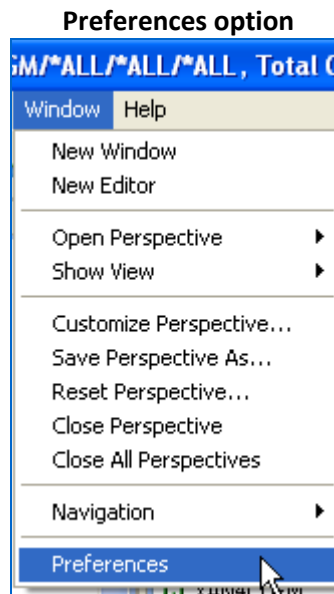
The **Install SSL CA certificate** allows you to transfer data in a convenient and secure manner. For more details, refer to **Appendix K**.

## X-ANALYSIS PREFERENCES

The X-Analysis **Preferences** provides the facility to modify product preferences.

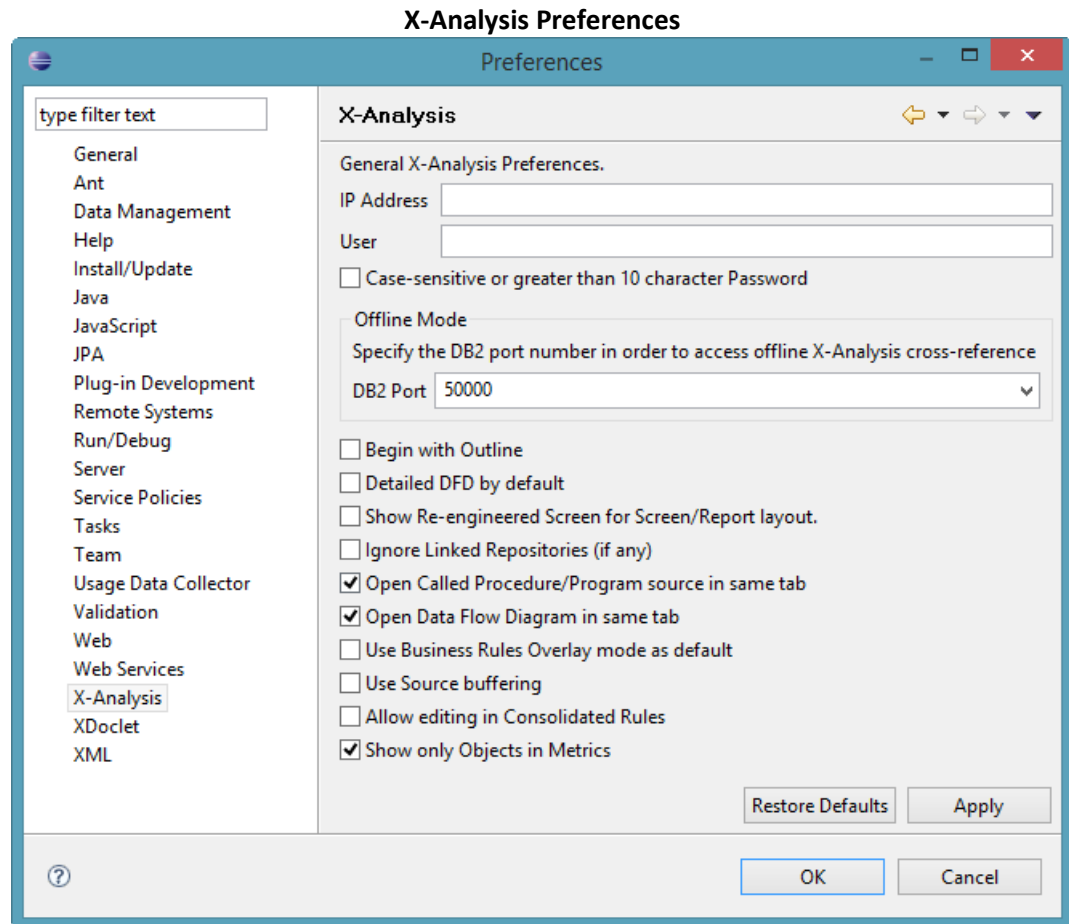
The X-Analysis Plugin comes with default preferences settings. You can change default preferences settings as required. To change preferences settings, open **IBM's Rational product 7.5** and above or **Eclipse 3.4** and above.

From the menu bar, select **Window > Preferences** to invoke the **Preferences** dialog.



To view / modify various X-Analysis Preferences, select the **X-Analysis** node.

When you select the **X-Analysis** node, the following window is displayed:



Here is a detailed look at the X-Analysis Preferences for the X-Analysis Plugin:

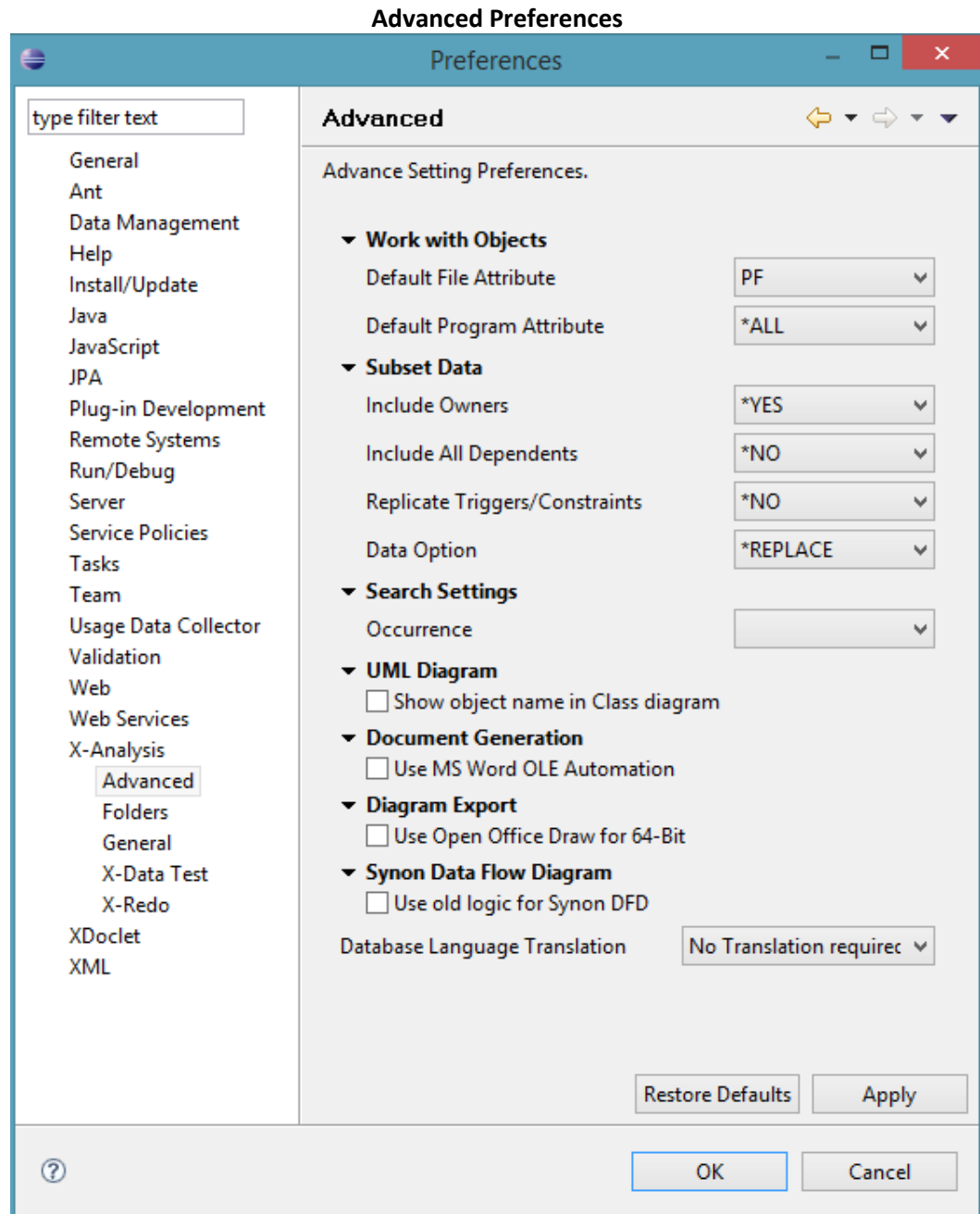
- **IP Address:** Specify the IP address of the IBM i on which the X-Analysis server components are installed.
- **User:** Specify the username to sign on to X-Analysis.
- **Case-sensitive Password:** If the IBM i server is configured for case-sensitive passwords, i.e. QPWDLVL is 2 or 3, and then check this option. For QPWDLVL on the IBM i as 0 or 1, leave it unchecked. The default option is checked.
- **DB2 Port:** Specify the port number for the DB2 instance, where DB2 services must be running. DB2 Port will be enabled on offline IP address i.e. 127.0.0.1 or localhost. The default DB2 port is 50000.
- **User Interface:** Specify language for the X-Analysis user interface. The default language is English.
- **Begin with Outline:** Specify appropriate settings for the Outline Pane (View Pane). The default option is unchecked, which means that the Outline Pane will not be

displayed automatically. The outline or any other view will be displayed only when asked for.

- **Detailed DFD by default:** Check this option to invoke detailed data flow diagram as default.
- **Show Re-engineered Screen for Screen/Report layout:** Check this option to view the re-engineered screen for Screen/Report layout. When not selected, the Screen/Report layout shows the green screen display. This is the default setting.
- **Ignore Linked Repositories (if any):** Check this feature to ignore linked repositories. The default option is unchecked.
- **Open Called Procedure/Program source in same tab:** Uncheck this option for not opening Called Procedure or program source in the same tab. The default option is checked.
- **Open Data Flow Diagram in same tab:** The default option is checked. Uncheck this box to force any DFD selected from within another Data Flow Diagram to open in a new editor. Currently such DFDs are drawn on the same editor.
- **Use Business Rules Overlay mode as default:** Check this option to set the Business Rules Overlay mode as default.
- **Use Source buffering:** Check this option to enable source buffering.
- **Allow editing in Consolidated Rules:** Check this option to make changes in the Consolidated Rules.
- **Show only Objects in Metrics window:** While listing metrics, when the relevant box is selected, then the metrics is shown for all items which actually have an object in the user's library(ies). When the box is left unselected, it also includes the source members which do not have any objects associated with it.

## ADVANCED PREFERENCES

Expand the **X-Analysis** node to view/modify the **Advanced Preferences**.



You can modify the following Advanced Preferences for the X-Analysis Client:

■ **Work with Objects:**

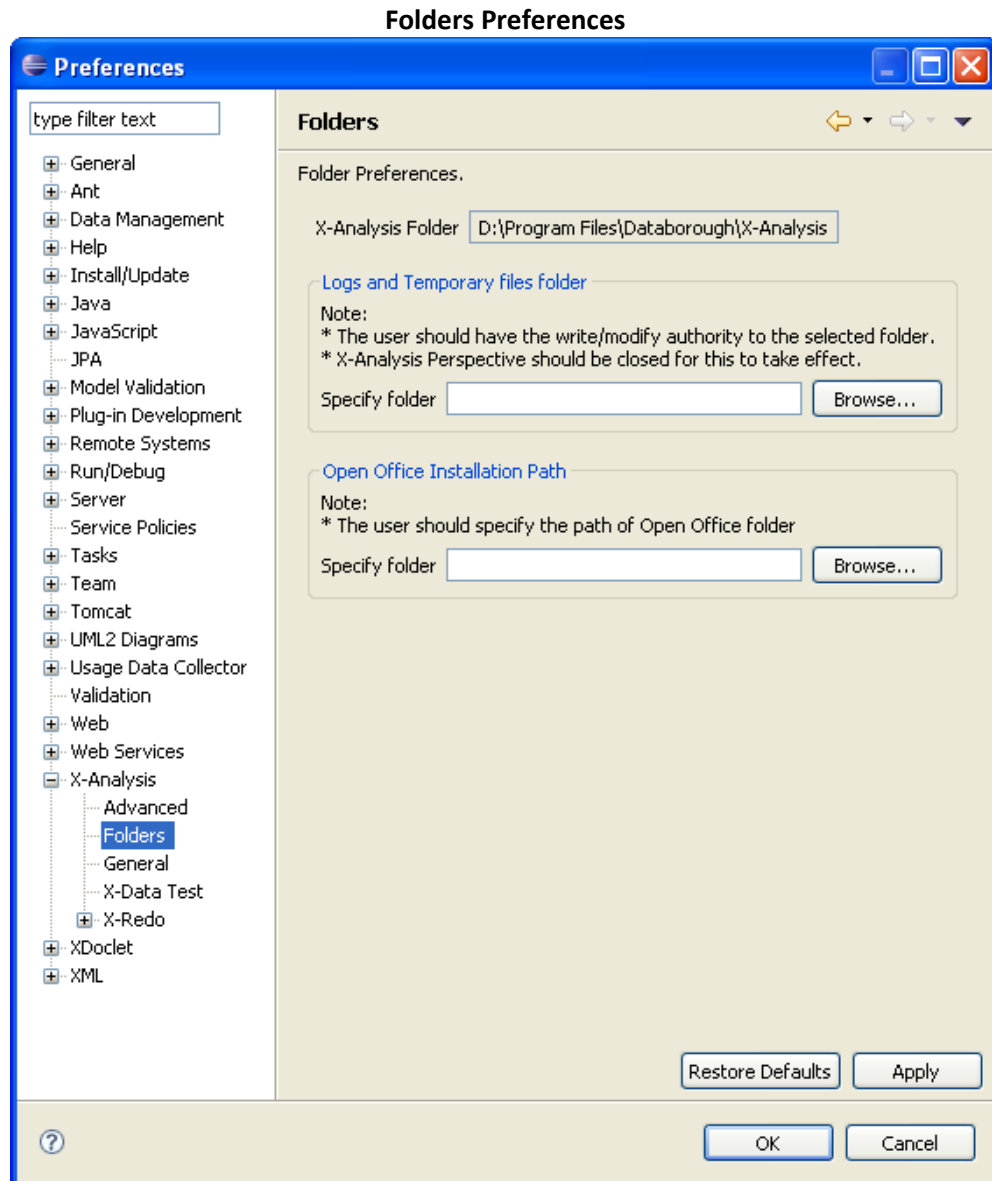
- **Default File Attribute:** Specify attribute for Object List of **\*Files**. The default value is 'PF'.
- **Default Program Attribute:** Specify attribute for Object List of **\*PGM**. The default value is '\*ALL'.

- **Subset Data:**
  - **Include Owners:** The default value is **\*YES**.
  - **Include All Dependents:** The default value is **\*NO**.
  - **Replicate Triggers/Constraints:** The default value is **\*NO**.
  - **Data Option:** The default value is **\*REPLACE**.
  
- **Search Settings:**
  - **Occurrence:** Select the appropriate search setting from the drop-down box. You will view the streamlined content based on this selection. If no selection is made, then the default search setting will apply.
  
- **UML Diagram:** Check the **Show object name in Class diagram** box to see the object name in the Class Diagram.
  
- **Document Generation:** The **Use MS Word OLE Automation** box is unchecked by default. Checking the box activates OLE Automation allowing greater flexibility in handling data during the document generation process.
  
- **Diagram Export:** The **Use Open Office Draw for 64-Bit** box is unchecked by default. Check the box to use Open Office Draw for exporting diagrams more efficiently in 64-bit machines. If the box is left unchecked, the diagrams will be exported in the default format.
  
- **Synon Data Flow Diagram:** When the **Use old logic for Synon DFD** box is checked, then the Synon DFD uses the older logic of reading the references from **X2EPGRF**. When the box is not checked, the new logic is used. In the latter case, you must have the latest server.
  
- **Database Language Translation:** This allows French users to select 'Database Translation Language', which enables correct display of French characters in the X-Analysis Client software.



## FOLDERS PREFERENCES

Expand the **X-Analysis** node to view/modify the **Folders Preferences**.



### ■ Folder Preferences:

- **X-Analysis Folder:** Specify path for the X-Analysis folder.

### ■ Logs and Temporary files folder:

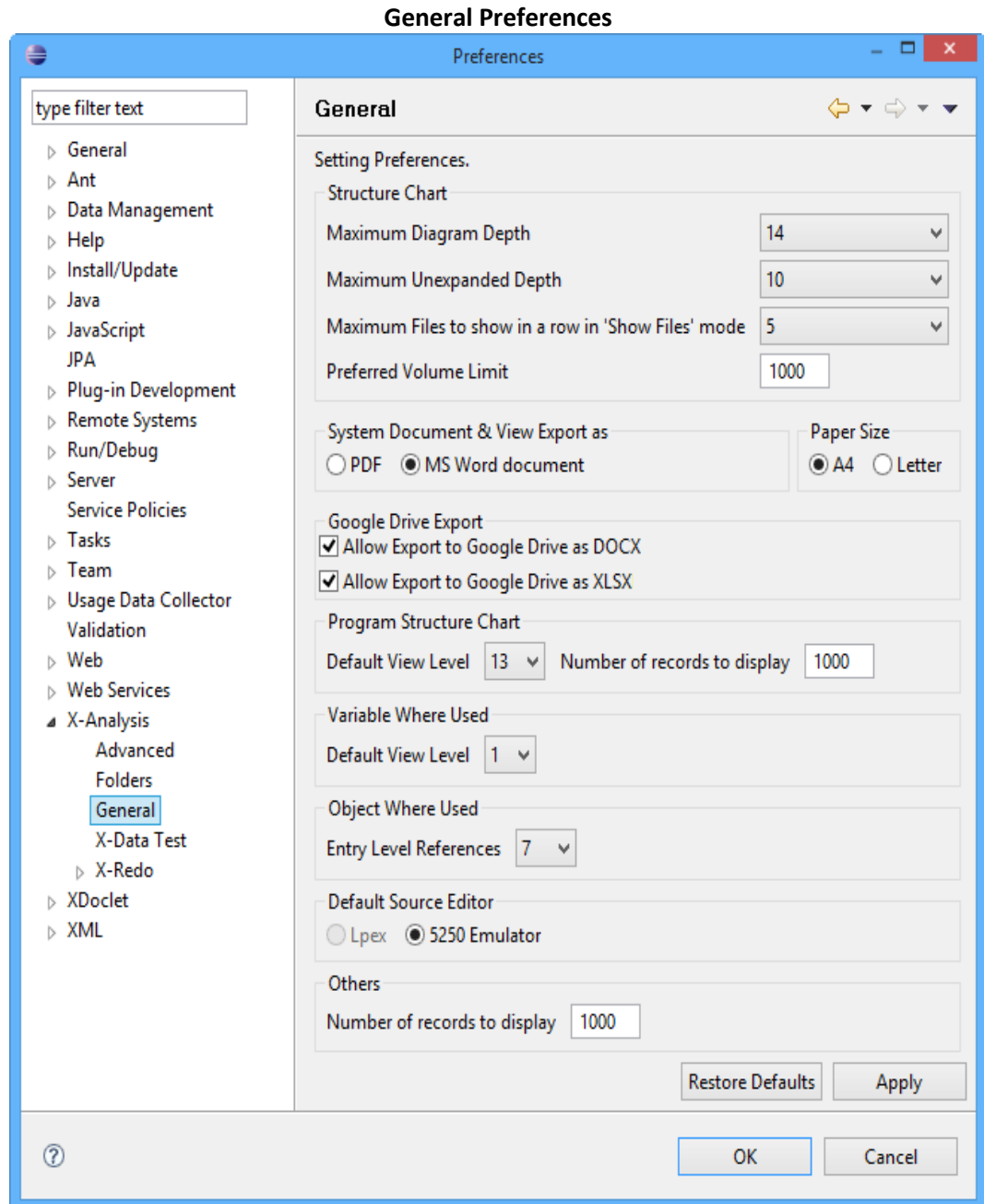
- **Specify Folder:** Specify location to change the default location for the X-Analysis logs and temporary files. If this is left blank, then default location is set.

■ **Open Office Installation Path:**

- **Specify Folder:** Specify location to change the default Open Office Installation path. If this is left blank, then default location is set.

**GENERAL PREFERENCES**

Expand the **X-Analysis** node to view/modify the **General Preferences**.



### ■ Structure Chart

- **Maximum Diagram Depth:** The Interactive Structure Chart can be displayed up to 14 levels. Select appropriate level for the interactive Structure Chart. The default level is 14.
- **Maximum Unexpanded Depth:** This sets the maximum depth up to which the SCD will be displayed as expanded. The data for further levels will be fetched, but shown as collapsed initially. The default level is 10.
- **Maximum Files to show in a row in 'Show Files' mode:** The Interactive Structure Chart can display up to 10 files in a row. Select appropriate value for files to be displayed. Value ranges from 1-10. The default value is 5.
- **Preferred Volume Limit:** The Interactive Structure Chart gets displayed according to the volume limit set / provided in this field. The default limit is 1000.

### ■ System Document & View Export as

- **PDF:** The **PDF** option is checked by default. It implies that System Document will be generated as PDF document. Also, all list/view/diagram exports will be as PDF.
- **MS Word Document:** Select this option to generate System Documents in MS Word format. Also then all the subsequent exports will be in MS Word document.

### ■ Paper Size

- **A4:** The **A4** option is checked by default. It implies that the print paper size will be A4.
- **Letter:** Choose **Letter** as paper size for printing.

### ■ Google Drive Export

- **Allow Export to Google Drive as DOCX:** Check this option to allow Google Drive export in the DOCX format.
- **Allow Export to Google Drive as XLSX:** Check this option to allow Google Drive export in the XLSX format.

### ■ Program Structure Chart

- **Default View Level:** Program Structure Chart can be displayed up to 20 levels. Select appropriate level. The default level is 13.

### ■ Variable Where Used

- **Default View Level:** Variable Where Used can be displayed up to 6 levels. Select appropriate level. The default level is 1.

■ **Object Where Used**

- **Entry Level References:** The Entry Level References need to gather information about calling program and then, in turn, calling program of calling program. This setting specifies the number of maximum recursions made while querying for the calling program. The default level is 7.

■ **Default Source Editor**

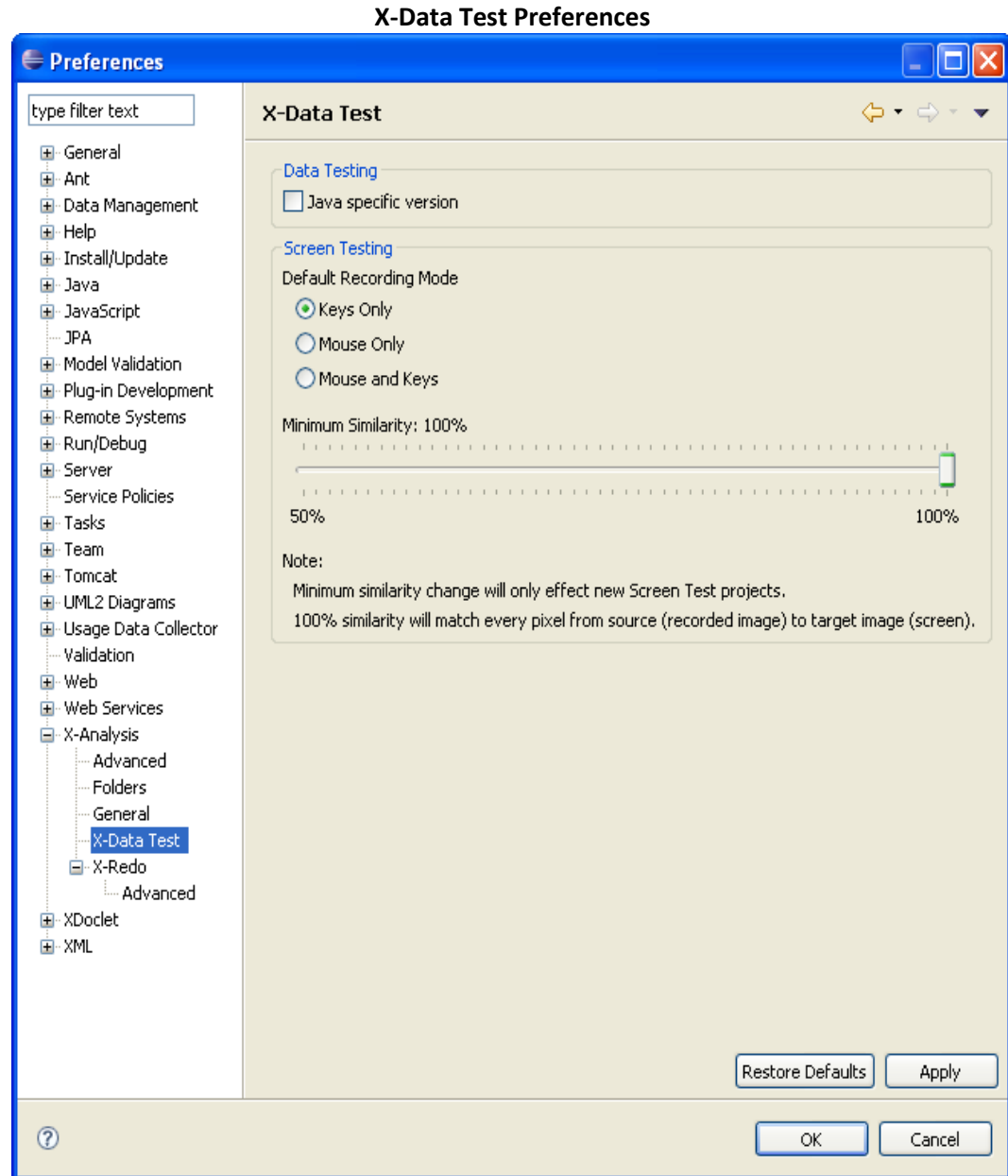
- **LPEX:** LPEX editor is checked by default for IBM Rational products having RSE plugin. It implies that the source member will be displayed in LPEX editor for editing purpose.
- **5250 Emulator:** 5250 Emulator is the default option for non-RSE plugin. It implies that the source member will be displayed in a 5250 session for editing purpose.

■ **Others**

- **No. of records to display:** Displays the total number of records to be displayed in any \*FILE object when the **View Data** option is executed.

## X-DATA TEST PREFERENCES

Expand the **X-Data Test** node to view/modify the **X-Data Test Preferences**.



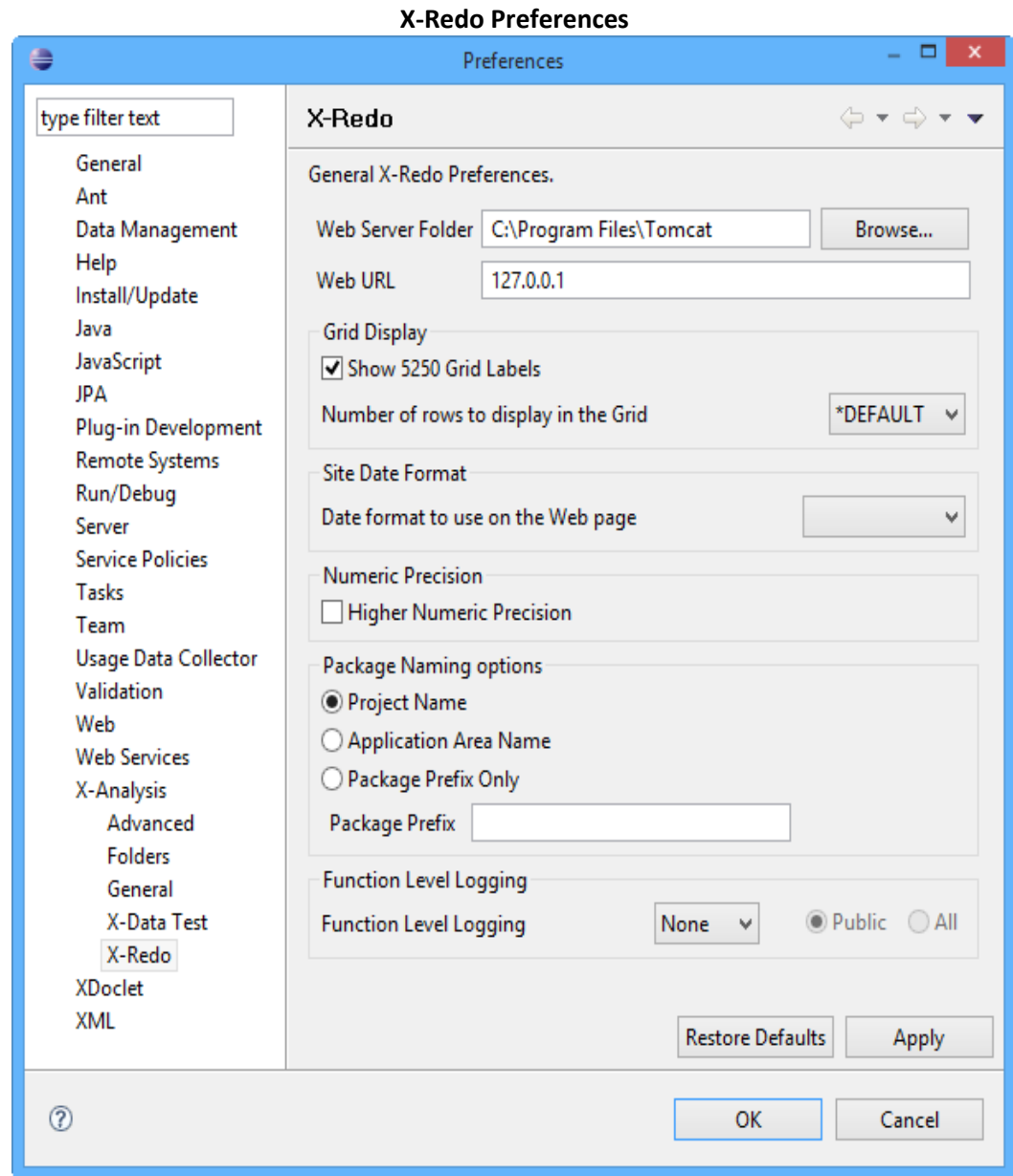
You can modify the following **X-Data Test Preferences**:

■ **Screen Testing**

- **Default Recording Mode (Radio button):** Select one of the following methods:
  - **Keys Only:** Only entries by computer’s keyboard are recorded.
  - **Mouse Only:** Only entries through computer’s mouse are recorded.
  - **Mouse and Keys:** Both keyboard and mouse entries are recorded. This is the default option.

## X-REDO PREFERENCES

Expand the **X-Analysis** node to view/modify the **X-Redo Preferences**.



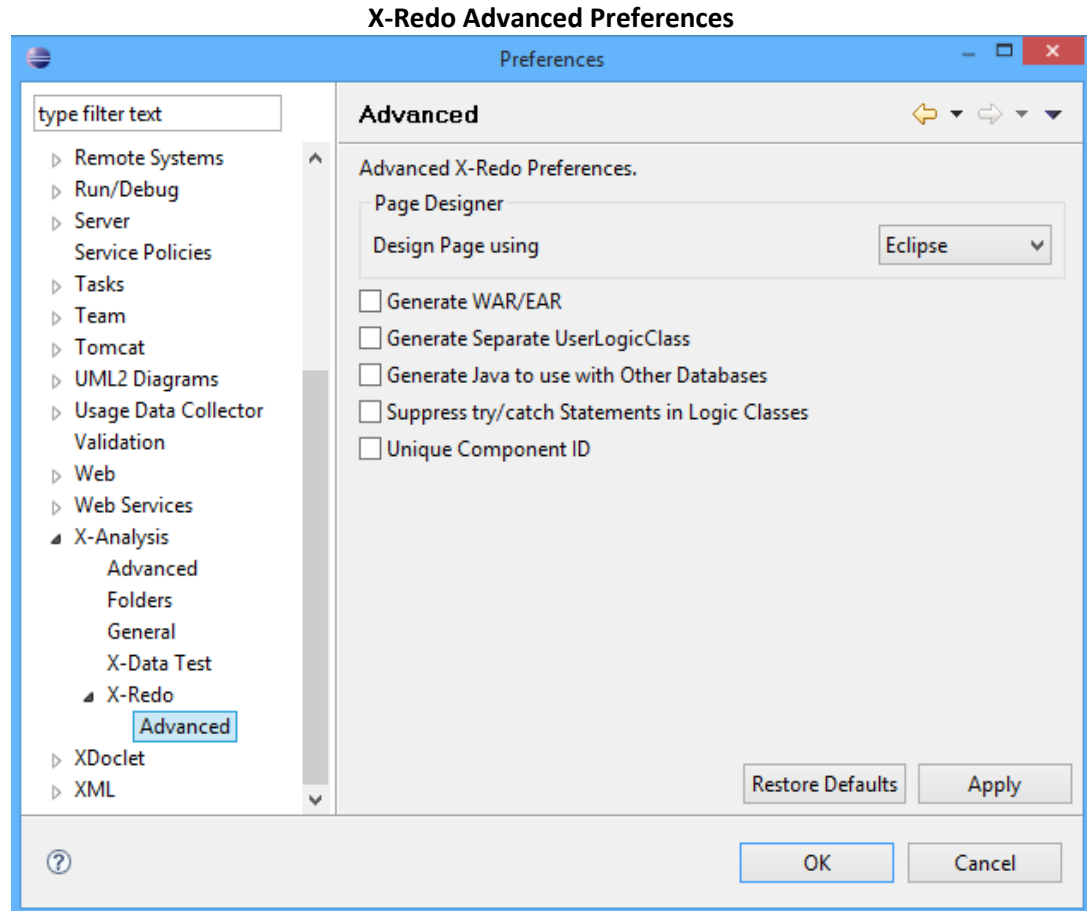
You can modify the following X-Redo Preferences:

- **Web Server Folder:** Specify the path for the Web Server folder. You may specify the Tomcat folder other than the one installed by X-Redo installer.
- **Web URL:** Specify the X-Redo URL for its execution. The default value is **127.0.0.1**. You may change the Tomcat port to use.

- **Grid Display:** These configure the grid presentation.
  - **Show 5250 Grid Labels (Checkbox):** The default value is checked.
  - **No. of rows to display in the Grid (Drop-down):** This is used to set the default number of rows to display in a grid. The default value is **\*DEFAULT**. You can override the default rows to show by setting the number of rows to show on each grid.
  
- **Site Date Format:** This is used to set the default date format settings for the generated web pages. You may select the required date format to use on the generated web pages to show and receive the dates.
  
- **Numeric Precision:**
  - **Higher Numeric Precision:** Selecting this option would use the BigDecimal data type instead of Double data type.
  
- **Package Naming options (Radio button):**
  - **Project Name:** Name of the project as specified on the **Generate Programs** dialog (by default). This is used as the first part on the package names created in the project.
  - **Application Area Name:** If selected, the application area name is used as the first part on the package names created in the project.
  - **Package Prefix Only:** Selecting this option would only use the value in 'Package Prefix' as the prefix for the package name without appending Project/Application Area Name.
  
- **Function Level Logging:** This controls the logging statements to include on the generated code. By default **'None'** is set i.e. no logging. **'Trace'** includes the Entry and Exit statements into the **'Public'** functions (by default). Selecting **'Debug'** includes the statements to log values of the entry parameters when entering a **'Public'** function and their values when exiting the function. These are in addition to the Entry and Exit statements generated by the **'Trace'** option. For **'Trace'/'Debug'** mode, you may select **'All'** to log all the functions the control enters and exits at the runtime.

## X-REDO ADVANCED PREFERENCES

Expand the **X-Redo** node to view/modify the **X-Redo Advanced Preferences**.



You can modify the following **X-Redo Advanced Preferences**:

- **Page Designer:** Option to design page using either **Eclipse** or **Dreamweaver**. By default, Eclipse is chosen.
- **Generate WAR/EAR:** When checked, this includes a right-click option **Generate WAR/EAR** on the X-Ref and application area.
- **Generate Separate UserLogicClass:** Check this option to generate separate UserLogicClass.
- **Generate Java to use with Other Databases:** Check this option to generate Java to use with the other databases.
- **Suppress try/catch Statements in Logic Classes:** Check this option to suppress try/catch statements in Logic Classes.
- **Unique Component ID:** Check this box to prefix the JSF Component IDs with the program names so that they are distinguishable when XHTML files are merged.

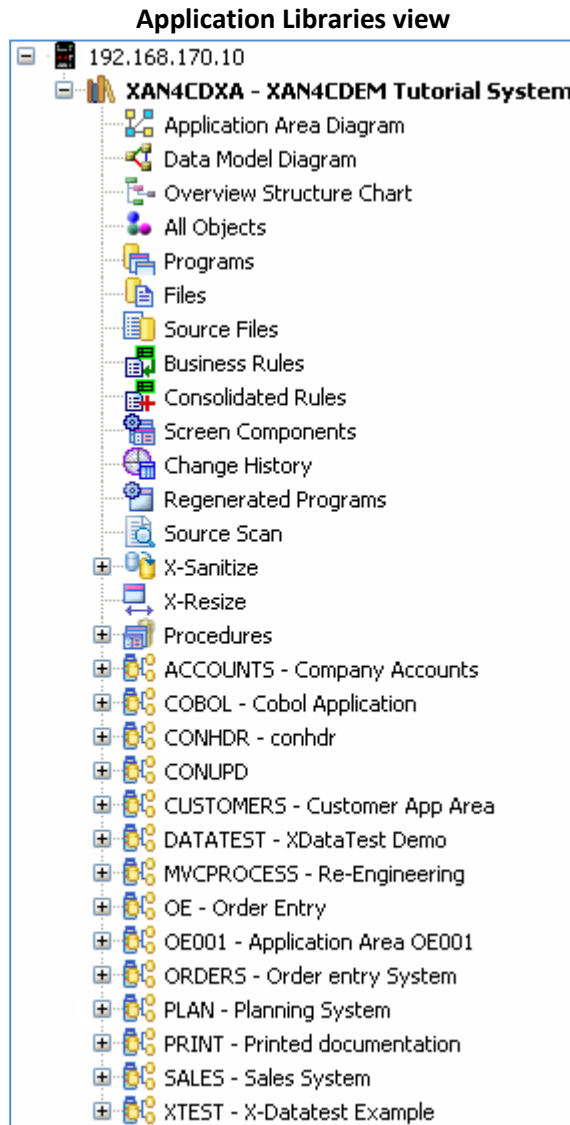
***Preference changes will take effect for the new X-Analysis Instance.***



# Application Library

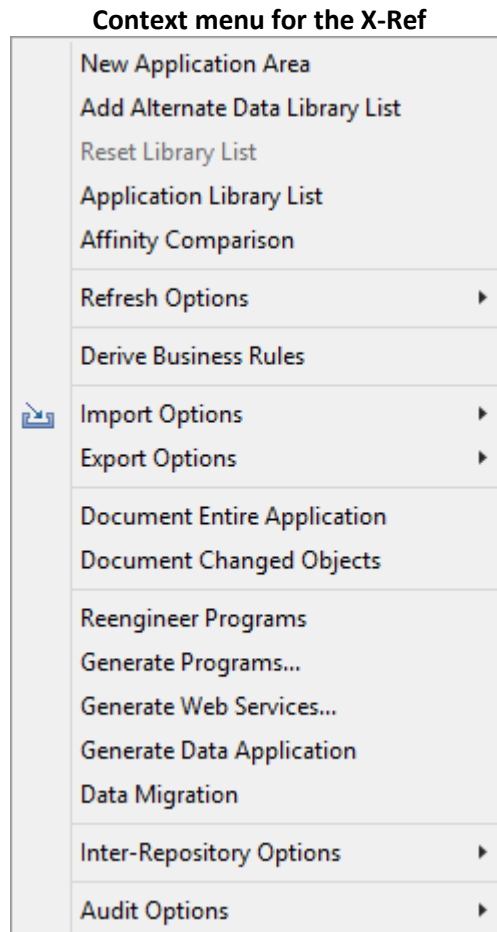
## WORK WITH APPLICATION LIBRARIES

The Application Libraries view is the first X-Analysis view. It lists all the applications added using the **X4WRKAPP** command.



## APPLICATION LIBRARY MENU OPTIONS

Select the cross-reference library and opt for the context menu which displays the following pop-up menu:



### NEW APPLICATION AREA

X-Analysis creates an application area from part of one or multiple systems. It is possible to programmatically subdivide an application into logical modules or areas. For more details, refer to the **Application Area** section.

### ADD ALTERNATE DATA LIBRARY LIST

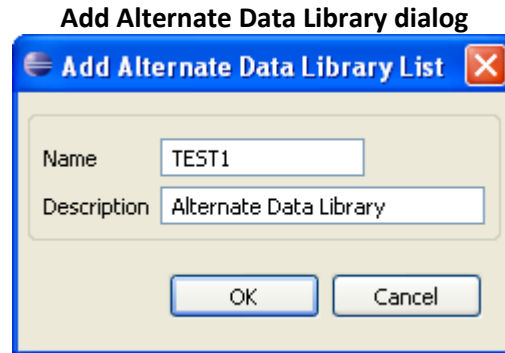
The library list changes accordingly when you select a cross-reference library. This library list contains cross-reference library, data library, QGPL, QTEMP, and XAOBJ.

When you select the **View Data** option on a PF or LF, then data is displayed from the data library mentioned in the library list. X-Analysis provides a feature called **Alternate Data**

**Library List** if you want to use a data library other than the ones mentioned in the library list.

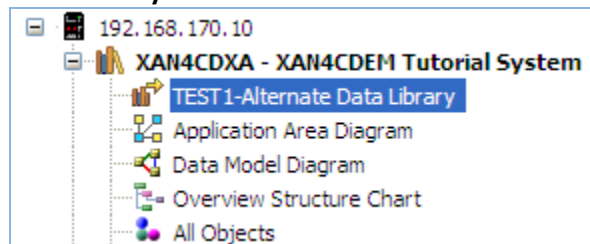
The **Add Alternate Data Library List** option is available on the right-click menu of a cross-reference library. It provides a method of inserting a library or a group of libraries into the data portion of the library list. This gives a name to a group of libraries that can be maintained by the **Work with Alternate Data Library List** option discussed below.

On selecting the **Add Alternate Data Library List** option, the following dialog appears:



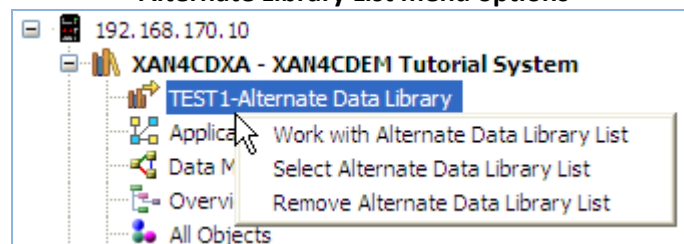
Provide a name and description for the alternate library group in the above dialog box. Click **OK** to add the alternate data library group name under the cross-reference library node shown below:

**Alternate Library List added to the cross-reference library**



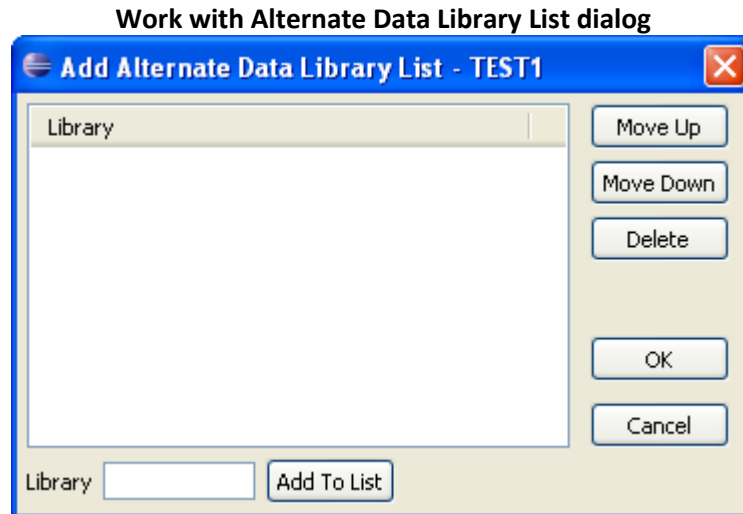
Expand the cross-reference node and select the **Alternate Data Library** node. Then, opt for the context menu as displayed below:

**Alternate Library List menu options**



## Add Data Library (ies) to the Alternate Data Library List

To add data library (ies), select the **Work with Alternate Data Library List** option from the right-click menu of the **Alternate Data Library List**. The **Work with Alternate Data Library List** invokes the following dialog:



Fill in the name of the data library as desired and click **Add To List**. This will add the data library in the **Library** section of the dialog. You can add more data libraries in the similar manner.

The **Work with Alternate Data Library List** dialog provides the following options for the libraries added:

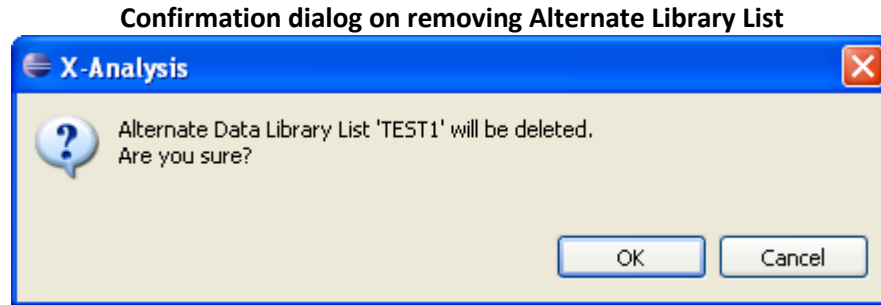
- **Move Up** moves the specific library name to a higher position in the list.
- **Move Down** moves the specific library name to a lower position in the list.
- **Delete** removes the library name from the list.
- **OK** proceeds to the further process and closes the dialog box.
- **Cancel** closes the dialog box.

## Select the Alternate Data Library List

The **Select Alternate Data Library List** option is used to select the Alternate Data Library. On selecting the option, the Library List is modified by replacing the Data Library from the user part of the Library List with Alternate Data Library/(ies) in the user part of Library List.

## Remove Alternate Data Library List

Select the **Remove Alternate Data Library List** option to remove the Alternate Data Library from the cross-reference library. It will invoke the following confirmation dialog:



Click **OK** to remove the Alternate Data Library. Click **Cancel** to cancel the option.

### Reset Library List

When a cross-reference library is selected, the Library List changes accordingly. This Library List contains cross-reference library, data library, QGPL, QTEMP, and XAOBJ.

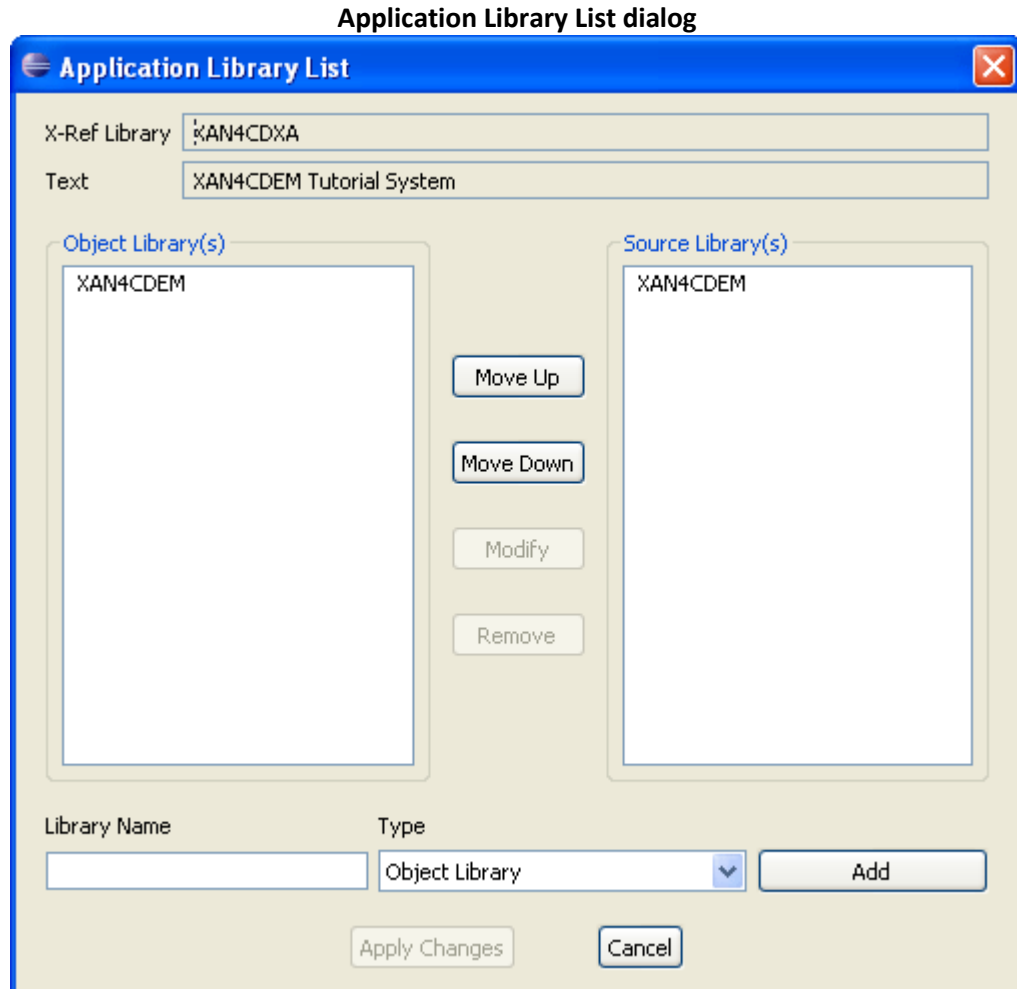
You can change this set of Library List by using the **Add Alternate Data Library List** option. After the Alternate Data Library is set up, select the **Select Alternate Data Library List** option to modify the Library List of the cross-reference. If you want to use the previous Library List (original Library List at the time of cross-reference selection), select the **Reset Library List** option.

The **Reset Library List** option is available on the right-click menu of a cross-reference library. On selecting Reset Library List, the Library List is modified by removing the Alternate Data Library(ies) from the user part of the Library List and restoring the original Data Library(ies) to the user part of the Library List.

***The Reset Library List option gets enabled only when the Select Alternate Data Library List option is selected from the right-click menu of the Alternate Data Library List.***

### Application Library List

The Application Library List is used to view/update the list of object and source libraries for the selected cross-reference. This feature allows you to add or remove any library or even change the sequence number. However, you need to re-initialize to see the effect after changing the application library list. To view/change the application libraries, opt for the context menu on the application library and select the **Application Library List** option. The following dialog is displayed:



The **Application Library List** dialog displays the list of libraries for the selected cross-reference library. You can add new libraries to the existing cross-reference library list. Provide a valid library name in the **Library Name** text box and choose the appropriate **Type** for the added library from the drop-down (it could be an object, a source, or a model library). Then click **Add** to add the library to the existing library list. Re-initialize the cross-reference library to see the change.

### Affinity Comparison

The **Affinity Comparison** option is allowed on the X-Ref library as well as an application area.

The **Affinity Comparison** option at the X-Ref library displays all the objects belonging to one or more application areas along with the affinity comparison of those objects.

In the following window, the rows display the objects which exist on one or more application area, whereas the columns display the names of all the application areas belonging to the X-Ref library.

**Affinity Comparison window for XAN4CDXA**

Programs	ACCOUNTS	ACHEAD01	BCHEAD01	COBOL	CONHDR	CONUPD	CUSFMAINT	CUSTOMERS
CB906R	10	0	0	0	0	0	0	0
CNTCMAINT	10	0	0	0	0	0	10	10
RTNMSGTEXT	10	0	0	0	10	0	10	10
X@GSCD	10	0	0	0	10	0	10	0
CONUPD0	0	0	0	0	0	0	0	0
CONUPD1	0	0	0	0	0	0	0	0
CONUPD2	0	0	0	0	0	0	0	0
CON001	0	0	0	0	0	0	0	0
CUSCPY	0	0	0	0	0	0	0	0
CUSFMAINT	10	0	0	0	48	0	48	20
CUSFMOLD	10	0	0	0	20	0	20	20
CUSFSEL	0	0	0	0	20	0	20	20
CUSGRSEL	0	0	0	0	20	0	20	20
CUSLETSQ	0	0	0	0	14	0	14	0

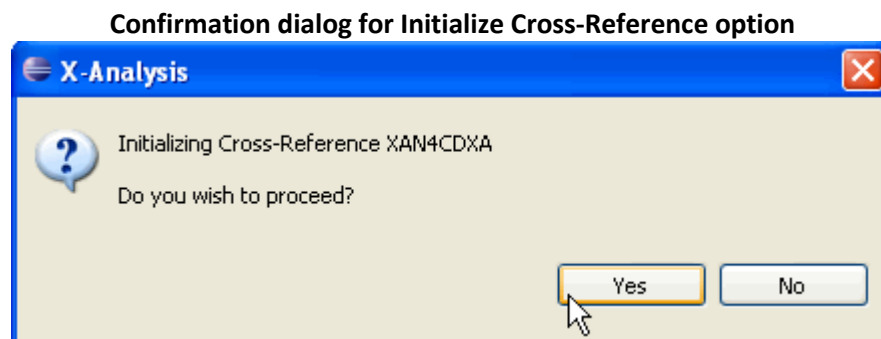
## REFRESH OPTIONS

The submenu has the following options:

- Initialize Cross-Reference
- Refresh Cross-Reference
- Rebuild Data Model
- Repository Refresh Log

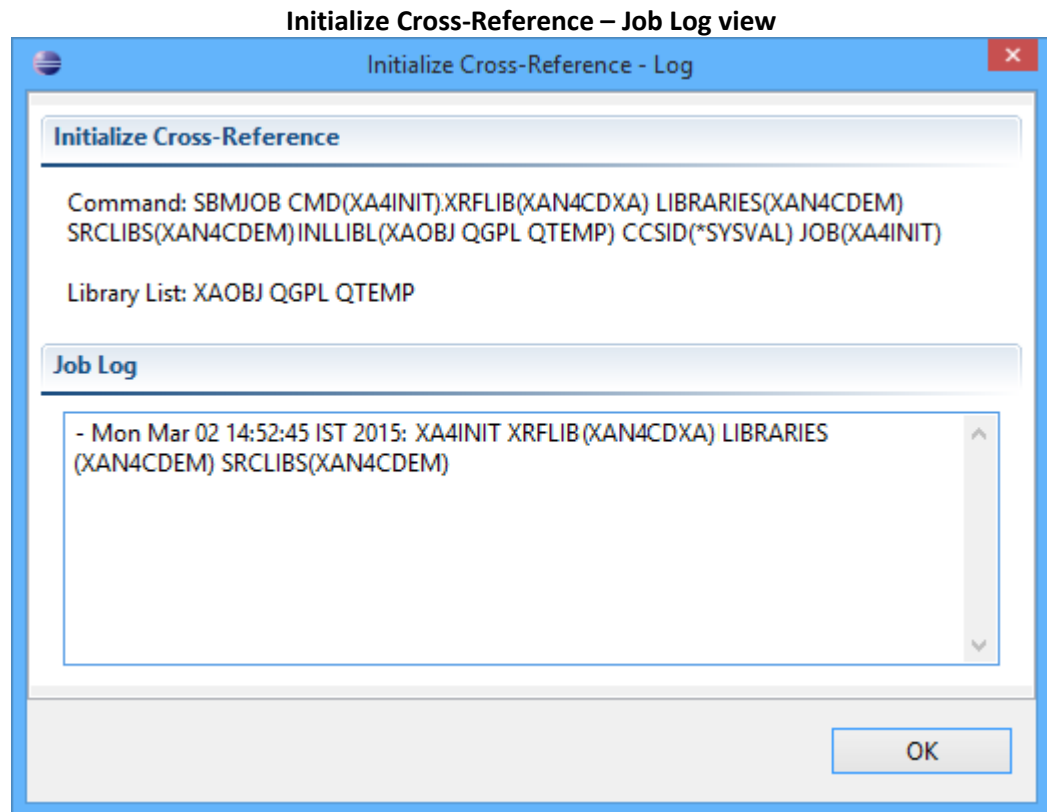
### Initialize Cross-Reference

The **Initialize Cross-Reference** option initializes the cross-reference library to reflect the changes made to the cross-reference library. Select the option from the **Refresh Options** submenu on the context menu of the cross-reference library. The following dialog is displayed on selecting this option:



Click **Yes** to submit a new batch job for initializing the cross-reference library.

The batch job processing on the server is displayed as below:



**Note:** *The Initialize Cross-Reference option gets enabled only for the new cross-reference application.*

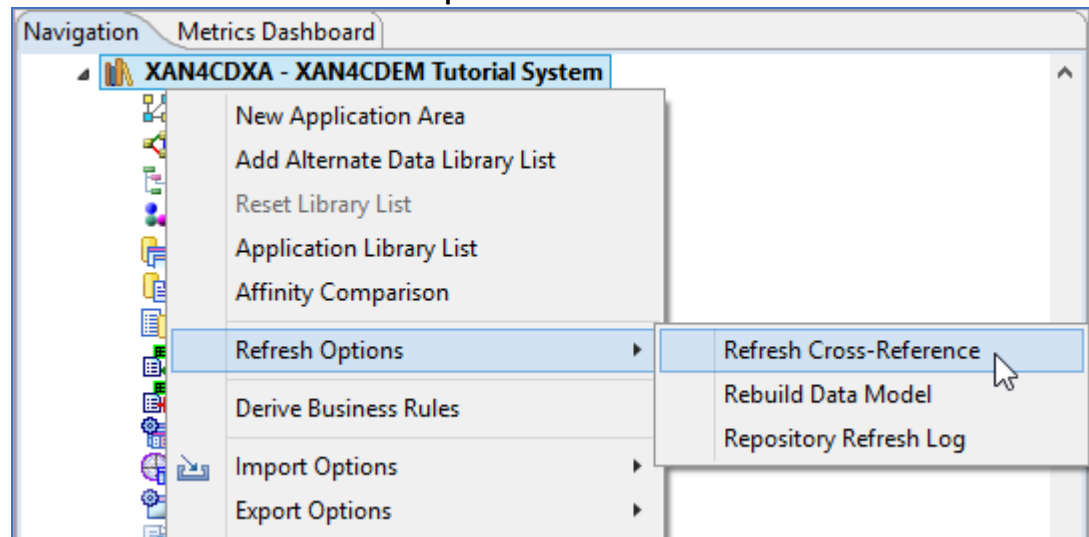
### Refresh Cross-Reference

The **Refresh Cross-Reference** option refreshes the cross-reference library to reflect any changes that have been made to the cross-reference library. This option only refreshes the sources and objects that have already been initialized; it will not look at the freshly-added or deleted sources and objects.

Select the **Refresh Cross-Reference** library option from the **Refresh Options** submenu on the context menu of the cross-reference library.

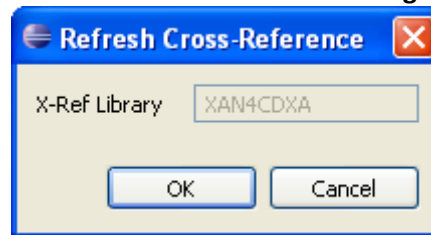


**Context menu option for Refresh Cross-Reference**



The following dialog is displayed:

**Refresh Cross-Reference dialog**



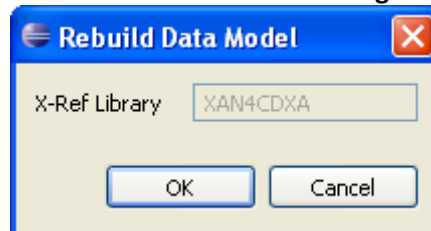
Click **OK** to execute a batch job and refresh the cross-reference for any changes.

This action locks X-Analysis Plugin. After the Refresh process is over, the lock on X-Analysis Plugin is released.

**Rebuild Data Model**

Select the **Rebuild Data Model** option to bring up the **Rebuild Data Model** dialog.

**Rebuild Data Model dialog**



Click **OK** to unselect the application and submit the modelling command in batch mode. The process locks the application.

## Repository Refresh Log

The **Repository Refresh Log** view displays list of commands executed over the selected cross-reference library. Select the option from the **Refresh Options** submenu on the context menu of the cross-reference library.

**Repository Refresh Log**

Run Date	Run Time	Program Executed	Notes	User Id
2012-12-20	12:56:52	XREGEN	*ALL programs	US
2012-12-20	12:50:25	XREGEN	*ALL programs	US
2012-12-20	12:40:36	XREGEN	*ALL programs	US
2012-12-20	12:11:54	XREGEN	Program: WWCUSTS	DVERMA
2012-12-14	07:57:03	XREFRESH	XREFRESH Processing	US
2012-12-14	07:38:02	XREFRESH	XREFRESH Processing	US
2012-12-03	17:48:04	XREFRESH	XREFRESH Processing	US
2012-11-29	12:53:39	XREGEN	Area: MVCPROCESS	US
2012-11-29	12:51:43	XGENBRULES	Area: MVCPROCESS	US
2012-11-29	11:46:19	XREGEN	Program: CUSTMNT1	TESTER
2012-11-29	11:46:00	XGENBRULES	Program: CUSTMNT1	TESTER
2012-11-29	10:53:04	XREGEN	Area: MVCPROCESS	US
2012-11-29	10:51:17	XREGEN	Area: MVCPROCESS	US
2012-11-29	10:28:16	XGENBRULES	*ALL programs	US
2012-11-29	10:24:01	XREFRESH	XREFRESH Processing	US
2012-11-29	10:12:25	XGENBRULES	Program: CUSFMINT	US
2012-11-29	10:06:48	XGENBRULES	Area: MVCPROCESS	US
2012-11-27	14:03:32	XGENBRULES	*ALL programs	US
2012-11-22	06:31:28	XDMODEL	*BOTH *PREFIX	US
2012-11-05	06:41:22	XREGEN	Program: AH0040	ANURUDHD
2012-11-05	06:41:16	XGENBRULES	Program: AH0040	ANURUDHD

The log contains information about the user who executed a command and its date and time details. Only the following commands were reported:

- Application Initialization (**XA4INIT**)
- Data Model Generation (**XDMODEL**)
- Business Rules Extraction (**XGENBRULES**)
- X-Resize Initialisation (**XRESIZE**)
- Application Refresh (**XREFRESH**)

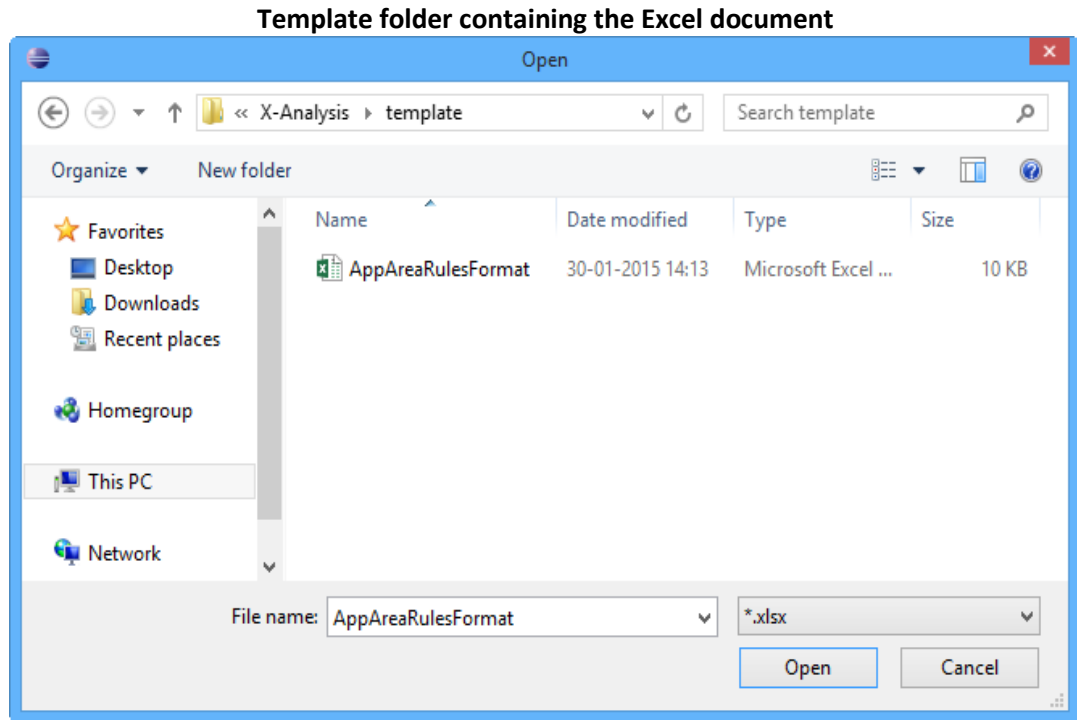
## DERIVE BUSINESS RULES

The **Derive Business Rules** option is available on the context menu over the application library, an application area, and on an individual \*PGM type object of **RPG/RPGL** or **CBL** attribute. For more details, refer to the Business Rules Analysis section.

## IMPORT OPTIONS

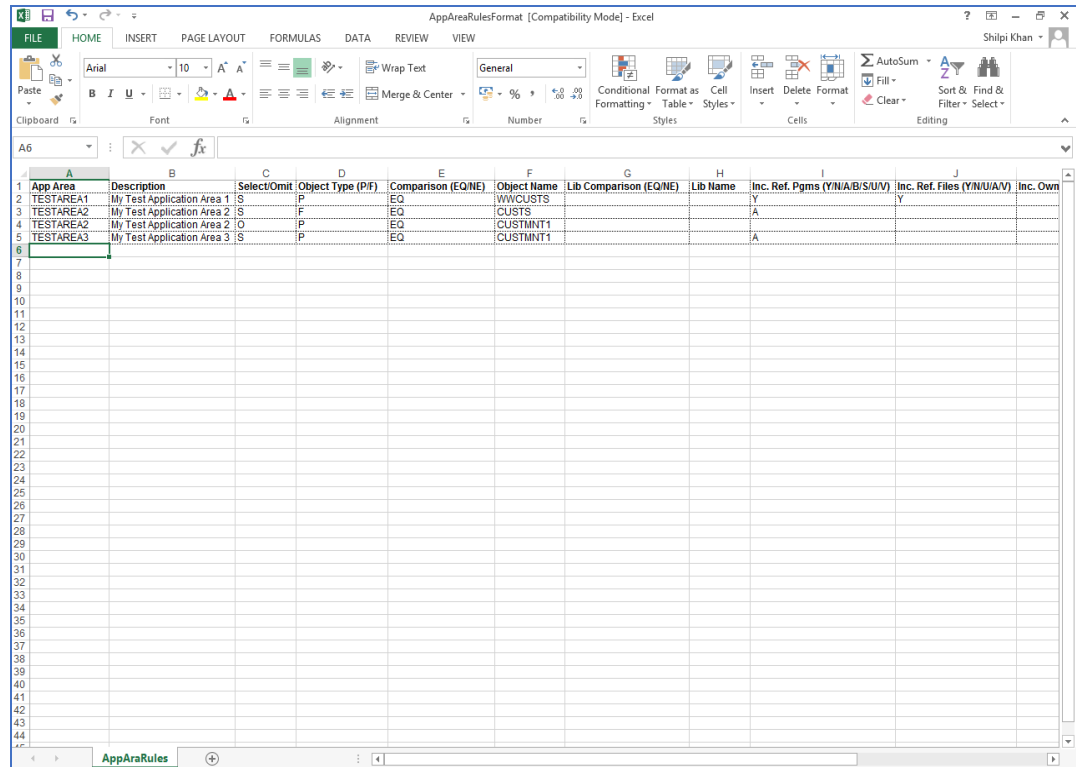
The **Import Options** submenu has the **Application Area using Excel Sheet** as the only option. Select the option to open a dialog box. Browse for the pre-defined format of the Excel document.

**Note: The pre-defined format for the Excel sheet is available in the 'template' folder on the location where X-Analysis is installed.**



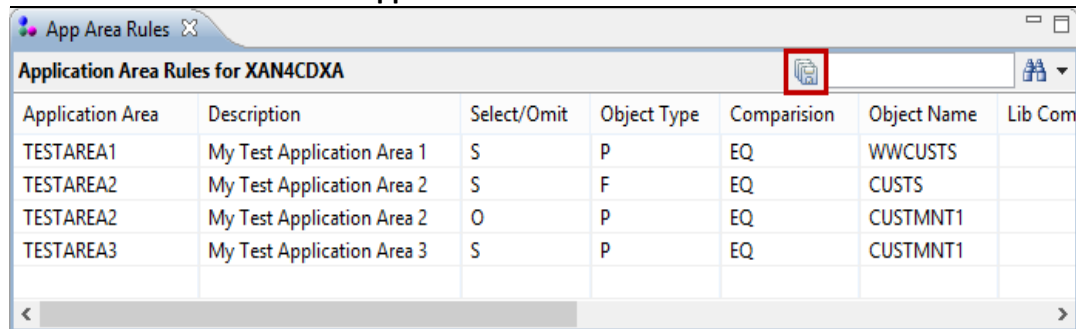
The image of the format is shown below:

### Excel sheet – Pre-defined format



The data loaded from the Excel document can be viewed in the Application Area Rules editor window on Eclipse as shown in the following image:

### App Area Rules editor window



Right-click on the required row to delete the entries; save the changes by clicking the **Save** icon marked in the above image.

## EXPORT OPTIONS

This submenu has the following options:

- Export as DDL
- Export as Web Query Metadata

- Export as Web Query Application
- Export Business Rules as XML
- Convert DDS to SQL
- Generate Database Service Programs
- Export CRUD Spreadsheet (available only for application areas)

### Export as DDL

The **Export as DDL** option exports Data Model information as Data Definition Language to the application folder. This information may be used by any database management system e.g. Oracle or SQL server to create a similar data model. For details, refer to the Export as DDL from X-Analysis section.

### Export as Web Query Metadata

The Web Query Metadata files are generated using the **XWBQMETS** command. These files can be used in IBM's DB2 Web Query Tool.

### Export as Web Query Application

The Web Query Report files are generated using the **XWBQRPT** command. These files can be used in IBM's DB2 Web Query Tool.

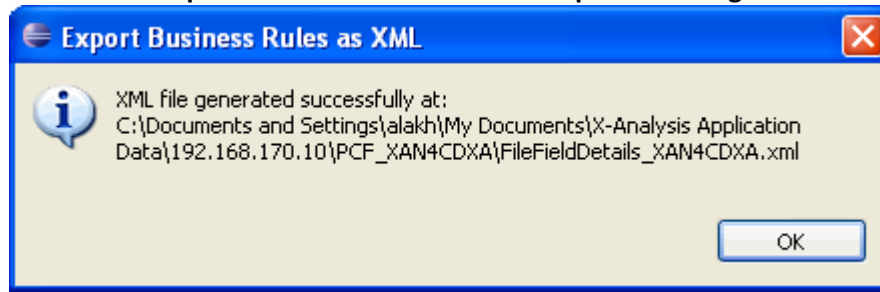
### Export Business Rules as XML

The **Export Business Rules as XML** option generates an XML file which has details of all the business rules of the selected application/application area. Select the option to display the following dialog:



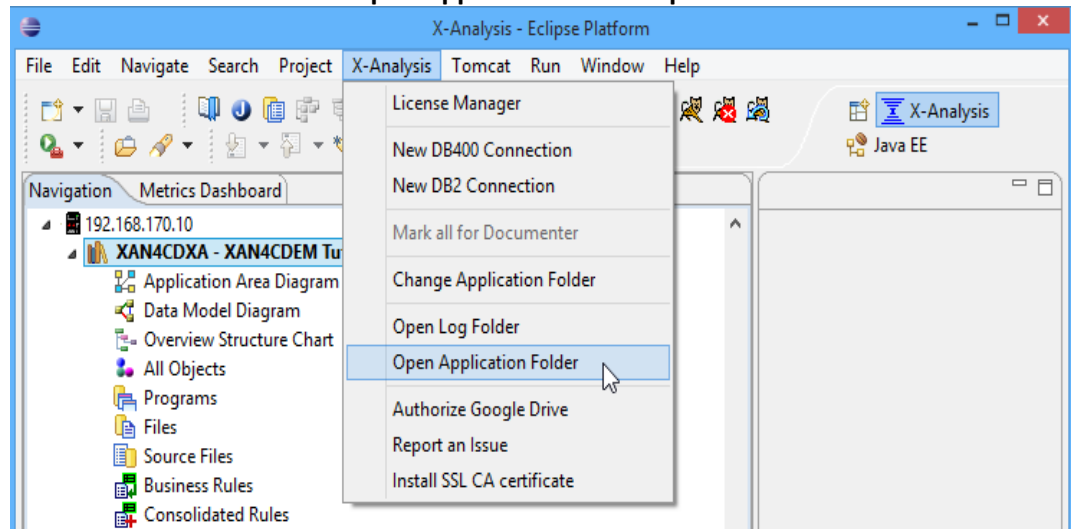
After the processing is complete, the following information dialog is displayed:

**Export Business Rules as XML completion dialog**



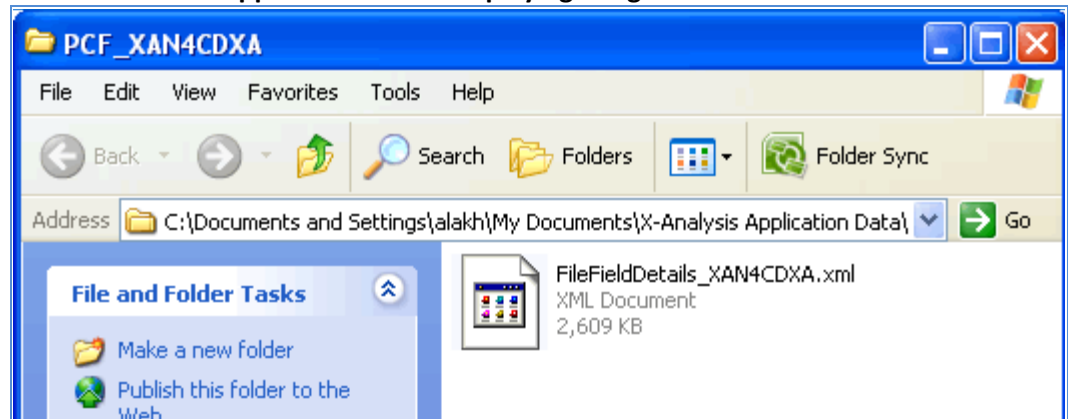
To view the generated XML file, open the application folder as displayed below:

**Open Application Folder option**

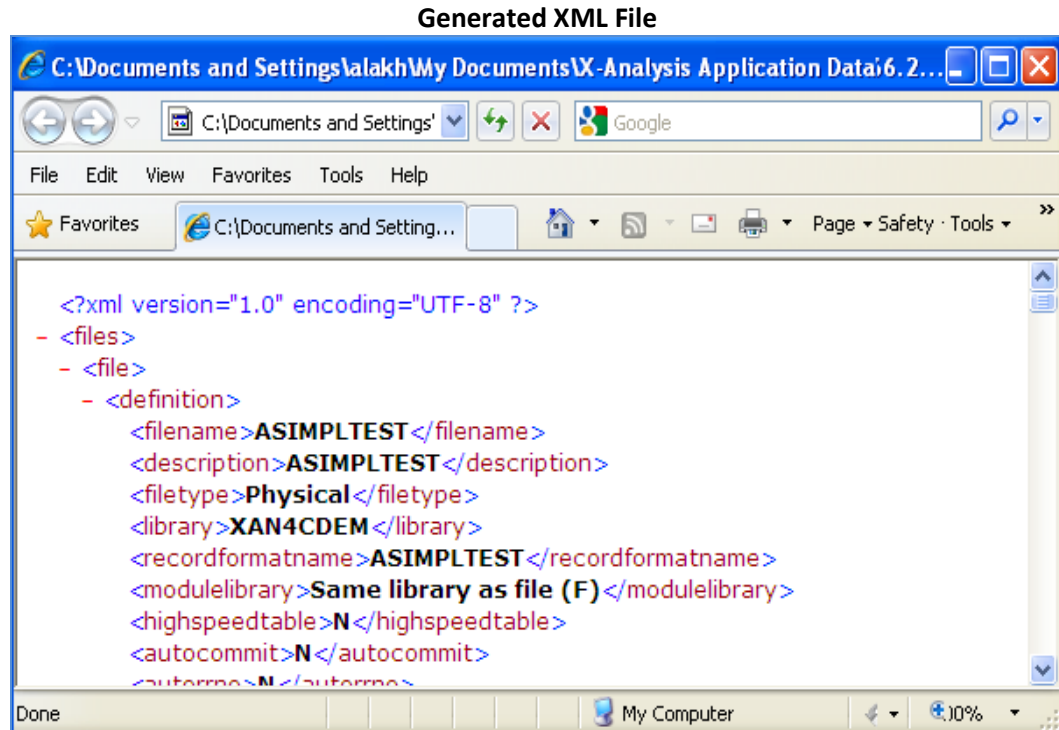


The following screen displays the Application Folder listing the generated XML file.

**Application Folder displaying the generated XML file**



Open the generated XML file in Internet Explorer or any other suitable editor.



## Convert DDS to SQL

The **Convert DDS to SQL** option calls the **XDDSTOSQL** IBM i command and submits the job in batch. For details, refer to the Convert DDS to SQL section.

## Generate Database Service Programs

The **Generate Database Service Programs** option calls the **XWRTDBSP** IBM i command and submits the job in batch. For details, refer to the Generate Database Service Programs section.

## DOCUMENT ENTIRE APPLICATION

Refer to the Document Manager section.

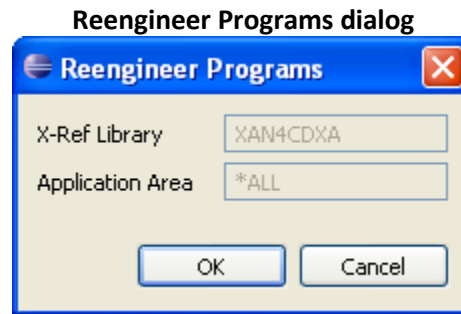
## DOCUMENT CHANGED OBJECTS

The **Document Changed Objects** option documents those objects which have changed since the last initialization was run on the cross-reference library. This option is available on the context menu of the application library. For more details, refer to the Document Manager section.

## REENGINEER PROGRAMS

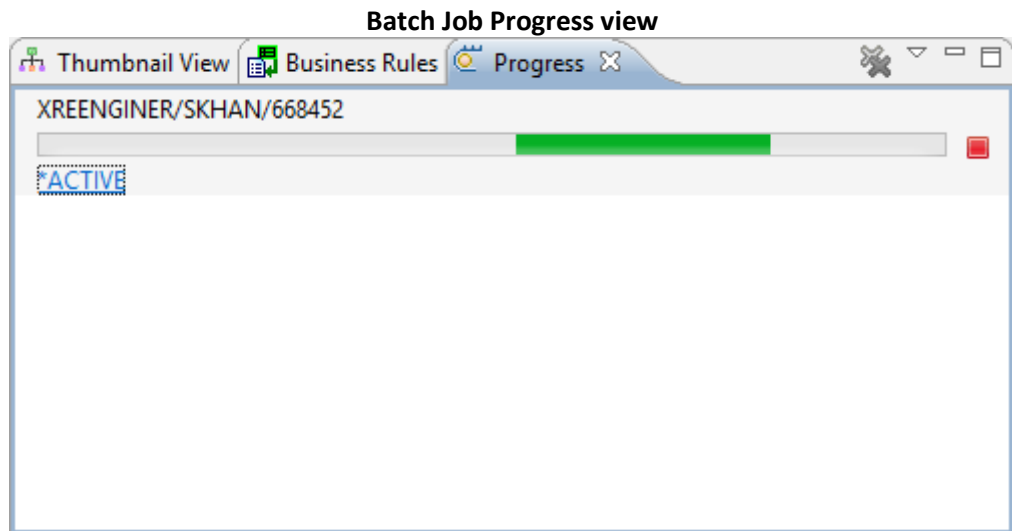
The **Reengineer Programs** option submits a batch job which performs the two tasks – Reengineering and Service Modules generation. The batch command (**XREGENS**) reengineers the client programs in such a way that the old code in RPG/RPGLE free/fixed format gets converted into free format procedure-based module. It does not change the program structure. The subroutines are converted into procedures.

The **Reengineer Programs** option is available on the context menu of application library and application areas and also available on individual **\*PGM** type objects, under the **Modernization Options** submenu. Select this option to display the following dialog:



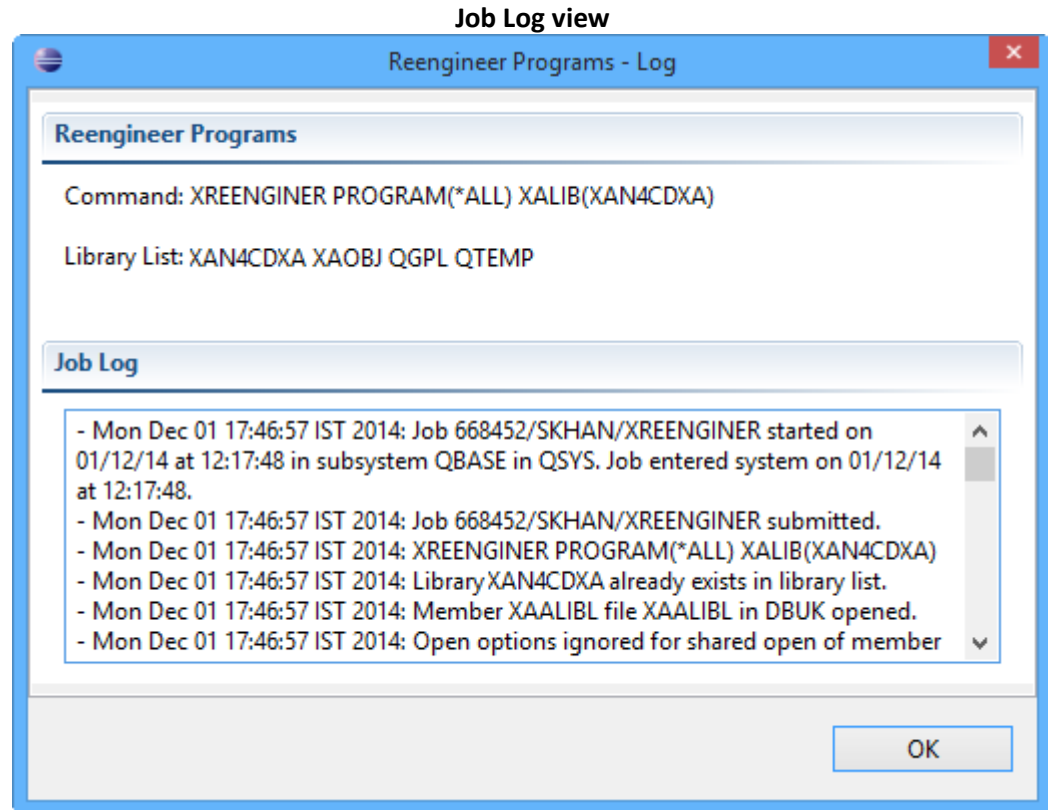
Click **OK** to submit a batch job.

The following window displays the progress of the batch job.



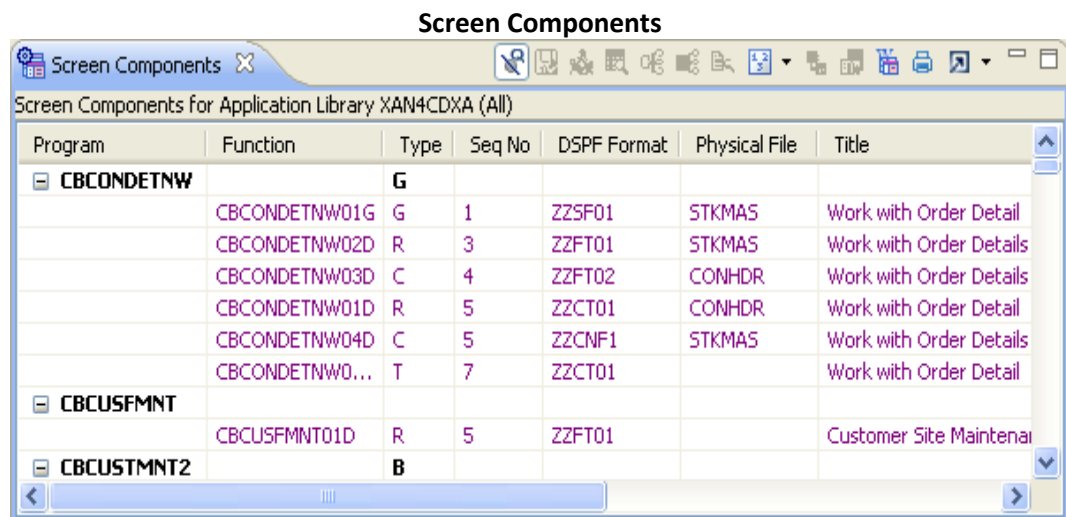
At any point, while the batch job is running, click the hyperlink (**\*ACTIVE**) to view the Job Log. The Job Log view is shown below:





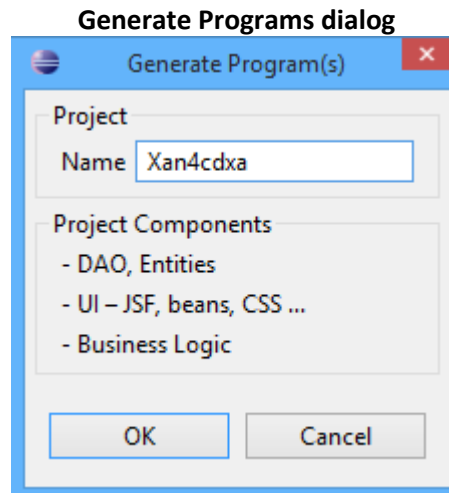
The 'Task Completed' message is displayed once the process is complete.

Now, double-click on the **Screen Components** node available under the cross-reference node in the navigation pane. It displays the Screen Components for the application. This option is also available for application areas.

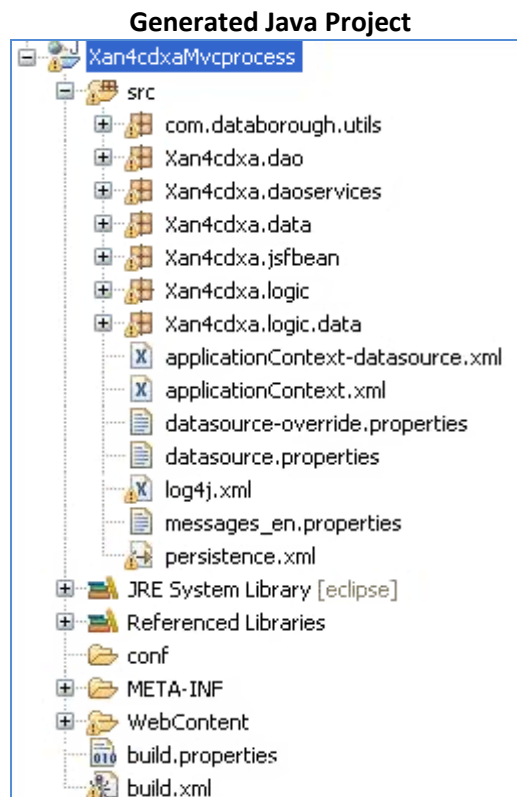


## GENERATE PROGRAMS

Select the **Generate Programs** option to generate a new Java application using the recovered screens and business logic.



The option generates a new Java application by default. The generated application follows MVC (Model-View-Controller) Architecture and uses Open frameworks viz., Spring, Hibernate, JSF 2.0 (Facelets), JQuery, etc. which drive it. The generated project has its neatly organized classes under various packages. See the screenshot below:



You can also generate the Silverlight/C# project. Here, the recovered screens are generated using Silverlight and the code behind/business logic is in C#.

## INTER-REPOSITORY OPTIONS

X-Analysis provides an option to compare database files across two cross-reference libraries. The options available are as under:

- Generate Difference Analysis
- Generate PTF Analysis
- Display Difference Analysis
- PTF Analysis
- Customized Libraries
- Manage Linked Repositories

For detailed description, refer to the Inter-Repository Options section.

## AUDIT OPTIONS

X-Analysis provides the following Audit Options:

- Metrics Analysis
- Screen Metrics
- File Metrics
- Business Process Logic Metrics
- Specialized Analysis
- Problem Analysis
- Object Allocation
- Database Summary
- Summary Report
- Initialize Source Archiving
- Generate Metrics Analysis
- Edit Problem Audit Limit

- Edit Problem Categories
- Generate Problem Analysis
- View Database Size Statistics

For detailed description, refer to the Audit Options section.

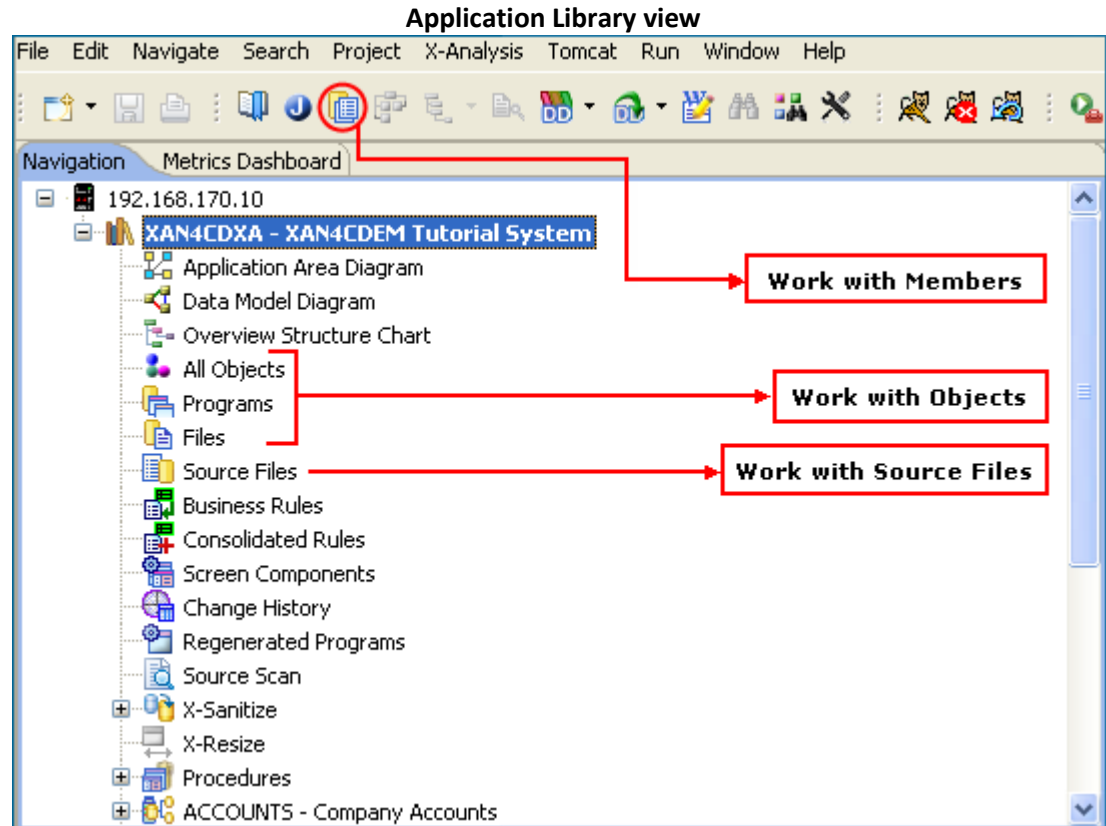
## WORK WITH MULTIPLE LIST OPTIONS

X-Analysis facilitates you to work flexibly and methodically by generating multiple lists. Under an application library, double-click on these nodes – **Files**, **Programs** or **All Objects** – to display the **Work with Objects** dialog. Alternatively, click **Member List** from the toolbar to bring up the **Work with Members** dialog. Likewise, you can access additional lists by double-clicking on the **Source Files** node to view the source list comprising source files.

Double-click on an individual Source File to view its Member List.

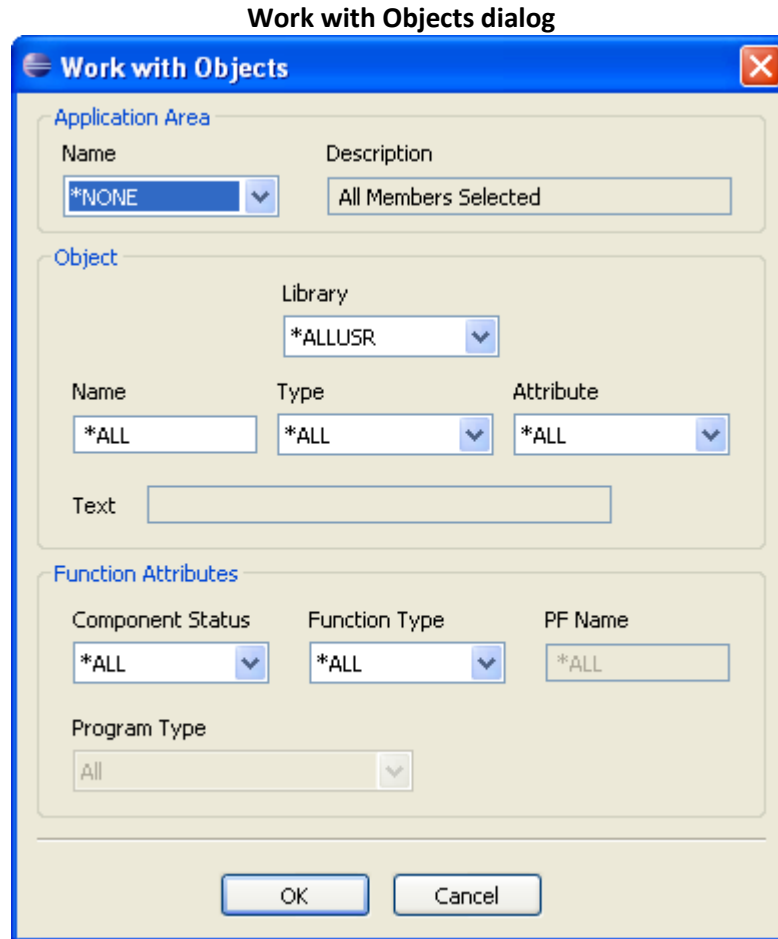
The various lists that can be generated are as under:

Lists	Brief Description
Object List	Displays a list of all/specified objects.
Member List	Displays a list of all /specified source members.
Source Files	Displays a list of all source files.
Business Rules	Displays a list of all business rules and their narrations.
Consolidated Rules	Displays a list of all rules based on file-field combination.
Screen Components	Displays a list of all reengineered components.
Change History	Displays a list of all source members that are modified.
Procedures	Displays a list of all procedures.
X-Analysis Bookmarks	Displays a list of objects that are bookmarked.



## OBJECT LIST

The Object List displays a list of all objects of the specified type from the selected library. Double-click on the **All Objects** node under the cross-reference library (**XAN4CDXA**) to bring up the **Work with Objects** dialog.



The Library drop-down box contains the following two important entries, apart from the user libraries:

- **\*ALLUSR** – All objects belonging to the user libraries
- **\*ALL** – All objects (including those in the X-Ref lib)

The default option is **\*ALLUSR**.

### Programs

When you double-click on the **Programs** node, the same **Work with Objects** dialog is invoked, but with the Type/Attribute set as **\*PGM/\*ALL**. Click **OK** to get the Object List for **\*Programs**.

Object List – Programs

Library	Name	Type	Attribute	Description	Status	Changed	Created	Used
CLXAN4CDEM	CBC110	*PGM	CLP	Order Entry System	*A	19/03/13	01/09/08	20/06/13
RPGXAN4CDEM	CB906R	*PGM	RPG	Back-out account	*B	19/03/13	03/12/12	20/06/13
CLXAN4CDEM	CLET	*PGM	CLP	Build Customer Letter	*A	19/03/13	01/09/08	20/06/13
CLXAN4CDEM	CLETN	*PGM	CLP	Print Customer Letter	*A	19/03/13	01/09/08	20/06/13
RLEXAN4CDEM	CNTCMAINT	*PGM	RPGLE	Contacts Maintenance	*A	19/03/13	13/09/10	20/06/13
RLEXAN4CDEM	CONUPD0	*PGM	RPGLE	Revert Back Customer Info	*D	11/06/13	04/06/13	20/06/13
RLEXAN4CDEM	CONUPD1	*PGM	RPGLE	Update Customer Info - Version 1	*D	11/06/13	04/06/13	20/06/13
RLEXAN4CDEM	CONUPD2	*PGM	RPGLE	Update Customer Info - Version 2	*D	11/06/13	05/06/13	20/06/13
RPGXAN4CDEM	CON001	*PGM	RPG	Contract Entry	*D	19/03/13	01/09/08	20/06/13
CLXAN4CDEM	CPDM	*PGM	CLP	List Correspondence	*A	19/03/13	01/09/08	20/06/13
CLXAN4CDEM	CSEC	*PGM	CLP	Build Security Fax	*A	19/03/13	01/09/08	20/06/13
CLXAN4CDEM	CSEC2	*PGM	CLP	Add Code to Batch	*B	19/03/13	01/09/08	20/06/13
CLXAN4CDEM	CSEC3	*PGM	CLP	Agent Fax Prompt	*A	19/03/13	01/09/08	20/06/13
RPGXAN4CDEM	CUSCPY	*PGM	RPG	Customer Copy	*D	19/03/13	01/09/08	20/06/13

The columns that appear in the Programs List are as follows:

**Library:** displays the name of the Object Library

**Name:** displays the name of the program

**Type:** displays the type of object; in this case it is \*PGM

**Attribute:** displays the object attribute like RPG/LE or CLP or CBL

**Description:** displays textual description/long name of the program

**Status:** displays the program status which will be either \*A, \*B, \*C or \*D. The details are provided in the Component Status section on the following page.

**Changed:** displays the date when the program was changed

**Created:** displays the date the program was created

**Used:** displays the date when the program was last used

**Function:** displays the function of the object. The various types are explained under the Function Type section.

**PF Name:** displays the name of the physical file related to the program

**BR Count:** displays the total count of business rules related to the program

**Annot. Count:** displays the total count of business rule annotations related to the program

**Stmt. Count:** displays the total count of the statements in the source list of the program

**Screen Count:** displays the total count of screens recovered by the re-engineering process

**Mode Count:** displays the total count of modes available to access the screens belonging to a program.

Double-click on the list item opens the object’s source code in the source browser.

**Files**

Similarly, double-click the **Files** node under **XAN4CDXA** to bring up the **Work with Objects** dialog with the Type/Attribute set to **\*FILE/PF**. Double-clicking on the **All Objects** node re-sets the Type/Attribute to **\*ALL/\*ALL**.

The following screen displays the Object List for Files:

**Object List – Files**

The screenshot shows a window titled 'Object List – Files' with a search bar containing 'Object List of \*ALLUSR/\*ALL/\*FILE/PF/\*ALL/\*ALL, Total Objects: 50'. Below the search bar is a table with the following columns: Library, Name, Type, Attribute, Description, Status, Changed, and Created. The table lists 12 objects, all of type \*FILE and attribute PF, with various descriptions and dates.

Library	Name	Type	Attribute	Description	Status	Changed	Created
PF XAN4CDEM	ASIMPLTEST	*FILE	PF		*D	05/06/12	30/03/11
PF XAN4CDEM	ASTATUS	*FILE	PF	Status file	*A	05/06/12	01/09/08
PF XAN4CDEM	CNTACS	*FILE	PF	Contacts	*C	05/06/12	01/09/08
PF XAN4CDEM	CONDET	*FILE	PF	Contract Detail	*B	15/08/12	01/09/08
PF XAN4CDEM	CONDETNEW	*FILE	PF	Contract Detail new -?...	*D	05/06/12	02/02/11
PF XAN4CDEM	CONHDR	*FILE	PF	Contract Header	*B	25/09/12	01/09/08
PF XAN4CDEM	CPYBKSRC	*FILE	PF	Cobol copybooks	*D	05/06/12	10/05/11
PF XAN4CDEM	CUSF	*FILE	PF	Sites	*B	22/06/12	01/09/08
PF XAN4CDEM	CUSGRP	*FILE	PF	Customer Groups	*A	05/06/12	01/09/08
PF XAN4CDEM	CUSTS	*FILE	PF	Purchases	*B	04/10/12	01/09/08
PF XAN4CDEM	DELIVA	*FILE	PF	Delivery Areas	*B	05/06/12	01/09/08
PF XAN4CDEM	DISTS	*FILE	PF	Distributors	*A	05/06/12	01/09/08

The description of the columns that appear in the Files List are as follows:

**Library:** displays the name of the Object Library

**Name:** displays the name of the file

**Type:** displays the type of object; in this case it is \*FILE

**Attribute:** displays the object attribute like PF, LF, DSPF or PRTF

**Description:** displays textual description/long name of the file

**Status:** displays the file status which will be either \*A, \*B, \*C or \*D. The details are provided in the Component Status section on the following page.



**Changed:** displays the date when the file was changed

**Created:** displays the date the file was created

**Used:** displays the date when the file was last used.

**Stmt. Count:** displays the total count of the statements in the source list of the file

**Format Count:** displays the total count of screen formats related to a file.

**The displayed Object List is sorted on an object's name in ascending order. Click the respective column heading to change the sort order.**

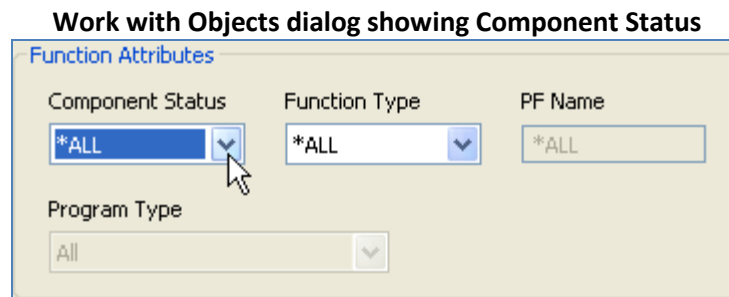
To narrow down the search, the object name on the object group may be mentioned as well. It can be:

- \*ALL
- Object Name (maximum 10 characters long).

Besides the other settings, the following can also be specified on the dialog:

### Component Status

The Component Status can be picked up by selecting appropriate status, for e.g. \*A,\*B, etc. under the **Function Attributes** section.



### Component Status for Programs

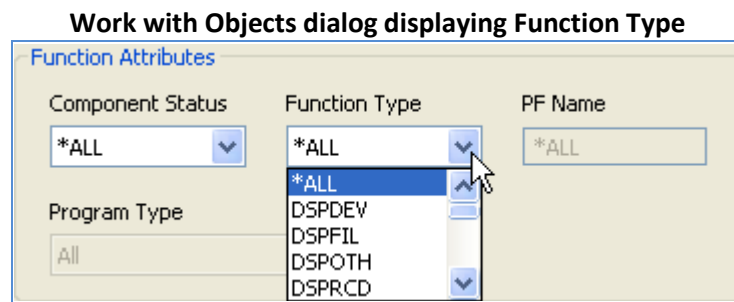
- \*A – Parent or top-level program i.e. calls other programs but is not called itself
- \*B – Program is called by another and also calls other programs
- \*C – Program at the end of a program tree; does not call other programs
- \*D – Standalone program

### Component Status for Files

- \*A – Accessed by other files, but does not access any other file
- \*B – Accesses other files and gets accessed by other files
- \*C – Only accesses other files, not accessed by others
- \*D – Standalone file

### Function Type

This describes the function of the object and based on COOL: 2E definitions.



The Function Attributes apply to program type objects only. The available Function Types are defined here:

**\*ALL** – Displays all objects; no function filter is applied.

**DSPDEV** – Defines a program which includes the Display file/s.

**DSPFIL (Display File)** – Defines a program which displays the records from a specified file, many at a time, using a sub-file.

**DSPOTH (Display Other)** – Defines a program which displays records from Display File(s) and does not have any file(s) in update/write/read mode. Also the program does not have any Printer File(s).

**DSPRCD (Display Record)** – Defines a program which displays a single record from a specified database file.

**DSPRCD2 (Display Record 2 panels)** – Defines a program that is identical to the DSPRCD function, except that it allows the database record details to extend to two separate display device pages.

**DSPRCD3 (Display Record 3 panels)** – Defines a program that is identical to the DSPRCD function, except that it allows the database record details to extend to three separate display device pages.

**DSPTRN (Display Transaction)** – Defines a program which displays the records from a specified pair of database files. The pair must be connected by an **Owned by** or **Refers to** relation.

**EDTFIL (Edit File)** – Defines a program which maintains records on a specified file, many at a time, using a sub-file.

**EDTRCD (Edit Record)** – Defines a program which maintains (add, change, and delete) records on a specified file, one at a time.

**EDTTRN (Edit Transaction)** – Defines a program which maintains the records on a specified pair of header and detail files. The pair must be connected by an **Owned by** or **Refers to** relation.

**EDTRCD2 (Edit Record 2 panels)** – Is identical to the Edit Record function, except that it allows the record details to extend to two separate display pages.

**EDTRCD3 (Edit Record 3 panels)** – Is identical to the Edit Record function, except that it allows the record details to extend to three separate display pages.

**EXCUSRPGM (Execute User Program)** – Defines a program which allows a user to describe the interface to a user-written HLL program so that it can be referenced by functions.

**OTH (Other)** – Defines a program which calls a program and does not have any files in update/write/read mode. Also the program does not have any Display File(s) or Printer File(s).

**OTHCAL (Other Call)** – It is identical to the OTH function except that it allows call with parameters.

**OTHFIL (Other File)** – Defines a program which accepts files in input mode and does not have Printer File(s), Display File(s) or any other files in update/write mode.

**PMTRCD (Prompt Record)** – Defines a program which prompts for a list of fields defined by a specified access path. The validated values can be passed to any other function.

**PRTDSP (Print Display)** – Defines a program which Display/Print records from input files and does not have any files in update/write mode.

**PRTFIL (Print File)** – Defines a program which prints records from a specified access path.

**SELRCO (Select Record)** – Defines a program which displays the records from a specified file, many at a time, using a sub-file. The program allows you to select one of the records. The selected record is returned to the calling program. This function is called from a function that requested a selection list.

**UPDFIL (Update File)** – Defines a program which updates specified files and does not have any Printer File(s) or Display File(s).

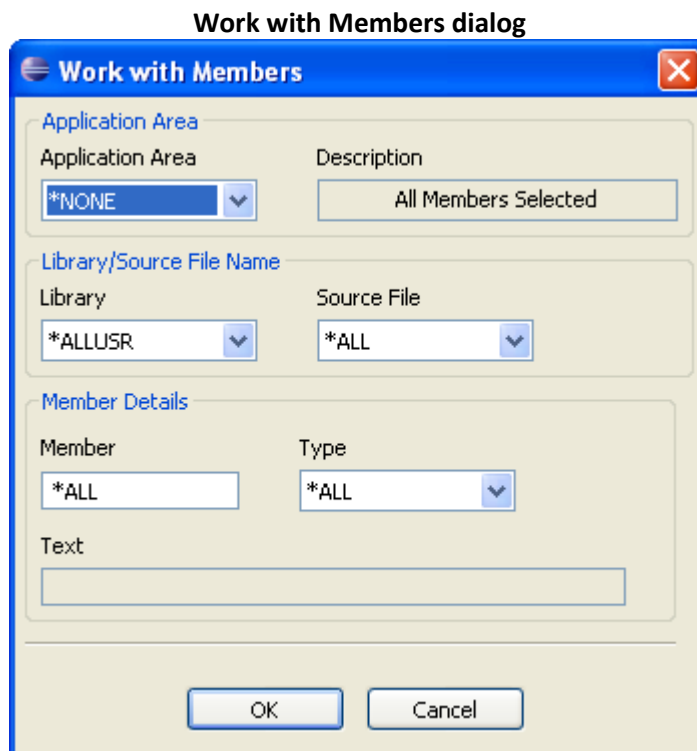
**UPDOTH (Update Other)** – Defines a program which updates data areas and has Display File(s). The program neither has a Printer File(s) nor files in update/write/read mode.

**UPDPRT (Update Print)** – Defines a program which prints a report with update(s) from the specified printer files. It does not have display files.

## MEMBER LIST

The **Member List** option displays the list of source members for a specified source file of the selected library. The Member List contains the members available in the selected library and the source file, based on the selected criteria.

Click the **Member List** icon, the following dialog is invoked:



Specify the selection criteria on the dialog to display a set of members.

1. Select the Source File and the Library using the drop-down list. Selecting **\*ALLUSR** as the library name prevents the source files in the cross-reference library from getting displayed.
2. The Member name on the Member Details group can be:
  - \*ALL
  - Member Name (maximum 10 characters long)

3. Select the Type from the drop-down list.
4. Click **OK**.

The following screen displays the list of members for the selected criteria. Select any member and double-click to invoke its Source List.

**Member List**

Library	Source File	Name	Type	Description	Date Changed	
PF	XAN4CDEM	QDDSSRC	ASTATUS	PF	Status file	25/05/11
CF	XAN4CDEM	QCBLSRC	CBCONDET	CBL	Work with Order Details	13/09/11
CF	XAN4CDEM	QCBLSRC	CBCONDETNW	CBL	Work with Order Details -?Long fi...	13/09/11
CF	XAN4CDEM	QCBLSRC	CBCONHDR	CBL	Work with Orders - Cobol vers.	13/09/11
CF	XAN4CDEM	QCBLSRC	CBCUSFMNT	CBL	Customer Site Maintenance	13/09/11
CF	XAN4CDEM	QCBLSRC	CBCUSTMNT2	CBL	Customer Detail Maintenance -?L...	13/09/11

*The first screen is sorted on the member name in ascending order. To change the sort order or to sort on any other column, click the respective column heading.*

## SOURCE FILES

Double-click on the **Source Files** node to generate a list of all the source files. The option is available under the cross-reference node. Double-click on any source file to display the Member List.

**Source File List**

Source Library	Source File	Source File Text
XAN4CDEM	ASIMPLTEST	
XAN4CDEM	CPYBKSRC	Cobol copybooks
XAN4CDEM	QCBLSRC	CBL Source File
XAN4CDEM	QCLSRC	
XAN4CDEM	QCMDSRC	
XAN4CDEM	QDDSSRC	
XAN4CDEM	QLETSRC	
XAN4CDEM	QQMQRYSRC	
XAN4CDEM	QRPGLESRC	RPGLE Source File
XAN4CDEM	QRPGSRC	
XAN4CDEM	QSECTXT	
XAN4CDXA	QDDSSRC	DDS Source File
XAN4CDXA	QRPGLESRC	Generated RPG Service Modules

## BUSINESS RULES

The program source is grouped into discrete blocks of logic so that each block represents a particular execution of business logic. This block of code is then converted into pseudo code that describes the execution of the logic. Literals and constants are liberally used in the narration, wherever possible, giving accurate descriptions of the logic. These logics are termed as Business Rules.

The **Business Rules** option displays a list of all the business rules and their narrations for the selected cross-reference library. The **Business Rules** node is available under the cross-reference node.

**Business Rules for XAN4CDXA**

Source Member	Rule Number	Field	File	Rule
CB906R	00001	SSRLNB	SECF	Srl_no = blank
CB906R	00002	SSRLNB	SECF	Srl_no = blank
CB906R	00003	SSRLNB	SECF	Srl_no = blank
CNTCMAINT	00001	CUSNO	CNTA...	Cus_No not found on Contacts
CNTCMAINT	00002	IXNAME	NAME...	Name found on Names_Index
CNTCMAINT	00003	USERNM	CNTA...	Contact = blank
CNTCMAINT	00004	TELNO	CNTA...	Phone <> blank
CNTCMAINT	00005	FAXNO	CNTA...	Fax_No <> blank
CNTCMAINT	00006	SINIT	CNTA...	Sales_Person <> blank
CNTCMAINT	00007	SINIT	CNTA...	Exact match not found for Sales_Person on Contacts

## CONSOLIDATED RULES

X-Analysis provides an important feature related to file-fields and business rules. Through this feature you can view all the business rules related to a file-field. Double-click the **Consolidated Rules** node to invoke the following window:

**Consolidated Rules for XAN4CDXA**

File/Field/Rule	Member	Message ID/Description
<b>CNTACS (Contacts)</b>		
<b>CUSNO (Cus. No.)</b>		
Cus_No = 0	WWCCONS/2/247	
Cus_No found on Contacts	WWCCONS/1/160	
Cus_No not found on Contacts	CNTCMAINT/1/44	
<b>FAXNO (Fax.No.)</b>		
Fax_No <> blank	CNTCMAINT/5/184	OEM0015 (The fax. no. is invalid
<b>SINIT (Sales Person)</b>		
Exact match not found for Sales_Person on Contacts	CNTCMAINT/7/198	OEM0023 (Invalid salesman.)
Sales_Person <> blank	CNTCMAINT/6/196	
<b>STATUS (Sts)</b>		
Sts <> blank	CNTCMAINT/8/209	OEM0019 (The status is invalid.)

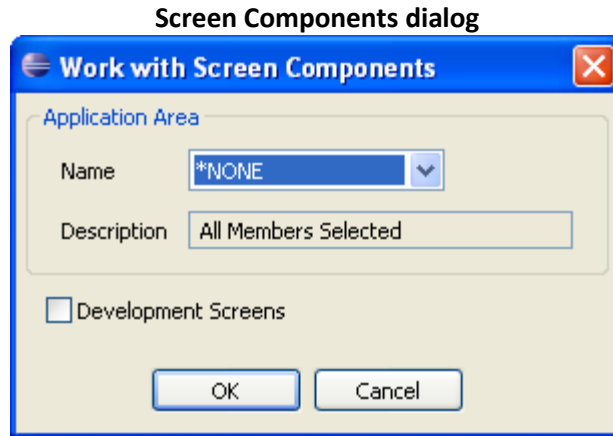
Select any business rule listed under a file and expand the business rules node to check the actual business rules code used, as shown below:

**Expand Business Rules node to see the actual code**

File/Field/Rule	Rule	Member	Message ID/Desc
<b>CNTACS (Contacts)</b>	CNTACS (Contacts)		
<b>CUSNO (Cus. No.)</b>	CUSNO (Cus. No.)		
Cus_No = 0	Cus_No = 0	WWCCONS/2/247	
Cus_No found on Contacts	Cus_No found on Contacts	WWCCONS/1/160	
<b>Cus_No not found on Contacts</b>	Cus_No not found on Contacts	CNTCMAINT/1/44	
// ?Retrieve record	// ?Retrieve record		
READ rcntac cntacskey	READ rcntac cntacskey		
IF not %found(cntacs)	IF not %found(cntacs)		
*inlr EQ *on	*inlr EQ *on		
RETURN	RETURN		
END	END		

## SCREEN COMPONENTS

The reengineering process involves several steps that generate various reengineered components for each program. There are eight types of reengineered components, details of which are accessible through the **Screen Components** option. Double-click on the **Screen Components** node to invoke the **Work with Screen Components** dialog, as shown below:



Click **OK** to generate the list of all Screen Components.

**Screen Components List**

Program	Function	Type	Seq No	DSPF Format	Physical File	Title
<b>CB906R</b>						
	CB906R01D	R	1	CB906R1		Date
	CB906R02D	C	2	SHD001		ACCOUNT ENTRY
	CB906R03D	R	3	SCT100		ACCOUNT ENTRY
	CB906R04D	R	5	SCT101		ACCOUNT ENTRY
	CB906R05D	R	7	SCT102		ACCOUNT ENTRY
	CB906R06D	R	9	XFLAT1	SECF	ACCOUNT ENTRY
<b>CNTCMAINT</b>						
	CNTCMAINT01D	R	1	ZZFT01	CNTACS	Contacts Maintenance
<b>CON001</b>						
	CON00101D	R	99	OESFLC	CONHDR	CONTRACT ENTRY

The following table displays the details of the generated reengineered components:

Component	Type	Description
TSAJE1R	*PGM	Executable reengineered program
TSAJE1RB	*SRVPGM	Created using TSAJE1RA and TSAJE1RB modules
TSAJE1R	*MODULE	UI module for the Reengineered program
TSAJE1RA	*MODULE	Re-engineered Action Diagram aka Programmed Module
TSAJE1RB	*MODULE	Re-engineered Controller aka Generated Code Module
TSAJE1RB	*FILE	Program Variables structure aka Program Data Object
TSAJE1RD	*FILE	Display file used by the reengineered program
TSAJE1RG	*FILE	Grid Data Object

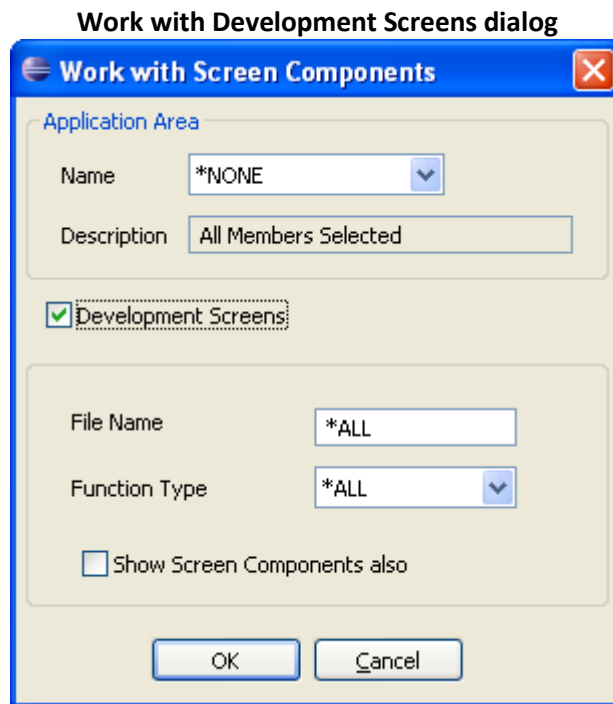
To display the 'Screen Components' list for a specific program, opt for the context menu on that program and select the **Screen Components** option.



## Development Screens

A Development Screen is a set of data that describes how information is to be displayed on a screen and governs the user interactivity with that information. For instance, validation information may be held for a field or details of a program to be called when the record is updated. In short, a Development Screen is a set of metadata relating to a screen display.

Select **Screen Components** and double-click on it to display the **Work with Screen Components** dialog. Then, check the **Development Screens** box which expands the dialog for the **Development Screens** option as shown below:



Click **OK** to generate a list of all Development Screens for the cross-reference library.

### Development Screens List

Function	Physical File	Title
AAASTATUS	ASTATUS	Status file
AACNTACS	CNTACS	Contacts
AACONDET	CONDET	Contract Detail
AACONDETNW	CONDETNW	Contract Detail new -?CBL Ver. with Long fields
AACONHDR	CONHDR	Contract Header
AACUSF	CUSF	Sites
AACUSGRP	CUSGRP	Customer Groups
AACUSTS	CUSTS	Purchases
AADELIVA	DELIVA	Delivery Areas
AADISTS	DISTS	Distributors

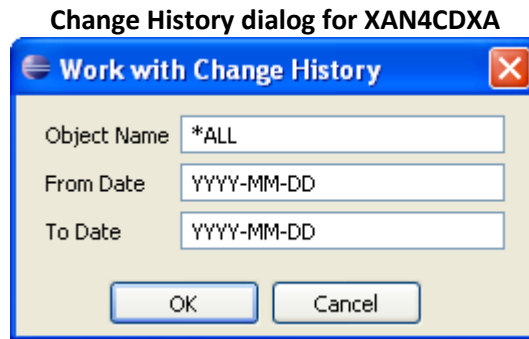
The columns of Development Screens List are described below:

- **Function:** This column lists the Standard Development Screen Definitions associated with the Development Screen in X-Analysis. These Standard Development Screen Definitions are built when the data model is created, directly from the database of the existing application, using the data model relationships to control cross-file validation and navigation.
- **Physical File:** This column represents the associated Physical File name with the specific Standard Development Screen in the database. Standard Development Screens tie directly to physical files, and can be used for file maintenance and display, as well as providing searchable grids and general purpose reports.
- **Title:** This represents the description of the Development Screen as per the database.

## CHANGE HISTORY

The **Change History** option lists the source members that have a change in their history.

Double-click the **Change History** node under **XAN4CDXA** to invoke the following **Work with Change History** dialog:



Click **OK** to invoke the following window.

Change History window for XAN4CDXA

ChangedDate/Name	Library	Type	Attribute	Description
CUSGRSELR	XAN4CDXA	*PGM	RPGLE	Customer group Selection
CUSGRSELR	XAN4CDXA	*PGM	RPGLE	Customer group Selection
CUSFSELR	XAN4CDXA	*PGM	RPGLE	Customer Site Selection
CUSFSELR	XAN4CDXA	*PGM	RPGLE	Customer Site Selection
2013-03-14				
XRATE_EURO	XAN4CDEM	*PGM	RPG	Euro Conversion Calculation
WKSECF6	XAN4CDEM	*PGM	RPG	Generate CPU Letter
WKCUS8P	XAN4CDEM	*PGM	RPG	Customer Enquiry Letter
WKCUS8EF	XAN4CDEM	*PGM	RPG	Find Fax Number
WKCUS8E	XAN4CDEM	*PGM	RPG	Customer Release Letter
WKCUSP	XAN4CDEM	*PGM	RPG	Summary Customer Report
SEC1	XAN4CDEM	*PGM	RPG	Security Code Report

Select a row and right-click on it for the context menu to call up a suitable source compare window. The following screen displays the context menu against a selected row:

Context Menu displaying Source Compare Options

ChangedDate/Name	Library	Type	Attribute	Description
CUSGRSELR	XAN4CDXA	*PGM	RPGLE	Customer group Selection
CUSGRSELR	XAN4CDXA	*PGM	RPGLE	Customer group Selection
CUSFSELR	XAN4CDXA	*PGM	RPGLE	Customer Site Selection
CUSFSELR	XAN4CDXA	*PGM	RPGLE	Customer Site Selection
2013-03-14				
XRATE_EURO	XAN4CDEM	*PGM	RPG	Euro Conversion Calculation
WKSECF6	XAN4CDEM	*PGM	RPG	Generate CPU Letter
WKCUS8P	XAN4CDEM	*PGM	RPG	Customer Enquiry Letter
WKCUS8EF	XAN4CDEM	*PGM	RPG	Find Fax Number
WKCUS8E	XAN4CDEM	*PGM	RPG	Customer Release Letter
WKCUSP	XAN4CDEM	*PGM	RPG	Summary Customer Report
SEC1	XAN4CDEM	*PGM	RPG	Security Code Report

You can also view this data in program sequence. For this, click on the **Order by Program** option available on the toolbar.

Order by Program option

ChangedDate/Name	Library	Type	Attribute	Description	Source change date
2013-03-20					

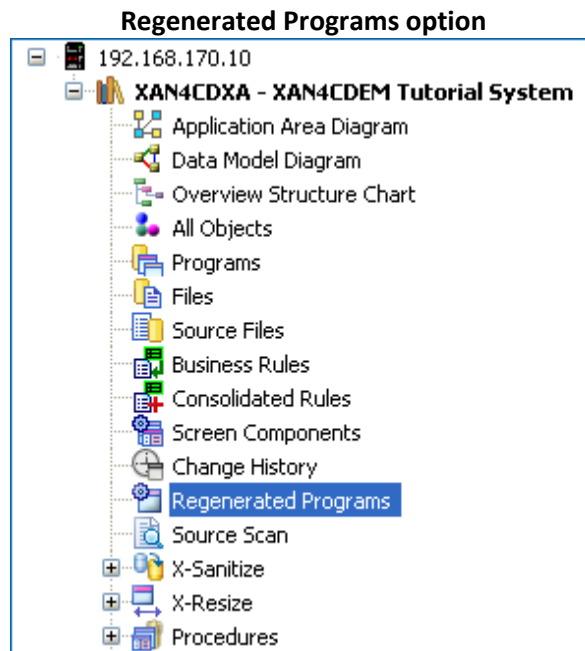
The following window will be invoked:

**Change History – Order by Program window**

ChangedDate/Name	Library	Type	Attribute	Description
CB906R				
2013-03-14	XAN4CDEM	*PGM	RPG	Back-out account
CBC110				
2013-03-14	XAN4CDEM	*PGM	CLP	Order Entry System
2011-09-13	XAN4CDEM	*PGM	CLP	Order Entry System
CLET				
2013-03-14	XAN4CDEM	*PGM	CLP	Build Customer Letter
2011-09-21	XAN4CDEM	*PGM	CLP	Build Customer Letter
CLETN				
2013-03-14	XAN4CDEM	*PGM	CLP	Print Customer Letter
CNTCMAINT				
2013-03-14	XAN4CDEM	*PGM	RPGLE	Contacts Maintenance

## REGENERATED PROGRAMS

You can view the list of programs regenerated through the **Regenerated Programs** node. The node is available on the navigation pane of the tutorial application, as shown below:



Double-click the node to invoke the following window:

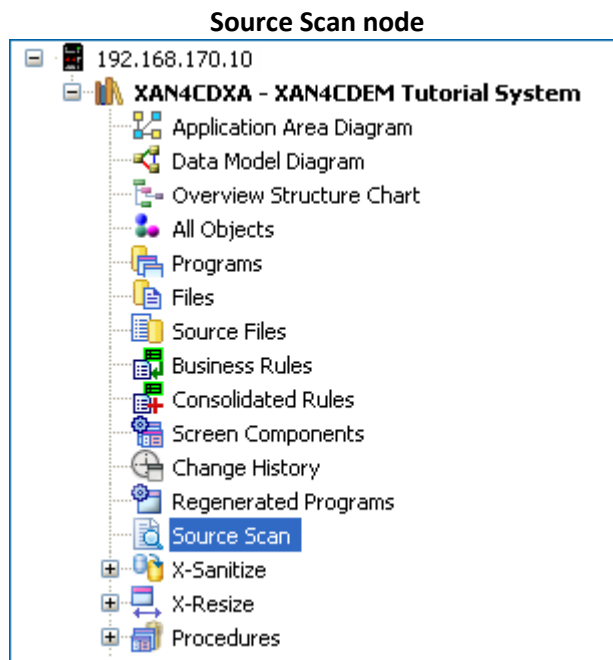
**Regenerated Programs window**

Legacy Program	Reengineered Member Name	Physical File	Access Path
MTT1	MTT1	CUST5	
MTT2	MTT2	CUST5	
CUSFSEL	CUSFSELR		
CUSFSEL	CUSFSELR		
CUSGRSEL	CUSGRSELR		
CUSGRSEL	CUSGRSELR		
CUSTOMNT1	CUSTOMNT1R		
CUSTSSEL	CUSTSSELR		
CUSTSSEL	CUSTSSELR		
DISTSSEL	DISTSSELR		
DISTSSEL	DISTSSELR		
ORDSTSEL	ORDSTSELR		

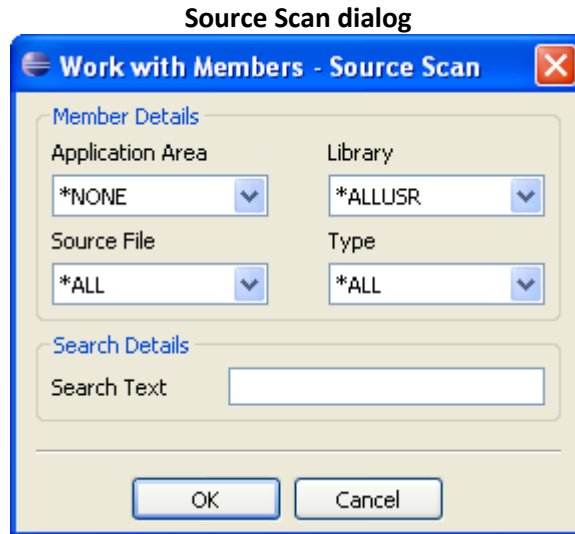
## SOURCE SCAN

The **Source Scan** node helps you scan particular text (also comments) used in a prescribed source member, or in general, all across the application/application area.

The node is available on the navigation pane, as shown below:

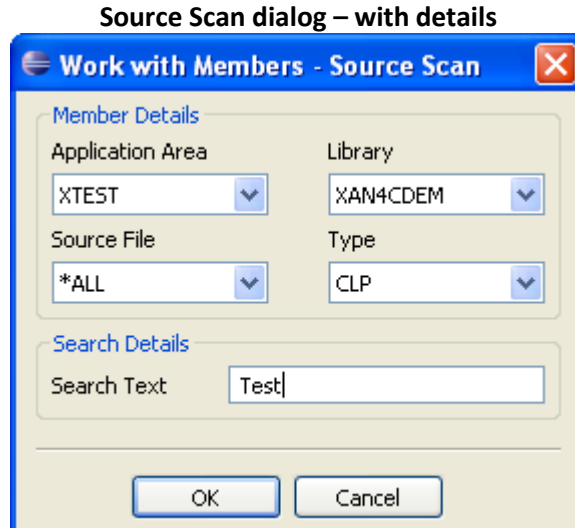


Double-click the node to invoke the **Work with Members – Source Scan** dialog.



You can provide keywords in the 'Search Text' box. If an application area is not selected, then click **OK** to scan the entire application for the Object(s) with the keywords specified by you. Limit the scan by selecting appropriate details in the other drop-down boxes. In this way you will get results quickly. The words mentioned in the 'Search Text' box will also scan the source member(s) for comments (if any) containing the keywords.

Select the required Member Details and fill in the keyword/s, as is shown below.



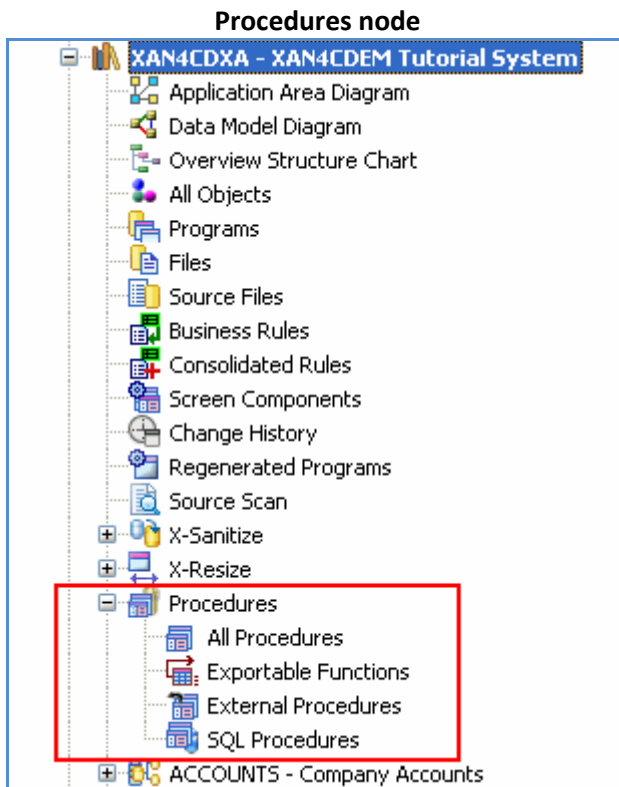
When the scan is complete, the Source Scan result is displayed as follows:

Window displaying Source Scan result

Name	Seq No	*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ..
XASYSOPR	2.00	SNDMSG MSG('XA Test Alert') TOUSR(*SYSOPR)
ORDAUDIT01	14.00	USRDTA (BATCHTEST) SPLFNAME (ORDERS)
ORDAUDIT01	19.00	USRDTA (BATCHTEST) SPLFNAME (BALANCESTO)
ORDAUDIT01	24.00	USRDTA (BATCHTEST) SPLFNAME (BALANCEPRD)
ORDAUDIT02	14.00	USRDTA (BATCHTEST) SPLFNAME (ORDERS)
ORDAUDIT02	19.00	USRDTA (BATCHTEST) SPLFNAME (BALANCESTO)
ORDAUDIT02	24.00	USRDTA (BATCHTEST) SPLFNAME (BALANCEPRD)
ORDAUDIT00	14.00	USRDTA (BATCHTEST) SPLFNAME (ORDERS)
ORDAUDIT00	19.00	USRDTA (BATCHTEST) SPLFNAME (BALANCESTO)
ORDAUDIT00	24.00	USRDTA (BATCHTEST) SPLFNAME (BALANCEPRD)

## PROCEDURES

Select the **Procedures** node to access procedure-related information. This node is available on the navigation pane of the application. Expand the **Procedures** node to reveal four sub-nodes displayed below:



These options are discussed as under:

## All Procedures

The first option under the **Procedures** node is **All Procedures**.

Select **All Procedures** to display a list of members. The members in this list have procedures defined in their source code.

### All Procedures option

Procedure Name	Source Member	Source File	Source Library
<FILE>_checkRow	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_deleteRow	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_insertRow	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_readRow	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_readRows	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_updateRow	ZSTEMPLATE	QRPGLSRC	XASRC
abbrev	XRSRV	QRPGLSRC	XASRC
ACOMMENT	XRRCVUNI	QRPGLSRC	XASRC
aComment	XRRCVUKY	QRPGLSRC	XASRC
acvlsActive	XACV	QRPGLSRC	XASRC
Already_Identified	XBRBDSFK	QRPGLSRC	XASRC
AnalyseDBF	XDDLZANZDBF	QRPGLSRC	XASRC
AnalyseLF	XDDLZANZLF	QRPGLSRC	XASRC

Right-click on a row to access the **Zoom Source** or **Variable Where Used** option.

### Context menu on a Procedure Name

Procedure Name	Source Member	Source File	Source Library
<FILE>_checkRow	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_deleteRow	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_insertRow	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_readRow	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_readRows	ZSTEMPLATE	QRPGLSRC	XASRC
<FILE>_updateRow	ZSTEMPLATE	QRPGLSRC	XASRC
abbrev	XRSRV	QRPGLSRC	XASRC
ACOMME	XRRCVUNI	QRPGLSRC	XASRC
aCommer	XRRCVUKY	QRPGLSRC	XASRC
acvlsActive	XACV	QRPGLSRC	XASRC
Already_Identified	XBRBDSFK	QRPGLSRC	XASRC
AnalyseDBF	XDDLZANZDBF	QRPGLSRC	XASRC
AnalyseLF	XDDLZANZLF	QRPGLSRC	XASRC
AnalysePF	XDDLZANZPF	EVFTMPF01	XASRC
ANALYSEPF	XDDLZANZPF	QRPGLSRC	XASRC



## Exportable Functions

Select the **Exportable Functions** option to display the list of names of exported procedures and variables in a module, which can be referred to by other modules.

**Exportable Functions List**

Exportable Functions	Module Name	Attribute	Library
ELLIPSE	XWUSRV	RPGL	XAMODS
ISAVVALIDSQLREF	XWUSRV	RPGL	XAMODS
PARMYN	XWUSRV	RPGL	XAMODS
QUALLOOKUP	XWUSRV	RPGL	XAMODS
RTNCPGM	XWUSRV	RPGL	XAMODS
XWU_BRACKETED	XWUSRV	RPGL	XAMODS
XWU_BUILDSTMT	XWUSRV	RPGL	XAMODS
XWU_CHECKPARMFLD	XWUSRV	RPGL	XAMODS
XWU_EXCLUDETHISREF	XWUSRV	RPGL	XAMODS
XWU_GETDSDEFN	XWUSRV	RPGL	XAMODS
XWU_GETEXTPROCNAME	XWUSRV	RPGL	XAMODS
XWU_GETEXTRANAMES	XWUSRV	RPGL	XAMODS
XWU_GETFMTUPDATEREFS	XWUSRV	RPGL	XAMODS

Right-click on a row to select the **Zoom Source** or the **Variable Where Used** options.

## External Procedures

The third option under the **Procedures** node is **External Procedures**. This option registers high-level language program like RPG, Java, C#, etc. as a stored procedure. However, the procedure may or may not use SQL.

Select the **External Procedures** option to invoke the following window:

Window – External Procedures List

Specific Name	Specific Schema	Routine Name	External Name	External Language
X@BWUDTA	XAOBJ	X@BWUDTA	XAOBJ/X@BWUDTA	CL
XABGWUI	XAOBJ	XABGWUI	XAOBJ/XABGWUI	CL
XACRTMLK	XAOBJ	XACRTMLK	XAOBJ/XACRTMLK	CL
XADSPOUJ	XAOBJ	XADSPOUJ	XAOBJ/XADSPOUJ	CL
XADTARDR	XAOBJ	XADTARDR	XAOBJ/XADTARDR	CL
XADTARDR2	XAOBJ	XADTARDR2	XAOBJ/XADTARDR2	CL
XAFFNDET	XAOBJ	XAFFNDET	XAOBJ/XAFFNDET	RPGLE
XALWSRCBRW	XAOBJ	XALWSRCBRW	XAOBJ/XALWSRCBRW	CL
XARRTVWD1	XAOBJ	XARRTVWD	XAOBJ/XARRTVWD	RPGLE
XARTVOBJWU	XAOBJ	XARTVOBJ	XAOBJ/XARTVOBJWU	RPGLE
XBLDSCD	XAOBJ	XBLDSCD	XAOBJ/XBLDSCD	RPGLE
XCEMBLFWU	XAOBJ	XCEMBLFWU	XAOBJ/XCEMBLFWU	CL
XCHKLIB	XAOBJ	XCHKLIB	XAOBJ/XCHKLIB	CL
XCRTLIB	XAOBJ	XCRTLIB	XAOBJ/XCRTLIB	CL
XEXCCMD	XAOBJ	XEXCCMD	XAOBJ/XEXCCMD	CL
XEXITJ	XAOBJ	XEXITJ	XAOBJ/XEXITJ	RPGLE
XFNSPCMGRT	XAOBJ	XFNSPCMGRT	XAOBJ/XFNSPCMGRT	CL
XFNSPCMGR1	XAOBJ	XFNSPCMGR1	XAOBJ/XFNSPCMGR1	CL
XJVAINIT	XAOBJ	XJVAINIT	XAOBJ/XJVAINIT	CL
XLICDTLQRY	XAOBJ	XLICDTLQRY	XAOBJ/XLICDTLQRY	RPGLE
XLICD0001	XAOBJ	XLICDTLQRY	XAOBJ/XLICDTLQRY	RPGLE
XLICVERPGM	XAOBJ	XLICVERPGM	XAOBJ/XLICVERPGM	RPGLE
XREFINUSE	XAOBJ	XREFINUSE	XAOBJ/XREFINUSE	CL
XSCNRPTLYT	XAOBJ	XSCNRPTLYT	XAOBJ/XSCNRPTLYT	CL
XSECCHK	XAOBJ	XSECCHK	XAOBJ/XSECCHK	RPGLE
XSRVAPP	XAOBJ	XSRVAPP	XAOBJ/XSRVAPP	RPGLE
XWRKAS4JB1	XAOBJ	XWRKAS4JB1	XAOBJ/XWRKAS4JOB	CL

Right-click on a row for the context menu and select the options to view the Data Flow Diagram or the Object Where Used/Variable Where Used references.

**SQL Procedures**

The last option under the **Procedures** node is **SQL Procedures**. This option presents the entire procedure coded with SQL. The option follows SQL Standard (PSM) and allows ‘normal’ DDL/DML SQL, in addition to procedural statements.

The following window appears on selecting the **SQL Procedures** option:

Window – SQL Procedures

SQL Procedures List

**SQL Procedures List, Total Objects: 164**

Specific Name	Routine Name	External Name	External Language
AUTHENTICATECREWUSERID	AUTHENTICATECREWUSERID	MISSYSOBJ/AUTHE00001	
CANEDITPROJECTPHASE	CANEDITPROJECTPHASE	MISSYSOBJ/CANED00002	
CANEDITPROJECTSTEP	CANEDITPROJECTSTEP	MISSYSOBJ/CANED00001	
CD7115QL	CD7115QL	MISSYSOBJ/CD7115QL	
CV5055QL	CV5055QL	MISSYSOBJ/CV5055QL	
CV5065QL	CV5065QL	MISSYSOBJ/CV5065QL	
C20045QL	C20045QL	MISSYSOBJ/C20045QL	
C20055QL	C20055QL	MISSYSOBJ/C20055QL	
C20485QL	C20485QL	MISSYSOBJ/C20485QL	
C20495QL	C20495QL	MISSYSOBJ/C20495QL	
C20505QL	C20505QL	MISSYSOBJ/C20505QL	
C20545QL	C20545QL	MISSYSOBJ/C20545QL	
C20555QL	C20555QL	MISSYSOBJ/C20555QL	
C20705QL	C20705QL	MISSYSOBJ/C20705QL	
C20715QL	C20715QL	MISSYSOBJ/C20715QL	
C20725QL	C20725QL	MISSYSOBJ/C20725QL	
C20735QL	C20735QL	MISSYSOBJ/C20735QL	
C20745QL	C20745QL	MISSYSOBJ/C20745QL	
C20755QL	C20755QL	MISSYSOBJ/C20755QL	
C20765QL	C20765QL	MISSYSOBJ/C20765QL	
C20805QL	C20805QL	MISSYSOBJ/C20805QL	
C20815QL	C20815QL	MISSYSOBJ/C20815QL	
C24885QL	C24885QL	MISSYSOBJ/C24885QL	
C25015QL	C25015QL	MISSYSOBJ/C25015QL	

# Application Area

## ADD APPLICATION AREA

X-Analysis creates application areas from part of one or multiple systems. It is possible to subdivide an application, programmatically, into logical modules or areas. This can be within the context of a single system or specific parts from multiple systems. For example, you can have an application area like **ORDERS**, containing Order Entry details from Operational System, to represent single system Application Area. You can also have an application area as **ORDERS**, containing Order Entry details from Operational System and Sales Ledger details from Financial System, representing the application area as a specific part from multiple systems.

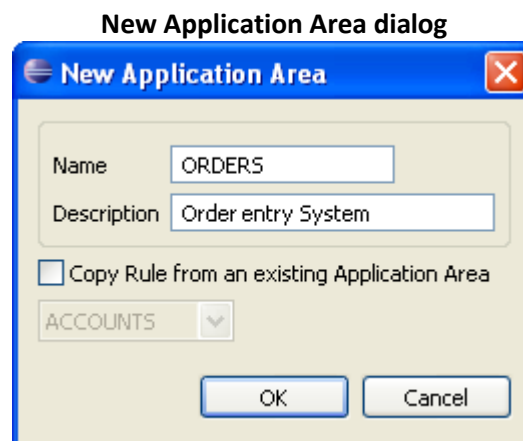
The Application Area feature facilitates grouping of an application into different Business Areas. They are defined on the basis of certain criteria called Application Area Rules. Application Area Rules are, hence, a mechanism which categorizes an application into different Application Areas.

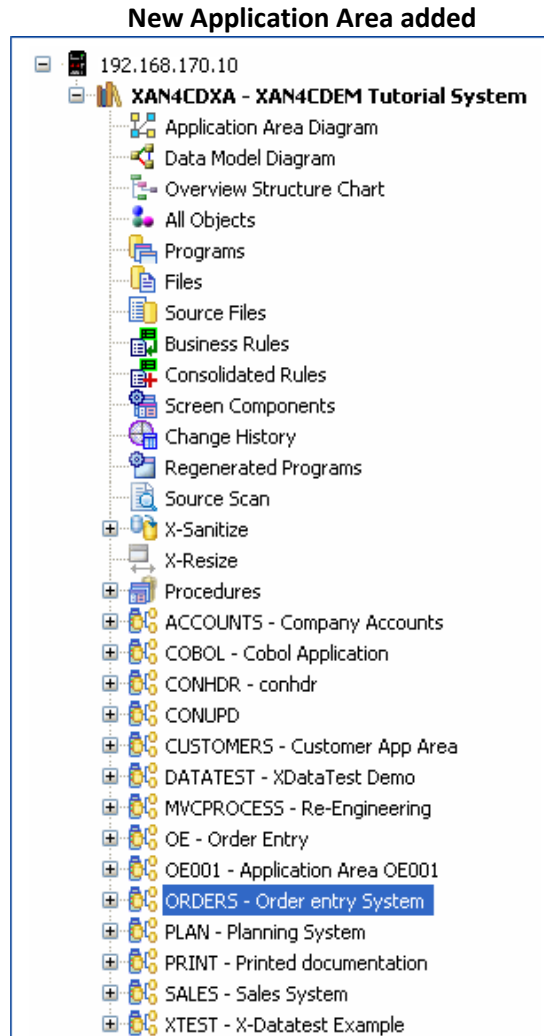
You can create an application area by running the X-Analysis Client or using **X4WRKAPP** on IBM i.

### Using X-Analysis Plugin

Opt for the context menu on the cross-reference library and select the **New Application Area** option. This brings up a dialog to add a new application area to the selected cross-reference library. The dialog takes the Application Area **Name** and **Description** as inputs.

Click **OK** to add the new application area to the cross-reference library.

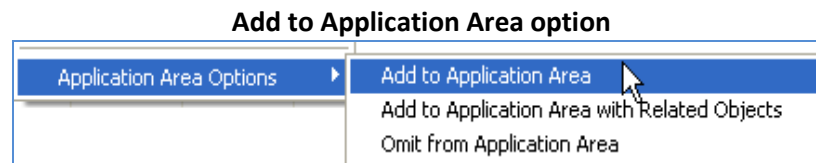




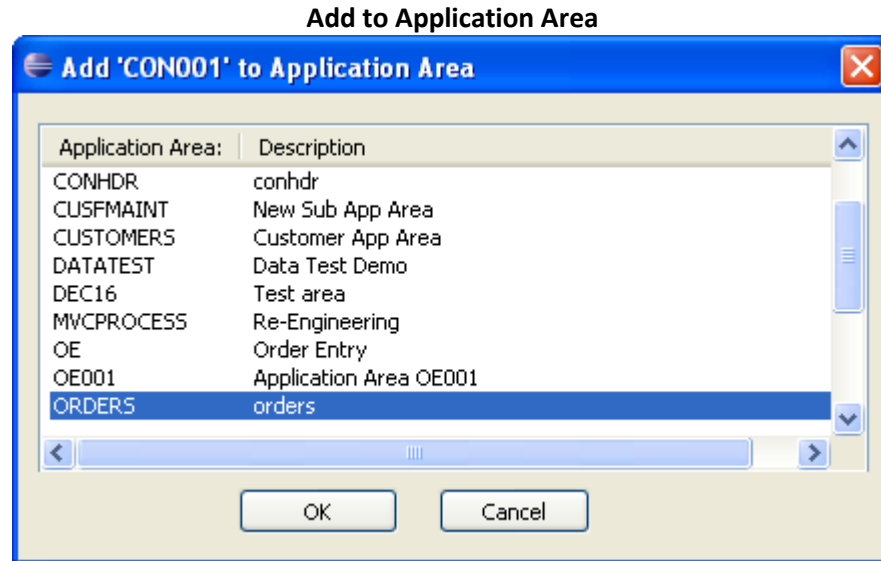
## ADDING OBJECT TO AN APPLICATION AREA

Opt for the Object List to add an object to an application area. Double-click on **All Objects** to bring up the **Work with Objects** dialog. Provide the object name to be added to the application area. For example, input **CON001** and click **OK**.

Select **CON001** and opt for the context menu on it. Then, select the **Add to Application Area** option, as shown below:

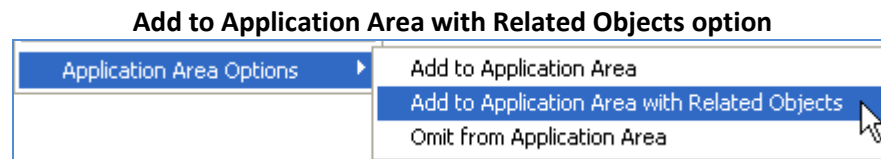


This option presents the following dialog:

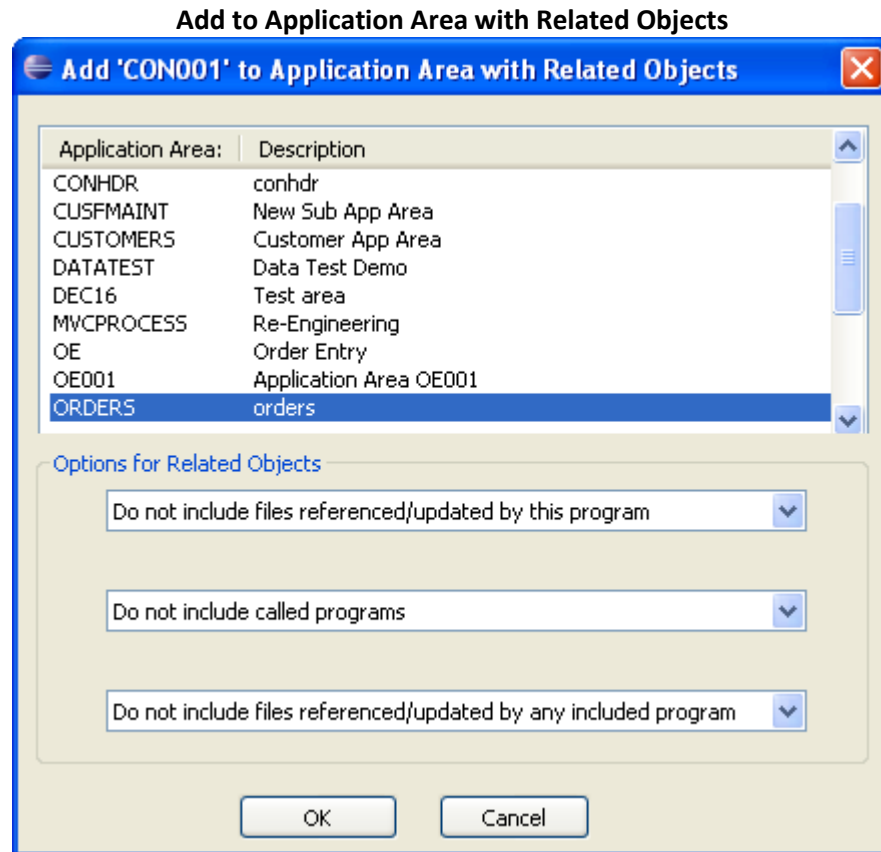


Select the application area in which you want to add the object and click **OK**.

To add the related objects, select the second option i.e. **Add to Application Area with Related Objects**, as shown below:



This option invokes the following dialog:



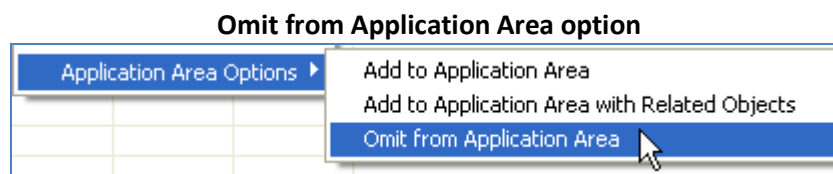
Perform the steps given below:

1. Select the application area in which you want to add the object.
2. Choose the required options from the three drop-down menus.
3. Click **OK**.

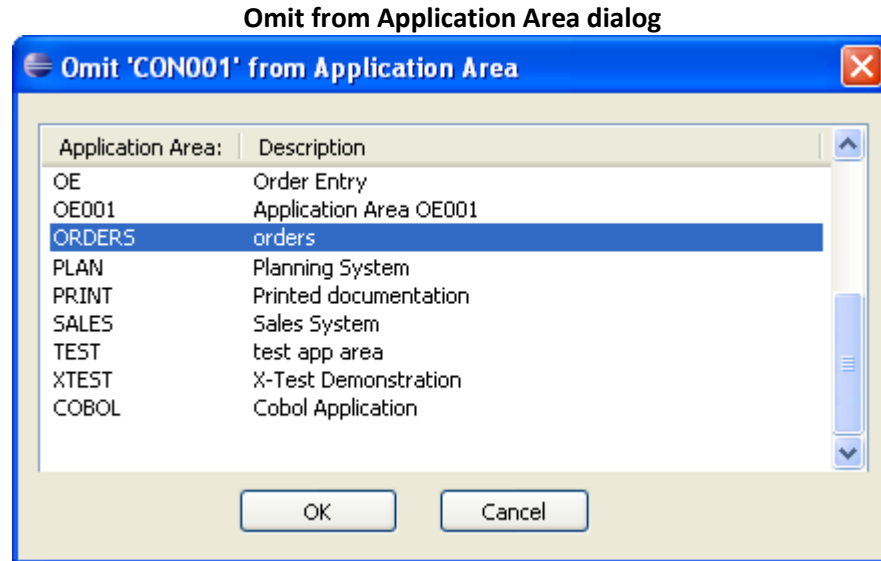
This adds the objects to the application area fulfilling the criterions.

## REMOVING OBJECT FROM AN APPLICATION AREA

Opt for the Object List and select the object to be removed from the application area. Right-click for the context menu on that object and select **Omit from Application Area** as displayed below:



The following dialog will be displayed:

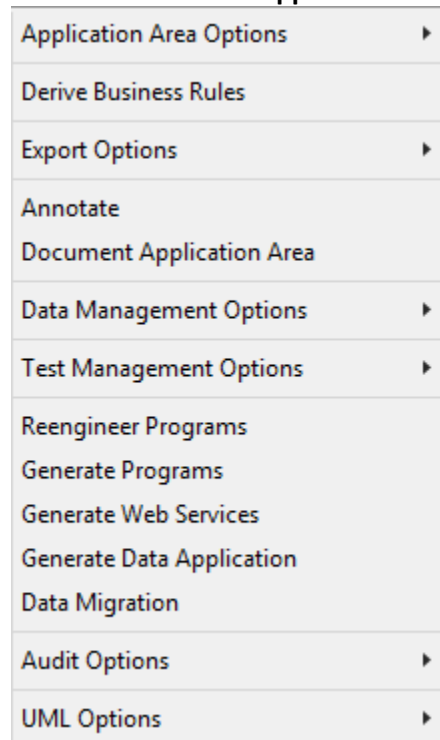


To remove the object, select the application area name and click **OK**.

## CONTEXT MENU ON AN APPLICATION AREA

The context menu on an application area is displayed below:

### Context menu on an application area





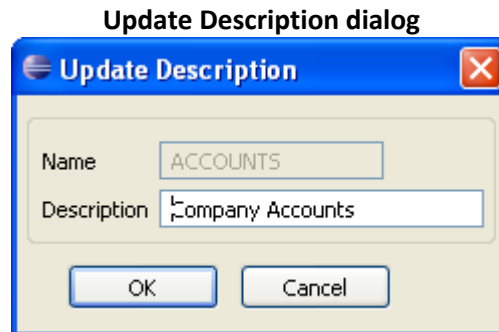
## APPLICATION AREA OPTIONS

The **Application Area Options** sub-group consists of the following:

- Update Description
- Remove Application Area
- Application Area Rules
- Affinity Identification
- Affinity Comparison
- New Application Area
- Add to Application Area
- Omit from Application Area

### Update Description

Select the **Update Description** option to modify the application area description. Change the description and click **OK** to reflect the changes to the application area description.



### Remove Application Area

Select the **Remove Application Area** option. This prompts for deleting the selected application area. After confirmation it deletes the application area.

### Application Area Rules

Select the **Application Area Rules** option. This invokes a window displaying the available 'Application Area Rules'. These rules determine which objects are to be placed in that particular Application Area. You may update/delete by using the right-click context menu on a row, or add new rules using the **Add** button from the editor toolbar.

**Application Area Rules dialog**

Seq.	Rule Type	Rule Value	Selection	Object Type	Object Attribute	Object Comparison	Name/Text
10	Object		Select	Program	*ALL	Equal	CNTCM...
20	Object		Select	Program	*ALL	Equal	CB906R

The following dialog will come up when the **Add** button is clicked:

**Add dialog – Application Area Rules**

The various options in the **Application Area Rules** dialog are described as below:

Feature	Brief Description
Sequence	The sequence number of the rule, which determines the order in which the rules are processed.

Feature	Brief Description
Rule Type	<p>Select from:</p> <p><b>Object:</b> This specifies that the scope of the rule type for only an Object.</p> <p><b>Application Area:</b> This specifies the scope of the rule type for an application area.</p> <p><b>Problem Analysis:</b> This specifies the scope of the rule type on Problem Analysis Category.</p>
Rule Value	<p>When the Rule Type is set as Application Area, the Rule Value dropdown will display all the application area names; when Rule Type is Problem Analysis, then all the Problem Analysis categories are displayed.</p>
Selection	<p>Defines whether the specified Object(s) should be selected or omitted.</p> <p>Choose from:</p> <p>S - Select O - Omit ' ' - AND - a further condition for the previous Select/Omit</p> <p>If only Omits are specified then a Select *ALL will be applied when the rules are processed.</p>
Object Type	<p>Choose from:</p> <p>P - Program. E - Entry point program, i.e. a program that calls other programs but is not called by any program. F - File. F - File. * - All Object types. ' ' - For an AND line. (The AND line takes the same value as the SELECT/OMIT line.)</p>
Object Comparison	<p>Specify the comparison type:</p> <p>EQ - equal NE - not equal CT - compare text</p> <p>Object Name: An individual name/a generic name/ '*ALL'. Both individual and generic names can have wildcards specified. Enter &amp; to denote that any character is allowable. Thus AAA&amp;1 means that any 5-character name where the first three characters are AAA and the fifth character is 1 will be selected. More examples: AA&amp;&amp;2, OE*.</p>

Feature	Brief Description
Object Usage	<p>Specify as follows:</p> <p>Last Used: This will select the objects based on the last used date.</p> <p>Created: This will select the objects based on the Object creation date.</p> <p>Modified: This will select the objects based on the object change date.</p> <p>Days Count: This will select the objects based on the total number of days the Object was used.</p>
Usage Comparison	<p>Specify as follows:</p> <p>Less than</p> <p>Less or Equal</p> <p>Equal</p> <p>Not Equal</p> <p>Greater or Equal</p> <p>Greater than</p>
Usage Value	<p>Specify the usage value here. If the usage is Last used, Modified or Created, then value should be a Date in the MMDDYY format. If the usage is Days Count, the value should be a number.</p>
Library Comparison	<p>Specify the comparison type:</p> <p>EQ - equal</p> <p>NE - not equal</p> <p>Library Name:</p> <p>An individual name/a generic name/ '*ALL'.</p> <p>If the Library Rule is left blank, it will be treated as equivalent to *EQ *ALL.</p>
Object Attribute	<p>Specify the attribute of the objects to be selected. The default is *ALL</p>
Name/Text	<p>Fill the name/text of the rule in this box.</p>
Status	<p>For the files, specify the status as:</p> <p>*A - Accessed by other files, but does not access any other files.</p> <p>*B - Accesses other files and gets accessed by other files</p> <p>*C - Only accesses other files, not accessed by others</p> <p>*D - Standalone File</p> <p>*ALL - This is the default selection.</p>

Feature	Brief Description
	<p>For the programs, specify the status as:</p> <p>*A - Parent or top-level program which calls other programs but is not called itself</p> <p>*B - Program is called by another and also calls other programs</p> <p>*C - Program at end of a program tree and does not call other program</p> <p>*D - Standalone Program</p>
Library Name	Provide the name of the X-Ref Library here.

Click **Add** on the **Application Area Rules** dialog after making your selections. Then click the **Apply Rules** button on the editor toolbar to rebuild the application area as per the specified rules. The same dialog will open if you wish to update the Application Area Rules. The **Update/Delete** options are available on the right-click menu of a rule.

### Referenced Programs and Referenced Files

These options only apply to SELECT lines. They allow the user to specify the selection of referenced Objects.

A value of 'A' specified for either option will initiate an iterative process. Each additional dependent Object will have any relevant criteria applied to it to determine any further dependent Objects.

If a value of 'A' is specified for Referenced Programs then referenced programs will also be included for any files selected by Owning File and Dependent File options.

A value of 'U' specified for both options will also initiate an iterative process. Each additional dependent Object will have any relevant criteria applied to it to determine any further dependent Objects.

If a value of 'U' specified for both options then any files included only by virtue of the Owning File or Dependent File options will not be included

### Referenced Programs

This option only applies to SELECT lines. It allows you to specify the selection of referenced programs. Select one of:

- Y - Yes - includes programs called by the specified program or programs, which reference the specified file.
- N - No - do not include programs called by the specified program.
- U - Update programs - include programs that update the specified file.

- S - Split - include programs that are not allocated to any other area and update the specified file.
- A - All - include programs called by the specified program or programs which reference the specified file or any dependent programs or files.
- V - All update programs - include programs that update the specified file or any other files, which have been added.
- '' - For an AND line. (The AND line takes the same value as the SELECT/OMIT line.)

**Note: When you select to include 'All' program references (or 'All Batch Programs'), a program level from 2 to 9 can be specified. The default value is 'ALL' which brings the entire depth of called programs.**

### Referenced Files

This option only applies to SELECT lines. It allows you to specify the selection of referenced files. Select one

- Y - Yes - include files referenced by the specified program.
- N - No - do not include files referenced by the specified program.
- U - Update files - include files updated by the specified program.
- A - All - include files referenced by the specified program or any dependent programs.
- V - All update files - include files updated by the specified program or any called programs. For an AND line. (The AND line takes the same value as the SELECT/OMIT line.)

### Owning Files and Dependent Files

These options only apply to SELECT lines. They allow you to specify the selection of files, which reference the specified file(s).

A value of 'C' (Cascade) will initiate an iterative process, selecting files, which refer to the original file(s) or any further files, which have been selected by this rule.

### Owning Files

This option only applies to SELECT lines. It allows you to specify the selection of files which own the specified file(s). Select one of:

- Y - Yes - include files, which own the specified file(s).
- N - No - do not include files, which own the specified file(s).

- C - Cumulative - include files, which own the specified file(s) or any other files, which have been selected.

**Dependent Files**

This option only applies to SELECT lines. It allows you to specify the selection of files which are owned by the specified file(s). Select one of:

- Y - Yes - include files, which are owned by the specified file(s).
- N - No - do not include files, which are owned by the specified file(s).
- C - Cumulative - include files, which are owned by the specified file(s) or any other files which have been selected by this rule.

Cumulative means including all the dependents of the first file, all the dependents of the dependent files, and so on.

Use **F3** to exit.

Press **ENTER** to build Application Area Lists.

**Dependencies options**

Tables summarizing the options and their interactions are compiled below.

**When the selected Object is a Program**

Feature	Brief Description
Referenced Programs	<p>N = Do not include any called programs.</p> <p>Y = Include programs called by the selected program.</p> <p>A = Include programs called by the selected program and any programs called by any programs included by this rule.</p>
Referenced Files	<p>N = Do not include any referenced files.</p> <p>Y = Include files referenced by the selected program.</p> <p>U = Include files updated by the selected program.</p> <p>A = Include files referenced by the selected program or by any programs subsequently included by the referenced Program value.</p> <p>V = Include files updated by the selected program or by any programs subsequently included by the referenced Program value.</p>
Owning Files	NOT APPLICABLE WHEN THE SELECTED OBJECT IS A PROGRAM.
Dependent Files	NOT APPLICABLE WHEN THE SELECTED OBJECT IS A PROGRAM.



**When selected Object is a File**

Feature	Brief Description
Referenced Programs	<p>N = Do not include any called programs.</p> <p>Y = Include programs which referenced the selected file.</p> <p>U = Include programs which update the selected file.</p> <p>A = Include programs which reference the selected file or any files which have been included as owner or dependent files.</p> <p>V = Include programs which update the selected file or any files which have been included as owner or dependent files.</p> <p>S = Include programs which update the selected file and are not allocated to any other area.</p>
Referenced Files	NOT APPLICABLE WHEN THE SELECTED OBJECT IS A FILE.
Owning Files	<p>N = Do not include any owned files.</p> <p>Y = Include files which own the selected file.</p> <p>C = Include files which own the selected file or which own those in turn and so on.</p>
Dependent Files	<p>N = Do not include files which are owned by the selected file.</p> <p>Y = Include files which are owned by the selected file</p> <p>C = Include files which are owned by the selected file or which are owned by those in turn and so on.</p>

**Special case when Referenced Programs and Referenced Files are set to 'U'**

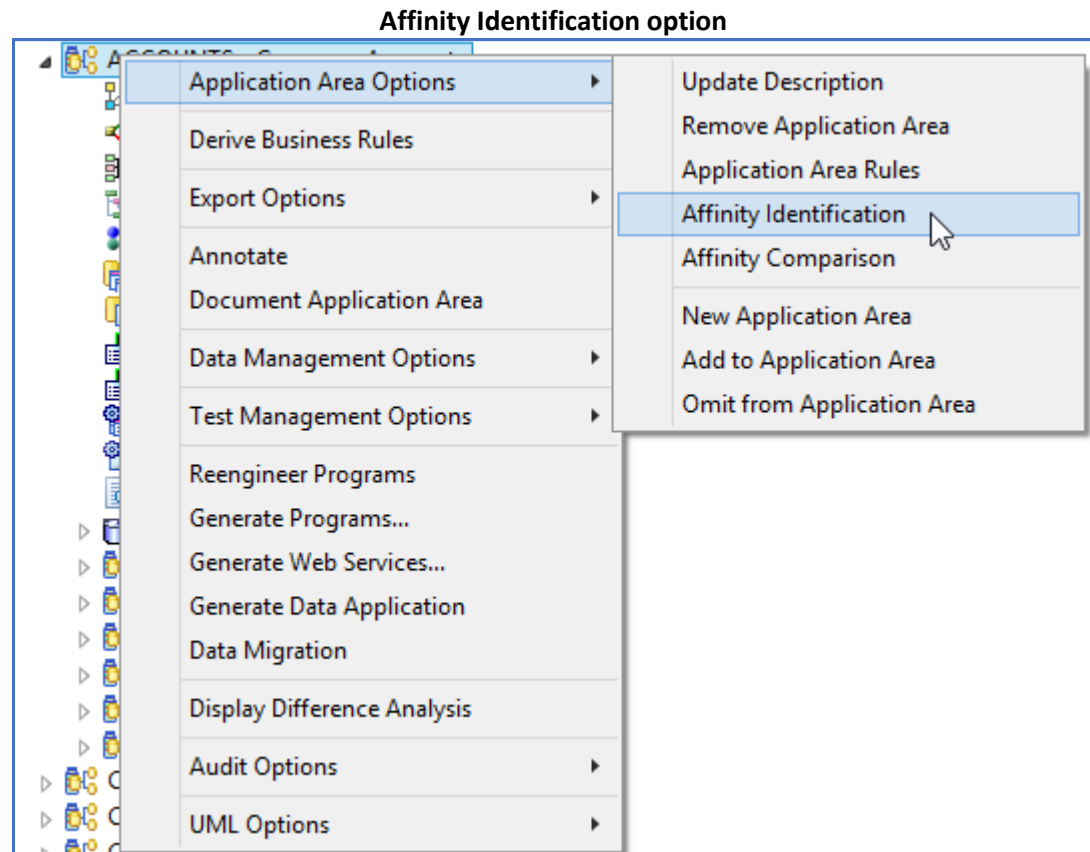
Feature	Brief Description
Referenced Programs	U = Include programs which update the selected file or any file added by these rules.
Owning Files	NOT APPLICABLE.
Referenced Files	U = Include files which are updated by the selected program or any program added by these rules.
Dependent Files	NOT APPLICABLE.

Make the appropriate selections in this dialog, for adding or modifying a rule for a specific application area.

## Affinity Identification

The **Affinity Identification** option displays the linkage of a program to another program and thereby, helps to identify the objects that do not exist in an application area but have high (or low) affinity to one or multiple programs under that application area, mainly due to data linkages or program dependencies. The affinity calculation is done at the server using the **XAFFINIDX** command.

The **Affinity Identification** option is shown below:



Select the option to generate a matrix of programs in the application area against the related program objects falling within or outside the selected application area. The affinity is displayed as shown in the following image.

**Affinity Identification window**

Programs	CB906R	CNTCMAINT	RTNMSGTEXT	X@GSCD
CBC110	10	0	0	8
CL03	0	0	8	0
CUSFMAINT	0	0	10	0
CUSFMAINTC	0	0	8	0
CUSFMOLD	0	0	10	0
CUSTOMT1	0	0	10	0
CUSTOMT1_0	0	0	10	0
CUSTOMT1_1	0	0	10	0
CUSTOMT1_2	0	0	10	0
CUSTOMTJR	0	0	10	0
RTNMSGTEXT	0	10	0	0
TRNCLPCMD	0	0	8	0
TRNHSTCLP	0	0	8	0
WWCONDET	0	0	10	0
WWCONHDR	0	0	10	0

Two colors denote the affinity index of the programs with all the objects under the selected application area.

- Red – denotes above average Affinity Index.
- Green – denotes below average Affinity Index.

The above calculation is done based on the criteria below:

1. The program-to-program dependency at the specific depth in the calling sequence.
2. The common Database Files used in the specific pair of the programs.
3. Exactly matching Business Rules.
4. Partially matching Business Rules.

The Affinity calculation is done considering the specific weightage for the above cases. The default calculation settings are shown below (i.e. in "Affinity Index" column):

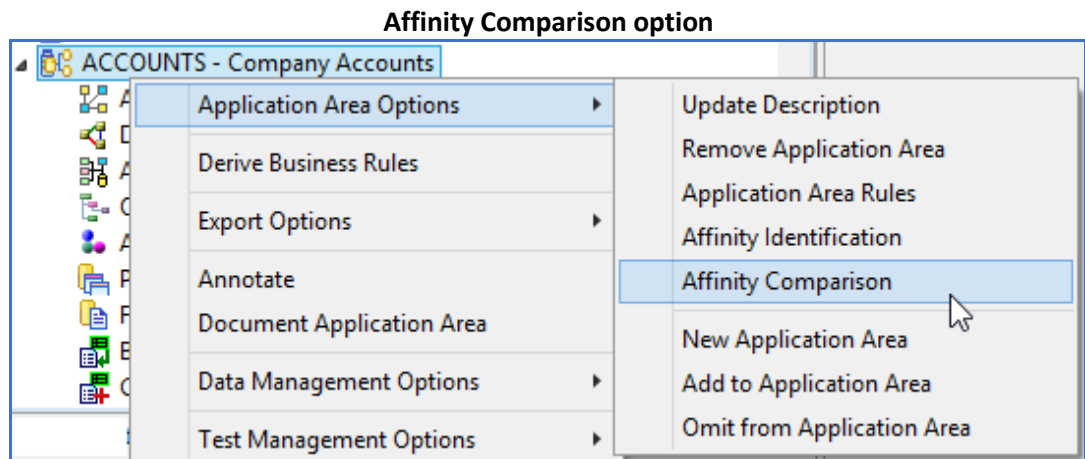
Type	Level/Depth	Affinity Index
PGM	1	10
PGM	2	8
PGM	3	6
PGM	4	4
PGM	5	2
PGM	6	2
FILE	N/A	10
BizRle	Exact Match	3
BizRle	Contained	1

**Note:** The Affinity Identification report can also be exported to MS Excel.

### Affinity Comparison

Select the **Affinity Comparison** option at the application area level to display the comparison of affinity values for all the objects present in that application area versus their affinity in other application areas.

The following image shows the **Affinity Comparison** option.



Select the option to invoke the following window.

**Affinity Comparison window**

Programs	ACCOUNTS	ACHEAD01	BCHEAD01	COBOL	CONHDR	CONUPD	CUSFMAINT
CB906R	10	0	0	0	0	0	0
CNTCMAINT	10	0	0	0	0	0	10
RTNMSGTEXT	10	0	0	0	10	0	10
X@GSCD	10	0	0	0	10	0	10

The first column displays the selected application area and rest of the columns are the other application areas in the X-Ref library.

The blue color in a specific cell (showing affinity value) represents the presence of that object in the application area corresponding to that column; red color means the object does not exist in the application area but has the highest affinity; green color represents the specific object has highest affinity and is also present in that application area.

## DERIVE BUSINESS RULES

The topic has been discussed under the Application Library section.

## EXPORT OPTIONS

The topic has been discussed under the Application Library section.

## ANNOTATE

X-Analysis provides the annotation facility for application areas. Select any application area and opt for the context menu on it, then select the **Annotate** option. This invokes a dialog box; provide the required text and click **Save**. The annotation is stored in a table available in the cross-reference library.

## DOCUMENT APPLICATION AREA

We will discuss it under the Document Manager section.

## DATA MANAGEMENT OPTIONS

This submenu has the following options:

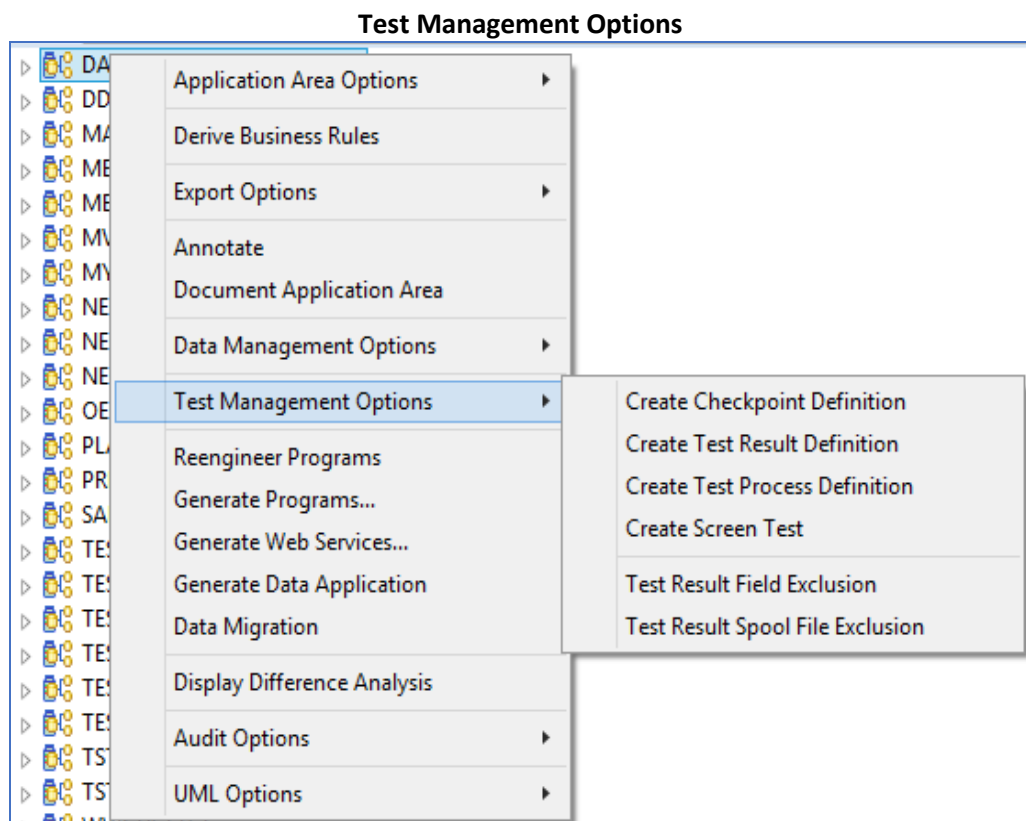
- Verify Data Relationships

- Subset/Archive Filter
- Subset Data
- Archive Data
- Purge Data
- Archive & Purge Data

We shall discuss these options under the Data Management Features section.

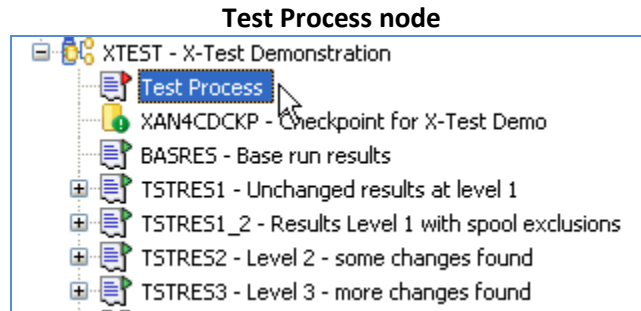
## TEST MANAGEMENT OPTIONS

This context menu contains various options related to X-Test. The following image displays the options:



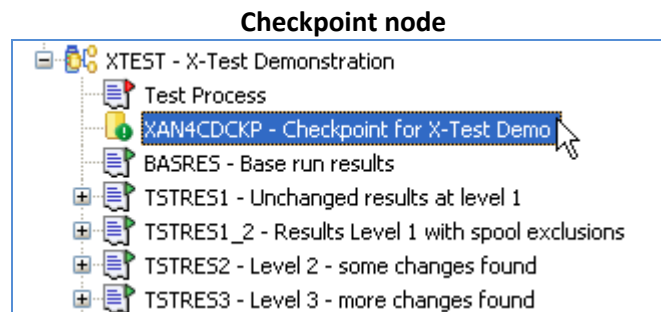
### Create Test Process Definition

The **Create Test Process Definition** is used to define the test process. It creates **Test Process** node under the application area. The following screen displays the available Test Process node; it comes pre-configured with the tutorial application – **XAN4CDXA**.



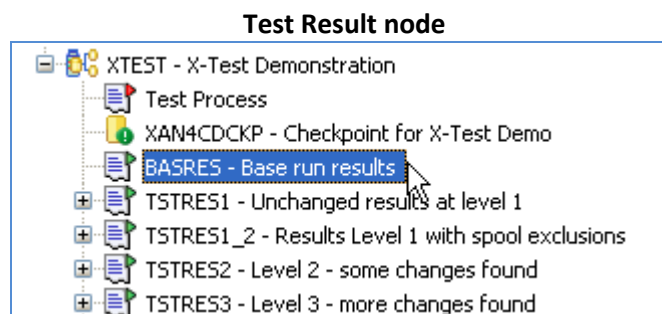
### Create Checkpoint Definition

This option is used to create checkpoints. The checkpoint acts as an image of the test data. The tutorial application has a pre-defined checkpoint – **XAN4CDCKP**. The following screen displays the checkpoint:



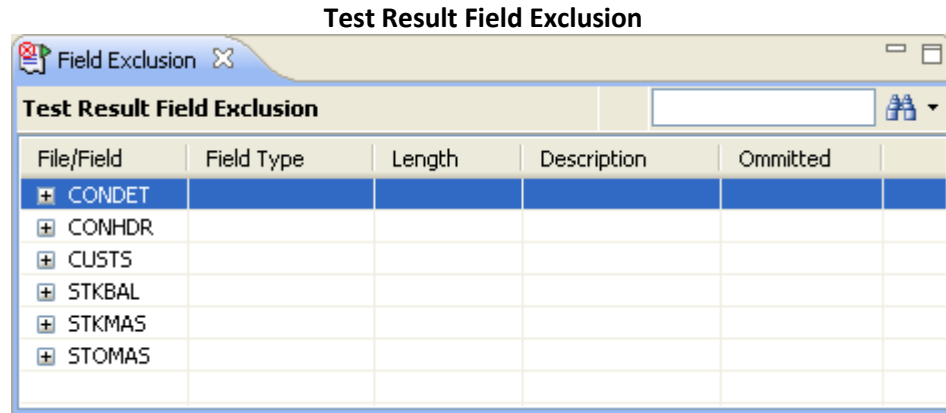
### Create Test Result Definition

Create the **Test Result Definition** in order to save the test process results. The tutorial application is pre-configured to have a Test Result Definition – **BASRES**. The following screen displays the test result definition:

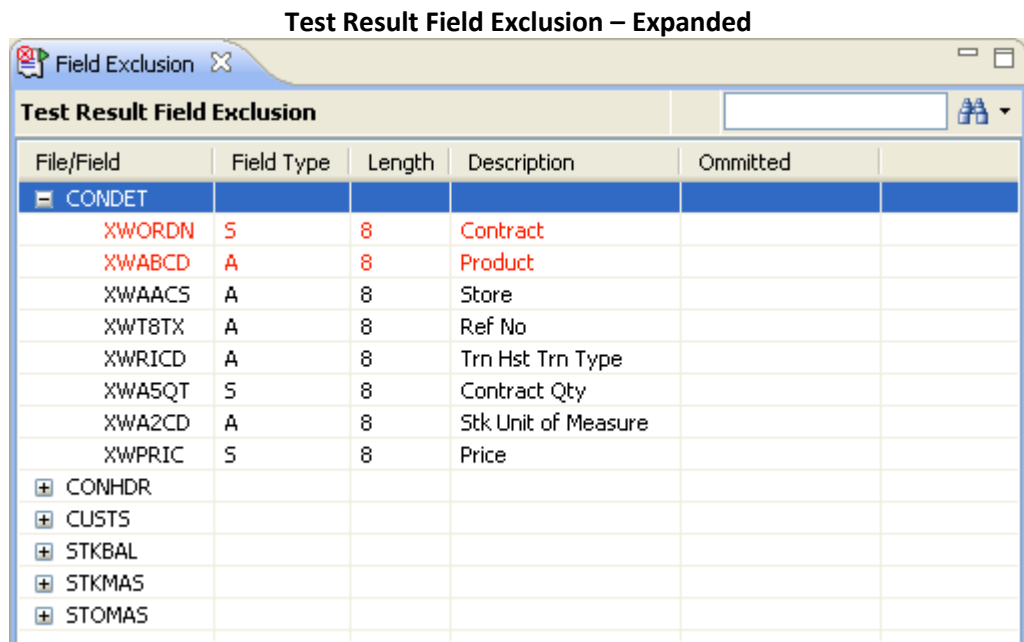


### Test Result Field Exclusion

This option lists all the files (PFs) under the application area, so that you can select any field for exclusion purpose. The following screen displays the field exclusion window:

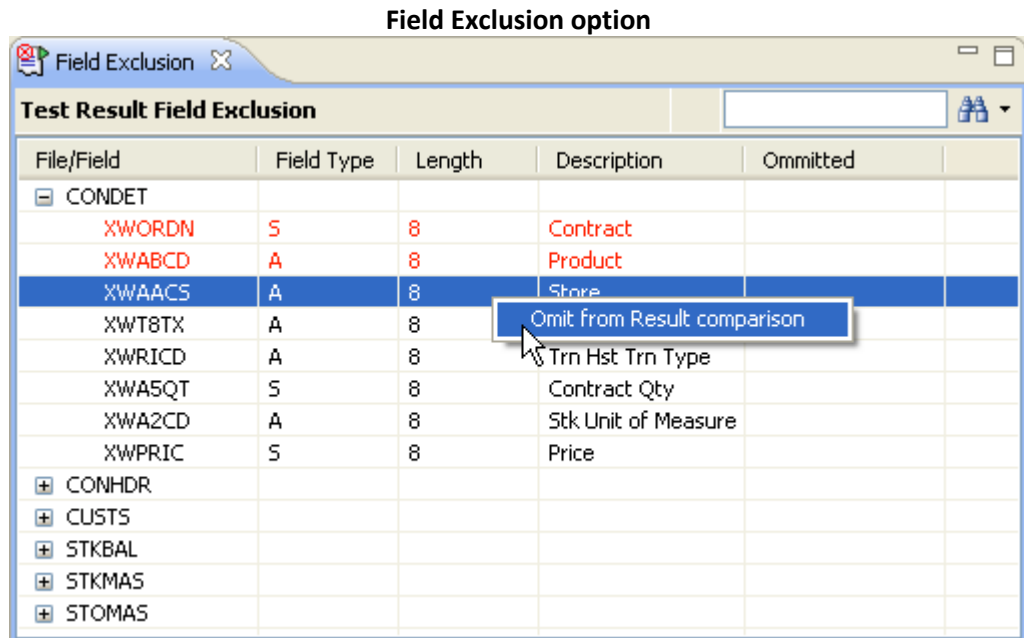


Expand a file to display the fields of that file.

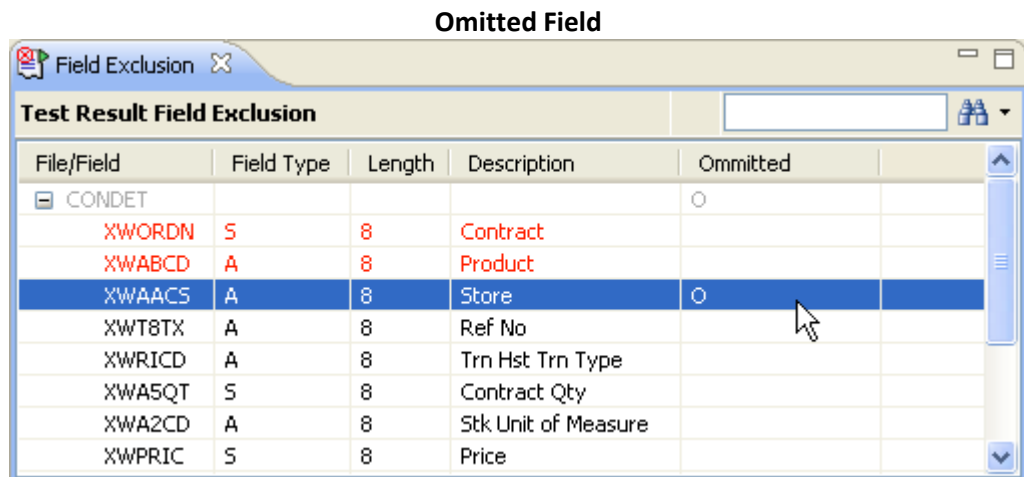


The keyed fields are displayed in RED. To exclude a field, select any field other than the keyed fields and opt for the context menu:

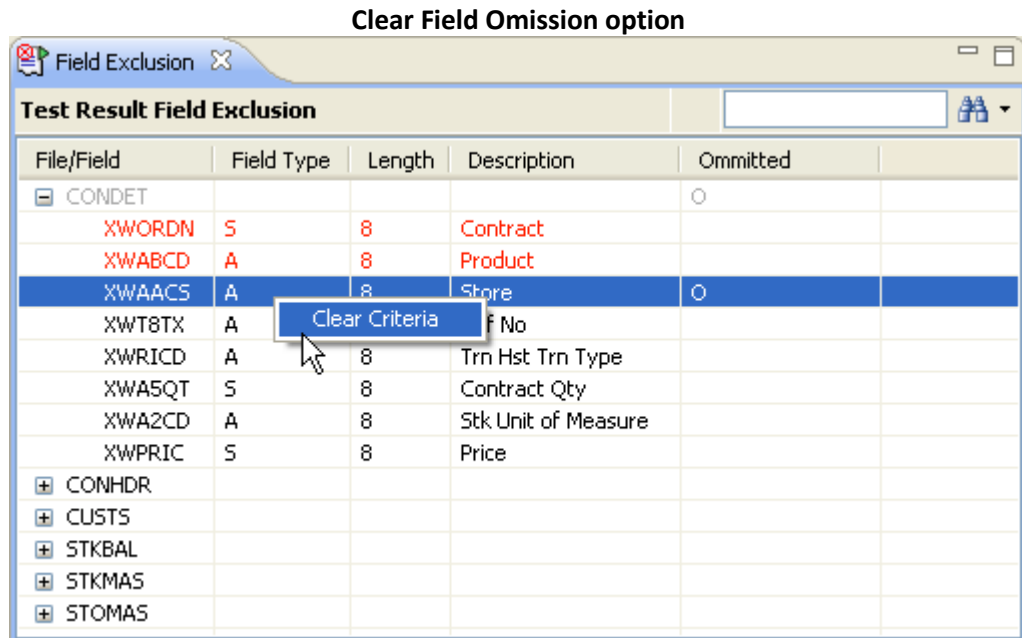




On selecting the exclusion option, **Omit from Result comparison**, the window gets updated and starts displaying **O** against the omitted field, as displayed below:

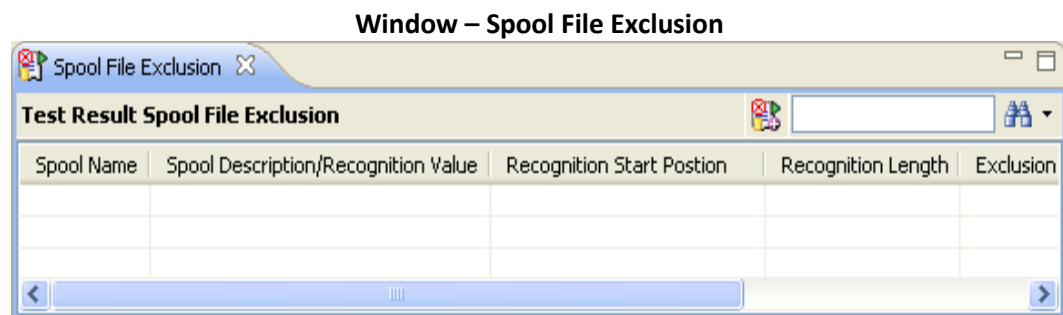


In order to clear field omission, select the omitted field and select the **Clear Criteria** option from the context menu.

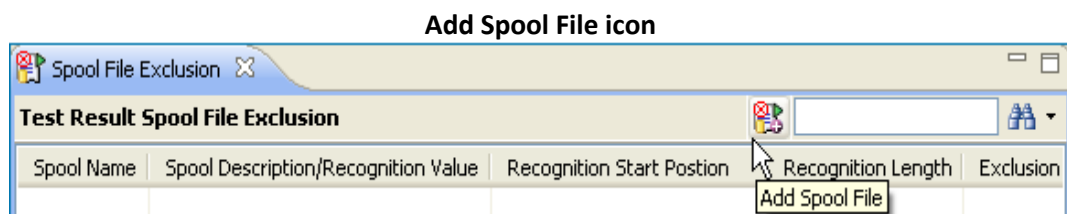


### Test Result Spool File Exclusion

There are some fields that may ‘pollute’ the test results during the test data comparison process. The **Test Result Spool File Exclusion** option helps you to exclude such polluted fields. On selecting this option, you will invoke a new window for Spool File Exclusion. The following screenshot displays the Spool File Exclusion window:

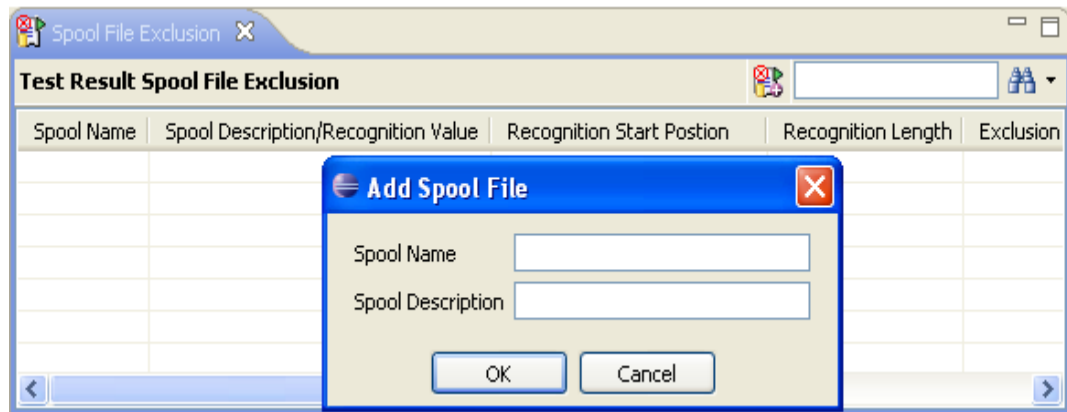


You can add a new spool file by clicking the **Add Spool File** icon, as shown below:



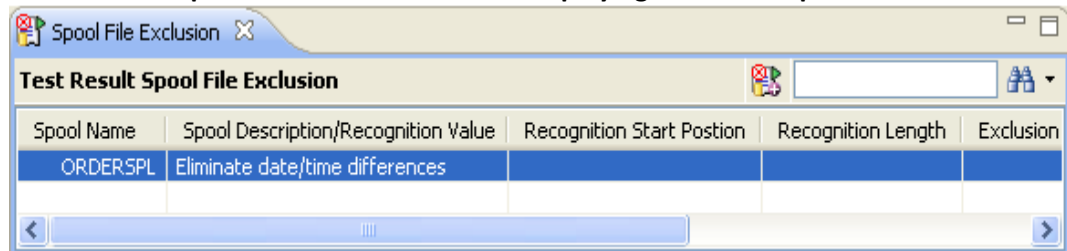
The following dialog box is invoked:

Dialog – Add Spool File



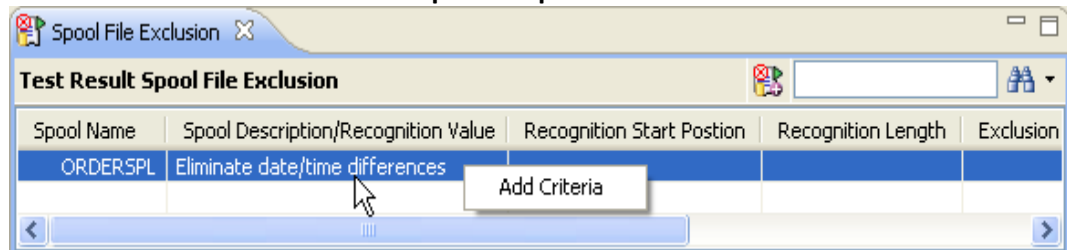
Provide the **Spool Name** and the **Spool Description** in the above dialog. Click **OK** to add the Spool File to the Spool File Exclusion window. In the following screenshot, the added Spool File is displayed:

Spool File Exclusion window displaying the added Spool File

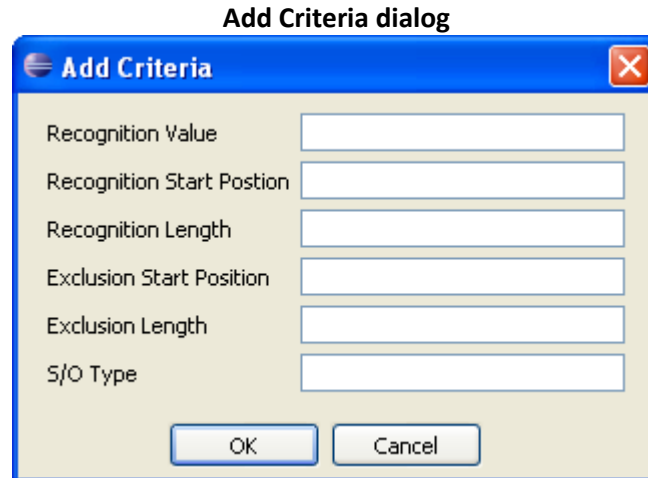


The next step will be to add exclusion criteria to the spool file. For this, select the spool file and right-click on it for the context menu. The menu contains a single option called **Add Criteria**.

Add Criteria option – Spool File context menu



Click the **Add Criteria** option to invoke the following dialog:



Provide the necessary criterions in the dialog box and click **OK** to add the criterions under the selected Spool File in the Spool File Exclusion window. Follow the same sequence of steps to add more Spool Files as per requirement.

For more details, refer to the X-DataTest User Manual.

## REENGINEER PROGRAMS

Refer to the Reengineer Programs section.

## GENERATE PROGRAMS

Refer to the Generate Programs section.

## AUDIT OPTIONS

For detailed description, refer to the Audit Options section given below.

## UML OPTIONS

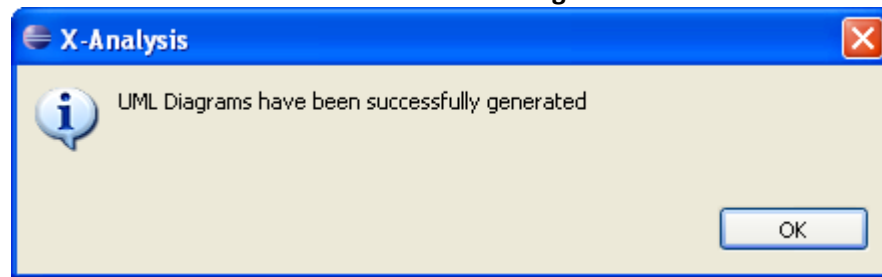
The **UML Options** menu has the following two options:

- Re-generate UML
- View App Area Class Diagram

### Re-generate UML

The **Re-generate UML** option is specific to application areas. When a user selects this option, then both the UML diagrams – Activity and Class diagrams are re-generated for the selected application area. When the process is over, the following dialog is displayed:

Information dialog

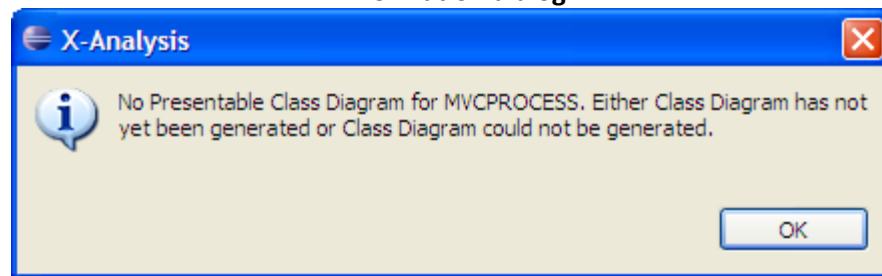


### View App Area Class Diagram

The **View App Area Class Diagram** option is specific to application areas. This is a special class diagram which displays all the objects available in the application area.

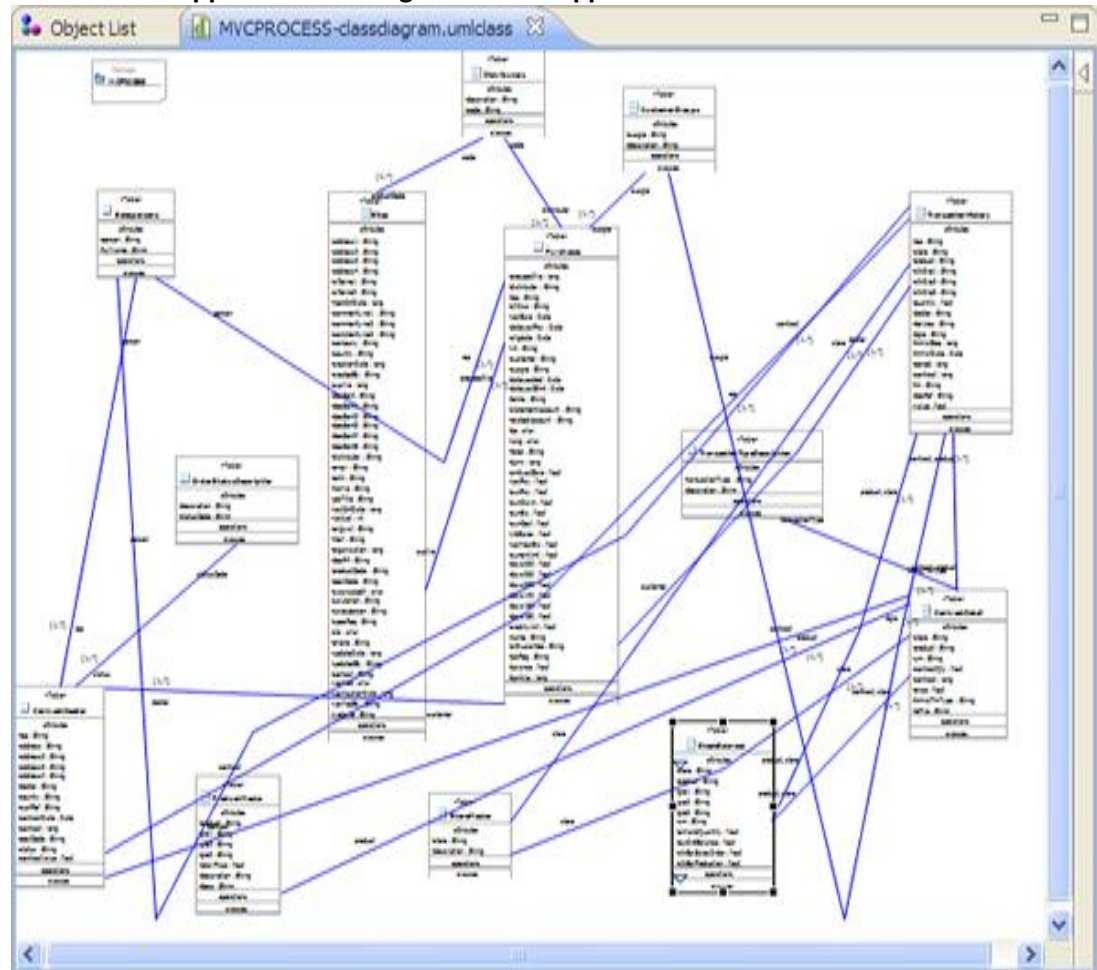
The following dialog is displayed when either the class diagram does not exist or the UML diagrams were not generated for the application area:

Information dialog



In order to view the class diagram for the application area, you must execute the **Re-generate UML** option.

App Area Class diagram for the application area MVCPROCESS



## DDL MODERNIZATION NODE ON AN APPLICATION AREA

The conversion of DDS into DDL is intended for the clients planning to modernize their databases to get the enhanced DDL features. Below are some of the benefits:

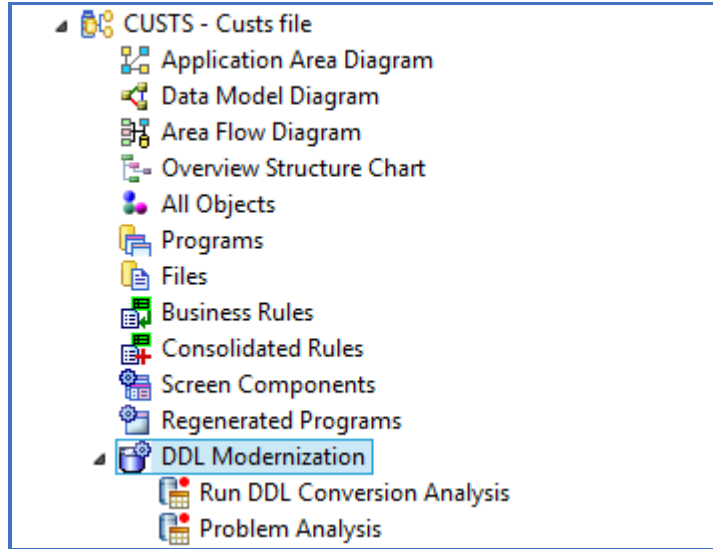
1. Better data integrity (data validation is performed at Write/Update, unlike in DDS where the validation is performed on a read)
2. Access to new data types not supported in DDS (identity columns, BLOBs, CLOBs, DataLinks etc.)
3. Better read performance.

### DDS to DDL – X-Analysis

In X-Analysis, enhancing the maintainability of databases by converting from DDS to DDL can be achieved via the **DDL Modernization** node. This feature is only available for

application areas. When an application area is expanded, the **DDL Modernization** node appears under it as shown below:

**DDL Modernization node under application area, CUSTS**



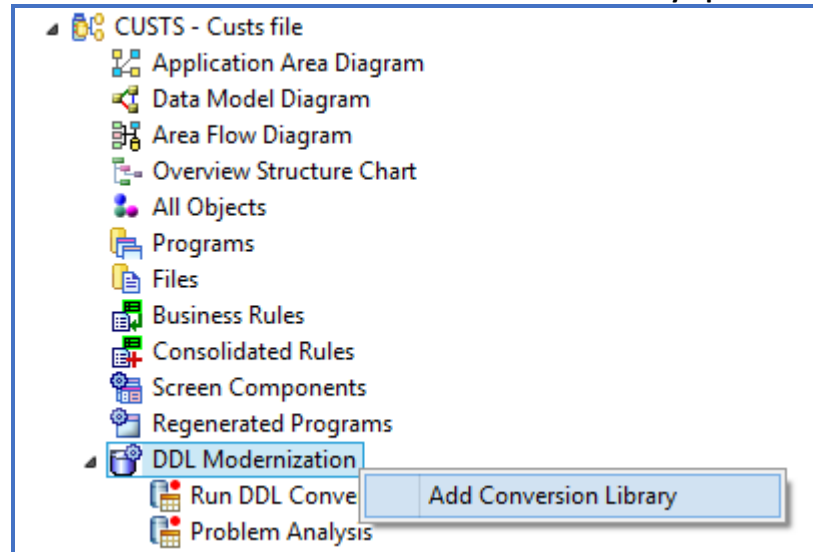
There are two sub-nodes under the **DDL Modernization** node. These are:

- Run DDL Conversion Analysis
- Problem Analysis

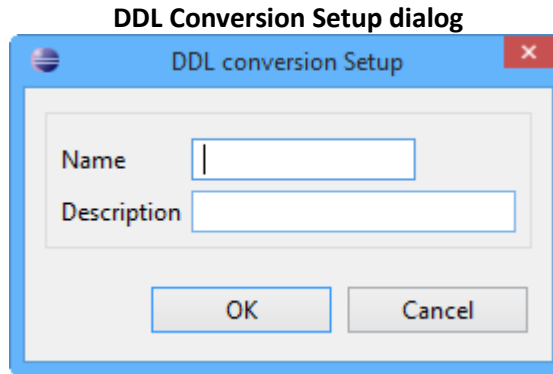
**Add Conversion Library**

Right-click on the **DDL Modernization** node for the **Add Conversion Library** option. This will invoke the **DDL Conversion Setup** dialog.

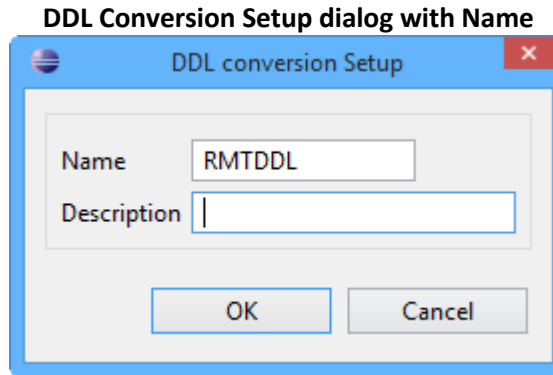
**DDL Modernization node – Add Conversion Library option**



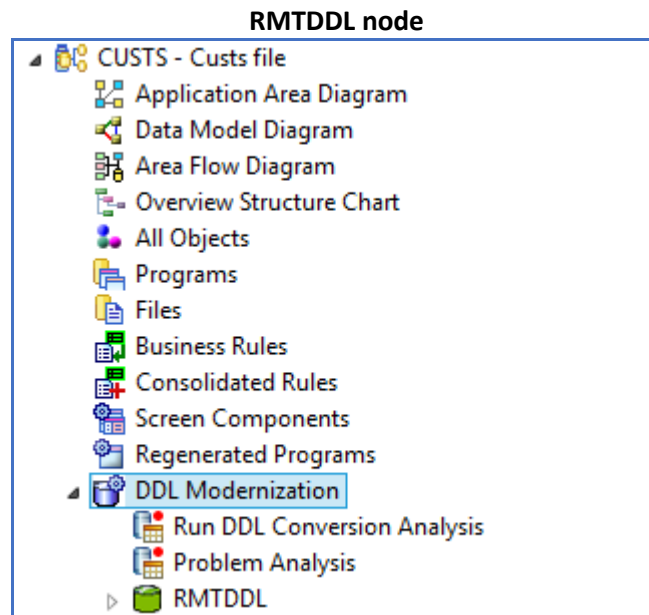
Through this dialog you can formulate a new DDL conversion setup.



Provide the **Name** and **Description** (adding **Description** is optional). The following image shows the name of the new DDL set up.

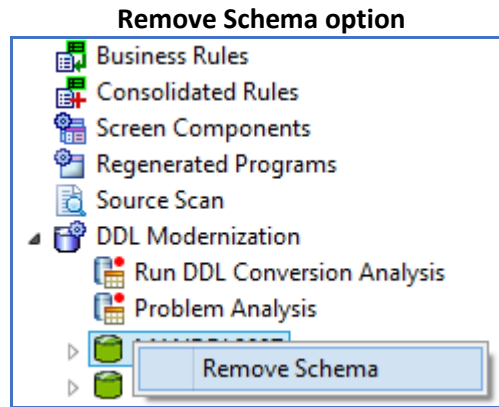


Click **OK**. The new node will appear as shown in the following image.





You may delete the newly-created node. Right-click on the node to select the **Remove Schema** option. The option is shown in the following image.

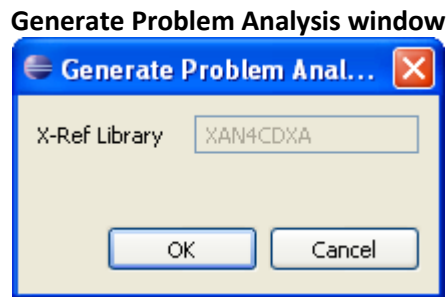


A confirmation dialog will appear asking you to confirm the deletion. The action removes the node from the Client UI and the table, although the schema library will continue to exist in the database and you must manually remove it.

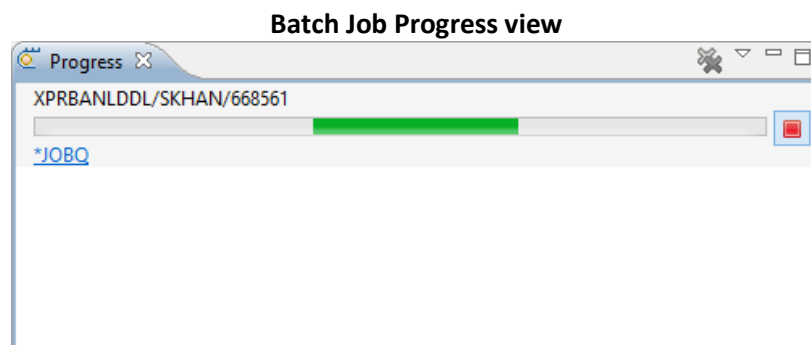
**Note: It is vital that if any PFs or LFs are converted, they have the same format level identifiers as the original in order to prevent repetitive level checks.**

### Run DDL Conversion Analysis

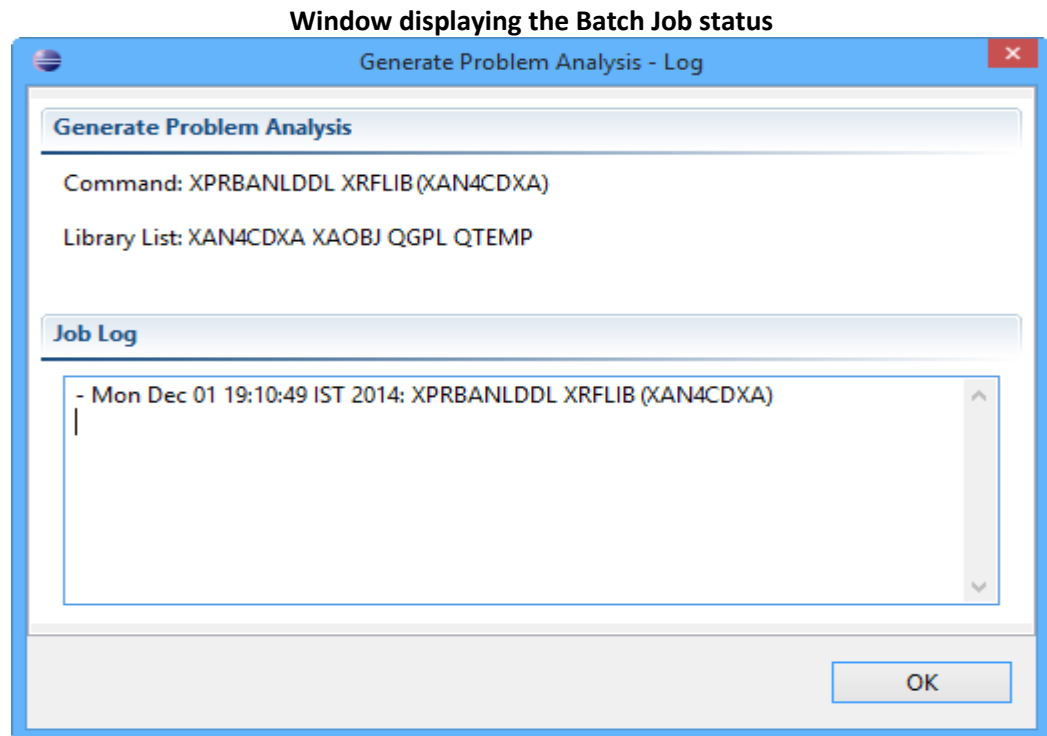
Select this option to invoke the following dialog:



Click **OK** to submit a batch job. The following window displays the progress of the batch job.



At any point, while the batch job is running, click on the hyperlink (\*JOBQ) to view the Job Log. The Job Log view is shown below:



## Problem Analysis

Problem Analysis contains specific information related to DDL conversion issues.

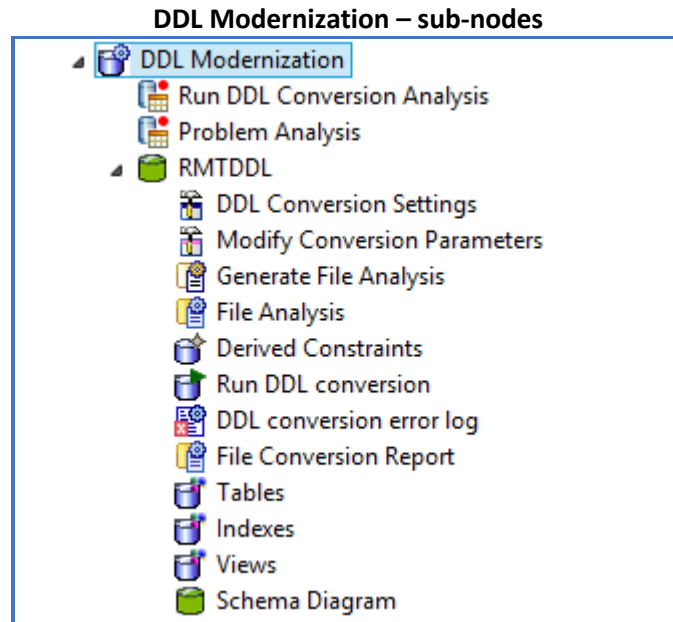
Double-click on the **Problem Analysis** option. The following image presents the conversion issues (like PFs with non-unique key) for the application area, **CUSTS**.

**Problem Analysis window**

Alert/Category/Object	Total	Description	Source Detail	Object Libra
<b>Problem Analysis data for CUSTS - Total Problems: 19</b>				
▲ DDL Conversion Issues	5			
▲ File is a Joined logical	1			
ORDBALDTL			XAN4CEM/QDDSSRC(ORDBA...	XAN4CEM
▷ PF with non-unique key	6			
▷ LFs referenced by embedded SQL	7			
▲ LFs referenced by Query	1			
CUSTSL1		by Cus Grp/Customer	XAN4CEM/QDDSSRC(CUSTSL1)	XAN4CEM
▲ Foreign Key value does not match parent key value	4			
CONDET			RMTDDL/QDDL SRC(CONDET)	RMTDDL
CONHDR			RMTDDL/QDDL SRC(CONHDR)	RMTDDL
PROJECT			RMTDDL/QDDL SRC(PROJECT)	RMTDDL
TRNHST			RMTDDL/QDDL SRC(TRNHST)	RMTDDL

## DDL Conversion – RMTDDL

The sub-nodes under the new node are shown below:



### DDL Conversion Settings

When the **DDL Conversion Settings** option is clicked, the following dialog is invoked.

**DDL Conversion Settings window**

The Generation method of DDL conversion is as follows:

■ Basic Conversion:

- (i) PF with Unique key will be created as Table with Primary key.
- (ii) PF with non-UNQ key will be suffixed surrogate table without key and Index with the key will be created with PF name.
- (iii) PF without key will be created as table.
- (iv) LF will get converted to DDL indexes/views as applicable.

■ Surrogate Table for Keyed PFs and Index for PF keys:

- (i) & (ii) Tables will be created with suffixed name + index with PF name
- (iii) Table as specified above
- (iv) same as above

■ Surrogate Table for PF and DDS LF for original PF fields/keys.

- (i), (ii) & (iii) - suffixed surrogate table + DDS LF with PF name
- (iv) same as above

- Surrogate Table for PF and DDS LF for PF and all Access Paths.

(i), (ii) & (iii) - as above

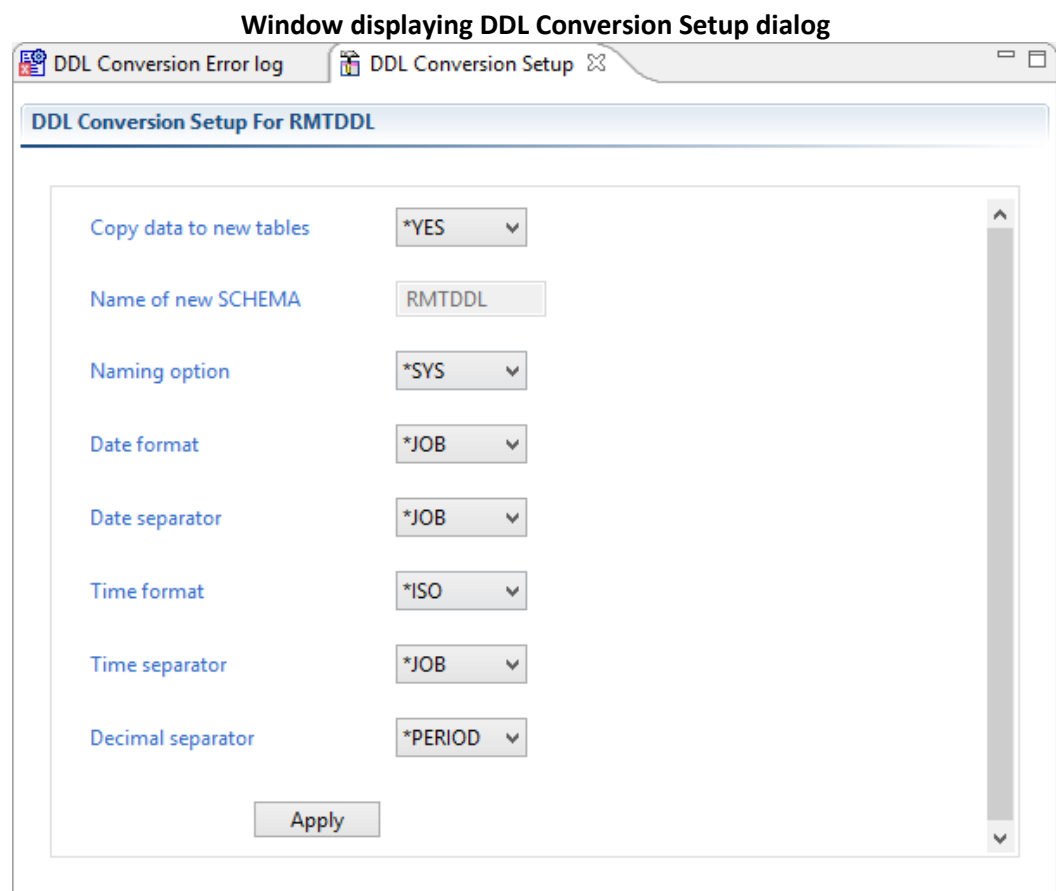
(iv) DDS LF method of indexes/views.

Check the other relevant boxes as per the conversion requirements, and then click **Apply**.

**Note: The Import Column Template in the image provided above is disabled. To enable this feature, the XDDLTMPLTE table must be populated manually from the IBM i screen.**

### Modify Conversion Parameters

Double-click the **Modify Conversion Parameters** option to invoke the following window.

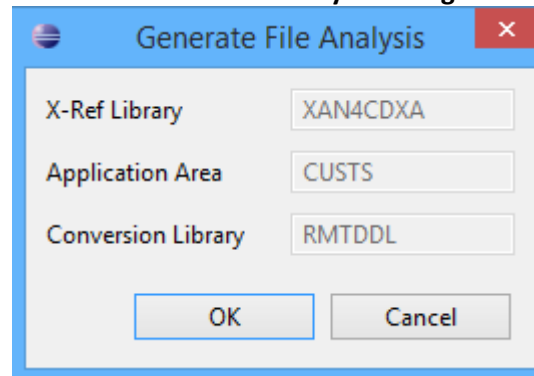


Modify the conversion parameters as is required. Then, click **Apply** to implement the changes.

### Generate File Analysis

When you select the **Generate File Analysis** option, the following dialog will be invoked.

Generate File Analysis dialog



Click **OK**.

### File Analysis

When you select the **File Analysis** option, a list will be presented displaying all the files. These files are sorted to be rebuilt as SQL Index, LF, rebuilt directly as SQL Tables, or Unspecified category.

The following screenshot shows the File Analysis list for application area, **CUSTS**.

File Analysis window

Category/Object	Description	Type	Attribute	Object Library	Source Library	Source File
▶ To be rebuilt as SQL Index	Count:49					
▶ To be rebuilt as LF	Count:13					
▲ To be rebuilt directly as SQL Tables	Count:8					
CONDET	Contract Detail	TABLE	PF	XAN4CDEM	XAN4CDEM	QDDSSRC
CONHDR	Contract Header	TABLE	PF	XAN4CDEM	XAN4CDEM	QDDSSRC
CUSF	Sites	TABLE	PF	XAN4CDEM	XAN4CDEM	QDDSSRC
CUSGRP	Customer Groups	TABLE	PF	XAN4CDEM	XAN4CDEM	QDDSSRC
CUSTS	Purchases	TABLE	PF	XAN4CDEM	XAN4CDEM	QDDSSRC
PROJECT	Projects	TABLE	PF	XAN4CDEM	XAN4CDEM	QDDSSRC
PROTRK	Project Tracking	TABLE	PF	XAN4CDEM	XAN4CDEM	QDDSSRC
TRNHST	Transaction History	TABLE	PF	XAN4CDEM	XAN4CDEM	QDDSSRC
▲ Unspecified Category	Count:2					
ASTATUSL1	Non-keyed LF	VIEW	LF	XAN4CDEM	XAN4CDEM	QDDSSRC
ORDBALDTL		VIEW	LF	XAN4CDEM	XAN4CDEM	QDDSSRC

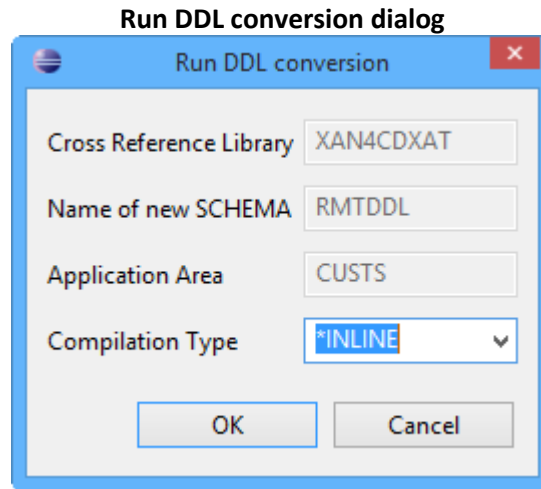
### Derived Constraints

Derived constraints are optionally generated during DDL modernization. These constraints are derived from the Data model.

The validity of the constraints is determined during problem analysis; the entries which are invalid are reported as usual in the **DDL Modernization->Problem Analysis** node.

### Run DDL conversion

When you double-click on the **Run DDL conversion** option, the following dialog shows up:



Choose the **Compilation Type** from the drop-down menu. The default option is **\*INLINE**. Click **OK**.

### DDL conversion error log

The **DDL conversion error log** lists the record of errors which occurred during the DDL conversion process.

### File Conversion Report

The **File Conversion Report** lists all the objects for conversion under the given categories – **To be rebuilt as SQL Index**, **To be rebuilt as Table with LF for existing name**, **To be rebuilt directly as SQL Tables** and **Unspecified category**. This window is similar to the **File Analysis** window.

The following screenshot shows the **File Conversion Report** for **CUSTS**. It gives the total count for the objects falling under each category.

### File Conversion Report for CUSTS

Category/Object	Description
▶ To be rebuilt as SQL Index	Count:56
▶ To be rebuilt as Table with LF for existing name	Count:13
▶ To be rebuilt directly as SQL Tables	Count:14
▶ Unspecified Category	Count:1

When you expand each category, the details of the files are presented as shown below.

This details show data after the conversion has been performed. This is seen in the Format level identifier columns for before and after conversion. Moreover, the record count before and after conversion can also be seen.

### Detailed view of File Conversion Report

Category/Object	Description	Object Library	Source Library	Source File	Target Library	Target File	Frmt Id Before	Frmt Id After	Rec Bef...	Rec After
▶ To be rebuilt as SQL Index	Count:56									
▲ To be rebuilt as Table with LF for existing	Count:13									
ASTATUS	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	2FD29BC8C74...	2FD29BC8C74...	0	0
CONDEL1	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	432B98FF0135C	432B98FF0135C	0	0
CONDEL2	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	432B98FF0135C	432B98FF0135C	0	0
CONDEL3	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	432B98FF0135C	432B98FF0135C	0	0
CUSTSL1	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	49C1211A71718	49C1211A71718	0	0
CUSTSL2	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	49C1211A71718	49C1211A71718	0	0
CUSTSL4	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	49C1211A71718	49C1211A71718	0	0
CUSTSL5	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	49C1211A71718	49C1211A71718	0	0
DISTS	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	2B06DADC49...	2B06DADC49...	0	0
LISTS	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	2CE87CAEEC...	2CE87CAEEC...	0	0
ORGS	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	33E7A236EC196	33E7A236EC196	0	0
PTYPES	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	304D50AA4C1...	304D50AA4C1...	0	0
SLMEN	Logical file cr...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDDSSRC	1DD9402FDDA...	1DD9402FDDA...	0	0
▶ To be rebuilt directly as SQL Tables	Count:14									
▲ Unspecified Category	Count:1									
ASTATUSL1	View created ...	RMTDDL	XAN4CDEM	QDDSSRC	RMTDDL	QDLSRC	2FD29BC8C74...	2FD29BC8C74...	0	0

## Tables

Double-click the **Tables** sub-node to invoke the following window. It presents the names of all the Tables for **RMTDDL**. Each table is also assigned a system table name.



Window displaying Tables for RMTDDL

Table Name	System Table Name	Table Schema
TRANSACTION_HISTORY_TRNHST	TRNHST	RMTDDL
STATUS_FILE_ASTATUS	ASTATUSXQ	RMTDDL
CONTRACT_DETAIL_CONDET	CONDET	RMTDDL
CONTRACT_HEADER_CONHDR	CONHDR	RMTDDL
CUSF	CUSF	RMTDDL
CUSTOMER_GROUPS_CUSGRP	CUSGRP	RMTDDL
PURCHASES_CUSTS	CUSTS	RMTDDL
DISTRIBUTORS_DIST	DISTSXQ	RMTDDL
LISTSXQ	LISTSXQ	RMTDDL
ORGANISATIONS_ORGS	ORGSXQ	RMTDDL
PROJECTS_PROJECT	PROJECT	RMTDDL
PROJECT_TRACKING_PROTRK	PROTRK	RMTDDL
PRODUCTS_PTYPE	PTYPESXQ	RMTDDL
SALESPERSONS_SLMEN	SLMENXQ	RMTDDL

The table names have a right-click option, **Zoom Source** to invoke the Source List for that table. Select the **Zoom Source** option to invoke the following window:

Source List window – CUSF

Seq No	*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...
0001.00	-- Generate SQL
0002.00	-- Version: V7R1M0 100423
0003.00	-- Generated on: 22/06/15 12:06:51
0004.00	-- Relational Database: S108B00R
0005.00	-- Standards Option: DB2 for i
0006.00	

### Indexes

Double-click the **Indexes** sub-node to display the index names. Similar to the Tables, each index is assigned a System Index Name.

Window displaying Indexes for RMTDDL

Index Name	System Index Name	Index Schema
CONDETL1	CONDETL1	RMTDDL
CONDETL2	CONDETL2	RMTDDL
CONDETL3	CONDETL3	RMTDDL
CONHDL1	CONHDL1	RMTDDL
CONHDL1A	CONHDL1A	RMTDDL
CONHDL2	CONHDL2	RMTDDL
CONHDL3	CONHDL3	RMTDDL
CONHDL4	CONHDL4	RMTDDL
CONHDL5	CONHDL5	RMTDDL
CUSFLA	CUSFLA	RMTDDL
CUSFLB	CUSFLB	RMTDDL
CUSFLC	CUSFLC	RMTDDL

Right-click on an index name to invoke the **Zoom Source** option. The following image shows the Source List for a selected Index name:

Source List window – CONDETL1

Seq No	Content
*...+... 1	-- Generate SQL
0001.00	-- Version: V7R1M0 100423
0002.00	-- Generated on: 22/06/15 12:06:57
0003.00	-- Relational Database: S108B00R
0004.00	-- Standards Option: DB2 for i
0005.00	
0006.00	CREATE INDEX CONDETL1
0007.00	ON CONDET ( XWAACS ASC , XWORDN ASC , XWABCD ASC )
0008.00	;
0009.00	

### Views

Select the **Views** sub-node to invoke the window listing the Table Name besides the System View Name. The screenshot below presents the Views window:

Window displaying Views for RMTDDL

Table Name	System View Name	Table Schema
ASTATUSL1	ASTATUSL1	RMTDDL

Select the **Zoom Source** option to invoke the Source List window.

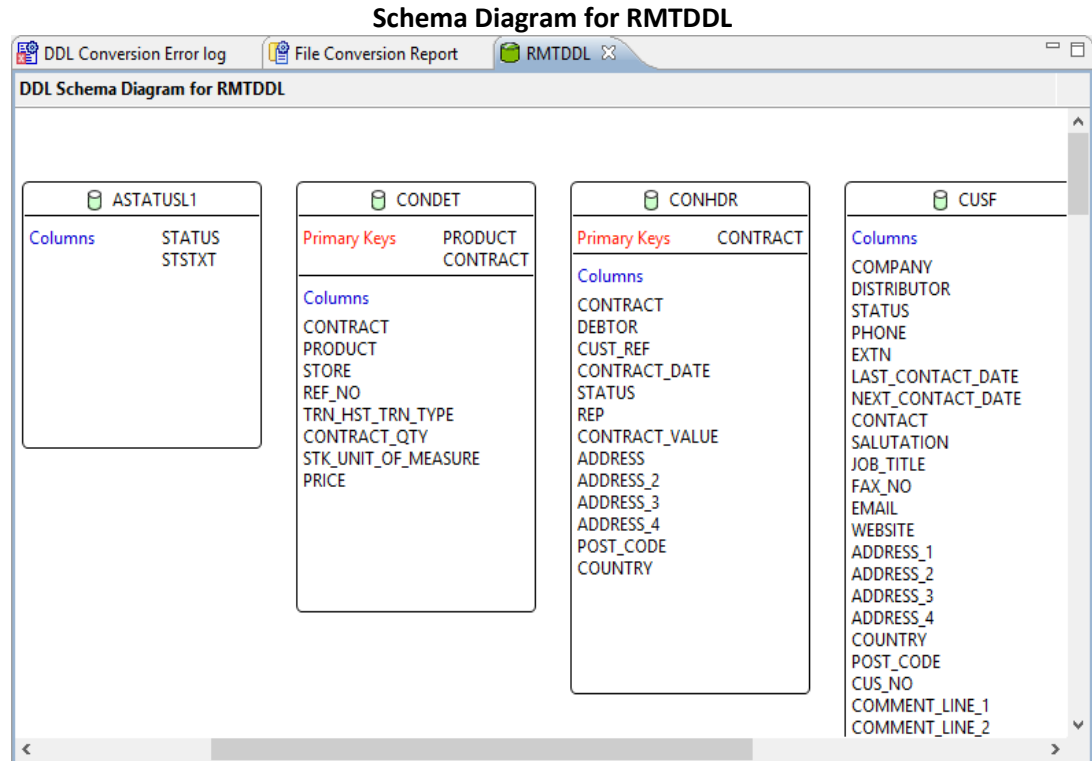
Source List window – ASTATUSL1

Seq No	Source Text
0001.00	-- Generate SQL
0002.00	-- Version: V7R1M0 100423
0003.00	-- Generated on: 22/06/15 12:06:56
0004.00	-- Relational Database: S108B00R
0005.00	-- Standards Option: DB2 for i
0006.00	
0007.00	CREATE VIEW ASTATUSL1 (
0008.00	STATUS ,
0009.00	STSTXT )

**Note:** Zoom Source displays the source from QDDL SRC, if existing in the given library. Otherwise, the image of DSPFFD would be displayed.

### Schema Diagram

Select the **Schema Diagram** option to invoke the block diagram for the entire schema. The diagram shows the files and relation among the files. Various relevant details like the primary keys, foreign keys, columns are presented in the Schema Diagram.

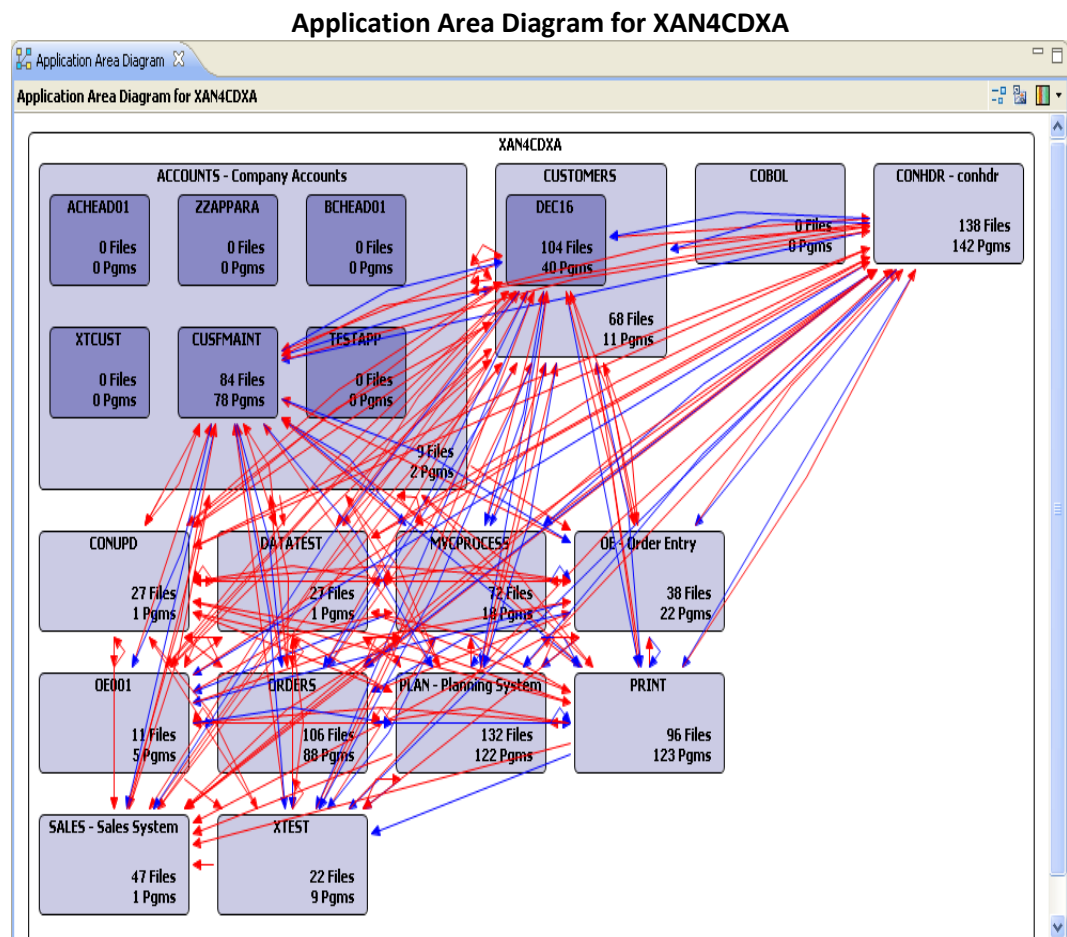


# Application Area Diagramming

## APPLICATION AREA DIAGRAM

X-Analysis allows easy subdivision of an application into business areas or application areas. You can split the application areas further into sub-application areas for better application analysis. For analyzing an application/application area, X-Analysis provides another diagrammatic construct called Application Area Diagram.

The Application Area Diagram helps in visualizing the relationships between various applications areas. When selected for the entire cross-reference library, the **Application Area Diagram** option displays all the application areas and sub-application areas.



The bluish-grey blocks represent an application area. The size of the box is indicative of number of objects it contains. A larger box has more objects as compared to a smaller box.

The relationship among various application areas can also be displayed by selecting an application area. Select an application area to test this.

The Application Area Diagram displays colored arrows – Red and Blue.

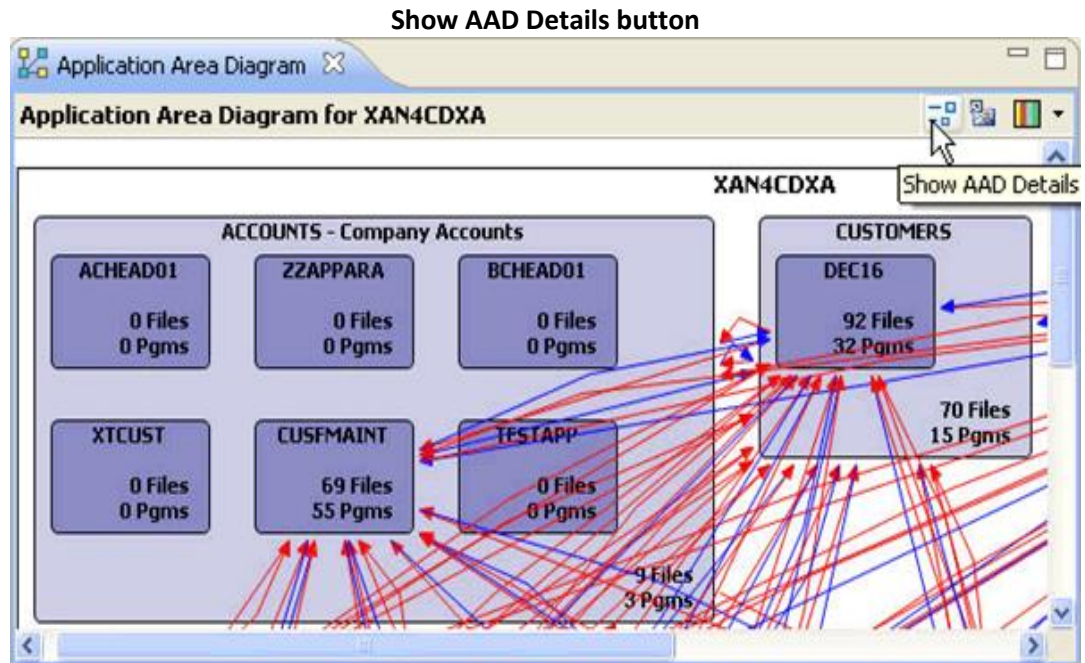
**Blue Arrow** – Displays Program-to-Program calls. The blue arrow points towards the application areas which has more calling programs.

**Red Arrow** – Program-to-File references are displayed with distinct red arrows.

In case a program from both application areas refers to files of the other application areas, then there should be two distinct red arrows.

### Application Area Diagram Details View

The Application Area Diagram provides an option to view the Application Area Diagram details. Click **Show AAD Details** on the Application Area Diagram toolbar.



A new window displaying the relationship details for all the application areas will be invoked.

Application Area Diagram details for XAN4CDXA

Application Area:	Rel Application Area	Type	Object Count
ACCOUNTS	COBOL	Referred File	1
ACCOUNTS	COBOL	Called Program	1
ACCOUNTS	CONHDR	Referred File	2
ACCOUNTS	CUSFMAINT	Referred File	4
ACCOUNTS	CUSFMAINT	Called Program	1
ACCOUNTS	CUSTOMERS	Referred File	1
ACCOUNTS	CUSTOMERS	Called Program	1
ACCOUNTS	DEC16	Referred File	2
ACCOUNTS	DEC16	Called Program	1
ACCOUNTS	MVCPROCESS	Referred File	2
ACCOUNTS	ORDERS	Referred File	1

The **Show AAD Details** displays limited records, if a particular application area is selected from the Application Area Diagram.

AAD details for selected Application Area

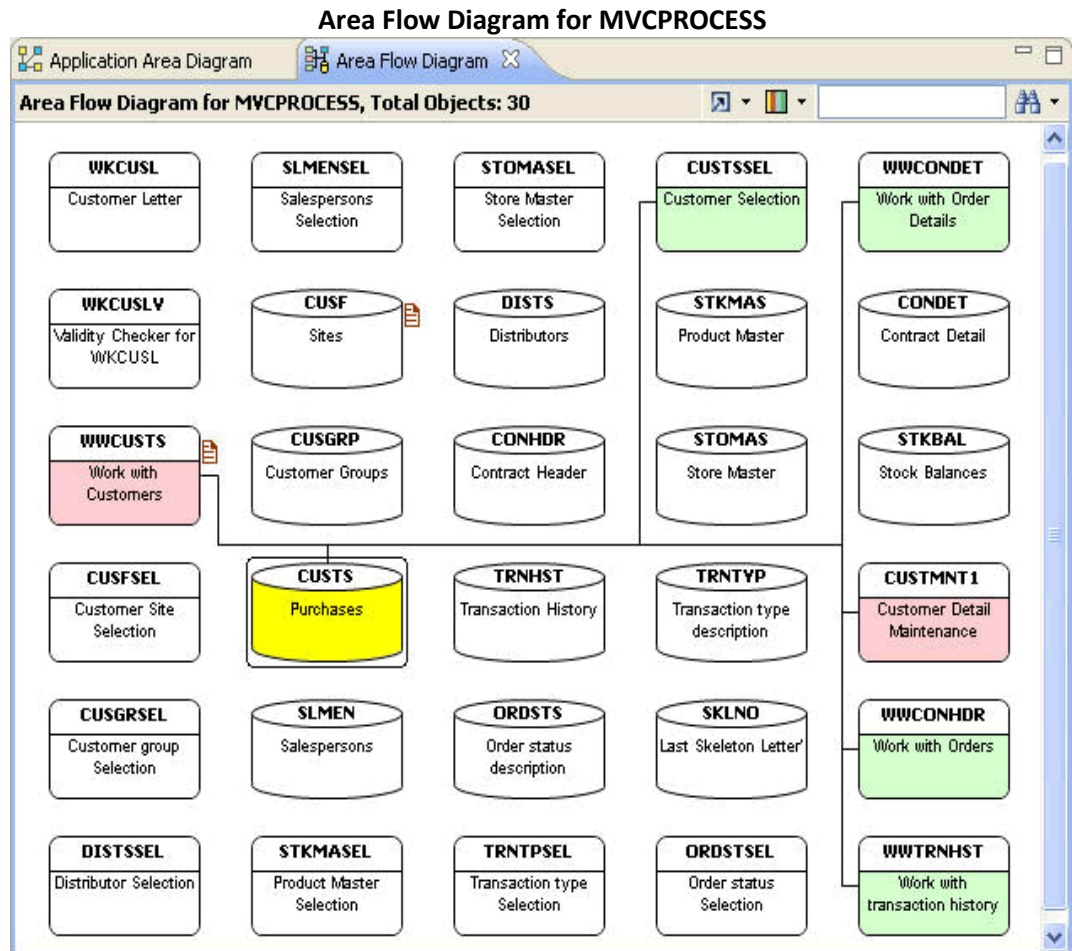
Application Area:	Rel Application Area	Type	Object Count
ACCOUNTS	CONHDR	Referred File	4
ACCOUNTS	CONUPD	Referred File	1
ACCOUNTS	CUSFMAINT	Referred File	5
ACCOUNTS	CUSTOMERS	Referred File	2
ACCOUNTS	DATATEST	Referred File	1
ACCOUNTS	DEC16	Referred File	3
ACCOUNTS	MVCPROCESS	Referred File	3
ACCOUNTS	OE	Referred File	1

## AREA FLOW DIAGRAM

The Area Flow Diagram (AFD) can be generated for an individual application area.

Select the **Area Flow Diagram** option to display programs and files in an application area along with the relations among them. The default selection is on the file which has the most referring programs.

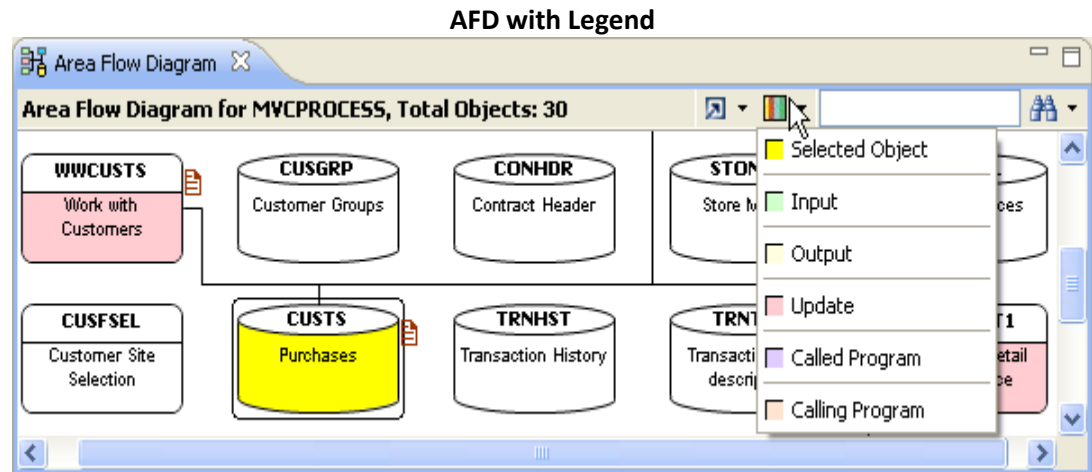
The following screen displays the AFD for the application area, **MVCPROCESS**.



### Legend

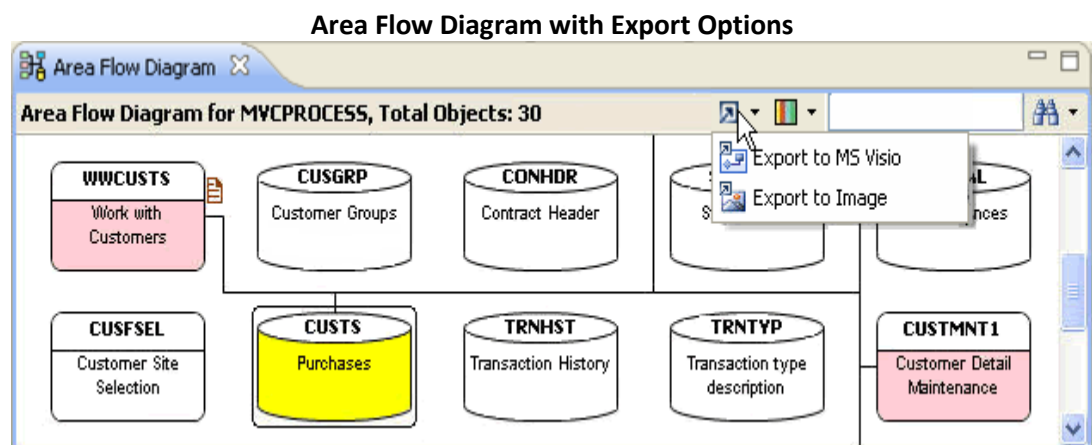
The nature of the programs and the files can be established through the AFD **Legend** bar. The image is shown below.





- **Selected Object** – This depicts the object on which you have made the selection. The highlighted objects are those referred to by the object.
- **Input** – This depicts the input file if program is selected, and a program receiving input if file is selected.
- **Output** – This depicts the output file if program is selected, and a program writing output if file is selected.
- **Update** – This depicts the Update file.
- **Called Program** – This depicts the program called by other programs.
- **Calling Program** – This depicts the program calling other programs.

Click **Export Options** and select to export the generated AFD into either **MS Visio** or **Image**.



## Quick Reference to an Object

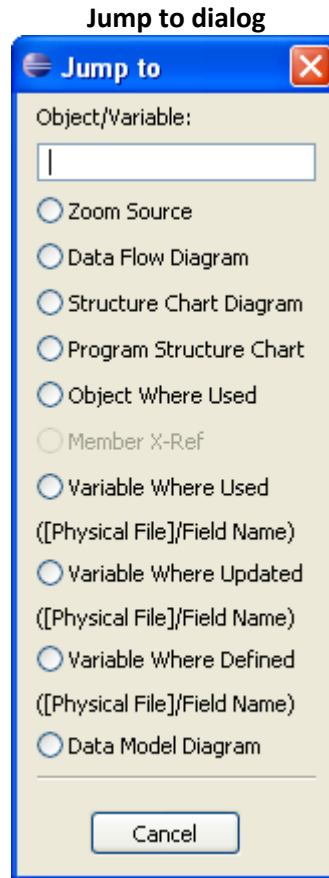
X-Analysis is loaded with various options that provide more information regarding the various objects/members. These options let you to refer to any given object in quick time, and also provide relevant information and/or diagrammatic presentations, as is required.

Feature	Brief Description
Jump to	Displays all the options available for a specified member, object or variable for fast access to Source Browser, DFD, Structure Chart, PSC, Object Where Used, Source cross-reference, Variable Where Used and DMD.
Source Browser View	Displays source code of the selected member. Provides various options related to the source code.
Object Where Used	Displays all the instances of an object in the application.
Variable Where Used	Displays all the instances of the specified variable in the application.
File Field Details	Displays the Field Details for a file.
LFs / Access Paths	Displays all Access Paths for the selected Physical File.
Member X-Ref	Displays all the instances of the specified variable in the source code. This is available only on the Source Browser view.
Enhanced Member X-Ref	Displays the references of a variable in the member, along with the information.
Add Bookmark	Displays the bookmarked source lines, besides allowing you to edit bookmarks as per requirement.
More Info	Displays detailed object Information like name, library, type, attribute, etc.

### JUMP TO DIALOG

The primary requirement of an analyst working with a case tool is to get quick and ample information about an object. X-Analysis facilitates this by providing faster access to the objects using the **Jump To** utility. This utility is accessible from any screen using the **Jump To** button on the toolbar.

**Jump to** displays all the options available for a specified member, object, or variable for fast access to Source Browser, DFD, Structure Chart, PSC, Object Where Used, Member X-Reference, Variable Where Used and DMD.

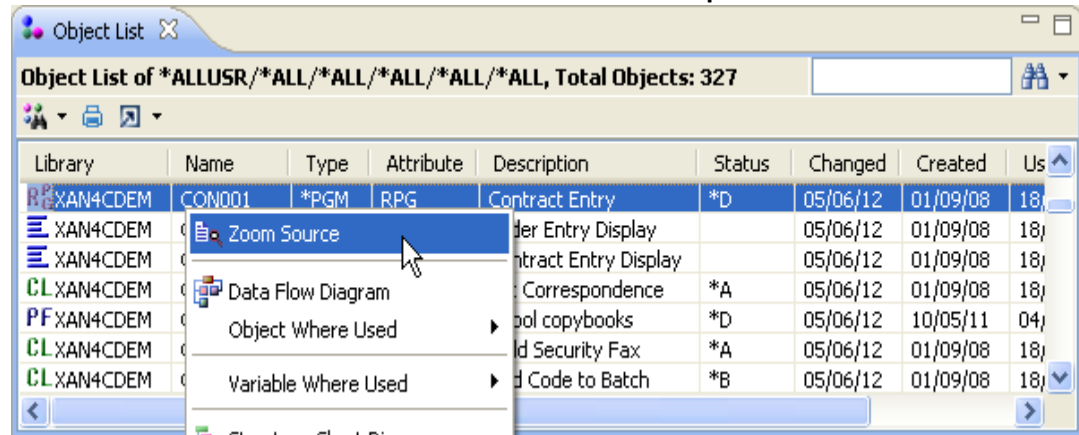


Options	Each option acts on the Object/Variable specified in the selection edit box
Zoom Source	Zooms the source code of the object.
Data Flow Diagram	Displays the Data Flow Diagram of the object.
Structure Chart Diagram	Displays the Structure Chart of the object.
Program Structure Chart	Displays the sequence of calls within the program.
Object Where Used	Displays all the instances of an object in the application.
Member X-Ref	Lists all the Source Lines where the Field/Variable has been used/referenced, in the Source Member and its associated Device Files and Copybooks. This option enables only when <b>Jump to</b> is opted on the Source Browser.
Variable Where Used	Displays all the instances of the specified variable in the application.
Variable Where Updated	Same as Variable Where Used, but displays only those source lines where the field is updated.
Variable Where Defined	Displays the source lines where the variable is defined.
Data Model Diagram	Displays the Data Model Diagram of the object.

## SOURCE BROWSER VIEW

The source browser displays the source for an object. The context menu on any member/object has the **Zoom Source** option which invokes the source browser for that object or member.

Context menu – Zoom Source option

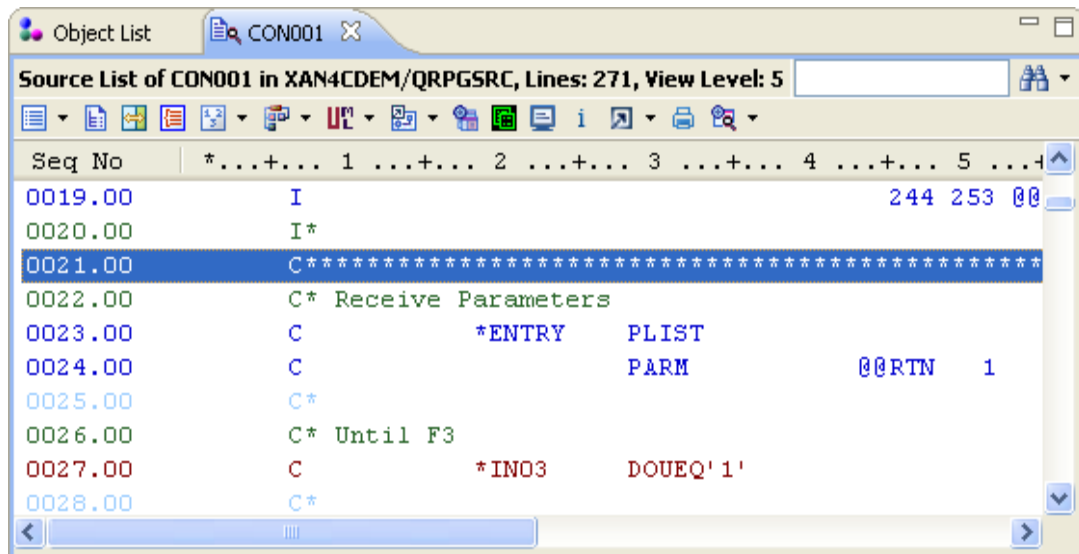


Select any member/object and double-click on it to open the source member of that object in the X-Analysis source browser.

### Zoom Source

The Source Browser follows the pattern similar to IBM's SEU and is equivalent to viewing a source member in SEU browser mode. However, the X-Analysis source browser provides a number of additional features. It allows you to browse another source, and also continue with another zoom on reaching there. Further, you can traverse to the previous screen from where the zoom was issued.

Source Browser View



**Note the following on this view:**

- When the Source Browser invokes, then the cursor is positioned to the beginning of C-specifications for RPG/RPGLE programs and Procedure Division for COBOL programs.
- Double-click on the line performs 'Member X-Ref' or 'Object Where Used' depending on whether Object/Variable is available on that line. Preference is given to the **Member X-Ref** option, in case it is a Program. On Physical/Logical Files, Global Where Used is performed for the field on that line for that file.

**Use of Templates by the Source Browser**

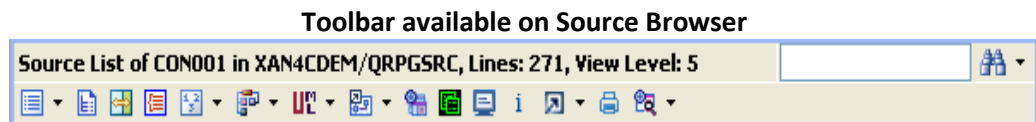
The source browser uses the extension of any **\*PGM** file to determine its type, for e.g. the attributes which are equivalent to CBL are: CBLLE, CBLnn (CBL36 & CBL38), CICSCBL, CICSSQLCBL, SQLCBL, SQLCBLLE, and undefined attributes if it is a COBOL Source File.

Information about an object can be displayed by selecting/highlighting the object and performing any of these:

- Opt for the context menu to select an option.
- Double-click to bring up a designated view depending on the current view.

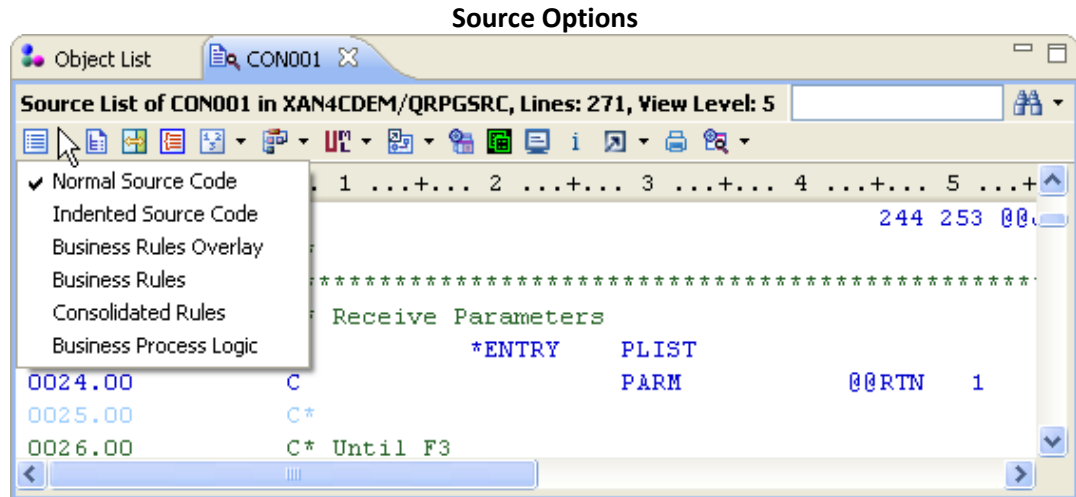
**Zoom Source toolbar**

Zoom Source toolbar comprises various options which are discussed below.



**Source Options**

**Source Options** is the drop-down menu presenting the different source mode views that are available.

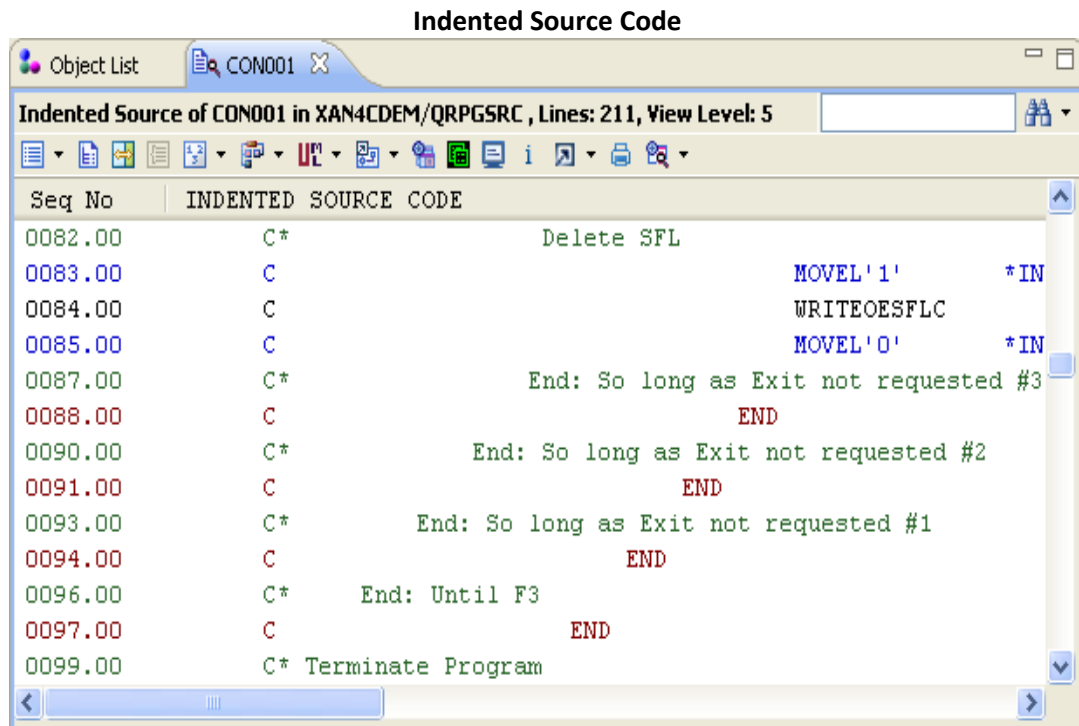


### Normal Source Code

The Normal Source Code is the default source view for RPG/COBOL programs.

### Indented Source Code

Select **Indented Source Code** from **Source Options** to display the indented source code:



### Business Rules Overlay

Select the **Business Rules Overlay** option to observe the business rules embedded in the Normal Source Code. The following screen displays the Business Rules Overlay view for **CON001**.

**Business Rules Overlay window**

**Business Rules Overlay for CON001 ...QRPGSRC, Lines: 282, View Level: 5**

Seq No	Code	Annotation
0043.00	C	EXFMTOESFLC 99
0044.00	C*	
0045.00	C*	So long as Exit not requested #1
0046.00	C	*IN03 IFNE '1'
0047.00	C*	
0048.98	R00001C*	Contract > 300000
0048.00	C*	Validate Contract no.
0049.00	C	DSORDN IFGT 300000
0050.00	C	MOVEL'OEM0010' ZMSGID 7
0051.00	C	ENDIF
0052.00	C*	

**Business Rules**

Business Rules for CON001, Number of Lines: 11

Source Member	Rule Number	Field	File	Rule
CON001	00001	XWORDN	CONDET	Contract > 300000
CON001	00002	XWORDN	CONHDR	Contract not found on Contract_Header
CON001	00003	XWBCCD	CONHDR	Debtor not found on Purchases
CON001	00004	XWORDN	CONHDR	Contract found on Contract_Header
CON001	00005	XWABCD	CONDET	Product <> 0
CON001	00006	XWABCD	CONDET	Product found on Contract_Detail
CON001	00007	XWABCD	CONDET	Product <> 0
CON001	00008	XWABCD	CONDET	Product not found on Product_Master
CON001	00009	XWABCD	CONDET	Product not found on Stock_Balances
CON001	00010	XWAACS	CONDET	Store not found on Store_Master
CON001	00011	XWABCD	CONDET	Product not found on Transaction_History

### Business Rules

Select the **Business Rules** option to access the business rules for the selected source member. The Business Rules for **CON001** are displayed below.

**Business Rules**

The screenshot displays the Business Rules application interface. The top window shows the source code for Business Rules for CON001. The code includes comments and logic for validating contract numbers. The bottom window shows a table of consolidated rules for CON001, listing 11 rules with their source members, rule numbers, fields, files, and descriptions.

```

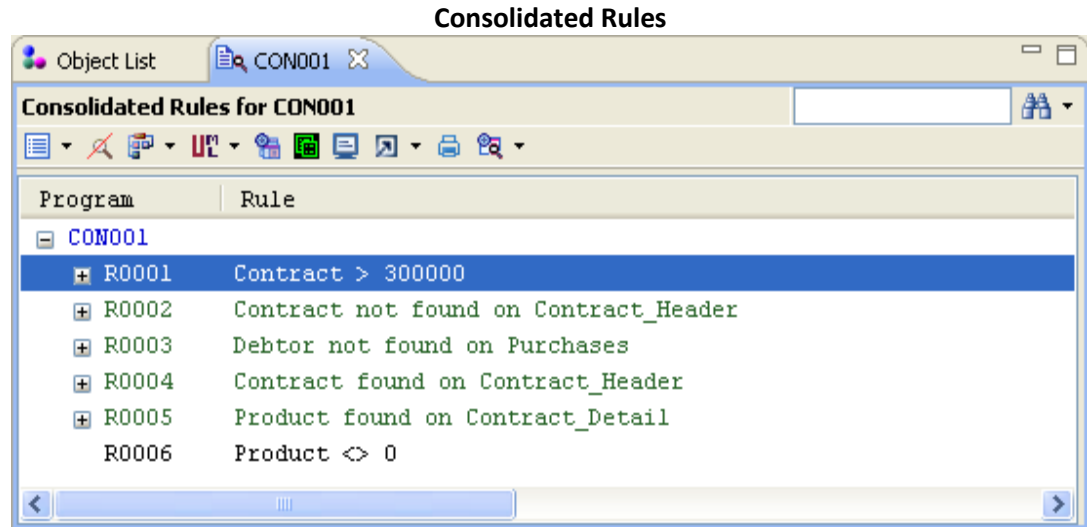
Business Rules
// Receive Parameters
// Until F3
// Initialise screen
// Get Contract No. & Customer No.
// So long as Exit Not requested #1
R00001 Contract > 300000
// Validate Contract no.
IF XWORDN > 300000
    ERROR OEM0010
END
// Retrieve Contract Details
// Set up blank subfile for Product lines
    
```

Source Member	Rule Number	Field	File	Rule
CON001	00001	XWORDN	CONDET	Contract > 300000
CON001	00002	XWORDN	CONHDR	Contract not found on Contract_Header
CON001	00003	XWBCCD	CONHDR	Debtor not found on Purchases
CON001	00004	XWORDN	CONHDR	Contract found on Contract_Header
CON001	00005	XWABCD	CONDET	Product <> 0
CON001	00006	XWABCD	CONDET	Product found on Contract_Detail
CON001	00007	XWABCD	CONDET	Product <> 0
CON001	00008	XWABCD	CONDET	Product not found on Product_Master
CON001	00009	XWABCD	CONDET	Product not found on Stock_Balances
CON001	00010	XWAACS	CONDET	Store not found on Store_Master
CON001	00011	XWABCD	CONDET	Product not found on Transaction_Histo

### Consolidated Rules

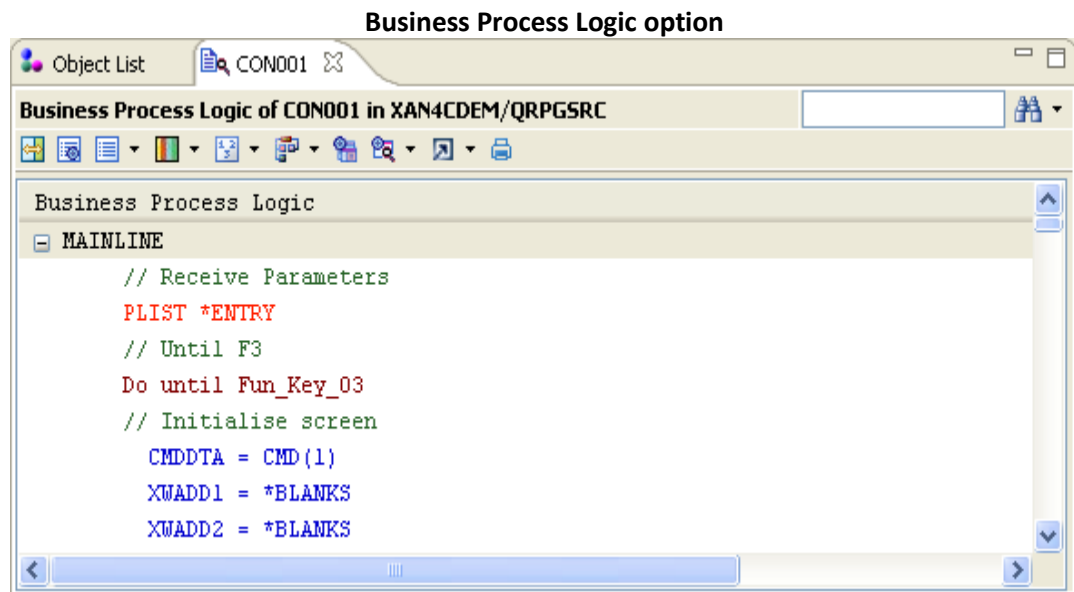
Select the **Consolidated Rules** option to display the file-field based business logic for the selected source member. The Consolidated Rules for **CON001** are displayed below:





### Business Process Logic

Select the **Business Process Logic** option to access the process logic for the selected source member. The Business Process Logic for **CON001** is shown below.

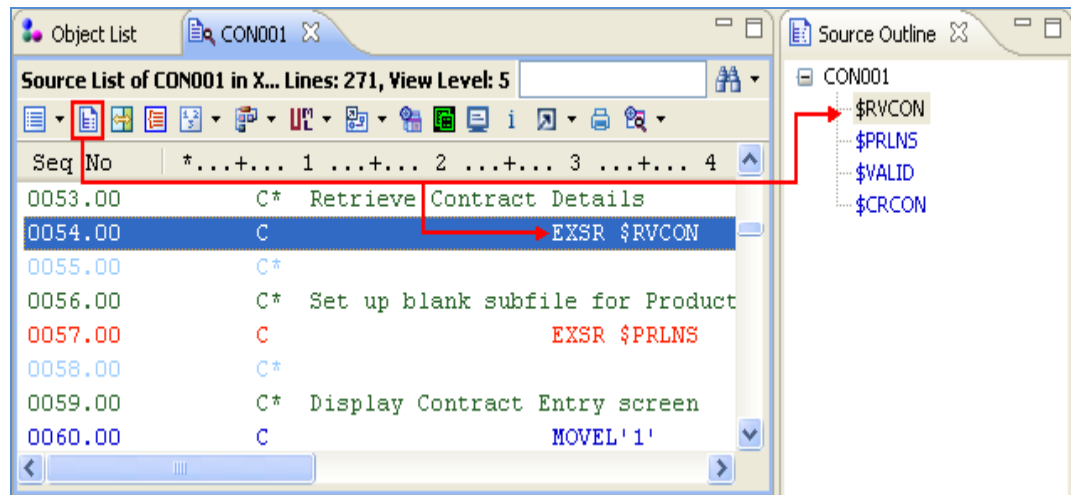


### Source Outline

Select the **Source Outline** option to view all subroutines/modules and called programs available in the source code.

The cursor is positioned to a particular line of code in the source browser when any of the listed items is double-clicked from the Source Outline view.

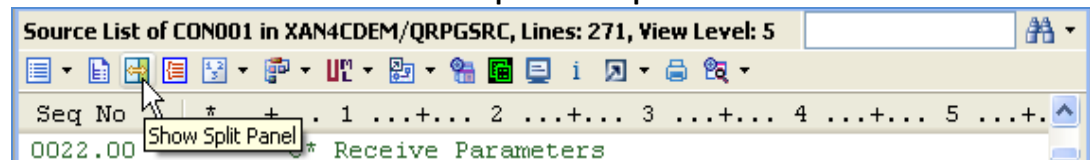
### Source Outline



### Show Split Panel

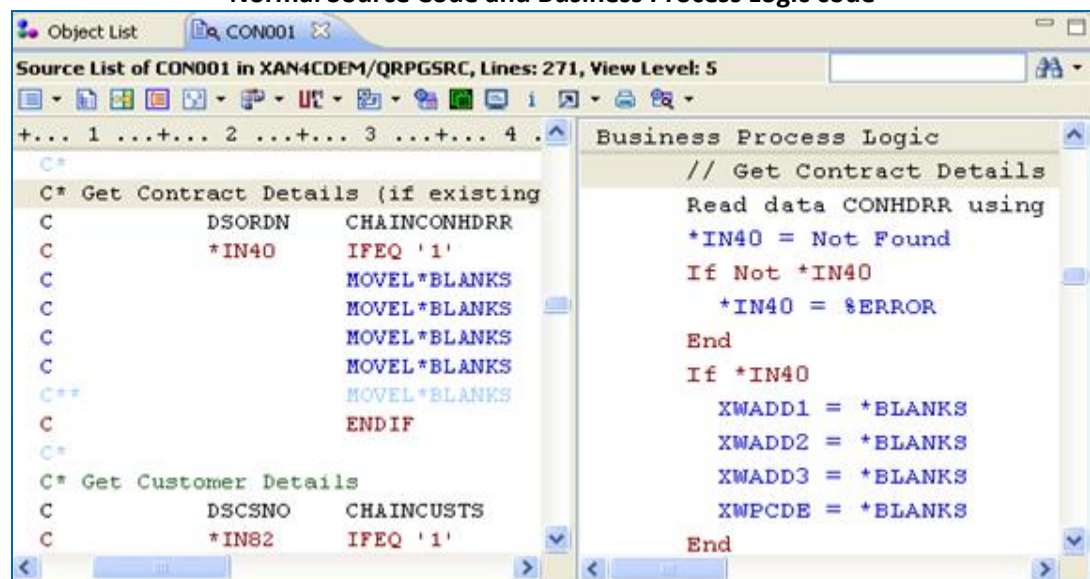
The **Show Split Panel** option helps you compare the Normal Source Code with its Business Process Logic code. It promotes better understanding of the Business Process Logic code.

### Show Split Panel option



Select the **Show Split Panel** option to display a split panel displaying the Normal Source and the Business Process Logic code, simultaneously:

### Normal Source Code and Business Process Logic code

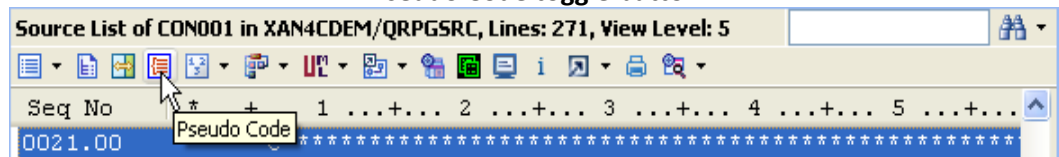


When you double-click on a particular line in the Normal/Original Source code, its corresponding source line on the Business Process Logic code gets highlighted. The **Show Split Panel** button has toggle behavior and clicking it reverts to the Normal Source Code view.

**Pseudo Code**

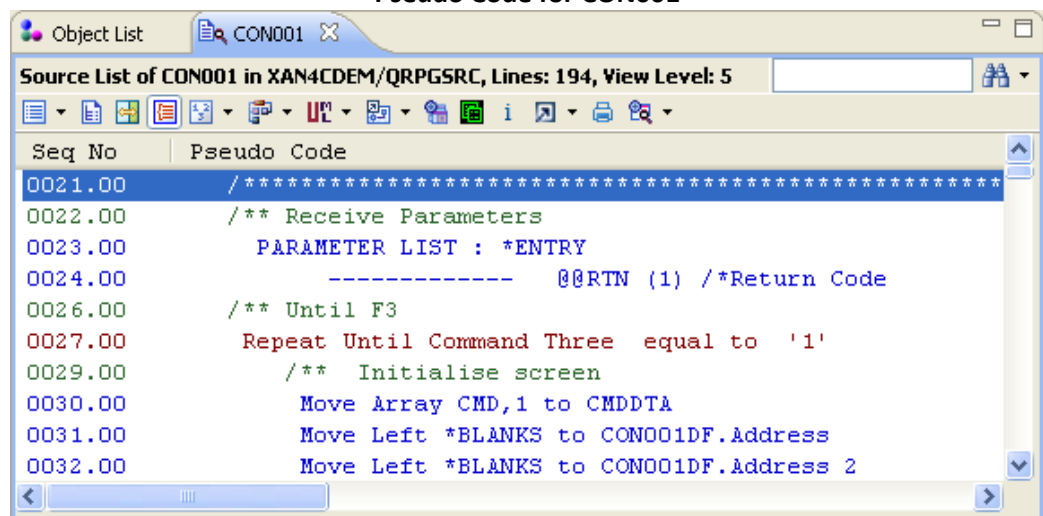
**Pseudo Code** is also a toggle option for viewing the Pseudo Code for the Normal Source Code.

**Pseudo Code toggle button**



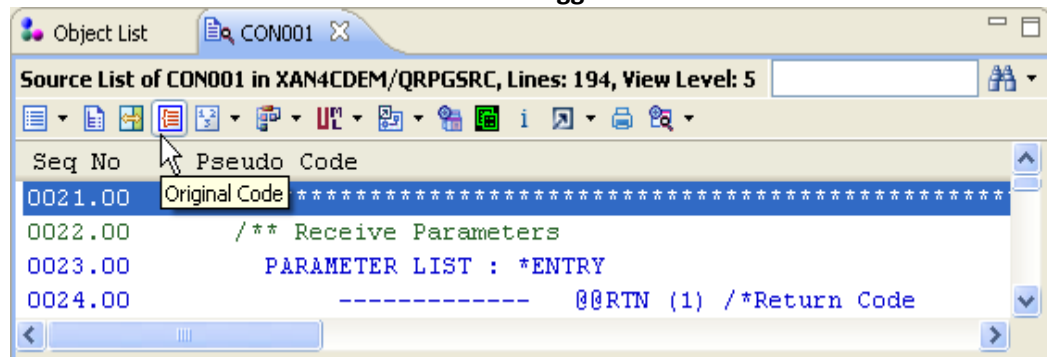
Click the icon to display the Pseudo Code for **CON001**.

**Pseudo Code for CON001**



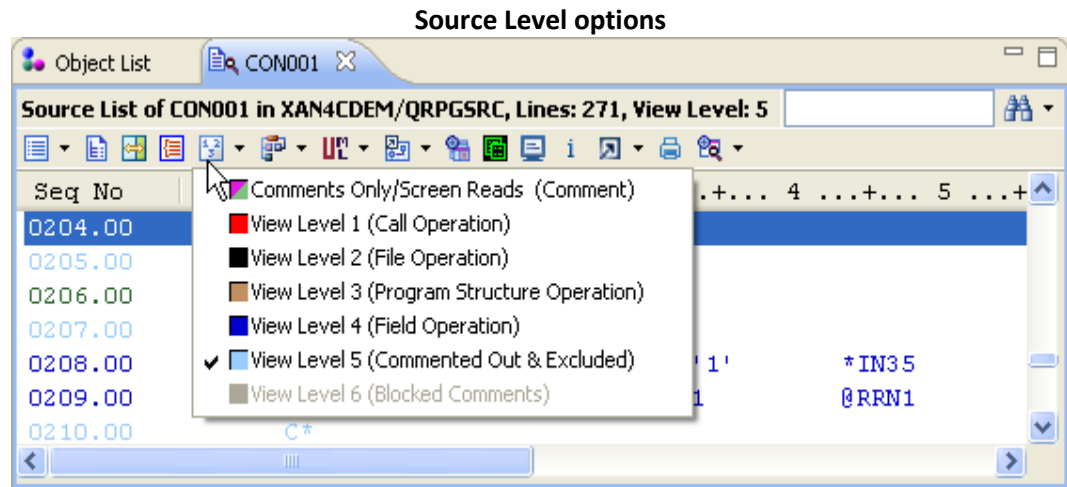
You can switch back to the Original Code through the toggle action of the button.

**Pseudo Code toggle button**



### Source Level

Source Levels 1-5 are available on Program objects only. The Source Level menu on this display allows for indentation and five levels of source listing. Each level suppresses certain source lines.

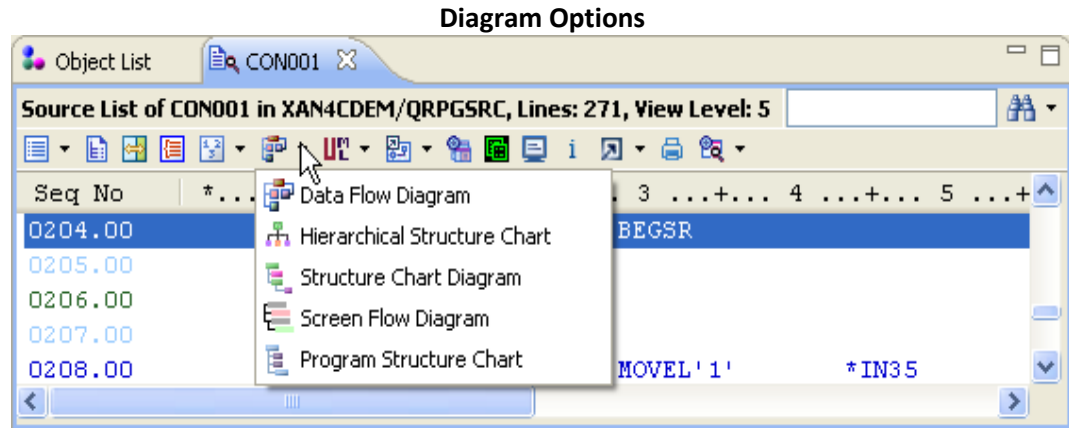


The current source level is shown on the title bar.

### Diagram Options

Choose different diagram options:

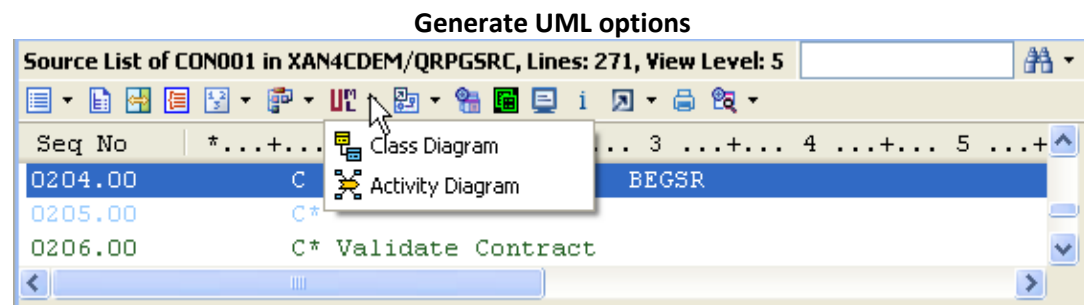
1. **Data Flow Diagram:** Generates Data Flow Diagram for the Object.
2. **Hierarchical Structure Chart:** Generates Hierarchical Structure Chart diagram for the Object.
3. **Structure Chart Diagram:** Generates Structure Chart Diagram for the Object.
4. **Screen Flow Diagram:** Generates Screen Flow Diagram for the Object.
5. **Program Structure Chart:** Generates Program Structure Chart for the Object.



### Generate UML

Choose different UML diagram options:

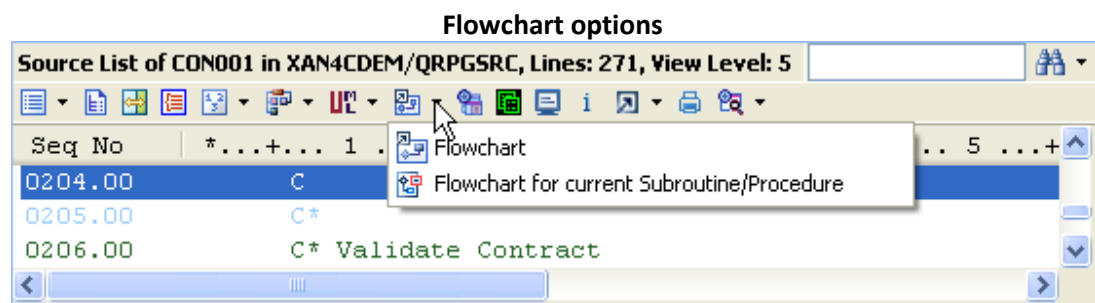
1. **Class Diagram:** Generates Class Diagram for the Object.
2. **Activity Diagram:** Generates Activity Diagram for the Object.



### Flowchart

It is a drop-down menu, and contains two options:

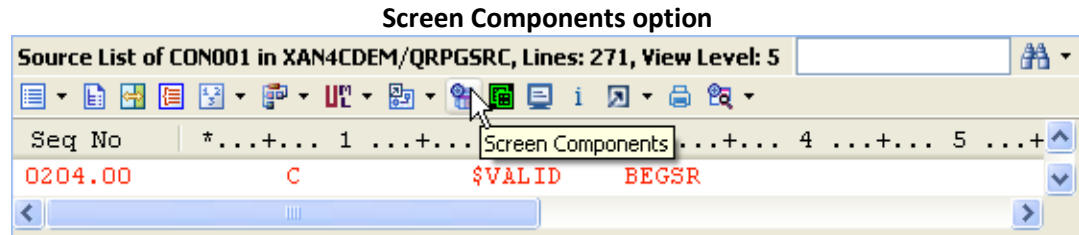
1. **Flowchart:** Generates Flowchart for the Program.
2. **Flowchart for current Subroutine/Procedure:** Generates Flowchart for the selected Subroutine/Procedure of the Program.



Click the **Flowchart** icon to generate a flowchart using Microsoft Visio.

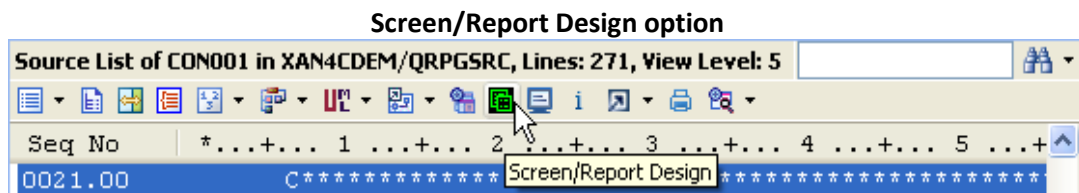
### Screen Components

Select the **Screen Components** option to display a list of all available screen components for the selected program.



### Screen/Report Design

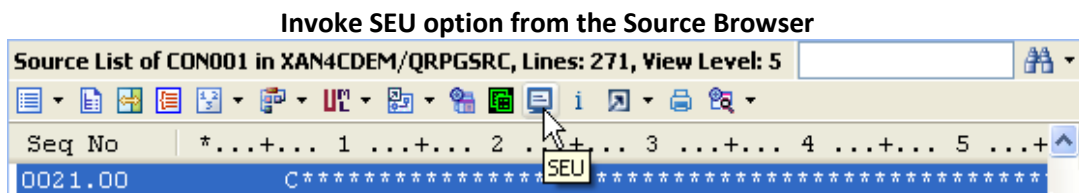
The **Screen/Report Design** displays the layout for associated DSPF/PRTF.



### Lpex/SEU Editor

#### SEU

You can make changes to the source code using the **SEU** option. Click the **SEU** icon available on the Source Browser toolbar.

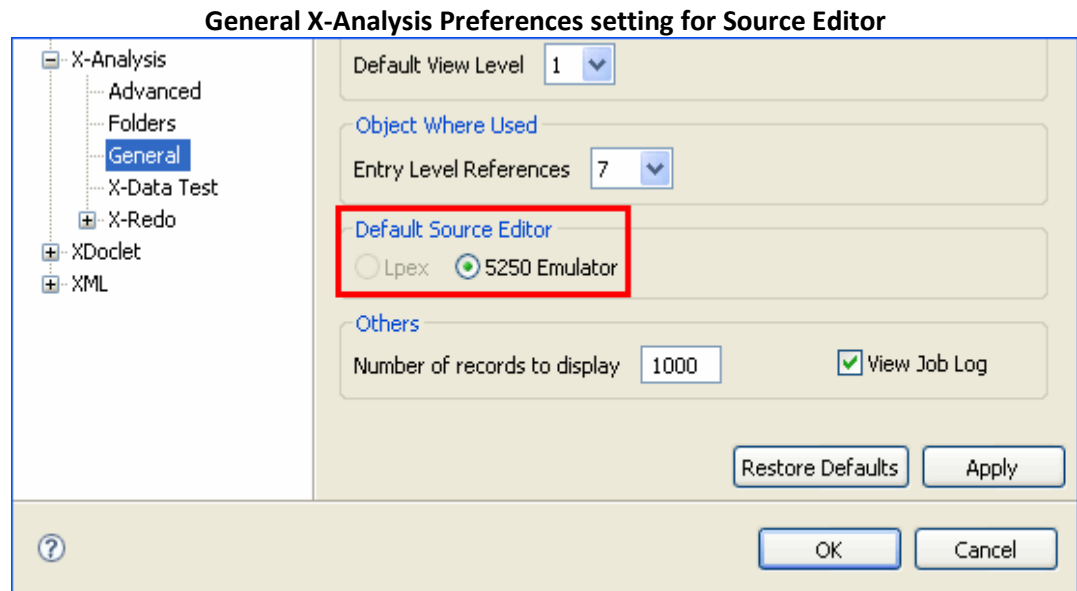


#### Lpex Editor

You can make changes to the source code using the **Zoom in Lpex** option. Click the **Zoom in Lpex** icon available on the Source Browser toolbar to initiate the Lpex editor.

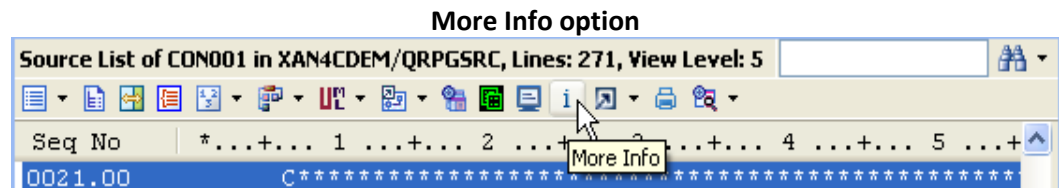
**Zoom in Lpex is a default option for all IBM Rational products having an RSE plugin. For all other Eclipse products, SEU (5250 Emulator) is the default option. You can change the default settings using the X-Analysis 'General Preferences' option. Invoking 5250 session requires XAN4SEU user on the IBM i. Refer to Appendix B for creating XAN4SEU user.**

The X-Analysis Plugin comes with default Preferences settings. To change the Preferences settings, start IBM's RDi/RDp/Wdsc (7.5 and above) or Eclipse 3.4 (and above), then select **Window > Preferences** to display the **Preferences** window.



**More Info**

The **More Info** option presents detailed information about an object. Select the option from the source browser toolbar or the right-click menu over a selected object from the Object List.



Important information related to the status, function, attribute etc. of an object are displayed, besides other relevant details like the number of Business Rules or the Complexity figures.

The screenshot underneath shows the **More Info** dashboard for the object, **CNTCMAINT**.

More Info window for a Program – CNTCMAINT

The screenshot shows two windows. The 'Object List' window displays a table of objects with columns: Library, Name, Type, Attribute, and Description. The 'More Info Dashboard' window shows details for CNTCMAINT.

Library	Name	Type	Attribute	Description
XAN4CDEM	BALANCESTO	*QMFORM	QUERY ...	Balance by Store
XAN4CDEM	CBCUSTSD	*FILE	DSPF	Work with Customers
XAN4CDEM	CBC110	*PGM	CLP	Order Entry System
XAN4CDEM	CB906R	*PGM	RPG	Back-out account
XAN4CDEM	CB906RD	*FILE	DSPF	Order Entry display file
XAN4CDEM	CLET	*PGM	CLP	Build Customer Letter
XAN4CDEM	CLETN	*PGM	CLP	Print Customer Letter
XAN4CDEM	CL03	*PGM	CLLE	for read source file
XAN4CDEM	CNTACS	*FILE	PF	Contacts
XAN4CDEM	CNTCMAINT	*PGM	RPGLE	Contacts Maintenance
XAN4CDEM	CNTCMAINTD	*FILE	DSPF	Contacts Maintenance
XAN4CDEM	CNTLF1	*FILE	LF	Global Contacts by Salesman
XAN4CDEM	CNTLF2	*FILE	LF	Global Contacts by Name
XAN4CDEM	CNTLF3	*FILE	LF	Global Contacts by Status
XAN4CDEM	CNTLF4	*FILE	LF	Global Contacts by Prod & Status
XAN4CDEM	CONDET	*FILE	PF	Contract Detail
XAN4CDEM	CONDETL1	*FILE	LF	by Store/Contract/Product
XAN4CDEM	CONDETL2	*FILE	LF	by Store/Contract/Product
XAN4CDEM	CONDETL3	*FILE	LF	by Product/Contract
XAN4CDEM	CONDETNW	*FILE	PF	Contract Detail new -?CBL Ver. wi

More Info for CNTCMAINT	
<b>General</b>	
Name	CNTCMAINT
Description	Contacts Maintenance
Library	XAN4CDEM
Type	*PGM
Attribute	RPGLE
Function	EDTRCD
Status	*A
Creation Date	13/09/10
Creation Time	13:14:09
Last Used	22/09/14
Days Used	24
Physical File	CNTACS
<b>Business Rule</b>	
BR Count	8
Annot. Count	0
<b>Complexity</b>	
Source Lines	266
Cyc. Complex.	23
Halstead	1240
Maint.Index	178
Files	3
Device Files	1
Called Programs	1
Calling Programs	0

However, for objects with PF attribute, the **More Info** display is limited to the General and the Complexity details. The image below shows More Info (without the Business Rules count) for the PF object, **CONDET**:

More Info window for a File – CONDET

The screenshot shows two windows. The 'Object List' window displays a table of objects with columns: Library, Name, Type, Attribute, and Description. The 'More Info Dashboard' window shows details for CONDET.

Library	Name	Type	Attribute	Description
XAN4CDEM	CNTACS	*FILE	PF	Contacts
XAN4CDEM	CNTCMAINT	*PGM	RPGLE	Contacts Maintenance
XAN4CDEM	CNTCMAINTD	*FILE	DSPF	Contacts Maintenance
XAN4CDEM	CNTLF1	*FILE	LF	Global Contacts by Salesman
XAN4CDEM	CNTLF2	*FILE	LF	Global Contacts by Name
XAN4CDEM	CNTLF3	*FILE	LF	Global Contacts by Status
XAN4CDEM	CNTLF4	*FILE	LF	Global Contacts by Prod & Status
XAN4CDEM	CONDET	*FILE	PF	Contract Detail
XAN4CDEM	CONDETL1	*FILE	LF	by Store/Contract/Product
XAN4CDEM	CONDETL2	*FILE	LF	by Store/Contract/Product
XAN4CDEM	CONDETL3	*FILE	LF	by Product/Contract
XAN4CDEM	CONDETNW	*FILE	PF	Contract Detail new -?CBL Ver. wi
XAN4CDEM	CONHDR	*FILE	PF	Contract Header
XAN4CDEM	CONHDR1	*FILE	LF	by Debtor/Contract
XAN4CDEM	CONHDR1A	*FILE	LF	by Debtor/Cust Ref
XAN4CDEM	CONHDR1?	*FILE	LF	by Debtor/Cust Ref

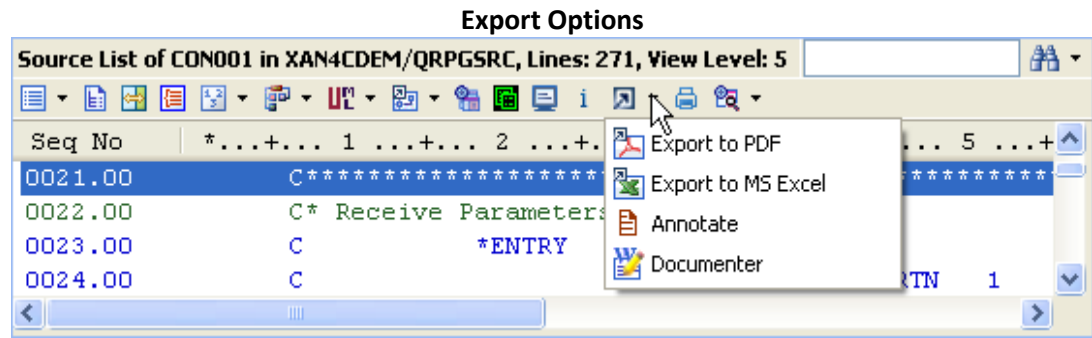
More Info for CONDET	
<b>General</b>	
Name	CONDET
Description	Contract Detail
Library	XAN4CDEM
Type	*FILE
Attribute	PF
Function	
Status	*B
Creation Date	01/09/08
Creation Time	15:27:40
Last Used	25/09/14
Days Used	81
<b>Complexity</b>	
Fields	8
Access Paths	4
Creating Pgms	0
Reading Pgms	5
Updating Pgms	10
Deleting Pgms	2
Total References	17



### Export Options

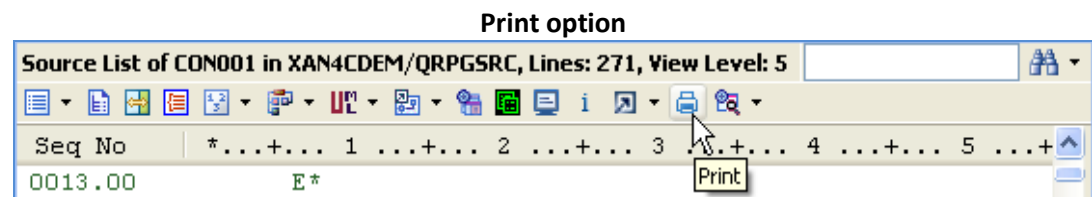
It is a drop-down menu, and contains options for exporting list, adding annotates and generating system document.

1. **Export to PDF/MS Word:** Exports current list on the X-Analysis Client to PDF/MS Word.
2. **Export to MS Excel:** Exports current list on the X-Analysis Client to MS Excel.
3. **Annotate:** Allows to add annotates for the selected object.
4. **Documenter:** Allows to access the **Documenter** option for generating a customized system document.



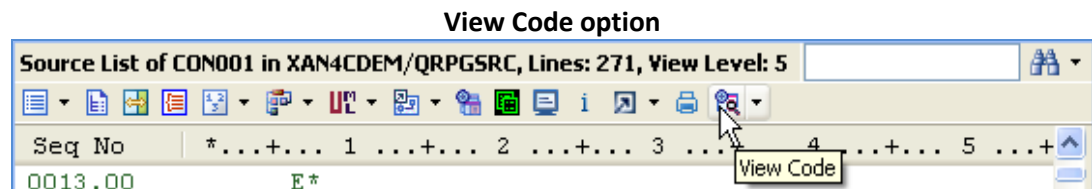
### Print

The **Print** option directly prints the currently displayed source content.



### View Code

Select the **View Code** option to view the reengineered, the restructured, or the generated code of a selected object.

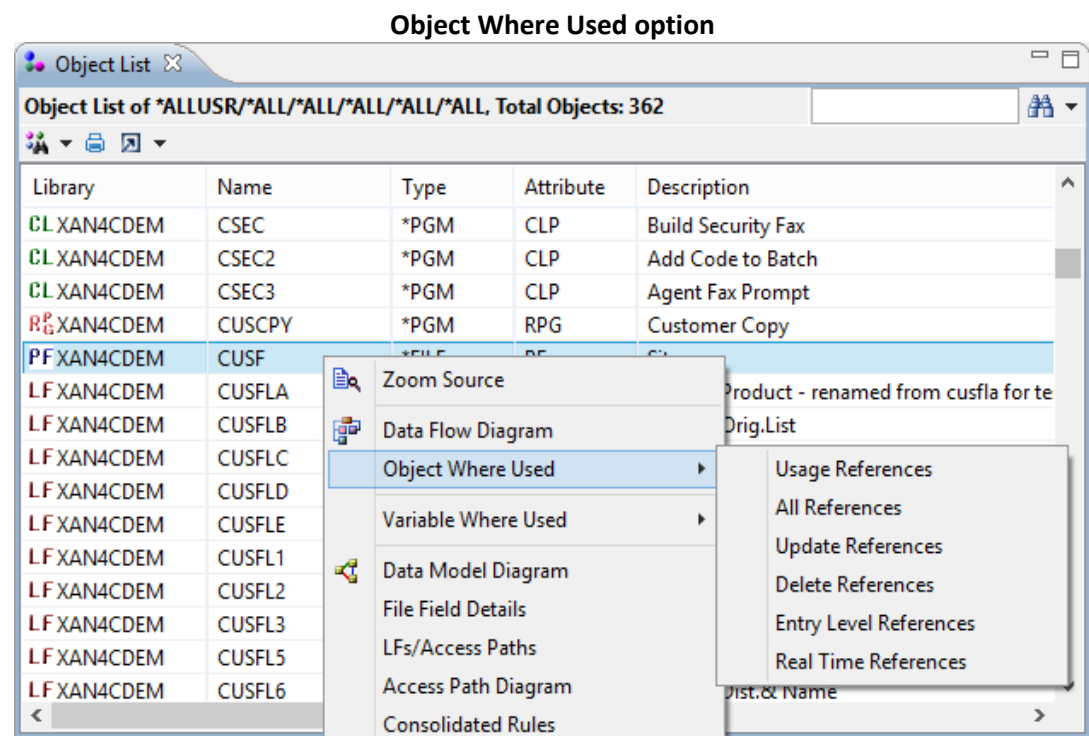


## OBJECT WHERE USED

The **Object Where Used** option lists all the instances in the application where a specified object has been used/referenced. The following are the details of the sub-options of **Object Where Used**.

- **Usage References:** List of objects which are using this object.
- **All References:** List of objects where this object is being used. Besides this, source references for which the objects do not exist are also displayed.
- **Update References:** List of objects which are updating this object.
- **Delete References:** List of objects which are performing delete operation on the specified object.
- **Entry Level References:** Entry level references in 'Object Where Used' list all entry level programs (\*A), which directly or indirectly access the object in question.
- **Real Time References:** Object Where Used references to track dependencies. It facilitates the live impact analysis at runtime, and lets you see the “Real Time” references or the object dependencies.

Select **CUSF** from the Member/Object List, and choose the **Object Where Used** option from the context menu.



This produces an Object Where Used listing for all objects referring to **CUSF**.

If you select the Object Where Used on a PF (CUSF, in this case), then besides listing the objects using **CUSF**, the objects using the LFs built on CUSF (e.g. CUSFL3) are also reported.

**Object Where Used – Usage References screen**

Object	Type	Text	Usage
CB906R	*PGM	Back-out account	File Updated By Program
CONUPD0	*PGM	Revert Back Customer Info	File Updated By Program
CONUPD1	*PGM	Update Customer Info - Version 1	File Updated By Program
CONUPD2	*PGM	Update Customer Info - Version 2	File Updated By Program
CUSCPY	*PGM	Customer Copy	File Read/Written To By Program
CUSFL1	*FILE	Sites by Name	Logical File
CUSFL2	*FILE	Sites by Status	Logical File
CUSFL3	*FILE	Sites by Number	Logical File
CUSFL5	*FILE	Sites by Dist.& Status	Logical File
CUSFL6	*FILE	Sites By Dist.& Name	Logical File
CUSFL7	*FILE	Sites by Last Cnt.Date	Logical File
CUSFL8	*FILE	Sites by Next Cnt.Date	Logical File

If you select the Object Where Used on a variable in a **\*PGM** type object, then all objects where the variable has been used are listed.

Select an object and click **ENTER** to access its Source List. Alternatively, double-click on that object row. Double-click on an object from the Object Where Used list to zoom on to the source line where the first reference has been made.

## VARIABLE WHERE USED

The **Variable Where Used** option lists all source lines from the application, where the field/variable of a file/program is used/referenced in any of the source members and its associated device files and copybooks.

A wide variety of options can be specified including:

Files, Array Definitions, Data Structures, Sub-Fields Data Structures, Indicators, Key Lists, Data Fields, File Formats, Subroutines, Program Variable, Array Elements, Parameter Lists, Parameters, Key Fields, Message Ids, EXCPT Names, etc.

The Variable Where Used submenu provides the following options:

- **All References:** All references of this variable.
- **Update References:** References where this variable is being updated.
- **File References:** All references where the object using this variable is a file.

- **Definitions Only:** Lists references where this variable was defined.
- **Summary References:** This option on a variable or File/Field, lists all objects that use the selected variable or File/Field and also the usages for the same. The result is displayed in Object Where Used.
- **Rule Variable References:** Lists all Business Rules based on the selected object from across the entire application.

Select the **Variable Where Used** option for the **CUSNO** field using the **JumpTo** dialog.

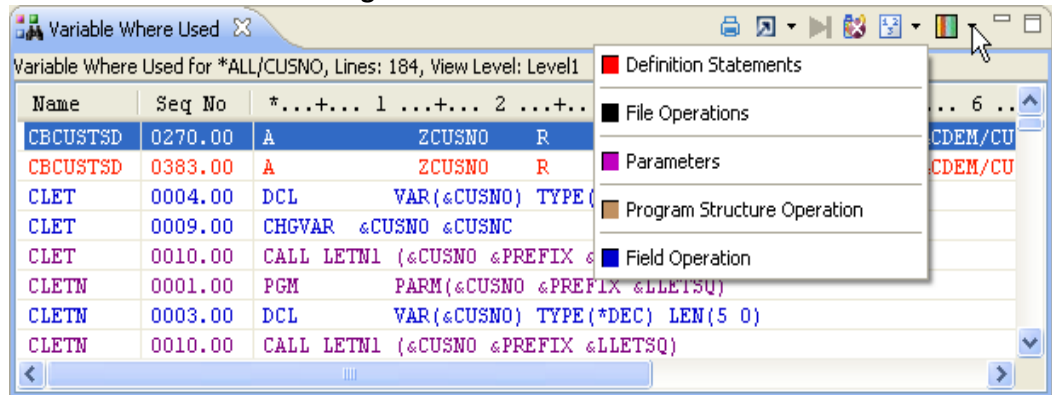
**Variable Where Used view for CUSNO**

Name	Seq No	*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+...
CBCUSTSD	0270.00	A ZCUSNO R B 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CBCUSTSD	0383.00	A ZCUSNO R 0 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CLET	0004.00	DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLET	0009.00	CHGVAR &CUSNO &CUSNC
CLET	0010.00	CALL LETN1 (&CUSNO &PREFIX &LETSQ)
CLETN	0001.00	PGM PARM(&CUSNO &PREFIX &LETSQ)
CLETN	0003.00	DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLETN	0010.00	CALL LETN1 (&CUSNO &PREFIX &LETSQ)
CNTACS	0003.00	A CUSNO SP 0 TEXT('Cus. No.')
CNTACS	0021.00	A K CUSNO
CNTCMINT	0101.00	C eval zcusno = cusno

**Legend**

- Dark Red depicts the Definition Statements
- Black depicts the File Operations
- Magenta depicts the Parameters
- Dark Brown depicts the Program Structure Operation
- Dark Blue depicts the Field Operation

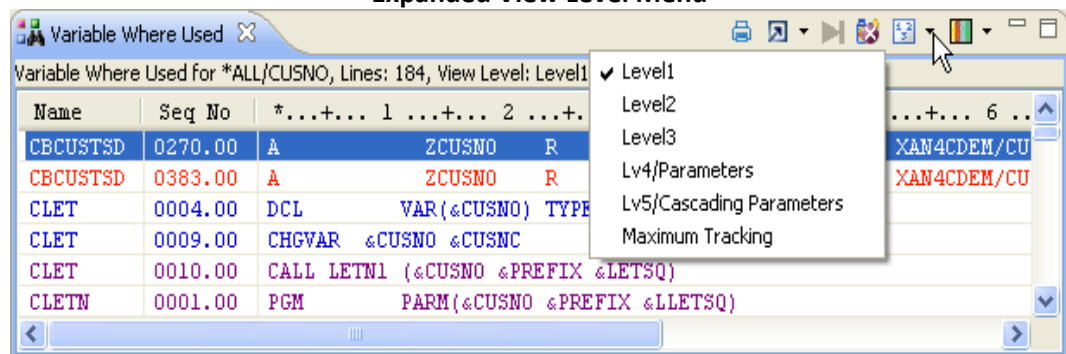
### Legend for Variable Where Used



### View Levels

The **Variable Where Used** view is available up to six view levels and the **Default View Level** icon located on the toolbar allows access to these levels.

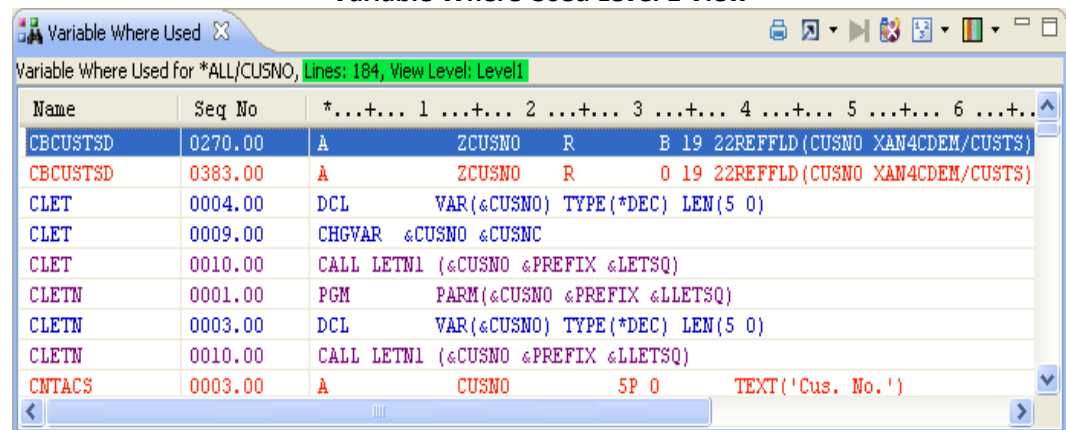
### Expanded View Level Menu



Higher Variable Where Used levels can be requested using VWU Levels. The Variable Where Used levels display the following information:

- **Level 1:** Direct references to the field.

### Variable Where Used Level 1 View



- **Level 2:** Level 2 adds indirect references.

**Variable Where Used Level 2 View**

Variable Where Used for \*ALL/CUSNO, Lines: 318, View Level: Level2

Name	Seq No	*...+... 1	...+... 2	...+... 3	...+... 4	...+... 5	...+... 6	...
CBCUSTSD	0270.00	A	ZCUSNO	R	B 19	22REFFLD(CUSNO XAN4CDEM/CUSTS)		
CBCUSTSD	0383.00	A	ZCUSNO	R	0 19	22REFFLD(CUSNO XAN4CDEM/CUSTS)		
CLET	0004.00	DCL	VAR(&CUSNO)	TYPE(*DEC)	LEN(5 0)			
CLET	0005.00	DCL	VAR(&CUSNC)	TYPE(*CHAR)	LEN(5)			
CLET	0008.00	CHGVAR	&CUSNC	&PK				
CLET	0009.00	CHGVAR	&CUSNO	&CUSNC				
CLET	0010.00	CALL	LETN1	(&CUSNO &PREFIX &LETSQ)				
CLET	0011.00	CHGVAR	&CUSNC	&PREFIX				
CLET	0014.00	CALL	WKCUSL	(&CUSNC PREFIX &LETNR)				

- **Level 3:** Level 3 adds further indirection/references to the field in level 2 referencing the first field.

**Variable Where Used Level 3 View**

Variable Where Used for \*ALL/CUSNO, Lines: 394, View Level: Level3

Name	Seq No	*...+... 1	...+... 2	...+... 3	...+... 4	...+... 5	...+... 6	...
CBCUSTSD	0092.00	A	SFIELD	10A	H			
CBCUSTSD	0202.00	A	SFIELD	10A	H			
CBCUSTSD	0270.00	A	ZCUSNO	R	B 19	22REFFLD(CUSNO XAN4CDEM/CUSTS)		
CBCUSTSD	0383.00	A	ZCUSNO	R	0 19	22REFFLD(CUSNO XAN4CDEM/CUSTS)		
CLET	0001.00	PGM	PARM(&PK)					
CLET	0002.00	DCL	VAR(&PK)	TYPE(*CHAR)	LEN(500)			
CLET	0004.00	DCL	VAR(&CUSNO)	TYPE(*DEC)	LEN(5 0)			
CLET	0005.00	DCL	VAR(&CUSNC)	TYPE(*CHAR)	LEN(5)			
CLET	0006.00	DCL	VAR(&prefix)	TYPE(*CHAR)	LEN(5)			

- **Level 4/Parameters:** Level 4 further includes fields used as parameters.

**Variable Where Used Level 4 / Parameters View**

Variable Where Used for \*ALL/CUSNO, Lines: 483, View Level: Lv4/Parameters

Name	Seq No	*...+... 1	...+... 2	...+... 3	...+... 4	...+... 5	...+... 6	...
CBCUSTSD	0023.00	A	XWBCCD	11A	0 10	5TEXT('Customer')		
CBCUSTSD	0092.00	A	SFIELD	10A	H			
CBCUSTSD	0132.00	A	ZWBNCB	2A	B 12 22			
CBCUSTSD	0136.00	A	ZPERSON	3A	B 13 22			
CBCUSTSD	0142.00	A	ZSDCDE	2A	B 14 22			
CBCUSTSD	0202.00	A	SFIELD	10A	H			
CBCUSTSD	0270.00	A	ZCUSNO	R	B 19	22REFFLD(CUSNO XAN4CDEM/CUSTS)		
CBCUSTSD	0383.00	A	ZCUSNO	R	0 19	22REFFLD(CUSNO XAN4CDEM/CUSTS)		
CLET	0001.00	PGM	PARM(&PK)					

- **Level 5/Cascading Parameters:** Extending the information in Level 4, Level 5 includes references where CUSNO fields are parameters in a function, called by another function.

**Variable Where Used Level 5 / Cascading Parameters View**

Variable Where Used for \*ALL/CUSNO, Lines: 804, View Level: Lv5/Cascading Parameters

Name	Seq No	*...+... 1	...+... 2	...+... 3	...+... 4	...+... 5	...+... 6	...+...
CBCUSTSD	0023.00	A	XWBCCD	11A	0 10	5TEXT('Customer')		
CBCUSTSD	0092.00	A	SFIELD	10A	H			
CBCUSTSD	0105.00	A	ZWBCCD	11A	B 5	22		
CBCUSTSD	0132.00	A	ZWBNCN	2A	B 12	22		
CBCUSTSD	0136.00	A	ZPERSON	3A	B 13	22		
CBCUSTSD	0142.00	A	ZDSDCDE	2A	B 14	22		
CBCUSTSD	0202.00	A	SFIELD	10A	H			
CBCUSTSD	0270.00	A	ZCUSNO	R	B 19	22REFFLD(CUSNO XAN4CDEM/CUSTS)		
CBCUSTSD	0383.00	A	ZCUSNO	R	0 19	22REFFLD(CUSNO XAN4CDEM/CUSTS)		

- **Maximum Tracking:** Tracks the usage of a variable or field to maximum level of indirection.

**Variable Where Used – Maximum Tracking View**

Variable Where Used for \*ALL/CUSNO, Lines: 809, View Level: Maximum Tracking

Name	Seq No	*...+... 1	...+... 2	...+... 3	...+... 4	...+... 5	...+... 6	...+...
CBCUSTSD	0023.00	A	XWBCCD	11A	0 10	5TEXT('Customer')		
CBCUSTSD	0073.00	A	ZMSAGE	78A	0 24	2DSPATR(HI)		
CBCUSTSD	0092.00	A	SFIELD	10A	H			
CBCUSTSD	0105.00	A	ZWBCCD	11A	B 5	22		
CBCUSTSD	0132.00	A	ZWBNCN	2A	B 12	22		
CBCUSTSD	0136.00	A	ZPERSON	3A	B 13	22		
CBCUSTSD	0142.00	A	ZDSDCDE	2A	B 14	22		
CBCUSTSD	0175.00	A	ZMSAGE	78A	0 24	2DSPATR(HI)		
CBCUSTSD	0202.00	A	SFIELD	10A	H			

## FILE FIELD DETAILS

The **File Field Details** option displays the field details for a file. This option is available for objects having **PF/LF** attribute.

Right-click for the context menu on a PF/LF from the Member/Object List and select the **File Field Details** option. The following window will be displayed.

File Field Details for CUSF

Mnemonic	Long Name	Type	Length	Dec.Pos.	Inp.Buf.Pos.	Display	Grid Seq.	Record Screen Seq.	Headings
CNAME	Company	CHAR	00034		00001	Y	1.00	2.00	Company
DSDCDE	Distributor	CHAR	00002		00035	Y	2.00	3.00	Distributor
STATUS	Sts	CHAR	00001		00037	Y	3.00	4.00	Sts
TELNO	Phone	CHAR	00017		00038	Y	4.00	5.00	Phone
EXTN	Extn	CHAR	00006		00055	Y	5.00	6.00	Extn.
LCTDAT	Last_Cnt_Date	ZONED	00006	00	00061	Y	6.00	7.00	Last Cnt Date
APDATE	Next_Cnt_Date	ZONED	00006	00	00067	Y	7.00	8.00	Next Cnt Date
USERNM	Contact	CHAR	00034		00073	Y	8.00	9.00	Contact
SALUT	Salutation	CHAR	00034		00107	Y	9.00	10.00	Salutation
JTITLE	Job_Title	CHAR	00034		00141	Y	10.00	11.00	Job Title
FAXNO	Fax_No	CHAR	00015		00175	Y	11.00	12.00	Fax. No.

If there are keys for a PF or LF, they are displayed in blue color as shown in the image below.

File Field Details showing key in blue color

Mnemonic	Long Name	Type	Length	Dec.Pos.	Inp.Buf.Pos.	Display	Grid Seq.
XWBCCD	Customer	CHAR	00011		00001	Y	1.00
XWG4TX	Name	CHAR	00040		00012	Y	2.00
XWB2CD	Statement_Account	CHAR	00011		00052	Y	3.00
XWB3CD	Related_Account	CHAR	00011		00063	Y	4.00
XWHITX	Tax_Reg	CHAR	00015		00074	Y	5.00
XWE0NB	Bank	PACKED	00009	00	00089	Y	6.00
XWJUN0	Bank_A_c	PACKED	00015	00	00094	Y	7.00
XWDVCD	Forex	CHAR	00003		00102	Y	8.00
XWBNCD	CusGrp	CHAR	00002		00105	Y	9.00
PERSON	Rep	CHAR	00003		00107	Y	10.00
DSDCDE	Distributor	CHAR	00002		00110	Y	11.00
XWBTCDE	Terms	CHAR	00003		00112	Y	12.00
XWGIVA	Credit Limit	PACKED	00015	02	00115	Y	13.00

LFs/ACCESS PATHS

Select the **LFs/Access Paths** option to display all Access Paths for the selected physical file. Opt for the context menu on a PF from the Object/Member List, and then select the **LFs/Access Paths** option.



**LFs / Access Paths**

Access Path	Text	Unique Keys	Select/Omit	Field Names	LF Seq.	Do Not Dis
CUSF	Sites	N	N		00000	N
CUSFLA	Sites by Product - ren...	N	N	PRPCDE,CNAME	00003	N
CUSFLB	Sites by Orig.List	N	N	LSCDE,CNAME	00004	N
CUSFLC	Sites by Salesperson	N	N	SINIT,CNAME	00005	N
CUSFLD	Sites by Validator	N	N	VINIT,CNAME	00006	N
CUSFLE	Sites by Organisation	N	N	ORG,CNAME	00007	N
CUSFL1	Sites by Name	N	N	CNAME	00001	N
CUSFL2	Sites by Status	N	N	STATUS,CNAME	00008	N
CUSFL3	Sites by Number	Y	N	CUSNO	00002	N
CUSFL5	Sites by Dist. & Status	N	N	DSDCDE,STATU...	00009	N
CUSFL6	Sites By Dist. & Name	N	N	DSDCDE,CNAME	00010	N

In order to browse a source of any LF, double-click on it or select the **Zoom Source** option from the context menu.

## MEMBER X-REF

The **Member X-Ref** option lists all source lines where the field/variable has been used/referenced, in the source member and its associated Device Files and Copybooks.

A wide variety of options can be specified including:

Files, Array Definitions, Data Structures, Sub-Fields of Data Structures, Indicators, Key Lists, Data Fields, File Formats, Subroutines, Program Variable, Array Elements, Parameter Lists, Parameters, Key Fields, Message Ids, EXCPT Names, etc.

Double-click on a field in source member displays Member X-Ref. Alternatively, choose the **Member X-Ref** option from the context menu.

When this option is selected for a sub-item (such as a Sub-Field, Data Structure, Array Element or File Format), a list of the sub-items along with all references to the parent items is displayed. Double-click on the source line to view source of the object.

**Member X-Ref view**

Seq No	*...+... 1	*...+... 2	*...+... 3	*...+... 4	*...+... 5	*...+... 6
0002.00	FCON001DFCF	E		WORKSTN		
0003.00	F			@RRN1	KSFILE	OESFL
0041.00	C		WRITEOECLR			99
0042.00	C		WRITEOETRL			99
0043.00	C		EXFMTOESFLC			99
0063.00	C		WRITEOETRL			99
0064.00	C		EXFMTOESFLC			99
0074.00	C		WRITEOETRL			99

### Legend

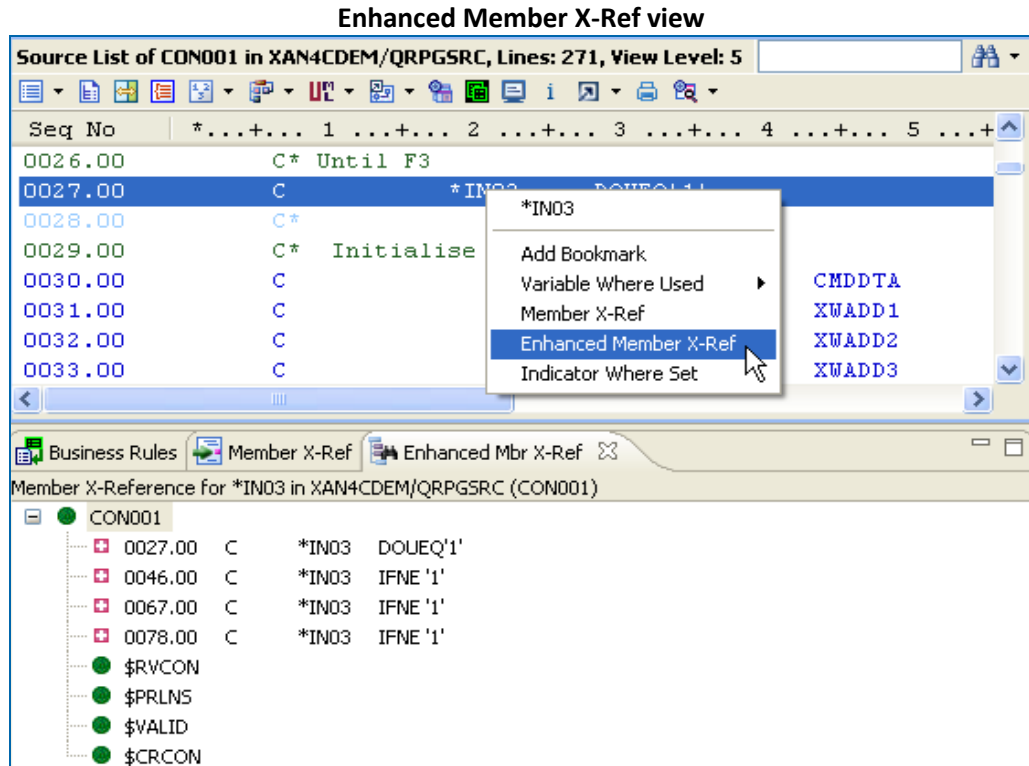
- Dark Red depicts the Definition Statements
- Black depicts the File Operations
- Magenta depicts the Parameters
- Dark Brown depicts the Program Structure Operation
- Dark Blue depicts the Field Operation.

**Legend for Member X-Ref**

Seq No	*...+... 1	*...+... 2
0002.00	FCON001DFCF	E
0003.00	F	
0041.00	C	
0042.00	C	
0043.00	C	

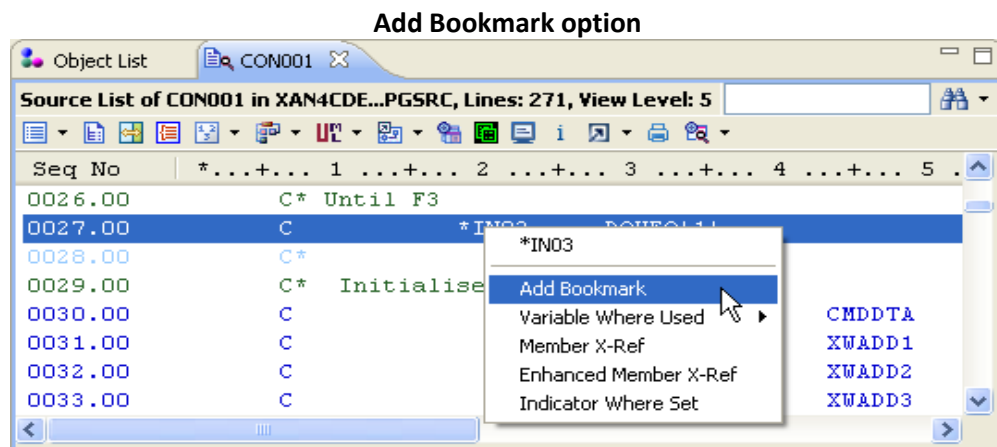
### ENHANCED MEMBER X-REF

The **Enhanced Member X-Ref** option displays the references of a variable in the member, along with information about how each subroutine handles this variable. It also presents the logical order in which the variable actually gets used, and not in the order of how it is physically placed in the source.



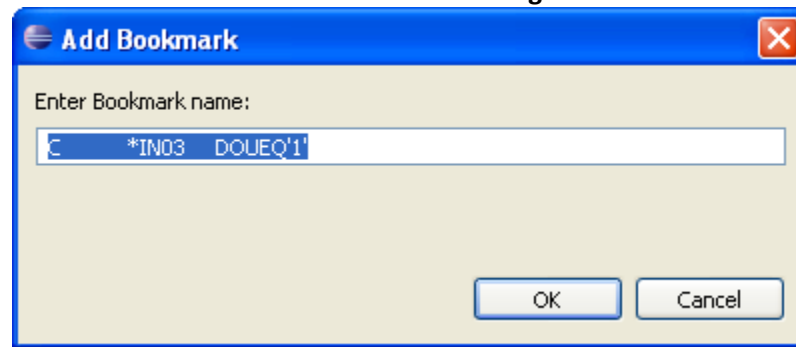
## ADD BOOKMARK

Use the **Add Bookmark** option to access the facility and bookmark a selected source line in the Source List view.



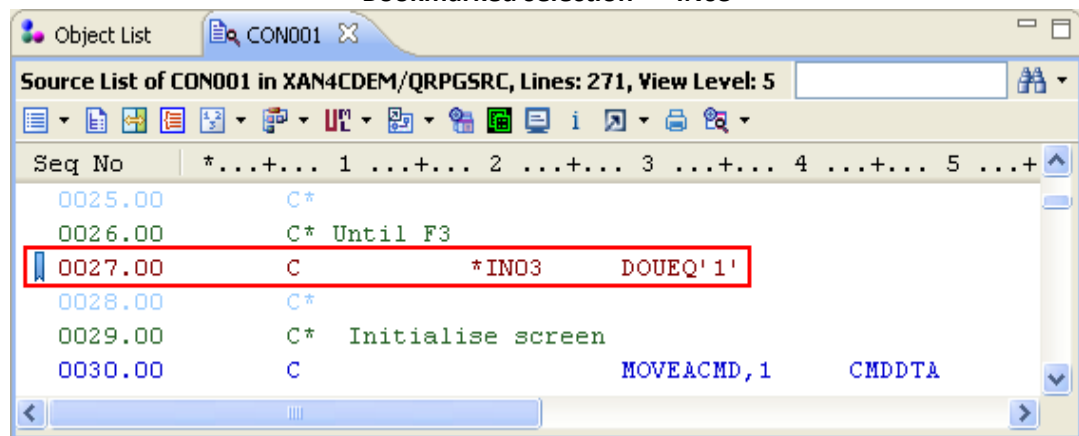
Select this option to invoke a dialog as shown below. You can edit the name of the Bookmark as per requirement.

Add Bookmark dialog



Click **OK** to bookmark the specific source line. The following image shows the bookmarked source line.

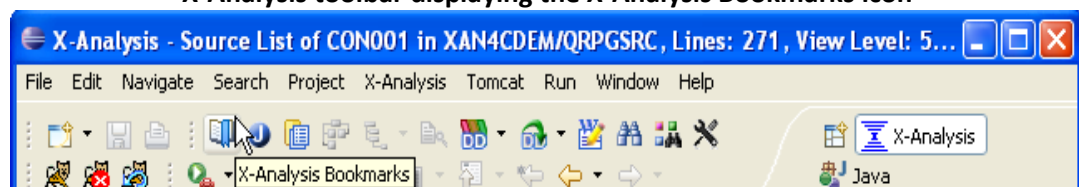
Bookmarked selection – \*IN03



To remove the bookmark, right-click on the bookmarked field and select the **Remove Bookmark** option or use the **Delete** option from the X-Analysis Bookmarks window.

To view the bookmarked items, click the **X-Analysis Bookmarks** icon featured on the X-Analysis toolbar.

X-Analysis toolbar displaying the X-Analysis Bookmarks icon



When you click the icon, the following window is invoked:

**X-Analysis Bookmarks window**

Object/Source	Description	X-Ref Library	Location
CON001	C *IN03 DOUEQ'1'	XAN4CDXA	line 27
CUSF	A CNAME 34A TEXT('Company')	XAN4CDXA	line 2

Local Shared

You also have the option to 'share' the bookmarks. When shared, the bookmarks become visible to others who are using the same cross-reference.

The following window displays the **Share** option:

**X-Analysis Bookmarks context menu showing the Share option**

Object/Source	Description	X-Ref Library	Location
CON001	C *IN03 DOUEQ'1'	XAN4CDXA	line 27
CUSF	A CNAME 34A TEXT('Company')	XAN4CDXA	line 2

Local Shared

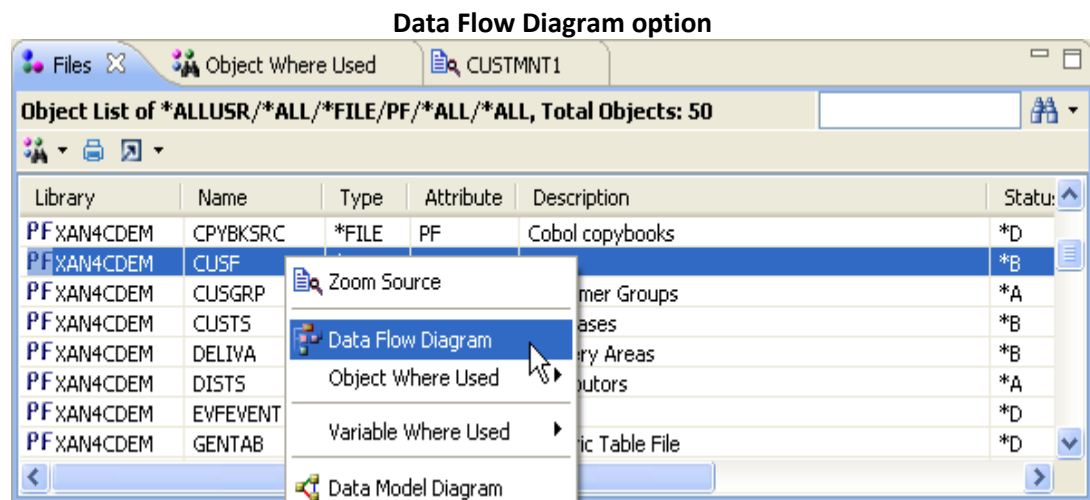
# Program Logic Documentation

## DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a diagrammatic representation of the data flow. A particular application contains many files and programs, and a DFD depicts all possible interrelationships among these multiple files and programs contained within a particular application. A color-coded DFD simultaneously plays the dual role of presenting the data flow at high object level, in addition to providing contextual details regarding specific variables and parameters passed between objects.

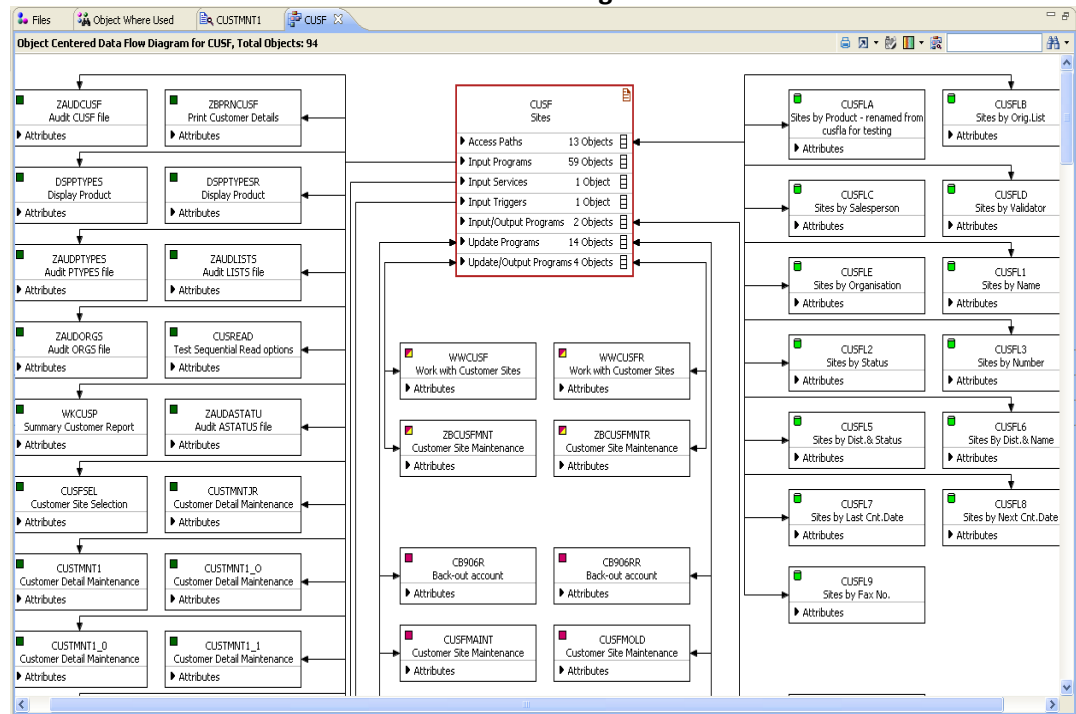
The Bus Routing DFD offers two benefits. One, it gives a precise idea of where and how the inputted data affects the desired output; two, it helps to visualize how an object within an application correlates with the other objects. The diagrams showing the data flow in neat blocks let even non-technical users get a clear picture of the object(s) interrelationships.

Select the **Data Flow Diagram** option from the context menu over an object, as shown below:



This brings up the DFD for the object, **CUSF**.

### Data Flow Diagram

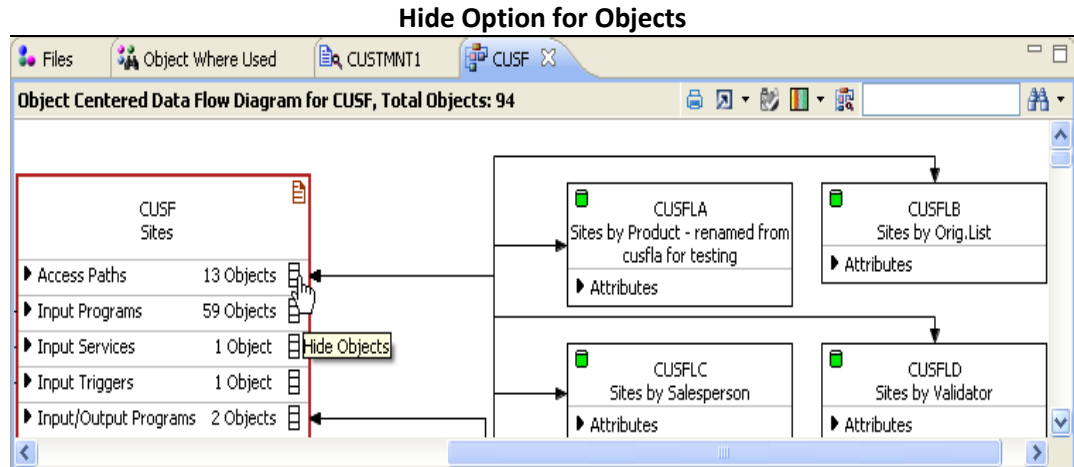


The DFD is also a graphic equivalent of the Object Where Used data. Besides the Logical Views/Access Paths for CUSF, you can see how CUSF fits into the application (i.e. the programs that update CUSF, programs that use CUSF as an input file and so on).

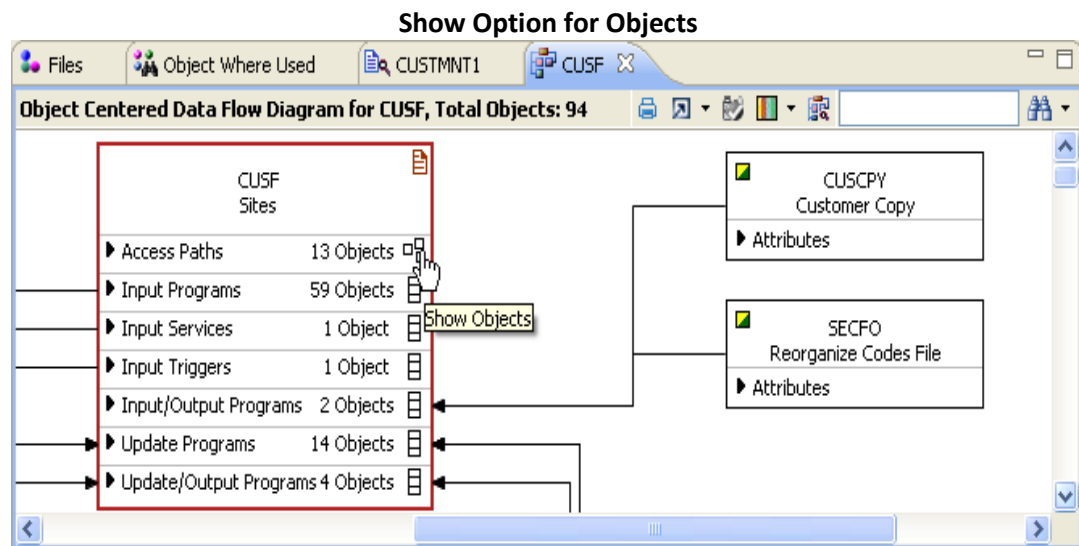
You will see how the dynamic and interactive diagram facilitates access to other features contained within an object. There are varied and flexible features and options like Hide/Show Objects, Expand/Collapse Referenced Objects, View Annotation, Attributes – all of these and more are explained ahead.

### Hide/Show Objects

To have better understanding of object interrelationships, you may want to hide/show all objects pertaining to programs. A single-click action on the icon alongside the objects enables you to hide/show objects. In the following screenshot, the icon against **Access Paths** is clicked to hide objects.



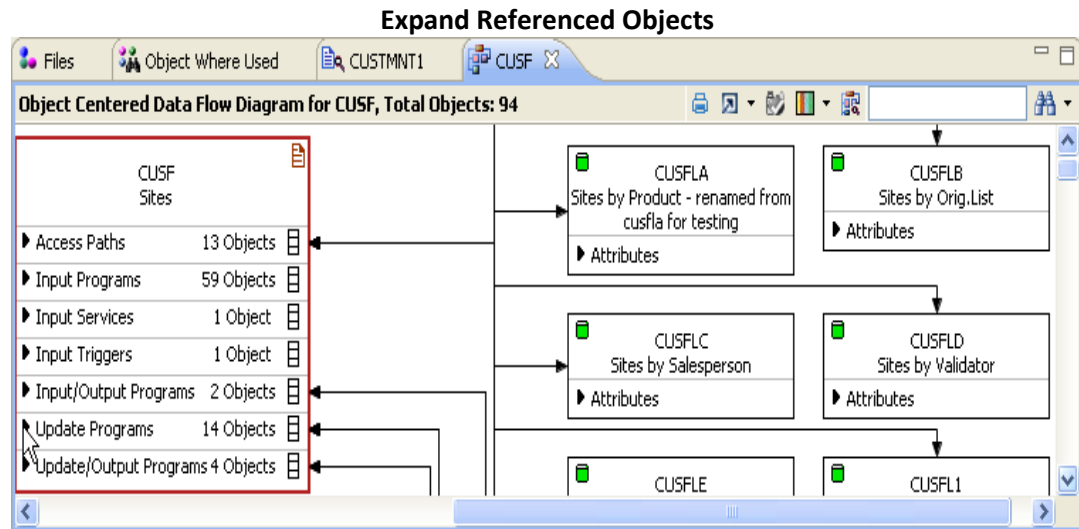
The following screenshot shows how another click displays all the objects within.



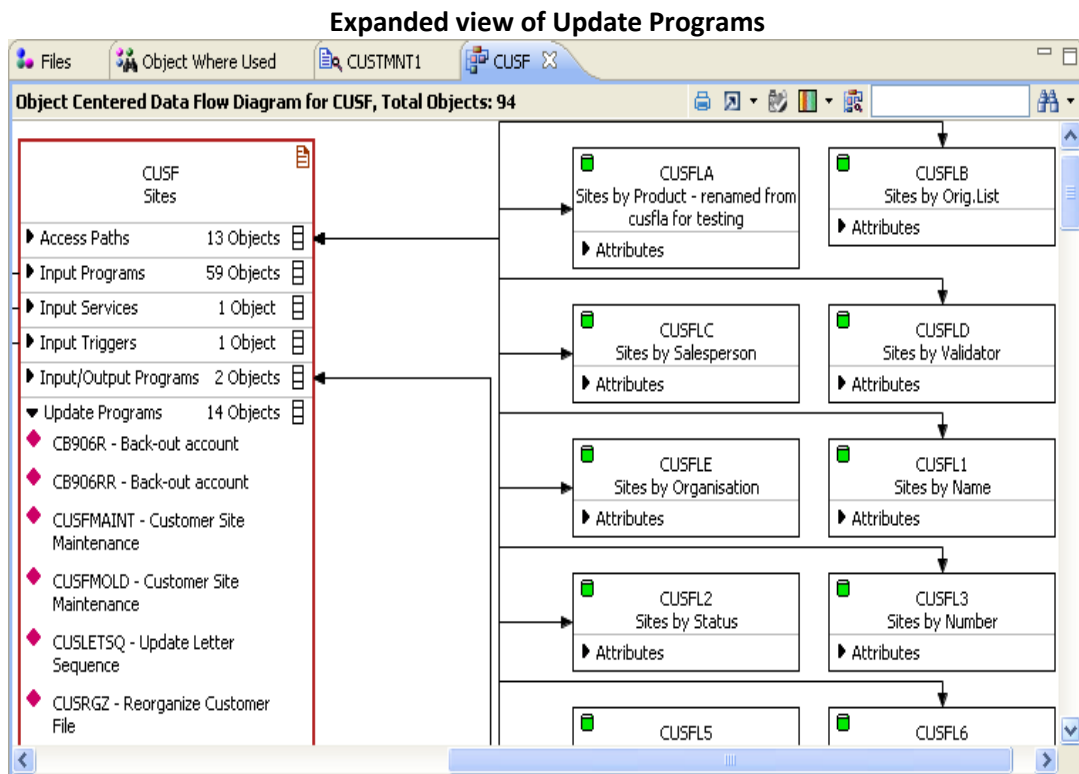
### Expand/Collapse Referenced Objects

The DFD takes another dynamic form when you expand the referenced object(s) on selecting a particular category from the main object's box. The following screenshot displays the action to be performed:



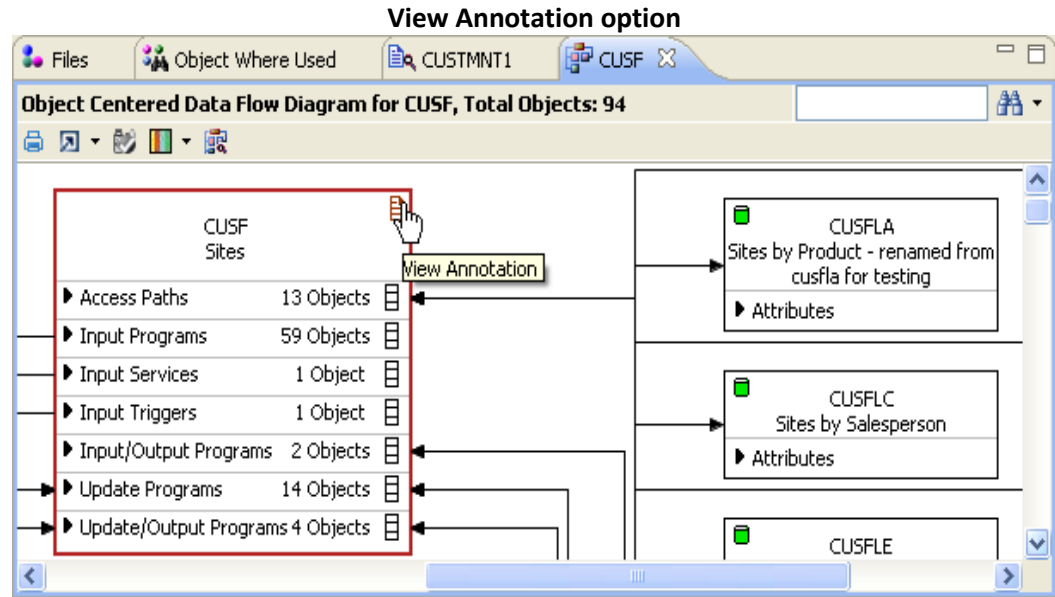


A single-click on the arrow icon adjacent to **Update Programs** reveals all the ten objects updating **CUSF**. The following screenshot displays the expanded view of the referenced objects' list:



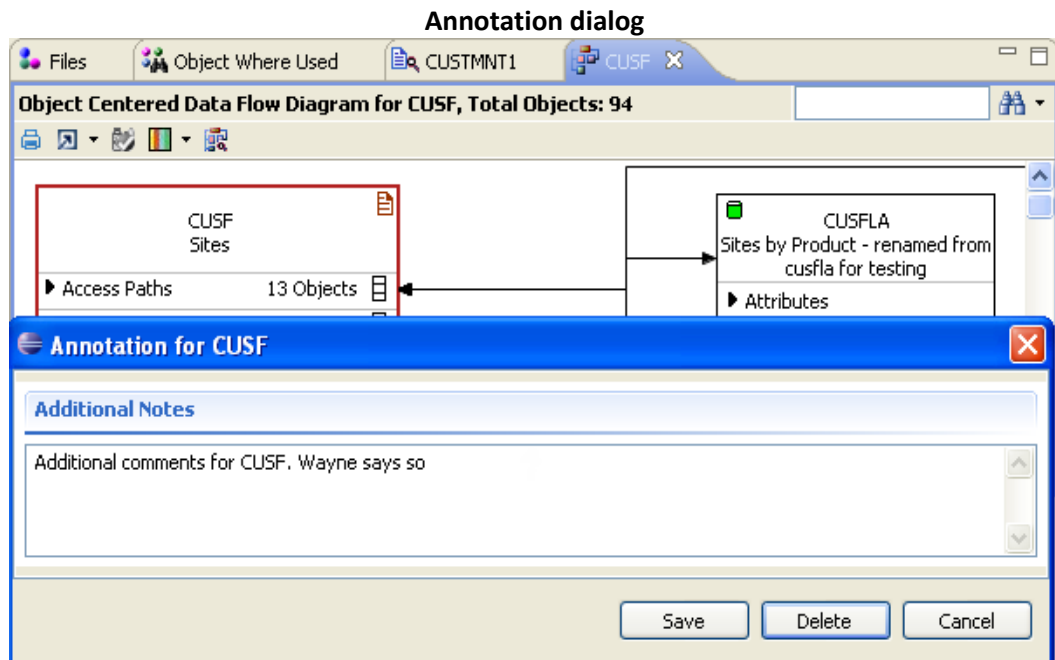
## View Annotation

The **View Annotation** option allows user to see annotation for a specific object. There is a red icon denoting Annotated text, on the right side of the Object (see the following screenshot).



Double-click on the **View Annotation** icon to invoke the Annotation dialog box, displaying the notes that had been written earlier.

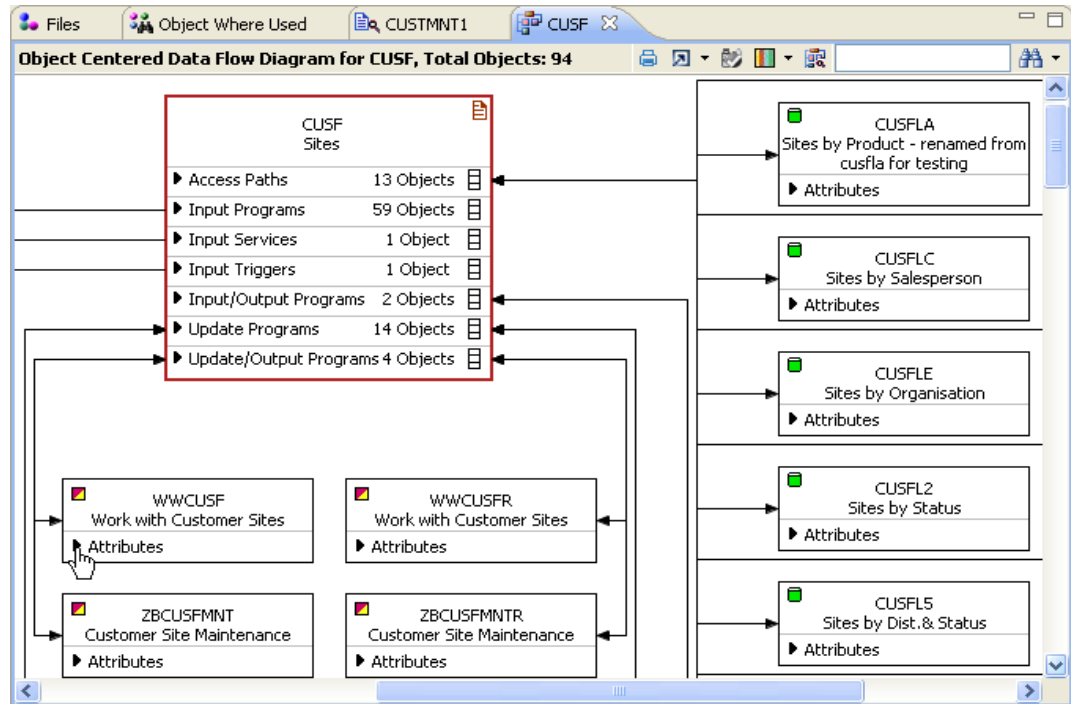
You can further add/modify notes in the Annotation dialog box and click **Save**. These notes will be viewable later using the same option.



### Attributes

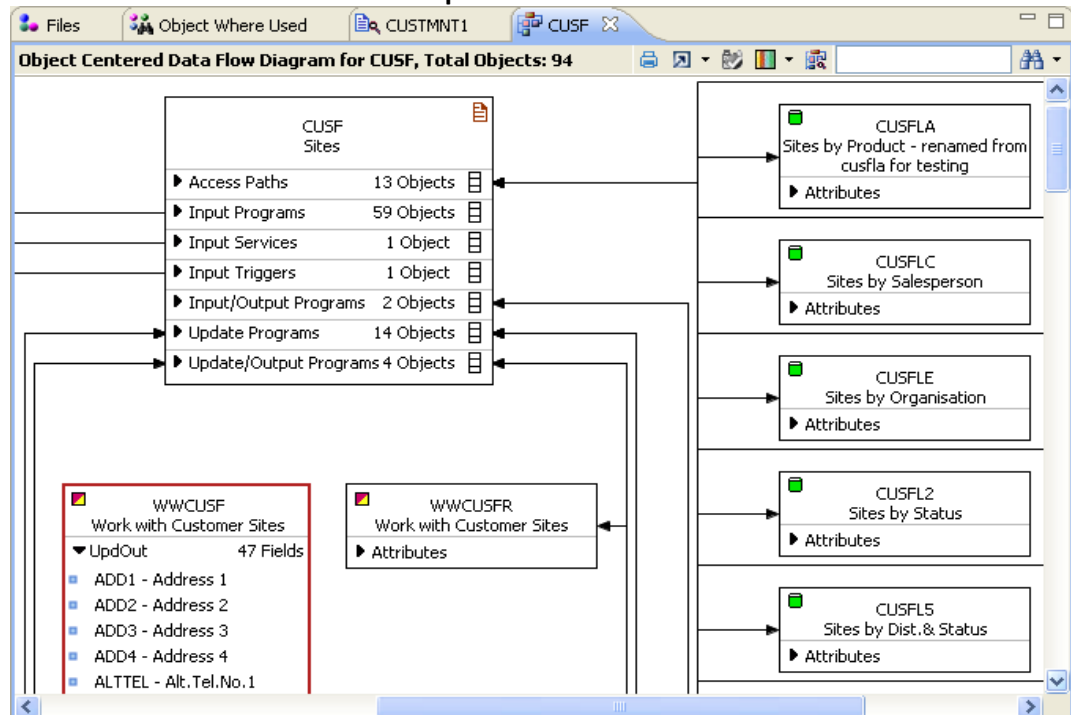
The **Attributes** feature comprises the impacted fields of a particular object. Through these fields, the main object is referenced.

Attributes icon



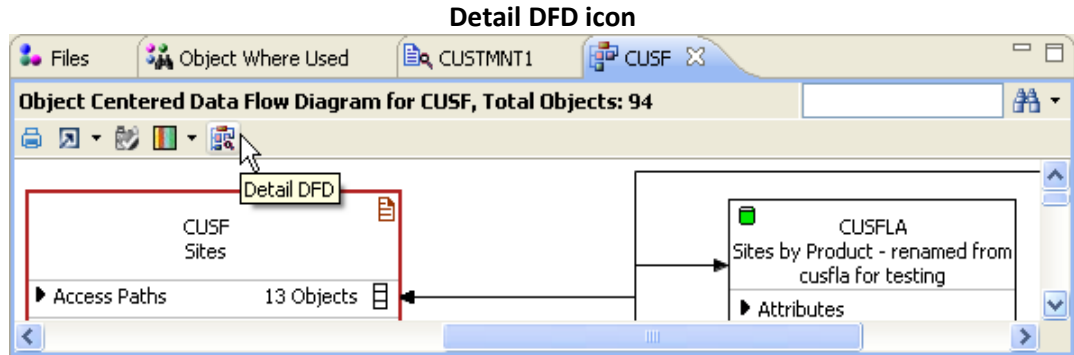
The different objects corresponding to the main object have fields within them, implicit as 'Attributes'. These are easily accessible by a single-click on the **Attributes** icon. The term 'Attributes' is changed to related attribute – input, update, output etc., on expanding the **Attributes** button, as shown below:

Expanded Attributes

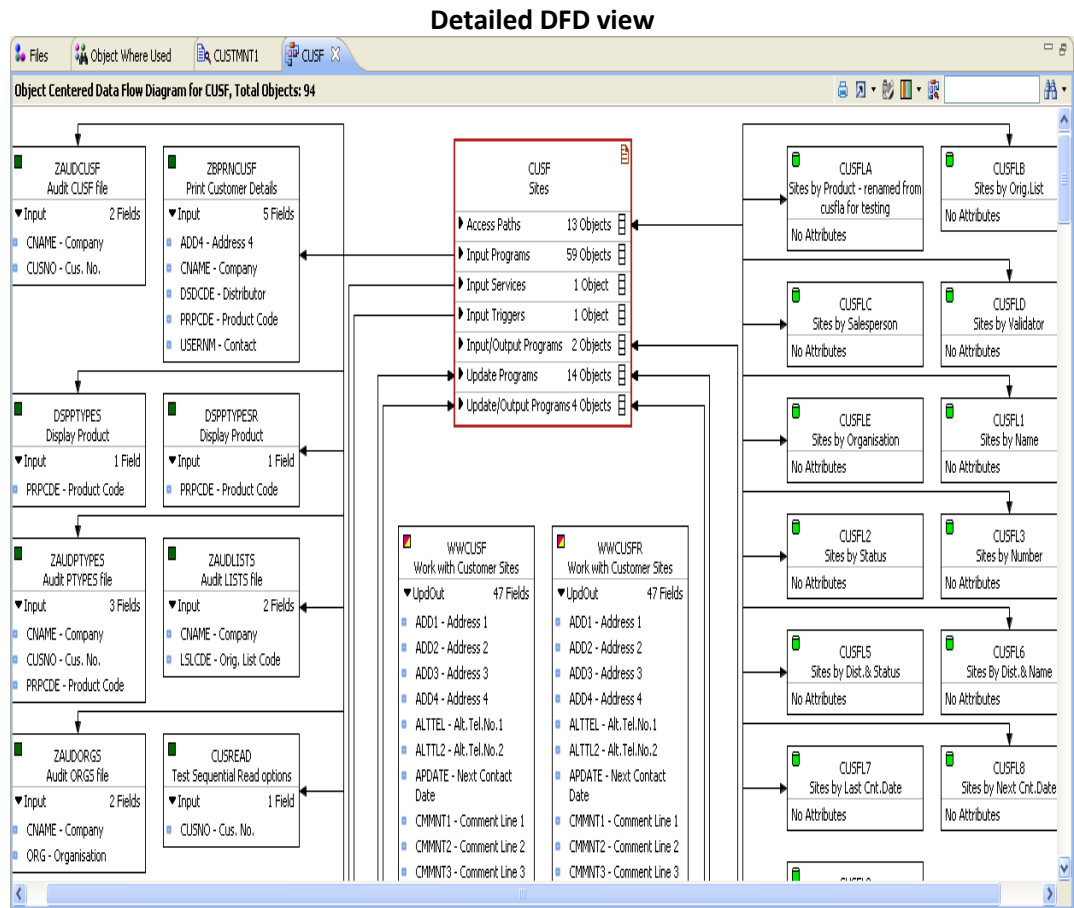


### Detail DFD icon

The **Detail DFD** presents the field usage of all the objects.

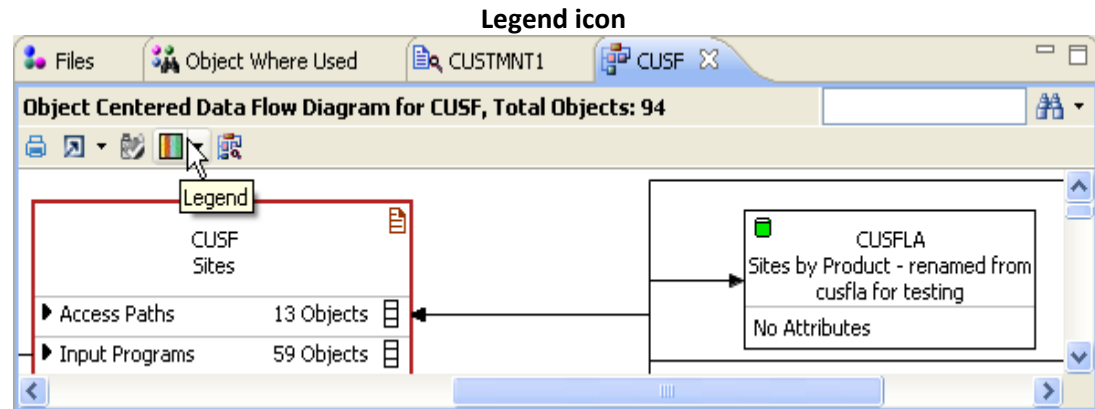


When you click on the **Detail DFD** icon on the toolbar, the Attributes section of all the objects gets expanded displaying referred fields from all objects. The following screenshot displays the detailed DFD screen:

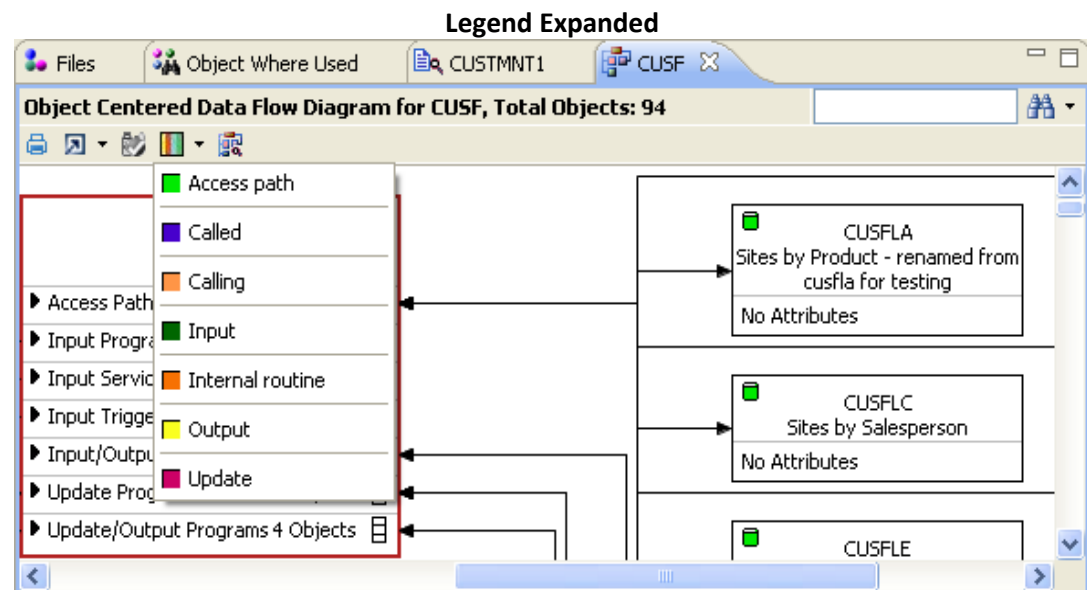


## Legend icon

The **Legend** icon on the toolbar displays details of the color scheme used by the DFD. Click the icon shown below:



The color scheme helps you understand the reference and association of specific objects, like how each object is referred to or used by the main object on which the DFD was opted. The expanded view of the **Legend** is given underneath.



Each object box has a colored square or disk on the top left corner. A disk denotes that the object is a file, whereas a square denotes a program. The description of the DFD Legend is as follows:

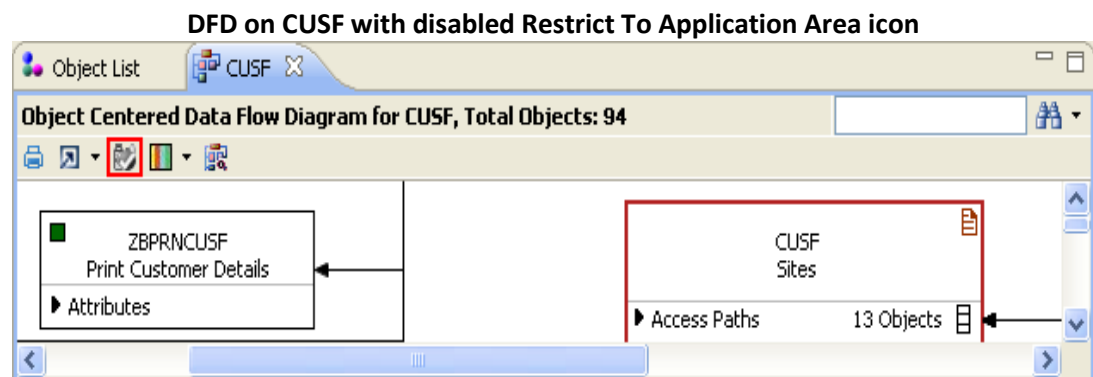
- **Access Path** – This is the LF for the File on which the Data Flow Diagram has been opted.
- **Called** – This is to represent programs called by the main program.

- **Calling** – This denotes the programs calling the main program.
- **Input** – For a program-centered DFD, this denotes an input file. For a file-centered DFD, this denotes a program taking input from the file.
- **Internal Routines** – These are Synon-specific routines being called from a 2E program.
- **Output** – For a program-centered DFD, this denotes an output file. For a file-centered DFD, this denotes a program giving output to the file.
- **Update** – For a program-centered DFD, this denotes an update file. For a file-centered DFD, this denotes a program updating the file.

### DFD Restricted to an Application Area

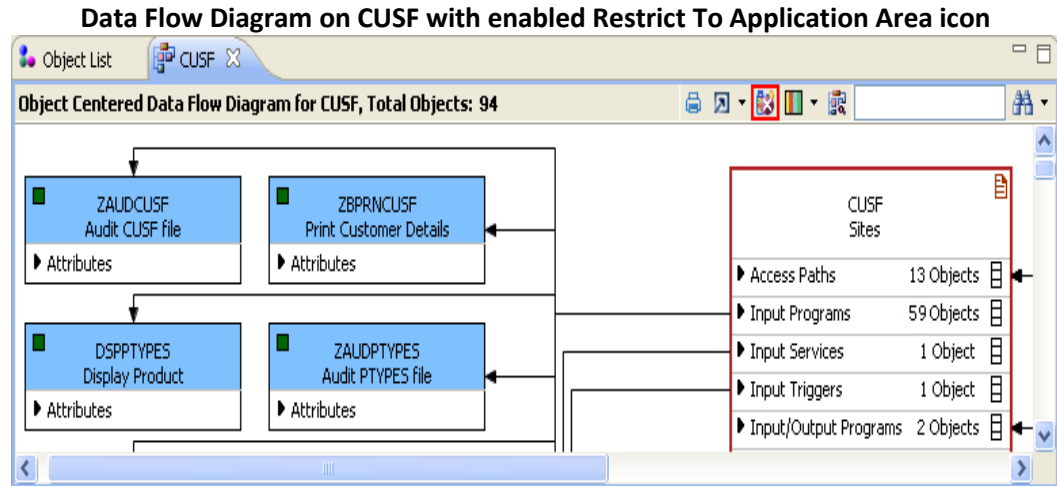
X-Analysis provides an additional feature related to DFDs. You can restrict the DFDs to the selected application area by clicking on the **Restrict To Application Area** icon. On clicking the icon, only those child objects are displayed which belong to the selected application area.

The following screen displays the DFD on **CUSF**. Notice that the **Restrict To Application Area** icon is disabled. This is so because this option gets enabled when any application area is selected.



Now select the application area, **MVCPROCESS**.

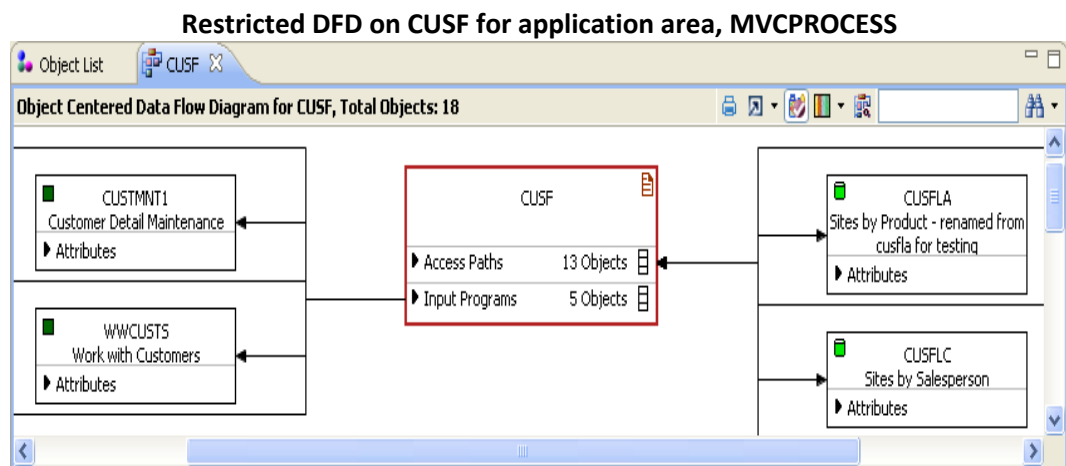
Select the **Data Flow Diagram** option on **CUSF**; notice that the **Restrict To Application Area** icon is enabled (see the following screen). This is so because you have selected an application area.



Now, click on the **Restrict To Application Area** icon as shown below:



The following screen is displayed:



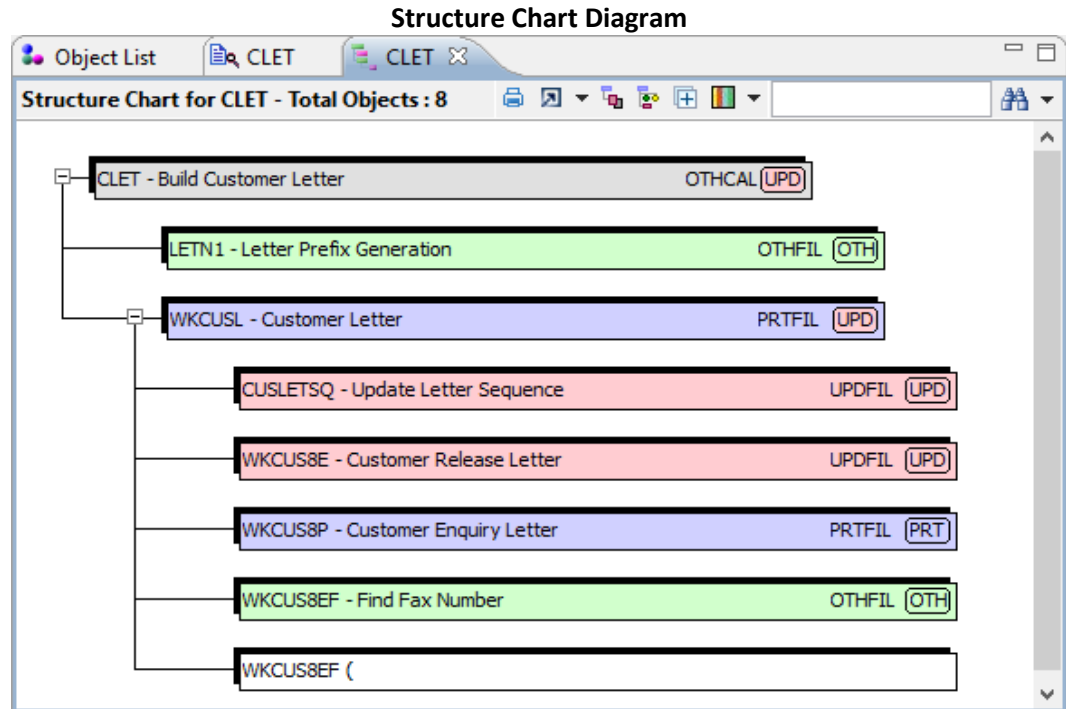
This tells us that the child objects belong to the application area, **MVCPROCESS**.

**Note:** While using the Restrict To Application Area feature, ensure that the originally-selected application area is not changed.

## STRUCTURE CHART DIAGRAM

Before undertaking an elaborate exercise of documenting program logic, it is imperative to understand how control transfers from one program to the next. A Structure Chart Diagram or SCD addresses this issue and represents the control through graphical, color-coded block diagrams. Broadly speaking, the SCD is a nested tree diagram that shows the

complete call hierarchy of the 'programs called'. These diagrams contain all the relevant information as per control flow and call structure. Moreover, you can view data input objects and avail a summarized description for each of the objects. Important functional aspects like updates, prints and displays are color coded to help you instantly focus on these commonly preferred details.



### Legend

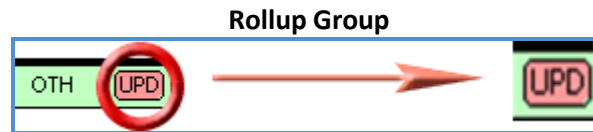
The SCD Legend describes the type of object displayed.

- **Update** – This depicts the program that updates a file.
- **Display** – This depicts the program that uses a Display file.
- **Print** – This depicts the program that uses a Print file.
- **Input** – This depicts the program that uses an Input file.
- **Output** – This depicts the program that writes to a file.
- **Command** – This simply depicts a Command.
- **Others** – This refers to the Programs where it is referring to a file which is not Update/Display/Print/Input/Output.
- **Internal Routine** – This refers to the Synon-specific routines.

Update
Display
Print
Input
Output
Command
Others
Internal Routine
Indeterminate
Trigger
Module



- **Indeterminate** – This depicts the programs where the usage cannot be programmatically determined.
- **Trigger** – This depicts the program which is a Trigger.
- **Module** – This depicts the program which is a Module.



The Rollup group describes the cumulative component function of the program and its dependents.

The following types of Rollup groups are available:

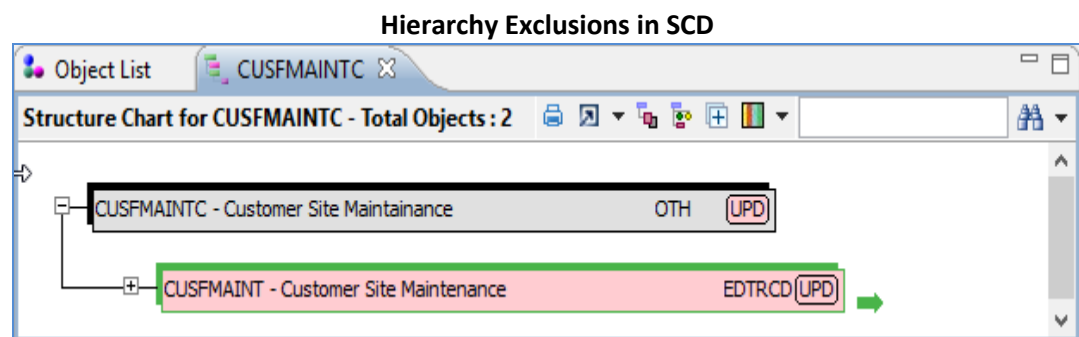
- **UPD** – At least one program updates a file.
- **PRT** – Program and dependent programs create a printed report.
- **DSP** – Program and dependent programs use input files and display files.
- **OTH** – No cumulative component function can be determined.

### Function Type

Function Type describes the function of the object and is based on COOL: 2E definitions.

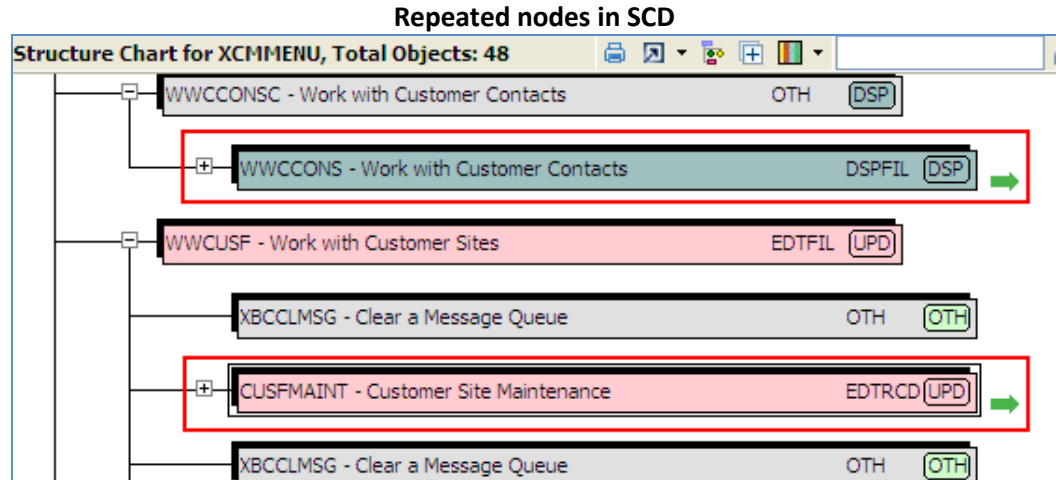
### Hierarchy Exclusions in SCD

**Work with Exclusions** is **Option 16** on the **X4WRKAPP** master command menu. With the help of this feature you can add a program’s name for Hierarchy Exclusions. This has effect in the SCD and the OSC. This feature removes the child nodes of the excluded object and a green arrow is displayed to indicate the hierarchy exclusion. The following screen shows this feature.



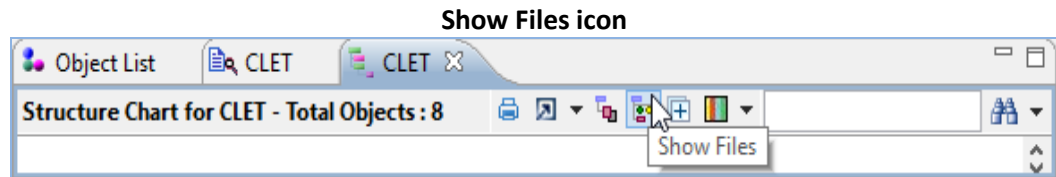
## Repeated nodes in SCD

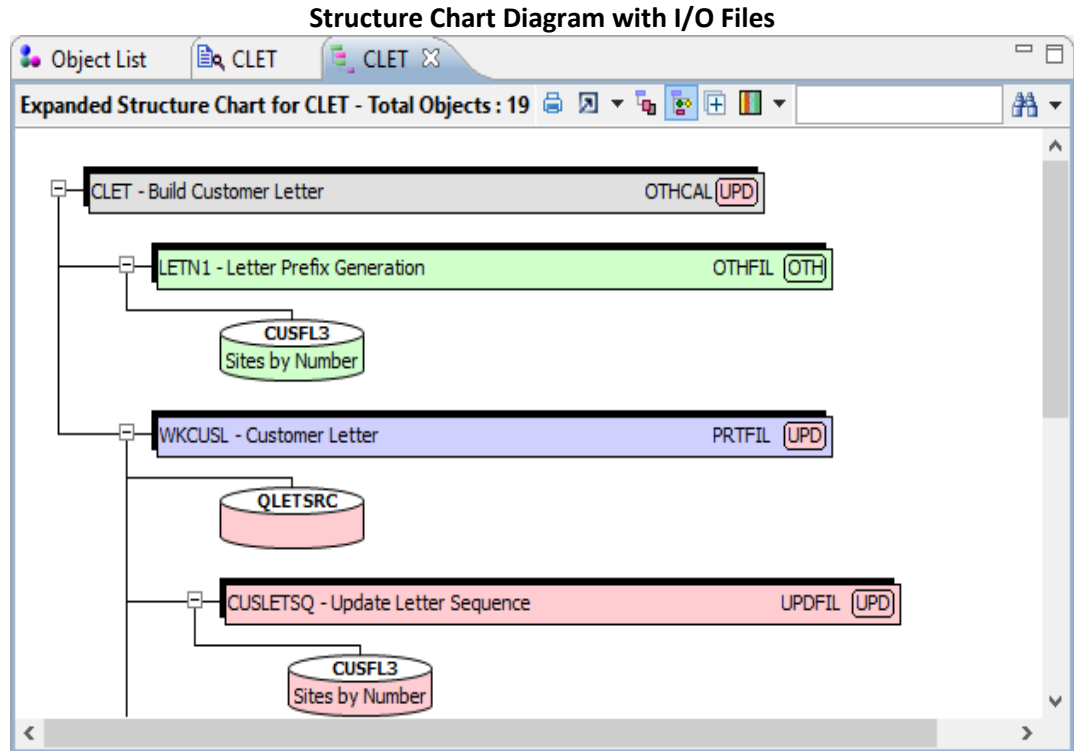
The SCD displays the repeated objects (having child nodes) with a green arrow beside them. The following image shows the repeated nodes in an SCD.



## Structure Chart Diagram with Files

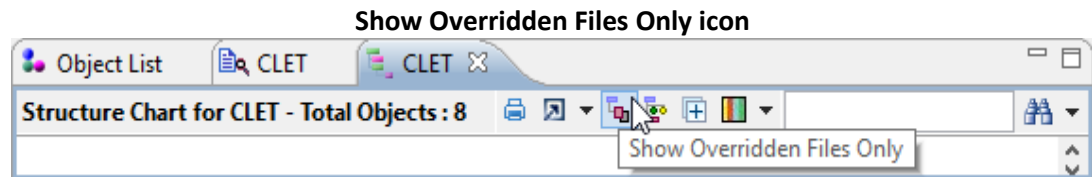
The SCD provides a graphic display of the program-to-program relationships. The SCD with files also displays associated files along with programs. To see the SCD with files, click on the **Show Files** icon available on the SCD toolbar.



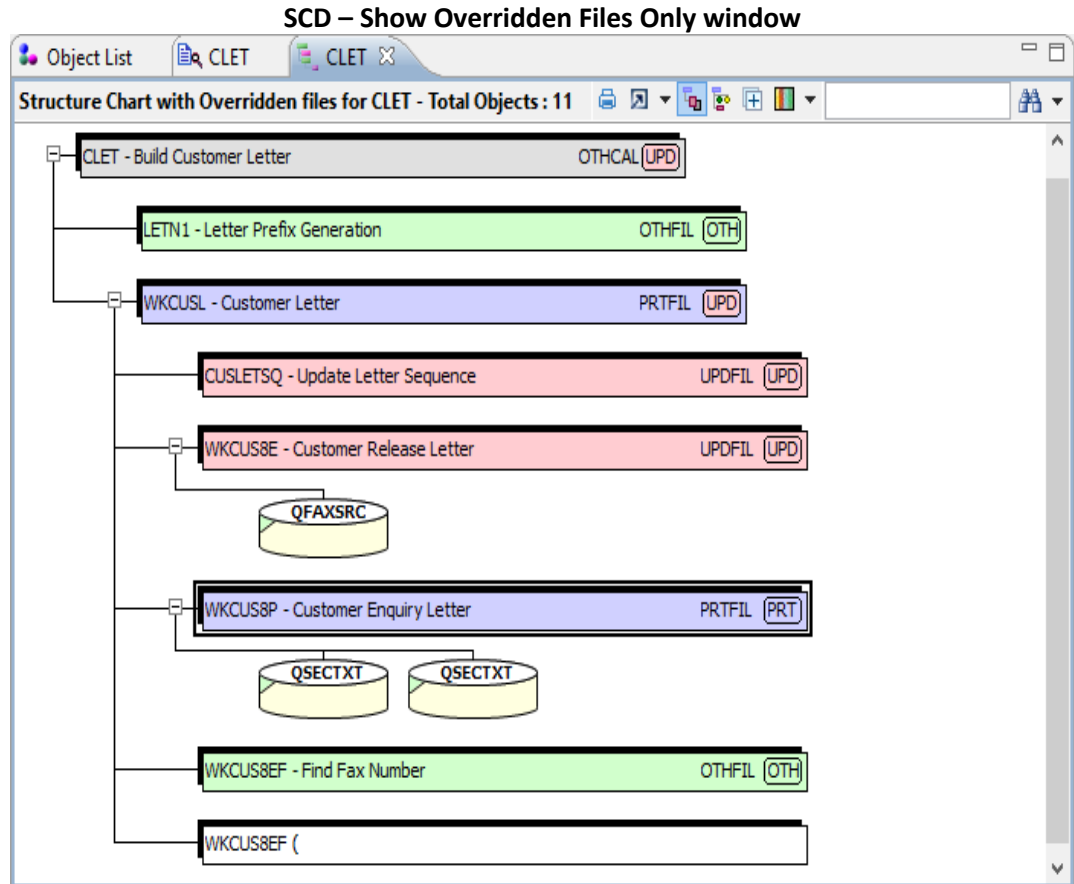


### Structure Chart Diagram – Show Overridden Files Only

In the case of only CLP/CLLE objects, the SCD has the feature that displays the Overridden Files. The following image shows the **Show Overridden Files Only** icon.



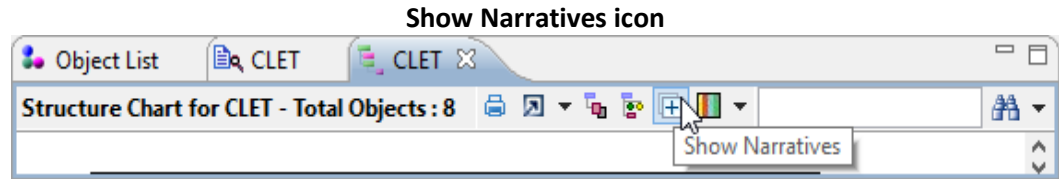
When the icon is clicked, the following window is displayed:



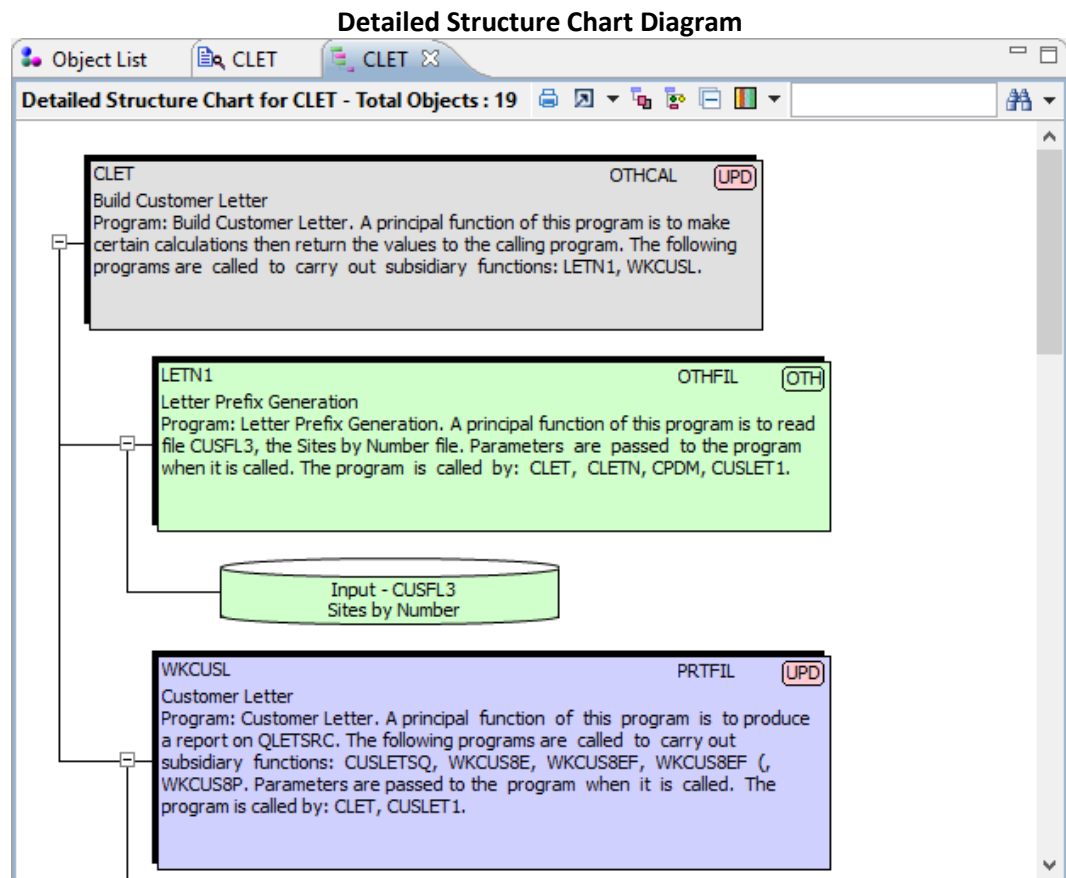
### Detailed Structure Chart

Generate the Detailed SCD by clicking the **Show Narratives** icon from the toolbar of both the SCD and the Expanded Structure Chart Diagram.

The following image shows the icon.



The image below shows the detailed SCD for the selected object, **CLET**.



The Rollup group describes the cumulative component function of the program and its dependents.

The following types of Rollup groups are available:

- UPD – At least one program updates a file.
- PRT – Program and dependent programs create a printed report.
- DSP – Program and dependent programs use input files and display files

- OTH – No cumulative component function can be determined

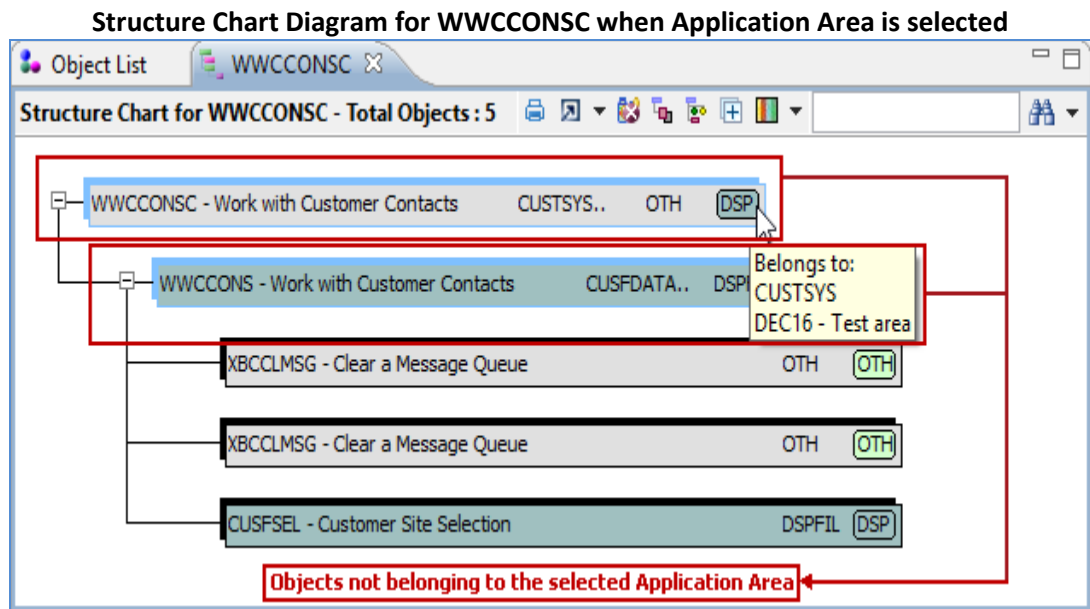
### Function Type

Function Type describes the function of the object and is based on COOL: 2E definitions.

## APPLICATION AREA SCD

When you select the **Structure Chart Diagram** option on an application area (the application area node should be selected), then objects not belonging to the selected application area are highlighted in blue. The names of the application areas are displayed on the tool tip of those objects which do not belong to the selected application area.

*While using the Restrict To Application Area feature, ensure that the originally-selected application area remains the same.*

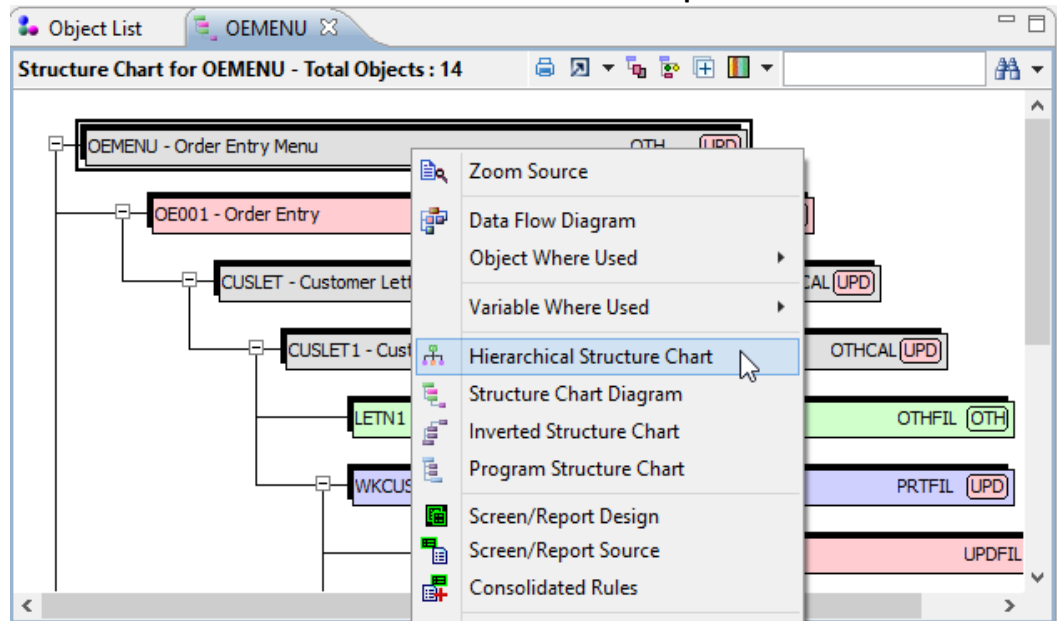


*Note that the SCD can be limited by level as well as volume. This is applicable to the interactive mode of SCDs. You must set the 'Preferred Volume Limit' in the X-Analysis General Preferences dialog.*

## HIERARCHICAL STRUCTURE CHART DIAGRAM

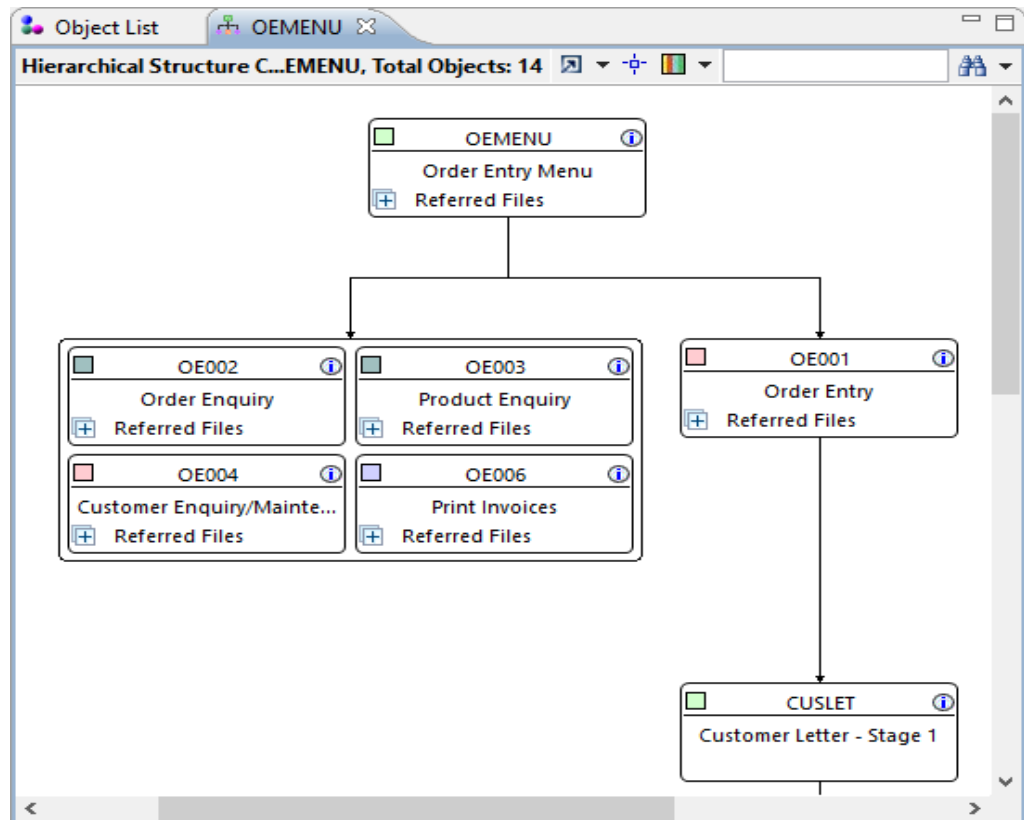
The Hierarchical Structure Chart Diagram offers a different layout for viewing the SCD. This illustration offers a well-defined view of all the programs by representing their control flow and call structure. Neat, color-coded bus routing block diagrams depict the movement of control / programs. Select the **Hierarchical Structure Chart** option for any object from the context menu. In the following screenshot, **OEMENU** is selected.

### Hierarchical Structure Chart option




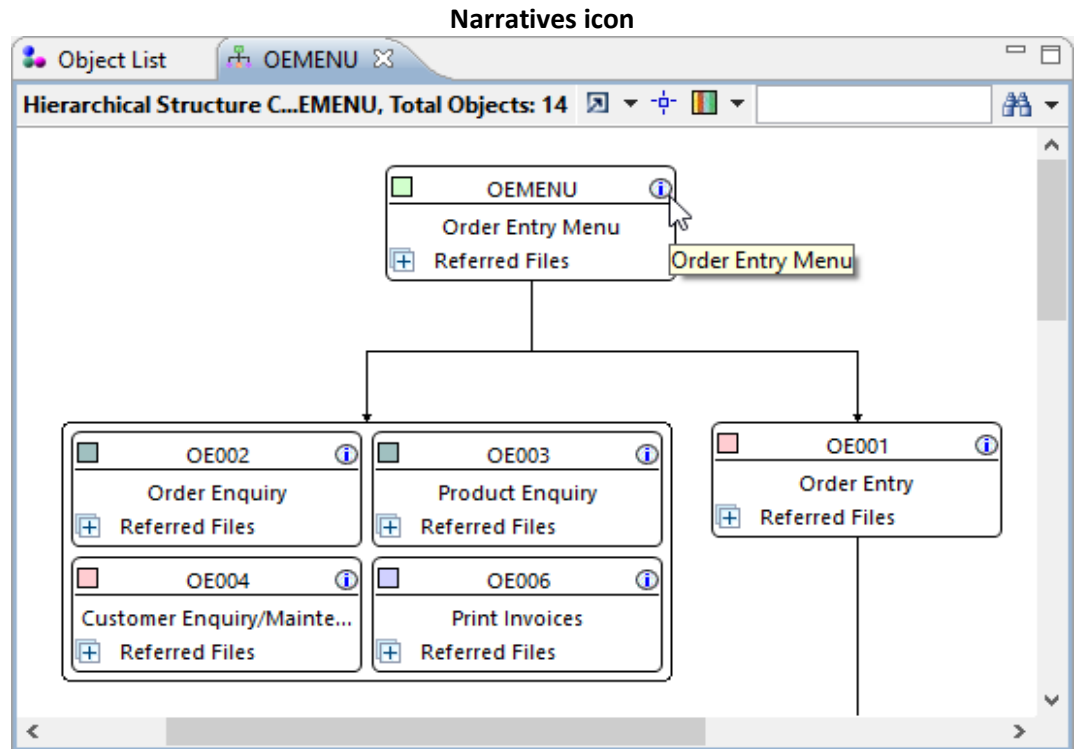
The screenshot below shows the delineation of the main object **OEMENU** into several blocks of related objects in the order of calling. The color codes signify the identity of objects as command-based or input-based or print-based, and so on.

### Hierarchical Structure Chart



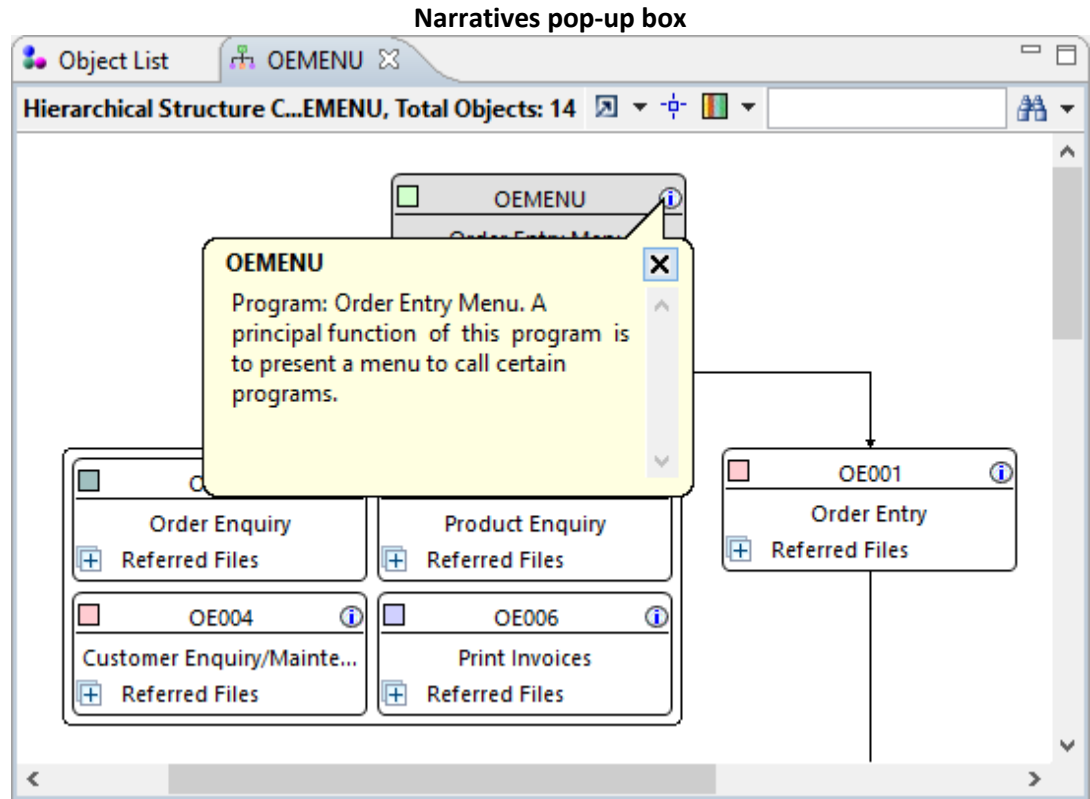
### Narration

Access the additional details related to an object through the  icon.




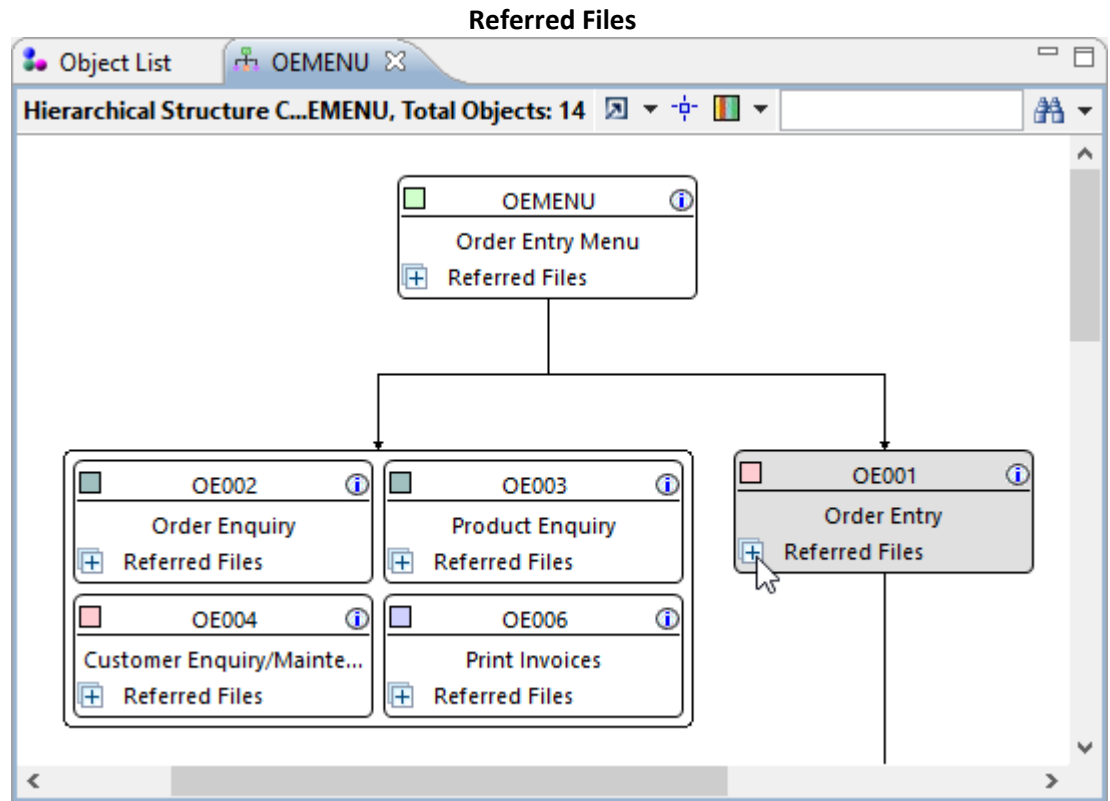
Click on the icon to invoke a pop-up window which provides the auto-generated narration for the program, as shown below:



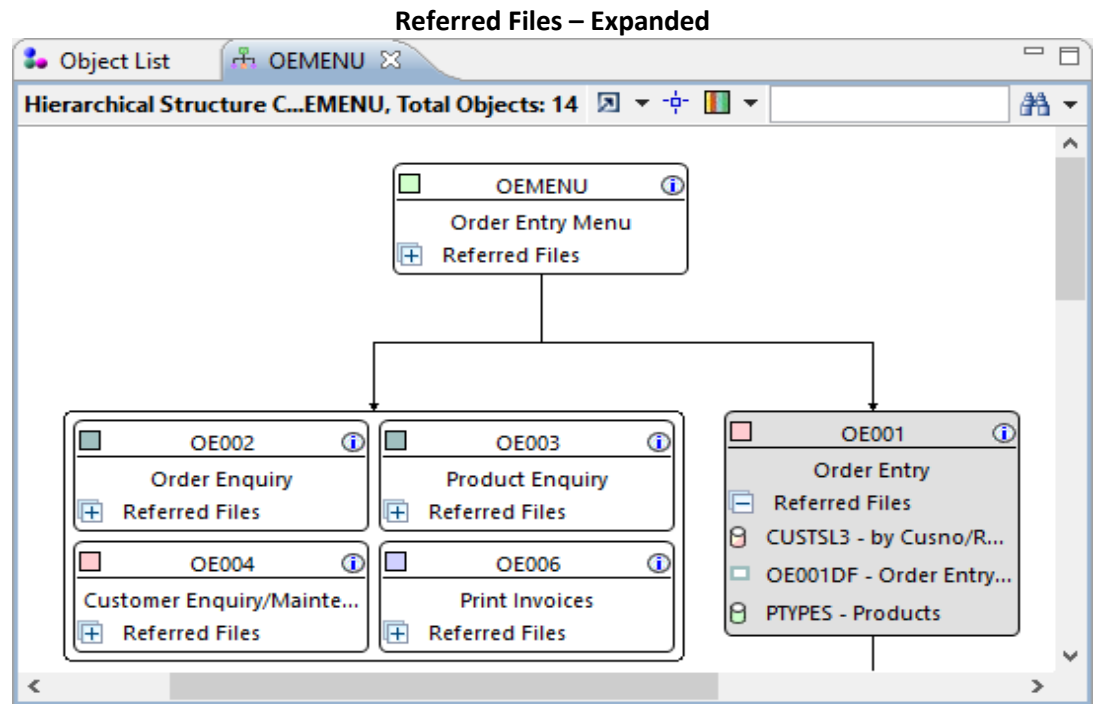


### Referred Files

The Hierarchical Structure Chart has a feature which displays the referred files inline. An expandable icon called **Referred Files** is available in each box. Click on the  icon preceding **Referred Files**.

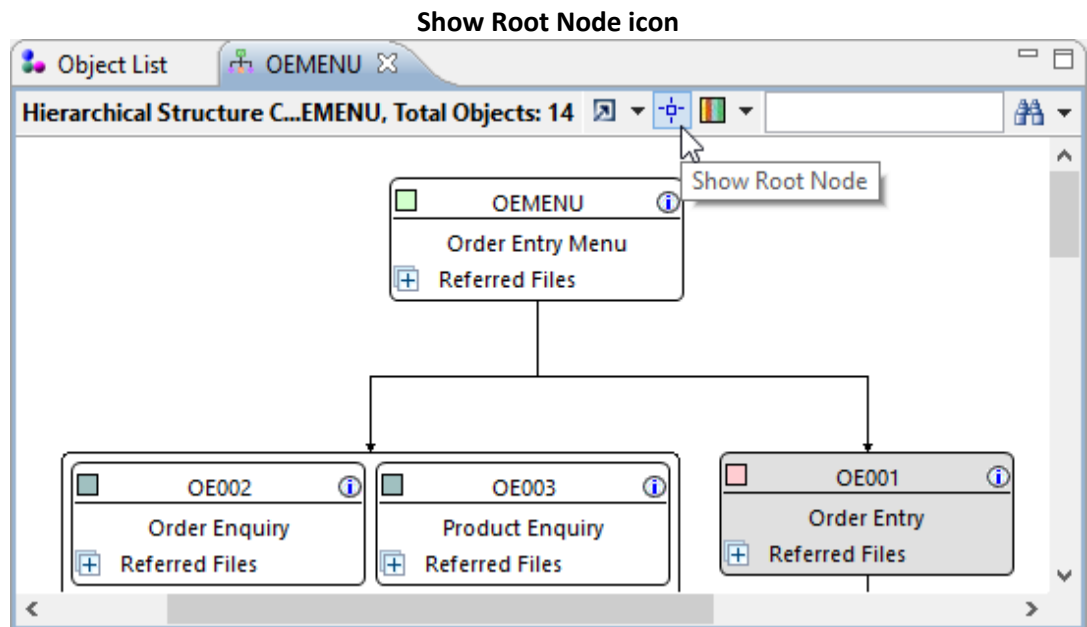


The box will expand to display the files referred to by **OE001**. The color-coded geometric shape before the file name indicates the file type.



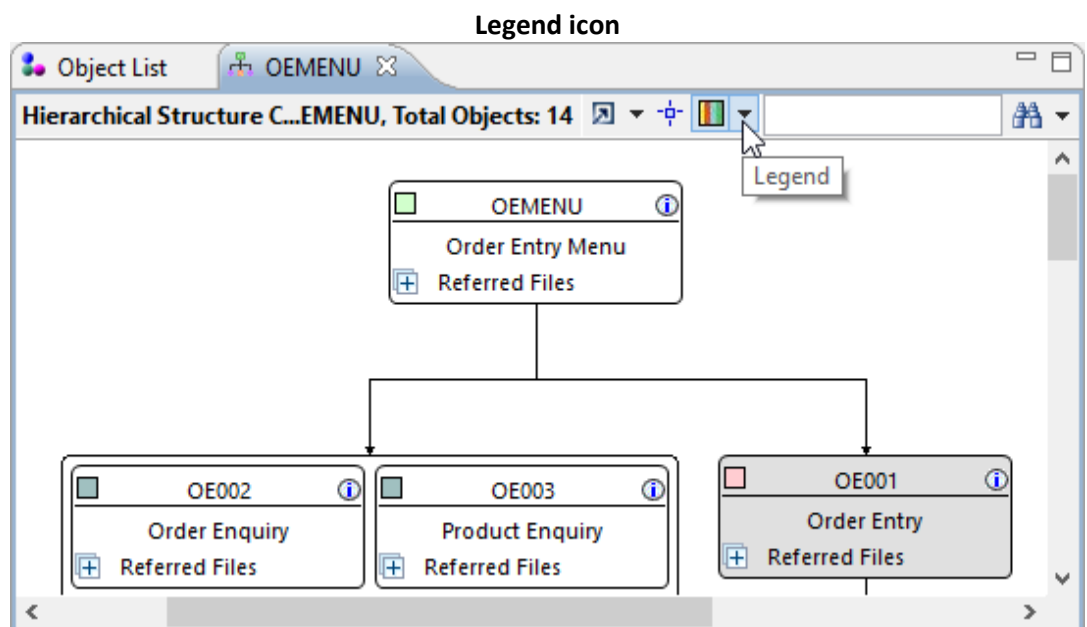
## Show Root Node

Click the **Show Root Node** icon to display the root node:

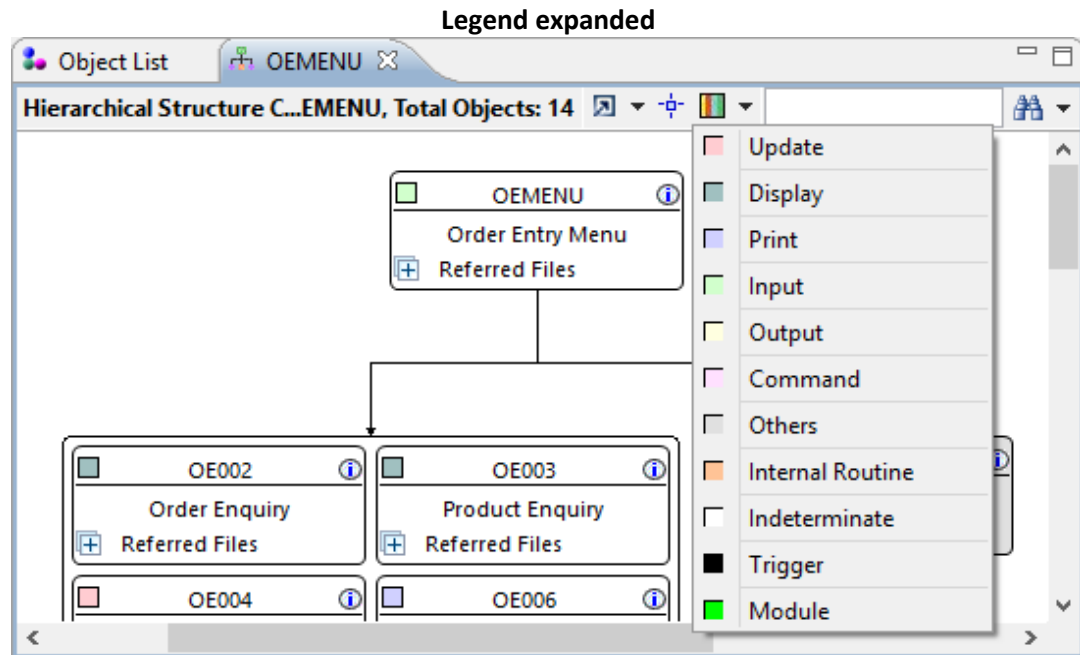


## Legend icon

The **Legend** icon on the toolbar displays details of the color scheme used by the Hierarchical SCD. The colors help in establishing the reference and association of specific objects. Click the **Legend** icon, as shown below:



The following image shows the expanded view of the Legend:

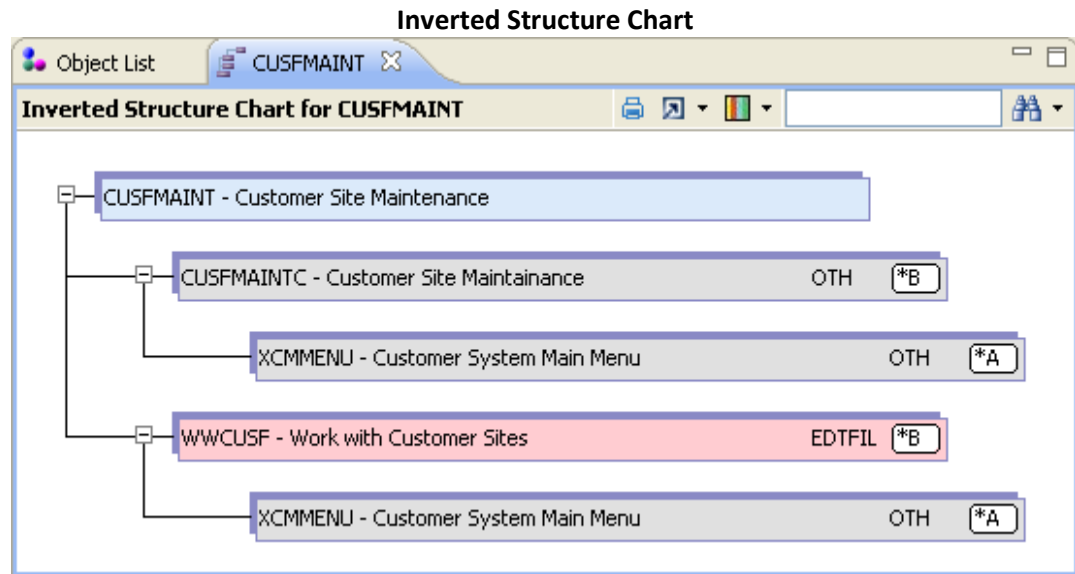


The description of the HSC Legend is as follows:

- **Update** – This depicts the program that updates a file.
- **Display** – This depicts the program that uses a Display file.
- **Print** – This depicts the program that uses a Print file.
- **Input** – This depicts the program that uses an Input file.
- **Output** – This depicts the program that writes to a file.
- **Command** – This simply depicts a Command.
- **Others** – This refers to the Programs where they are referring to a file which is not Update/Display/Print/Input/Output.
- **Internal Routine** – This refers to the Synon-specific routines.
- **Indeterminate** – This depicts the programs where the usage cannot be programmatically determined.
- **Trigger** – This depicts the program which is a Trigger.
- **Module** – This depicts the program which is a Module.

## INVERTED STRUCTURE CHART

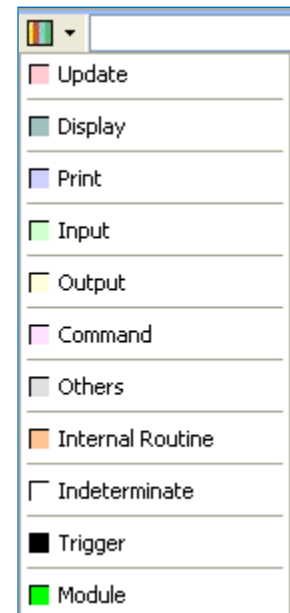
The Inverted Structure Chart depicts the reverse order of the calling programs. In other words, it traces the backward movement of how a specific program gets called. It shows the immediate calling programs that may be the same for the other programs called. In the screenshot below, **XCMMENU** program is calling for both **WWCUSF** and **CUSFMAINTC** along with the main called program, **CUSFMAINT**.



### Legend

The image and the description of the **Inverted Structure Chart Legend** are as follows:

- **Update** – This depicts the program that updates a file.
- **Display** – This depicts the program that uses a Display file.
- **Print** – This depicts the program that uses a Print file.
- **Input** – This depicts the program that uses an Input file.
- **Output** – This depicts the program that writes to a file.
- **Command** – This simply depicts a Command.
- **Others** – This refers to the Programs where they are referring to a file which is not Update/Display/Print/Input/Output.
- **Internal Routine** – This refers to the Synon-specific routines.



- **Indeterminate** – This depicts the programs where the usage cannot be programmatically determined.
- **Trigger** – This depicts the program which is a Trigger.
- **Module** – This depicts the program which is a Module.

The Inverted Structure Chart can also be viewed as the diagrammatic representation of **Object Where Used > Entry Level References** for a particular program. The references appear as a list in tabular form that gives the lead of the calling object. In this case it is **XCMMENU**, as shown in the screenshot below:

**Entry Level References List – XCMMENU**

Object	Type	Text	Usage	Library
XCMMENU	*PGM	Customer System Main Menu	Entry Level Reference	XAN4CDEM

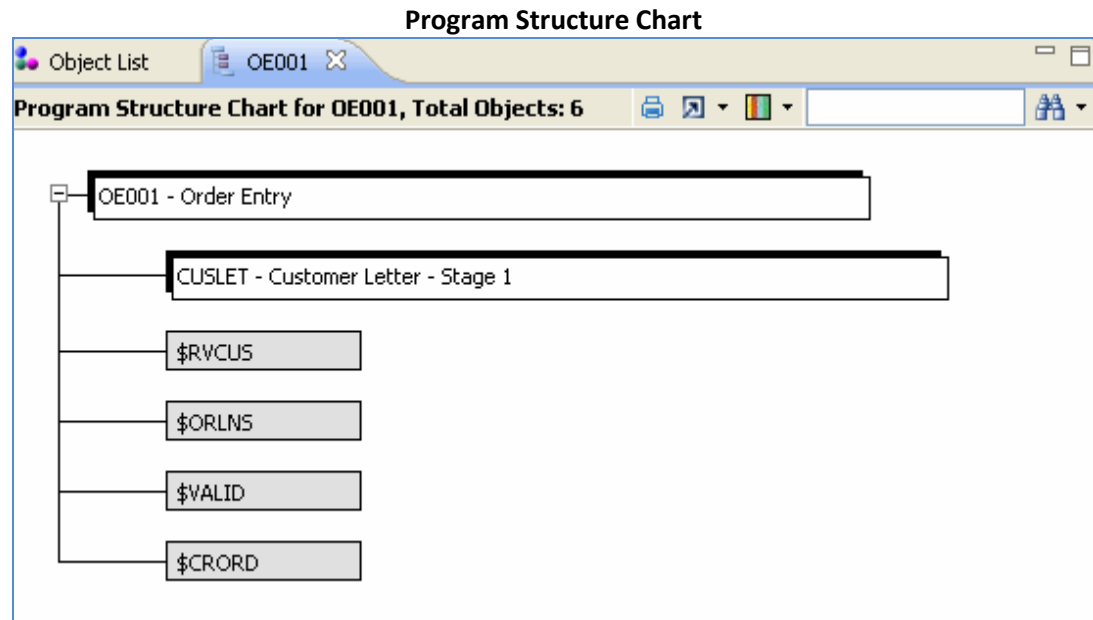
## PROGRAM STRUCTURE CHART/PSC

The Program Structure Chart graphically displays the sequence of calls in the program. The call operation can perform the following:

- Execute a Subroutine
- Execute a Sub-Procedure
- Execute a Program/Module/Service Program.

The subroutines are displayed as small rectangles with grey background, displaying name of the subroutine. The object’s Function Type determines the coloring of all other boxes viz. Programs, Modules, and Service Programs.

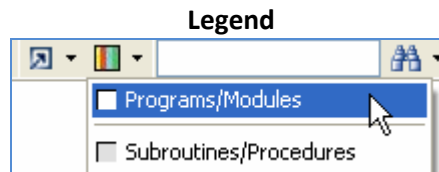
Boxes other than the subroutine boxes, are of the size of program element as on the Structure Chart.



The menu options and context menu options on the PSC work the same way as on the SCD, except for the **Zoom Source** option.

*If there is no Main Procedure and only sub-procedures exist, then the PSC displays each sub-procedure's PSC independently, one after the other. If no sub-procedures exist then the PSC only displays the program.*

### Legend

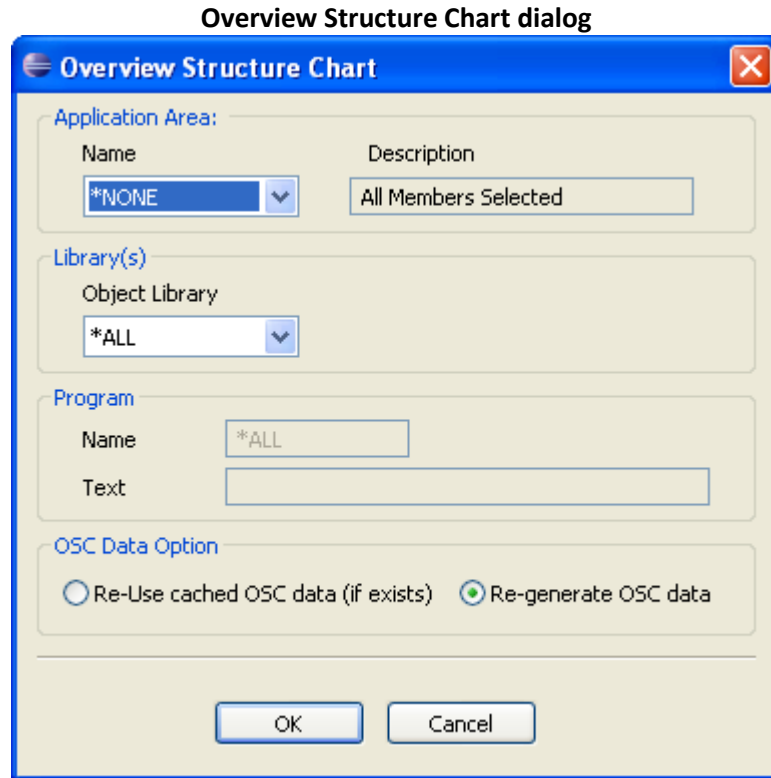


There are two colors in the PSC Legend. White depicts the calling Programs or Modules. Gray depicts the calling Subroutines or Procedures.

## OVERVIEW STRUCTURE CHART/OSC

The OSC gives a snapshot of an application displaying all entry points to the application. The details of all the mainline entry-level programs are displayed, which give an idea of the modules and sub-modules present in an application.

The **Overview Structure Chart** node is available under the cross-reference library node and application area(s) node. Double-click the **Overview Structure Chart** node to display the following dialog.

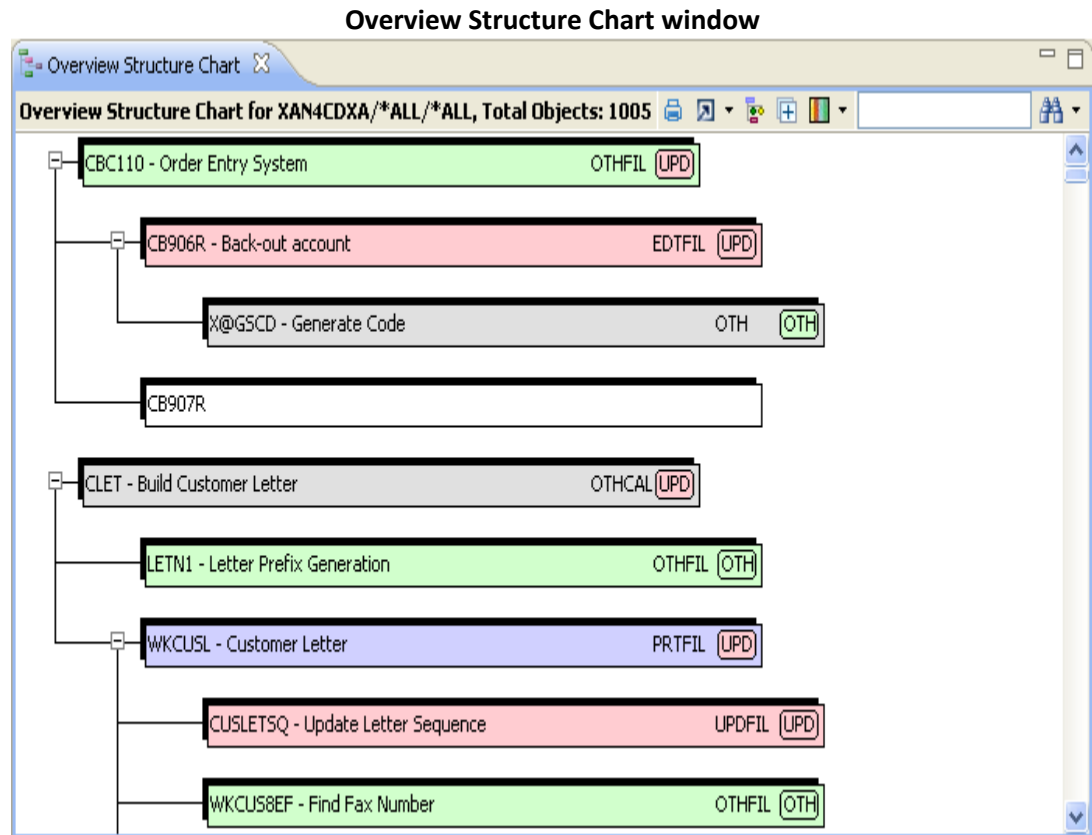


The **Overview Structure Chart** dialog prompts you to:

1. Select the Application Area name, if available, else leave it as \*NONE.
2. Pick the Object Library from the drop-down list.
3. The Program Name will be set as \*ALL.
4. Select **OSC Data Option** to re-use cached data or re-generate data.

Click **OK** to display the Objects' OSC based on the selection criterion.





**Legend**

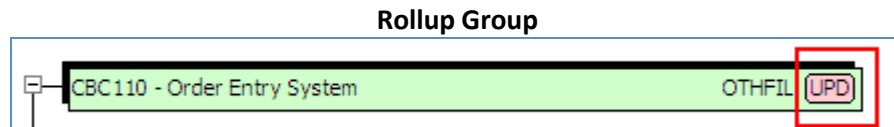
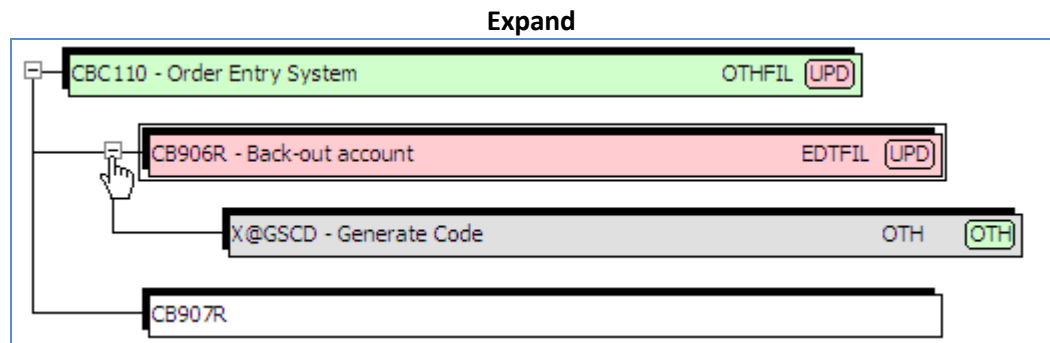
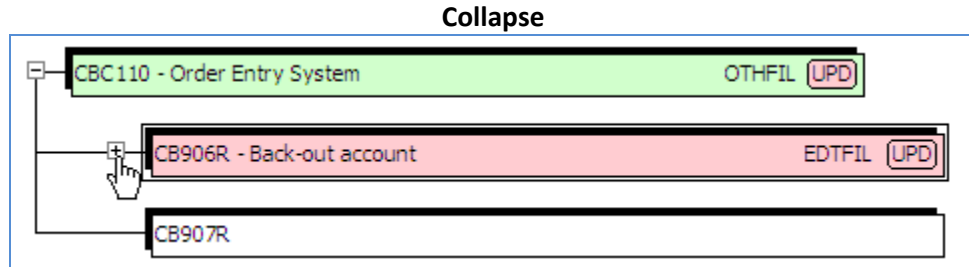
The description of the OSC Legend is as follows:

- **Update** – This depicts the program that updates a file.
- **Display** – This depicts the program that uses a Display file.
- **Print** – This depicts the program that uses a Print file.
- **Input** – This depicts the program that uses an Input file.
- **Output** – This depicts the program that writes to a file.
- **Command** – This simply depicts a Command.
- **Others** – This refers to the Programs that are referring to a file which is not Update/Display/Print/Input/Output.
- **Internal Routine** – This refers to the Synon-specific routines.
- **Indeterminate** – This depicts the programs where the usage cannot be programmatically determined.

<span style="color: red;">■</span>	Update
<span style="color: teal;">■</span>	Display
<span style="color: purple;">■</span>	Print
<span style="color: green;">■</span>	Input
<span style="color: yellow;">■</span>	Output
<span style="color: pink;">■</span>	Command
<span style="color: grey;">■</span>	Others
<span style="color: orange;">■</span>	Internal Routine
<span style="color: black;">■</span>	Indeterminate
<span style="color: black;">■</span>	Trigger
<span style="color: green;">■</span>	Module

- **Trigger** – This depicts the program which is a Trigger.
- **Module** – This depicts the program which is a Module.

The OSC can be expanded/collapsed using the button on the lines.



The Rollup group describes the cumulative component function of the program and its dependents.

The following types of Rollup groups are available:

- **UPD** – At least one program updates a file.
- **PRT** – Program and dependent programs create a printed report.
- **DSP** – Program and dependent programs use input files and display files.
- **OTH** – No cumulative component function can be determined.

### Function Type

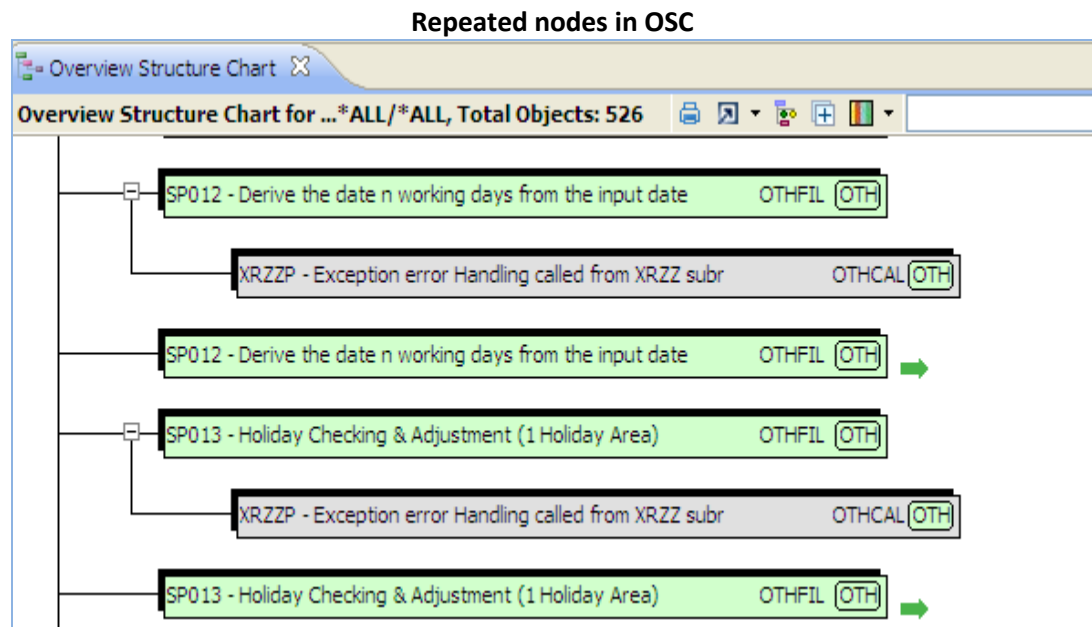
Function Type describes the function of the object and is based on COOL: 2E definitions.

## Hierarchy Exclusions in OSC

**Work with Exclusions** is an option on the master command menu **X4WRKAPP (Option 16)**. Using this feature you can add a program's name for Hierarchy Exclusions. This has effect in the OSC and the SCD. This feature removes the child nodes of the excluded object and a green arrow is shown to indicate the hierarchy exclusion.

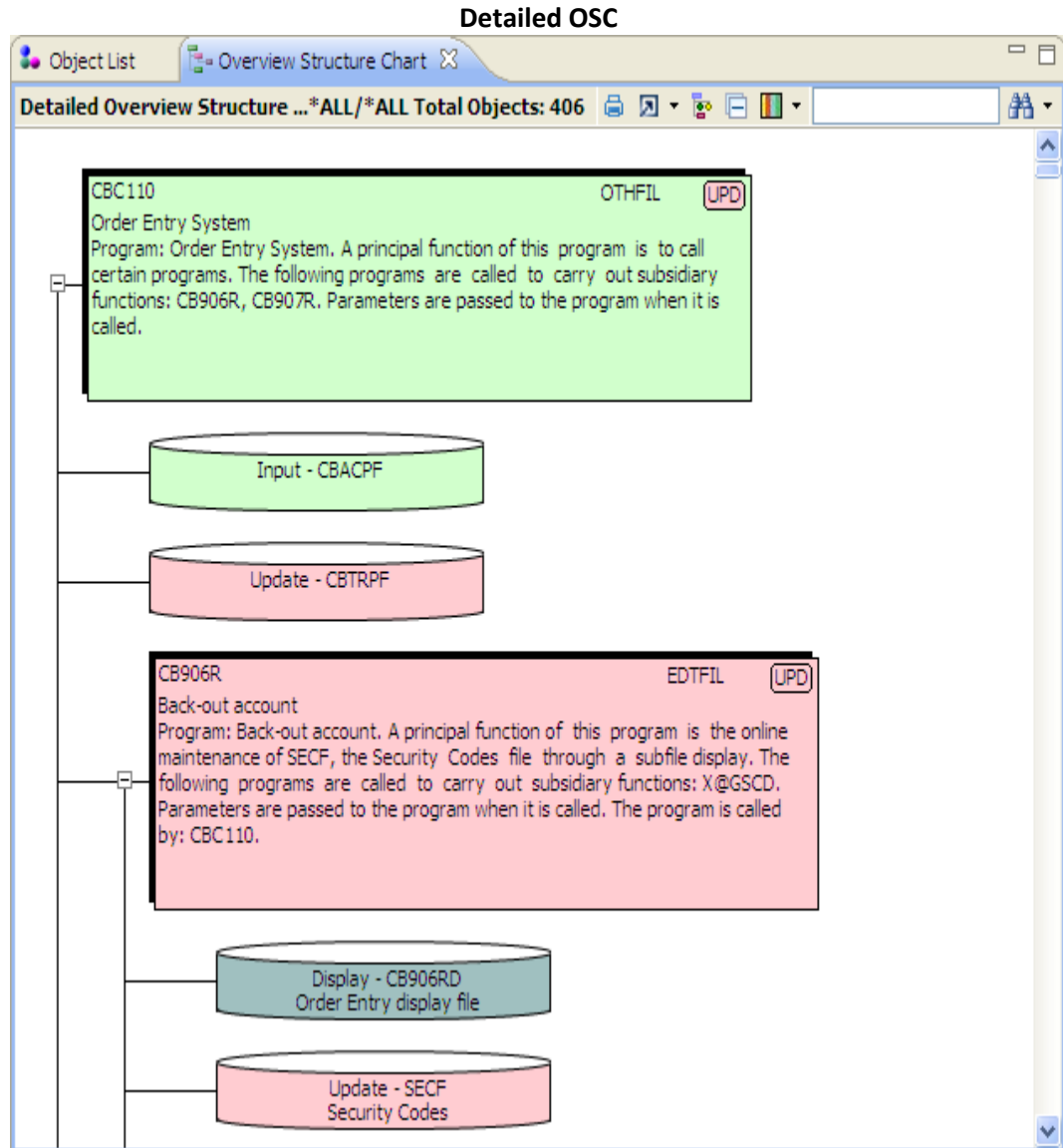
## Repeated Nodes in OSC

The OSC displays the repeated objects (having child nodes) with a green arrow beside them. The following screen displays repeated nodes in OSC.

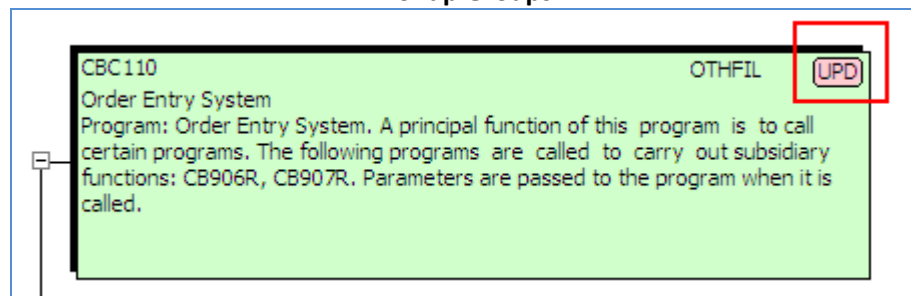


## Detailed OSC

Click on the **Show Narratives** icon to invoke the Detailed Overview Structure Chart.. It is available on the toolbar associated with the OSC.



**Rollup Groups**



The Rollup group describes the cumulative component function of the program and its dependents.

The following types of Rollup groups are available:

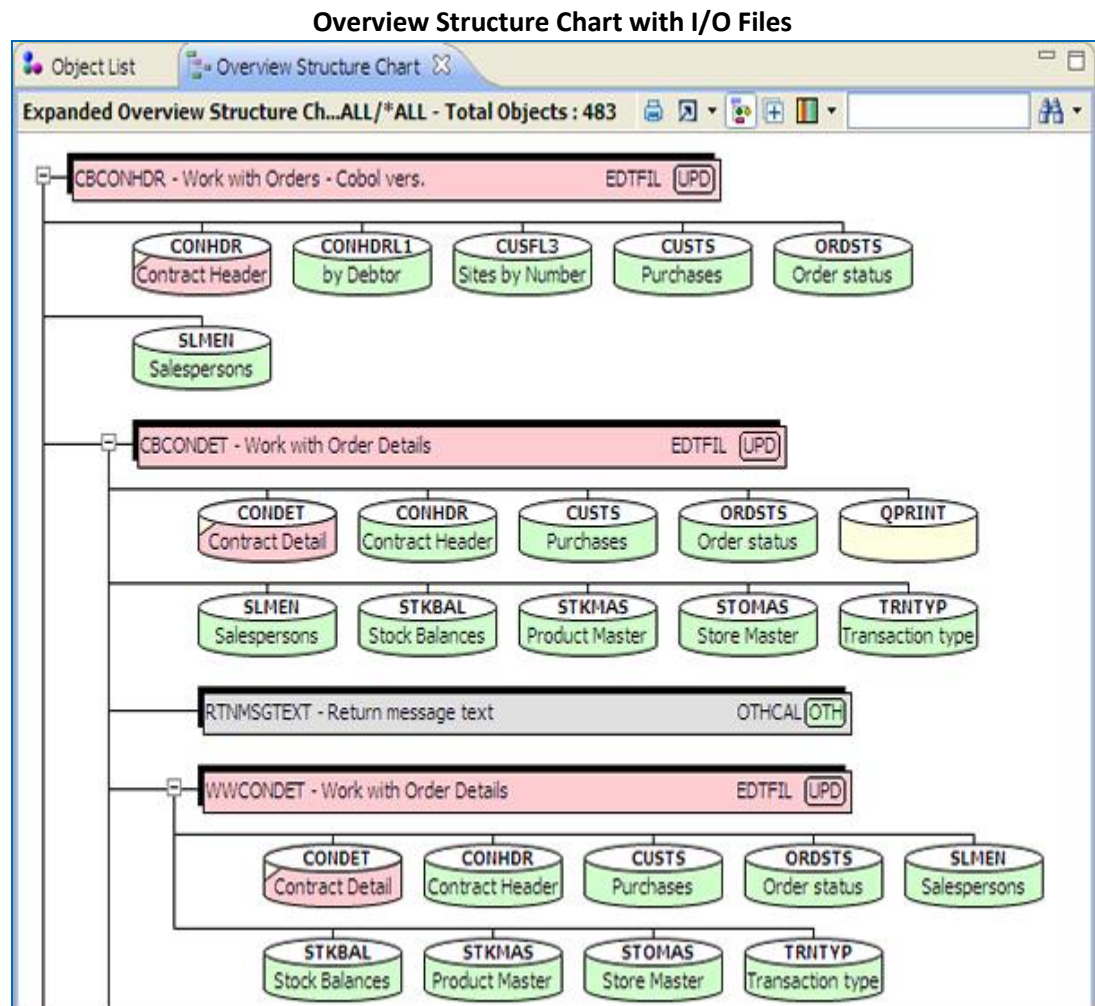
- UPD – At least one program updates a file
- PRT – Program and dependent programs create a printed report
- DSP – Program and dependent programs use input files and display files
- OTH – No cumulative component function can be determined.

### Function Type

Function Type describes the function of the object and is based on COOL: 2E definitions.

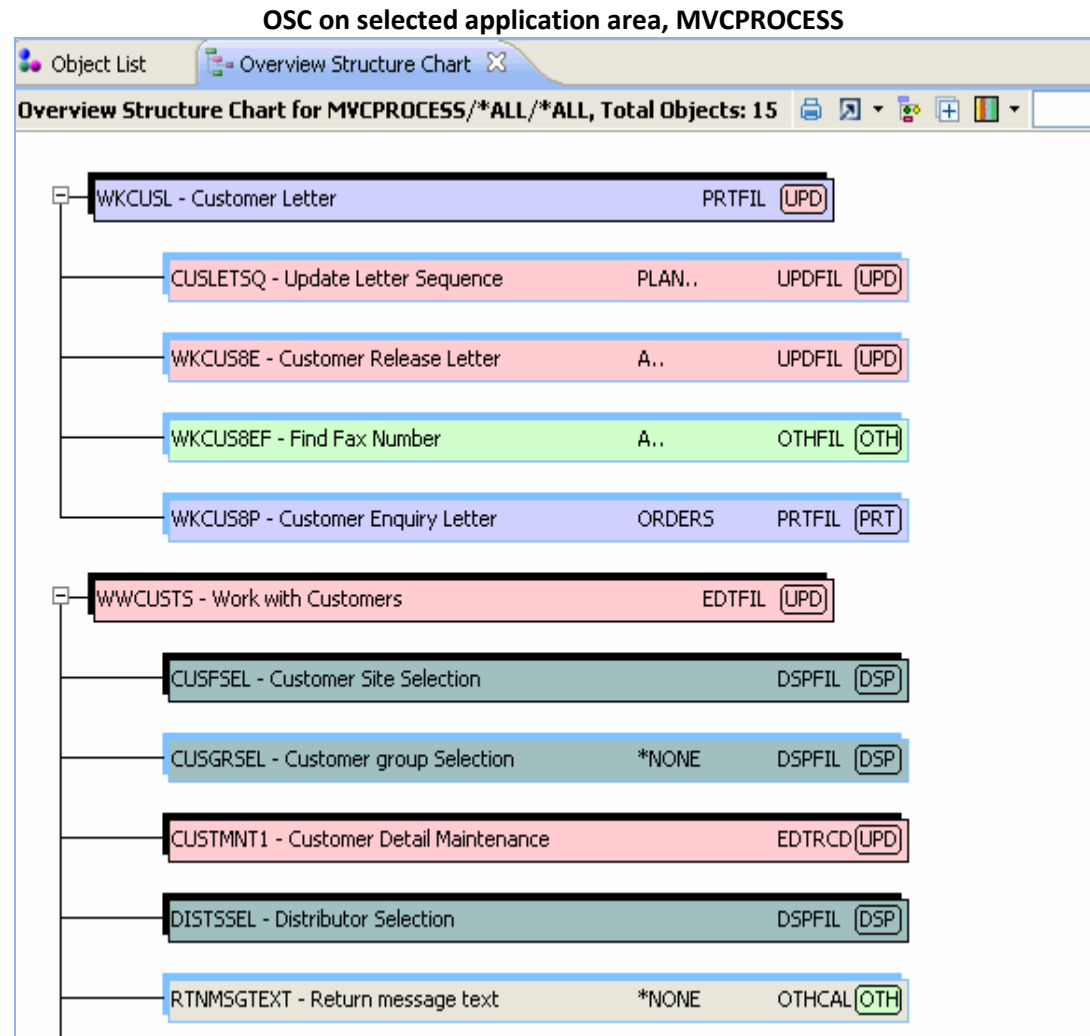
### OSC with Files

The Normal Overview Structure Chart displays a snapshot of an application using programs only. Click the **Show Files** icon available on the OSC toolbar to display the available files along with the programs.



## Application Area OSC

When you select the **OSC** option on an application area (Application Area node should be selected), then objects not belonging to the selected application area are highlighted in blue. The names of application areas are displayed on the tool tip of those objects not belonging to the selected application area.



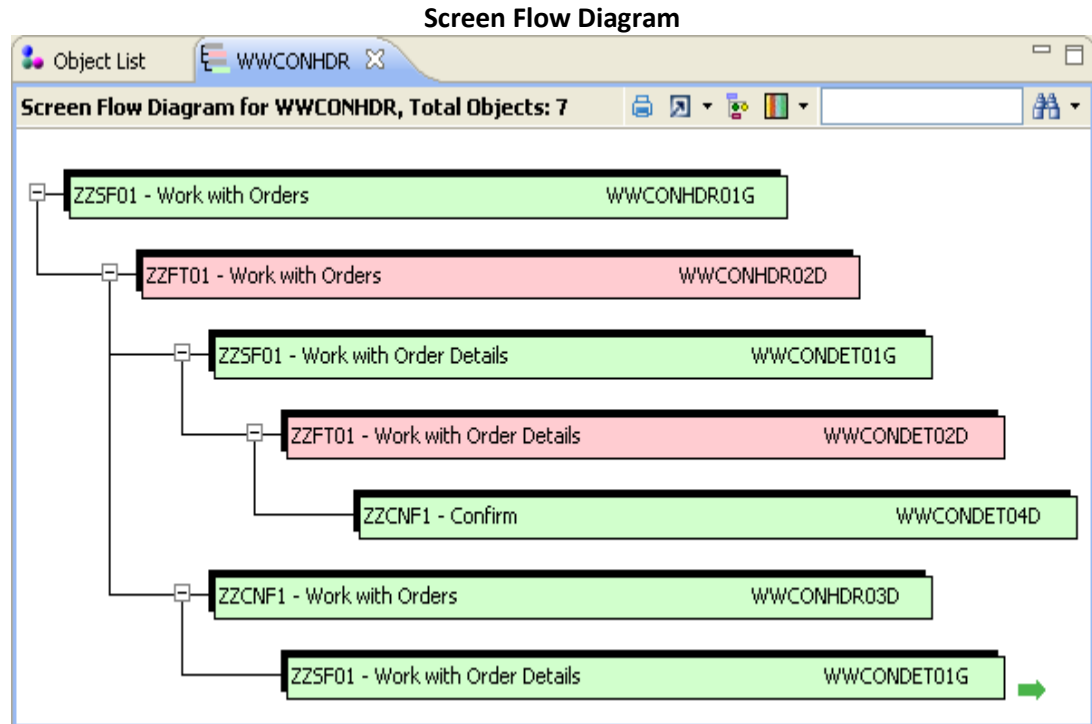
## SCREEN/REPORT DESIGN

The **Screen/Report Design** option works on Display and Printer Files. It displays the actual layout for the Display/Printer file. This option also works on program objects (RPG, RPGLE and MENU) and displays the layout of the associated Display/Printer files.









### Legend

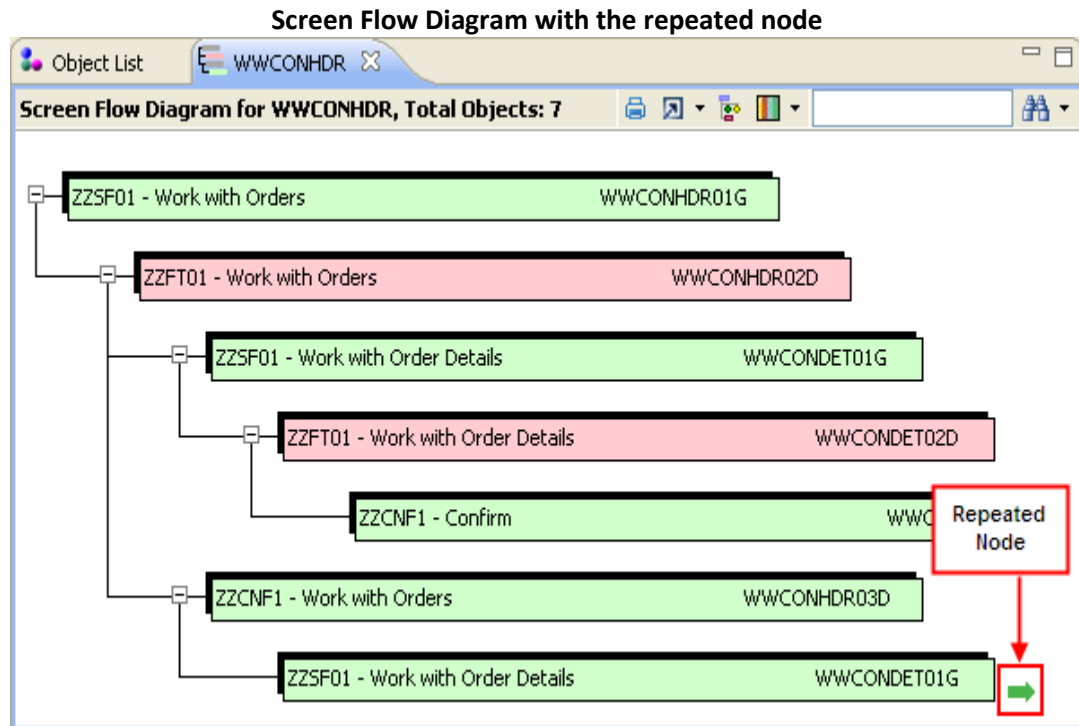
The Screen Flow Diagram **Legend** illustrates the type of object displayed.

- **Subfile** – This refers to the object using a Subfile.
- **Update** – This refers to the object updating a file.
- **Display** – This refers to the object using a Display file.
- **Primary File** – This refers to the PF used by the object.
- **Secondary File** – This refers to the Secondary File used by the object.
- **Indeterminate** – This refers to the objects where the usage cannot be programmatically determined.

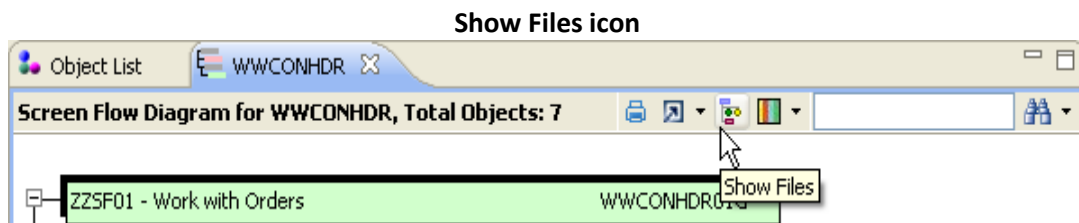
<input type="checkbox"/>	Subfile
<input type="checkbox"/>	Update
<input type="checkbox"/>	Display
<input type="checkbox"/>	Primary File
<input type="checkbox"/>	Secondary File
<input type="checkbox"/>	Indeterminate

### Repeated Nodes in Screen Flow Diagram

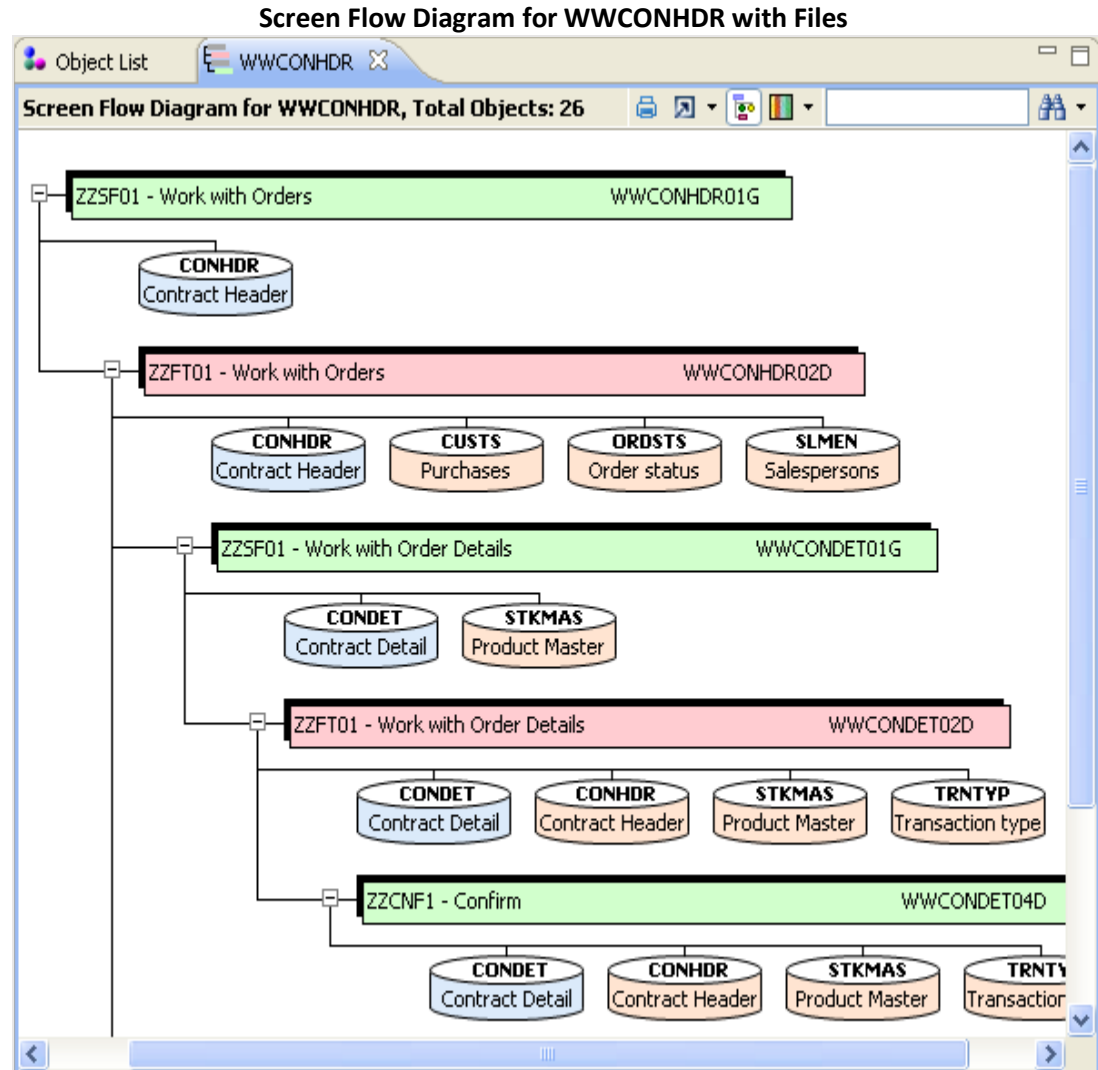
The Screen Flow Diagram displays the repeated nodes in their original color. Also, an arrow of the same color is displayed for the repeated nodes (having child nodes). The following image displays repeated nodes in Screen Flow Diagram.



The **Show Files** icon is provided to show the files used by the function.



When you click on the icon, all the files related to the selected object are displayed, as shown below.



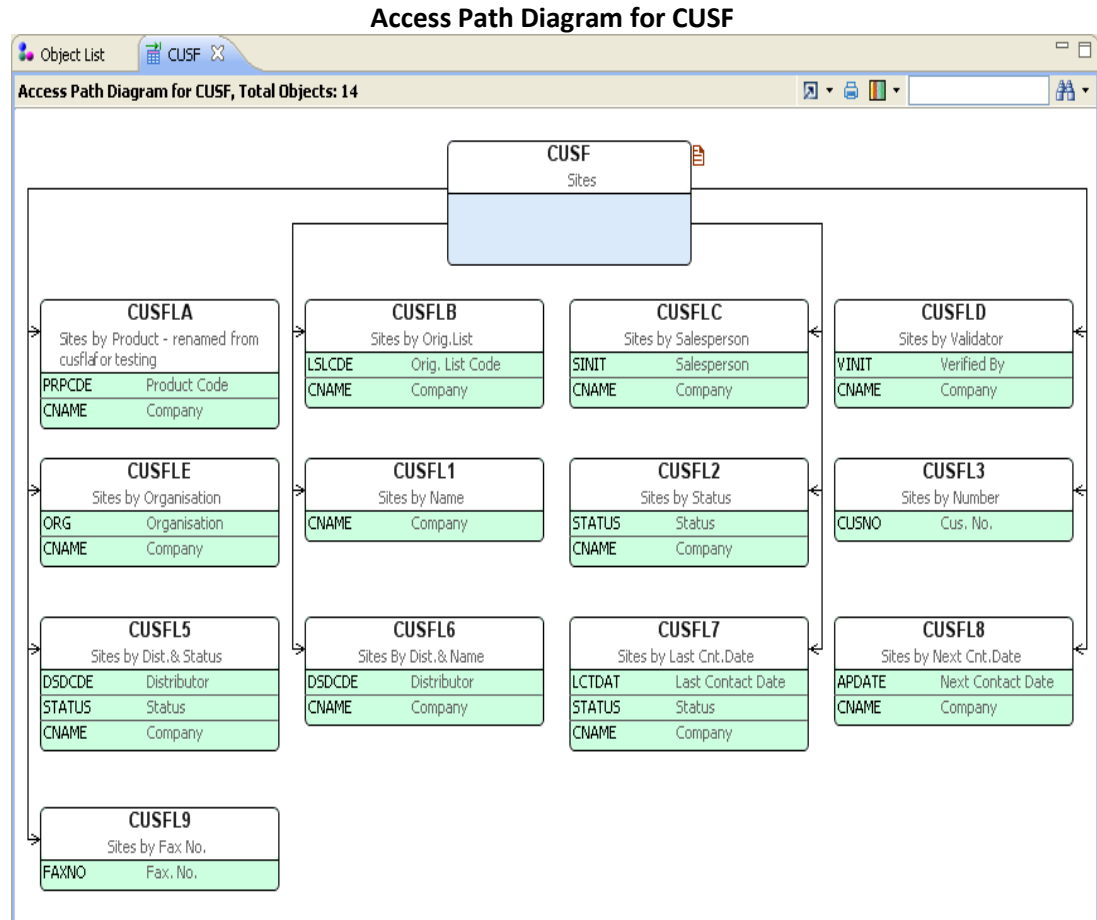
**Note:** The functions in Screen Flow Diagram suffixed with "G" denote the grid display corresponding to the subfile record format of the display file used in the program. The ones suffixed with "D" represent the screen functions for the flat screen record format of the display file.

## ACCESS PATH DIAGRAM

The Access Path Diagram is the diagrammatic representation of LFs/Access Paths lists. The LFs/Access Paths displays all the access paths for a selected physical file.

Opt for the context menu on that PF to generate the Access Path Diagram for a PF, and then select the **Access Path Diagram** option.

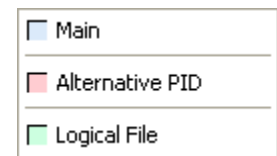
The following diagram displays the Access Path Diagram for **CUSF**.



## Legend

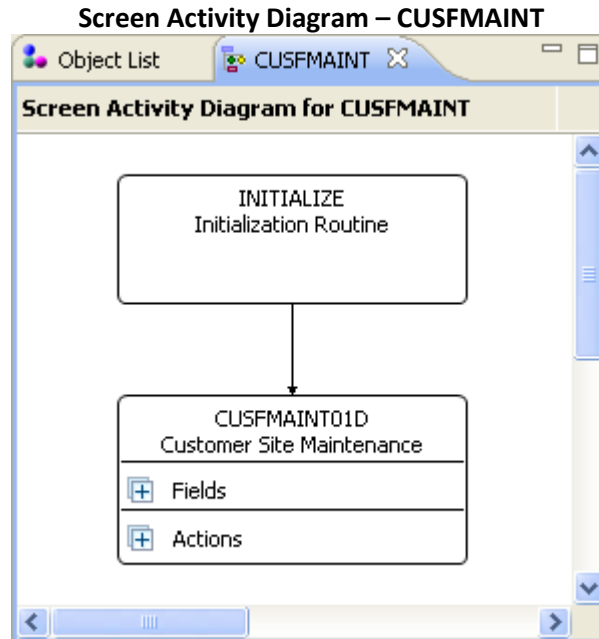
The Access Path Diagram **Legend** displays the following:


- **Main** – This depicts the main object.
- **Alternative PID** – This depicts the alternative Primary Identifier file.
- **Logical File** – This depicts the LF for the selected object.

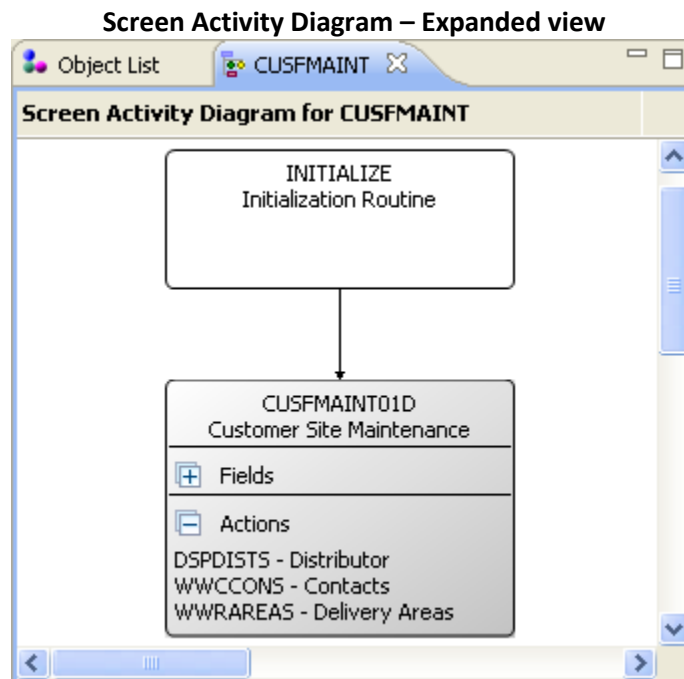


## SCREEN ACTIVITY DIAGRAM

The **Screen Activity Diagram** option is available on the context menu of an object. Select this option to study the screen(s) activity of a particular object. Bus-routing block diagrams are used to map the activity of the object. When you select this option, the following diagram appears:



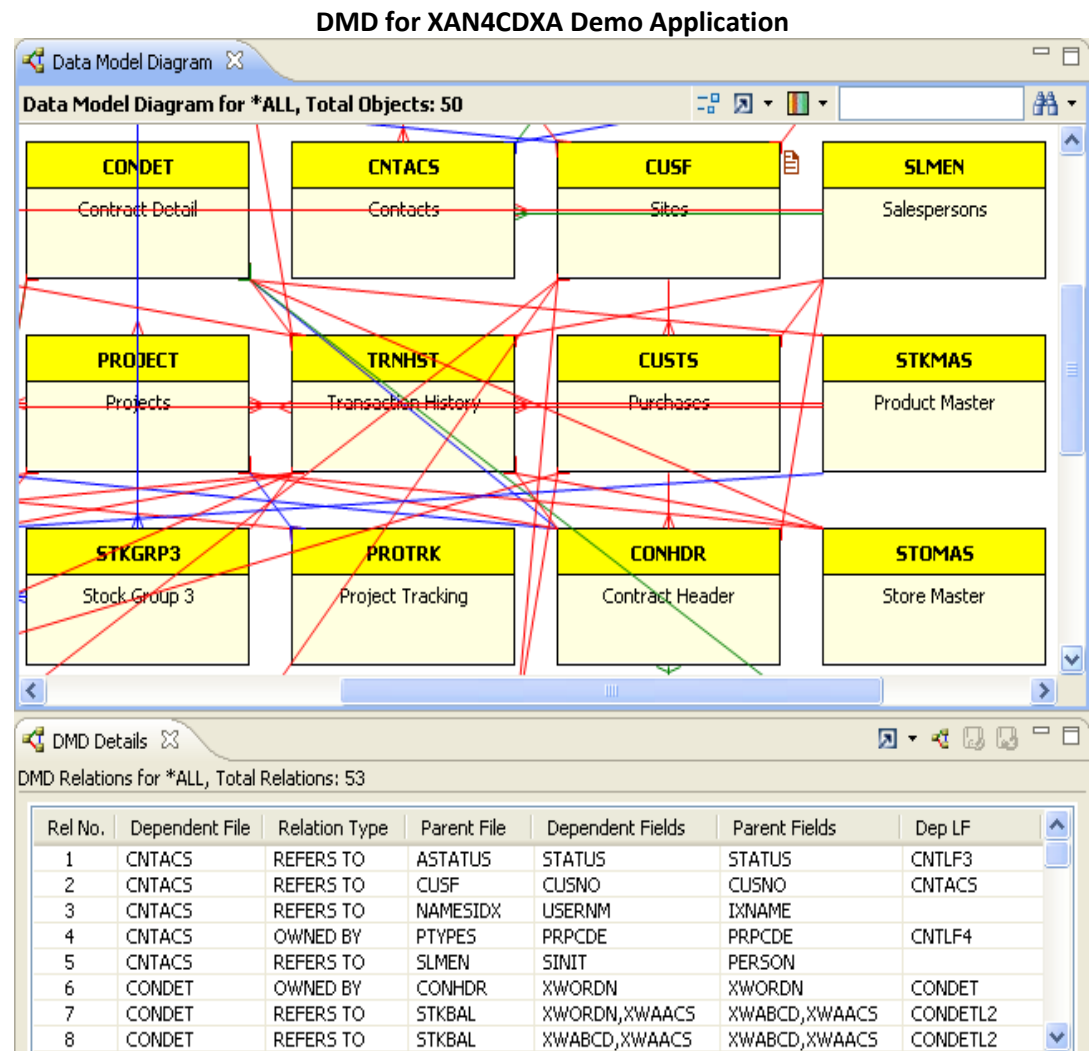
Click the  icon to expand the screen and reveal the Fields and the Actions of the object, as displayed underneath:



**Note: Generating the Screen Activity Diagram is limited to objects with RPG/RPGLE/CBL/CLP/CLLE attribute.**

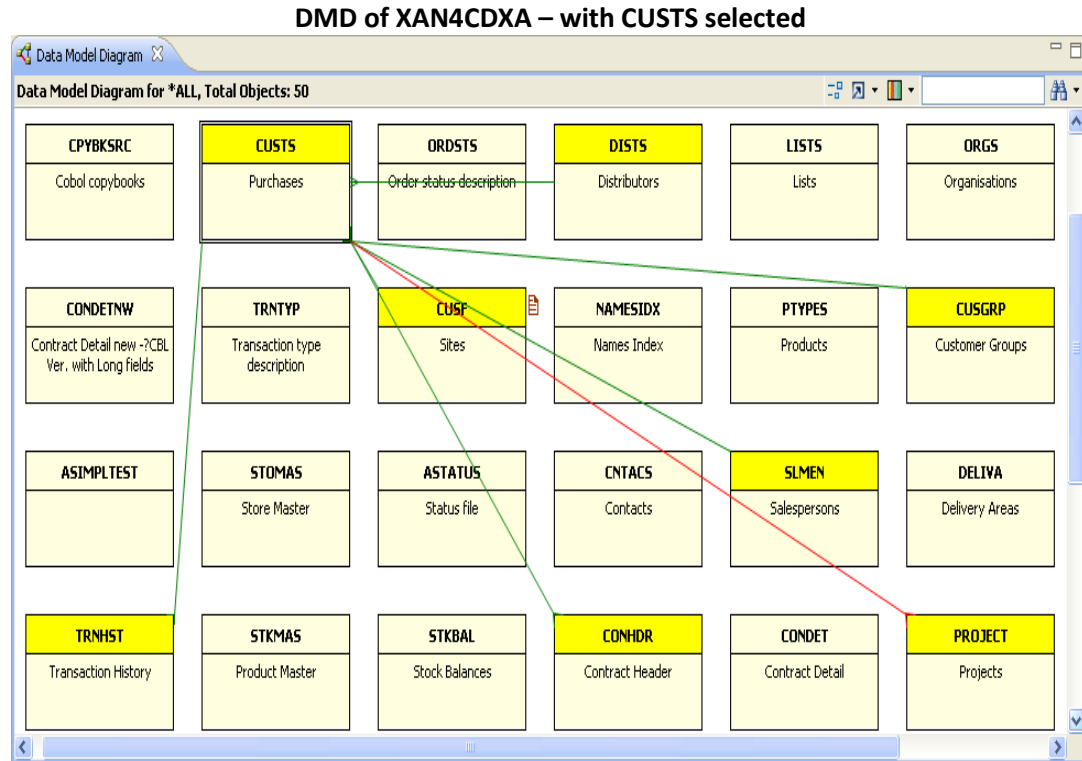
# Data Model Diagram

The Data Model Diagram displays file relationships for a File within the cross-reference library or an application area. The related members are displayed distinctly in yellow, while the external Objects (applicable only in the application area) are displayed in blue.



The File Connection details are displayed in the DMD Details view.

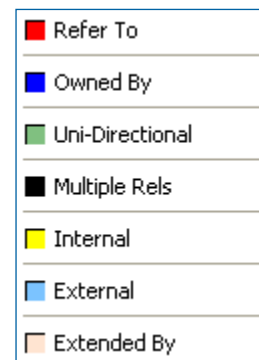
Single-click on a specific object shows the references of that object. Click on **CUSTS** to view its references.



## Legend

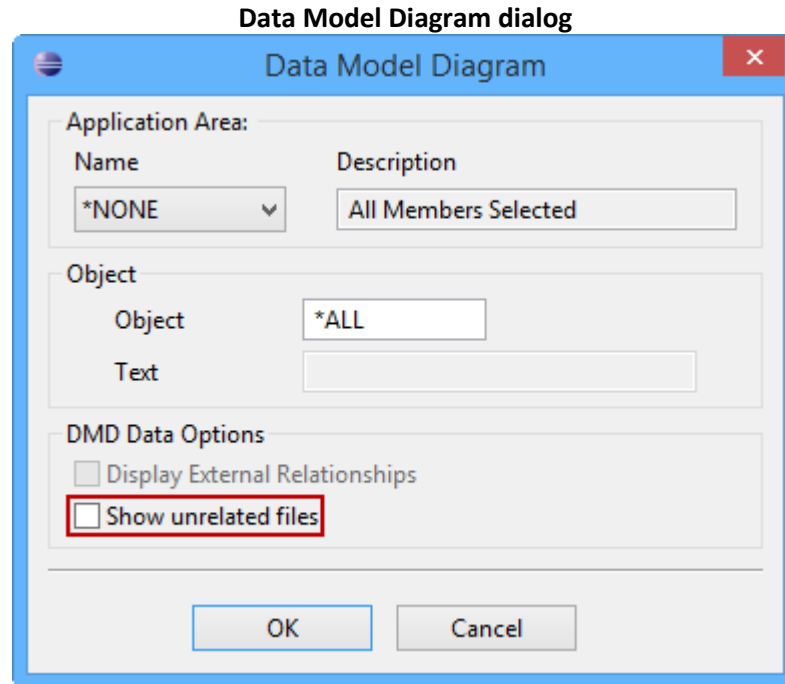
The DMD **Legend**, shown alongside, depicts the relationship type of the object(s).

- **Refer To** – This depicts a relationship where a non-key field of another file is referred.
- **Owned By** – This depicts a relationship where the key field of another file is referred.
- **Uni-Directional** – This indicates a singular relationship between two objects.
- **Multiple Rels** – This indicates multiple relationships between two objects.
- **Internal** – This depicts the file internal to an application area.
- **External** – This depicts the file external to an application area.
- **Extended By** – This depicts a special kind of Refers to which is seen in Synon applications.



## GENERATING DMD

To generate the DMD, expand the Application Library and double-click on the **Data Model Diagram** node. This invokes the **Data Model Diagram** dialog, as shown below.



It prompts the user to:

1. Select the Application Area name, if available; else leave it as \*NONE.
2. The Object Name on the Object group can be:
  - \*ALL (for all Objects)
  - Object Name (maximum 10 characters long).
3. **DMD Data Options** to Display External Relationships (for Application Area only) and Show unrelated files.
4. Click **OK**.

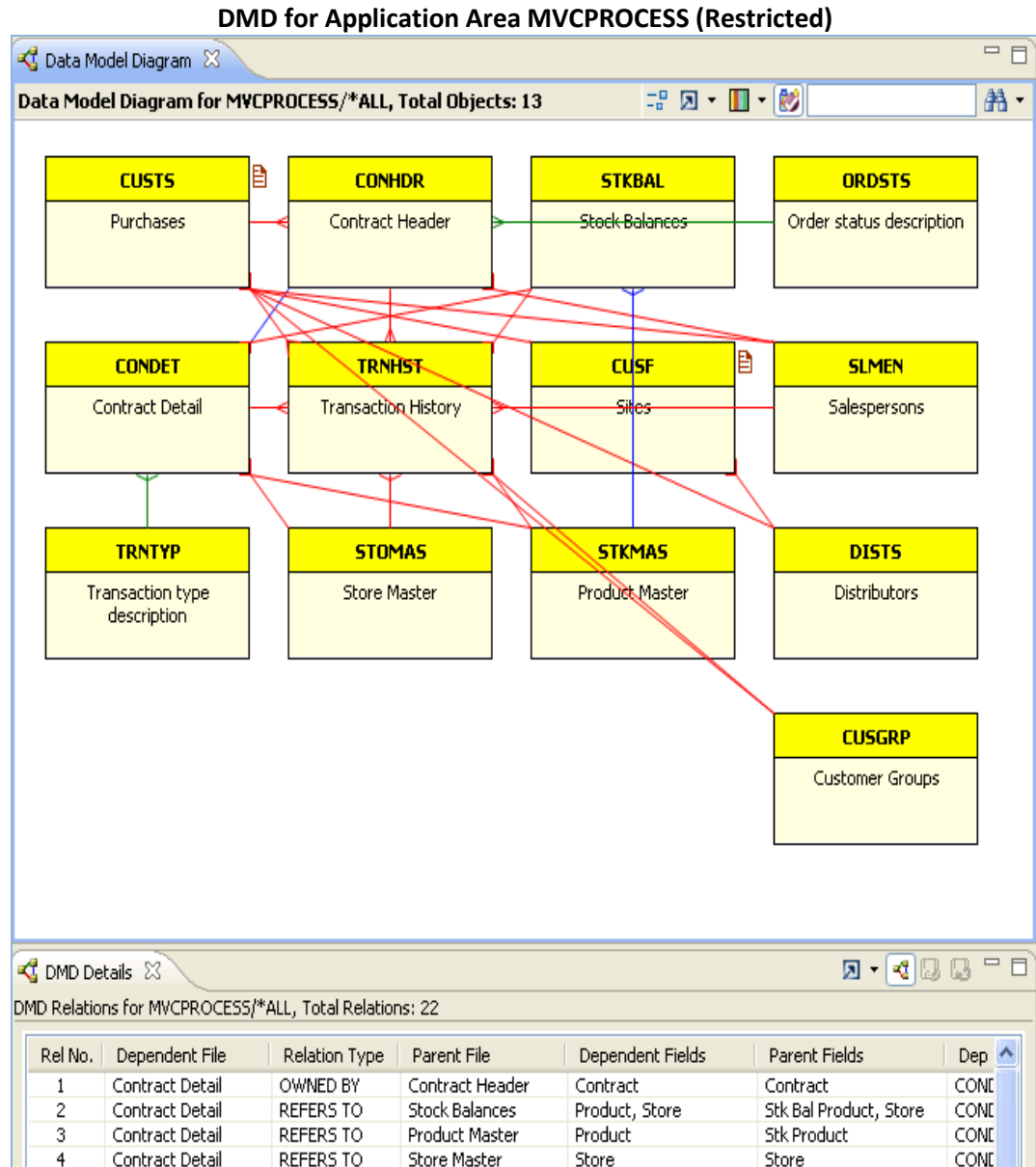
***The Data Model Diagram node is present under the cross-reference library node and the Application Area nodes.***



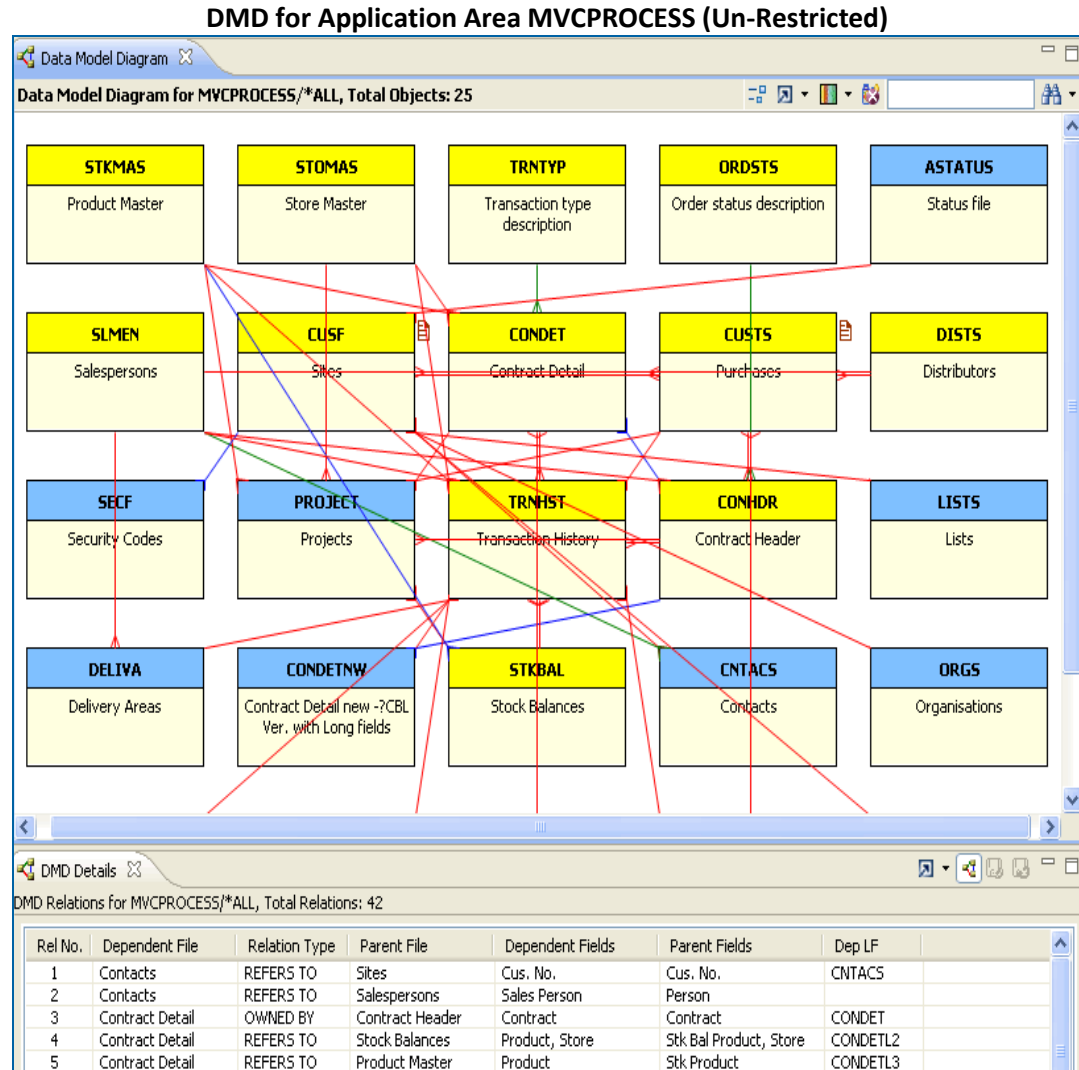
## DMD FOR AN APPLICATION AREA

The DMD can also be generated for an application area. It can be opted either by expanding the application area under the cross-reference library node or by selecting the specific application area name on the **Data Model Diagram** dialog.

The DMD for an application area is **restricted** to that application area, representing the relationships among the related objects of the application area.



The DMD for an application area can be un-restricted by clicking the **Unrestrict To Application Area** icon.



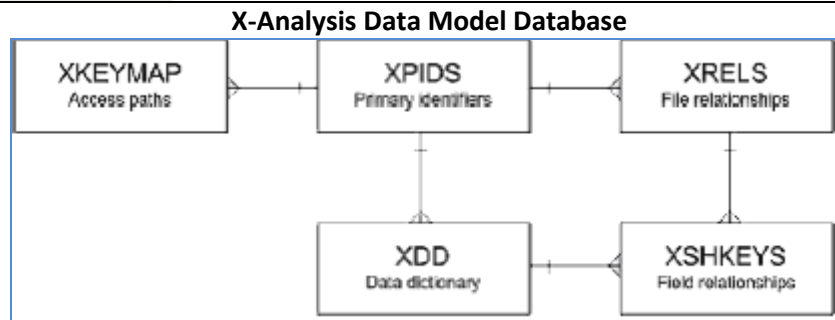
**Note: While using the 'Restrict To Application Area' feature, ensure that the originally-selected application area is not changed.**

## UNDERSTANDING DATA MODEL DATABASE

The metadata database that underlies X-Analysis is a valuable resource and contains information that can be leveraged for your own purposes.

There are five core tables that are generated by the X-Analysis data modelling process. These tables are listed below.

Feature	Brief Description
XPIDS	Primary identifiers
XDD	Data dictionary
XRELS	Relationships
XSHKEYS	Relationship detail
XKEYMAP	Access paths



The easiest way to view the data in the data model is to use the **Data Dictionary** facility provided within X-Analysis.

1. Open the Customer Maintenance System in X-Analysis.
2. Click the **Data Dictionary** icon on the toolbar.

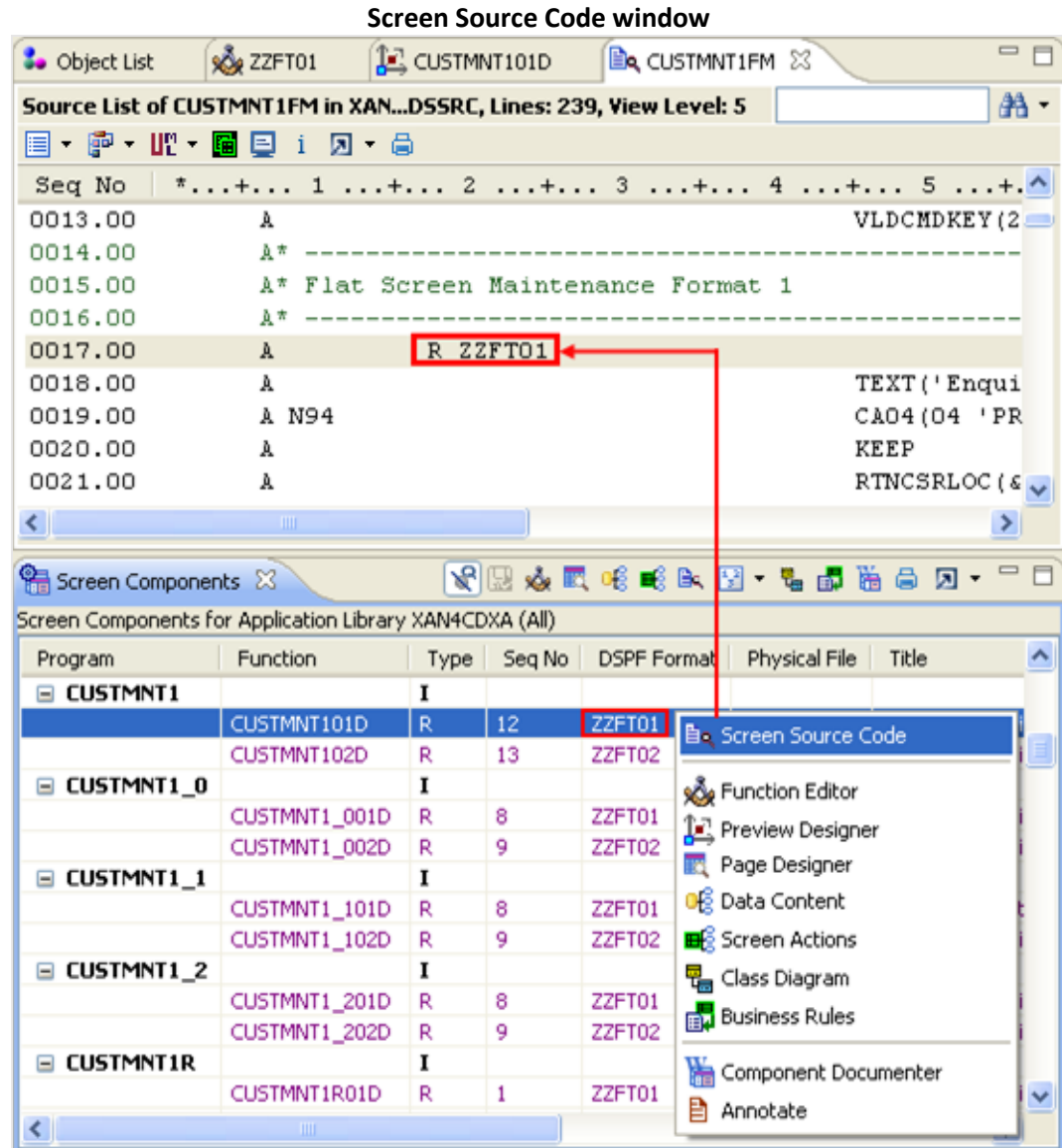
# Options on Screen Components

X-Analysis is equipped with a set of options that provides you with significant details about the application like source codes, business rules, data content, and other similar information. The following options are covered under the Screen Components feature.

- Screen Source Code
- Function Editor
- Preview Designer
- Page Designer
- Data Content
- Screen Actions
- Class Diagram
- Business Rules
- Component Documenter
- Annotate

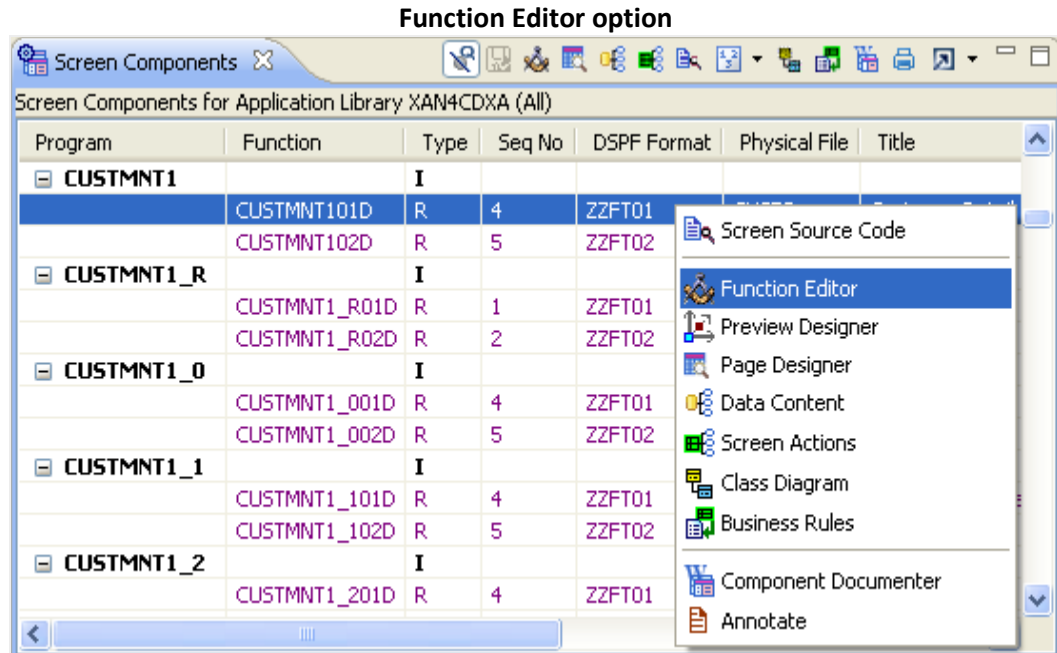
## SCREEN SOURCE CODE

Select the **Screen Source Code** option to display the source code for the associated display file. A new source browser window will be invoked, displaying the source member of the associated display file.

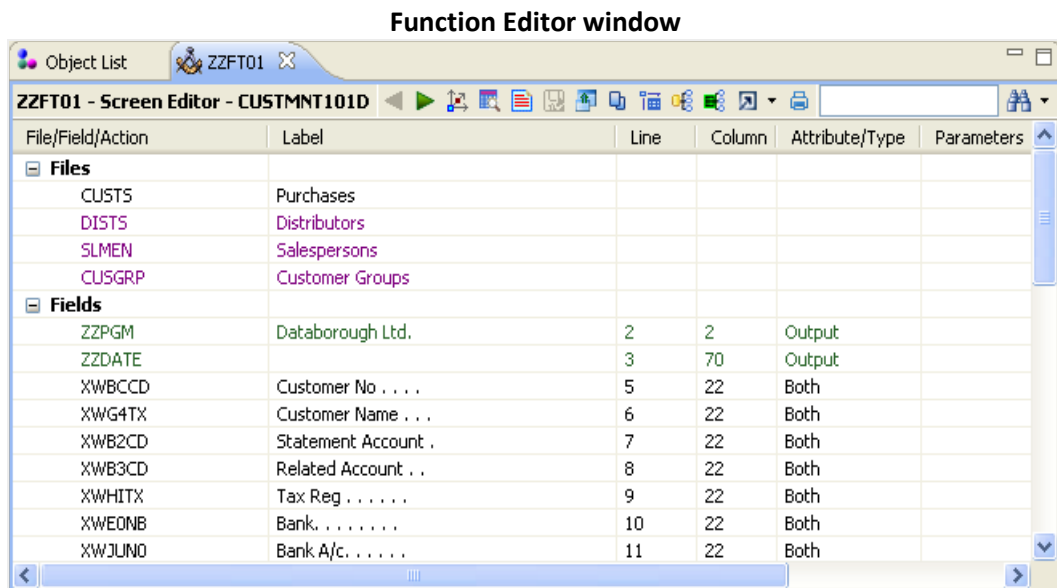


## FUNCTION EDITOR

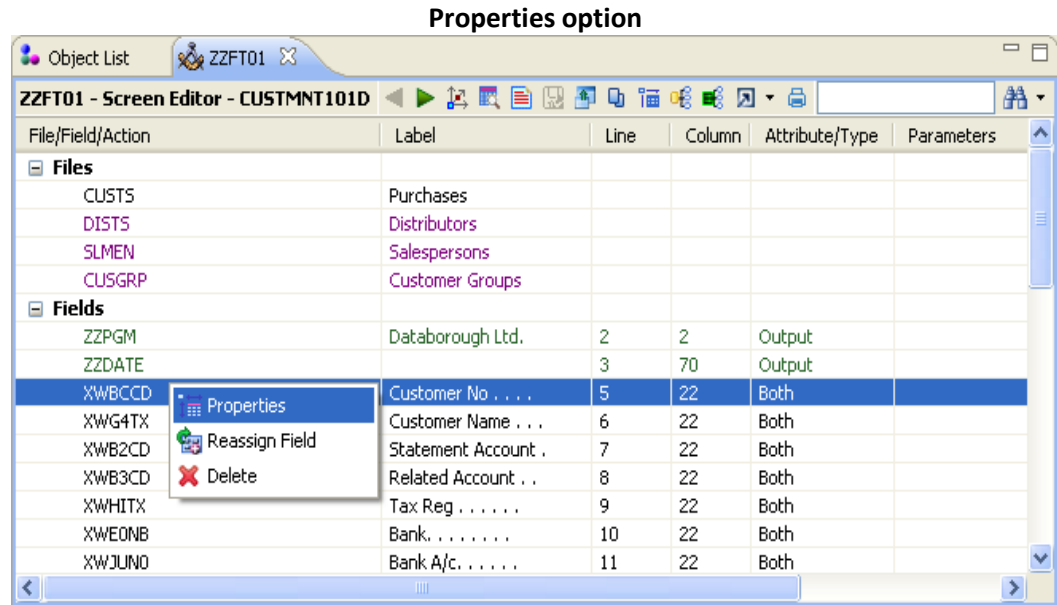
The **Function Editor** option allows you to modify a given function. Right-click over a selected Screen Component for the context menu, as shown below:



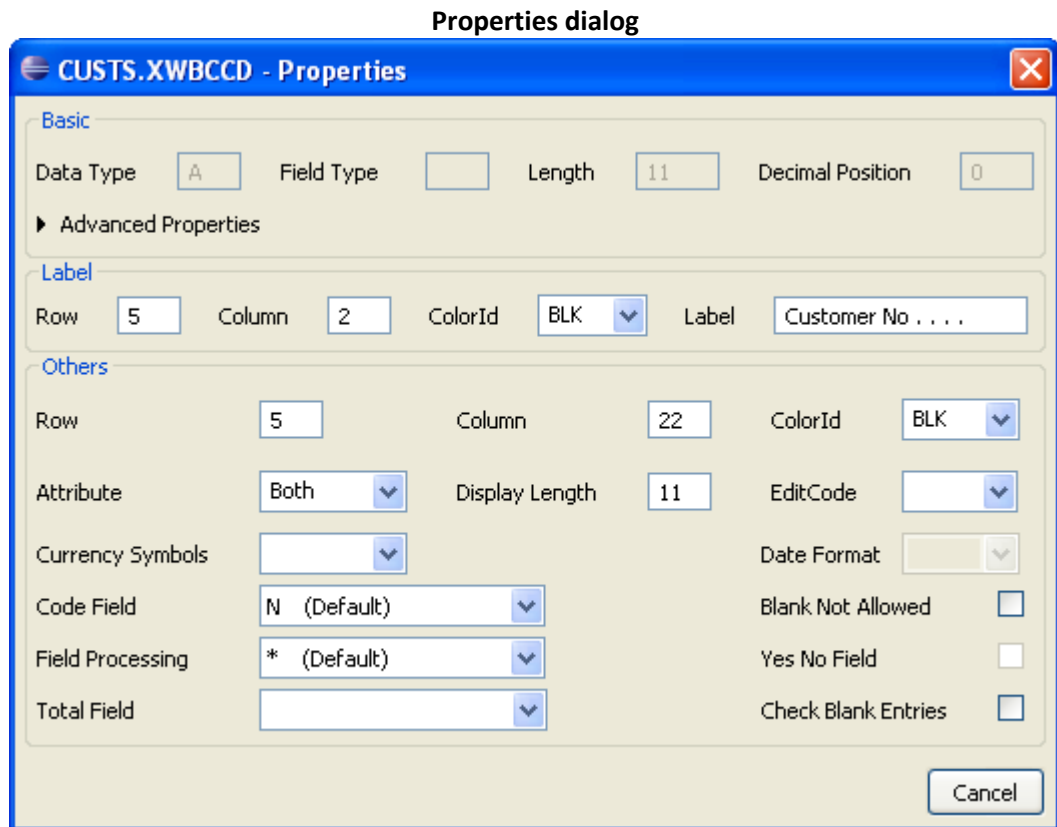
Select the **Function Editor** option to invoke the following window:



Select a particular field, and right-click over it for the context menu. The context menu will display the **Properties** option as shown below:



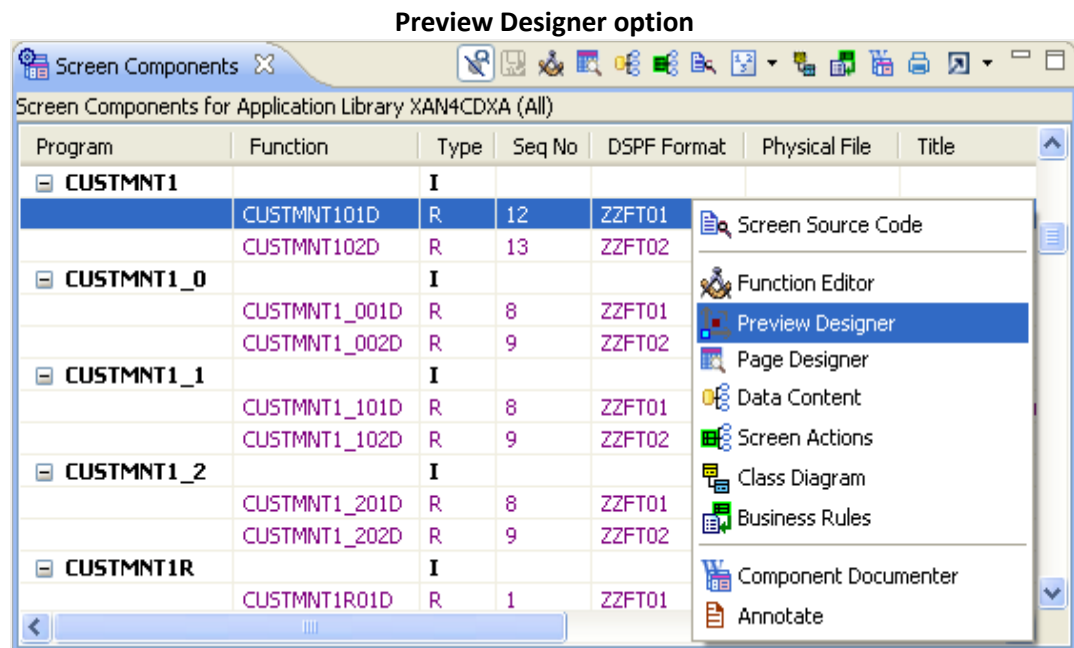
Click this option to invoke the following dialog. You can make the necessary modifications in this.



## PREVIEW DESIGNER

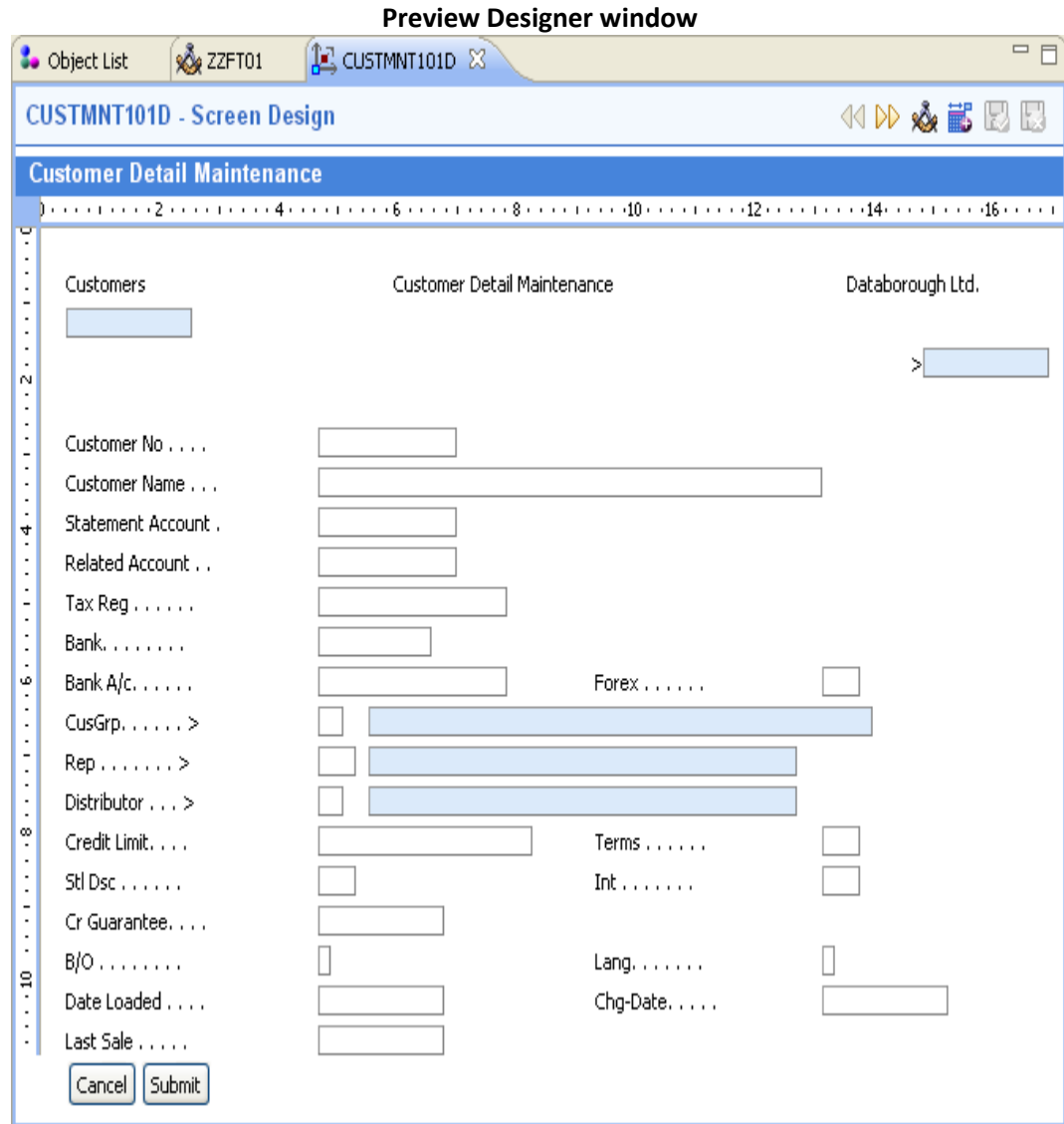
The **Preview Designer** option is the outline of the Page Designer. Use the options in the Preview Designer window to make changes such as adding constants, or modifying page layout.

After the changes are applied, they subsequently show up on the Page Designer window.



Right-click on a Screen Component for the context menu and select the **Preview Designer** option to invoke the following window:

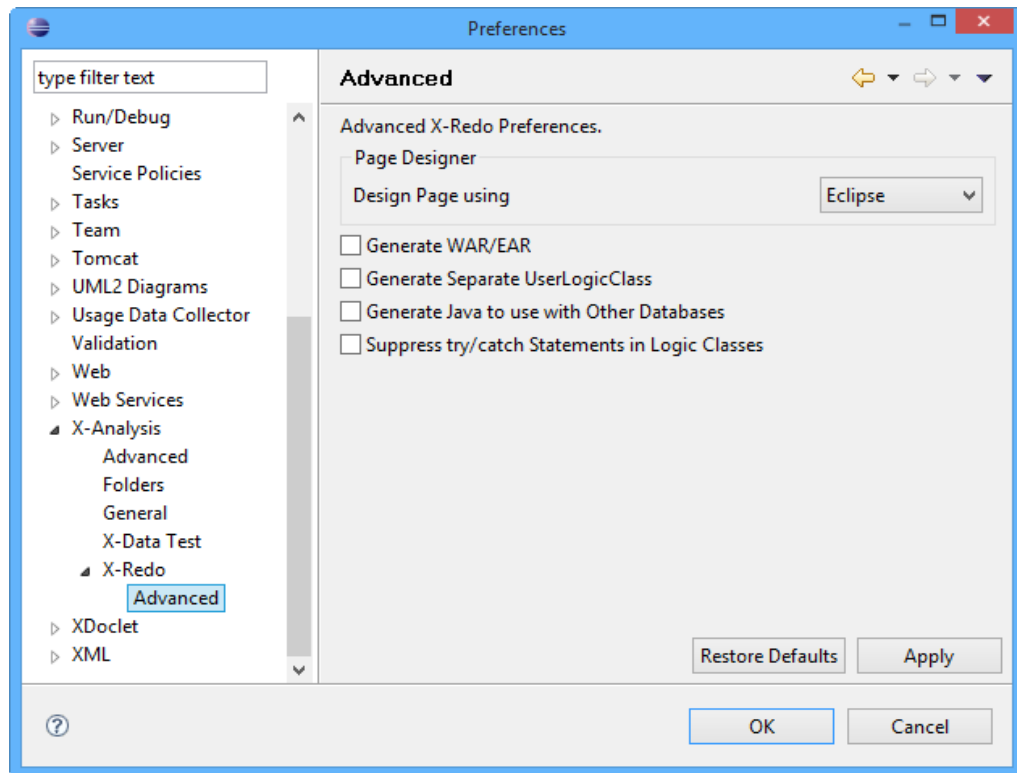




## PAGE DESIGNER

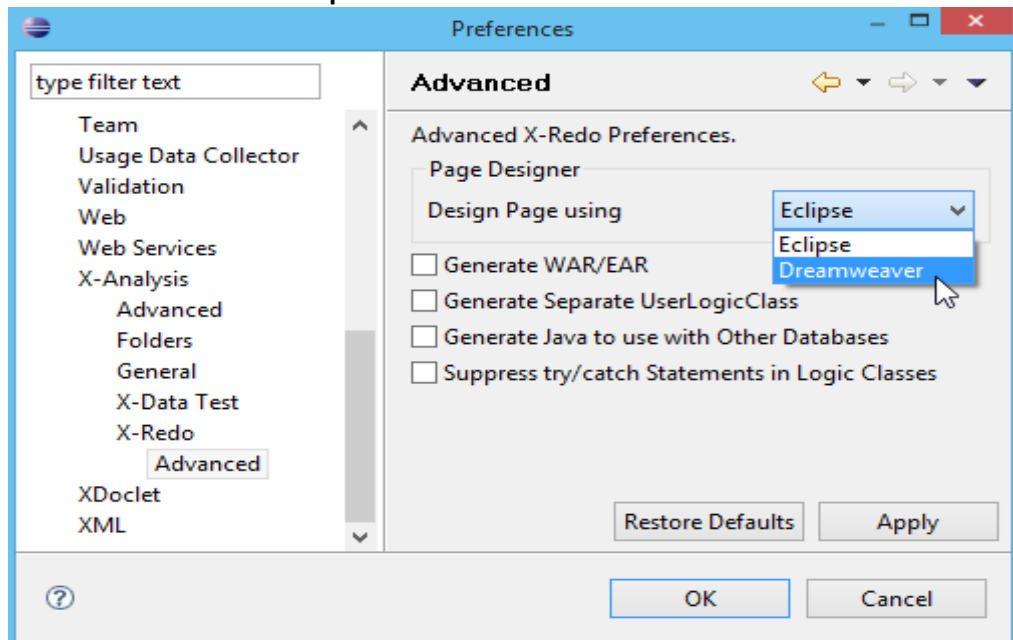
X-Analysis allows you the access to two versions of page design via the **Page Designer** option. Set the option on the **X-Redo Advanced Preferences** window (refer to the image below). The default option to edit the selected page is Eclipse.

X-Redo Advanced Preferences window

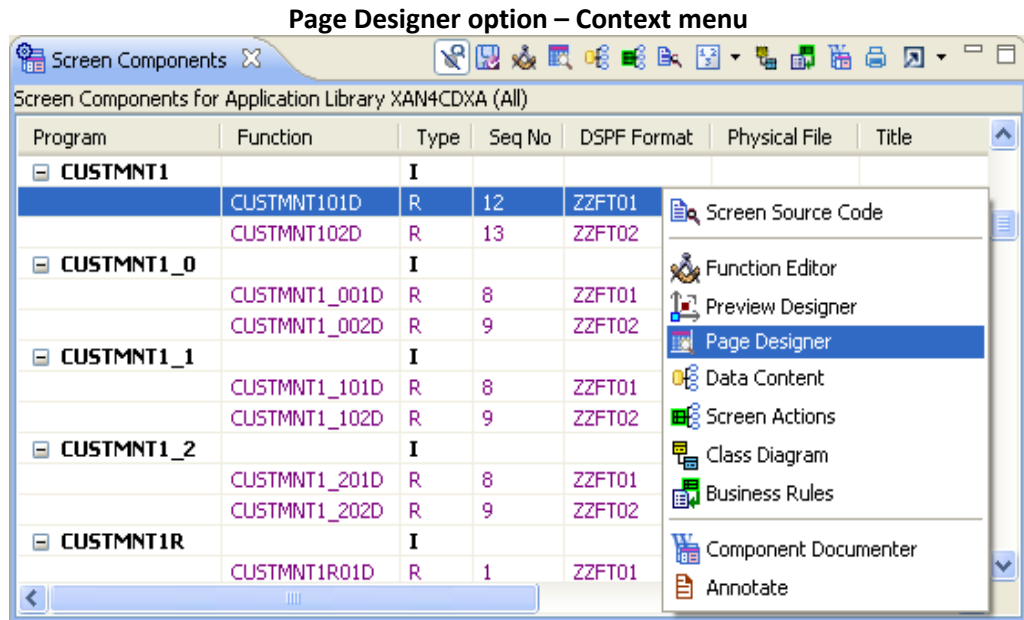


Alternatively, you can edit page/s using Dreamweaver. If Dreamweaver is installed on your machine, then the drop-down will show it as an option. After setting the Page Designer preference as Dreamweaver in the **X-Redo Advanced Preferences** window, restart the X-Analysis plugin to invoke Adobe's Dreamweaver software for designing a web page.

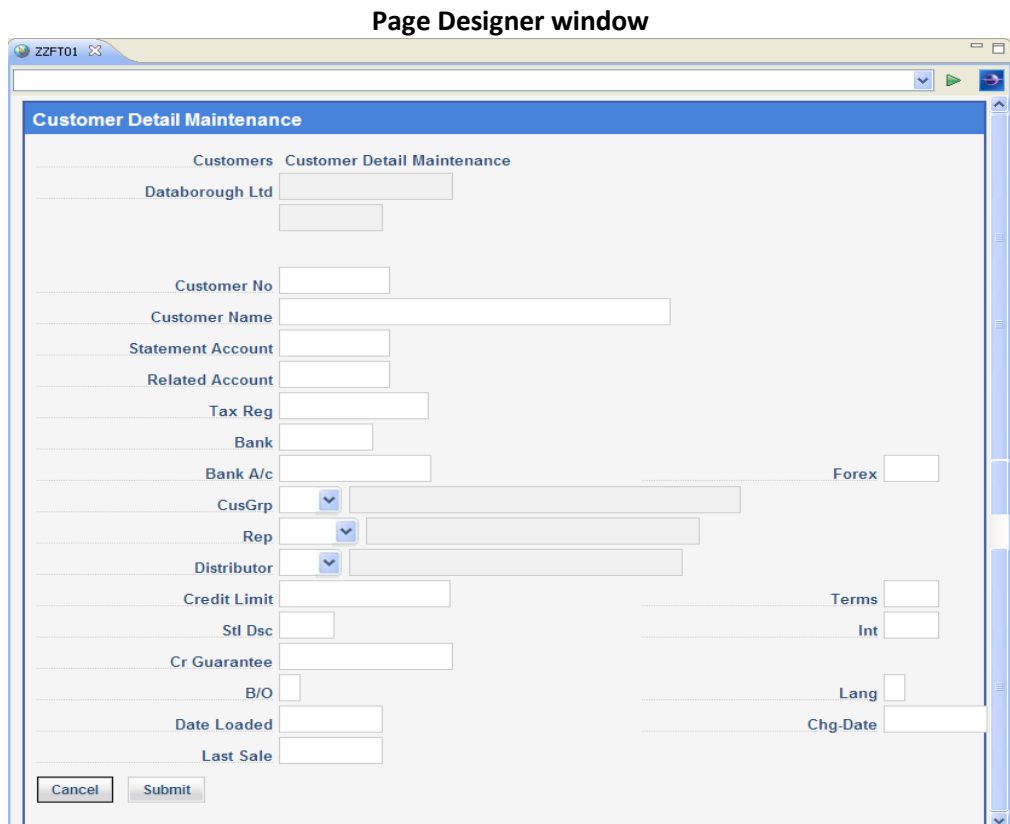
Dreamweaver option – X-Redo Advanced Preferences window



Right-click on a Screen Component for the context menu and select the **Page Designer** option, as displayed underneath:

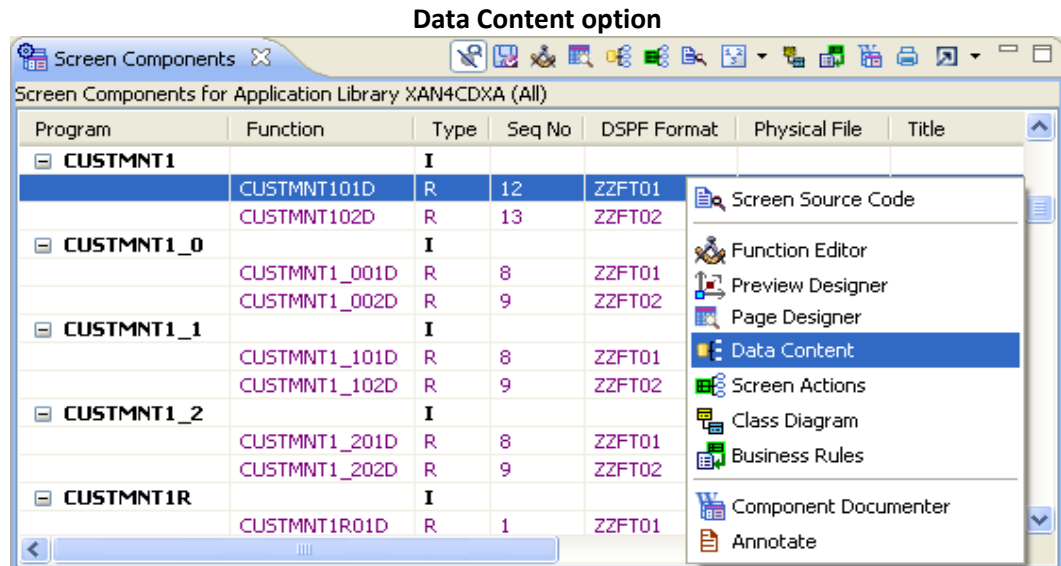


The following screenshot displays the Page Designer window in the Eclipse mode:

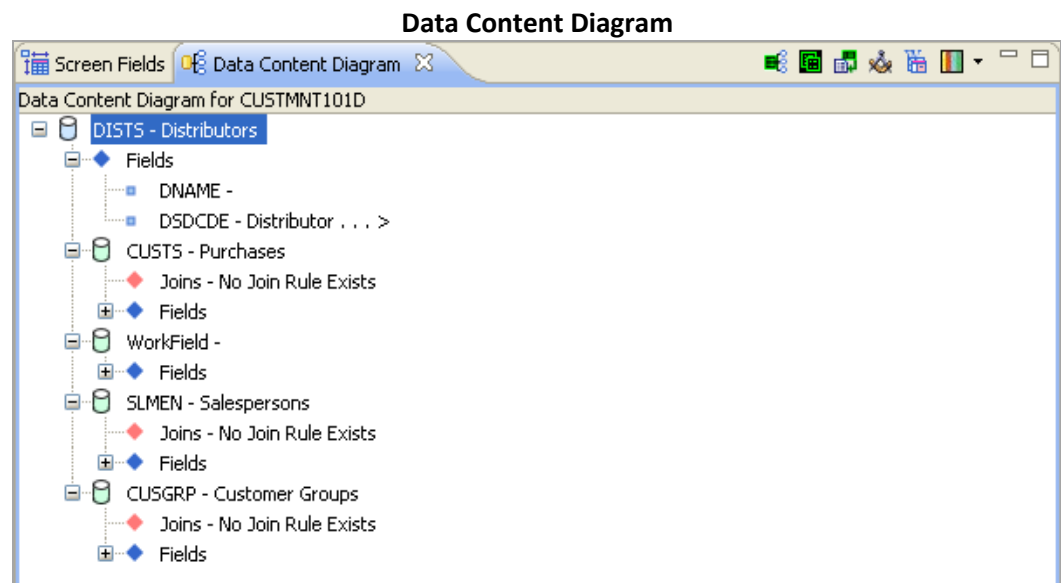


## DATA CONTENT

Select the **Data Content** option to access further relevant details of a particular file. The option is available for all Screen Components and Development Screens. Right-click on a Screen Component for the context menu and select the **Data Content** option, as shown below:



The Data Content Diagram generated for a screen uses the model information to depict the primary file in use by that screen shown in blue. The sub-node is the secondary file (in green) with which the primary file joins to pull the additional information to show on the screen. The sub-node splits into two parts. The first part displays **Joins** - lists the field(s) from the secondary file facilitating the file join; the second part displays **Fields** - lists the field(s) from the primary file.

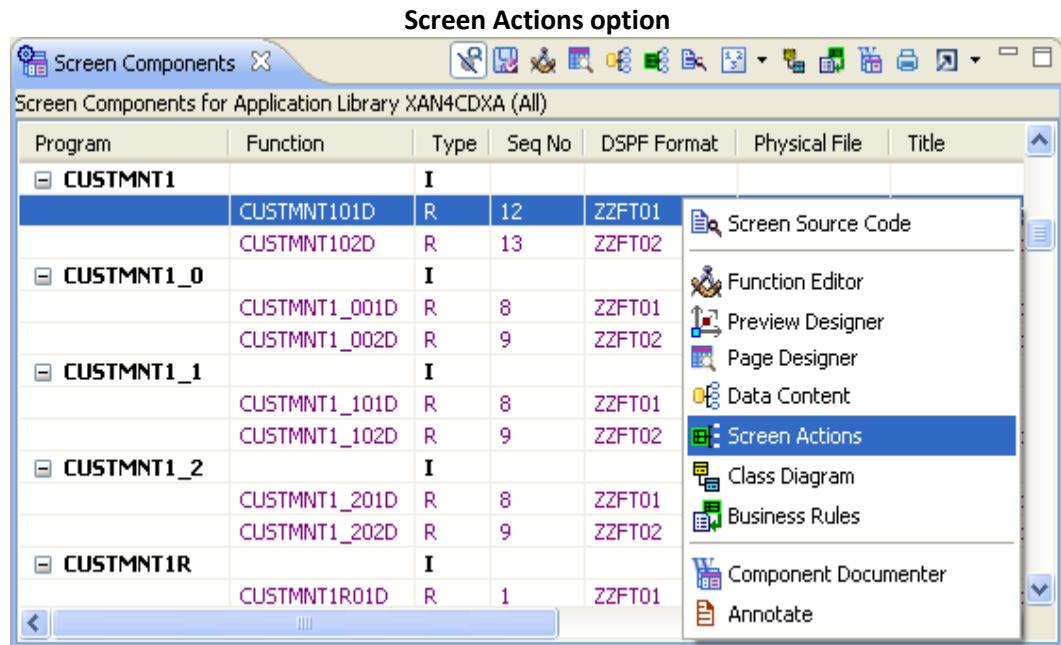


## SCREEN ACTIONS

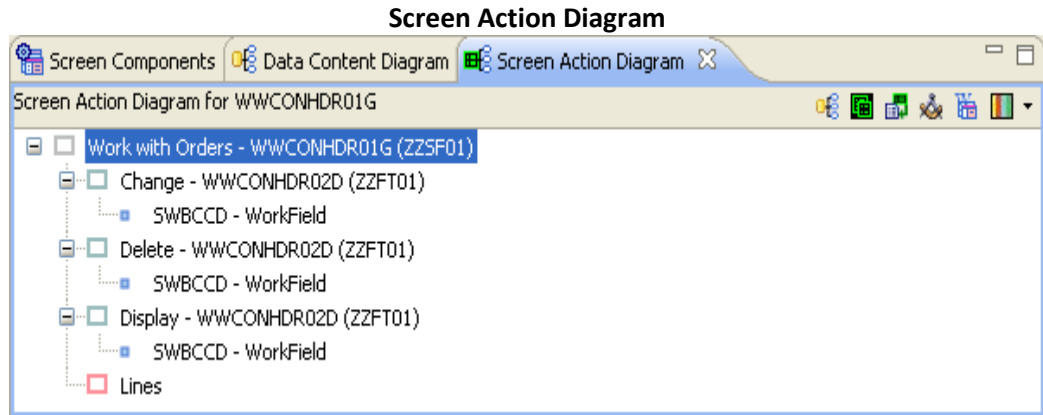
The Screen Actions Diagram presents the actions allowed on the screen. The actions could be:

- Prompt Action – To look up for the possible values for a field, facilitated by the join on the secondary/foreign file.
- Submit Action – Usually on the record screen or a form, which submits the data for validation and moves on.
- Navigation Action – To branch off to a new screen. Usually on the grids or record screens being viewed in the display mode.

Right-click for the context menu over a selected Screen Component and select the **Screen Actions** option, as shown below:

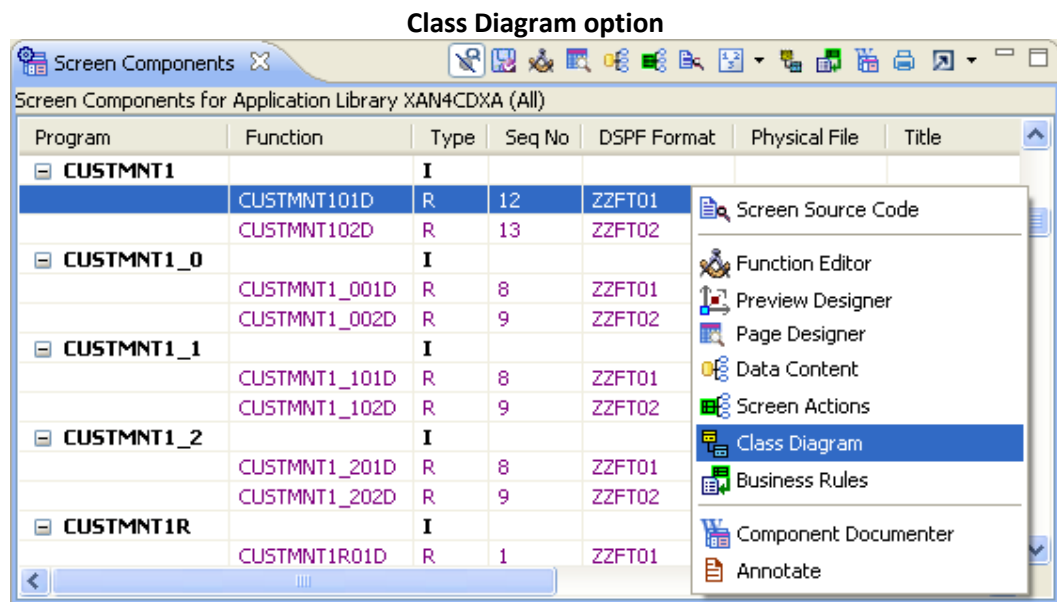


The **Screen Actions** option is available for all Screen Components and Development Screens.

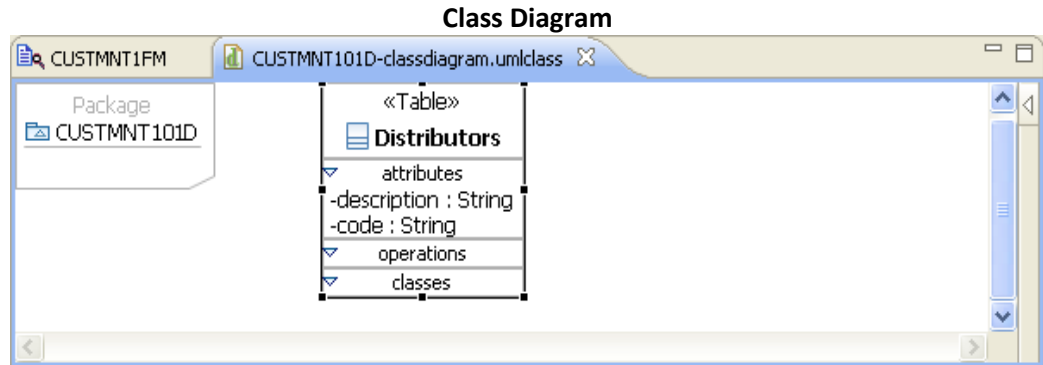


## CLASS DIAGRAM

Select the **Class Diagram** option to generate the UML class diagram. Right-click for the context menu on a Screen Component and select the **Class Diagram** option. :



The **Class Diagram** option is available for all Screen Components and Development Screens.



## BUSINESS RULES

Business rules are defined as discrete blocks of program logic gathered during the design recovery process, which describe data processes that are independent of both the data model and the environment. The rule narration too is held along with the rule for better understanding.

Right-click for the context menu on a Screen Component and select the **Business Rules** option, as shown below:

The screenshot shows the 'Screen Components' window for application library XAN4CDXA. It contains a table of components and a context menu with 'Business Rules' selected.

Program	Function	Type	Seq No	DSPF Format	Physical File	Title
CUSTMNT1	CUSTMNT101D	R	12	ZZFT01		
	CUSTMNT102D	R	13	ZZFT02		
CUSTMNT1_0	CUSTMNT1_001D	R	8	ZZFT01		
	CUSTMNT1_002D	R	9	ZZFT02		
CUSTMNT1_1	CUSTMNT1_101D	R	8	ZZFT01		
	CUSTMNT1_102D	R	9	ZZFT02		
CUSTMNT1_2	CUSTMNT1_201D	R	8	ZZFT01		
	CUSTMNT1_202D	R	9	ZZFT02		
CUSTMNT1R	CUSTMNT1R01D	R	1	ZZFT01		

The context menu options are: Screen Source Code, Function Editor, Preview Designer, Page Designer, Data Content, Screen Actions, Class Diagram, Business Rules (selected), Component Documenter, and Annotate.

The business rules for the source member will get listed. The business rules are listed only when the **Derive Business Rules** option has already been opted on the source member.

**Business Rules**

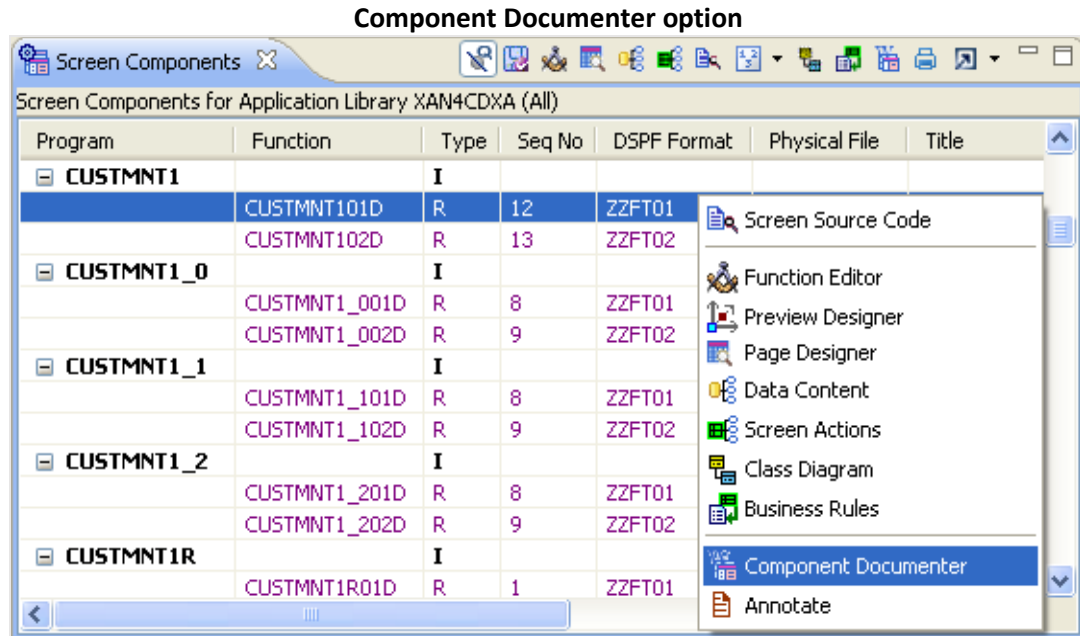
Source Member	Rule Number	Field	File	Rule
CUSTMNT1	00001	XWBCCD	CUSTS	Debtor = blank
CUSTMNT1	00002	XWG4TX	CUSTS	Name = blank
CUSTMNT1	00003	XWBNCB	CUSTS	End of file on CUSGRP and CUSGRP.CusGrp <> blank
CUSTMNT1	00004	PERSON	CUSTS	Rep not found on Salespersons
CUSTMNT1	00005	DSDCDE	CUSTS	Distributor not found on Distributors
CUSTMNT1	00006	XWGIVA	CUSTS	Credit_Limit < 0
CUSTMNT1	00007	CUSNO	CUSTS	Cus_No = 0
CUSTMNT1	00008	CUSNO	CUSTS	Cus_No not found on Sites
CUSTMNT1	00009	XWBCCD	CUSTS	Debtor found on Purchases

## COMPONENT DOCUMENTER

The **Component Documenter** option documents the extracted Screen Components (Re-engineered Functions). The following information is documented:

- Additional Header Info – This includes the function header information.
- Data Content – This includes the data content diagram.
- Screen Actions – This includes the screen action diagram.
- Screen Design – This includes the Screen Design for all formats.
- Residual Logic – This includes the business process logic for the selected screen component.
- Business Rules – This includes the business rules for the selected screen component.

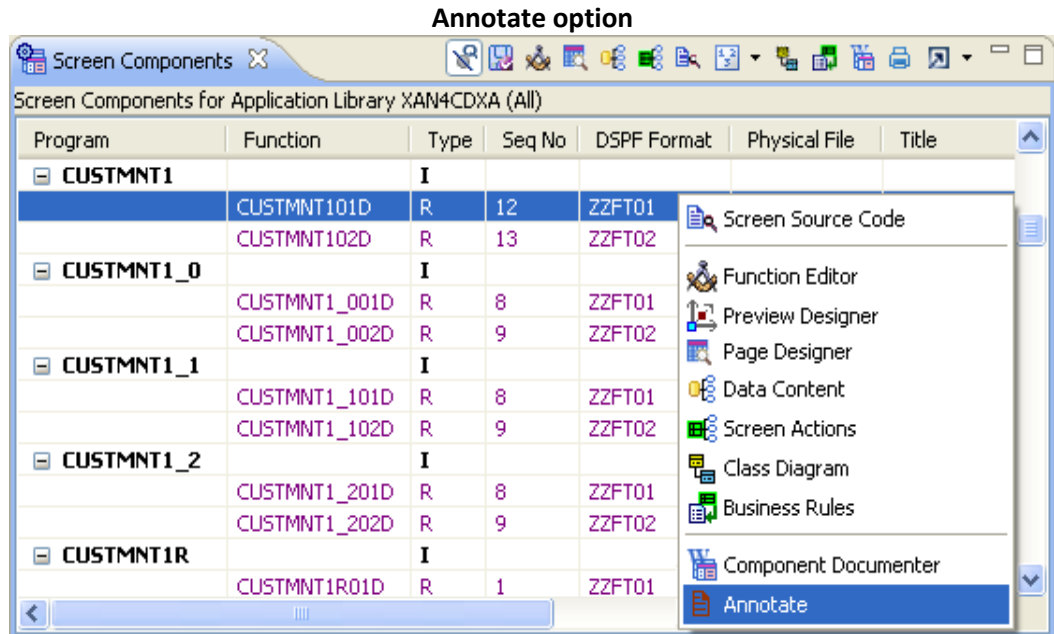




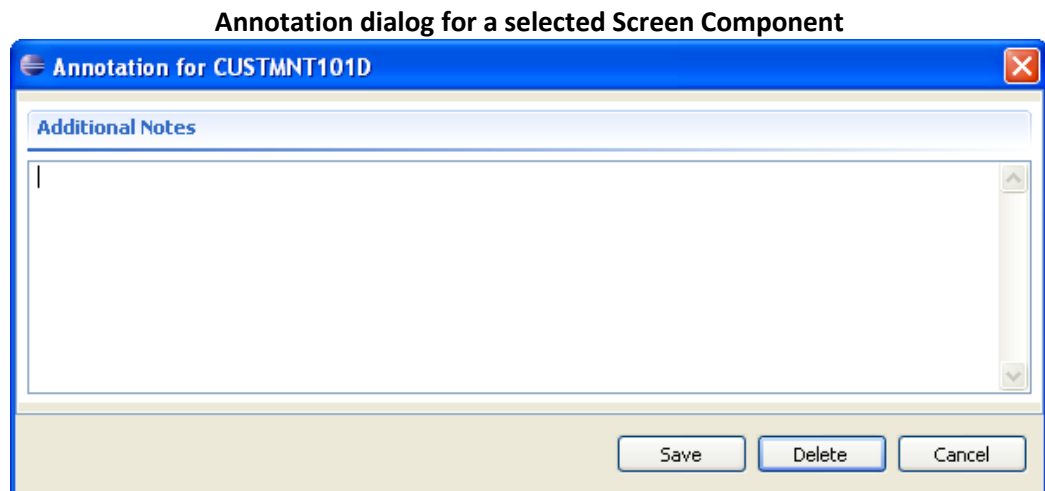
For more details, refer to **Appendix C**.

## ANNOTATE

The **Annotate** option is available to provide annotates to a specific function. Right-click on a Screen Component for the context menu and select the **Annotate** option, as displayed underneath:



The following dialog box is invoked in which you can write notes. Subsequently, click the related buttons to **Save**, **Delete**, or **Cancel** annotates.



## DEVELOPMENT SCREENS

X-Analysis provides the following options on Development Screens:

- Function Editor
- Preview Designer
- Page Designer
- Data Content
- Screen Actions
- Class Diagram
- Business Rules

**Options available on Development Screens List**

Development Screens List of \*NONE/\*ALL/\*ALL

Function	Physical File	Title
AAASTATUS	ASTATUS	Status file
AACNTACS	CNTACS	Contacts
AACONDET	CONDET	Contract Detail
AACONDETNW	CONDETNW	Contract Detail new -?CBL Ver. with Long fields
AACONHDR	CONHDR	Contract Header
AACUSF	CUSF	Sites
AACUSGRP	CUSGRP	Customer Groups
AACUSTS	CUSTS	Purchases
AADELIVA	DELIVA	Delivery Areas
AADISTS	DISTS	Distributors
AAEVFEVENT	EVFEVENT	File: EVFEVENT

Context Menu Options:

- Function Editor
- Preview Designer
- Page Designer
- Data Content
- Screen Actions
- Class Diagram
- Business Rules

All these options available on Development Screens are already discussed under the Screen Components section.

# Business Rules Analysis

Fresche Legacy's Business Rules Extraction software, **X-Rules**, can be used to highlight the business rules within a source member using X-Analysis. Using **X-Rules**, the business logic may be identified and narrated from individual programs or parts of the entire system. This business logic, thus extracted, is analyzed and documented using the various related features of X-Analysis.

The Business Rules of an application are what makes the application function uniquely. While X-Analysis can expose the Business Rules implicit in the data and process models of an application, this does not entirely account for the vast amount of business logic that is buried inside the source code of the programs.

X-Rules is capable of identifying and narrating this logic automatically from individual programs or parts of the entire system. The business rules logic can then be analyzed and documented with the powerful and interactive source browser integrated with X-Analysis.

## BUSINESS RULES

The program source is grouped into discrete blocks of logic so that each block represents a particular execution of a business rule. This block of code is then converted into 'Pseudo Code' that describes the execution of the logic. Literals and constants are liberally used in the narration, wherever possible, giving very accurate descriptions of the logic. Each rule has an exclusive identifier that makes system-wide analysis and documentation of business rules possible in X-Analysis.

The entire process is achieved by invoking a single command on X-Analysis. The business rules generation process identifies the various components of the business rules and writes them to either:

1. A new source member or
2. An index over the original source member.

***X-Analysis can display business rules automatically using the generated index.***

X-Rules not only identifies the Business Rules Logic, but also generates a prototype application for a part of the original application.

X-Rules uses the X-Analysis cross-reference database and the original application program source code to provide shadow programs for the functions in the prototype application. These shadow programs contain all the business rules logic from the original programs. These rules include all field validation that is additional to the normal database integrity checks (which are generated automatically), calls to batch programs for additional functions, and secondary file processing.

The primary criteria to track Business Rules are the presence of CAS, COMP, IF, ELSEIF, and WHEN statements.

For the secondary criteria, the following are specified:

- The condition involves one or more database fields.
- The condition contains the screen fields which get tracked to the database fields.
- The condition involves the %EQUAL, %FOUND, %EOF built-in functions.
- The condition contains the resulting indicators for the database I/O operations (analogous to %EQUAL, %FOUND, and %EOF built-in functions).
- The presence of the conditioning indicators for some other operation codes (e.g. CHECK, SCAN, LOOKUP).

Based on the above specifications, the recovered logic contains the following business rules components:

- Field Validations
- Calls to other (significant) programs
- Secondary (database) file updates
- Non-owner file reads

## DERIVE BUSINESS RULES

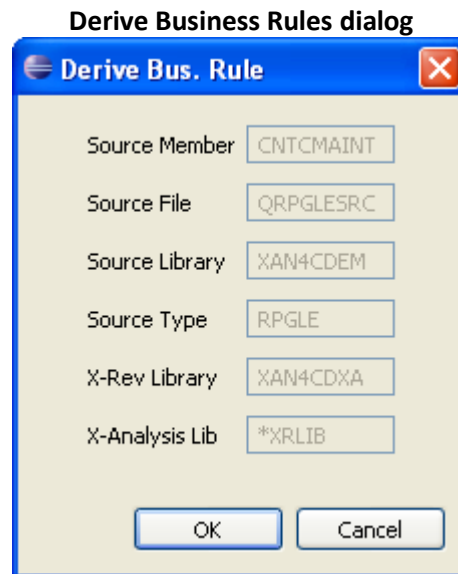
This option is available on the context menu of a cross-reference library and an application area. The Business Rules may only be generated for RPG, RPGLE, and CBL objects (\*PGM type).

The **Derive Business Rules** option on an individual program calls the **XBIZRULES** command. This command uses the X-Analysis databases to re-engineer all relevant functionality from a legacy program.

The extracted code comprises the following:

- Validations
- Batch Program Calls
- Secondary File Updates
- Non-owner File reads

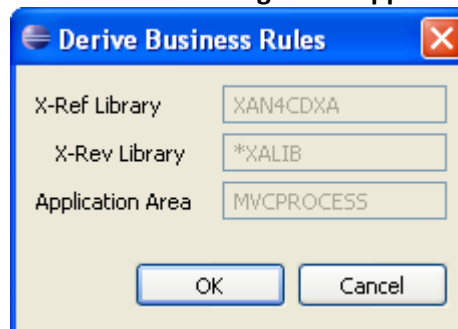
The **Derive Business Rules** option on an individual **\*PGM** object invokes the following dialog:



The process involves identifying certain key components of the program, including message statements, return codes, and validation flags. Then, the significant update files are identified. After the process is over, the program is scanned for statements which represent any of the above logic types. These statements are written to the file **XEXTRGLINS** – the "Trigger Lines" file, which is then used to produce the required output.

The **Derive Business Rules** option for the entire application or a single application area calls the **XGENBRULES** command.

**Derive Business Rules dialog on an Application Area**

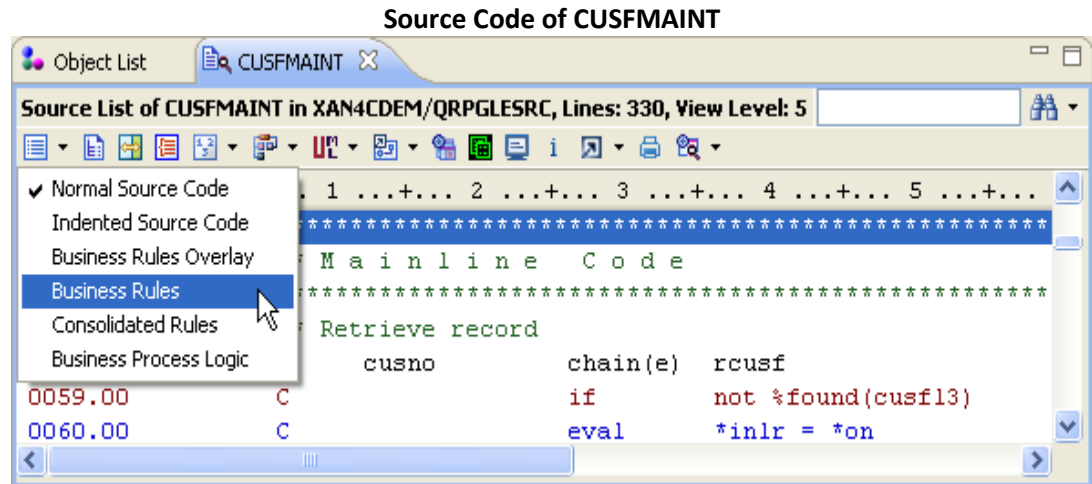


This command will identify the business rules logic in each program in the application over which the specified cross-reference database has been built. A source member containing the business rules logic and narrative describing each rule is generated for each program. This is achieved by invoking the **XBIZRULES** X-Model command for each program in the application.

## VIEW BUSINESS RULES

X-Analysis can display Business Rules automatically using the generated index.

X-Analysis allows the display of the source member for any program in the application. When the source member is displayed, click the **Source Options** drop-down menu and select **Business Rules** to see the business rules logic highlighted within the member. You can immediately see the business logic within the context of the program as a whole.



The following window is invoked:

**Business Rules for CUSFMAINT**

**Business Rules for CUSFMAINT in XAN4CDEM/QRPGLESRC, View Level: 1**

```

Business Rules
MAINLINE
// Mainline Code
R00001 Cus_No not found on Sites
// Retrieve record
Read data rcusf using cusno
IF Not Found(cusf13)
  *inlr = *on
  RETURN
END
// Set screen values
// Until Exit/Cancel
  
```

**Business Rules for CUSFMAINT, Number of Lines: 10**

Source Member	Rule Number	Field	File	Rule
CUSFMAINT	00001	CUSNO	CUSF	Cus_No not found on Sites
CUSFMAINT	00002	CNAME	CUSF	Company = blank
CUSFMAINT	00003	TELNO	CUSF	Phone <> blank
CUSFMAINT	00004	FAXNO	CUSF	Fax_No <> blank
CUSFMAINT	00005	DSDCDE	CUSF	Distributor <> blank
CUSFMAINT	00006	DSDCDE	CUSF	Exact match not found for Distributor on Distributors
CUSFMAINT	00007	STATUS	CUSF	Sts <> blank
CUSFMAINT	00008	USERN...	CUSF	Contact = blank
CUSFMAINT	00009	SALUT	CUSF	Salutation <> blank and <> 'Mr' and <> 'Mrs' and ...
CUSFMAINT	00010	CUSNO	CUSF	Cus_No = 0

The Business Rules view also displays columns for Error Message, Business Rule Annotation, Rule Status, and Rule Status Comment. The columns can be seen in the image underneath.



Business Rules window showing the new columns

Message ID	Rule Status	Rule Status Comment	Annotation
	No Status		
OEM0012 (You must enter the customer na...	No Status		
OEM0014 (The telephone no. is invalid.)	No Status		
OEM0015 (The fax. no. is invalid.)	No Status		
	No Status		
OEM0018 (The distributor is invalid.)	No Status		
OEM0019 (The status is invalid.)	No Status		
OEM0020 (You must enter a contact name.)	No Status		
OEM0021 (The title is invalid.)	No Status		
	No Status		

The **Configure Columns** feature in the Business Rules view helps you manage the columns displayed. You can reduce the width or hide any column by setting width to 0.

Business Rules window – Configure Columns option

Source Member	Rule Number	Field	File	Rule
CUSFMAINT	00001	CUSNO	CUSF	Cus_No no
CUSFMAINT	00002	CNAME	CUSF	Company
CUSFMAINT	00003	TELNO	CUSF	Phone <>
CUSFMAINT	00004	FAXNO	CUSF	Fax_No <>
CUSFMAINT	00005	DSDCDE	CUSF	Distributor
CUSFMAINT	00006	DSDCDE	CUSF	Exact matc
CUSFMAINT	00007	STATUS	CUSF	Sts <> bla
CUSFMAINT	00008	USERN...	CUSF	Contact =
CUSFMAINT	00009	SALUT	CUSF	Salutation
CUSFMAINT	00010	CUSNO	CUSF	Cus_No =

Filter the display of business rules using the various buttons. The rules can be filtered based on whether they are Exportable Rules, Update Rules, or Excluded Rules. These three filters have toggle behavior.

**Business Rules window – Filter buttons**

The screenshot shows a window titled "Business Rules" with a subtitle "Business Rules for CUSFMAINT, Number of Lines: 10". The window contains a table with the following data:

Source Member	Rule Number	Field	File	Rule
CUSFMAINT	00001	CUSNO	CUSF	Cus_No not found on Sites
CUSFMAINT	00002	CNAME	CUSF	Company = blank
CUSFMAINT	00003	TELNO	CUSF	Phone <> blank

The filter buttons (three funnel icons) in the title bar are highlighted with a red box.

**Note: For details regarding Business Rules Status, refer to [Appendix L](#).**

# Inter-Repository Options

The **Inter-Repository Options** provides different sub-options for comparing database files (across any two cross-reference libraries) and managing linked repositories.

The **Difference Analysis** option analyzes the application database files and reports the difference with the files.

The **PTF Analysis** option analyzes the base and the customized applications for PTF analysis.

The **Manage Linked Repositories** option allows analysis of one or more IBM i and/or non-IBM i (Windows) cross-reference library to an existing cross-reference library.

The **Inter-Repository Options** is available on the context menu of the cross-reference library. The following group of options is available under it:

- Difference Analysis
- Generate Difference Analysis
- Display Difference Analysis
- PTF Analysis
- Customized Libraries
- Generate PTF Analysis
- PTF Analysis
- Manage Linked Repositories

**Note:** *Fresche Legacy supplies the following two additional data libraries for demonstrating Difference Analysis and PTF Analysis:*

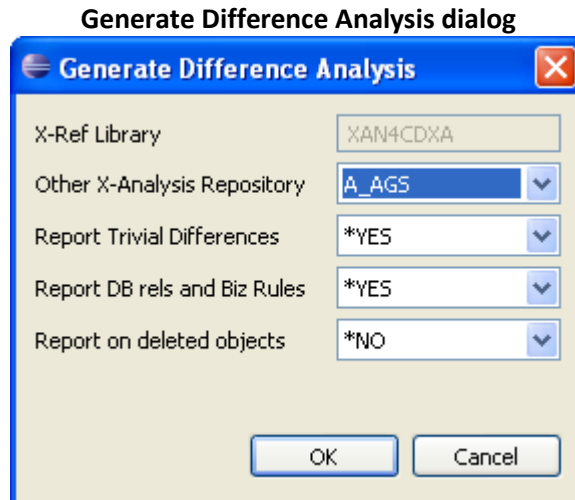
***XAN4CEMCU – This library contains objects from XAN4CEM with simulated changes.***

***XAN4CEMPT – This library contains simulated PTF for XAN4CEM.***

## GENERATE DIFFERENCE ANALYSIS

The **Generate Difference Analysis** option submits a batch job which populates data for Difference Analysis. You must provide the cross-reference library name which will be used to compare the cross-reference libraries.

The following dialog is displayed when you select the **Generate Difference Analysis** option:



## DISPLAY DIFFERENCE ANALYSIS

The **Display Difference Analysis** option displays the differences of the application database files and programs. The difference analysis data is available only when the difference analysis has been generated by selecting the **Generate Difference Analysis** option.

### Demo Case – Display Difference Analysis

Create a demo case for better understanding of Display Difference Analysis. Follow the given steps:

1. Create a new X-Analysis application (call it **XAN4CDXC**) with the following libraries:

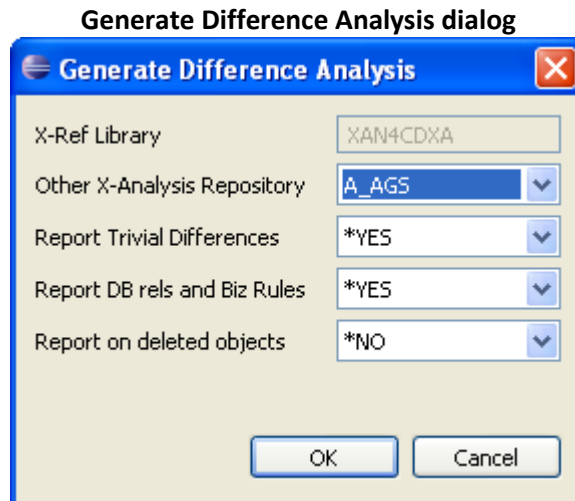
Source:

XAN4CEMCU  
XAN4CEM

Object:

XAN4CEMCU  
XAN4CEM

2. Initialize the new application.
3. To populate Difference Analysis data, opt for the context menu on the new X-Analysis application (**XAN4CDXC**), and then select the **Generate Difference Analysis** option from the **Inter-Repository Options** submenu. Select **XAN4CDXC** from the drop-down box, **Other X-Analysis Repository**. Then, click **OK** to submit the batch job.



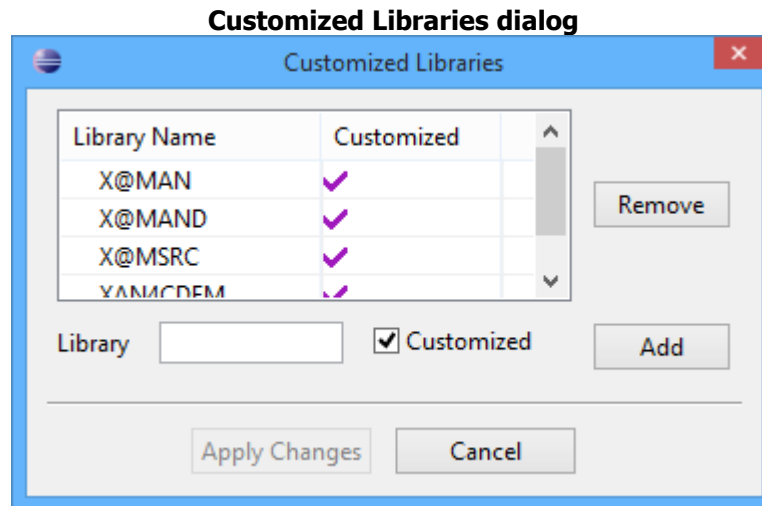
4. To display the Difference Analysis data, opt for the context menu on the new X-Analysis application (**XAN4CDXC**), and then select the **Display Difference Analysis** option from the **Inter-Repository Options** submenu. The following screen should appear:

**Display Difference Analysis for XAN4CDXA**

Heading/Object/Category	Description	Total	Library	Element	Difference
<b>CHANGED</b>	<b>Changed Files</b>	<b>18</b>			
[-] CNTACS	Contacts	2			
[-] FIELDS	Database File Fields	1			
	Field CUSNO has been changed.		XAN4CDEM		Changed
[+] RELNS	Database File Relationships	2			
[-] CNTLF1	Global Contacts by Salesman	2			
[+] FIELDS	Database File Fields	10			
[-] KEYS	Database File Keys	2			
	Key no. 1 has been added.		XAN4CDEM		Added
	Key no. 2 has been added.		XAN4CDEM		Added
[+] CNTLF2	Global Contacts by Name	2			

## CUSTOMIZED LIBRARIES

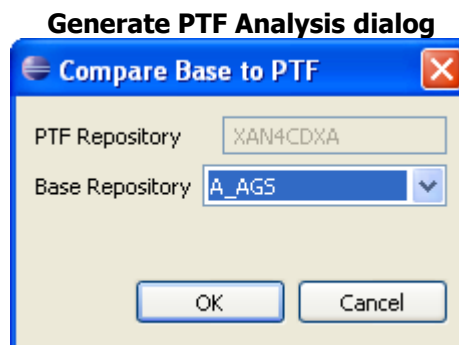
A customized library is where you would store programs taken from the vendor's library and modified. In this way you will retain the original programs from the vendor and have their modified version, too. The following dialog is displayed when you select the **Customized Libraries** option:



Provide valid entries for Customised Library (ies) and for Non-Customised Library (ies).

## GENERATE PTF ANALYSIS

The **Generate PTF Analysis** option submits a batch job which populates data for PTF Analysis. The following dialog is displayed when you select the **Generate PTF Analysis** option:



Provide the base repository name in the **Generate PTF Analysis** dialog and this will be used to compare the PTF repository with the base repository.

## PTF ANALYSIS

The PTF Analysis displays the comparison between the PTF repository and the base repository. Select the **Generate PTF Analysis** option first to access the PTF Analysis data.

### Demo Case – PTF Analysis

Create a demo case for better understanding of the PTF Analysis.. Follow the given steps to set up the demo case:

1. Create a new X-Analysis application (call it **XAN4CDXP**) with the following libraries:

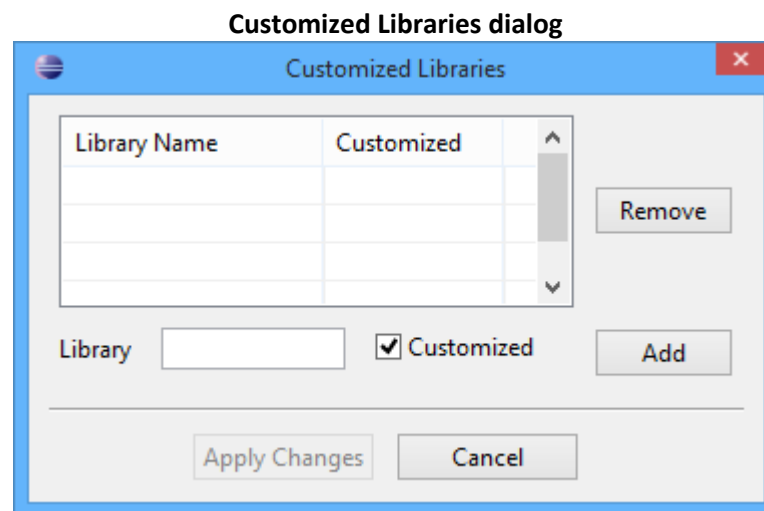
Source:

XAN4CEMPT

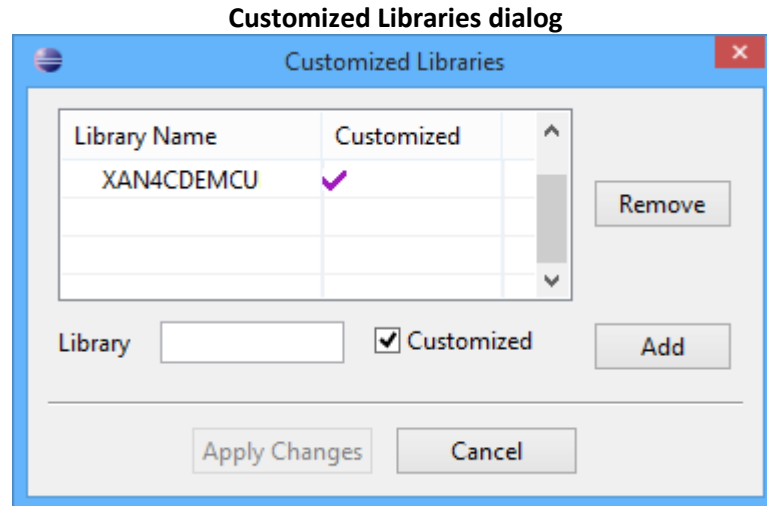
Object:

XAN4CEMPT

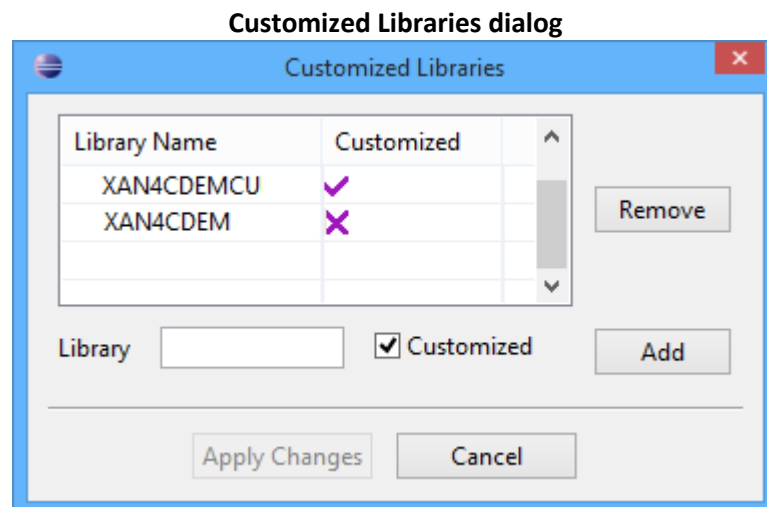
2. Initialize the new application – **XAN4CDXP**.
3. To generate the PTF Analysis, the first step is to identify libraries as the customised libraries. Select the X-Analysis application – **XAN4CDXC**, and then select the **Customized Libraries** option from the **Inter-Repository Options** submenu on the context menu. This invokes the following dialog:



Type in **XAN4CEMCU** to the Library text box and check the **Customized** box. Then, click **Add**. This adds the **XAN4CEMCU** library as the customized library.

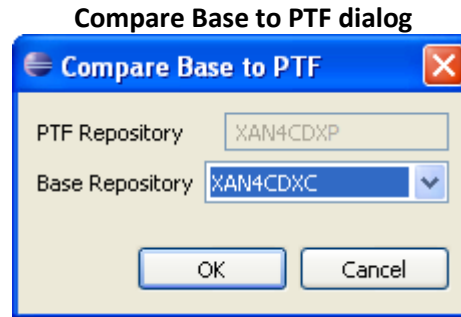


Now, add the **XAN4CEM** library as non-customized library. Type in **XAN4CEM** to the **Library** text box and un-check the **Customized** box. Then, click **Add**. This adds the **XAN4CEM** library as a non-customized library.



- The next step is to select the **Generate PTF Analysis** option. Opt for the context menu on the X-Analysis application – **XAN4CDXP**, and select the **Generate PTF Analysis** option from the **Inter-Repository Options** submenu. Enter **XAN4CDXC** in the Base Repository. Click **OK** to submit the batch job.





- The final step is to display the PTF Analysis data. Opt for the context menu on new X-Analysis application – **XAN4CDXP**, and then select the **PTF Analysis** option from the **Inter-Repository Options** submenu. The following screen should appear:

**PTF Analysis for XAN4CDXP**

Class	Type	Name	Description	PTF Change Date	Base Change Date
APPLY	*FILE	CUSFMAINTD	Customer Site Maintenance	19/03/10	28/09/09
APPLY	*FILE	ORGS	Organisations	19/03/10	28/09/09
APPLY	*FILE	ORGSL1	Organisations by Name	19/03/10	28/09/09
APPLY	*PGM	CUSGRSEL	Customer group Selection	19/03/10	08/03/10
APPLY	*PGM	CUSTSSEL	Customer Selection	19/03/10	08/03/10
APPLY	*PGM	DISTSSEL	Distributor Selection	19/03/10	08/03/10
APPLY	*PGM	DSPPTYPES	Display Product	19/03/10	28/09/09
MODIFIED	*FILE	CNTCMAIN...	Contacts Maintenance	19/03/10	18/03/10
MODIFIED	*FILE	CONDET	Contract Detail	19/03/10	19/03/10
MODIFIED	*FILE	CONDETL1	by Store/Contract/Product	19/03/10	18/03/10
MODIFIED	*FILE	CONDETL2	by Store/Contract/Product	19/03/10	18/03/10
MODIFIED	*FILE	CONDETL3	by Product/Contract	19/03/10	18/03/10
MODIFIED	*FILE	CUSFSEL	Customer Site Selection	19/03/10	18/03/10
MODIFIED	*FILE	CUSTOMNT1...	Customer Detail Maintena...	19/03/10	18/03/10
MODIFIED	*FILE	CUSTS	Purchases	19/03/10	18/03/10
MODIFIED	*FILE	CUSTSL4	by Distributor/Customer	19/03/10	18/03/10

The first column of the PTF Analysis displays Class. The Class column can have any of the following entries:

**MODIFIED** = The object from the PTF library was found in one of the CUSTOMISED libraries.

**User Action:** The PTF object will have to be reviewed and changes applied in the CUSTOMISED library; manually applied to the object in the PTF library.

**NEW** = The object from the PTF library was not found in the base repository.

**User Action:** The PTF object can be placed in the base library.

**APPLY** = The object from the PTF library was found in one of the BASE libraries (Vanilla) but not in any of the CUSTOMISED libraries.

**User Action:** The PTF object can overlay the object in the base library.

**REFERS** = The object from the PTF library refers to one or more objects in one of the CUSTOMISED libraries. The details are in XPTFROBJ.

**User Action:** The PTF object will have to be revised to make sure all customised objects referred to still meet the requirements of this object.

**REFERENCED** = The object from the PTF library is referenced by an object in one of the CUSTOMISED libraries. The details are in XPTFROBJ.

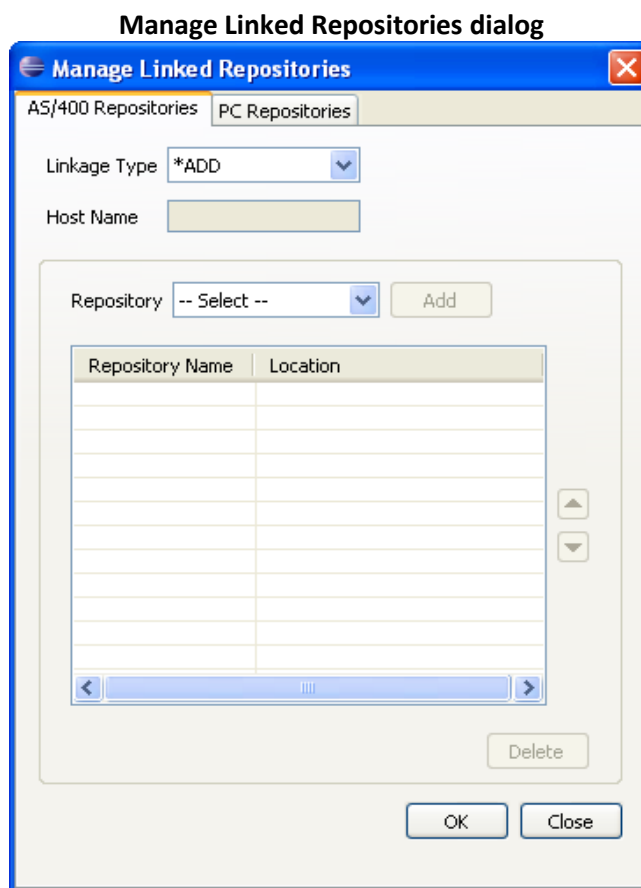
**User Action:** The CUSTOMISED objects will have to be reviewed to make sure the PTF object still meets the requirements of that object.

## MANAGE LINKED REPOSITORIES

If you want to link one or more IBM i and/or non-IBM i (Windows) cross-reference repository to an existing IBM i repository, select the **Manage Linked Repositories** option. The option is available under **Inter-Repository Options**. You can use this option to manage the linked repositories.

### Linking IBM i Repositories

The **Manage Linked Repositories** option opens the following dialog:



In the above dialog, **Host Name** is the field that will show the IP address of the AS/400 server whose repositories can be selected from the Repository Combo.

Add the repository (ies) on to the base (working) repository for combined analysis. The dialog lists all repositories available on the X-Analysis server, besides the base repository. You can select the repository to add.

**Linkage Type:** Link repository (ies) in the following two ways:

- **\*ADD** – In this mode, the cross-reference information from the entire linked repository (ies) is merged with those of the base repository on the X-Analysis lists and diagrams.
- **\*REPLACE** – Here, **ONLY** the distinct cross-reference information from the repository (ies) is put on the X-Analysis lists/diagrams. This depends on the sequence of the repositories.

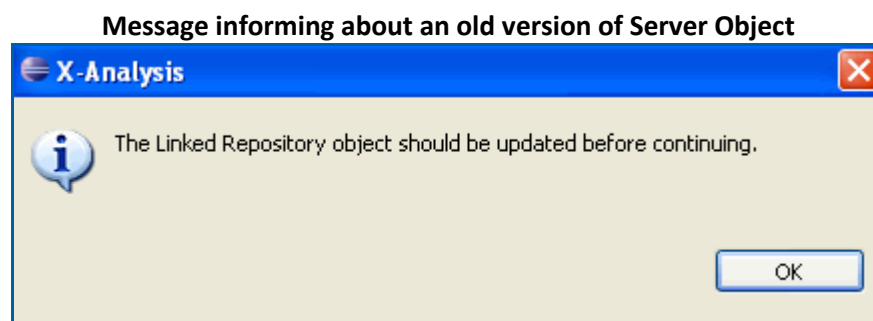
**Repository:** It lists all the X-Analysis repositories on the machine, besides the one working with. Select a repository to link with the base repository.

To link a repository, select the desired repository from Repository drop-down and click **Add**. This adds the selected repository to the linked repository list.

To delete the repository from linked repository list, select the repository and click **Delete**. This removes the selected repository from the linked repository list. The base repository, shown in blue, cannot be removed from the list.

Use the arrow buttons to change the sequence of the linked repositories.

**Old Linked Repository Object** – When the old users of X-Analysis select the **Manage Linked Repositories** option, they see the following information message:



***In case you receive this message, then request Fresche Legacy for the updated Server Component(s).***

## Linking Non-IBM i (PC Repositories)

Click on the **PC Repositories** tab to invoke the following window:

**Manage Linked Repositories – PC Repositories**

AS/400 Repositories PC Repositories

Linkage Type \*ADD

**DB2 Connection information**

Host Name

DB2 User

DB2 Password

DB2 Port 50000

Fetch

Repository -- Select -- Add

Repository Name	Location

Delete

OK Close

Note that in the above window, besides the DB2 Connection information group, all the other information will remain the same as specified for Linking IBM i Repositories (AS/400 Repositories).

The **DB2 Connection information** group is described as follows:

**Host Name:** Host Name is the name or IP address of the machine with which the DB2 connection is required.

**DB2 User:** Specify the DB2 user that uniquely identifies the DB2 user of the system and allows access to DB2 tools/services.

**Password:** Specify the password that is used for DB2 authentication, to prove identity or gain access to a DB2 resource.

**DB2 Port:** Specify the port number for the default DB2 instance where DB2 services must be running (Default DB2 port is 50000).

**Fetch:** After the DB2 information is supplied, click **Fetch** to populate the Repository Combo. Once this action is performed, you can select the repository to add.

# Audit Options

These options simplify the auditing processes for you by providing effective means to measure, monitor, and manage changes and complexity to applications. **Audit Options** are available on the context menu over the cross-reference library and application areas.

The following options constitute **Audit Options**:

- Metrics Analysis
- Screen Metrics
- File Metrics
- Business Process Logic Metrics
- Specialized Analysis
- Problem Analysis
- Object Allocation
- Database Summary
- Summary Report
- Initialize Source Archiving
- Generate Metrics Analysis
- Edit Problem Audit Limit
- Edit Problem Categories
- Generate Problem Analysis
- View Database Size Statistics

***The Audit Options functionality is implicitly dependent on X-Rules for certain problem analysis categories and screen metrics. You must own the X-Rules license to generate Business Rules (for the X-Ref library) before using them.***

***The X-Audit features dependent on X-Rules license are "Program Code Alerts" under Problem Analysis and Screen Metrics information.***

## METRICS ANALYSIS

**Metrics Analysis** is the first option under **Audit Options**. The **Metrics Analysis** option provides low, medium, and high complexity classification of each program based on the following attributes of the program:

- Source Type
- Source Lines
- Cyclomatic Complexity
- Halstead
- Maintainability Index
- Files
- Device files comprising Display Files and Printer Files
- Called Programs
- Calling Programs

The Metrics information is displayed under the following headings:

- Batch Programs
- Interactive Programs

These two highest levels are then further sub-categorised as High, Average, and Low.

The user-specified values determine where a program fits into these sub-categories. By default, these Preferences are blank, hence all programs are listed under 'Low' complexity, until values have been set using the Metrics Preferences, discussed below.

The following screen displays the Metrics information for the cross-reference library, **XAN4CDXA**:

Metrics information for XAN4CDXA

Complexity Level	Units	Text	Source Type	Source Lin...	Cyc. Complex.	Halstead	Maint.Index	Files	Device Files	Called Programs	Calling Progra...
▲ Grand Total	188			27,730	18	976	77	434	70	277	188
▲ Interactive Source Members	69			21,301	43	2,264	125	254	70	228	108
▲ High Total	1			1,186	133	7,551	232	1	1	5	1
High		ORGMNT Organisation Main...	RPG	1,186	133	7,551	232	1	1	5	1
▷ Average Total	33			17,596	62	3,241	153	170	33	163	35
▷ Low Total	35			2,519	23	1,191	96	83	36	60	72
▲ Batch Source Members	119			6,429	3	230	49	180	0	49	80
High Total	0			0	0	0	0	0	0	0	0
▲ Average Total	2			1,156	54	4,580	148	6	0	1	6
Average		WKCUS8E Customer Release ...	RPG	735	76	5,752	198	2	0	0	3
Average		WKSECF6 Generate CPU Letter	RPG	421	33	3,408	99	4	0	1	3
▷ Low Total	117			5,273	2	156	47	174	0	48	74
Application Area Breakdown											
▲ ACCOUNTS (+)	54			15,458	33	1,706	5	192	32	133	78
High Total	0			0	0	0	0	0	0	0	0
▷ Average Total	1			266	23	1,240	178	3	1	1	0
▷ Low Total	1			156	25	1,144	144	2	1	1	1
▷ CUSFMAINT	52			15,036	34	1,726	105	187	30	131	77
▲ CONHDR	98			22,057	23	1,320	108	312	41	145	129
High Total	1			1,186	133	7,551	232	1	1	5	1
▷ Average Total	28			15,784	66	3,636	158	155	26	129	32
▷ Low Total	69			5,087	4	289	86	156	14	11	96
▲ CUSTOMERS (+)	45			12,212	29	1,450	27	122	38	102	214
High Total	0			0	0	0	0	0	0	0	0
▷ Average Total	4			2,435	71	3,772	188	29	4	24	15
▷ Low Total	10			633	6	188	50	9	9	0	78
▷ DEC16	31			9,144	31	1,558	106	84	25	78	121
▲ MVCPROCESS	16			3,811	25	1,301	88	44	14	32	82
High Total	0			0	0	0	0	0	0	0	0

The Metrics information displayed above has the following columns:

1. **Complexity Level:** For each attribute 1 - 6, you will allocate weights, e.g. each file usage = 1, each Copybooks usage = 4, etc. The sum total of these per program will be calculated and the Complexity level for the program worked out. E.g. Points <10 - LOW, 10-20 - AVERAGE, >20 - HIGH. You can allocate weights in the **General Metrics Preferences** dialog.
2. **Units:** When collapsed, it displays the total number of programs. When expanded, it displays the names of the programs.
3. **Text:** Displays the description of the object.
4. **Source Type:** Informs about the type of source.
5. **Source Lines:** Total number of Source Lines in a source member.
6. **Cyclomatic Complexity:** Measures amount of decision logic in a program. Shows total number of conditional statements used.
7. **Halstead:** Displays program's complexity directly from source code based upon the operators and operands used.



8. **Maintainability Index:** The maintainability index is calculated with certain formulae from lines-of-code measures, Cyclomatic Complexity and Halstead complexity measures.
9. **Files:** Total number of Files used by the source member.
10. **Device Files:** Total number of Display and Printer Files used by the source member.
11. **Called Programs:** Total number of called programs from the source member.
12. **Calling Programs:** Total number of calling programs from the source member.

**Note: The Cyclomatic Complexity, Halstead, and Maintainability Index columns in the Metrics window display the average count. This can be seen in both the Group Total and the Grand Total.**

The conventions that are used for processing Cyclomatic Complexity, Halstead and Maintainability Index are given below:

**Cyclomatic Complexity** – This is simply a count of the number of decision points and exit points in a module. In RPG, this would be a count for each subroutine or procedure (plus mainline) of how many statements have these operation codes:

- IFxx
- ELSEIF
- DOW
- DOU
- CABxx
- WHxx
- CASxx
- FOR

**Halstead measures** – These are five different measurements based on formulas applied to four different values obtained from the code, again, for each subroutine:

**n1** – the number of different op codes in the subroutine

**n2** – the number of different variables (or files) used on all statements in the subroutine

**N1** – the total number of op codes used in the subroutine (some may be used multiple times)

**N2** – the total number of all instances of variables in the subroutines

From these four numbers different measurements are calculated:

**Module length** = N1 + N2

**Module vocabulary** = n1 + n2

**Halstead Volume** = N \* log<sub>2</sub>(n)

**Difficulty** = (n1/2) \* (N2/n2)

**Effort** = Volume \* Difficulty

**Maintainability Index** – This is a formula based on some years of experience of Hewlett-Packard engineers. The lower the number, the less maintainable the code will be. This is also at the subroutine level. It uses four numbers as input:

HV – Halstead volume from above

CC – Cyclomatic Complexity from above

LOC – Lines of actual code in the subroutine

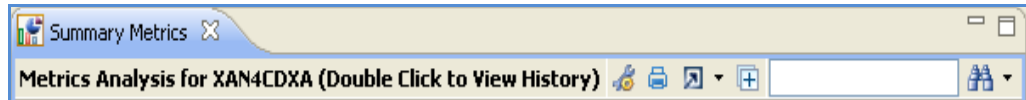
COM – Lines of non-blank comments in the subroutine (beginning after the previous ENDSR)

$$MI = 5.2 * \text{naturallog} (HV) - 0.23 * CC - 16.2 * \text{naturallog} (LOC) + 50.0 * \sin (\text{square root} (2.46 * COM))$$

### Metrics Toolbar

The Metrics toolbar comprises various options which are discussed below.

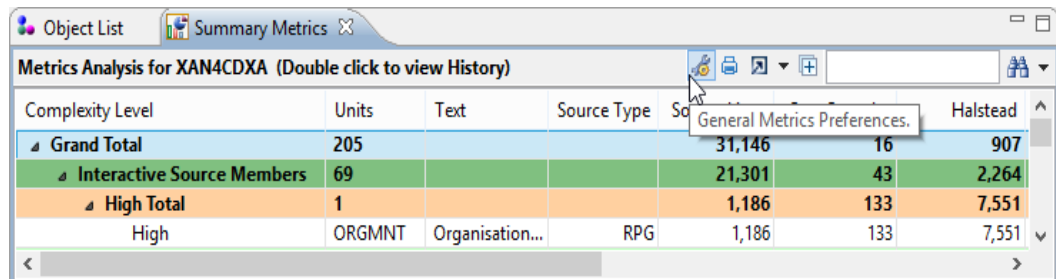
**Toolbar available on Metrics Window**



### Metrics Preferences

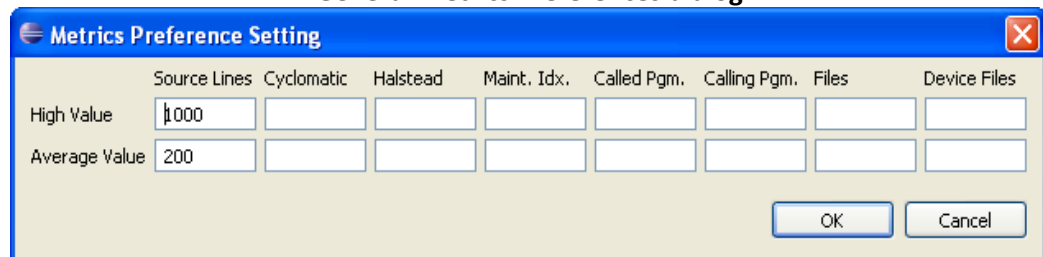
You can set the Metrics Preferences as per your requirements.

**General Metrics Preferences icon on Metrics Window Toolbar**



Click the **General Metrics Preferences** icon to invoke the following dialog:

**General Metrics Preferences dialog**

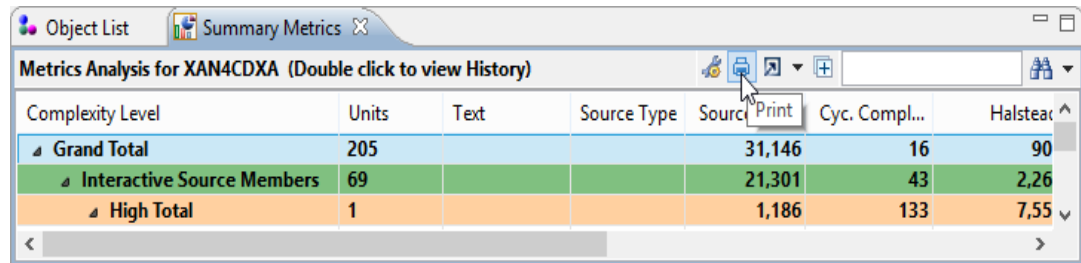


Specify a high value so that any value above this will determine that the program is of high complexity. Any program that falls below the Average setting will be determined as Low complexity.

### Print Metrics

To print the Metrics directly, select **Print**.

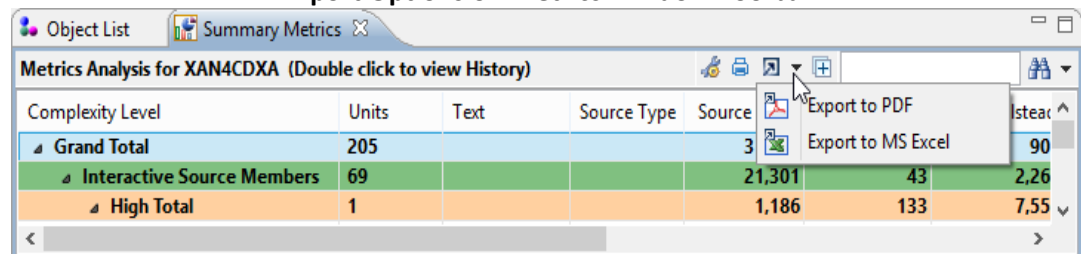
#### Print icon on Metrics Window Toolbar



### Export Metrics

Select the **PDF** or **MS Excel** option as required under the **Export Options** icon.

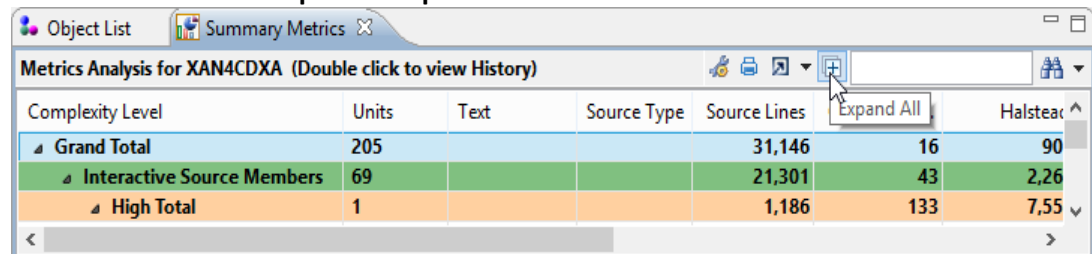
#### Export Options on Metrics Window Toolbar



### Expand All

Click the **Expand All** icon which will expand all the data.

#### Expand All option on Metrics Window Toolbar



The screen below shows the expanded window after the **Expand All** icon is clicked:

Expanded Metrics window

Complexity Level	Units	Text	Source Type	Source Lines	Cyc. Complex.
▲ Grand Total	205			31,146	16
▲ Interactive Source Members	69			21,301	43
▲ High Total	1			1,186	133
High	ORGMNT	Organisation Mainte...	RPG	1,186	133
▲ Average Total	33			17,596	62
Average	CNTCMAINT	Contacts Maintenance	RPGLE	266	23
Average	OE001	Order Entry	RPG	240	18
Average	CUSTOMNT1	Customer Detail Mai...	RPGLE	336	21
Average	WWCONDET	Work with Order Det...	RPGLE	605	77
Average	WWCONHDR	Work with Orders	RPGLE	741	95
Average	WWCUSTS	Work with Customers	RPGLE	753	94
Average	CON001	Contract Entry	RPG	271	22

Metrics History

The Metrics History displays all previous instances of the generated metrics data. The Metrics History data will be available only when the Metrics data is generated more than once.

The Metrics History can be generated for all individual levels – High, Average & Low Totals for Batch Programs or Interactive Programs and for the Grand Total also.

Invoking Metrics History

Complexity Level	Units	Source Type	Source Lines	Cyc. Complex.	Halstead	Maint.Index	Files
▣ Grand Total	127		11,826	1,750	90,333	7065	222
▣ Interactive Source Members	50		9,842	1,594	81,830	5694	163
▣ High Total	5		3,543	435	21,583	850	34
▣ Average Total	13		4,036	374	20,036	1962	46
▣ Low Total	32			785	40,211	2882	83
▣ Batch Source Members	77			156	8,503	1371	59
High Total	0			0	0	0	0
Average Total	1			33	3,408	99	4
Low Total	76			123	5,095	1272	55

Select High Total / Average Total / Low Total and double click to invoke the History window.

One can also invoke the History window for Grand Total or Batch Program or Interactive Program.

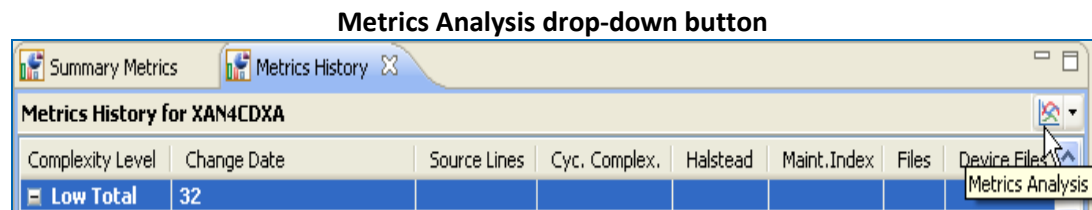
Select 'Low Total' row from the Metrics Window and perform double-click action to invoke the Metrics History window, as shown below:

**Metrics History window**

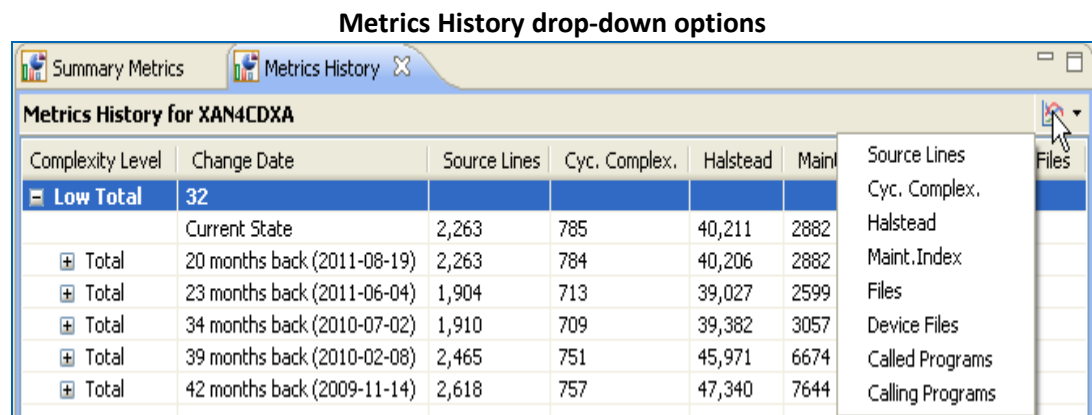
Complexity Level	Change Date	Source Lines	Cyc. Complex.	Halstead	Maint.Index	Files	Device Files
Low Total	32						
	Current State	2,263	785	40,211	2882	83	33
+	Total 20 months back (2011-08-19)	2,263	784	40,206	2882	83	33
+	Total 23 months back (2011-06-04)	1,904	713	39,027	2599	73	29
+	Total 34 months back (2010-07-02)	1,910	709	39,382	3057	73	29
+	Total 39 months back (2010-02-08)	2,465	751	45,971	6674	73	29
+	Total 42 months back (2009-11-14)	2,618	757	47,340	7644	73	29

**Metrics History Chart**

X-Analysis can also display the Metrics History in a chart form for all individual parameters. The Metrics History toolbar contains a drop-down button called Metrics Analysis:



The drop-down button contains the list of parameters against which a chart can be generated.



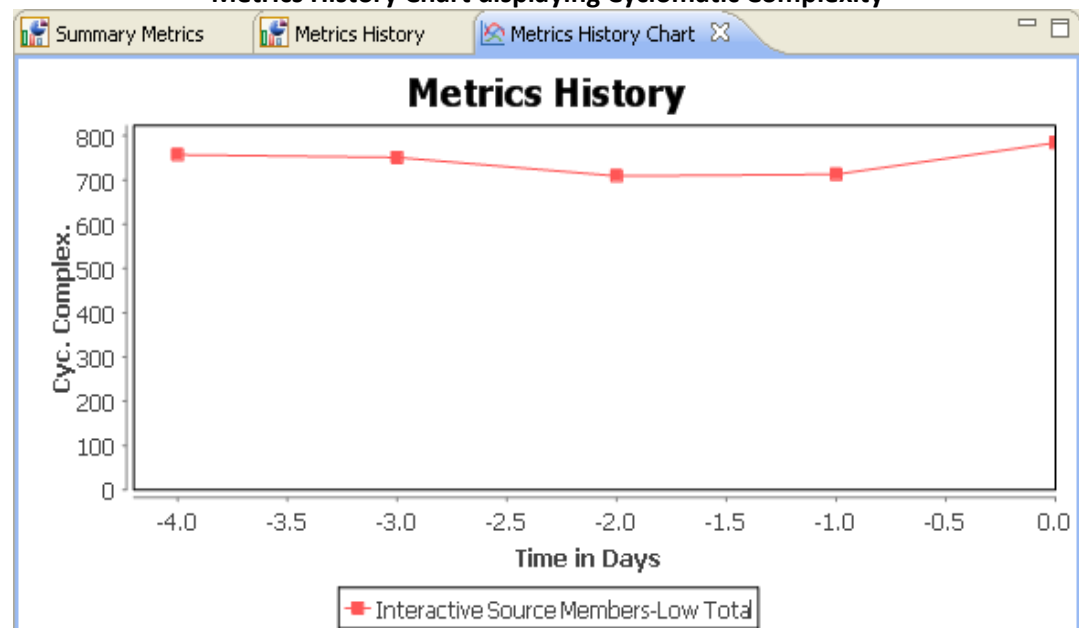
Select the **Cyc. Complex.** option from the drop-down menu:

**Cyclomatic Complexity option for Chart**

Complexity Level	Change Date	Source Lines	Cyc. Complex.	Halstead	Main	Source Lines	Files
<b>Low Total</b>	<b>32</b>						
	Current State	2,263	785	40,211	2882		
+	Total 20 months back (2011-08-19)	2,263	784	40,206	2882		
+	Total 23 months back (2011-06-04)	1,904	713	39,027	2599		
+	Total 34 months back (2010-07-02)	1,910	709	39,382	3057		
+	Total 39 months back (2010-02-08)	2,465	751	45,971	6674		
+	Total 42 months back (2009-11-14)	2,618	757	47,340	7644		

This action invokes the Metrics History chart displaying Cyclomatic Complexity:

**Metrics History Chart displaying Cyclomatic Complexity**



Similarly, the user can generate charts for all the other parameters.

You can check Metrics History for all the Interactive Programs / Batch Programs and Grand Total from the Metrics window.

**Source code tracking**

The Metrics History provides a facility to see changes in the source code. Expand the Metrics History and select a program as shown below:

**Invoking source code tracking**

Complexity Level	Change Date	Source Lines	Cyc. Complex.	Halstead	Maint.Index
<b>Low Total</b>	<b>32</b>				
	Current State	2,263	785	40,211	2882
+	Total 20 months back (2011-08-19)	2,263	784	40,206	2882
+	Total 23 months back (2011-06-04)	1,904	713	39,027	2599
+	Total 34 months back (2010-07-02)	1,910	709	39,382	3057
	OE004 (CHG 2010-09-03[21:26:30])				
	OE002 (CHG 2010-08-27[21:27:39])				
+	Total 39 months back (2010-02-08)	2,465	751	45,971	6674
+	Total 42 months back (2009-11-14)	2,618	757	47,340	7644

The Source Compare editor is invoked when a user double-clicks on the listed program, as shown below:

**Source Compare editor displaying the code differences**

WKCU58P (Changed on 2011-08-05)		WKCU58P of 2010-03-12	
I		C	MOV
C	MOVE '1	C	REA
C	READ QL	C	*INLR DOW
C	*INLR DOWEQ' C	C	EXC
C	EXCPTPF	C	REA
C	READ QL	C	END
C	END		
	OQSYSPT H 00 1 OA		OQSYSPT H 00 1 OA
O	EF 1 PRT	O	EF 1
O	SRC	O	O* END OF PGM

## SCREEN METRICS

The **Screen Metrics** option provides low, medium and high complexity classification of all the available screen functions. The screen metrics information is displayed for the complete application and for all the application areas.

The Screen Metrics information is displayed under the following headings:

- Grid type functions
- Record type functions

■ Other functions

The following screen displays the Screen Metrics information for the cross-reference library XAN4CDXA:

**Window displaying Screen Metrics for XAN4CDXA**

Complexity Level	Units	Files	Database Fields	Work Fields	Outgoing Calls	Incoming Calls	Function Keys	Conditioning Fields
<b>Grand Total</b>	88	131	664	324	64	30	36	734
High	6	6	55	13	6	0	6	48
Average	71	114	590	309	58	30	30	685
Low	11	11	19	2	0	0	0	1
<b>Application Area Breakdown</b>								
<b>ACCOUNTS</b>	63	106	576	276	56	22	31	612
High	1	1	7	5	0	0	0	12
Average	0	0	0	0	0	0	0	0
Low	0	0	0	0	0	0	0	0
<b>CUSFMAINT</b>	62	105	569	271	56	22	31	600

The Metrics information displayed above has the following columns:

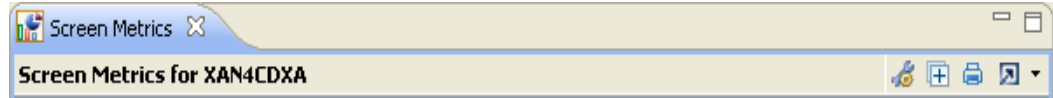
1. **Complexity Level:** This shows various groups. The topmost group is either Grand Total, or App area totals. All functions in application areas or cross-reference application are then grouped based on complexity and then, on type of function
2. **Units:** Shows the number of functions in the group
3. **Files:** Total number of Files used by screen function
4. **Database Fields:** Total number of screen fields which are read from database fields
5. **Work Fields:** Total number of work fields in the group
6. **Outgoing Calls:** Number of functions called by this function
7. **Incoming Calls:** Number of functions calling this function
8. **Function Keys:** Total number of Function key-based actions called by functions in this group
9. **Conditioning Fields:** Number of fields on which there is a conditioning logic.



## Screen Metrics toolbar

The Screen Metrics toolbar comprises various options, which are discussed below:

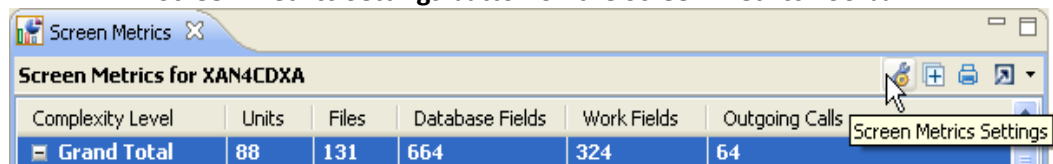
Toolbar available on Screen Metrics window



## Screen Metrics Settings

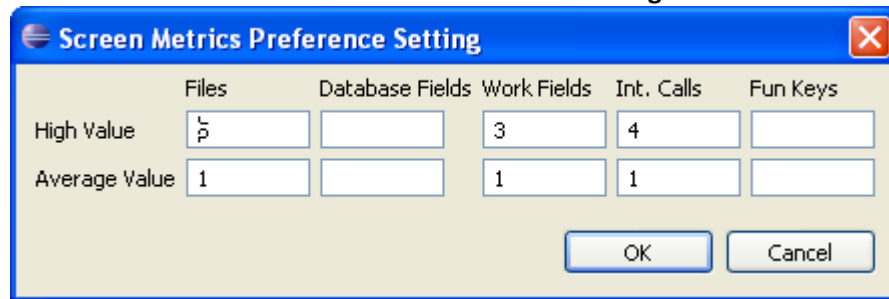
The user can set the Screen Metrics settings as per the requirements.

Screen Metrics Settings button on the Screen Metrics Toolbar



Click **Screen Metrics Settings** to invoke the associated dialog:

Screen Metrics Preferences dialog

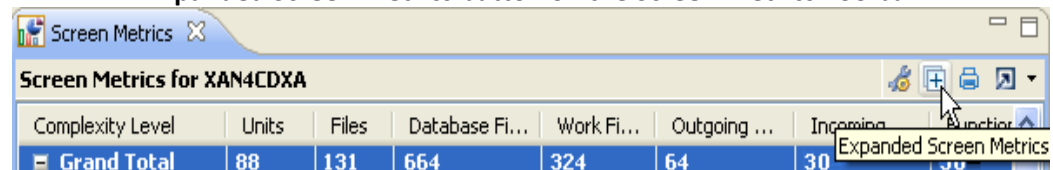


The user can set the criteria for High / Average using the above dialog.

## Expand All Screen Metrics Data

Click **Expanded Screen Metrics** icon which will expand all the data.

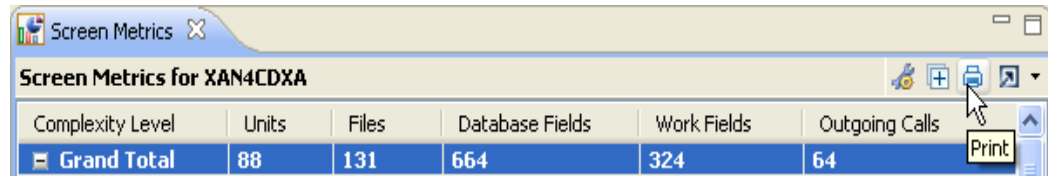
Expanded Screen Metrics button on the Screen Metrics Toolbar



## Print Screen Metrics

To print the Screen Metrics information, click the **Print** icon available on the toolbar.

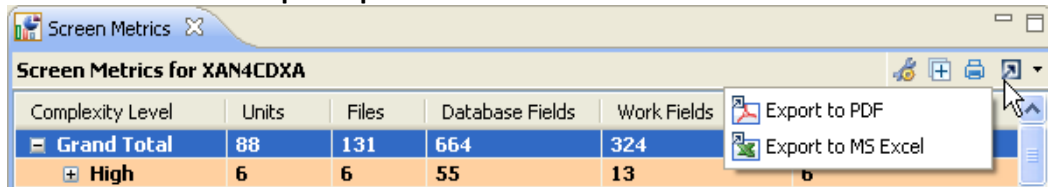
Print button on the Screen Metrics Toolbar



## Export Screen Metrics

Select the **PDF** or **MS Excel** option, as required under the **Export Options** icon.

Export Options on the Screen Metrics Toolbar



## FILE METRICS

The **File Metrics** option displays various metrics on all the files. The file metrics information is displayed for the complete application and for all the application areas.

The File Metrics displays information under the following headings:

1. **Units:** Displays total number of Files.
2. **Fields:** Displays the total number of fields available in the file.
3. **Access Paths:** The total number of access paths for the file.
4. **Creating Programs:** The number of programs creating records in this file.
5. **Reading Programs:** The number of programs reading this file.
6. **Updating Programs:** The number of programs updating records in this file.
7. **Deleting Programs:** The number of programs deleting records from this file.
8. **Total References:** The total numbers of programs referencing this file (in effect total of 3 - 6).

The following screen displays the File Metrics information for the cross-reference library, **XAN4CDXA**:

Window displaying File Metrics for XAN4CDXA

Name	Units	Fields	Access Paths	Creating Pgms	Reading Pgms	Updating Pgms	Deleting Pgms	Total References
Grand Total	39	5561	80	3	156	29	22	210
ACCOUNTS	3	16	5	0	3	0	0	3
CONHDR	16	175	66	3	150	28	20	201
CONUPD	3	100	28	2	97	25	14	138
CUSFMAINT	11	156	45	2	106	28	17	153
CUSTOMERS	13	154	51	2	143	28	19	192

## BUSINESS PROCESS LOGIC METRICS

The Business Process Logic Metrics Report displays business process logic data in metrics form – Total Lines, Excluded Lines, Controller Lines, and Residual Logic.

The following screen displays the Business Process Logic Metrics Report for **XAN4CDXA**:

Business Process Logic Audit Report for XAN4CDXA

Name	Total Lines	Excluded Lines	Controller Lines	Residual Logic
CB906R	141	6	0	135
CNTCMANT	196	19	0	177
CNTCMANTR	250	63	0	187
CON001	278	65	0	213
CON001R	441	169	0	272
CUJSCPY	61	0	0	61
CUSFMAINT	254	19	0	235
CUSFMAINR	326	87	0	239
CUSFMOLD	259	19	0	240

**Note: To use this option you must have the X-RPG Migrate license.**

## SPECIALIZED ANALYSIS

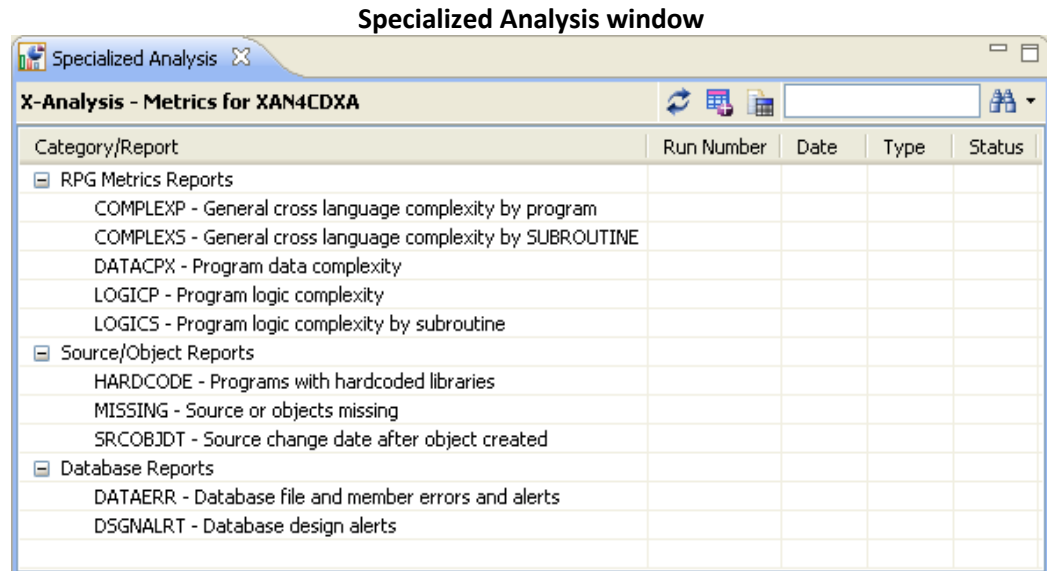
The **Specialized Analysis** option allows users to design their own reports using the full metrics database in the defined system repository (the summary metrics described in the previous section uses a subset of this database). This reporting provides a valuable way to measure and manage the quality and complexity of a code base, either as a one-off or on an ongoing basis.

The Specialized report can be viewed in two ways:

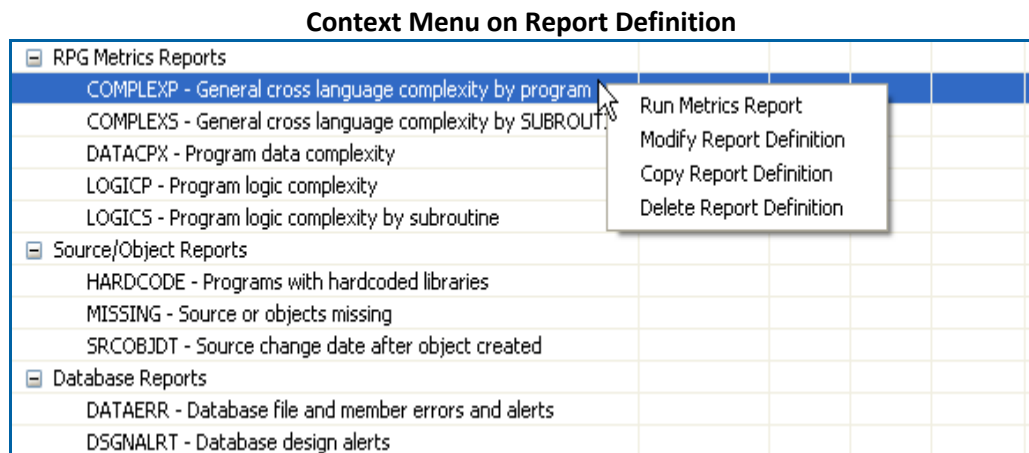
- Static reports.

- Difference reports that show the changes in those values over a period of time.

Opt for the **Specialized Analysis** option from the **Audit Options** submenu. The following screen displays the Specialized Analysis for the application library, **XAN4CDXA**:



The user has the option to generate pre-configured reports. Select any report under the listed category, and then right click on it to invoke the context menu:



### Run Metrics Report

When the user opts for this option, the pre-configured report dialog invokes:

### Report Definition dialog

X-Analysis Metrics: Report Specification and Submission
✕

Report Name:

Report Title:

Report category:

Application Area:

Object Name:

Select Report Columns and Options

Column	Metrics	VarName	Subr
<input type="checkbox"/> OBJNAM	Object and Source ID Data		
<input type="checkbox"/> OBJATR	Object Library	OBJLIB	
<input type="checkbox"/> CYC	Object Name	OBJNAM	
<input type="checkbox"/> HAL	Object Type	OBJTYP	
<input type="checkbox"/> MI	Object Attribute	OBJATR	
<input type="checkbox"/> SRCLINSTM	Object creation date	OBJCRTDAT	
	Object last used date	OBJLSUDAT	
	Source File	OBJSRCFIL	
	Source Library	OBJSRCLIB	
	Source file change date	OBJSRCFCHD	
	Source Code Metrics		

Show report data at subroutine level

Filter:

Search variables:

User metric formula:

User program:

Outfile: XAN4CDXA "/>

Click **Submit Report** to generate the report. A batch job will be invoked and upon its completion the Specialized Analysis window will be updated:

Specialized Analysis window

Category/Report	Run N...	Date	Type	Status
RPG Metrics Reports				
COMPLEXP - General cross language complexity by program	1	2013-06-06...	Metrics data	Submitted
COMPLEXS - General cross language complexity by SUBROUTINE				
DATACPX - Program data complexity				
LOGICP - Program logic complexity				
LOGICS - Program logic complexity by subroutine				
Source/Object Reports				
HARDCODE - Programs with hardcoded libraries				
MISSING - Source or objects missing				
SRCOBJDT - Source change date after object created				
Database Reports				
DATAERR - Database file and member errors and alerts				
DSGNALRT - Database design alerts				

To view the generated report, select the report and right-click on it, which invokes the context menu. Select the **View Report** option as displayed below:

Updated Specialized Analysis window

Category/Report	Run N...	Date	Type	Status
RPG Metrics Reports				
COMPLEXP - General cross language complexity by program	1	2013-06-06 ...	Metrics data	Complete
COMPLEXS - General cross language complexity by SUBROUTINE	1		Metrics data	Complete
DATACPX - Program data complexity				
LOGICP - Program logic complexity				
LOGICS - Program logic complexity by subroutine				
Source/Object Reports				
HARDCODE - Programs with hardcoded libraries				
MISSING - Source or objects missing				
SRCOBJDT - Source change date after object created				
Database Reports				
DATAERR - Database file and member errors and alerts				
DSGNALRT - Database design alerts				

The following similar report will be displayed. The user can export this report to MS Excel.

### COMPLEX Report

Specialized Analysis | COMPLEX X

COMPLEX - General cross language complexity by program Run 1, Total Objects: 72

Object Name	Object Attribute	Sum of Cyclomatic Complexity	Sum of Halstead Vol...	Greatest Maintainability Index	Source statements
CB903R	RPG	17	1072	164	139
CB905R	RPG	21	730	93	103
CFD211	RPG	7	52	55	8
CONFIX1	RPG	1	52	58	10
CONFIX2	RPG	1	48	59	11
CON001	RPG	22	1295	162	271
CUSLETSQ	RPG	1	55	20	11
CUSRGZ	RPG	2	102	20	17
FAXERR1	RPG	6	117	39	26
FAXERR2	RPG	6	119	39	26
FAXNOS1	RPG	4	69	72	21

### Modify Report Definition

The user has the option to modify the existing report definition.

### Modify Report Definition option

Specialized Analysis X

X-Analysis - Metrics for XAN4CDXA

Category/Report	Run N...	Date	Type	Status
[-] RPG Metrics Reports				
+ COMPLEX - General cross language complexity by program				
COMPLEXS - General cross language complexity by SUBROUTINE				
DATACPX - Program data complexity				
LOGICP - Program logic complexity				
LOGICS - Program logic complexity by subroutine				
[-] Source/Object Reports				
HARDCODE - Programs with hardcoded libraries				
MISSING - Source or objects missing				
SRCOBJDT - Source change date after object created				
[-] Database Reports				
DATAERR - Database file and member errors and alerts				
DSGNALRT - Database design alerts				

- Run Metrics Report
- Modify Report Definition**
- Copy Report Definition
- Delete Report Definition

Select the **Modify Report Definition** option to invoke the report configuration dialog:

**Report Definition dialog**

**X-Analysis Metrics: Report Specification and Submission** ✖

Report Name:

Report Title:

Report category:  Edit categories

Application Area:  All Members Selected

Object Name:

Select Report Columns and Options

Column	Metrics	VarName	Subr
<input type="checkbox"/> OBJNAM	Object and Source ID Data		
<input type="checkbox"/> OBJSUBNAM	Object Library	OBJLIB	
<input type="checkbox"/> OBJATR	Object Name	OBJNAM	
<input type="checkbox"/> CYC	Object Type	OBJTYP	
<input type="checkbox"/> HAL	Object Attribute	OBJATR	
<input type="checkbox"/> MI	Object creation date	OBJCRTDAT	
<input type="checkbox"/> SRCLINSTM	Object last used date	OBJLSUDAT	
	Source File	OBJSRCFIL	
	Source Library	OBJSRCLIB	
	Source file change date	OBJSRCFCHD	
	Source Code Metrics		

Show report data at subroutine level

Filter:

Search variables:

User metric formula:

User program:

Outfile: XAN4CDXA "/>

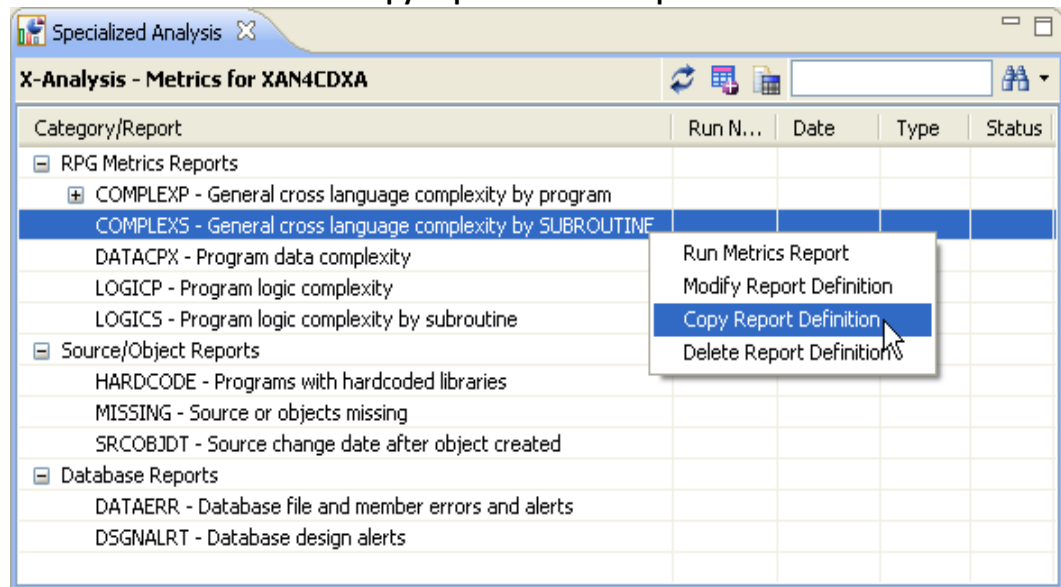
After changing the report definition, click **Save Definition Only**. If you would like to generate the report then click **Save and Submit Report**.

### Copy Report Definition

The user has the option to copy the existing report definition. It can be used when the user wants to retain the existing report as well as have a customised report.



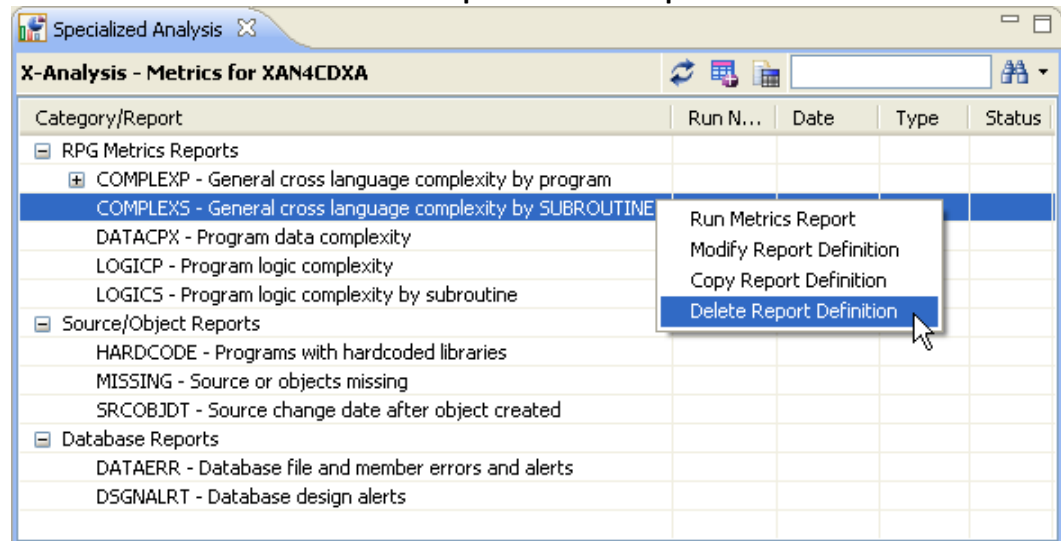
### Copy Report Definition option



### Delete Report Definition

The user can delete an existing report definition using the **Delete Report Definition** option:

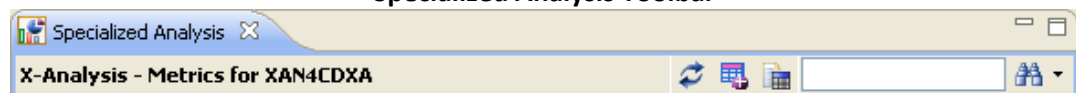
### Delete Report Definition option



### Specialized Analysis Toolbar

The Specialized Analysis toolbar comprises various options which are discussed below:

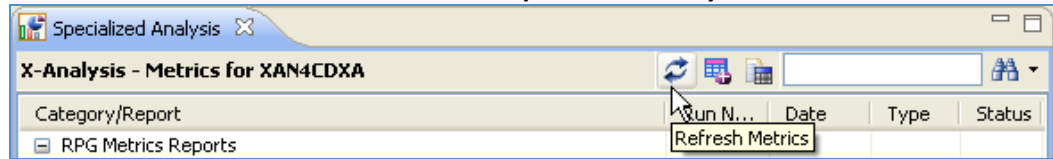
### Specialized Analysis Toolbar



## Refresh Metrics

The **Refresh Metrics** icon performs the refresh function.

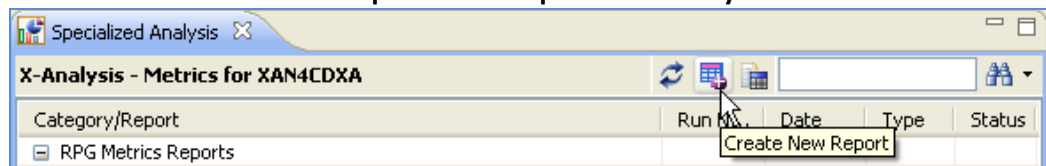
Refresh Metrics icon on Specialized Analysis Toolbar



## Create New Report

The user can create a customised report. For this, the **Create New Report** icon is available on the toolbar:

Create New Report icon on Specialized Analysis Toolbar



The following report definition dialog is invoked when the user clicks the **Create New Report** icon:

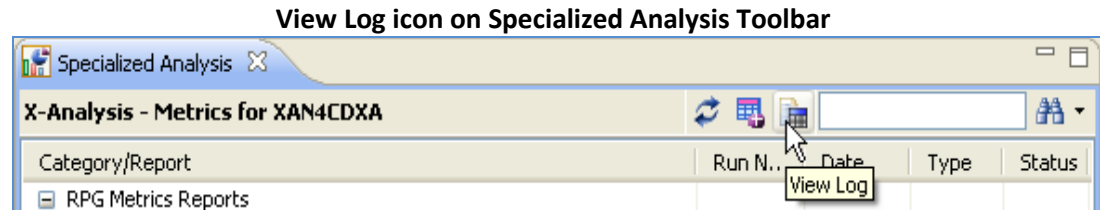
Create New Report dialog

The dialog box is titled 'X-Analysis Metrics: Report Specification and Submission'. It contains the following fields and controls:

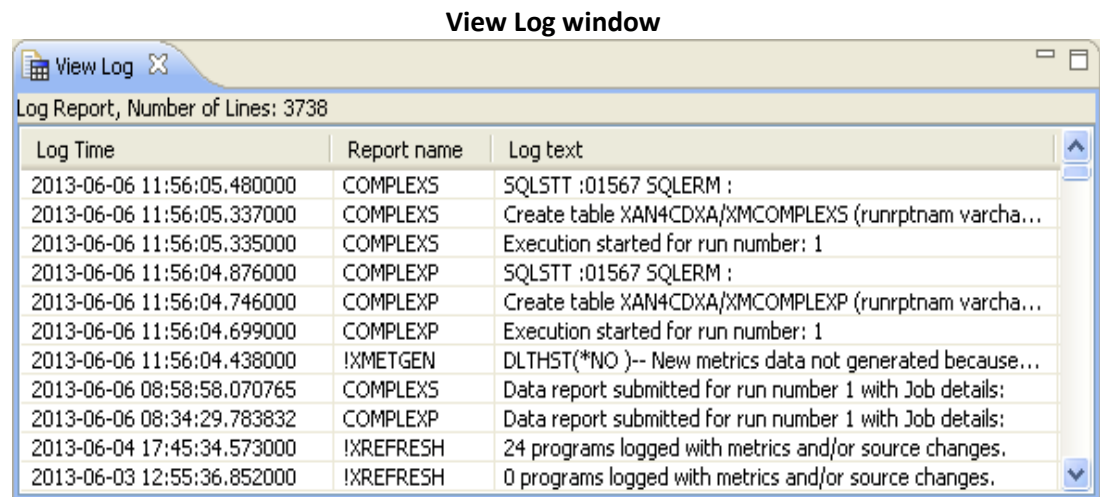
- Report Name: [Text input field]
- Report Title: [Text input field]
- Report category: [Dropdown menu showing 'RPGMET'] with an 'Edit categories' button.
- Application Area: [Dropdown menu showing '\*ALL'] with an 'All Members Selected' button.
- Object Name: [Text input field]
- Select Report Columns and Options:
  - A table with columns: Column, Metrics, VarName, Subr.
  - Metrics list: Object and Source ID Data, Object Library (OBJLIB), Object Name (OBJNAM), Object Type (OBJTYP), Object Attribute (OBJATR), Object creation date (OBJCRTDAT), Object last used date (OBJLSUDAT), Source File (OBJSRCFIL), Source Library (OBJSRCLIB), Source file change date (OBJSRCFCHD), Source Code Metrics.
  - Arrows for moving items between the Column and Metrics lists.
- Show report data at subroutine level
- Filter: [Text input field]
- Search variables: [Text input field]
- User metric formula: [Text input field]
- User program: [Text input field]
- Outfile: XAN4CDXA \*.XML
- Buttons: Save and Submit Report, Save Definition Only, Cancel.

## View Log

The user can view log related to Metrics processing. The **View Log** icon is available on the toolbar as shown below:



Click the **View Log** icon to check the log:



## PROBLEM ANALYSIS

After the Generate Problem Analysis batch job is over, select the **Problem Analysis** option from the **Audit Options** under the context menu on **XAN4CDXA**, to display the Problem Analysis data.

### Problem Analysis for Cross-Reference

Alert/Category/Object	Total	Description
Source/Object Alerts	14	
▶ Source member changed after devicefile created	2	
▶ No file found for existing source member	8	
▶ No source member for file	6	
▶ No program object found for source member	31	
▶ No source member for program/module	8	
▶ Source member changed after file created	67	
▶ No device file found for existing source member	8	
▶ No source member for device file	5	
▶ Referenced data area does not exist	1	
▶ Referenced database file does not exist	2	
▶ Referenced other file does not exist	1	
▶ Referenced program object does not exist	18	
▶ No source member for copy book	2	

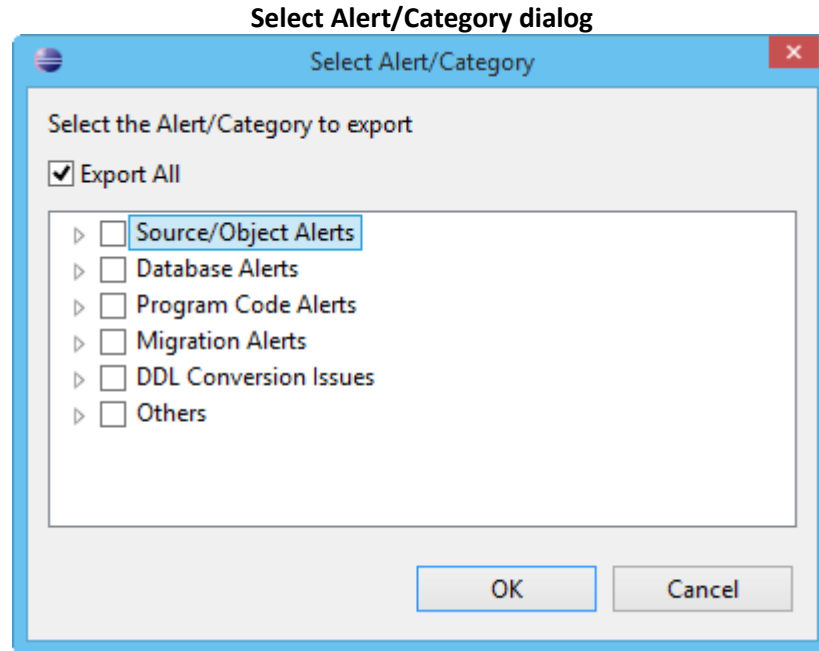
Expand the available Problem Category section to view name of the files having problems.

There is an option to allow **Customized Export to Excel** for the Problem Analysis data.

### Customized Export to Excel option

Alert/Category/Object	Total	Description
Source/Object Alerts	14	
▶ Source member changed after devicefile created	2	
CON001DF		Order Entry Display
CUSFMAINTD		Customer Site Maintenance
▶ No file found for existing source member	8	
▶ No source member for file	6	
▶ No program object found for source member	31	
▶ No source member for program/module	8	
▶ Source member changed after file created	67	

Clicking on this icon will invoke the following dialog:



The user can individually select Categories to be exported to Excel. By default, the **Export All** box is checked.

## OBJECT ALLOCATION

The **Object Allocation** option displays the information about all objects along with the application area names to which they belong. The following screen displays the Object Allocation window:

**Object Allocation for XAN4CDXA**

Name	Description	Type	Attribute	Application Area:	Library
ASIMPLTEST		*FILE	PF		XAN4CDEM
ASTATUS	Status file	*FILE	PF	XXX *	XAN4CDEM
BALANCEPRD	Balance by Product	*QMORY	SQL		XAN4CDEM
BALANCEPRD	Balance by Product	*QMFORM	QUERY MGR		XAN4CDEM
BALANCESTO	Balance by Store	*QMORY	SQL		XAN4CDEM
BALANCESTO	Balance by Store	*QMFORM	QUERY MGR		XAN4CDEM
CBCUSTSD	Work with Customers	*FILE	DSPF	2EUG *	XAN4CDEM
CBCUSTSD0	Work with Customers	*FILE	DSPF		XAN4CDXA
CBC110	Order Entry System	*PGM	CLP		XAN4CDEM
CB906R	Back-out account	*PGM	RPG	XXX *	XAN4CDEM
CB906RD	Order Entry display file	*FILE	DSPF	XXX *	XAN4CDEM
CB906RDXL1		*FILE	DSPF	XXX *	XAN4CDXA
CB906RR	Back-out account	*PGM	RPG	XXX *	XAN4CDXA

The above screen lists all objects from the application library, **XAN4CDXA** and provides information about application areas. Notice that some rows were blank under the

application area column, which means that the object does not belong to any application area. Similarly, note the '\*' sign which means that the object belongs to multiple application areas.

## DATABASE SUMMARY

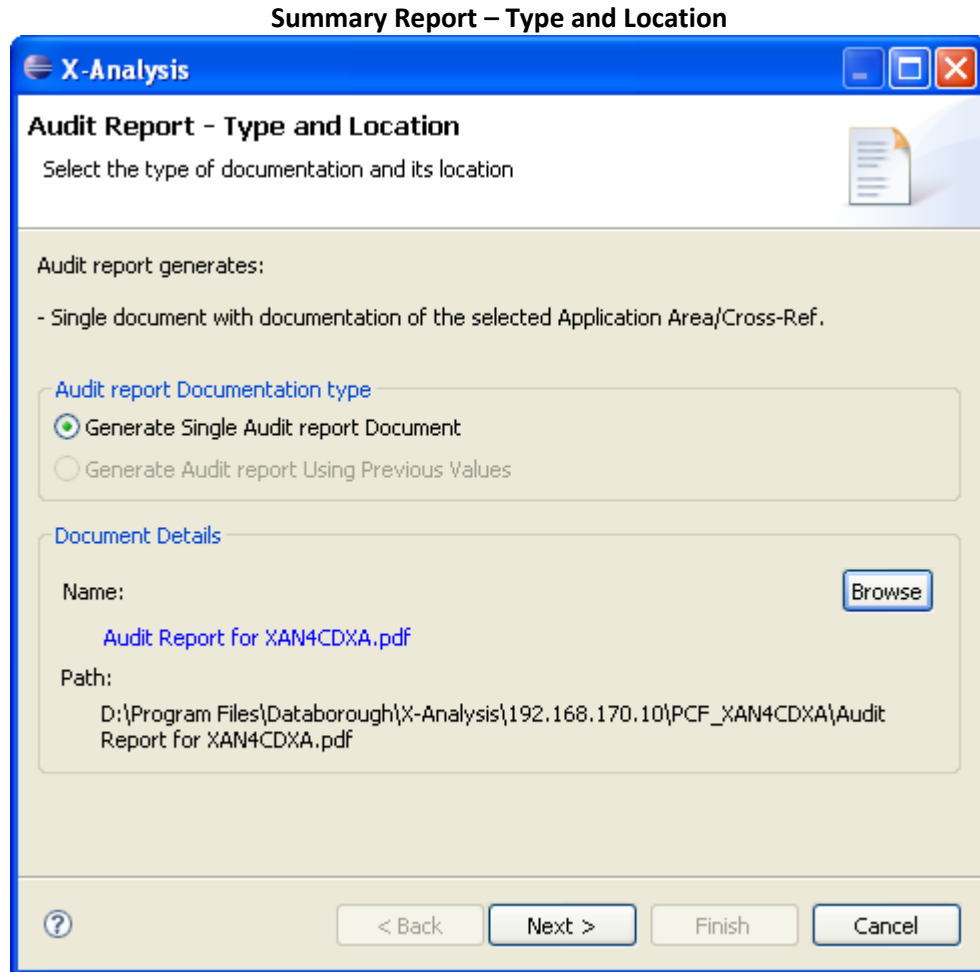
The **Database Summary** option gives the user access to the summarized database report for the entire cross-reference library. The report contains information related to files, their unique keys and other necessary file-related details. On clicking the option, the following window is displayed:

**Database Summary Report window**

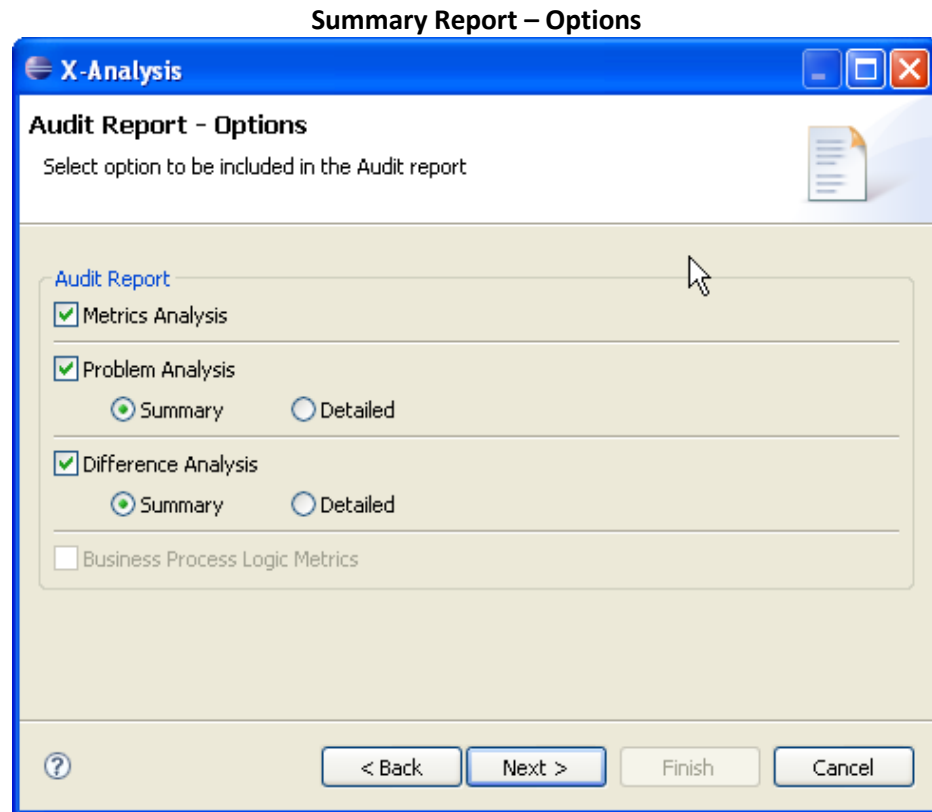
File	Unique Keys	Parent File No.	Child File No.	File With Identical Key	Foreign Keys to Parent	Foreign Keys from Child
ASTATUS	STATUS	2	0	0	1	0
CNTACS	CUSNO, PRCDE	0	5	0	0	5
CONDET	XWORDN, XWABCD	2	6	1	2	4
CONDETNW	XWORDN, XWABCD	2	1	1	2	1
CONHDR	XWORDN	4	3	0	1	3
CUSF		3	5	0	1	5
CUSGRP	XWBNCN	2	0	0	1	0
CUSTS	XWBCCD	3	4	0	1	4
DELIVA	XWBDCD	1	1	0	1	1
DISTS	DSDCDE	2	0	0	1	0
EVFEVENT		0	0	0	0	0

## SUMMARY REPORT

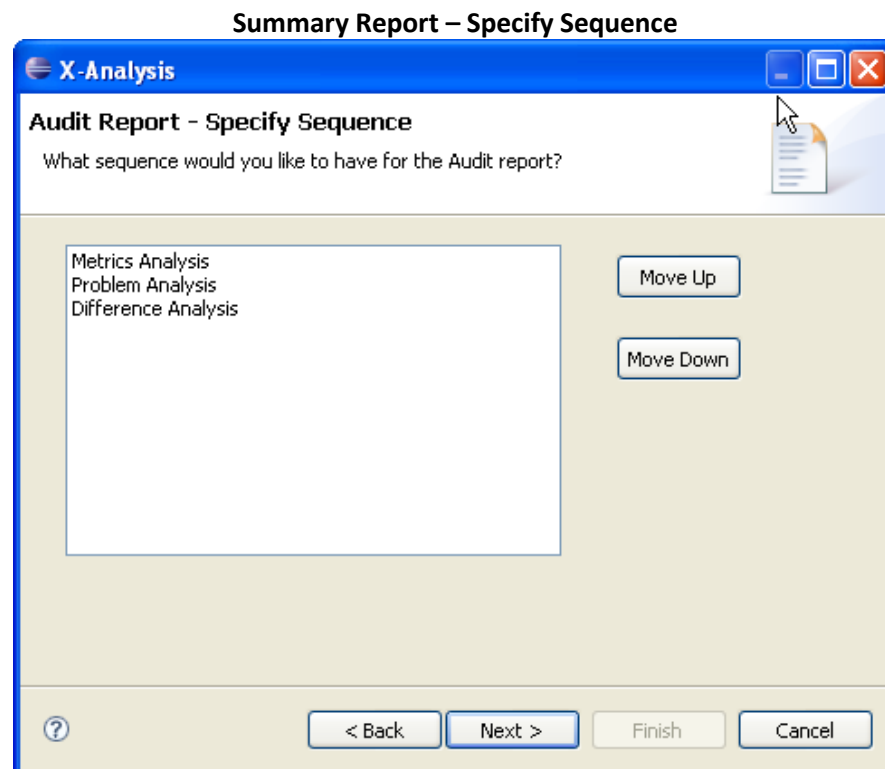
The **Summary Report** option is available under the **Audit Options** submenu on the context menu of cross-reference library and application areas.



Specify Type and Location. Click **Next**.

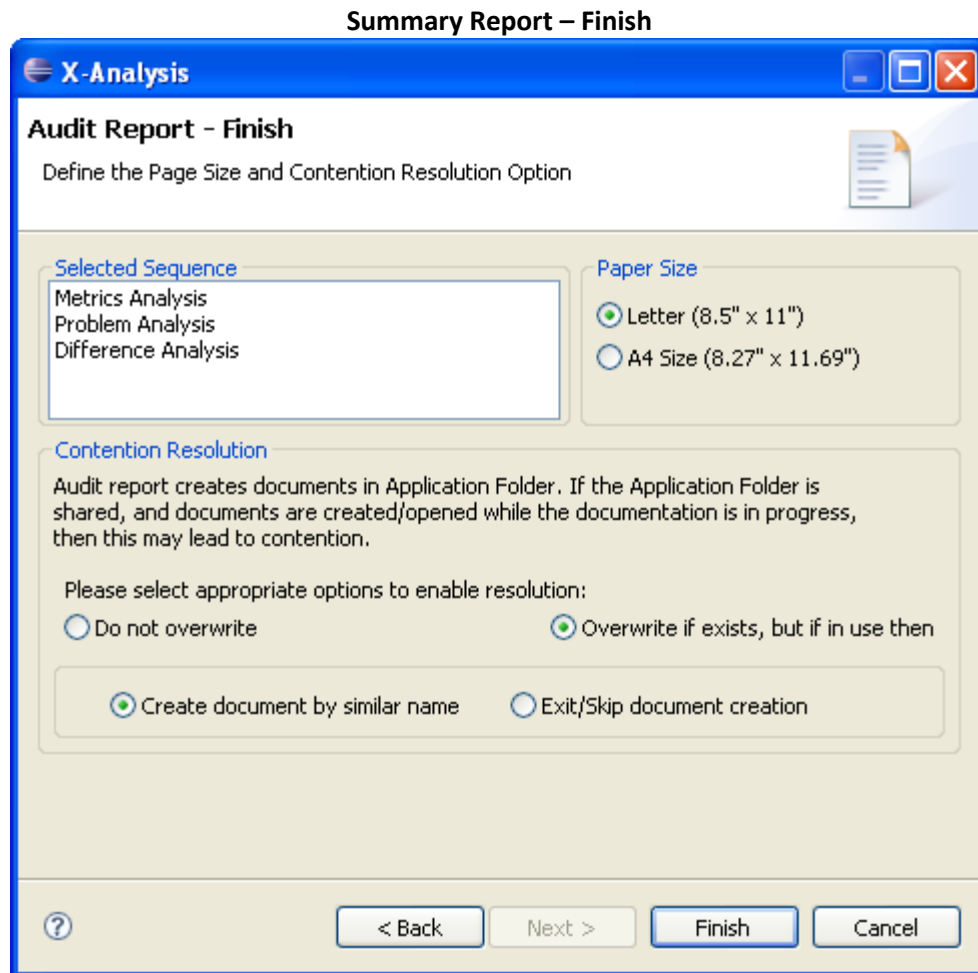


Mark options to be included in the Summary Report and click **Next**.

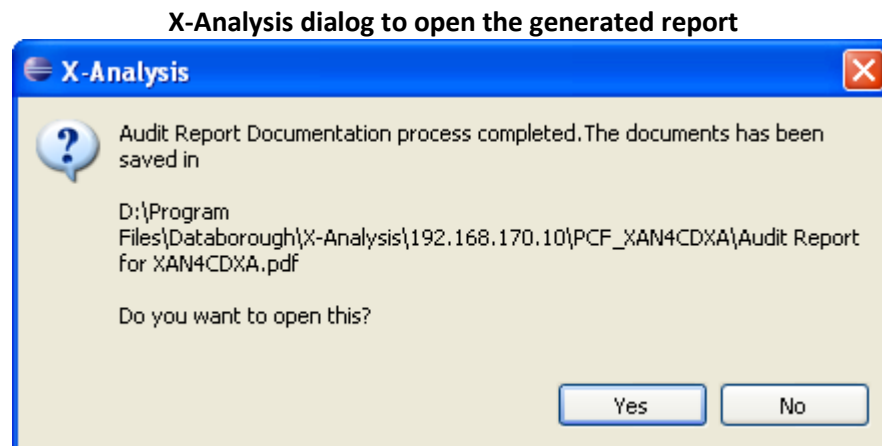




Specify the sequence of contents for the Summary Report and click **Next**.

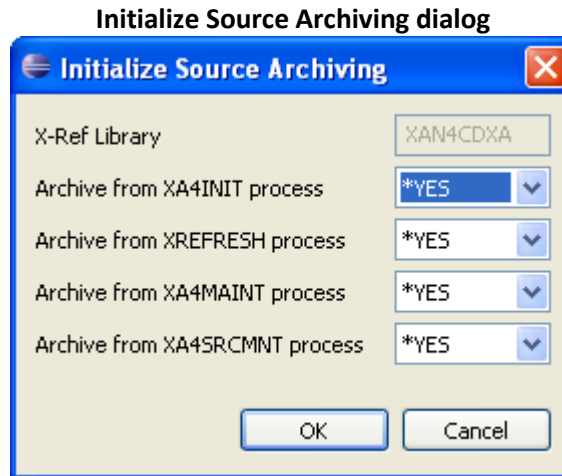


Choose desired settings for the Audit Report and click **Finish** to generate the report. When the generation is over, the following dialog appears which asks to open the generated document:



## INITIALIZE SOURCE ARCHIVING

Source archiving can be run independently of metrics. The **Initialize Source Archiving** option is available for the cross-reference library and the application areas. When the user chooses the option, the following dialog is invoked:



Source archiving is started by the **XACVINI** command, which sets up a controlling \*DTAARA in the XA library and makes an initial copy of all source codes. If archiving is deactivated and then restarted later, the initial archived copy is not made. Source archiving can be deactivated by **XACVEND**, which optionally clears all source archives and controlling data. This command can only be run on the server.

### Files

All archived source versions are recorded in XAACVSRC, whose data is only ever purged when **XACVEND DLTHISTO(\*YES)** is run (whereas metrics can be purged independently, which clears XMETOBJ). When archiving is active, the source date-time of the latest version archived is recorded in XAACVHDR. Archiving handles all the source types (whereas metrics only records for CL, RPG and CBL).

Source archiving continues to maintain data in XMETOBJ/XMETOBJH, if necessary. The data in XMETOBJ/XMETOBJH is not necessary to the source archiving process itself, but is used by the PC client to locate the change history. If data is written to XMETOBJ by source archiving, the SRCACT field is set to the value 'A'.

### Processing

Source archiving is invoked from XA4INIT, XREFRESH, XA4MAINT and XA4SRCMNT, which all call the wrapper program, XRACVMBR.

The archive processing itself is done in \*srvpgm XACV, in procedure XACV\_ArchiveMember(). This procedure checks the source update date-time against the date-time recorded in XAACVHDR. If there is a difference, archiving takes place i.e. copy

the source, write out to XAACVSRC, update XAACVHDR, and write out to XMETOBJ/XMETOBJH, if appropriate data is not already present in these files.

The wrapper command/program XACVMBR/XRACVMBR first checks whether metrics is active, then performs either:

a) if metrics are active, writes out a record to XMETCHGS, which will cause metrics processing to take place when XRMETCHGS is called, which is the case in XREFRESH, XA4INIT, and XA4SRCMNT or

b) if metrics are not active, calls procedure XACV\_ArchiveMember().

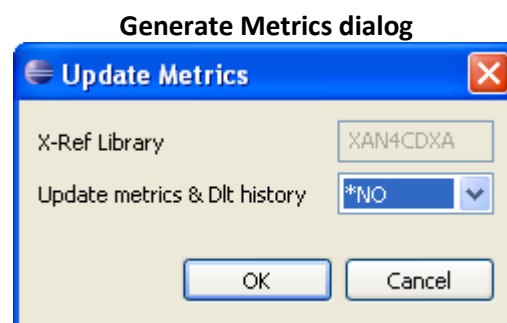
If metrics is active, then the source archiving call is made from metrics processing, which will call XACV\_ArchiveMember(). This is so that metrics will write the appropriate XMETOBJ/XMETOBJH records before source archive processing takes place.

### **Purge**

A purge process (command XACVPRG) will move source to a user-specified library, and record the location in XAACVSRC. Purge is by cut-off date, as compared to the archive timestamp in XAACVSRC. The purge process always leaves one source version in place, even if the timestamp is older than the cut-off date.

## **GENERATE METRICS ANALYSIS**

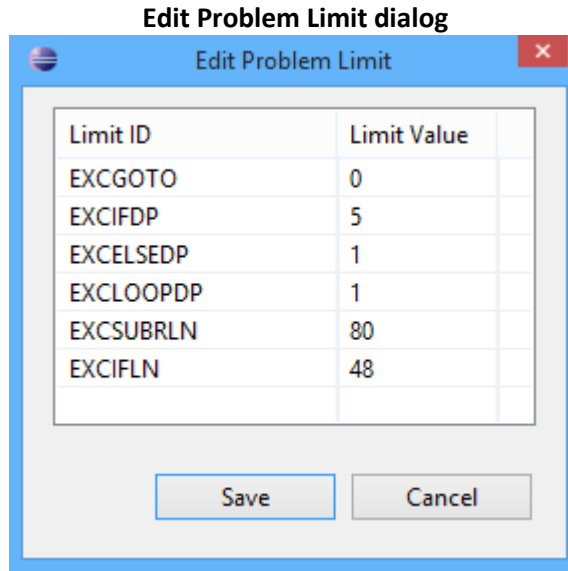
The **Generate Metrics Analysis** option generates the metrics data for the selected cross-reference library. The following dialog is displayed when you select the **Generate Metrics Analysis** option:



A batch job is submitted when the user clicks **OK**.

## **EDIT PROBLEM AUDIT LIMIT**

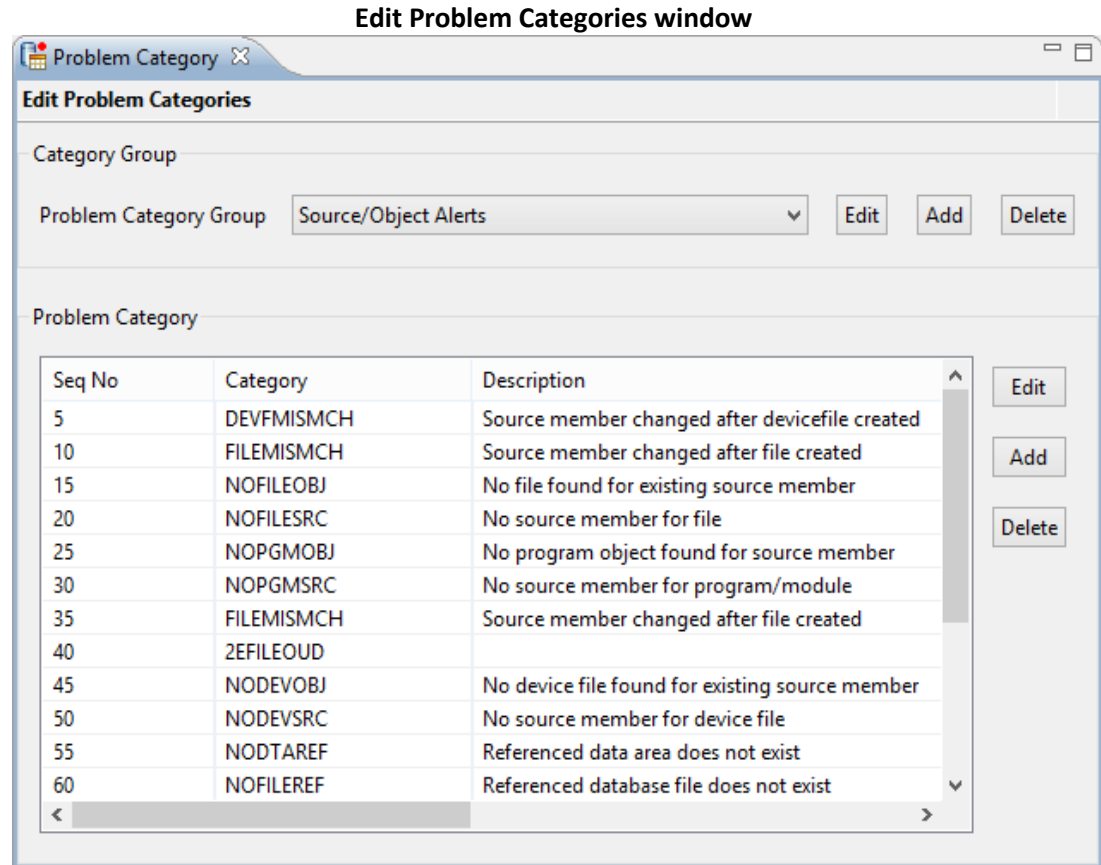
When you select the option, the following dialog is displayed:



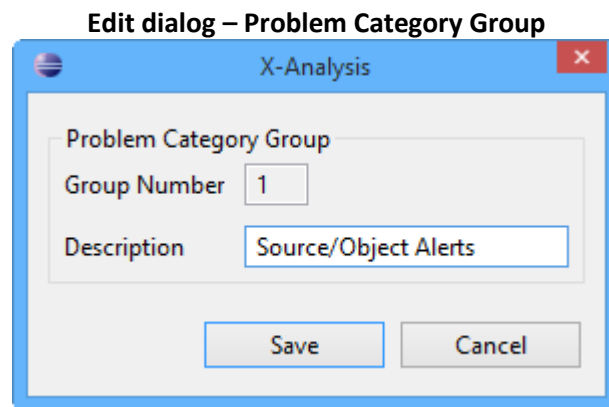
The Limit Value given in the above dialog is user configurable. The values shown are set by default. When you assign a new value through the above dialog, it determines the inclusion of the category in the Problem Analysis process. Click **Save** to apply your changes. The changed value will get reflected in the related table on the server-side.

## EDIT PROBLEM CATEGORIES

You can add a new category or edit/delete a previously-existing category by selecting the **Edit Problem Categories** option. Such modifications can be made for the main category i.e. the Problem Category group as well as for the sub-categories. Select the option to invoke the following dialog:



Use the **Edit**, **Add**, or **Delete** buttons to make changes to the Problem Category Group. Click **Edit** to invoke the following dialog:



Edit the **Group Number** and/or the **Description**. Click **Save**.

Click **Add** to invoke the following dialog:

**Add dialog – Problem Category Group**

X-Analysis

Problem Category Group

Group Number

Description

Category Group

Seq No  Severity

Category

Description

Save Cancel

Enter details in the given fields. In the Category Group section, enter the sequence number and the severity scale to be assigned to the new category. The Severity scale indicates the complexity of the problem and is based on the combination of problem report data and additional data. Click **Save**. The new category will appear in the **Edit Problem Categories** window.

On selecting the **Delete** option, a window appears which asks the user's confirmation before deleting a specific category.

Similarly, you can select the **Edit** and/or **Delete** options for the displayed sub-categories. By selecting the **Add** option, the user can add a new category under a pre-defined main category.

Note that you must make a few changes on the server-side for editing the problem categories on the client-side.

If you have to add new problem category TRIGGERS with description like "FILE HAS TRIGGERS", follow the steps given below to add problem category in the **XPRBCATS** file.

```

File Edit View Communication Actions Window Help
Host: 192.168.21.102 Port: 23 Workstation ID: Disconnect
Columns . . . . : 1 71 Browse
SEU=>
FMT ** ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
0059.00 prbcat = 'TRIGGERS';
0060.00 setll(e) prbcat xprbcats;
0061.00 if not %equal(xprbcats);
0062.00
0063.00 // Category group number
0064.00 catgrpn = 2;
0065.00
0066.00 // Category sequence number
0067.00 catseqn = 40;
0068.00
0069.00 // Category description
0070.00 catdes = 'File has triggers';
0071.00
0072.00 // Write the records
0073.00 write(e) rprbcats;
0074.00
0075.00 endif;

F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys
MA A MW 04/018
1902 - Session successfully started

```

You will get CATGRPN and CATSEQN fields value from XA while adding new problem category.

To write the entry in the **XPRBOBJS** file for the above category you have to write your own log as displayed below:

```

File Edit View Communication Actions Window Help
Host: 192.168.21.102 Port: 23 Workstation ID: Disconnect
Columns . . . . : 1 71 Browse
SEU=>
FMT ** ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
0085.00 read(e) xtriggers;
0086.00 dow not %eof(xtriggers) and not %error;
0087.00 if trfile <> *blanks and trtrig <> *blanks;
0088.00
0089.00 // Ensure the file object exists
0090.00 chain(e) (trfile:'*FILE') xobject11;
0091.00 if %found(xobject11) and not %error;
0092.00
0093.00 // Retrieve the source file and source library details
0094.00 chain(e) (trfile:trfatr) xmember11;
0095.00 if %found(xmember11) and not %error;
0096.00
0097.00 // Source library
0098.00 prbsrclib = x#lib;
0099.00
0100.00 // Source file
0101.00 prbsrcfil = x#sref;

F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys
MA A MW 04/018
1902 - Session successfully started

```

```

File Edit View Communication Actions Window Help
Host: 192.168.21.102 Port: 23 Workstation ID: Disconnect
Columns . . . : 1 71 Browse /QRPGLESRC
SEU=> XRADDTRGRS
FMT * . . . . 1 . . . . 2 . . . . 3 . . . . 4 . . . . 5 . . . . 6 . . . . 7
0102.00
0103.00 // Write the record in XPRB0BJS file
0104.00     exsr zwrtprbobj;
0105.00
0106.00     endif;
0107.00
0108.00     endif;
0109.00
0110.00     endif;
0111.00
0112.00     read(e) xtriggers;
0113.00     enddo;
0114.00
0115.00     endsr;
0116.00 // *****
0117.00
0118.00 // *****

F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys
MP A MW 04/026
1902 - Session successfully started

```

```

File Edit View Communication Actions Window Help
Host: 192.168.21.102 Port: 23 Workstation ID: Disconnect
Columns . . . : 1 71 Browse /QRPGLESRC
SEU=> XRADDTRGRS
FMT * . . . . 1 . . . . 2 . . . . 3 . . . . 4 . . . . 5 . . . . 6 . . . . 7
0120.00 // *****
0121.00 begsr zwrtprbobj;
0122.00
0123.00     prbcat = 'TRIGGERS';
0124.00     prbobj = trfile;
0125.00     setll(e) (prbcat:prbobj) xprbobj;
0126.00     if not %equal(xprbobj);
0127.00
0128.00         // Write the records
0129.00         write(e) rprbobj;
0130.00
0131.00         // Clear the existing records
0132.00         clear rprbobj;
0133.00
0134.00     endif;
0135.00
0136.00     endsr;

F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys
MP A MW 05/016
1902 - Session successfully started

```

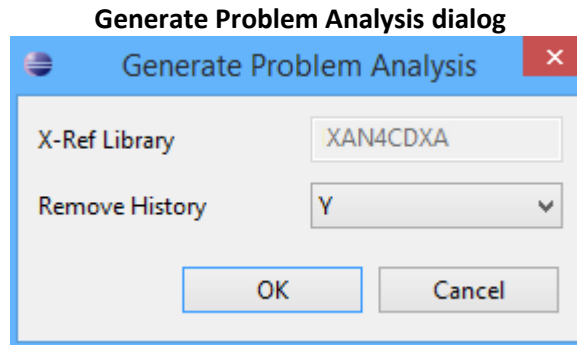
These modifications in the Problem Analysis will be reflected in the Problem Analysis Editor (when taken).

Now, when you select the **Problem Analysis** option, the Edited Category can be seen there.



## GENERATE PROBLEM ANALYSIS

Generate Problem Analysis analyzes the application database files and reports problems. Select the **Generate Problem Analysis** option from the **Audit Options** on the context menu of the X-Analysis application. This invokes the following dialog:



You can choose to 'Remove History'. The default selection is 'Y' which deletes the entire history that existed previously. Select 'N' if you want to retain the history.

Click **OK** to invoke the batch job command.

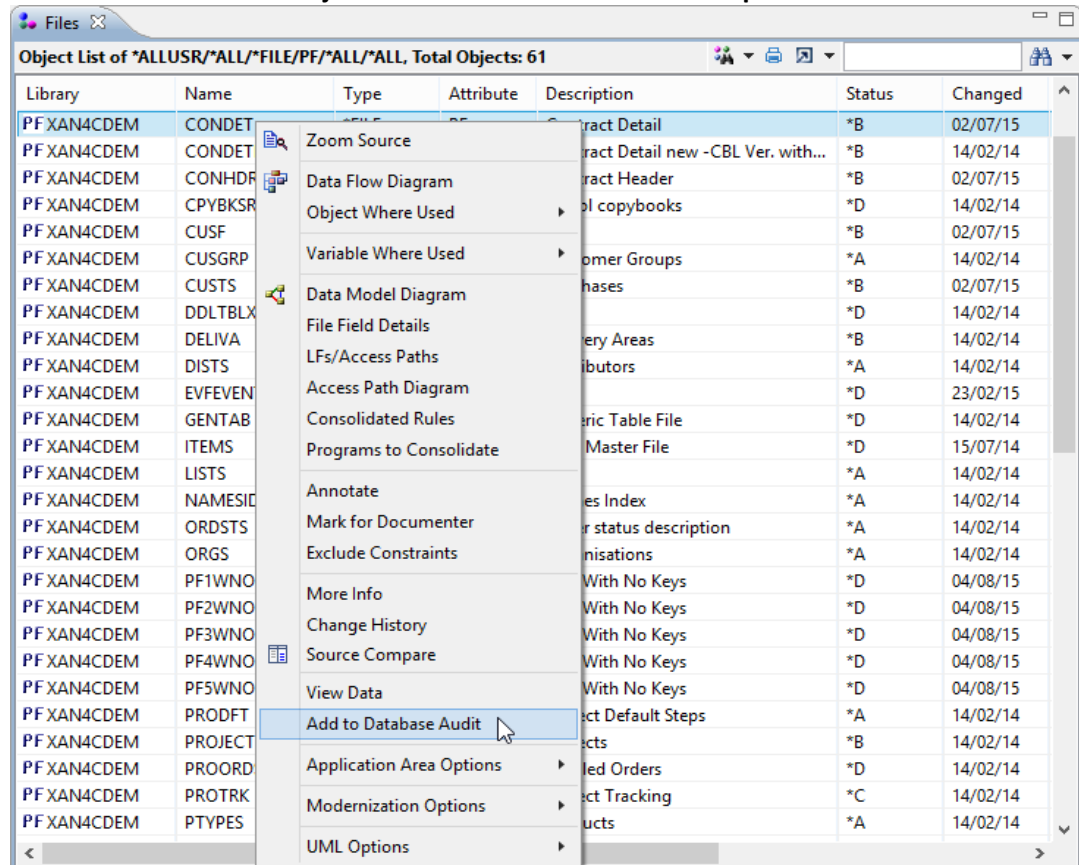
## VIEW DATABASE SIZE STATISTICS

**View Database Size Statistics** helps you monitor the growth statistics of a database over a selected period of time. The current aggregate/total database statistics will be displayed for the database and also for individual files on a new editor.

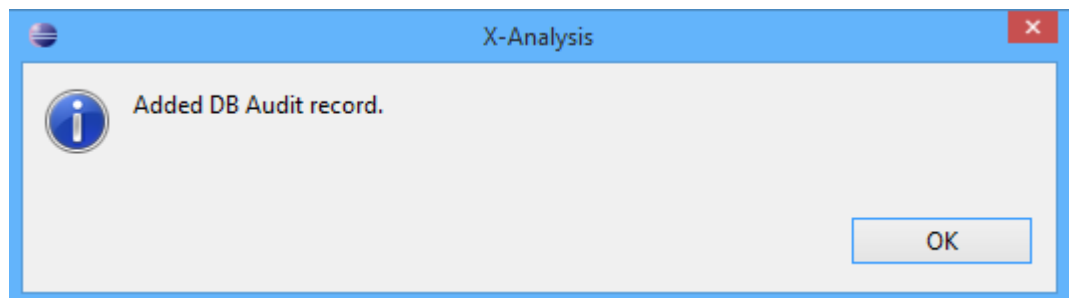
To use this option, below steps need to be executed:

- Double-click on the **Files** node for the Object List.
- Select the files you wish to audit using the **Add to Database Auditing** option. This option is available only for PF type objects. The following image shows the option.

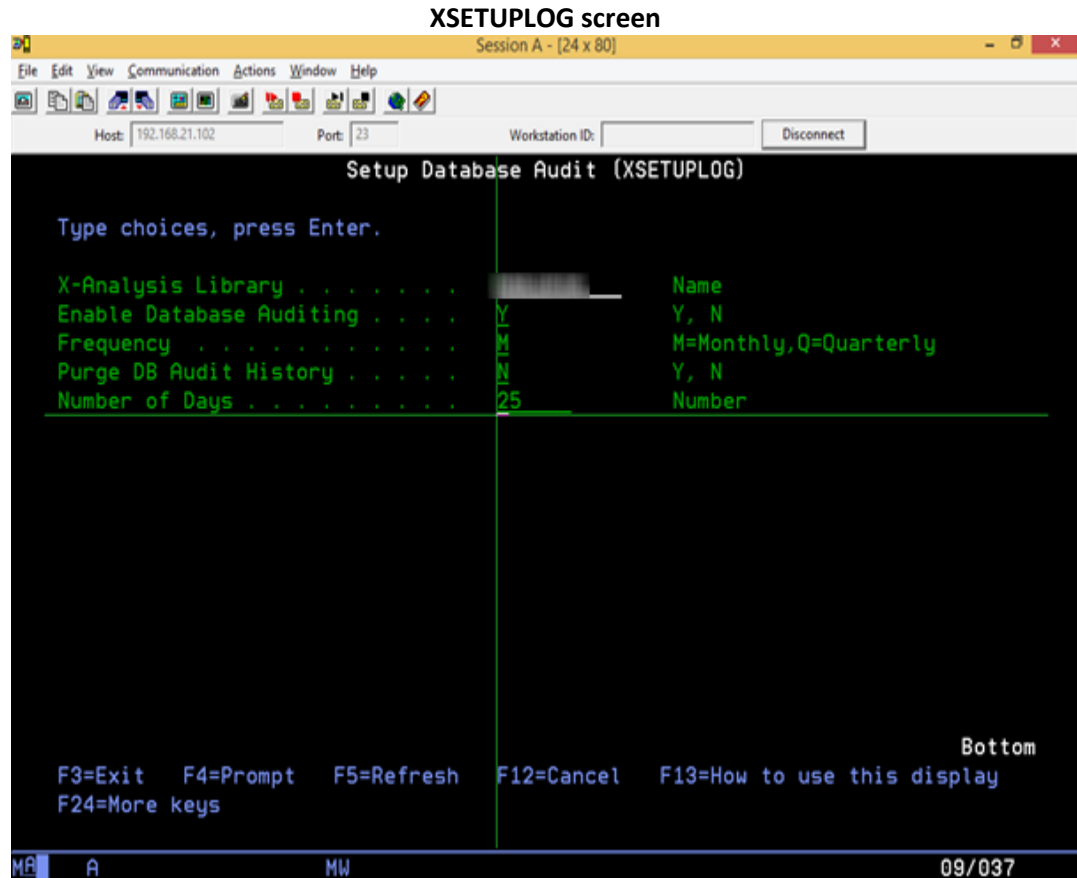
Object List – Add to Database Audit option



After you select the file, the following window will appear confirming the addition of the file.



Hereafter, you have to process the **XSETUPLOG** command from the IBM i screen. The following image shows the **XSETUPLOG** command screen.



The Enable Database Auditing is set as **N** by default. You must change it to **Y**. Select the other details as required. Press **ENTER**. Specifying the requirements through this screen will ensure that the selected files are monitored for the database growth from the date they have been added after you have initialized the X-Ref.

Now select the **View Database Size Statistics** option from the **Audit Options** submenu. The database size statistics will be displayed as below:

Database Statistics Analysis for XAN4CDXA

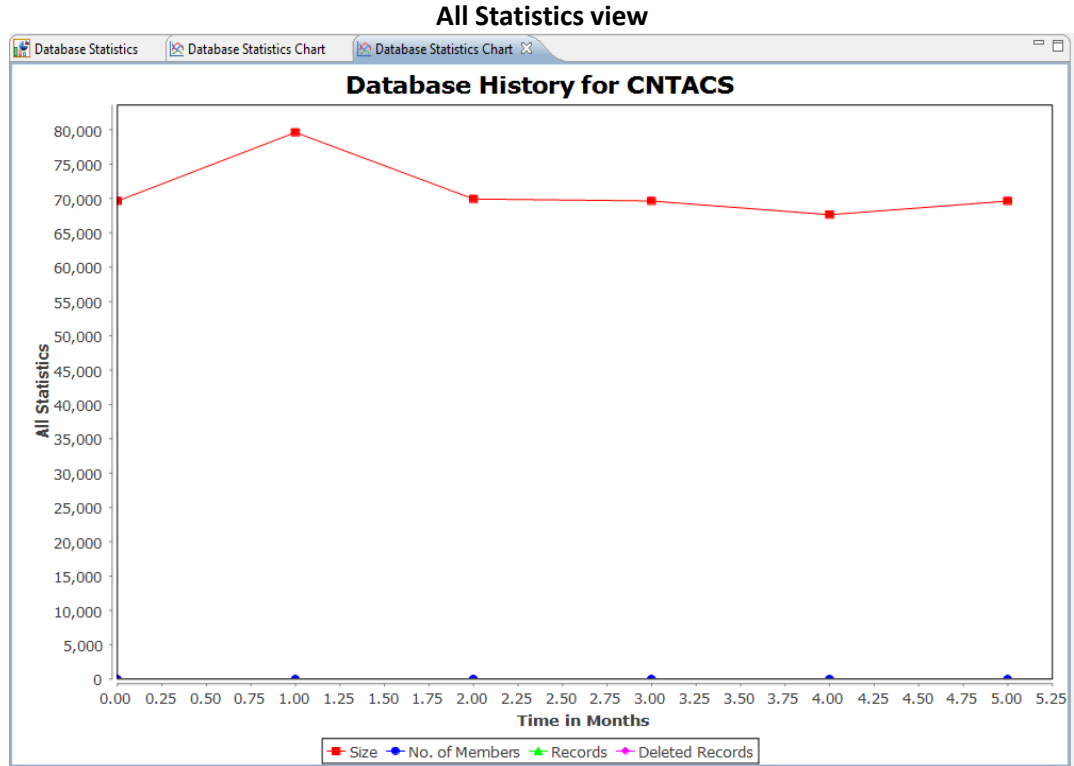
Database Name	Date	Size	No. of Members	Records	Deleted Records
▲ ASTATUS	2012-07-05	81920	1	15	6
	2012-09-06	91920	2	20	10
	2012-12-12	82920	2	17	9
	2013-05-09	81930	2	18	7
	2014-12-03	71920	1	15	3
	2015-08-05	81920	1	15	6
▲ CNTACS	2012-07-05	69632	1	9	0
	2012-09-06	79632	1	12	2
	2012-12-12	69932	2	14	6
	2013-05-09	69638	3	19	2
	2014-12-03	67632	1	9	0
	2015-08-05	69632	1	9	0
▲ CONDET	2012-07-05	110592	1	98	8
	2012-09-06	120592	2	101	17
	2012-12-12	120592	3	100	10
	2013-05-09	110792	2	99	9
	2014-12-03	120592	1	98	5
	2015-08-05	110592	1	98	8
▲ CONHDR	2012-07-05	122880	1	19	119
	2012-09-06	132880	1	20	121
	2012-12-12	122980	3	21	120
	2013-05-09	123180	3	17	139
	2014-12-03	102880	1	19	100
	2015-08-05	122880	1	19	119
▲ CUSF	2012-07-05	303104	1	67	151
	2012-09-06	313104	2	68	152

Right-click on the Database Name. More options will appear as shown below:

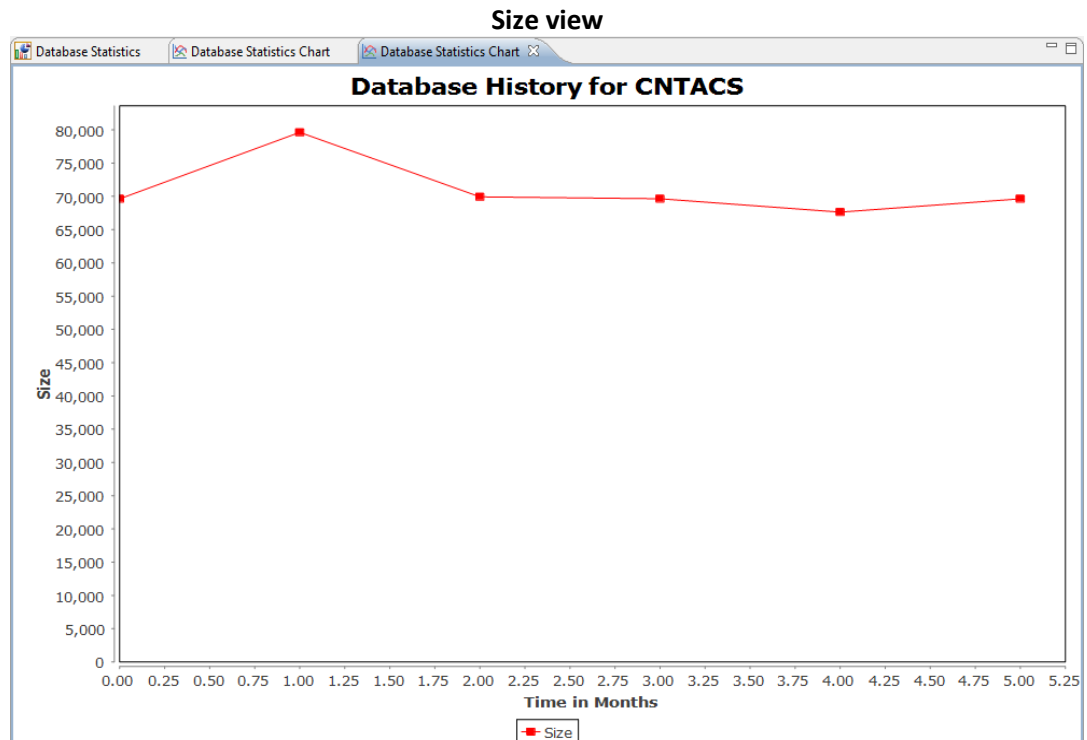
Context menu showing options - Database Statistics

Database Name	Date	Size	No. of Members	Records	Deleted Records
▲ ASTATUS	2012-07-05	81920	1	15	6
	2012-09-06	91920	2	20	10
	2012-12-12	82920	2	17	9
	2013-05-09	81930	2	18	7
	2014-12-03	71920	1	15	3
	2015-08-05	81920	1	15	6
▲ CNTACS	2012-07-05	69632	1	9	0
	2012-09-06	79632	1	12	2
	2012-12-12	69932	2	14	6
	2013-05-09	69638	3	19	2
	2014-12-03	67632	1	9	0
	2015-08-05	69632	1	9	0
▲ CONDET	2012-07-05	110592	1	98	8
	2012-09-06	120592	2	101	17
	2012-12-12	120592	3	100	10
	2013-05-09	110792	2	99	9
	2014-12-03	120592	1	98	5
	2015-08-05	110592	1	98	8
▲ CONHDR	2012-07-05	122880	1	19	119
	2012-09-06	132880	1	20	121
	2012-12-12	122980	3	21	120
	2013-05-09	123180	3	17	139
	2014-12-03	102880	1	19	100
	2015-08-05	122880	1	19	119
▲ CUSF	2012-07-05	303104	1	67	151
	2012-09-06	313104	2	68	152

When you click **All Statistics**, the graph will display the entire statistics of the database over the selected period of time.



**All Statistics** can be further split for individual parameters like Size, or No. of records, as specified in the context menu. When you select the **Size** option, the size of the database is plotted as follows:



# UML Diagramming

X-Analysis provides various options for UML diagramming on RPG/RPT/SQLRPG types of programs. The following options are available in X-Analysis for UML diagramming:

- Re-generate UML
- Activity Diagram
- Class Diagram

The UML Diagramming options are available on the context menu under the **UML Options** submenu on the Object/Member List.

## THE PRE-REQUISITES

1. As a pre-requisite, you need to install the XAUML.msi (XA UML Support).
2. Use the Business Rules functionality to re-engineer the programs. The Activity Diagrams will then be generated on the re-engineered program(s).

**Note: The UML functionality works only on the Eclipse 3.4 (provided with the Runtime Environment).**

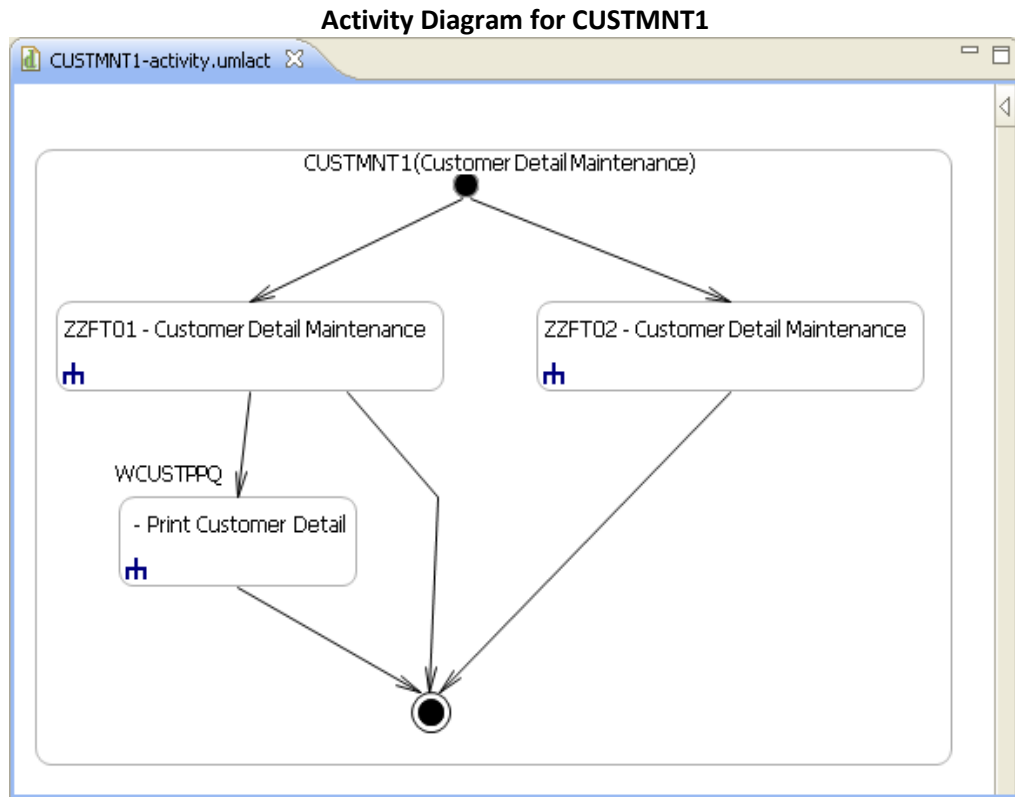
## RE-GENERATE UML

When the **Re-generate UML** option is opted from the **UML Options** submenu available on the context menu over the Object/Member List, then it will generate the Activity Diagram and the Class Diagram for that Object.

## ACTIVITY DIAGRAM

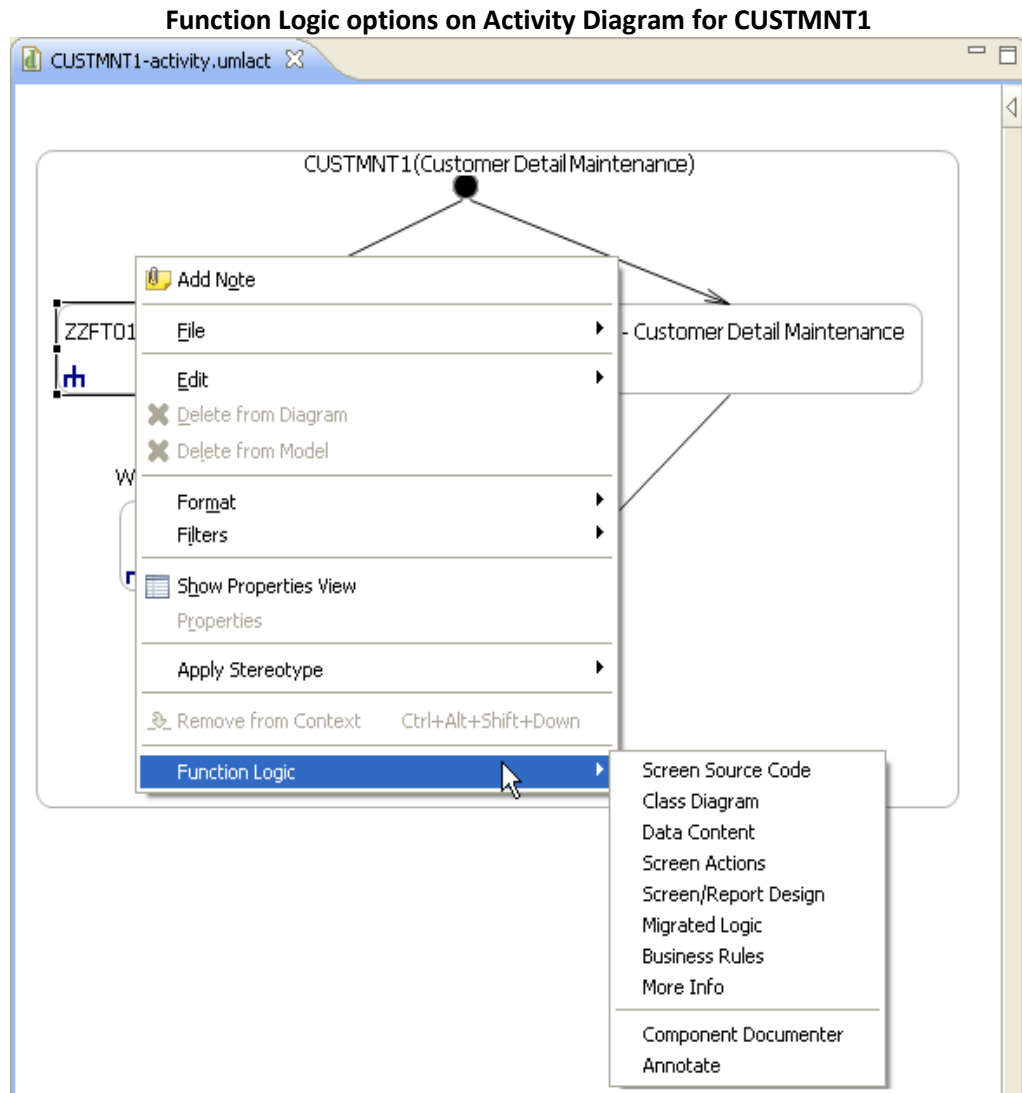
The Activity Diagram illustrates the dynamic nature of a system by modelling the flow of control from activity to activity. An activity represents an operation on some class in the system that results in a change in the state of the system. Typically, Activity Diagrams are used to model workflow or business processes and internal operation.

Let us see how an Activity Diagram looks for our example. From the tutorial application **XAN4CDXA**, select the **CUSTMNT1** program and opt for the context menu on it, then select the **Activity Diagram** option. This invokes the Activity Diagram as displayed below:



### Function Logic

The **Function Logic** is available as context menu on Activity Diagram. The following screen displays the **Function Logic** options on an Activity Diagram:



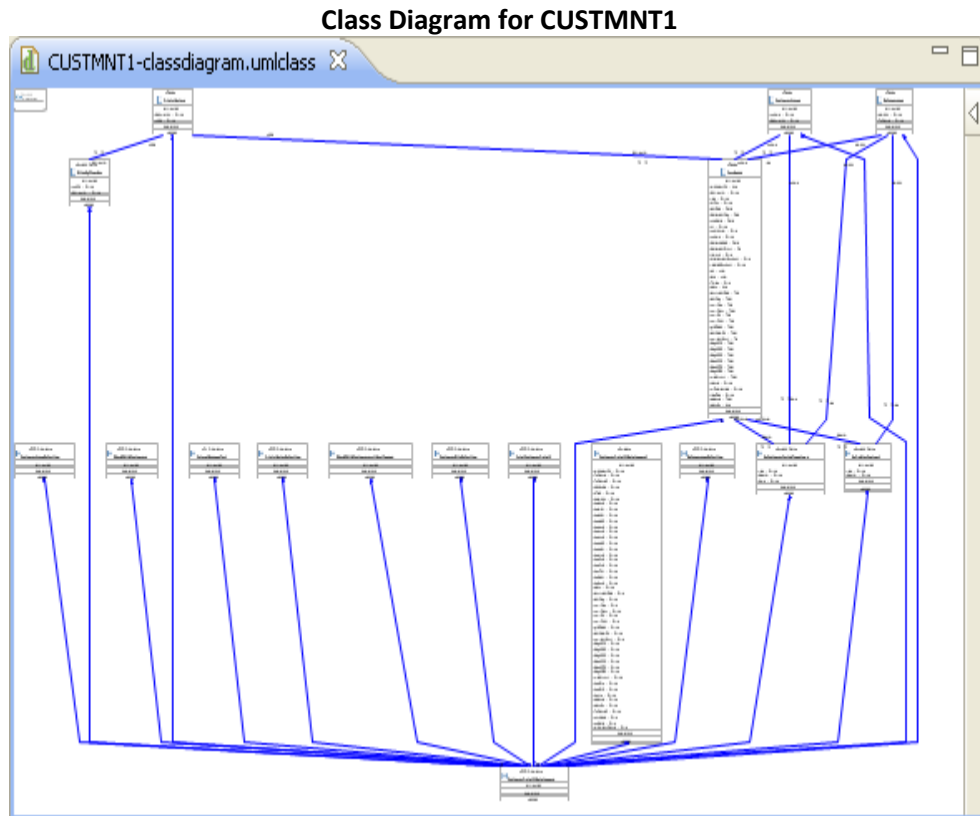
***The Function Logic options work correctly when the X-Analysis application library is selected in the X-Analysis Perspective.***

## CLASS DIAGRAM

The Class Diagram is the backbone of all Object-oriented methods, including UML. The diagram describes the static structure of a system. Classes represent an abstraction of entities with common characteristics. Associations represent the relationships between classes.

Let us see how a Class Diagram looks for our example. From the tutorial application **XAN4CDXA**, select **CUSTMNT1** and opt for the context menu on it, then select the **Class Diagram** option. This action displays the Class Diagram as shown below:



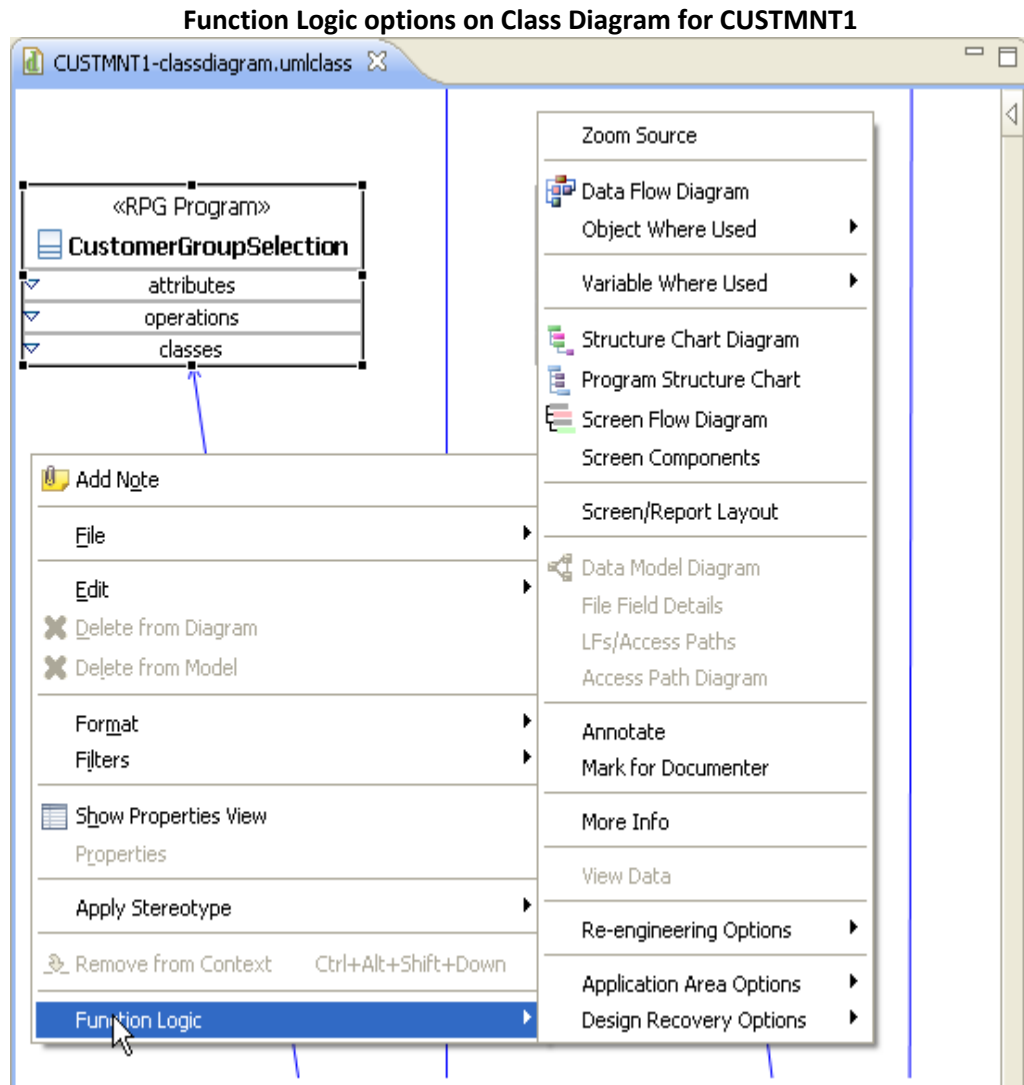


The Class Diagram displays the following:

1. Shows all the PF used by the program, and their relationships.
2. Joining fields are shown on the edge of the connection.
3. All the keys fields and field usage are shown inside the file figure as attribute with their types.

### Function Logic

The Function Logic is available as context menu on the Class Diagram. The following screen displays the **Function Logic** options on a Class Diagram:



## RE-GENERATE UML FOR APPLICATION AREA

The **Re-generate UML** option on an application area generates Activity Diagram and Class Diagram for all objects belonging to the selected application area. Select the **MVCPROCESS** application area from **XAN4CDXA** and opt for the context menu on it. Then, select the **Re-generate UML** option from the **UML Options** submenu. This generates the Activity Diagram and the Class Diagram for all objects along with the Class Diagram for the selected application area.

## Data Management Features

X-Analysis is unique in that it automatically derives the system data model by analyzing both the actual data contents and all programs that use this data to verify the existence of any cross-file relationships. These potential relationships are verified by performing an integrity check to ensure that all data from the dependent file does indeed validly reference data records from the owning file. In this way even the most complex legacy system can be data modelled with relatively no effort.

### VIEW DATA

Using the **View Data** option from the context menu, the records of \*FILE type objects (PFs and LFs) may be viewed.

On selecting the **View Data** option, the following Data View is displayed:

**View Data on CUSFL1**

Company	Distributor	Sts	Last ...	Next ...	Fa...	Cus. No.	Product Code
Bertwhistle & Company Ltd	DT	5	030514	031025	01...	00001	
Besson Bros.	DT	7	031102	031125	05...	00015	
Beta Company Limited		8	030408	031006		00140	
Bock & Co. Ltd		8	030408	031006	05...	00014	
Cable Installations Ltd.		7	031102	031125		00092	
Carmel Automotive Ltd.		2	030508	031013	15...	00100	
Computer Products Ltd		8	030408	031006	01...	00118	
Consumer Products Ltd		0	030514	031025	03...	00102	
Culver plc		5	030514	031025	04...	00139	
Driver Drawdowns plc		9	030908	031013	01...	00029	
Express International plc		9	030908	031013	04...	00116	
First Chemicals Ltd		3	030514	031025	05...	00043	
First Tradinn Ltd		3	030514	031025	01...	00103	XR

### DATA DICTIONARY

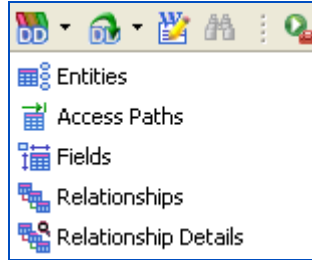
X-Analysis makes the seemingly complicated task of data modelling an easy one. When the data inherent in a specific application is accessible, data modelling can be a straightforward procedure. X-Analysis has the **Data Dictionary** option for this purpose.

The Data Dictionary contains detailed information for every field in each file in the application database. Much of this data is the standard metadata extracted for each file and stored on the **XDD** file – for instance field and column names, field size and field type.

Thus, record metadata is readily available for use by other applications.

Click on the **Data Dictionary** icon available on the X-Analysis toolbar. This will show up the Data Dictionary submenu options. These options are:

**Data Dictionary menu options**



**Entities**

The first submenu option is **Entities**. Select this option to display the Primary Identifiers view. This is also the default view when the Data Dictionary is invoked from X-Analysis.

The identification of the correct primary identifier is crucial to the building of an accurate data model. The primary identifier is determined by an examination of all the access paths for the file and is verified against the data in the file. All the primary identifiers are written to the **XPIDS** file.

**Data View for XPIDS**

PF NAME	PID FILE	KEY1	KEY2	KEY3	KEY4	KEY5
ASTATUS	ASTATUS	STATUS				
CNTACS	CNTLF4	PRPCDE	STATUS	CUSNO		
CONDET	CONDET	XWORDN	XWABCD			
CONDETNW	CONDETNW	XWORDN	XWABCD			
CONHDR	CONHDR	XWORDN				
CUSF	CUSFL3	CUSNO				
CUSGRP	CUSGRP	XWBNCB				
CUSTS	CUSTS	XWBCCD				
DDLTLXMP	DDLTLXMP	CUSNBR				
DELIVA	DELIVA	XWBDCD				
DISTS	DISTS	DSDCDE				
EVFEVENT	EVFEVENT	EVFEVENT				
GENTAB	GENTAB	FLDNAM	CODVAL			
ITEMS	ITEMS	#ITEM				
LISTS	LISTS	LSLCDE				

## Access Paths

The second submenu option is **Access Paths**. This file records all of the access paths available to each Physical File. There is one **XKEYMAP** record for each access path. You can select the **Access Paths** option by clicking on the **Data Dictionary** icon.

**Data Dictionary – Access Paths**

FILE NAME	LF NAME	S/O	U/K	KEY FIELDS	REF. FIELDS	FIELD ATTRIBUTES #1
ASTATUS	ASTATUS			STATUS		ATUSA00001
CNTACS	CNTACS			CUSNO PRPCDE		SNO N00005PCDEA00002
CNTACS	CNTLF1	N		SINIT USERNM		NIT A00003ERNMA00034
CNTACS	CNTLF2	N		USERNM		ERNMA00034
CNTACS	CNTLF3	N		STATUS CUSNO		ATUSA00001SNO N00005
CNTACS	CNTLF4	N	Y	PRPCDE STATUS...		PCDEA00002ATUSA00001...
CONDET	CONDET		Y	XWORDN XWAB...		ORDNN00006ABCD00020
CONDET	CONDETL1	N		XWAACS XWOR...		AACSA00011ORDNN0000...
CONDET	CONDETL2	N		XWABCD XWAA...		ABCD00020AACSA0001...
CONDET	CONDETL3	N		XWABCD XWOR...		ABCD00020ORDNN00006
CONDETNW	CONDETNW		Y	XWORDN XWAB...		ORDNN00006ABCD00020
CONHDR	CONHDR		Y	XWORDN		ORDNN00006

Up to 10 key fields can be associated with each field.

## Fields

The third submenu option is **Fields**. Select this option to view information for every field in each file in the application database. All the field information extracted during the Data Modelling process is contained in the Data Dictionary file. Each field from each Physical File in **XPIDS** is listed. The metadata extracted can be interpreted and utilized by applications to read, write, and format the fields correctly.

On selecting the **Fields** option, the file fields' details are displayed as shown in the image below:

**Data Dictionary – File Fields**

FIELD NAME	PF NAME	GRID SEQ.	RCD.SEQ.	TYPE	FLD HEADING	FLD CLASS
#DESC	ITEMS	2.0	2.0	D	Description	
#ITEM	ITEMS	1.0	1.0	K	Item #	
#PART	ITEMS	3.0	3.0	K	Part #	
#UOM	ITEMS	5.0	5.0		Weight Unit of Measure	
#WEIGHT	ITEMS	4.0	4.0		Weight	
AACG	XFRF	1.0	1.0		JCPMST AUTO ADD-C/O	
AACM	XFRF	2.0	2.0		AUTO ASSIGN CUST	
AACS	XFRF	3.0	3.0		ADD COST INCOME	
AADO	XFRF	4.0	4.0		AUTO ADD DOC	
AAIT	XFRF	5.0	5.0		AUTO ASS ITM	
AAPO	XFRF	6.0	6.0		JCPMST AUTO ADD-P/O	
AAPS	XFRF	7.0	7.0		POPSHP AUTO ADD-J/	

### Relationships

The fourth submenu option is **Relationships**. Select this option to view relationships among all the PFs that form the Data Model as the files contained in an application could be inter-related. For executing the data modelling procedure, it is imperative to have information of all these relationships.

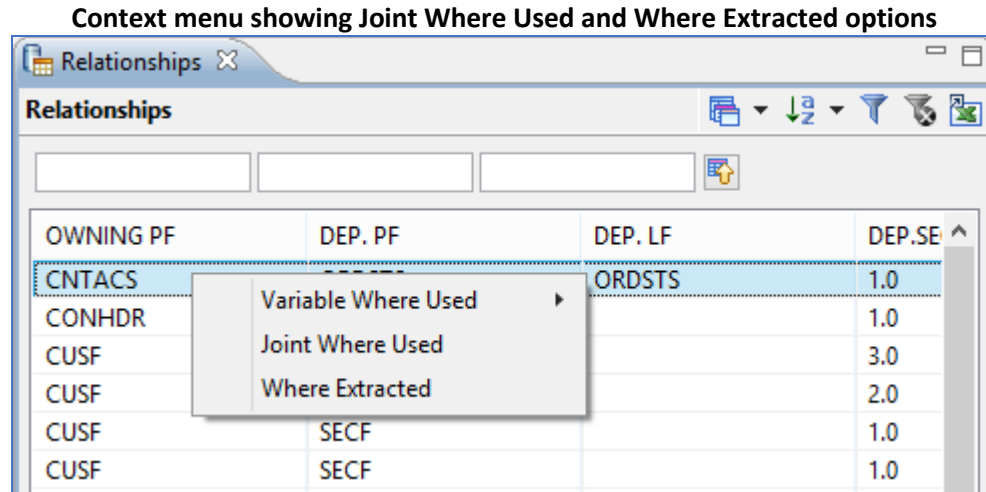
**Data Dictionary – Relationships**

OWNING PF	DEP. PF	DEP. LF	DEP.SEQ.	R.TYPE	OWNING PF TEXT	RELN.ID
ASTATUS	CNTACS	CNTLF3	1.0		Status file	00102
ASTATUS	CUSF	CUSFL2	2.0		Status file	00114
CONDET	PROJECT	PROECL5A	1.0		Contract Detail	00126
CONDET	TRNHST	TRNHSTL6	2.0		Contract Detail	00144
CONDETNW	PROJECT	PROECL5A	1.0		Contract Detail new -CBL V...	00127
CONDETNW	TRNHST	TRNHSTL6	2.0		Contract Detail new -CBL V...	00145
CONHDR	CONDET	CONDET	1.0	O	Contract Header	00104
CONHDR	CONDETNW	CONDETNW	2.0	O	Contract Header	00108
CONHDR	PROJECT	PROECL5A	3.0		Contract Header	00128
CONHDR	TRNHST	TRNHSTL6	4.0		Contract Header	00146
CUSF	CNTACS	CNTACS	1.0		Sites	00101
CUSF	CUSTS	CUSTSL3	2.0		Sites	00118

There are three types of relationships that can be identified:

- Owns – PID to PID relationship
- Accesses – Access Path to Access Path relationship
- Refers to – Foreign key to PID relationship

When you right-click on an object, besides the Variable Where Used functionality, you get two more options on the context menu – **Joint Where Used** and **Where Extracted**. These options are shown in the screenshot below:



The details for these features are as follows:

- **Joint Where Used:** Displays the list of programs with the Join Usage of the Owning file and Dependent file.
- **Where Extracted:** Displays the origin program and relationship details. The Origin program is the program of X-Analysis product where the relationship was extracted in the Data Model build process. The information of "Where Extracted" is further used in the data modelling process.

### Relationship Details

The last submenu option is **Relationship Details**. Select this option to view the detailed composition of every File-to-File relationship. This file is the counterpart to **XRELS** and every File-to-File relationship is recorded in **XRELS**. **XSHKEYS** describes each of the Field-to-Field relationships that make up these **XRELS** relationships.

**Data Dictionary – Relationship Details**

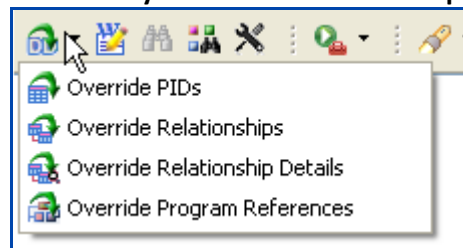
OWN. PF	DEP. PF	DEP.PF FLD	OWN.PF FLD	KEY SEQ.	CONSTANT	RELN.ID
ASTATUS	CNTACS	STATUS	STATUS	1.0		00102
ASTATUS	CUSF	STATUS	STATUS	1.0		00114
CONDET	PROJECT	XWORDN	XWORDN	1.0		00126
CONDET	PROJECT	XWABCD	XWABCD	2.0		00126
CONDET	TRNHST	XWORDN	XWORDN	1.0		00144
CONDET	TRNHST	XWABCD	XWABCD	2.0		00144
CONDETNW	PROJECT	XWORDN	XWORDN	1.0		00127
CONDETNW	PROJECT	XWABCD	XWABCD	2.0		00127
CONDETNW	TRNHST	XWORDN	XWORDN	1.0		00145
CONDETNW	TRNHST	XWABCD	XWABCD	2.0		00145
CONHDR	CONDET	XWORDN	XWORDN	1.0		00104
CONHDR	CONDETNW	XWORDN	XWORDN	1.0		00108

## DATA DICTIONARY OVERRIDES

The elaborate Data Modelling process demands the presence of several details. Select the **Data Dictionary Overrides** menu to access detailed information for every field in each file in the application database. Much of this data is the standard metadata extracted for each file and stored on the **XDD** file – for instance field and column names, field size and field type. Thus, record metadata is readily available for use by other applications. The drop-down icon for this option is present alongside the **Data Dictionary** icon on the X-Analysis toolbar.

The **Data Dictionary Overrides** submenu options are:

### Data Dictionary Overrides – Submenu options



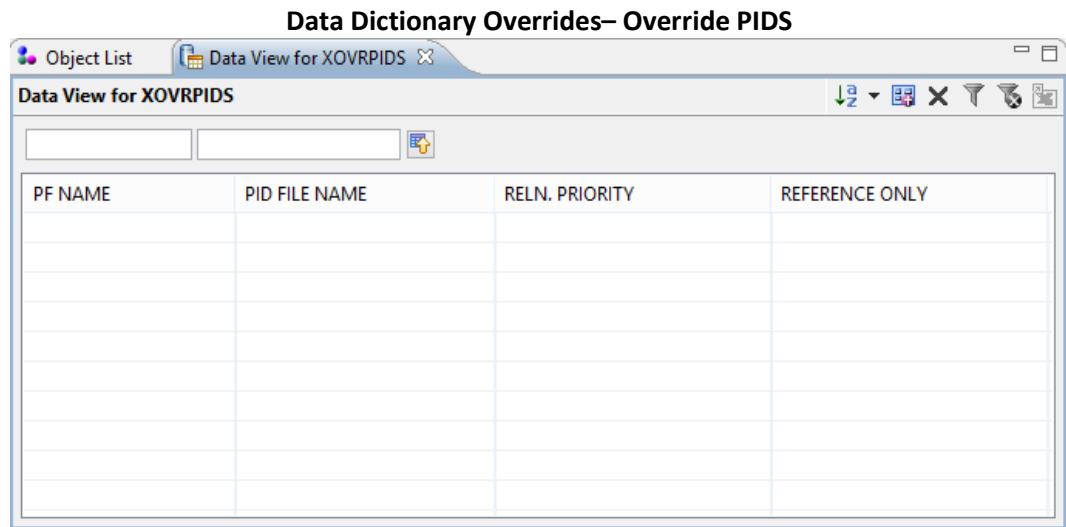
## Override PIDS

The first submenu option is **Override PIDs**. Click this option to display the **XOVRPIDS** file which contains all the override entries for the **XPIDS** file.



Field	Field Name	Size	Description
Physical File Name	OVRPF	10A	
PID File Name	OVRPID	10A	Access Path for file to be used as the PID
Relationship Priority	OVRPTY	1A	Only 1, 2 & 3 signify; 1 is the highest – this value is used when determining which “owner” file is to supply the descriptor for screen layouts.
Reference Only	OVRRFO	1A	If this relationship is reference only, enter “y”.

The screenshot below displays the Override PIDs fields.

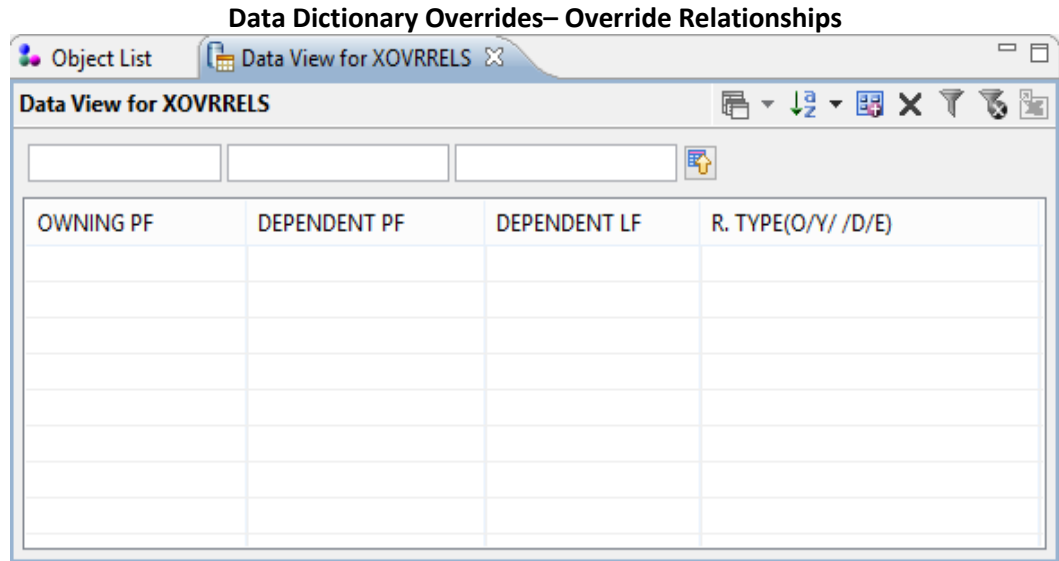


### Override Relationships

**Override Relationships** is the next option on the **Override Data Dictionary** menu. Select this option to display the **XOVRRELS** file, which holds the override entries for **XRELS**.

Field	Field Name	Size	Description
Owning PF	OVRDPF	10A	
Dependent PF	OVRDPF	10A	
Dependent LF	OVRDLF	1A	
Reference Type	OVRRFO	1A	

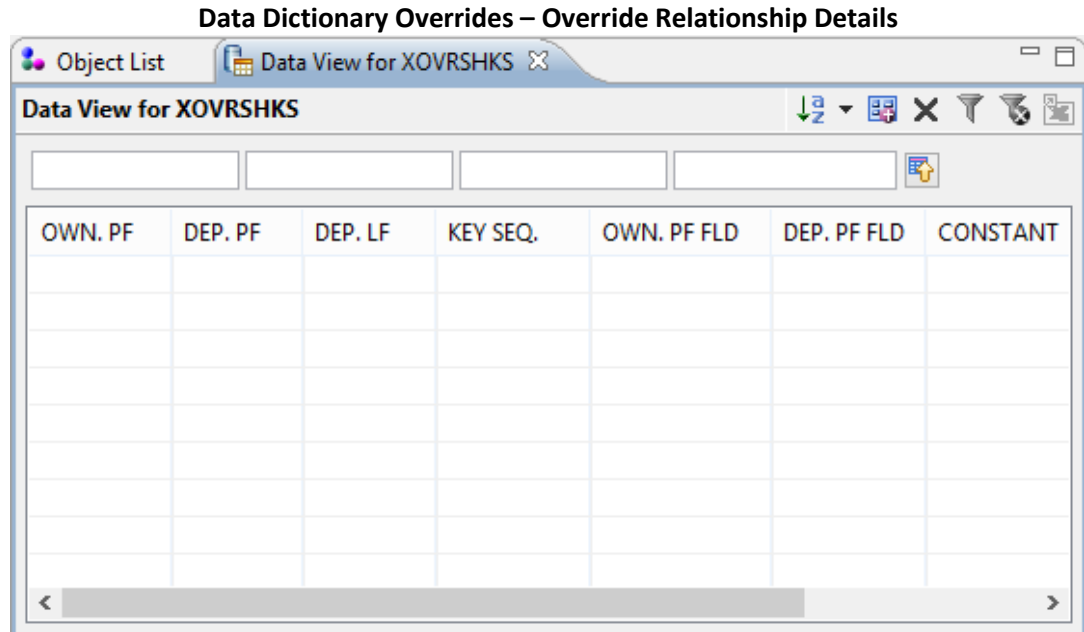
The following screen displays the Override Relationships window.



### Override Relationship Details

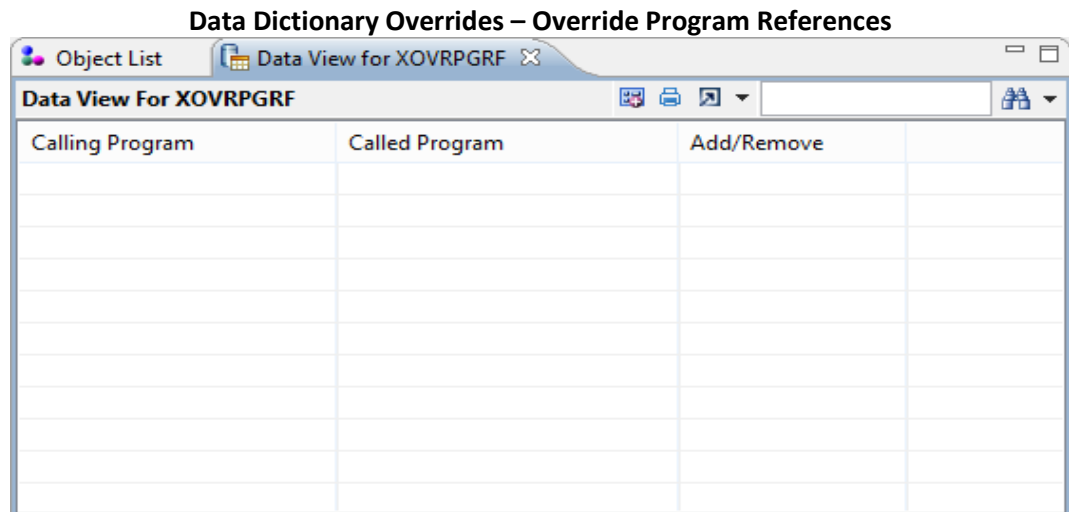
The next submenu option is **Override Relationship Details**. Select this option to display **XOVRSHKS** file which contains the override entries for the **XSHKEYS** file.

Field	Field Name	Size	Description
File	OVRFIL	10A	
Match File	OVRMFIL	10A	
Key Seq.	OVRSEQ	5P 2	
Field	OVRFLD	10 A	
Match Field	OVRMFLD	10 A	
Constant	OVRCON	20 A	
Relationship ID	OVRRLID	5P 0	



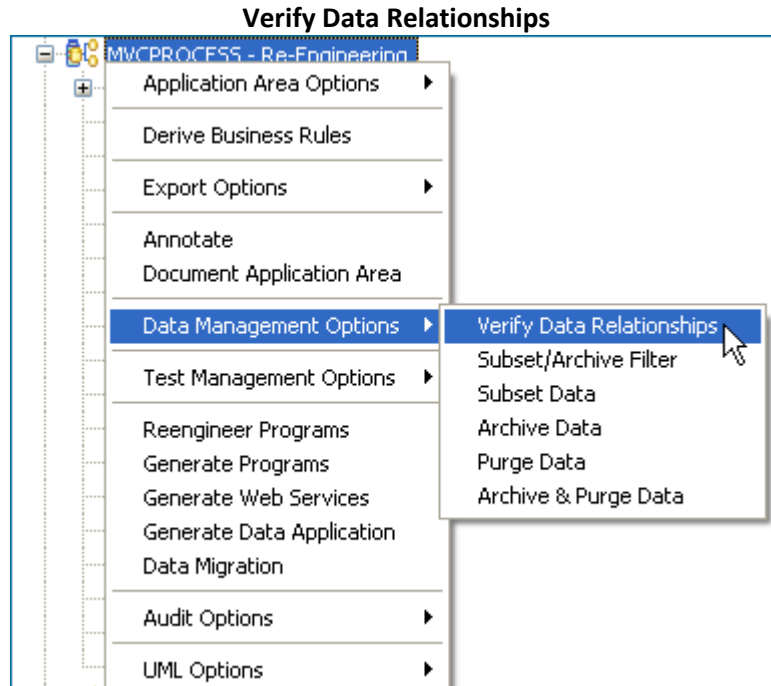
### Override Program References

The last option is **Override Program References**. Select this option to add or remove program references for a specific object.

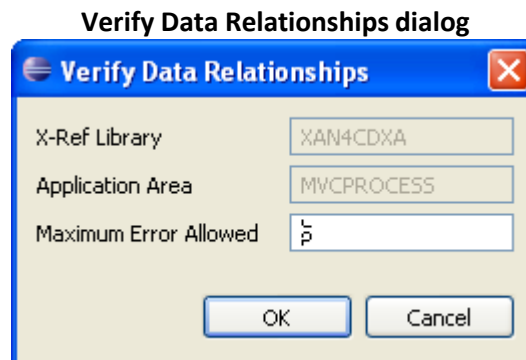


### VERIFY DATA RELATIONSHIPS

The **Verify Data Relationships** option is a submenu option of the **Data Management Options**, which is available on the context menu of a selected application area. Clicking the **Verify Data Relationships** option brings up a dialog showing the selected cross-reference library and application area.



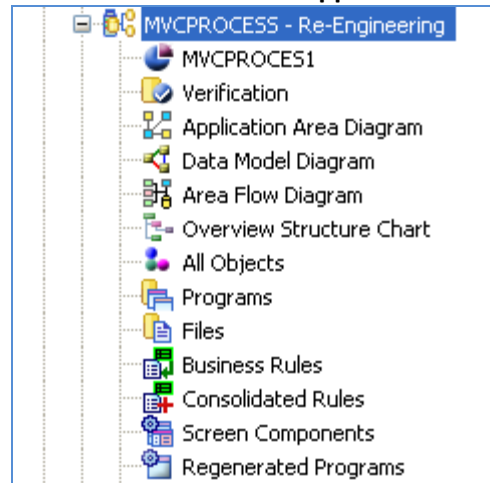
This presents a dialog showing the selected cross-reference library and the application area.



It prompts for maximum records in error to be reported, showing the primary keys and the foreign keys of each record that breaches a given relationship. This can range from 1 to 999.

If the request is successful then the job gets submitted and the job details are displayed. On completion, a **Verification** node gets added under the application area.

### Verification node under Application Area



## Verification Process

The **Verify Data Relationships** option submits the **XVERIFY** command in batch. The **XVERIFY** command uses the data model constructed by re-engineering, to automatically verify that all application data satisfies the relationships deduced by the data model.

The product examines each data record in turn to see if its referential integrity relationships are satisfied. Each integrity relationship that is breached is separately reported on in a comprehensive audit print produced by the product.

This command is used to verify the data model against the data in the database.

## Parameters

The parameters passed internally to the **XVERIFY** command are:

### Re-engineering Function Library

It is the library which contains the data model and application-specific files created by the command **XA4MODEL**. This is the name of the library that was entered as the Function Library on the **XA4MODEL** command.

### Database Library Name

The library name, which contains the application database files. The command submitted with the value **\*LOADLIB**, implying, each database file should be located in the same library used when **XA4MODEL** was run.

### X-Analysis Application Area

The command uses the application area, on which this option is invoked, to control which files in the data model should be verified. Only relationships among files in the specified

application area will be verified. Since an application area has been specified, the X-Analysis cross-reference library too is passed as parameter to the command.

### Run Mode

The Run Mode parameter is passed as **\*REPORT**, implying, generate a report showing the primary keys and the foreign keys of each record that breaches a given relationship up to a maximum number for each relationship as specified by the Maximum records parameter.

### Maximum Records

If you have selected a run mode of **\*REPORT** then **XVERIFY** will print a report showing the primary keys and the foreign keys of each record that breaches a given relationship. This parameter allows you to specify the maximum number of records printed for each relationship.

If a dependent file contains fewer than the maximum number of records specified (but more than zero records) and all the records breach the relationship, then that relationship will be updated.

### Verification Report

Opt for the context menu on the **Verification** node under the selected application area; select the **Orphaned Records** option. This generates a report displaying the primary keys and the foreign keys of each record that breaches a given relationship.

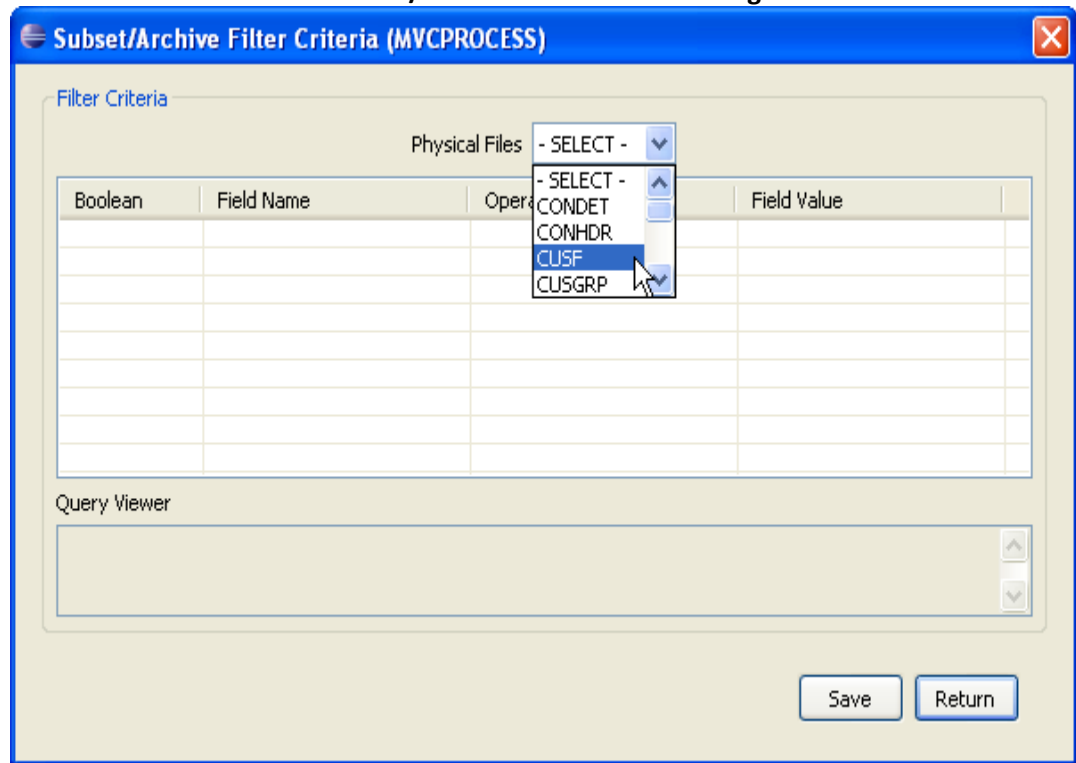
Verification Report

File/Owner	Total	Primary Key	Foreign Key
[-] CUSTS	0		
+ CJSF	0		
+ CJSGRP	0		
+ DISTS	0		
[-] SLMEN	0		
		Relationship verified.	
[-] CONDET	9		
[-] CONHDR	5		
		XWORDN-XWABCD:3-000080	XWORDN:3
		XWORDN-XWABCD:4-000083	XWORDN:4
		XWORDN-XWABCD:5-000031	XWORDN:5
		XWORDN-XWABCD:5-000083	XWORDN:5
		XWORDN-XWABCD:7-000083	XWORDN:7
+ STKBAL	4		
+ STKMAS	0		
+ STOMAS	0		
+ TRNTYP	0		
+ STKBAL	0		
+ CONHDR	0		
+ CJSF	0		
+ TRNHST	10		

### SUBSET/ARCHIVE FILTER

The subset selection criteria can be understood as the filter criteria specified on the Physical File(s) under an application area to select records to subset. On the **Subset/Archive Filter Criteria** dialog, pick the file in the drop-down to add/update filter criteria.

Subset/Archive Filter Criteria dialog



This lists the filter criteria defined on the file, if any. An add row is provided to add a new criterion.

Filter Criterion	Description
<p>Boolean</p> <p>IF</p> <p>AND</p> <p>AND</p> <p>OR</p>	<p><b>Boolean Column</b></p> <p>The default value is 'IF'. For the second line, one can select from AND/OR.</p>
<p>Field Name</p> <p>Cus. No.</p> <p>Cus. No.</p> <p>Company</p> <p>Distributor</p> <p>Sits</p> <p>Last Cnt Date</p>	<p><b>Field Name Column</b></p> <p>This column lists the fields of the Physical File picked. Pick the field on which the criterion is to be created.</p>
<p>Operator</p> <p>Choose operator...</p> <p>Choose operator...</p> <p>Less than (LT)</p> <p>Less than OR Equal to (LE)</p> <p>Equal to (EQ)</p> <p>Greater than OR Equal to (GE)</p>	<p><b>Operator Column</b></p> <p>Pick the operator to apply</p>



Filter Criterion	Description
<div style="border: 1px solid black; padding: 5px;"> <input type="text" value="Field Value"/> </div>	<p><b>Field Value</b> Supply the field value against which the field is to be compared.</p>

Click **Save** to save the filter criteria. Click **Return** to present the display dialog, listing the filter criteria specified for the application area.

## SUBSET DATA

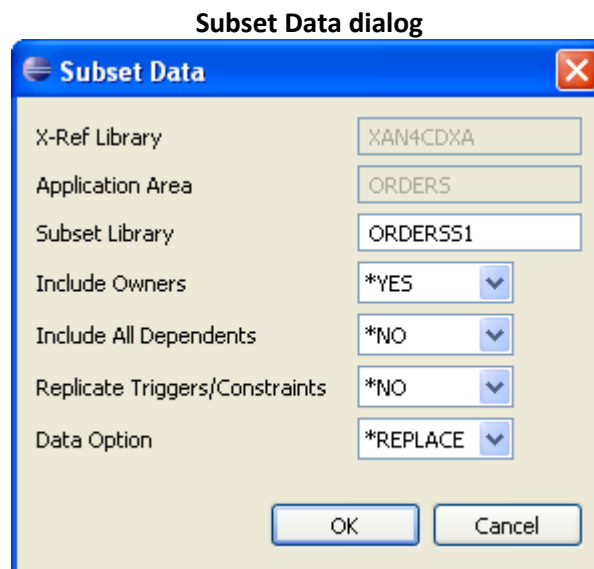
The **Subset Data** option creates complete test data subsets from live data based upon existing application data model. Subset Data uses the data model constructed by X-Model to produce test data sets that satisfy all the constraints of the data model. The product first takes a specified number of records from each client file, and then examines each data modelling relationship in turn to check that all referenced records are also included.

Creating test data sets is a three-stage process.

- Define the application area using the **X4WRKAPP/X-Analysis**.
- Define the filter using X-Analysis.
- Take the **Subset Data** option on the application area.

### Creating Subset Data

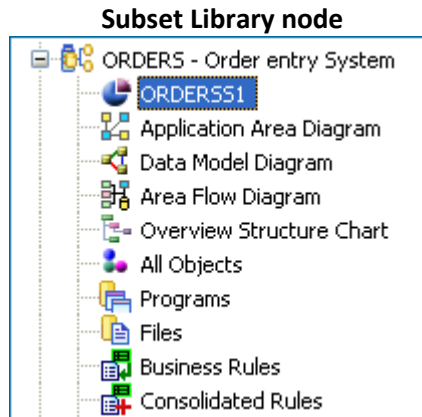
Select the application area **ORDERS** from the tutorial application, **XAN4CDXA**. Select the **Subset Data** option from the **Data Management Options** submenu, available on the context menu on application areas. The **Subset Data** option brings up the **Subset Data** dialog, as shown below:



The **Subset Data** dialog prompts for the following options:

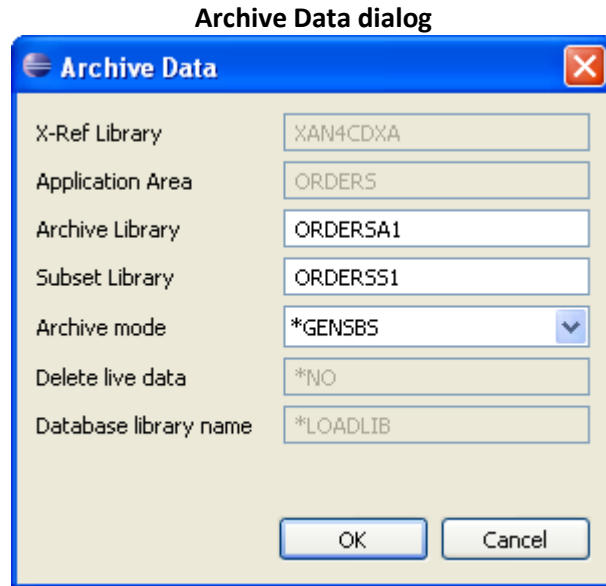
- **Subset Library:** Library to hold the subset records
- **Include Owners:** Select from \*YES (default value), \*NO, \*ALL
- **Include All Dependents:** Select from \*NO (default value), \*YES, \*ALL
- **Replicate Triggers/Constraints:** Select from \*NO (default value), \*Yes
- **Data Option:** Select from \*REPLACE (default value), \*ADD

After making the choices, click **OK** to execute the batch server command, **XSUBAREA**. This produces the subset library, as the name specified in the **Subset Data** dialog. The records on the file obey the subset filter criteria specified on the files under the application area. This also adds the subset library – **ORDERSS1** as a node under the application area node in the navigation view.



## ARCHIVE DATA

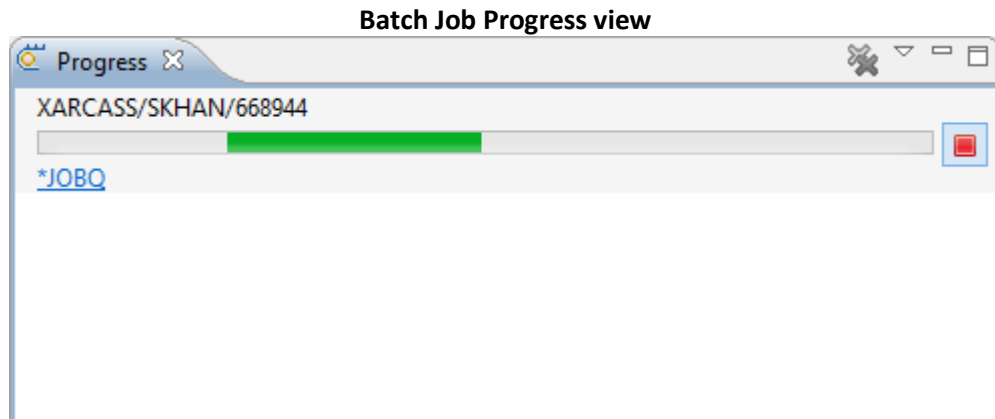
According to its name, the **Archive Data** option helps you in archiving data, thus supporting application development and maintenance work. Select the option from **Data Management Options** submenu to invoke the following dialog.



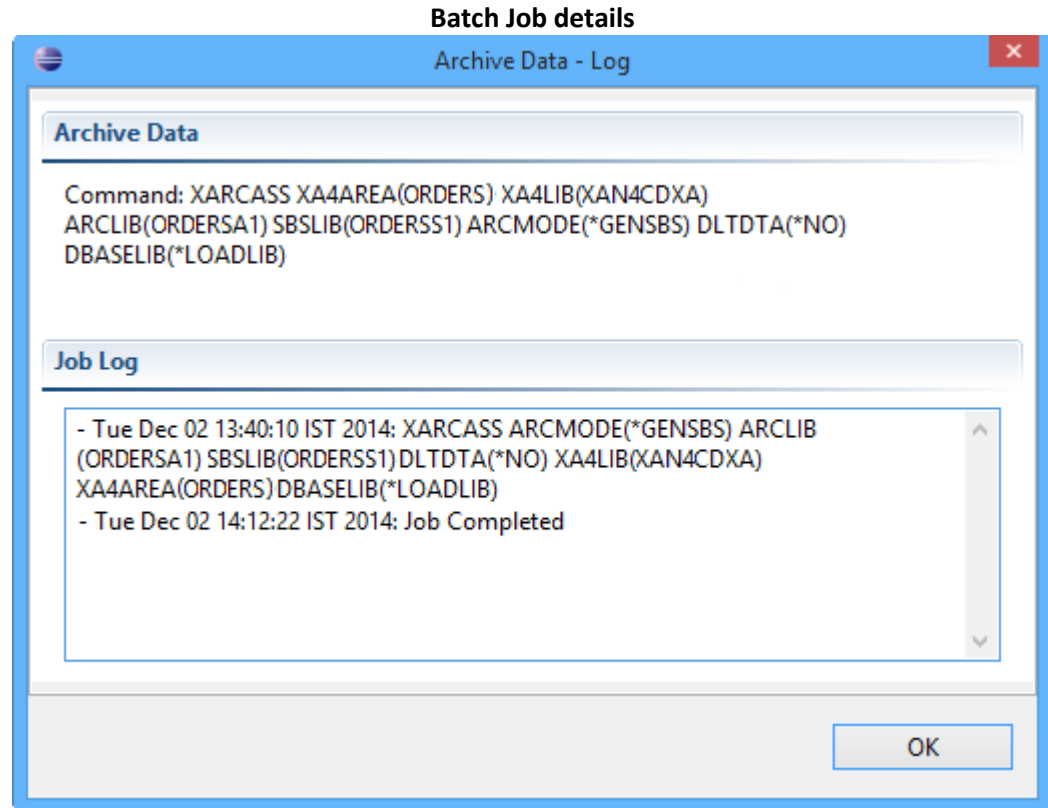
The dialog prompts you to supply the following details:

- **Archive Library:** Name of the Archive Library
- **Subset Library:** Name of the Subset Library
- **Archive mode:** Select from \*GENSBS (default value), \*ARCDTA, \*BOTH

After providing the details, click **OK** to submit a batch job.

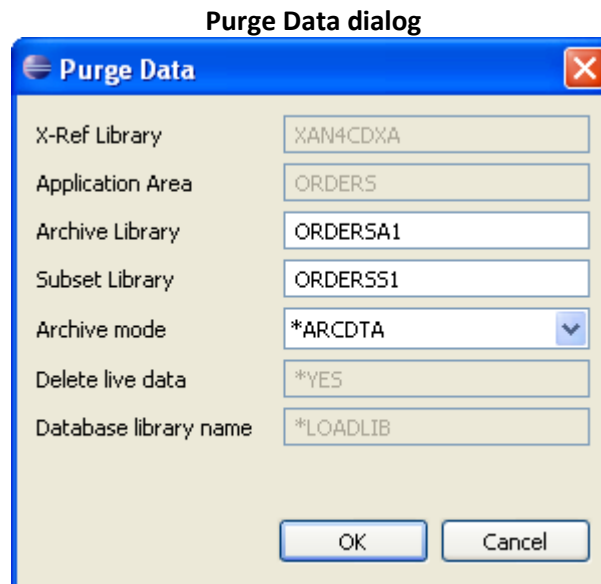


At any point, while the batch job is running, click on the hyperlink (\*JOBQ) to view the Job Log. The Job Log view is shown below:



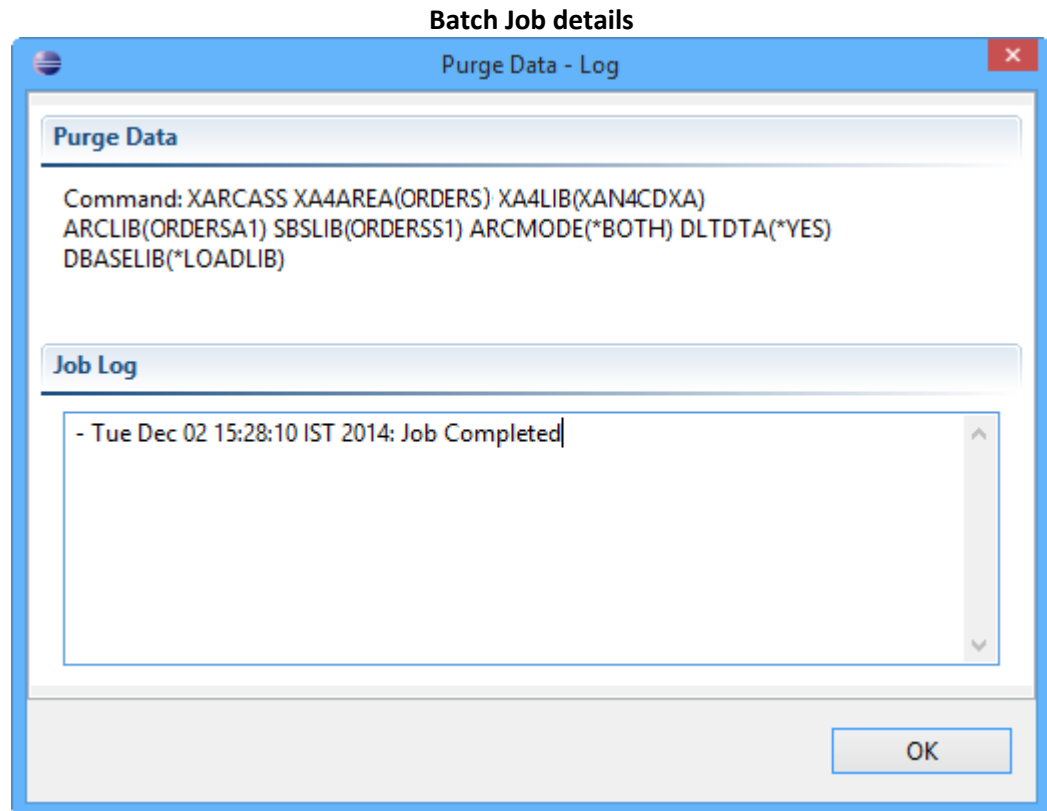
## PURGE DATA

Select the **Purge Data** option from **Data Management Options** to eliminate superfluties, and further streamline the data. The following dialog with available details is invoked:



The **Purge Data** dialog is the same as the **Archive Data** dialog. However, note that the default Archive mode is \*ARCDTA (you can change it to \*BOTH), and the Delete live data is pre-set as \*YES.

Click **OK** to submit a batch job. The details appear on screen as shown below:



## ARCHIVE & PURGE DATA

Select the **Archive & Purge Data** option from **Data Management Options** to invoke the following dialog (similar to the **Subset/Filter Criteria** dialog).

Archive & Purge Data dialog

Filter Criterion	Description
	<p><b>Field Name Column</b></p> <p>This column lists the fields of the Physical File picked. Pick the field on which the criterion is to be created.</p>
	<p><b>Operator Column</b></p> <p>Pick the operator to apply.</p>
	<p><b>Field value</b></p> <p>Supply the field value against which the field is to be compared.</p>
	<p><b>Boolean Column</b></p> <p>The default value is 'AND'. The other option is 'OR'.</p>

# Exporting & Printing

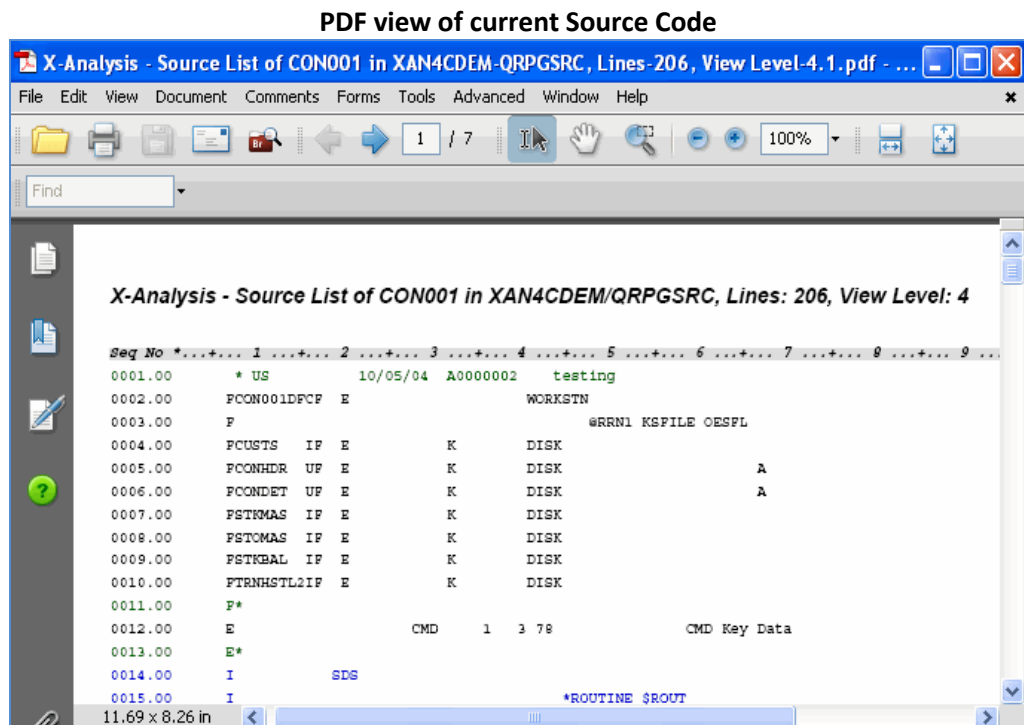
Modern software design tools frequently offer the facility to re-engineer a data model or entity relationship diagram from an existing database. This is usually done over an Open Database Connectivity (ODBC) connection and relies on the metadata held within a database to describe the relationships between tables. These tools are often unable to re-engineer an accurate data model from an existing DB2 database because it predates the database features that the tool relies on. You can use the X-Analysis data model to bridge this gap and import your data model into other tools.

X-Analysis provides various export options for exporting diagrams and technical details directly to applications such as PDF/Microsoft Word or Microsoft Visio.

The interface to PDF/Microsoft Word is sophisticated enough to automatically produce detailed and structured documents that have Contents & Index pages, chapters, sections and all of the screens available in X-Analysis, displayed with a simple selection wizard. Existing documentation, object/field annotation can be included in the exported PDF/Microsoft Word documents.

## EXPORT TO PDF

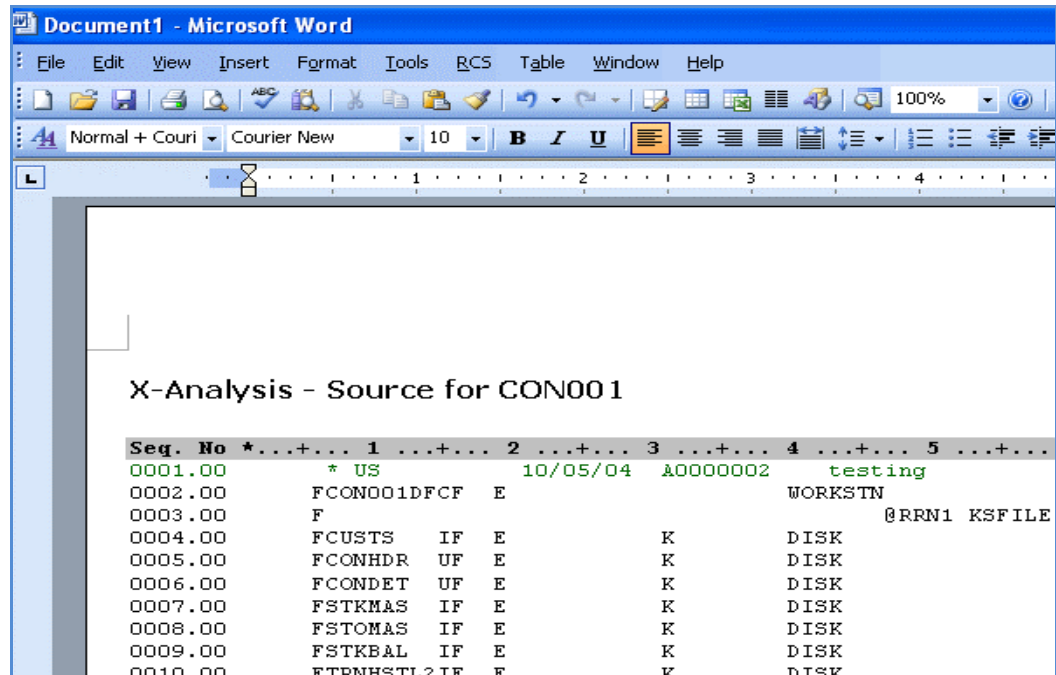
Selecting the **Export to PDF** option from the **Export Options** icon available on the toolbar to export the content to the PDF format.



## EXPORT TO MICROSOFT WORD

Select the **Export to Microsoft Word** option from the **Export Options** icon available on the toolbar to export the content to the Word format.

Microsoft Word view of Current Source Code



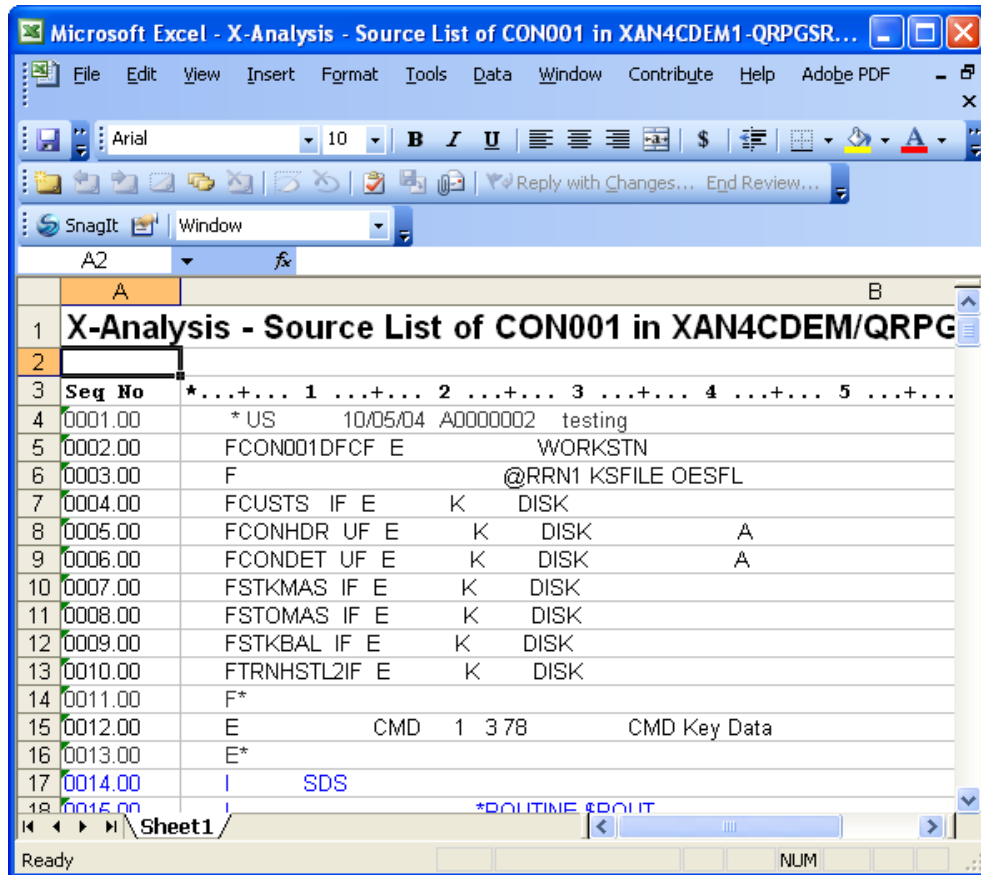
## EXPORT TO MICROSOFT EXCEL

X-Analysis displays various lists. All lists have the options to export data to MS Excel and MS Word. The **Export Options** drop-down icon appears on the associated toolbar.

Select **Export to Excel** and export current source code in the MS Excel format, as displayed below:



Microsoft Excel view of Current Source Code



## EXPORT TO FLOWCHART

X-Analysis generates Flowcharts for RPG, RPGLE, and COBOL programs. It also generates Process Flow Diagrams for CL programs. The **Flowchart** option is enabled only in the source browser view. It generates the flowchart of the displayed program using MS Visio.

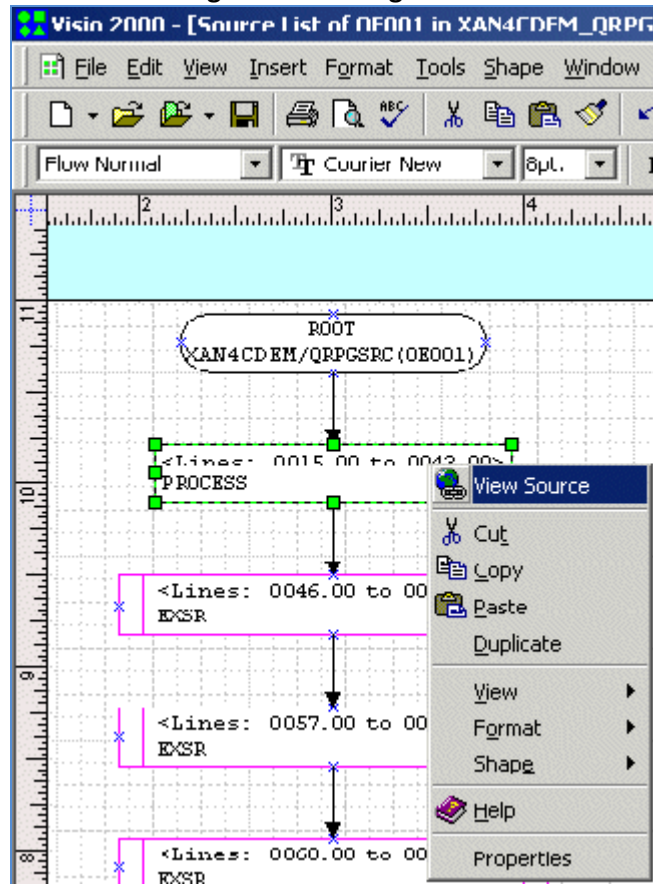
Each level of source (selected source member) has a different flowchart:

- Level 1-2 will have a Flowchart without any code
- Level 3-4 will have a Flowchart with code without blank lines, and with no comments
- Level 5 will have a Flowchart with full code and comments

In Level 1-2 the context menu on a shape in the Flowchart has the option: **View Source**

The **View Source** option displays the code for that section of the flowchart in the form of an HTML page.

**Flowchart generated using Microsoft Visio**



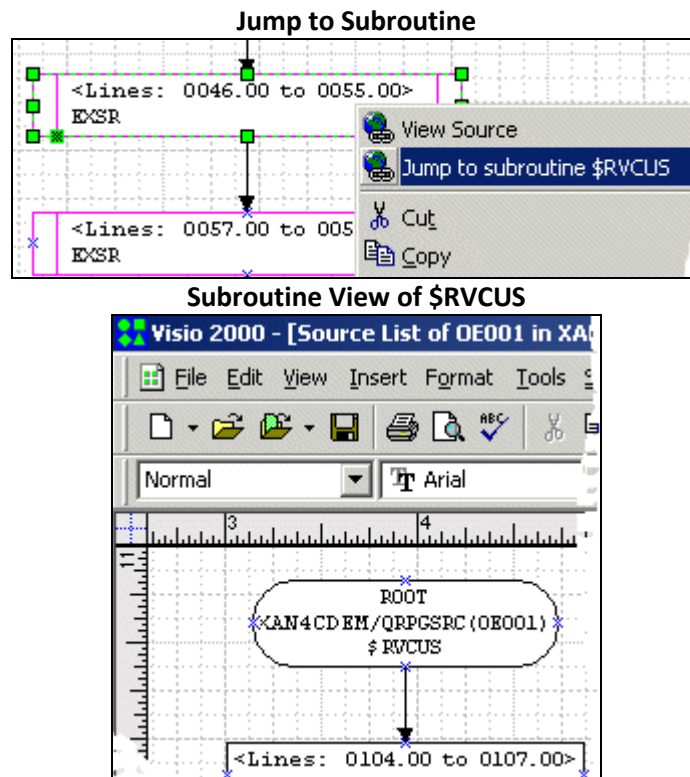
**Source Code generated in HTML**

```

E:\Program Files\Databorough\X-Analysis\Temp\314154114\Source Lis...
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites Media
Address E:\Program Files\Databorough\X-Analysis\Temp\314154114\0015.00 Go
0015.00 C*****
0016.00 C* RECEIVE PARAMETERS
0021.00 C* UNTIL F3
0024.00 C* INITIALISE SCREEN
0032.00 * RETRIEVE LAST ORDER NUMBER
0043.00 C CALL 'CUSLET'

0046.00 C* GET ORDER NO. & CUSTOMER NO.
0051.00 C* SO LONG AS EXIT NOT REQUESTED #1
0054.00 C* RETRIEVE CUSTOMER DETAILS
0055.00 C EXSR $RVCUS
  
```

The right-click menu option **Jump to subroutine** on EXSR (Execute Subroutine) boxes opens the flowchart for the selected subroutine. This option is available at all levels.



## PRINTING FROM X-ANALYSIS

X-Analysis allows printing of various List/Diagrams/Source members. The **Print** icon is available on the toolbar of various list/diagrams/source members.

**Note that the Printer should be already configured.**

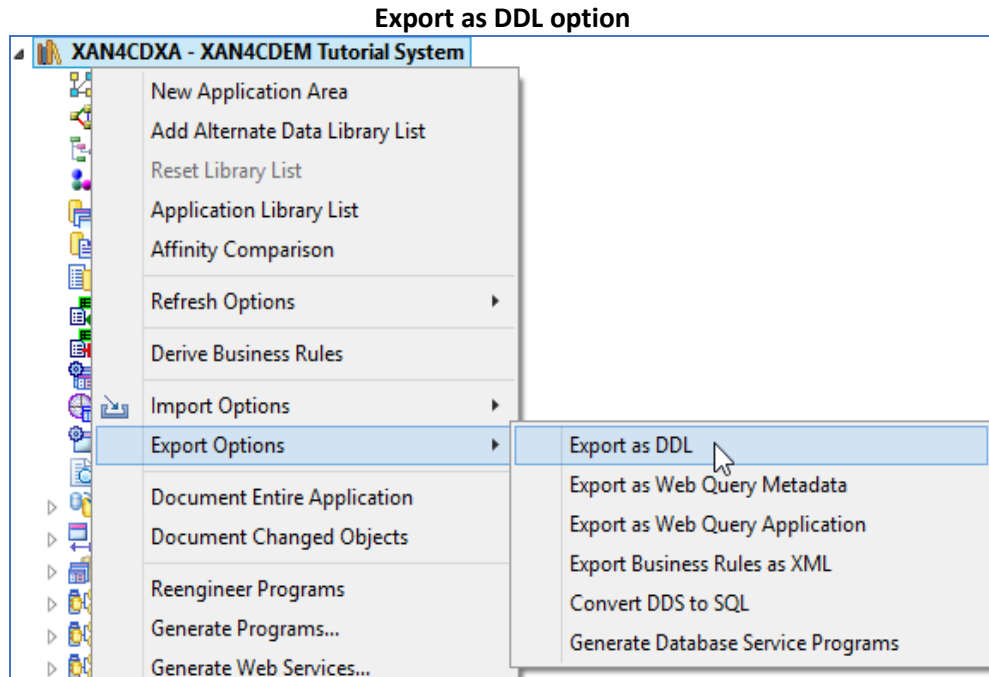
## EXPORT AS DDL FROM X-ANALYSIS

The **Export as DDL** option exports data model information as Data Definition Language (DDL) to the application folder. This information may be used by any database management system e.g. Oracle or SQL Server to create a similar data model.

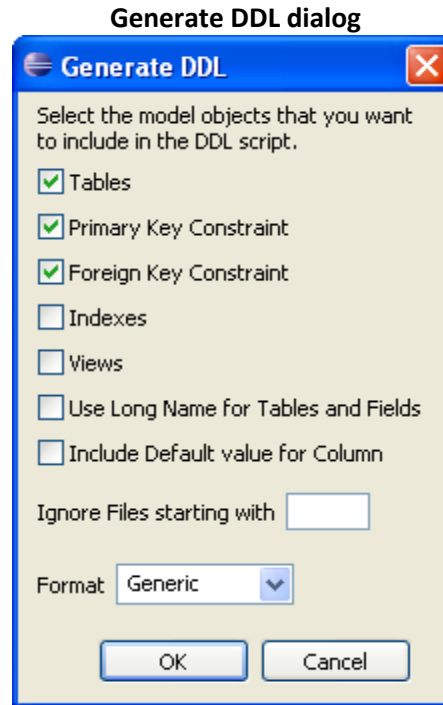
The Data Definition Language (DDL) is a sequence of Structured Query Language (SQL) commands that defines the structure of a database. X-Analysis can export the structure of an application or application areas as DDL. The DDL can be used to recreate a database on any SQL database system. If your modelling tool does not support XML, then you can use the **Export as DDL** option. This option recreates your database as SQL tables with complete metadata information, required for a tool to re-engineer the new database over ODBC. Some third-party modelling tools allow importing SQL scripts or DDL files directly.

To export the DDL for the example Tutorial System (**XAN4CDXA**) data model:

1. Open **XAN4CDXA** from the X-Analysis Client.
2. Opt for the context menu on **XAN4CDXA**, and then select the **Export as DDL** option from the **Export Options** submenu.

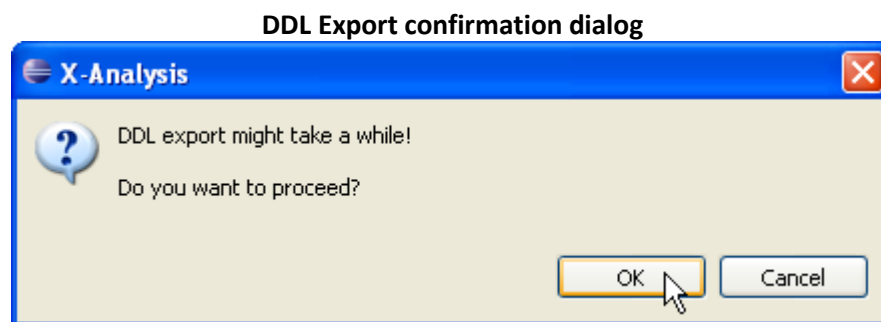


X-Analysis then invokes **Generate DDL** dialog as displayed below:

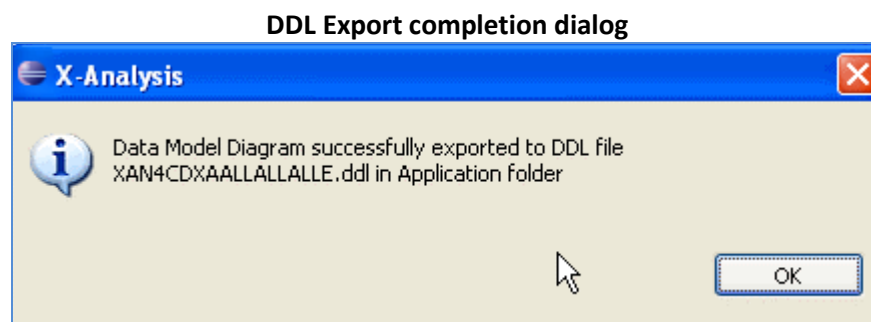


Make choices from the **Generate DDL** dialog and click **OK** to start the process.

X-Analysis displays the following confirmation dialog to get confirmation from the user and start the process:

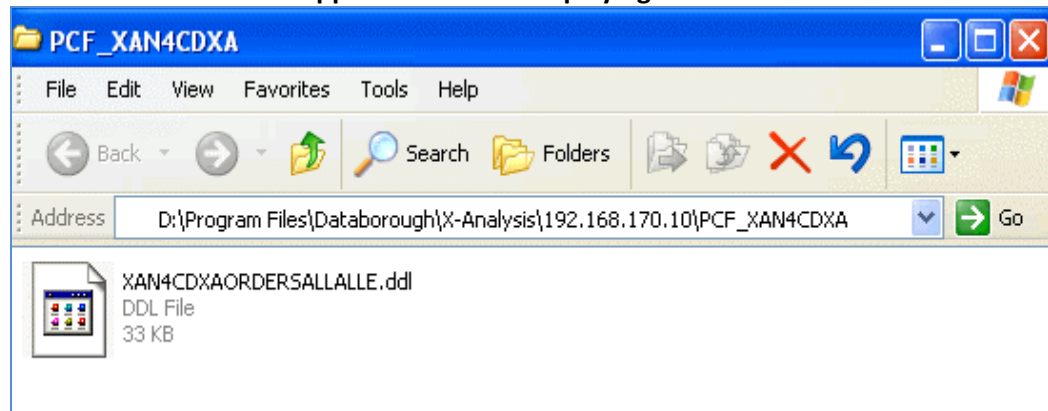


After the process is over, X-Analysis displays a successful message dialog.



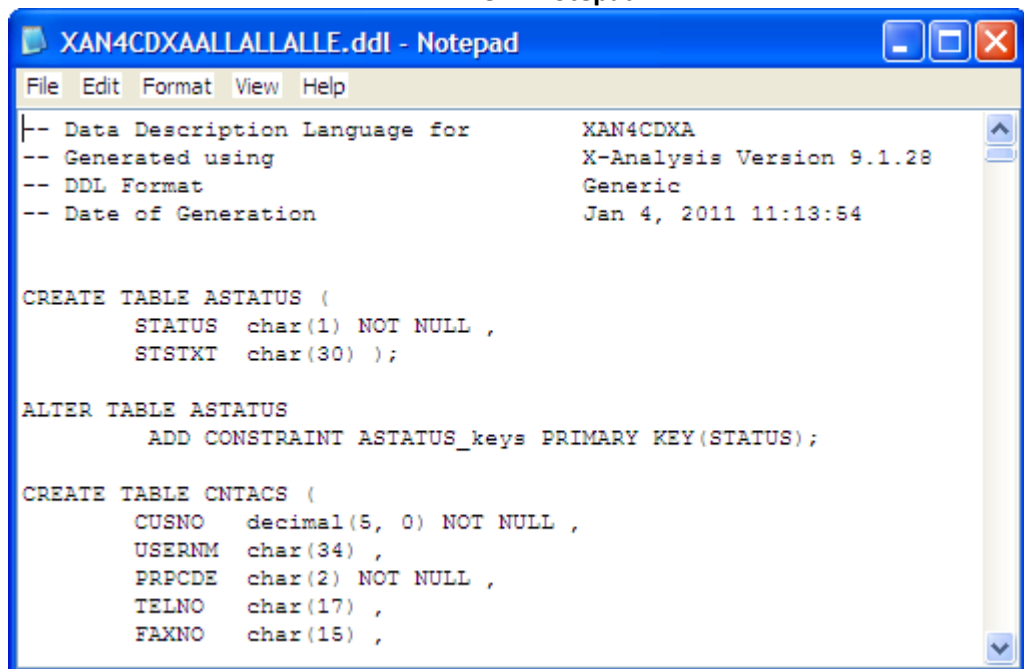
To view exported DDL statements, select menu **X-Analysis > Open Application Folder**. The generated DDL file is listed in this folder.

**Application Folder displaying .DDL File**



DDL is plain text and human readable so you can view the file in any text, such as Notepad. The snippet of the DDL statement generated is displayed below:

**DDL File in Notepad**



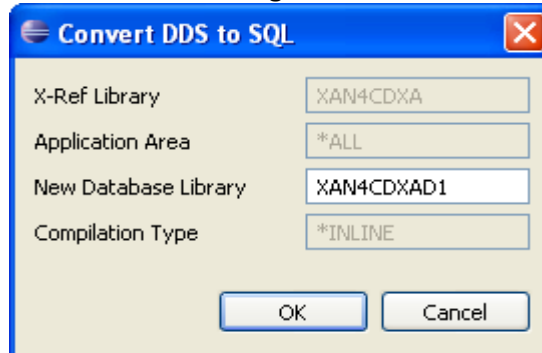
**Note: The Export as DDL option is also available on application areas.**

## CONVERT DDS TO SQL

The **Convert DDS to SQL** option calls the IBM i command, **XDDSTOSQL** and submits the job in batch. This option is available on cross-reference library, Application Areas, and Physical Files (PF).

Opt for the context menu on the tutorial application, and then select the **Convert DDS to SQL** option from the **Export Options** submenu. The following dialog appears:

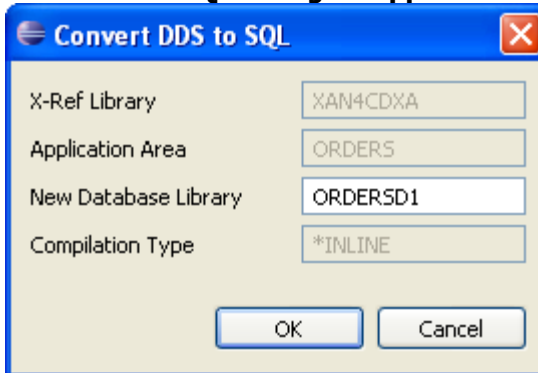
**Convert DDS to SQL dialog on cross-reference library**



Click **OK** to start the process of conversion.

Opt for the context menu on the application area **ORDERS** and select the **Convert DDS to SQL** option under the **Export Options** submenu. The following dialog appears:

**Convert DDS to SQL dialog on application area**



The **New Database Library** contains the generated SQL Objects.

### **XDDSTOSQL command**

The **XDDSTOSQL** command will initiate the following sequence:

- Generate DDL source members for the PFs. ("CREATE TABLE")
- Amend the DDL source members to specify the new library and SQL table name.
- Run RUNSQLSTM over the DDL source members to create the tables.
- Create a copy of original PFs as LFs pointing to the new SQL table.
- Generate DDL source members for the LFs. ("CREATE INDEX")

- Run RUNSQLSTM over the DDL source members to create the indexes.
- Create a copy of original LFs as LFs pointing to the new SQL table, but using the format of the PF. (These will use the access paths of the indexes.)
- Copy data from the original PFs to the new SQL tables.

**Working of XDDSTOSQL command**

With the help of the **XDDSTOSQL** command one can run all original application software immediately on the new database with no level check problems.

The DDL source for the SQL tables and indexes are stored in **QDDL SRC** in the X-Analysis library. The DDS source for the new LFs is stored in **QDDSSRC** in the X-Analysis library.

The new SQL tables are named using the maximum number of first characters from original PF name which together with the specified suffix are not more than ten characters. The new SQL indexes are named in the same way.

This suffix is specified in the **XSQLCVSFX** data area.

```

                                Display Data Area
                                System:   DBS525B
Data area . . . . . : XSQLCVSFX
  Library . . . . . :   XAN4CDXA
Type . . . . . : *CHAR
Length . . . . . : 10
Text . . . . . : XDDSTOSQL SQL Table Name Suffix

      Value
Offset *...+....1...+....2...+....3...+....4...+....5
  0    'XQ      '
  
```

The converted DDS source members can be flagged in columns 1 to 5. This flag is specified in the **XSQLCVFLG** data area. If the data area is blank or missing, then columns 1 to 5 are not changed.

```

                                Display Data Area
                                System:   DBS525B
Data area . . . . . : XSQLCVFLG
  Library . . . . . :   XAN4CDXA
Type . . . . . : *CHAR
Length . . . . . : 5
Text . . . . . : XDDSTOSQL Source Flag

      Value
Offset *...+....1...+....2...+....3...+....4...+....5
  0    'XDSCV'
  
```

Certain run time values used in the generation of the DDL source are stored in data area – **XSQLCVPMS**.

**Data Area XSQLCVPMS**



Display Data Area		System:	DBS525B
Data area . . . . .	: XSQLCVPMS		
Library . . . . .	: XAN4CDXA		
Type . . . . .	: *CHAR		
Length . . . . .	: 100		
Text . . . . .	: XDDSTOSQL Run Parameters		
	Value		
Offset	*...+...1...+...2...+...3...+...4...+...5		
0	'*AS400*SQL*JOB*JOB *ISO*JOB *PERIOD*YES*PREFIX'		
50	'N*YES'		

The following values are currently stored. (The shipped value is shown first.)

- Positions 1 to 6: Standards Option – \*AS400, \*DB2, \*ISO.
- Positions 7 to 10: Naming Option – \*SQL, \*SYS.
- Positions 11 to 14: Date Format – \*JOB, \*ISO, \*EUR, \*JIS, \*USA, \*MDY, \*DMY, \*YMD, \*JUL.
- Positions 15 to 21: Date Separator – \*JOB, \*SLASH, \*PERIOD, \*COMMA, \*DASH, \*BLANK.
- Positions 22 to 25: Time Format – \*ISO, \*EUR, \*JIS, \*USA, \*HMS.
- Positions 26 to 32: Time Separator – \*JOB, \*COLON, \*PERIOD, \*COMMA.
- Positions 33 to 39: Decimal Point – \*PERIOD, \*COMMA.
- Positions 40 to 43: Generate aliases – \*YES, \*NO. When generating aliases you can specify replacement characters **XSQLCVRPL**. The data area containing replacement characters are **XSQLCVRFR** and **XSQLCVRTO**.
- Positions 44 to 51: Leading numeric processing for aliases – \*PREFIXN, \*XLATE. If \*PREFIXN is specified then "N" is added to the beginning of the alias name. \*XLATE will translate the numeric into characters. (NOT YET IMPLEMENTED.)
- Positions 52 to 55: Compress embedded blanks for aliases – \*YES, \*NO. If \*YES is specified then wherever there are two or more contiguous underscores in the generated alias they will be replaced by a single one.

**Data Areas XSQLCVRFR and XSQLCVRTO**

If you have requested the generation of aliases then you can specify replacement for invalid characters. You can specify up to 50 *from characters* in the **XSQLCVRFR** data area and up to 50 *to characters* in the **XSQLCVRTO** data area.

The characters are matched between *from* and *to* areas.

```

                                Display Data Area
                                System:   DBS525B
Data area . . . . . : XSQLCVRFR
  Library . . . . . : XAN4CDXA
Type . . . . . : *CHAR
Length . . . . . : 50
Text . . . . . : XDDSTOSQL Replacement Characters, From

      Value
Offset *...+....1...+....2...+....3...+....4...+....5
  0    '@#$.

```

```

                                Display Data Area
                                System:   DBS525B
Data area . . . . . : XSQLCVRTO
  Library . . . . . : XAN4CDXA
Type . . . . . : *CHAR
Length . . . . . : 50
Text . . . . . : XDDSTOSQL Replacement Characters, To

      Value
Offset *...+....1...+....2...+....3...+....4...+....5
  0    'QZX_

```

If any of the following characters remain then they are automatically removed:  
 ,;:;!%<>/\+ -=\* & f { }

Embedded blanks are then replaced with underscores.

The only values that may normally need changing relate to the generation of aliases.

**File Exclusions**

Files are excluded in three ways:

- Source PF files which have been loaded into X-Analysis are automatically excluded. These can be found in the **XPFSRC** file.
- Files with no members or multiple members are automatically excluded. A message is written to the error log for each of these files.
- Files can be manually excluded by adding them to the **XMDLEXCS** file. (The Reason Code should be set to blank.)

**Error Log**

An Error Log is written to source member ERRORLOG in QTXTSRC in the X-Analysis library. The messages may be diagnostic or terminal.

**Exception Processing**

Please note the following:

- Multi-format files: Indexes are created for each file access path.
- LFs not using the PF format name or where individual fields specified: The format name is retained.
- No statement is required to point to the original PF format name.
- JOIN Files: JFILE and JOIN point to the SQL table names. The format name is retained. No statement is required to point to the original PF format name.
- FIFO/LIFO Files: The keyword cannot be used with SQL tables and is removed. A message is written to the error log for each file.
- REFERENCE Fields: These can only be used in PFs so the references are removed. A message is written to the error log for each file.
- TEXT specified on an LF format: Where the PF format can be added, TEXT cannot be specified so it is removed.
- ALWNULL, CCSID() and DFT() field keywords: These are removed from the original PF definition when it is converted to an LF definition. (They will have been generated in the DDL source for the SQL table.)

### Command Parameters

The **XDDSTOSQL** command requires the following parameters:

- **X-Analysis Library:** Enter the name of the X-Analysis cross-reference library built for the application containing the database objects to be converted.
- **New Database Library:** Enter the name of a new library which will contain the converted database.
- **Application Area:** Enter the name of the application area containing the database objects to be converted. You can also enter the special value of **\*ALL**. This will result in all database objects in the application being converted.
- **Compilation Type:** This option will allow the user to choose whether this command should run all compilation commands or whether calls should be made to external change control systems. When the **\*INLINE** option is selected, the user will be able to set various compile command parameters using data areas.

### XWRKDTAARA command

The **XWRKDTAARA** command assists the user to maintain various values for data areas used in **XDDSTOSQL** command. The command is available in the library **XAOBJ**, which must be included in the library list, before executing the command. The command accepts the following two parameters:

**XWRKDTAARA XRFLIB(XAN4CDXA) SYSTEM(XDDSTOSQL)**

**XRFLIB** – Cross-Reference library

**SYSTEM** – The name of the command for which related data areas have to be listed.

```

X-Analysis                               Work with Data Areas                Databorough Ltd.
XARWKDARAS                               12:50:53
                                           2015-02-21

Enter options, press Enter.
5=Work with values

Data Area

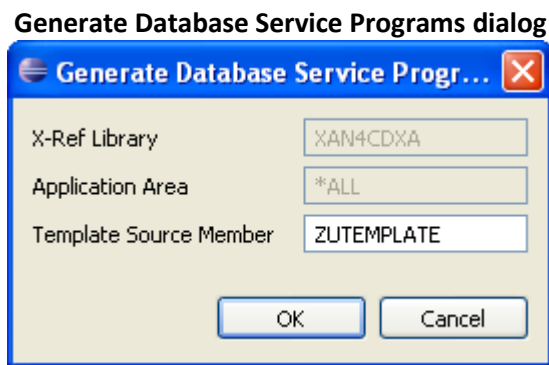
XDDSTOSQL Source Flag
XDDSTOSQL Run Parameters
XDDSTOSQL Replacement Characters, From
XDDSTOSQL Replacement Characters, To
XDDSTOSQL SQL Table Name Suffix
  
```

The above screen displays the command screen for **XWRKDTAARA**. Data areas related to the **XDDSTOSQL** command are listed here. The user can use **Option=5** against any of them to view/modify their value.

**GENERATE DATABASE SERVICE PROGRAMS**

The **Generate Database Service Programs** option calls the IBM i command, **XWRDTBSP** and submits the job in batch. This option is available on cross-reference library, application areas and physical files (PF).

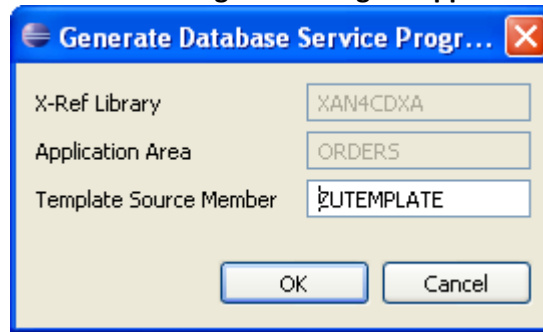
Opt for the context menu on the tutorial application and select the **Generate Database Service Programs** option from the **Export Options** submenu. The following dialog invokes when the user selects the option:



Click **OK** to execute the batch command.

Opt for the context menu on the application area **ORDERS**, and select the **Generate Database Service Programs** option from the **Export Options** submenu. The following dialog invokes when the user selects this option:

**Generate Database Service Programs dialog for application area, ORDERS**



The **XWRTDBSP** command will generate Service programs for the specified database files. The generated source will be placed in **QRPGLESRC** of the specified cross-reference library. The type of service program generated will depend on the template specified.

The command requires Template Source Member name as input parameters.

The pre-defined templates are located in **XAOBJ/QRPGLESRC**. The following are the available pre-defined templates:

- **ZUTEMPLATE** – file update/delete program template
- **ZSTEMPLATE** – this will generate an SQL CRUD service program.
- **ZXTEMPLATE** – this will generate an SQL extended READ service program.
- **ZRTEMPLATE** – this will generate an RPGLE CRUD service program.

**Generated Service Program**

The service program naming depends upon the template selected. The following table explains this:

Template	Service Program starting with
ZUTEMPLATE	ZU
ZSTEMPLATE	ZS
ZRTEMPLATE	ZR
ZXTEMPLATE	ZX

On selecting **ZSTEMPLATE**, an SQL CRUD service program is generated; whereas on selecting **ZRTEMPLATE**, an RPGLE CRUD service program is generated. In both the cases, a service program is generated containing sub-procedure definitions for READ / UPDATE / WRITE / DELETE record.

On selecting **ZXTEMPLATE**, an SQL extended READ service program is generated. The generated service program contains sub-procedure definitions for Extended READ.

## Using Generated Service Program

The following is a snapshot of the generated service program:

### Snapshot of a Database Service Program

```

H*1-----
H debug(*yes) copyright('Databorough Ltd. 2008')
H nomain

D*****
D*1D e f i n i t i o n s
D*****
D zrecord          e ds          extname(condet)
D zrecordsql       e ds          extname(condet)
D                  prefix(sql)
D zrecordcpy       e ds          extname(condet)
D                  prefix(cpy)

D*1Data structure containing all required parameters
D*1 Plus: before and after database record image.
D*1 Keys passed in ZOLDRECORD, data returned in ZNEWRECORD
D zsdta           ds
D znewrecord      like(zrecord)
D zoldrecord      like(zrecordcpy)
D/copy qrpglesrc,zsheader

D*1Prototypes

D*1Read
D zcondetr        pr            likeds(zsdta)
D zreadparms      likeds(zsdta)

D*1Update
D zcondetu        pr            likeds(zsdta)
D zupdateparms    likeds(zsdta)

D*1Write
D zcondetw        pr            likeds(zsdta)
D zwriteparms     likeds(zsdta)

D*1Delete
D zcondetd        pr            likeds(zsdta)
D zdeletparms     likeds(zsdta)

```

Note the various sub-procedures defined (for Read, Update, Write, and Delete) in the service program are displayed above.

The user should call the appropriate sub-procedure to READ / UPDATE / WRITE / DELETE the record. There is one parameter – a data structure which includes a ‘before’ and ‘after’ image of the database record, plus the fields in the copybook member **ZSHEADER**. Keys are passed in the ‘before’ image (ZOLDRECORD) and data is returned in the ‘after’ image (ZNEWRECORD).

Currently, only one field is used from ZSHEADER – **ACTION**.

**The copy-book member ZSHEADER**

```

D*1-----
D*1Author:  DATABOROUGH LTD 2008
D*1-----
D*1SERVICE PROGRAM PARAMETERS
D*1-----
D inuser                10
D indate                8
D intime               6
D action               10
D entrypoint          20
D rtnmsgtp             1
D rtnmsg              80   dim(20)
D rtnmsgids           7   dim(20)
D rtnflds             30   dim(20)
D rtnupdbuf           1
D rtnnewfun           23
D gtots               30p 9
D zworkflds          50a   dim(20)
D zwfnames           30a   dim(20)
D zwftypes            1a   dim(20)
D supflds            30   dim(20)
D conflds            30   dim(20)
D clrflds            30   dim(20)
D ovrclrs             3   dim(20)
D selact             20
D supacts            23   dim(50)
D calltype            1
D*1-----

```

# Document Manager

The Documenter (Document Manager) facilitates the generation of a PDF/MS Word document containing the system design information for the specified objects in an application.

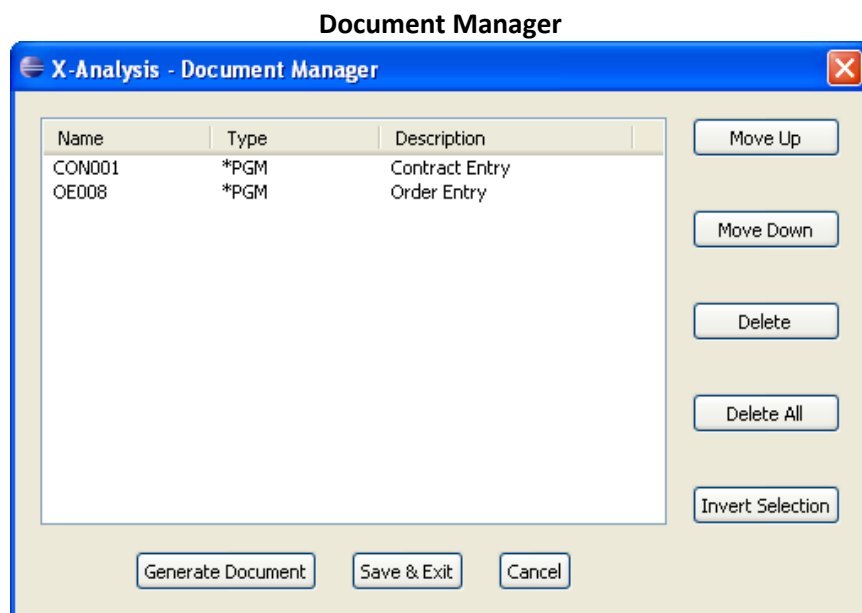
The System Documentation is generated in the following two ways:

- Marking the individual objects/complete list
- Documenting an application area

## MARKING THE INDIVIDUAL OBJECTS/COMPLETE LIST

Follow the steps below to generate the system document:

1. Start X-Analysis.
2. Select a cross-reference from the cross-reference list view.
3. Mark objects to be included for the System Documentation process. To mark the objects for documentation process, use the context menu on objects and select the **Mark for Documenter** option. Alternatively, the entire list can be selected for documentation by selecting the **Mark all for Documenter** option, available under the X-Analysis menu.
4. Select the **Documenter** button from the main toolbar.

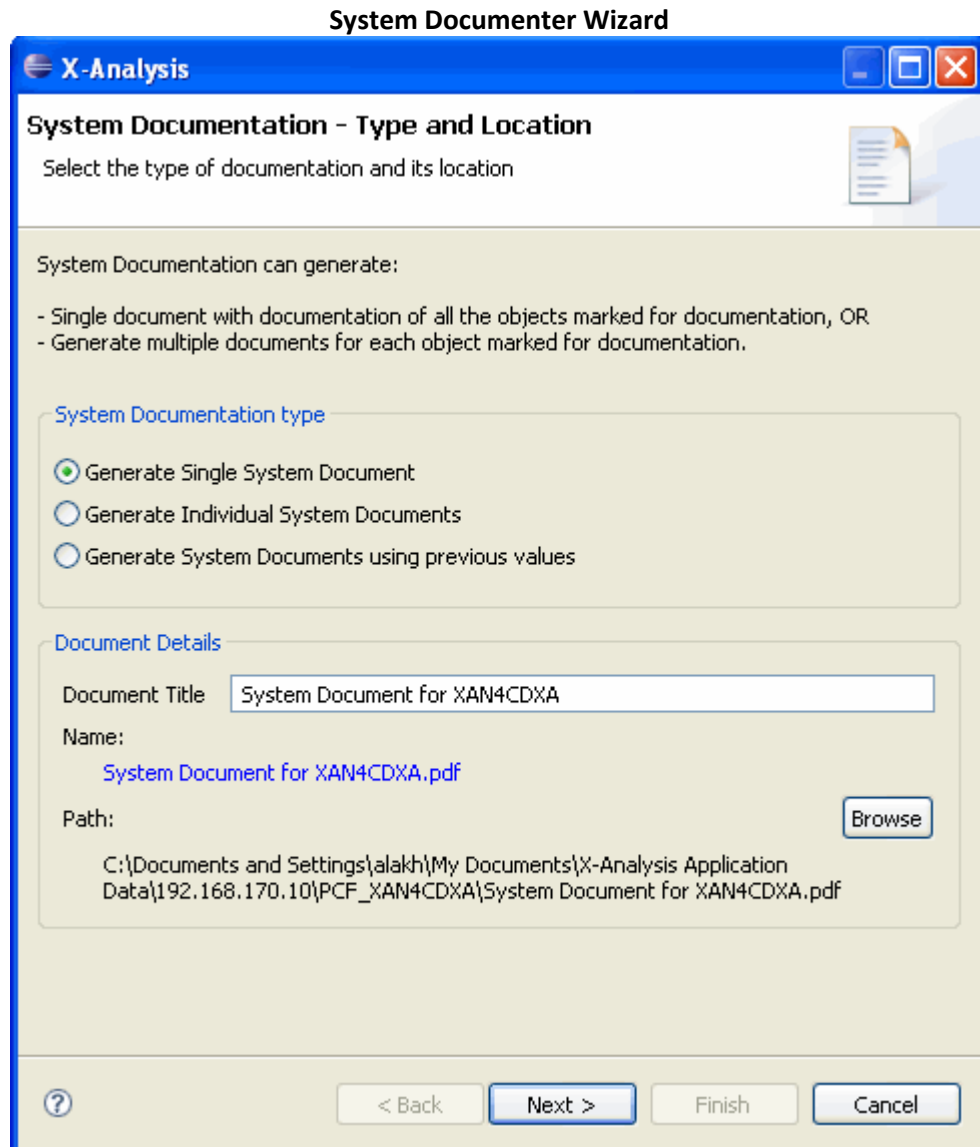




The Objects/Members on the documenter list can be arranged using the **Move Up / Move Down / Delete / Delete All** buttons on the Document Manager.

The Document Manager provides a facility for object selection for system document – **Invert Selection**. On clicking **Invert Selection**, the selected object gets un-selected and all other un-selected objects get selected.

After ordering of the objects, click **Generate Document**. This invokes the Documenter Wizard, as shown below:



Note that the **Documenter** option can also be alternatively accessed from the **Export Options** drop-down on the Source Browser toolbar of a selected object.

## Document Wizard Sections

### System Documentation Type

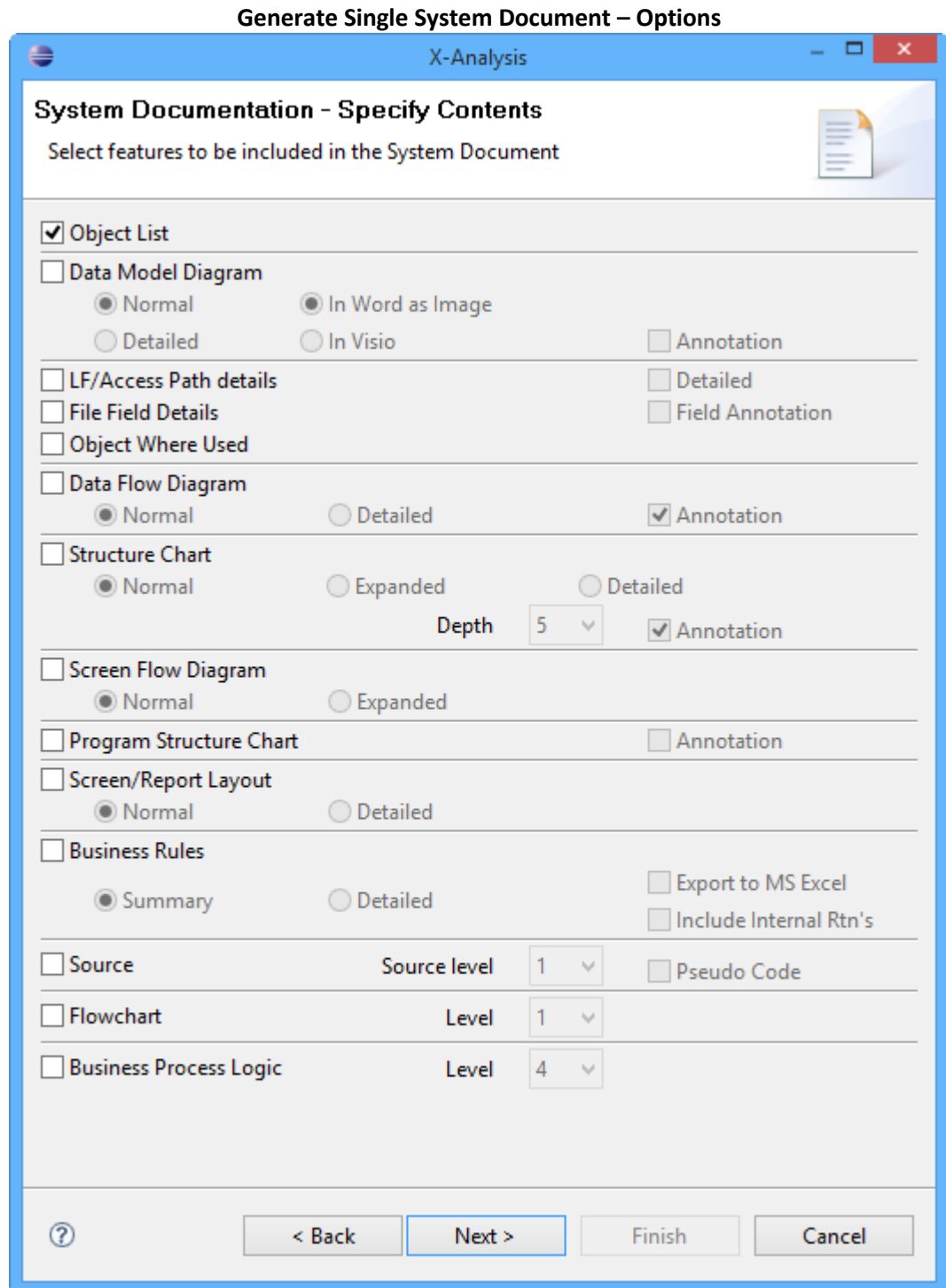
Various options are available for the System Documentation type. By default, the **Generate Single System Document** option is checked.

### Document Details

**Document Title** – The user can change document title as per the requirement.

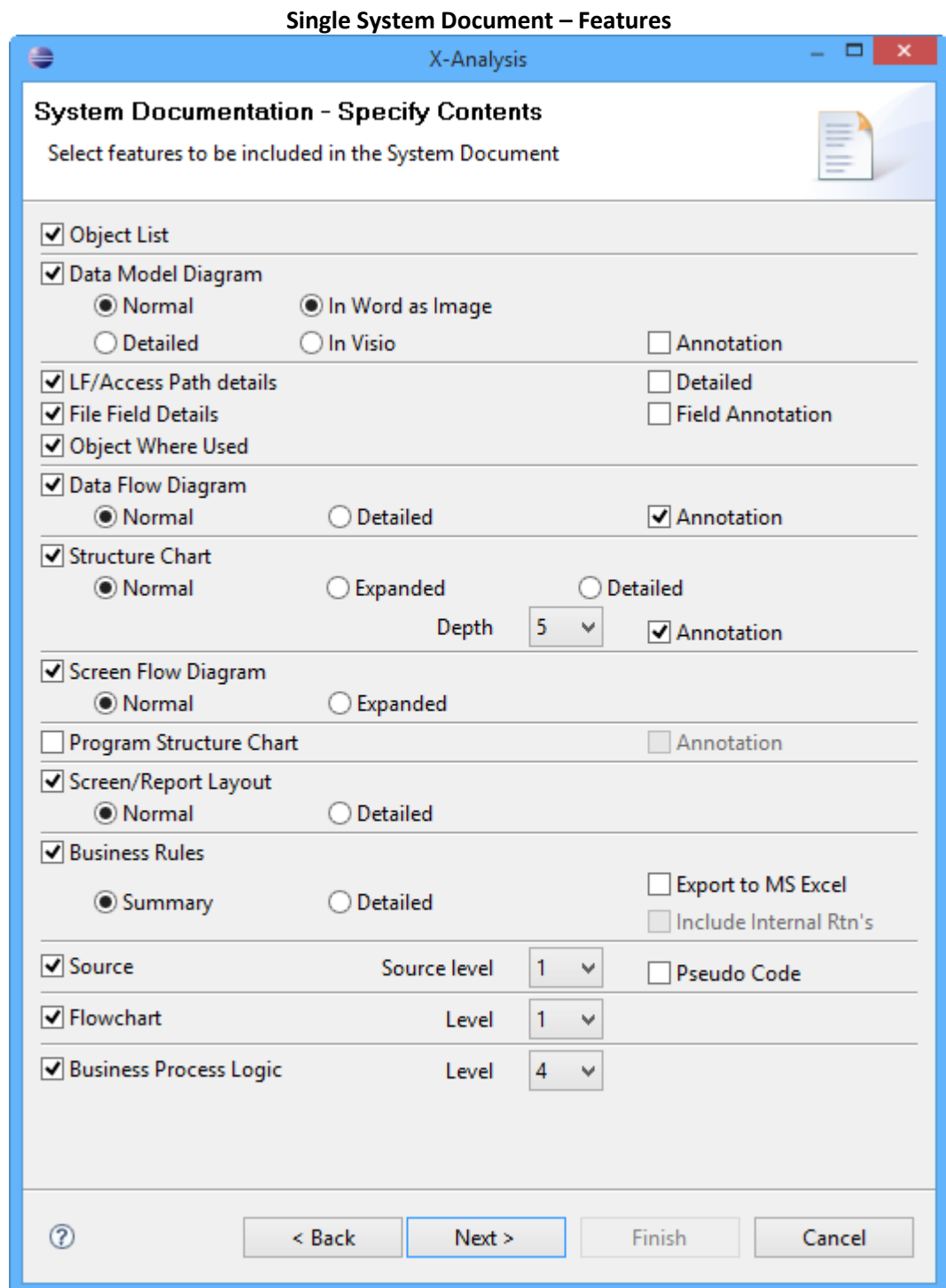
**Path** – Click the **Browse** button to change the default path. The default path is <C:\Documents and Settings\alakh\My Documents\X-Analysis Application Data\192.168.170.10\PCF\_XAN4CDXA>

Press **Next** to proceed further. For Single System Documentation, the following dialog is displayed:



A user can select different options from the above dialog as per the requirements. If a user selects the **Business Rules** for documentation, then he has the option to get the business rules documented in MS Excel. This can be done by checking the **Export to MS Excel** option. If the user selects the Business Rules for documentation with the **Summary**

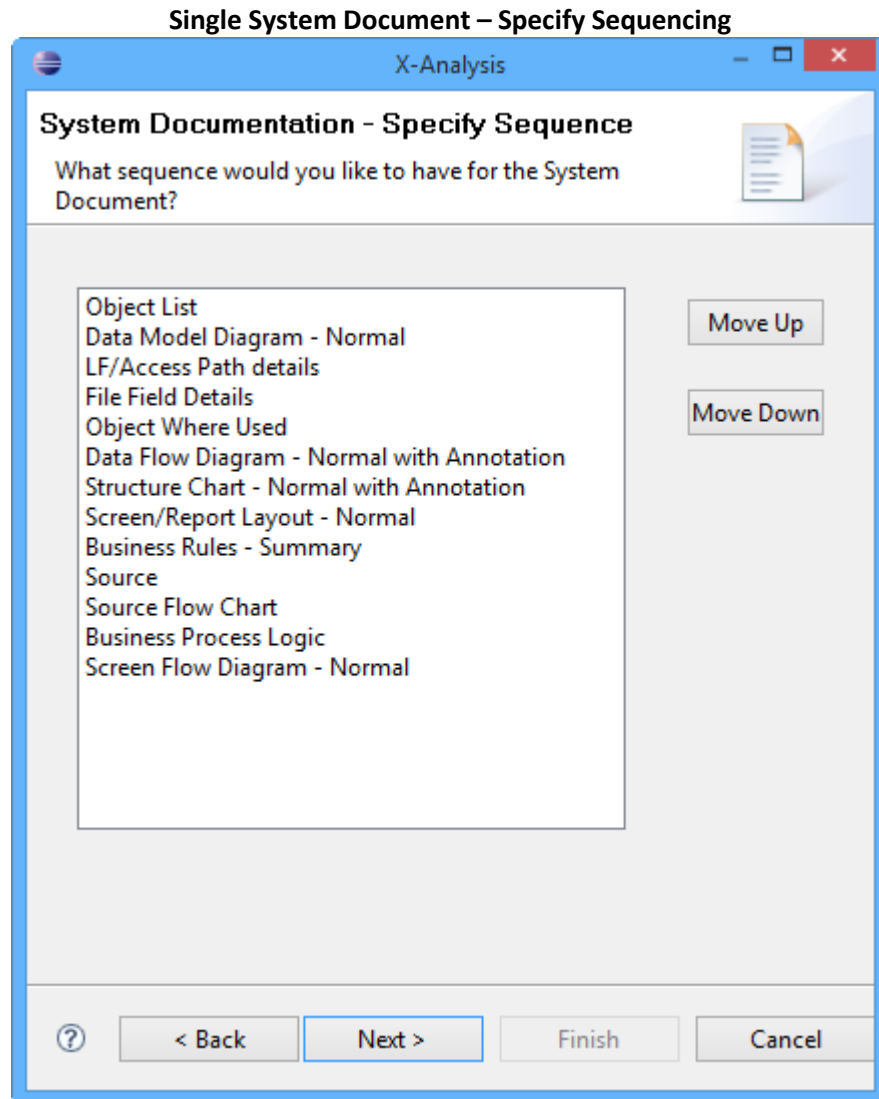
option, then the basic rule information will be documented; if the user selects the **Detailed** option, then the logic behind the rule will also be documented.



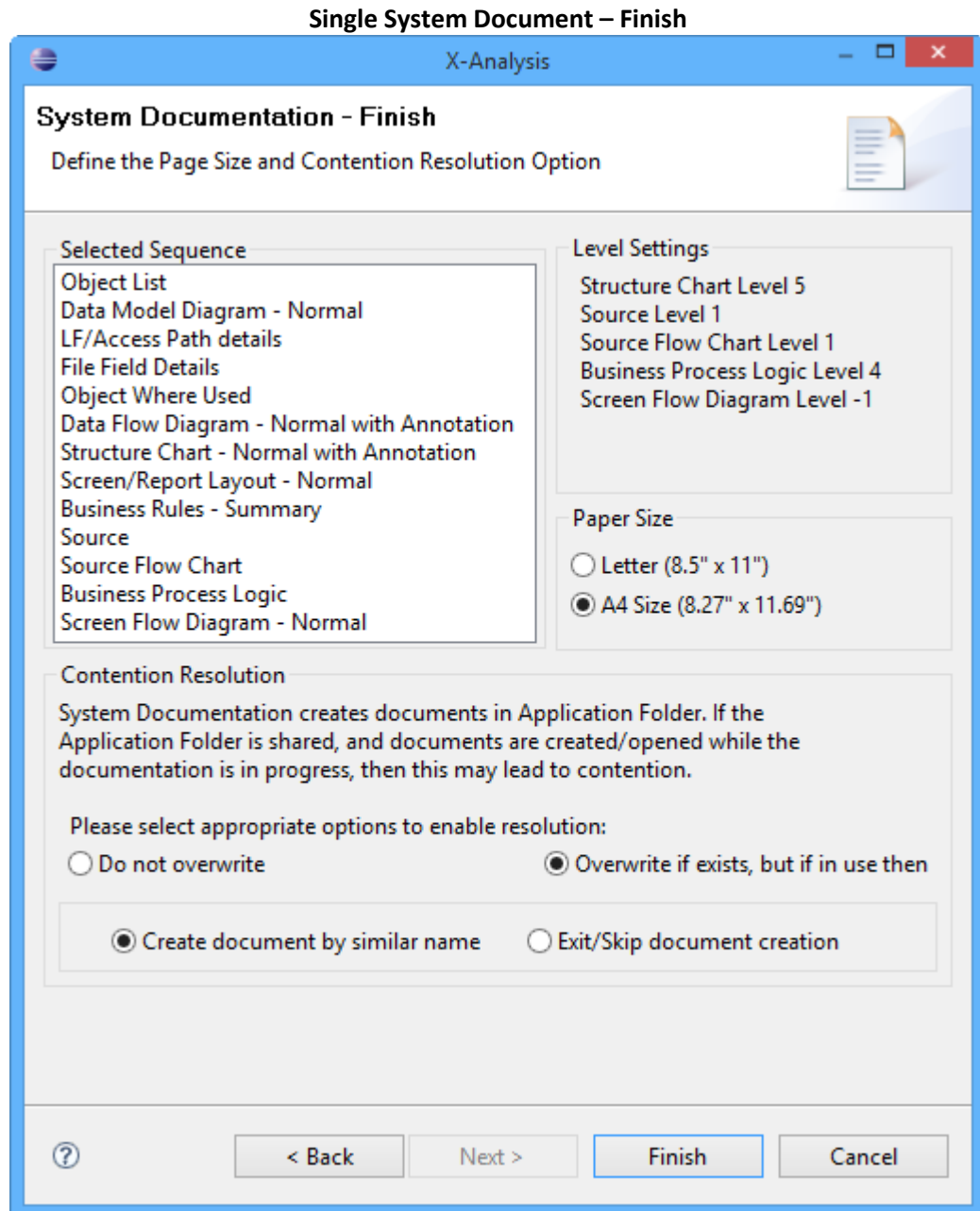
If a user selects the **Screen/Report Layout** for documentation with the **Normal** option, then the System Documentation process will print the Screen and the Fields list of

individual formats one after the other, for all the screen formats. If the **Detailed** option is selected, then it will also print the Header information, the Data Content Diagram and the Screen Action Diagram for each screen, apart from the Screens and the Fields List for all the screen formats.

Select the options to be included in the document and click **Next** to proceed further.



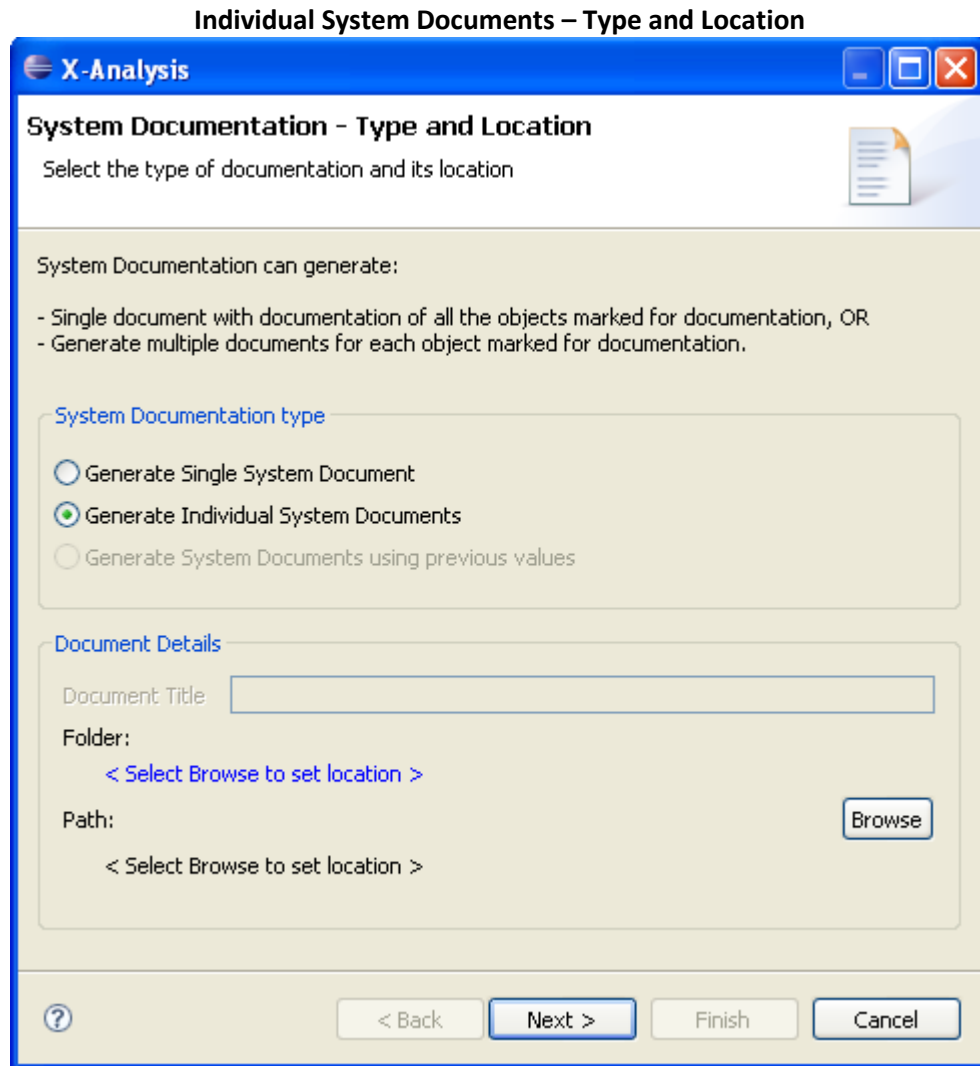
From the above screen, the user can re-sequence the options selected for the System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all the selections that he has made and can also define various options related to document formatting, like 'Paper Size', 'Contention Resolution', etc.



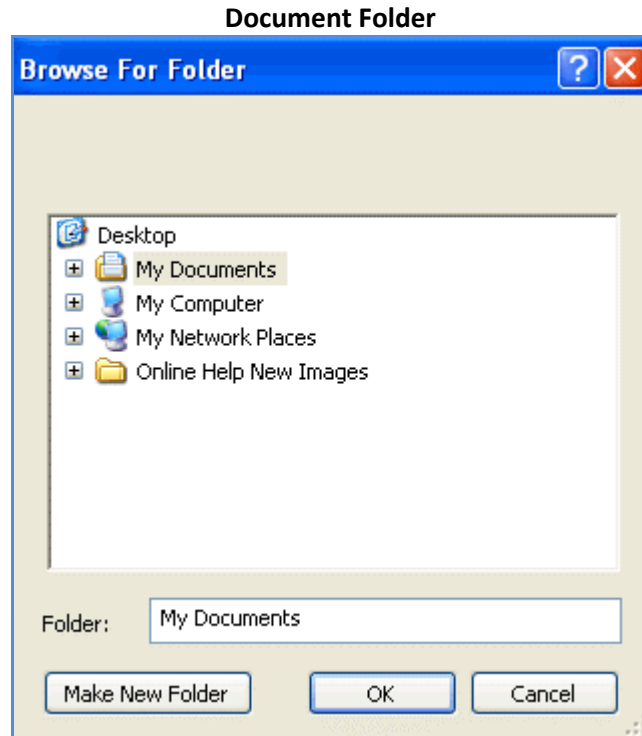
Click **Finish** to generate the document. The progress status is displayed on the screen while generating the System document. The document will be located in the specified save location.

### Generate Individual System Documents

Select the **Generate Individual System Documents** option from the following dialog:

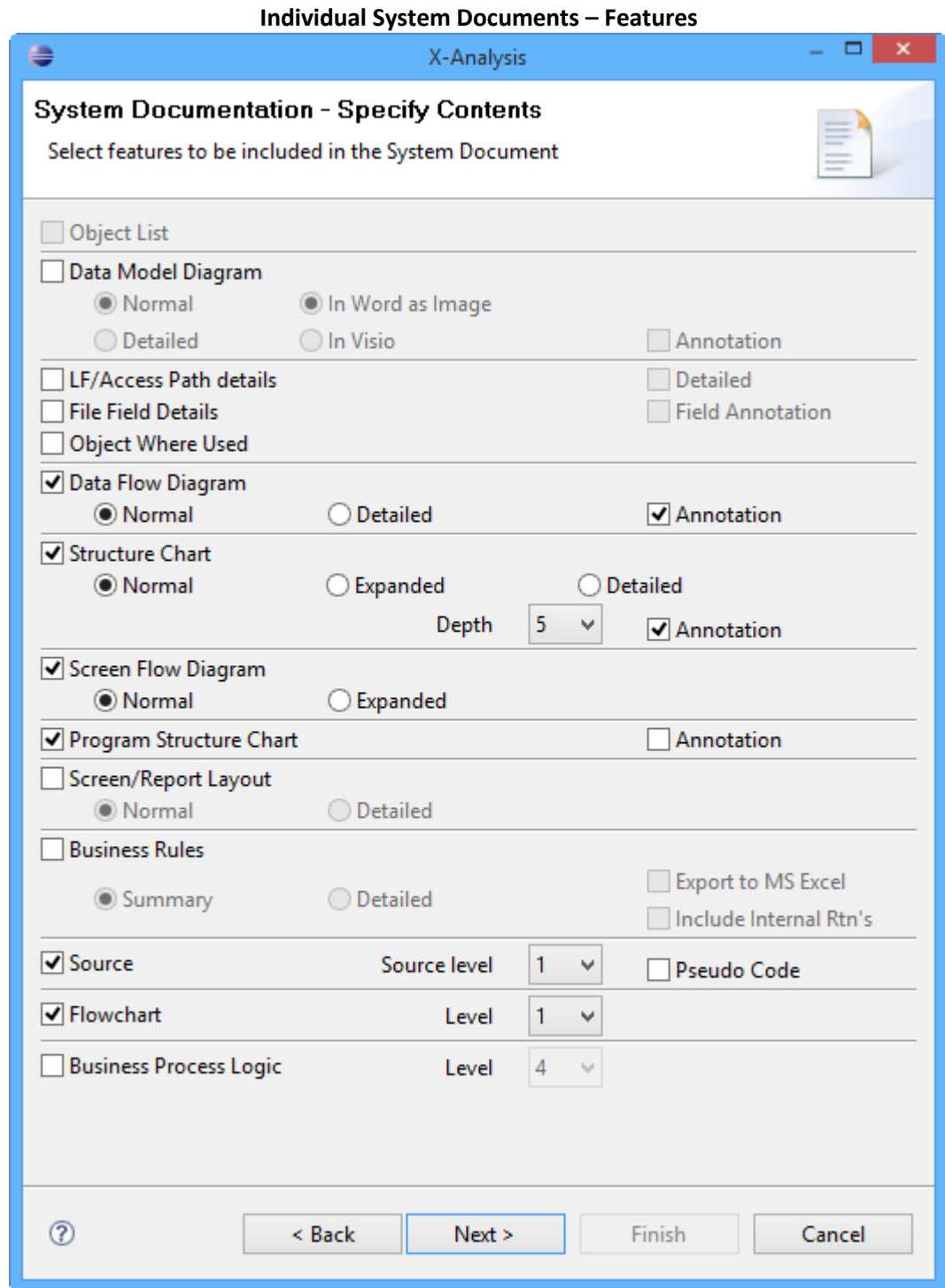


After selecting the **Generate Individual System Documents** option, click **Browse**. Select the desired location to save the document.



For the **Generate Individual System Documents** option, the following dialog is displayed after the user clicks **Next** on the System Document Wizard:





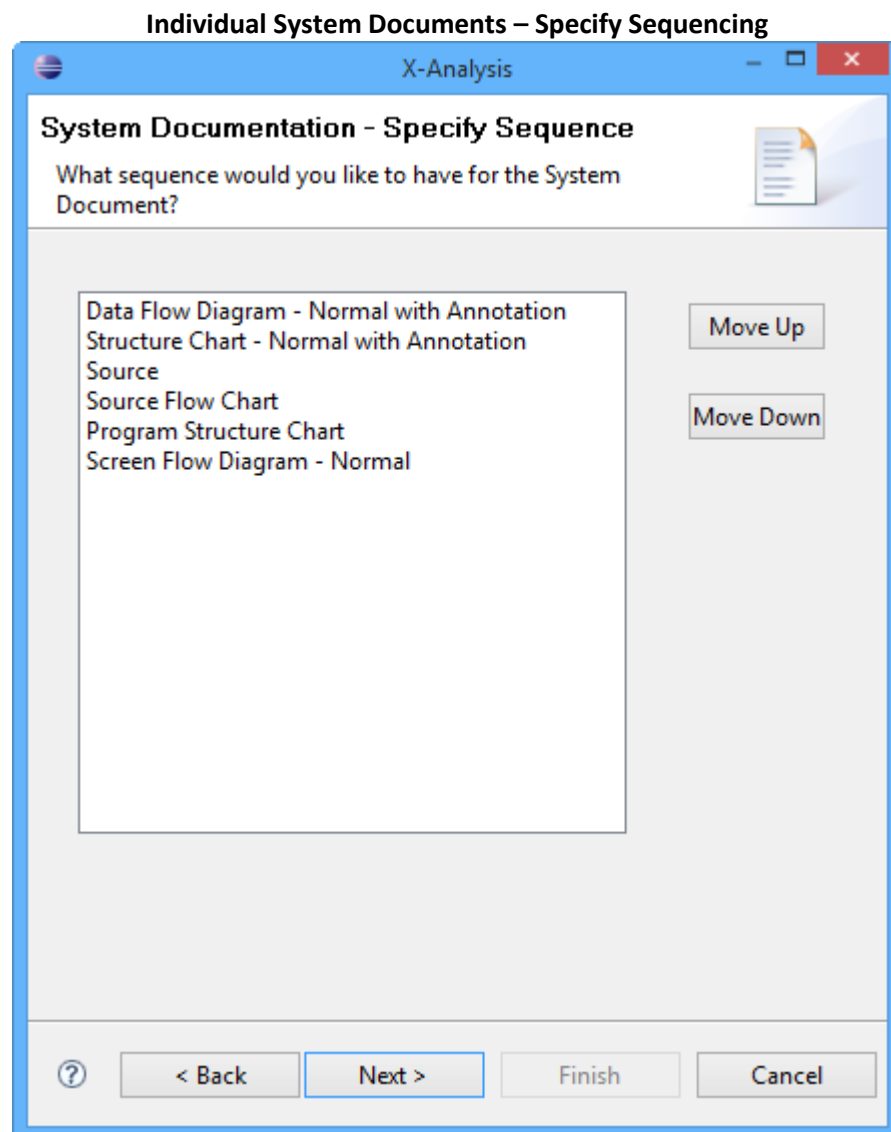
The **Object List** option is disabled in this dialog. Choose the options which you want to document from the above dialog.

If a user selects the **Business Rules** for documentation, then he has the option to get the business rules documented in MS Excel. This can be done by checking the **Export to MS Excel** option. If the user selects the Business Rules for documentation with the **Summary**

option, then the basic rule information will be documented; if he selects the **Detailed** option, then the logic behind the rule will also be documented.

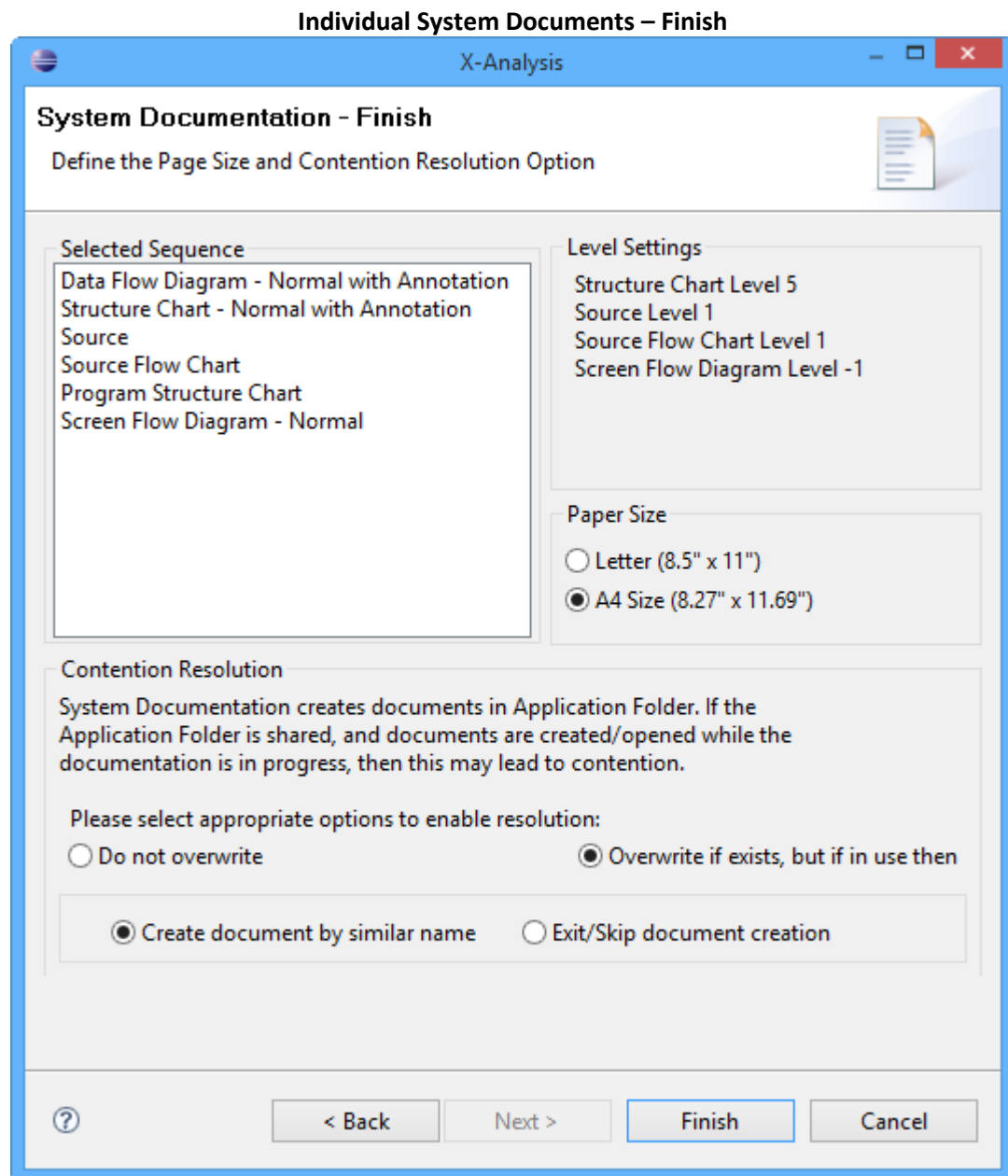
If a user selects the **Screen/Report Layout** for documentation with the **Normal** option, then the System Documentation process will print the Screen and the Fields list of individual formats one after the other, for all the screen formats. If the **Detailed** option is selected, then it will also print the Header information, the Data Content Diagram and the Screen Action Diagram for each screen, apart from the Screens and the Fields List for all the screen formats.

Click **Next** which displays the following screen:



From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all the selections that he has made and can also define

various options related to document formatting, like 'Paper Size', 'Contention Resolution', etc.



Click **Finish** to generate the document. The progress status is displayed on screen while generating the system document. The generated document will be available in the specified saved location.

### System Documents using previous values

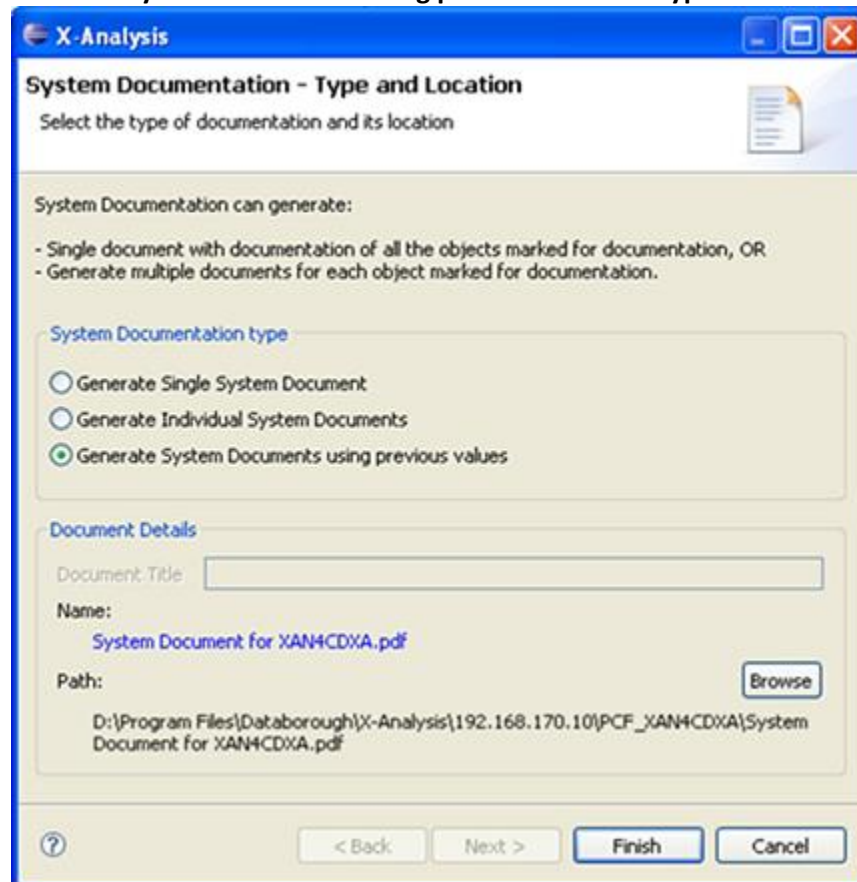
X-Analysis provides a unique feature of recalling previous options opted by the user in the System Documentation process. With the help of this feature the user can generate a

System Document without selecting the same options again for the System Documentation process.

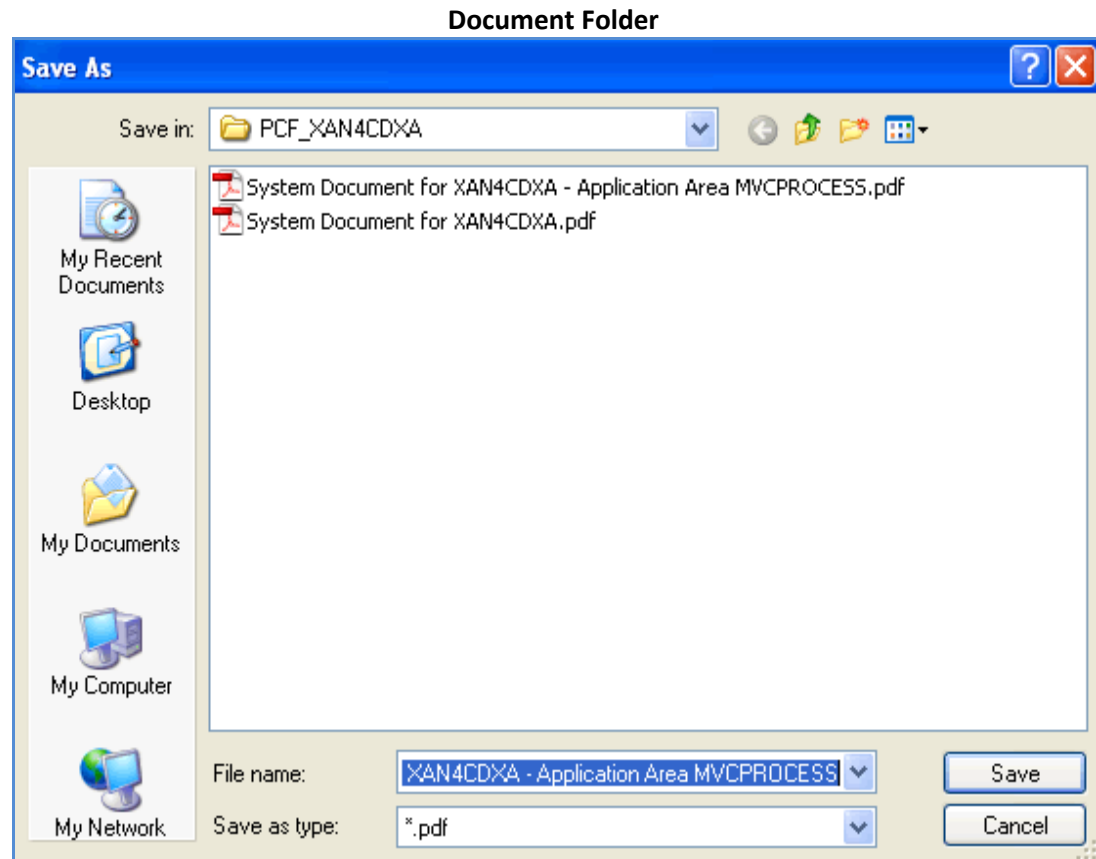
The **Generate System Documents using previous values** option can be used by the user when he wants to generate the System Document using the previous options selected for the System Documentation.

This option gets disabled if the user switched to generate the System Document for Application Area from System Documentation for Object(s) or vice-versa. Start the Documenter (either by marking individual Objects for Documentation or selecting the **Documenter** option on Application Area). Select the **Generate System Documents using previous values** option from the documentation wizard as shown below:

### Generate System Documents using previous values – Type and Location



After selecting the **Generate System Documents using previous values** option, click **Browse** to invoke the **Save As** dialog. Select the desired location to save the document and enter a new file name, if required.

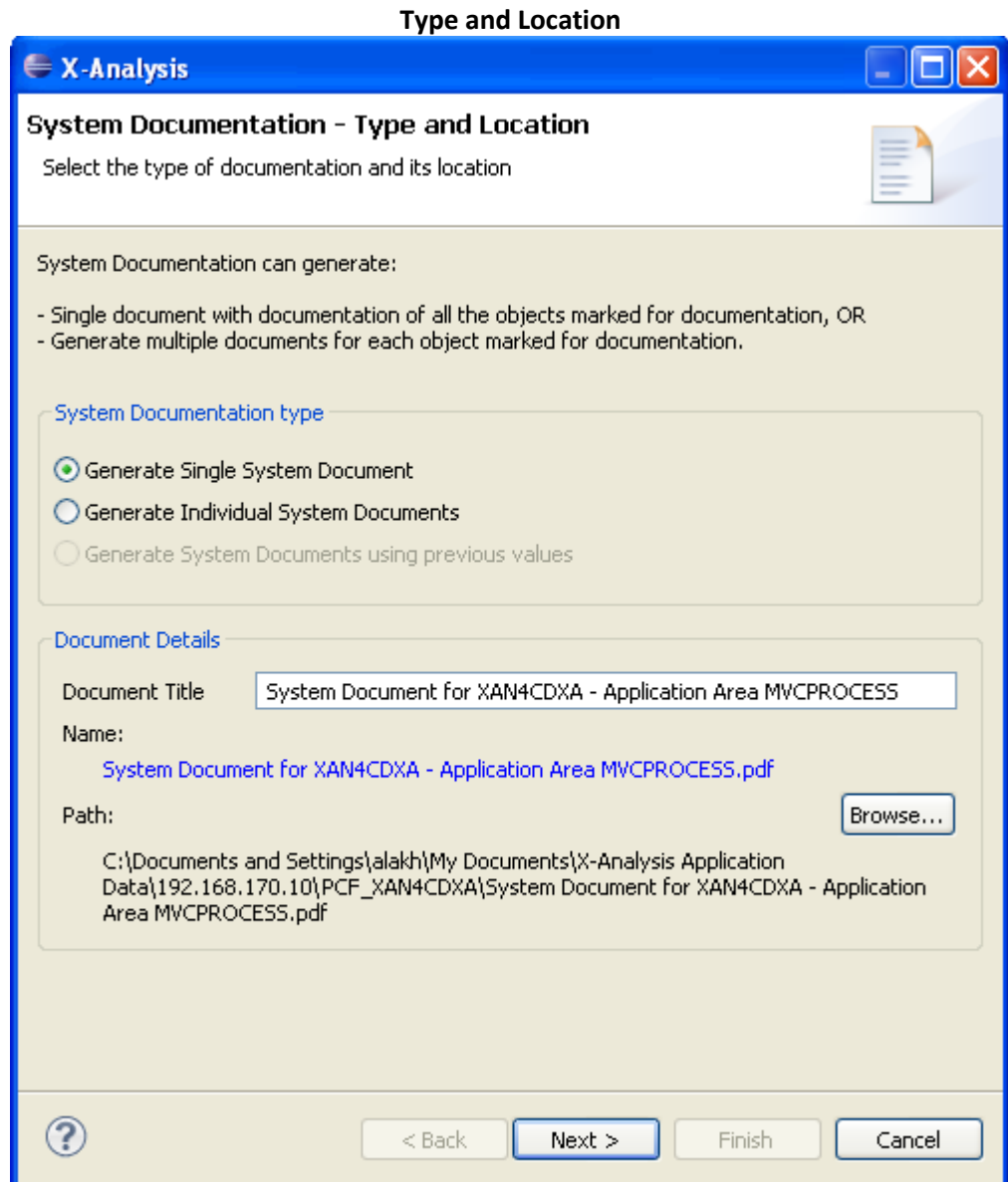


Then, click **Finish** to initiate the System Documentation Process.

## DOCUMENTING AN APPLICATION AREA

The **Document Application Area** option documents all information about objects belonging to the selected application area. This option is available on the context menu of an application area and invokes the System Documentation Wizard.

On selecting the **Document Application Area** option, the following System Documentation Wizard appears:

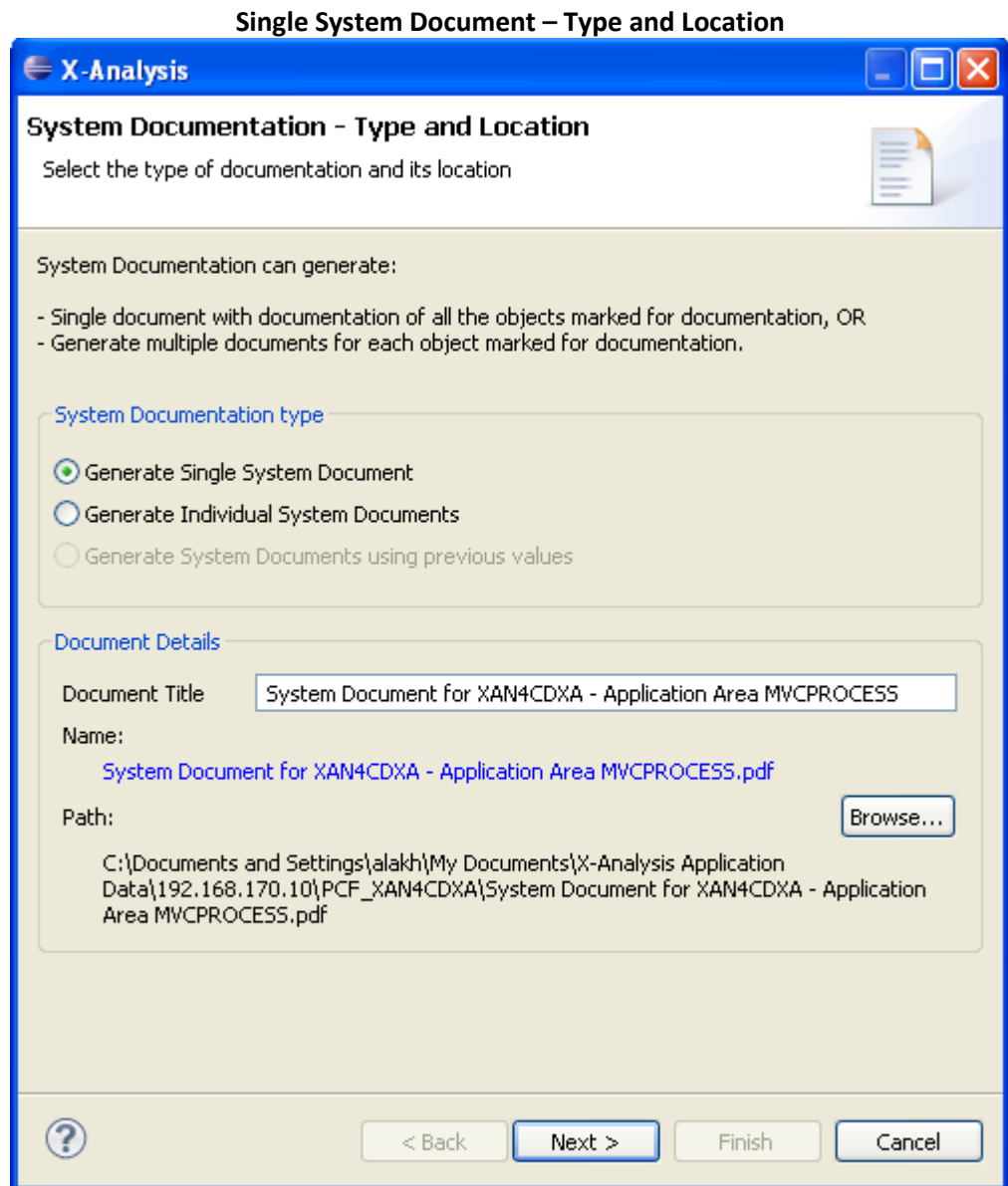


You can choose from the following options:

1. Generate a single document with documentation for all objects marked for documentation in the Application Area.
2. Generate individual documents for all object marked for documentation in the Application Area.
3. Generate System Document using previous values for the Application Area.

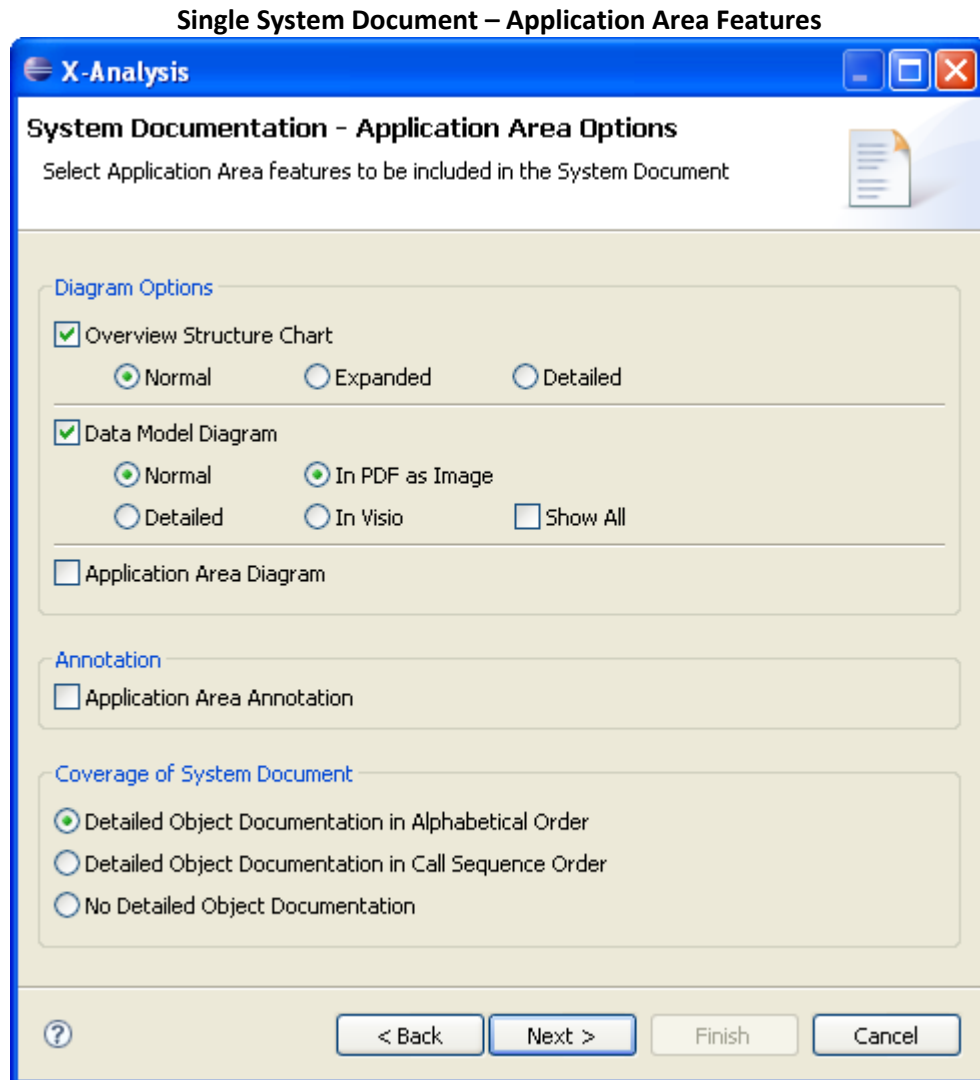
## Document Application Area-Single System Document

Select the **Generate Single System Document** option, as displayed below:



To change the default document name and path, click **Browse** to specify new document name and path. The default location is <Application Folder>.

After this step, click **Next** to proceed further as shown below:



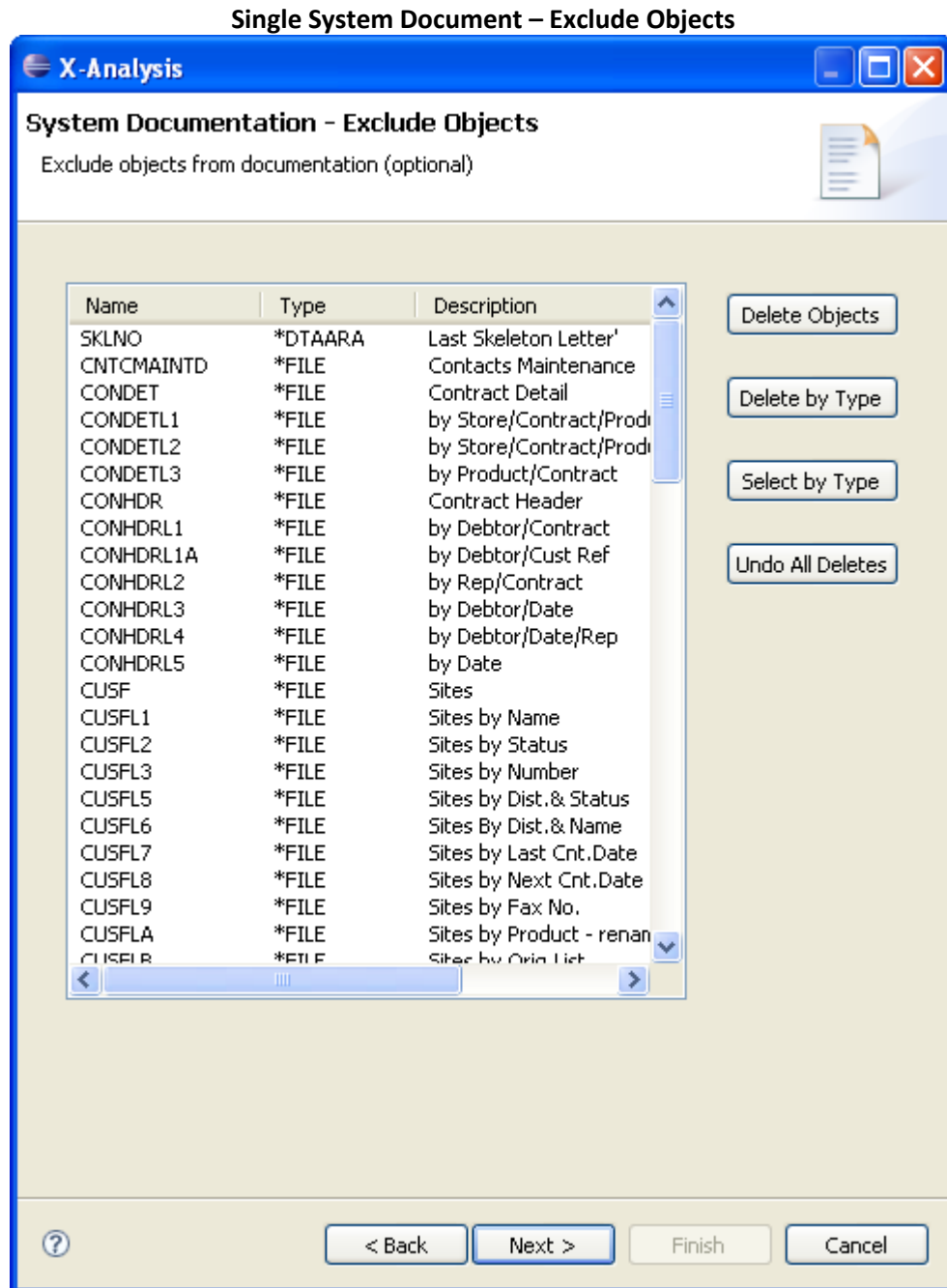
The **Overview Structure Chart** and the **Data Model Diagram** options mentioned in this dialog are only for the selected application area.

The wizard dialog displayed above has a section called '**Coverage of System Document**'. This section has three options; depending upon these three options, the System Document differs in its approach. Let us see how these three options work.

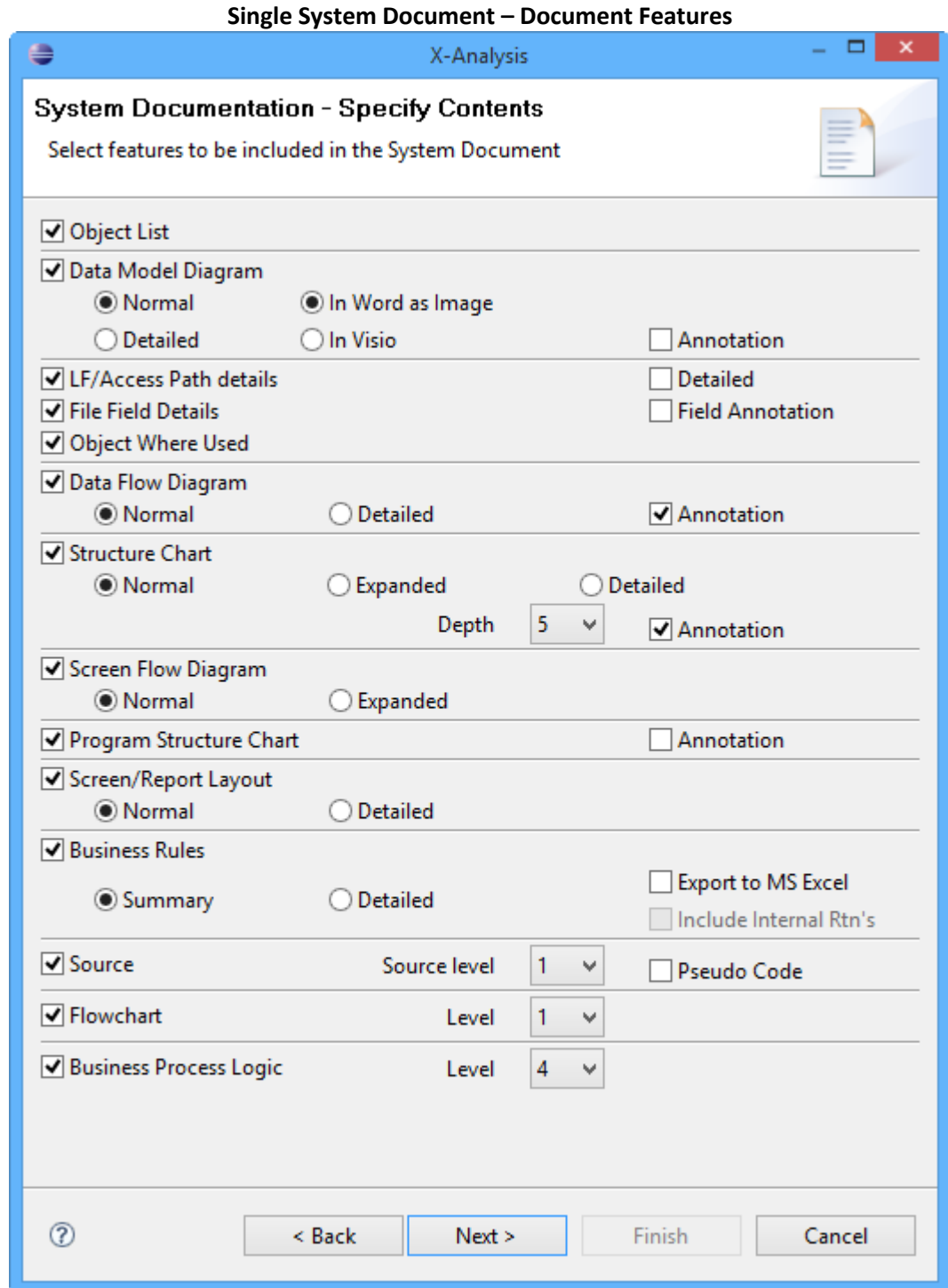
#### **Detailed Object Documentation in Alphabetical Order**

If the **Detailed Object Documentation in Alphabetical Order** option is selected, then the object documentation proceeds in ascending alphabetical order of the name of objects in the application area. The following dialog is displayed in the wizard:



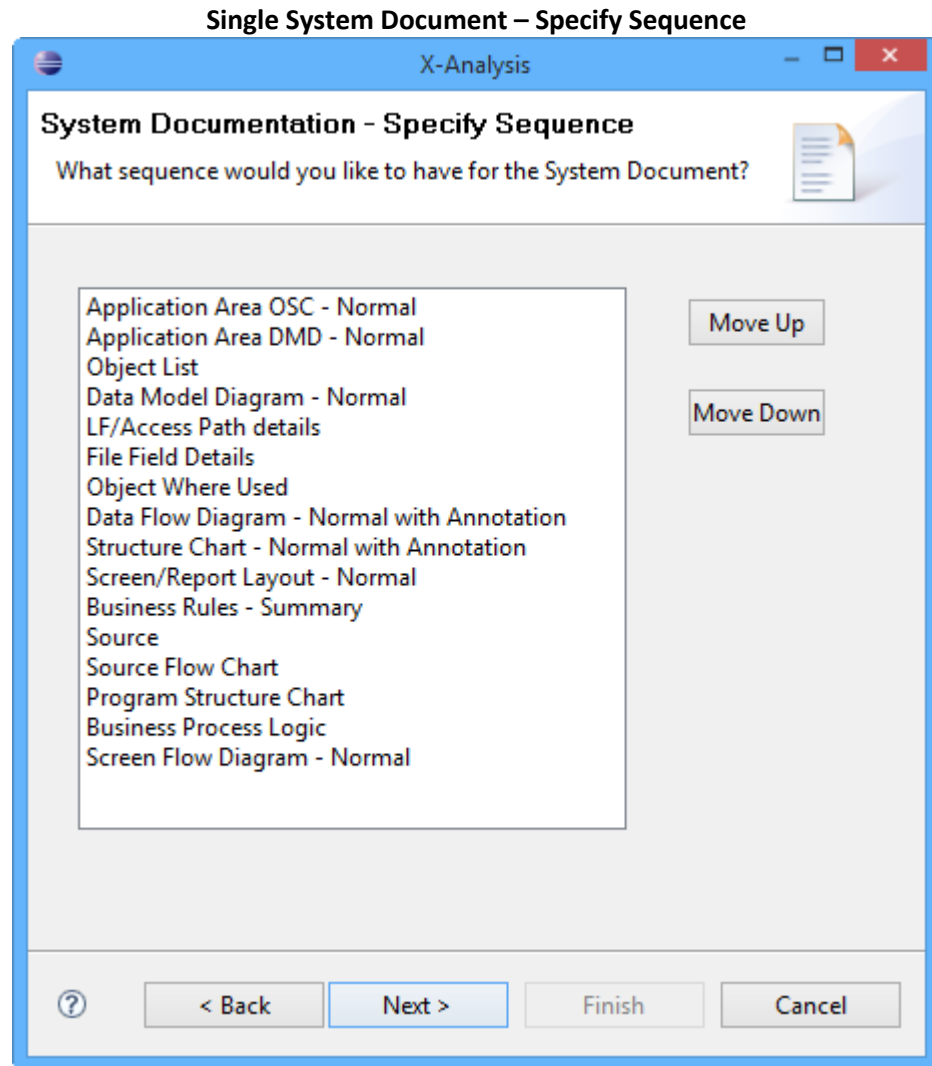


The dialog offers removal of objects from the system documentation process, based on the name/type of objects. The selected name/type can be removed using the **Delete** buttons.

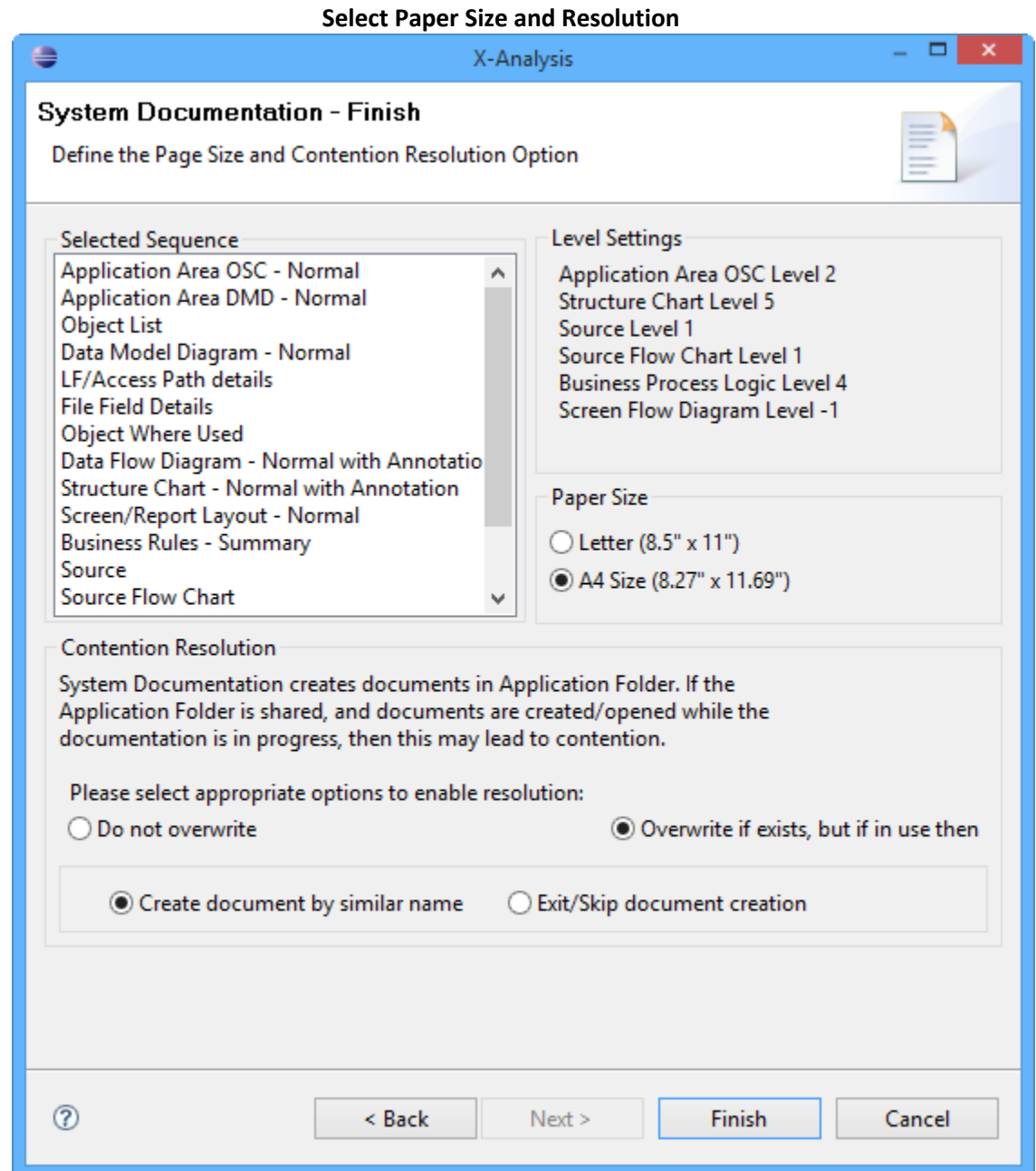


Choose the options which you want to document from the above dialog.

Click **Next** which will display the following screen:



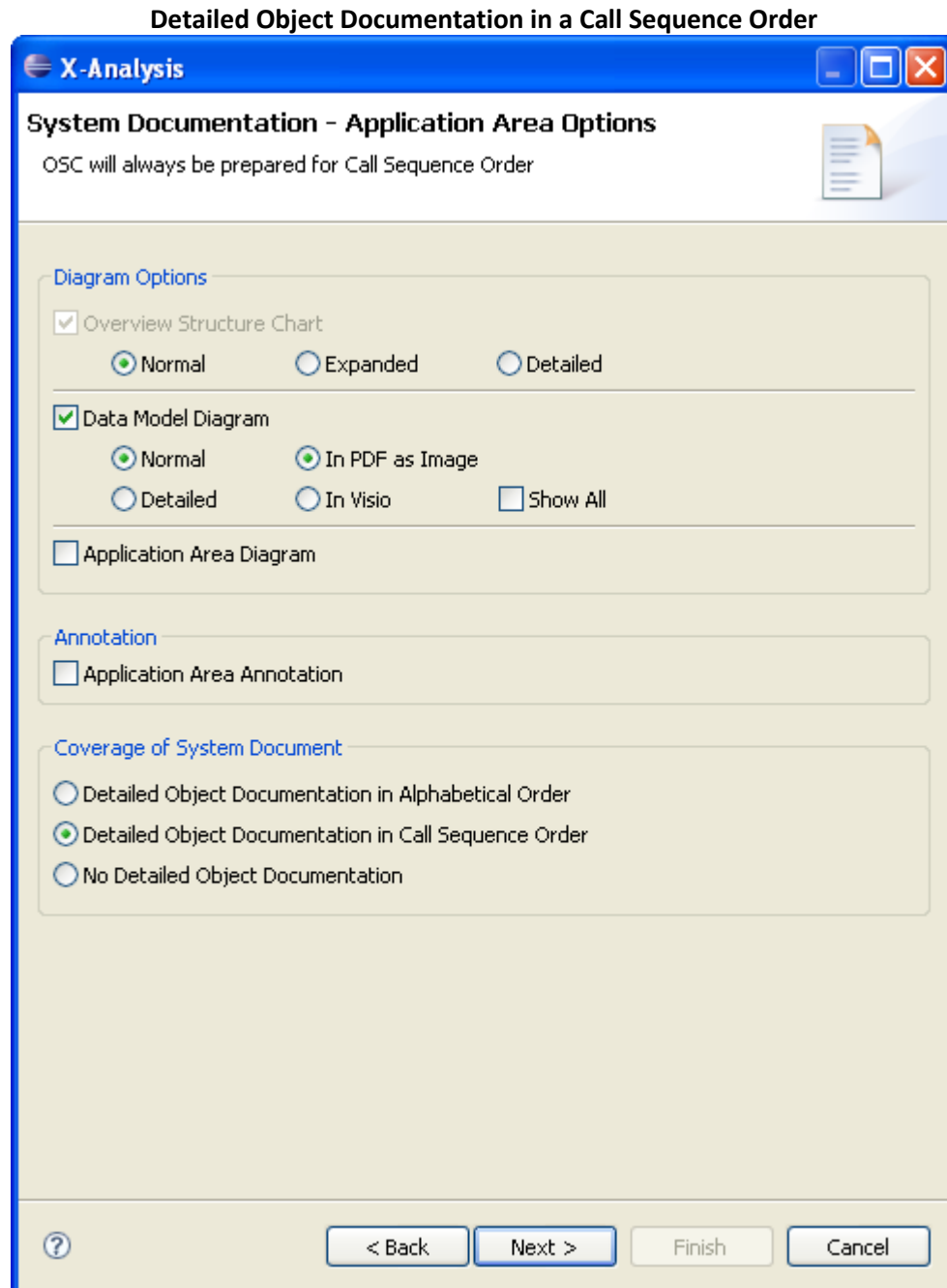
From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.



Click **Finish** to generate the document.

### Detailed Object Documentation in Call Sequence Order

If the **Detailed Object Documentation in Call Sequence Order** option is selected, then the object documentation is based on the Overview Structure Chart for the selected application area. For this option, the Overview Structure Chart is always generated.



Click **Next** to proceed further.

**Detailed Object Documentation – Document Features**

X-Analysis

---

**System Documentation - Specify Contents**

Select features to be included in the System Document

---

Object List

---

Data Model Diagram

Normal       In Word as Image  
 Detailed       In Visio

Annotation

---

LF/Access Path details       Detailed

File Field Details       Field Annotation

Object Where Used

---

Data Flow Diagram

Normal       Detailed

Annotation

---

Structure Chart

Normal       Expanded       Detailed

Depth

Annotation

---

Screen Flow Diagram

Normal       Expanded

---

Program Structure Chart       Annotation

---

Screen/Report Layout

Normal       Detailed

---

Business Rules

Summary       Detailed

Export to MS Excel  
 Include Internal Rtn's

---

Source      Source level

Pseudo Code

---

Flowchart      Level

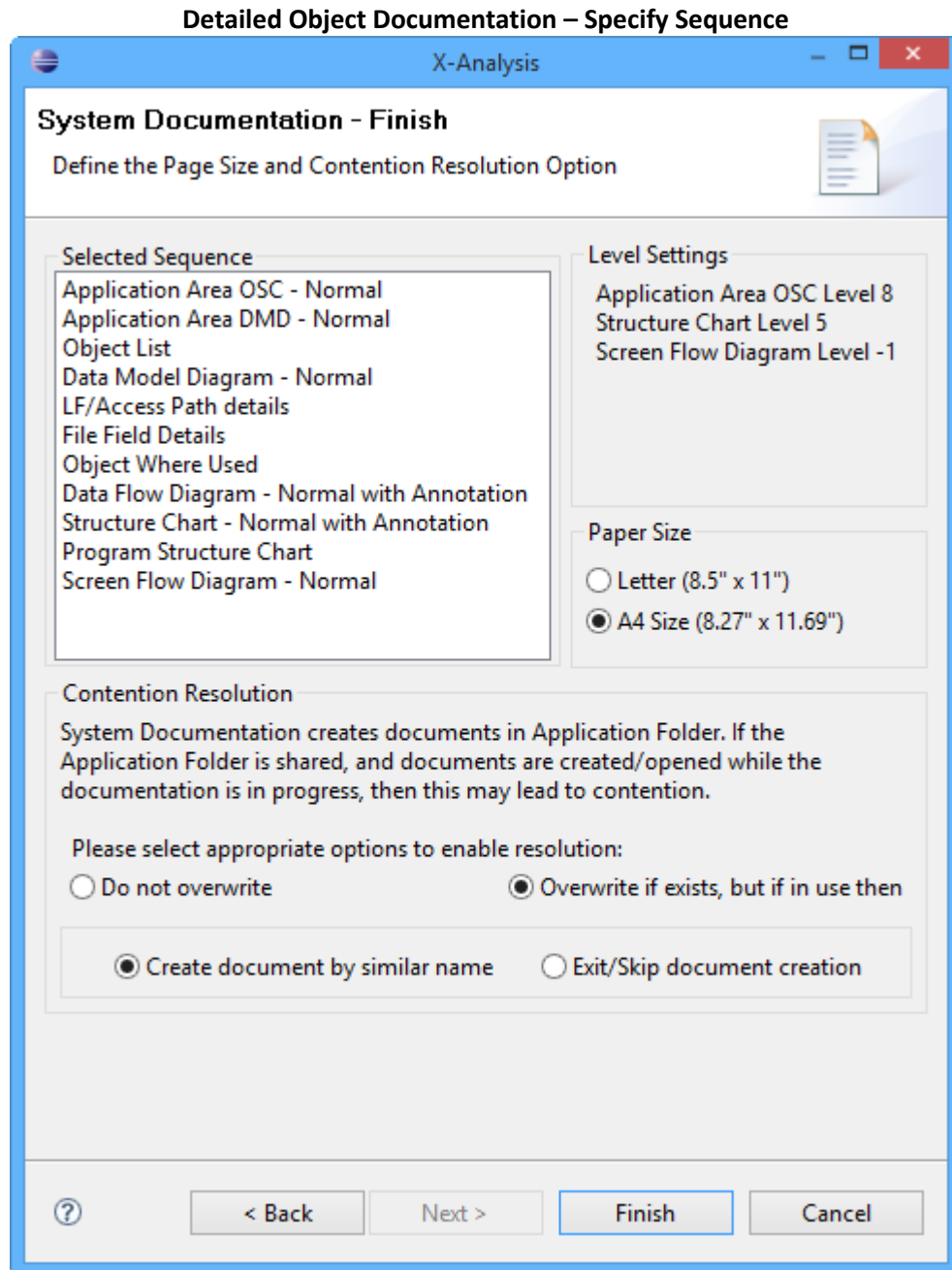
---

Business Process Logic      Level

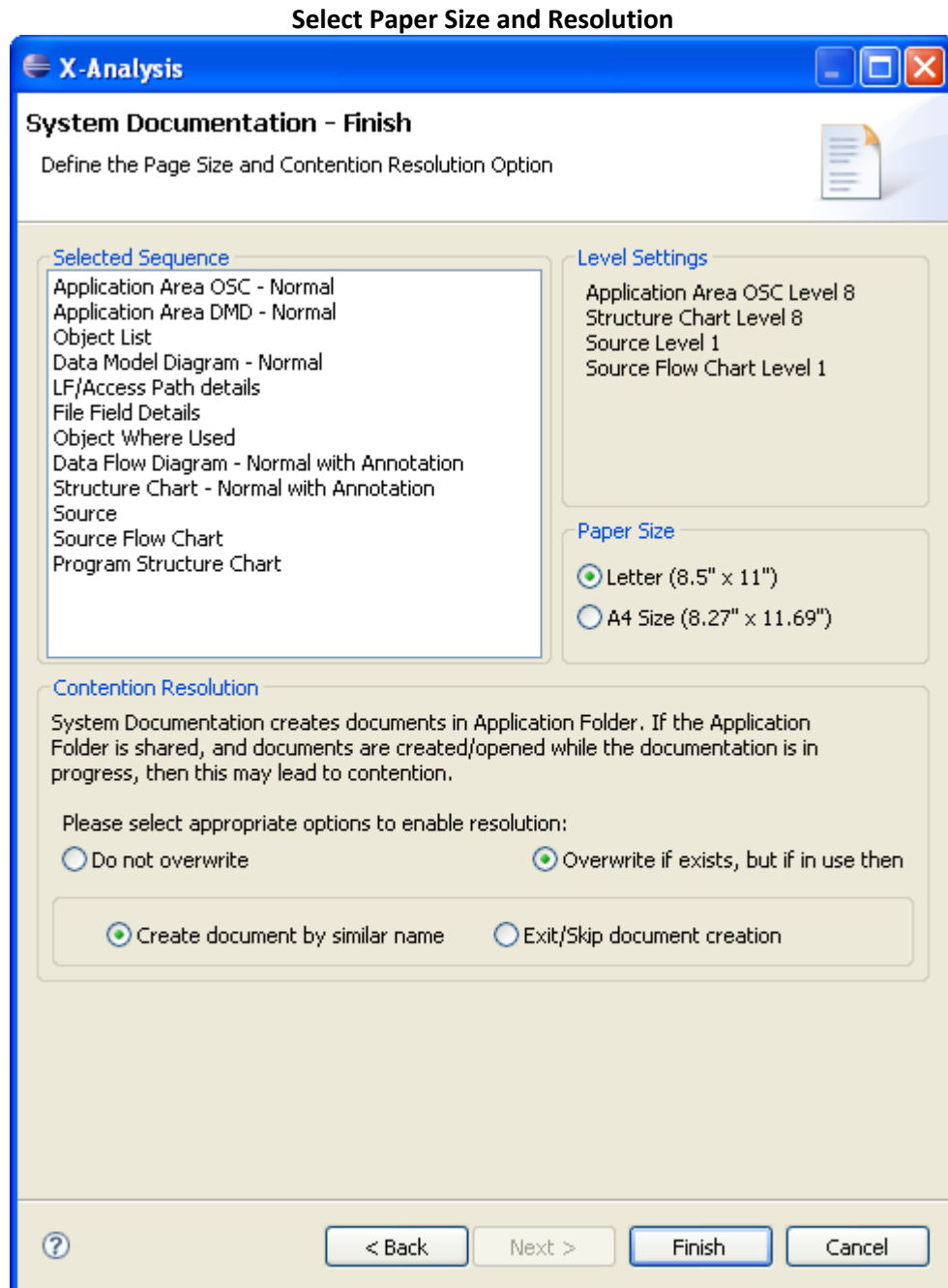
---

Choose the options which you want to document from the above dialog.

Click **Next** to proceed further.



From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.

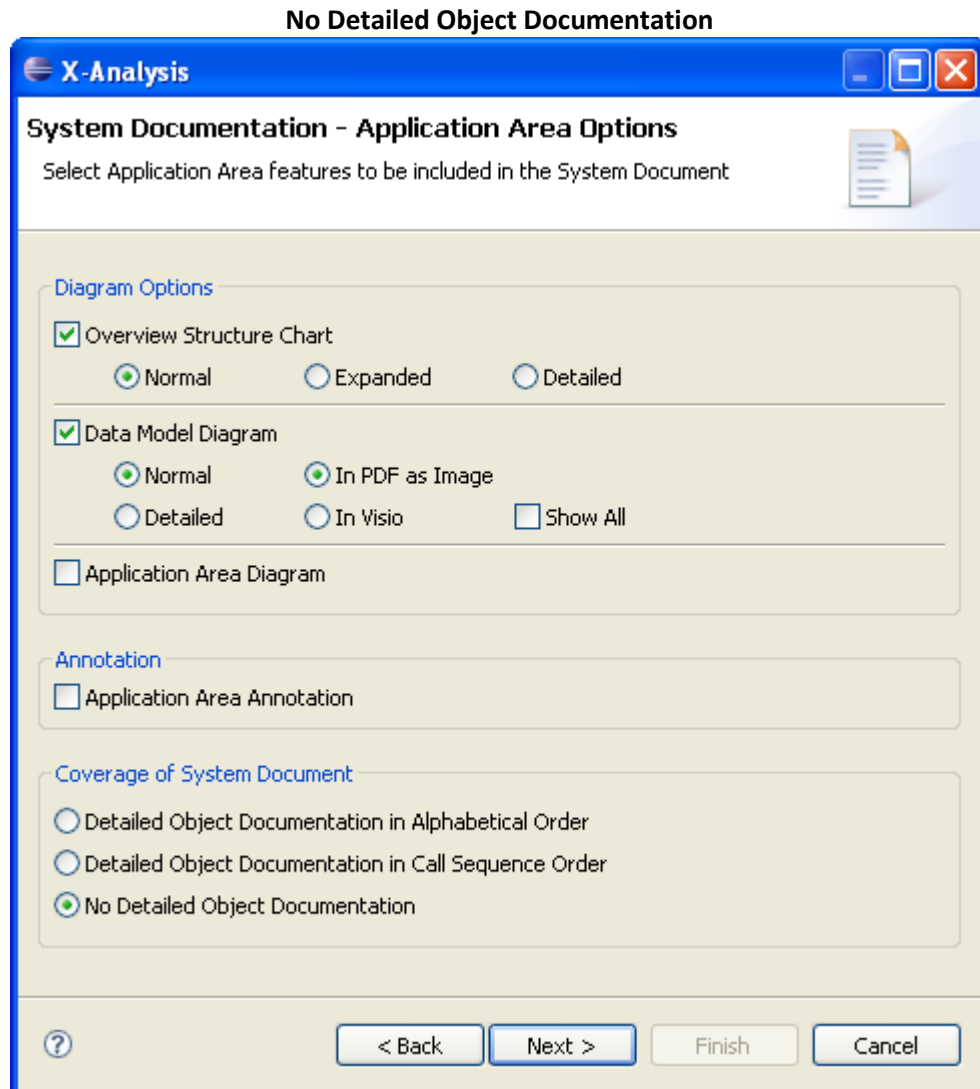


Click **Finish** to generate the document.

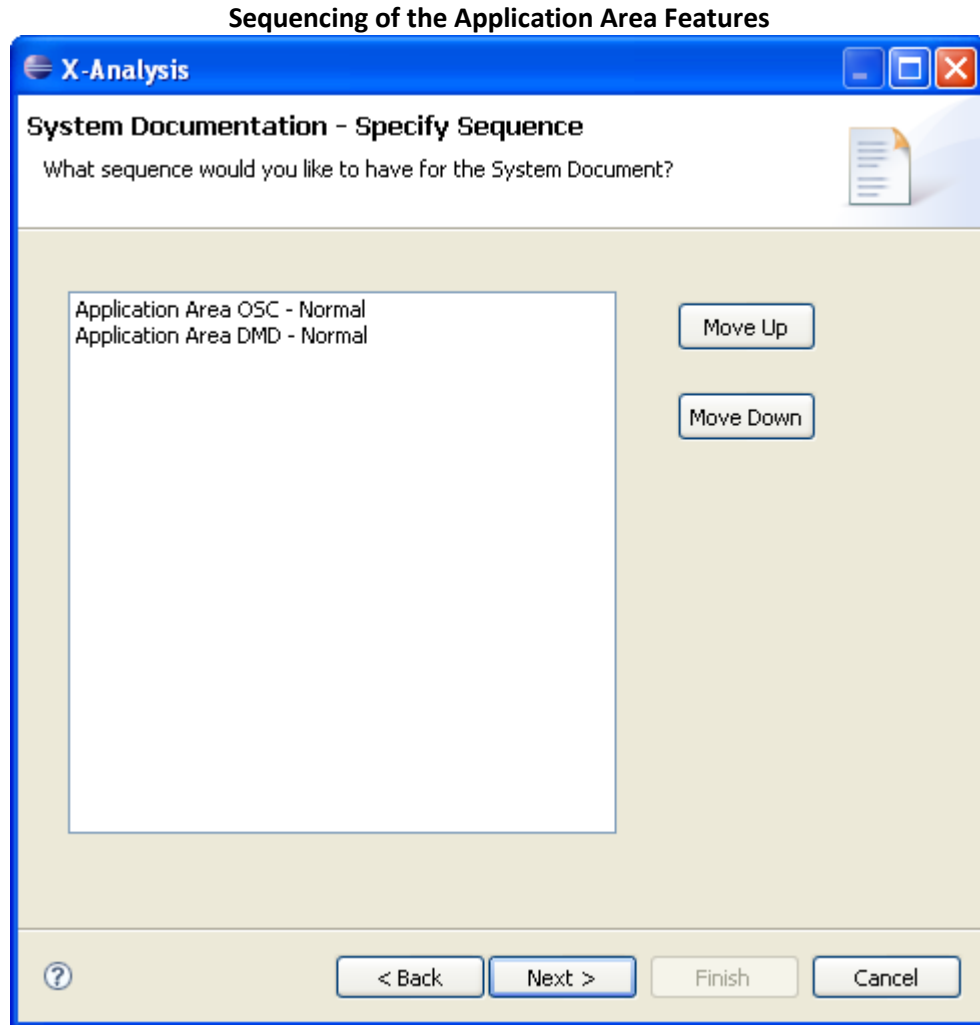
### No Detailed Object Documentation

If the **No Detailed Object Documentation** option is selected, then only the Overview Structure Chart and/or the Data Model Diagram as specified in the **Application Area Options** dialog is created.

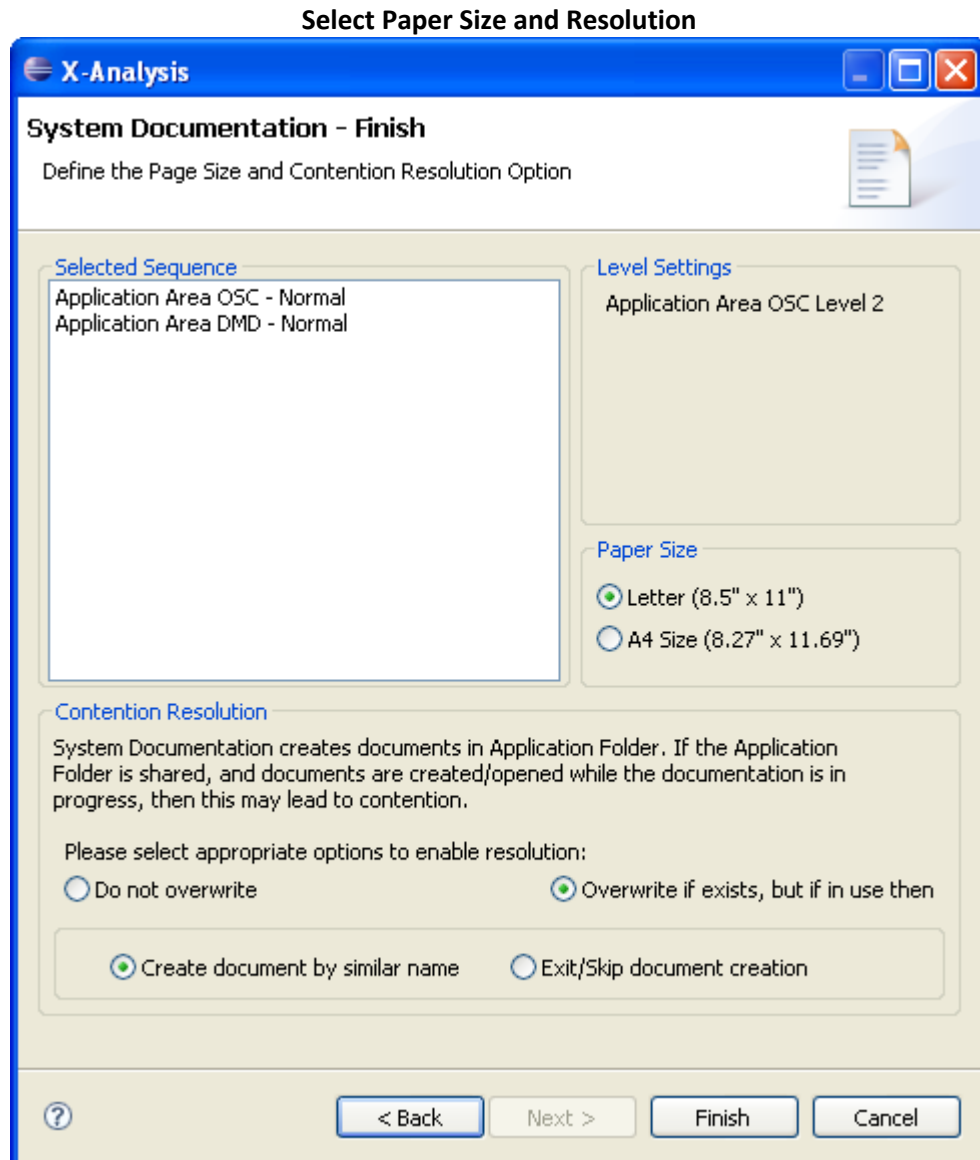




Click **Next** to proceed further.



From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.



Click **Finish** to generate the document.

### Document Application Area – Individual System Documents

Select the **Generate Individual System Documents** option, as displayed below:

**Document Application Area – Individual System Documents**

**System Documentation - Type and Location**

Select the type of documentation and its location

System Documentation can generate:

- Single document with documentation of all the objects marked for documentation, OR
- Generate multiple documents for each object marked for documentation.

**System Documentation type**

Generate Single System Document

Generate Individual System Documents

Generate System Documents using previous values

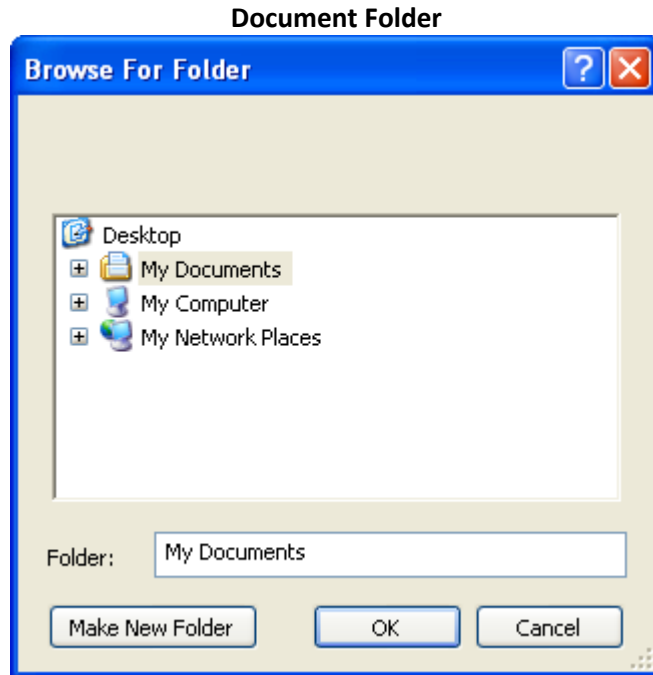
**Document Details**

Document Title:

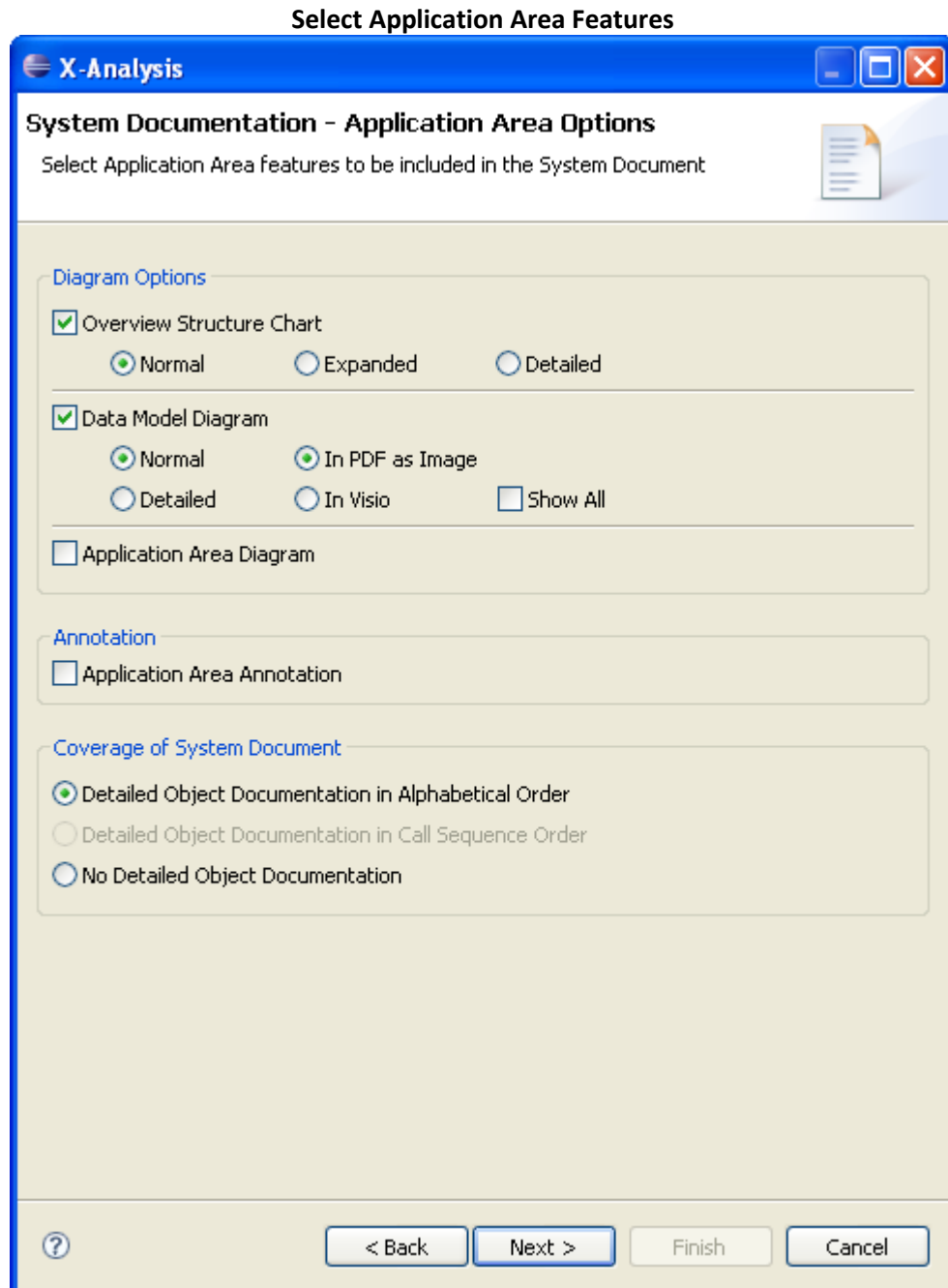
Folder: [< Select Browse to set location >](#)

Path:  [< Select Browse to set location >](#)

Click **Browse** to select the desired location to save the document and enter a new filename, if required.



After selecting the desired location for documentation and providing the file name, the System Documentation wizard processes further, as shown below:

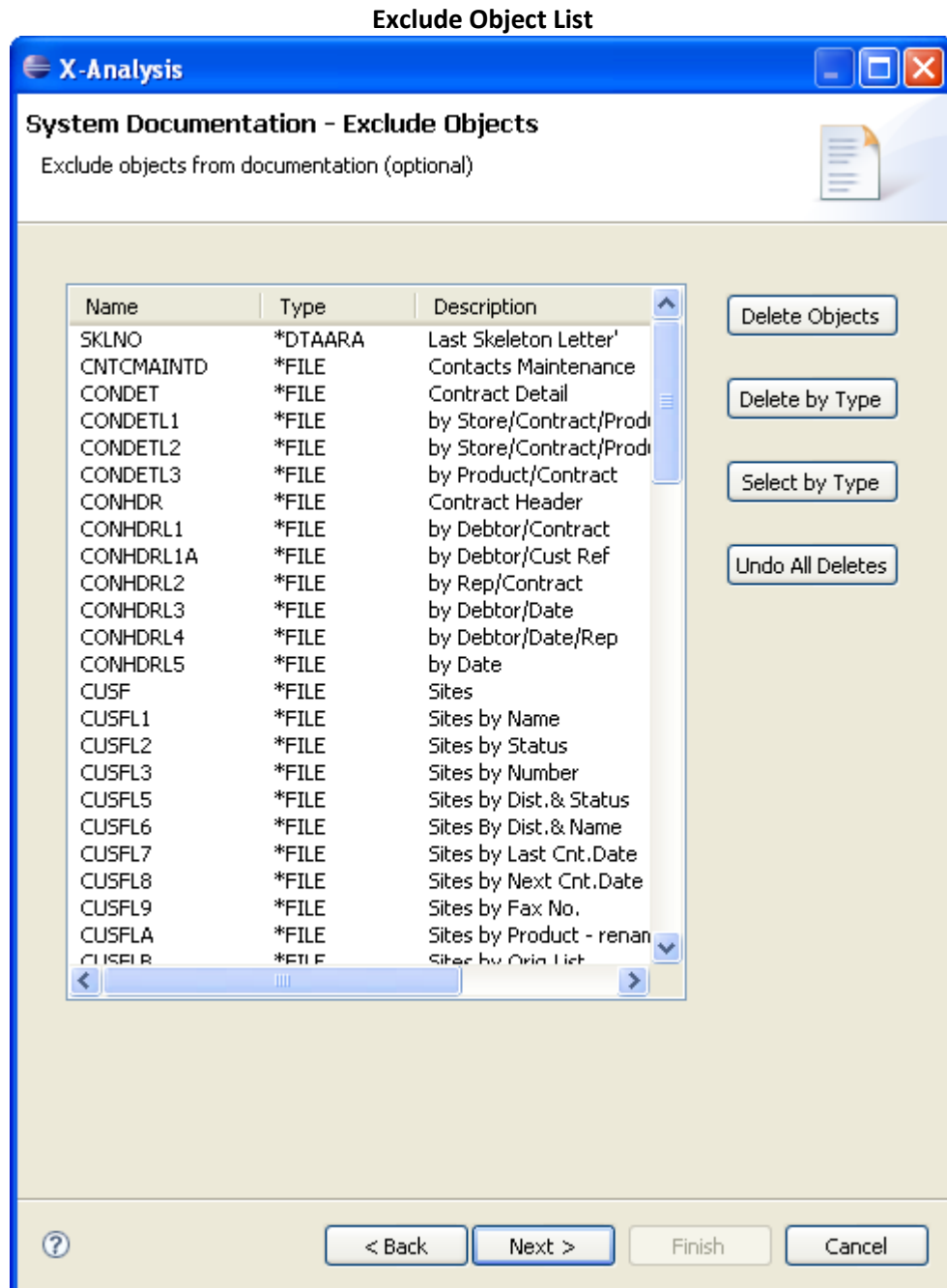


The **Overview Structure Chart** and the **Data Model Diagram** options mentioned in the above dialog box are only for the selected application area.

The wizard dialog displayed above has a section called '**Coverage of System Document**'. This section has two options, depending on which the System Document differs in its approach. Let us see how these two options work.

### Detailed Object Documentation in Alphabetical Order

If the **Detailed Object Documentation in Alphabetical Order** is selected, then the object documentation generates in ascending alphabetical order of Object name from the application area. The following dialog is displayed in the wizard:



The dialog offers removal of objects from system documentation, based on name/type of objects. The selected name/type can be removed using the **Delete** buttons. Click **Next** to proceed further.

**Features to Document**

X-Analysis

**System Documentation - Specify Contents**

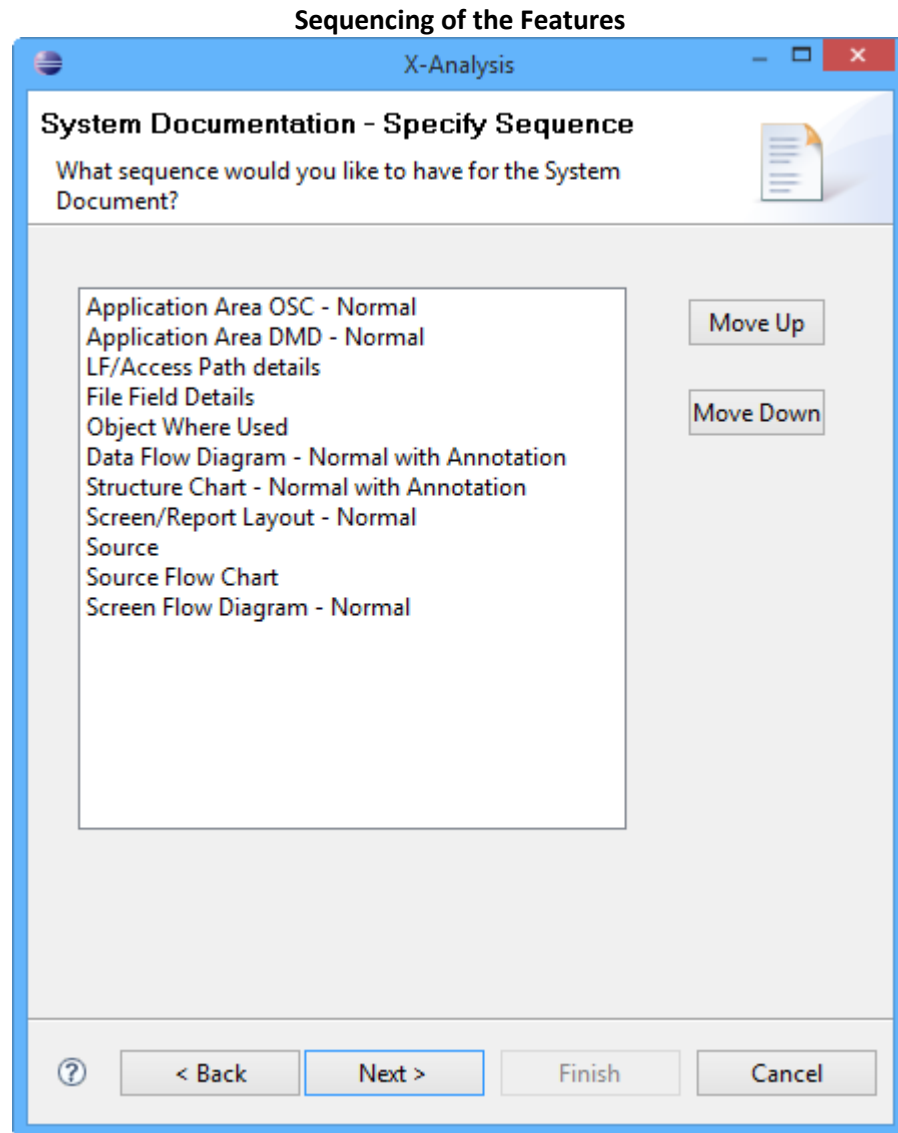
Select features to be included in the System Document

- Object List
- Data Model Diagram
  - Normal  In Word as Image
  - Detailed  In Visio  Annotation
- LF/Access Path details  Detailed
- File Field Details  Field Annotation
- Object Where Used
- Data Flow Diagram
  - Normal  Detailed  Annotation
- Structure Chart
  - Normal  Expanded  Detailed
  - Depth   Annotation
- Screen Flow Diagram
  - Normal  Expanded
- Program Structure Chart  Annotation
- Screen/Report Layout
  - Normal  Detailed
- Business Rules
  - Summary  Detailed  Export to MS Excel
  - Include Internal Rtn's
- Source Source level   Pseudo Code
- Flowchart Level
- Business Process Logic Level

Choose the options which you want to document from the above dialog.

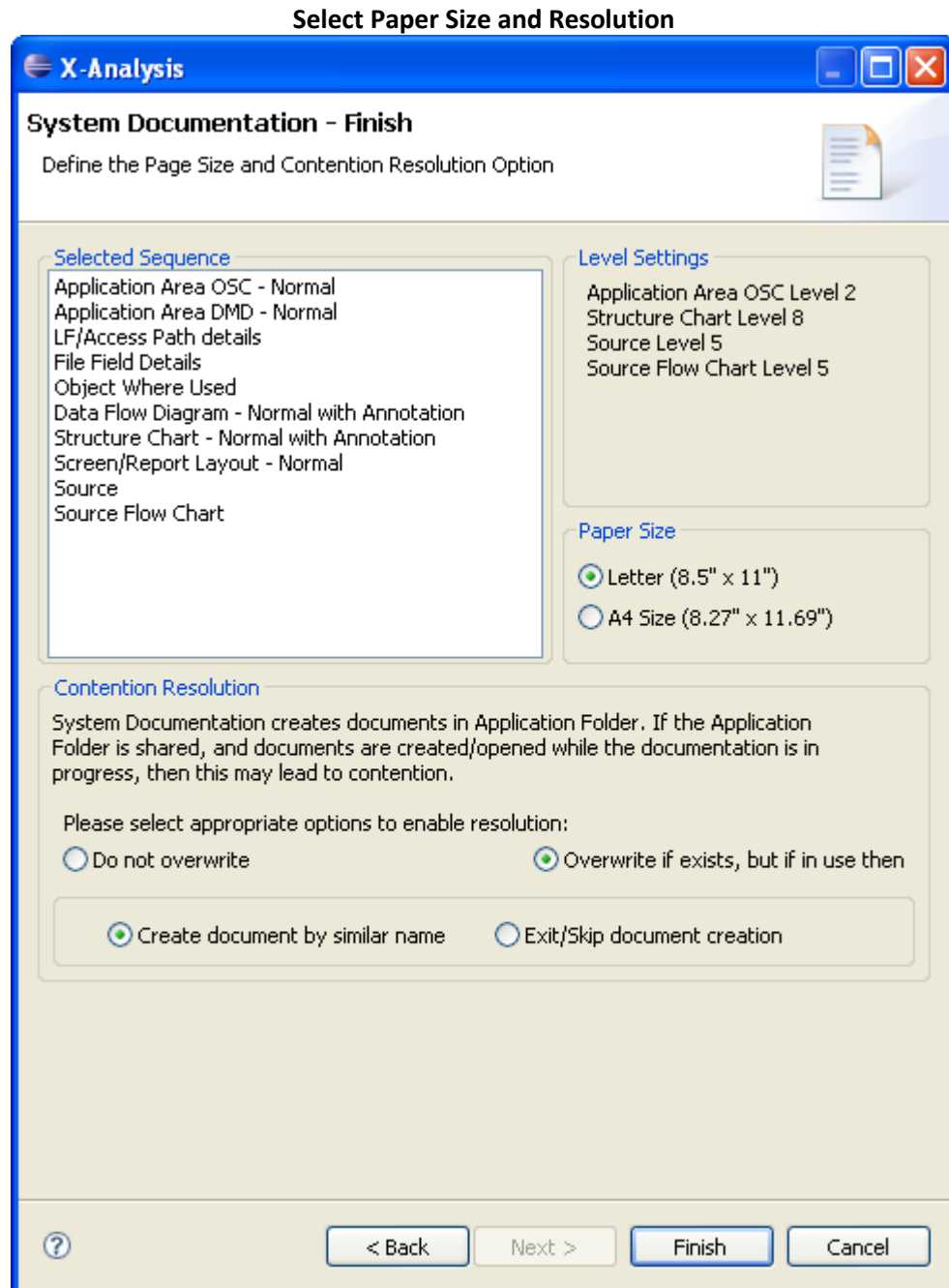
Click **Next** which will present the following screen:





From the above screen, the user can re-sequence the options selected for System Documentation.

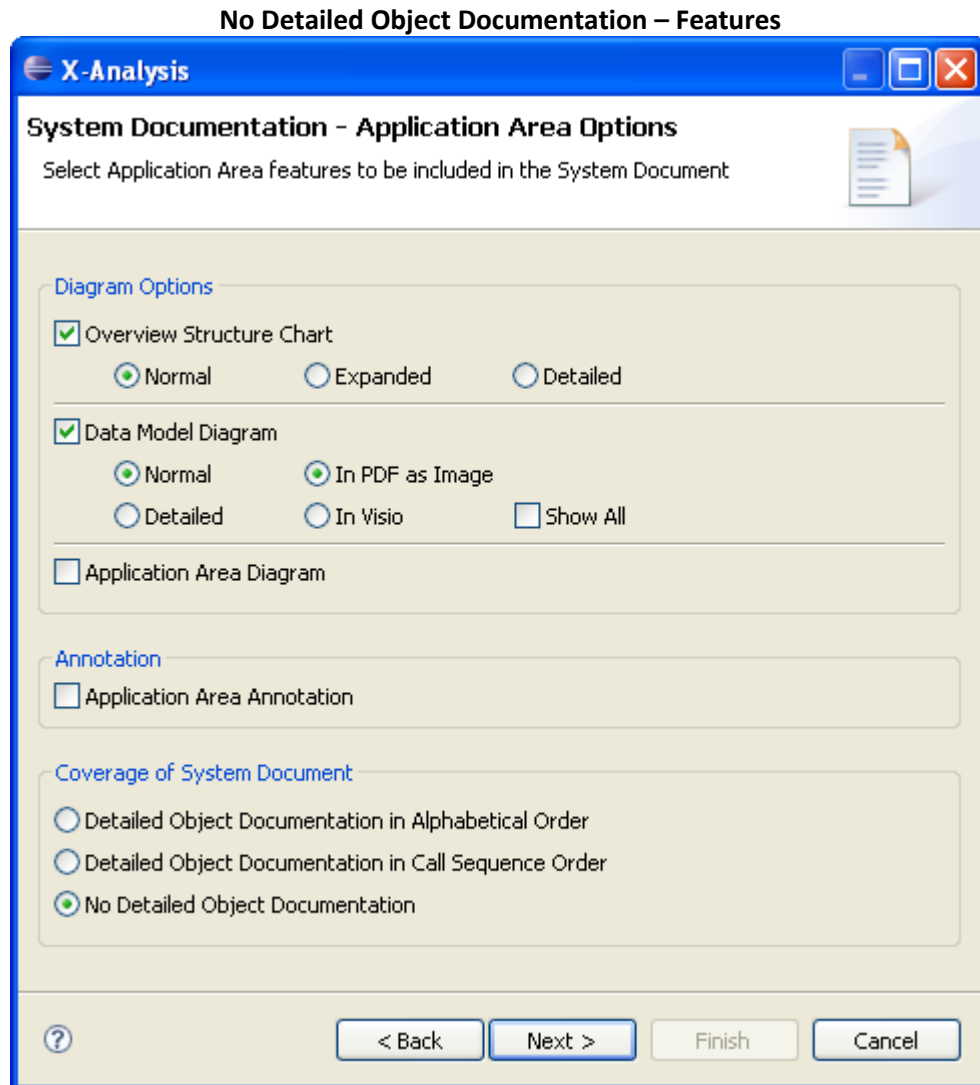
After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.



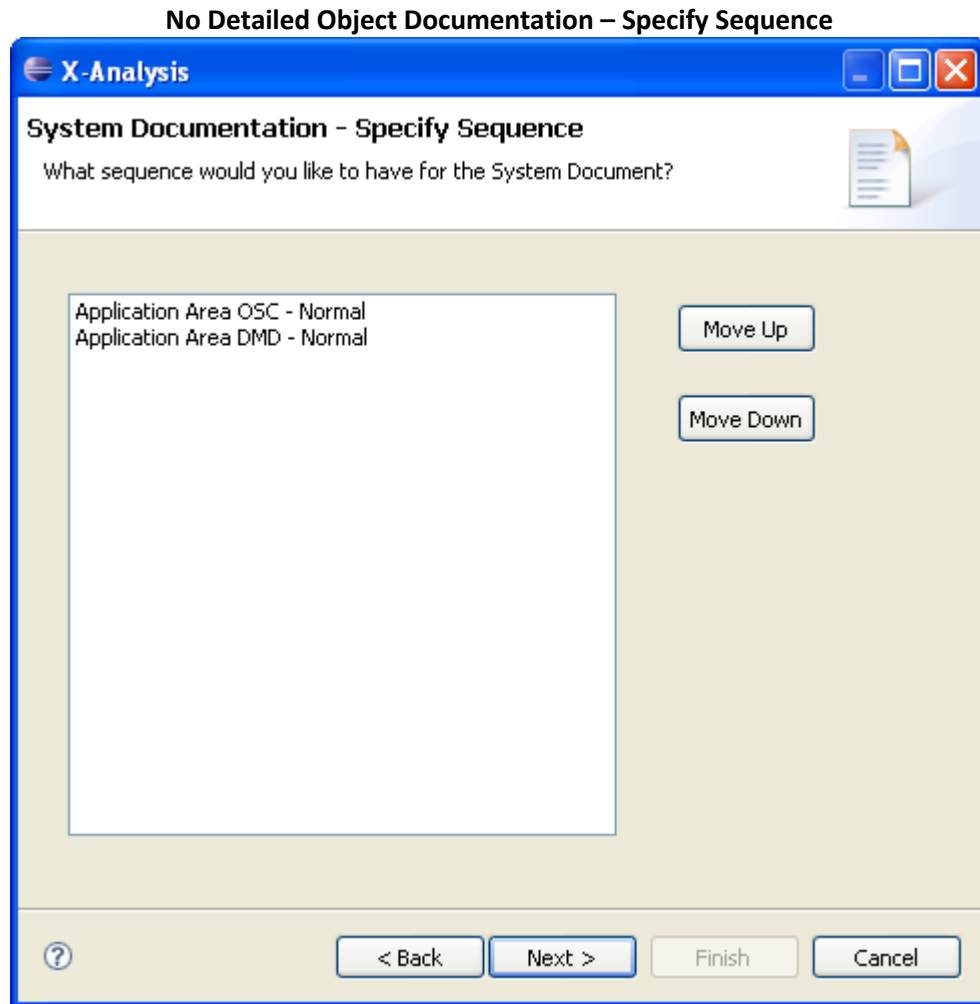
Click **Finish** to generate the document.

### No Detailed Object Documentation

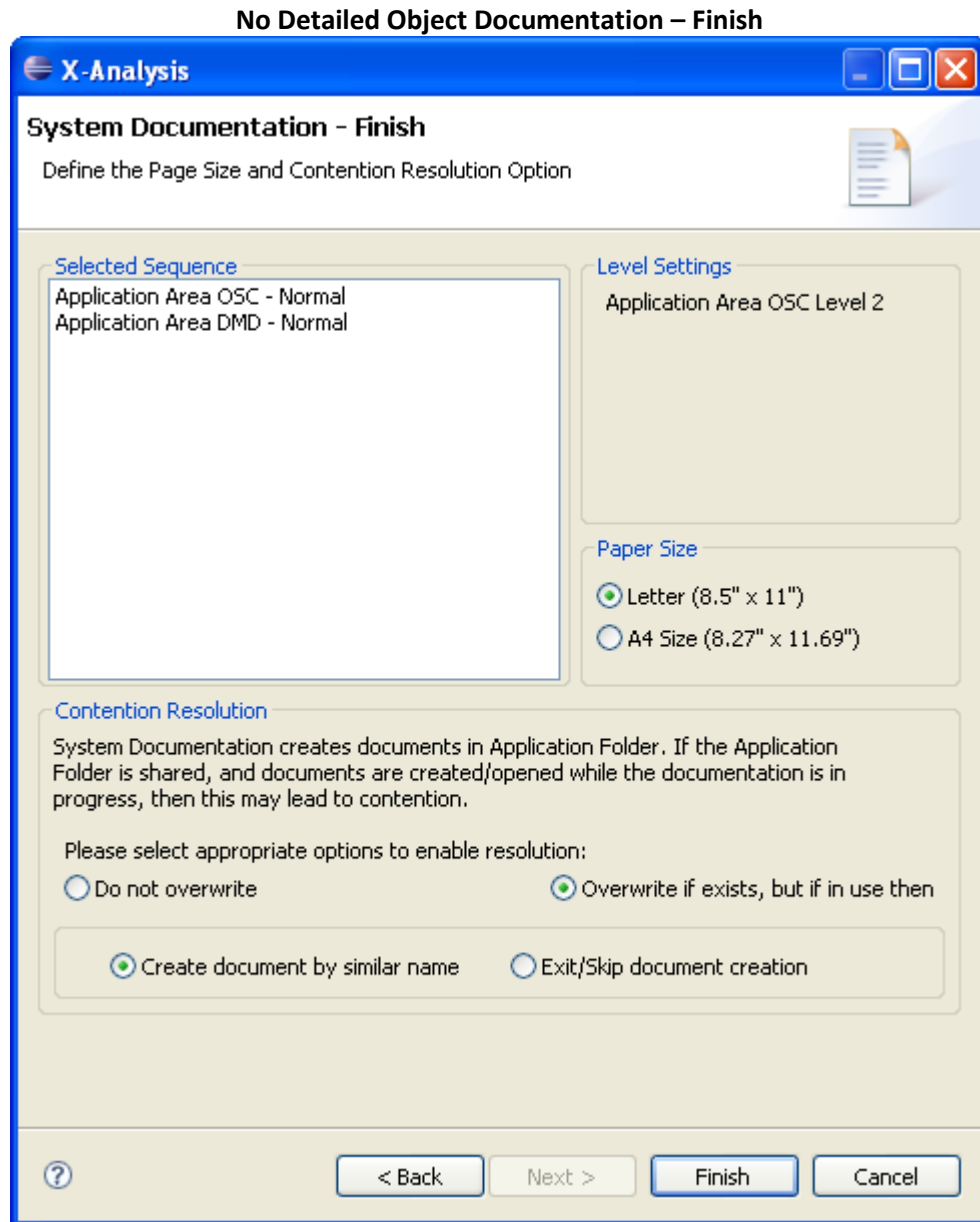
If the **No Detailed Object Documentation** option is selected, then only the Overview Structure Chart and/or the Data Model Diagram as specified in the **Application Area Options** dialog is created.



Click **Next** to proceed further.



From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all the selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.



Click **Finish** to generate the document.

### System Document using previous values

We have already discussed this topic under the **Marking the individual objects/complete list** section.

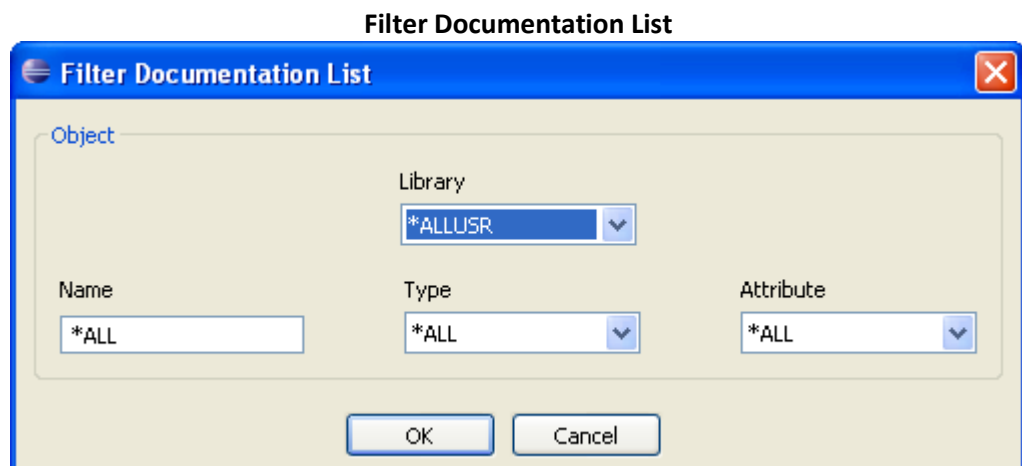
## DOCUMENTING AN ENTIRE APPLICATION

The **Document Entire Application** option documents all information about objects belonging to the selected application. This option is available on the context menu of an application and invokes the **System Documentation Wizard**. The procedure for documenting an entire application is same as the procedure of documenting an application area.

## DOCUMENT CHANGED OBJECTS

The **Document Changed Objects** option documents those objects which have changed since the last initialisation was run on the cross-reference library. This option is available on the context menu on a cross-reference library.

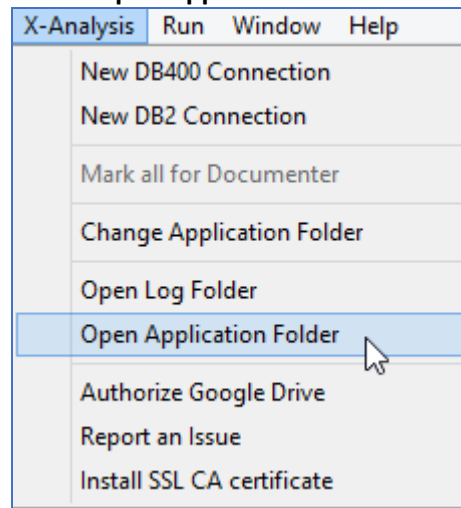
The **Document Changed Objects** provides a filter criterion for the System Documentation process. The user can select the object's library, name, type and attribute, as per the requirement.



## VIEWING THE GENERATED DOCUMENT

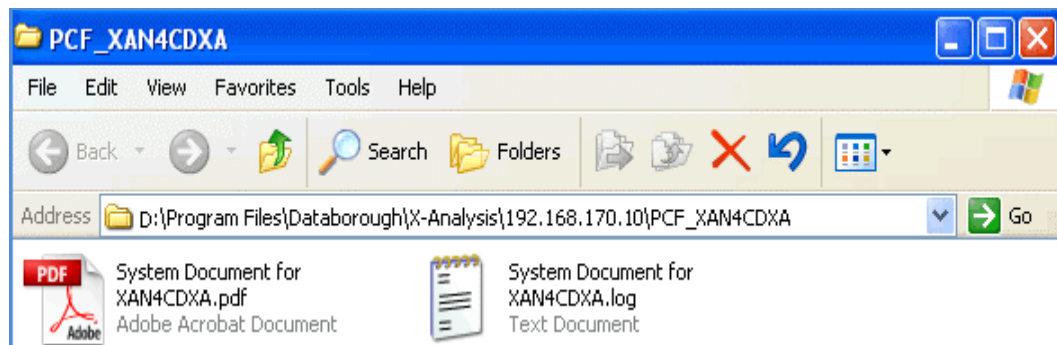
The default Application Folder for a specific application can be opened by selecting the **Open Application Folder** option from the X-Analysis menu from menu bar.

**Open Application Folder**

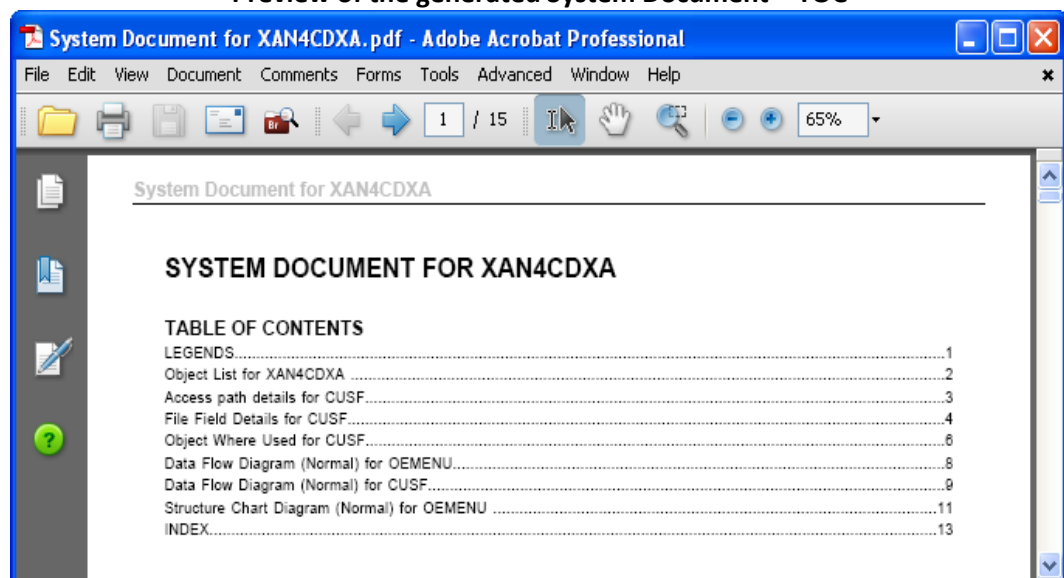


Locate the document in the specified save location and double-click on it to open the document.

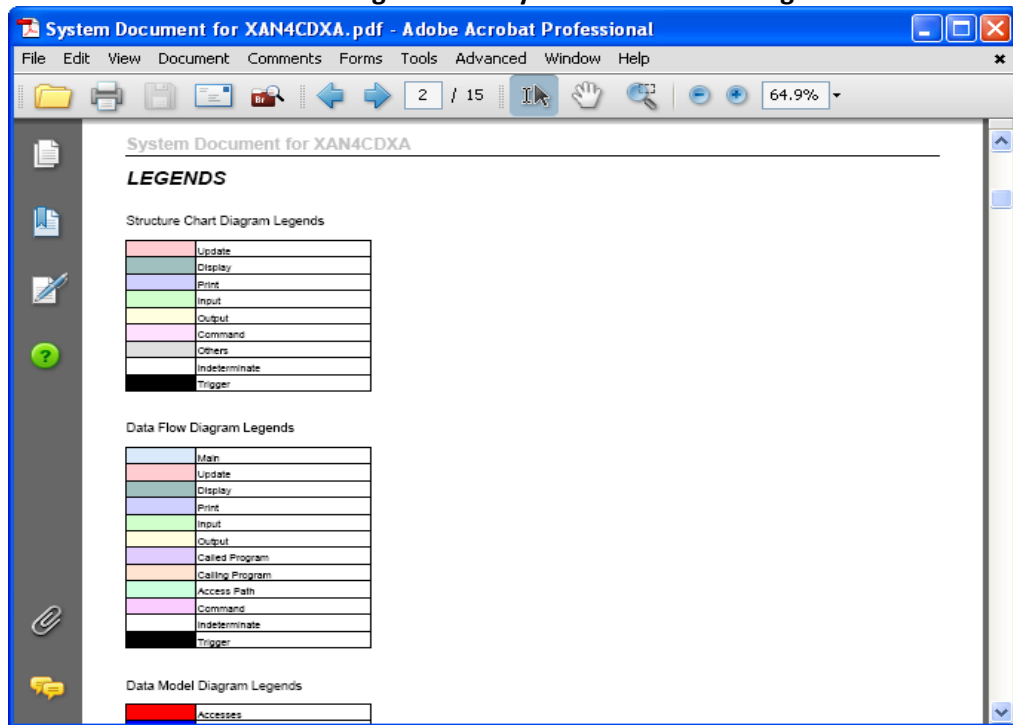
**Document Folder**



**Preview of the generated System Document – TOC**

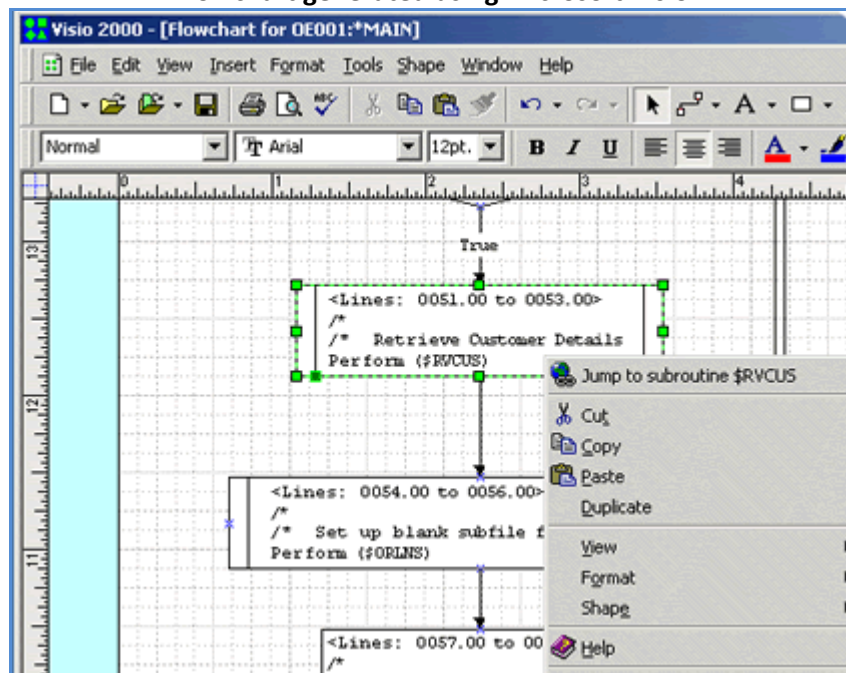


Preview of the generated System Document – Legend



If the **Flowchart** option is selected, then the flowchart will be generated using Microsoft Visio, and its link is placed in the System Document.

Flowchart generated using Microsoft Visio





## LIMITATIONS OF X-ANALYSIS SYSTEM DOCUMENTER

### Editing another Word Document

X-Analysis uses OLE Automation to send data to Microsoft Word. This depends on Automation objects provided by Microsoft Word. Automation objects by Microsoft Word have the limitation that when Automation is used on a Word document, then, editing of another Word document may get affected or may interfere with the automation process of the system document.

The following problems may be noticed in the document being edited:

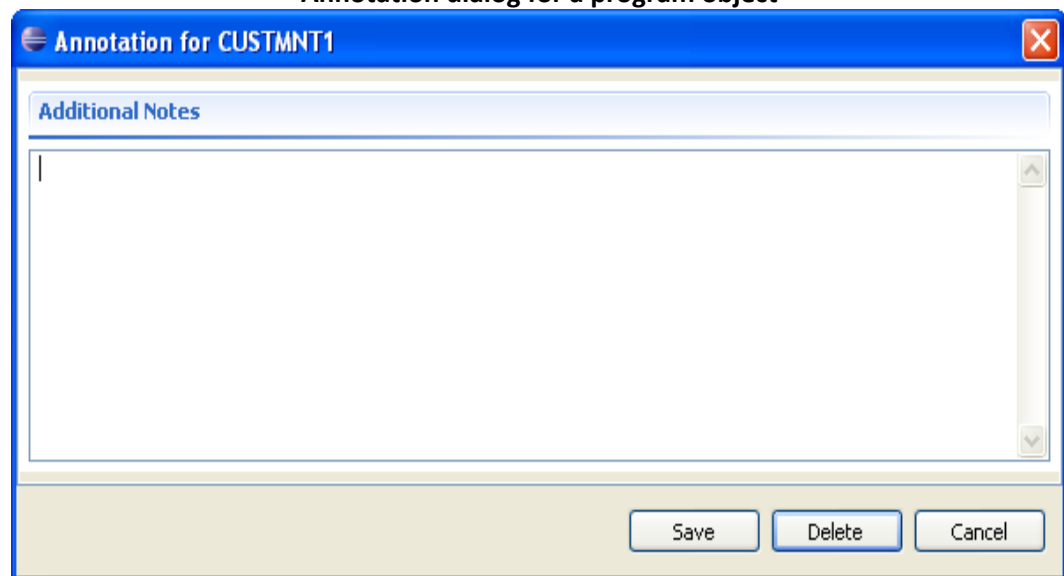
- The cursor will frequently change to hourglass.
- Text once selected may not be unselected.
- After clicking a menu it may disappear by itself.
- Opening a dialog may end/block the documentation process abruptly.

## USING THE ANNOTATOR

### Annotate option

The **Annotate** option is available on the context menu of an object or field name. Selecting the **Annotate** option invokes a dialog box. Provide the required text and click **Save**. The annotation is stored in a table available in the cross-reference library.

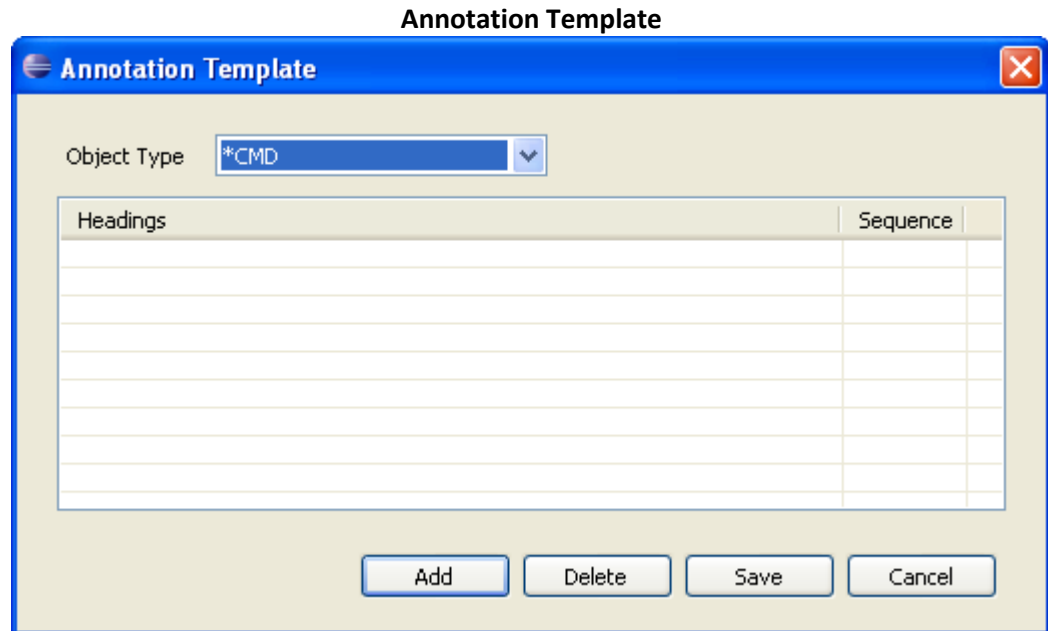
Annotation dialog for a program object



## Object type-based Annotation

The annotations based on the Object type are saved in a table available in the cross-reference library.

Select the **All Objects** option from the navigation pane, and opt for the context menu. Then, select the **Annotation Template** option. This invokes a dialog box as shown here:



From the **Object Type** drop-down, select the required object type. After that, provide appropriate headings for the object type and click **Save**. When you now annotate the specified object type you can see the prescribed heading.

## Appendix A – X-Analysis Offline

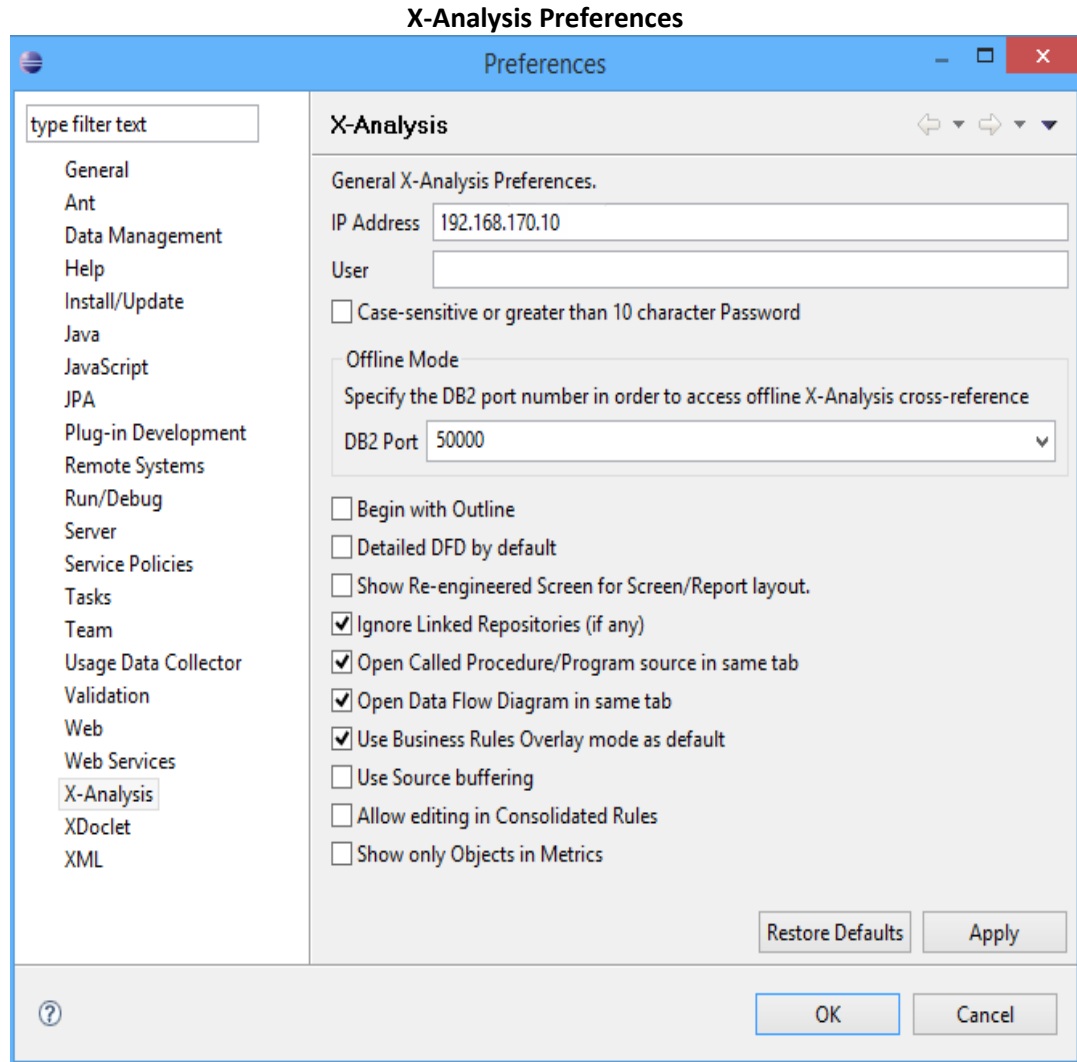
The X-Analysis Client can also be used to run in offline mode. The offline mode of X-Analysis is based on the IBM DB2 database. X-Analysis offline can be used in the following scenario:

- Analysis of PC-based application (which uses the IBM i) – Java, VB, VB.Net and PowerBuilder, by using XA-Open of Fresche Legacy. For details on XA-Open, refer to the **XA-Open User Manual**.

### X-ANALYSIS OFFLINE PREREQUISITES

Ensure that your environment meets the following requirements:

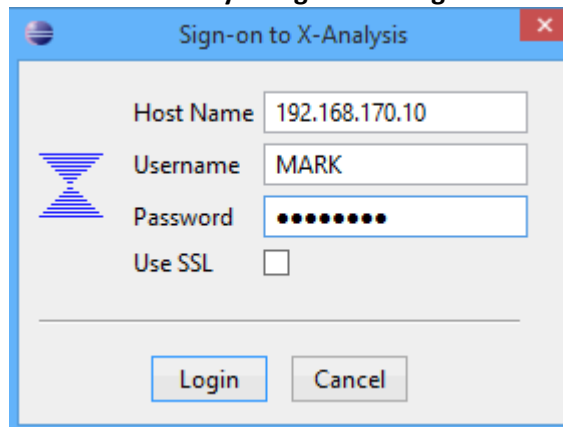
- IBM DB2 Express-C must be installed.
- Set X-Analysis Preferences
  - Before connecting the offline X-Analysis, you need to specify the DB2 port number in the X-Analysis Preferences settings (in case different from the default port number 50000).
- XAN4CDXA Configurator can be optionally run to setup the demo application XAN4CDXA



## START X-ANALYSIS OFFLINE

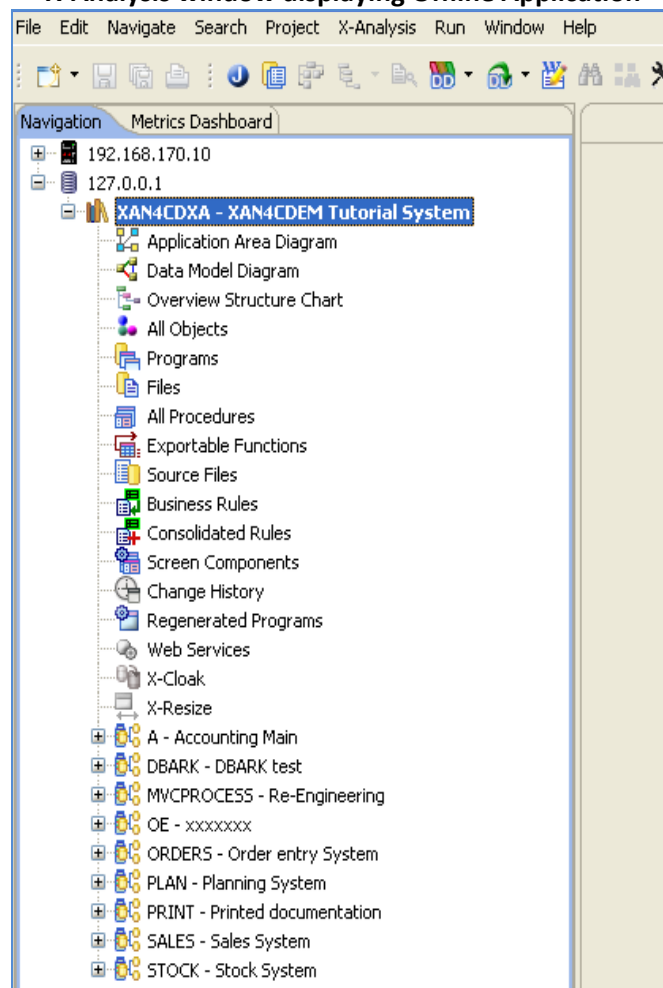
Select the **New DB2 Connection** option and provide the required details in the dialog box, as shown below:

**X-Analysis Sign-on dialog**



Then, click **Login** to start offline session of X-Analysis. On successful logon, the tutorial application **XAN4CDXA** can be seen located under the navigation view (displayed below):

**X-Analysis window displaying Offline Application**



# Appendix B – Enabling the SEU Interface

## CREATE USER PROFILE XAN4SEU

When browsing source code using the IBM i (**AS400**) **SEU**, it is necessary to be logged in as user **XAN4SEU**. The following gives instructions for creating the correct user profile.

**Step 1** Logon as **QSECOFR**.

**Step 2** Create **XAN4SEU** user profile.

Use the **CRTUSRPRF** command to create the **XAN4SEU** user profile. Make sure that the following parameters are set:

```

User Password      :      XAN4SEU
User Class        :      *PGMR
Initial Program   :      XSEUCLP
Library           :      XAOBJ
  
```

```

                                Create User Profile (CRTUSRPRF)

Type choices, press Enter.

User profile . . . . . > XAN4SEU      Name
User password . . . . . *USRPRF      Name, *USRPRF, *NONE
Set password to expired . . . . *NO      *NO, *YES
Status . . . . . *ENABLED          *ENABLED, *DISABLED
User class . . . . . > *PGMR          *USER, *SYSOPR, *PGMR...
Assistance level . . . . . *SYSVAL    *SYSVAL, *BASIC, *INTERMED...
Current library . . . . . *CRTDFT     Name, *CRTDFT
Initial program to call . . . . > XSEUCLP  Name, *NONE
  Library . . . . . > XAOBJ           Name, *LIBL, *CURLIB
Initial menu . . . . . MAIN          Name, *SIGNOFF
  Library . . . . . *LIBL            Name, *LIBL, *CURLIB
Limit capabilities . . . . . *NO      *NO, *PARTIAL, *YES
Text 'description' . . . . . > 'X-Analysis - SEU User'

                                                                More...
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
  
```

Press **F10** and Page Down

Set Special Authorities:

- \*ALLOBJ
- \*JOBCTL
- \*SAVSYS

```

Change User Profile (CHGUSRPRF)

Type choices, press Enter.

Additional Parameters

Special authority . . . . . *ALLOBJ      *SAME, *USRCLS, *NONE...
                          *JOBCTL
                          *SAVSYS
Special environment . . . . . *SYSVAL      *SAME, *SYSVAL, *NONE, *S36
Display sign-on information . . *SYSVAL      *SAME, *NO, *YES, *SYSVAL
Password expiration interval . . *SYSVAL      1-366, *SAME, *SYSVAL, *NOMAX
Limit device sessions . . . . . *SYSVAL      *SAME, *NO, *YES, *SYSVAL
Keyboard buffering . . . . . *SYSVAL      *SAME, *SYSVAL, *NO...
Maximum allowed storage . . . . *NOMAX       Kilobytes, *NOMAX
Highest schedule priority . . . 3                0-9
Job description . . . . . QDFTJOB      Name
  Library . . . . . QGPL          Name, *LIBL, *CURLIB
Group profile . . . . . *NONE       Name, *NONE

More...

F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
  
```

**Step 3** Logoff.

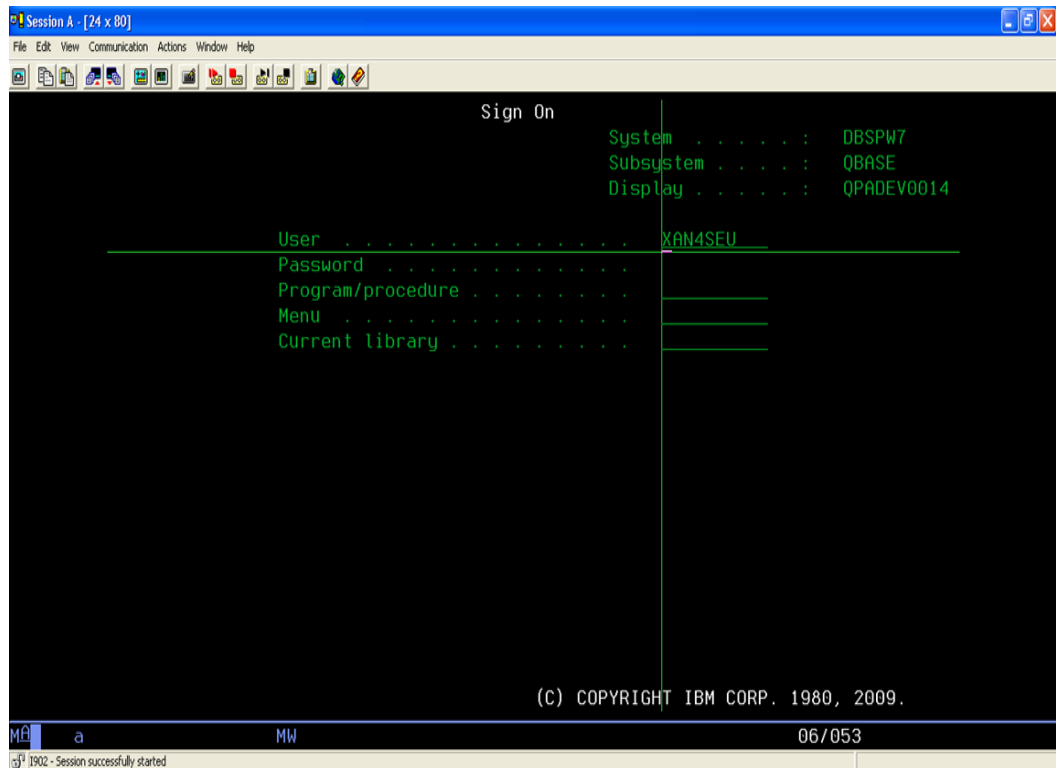
## CREATING MACRO OF XAN4SEU

Macros allow you to automatically sign on for XAN4SEU, and seamlessly work with the **SEU** option. So, it is necessary to verify whether the XAN4SEU macro has been created. If not, then record this macro using the following steps:

Step 1: Press the **Start Recording** button. The **Record Macro/Script as** dialog will be displayed. Sign on with the **XAN4SEU** user profile.

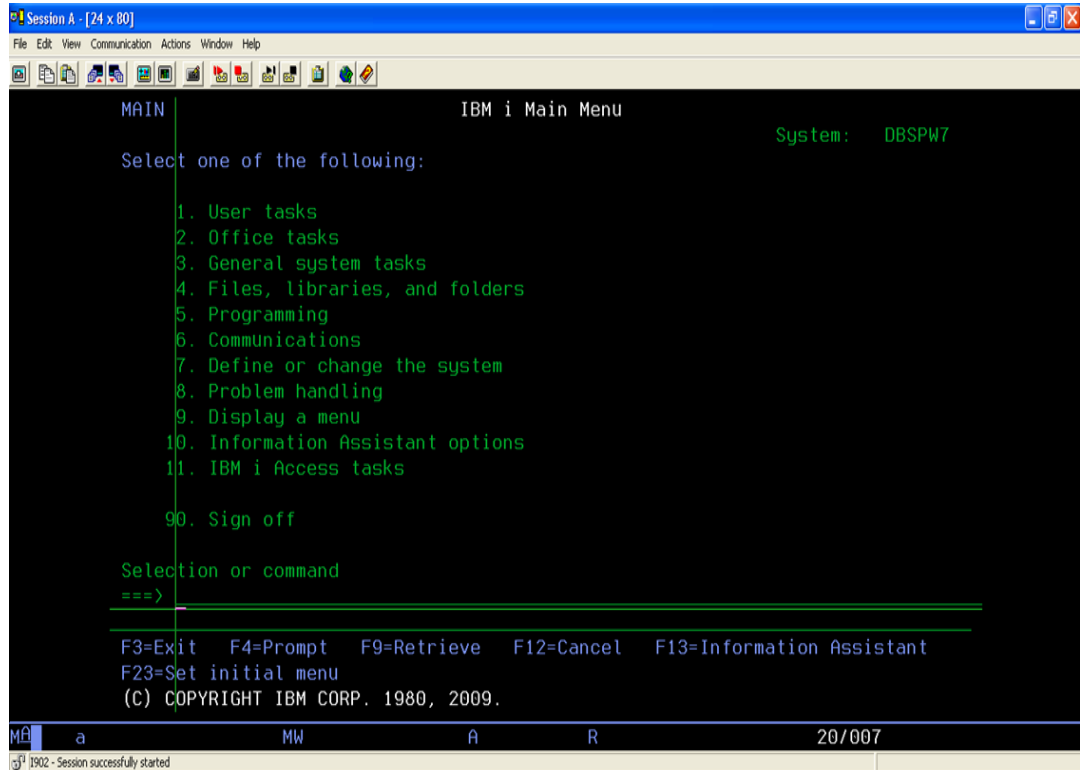


Step 2: On the Sign On screen, enter the User Profile – **XAN4SEU**. Press **Tab** and enter the Password also as **XAN4SEU**.

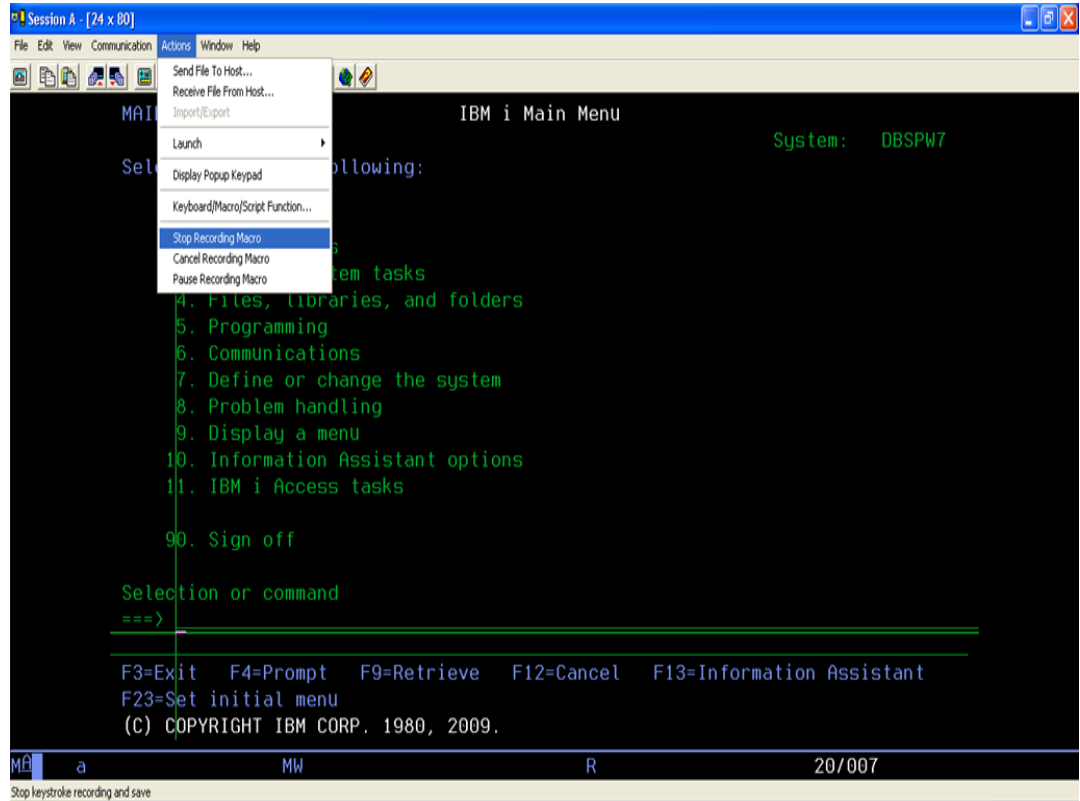


Press **ENTER**. The IBM i main menu screen will be displayed:





**Step 3:** Stop the recording by selecting the **Stop Recording Macro** option from the **Actions** submenu or clicking the related button directly from the toolbar.

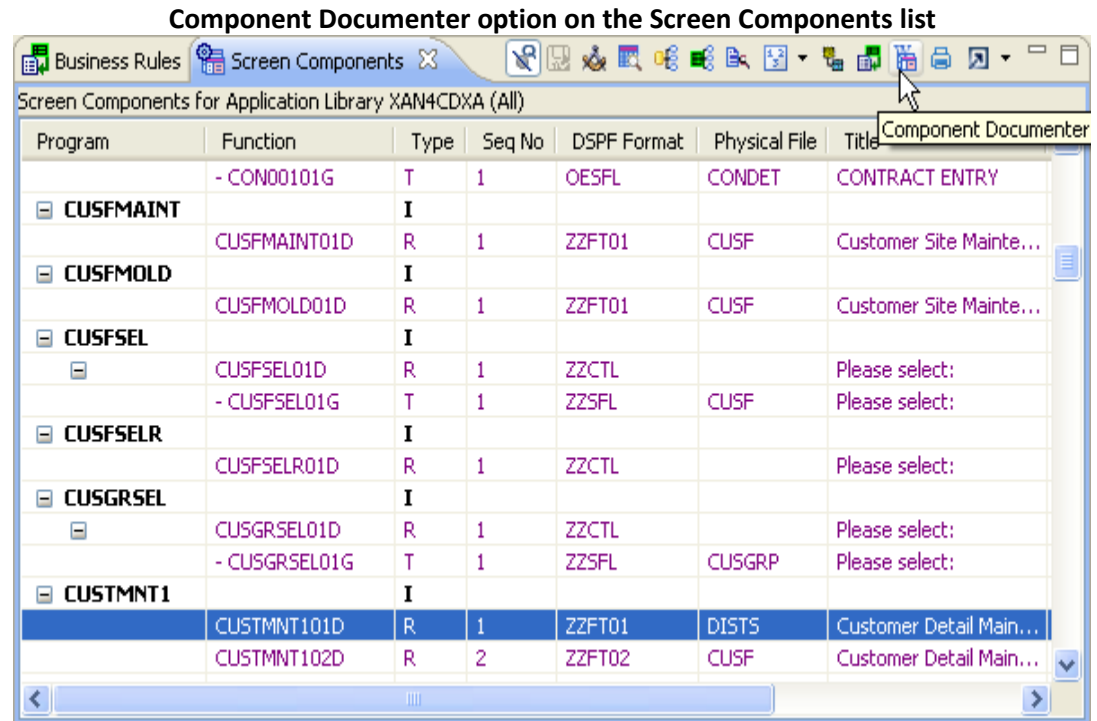


## Appendix C – Component Documenter

The **Component Documenter** option documents the extracted Screen Components (Re-engineered Functions). The option is available on the toolbar of Screen Components, Data Content Diagram, and Screen Action Diagram. The System document is generated for the selected Screen Component.

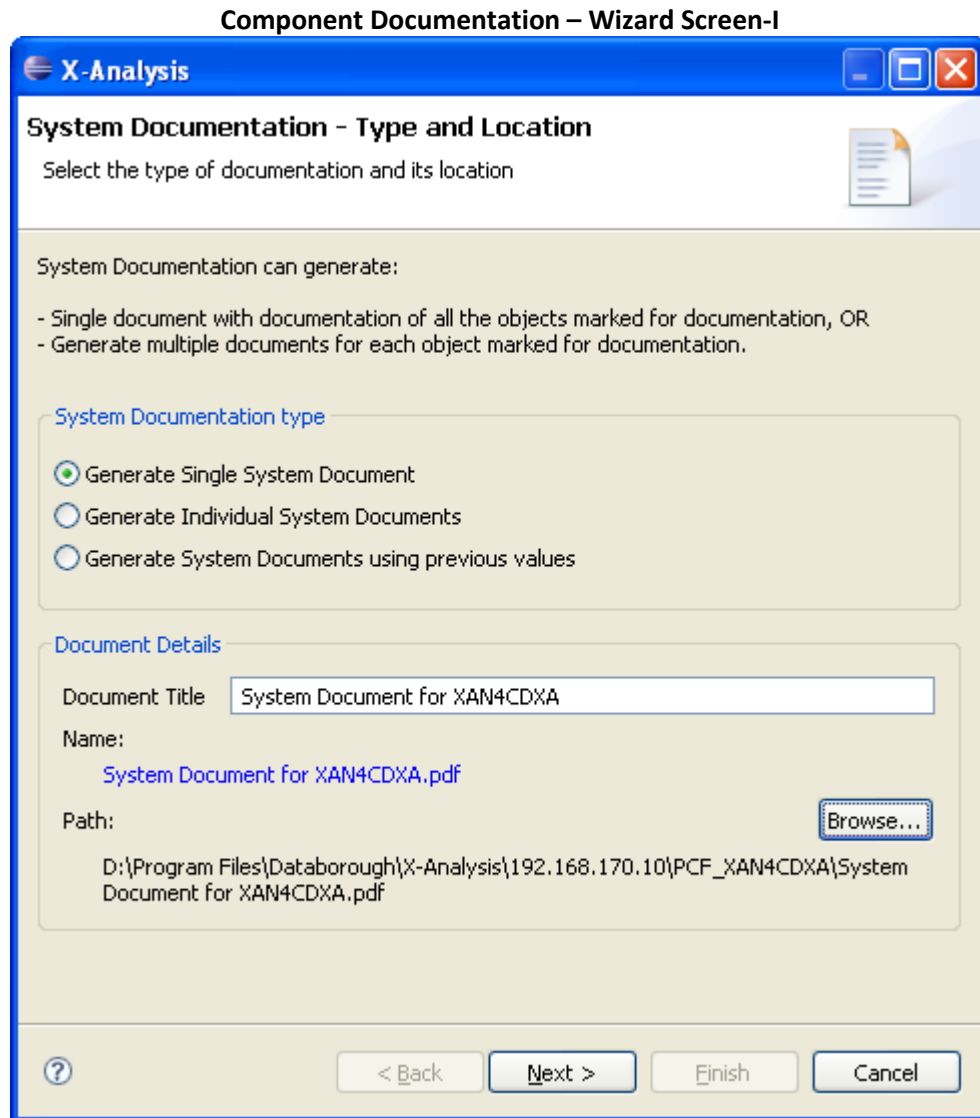
### WORK WITH COMPONENT DOCUMENTER

Expand the X-Analysis application library (cross-reference library), and then double-click the **Screen Components** node. This invokes the Screen Components list. Select the screen component for which component documentation is to be done, and then click the **Component Documenter** icon as shown below:



**Note: Multiple selections of Screen Components are allowed for Component Documentation.**

Click the **Component Documenter** icon to display the System Documenter Wizard, as shown below:



## Document Wizard Sections

### System Documentation type

The following options are available for System Documentation type:

- **Generate Single System Document** – This is the default option. It means that a single system document will be generated for all the selected objects.
- **Generate Individual System Documents** – It means that individual system documents will be generated for all the selected objects.
- **Generate System Documents using previous values** – X-Analysis provides a unique feature of recalling the previous options selected by the user in System Documentation process. Through the **Generate System Documents using previous**

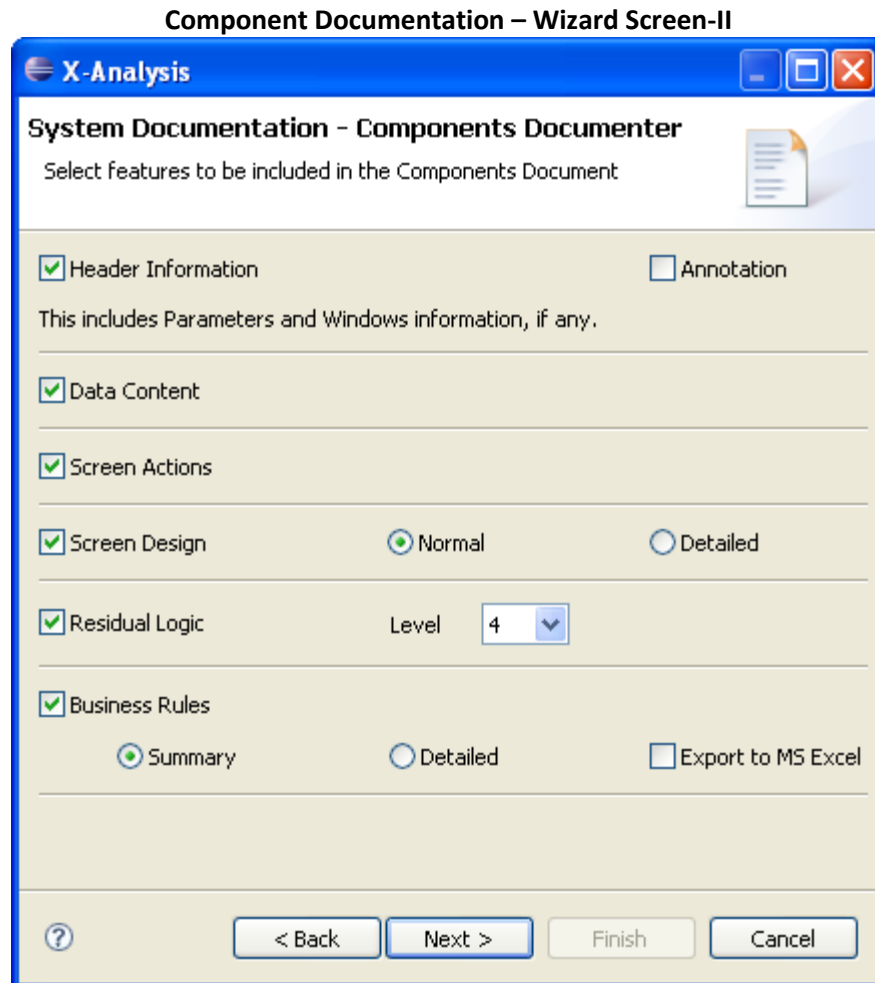
**values** option the user is able to generate a System Document without choosing the same options again in System Documentation process.

### Document Details

Document Title – The user can change document title as per the requirement.

Path – Click the **Browse** button to change the default path.

After making appropriate selections, click **Next** which displays the following screen:

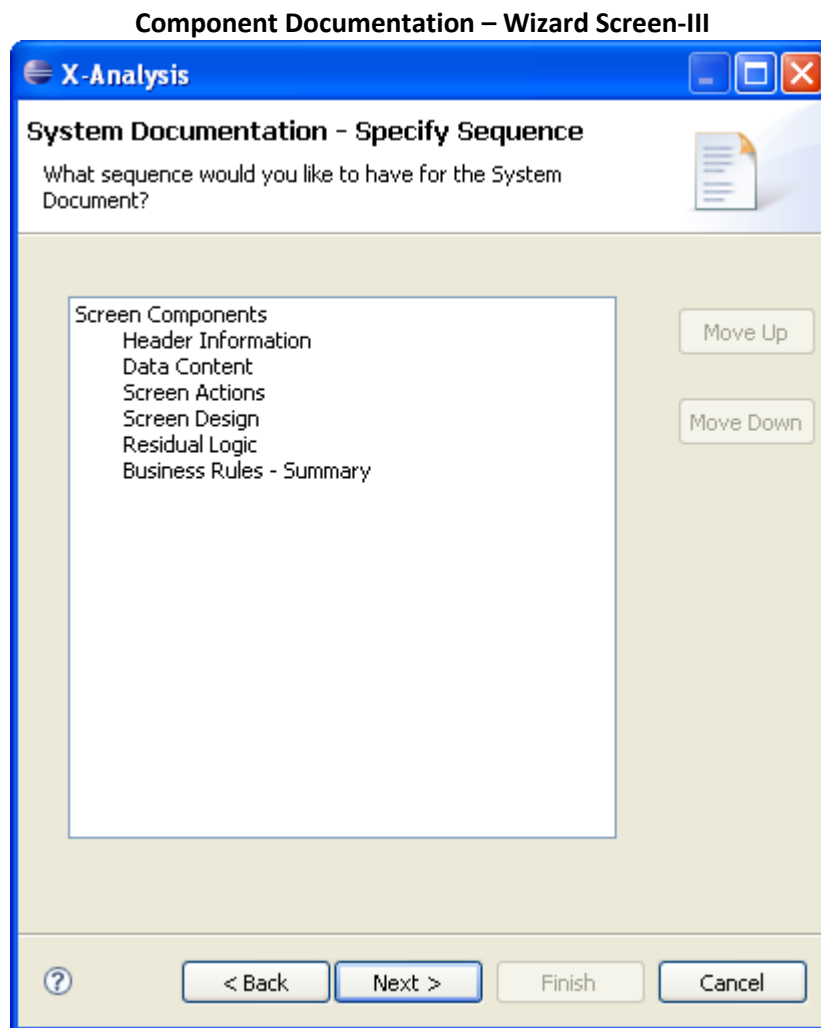


The user can select various options as per requirement from the Wizard Screen-II. The options available are:

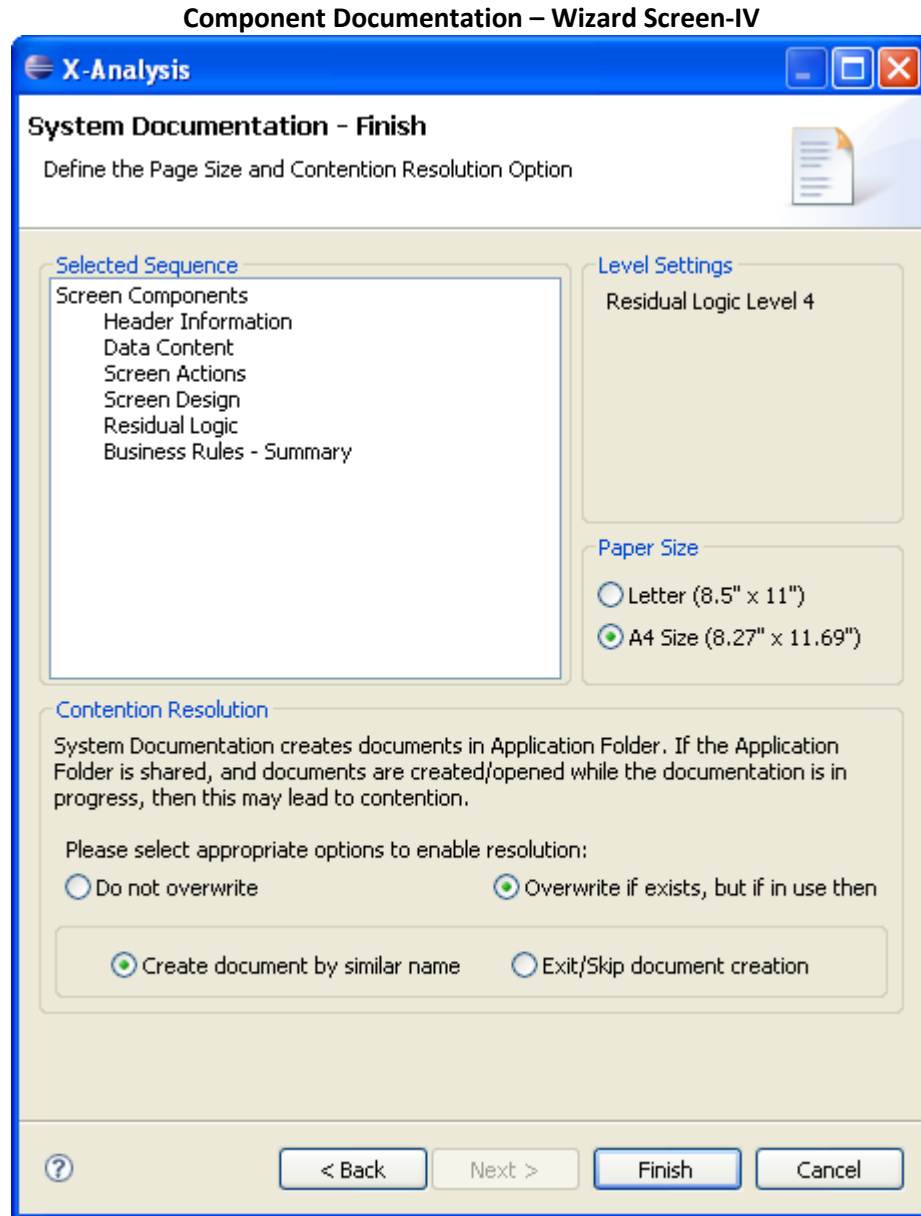
- Header Information – This prints the function header information from the screen design. It also prints the parameters and windows information for the selected screen component.
- Data Content – This prints the data content diagram for the selected screen component.

- Screen Actions – This prints the screen action diagram for the selected screen component.
- Screen Design (Re-engineered Screen) – This prints the screen design (re-engineered screen) for the selected screen component. It has got two sub-options, Normal and Detailed. The default option is **Normal**. When the **Detailed** option is selected then the Field Details for the associated screen formats are also printed.
- Residual Logic – This prints the business process logic for the re-engineered screen.
- Business Rules – This prints the business rules for the selected screen.

After making the appropriate selections, click **Next** which displays the following screen:



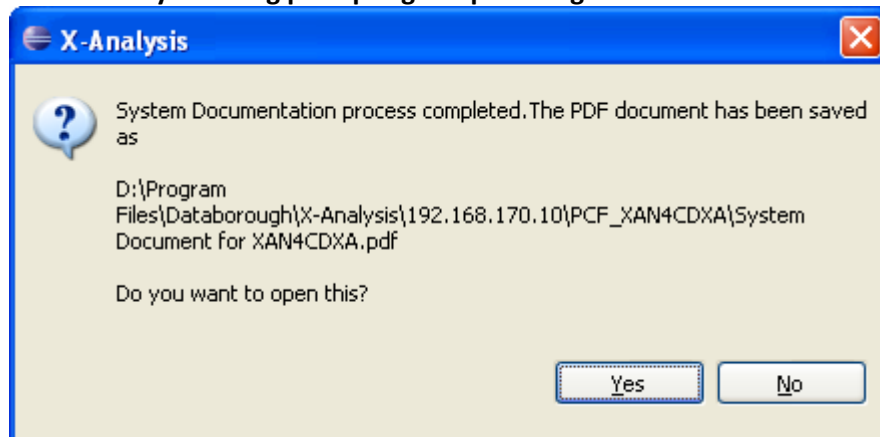
Click **Next** which displays the following screen:



Here, you can see all selections that he has made and can also define various options related to document formatting like 'Paper Size' and 'Contention Resolution'.

Click **Finish** to generate the document. The Progress status is displayed on screen while generating the system document. The document will be located in the specified save location. After the documentation process is over, the following screen is displayed by X-Analysis to open the generated document:

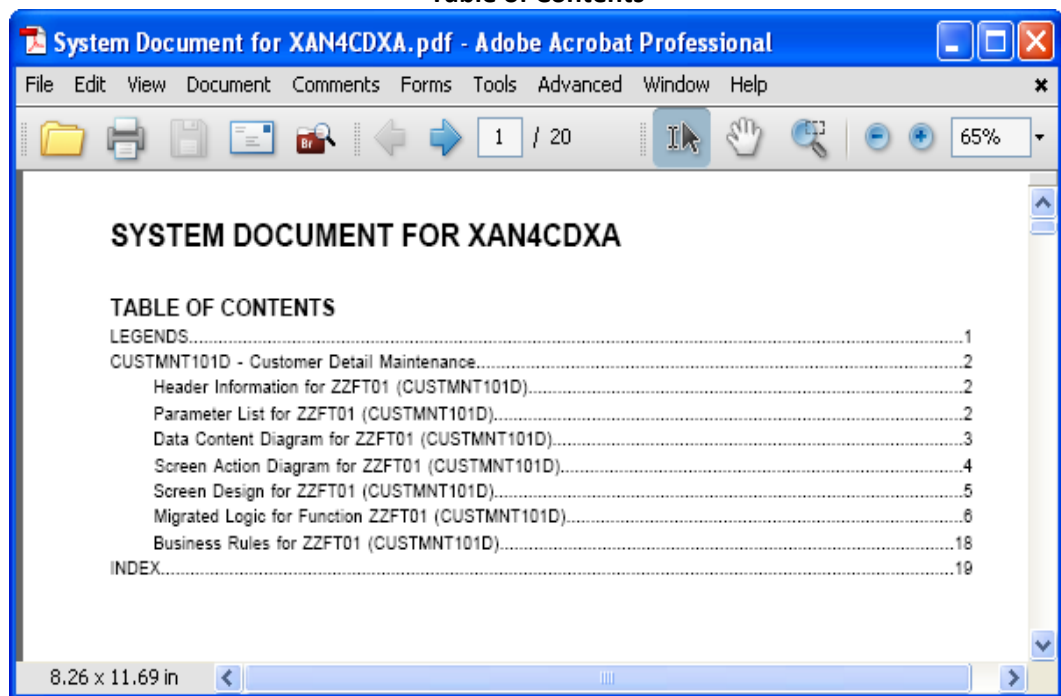
**X-Analysis dialog prompting to open the generated document**



**Viewing the Generated Document**

The following screens display the generated document:

**Table of Contents**





### Header & Parameter information

System Document for XAN4CDXA.pdf - Adobe Acrobat Professional

File Edit View Document Comments Forms Tools Advanced Window Help

System Document for XAN4CDXA

**CUSTMNT101D - Customer Detail Maintenance**

1. Header Information for ZZFT01 (CUSTMNT101D)

Name	Value
Title	Customer Detail Maintenance
Function Type	R (Record)
Re Engineered Function	N
Attached Grid	
Attached Trailer	ZZFT01
Entry Mode	N
Grid with Add	N

2. Parameter List for ZZFT01 (CUSTMNT101D)

Field Name	Description	Type	Length	Decimal Position
DSDCDE	Distributor . . . >	A	2	0

8.26 x 11.69 in

### Data Content Diagram

System Document for XAN4CDXA.pdf - Adobe Acrobat Professional

File Edit View Document Comments Forms Tools Advanced Window Help

System Document for XAN4CDXA

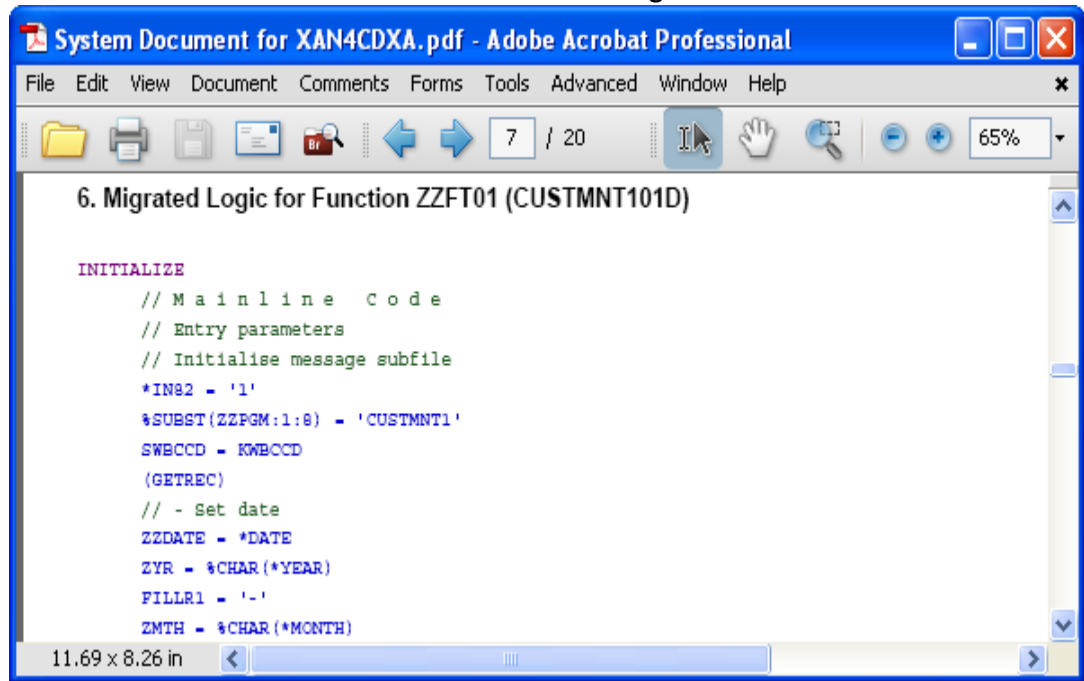
3. Data Content Diagram for ZZFT01 (CUSTMNT101D)

- Fields
      - DNAME -
      - DSDCDE - Distributor . . . >
  - CUSTS - Purchases
    - Joins - No Join Rule Exists
    - Fields
      - XWBCCD - Customer No . . . .
  - WorkField -
    - Fields
      - RECNAM -
      - SFIELD -

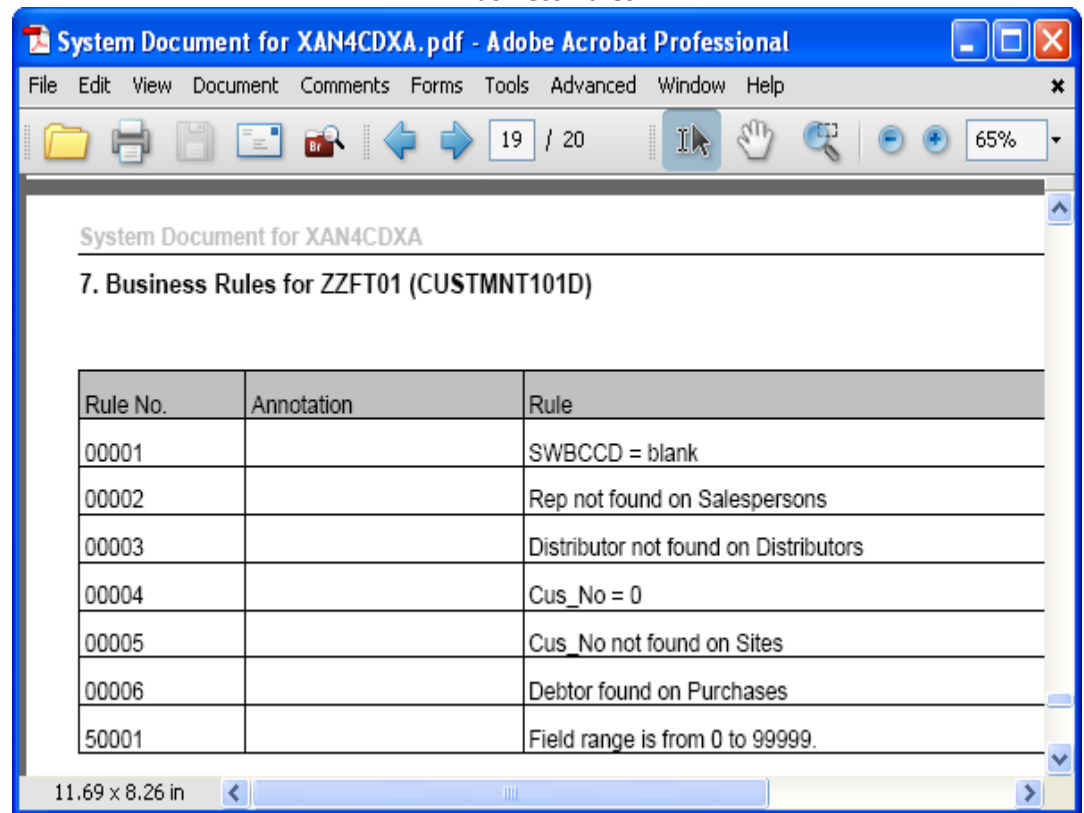
8.26 x 11.69 in



**Business Process Logic**



**Business Rules**



## Appendix D – XREDOAPP Command

The **XREDOAPP** command is the master interface to control an X-REDO application. The Library List needs to be set correctly before using this master command.

### SET THE LIBRARY LIST

Change the Library List to ensure the following sequence:

- **XAOBJ**
- **QGPL**
- **QTEMP**

Use the **EDTLIBL** command to set the library list.

#### EDTLIBL command screen

```

                                Edit Library List
                                System:  DBSPW6
Type new/changed information, press Enter.

Sequence      Sequence      Sequence
Number  Library      Number  Library      Number  Library
  0
 10  XAOBJ
 20  QGPL
 30  QTEMP
 40
 50
 60
 70
 80
 90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
More...

F3=Exit  F5=Refresh  F12=Cancel

```

After updating the Library List, type the **XREDOAPP** command and press **ENTER**. The following screen (similar) should appear:

**XREDOAPP Command screen**

```

X-Analysis/4                X-Redo Application Control          Databorough Ltd.
XARREDOAPP                  11:49:25
                              21 Jan 2013

Enter options, press Enter.
2=Linking  3=Copy  6=Date Attributes  8=Libraries  12=Initialise
15=Business Rules  16=Generate  17=Failures  18=Errors  19=Load Log
20=X-A Log  21=File Check  22/23=Compile Chk  24=Prb.Anl.  CT=Prj Ctl

      X-ref Lib      Text                               Company/division

      AA2EDEMO      X-2E Hospital Demo
      XAN4CDXA      XAN4CDEM Tutorial System

F1=Help  F3=Exit  F10=Cmd Line  F12=Cancel  F24=More Keys
  
```

**OPTIONS AVAILABLE ON THE XREDOAPP COMMAND INTERFACE**

The following options are available on the **XREDOAPP** command interface:

- Option 2 = Linking
- Option 3 = Copy
- Option 6 = Date Attributes
- Option 8 = Libraries
- Option 12 = Initialise
- Option 15 = Business Rules
- Option 16 = Generate
- Option 17 = Failures
- Option 18 = Errors
- Option 19 = Load Log
- Option 20 = X-A Log
- Option 21 = File Check
- Option 22 = Compile Check
- Option 24 = Prb. Anl.
- Option CT = Prj Ctl

### Option 2 = Linking

**Option 2** can be used to link multiple applications. To use the **Linking** option some Data Areas need to be updated. The following screen displays the 'Linking' window:

```

LINKING option – Work with Data Areas
X-Analysis          Work with Data Areas          Databorough Ltd.
XARWKDARAS          11:49:25
                    2013-01-21

Enter options, press Enter.
5=Work with values

Data Area

XS2ELKPRJ: Linked Project
XS2EMNPRJ: Main Project
XS2EPXLIB: Program Object Exclusion Library

F3=Exit, F12=Cancel

```

### Linked Project

To display/edit the 'Linked Project' Data Area, use **Option 5** against it. The following similar window appears:

```

Work with Data Areas – Linked Project
X-Analysis          Work with Data Area Values          Databorough Ltd.
XARWKDARAS          11:49:25
                    2013-01-21

Enter options, press Enter.
2=Change value

Description          Current Value

Linked Project Library Name

```

Use **Option 2** to change the value of the Data Area – Linked Project.

```

Change value of Data Areas – Linked Project
X-Analysis          Change Data Area Value          Databorough Ltd.
XARWKDARAS          11:49:25
                    2013-01-21

Linked Project Library Name

```

**Main Project**

To display/edit the ‘Main Project’ Data Area, use **Option 5** against it. The following similar window appears:

**Work with Data Areas – Main Project**

X-Analysis	Work with Data Area Values	Databorough Ltd.
XARWKDARAS		11:50:15
		2013-01-21
Enter options, press Enter.		
2=Change value		
Description	Current Value	
Main Project Library Name		

Use **Option 2** to change the value of the Data Area – Main Project.

**Change Value of Data Areas – Main Project**

X-Analysis	Change Data Area Value	Databorough Ltd.
XARWKDARAS		11:50:27
		2013-01-21
Main Project Library Name		

**Program Object Exclusion Library**

This X-2E feature allows the user to exclude the programs from reengineering them when the program objects are in the specified library. This feature is directly controlled by **XS2EPXLIB** data area. If the user wants to exclude the programs from a particular library then that library name can be specified in the **XS2EPXLIB** data area. The default value is blank.

To display/edit the ‘Program Object Exclusion Library’ Data Area, use **Option 5** against it. The following similar window appears:

**Work with Data Areas – Program Object Exclusion Library**

X-Analysis	Work with Data Area Values	Databorough Ltd.
XARWKDARAS		11:50:27
		2013-01-21
Enter options, press Enter.		
2=Change value		
Description	Current Value	
Program Object Exclusion Library		

Use **Option 2** to change the value of the Data Area – Program Object Exclusion Library.

**Change Value of Data Areas – Program Object Exclusion Library**

```

X-Analysis          Change Data Area Value          Databorough Ltd.
XARWKDARAS                11:50:27
                                2013-01-21

Program Object Exclusion Library
  
```

**Option 3 = Copy**

Option 3 copies the X-REDO Application Control settings to a new library. The following screen displays the 'Copy' window:

**Screen displaying Copy option**

```

X-Analysis/4          X-Redo Application Control          Databorough Ltd.
XARREDOAPP                11:51:11
                                21 Jan 2013

X-ref Library. . . . .
Text . . . . .          X-2E Hospital Demo
Company/division . . . . .
Index src files. . . . .          Y
Process var & bound calls. . . . .          Y
Include obsolete source . . . . .
Build data model . . . . .
Data model match value . . . . .
TCPIP address . . . . .
User id . . . . .

F1=Help          F3=Exit          F12=Cancel
  
```

**Option 6 = Date Attributes**

**Option 6** can be used to change the SYNON shipped date types. The following screen displays the 'Date Attributes' window:

**Change Date Attributes**

```

WORK WITH DATA IN A FILE          Mode . . . . . : CHANGE
Format . . . . . : XS2EDTATRF          File . . . . . : XS2EDTATR

S2DTATR:

F3=Exit          F5=Refresh          F6=Select format
  
```



F9=Insert

F10=Entry

F11=Change

### Option 8 = Libraries

**Option 8** can be used to set up library list for the X-REDO application. The following screen displays the 'Libraries' window:

#### Libraries screen

```

X-Analysis/4   Work with X-Analysis/4 Application Libraries   Databorough Ltd.
XARWKLIB                                           11:51:11
                                                    21 Jan 2013

Selected x-ref Library -> :   AA2EDEMO

Enter options, press Enter.
2=Change      4=Delete      5=Display

Type Sequence Library

S      .00   X2EGEN
O      .00   X2EGEN
M      .00   X2EMDL

F1=Help      F3=Exit      F6=Add      F12=Cancel   F16=Print
  
```

The **F6** function key can be used to add new library as shown below:

#### Add New Libraries screen

```

X-Analysis/4   Work with X-Analysis/4 Application Libraries   Databorough Ltd.
XARWKLIB                                           11:51:11
                                                    21 Jan 2013

X-ref library.   AA2EDEMO
Type . . . . .   M      (O=Object,S=Source,M=2E Model)
Sequence . . .   .00
Library . . . .
  
```

This screen is used to set up the source, object and model libraries for the selected application. If you intend to build the data model using CA 2E model libraries, then you should enter the names of those libraries here, specifying the library type as "M".

These libraries are used when initializing the application and for various other commands which need this information.

The maximum number of libraries allowed for each type is 300.

Two items of data are held against each library name:

**Library type** – O - Object, S - Source or M - 2E Model type of libraries

**Sequence Number** – It determines the order in which the libraries are placed in the library list.

**Option 12 = Initialise**

**Option 12** can be used to initialise the X-REDO Application Library. The following screen displays the ‘Initialise’ window:

**Initialise screen**

```

Initialise X-Analysis/4 (XAXREF)

Type choices, press Enter.

X-Analysis Library . . . . . > AA2EDEMO      Name
Object Libraries . . . . . *SPECIFIED    Name, *SPECIFIED
      + for more values
Source Libraries . . . . . *SPECIFIED    Name, *SPECIFIED, *NONE
      + for more values
Index Source Files . . . . . > *ALL      *CHG, *NO, *ALL, *UPG
Build Data Model . . . . . > *YES      *YES, *NO
Generate Business Rules . . . . . > *YES    *YES, *NO
Initialise X-Resize . . . . . *NO      *YES, *NO
Include obsolete source/object . . . . . *NO    *YES, *NO
Import 2E Model . . . . . > *MODEL    *CODE, *MODEL

                                                                    Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys

```

**Option 15 = Business Rules**

**Option 15** can be used to generate Business Rules for a single application area, or for the entire application. The following screen displays the Business Rules window:

**Generate Business Rules screen**

```

Generate Business Rules (XGENBRULES)

Type choices, press Enter.

X-Analysis X-Ref Library . . . . . > AA2EDEMO      Name
X-Rev Library . . . . . *XALIB      Name, *XALIB
X-Analysis Application Area . . . . . *ALL      Character value, *ALL, *PGM

                                                                    Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys

```

This command will identify the business rules logic in each program in the application over which the specified X-Analysis cross-reference database has been built.

A source member containing the business rule logic and narrative describing each rule is generated for each program.

**Option 16 = Generate**

**Option 16** can be used to generate the new RPGLE application programs. The following screen displays the ‘Generate’ window:

```
GENERATE screen
```

```
Re-engineer Programs (XREGENP)
```

```
Type choices, press Enter.
```

```

Program Name . . . . . *AREA           Name, *AREA, *ALL
X-Analysis Library . . . . . > AA2EDEMO   Name
New Pgm Suffix . . . . . R             Character value
Restructure Interactive Pgms . . *YES       *YES, *NO
Compile the Re-engineered Pgms   *YES       *YES, *NO

```

```
Bottom
```

```
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

**Option 17 = Failures**

**Option 17** can be used to list program failure from the ‘Generate’ (**Option 16**) job. The following screen displays the ‘Failures’ window:

```
Failures Report
```

```
Display Report
```

```

Position to line . . . . . Report width . . . . . :      84
Shift to column . . . . .
Line  ....+....1....+....2....+....3....+....4....+....5....+....6....+....7..
      X2RDAT      X2RTIM      X2ROBJ      X2RERR
000001 2011-07-29 09.14.14 A1002498 File Y2CFGTL0 is missing.
000002 2011-07-29 09.14.14 A1002498 Failed to compile.
000003 2011-07-29 09.14.14 A1002499 File Y2CFGTL0 is missing.
000004 2011-07-29 09.14.14 A1002499 Failed to compile.
000005 2011-07-29 09.14.14 A1002500 File Y2CFGTL0 is missing.
000006 2011-07-29 09.14.14 A1002500 Failed to compile.
000007 2011-07-29 09.14.14 A1002503 File Y2DSTFL0 is missing.
000008 2011-07-29 09.14.14 A1002503 Failed to compile.
000009 2011-07-29 09.14.14 A1002504 File Y2DSTFL0 is missing.
000010 2011-07-29 09.14.14 A1002504 Failed to compile.
000011 2011-07-29 09.14.14 A1002505 File Y2DSTFL0 is missing.
000012 2011-07-29 09.14.15 A1002505 Failed to compile.
000013 2011-07-29 09.14.15 A1002527 File Y2CFGTL1 is missing.
000014 2011-07-29 09.14.15 A1002527 Failed to compile.
000015 2011-07-29 09.14.15 A1002528 File Y2CFGTL1 is missing.
000016 2011-07-29 09.14.15 A1002528 Failed to compile.

```

```
More...
```

```
F3=Exit   F12=Cancel   F19=Left   F20=Right   F21=Split
```

### Option 18 = Errors

**Option 18** can be used to list compile time errors for program failures from the ‘Generate’ (**Option 16**) job. The following screen displays the ‘Errors’ window:

```

Errors Report
Display Report
Report width . . . . . : 350
Position to line . . . . . Shift to column . . . . .
Line . . . . .1. . . . .2. . . . .3. . . . .4. . . . .5. . . . .6. . . . .7. . . . .
Source      Source      Source      Compiler   Compile   Compile   Ob
Library     File       Member     Command    Date      Time
***** ***** End of report *****

```

### Option 19 = Load Log

**Option 19** can be used to display any notifiable errors encountered in any of the Generate processes. The following screen displays the ‘Load Log’ window:

```

Load Log Report screen
Display Physical File Member
File . . . . . : XS2ELDLOG      Library . . . . . : AA2EDEMO
Member . . . . . : XS2ELDLOG      Record . . . . . : 3
Control . . . . .      Column . . . . . : 1
Find . . . . .
* . . . . .1. . . . .2. . . . .3. . . . .4. . . . .5. . . . .6. . . . .7. . . . .
A1002920 Q2ESRC2 AA2EDEMO XRRVY2EEDPY2DLSHL0 Missing access path for entr
***** END OF DATA *****

Bottom

F3=Exit  F12=Cancel  F19=Left  F20=Right  F24=More keys

```

### Option 20 = X-Analysis Log

**Option 20** can be used to display an audit of X-Analysis and Generate processes. The following screen displays the ‘X-Analysis Log’ window:

```

X-Analysis Log Report screen
Display Physical File Member
File . . . . . : XA4LOG      Library . . . . . : AA2EDEMO
Member . . . . . : XA4LOG      Record . . . . . : 367
Control . . . . . : B          Column . . . . . : 1
Find . . . . .
* . . . . .1. . . . .2. . . . .3. . . . .4. . . . .5. . . . .6. . . . .7. . . . .
2012-08-1005.43.33AA2EDEMO XREGEN Program: TSAHSRR MANOJK
2012-09-1212.00.48AA2EDEMO XREGEN Program: TSBMPFR MANOJK
2012-09-1212.03.29AA2EDEMO XREGEN Program: TSBMPFR MANOJK

```

```

2012-09-1212.04.02AA2EDEMO XREGEN Program: TSBMPFR MANOJK
2012-09-1212.08.07AA2EDEMO XREGEN Program: TSBMPFR MANOJK
2012-09-1212.51.06AA2EDEMO XREGEN Program: TSBMPFR MANOJK
2012-09-1213.34.42AA2EDEMO XREGEN Program: TSBMPFR MANOJK
2012-09-1213.35.36AA2EDEMO XREGEN Program: TSBMPFR MANOJK
2012-09-2510.23.20AA2EDEMO XA4INIT Application Initialization STUART
2012-09-2510.23.41AA2EDEMO XDMODEL *CA2E STUART
2012-09-2510.24.13AA2EDEMO XRENGPGMS*ALL programs STUART
2012-09-2510.24.14AA2EDEMO XGENBRULES*ALL programs STUART
2012-09-2510.39.20AA2EDEMO XREGEN *ALL programs STUART
2012-10-0312.58.16AA2EDEMO XREGEN *ALL programs TESTER
***** END OF DATA *****
Bottom
F3=Exit F12=Cancel F19=Left F20=Right F24=More keys

```

### Option 21 = File Check

**Option 21** submits the **XCMPDB2MDL** command to batch. This option identifies all the programs and identifies any missing display files, printer files, physical files and access paths files. It also identifies field errors. It can be run over the entire application or application areas. The file results can be found in X2EDBERR and all associated programs can be found in X2EDBEPG.

```

File Check Report Compare Database to Model (XCMPDB2MDL)
Type choices, press Enter.
X-Analysis X-Ref Library . . . . > AA2EDEMO Name
X-Analysis Application Area . . *ALL Character value, *ALL
Bottom
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

```

### Option 22 = Compile Check

**Option 22** submits **XGENORGOBJ** command to batch. This option compiles all the original programs in **QTEMP**. It can be run over the entire application or application areas. All failures are logged in **X2EGCMLOG** and the associated error records are logged in **X2ECPLLOGO**. In addition, any original programs which fail to compile are written to the exclusion file, **X2ERGNEXS**. The programs listed in the exclusion file are not generated as part of **Option 16, XREGENP**.

```

Generate Original Objects (XGENORGOBJ)
Type choices, press Enter.
X-Analysis X-Ref Library . . . . > AA2EDEMO Name
X-Analysis Application Area . . *ALL Character value, *ALL

```

```

                                                                 Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys

```

**Option 24 = Prb. Anl.**

**Option 24** can be used to display problems associated with the application. The following screen is displayed when **Option 24** is selected:

**Problem Analysis screen**

```

                          Analyse Application Problems (XPRBANL)

Type choices, press Enter.

X-Analysis Library . . . . . > AACAA2EDEMO      Name

                                                                 Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys

```

Press **ENTER** to submit a batch job which will execute the **XPRBANL** command in batch mode.

**Option CT = Prj Ctl**

**Option CT** can be used to work with X2E/RPG Project Control. The following screen is displayed when you select **Option CT**:

**Problem Control screen**

```

X2E/RPG                Work with X2E/RPG Project Control          Databorough Ltd.
XARWKPRJL              Project: AA2EDEMO      Ref'd Project: RF2EDEMO      11:55:12
                                                                21 Jan 2013

Type options, press Enter.
2=Change  4=Delete  5=Display  7=Notes  8=Comp.Errors  9=Missing Files

----Issue----
pt Program   Type Category   Program Description          Assig'd To
TSAGEFR     E  DSPDTASFL   Edit Doctor                  LYNDAB
TSAWEFR     * E  PMTERROR   Edit Medication              LYNDAB
TSAXE1R     * E  SCNDATE    EDTRCD Edit Diagnosis        LYNDAB
TSAZETR     * E  TRNLOGIC   TRN Edit Prescriptions       LYNDAB

                                                                 Bottom
F1=Help   F3=Exit   F5=Refresh   F6=Add   F10=Drop/Fold   F12=Cancel   F20=Summary
F21=Project Notes   F22=File Errors

```

## Options under Project Control Screen

The flow of actions from the 'Work with X2E/RPG Project Control' screen is as follows:

Actions	Options
Report issue picked for a program	<b>F6</b> – Add / <b>Option 2</b> - Change
Delete reported issue for a program	<b>Option 4</b>
Display reported program details	<b>Option 5</b>
Notes	<b>Option 7</b>
Compilation Errors	<b>Option 8</b>
Missing Files	<b>Option 9</b>
Summary	<b>F20</b>
Project Notes	<b>F21</b>
File Errors	<b>F22</b>

### F6 = Add

Enter the following information:

**Note: Same applies to Option 2 – change the added issue.**

#### Program Name

Enter the program's name for which the issue has to be reported.

#### Text

Enter suitable description for the issue.

#### Issue Type

Enter issue type.

#### Date and Time of event

This is a system-generated field.

#### Issue Category

Enter issue category.

#### Category Description

Enter category description.

#### Assigned To

Enter the name of the person to whom the issue is assigned.

#### Programmer Narrative

Enter note for programmer

**F6 screen – To add issue picked for a program**

```

X2E/RPG          Work with X2E/RPG Project Control          Databorough Ltd.
XARWKPRJL       Project: AACAA2EDEMO  Ref'd Project: *NONE          11:53:11
                                                    21 Jan 2013

Program Name . . . . .
Text . . . . .
Issue Type . . . . .
Date and Time of event . . . . . 2013-01-21  10.43.21
Issue Category . . . . .
Category Description .
Assigned To . . . . .
Programmer Narrative
  
```

**Option 4 – Delete**

Use this option to delete the reported issue.

**Option 5 – Display**

Use this option to display the reported issue.

**Option 7 – Notes**

Use this option to provide notes related to the issue.

**Option 8 – Comp. Errors**

Displays Compilation Errors for the program.

**Option 9 – Missing Files**

Displays Missing Files required by the program.

**F20 – Summary**

Displays Project Summaries. The user can see various project summaries by opting for F15.

**F21 – Project Notes**

Displays Project Notes.

**F22 – File Errors**

Reports the File in Errors



**F22 screen – Files in Error**

X2E/RPG	Work with X2E File Errors	Databorough Ltd.	
XARWKDBERR	Project: AA2EDEMO Ref'd Project: RF2EDEMO	11:56:21	
		21 Jan 2013	
Error	File	Field	Description
FFD0001	EDAAPI		File: EDAAPI not in XOBJECT
			Bottom
F1=Help F3=Exit F12=Cancel			

## X-2E DATA AREAS

The user can customize the X-2E settings to meet the project-specific needs. These can be controlled by the data areas available in the X-Analysis cross-reference library. The purpose of each data area has been detailed below:

### Synon Date Fields

This data area indicates that the Date Fields have already been processed. If the process is successful in processing the date fields, it sets the **XS2EDTSRUN** data area to **\*YES**. The default value is **\*NO**.

### Synon Entry Parameters

The entry parameters processing for a Synon application is governed by the reengineering process and the details are maintained in a **XS2ELDLOG** log file. The **XS2EEPVFD** data area is set to **\*YES** to indicate that the entry parameters have been processed successfully. The default value is **\*NO**.

### Synon Product Library for the Edit Code Definitions

The X-2E reengineering process is capable of obtaining the edit codes definitions stored in **YEDTCDERFP** file. The **XS2EEWLIB** data area has a value 'Y2SY' by default, which helps in locating the base product library for the 'PRD Edit code definitions' file. You can change the data area value to suit your environment. As an example, 'Y1SY' is another base product library.

## Synon Edit Code Definitions Processed

X-2E has the requisite capability to integrate the Synon edit code definitions into the X-Analysis edit code definitions table, **XEDITC**. This in turn will be accessed by the reengineering process, when required. The process sets the **XS2EWRUN** data area to **\*YES** if the Synon edit code definitions are successfully processed, else it will remain unchanged. The shipped value is **\*NO**.

## Synon Field Mapping Fix

The X-2E reengineering process maintains the field mapping data in X-2E databases. The value in the **XS2EFIEFIX** data area will be set to **'\*YES'** if the reengineering process manages to fix both external and internal Synon field mappings successfully. By default, the **XS2EFIEFIX** data area is set to **'\*NO'**.

## Synon EXCURSRC Function

The residual logic is a high-level view of a Synon program. The X-2E feature allows the user to merge the user source (invoked by **EXCURSRC** function) into the Synon program to present a complete view of the residual logic. By default, this functionality is always available and the **XS2EMRGEUS** data area is set to **\*YES**. If it is changed to **\*NO**, then the X-2E process will not merge the user source into the Synon program.

## Synon Debug Data

This X-2E feature allows the user to maintain the Synon debug data in the **XS2EDEBUG** file in the cross-reference library. To enable this feature, the user needs to change the value of the **XS2ERUNDBG** data area to **\*YES**. By default, the data area **XS2ERUNDBG** is set to **\*NO**.

## Synon Consolidated RTVCND Values

The X-2E reengineering process creates the **RTVCND** values in the **XS2EYYCNDX** table. This is a special feature which works only when the user sets the value of the **XS2EYYRUN** data area to **\*YES**. By default, it is set to **\*NO**.

## Synon Prototype Library

By default, the Synon base product library is set to 'Y2SY' for the various X-2E functionalities. In case it does not match your setup, then change the **XA2EPROLIB** data area to suit your environment. As an example, 'Y1SY' is another base product library.

# Appendix E – Overriding Data Tables

## SYNON FUNCTION KEY / OPTION DEFAULTS

The **XS2EFODFT** table identifies default function keys and options, their texts and action type. Applications may re-assign the \*PREVIOUS key from **F12** to **F24**, and use "A" for \*DELETE and "Z" for \*DETAIL.

**Table Structure for XS2EFODT**

```

A   R XS2EFODFT
A   S2ODTYP   1A   TEXT('Function Key/Option')
A   S2ODVAL   2A   TEXT('Value')
A   S2ODOVL   2A   TEXT('Override Value')
A   S2ODTXT   50A  TEXT('Text')
A   S2ODACT   20A  TEXT('Action')
A* -----
A   K S2ODTYP
A   K S2ODVAL
A* -----

```

**Default Values of the Table XS2EFODT**

S2ODTYP	S2ODVAL	S2ODOVL	S2ODTXT	S2ODACT
F	03		Exit	*EXIT
F	09		Add/Change	*ADD/*CHANGE
F	11		Delete	*DELETE
F	12		Cancel	*PREVIOUS
O	01		Select	*SELECT
O	04		Delete	*DELETE
O	05		Display	*DETAIL

**Example – Modified Values for the Table XS2EFODT**

S2ODTYP	S2ODVAL	S2ODOVL	S2ODTXT	S2ODACT
F	03		Rinucia	*EXIT
F	09		Modo<Inser>::Modo <Modif.>	*ADD/*CHANGE
F	11		Annullamento	*DELETE
F	12	24	Ritorna	*PREVIOUS

S2ODTYP	S2ODVAL	S2ODOVL	S2ODTXT	S2ODACT
O	A		Cancellazione	*SELECT
O	Z		Zoom	*DELETE
O	01		Selezione	*DETAIL

### SYNON FUNCTION KEY/OPTION EXTRA DEFAULTS

The **XS2EFOXTR** table details additional function key usage. In some applications, **F12** could be an extra default function key for the functions listed.

**Table Structure for XS2EFOXTR**

A	R XS2EFOXTRF		
A	S2OXTYP	1A	TEXT('Function Key/Option')
A	S2OXVAL	2A	TEXT('Value')
A	S2OXFNT	10A	TEXT('2E Function Type')
A*	-----		
A	K S2OXTYP		
A	K S2OXVAL		
A*	-----		

**Sample Values for XS2EFOXTR**

S2OXTYP	S2OXVAL	S2OXFNT
F	12	PMTRCD
F	12	DSPRCD
F	12	EDTRCD
F	12	SELRCO

# Appendix F – X2E Specific Features

The X2E reengineering process is a two-part process.

1. Reengineering of non-2E programs and EXCURSRC members.
2. Reengineering of 2E programs.

## REENGINEERING OF NON-2E PROGRAMS

This entails the following steps:

### Generate Business Rules

In this process, the business rules are generated and object/source level information i.e. Files used in the program, External data structure declared in a program, program calls, file/field info, entry parameters, program declared fields, actual source code and other object-related information is extracted and stored in various X-Ref files. This information is then used by X2E reengineering process to create procedure-based module/service program.

### Reengineer Programs

#### Program Restructuring

Here, the original RPG/COBOL source code is converted from language-specific syntax into a general format (e.g. MOVE/MOVEL/ADD/SUB etc. statements get converted into ASSIGN with proper conversion). In case of interactive program, the source code gets restructured to extract each logical screen as an equivalent function and related processing logic. Thereby, each logical screen is recovered as an equivalent function to be converted into JSF (Java) / XAML (Silverlight). The batch programs are simply converted without any restructuring. The restructured code is stored in the X-Ref library.

#### Service module generation

Having restructured the code, the process creates procedure-based module and service programs with all subroutines/procedures converted into procedures. For interactive programs, the exportable procedures are created for the functions which could be used either from the controller Javabeen or from RPG screen controller module.

#### Refactoring

In this process, all the special characters (i.e. #, @ or \$) which are not allowed in java literals are replaced with allowed characters to make a valid Java/C# literal. If a special character is used on a PF/LF, a new LF is created by renaming the fields with the java-acceptable names. The original file is then replaced in the program with the new file along

with the new fields throughout the program. In case a program contains a Display/Printer File and that file contains special characters in field names, a new file with the same name is created in X-Ref library. The newly-created file contains java compatible field names and the necessary changes (due to renaming of fields and record formats) are reflected in RPG program.

The data structures (except PSDS, INFDS and Externally-described DS – the Java generation takes care of it suitably) too are converted to standalone fields and the additional code (to reflect the operation on DS/subfields on all its individual converted standalone fields) gets added in the generated procedure-based module.

The assignment of compile time data to the corresponding arrays is also done from the initialise procedure. The conversion on the keyed data structures and Eval-Corr operations is also done in Java-acceptable format.

In the case of EXCURSRC, no refactoring and service module generation takes place. However, in order to handle special characters, the process replaces the special characters in the field names/ source code of the specific program as stored in one of the cross-reference files.

### Reengineer 2E programs

The X2E reengineering process refers the 2E model files to extract various details about the functions, fields, files, access paths, conditions, etc. This information is then held in the various cross-reference files created for the purpose. Once the basic information is extracted, the action diagrams of the 2E members are generated from 2E model files. The process then creates the procedure-based RPG source from the action diagram. If a specific 2E member includes any EXCURSRC type member, its content (which is recovered and stored in cross-reference files) gets appended. The field definitions of the EXCURSRC member are also appended to the program using it.

The parameters (e.g. starting with #I, #O or #B are renamed to start with II, OO and BB) are set accordingly with the long field names which have been passed as the actual parameter from the calling 2E program's action diagram. The example below illustrates this:

#### DRPRDFR Action diagram (snippet)

```
// Execute function Scan.
EXECUTE FUNCTION(Scan) TYPE(EXCURSRC);
PARAMETER(RCD.Oms_status);
PARAMETER(CTL.Oms_status_p12);
PARAMETER(LCL.Scanresult);
```

#### Execute user source - content of "Scan"

```
* Scan for search string
* Parameters :
```

```

* input : #ixutx : te onderzoeken string
* input : #ixvtx : zoekstring
* output #Ounnb : positie
*
D up          C          const('ABCDEFGHJKLMNOPQRS-
D            TUVWXYZ')
D lo          C          const('abcdefghijklmnopqrs-
D            tuvwxz')
D ulen       s          3 0
* Initialize parameters
C            movel      *blank      uscan1      80
C            movel      *blank      uscan2      80
C            movel      *blank      utran1      80
C            movel      *blank      utran2      80
C            z-add      *zero       uresul      3 0

* Te onderzoeken string save in uscan2
C            movel      #ixutx      uscan2
* Zoekstring save in uscan1
C            movel      #ixvtx      uscan1
* Lengte van de zoekstring bepalen
C            eval      ulen=%len(%trim(uscan1))
* Startpositie in de te onderzoeken string bepalen
C            z-add      1           upos        3 0

* Translate USCAN1 to Uppercase
C      lo:up      xlate      uscan1      utran1
* Translate USCAN2 to Uppercase
C      lo:up      xlate      uscan2      utran2
* Find argument
C      utran1:ulen scan(e)   utran2:upos  uresul
C            if        %Error
C            z-add     999      #ounnb
C            else
C            z-add     uresul   #ounnb
C            endif

```

**Code snippet of the generated procedure-based module:**

```

IIXUTX = Oms_status;
IIXVTX = SEL_Oms_status;
uscan1 = *blank;
uscan2 = *blank;
utran1 = *blank;
utran2 = *blank;
uresul = *zero;
uscan2 = iixutx;
uscan1 = iixvtx;
ulen = %len(%trim(uscan1));
upos = 1;
utran1 = %xlate(lo:up:uscan1);
utran2 = %xlate(lo:up:uscan2);
uresul = %scan(%subst(utran1:1:ulen):utran2:upos);

if %Error;
ounnb = 999;

else;

ounnb = uresul;

```

```
endif;
```

```
Scanresult = OOUNNB;
```

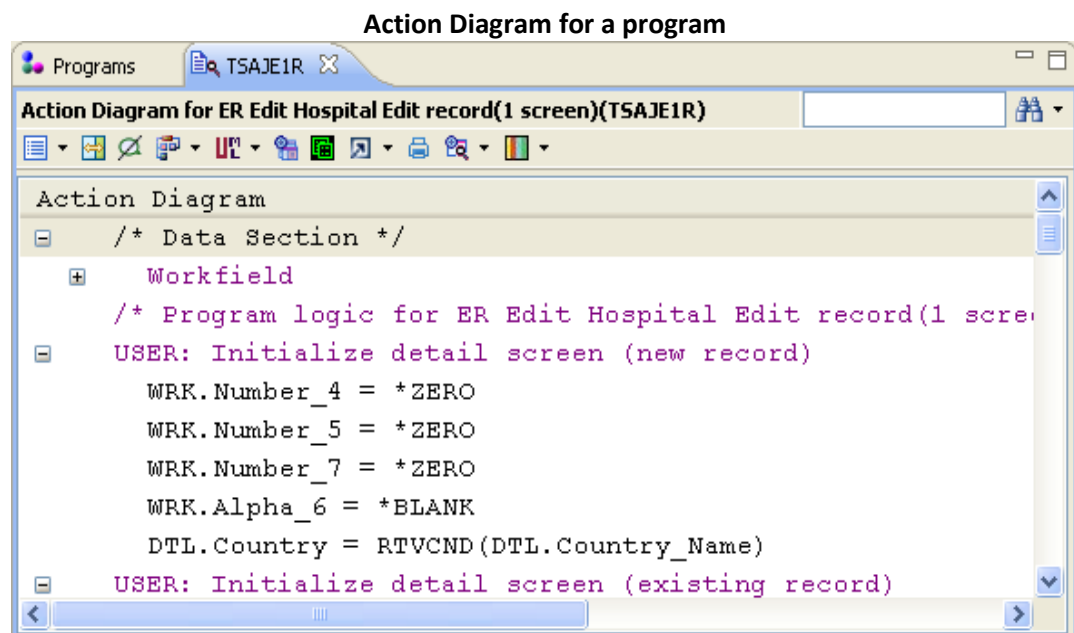
Let us closely look at the artifacts recovered by the X2E Reengineering process, i.e.:

1. Action Diagram
2. Business Rules
3. Residual Logic
4. Re-engineered Action Diagram
5. Re-engineered Controller
6. INTERNAL ROUTINES Objects
7. Business Process Logic Metrics

## ACTION DIAGRAM

The X-Analysis Initialization process uses 2E Model to generate Action Diagrams in the cross-reference library. On the X-Analysis Perspective, double-click the **Programs** node under the selected cross-reference to bring up the list of all programs.

Double-click on a program to zoom source into its corresponding Action Diagram (see below).

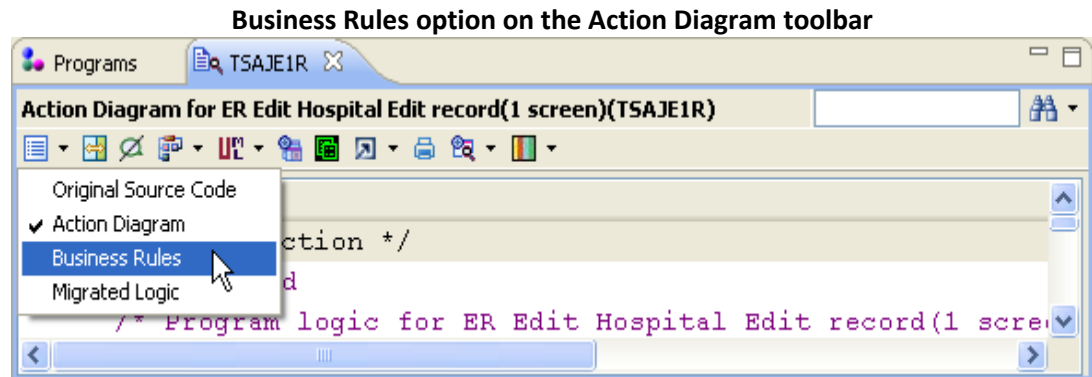




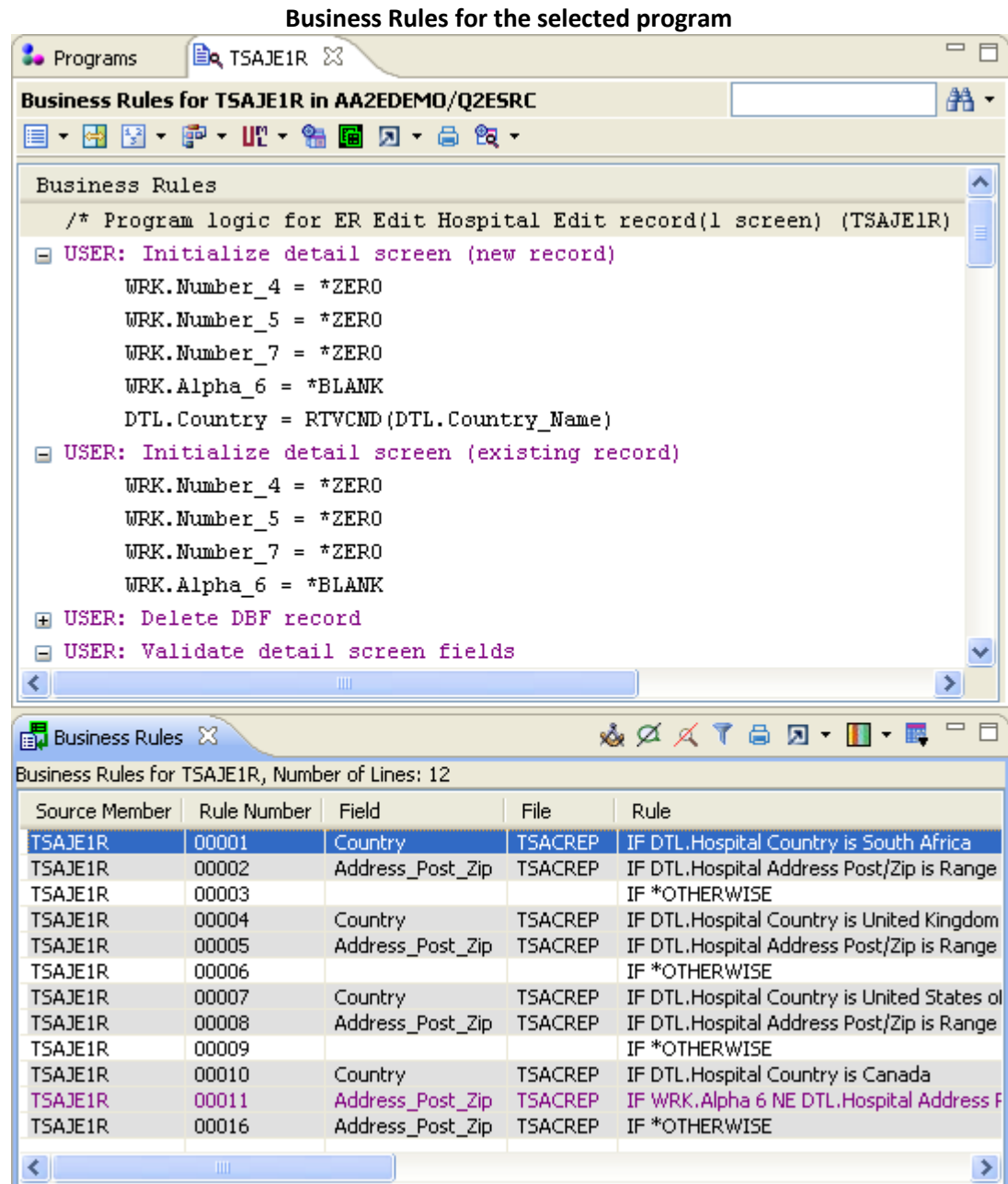
Note that the 'Call' has a '+' before it indicating that the program being called has parameter(s).

## BUSINESS RULES

Opt for the **Business Rules** option from the **Source Options** drop-down menu on the Action Diagram toolbar.



On selecting the **Business Rules** option, the following screen is displayed:

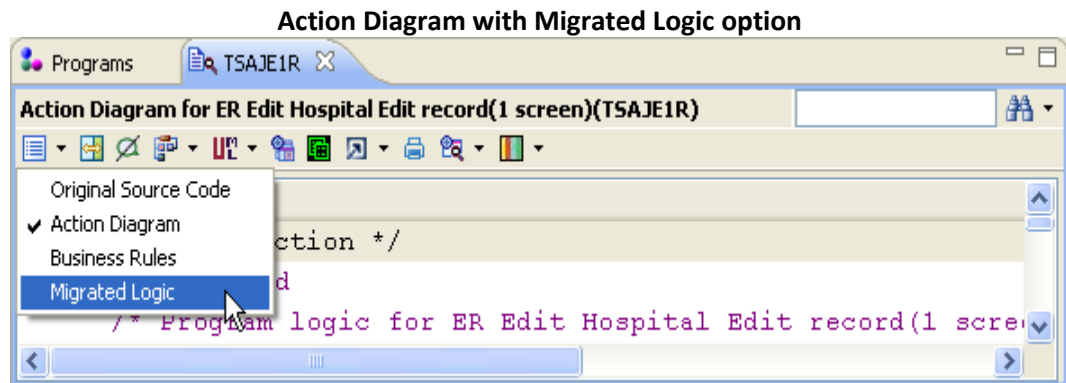


This also opens an additional Business Rules summary window listing all the business rules for the program.

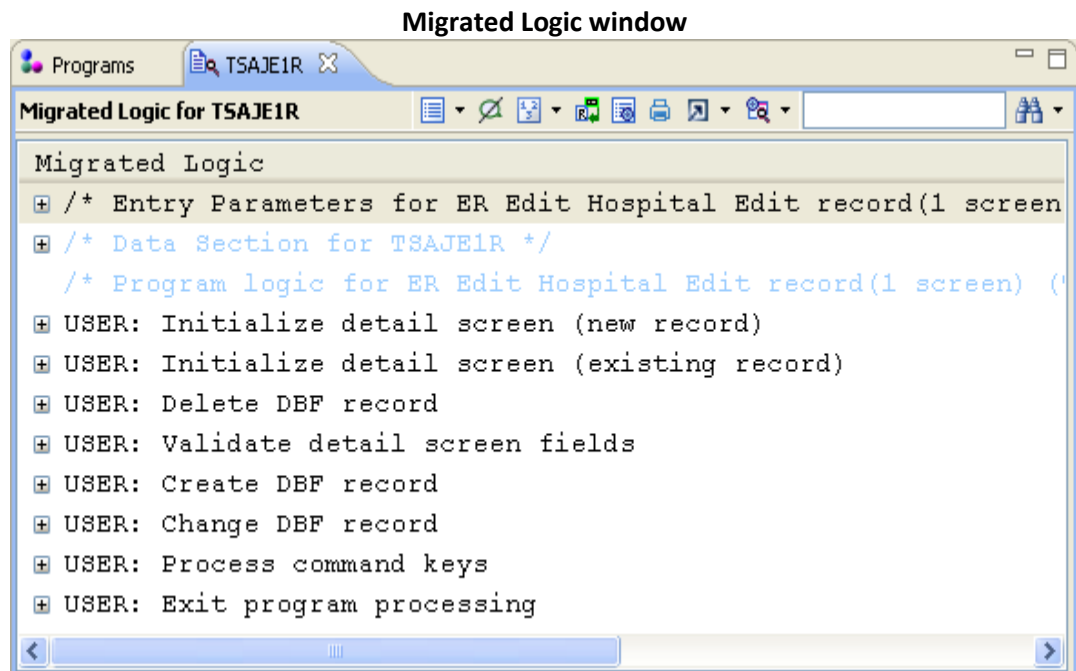
## MIGRATED LOGIC

The Migrated Logic is the reorganized/restructured view of what is shown in the Business Rules view. It is also a precursor of what the generated java code will look like. For this, the program should be reengineered first.

Select the **Migrated Logic** option from the **Source Options** drop-down icon on the Action Diagram toolbar, as shown below:

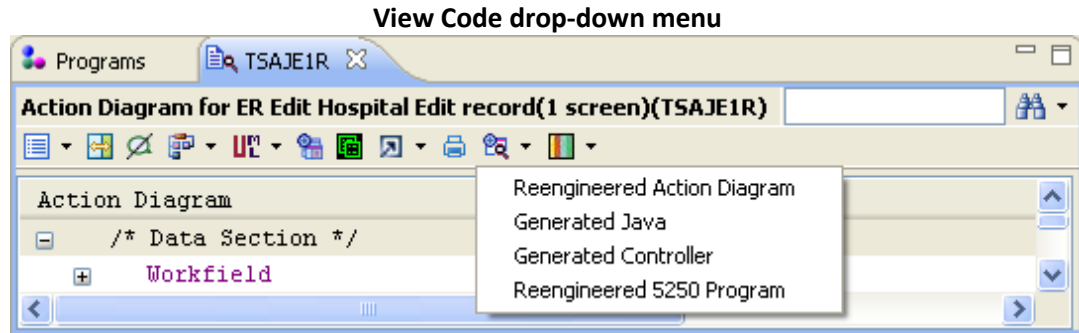


On selecting the **Migrated Logic** option, the following window is displayed:

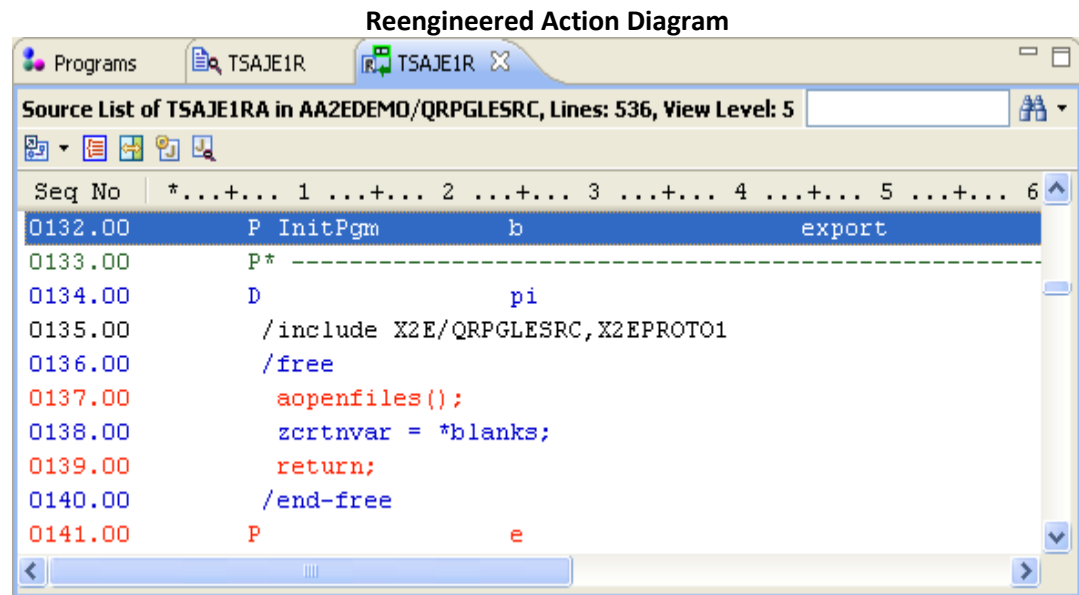


## REENGINEERED ACTION DIAGRAM

The Reengineered Action Diagram is available only when the Reengineering process is over. The following screen displays the **Reengineered Action Diagram** option from the Action Diagram toolbar:



The Reengineered Action Diagram is the RPGLE member, generated for the Action Diagram. This is created in the name <Program>A e.g. DRPZE1RA.



## INTERNAL ROUTINES OBJECTS

The X-Analysis Initialise process uses the Model information to identify internal routines. This information is maintained in the X2E repository in the **XS2EANXRF** file.

Opt for \*INTRTN on the **Work with Objects** dialog. This displays the following screen:

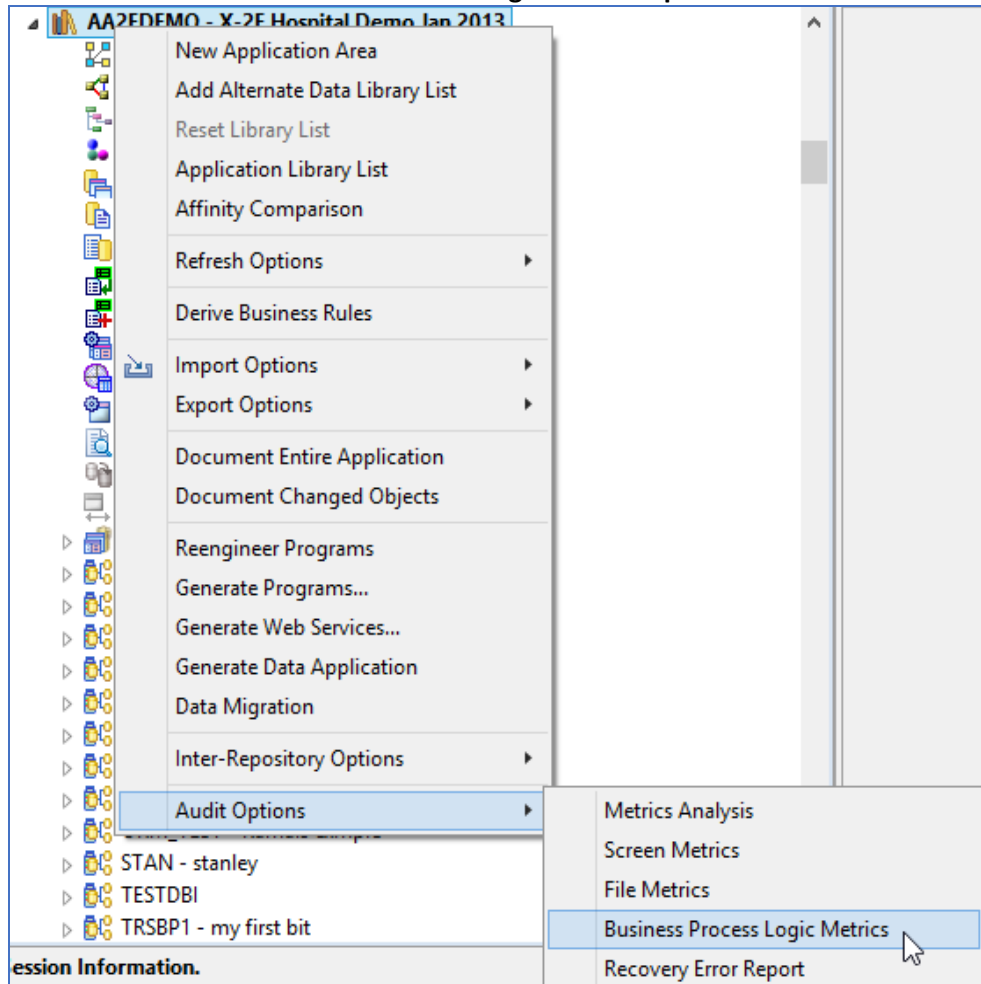
Object List displaying \*INTRTN objects

Library	Name	Type	Attribute	Description
	A1002463	*INTRTN		*Notepad
	A1002498	*INTRTN		Create *Configuration Tab
	A1002499	*INTRTN		Change *Configuration Tab
	A1002500	*INTRTN		Delete *Configuration Tab
	A1002503	*INTRTN		Create *Distributed File
	A1002504	*INTRTN		Change *Distributed File
	A1002505	*INTRTN		Delete *Distributed File
	A1002526	*INTRTN		Determine Recs to Delete
	A1002527	*INTRTN		Dlt Table & View Cfg Recs
	A1002528	*INTRTN		Ensure RDB Exists on Tab
	A1002569	*INTRTN		Retrieve Table for View
	A1002572	*INTRTN		NULL FUNCTION
	A1002573	*INTRTN		Create Config Recs
	A1002576	*INTRTN		Crt Table & View Cfg Recs
	A1002579	*INTRTN		Dlt Table & View Y2DSTFP
	A1002807	*INTRTN		Convert DT#
	A1002808	*INTRTN		Check DT#
	A1002809	*INTRTN		Convert TM#
	A1002810	*INTRTN		Check TM#
	A1002918	*INTRTN		Create *Date List Header
	A1002919	*INTRTN		Change *Date List Header
	A1002920	*INTRTN		Delete *Date List Header
	A1002925	*INTRTN		Create *Date List Detail
	A1002926	*INTRTN		Change *Date List Detail

## BUSINESS PROCESS LOGIC METRICS

Select **Audit Options** on the context menu over the cross-reference library and choose the **Business Process Logic Metrics** option from it, as is shown below:

**Business Process Logic Metrics option**



**Window displaying Business Process Logic Metrics**

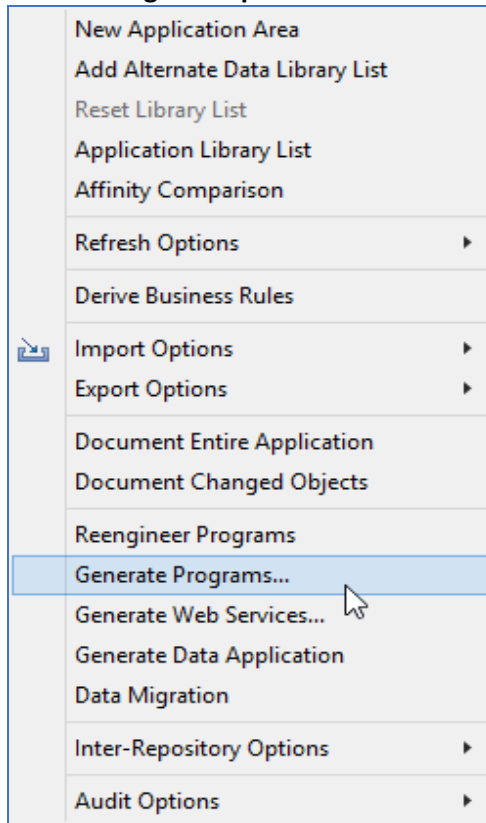
Business Process Logic Audit Report for AA2EDEMO

Name	Total Lines	Included Lines	Exclcd/FixMe Lines	Unmarked Lines	Total Stmt	Excluded Stmt
A1002463	0	0	0	0	0	0
A1002498	0	0	0	0	0	0
A1002499	0	0	0	0	0	0
A1002500	0	0	0	0	0	0
A1002503	0	0	0	0	0	0
A1002504	0	0	0	0	0	0
A1002505	0	0	0	0	0	0
A1002526	11	0	0	11	10	0
A1002527	4	0	0	4	3	0
A1002528	2	0	0	2	1	0
A1002569	13	0	0	13	11	0
A1002572	0	0	0	0	0	0
A1002573	16	0	0	16	15	0
A1002576	15	0	0	15	14	0

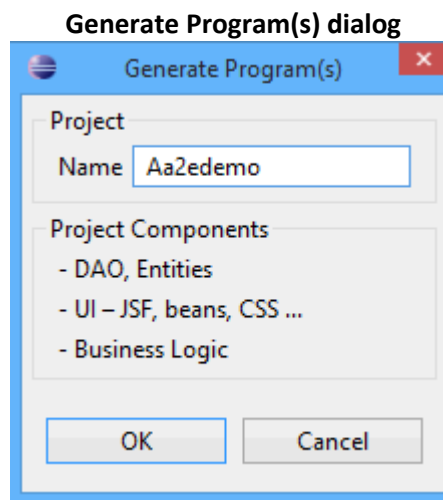
## GENERATING JAVA APPLICATION

Once the reengineering process completes, the user can opt to generate a Java application. He can use the **Generate Programs** option available on the context menu over a selected cross-reference library or an application area.

### Generate Programs option over X-Ref library



This presents the following dialog:

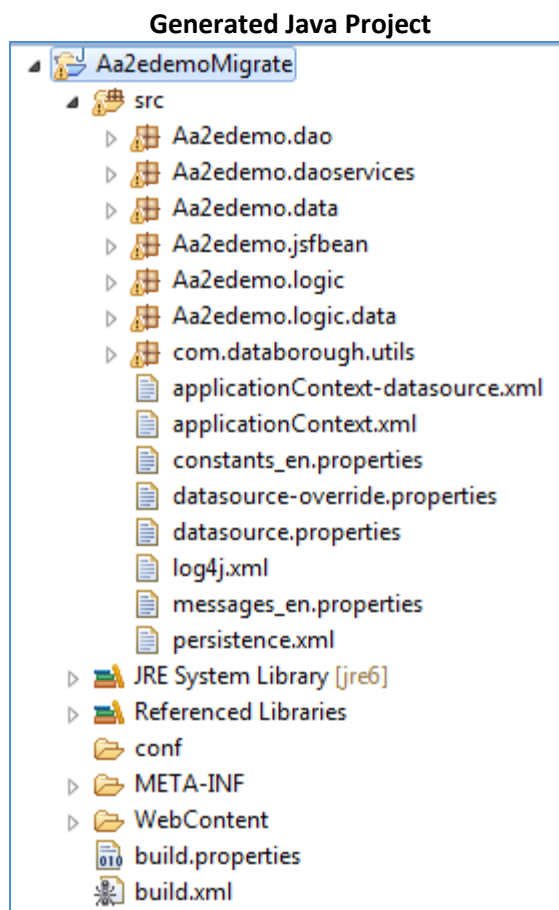


Click **OK**. The process generates the following components:

- Java for Business Rules under .logic and .logic.data package.
- DAO components for each Physical file. These are held in .dao, .daoservices and .data packages of the Java project.
- Managed Javabeans (.java) for each JSF under .jsfbean package.
- Java Server Faces (JSF) for each reengineered screen is created under WebContent folder.

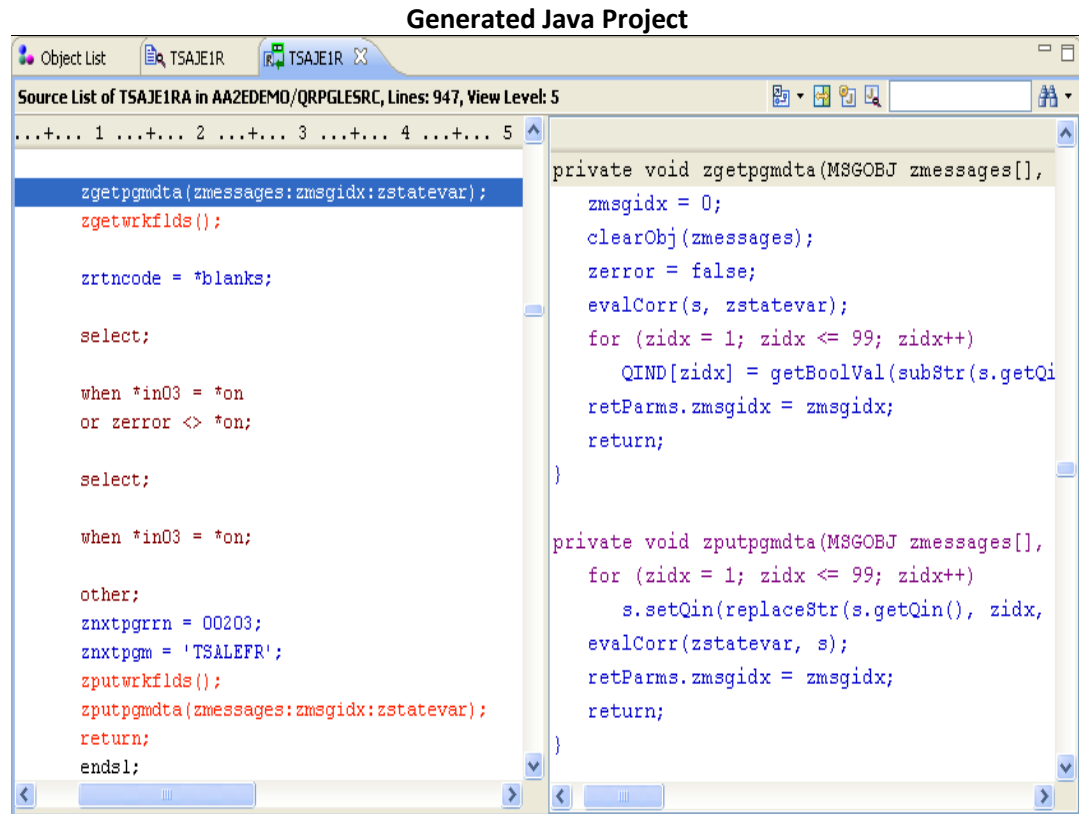
The process on completion prompts the user to switch to Java Perspective, if desired. If selected, Eclipse perspective switches to Java and the user gets to see the Java project generated by the Re-generate Programs.

The screenshot below shows the generated Java project with both ‘Generate Business Logic & DAO’ and ‘UI’ checkboxes checked.





The tool also gives the option to review the Reengineered Action Diagram and the generated Java code side-by-side by clicking the **Show Split Panel** icon on the Reengineered Action Diagram view.



## Appendix G – Troubleshooting

*It is recommended that after the X-Analysis Client installation/upgrade, the first invocation should be done using the 'Clean start Eclipse' shortcut from the X-Analysis program group. The subsequent X-Analysis sessions can be started using the 'X-Analysis for Eclipse' shortcut.*

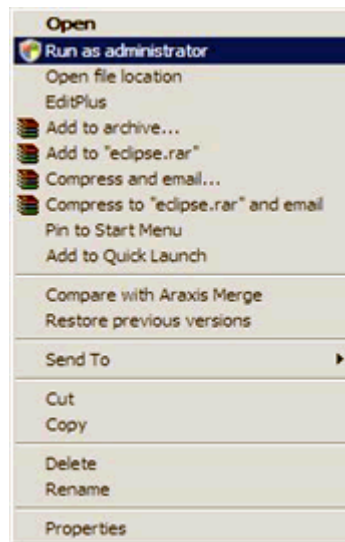
### X-ANALYSIS PERSPECTIVE NOT VISIBLE/WORKING AFTER UPGRADING X-ANALYSIS CLIENT

Close the X-Analysis Perspective and exit from Eclipse/WDSc/RDi/RBD. Select **Clean start Eclipse** for X-Analysis invocation.

In case of Windows Vista and above, you may need to select the **Run as administrator** option.

Opt for the context menu on the **Clean start Eclipse/X-Analysis for Eclipse** shortcut (from the X-Analysis program group), and then select the **Run as administrator** option as shown in the screen below:

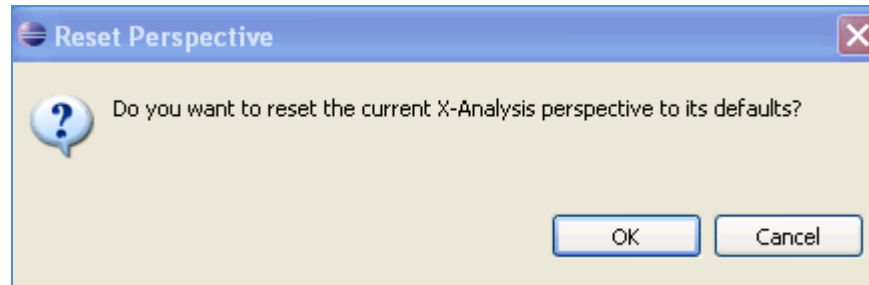
**Context Menu for Run as administrator**



This will launch Eclipse correctly and you will be able to switch to the X-Analysis Perspective.

## X-ANALYSIS MENU ON THE MAIN MENU BAR DISAPPEARS FROM X-ANALYSIS PERSPECTIVE

Sometimes, it so happens that the X-Analysis menu on the main menu bar disappears. Use the **Window->Reset Perspective** option to restore it.

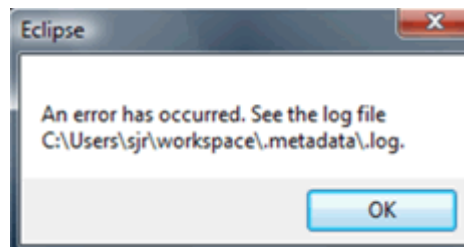


Also, Eclipse allows you to drag and drop various views. If some of the X-Analysis views are accidentally closed or are not visible, the **Window->Reset Perspective** option should be used to restore them.

## ERROR IN RUNNING X-ANALYSIS INSTALLED ON WINDOWS VISTA FOR THE FIRST TIME

This is observed when:

- The user has installed XARuntimeEnv11\_x\_x.msi
- On running X-Analysis, the following error message is reported:



Check the XAPugin.log file (available under **X-Analysis > Open Log folder**), to see if it has the following line: “java.lang.UnsatisfiedLinkError: no swt-win32-3232 in java.library.path.” This means that swt-win32-3232 file is not copied to the system folder.

The reason is that UAC (User Account Control, the security feature in Windows Vista) is ON and does not allow the user to write in the system folders e.g. C:\Program Files, C:\Windows etc.

To correct this, opt for the context menu on the **Clean start Eclipse/X-Analysis for Eclipse** shortcut and select the **Run as administrator** option. Refer to the description of the option given above.

## INITIALIZATION REPORTS

After initializing an IBM i application various log reports are generated by the X-Analysis server. The log reports generated are categorized as:

- Program Reference Exclusions
- Missing Object and Source

### Program Reference Exclusions

These exclusions are specified in the **XAOBJ/XPGREXCS** file.

X-Analysis is shipped with **XPGREXCS** file containing values QRN\*, QLE\*, QC\*, QM\*, QS\*. The file is duplicated into the user's X-Analysis library.

Any program reference specified in this file is excluded from the X-Analysis program cross-reference database, **X@XPGRF**.

Two reports are produced to list all actual exclusions:

- XARRMIVN program reports on exclusions from the DSPPGMREF output
- X@PMX1 program lists exclusions from the QBNLPGMI output

### Missing Object and Source

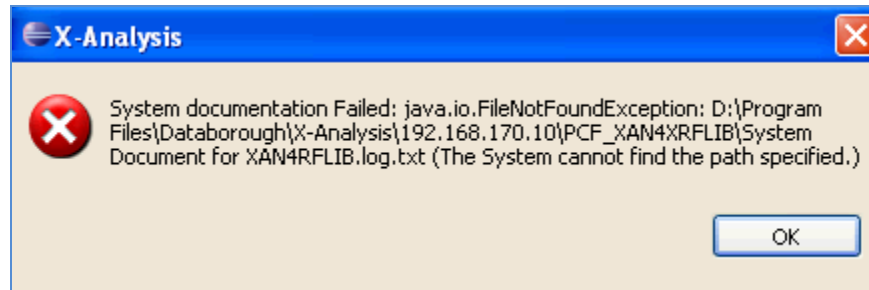
Various programs in X-Analysis initialization process write mismatches to all logs. These mismatches are printed out under the following headings:

- References to Objects not loaded
- References to Sources not loaded
- Source Code without Objects

***The above reports help you to interpret the outcome of the initialization command run on an IBM i application.***

## SYSTEM DOCUMENTATION FAILED: FILENOTFOUNDException

On executing the X-Analysis Documenter, if the following error is reported:



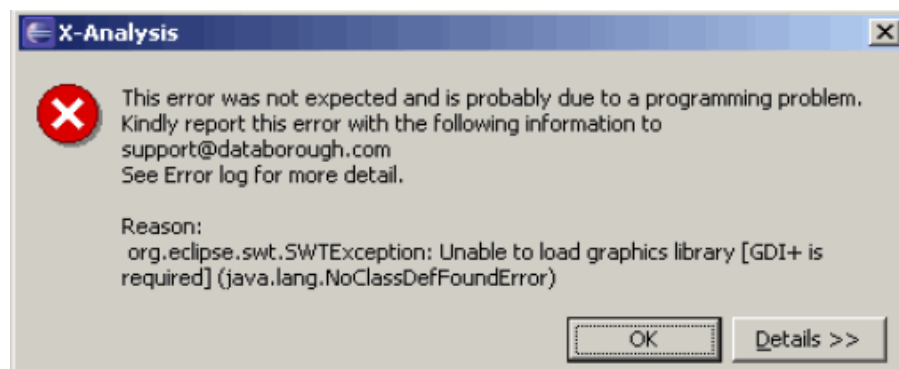
This means that the user does not have rights to create files under Program Files folder.

Do the following to get around this problem:

1. On WDS, under the X-Analysis menu, opt for **Change Application Folder**. Select the folder for which you have full rights.
2. Opt for the **Documenter** again.

## SWTEXCEPTION ON WINDOWS 2000 MACHINES

If the following error is reported on opting for diagrams in X-Analysis running under Windows 2000 machine:



This can be corrected as follows:

This is the SWTException that is reported on the Windows 2000 machines. The cause for this exception is the absence of GDI+ library (gdiplus.dll) on Windows 2000. On Windows XP and Vista, it is available by default. The user needs to download the required DLL (gdiplus.dll) from Microsoft site.

<http://www.microsoft.com/downloads/details.aspx?FamilyID=6a63ab9c-df12-4d41-933c-be590feaa05a&DisplayLang=en>

Download and copy the GDIPLUS.DLL to the default installation directory e.g. C:\PROGRAM FILES\DATABOROUGH\ECLIPSE\JRE\BIN

Restart X-Analysis and the diagrams should show up now.

## SCREEN/REPORT DESIGN FEATURE FAILS WITH SERVER JOB ERROR

If the **Screen/Report Design** feature was working fine earlier and is now giving error, then look at the Server Job associated with X-Analysis.

1. Identify the QZDASOINIT job associated with the XA session and look for the USER NAME/QPRTJOB messages. For example:

Message . . . : A duplicate job named 103581/MARK/QPRTJOB was found.  
 Message . . . : A duplicate job named 161482/MARK/QPRTJOB was found.

2. Run the following command on the session:  
 WRKSPLF SELECT(\*ALL) JOB(103581/MARK/QPRTJOB) and  
 WRKSPLF SELECT(\*ALL) JOB(161482/MARK/QPRTJOB).  
 Take **Option 4** against the spool files to delete them.
3. Opt for the **Screen/Report Design** feature again. This should be working now.

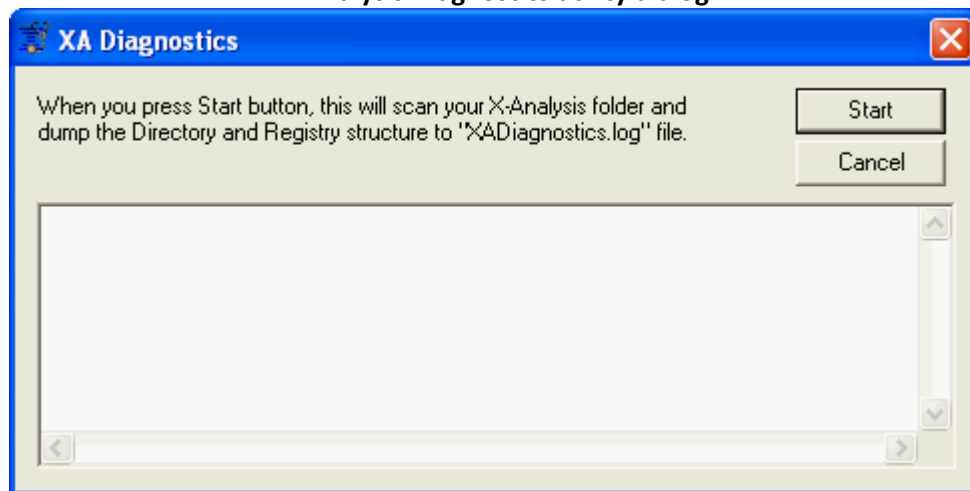
## X-ANALYSIS DIAGNOSTICS UTILITY

**Note: To ensure correct results, please use the 'Run as administrator' option for this utility.**

The X-Analysis Diagnostics utility is invoked automatically when an exception occurs on X-Analysis; it opens the log folder which has the "XADiagnostics.log" along with other '.log' files. This utility will log entries under CLSID value (for bean), databorough\lib folder structure and information about IBM's Rational products 7.5 and above or Eclipse 3.4 and above.

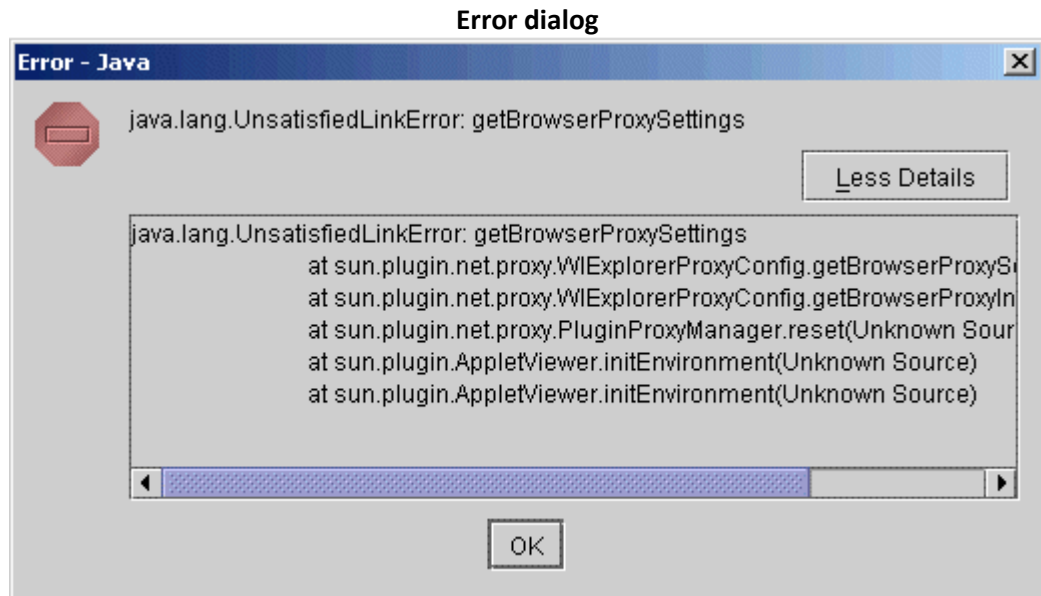
This utility can also be invoked standalone to provide directory and registry structure related to the X-Analysis installation to a log file. To run this utility, select the **X-Analysis Diagnostics** under the X-Analysis program group:

X-Analysis Diagnostics utility dialog



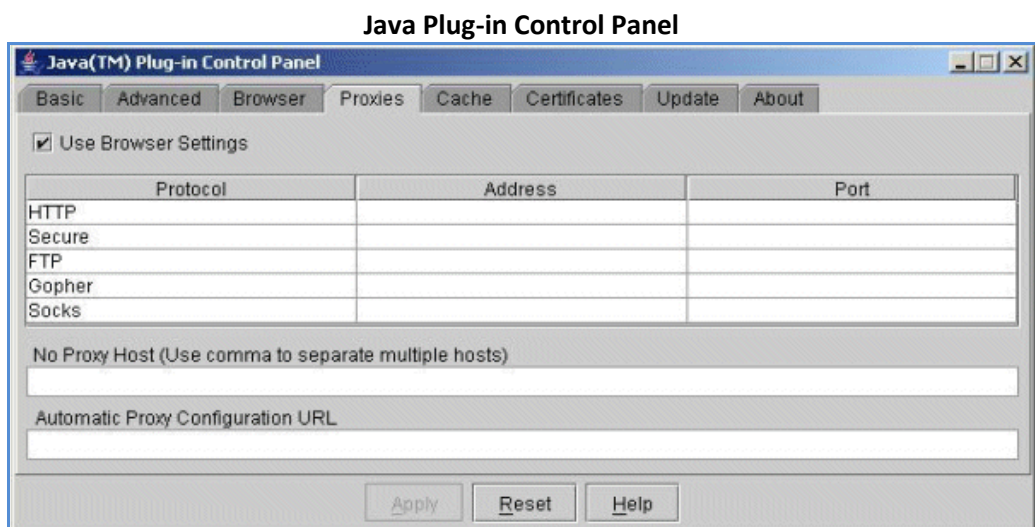
## ERROR MESSAGE APPEARS ON SIGNON TO X-ANALYSIS

While signing on to X-Analysis if the following error message is displayed, then please perform the following troubleshooting steps:



1. Go to the Control Panel.

Double-click the Java Plugin. This opens the Java Plug-in Control Panel. Go to **Proxies** Panel. The Proxies panel looks like this:



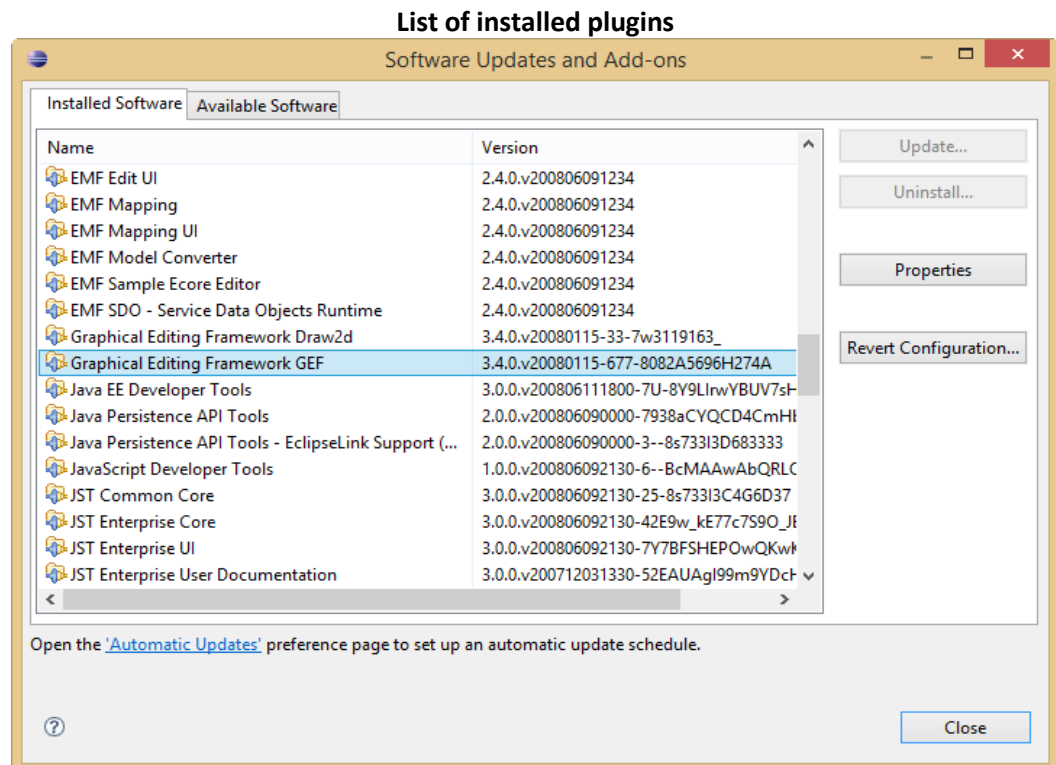
Uncheck the Use Browser Settings checkbox. Click **Apply** and close the Java Plug-in Control Panel.

2. Start XA again.

## DATA FLOW DIAGRAMS ARE UNAVAILABLE

Sometimes the available version of the Graphical Editor Framework may not be compatible with what is required for the new feature. Perform the following steps to begin viewing the Data Flow Diagrams:

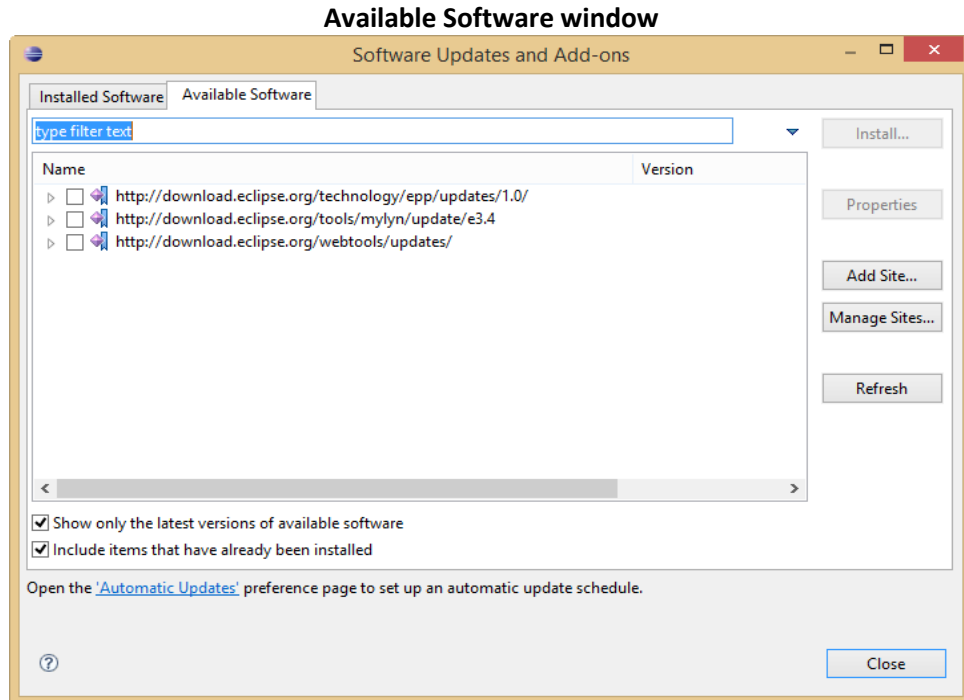
1. On the WDS, go to **Help** and select **Software Updates**. This will display the list of the installed plugins (as shown below). Look for the Graphical Editor Framework and cross-check the version number. The following image shows the **Software Updates and Add-ons** window



If the GEF version number on the user's RDi is below 3.3, the **Data Flow Diagram** will not be displayed. In such a scenario, perform the following steps to update the Graphical Editing Framework:

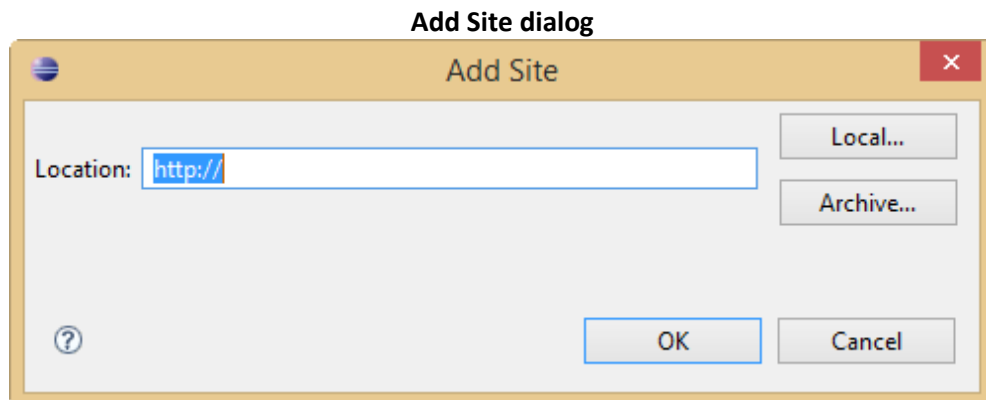
2. Click on the **Available Software** tab and check for the latest version of the Graphical Editing Framework.





If the installed GEF software is below 3.3, its upgraded version will be shown in the list of available software. Click the relevant box to install the latest version.

If the latest version of the software is not displayed, click on **Add Site**. The following window will be displayed:



3. Provide the name of the given site in the Location field:

`http://archive.eclipse.org/tools/gef/downloads/drops/R-3.3-200706281000/`

4. Click **OK**.

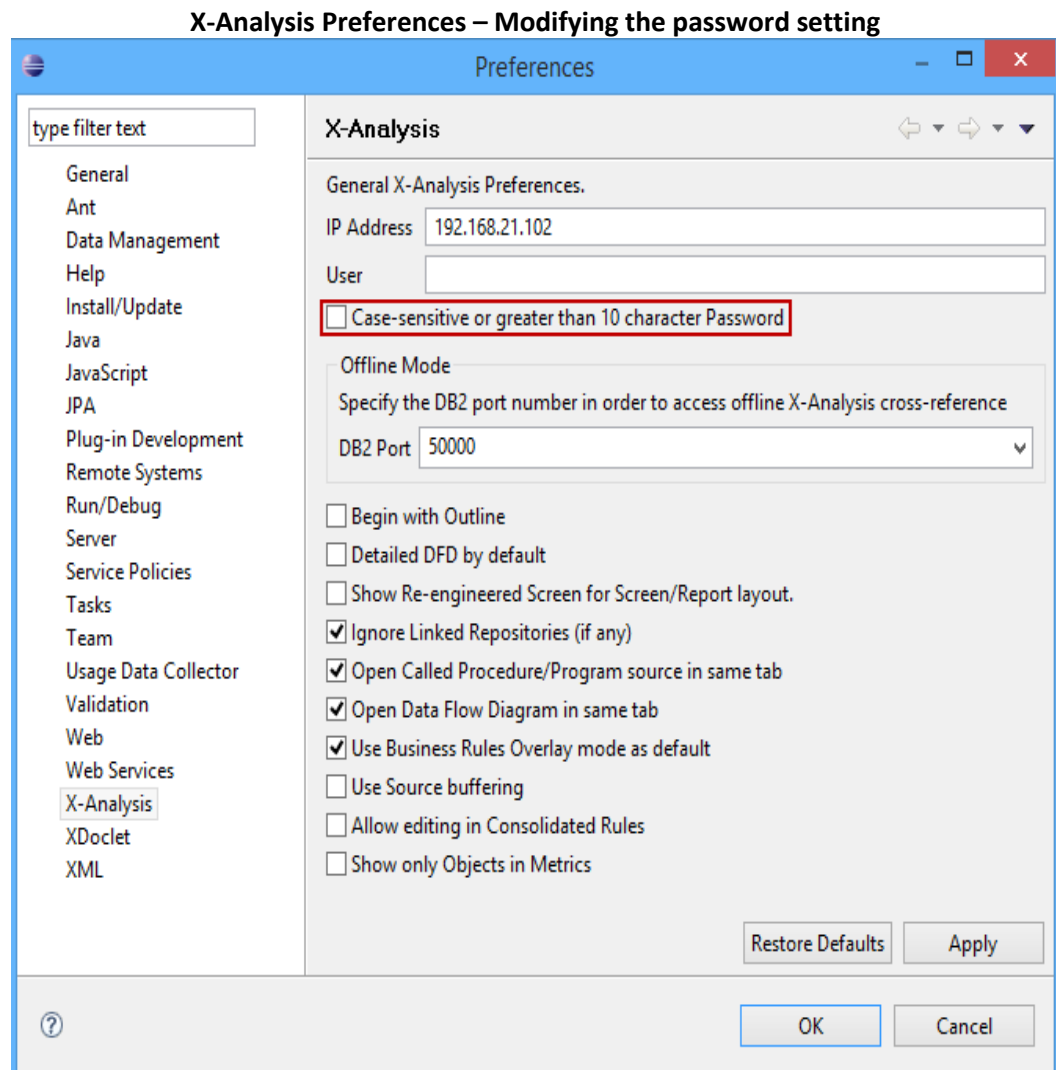
5. Close the Software Updates and Add-ons window and re-start the WDSc to view the DFDs.

**Note: Verify the current location of the installed X-Analysis. If it is installed on the XA Runtime Environment, you must uninstall the X-Analysis client as well as the XA Runtime. Re-install X-Analysis to resume its working on the WDS.**

## SETTING THE PASSWORD FIELD

To set the password field for more than 10 characters, please perform the given steps:

1. Go to **Window->Preferences->X-Analysis**.
2. Check the **Case-sensitive or greater than 10 character Password** setting and click **OK**. The setting is shown below:

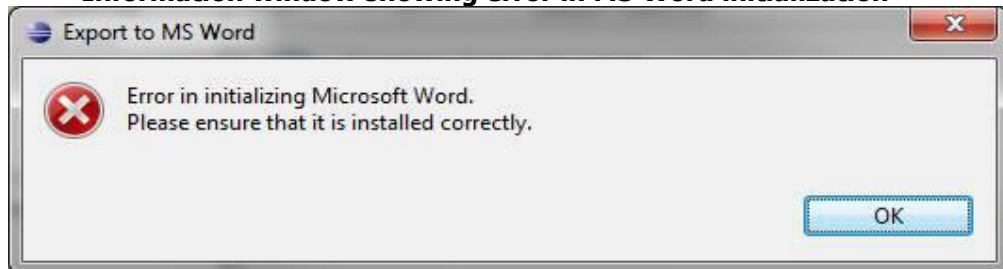


3. Login again. You will be able to input more than ten characters for the password.

## ERROR IN GENERATING PROGRAM DOCUMENTATION

There may be instances (while generating program documentation) when you may encounter the following error:

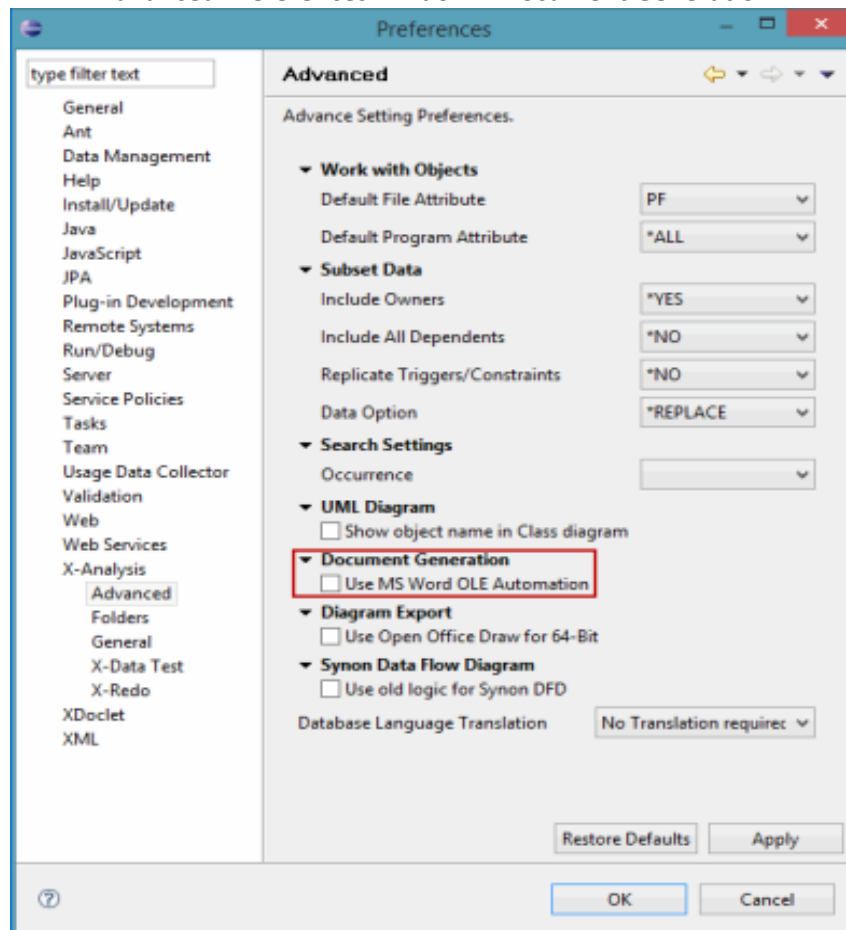
### Information window showing error in MS Word initialization



To resolve this error, check the preference setting for documentation.

Go to **Window->Preferences->X-Analysis->Advanced** tab. You will see a specific setting **Use MS Word OLE Automation** under **Document Generation**. Check the box to activate the OLE automation for various documenting and exporting tasks.

### Advanced Preferences window – Document Generation

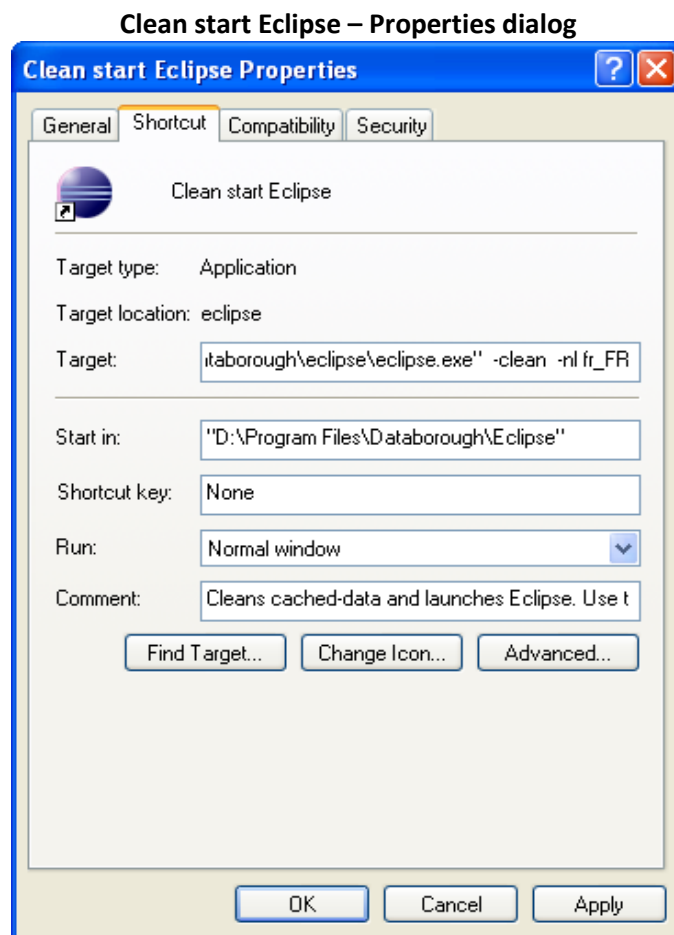


If OLE automation fails, check your OS configuration. For instance, if you have a 64-bit OS, the OLE automation will not work. In such a case, uncheck the **Use MS Word OLE Automation** to continue generating documents in generic format. These documents can be viewed later using MS Office or Open Office.

## USING THE FRENCH INTERFACE

If you wish to run the Eclipse provided with the Runtime Environment in the **French** mode, you need to edit the properties of the shortcuts provided in X-Analysis group – **Clean start Eclipse** and **X-Analysis for Eclipse**.

Using the **Properties** option on the shortcuts, update the **Target** value by appending ' **-nl fr\_FR**' at the end of existing value.



***In case there is any other problem not covered above, please send your requests to [Support@freschelegacy.com](mailto:Support@freschelegacy.com) along with the log file for the current X-Analysis session. The file can be obtained by using X-Analysis -> Open Log Folder menu option.***

## Appendix H – Refresh X-Analysis

X-Analysis provides two commands for the operational maintenance of X-Analysis repository (cross-reference library). These two commands are **XREFRESH** and **XAXREF**.

### XREFRESH

The **XREFRESH** command refreshes the cross-reference library to reflect any changes that are made to the cross-reference library. The command refreshes both the sources and objects that are already initialized; it will not look at freshly-added sources or objects.

*It is recommended to run this command each night so that the cross-reference reflects the most updated state.*

Before using the **XREFRESH** command ensure the following sequence of the library list:

- XAOBJ
- QGPL
- QTEMP

Then, type the **XREFRESH** command on the command line and press **ENTER**. The following screen should appear:

#### XREFRESH command screen

```

Refresh Changed Objects (XREFRESH)

Type choices, press Enter.

X-Analysis Library . . . . . Name
Refresh Application Areas . . . *YES *YES, *NO, Y, N
Refresh Business Rules . . . . *NO *YES, *NO

Bottom
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys
Parameter XRFLIB required.
```

Provide the name of the cross-reference library which needs to be refreshed along with other details and click **ENTER** to submit a batch job. This batch job refreshes the cross-reference library.

Once the batch job is over, you can check the error log. It is a spool file generated as a result of this batch job. The following screen displays the spool file listing:

**Spool file listing**

```

Work with Job Spooled Files

Job:   XREFRESH      User:   US           Number:  086439

Type options, press Enter.
  1=Send  2=Change  3=Hold  4=Delete  5=Display  6=Release  7=Messages
  8=Attributes  9=Work with printing status

Opt  File           Device or      User Data      Status  Total  Current  Copies
     XREPORT        QPRINT        XARPTRLOG      RDY     1      1         1
     QPJOBLOG       QEZJOBLOG     XREFRESH       RDY    2594    1         1

Parameters for options 1, 2, 3 or command
====>
F3=Exit  F10=View 3  F11=View 2  F12=Cancel  F22=Printers  F24=More keys
Bottom

```

Then, use **Option 5** against spool files to view the report.

**Spool file for the XREFRESH command**

```

Display Spooled File
File . . . . . : XREPORT          Page/Line  1/1
Control . . . . .      Columns    1 - 78
Find . . . . .
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...
X-Analysis          Audit Log for X4SRCXC XREFRESH Processing
XARPTRLOG

-----
XREFRESH completed X4SRCXC at 08.50.56 on 2012-12-10
* * * * * E N D   O F   R E P O R T * * * * *

```

F3=Exit F12=Cancel F19=Left F20=Right F24=More keys  
Overprinting not displayed.

Bottom

## XAXREF

The **XAXREF** command reinitializes the cross-reference library to reflect any changes that have been made to the cross-reference library.

***It is recommended to run this command each night (or weekly, as the case may be) so that the cross-reference reflects the most updated state.***

Before using the **XAXREF** command ensure the following sequence of the library list:

- XAOBJ
- QGPL
- QTEMP

Then type the **XAXREF** command on the command line and press **ENTER**. The following screen should appear:

### XAXREF command screen

```

                Initialise X-Analysis/4 (XAXREF)

Type choices, press Enter.

X-Analysis Library . . . . .ABCD           Name

                                                                 Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys
Parameter XRFLIB required.

```

Provide the name of the cross-reference library and press **ENTER** to input further details:

**XAXREF command screen**

```

Initialise X-Analysis/4 (XAXREF)

Type choices, press Enter.

X-Analysis Library . . . . . > ABCD          Name
Object Libraries . . . . . *SPECIFIED      Name, *SPECIFIED
      + for more values
Source Libraries . . . . . *SPECIFIED      Name, *SPECIFIED, *NONE
      + for more values
Index Source Files . . . . . *CHG          *CHG, *NO, *ALL, *UPG
Build Data Model . . . . . *NO            *YES, *NO
Generate Business Rules . . . . . *NO      *YES, *NO
Initialise X-Resize . . . . . *NO         *YES, *NO
Include obsolete source/object . . . . . *NO  *YES, *NO

```

If the sources and objects are modified, then the **XAXREF** job needs to run with **\*CHG** option and Build Data model to **\*YES** (to track any file level changes in keys, fields etc.), Generate Business Rules to **\*YES** (to track any source level changes).

The details of the various options available on the **XAXREF** command are given below:

Feature	Brief Description
X-Analysis Library	The X-Analysis cross-reference library name.
Object Libraries	Special value <b>*SPECIFIED</b> is selected by default. It means that X-Analysis will retrieve all object libraries you have previously specified (using <b>Option 8</b> ).
Source Libraries	Special value <b>*SPECIFIED</b> is selected by default. It means that X-Analysis will retrieve all source libraries you have previously specified (using <b>Option 8</b> ).
Index Source Files	Specify whether or not to create indexes over the source files. These indexes will allow the immediate display of "where used" data. They may be required for the data model generation, depending on which options are taken. If the indexes are not built now, they can be built for an individual Source Member at the time they are viewed through the X-Analysis browser. Select one of the following: <ul style="list-style-type: none"> <li><b>*CHG</b> – Only update current indexes. It will find newly added source members and remove deleted members. It will also index any source member that has changed since the last initialisation.</li> <li><b>*NO</b> – Do not build the indexes</li> <li><b>*ALL</b> – It is similar to <b>*CHG</b> when it comes to finding new members and removed members. It will index all source members without checking the change date.</li> <li><b>*UPG</b> – Upgrade the X-Analysis database and rebuild all data including all indexes (replacing current ones).</li> </ul>
Build Data Model	If you take the option to build the data model for your application then you can view it through X-Analysis. Select one of the following: <ul style="list-style-type: none"> <li><b>*YES</b> – Build the data model</li> <li><b>*NO</b> – Do not build the data model</li> </ul> <p><b>You should have the X-Analysis Professional Module/Modeling set for this to work.</b></p>



Feature	Brief Description
Generate Business Rules	<p>If you take the option to generate the business rules for your application then you can view it through X-Analysis. Select one of the following:</p> <ul style="list-style-type: none"> <li>• <b>*YES</b> – Generate Business Rules</li> <li>• <b>*NO</b> – Do not generate Business Rules</li> </ul> <p><b>You should have the X-Rules Module/Design Recovery set for this to work. If choosing *YES, Modeling should have been already performed or Build Data Model should be *YES.</b></p>
Initialize X-Resize	<p>If you take the option to generate the X-Resize Project for your application then you can view it through X-Analysis. Select one of the following:</p> <ul style="list-style-type: none"> <li>• <b>*YES</b> – Initialise X-Resize Project</li> <li>• <b>*NO</b> – Do not initialise X-Resize Project</li> </ul> <p><b>You should have the X-Field Resize Module for this to work.</b></p>

Press **ENTER** to submit a batch job to process the **XAXREF** command.

Once the batch job is over, you can check the different log files, which are spool files generated as a result of this batch job. Different sets of spool files are generated based on RPG or 2E environment.

For RPG environment, the following spool files are generated:

Spool File	Message	Purpose
XREPORT	Audit Log for <X-Ref library> Init	Job Initialisation
XREPORT	Audit Log for <X-Ref library> D/B Model Build	If Build Data Model is *YES
XREPORT	Audit Log for <X-Ref library> Business Rule Extraction	If Generate Business Rules is *YES

For 2E environment, the following spool files are generated:

Spool File	Message	Purpose
XREPORT	Audit Report for <X-Ref library> Load on...	Object/Member List
XREPORT	Audit Log for <X-Ref library> Init	Job Initialisation
XBREPORT	SYNON Relationships where foreign keys are missing	Foreign key relationships
XREPORT	Audit Log for <X-Ref library> D/B Model Build	If Build Data Model is *YES
XREPORT	Audit Log for <X-Ref library> Re-engineering Processing	Re-engineering executed
XREPORT	Audit Log for <X-Ref library> Business Rule Extraction	If Generate Business Rules is *YES

Use the following command to check the generated spool file:

**WRKJOB JOB(JOB NUMBER/USER/XAXREF)**

This should invoke the following similar screen:

**Work with Job screen**

```

Work with Job
Job:  QPADEV0021      User:  US              Number:  087868      System:  DBSPW6
Select one of the following:
    1. Display job status attributes
    2. Display job definition attributes
    3. Display job run attributes, if active
    4. Work with spooled files
    10. Display job log, if active, on job queue, or pending
    11. Display call stack, if active
    12. Work with locks, if active
    13. Display library list, if active
    14. Display open files, if active
    15. Display file overrides, if active
    16. Display commitment control status, if active
More...
Selection or command
====>
F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel

```

Then, use **Option 4** to work with associated spool files:

**Job-specific Spool Files**

```

Work with Job Spooled Files
Job:  XAXREF          User:  US              Number:  087868
Type options, press Enter.
  1=Send  2=Change  3=Hold  4=Delete  5=Display  6=Release  7=Messages
  8=Attributes  9=Work with printing status

```

Opt	File	Device or Queue	User Data	Status	Total Pages	Current Page	Copies
	XREPORT	QPRINT	XARPTRLOG	RDY	1		1
	XREPORT	QPRINT	XARPTRLOG	RDY	1		1
	XREPORT	QPRINT	XARPTRLOG	RDY	1		1
	QPJOBLOG	QEZJOBLOG	XAXREF	RDY	90		1

Then, use **Option 5** against spool files to view the report.

# Appendix I – X-Analysis Indexes Job Scheduler Entries

X-Analysis initialization process (**XA4INIT** command) calls the **XASCDEIDX** and **XAROBOT** commands towards the end of the processing. These commands generate source members for IBM Job Scheduler entries and ROBOT Job Scheduler entries.

X-Analysis initialization process starts the ROBOT processing if it finds the **RBTROB8**, **RBTCMD1** and **RBTC2** files all in the same library.

For ROBOT entries, it creates and indexes source members in QCLSRC and writes XMEMBER records. It also populates the **XAROBOTIDX** file.

## XASCDEIDX COMMAND

The **XASCDEIDX** command will cross reference the IBM job scheduler entries. A CL source member is generated in the specified library for each job.

This source is then indexed, enabling references to be displayed through the Variable Where Used and the Object Where Used features.

### X-Ref Job Scheduler Entries (XASCDEIDX)

```

X-Ref Job Scheduler Entries (XASCDEIDX)

Type choices, press Enter.

X-Analysis library . . . . . Name
CL source library . . . . . Name
  
```

### X-Analysis Library

Enter the name of the X-Analysis library where the Where Used data should be stored.

### CL Source Library

Enter the name of the library where the CL source should be stored. This can be the X-Analysis library itself, if required.

## XAROBOT COMMAND

The **XAROBOT** command creates Program References and Global Where Used entries for jobs initiated from the Robot job scheduler.

**Index Robot Scheduler Jobs (XAROBOT)**

```

Create/Index Robot Sched Jobs (XAROBOT)

Type choices, press Enter.

X-Analysis library . . . . . Name
Robot library . . . . . Name
CL source library . . . . . Name
  
```

**X-Analysis Library**

Enter the name of the X-Analysis cross-reference library built for the application containing the jobs scheduled by Robot.

**Robot Library**

Enter the library name that contains the Robot database.

**CL Source Library**

Enter the library name where the program can generate CL source members for each scheduled job entry. You can enter **QTEMP** if you do not wish to keep or view the source programs generated.

## Appendix J – Dual Installation of X-Analysis

X-Analysis gets installed on the X-Analysis Runtime Environment if both RDP and Runtime Environment are installed (as preference is given to the Runtime Environment).

In order to run X-Analysis on both the Runtime Environment and RDP 8.5, you must follow the steps given below:

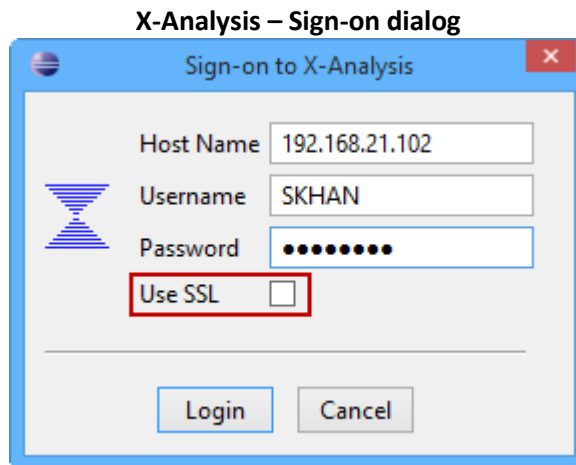
1. Uninstall X-Analysis, which is installed on RDP, and then install X-Analysis Runtime Environment.
2. Install the X-Analysis client.
3. In the location where Runtime Environment is installed (for e.g. C:\Program Files\Databorough\Eclipse) look for a subfolder named dropins. This would have a file named com.databorough.xanalysis.plugin.link
4. Now locate the installation path for RDP. At the same level where eclipse.exe lies (like C:\Program Files\IBM\SDP), look for the dropins folder, or create one if it does not exist. Copy the file as in 3 above to this dropins folder.
5. Copy a shortcut to RDP to desktop. Right-click the shortcut, and select **Properties**. At the end of the 'Target' text box, append –clean.
6. Start RDP using the new shortcut. X-Analysis should be visible as one of the perspectives.

The UML plugin cannot be installed from within Rational 8.5, as the underlying Eclipse Modelling Framework required for these plugins does not match those which Rational has inbuilt. The new version of EMF no longer supports the UML2Tools plugins that are supplied with our UML Support msi.

## Appendix K – Use SSL feature

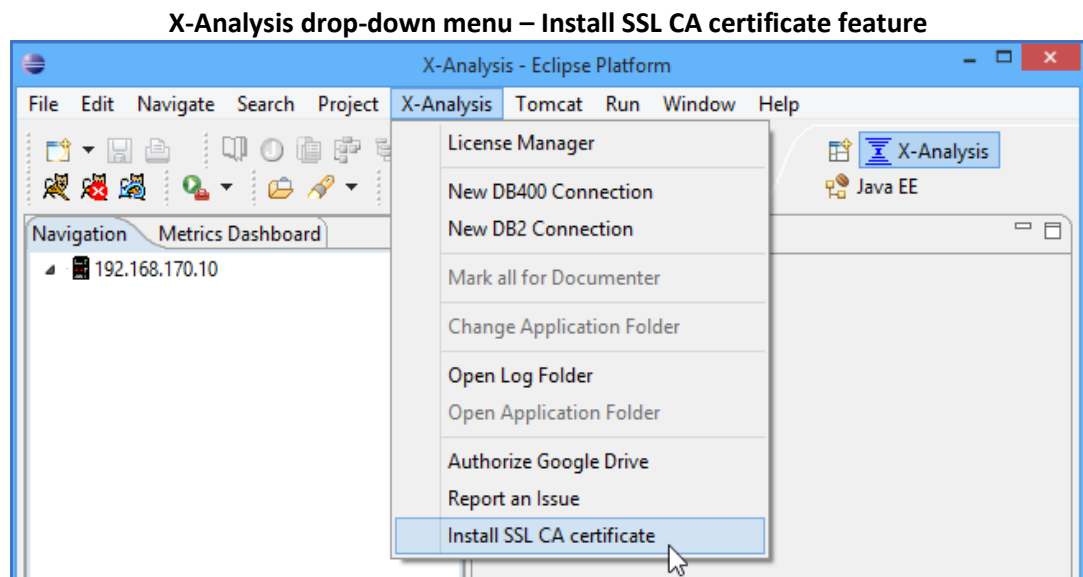
The X-Analysis **Sign-on** dialog is equipped with the ‘Use SSL’ feature. The feature has been introduced to transfer data in a secure manner. The box is unchecked by default. Check the box to enable the feature while working with X-Analysis.

The following screenshot shows the dialog:



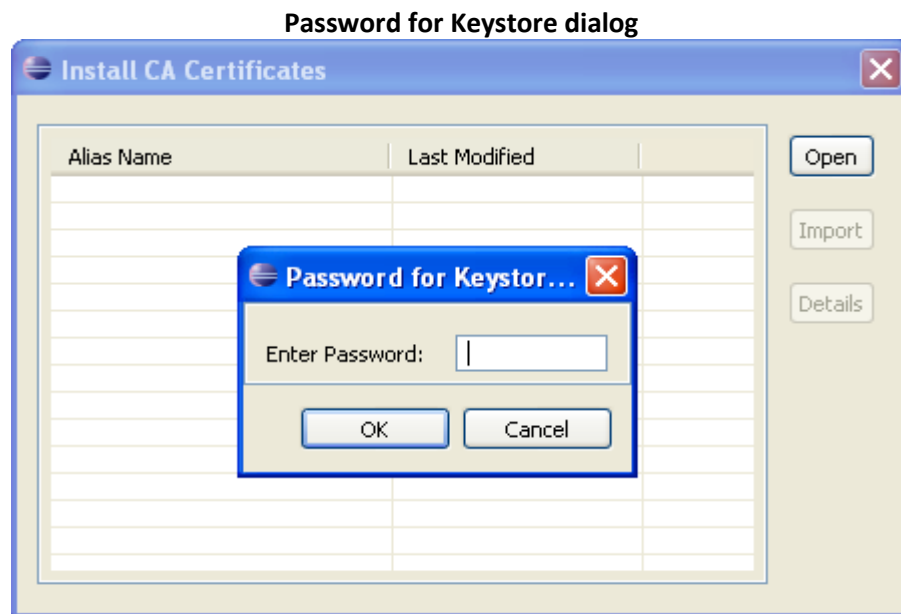
Before using this feature, follow the given steps to establish the SSL connection:

1. Choose the X-Analysis drop-down menu from the X-Analysis toolbar and click on the **Install SSL CA certificate** feature. The selection is shown below:

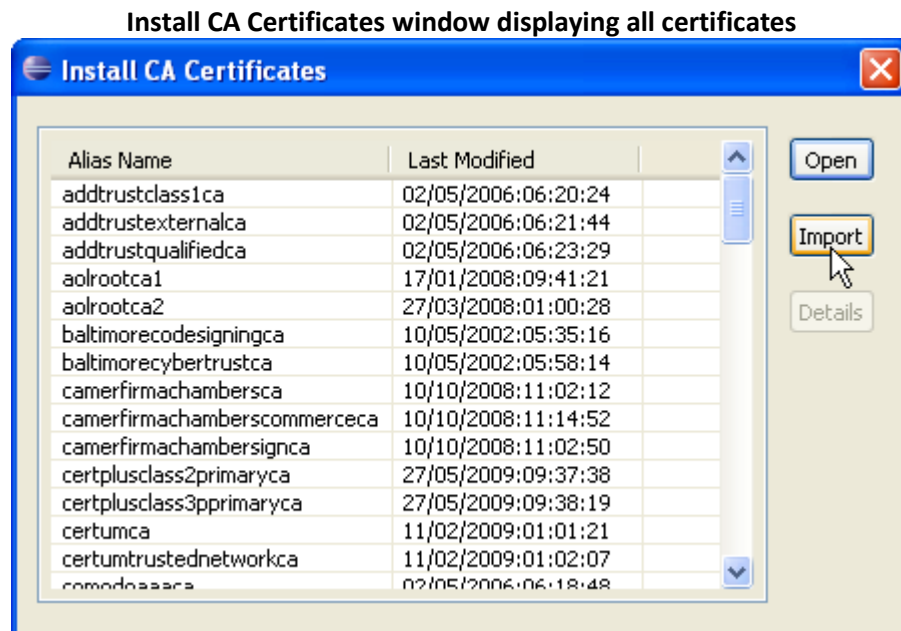




- A new dialog is displayed which prompts you to enter the password for Keystore. The default password is 'changeit'.



- Click **OK**. The **Install CA Certificates** dialog displays the list of all the available certificates.



- Click **Import**, and select the Security Certificate issued from the iSeries. It would then get added to the list of certificates, providing you with the necessary authorization.

After performing these steps, check the 'Use SSL' box in the **Sign-on** dialog to begin using the feature.



# Appendix L – Setting Status for Business Rules

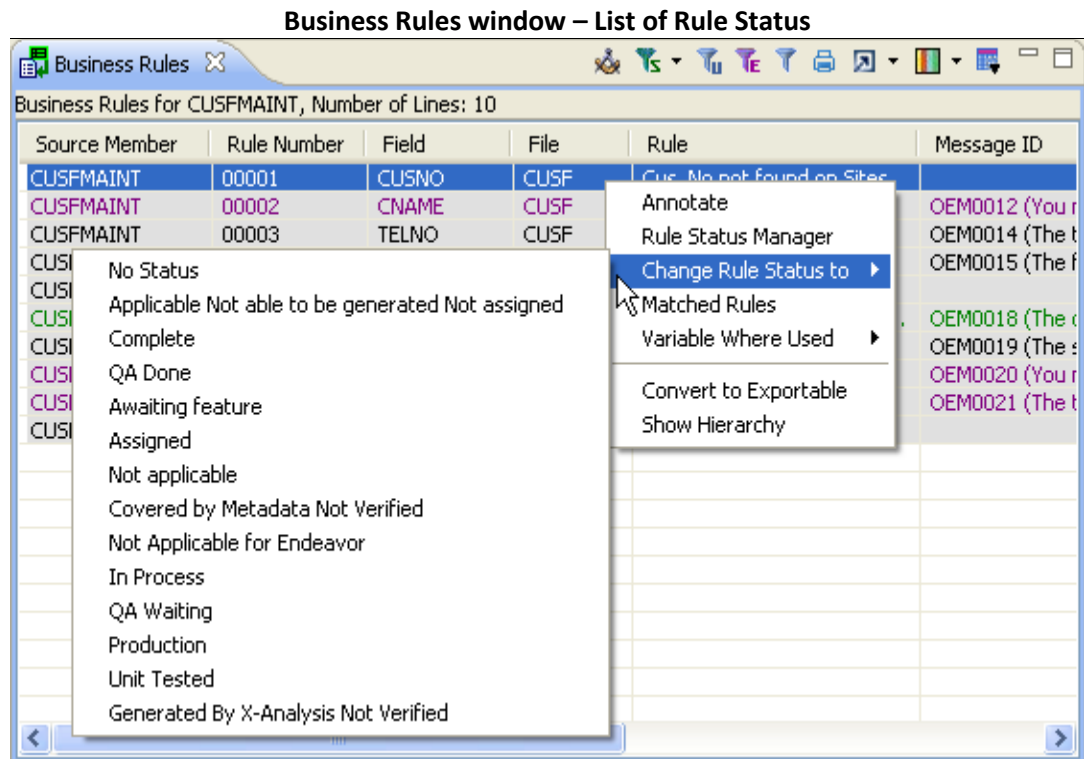
## BUSINESS RULES STATUS\*

When you select the **Business Rules Overlay** or the **Business Rules** mode in the Source Editor, a new functionality allows you to set Rule Status for any rule.

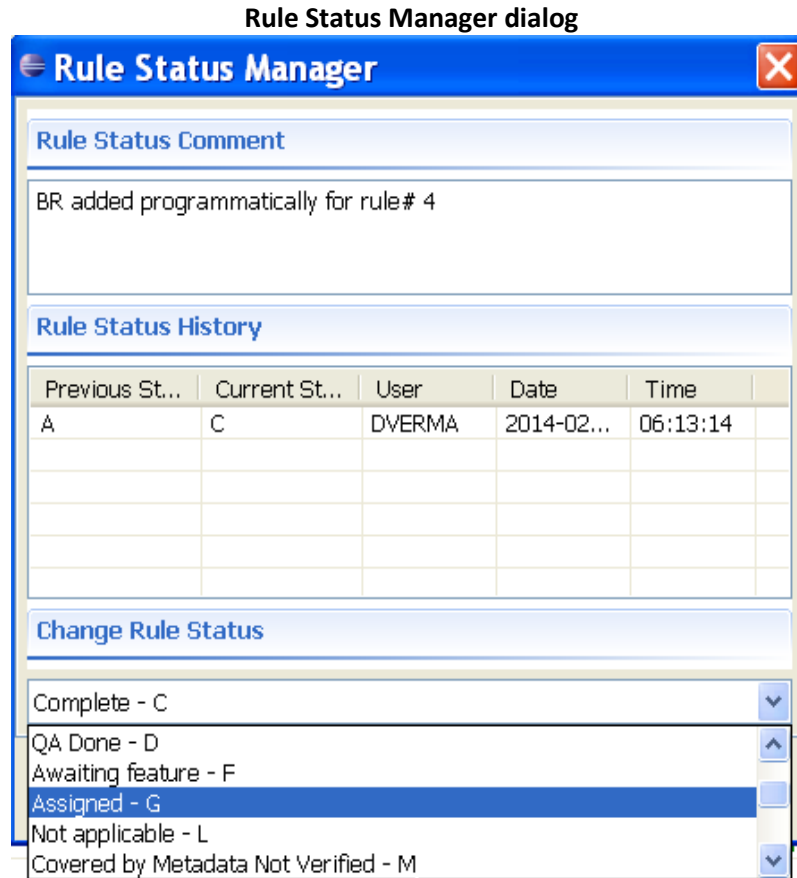
**\*Check the box – ‘Allow editing in Consolidated Rules’ from Window->Preferences->X-Analysis for full activation of these features.**

You can set comment and/or change the rule status for any rule. Select the right-click option, **Change Rule Status to**, for directly changing the rule status.

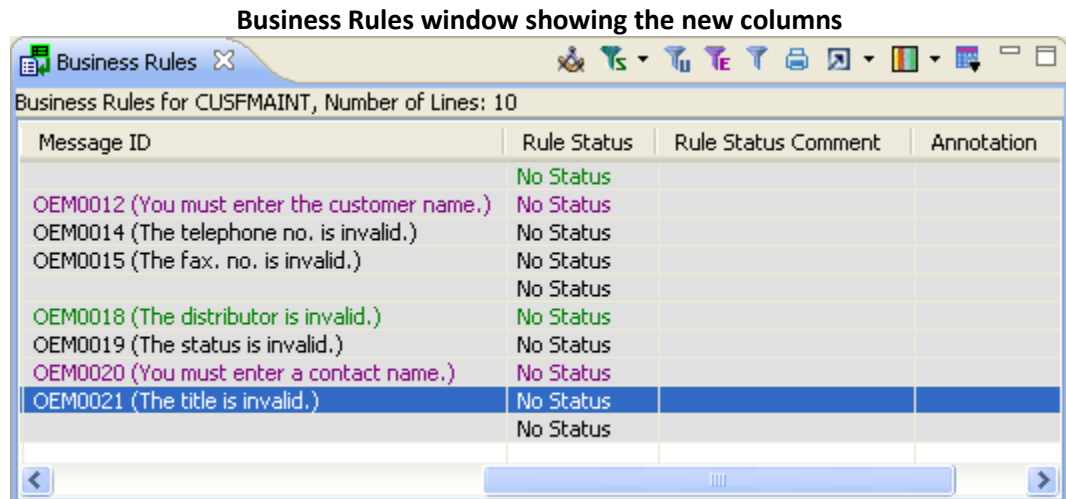
A list of such possible statuses is already provided, and shown in the image below:



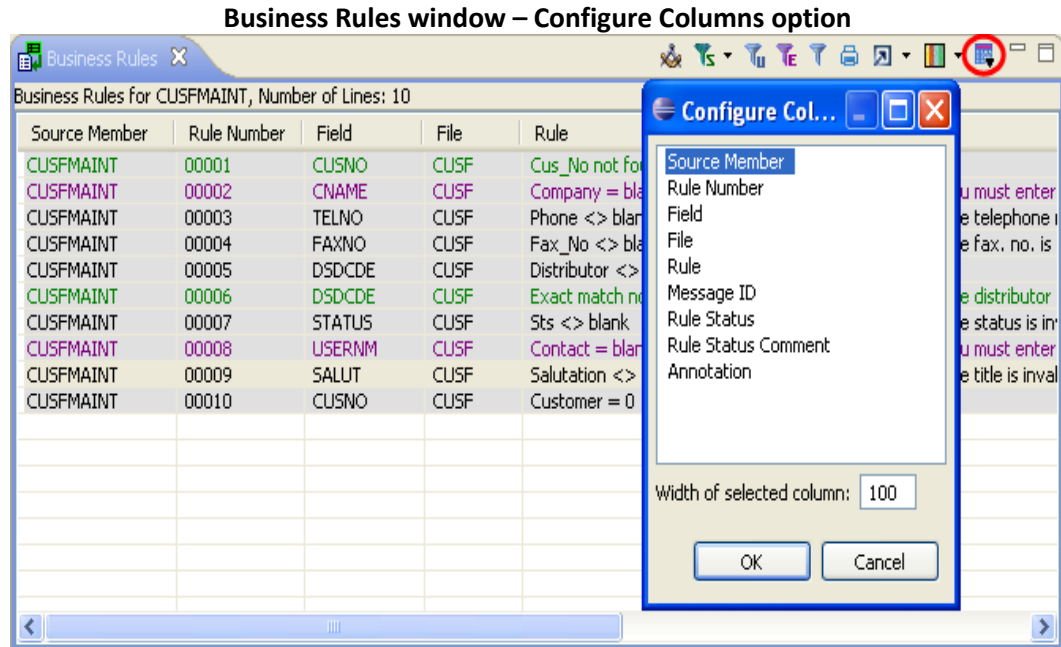
View the history of how the rule status has changed through the **Rule Status Manager** option available on right-click on a rule. The following image shows the **Rule Status Manager** dialog.



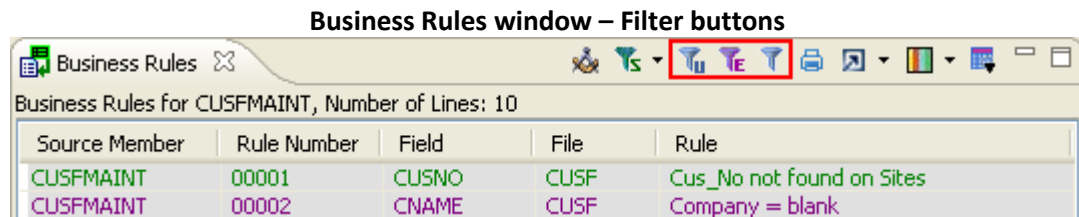
The Business Rules view displays new columns for Error Message, Business Rule Annotation, Rule Status, and Rule Status Comment. The columns are shown in the image underneath.



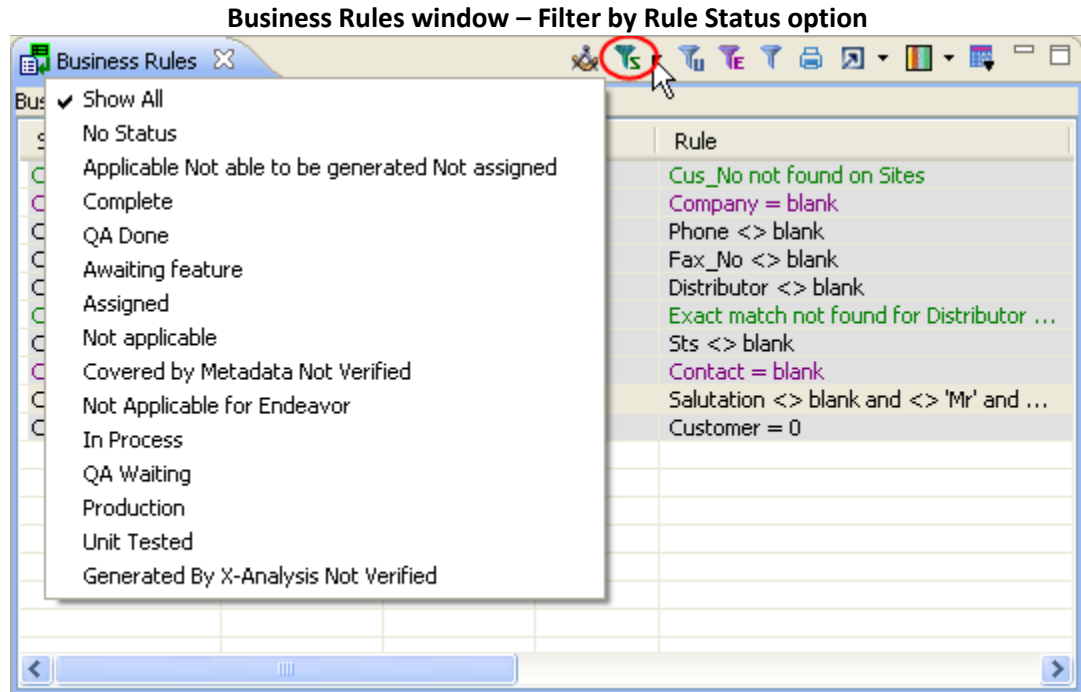
The **Configure Columns** feature in the Business Rules view allows the user to manage the columns displayed. The user can reduce the width, or hide any column by setting width to 0.



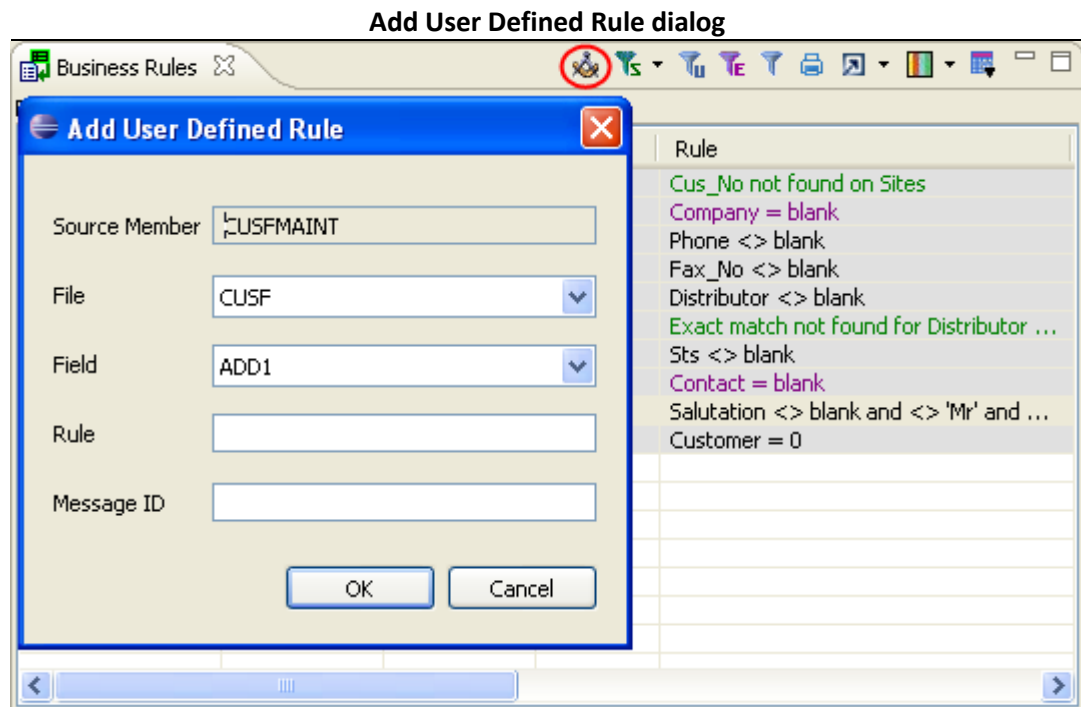
There are various buttons for filtering business rules display. The rules are filtered based on whether they are **Exportable Rules**, **Update Rules**, or **Excluded Rules**. The filters have toggle behaviour. The following image shows the three filter buttons.



An additional option, **Filter by Rule Status** has been provided to filter the rules based on their status. Make the selection from the list of Rule Status in a drop-down menu.

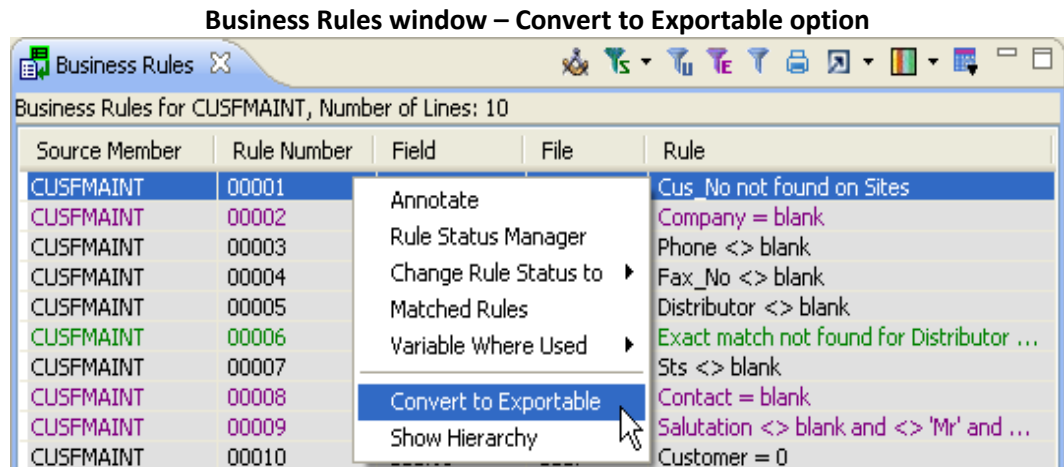


There is an option to allow to **Add User defined Rule**. Select the relevant File/Field and set the Rule text and error message ID. Such rules start from 60001, and are shown in a different color (orange). Select the option to invoke the following dialog:



**Note: Define a rule only when you have selected the 'Business Rules' feature on an individual program from the Source Member view.**

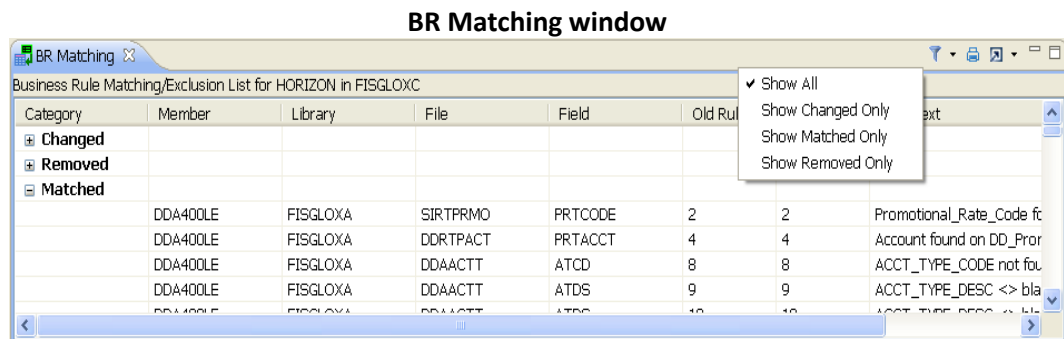
Select the right-click option to convert a rule to 'Exportable/Non Exportable'. The option is displayed in the image below:



The X-Analysis client allows you to view the Business Rules Matching/Exclusion list, produced as a result of a process on server which compares the existing cross-reference against an older one, and moves the Business Rule Status and Annotations from the older to the new cross-reference.

This report can be seen by the right-click option, **Business Rule Matching**, available on the context menu of the entire cross-reference, an application area, or a program. The report can be filtered to view only one of the types (Changed/Removed/Matched), and also exported to Word/PDF/Excel.

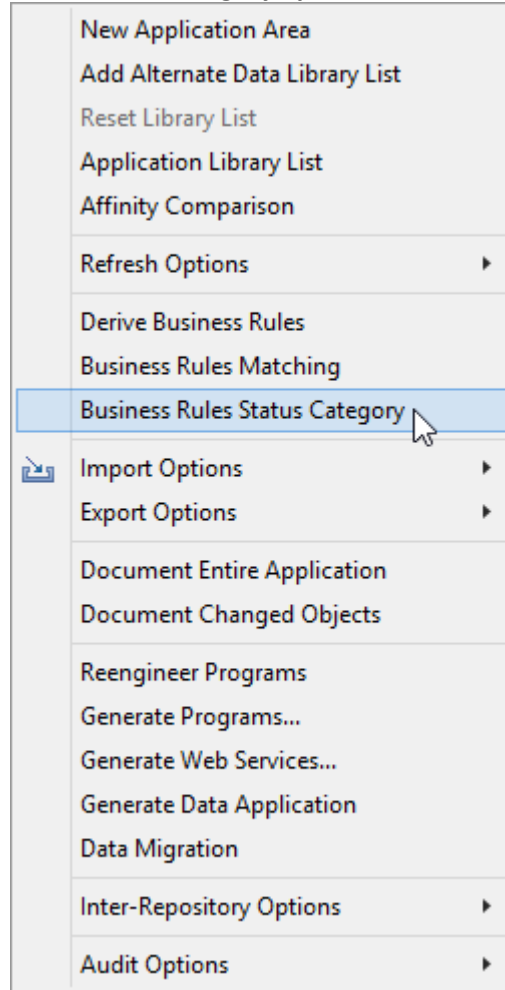
The following image shows Business Rule Matching view of application area, **HORIZON**.



## BUSINESS RULES STATUS CATEGORY

The **Business Rules Status Category** option is present on the context menu of the X-Ref library as is seen in the image below.

**Business Rules Status Category option – X-Ref context menu**



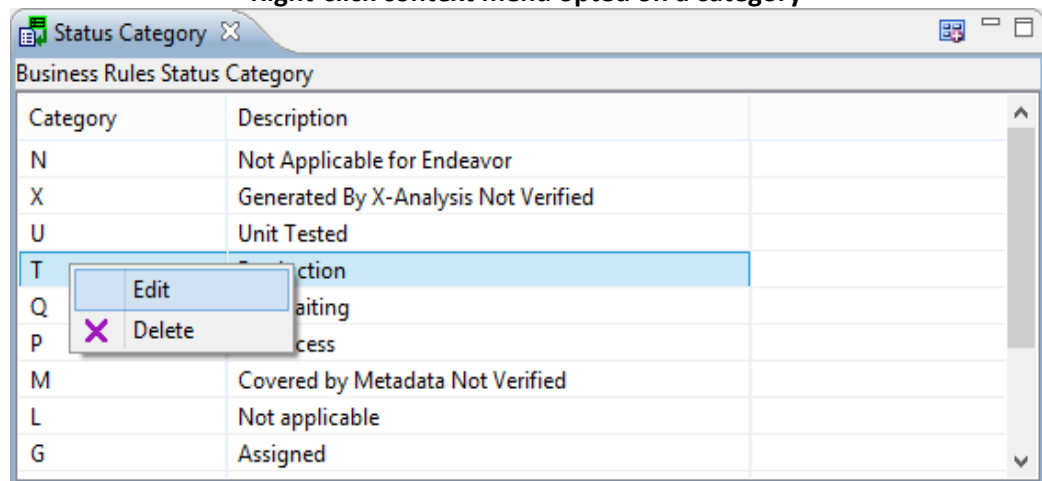
All the pre-set categories of Business Rules Status are displayed on clicking this option. The following window shows all the categories:

**Business Rules Status Categories**

Category	Description
N	Not Applicable for Endeavor
X	Generated By X-Analysis Not Verified
U	Unit Tested
T	Production
Q	QA Waiting
P	In Process
M	Covered by Metadata Not Verified
L	Not applicable
G	Assigned
F	Awaiting feature
D	QA Done
C	Complete
A	Applicable Not able to be generated Not assigned

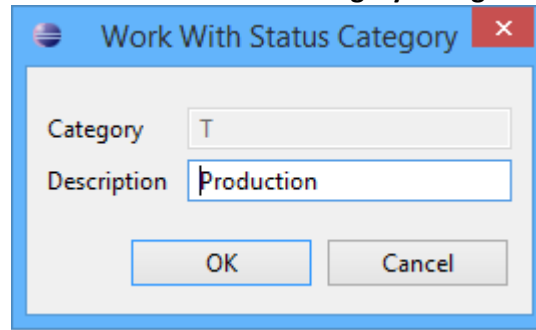
The existing categories can be edited or deleted by using the right-click context menu on a specific category. The following image shows the context menu opted on a category.

**Right-click context menu opted on a category**



On selecting the **Edit** option, the following dialog box is invoked:

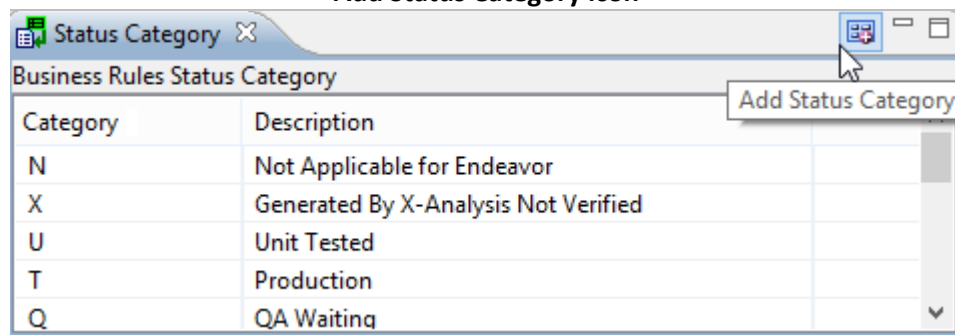
Work With Status Category dialog



Using the above dialog, modify the description of the default category, as required.

On clicking **Add Status Category** icon on the Status Category toolbar, the same dialog as presented above is invoked. This time you can assign a letter for the Category, besides the Description. The icon is indicated in the following image:

Add Status Category icon





## Appendix M – Export to Google Drive

You can now export DOCX and XLSX type to Google Drive. The use of Google Drive export requires Authorization setup. As the initial step, you will need to authorize the Google Drive, and then select the related options from X-Analysis Preferences.

The link provided below helps you with all the information related to the Google Drive Web APIs:

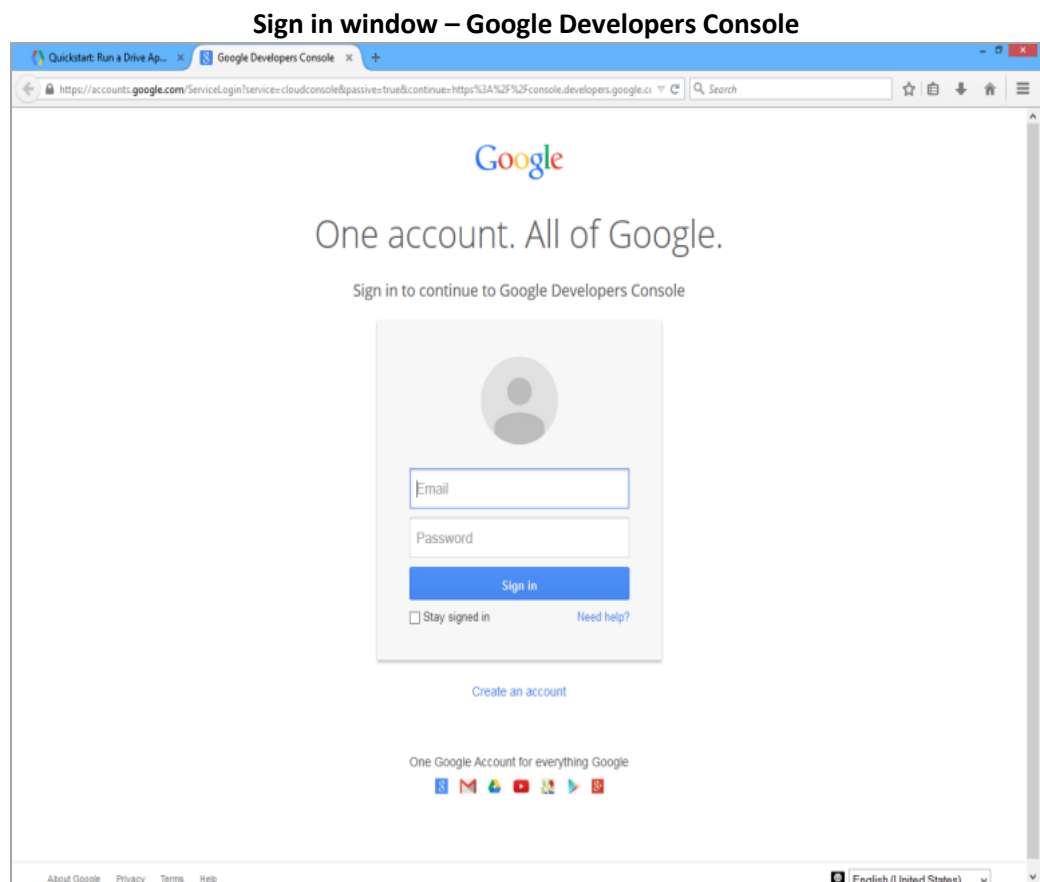
<https://developers.google.com/drive/web/quickstart/quickstart-java>

The steps to be followed are given as below:

1. Generate a Client ID/Client Secret for your google account. Click on the link:

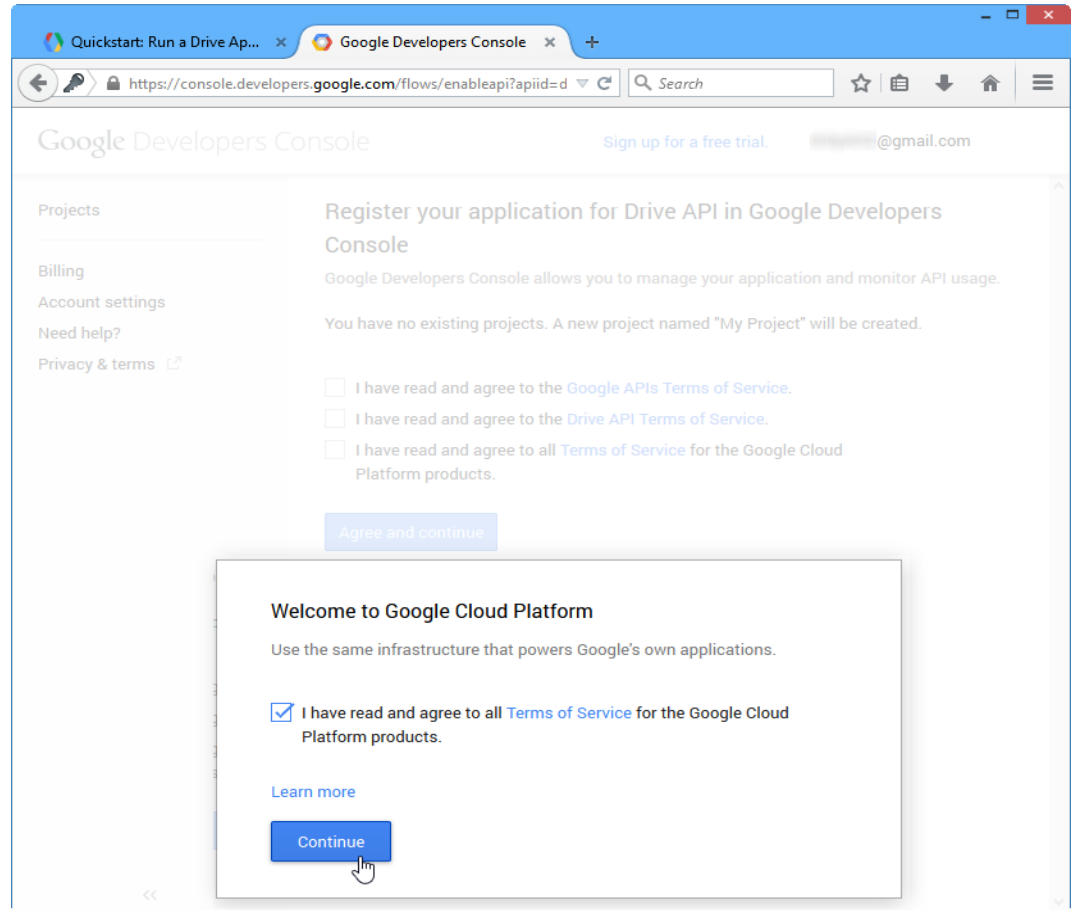
[https://console.developers.google.com//start/api?id=drive&credential=client\\_key](https://console.developers.google.com//start/api?id=drive&credential=client_key)

The following window will appear:



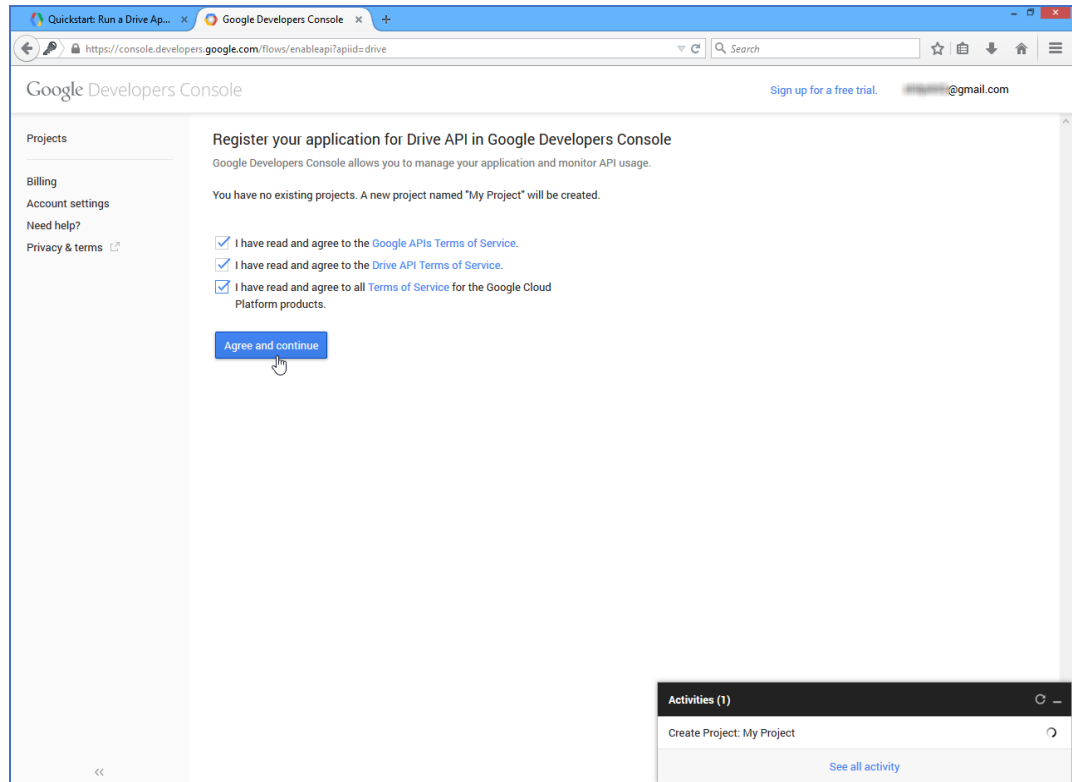
Sign in with your google email id and password.

2. After sign in is complete, the following registration window will appear:



Check the box on the pop-up and click **Continue**.

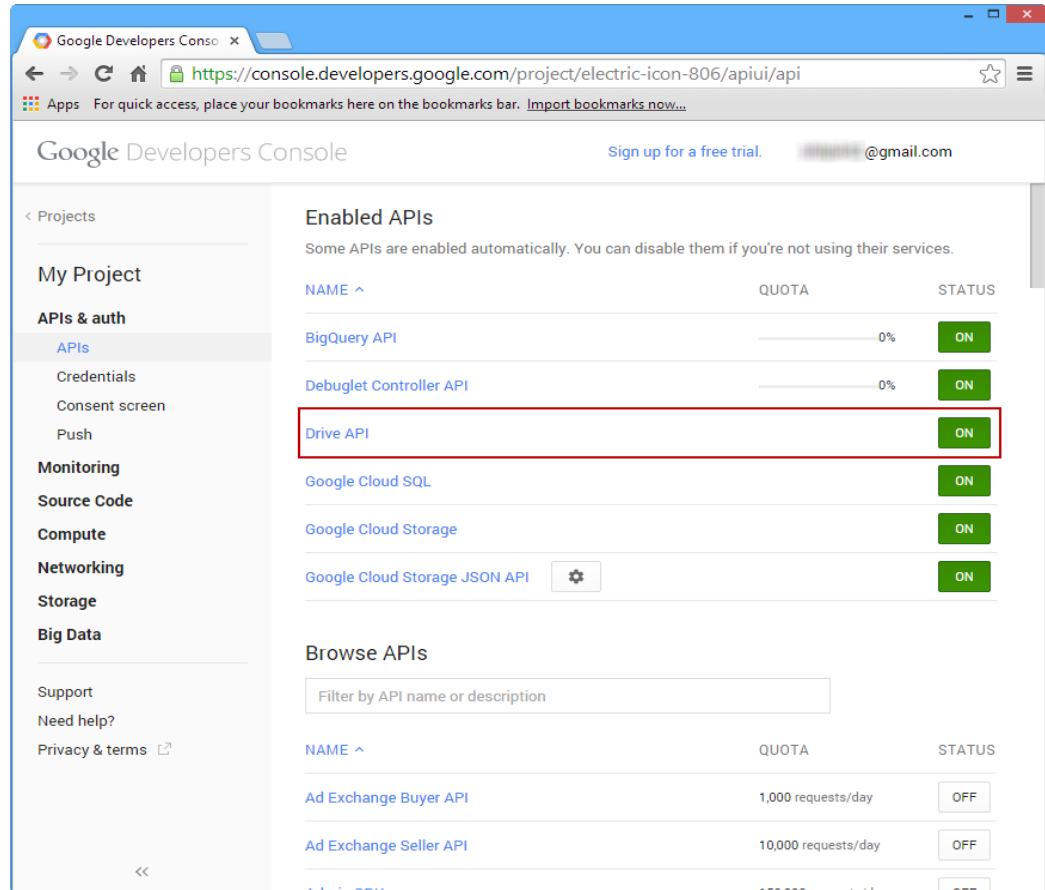
3. The following window will appear. Confirm the registration process by checking all the boxes.



Click **Agree and continue**. A project will be created with the default name, **My Project**.

4. Under **My Project > APIs & auth**, click on **APIs**. Check that the **Drive API** is **ON** as displayed in the following image:

**APIs window**



If not, locate it under **Browse APIs**. The image below shows **Drive API** as **OFF**. Click **OFF** to enable the feature.

**Drive API under Browse APIs section**

Directions API	2,500 requests/day	OFF
Distance Matrix API	2,500 requests/day	OFF
DoubleClick Search API	100,000 requests/day	OFF
<b>Drive API</b>	10,000,000 requests/day	<b>OFF</b>
Drive SDK	none	OFF
Elevation API	2,500 requests/day	OFF
Enterprise License Manager API	10,000 requests/day	OFF
Fitness API	86,400 requests/day	OFF

- Under **My Project > APIs & auth**, click **Consent screen**. The following window will appear:

### Consent screen window

**Consent screen**


The consent screen will be shown to users whenever you request access to their private data using your client ID.


**Note:** This screen will be shown for all of your applications registered in this project

EMAIL ADDRESS

PRODUCT NAME


HOMEPAGE URL (Optional)

PRODUCT LOGO (Optional) 

 This is how your logo will look to end users.  
 Max size: 120x120 px

PRIVACY POLICY URL (Optional)

TERMS OF SERVICE URL (Optional)

GOOGLE+ PAGE (Optional) 

**Preview:**

Logo

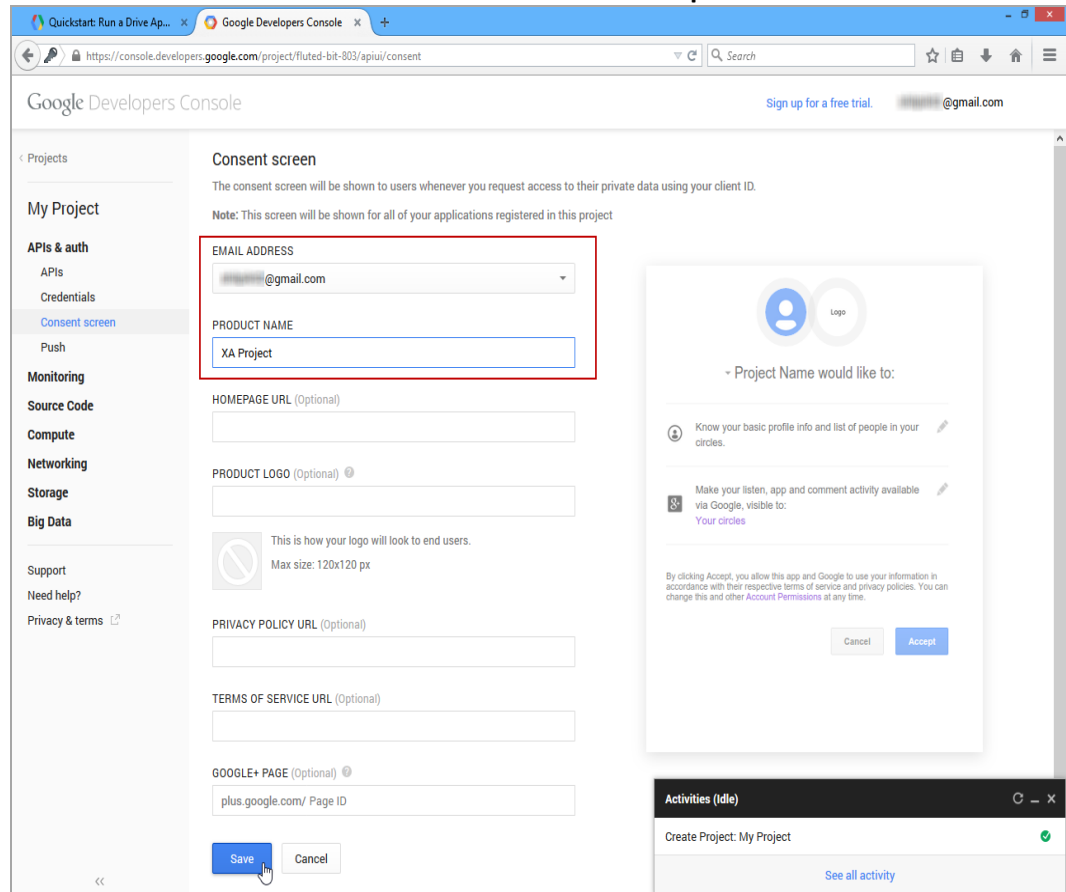
- Project Name would like to:

- Know your basic profile info and list of people in your circles.
- Make your listen, app and comment activity available via Google, visible to: Your circles

By clicking Accept, you allow this app and Google to use your information in accordance with their respective terms of service and privacy policies. You can change this and other Account Permissions at any time.

Provide your email address and Product Name, as shown below:

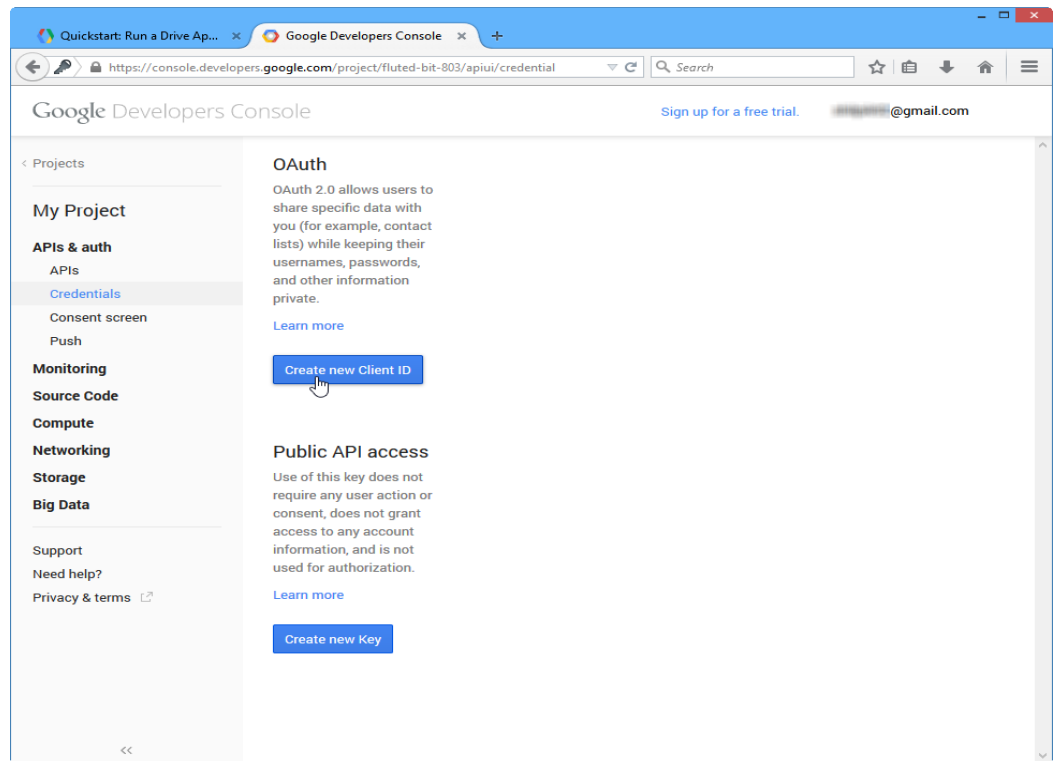
**Consent screen window with email and product details**



Click **Save**.

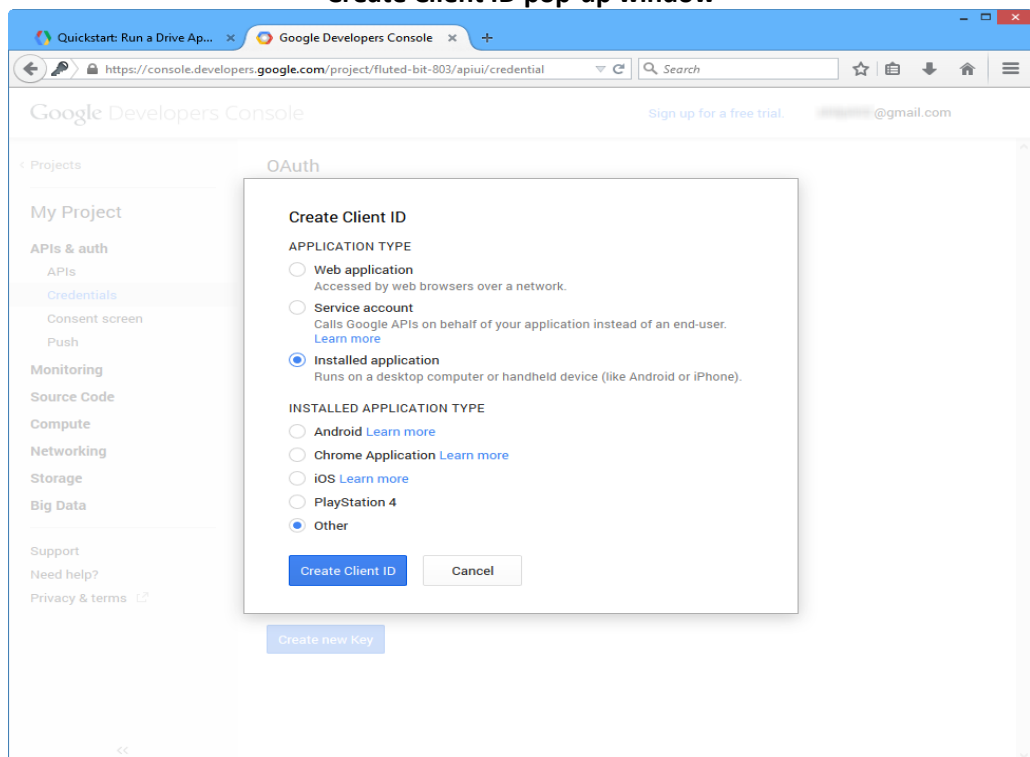
- Now, click **Credentials** under **My Project > APIs & auth**. The following window will appear:

### Credentials window



Click on **Create new Client ID**. The following pop-up window will appear:

### Create Client ID pop-up window



On the pop-up window, select **APPLICATION TYPE > Installed application** and **INSTALLED APPLICATION TYPE > Other**.

Click **Create Client ID**.

7. A window will appear displaying the **Client ID** and **Client Secret**. Please save the Client ID and Secret for later use.

**Client ID and Client Secret**

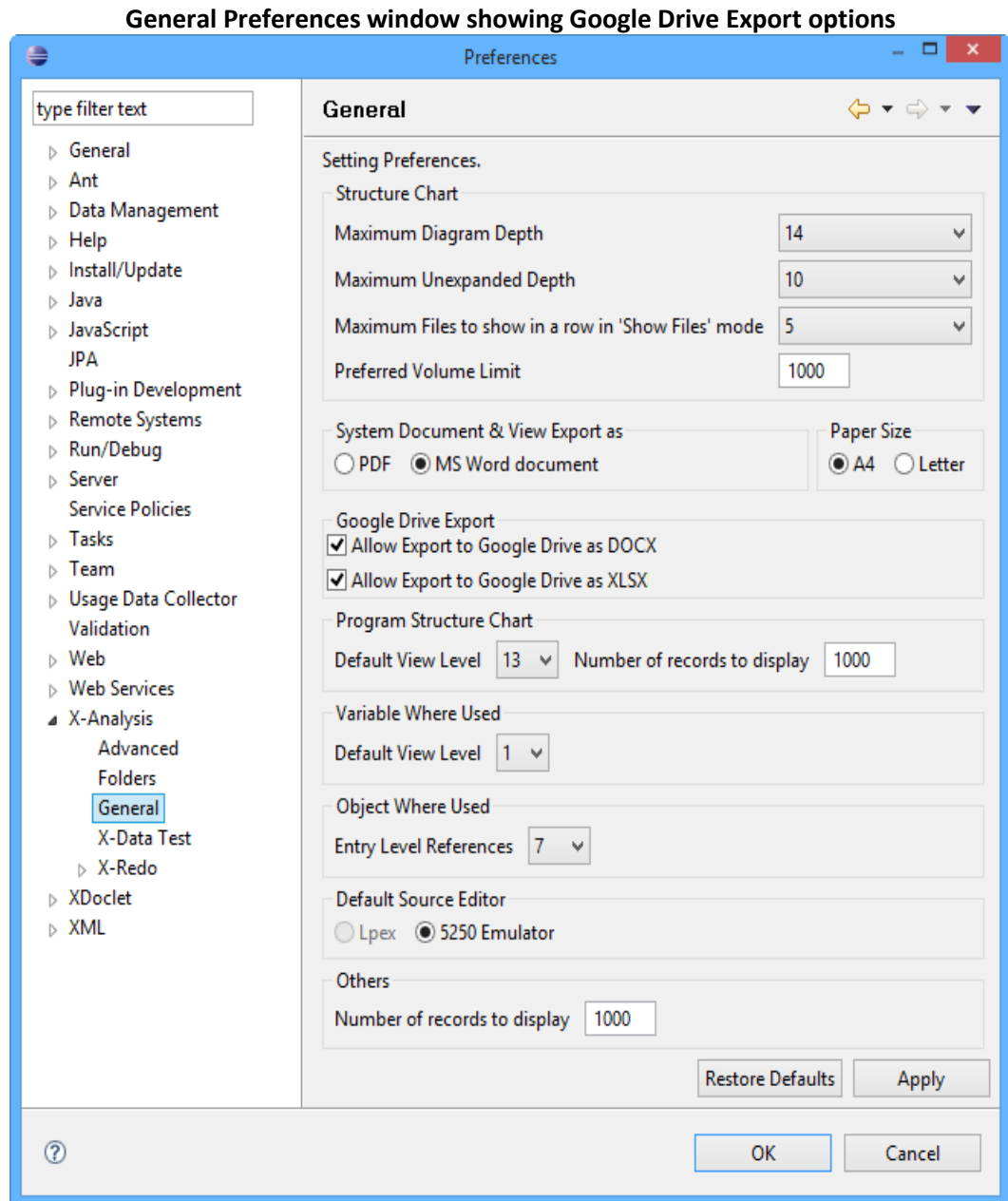
**Client ID for native application**

CLIENT ID	990479954585-ghu0batn4nm03bnue9ufuq49r0b7bc4g.apps.googleusercontent.com
CLIENT SECRET	_4F7B2EW_gwLSZzQK4CjPH
REDIRECT URIS	urn:ietf:wg:oauth:2.0:oob http://localhost

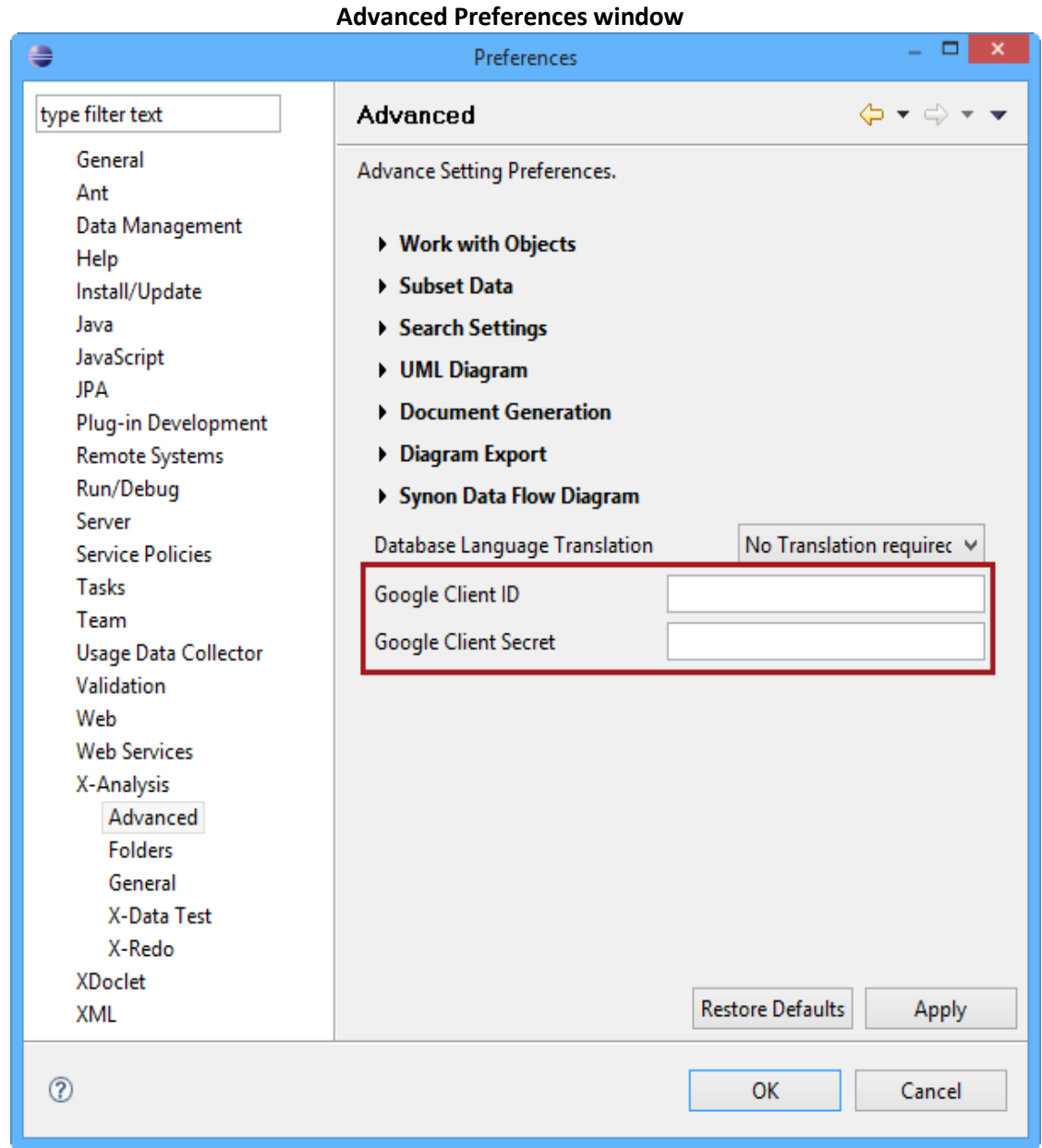
Reset secret
Download JSON
Delete

8. On the X-Analysis Client, check to allow options for **DOCX** and **XLSX** on the **Window>Preferences>X-Analysis>General**.



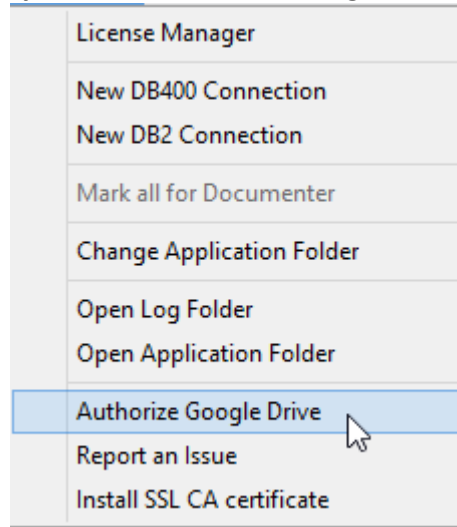


9. Click the **Preferences>Advanced** tab. The following window will be displayed. Provide the saved **Google Client ID** and the **Google Client Secret** in the specified fields.



10. Click **Authorize Google Drive** from the **X-Analysis** drop-down menu.

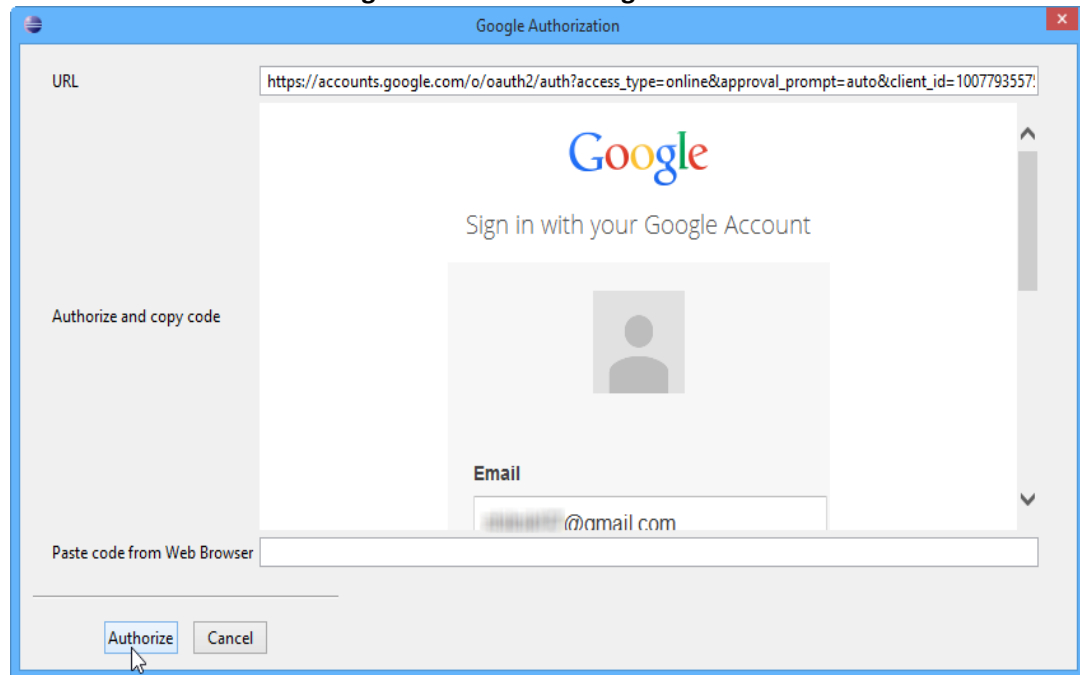
**X-Analysis menu – Authorize Google Drive option**



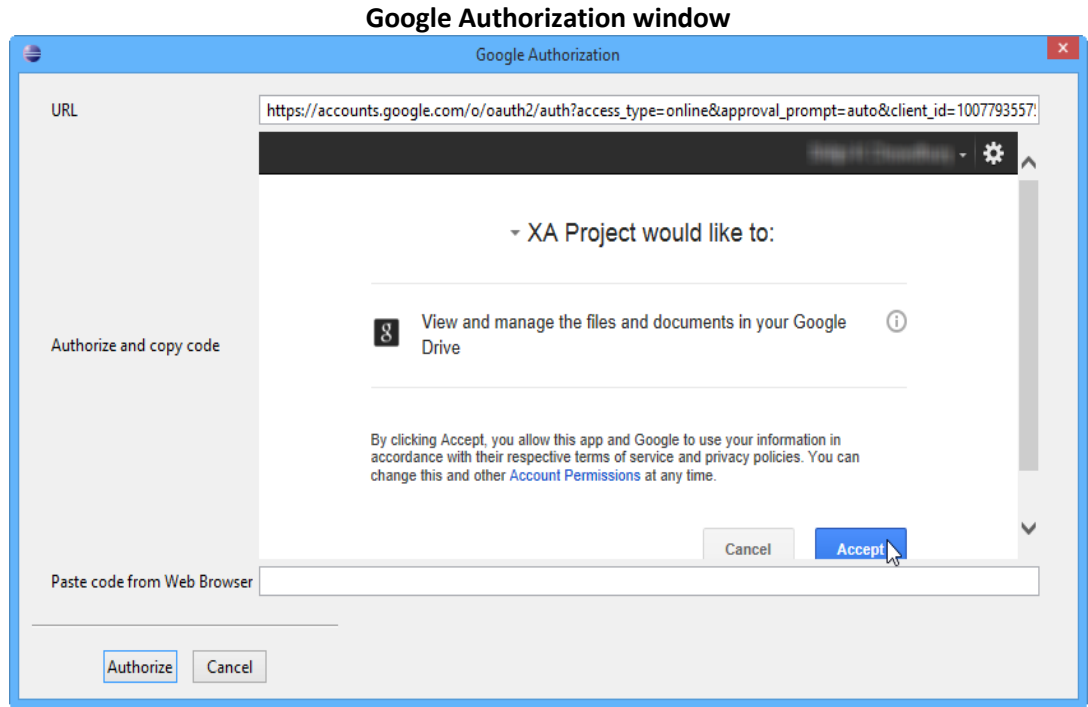
The Authentication URL using the Client ID and Secret will be automatically generated.

11. The **Google Authorization** window will appear. Sign in with your gmail id and password.

**Google Authorization – Sign in window**

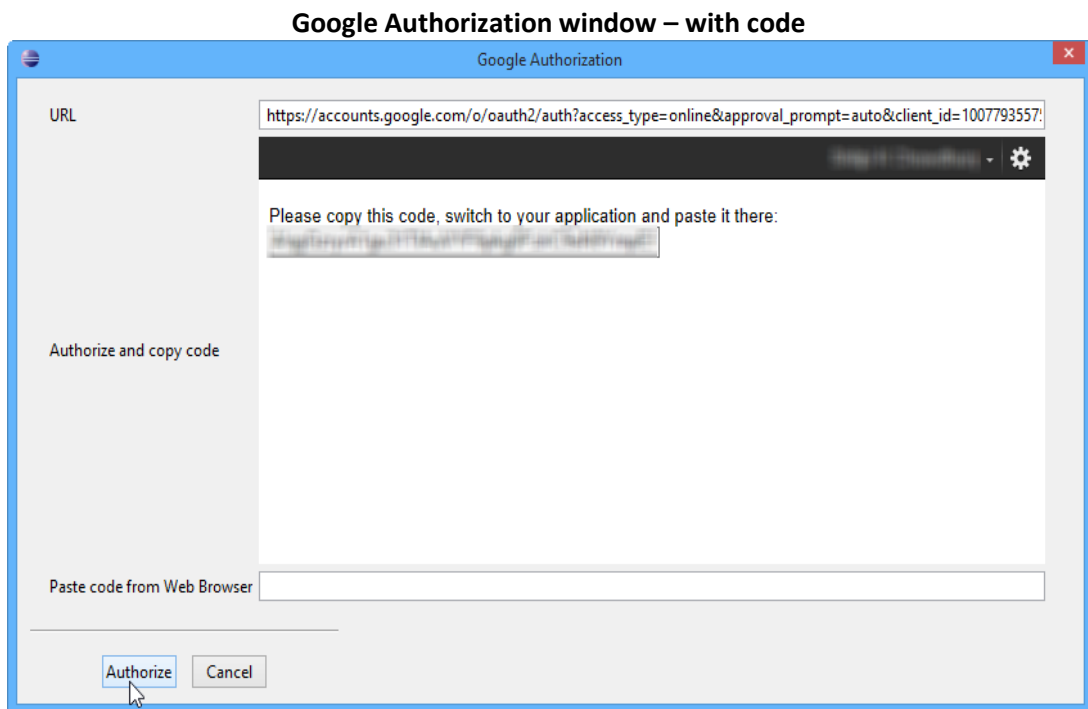


12. After sign in, the following window will appear:



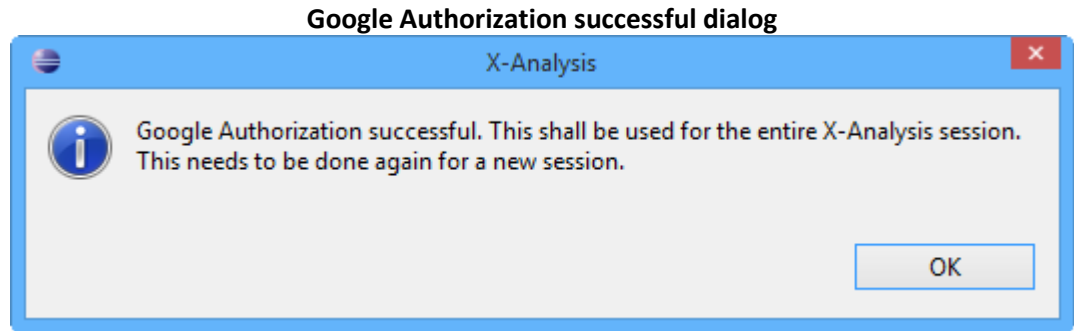
Click **Accept**.

- The following window containing a code will appear. Copy and paste this code on the **Paste code from Web Browser** box.

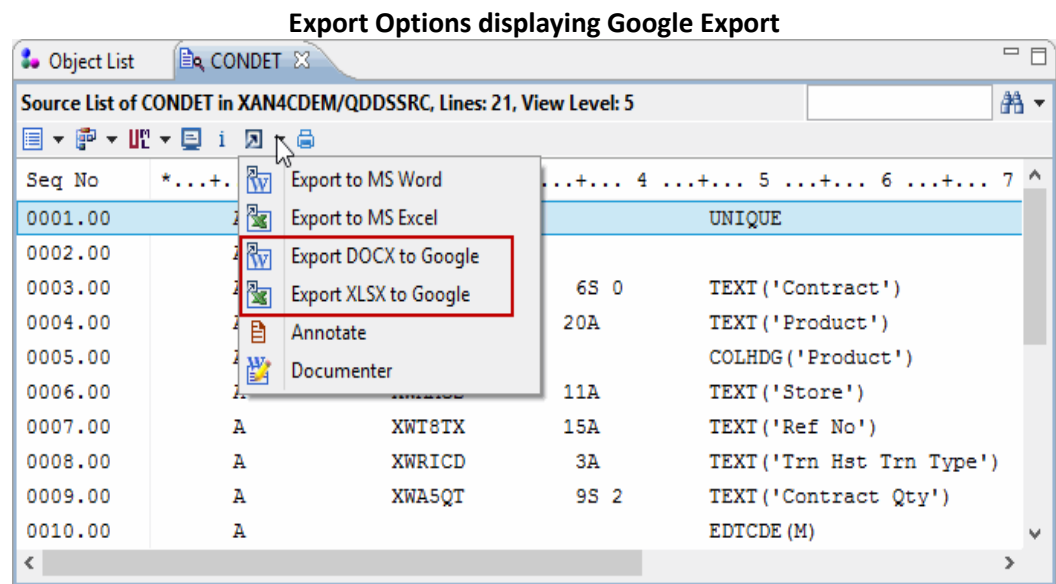


Click **Authorize**.

- The following window will appear. Click **OK** to confirm the use of the Google Drive feature.



After completing these steps, you will see **Export DOCX to Google Drive** and **Export XLSX to Google** among the **Export Options**.



The document you select would be placed in the google drive, and can be checked using the web browser.

**Note:** Once authorized, the Google Export feature will work on an active session of X-Analysis. After exiting the X-Analysis platform, you will need to re-authorize the Google drive.

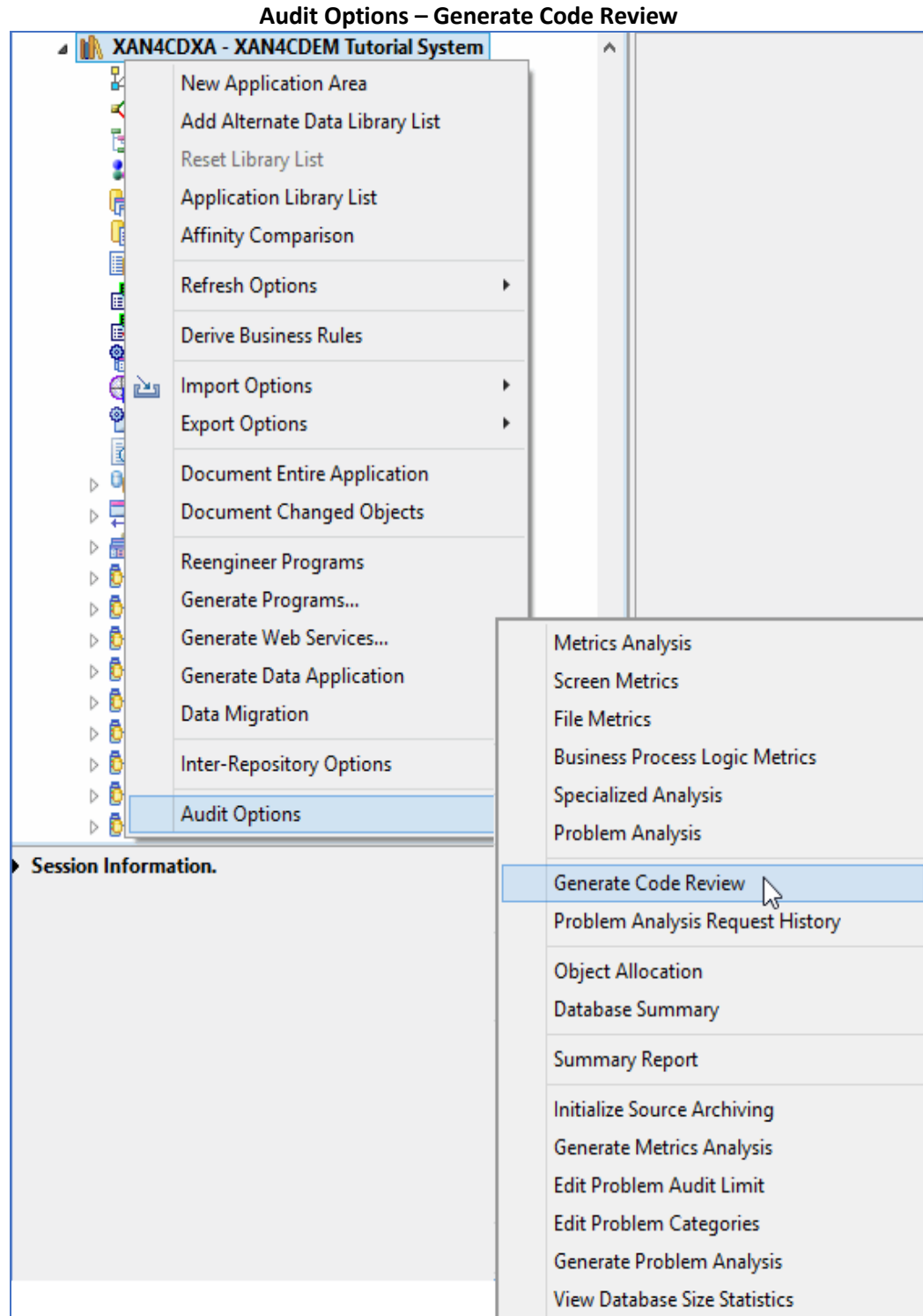
## Appendix N – Code Review feature (TD/OMS support)

**Note: The TD/OMS\* version 7 support is now available for the X-Analysis customers.**

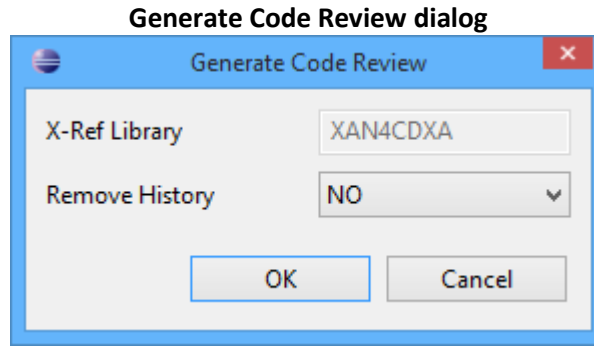
The **Code Review** functionality has been added to X-Analysis for harnessing the TD/OMS support. The **Code Review** functionality, effectively, is the problem analysis execution on the selected object. It helps you to view any issues at source/object level while promoting to the next stage or visualize the problem analysis statistics/history on the selected object.

**The Code Review functionality is only enabled when the XSCMREVIEW data area is set to 'Y'.**

The **Generate Code Review** option is present under the **Audit Options** submenu as can be seen below:

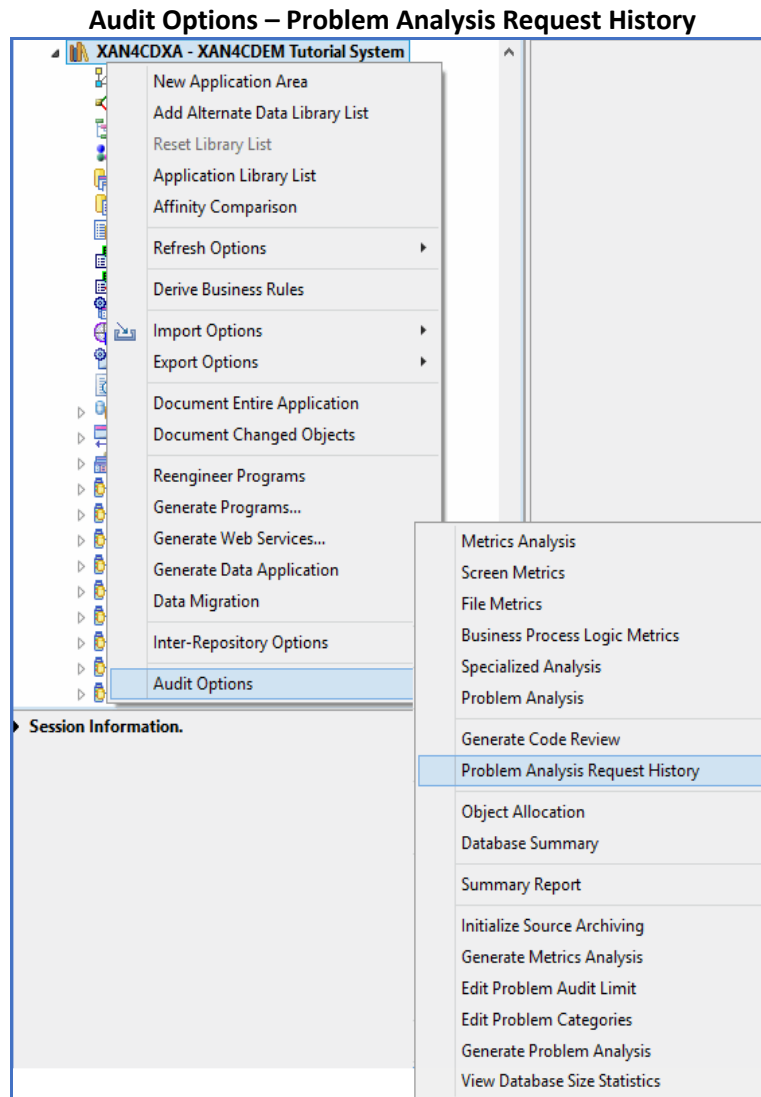


When you click the option, the following dialog is displayed:



You can choose to **Remove History**. The default option is **NO**. If you select **YES** then all the previous history will be deleted or removed. Click **OK** to begin the Code generation.

Click the **Problem Analysis Request History** option to review the generated code. The option is shown below:





**Problem Analysis Request History**

Problem Analysis Request History 960 Records

Object	Category	Comment	Date
ARPGLE	Update date on source and object do not...	Request generated by QPADEV001...	2015-05-14
CUSTS	Source member changed after file created	Request generated by XCODERVW ...	2015-05-05
CUSTS	Source member changed after file created	Request generated by XCODERVW ...	2015-05-05
CUSTS	File has Constraints	Request generated by XCODERVW ...	2015-05-05
CUSTS	No Matching Parent Key in derived const...	Request generated by XCODERVW ...	2015-05-05
CUSTS	Foreign Key value does not match parent...	Request generated by XCODERVW ...	2015-05-05
XRMETCHGS	Greatest IF/DO block nbr of lines exceeds...	Request generated by XCODERVW ...	2015-04-24
XRMETCHGS	Greatest IF/DO block nbr of lines exceeds...	Request generated by XCODERVW ...	2015-04-24
XRMVBIZRMB	Update date on source and object do not...	Request generated by XCODERVW ...	2015-04-24
XRMVBIZRMB	Unused Procedures	Request generated by XCODERVW ...	2015-04-24
XREENGPGM	Update date on source and object do not...	Request generated by XCODERVW ...	2015-04-24
XREENGPGM	Program has (non-excluded) hardcoded l...	Request generated by XCODERVW ...	2015-04-24

The **Code Review** functionality can be used for the entire X-Ref library and for individual objects as well.

In the following image, the **Display Code Review** option has been selected on an individual object, **WWCUSTS**.

**Code Review view for WWCUSTS**

Code Review for WWCUSTS 5 Records

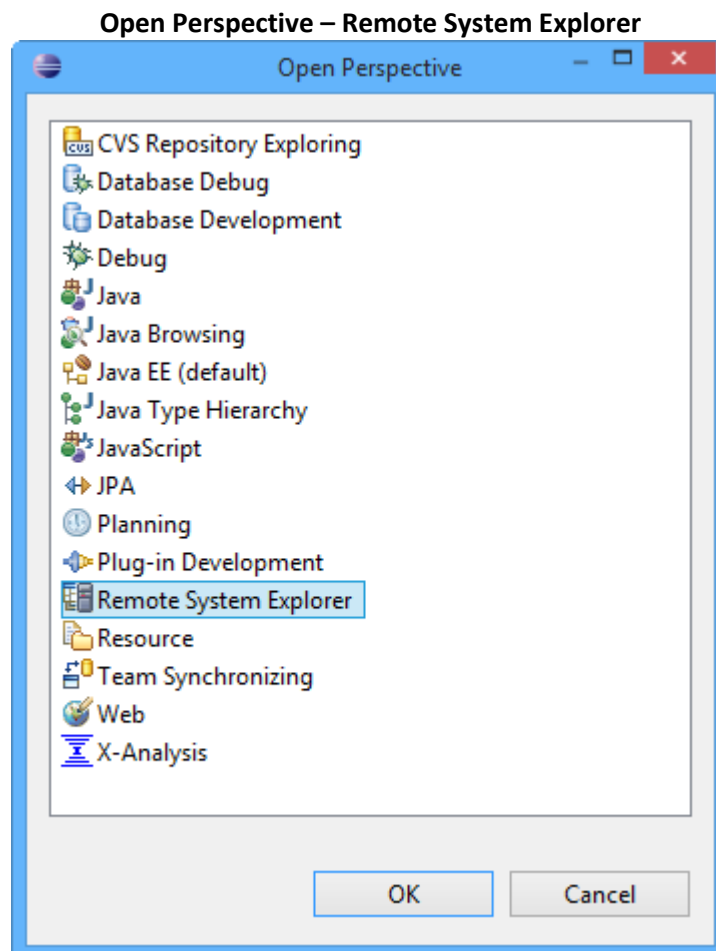
Object	Category	Comment	Date	Time
WWCUSTS	Update date on source and object do no...	Request generated by XCODERVW Job	2015-04-24	11:13:09
WWCUSTS	Greatest subroutine nbr of lines exceeds ...	Request generated by XCODERVW Job	2015-04-24	11:13:09
WWCUSTS	Greatest IF/DO block nbr of lines exceed...	Request generated by XCODERVW Job	2015-04-24	11:13:09
WWCUSTS	Greatest subroutine nbr of lines exceeds ...	Request generated by XCODERVW Job	2015-02-27	13:17:45
WWCUSTS	Greatest IF/DO block nbr of lines exceed...	Request generated by XCODERVW Job	2015-02-27	13:17:45

## Appendix O - RSE (Remote System Explorer) on RDi

X-Analysis features can be invoked through the Remote System Explorer on RDi. You have to right-click on a specific member name to use the options.

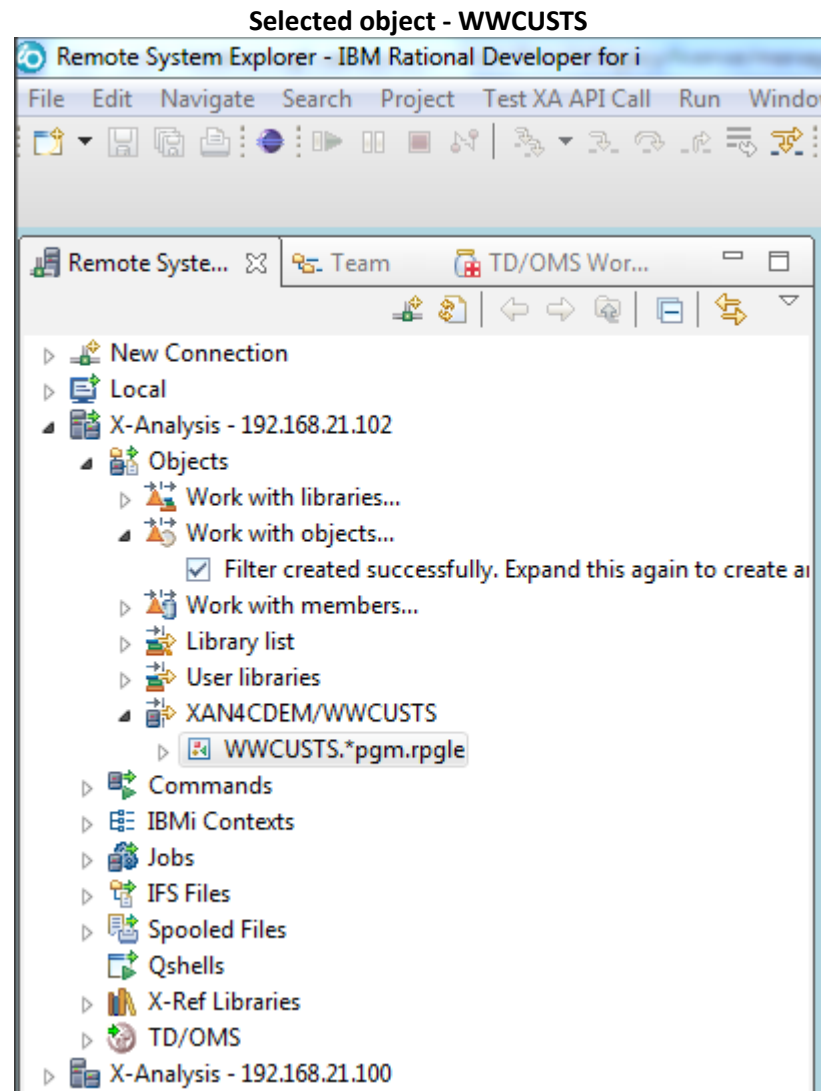
The first step is to install RDi. Download RDi version 9.0 and above (preferably).

Then go to the X-Analysis client interface. If you have installed a new version, then use the **Clean start Eclipse** option. Then, go to **Window > X-Analysis > Open Perspective > Other...** and choose **Remote System Explorer**.

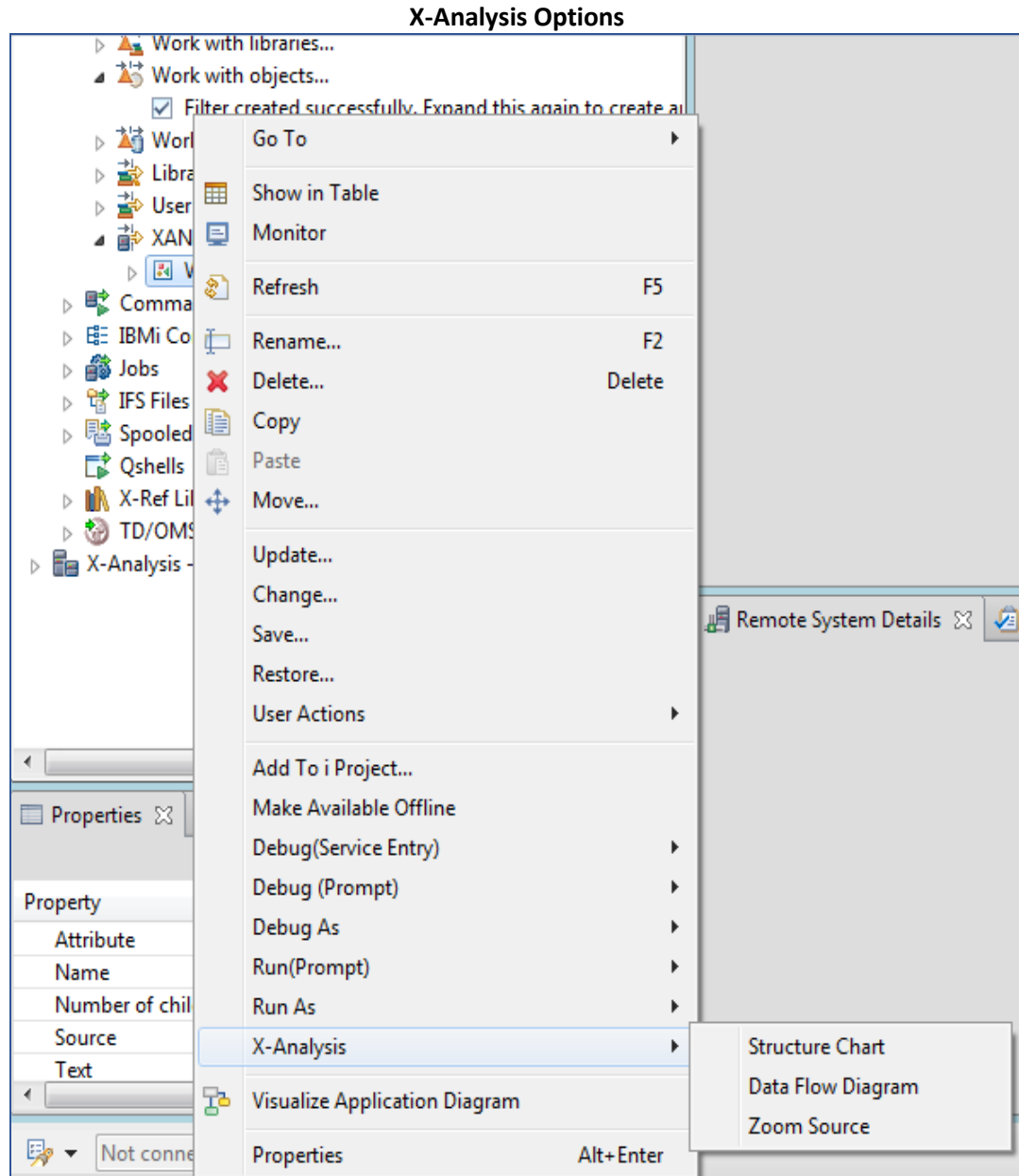


Click **OK**.

Select the object from the Member List or the Object List as shown below:

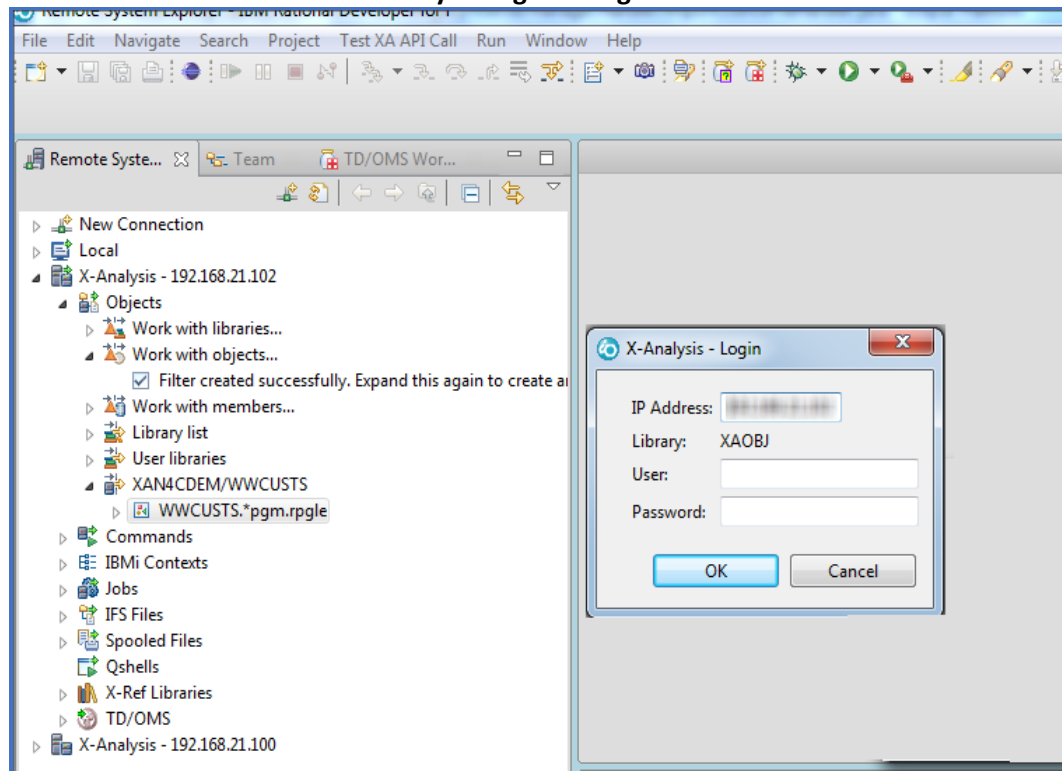


Now right-click on the object to use the X-Analysis options. The following screenshot shows these options:



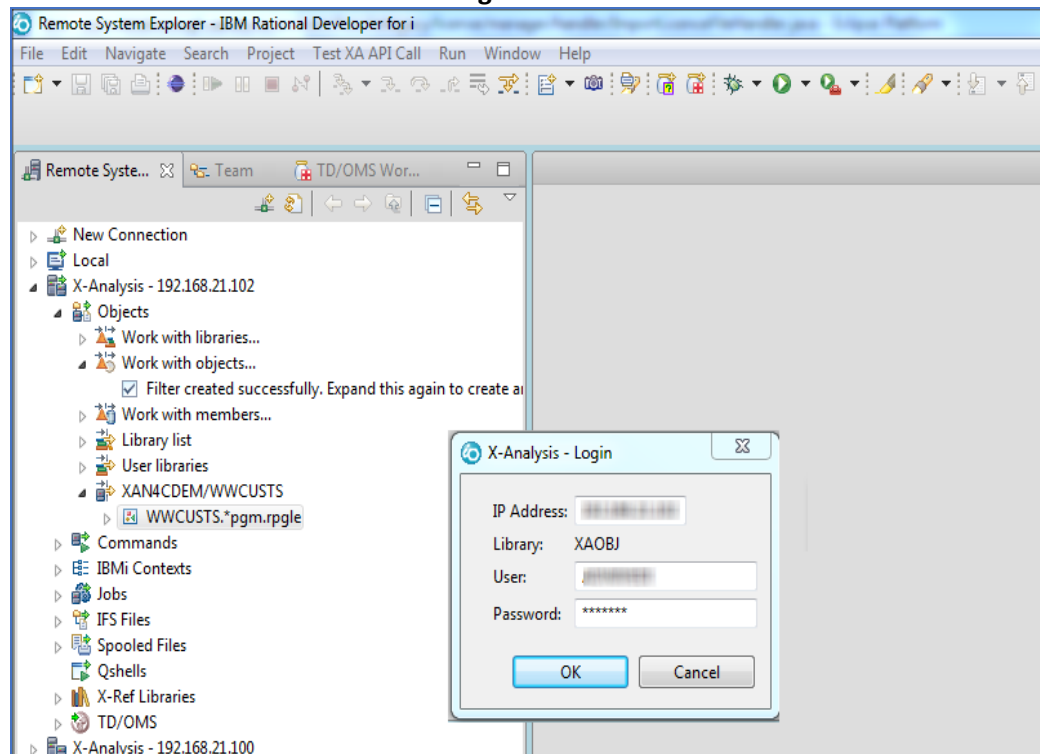
For instance, if you select the **Data Flow Diagram** option then the following dialog will get invoked:

### X-Analysis Login dialog on RSE



Enter the IP Address and your user name and password to enable the X-Analysis Login.

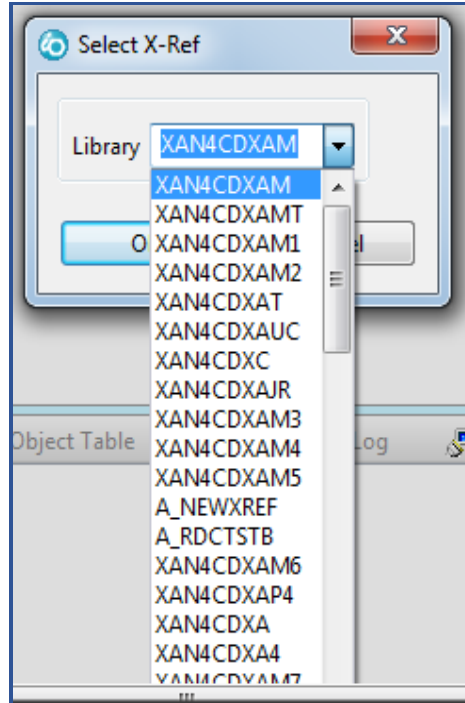
### Login details



Click **OK**. This will invoke another dialog that will ask you to specify the X-Ref library.

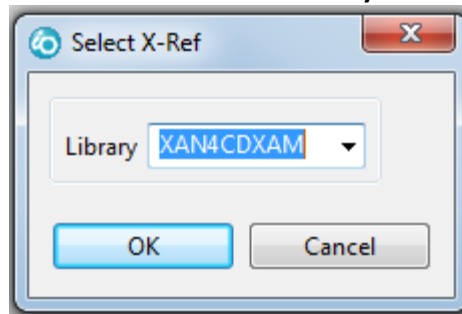
The dropdown box will show as follows:

**Select X-Ref dialog – Drop-down showing the available X-Ref libraries**



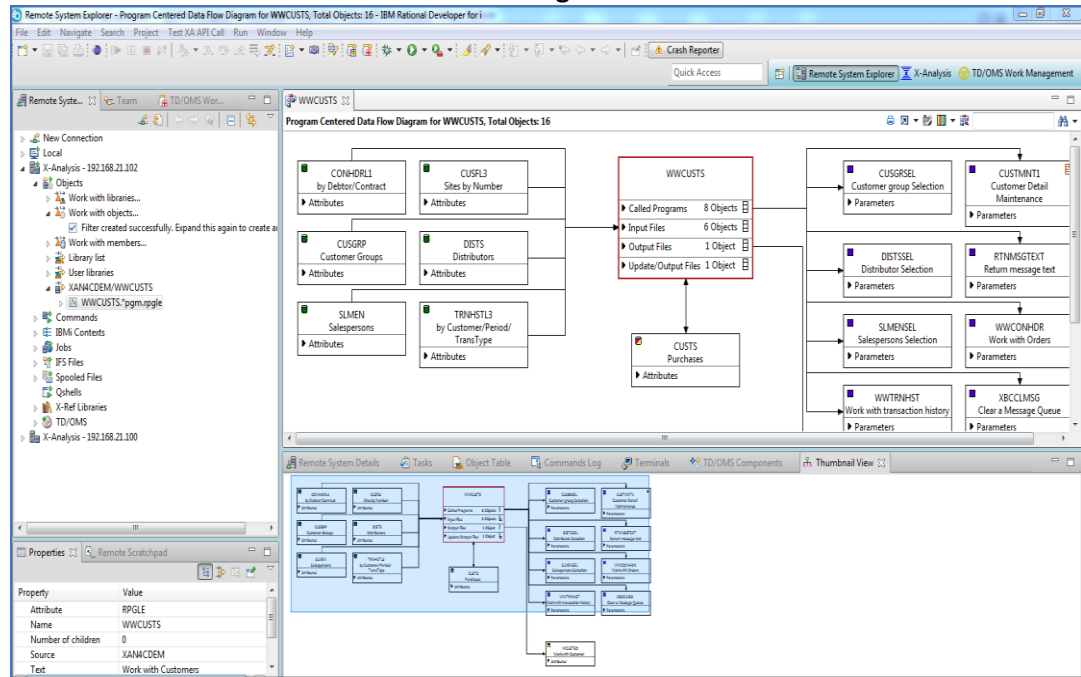
Select the X-Ref library.

**Selected X-Ref Library**



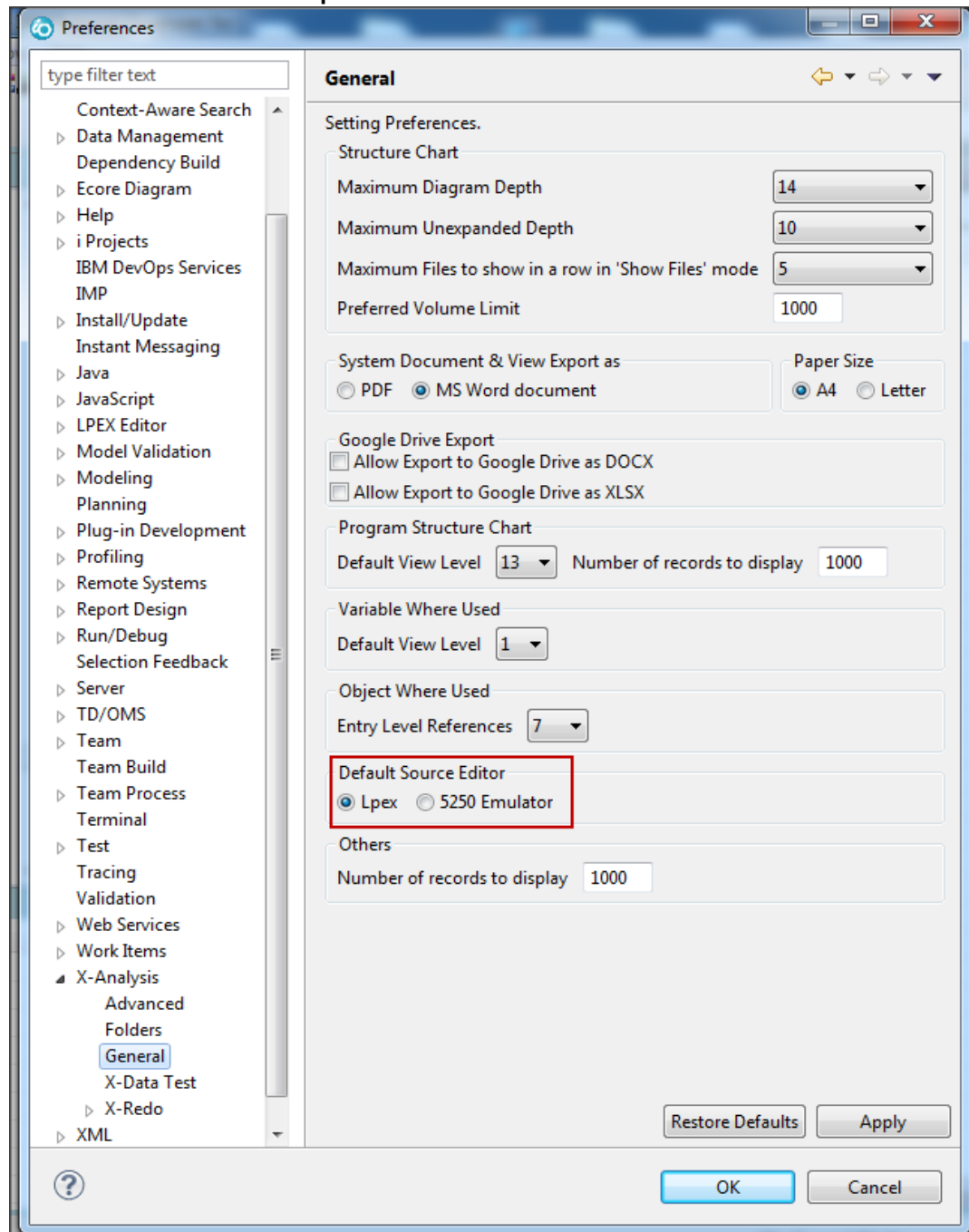
Click **OK**. The Data Flow Diagram for the selected object will be displayed as follows:

Data Flow Diagram on RSE



The **Variable Where Used** options can also be accessed through the Lpex editor. For this, change the settings through the X-Analysis General Preferences dialog.

Lpex as the Default Source Editor

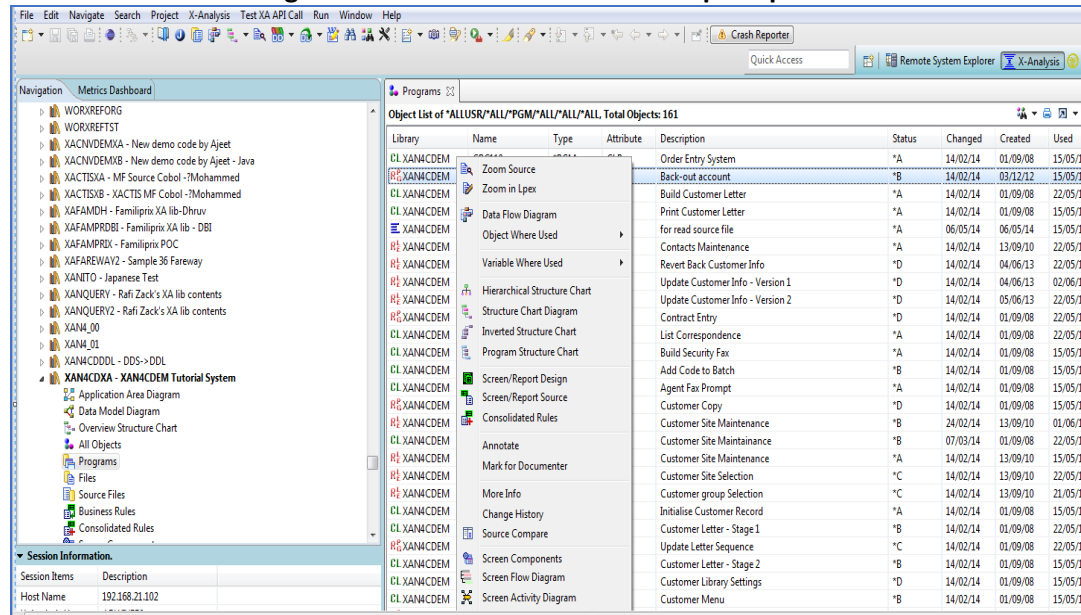


Click **OK** to confirm the change.

Again select the WWCUSTS program and right-click for the context menu and see the **Zoom in Lpex** option.

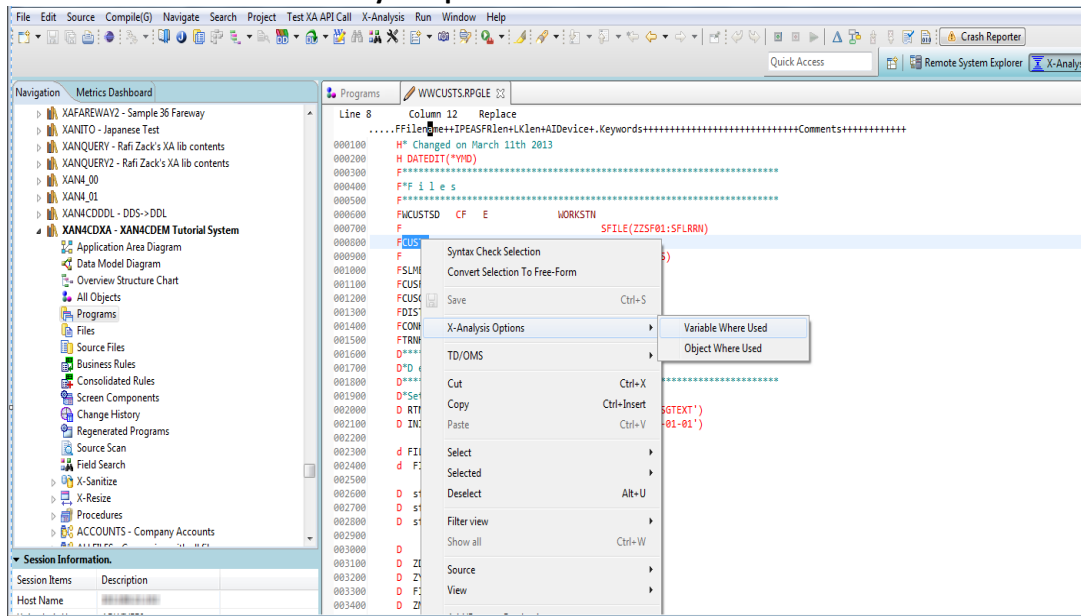


Right-click context menu - Zoom in Lpex option



The following window shows the **Variable Where Used** option on the Lpex Source Editor.

X-Analysis Options - Variable Where Used



**Note: Switching between the RSE and X-Analysis perspectives (or, if changing the X-Ref library within RSE) will close all the active Editors/Views in X-Analysis.**

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