X-Analysis

5250 User Manual

Software Version 13.3.01, 20230403

Contents

[Contents 2](#_Toc130897960)

[Publication Information 4](#_Toc130897961)

[Preface 5](#_Toc130897962)

[About this guide 5](#_Toc130897963)

[Version 5](#_Toc130897964)

[How to use this guide 5](#_Toc130897965)

[What is new in the latest release? 6](#_Toc130897966)

[Overview 7](#_Toc130897967)

[Installation and Setup 8](#_Toc130897968)

[Preparing IBM i To Run X-Analysis 9](#_Toc130897969)

[Post Load IBM i Activities 10](#_Toc130897970)

[Initialization of an IBM i Application for X-Analysis 11](#_Toc130897971)

[Set the Library List 12](#_Toc130897972)

[Work with X-Analysis/4 for Application 13](#_Toc130897973)

[Library Information 17](#_Toc130897974)

[Source & Object Libraries 19](#_Toc130897975)

[Cool/2E (Synon Model) Libraries 19](#_Toc130897976)

[Initialization 20](#_Toc130897977)

[Exclusions 24](#_Toc130897978)

[Generating the Data Model 27](#_Toc130897979)

[Using X-Analysis 30](#_Toc130897980)

[Navigating X-Analysis 31](#_Toc130897981)

[Source Browser Display 31](#_Toc130897982)

[SEU Command Line 32](#_Toc130897983)

[Sequence No. Field 32](#_Toc130897984)

[Action Codes 33](#_Toc130897985)

[Other Displays 42](#_Toc130897986)

[Reports 42](#_Toc130897987)

[The Diagrammer 43](#_Toc130897988)

[Action Codes 44](#_Toc130897989)

[Windows 44](#_Toc130897990)

[Data Flow Diagram 44](#_Toc130897991)

[Global Where Used Window 45](#_Toc130897992)

[Variable Where Used window 49](#_Toc130897993)

[Object Where Used window 50](#_Toc130897994)

[Structure Chart Diagram 51](#_Toc130897995)

[Displaying and Printing Diagrams 52](#_Toc130897996)

[Structure Charts (XSCD) 52](#_Toc130897997)

[Data Flow Diagrams (XDFD) 52](#_Toc130897998)

[Display Diagram X@DSPDGM 52](#_Toc130897999)

[Change Diagram X@CHGDGM 52](#_Toc130898000)

[Subsidiary Commands 53](#_Toc130898001)

[Summary 53](#_Toc130898002)

[Appendix – Troubleshooting 55](#_Toc130898003)

[Initialization Report Log Generation 55](#_Toc130898004)

[Initialization Reports 56](#_Toc130898005)

[Program Reference Exclusions 56](#_Toc130898006)

[Missing Object and Source 56](#_Toc130898007)

[Index 57](#_Toc130898008)

Publication Information

© 2023 Fresche Solutions Inc.

**Published by:**

Fresche Solutions Inc.  
995 Wellington Suite 200  
Montreal, QC  
Canada, H3C 1V3

Telephone numbers:

(514) 747.7007  
(toll-free in US and Canada): 1.800.361.6782  
(toll-free in Belgium, France, Germany, UK): 00 800 361 67 82 0  
(toll-free in Australia): 0011 800 361 6782 0

E-mail for support: [support@freschesolutions.com](mailto:support@freschesolutions.com?subject=Support)

E-mail for inquiries: [info@freschesolutions.com](mailto:inquiry@freschesolutions.com?subject=inquiry)

Web: [www.freschesolutions.com](http://www.freschesolutions.com/)

Title: X-Analysis 5250 User Manual, software version 13.3.01

Publication Date: April 2023

**Trademarks**

X-Analysis and X-Analysis Professional are trademarks or registered trademarks of Fresche Solutions Inc. <iSeries, Power Systems, Power8> are registered trademarks of IBM Corporation. Microsoft and Microsoft Windows are registered trademarks of Microsoft Corporation. All other brand and product names are trademarks or registered trademarks of their respective companies.

No part of this document may be reproduced or transmitted in any form or by any means, without prior permission in writing from Fresche Solutions.

The information in this manual is believed to be correct at the time of publication. However, Fresche Solutions Inc. makes no warranty, express or implied, about the accuracy of this information and reserves the right to revise this document or make changes to the products described herein at any time without notice and without obligation. Fresche Solutions Inc. is not liable for any loss of data, damage to databases or other software, or any other losses arising from the use of this manual.

Preface

About this guide

The X-Analysis 5250 guide describes the X-Analysis cross-referencing tool for use with the IBM i Source Entry Utility and PDM. The subsequent parts of this guide cover the installation and setup of the product and give insight into the diverse features of X-Analysis. The following topics are discussed:

* Installation and setup
* PDM user options
* Initializing the IBM i
* Navigating X-Analysis
* Troubleshooting

Version

This guide covers X-Analysis 5250, Software version 13.3.01.

How to use this guide

The two chapters in this guide focus on the installation, setup, and use of X-Analysis. The topics progress from the initial steps of installation covering pre-load and post-load IBM i activities to generating the Data Model, to the details of various commands used for the X-Analysis features.

The X-Analysis suite of products contains a total of eight modules. This guide describes only the following module: X-Analysis 5250. For information about the other modules, please contact your Fresche Solutions representative, or visit us at:  
<https://freschesolutions.com/products/x-analysis-suite/>

What is new in the latest release?

|  |  |
| --- | --- |
|  | For this release, we updated this Help. This release has the following changes: |

* Initialization of an IBM i Application for X-Analysis: Revised the content for all the sub-sections available under this section to match with the latest X-Analysis Initialization Guide. Also, added new topic Exclusions as a part of X-Analysis Initialization.
* Replaced all the existing X-Analysis Server screens with the new 5250 Emulator screens.
* [Post Load IBM i Activities](#_Ref-868084326): Revised the section to update the reference for Obtaining and Applying the License File.
* [Initialization](#_Ref903013079): Added new step related to cross-reference library locked by another job.

Overview

X-Analysis is a powerful reengineering CASE Tool. It allows technical analysts to navigate through an IBM i application. It automatically cross-references the database and ensures that what is displayed is always up-to-date and a true representation of the application on the IBM i.

X-Analysis is used for analyzing an application running on an IBM i server, by viewing the Object/Member Lists, Data Flow Diagrams, Program and Normal Structure Charts, Source X-References, File Usage, Source Code, and Object Where Used, etc.

X-Analysis provides instant access to information about the files and programs as it is working with them. The product seamlessly interfaces to the powerful features, which are available within the familiar IBM environment.

|  |  |
| --- | --- |
|  | Important Note:  The X-Analysis Library structure has changed from version 12.0. The new library being used is XAPROD. X-Analysis client release 10.X onwards is digitally signed. |

Installation and Setup

To use X-Analysis, it is important to ensure that the required software is installed on the IBM i. This chapter gives details of the required steps for completing the installation and initialization process.

X-Analysis can be installed on an IBM i either from a tape or CD-ROM. Please refer to the relevant installation section for the chosen media type.

It is recommended to read this chapter thoroughly before beginning any part of the installation and initialization procedures.

Preparing IBM i To Run X-Analysis

1. Sign on as an authorized user – that is, a user who can create and restore libraries and has the authority to perform commands such as DSPDBR over the libraries to be documented. At the point where the MMC@INST command is invoked, an authorized security officer user must be signed on or another profile with user profile creation rights.
2. Set the logging level. CHGJOB LOG(4 00 \*SECLVL) LOGCLPGM(\*YES).
3. **ENDSBS SBS(MMRMTCMD) Option \*IMMED.**
4. Place the CD in the CD-ROM Drive.
5. Perform a LODRUN.
6. Review the job log(s) to verify that all objects were restored successfully. Print and save the job log. Use DSPJOB Option 4 and print the spool file.
7. Remove the CD from the optical device.
8. Continue with Post-Load Activities.

Post Load IBM i Activities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Obtaining the License File   |  |  | | --- | --- | |  | Refer to the section Obtaining the License File in the document “X-Analysis\_ User\_Manual” for more details. |   Applying the License File   |  |  | | --- | --- | |  | Refer to the section Applying the License File in the document “X-Analysis\_ User\_Manual” for more details. | |

Initialization of an IBM i Application for X-Analysis

Before executing X-Analysis build the application cross-reference library and the application repository. Use the XAXREF command to achieve this, which can be either run interactively or as a batch process depending on the application size.

The initialization process takes care of setting up of the cross-reference database.

Set the Library List

Change the Library List to ensure the following sequence:

* XAPROD
* QGPL
* QTEMP

Use the EDTLIBL command to set the Library List.

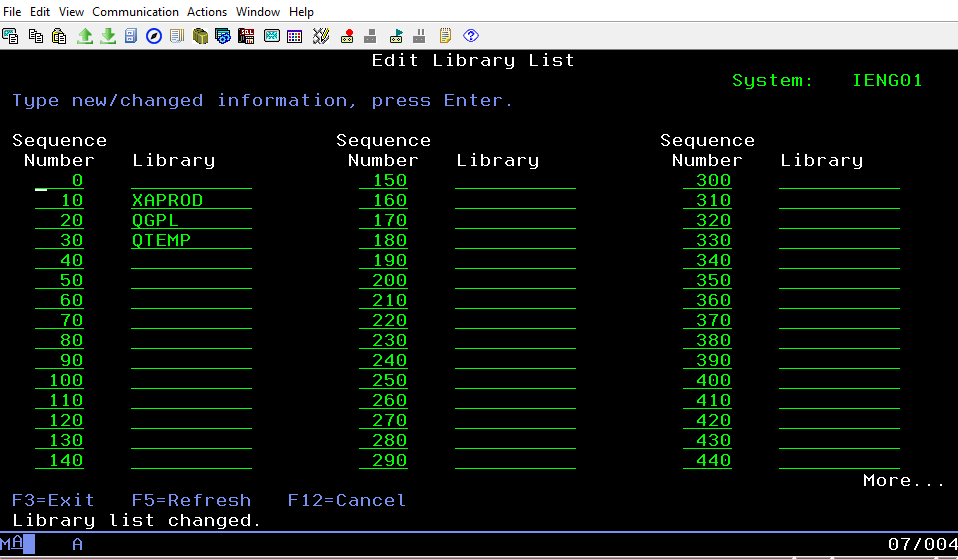


Fig. 1.1.1 – EDTLIBL command screen

Work with X-Analysis/4 for Application

|  |  |  |
| --- | --- | --- |
| After setting the Library List, enter the command XREFMENU command on the command line and press ENTER. Now the user will see the following screen.  Fig. 1.1.2 – XREFMENU command screen  Choose option 99=Work with against the X-ref library where the user wants to work with. Press ENTER to get the Work with X-Analysis/4 Applications screen.  Fig. 1.1.3 – Work with X-Analysis/4 Applications screen  The first step is to add a new cross-reference library. Press F6 to add a new cross-reference library.  Fig. 1.1.4 – F6 – Add Application screen  Pressing F6 will add an entry to the list of the X-Analysis/4 Applications and create a new (empty) cross-reference library. Specify a cross-reference library name (for example XAN4CDXA). Optionally, specify something in the Text and Company/division fields, as shown in the screen below.  Fig. 1.1.5 – Screen showing the added Application  Press ENTER to proceed.  Choose option 4=Delete from the XREFMENU command screen against the X-ref library where the user wants to delete a cross-reference.  Press ENTER to proceed.   |  |  | | --- | --- | |  | Option 4=Delete does not delete the cross-reference libraries physically from the IBM i box. It will be the responsibility of the user to remove the cross-reference libraries. Refer to the section Removing the Cross-Reference Libraries in the document "X-Analysis\_Installation\_And\_Upgrade\_Guide" for more details. | |

From the master command screen above, press F6 and select the desired version to add a new X-Ref library. The following screen will appear only when version is below 13.1.00 and X-Analysis is installed on \*SYSBAS:

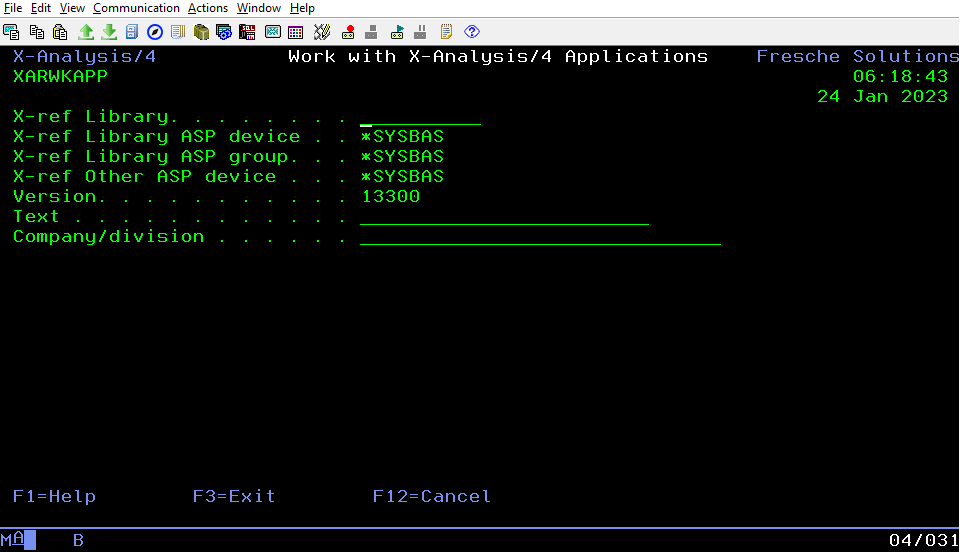


Fig. 1.1.6 – Work with X-Analysis/4 Application – Add Application screen

This option will add an entry to the list of the X-Analysis/4 applications and create a new (empty) cross-reference library. The user must specify the name of the cross-reference library (for example, XAN4CDXA) . It is optional to the user to specify text and a company name.

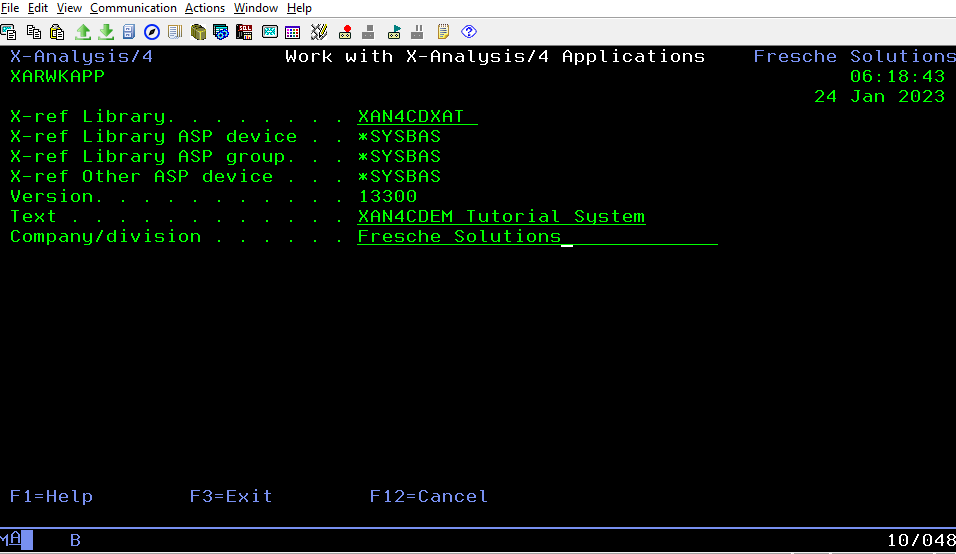


Fig. 1.1.7 – Work with X-Analysis/4 Application – Application added

Fields, viz., X-ref Library ASP device, ASP group, and Other ASP device—display—ASP device value, ASP group, and other ASP device value, respectively. Press F7=ASP Device to select the desired ASP device enlisted and in case there is no ASP device, \*SYSBAS will be the default device.

The following screen will appear only when X-Analysis version is 13.1.00 or above and X-Analysis is installed on independent ASP group:

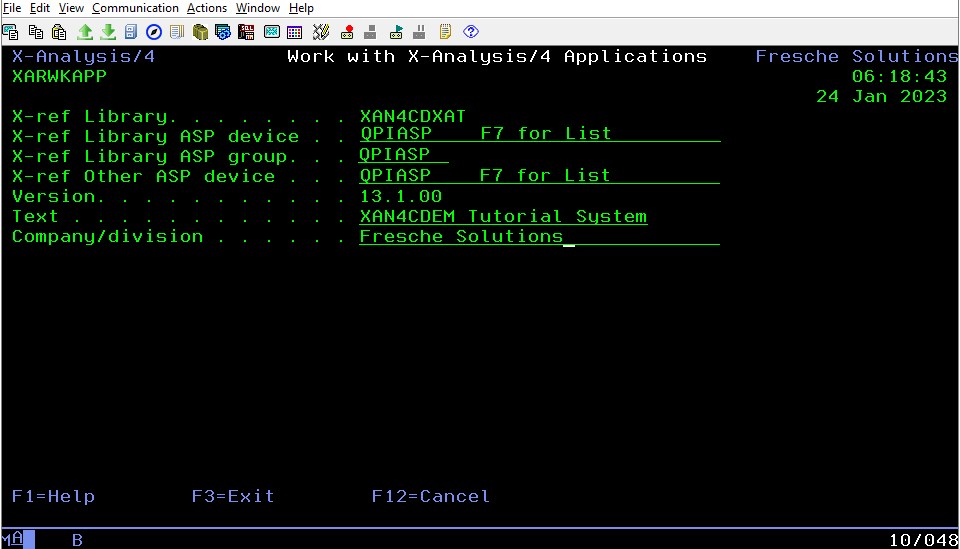


Fig. 1.1.8 – Application added

Library Information

In the previous step, we successfully added a new cross-reference library. Now we can provide the Library information.

We need to add the Source Library and the Object Library to the cross-reference library. The initialization process generates the repository by reading these libraries.

Select Option 8 to assign the Source, the Object, and/or the Model (2E) libraries.

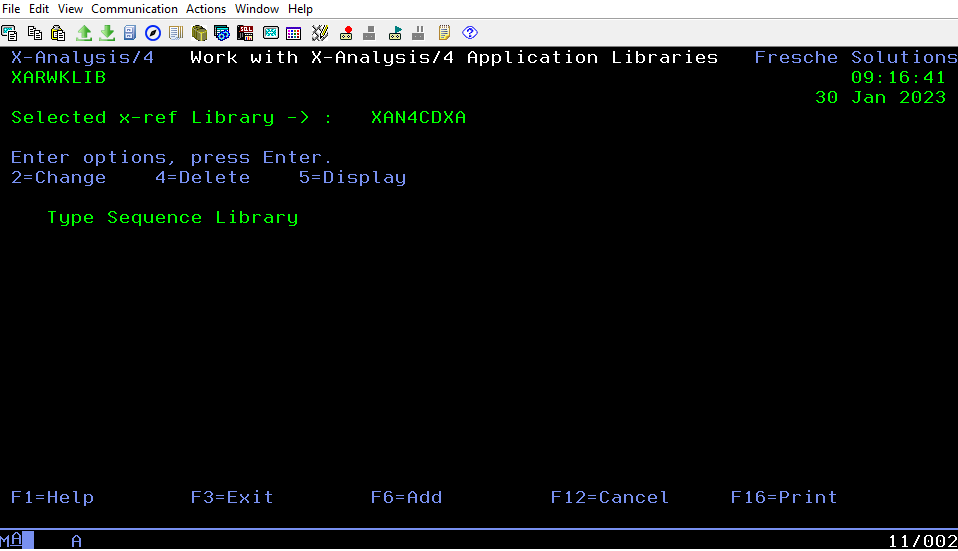


Fig. 1.1.9 – Work with X-Analysis/4 Application – Application added

|  |  |
| --- | --- |
|  | The sequence of the libraries is important because the objects and the sources are given preference according to the order of the libraries. Only the first occurrence of the object/source gets reported, but the subsequent occurrences are removed by the initialization process. |

Press F6 to add the names of the Source / Object / Model libraries associated with the application, and press ENTER. Repeat the step if the application consists of multiple libraries.

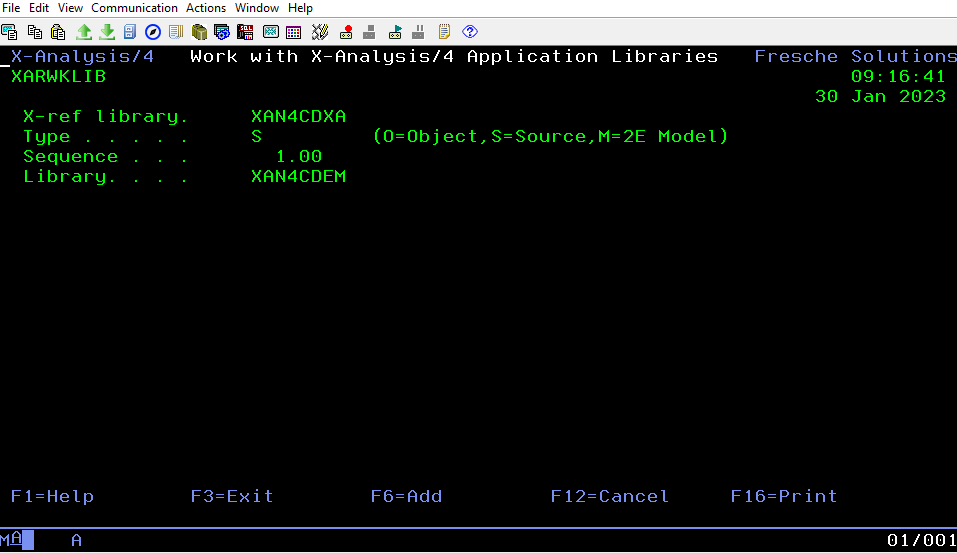


Fig. 1.1.10 – Work with X-Analysis/4 Application – Add Library Screen

The Type may be any one of the following:

* O=Object
* S=Source
* M=Model

Source & Object Libraries

The source library contains the un-compiled source files and the object library contains the compiled objects for the same.

|  |  |
| --- | --- |
|  | Specify the libraries containing both source and object as S and O types respectively. See the setting on the ‘XAN4CDXA – Tutorial Application’. It has XAN4CDEM specified as ‘O’ and ‘S’ types. |

Cool/2E (Synon Model) Libraries

Specify the model library/libraries to analyze a Synon application. The user can achieve this by setting the library type as "M". The initialization process picks the data model information from the Synon model library/libraries while building the cross-reference repository.

Press F3 when the libraries are included.

|  |  |
| --- | --- |
|  | X-Analysis references the Synon Product library available in the XA2EPROLIB data area. Users should set it to Y2SY or U2SY depending on the Synon CA 2E version they are on. By default, it is set to Y2SY.  If a user is using the National Language Support Synon Product Library (for example Y2SYVFRN2) and not the English one (that is, Y1SY & Y2SY) then that particular Product Library must be updated in data area XA2EPROLIB in library XADTAXXXXX.  IBM has documented the problem with \*QRYDFN objects, created before V7.2, and affects the metadata that is stored in the object. This issue prevents X-Analysis from retrieving accurate information about the tables used. If the system is running V6.1 or V7.1 and it contains \*QRYDFN objects, then before initializing the application cross reference, please follow the instructions given here:  <https://www-01.ibm.com/support/docview.wss?uid=nas8N1021173> |

Initialization

Start the initialization process using option 12 on Work with X-Analysis/4 Applications screen against the cross-reference library for initialization.

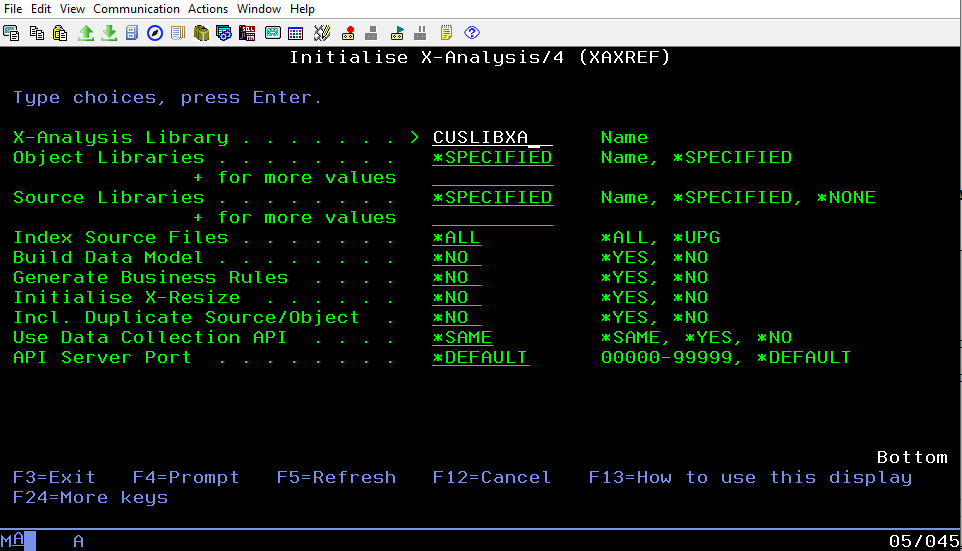


Fig. 1.1.11 – Initialise X-Analysis/4 (XAXREF)

In case of Synon Model libraries, a user need to specify the model library / libraries to analyze a Synon application. To achieve this the user need to add the library type as "M". The initialization process picks the data model information from the Synon model library / libraries while building the cross-reference repository.

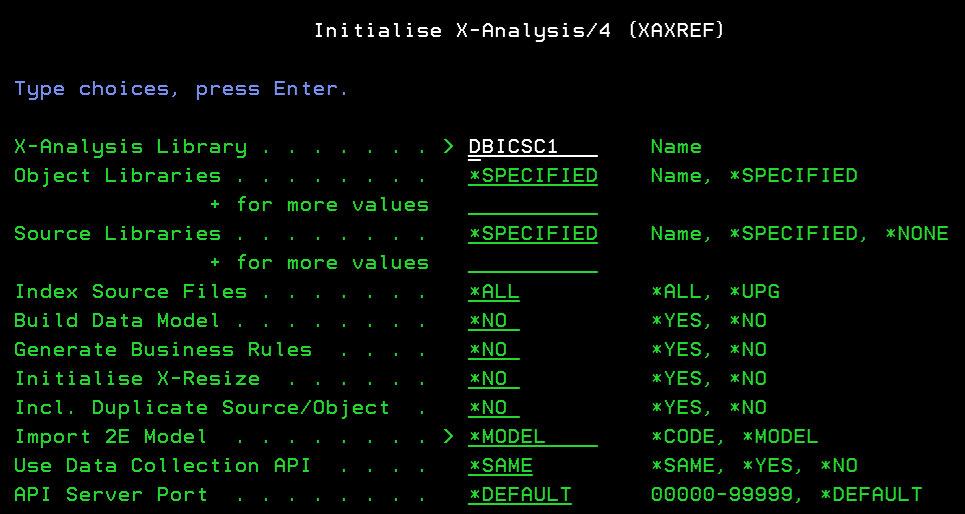


Fig. 1.1.12 – XAXREF Command Screen

|  |  |
| --- | --- |
|  | All jobs from X-Analysis are submitted in batch mode. The user can change default job queue (QBATCH) by changing the job description for XAOBJXXXXX/XAN4.  Use the following command to change the job description: WRKJOBD JOBD(XAOBJXXXXX/XAN4)  The user should set both the ‘Generate Business Rules’ & ‘Initialize X-Resize’ parameters to \*NO for faster initialization of the X-Analysis repository. The user can opt to run the two jobs later. |

|  |  |
| --- | --- |
| **Initialization criteria** | **Brief Description** |
| X-Analysis Library | The X-Analysis cross-reference library name. |
| Object Libraries | The default value is \*SPECIFIED. It means that X-Analysis will retrieve all the object libraries you have previously specified (using Option 8). |
| Source Libraries | The default value is \*SPECIFIED. It means that X-Analysis will retrieve all the source libraries you have previously specified (using Option 8). |
| Index Source Files | Specify whether to create indexes over the source files. These indexes will allow the of "Where Used" data to be displayed immediately. They may be required for the generation of the data model, depending on what options are selected. If the indexes are not built now, they can be built later for an individual Source Member, when they are viewed on the X-Analysis interface.  \*ALL – It will index all source members without checking the change date.  \*UPG – This option is no longer allowed on repositories at 13.2.XX (remains applicable for pre 13.2.00 repo). Instead, the user must use the option \*ALL. |
| Build Data Model | Choose an option to build the data model for your application:  \*YES – Build the data model \*NO – Do not build the data model  You should have the X-Analysis Professional Module set for this to work. |
| Generate Business Rules | Choose an option to generate the business rules for your application:  \*YES – Generate Business Rules  \*NO – Do not generate Business Rules  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. |
| Initialize X-Resize | 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:  \*YES – Initialize X-Resize Project  \*NO – Do not initialize X-Resize Project  **You should have the X-Resize Module for this to work.** |
| Include Duplicate Source/Object | If the user has different (duplicate) versions of the same source (s)/ object (s) in different libraries and all such libraries are part of the cross reference, and then the behaviour shall be as follows:  \*NO – The object and source from the topmost library in the library list shall only be processed and become part of the cross-reference library. The duplicate object/source will neither be processed nor shown on Object/Member list.  \*YES – The duplicate objects and members will also get processed and shown on the Object and Member list. The object reference data is extracted on the basis of library sequence in the library list.   |  |  | | --- | --- | |  | When \*YES is selected, the object references shown in the diagrams like Structure Chart Diagram and Data Flow Diagram may show incorrect reference to the duplicate objects. This is a known limitation. | |
| Import 2E Model | \*CODE – For non Synon 2E Model library, the initialization process picks the default value \*CODE.  \*MODEL – In case of Synon model library / libraries while building the cross-reference repository the initialization process picks the data model information and displays the value \*MODEL.   |  |  | | --- | --- | |  | When the user selects a Model library while initializing a X-Analysis cross-reference in that case the default gets selected is \*MODEL. X-Analysis still provides flexibility to change the default to \*CODE with an exception wherein Action Diagram will not be generated. | |

|  |  |
| --- | --- |
|  | From 13.0 onwards, \*CHG and \*NO options of ‘Index Source Files’ parameter has been removed from XAXREF command screen.  From 13.2.10 onwards, it is not required for the user to provide a setting regarding the ‘Index Source Files’ parameter as the appropriate decision will be automatically takes placed based on the destination version and the option index source files will not be displayed on the screen. |

|  |  |
| --- | --- |
|  | From 13.3.00 onwards, two new options "Use Data Collection API" and "API Server Port" are added to the XAXREF command screen. Currently, these two new options are not ready for consumption. |

Press ENTER to submit a batch job to start the initialization process.

|  |
| --- |
| X-Analysis Initialization requires exclusive access to the cross-reference library. So, trying to access it while initialization is being performed will generate the following error from the X-Analysis client. Refer to the screen below.  Fig. 1.1.13 – Cross-Reference library locked by another job |

Exclusions

The exclusions can be set up after initializing the cross-reference using the “Exclusions” option from the Work with X-Analysis/4 Applications screen. Select Option 16 to do this and press Enter.

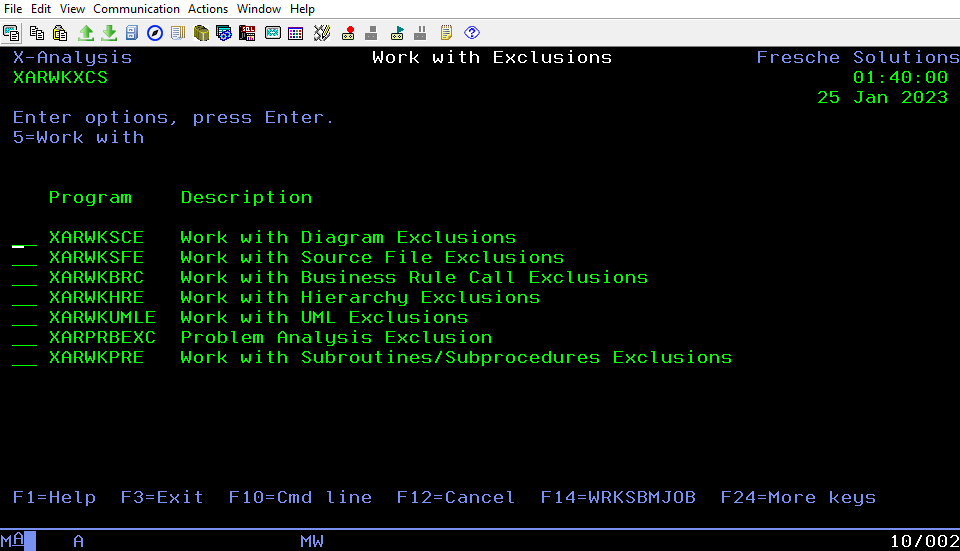


Fig. 1.1.14 – Work with Exclusions Screen

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
* XARPRBEXC – Work with Problem Analysis Exclusion
* XARWKPRE – Work with Subroutines/Subprocedures Exclusion

**XARWKSCE – Work with Diagram Exclusions**

After initialization, the objects excluded by using this option will not appear in the following:

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

|  |  |
| --- | --- |
|  | 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**

If the user uses this option to exclude source files than the 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. This option can be taken prior to the initialization process.

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

After initialization, use this option to set up Business Rule call exclusions. Specify program name which you wish to exclude. This option will exclude the CALL Statement from the calling program for the excluded member.

**XARWKHRE – Work with Hierarchy Exclusions**

After initialization, use the Hierarchy Exclusion option to prevent all the programs called by the excluded programs shown in the Structure Chart Diagram and the Overview Structure Chart. Programs excluded in SCD or OSC gets displayed by a green arrow next to it.

**XARWKUMLE – Work with UML Exclusions**

After initialization, use this option to exclude objects for the UML diagram. Specify the object name which you wish to exclude from the UML diagram.

**XARPRBEXC – Work with Problem Analysis Exclusion**

After initialization, use this option to specify objects/sources to be excluded from Problem Analysis.

**XARWKPRE – Work with Subroutines/Subprocedures Exclusion**

Use this option to exclude source files. Excluded source files will not be loaded into X-Analysis. You have to provide the following details:

* Source Member name
* Source Member File name
* Source Member Library name

The Subroutines/Subprocedures Exclusion details can be left as blank. This option can be taken prior to the initialization.

Generating the Data Model

|  |  |
| --- | --- |
|  | The user should only attempt to build the data model, if the user purchased the X-Analysis Professional Module/Modeling Set. |

X-Analysis provides a data-modeling environment on the IBM i. Its re-engineers a current application and then automatically generates 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 Data Model is an essential part of the initialization process. If the Data Model is not generated, then select Option 13 on the Work with X-Analysis Applications menu to generate it.

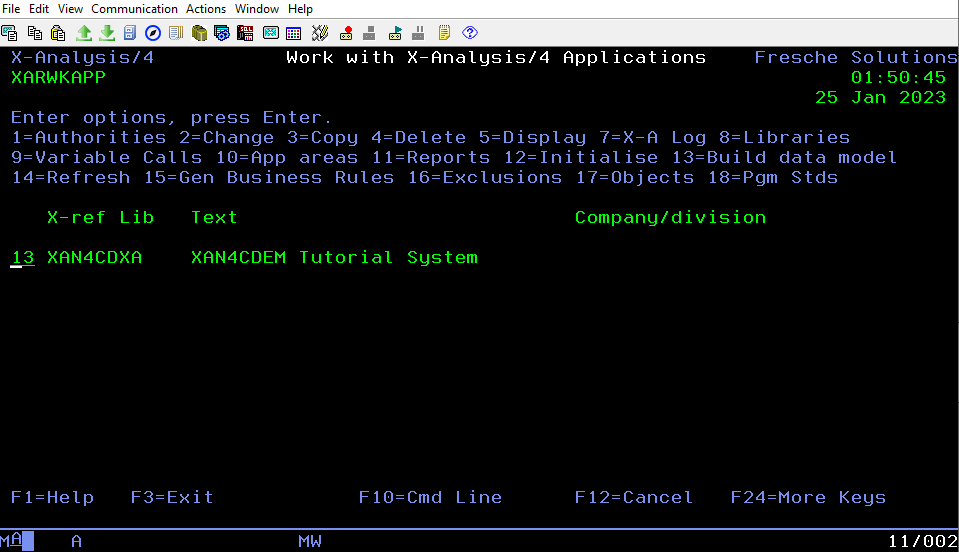


Fig. 1.1.15 – Work with X-Analysis/4 Applications

Press ENTER.

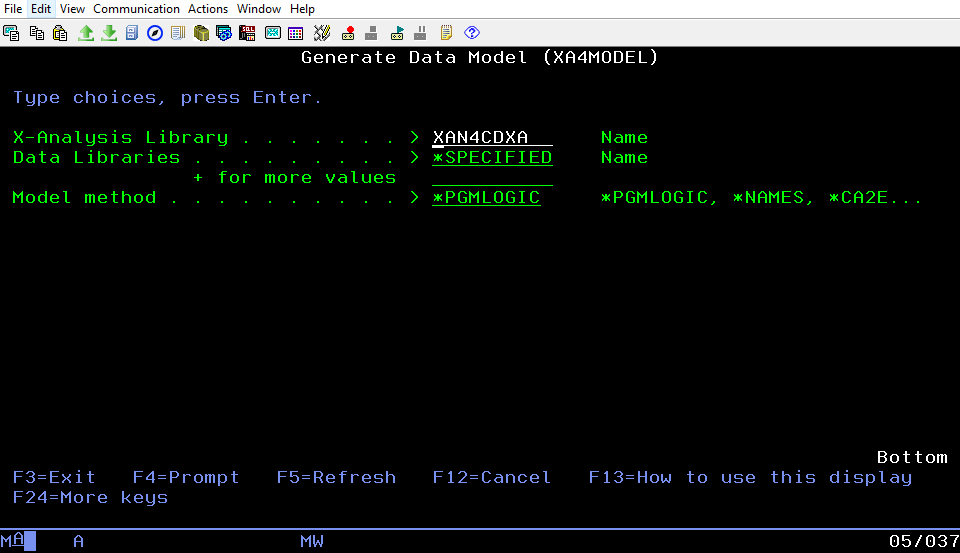


Fig. 1.1.16 – Generate Data Model (XA4MODEL)

Press ENTER to run the modeling command executed in batch mode. This completes the modeling process.

|  |  |
| --- | --- |
| **Data Modeling criteria** | **Brief Description** |
| X-Analysis Library | The X-Analysis cross-reference library name. |
| Data Libraries | Specify the data library/libraries names. |
| Model Method | * \*PGMLOGIC – 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. * \*CA2E – Synon is used to generate the data model. Use only the Synon data model database to derive the data model. * \*NAMES – Only derive foreign keys for owning relationships, considering the option specified in the ‘Matching Method’ parameter. * \*BOTH – Derive foreign keys considering the Program Logic and the \*NAMES OR Program Logic and \*CA2E (in case of CA2E application). |

The other options from the screen are explained below:

1=Authorities: Use this option to maintain the User Authorities (for details on these, refer to the X-Analysis User Authorities PDF).

2=Change: Use this option to change an application.

3=Copy: Use this option to copy an application.

4=Delete: Use this option to remove the X-Ref library from the application selection list. Note that selecting this option only removes the X-Ref entry from the server.

5=Display: Use this option to display the records from an application.

7=X-A Log: Use this option to view the details of the options taken for the selected X-Ref.

10=App Areas: Use this option to specify application areas for the selected application.

11=Reports: Use this option to request all the reports relating to application areas and objects.

17=Objects: Use this option to work with Objects for the selected application.

18=Pgm Stds: Use this option to set program standards for variables within programs if the variable you have entered does not have any object or field description known to X-Analysis.

Using X-Analysis

Before using X-Analysis, the user must make sure that the library list is set up with the correct libraries in the required sequence.

If the users are using the default object cross-reference database (that is, the one located in the XAPROD library), then the XAOBJXXXXX and the XAPROD product libraries need to be in their Library List.

If the object cross-reference database was created in a library other than XAPROD, the library also needs to be in their library list above the XAPROD library.

Once the library list is correctly set, the user can start X-Analysis with either the XA or the STRSEUB commands. Both commands have the same effect.

From the command line, enter the commands as follows:

|  |
| --- |
| STRSEUB SRCFILE(<source library>/<source file>) SRCMBR(<member>)  (The STRSEUB is analogous with the IBM i STRSEU command.)  **OR**  ***XA SRCMBR(<member>)*** |

The XA command is designed to allow quick access to a source member. X-Analysis will search through the source files in the library for a member that matches the member name specified as a parameter.

Navigating X-Analysis

After entering the XA or STRSEUB command, the user will be presented with a familiar SEU browser display.

Source Browser Display

The following functions are available:

**Function keys**

The display supports a set of function keys that allows a user to perform specific tasks:

|  |  |  |
| --- | --- | --- |
| **Keys** | **Function** | **Brief Description** |
| **F1** | **Help** | Displays the HELP text for the view you are in. |
| **F3** | **Exit** | Leaves the current display. |
| **F4\*** | **Prompt** | Prompts an action code command. |
| **F5** | **Reduce** | Reduces the level of detail (by one level). |
| **F6** | **Magnify** | Increases the level of detail (by one level). |
| **F9** | **Retrieve SEU Command** | Retrieves (up to 50) previous SEU commands from the SEU command line. |
| **F10** | **Switch Cursor between SEU command line/main screen** | Moves the cursor between the SEU command line and the main body of the screen. |
| **F12** | **Cancel** | Cancels the current display. |
| **F16** | **Scan forward** | Scans forward for the requested string. |
| **F17** | **Scan back** | Scans backward for the requested string. \*F4 within the scan area gives more control. |
| **F19** | **Start SEU** | Starts SEU at the displayed source position. |
| **F20** | X-Analysis | Displays the Program logic within X-Analysis. |
| **F21** | **System command** | Uses the System command entry display. |

SEU Command Line

The following SEU commands are available:

* To find a string, enter “F” or “FIND” followed by the search string, then press ENTER or F16 to scan forwards, F17 to scan backwards.
* Enter “T” or “TOP” to locate the display at the beginning of the source member.
* Enter “B” or “BOTTOM” to locate the display at the end of the source member.

All SEU commands can be entered in any combination of upper- and lower-case characters.

Use F9 to retrieve up to 50 previously entered commands. Use F10 to alternate the cursor between the command line and the main body of the screen.

Sequence No. Field

The user may enter one of the following into this field:

* A line number (in any format allowed by SEU) to re-position to that line.
* One of the following action codes:

Action Codes

Action Codes are entered over the sequence number field. They can be entered in any position in that field.

An alternative way of entering an Action Code is to position the cursor anywhere over the source line and press ENTER. A drop-down menu is displayed.

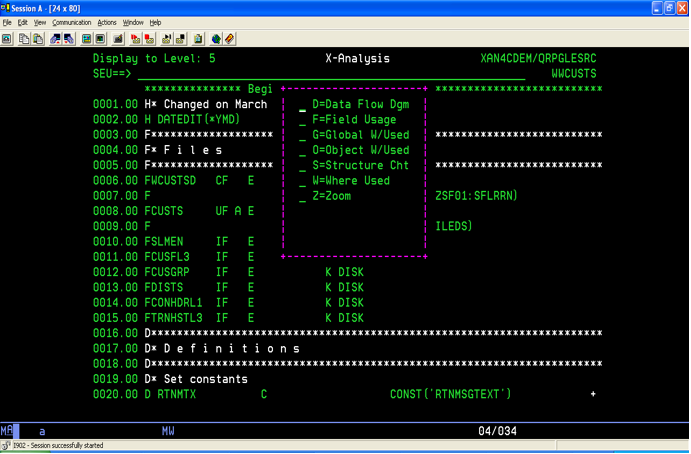


Fig. 2.1.1 – Action Codes drop-down menu

Select from the menu by entering either “1” or “X” beside an option or just positioning the cursor over the correct line. In the following screen, “1” is entered next to Data Flow Diagram.

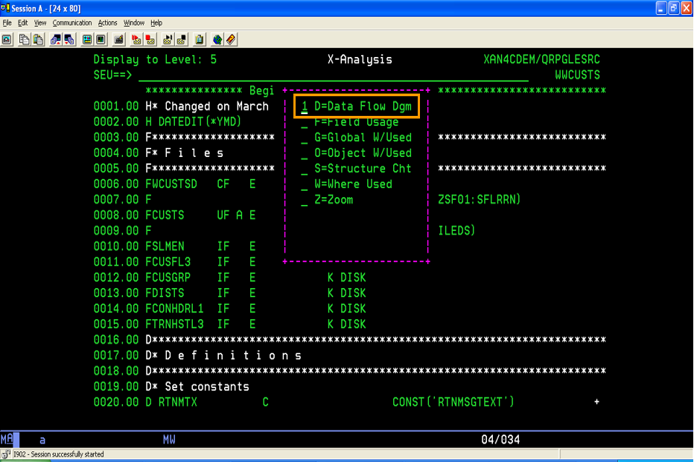


Fig. 2.1.2 – Displayed as entered in the drop-down menu

Press ENTER or F4 to continue, F3 or F12 to cancel.

**D = Data Flow Diagram**

Step 1: Select a program or file and enter “D” to display its Data Flow Diagram. In the following screen, we selected CUSTS file, then entered “D”. The same can be done by entering “1” or “X” next to the relevant item in Action Codes drop-down menu (explained above).

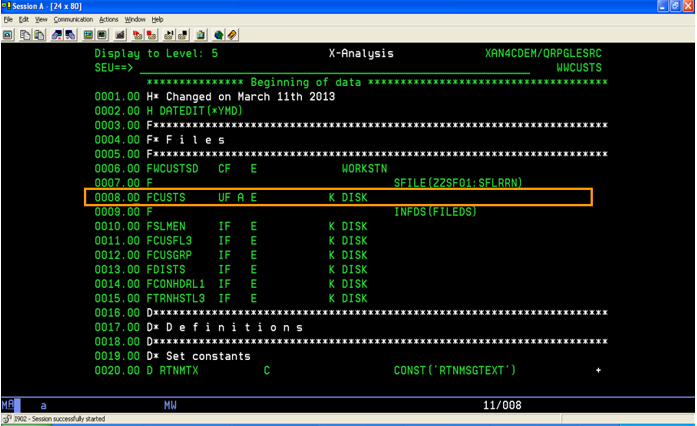


Fig. 2.1.3 – D option entered against CUSTS

Step 2: Press ENTER.

The Data Flow Diagram will be displayed:

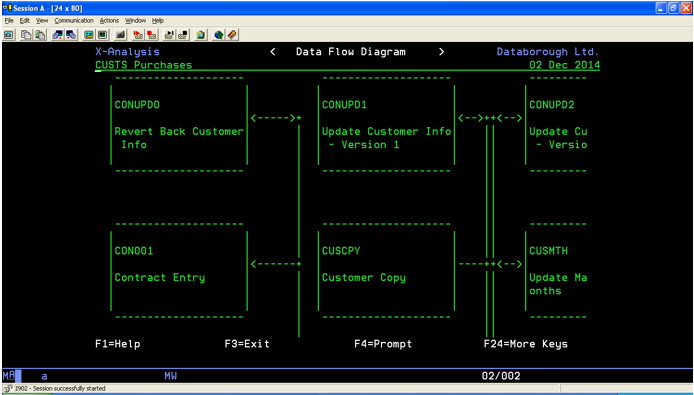


Fig. 2.1.4 – Data Flow Diagram display

**G = Global Where Used**

Step 1: Select a variable (field, object, literal, or RPG indicator), and enter “G” to display a list of all that variable’s references across all source members in all source files in all application libraries (in the library list).

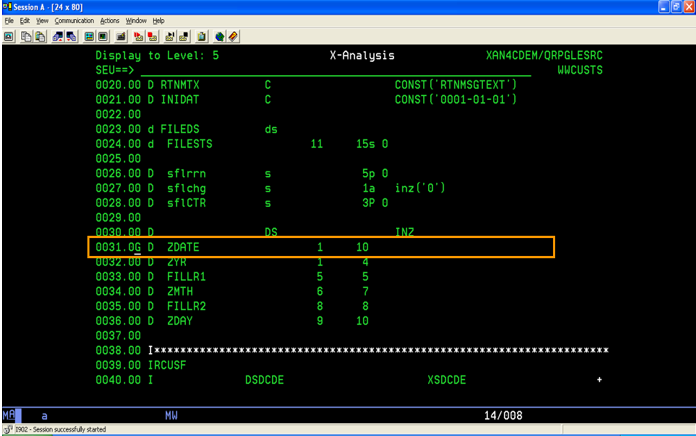


Fig. 2.1.5 – “G” option entered against Date field

Step 2: Press ENTER. The following screen will be displayed.

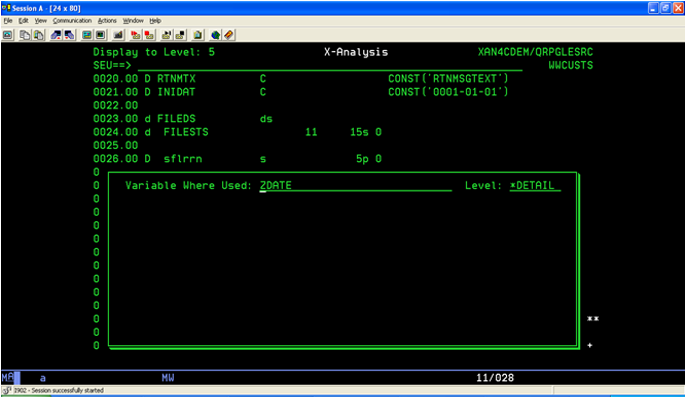


Fig. 2.1.6 – Global Where Used display

Step 3: Press ENTER again. The Global Where Used data will be displayed as shown below.

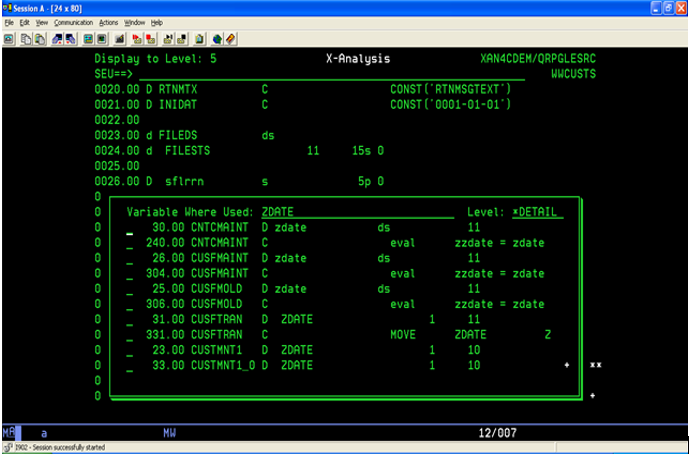


Fig. 2.1.7 – Screen showing Global Where Used data

**O = Object Where Used**

Step 1: Select a program or file and enter “O” to display a list of all references. Alternatively, a user may press F4\*. Press ENTER.

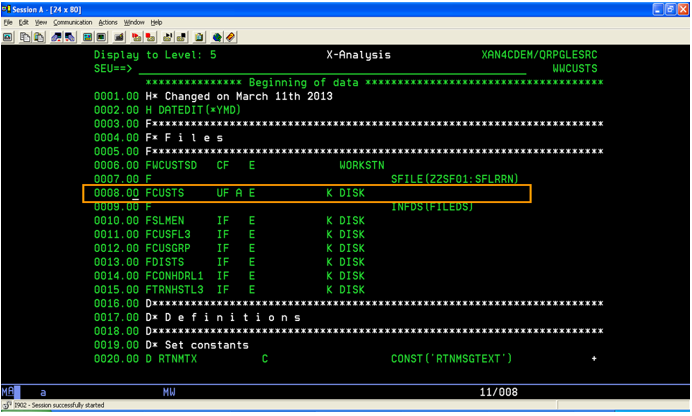


Fig. 2.1.8 – O option entered against CUSTS

Step 2: Press ENTER. The Object Where Used field will be displayed.

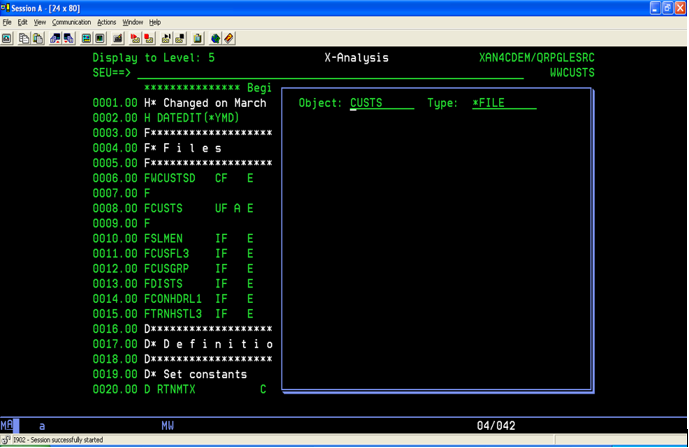


Fig. 2.1.9 – Screen displaying Object Where Used field

Step 3: Press ENTER again. All references will be displayed, as shown below.

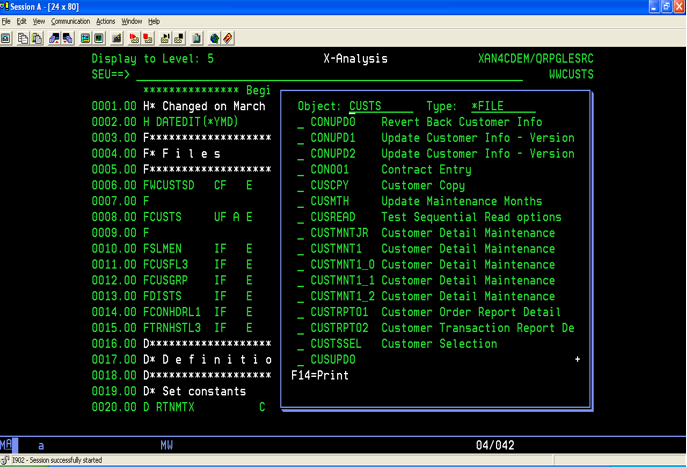


Fig. 2.1.10 – Screen displaying Object Where Used references

**S = Structure Chart Diagram**

Select a program and enter “S” to display its Structure Chart. Press ENTER.

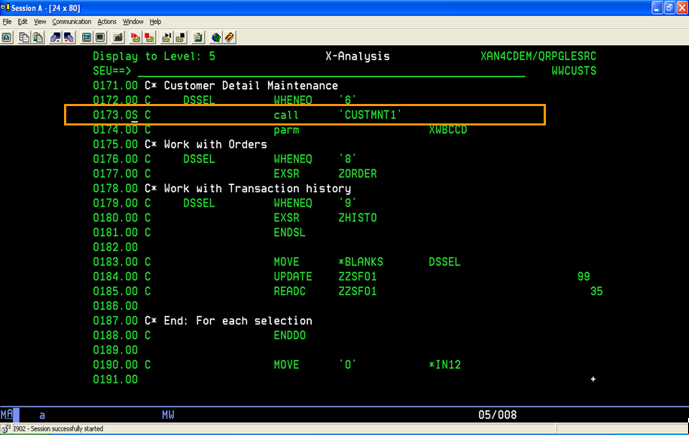


Fig. 2.1.11 – Entering S after selecting CUSTMNT1

The following screen will be displayed.

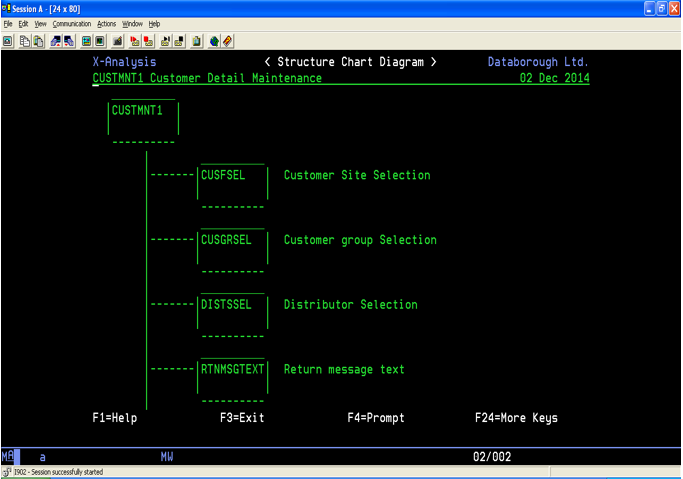


Fig. 2.1.12 – Screen displaying the Structure Chart Diagram of CUSTMNT1

**W = Where used**

Select a variable (field, object, literal, or RPG indicator) and enter “W” to display a list of all references to that variable. F4 may also be used to prompt this action code.

Press ENTER.

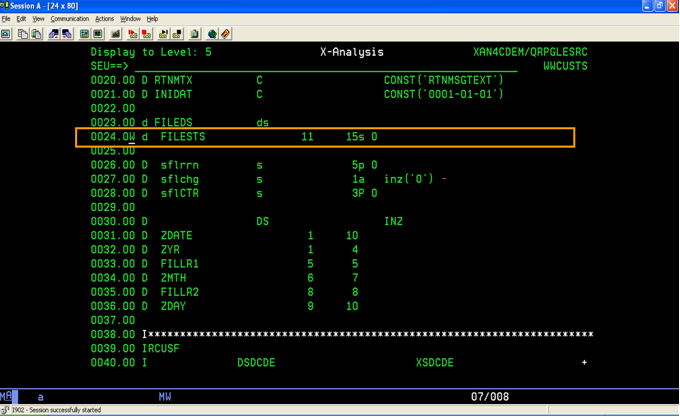


Fig. 2.1.13 – Entering W after selecting FILESTS

The following screen will be displayed.

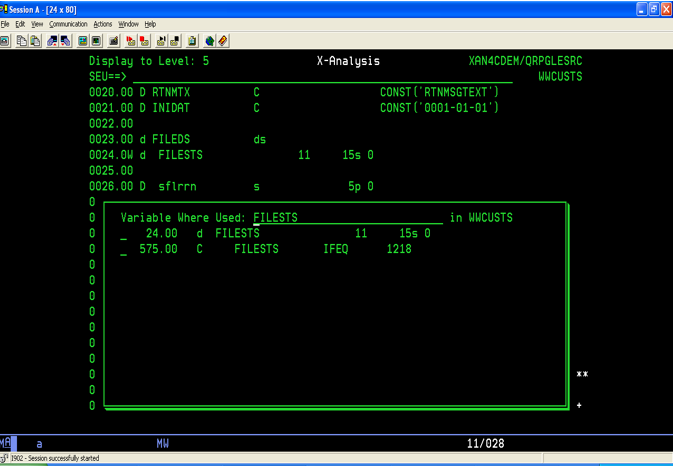


Fig. 2.1.14 – Screen displaying the Where Used References for FILESTS

**Z = Zoom**

Select a source line and enter “Z” to start a fresh browse session over the source member (Program, File, or Subroutine). This is a more powerful replacement for the conventional F15 split-screen function of IBM SEU.

Press ENTER.

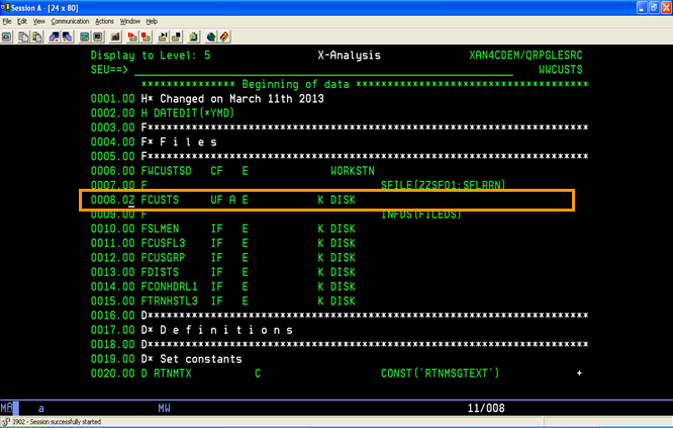


Fig. 2.1.15 – Z option entered against CUSTS

The following screen will be displayed.

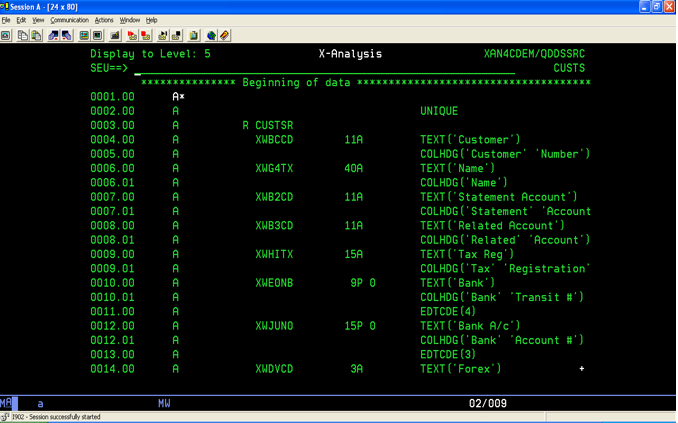


Fig. 2.1.16 – Screen displaying the fresh browse session for CUSTS

Other Displays

X-Analysis uses the following screens in addition to the Source Browser screen:

* The drop-down Action Codes Menu (Refer to the relevant section earlier in the document)
* Windows showing subsidiary data (Where Used, Dataflow field usage etc.)
* The Diagrammer (See below)

Reports

All diagrams can also be printed.

When entering one of these Action Codes, S=Structure Chart Diagram or D=Data Flow Diagram – prompt the request and change the output parameter from “\*” to “\*PRINT”.

The graphical diagrams will be identical to those shown on the screen, but additional information will usually be printed.

The Data Flow Diagram for a program will be preceded by a description of the program function. After all Data Flow Diagrams, the Field Usage will be printed for program-to-file flows and the parameters for program-to-program flows.

The Diagrammer

The Diagrammer is used to display all diagrams. The following functions are available:

|  |  |  |
| --- | --- | --- |
| **Keys** | **Function** | **Brief Description** |
| **F1** | **Help** | Displays HELP text. |
| **F3** | **Exit** | Helps to leave the Diagrammer. |
| **F4** | **Prompt** | Prompts the current request. |
| **F12** | **Cancel** | Cancels the current display. |
| **F14** | **WRKSBMJOB** | Runs the WRKSMBJOB command. |
| **F17** | **Command Line** | Puts up the SEU command line window. |
| **F19** | **Window Left** | Moves/Shifts the window to the left-side display. |
| **F20** | **Window Right** | Moves/Shifts the window to the right-side display. |
| **F21** | **WRKSLF** | Runs the WRKSPLF command. |

Action Codes

The same Action Codes that are used with the Source Browser are applicable to the Diagrammer. Instead of entering codes over the sequence number they can be entered in the second column of the screen showing the diagram.

This method is often too imprecise in a diagram where there may be several objects on the same line. In such cases, it is much better to position the cursor over the actual name of the object and press ENTER. The drop-down menu will then appear allowing choice of the specific action code required.

Windows

Windows are used to display subsidiary data. The following data is displayed through windows:

* Global Where Used
* Object Where Used
* Where Used
* Field Usage (Data Flow Diagrams)

Data Flow Diagram

The Data Flow Diagram is a graphical display of all objects referenced by a program or file represented through a bus-routing block diagram. The color-coded DFD simultaneously plays the dual role of presenting the data flow at a high object-level besides providing contextual details regarding specific variables and parameters passed between objects. Lines show the actual flow of data between the objects and arrowheads indicate the direction of the flow.

The Data Flow Diagram is displayed by the Diagrammer. (See above for a full description of the functionality.)

An extra Action Code is applicable in this diagram. Position the cursor over any object name in the diagram and press ENTER. Select “Field Usage” to see the actual data flow between the selected object and the subject of the Data Flow Diagram.

Global Where Used Window

All references to the item across all source members in all source files in all application libraries (in the library list) are shown.

The data can be displayed at two levels:

* \*DETAIL
* \*SUMMARY

**\*DETAIL**

The default mode is \*DETAIL which shows each individual reference.

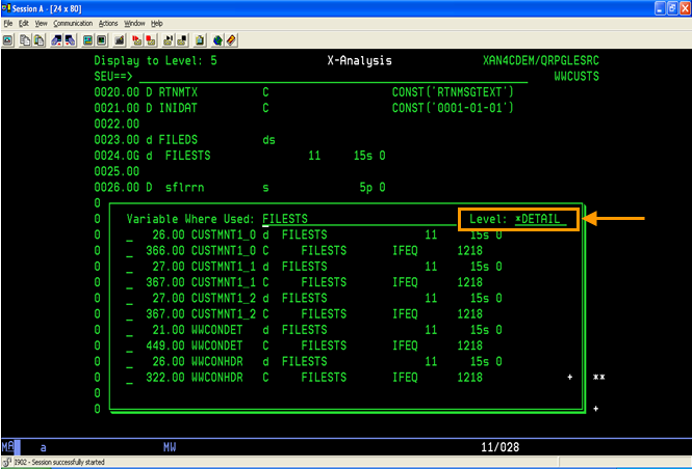


Fig. 2.1.17 – Data display in the \*DETAIL mode

The source member is shown on the left followed by the referencing line of source code.

Using F20 will shift the window to the right and only show the remaining source code.

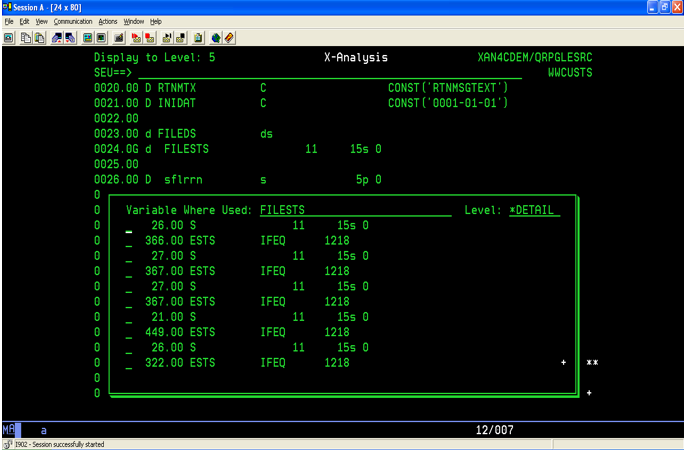


Fig. 2.1.18 – Screen showing the source code after using F20

**\*SUMMARY**

Enter \*SUMMARY next to “Level:” to see the summary display.

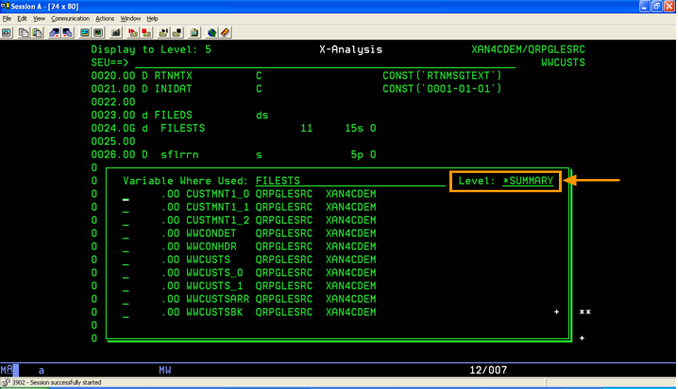


Fig. 2.1.19 – Data display in the \*SUMMARY mode

The data is summarized by source member. Thus, each source member with at least one reference to the item is displayed in the list.

Press “Z” to zoom into any source member reference. In the \*DETAIL mode, this will point directly to the line within the source member. In the \*SUMMARY mode, this will point to the beginning of the source member. (You can then scan for the item.) The Zoom function in both modes is explained below.

At the \*SUMMARY level, zoom in by entering “Z”. Press ENTER.

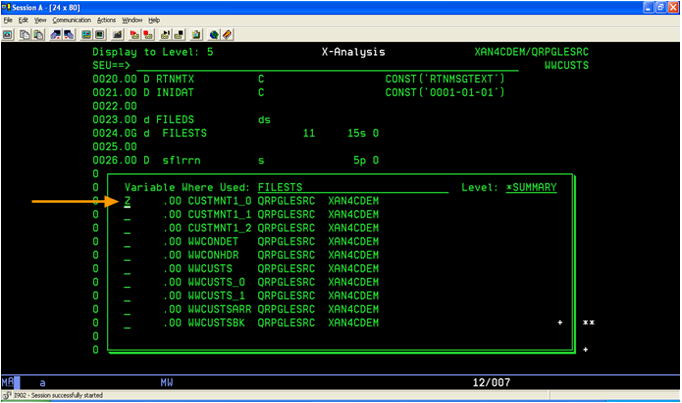


Fig. 2.1.20 – Z entered for Zoom action at the \*SUMMARY level

After “Z” is entered, the beginning of the source member will be displayed.

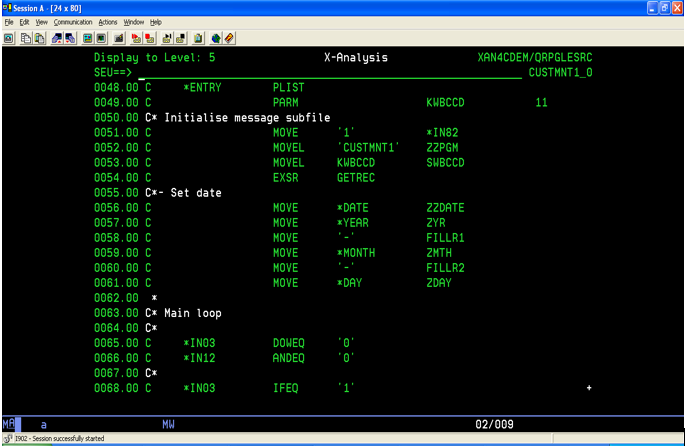


Fig. 2.1.21 – Zoomed screen for the selected source member

At the \*DETAIL level, zoom in by entering Z. Press ENTER.

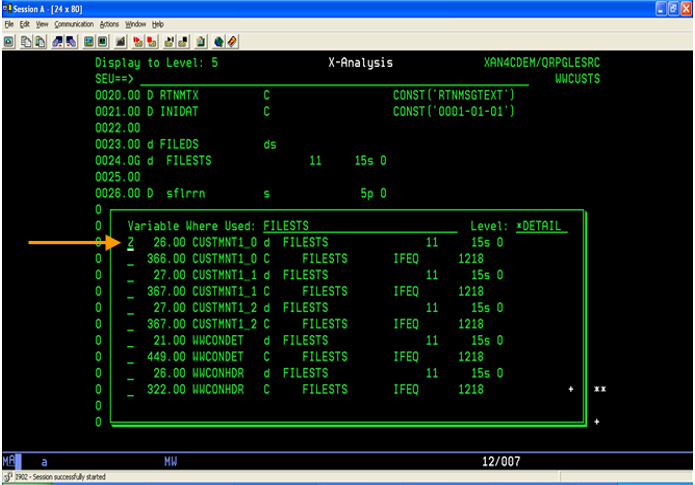


Fig. 2.1.22 – Z entered to zoom in at the \*DETAIL level

The line within the source member will be displayed.

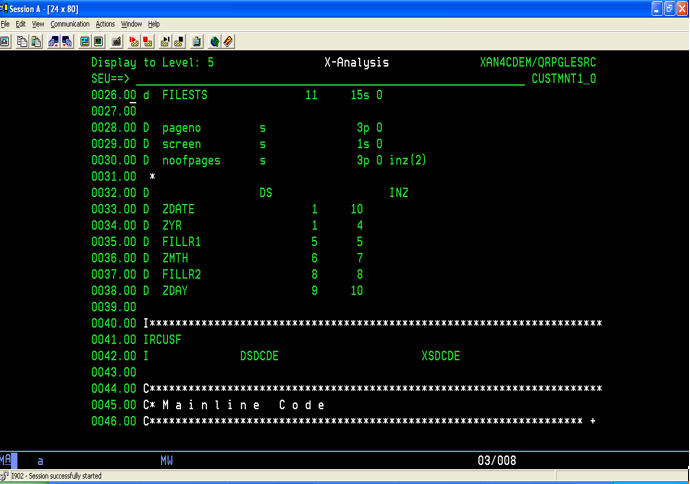


Fig. 2.1.23 – Zoomed screen for the selected source member

Variable Where Used window

The function allows the Where used references of an item to be displayed and is accessed by selecting the Source Browser and entering “W.”

This information can include references in the source member, associated device files, or source copybooks. Lines containing any reference from outside the source member will be prefixed as below:

* \* Reference in Source Copy Book
* D Reference in associated Device file (Display or Print file)

**Function keys**

Each display supports a set of function keys that allows a user to perform specific tasks.

|  |  |  |
| --- | --- | --- |
| **Function** | **Keys** | **Brief Description** |
| **F1** | **Help** | Press F1 to see information about this display. |
| **F3** | **Exit** | Press F3 to leave this display. |
| **F12** | **Cancel** | Press F12 to cancel the current display. |

**Variable**

Enter the name of the item that a user want to see.

**Select**

Enter a valid option - see below.

**Action Codes**

**Z = Zoom**

Use Z to display the details of the item. It takes the editor to the specification document that is named in parentheses.

Object Where Used window

The function allows the Object Where Used references for an item to be displayed. This information comes directly from the Object cross-reference database created or refreshed by the latest use of the XAXREF command, except when it is used for a record format in which case it will show all files using that format used by programs over which the XINDEX command has been run.

For Physical Files (PFs), all Logical Files (LFs) dependent on the PF will also be displayed, together with any programs referencing these logical files. However, any program will only be shown once – for the first file it references and will not be shown for any subsequent logical file it references.

The display supports a set of function keys that allows a user to perform specific tasks.

|  |  |  |
| --- | --- | --- |
| **Function** | **Keys** | **Brief Description** |
| **F1** | **Help** | Press F1 to see information about this display. |
| **F3** | **Exit** | Press F3 to leave this display. |
| **F12** | **Cancel** | Press F12 to cancel the current display. |

**Object**

The user must enter the name of the object to work with.

**Select**

Enter 1 or Z next to a Program or File to either browse the source member at the first point of usage, or (in the case of RPG programs) to give a list of all references to the object.

|  |  |
| --- | --- |
|  | These steps have been explained in the Action Codes section of this document. |

Structure Chart Diagram

The Structure Chart Diagram provides a graphical display of the program-to-program relationships through graphical, color-coded block diagrams. The Structure Chart is a nested tree diagram that shows the complete call hierarchy of the ‘programs called’ and contains all the relevant information as per control flow and call structure.

The Structure Chart Diagram is displayed by the Diagrammer. (See above for a full description of the functionality.)

It may be necessary to shift the window to see some levels of the diagram. Press F20 (window right) to do this.

All the standard Action Codes are available from this diagram. Enter the Action Code in column two or position the cursor over an object name and press ENTER for the drop-down menu to be displayed.

|  |  |
| --- | --- |
|  | The screens for Variable Where Used, Object Where Used, and Structure Chart Diagram have been already shown in the Action Codes section. |

Displaying and Printing Diagrams

The Diagrammer can be invoked directly that is, without first calling the Source Browser. Use the following commands:

Structure Charts (XSCD)

The command is entered as follows:

|  |
| --- |
| XSCD MEMBER(<member name>) OUTPUT(<output type>) |

<member name> Specify the name of the source member for which the diagram is required.

<output type> Choose either \* for display output or \*PRINT for printed output.

Data Flow Diagrams (XDFD)

The command is entered as follows:

|  |
| --- |
| XDFD MEMBER(<member name>) OUTPUT(<output type>) |

<member name> Specify the name of the source member for which the diagram is required.

<output type> Choose either \* for display output or \*PRINT for printed output.

These commands can be set up as PDM user options.

Both the above commands invoke the more generalized command, X@DSPDGM.

Display Diagram X@DSPDGM

This command can be used to display Structure Chart Diagrams, Data Flow Diagrams, Flow of Control Diagrams, and Data Model Diagrams. It allows the user more control over the parameters.

Help text is available against each parameter.

Change Diagram X@CHGDGM

This command allows a user to change the parameters for the diagrams generated (directly or indirectly) by the X@DSPDGM command. The following parameters are currently applicable:

**\*ALL**

Submit Print Requests (\*YES, \*NO)  
 Process Copybooks (\*YES, \*NO) – Currently actually only applies \*FLW diagrams.

**\*SCD**

Maximum level to display (a three-digit number e.g.: “009“)

**\*FLW**

\*FLW Type (\*PROGRAM, \*EXTERNL, \*SYSTEM)  
 \*FLW Detail Level (\*BASE, \*FNCTEXT, \*FILES, \*CL)  
 \*FLW \*EXTERNL Option (\*SOURCE, \*OBJECT)

**\*DFD**

None

**\*DMD**

None

Subsidiary Commands

The following commands are invoked by X@DSPDGM but can be called individually:

* Re-engineer Structure Chart Diagram X@RESCD
* Re-engineer Data Flow Diagram X@REDFD
* (Re-engineer Data Model Diagram X@REDMD)
* Re-engineer Function X@REFNC
* Re-engineer Overrides X@REOVR

These commands write data to the X-Analysis encyclopaedia. Thus, it is possible to build up a database of diagrams and function texts and CL overrides.

The user should take the DATA(\*CURRENT) option from the X@DSPDGM command to utilize current data.

Summary

The fully recursive nature of X-Analysis allows the user to repeat the requests for information at successively deeper levels in their application. The user can start at a top-level program and drill down to follow the path of control or data items within the application. This provides an invaluable tool for debugging programs or gaining familiarity with their applications.

It also remembers the path the users have taken and enables the user to step back and recommence the investigation from a higher level. Effectively, a user can traverse the entire application through these diagrams until they find the necessary point on which to focus their analysis.

Appendix – Troubleshooting

Initialization Report Log Generation

X-Analysis can generate a log for the initialization process. This is controlled by the data area, XGENJOBLOG, set to \*NO by default. To generate a log, set it to \*YES by running the following commands:

|  |
| --- |
| For a specific cross-reference: |
| CHGDTAARA DTAARA(<X-Ref Library>/XGENJOBLOG \*ALL) VALUE(\*YES) |
| For a specific X-Analysis version (applicable to all cross-references): |
| **CHGDTAARA DTAARA(<XADTAXXXXX>/XGENJOBLOG \*ALL) VALUE(\*YES)** |

Initialization Reports

When initializing an IBM i application for X-Analysis using XAXREF, the command also produces the log reports. The generated log reports are categorized as:

* Program Reference Exclusions
* Missing Object and Source

Program Reference Exclusions

These exclusions are specified in the XAOBJXXXXX/XPGREXCS file.

X-Analysis is shipped with the XPGREXCS file containing QRN\*, QLE\*, QC\*, QM\*, QS\* values. 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 the X-Analysis initialization process write mismatches to a log. 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 users to interpret the outcome of the XAXREF command run on an IBM i application.

Index

2E, 17, 22

5250 Emulator, 6

Action Diagram, 22

All references, 39, 45, 50

API, 23

block diagrams, 51

Business Rules, 21, 22

CASE Tool, 7

Client, 7, 23

Cross-Reference Libraries, 15

cross-reference library, 6, 11, 14, 17, 20, 21, 22, 28

Data Flow Diagram, 7, 22, 33, 34, 35, 42, 44, 52, 53

data library, 28

data model, 5, 19, 21, 22, 27, 28, 52

Device Files, 49

DFD, 44, 53

Diagrammer, 42, 43, 44, 52

Diagrams, 7, 22, 24, 42, 43, 44, 52, 53, 54

DMD, 53

entity relationship diagram, 27

Fields, 14

generic file, 25

Global Where Used, 35, 36, 44, 45

Hierarchy Exclusions, 24

IBM, 4, 5, 6, 7, 8, 9, 10, 11, 15, 19, 27, 30, 40, 56

IBM i, 5, 6, 7, 8, 9, 10, 11, 15, 27, 30, 56

Initialize, 22

Level, 9, 31, 48, 51, 53

LFs, 50

libraries, 15, 17, 20, 28

Libraries, 9, 30, 35, 45

Library List, 12, 13, 22, 30, 35

Member List, 22

metadata, 19

Object Library, 19

Object Where Used, 7, 24, 36, 37, 44, 50, 51

Overview Structure Chart, 25

parameters, 21, 42, 44, 52

Print, 9

Problem Analysis, 24

program logic, 28, 31

repository, 11, 19, 20, 21, 22

RPG, 28, 35, 39, 50

SCD, 25

Server, 6, 7, 23, 29

SOURCE, 5, 7, 17, 18, 19, 21, 22, 23, 24, 30, 31, 52, 56

Source Browser, 31, 42, 44, 49, 52

spool file, 9

Structure Chart Diagram, 22, 38, 39, 42, 51

subroutines, 24

Suite of products, 5

Synon, 19, 22, 28

Troubleshooting, 5, 55

user authorities, 28

Variable Where Used, 49, 51

X-Analysis, 4, 5, 6, 7, 8, 9, 10, 11, 13, 17, 20, 24, 27, 30, 31, 53, 55, 56

X-Analysis Client, 7, 23

XAPROD, 7, 12, 30

XREFMENU, 13

X-Rules, 22