

X-Resize

M a n a g e m e n t O v e r v i e w

Databorough ©
Producers of X-Analysis

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Overview

X-Analysis is a suite of modules which is now fully integrated with IBM's Rational product and also works under Eclipse 3.2 and above. Individual modules are grouped together to provide useful solution sets that meet a number of requirements around a central theme.

Databorough offers following modules of X-Analysis:

- X-Analysis (Core Module)
- X-Analysis Professional
- X-Resize
- Modelling Toolset
- Design Recovery Toolset
- Modernization Toolset

X-Resize is one of the modules in the internationally successful X-Analysis tool Suite. It is a project-based tool used to extend field sizes throughout a database and application. In addition to field size conversion, X-Resize can also be used to convert file fields to Unicode Compatibility.

Using reverse-engineering techniques, the essence of any System i software application is reverse engineered, and the output is stored in a structured data repository. This data repository is detailed down to variable level in each program, and includes a data model of the entire system.

The reverse engineering process has been developed over the last 12 years, and is both repeatable and totally automated. It is this that gives X-Analysis and all of its individual modules, such as 'X-Resize', such a productivity advantage.

X-Analysis at a Glance

The X-Analysis is Databorough's core tool set. It provides key functionality essential to clearly understand existing applications. Over twenty years of development has produced this powerful graphical tool enabling the user to browse an application from a high-level model right down to individual lines of code.

Cross-referencing, pseudo source code views, graphical program analysis, static project document wizards, variable level impact analysis, graphical flow/structure charts, MS Word/Visio wizards, data analysis and data Modelling, are just some of the features packed into this globally renowned toolset.

X-Analysis at a glance

The screenshot displays the X-Analysis interface with several components:

- Object List:** Shows a list of objects for library PF XAN4CDEM (ASTATUS) and CL XAN4CDEM (CBC110).
- Structure Chart:** Shows a hierarchy for OE001 - Order Entry, including sub-components like EDIFIL (LPO) and CUSLET - Customer Letter - Stage 1.
- Program Centered Data Flow Diagram:** A diagram for CUSPMAINT (Customer Site Maintenance) showing data flows between entities: DISTS (Distributors), CUSR3 (Sites by Number), CUSPMAINT (Customer Site Maintenance), CUSPSEL (Customer Site Selection), and DSPDISTS (Display Distributor). It also shows associated files like OTHCAL (LPO), OTHFIL (OTH), PRIFIL (LPO), LPOFIL (LPO), and OTHFIL (OTH).
- Code Editor:** Shows source code for sequence numbers 0042.00 through 0049.00. The code includes comments like '/* Mainline Code' and 'C* Retrieve record', and logic for handling records with fields like cntacskey, chain(e), rcntac, if, not, eval, *in, return, and endif.

X-Analysis provides analysts, developers, architects and operations teams with detailed analysis and interactive diagrammatic constructs that enable rich understanding of existing applications.

Instant & Detailed Impact Analysis

The impact of changing a single field in a single physical file can often extend throughout many different components of an entire system. Programs, logical files, displays, menus and even related data files can all potentially be affected by such a change. Variables that are used to hold values passed from fields that are to be changed are affected, and variables related to these variables are also affected. These factors make the task of identifying the impact of even an individual change tedious and labour intensive.

X-Resize simplifies this task greatly with a comprehensive series of reports and drill-down inquiries over the entire system, to indicate the affected programs, files,

displays, fields, variables etc. In addition, there are exception reports for instances where the conversion of the display files cannot be completed automatically because of overlapping or screen size restrictions. Another very useful and powerful report is where conversions will cause the field to require resizing, such as for currency conversions where the number in the field will increase.

X-Resize has sophisticated search criteria including aliases, exclusion words, and predefined sets. This makes the task of identifying and reporting the impact of changes accurate and efficient. Once identified, each field and file can be assessed in terms of where usage throughout the entire system. The full impact across the application is automatically discovered using the X-Analysis impact analysis capabilities – unmatched in power. All inferred references drilling down through programs and variable names, prefixes renames etc. are discovered by the tool.

Impact Analysis using X-Analysis

The screenshot displays the X-Analysis tool interface. The top window shows a 'Source List of CUSF in XAN4CEM/QDDSSRC, Lines: 69, View Level: 4'. A callout box points to the 'CUSNO' variable in the source list, stating: 'Automatically drills down through all variants and programs for all related variables'. Below this, the 'Variable Where Used' window is open for '*ALL/CUSNO, Lines: 141, View Level: 1'. A dropdown menu is visible, showing tracking levels: Level1 (selected), Level2, Level3, Lv4/Parameters, Lv5/Cascading Parameters, Lv6/Aliases, and Maximum Tracking.

Seq No	*...+... 1	...+... 2	...+... 3	...+... 4	...+... 5	...+... 6	...+...
0022.00	A		ADD3	34A		TEXT('Address 3')	
0023.00	A		ADD4	34A		TEXT('Address 4')	
0024.00	A		CNTRY			TEXT('Country')	
0025.00	A		PSCD			TEXT('Code')	
0026.00	A		CUSNO			TEXT('No.')	
0027.00	A					TEXT('No.')	
0028.00	A		CMMNT1			TEXT('Comment Line 1')	
0029.00	A		CMMNT2			TEXT('Comment Line 2')	
0030.00	A		CMMNT3	40A		TEXT('Comment Line 3')	
0031.00	A		DOCRCD	3A		TEXT('Docn.sent')	
0032.00	A					COLHDG('Doc.' 'Sent')	

Name	Seq No	*...+... 1	...+... 2	...+... 3	...+...
CLET	0004.00	DCL	VAR(&CUSNO)	TYPE(*DEC)	LEN(
CLET	0009.00	CHGVAR	&CUSNO	&CUSNO	
CLET	0010.00	CALL LETM1	(&CUSNO	&PREFIX	&LETSQ)
CLETM	0001.00	PGM	PARM(&CUSNO	&PREFIX	&LLETSQ)
CLETM	0003.00	DCL	VAR(&CUSNO)	TYPE(*DEC)	LEN(
CLETM	0010.00	CALL LETM1	(&CUSNO	&PREFIX	&LLETSQ)
CNTACS	0003.00	A	CUSNO	5P 0	TEXT('Cus. No.')
CNTACS	0021.00	A	K CUSNO		
CNTCMAINT	0097.00	C		eval	zcusno = cusno
CNTCMAINT	0116.00	C		eval	cusno = zcusno
CNTCMAINT	0243.00	C		eval	cusno = customer
CNTCMAINT	0257.00	C		kfld	cusno

Integrated Project Control

The product uses the concept of projects, where each project is defined by a unique description. All of the fields and variables that are to be resized or added to existing files are identified at this stage. This is achieved by two methods: firstly by using user-defined search criteria, and secondly by specifying the fields manually such as when adding a new field to a physical file. X-Resize then builds a list of all of the objects that are affected by the changes defined for the project. These lists are stored in a structured database and are used for tasks such as:

- Impact analysis reports and inquiries.
- Project Management with Databorough's X-Analysis Application Overview.

These lists can also be used to build an application area in Databorough's documentation and analysis tool, X-Analysis. There is an option to export the relevant associated object lists to third party change management software such as Aldon.

Each project is given a unique description

```
X-Resize          Work with X-Resize Projects          Databorough Ltd.
XRRWKPRJ                                               10:42:22
                                                    29 Jan 2009

Enter options, press Enter.
1=Initialise 2=Change 4=Delete 5=Display 6=Searches 7=Fields 8=Build Lists
9=Work with lists 10=Conversions 12=Print dev. problems 13=Print pgm problems

  Project      Status      X-A Lib      Project Description
  ___
  ASERXR1      Lists built  ASERXB       LOTID
  RFSUNITEST   Conversion  XAN4CDRF     Robins UNICODE Test
  RFSVERTEST   Conversion  XAN4CDRF     RFs test on current version

F1=Help  F3=Exit  F6=Add  F10=Cmd line  F12=Cancel  F24=More keys
```

User-defined search criteria

```
X-Resize          Work with X-Resize Searches          Databorough Ltd.
XRRWKSCH                                               10:46:30
                                                    29 Jan 2009

Enter options, press Enter.
1=Run search 2=Change 4=Delete 5=Display 6=Run search incl. aliases
7=Work with exclusions

  Search Word      + Option      Field Type, Length, Decs. DecChg
  ___
  G4TX             0 *ADD        Character          0
  NAME            0 *ADD        Character          0

F1=Help  F3=Exit  F6=Add  F10=Cmd line  F12=Cancel  F24=More keys
```

Fields changes can be added manually

```

X-Resize          Work with X-Resize Project Fields          Databorough Ltd.
XRRWKFLD                                     10:46:48
                                                29 Jan 2009

Position on: _____
Enter options, press Enter.
2=Change 4=Delete 5=Display 6=Field usage 7=File usage

  Field      File      Curr. Vals      New Vals Field text...
  ___ AACG      XFRF          1 0 0          0 0 0 JCPMST AUTO ADD-C/O ENTRY
  ___ AACM      XFRF          1 0 0          0 0 0 AUTO ASSIGN CUST# Y/N

F1=Help F3=Exit F6=Add F7=File/field sequence F24=More keys

```

Fully Automated Source Conversion

This stage assumes that all of the details specified in the analysis are correct. The source is copied away and relevant changes automatically implemented. These changes can be made by replacing existing lines of code with commented copies of the old lines included, or replaced and comments added to the line changed. Any instance where a field is moved into a program specific variable will result in automatic changes to the affected variables where necessary. The product will make the change where possible and report exceptions where fields could not be changed because of overlapping problems. The source that will be converted includes:

- Physical and logical files (this includes multi member files)
- Programs
- Display files
- Report DDS

Display File Changed with X-Resize

```

Columns . . . : 1 71          Browse          RFPROJ3CV/QDDSSRC
SEU=>>                                     OE003DF
FMT DP .....AAN01N02N03T.Name+++++RLen++TDpBLinPosFunctions+++++
***** Beginning of data *****
0001.00      A                                     CA03(03 'Exit')
0002.00      A                                     PRINT
0003.00      A*
0004.00      A* Subfile Record
0005.00      A          R OESFL                                     SFL
0006.00      XRSZEA* Changed by X-RESIZE
0007.00      XRSZEA*          PRPRNO          5Y 00 8 2
0008.00      XRSZEA          PRPRNO          7Y 00 8 2
0009.00      A                                     DSPATR(HI)
0010.00      A          PRDESC          30A 0 8 9
0011.00      A                                     DSPATR(HI)
0012.00      A          PRCOST          7Y 20 8 41EDTCDE(1)
0013.00      A                                     DSPATR(HI)
0014.00      A          PRSQTY          5Y 00 8 53EDTCDE(1)
0015.00      A                                     DSPATR(HI)
0016.00      A*

F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys

```

Program Changed with X-Resize

```
Columns . . . : 1 71          Browse          CUSNOXRT/QRPGSRC
SEU==>          PRJINZ1
FMT *          ..... *. 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
***** Beginning of data *****
0001.00          * INITIALISE A PROJECT:
0002.00          FPROJECT IF E          K          DISK
0003.00          FPRODFT IF E          K          DISK
0004.00          FPROTRK UF E          K          DISK          A
0005.00          DBI IAAJOBN          DS          6
0006.00          XRSZEI* Changed by X-RESIZE
0007.00          XRSZEI*          1          60AA1
0008.00          XRSZEI          1          80AA1
0009.00          C          *ENTRY          PLIST
0010.00          C          PARM          AAJOBN
0011.00          C          AA1          SETLLPROTRK          81
0012.00          *
0013.00          *IF NO CURRENT RECORDS THEN INITIALISE WITH DEFAULTS FROM PRODFT:
0014.00          C          *IN81          IFEQ *OFF
0015.00          C          AA1          CHAINPROJECT          82
0016.00          C          MOVE XWFMDT          XWPLDT

F3=Exit  F5=Refresh  F9=Retrieve  F10=Cursor  F11=Toggle  F12=Cancel
F16=Repeat find  F24=More keys
```

Bulk Recompile & Data Conversion

It is possible to recompile all affected objects into a new library from within a conversion project of X-Resize. This includes CL, RPG, ILE, PF, LF, and DSPF. It is also possible to export the relevant compilation requirements to third party change management software such as Aldon, Turnover etc.

The compilation can be done by one object type at a time i.e. files followed by displays, followed by programs etc. These can be fully tested without any impact on a production system. Alternatively, the entire recompile can be submitted as a single job from within X-Resize. The bulk recompile can be parameterised so as to ensure strict adherence to development standards.

Where data needs to be converted (as in a currency conversion), a conversion factor is specified and X-Resize uses this factor to automatically apply the conversion across all fields listed in the project.

Unicode Conversion

X-Resize can be used without field extension, to convert fields for Unicode Compatibility. Unicode conversion includes recompiling RPG programs. Only RPGLE programs can use Unicode fields. RPG III programs may also be used, but first they should be converted to the source of RPGLE and recompile them, before starting the X-Resize conversion project.

The Unicode Conversion process occurs in following two parts:

- Firstly the 'Convert Fields' option changes the attributes of the appropriate database fields to type 'G' with the correct CCSID for UCS-2 or UTF-16 compatibility (CCSID 13488 for UCS, CCSID 1200 for UTF).
- Secondly the 'Convert Programs' option changes the attributes of the appropriate device file fields to type 'G' with a hard coded length and a reference to a 'G'-type field. This gives correct results for system levels V5R3 or above.

Create New Project for Unicode Conversion

```

X-Resize                               Work with X-Resize Projects
XRRWKPRJ

Project Name . . . . . XAN4XRUC
Project Status . . . . .
X-Analysis Library . . . . . XAN4CDXA
Project Description . . . . . Demo Unicode Conversion

```

Display File Changed with X-Resize

```

                               Set Unicode Parameters (XSETUTF)

Type choices, press Enter.

Project library . . . . . > XAN4XRUC      Name
Unicode Conversion . . . . . > *ON         *ON, *OFF
Unicode encoding . . . . . > 'UCS-2'      UCS-2, UTF-16
Limit conversion to database . . > *YES     *YES, *NO

```

Highlights of X-Resize

- ✓ Automated field expansion conversions
- ✓ Decimal position conversions
- ✓ Integrated project control documentation with X-Analysis
- ✓ Totally automated source conversion for all object/source types
- ✓ Automated Bulk recompile
- ✓ Automated data conversions
- ✓ Exception reports for overlays and other problems
- ✓ Instant & Detailed impact analysis for all instances: Fields, variables, programs, displays, reports, including aliases
- ✓ X-Resize can be used to convert file fields for Unicode Compatibility

Summary

X-Resize automates the entire life cycle of implementing field expansion and field type changes in RPG systems. All instances of all related variables are discovered across an entire system, and these changes automatically made in all relevant places of programs, files, displays and databases. Detailed exception reporting is provided where automated changes are not possible because of problems such as display overlays or overflows, or even business logic corruption potential. There are documented cases of saving companies hundreds of man days in such projects. X-Resize can be used without field extension, to convert fields to Unicode Compatibility.

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