

Application Modelling with X-Analysis

Version 9

Overview

*A guide to the benefits of using
X-Analysis Modelling Toolset*



Application Modelling with X-Analysis

Preface

Developing tools and services for analyzing and reengineering applications for the last 20 years, has given Databorough a unique view of the very large and complex world of legacy applications running on System i. This management overview document focus on the Modernization practices (RPG/COBOL/2E) for System i applications using X-Analysis 8. It discuss new concepts and methods for design recovery and rebuilding of monolithic RPG/COBOL/2E applications into modern application architectures.

Contact info@databorough.com for a copy of the trial software.



Table of Contents

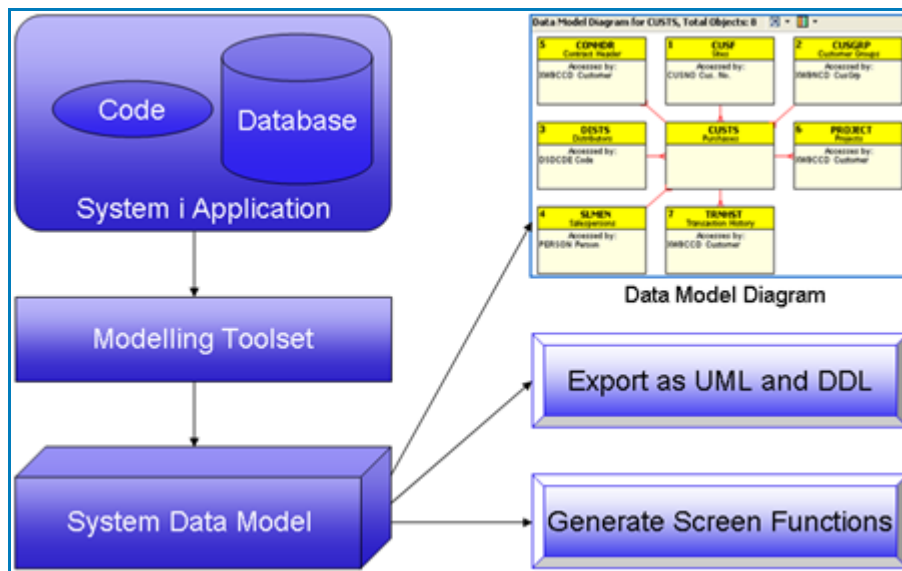
Introducing Modelling Toolset	1
Analysis, Documentation & Application Subdivision	2
Understanding Design & Function More Easily	2
Producing Static Documentation Automatically	5
Application Subdivision	5
Recovering the Data Model	7
Deriving the Legacy Data Model.....	7
Automated Generation of Data Model	8
Analysis of Data Dictionary	8
View Data Dictionary.....	9
Entity Relationship Data Model Diagrams	9
File Centered Data Model Diagram	10
Browsing Application data.....	11
Highlights of Modelling Toolset	13
Summary	14



Introducing Modelling Toolset

Whatever the business needs driving companies to redevelop or modify their applications, most want to ensure that the business logic and functional design are preserved to varying degrees as these are core assets.

The Modelling Toolset, which extends X-Analysis Professional ensures that the functional design of an application is preserved. It is unique in that it automatically derives an explicit physical & logical 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 then verified by performing an integrity check to ensure that all data from the dependant file does indeed validly reference data records from the owning file.



A complete data model accurately describing all possible relationships between each file is essential for productive maintenance and development work. Such a model also provides the foundation upon which critical data administration tasks such as referential integrity testing, and test data extraction can be automated.

The Modelling Toolset can be broken down into a few logical steps or stages that represent a generic adaptable approach to any application modification or redevelopment project:

- Application Analysis
- Application Subdivision
- Application Documentation
- Recovering Data Model



Analysis, Documentation & Application Subdivision

X-Analysis builds a detailed repository over an entire application. The repository maintains all information about application objects, their relationships and all necessary information to obtain detailed information from each object across the entire system. 20 years of ongoing development, over thousands of System i applications written in all variants of RPGII/400/IV, COBOL, 2E and CL, has produced an unmatched capability to extract everything about an application from object right down to individual variables. The repository is built automatically using a single command, and initially collects all object related information, but then parses every source member in the specified system and every source line mapping the contextual information of each variable in the system. A certain amount of logical abstraction processing then takes place while building the repository to account for some of the idiosyncrasies typical in an RPG application. This includes constructs such as variable program calls, file overrides, prefixing and renaming in RPG. The repository thus represents a map of how the entire application functions right down to individual variables.

Understanding Design & Function More Easily

For efficient familiarization of an application's structure and general function, an abstraction above the source code combined with object-to-object relational information is required. A few simple but rich types of color-coded, graphical diagrams can reveal the data flow and architecture of individual objects or parts of an entire system. This is combined with automatically derived descriptions in the form of Pseudo narratives either in the diagrams or while browsing source code.

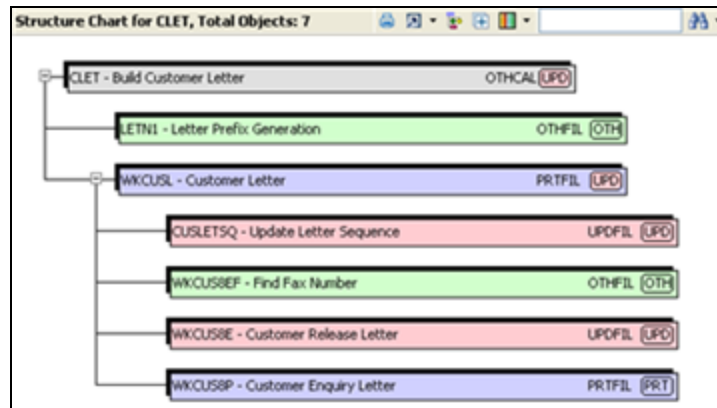
Here is a brief description of some of these diagrammatic constructs and views:

Structure Chart Diagram

A Structure Chart Diagram (SCD) Display gives a graphic representation of how the control passes from one program to another program within the application. This follows the call structure down the complete stack. The diagram also reveals data input objects and also automatically derives a summarized description of each of the object in the diagram. Color-coding also reveals important functional aspects such as updates, prints, and displays, which help the user to zone in on commonly, sought after details.

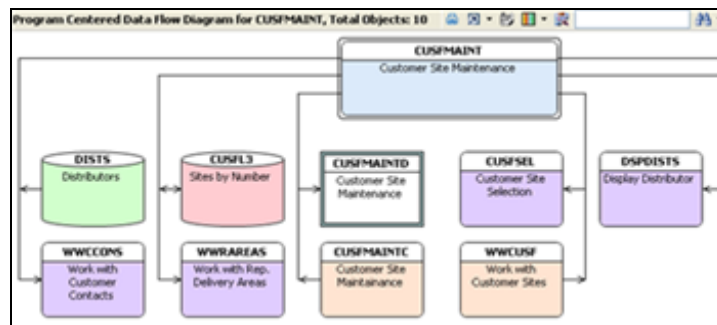


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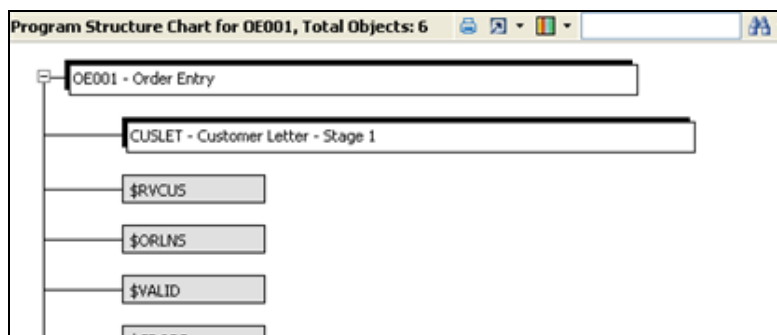
Data Flow Diagram

A Data Flow Diagram (DFD) is a graphical representation of a program/object where used, showing the files and programs accessed by the subject object. It is also color-coded and shows both flow of data at a high object level, and contextual information about the specific variables / parameters passed between objects.



Program Structure Chart

A Program Structure Chart graphically displays the sequence of calls in the program. The call could be to execute a Subroutine / Program / Module / Service Program.

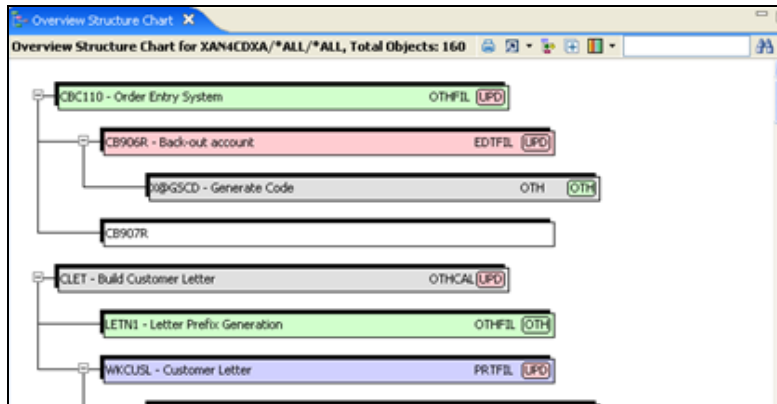




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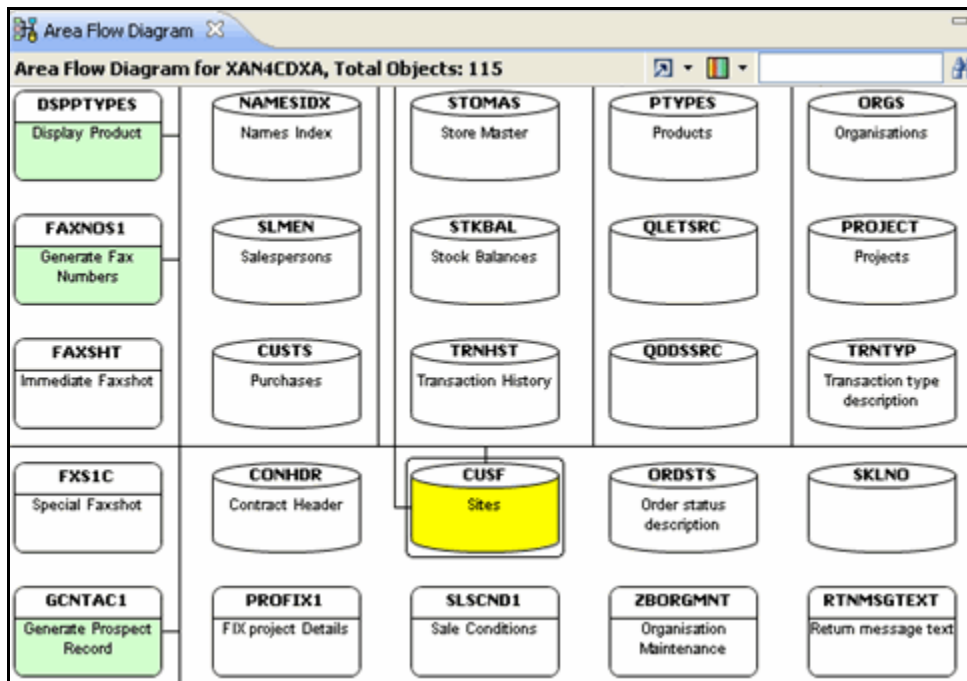
Overview Structure Chart

The Overview Structure Chart gives a snapshot of an application. It displays all the entry points to the application, and then the structure chart for each of these entry points.



Area Flow Diagram

Area Flow Diagram displays all the programs and the files for the selected Cross-Reference library / Application Area, highlighting the most referred to file by default. This is a fully interactive diagram and by clicking on a file or program the other files and programs it interacts with are highlighted.

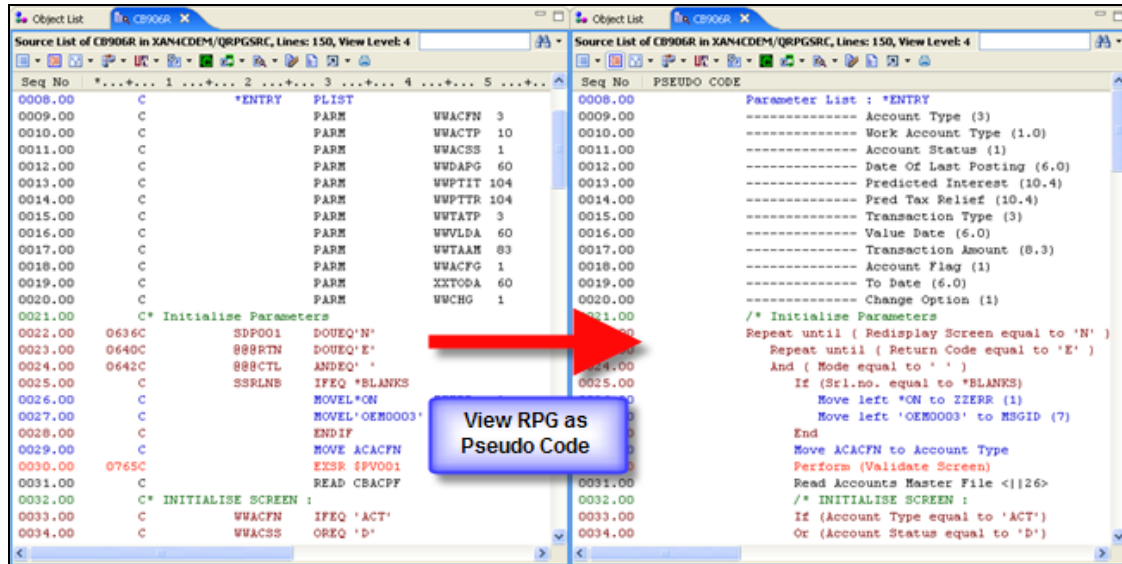


RPG as Pseudo Code



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With a single click, RPG can be viewed as a form of structured English or Pseudo code. Mnemonics' are substituted with file/field/variable texts and constants or literals.



Producing Static Documentation Automatically

Interactive analysis via a graphical client is generally the most intuitive manner in which to analyze a system, but there is often a requirement for various types of static information in the form of structured documentation. Examples of this are project documentation, auditing information, testing instructions, and customer support documentation (such as with ISV supplied business software). X-Analysis produces a number of these outputs including:

Data Flow Chart in MS Visio – Any interactive diagram produced by X-Analysis 8 in the client, can be automatically exported to MS Visio

Lists and Results sets – Any source, object, or impact-analysis result list can be directly exported to formatted MS Excel or Word from the client.

MS Word Project Documentation Wizard – With the use of a simple wizard, documents that might take weeks to produce manually, allow the user to select any of the graphical diagrams, lists, flowcharts, annotation and business rules summaries generated interactively by the client interface, can be collated into a single document with contents and index. This can be done for a single object, an application area (explained below), a list of objects, or an entire system. Any of these documents can then be edited and distributed as required.

Application Subdivision

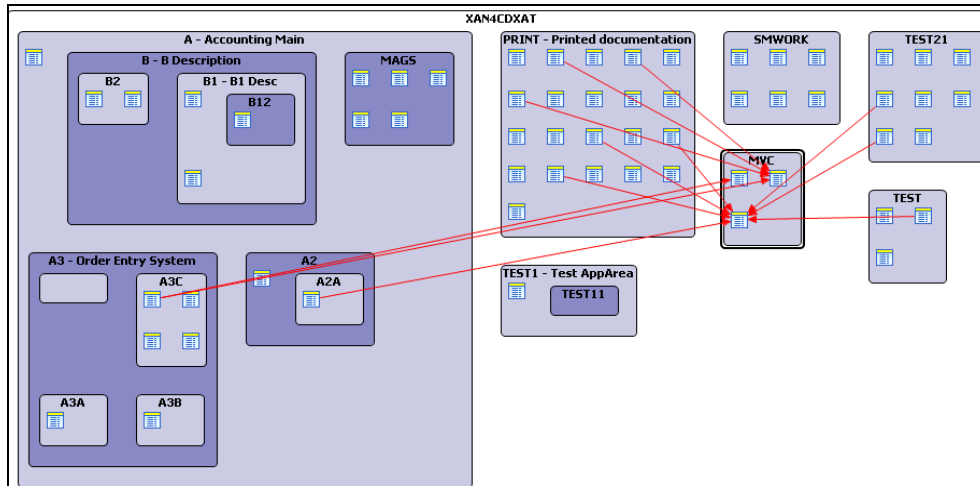
Entire legacy applications are often too large to effectively comprehend or effect wholesale change. For this reason it is often necessary or helpful to sub divide a system into application areas. X-Analysis provides facilities for subdividing an application area into groups of objects that



Application Modelling with X-Analysis

meet user defined selection criteria. Application areas filters can then be used through the X-Analysis Solution Sets to view, document or re-engineer as opposed to individual objects.

Application Overview – The Application Area Diagram displays an overview for the application. It is an interactive diagram and by clicking on different parts of the system you can see the relationships between either all parts or just the area you've clicked on and the areas it relates to.





Recovering the Data Model

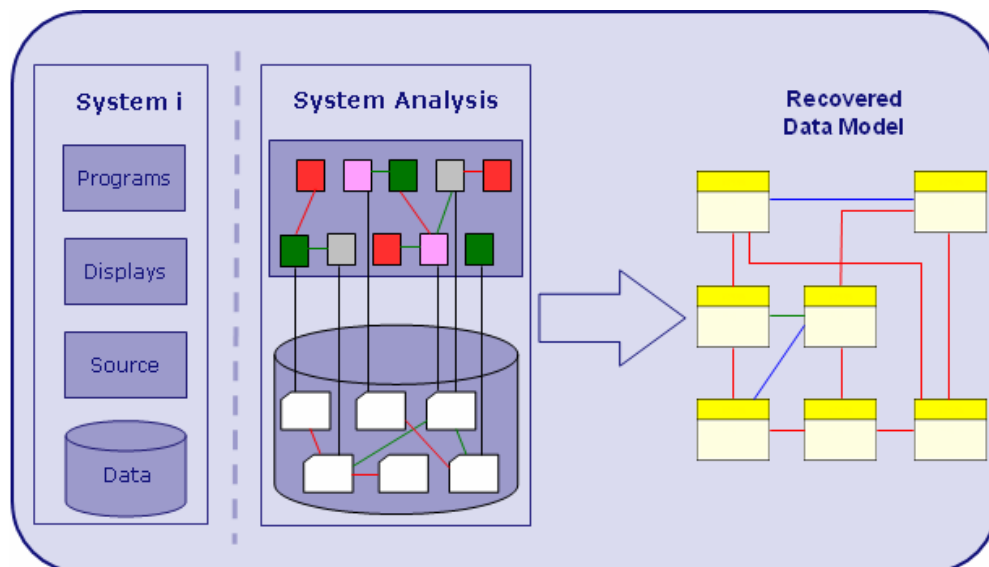
The relational model of an enterprise application is an extremely powerful piece of information and potentially valuable asset to the organization. For almost all RPG or COBOL applications running on System i, there is no explicit data model or schema defined. By the term model, we are referring to the foreign key or relational model, not just the physical model of the database.

Deriving the Legacy Data Model

X-Analysis accomplishes this by analyzing the data structures of the physical and logical files, but it then programmatically traces these through all programs that use them to verify the existence of any cross-file relationships or foreign keys. These derived relationships can also be verified by the product by performing an integrity check on the actual data. This ensures that the data of the dependent file makes a reference, to data records from the owning file. In this way, the automated reverse engineering can fully extract the data model from even the most complex legacy system.

The relational model or architecture of the database can be reused in a number of scenarios including:

- Understanding application architecture
- Data quality analysis – referential integrity testing
- Automated test data extraction, scrambling and aging
- Building BI applications or Data warehouses



X-Analysis has the unique capability of automatically deriving the explicit system data model from a legacy RPG, COBOL or 2E application. Let us have a look at this and the model reuse capability in a bit more detail.



Application Modelling with X-Analysis

Automated Generation of Data Model

The Modelling toolset extracts information about the logic and structure of legacy System i applications, and builds a reliable data-model from the data itself, augmented by the application logic and override files. The data-model thus generated is used for:

Visualisation

Data-model can be viewed and analysed in X-Analysis

Export to other CASE Tools

The Data Model can be exported to DDL and other CASE tools such as COOL:Biz.

Generating Screen Functions

The generation of Screen Functions is incorporated into the XDMODEL command.

Databorough's data model describes an application database in terms of its structure and how the database is used by an application.



Analysis of Data Dictionary

The Modelling Toolset 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 in one of the repository files - for instance field and column names, field size and field type. Thus record metadata is readily available for use by other applications.

Apart from extracting the metadata when building the data model, Modelling Toolset also does the following:

Determine the format of the date in non-timestamp fields

Modelling Toolset examines each field for date information. Indications of date information are the field name and the associated text with the field. This is re-enforced by examining the data to see if it contains date information and the format in which the date is stored, whether the date held is in year, month, day order or month, day, year order and the number of digits used. This information is stored with the metadata.

Discover a field that will act as a descriptor for the record

A descriptor sums up the information on a record. This information is used when building the screen functions. Modelling Toolset can automatically determine which field is the most likely contender, using the field name, field type, field length and the associated text as clues.



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Reverse engineer column and field sequence from application screens

This feature is available if the X-Analysis repository has been built. The fields and columns used in the screen displays are ranked in order of appearance and position in the screen displays. Those, which appear more often, are given higher ranking than fields, which are seldom used if at all.

View Data Dictionary

The Data Model once created by Modelling Toolset, may be browsed using X-Analysis All physical files for the selected application would be listed along with their structure details. The various File Field Details, Access Paths, File Relationships and Overrides information may be extracted.

Data View for XKEYMAP				
File Name	LF Name	S/O	U/K	Key Fields
ASTATUS	ASTATUS			STATUS
CNTACS	CNTACS			CUSNO PRPCDE
CNTACS	CNTLF1	N		SINIT USERNM
CNTACS	CNTLF2	N		USERNM
CNTACS	CNTLF3	N		STATUS CUSNO
CNTACS	CNTLF4	N	Y	PRPCDE STATUS CUSNO
CNTCMAINPF	CNTCMAINPF			XREVKY01
CONDET	CONDET		Y	XWORDN XWABCD
CONDET	CONDETL1	N		XWAACS XWORDN XWABCD
CONDET	CONDETL2	N		XWABCD XWAACS XWORDN
CONDET	CONDETL3	N		XWABCD XWORDN
CONHDR	CONHDR		Y	XWORDN
CONHDR	CONHDRL1	N		XWBCCD XWORDN
CONHDR	CONHDRL1A	N		XWBCCD XWCREF
CONHDR	CONHDRL2	N		PERSON XWORDN
CONHDR	CONHDRL3	N		XWBCCD XWDLDT
CONHDR	CONHDRL4	N		XWBCCD XWDLDT PERSON
CONHDR	CONHDRL5	N		XWDLDT
CON001PF	CON001PF			XREVKY01
CUSE	CUSELA	N		PRPCDE CNAME

Entity Relationship Data Model Diagrams

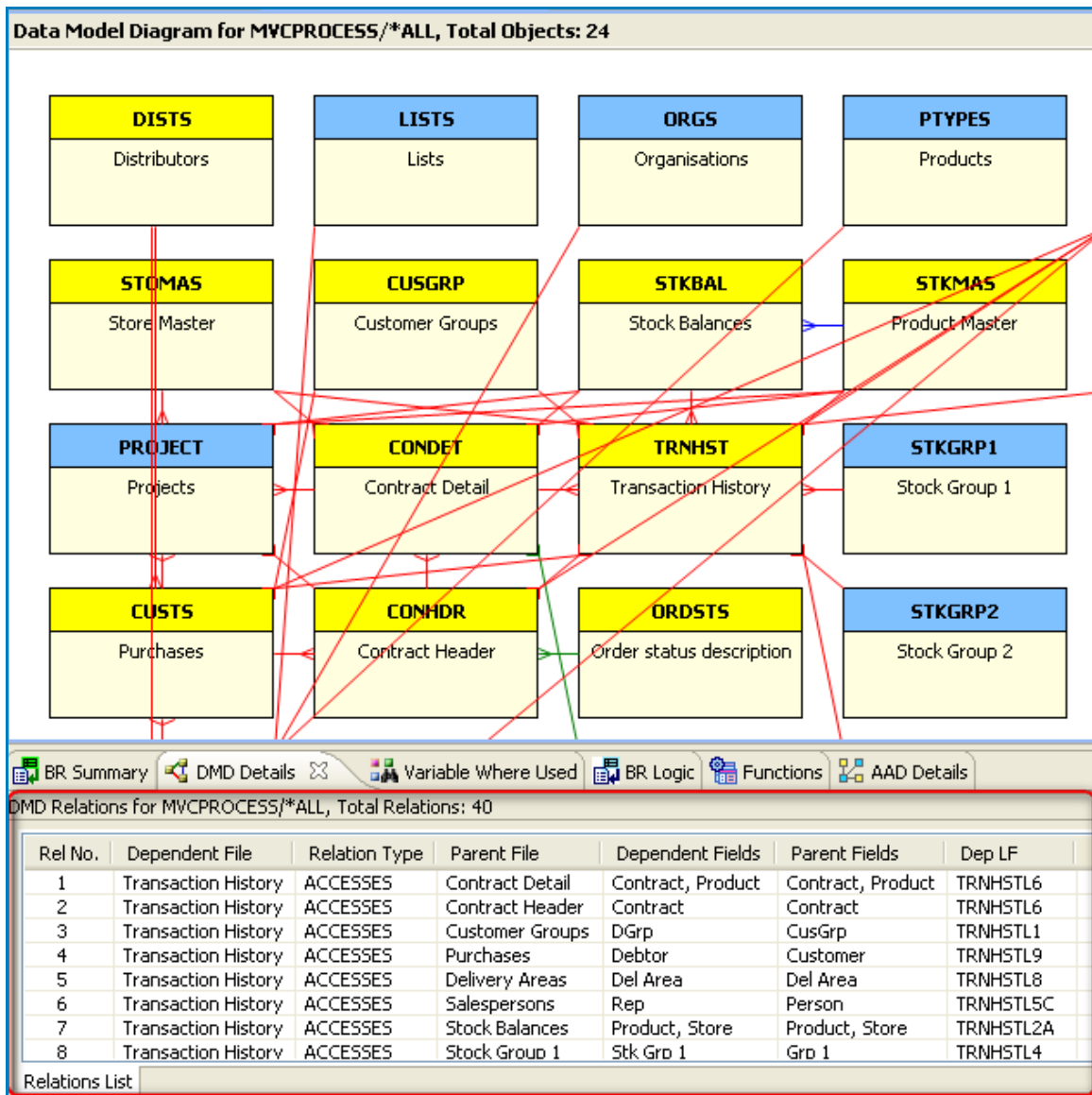
This is the heart of the data modelling process, and is done when all the primary identifiers have been found and the data dictionary has been built.

Data Model Diagram displays the file relationships for an application/application area. The related members are displayed distinctly in yellow, while the external objects are displayed in blue.

The diagram also details the relations as encircled in red below.



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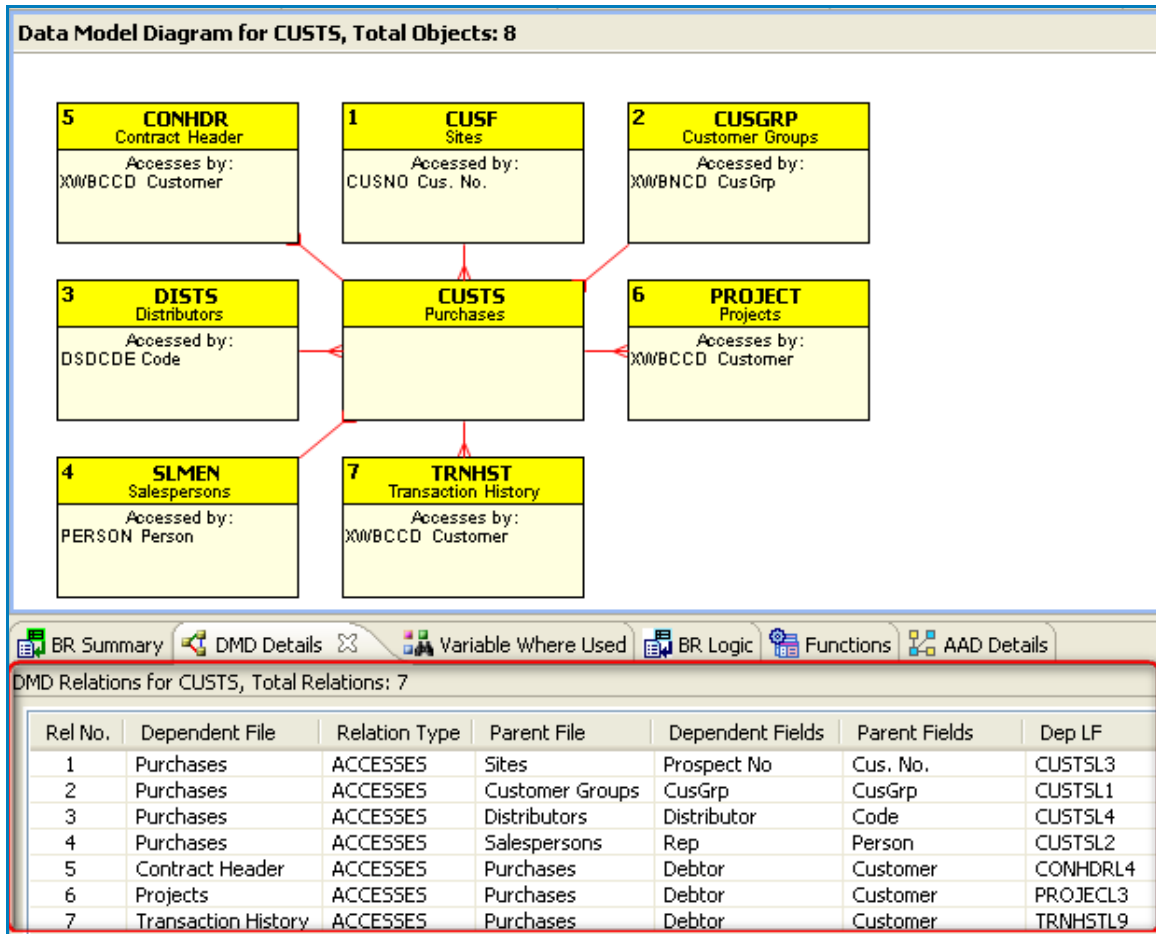


File Centered Data Model Diagram

The user can also easily produce a file centered Data model diagram.



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Browsing Application data

Browsing Application data is yet another important feature of the Modelling toolset. The user can opt to View Data for a file on the Data model diagram.

Data View for DISTS

Code	Description
	UK only
AU	Australia
BL	Belgium
DF	Daborough France
DS	Daborough Spain
DT	Daborough Tech
GE	Germany
IC	Iceland
IR	Ireland



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The user can also opt to view record of interest, which gets shown with its dependents below it.

Data View for DIST5

Code

Description

Sites Purchases

Company	Sts	Last Cnt Date	Next Cnt Date
A1		14-05-03	25-10-03
Beta Company Limited	8	08-04-03	06-10-03
Bock & Co. Ltd	8	08-04-03	06-10-03
Cable Installations Ltd.	7	02-11-03	25-11-03
Carmel Automotive Ltd.	2	08-05-03	13-10-03
Computer Products Ltd	8	08-04-03	06-10-03
Consumer Products Ltd	0	14-05-03	25-10-03
Culver plc	5	14-05-03	25-10-03
Driver Drawdowns plc	9	08-09-03	13-10-03
Express International plc	9	08-09-03	13-10-03
First Chemicals Ltd	3	14-05-03	25-10-03
First Trading Ltd	3	14-05-03	25-10-03
Garth Trading	0	14-05-03	25-10-03



Highlights of Modelling Toolset

- ✓ Fully automated and integrated documentation with X-Analysis
- ✓ Verifies relationships using actual program code and data
- ✓ Works without source code if necessary
- ✓ Makes accurate data modelling for even the largest systems possible
- ✓ Fully exportable to DDL and other popular modelling tools
- ✓ Produces a data encyclopedia for entire system including field usages

The Modelling toolset process interrogates the host application and database and outputs the Data Model files which describe the internal structure and composition of the system. This information is then converted into a format more suitable for rapid application access.

This data model information accurately describes all possible relationships between each file and is essential for productive maintenance and development work. Such a model also provides the foundation upon which critical data administration tasks can be automated.



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Summary

Comprehensive, accurate, and current documentation of a legacy application improves quality, productivity and reduces risk, for any maintenance, modernization or rebuild IT project. The risk associated with maintaining large complex legacy application, with a rapidly diminishing set of legacy skills, can be largely mitigated by access to such documentation.

Understanding and mapping the relevance of existing designs, and quantifying the scope and metrics of an application provides a solid foundation for either ongoing maintenance projects or modernization efforts. Legacy design constructs can be used passively in the form of information they represent, and programmatically to radically accelerate application rebuilds; a requirement for achieving true long-term application modernization. A combination of both allows optimum use of internal and external resources and existing design assets.

The X-Analysis Modelling Toolset delivers against all of these concepts. Twenty years of development effort, ensures that virtually any legacy application can be automatically reverse engineered onto a high-level design.