

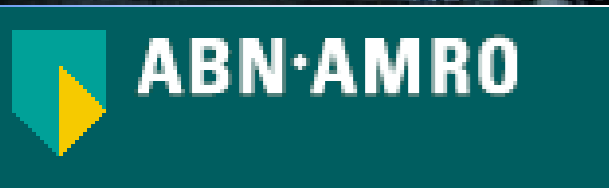
A Large NetRexx Application

René Vincent Jansen, I-Bizz IT Services and Consultancy BV



Böblingen, May 6th 2004, 08.15 h.

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I-BIZZ IT Services
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Goals



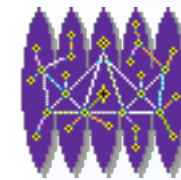
- Give an account of the design and implementation of a fairly large Object Oriented, Multi-User Client Server Application
- Show specific advantages
- Present practical experiences in combining NetRexx with generated Gui-builder code
- Show pitfalls and solutions

Non-Goal

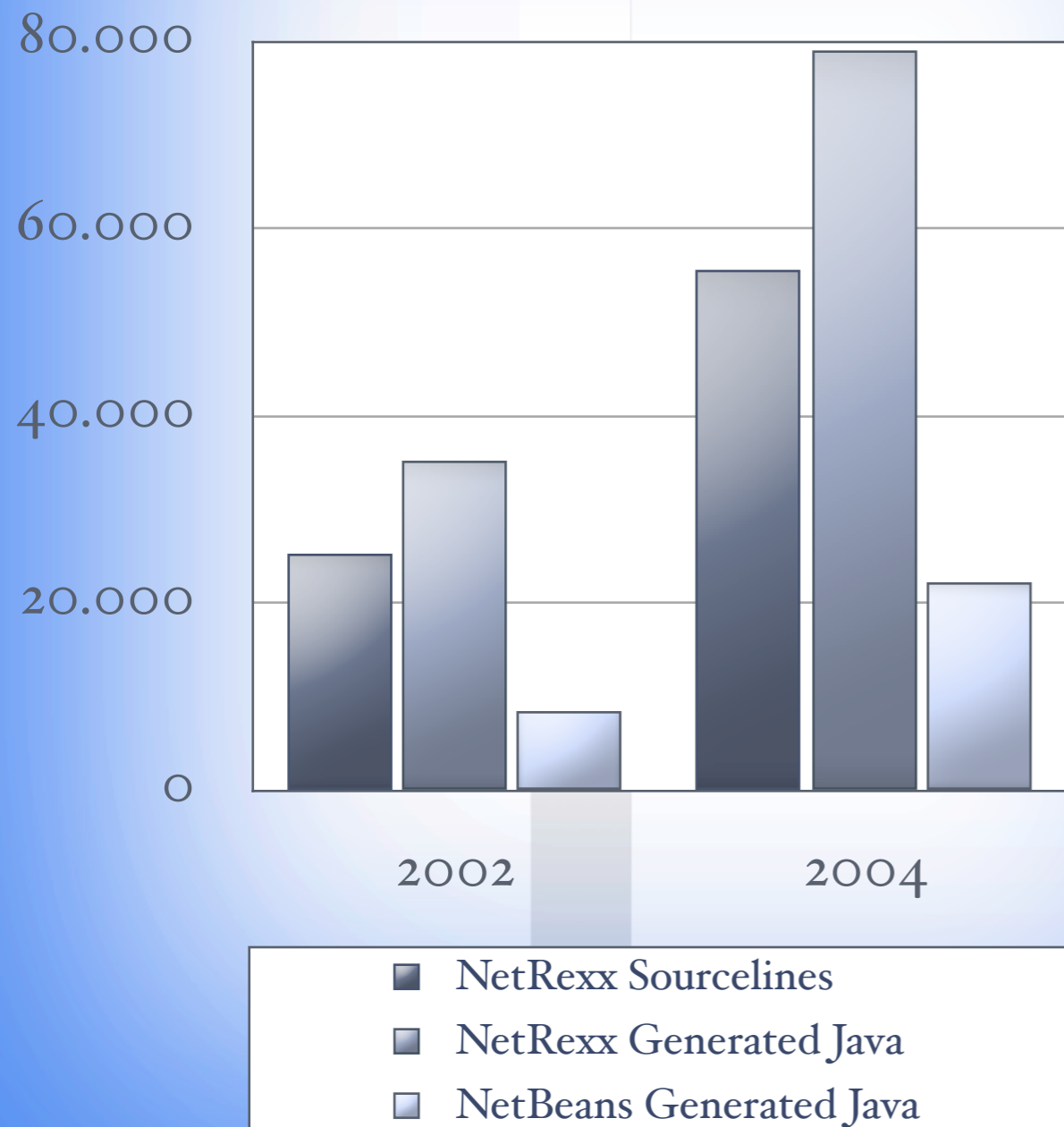
- Preach to the converted



THE **NETREXX** LANGUAGE










How large is Large?

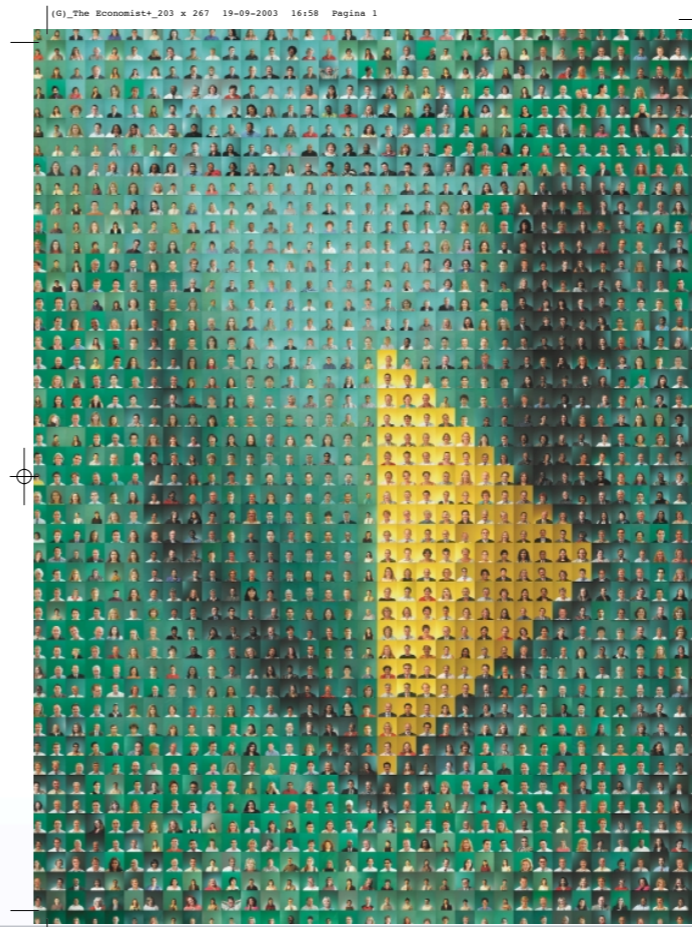
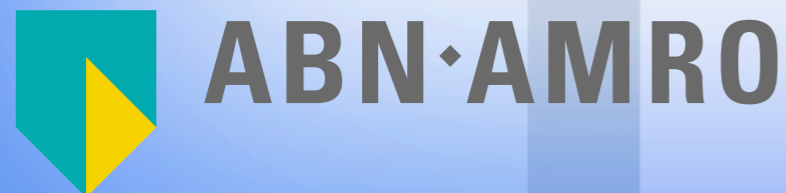


- 52 Dialogs
- 232.427 Records in data base
- 18.834 Object Instances
- 376 NetRexx Classes
- 53 Java - Only Classes

About ABN AMRO

- ABN AMRO is a prominent international bank, its origins going back to 1824. ABN AMRO ranks 11th in Europe and 23rd in the world based on tier 1 capital, with over 3,000 branches in more than 60 countries, a staff of over 110,000 full-time equivalents and total assets of EUR 560.4 billion (as of 31 December 2003).

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-  **Alfred Berg**
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From today several leading banks, well known in their own markets, will look a little different. They are adding our green and yellow shield to their names. We're proud they will now be clearly recognised as part of one of the world's leading banking groups, with origins going back 180 years. It's a visible sign of the increasing collaboration between over 100,000 talented colleagues in more than 60 countries. Sharing knowledge and expertise. Sharing the same vision and values. Together, serving 15 million clients. United by mutual beliefs. Uniting under one shield.

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We wish to thank our colleagues on location in Amsterdam, Chicago, Detroit, London, São Paulo and Singapore who volunteered to appear in this advertisement.
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About I-Bizz



IT Services & Consultancy



- I-Bizz IT Services and Consultancy is a privately owned limited company that operates since 1998 and is legally based in Amsterdam, The Netherlands. It has one Full Time Employee. It offers a portfolio of services that ranges from architectural consultancy to technical project management. Its current specialization is in Knowledge Management and Management Information Systems.



Requirements

Business Issue

Deliverables

Package Selection



The Business Issue

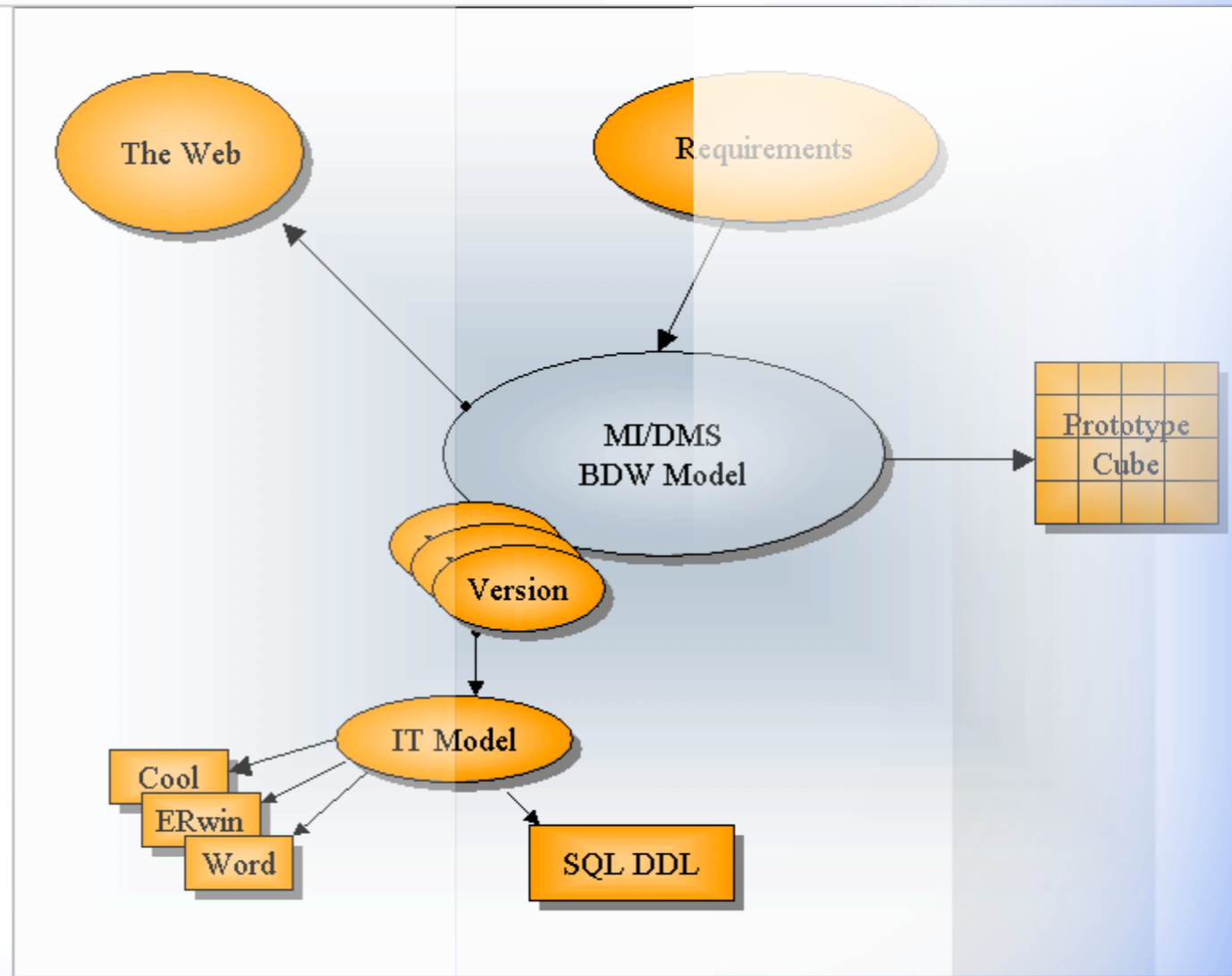
- ABN AMRO CFO decision too much was spent decentrally designing MIS Applications - “Data Warehouse Models.”
- A centralized, Head Office department was tasked with developing and scoping an Enterprise Wide MIS Model
- The IBM BDWM was taken as a basis for the AAB MIS Model

Customers

- Our customers are ABN AMRO Business Units that need a data model for MIS Purposes
- We only do word-of-mouth advertising
- We are now 17 people strong but had to turn down some customers
- We only charge late implementations

Deliverables

- The main objective of a logical data model is to serve as a IT / business communication bridge
- It is delivered in various forms, as a structured MS Word Document and in forms suitable for different data modelling tools like Cool:biz, and ERwin
- A Prototype *Cube* proves validity of the model



Logical Data Model

The logical model is always based on a requirements model. In this, e.g. the need for keeping history on an attribute/relationship level is specified.

Software Selection (August 2000)

- No package fit all requirements
- These are, amongst others
 - Multi User
 - Multi Project
 - Platform Independence
 - Integrated Versioning
- **Decision to build; team of 2**

Design

Meta Model

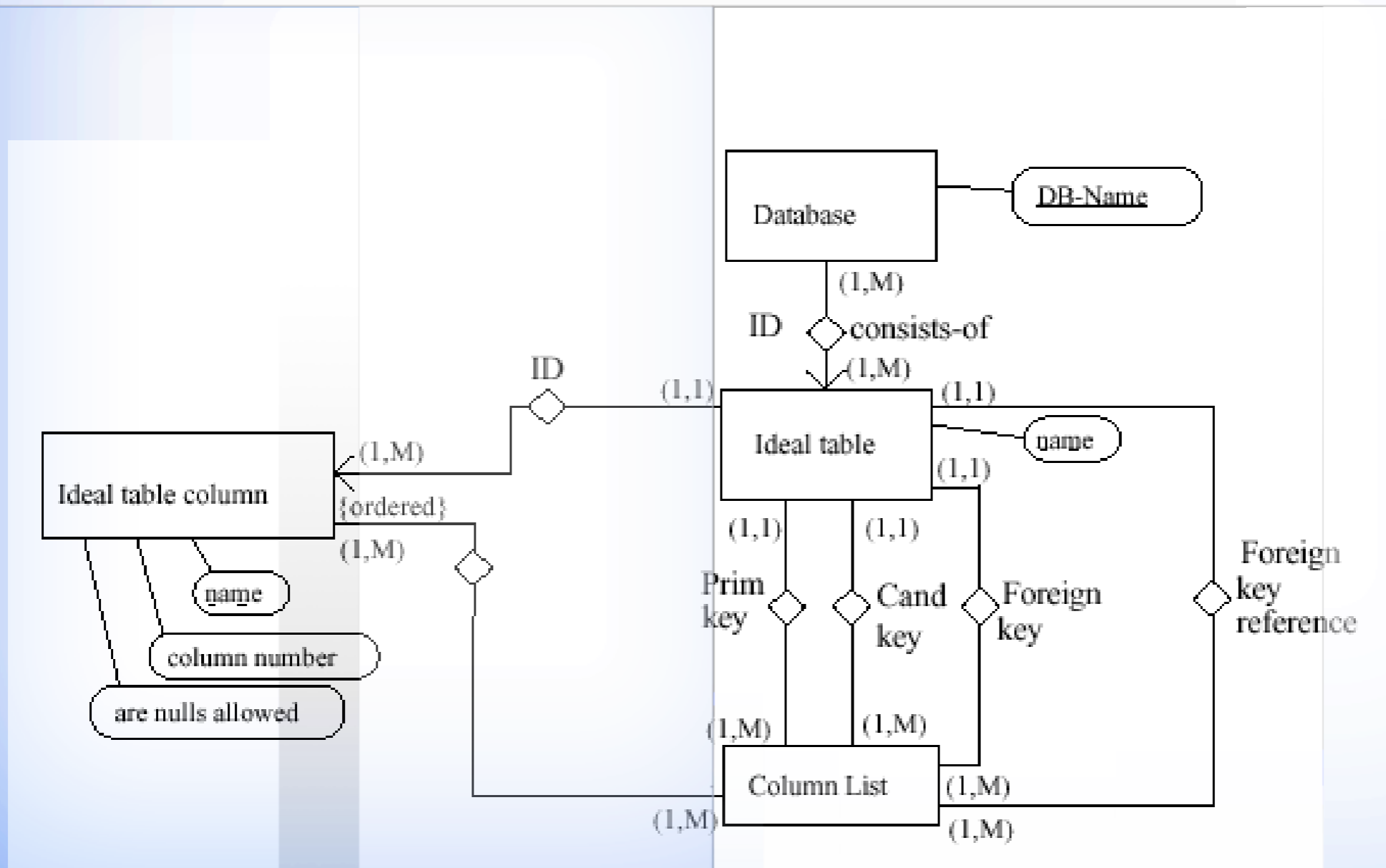
UML

*Versioning &
History*

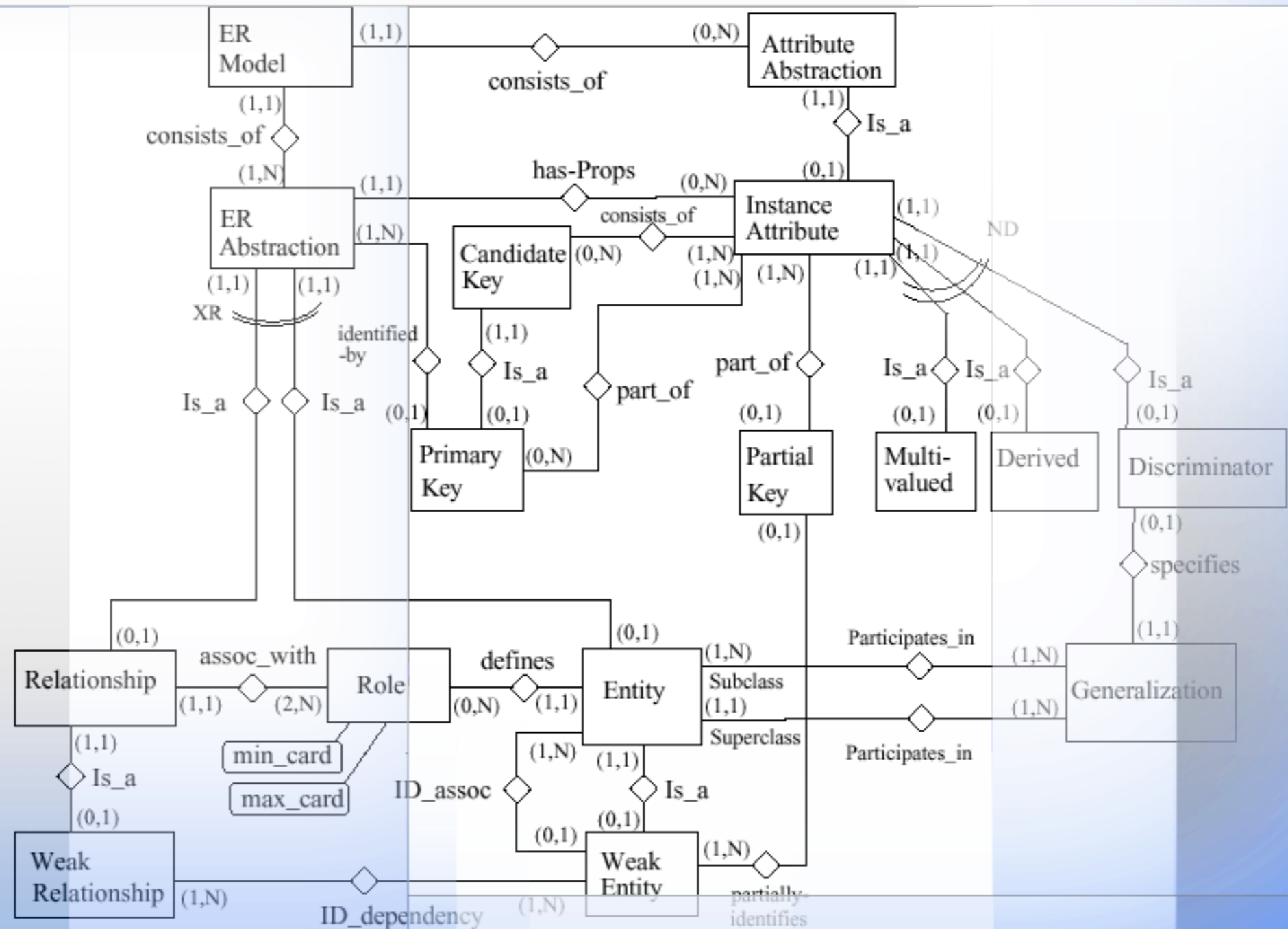
*Relational &
Object Tech*

*Persistence
Engine*

Relational Meta Model

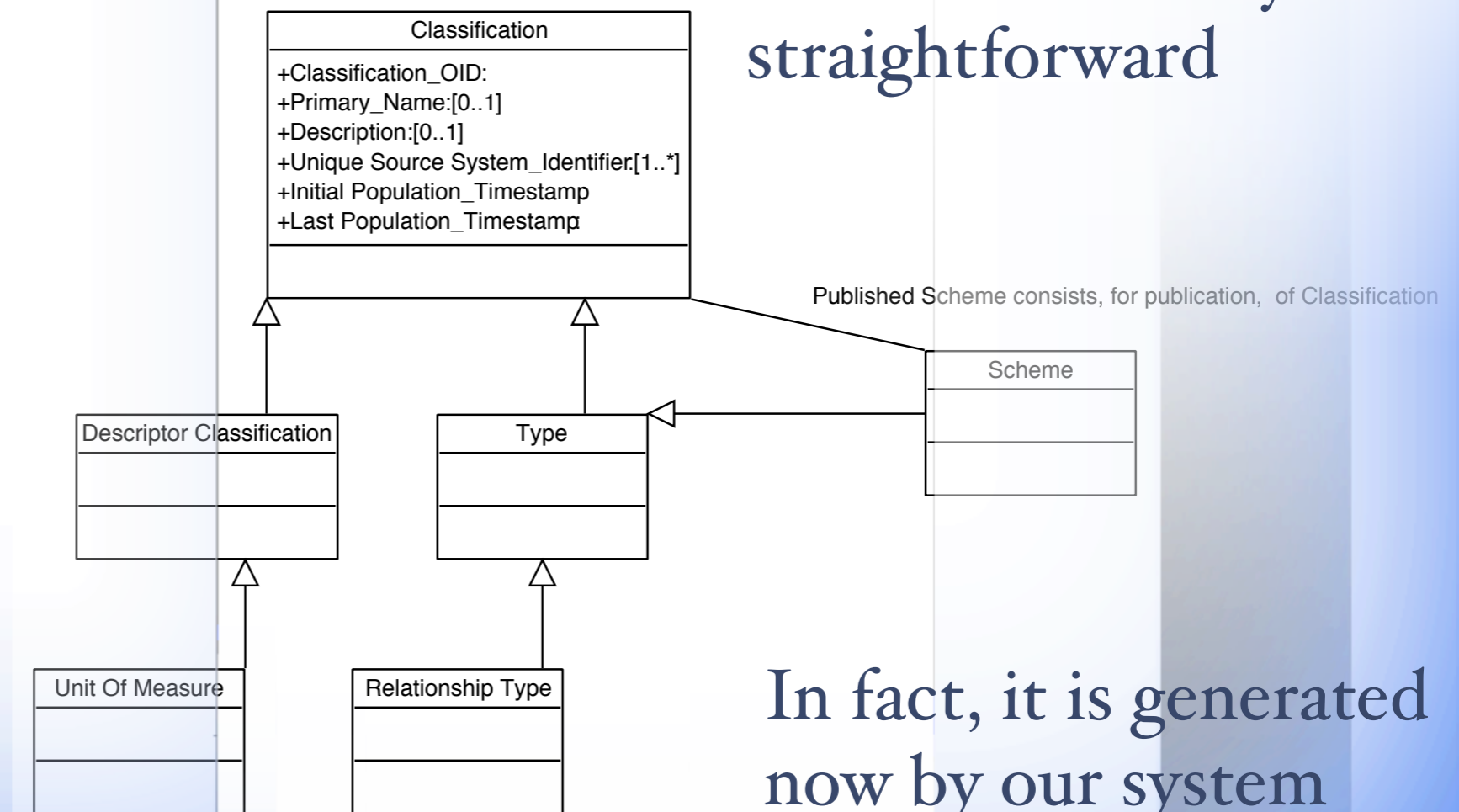


Extended ER Meta Model



Design using UML

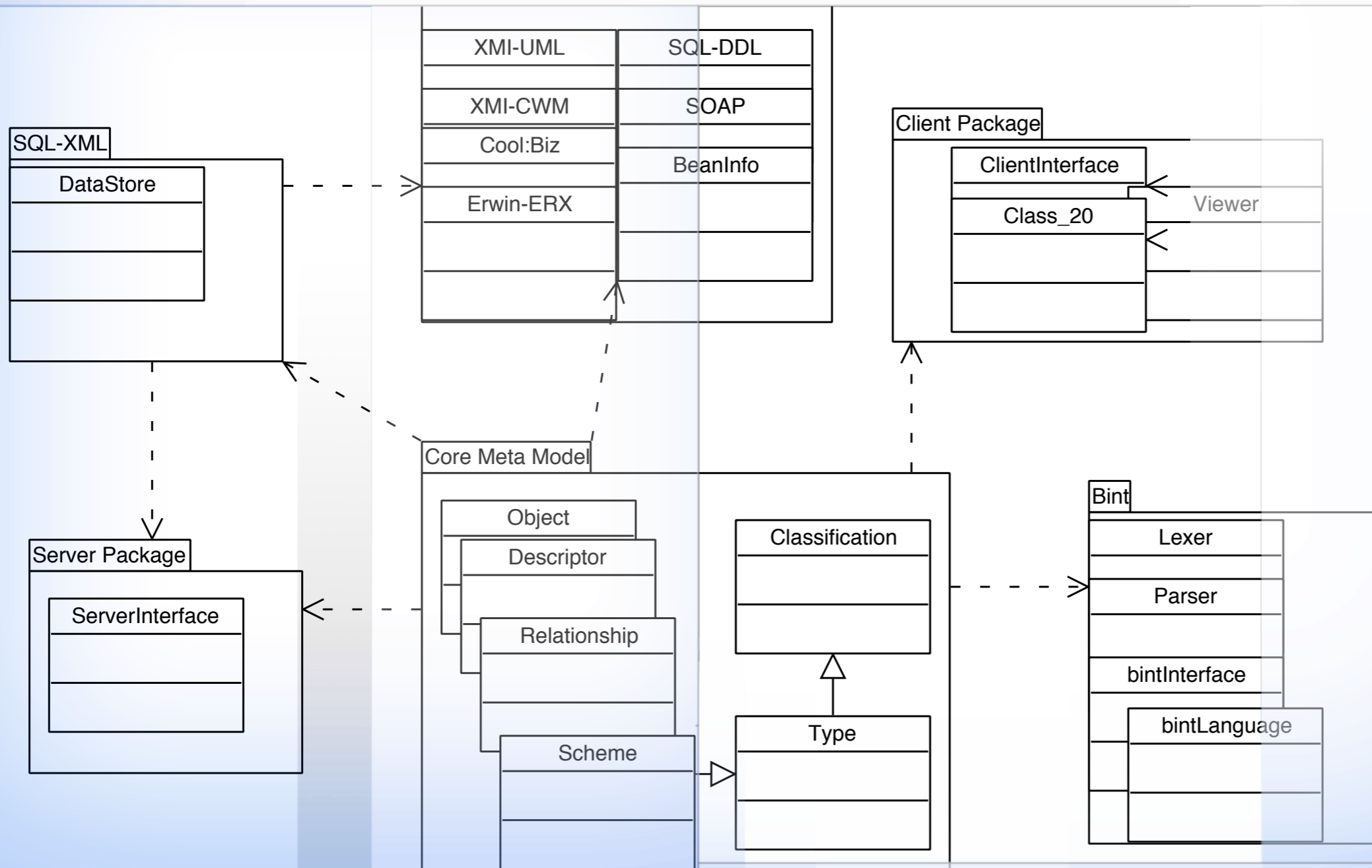
Works for Code and Database Design



From UML to NetRexx is totally straightforward

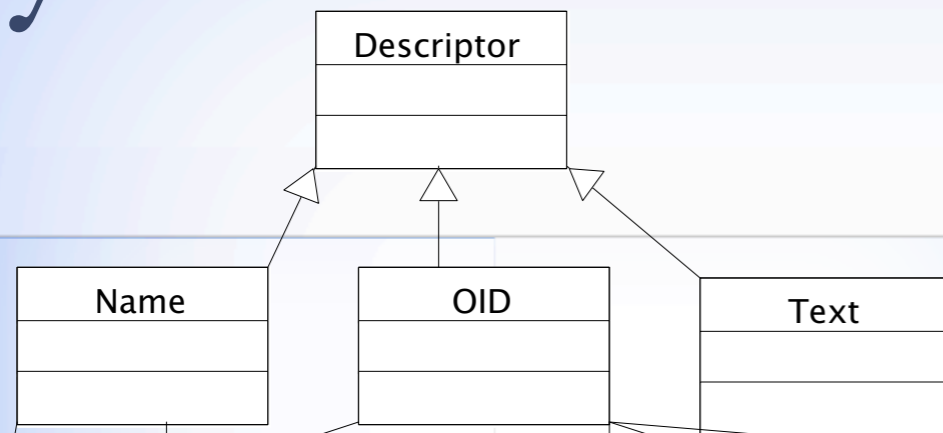
In fact, it is generated now by our system

Package Structure

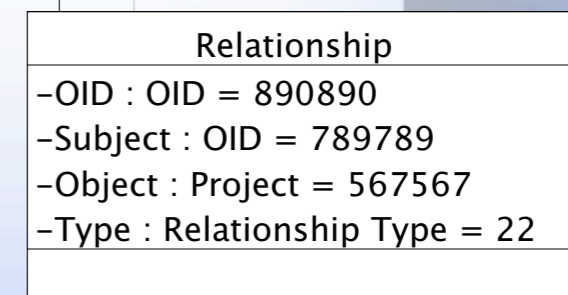
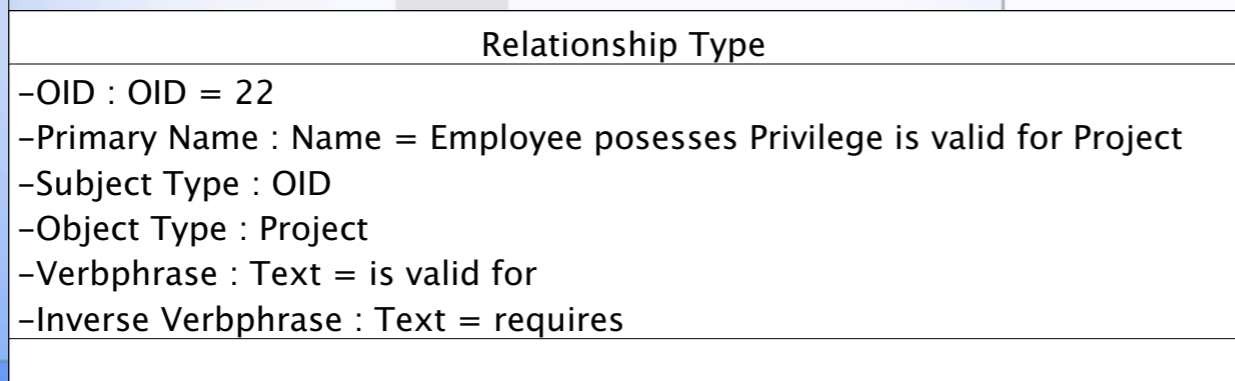
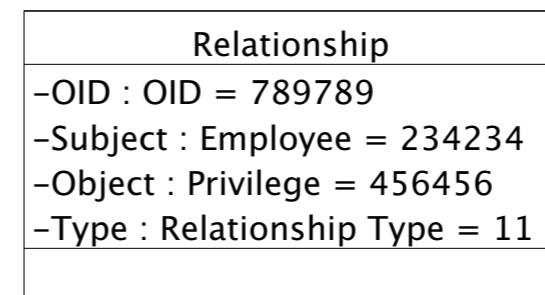
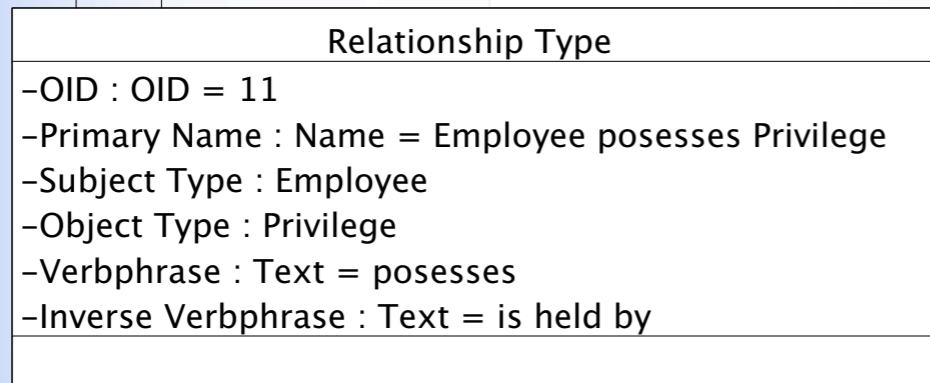
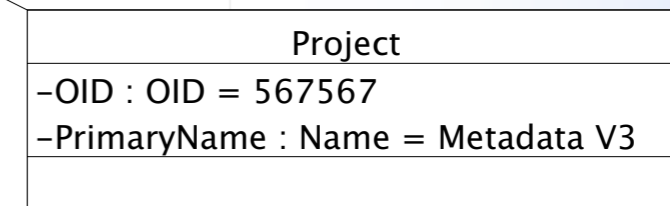
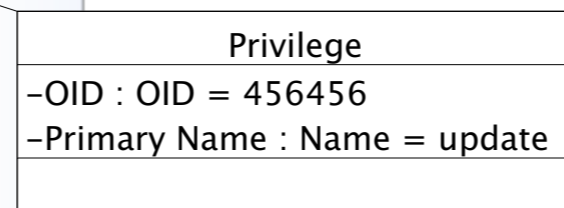
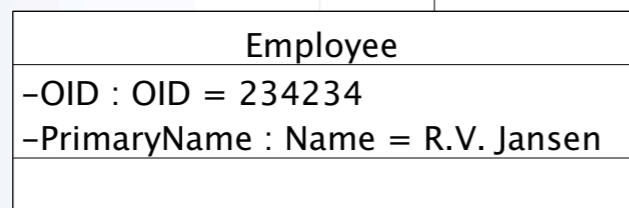


Dyadic Relationship Modeling

(We say *binary*)



These relationship instances ...



... end up as the following propositions

$O_{20013284} = \{T = \text{DomainOnly}, N = \text{Employee}\}$ (1)

$O_{10009986} = \{T = \text{DomainOnly}, N = \text{Project}\}$ (2)

$O_{22222222} = \{T = \text{DomainOnly}, N = \text{Privilege}\}$ (3)

$O_{234234} = \{T_{20013284}, N = \text{R.V.Jansen}\}$ (4)

$O_{456456} = \{T_{22222222}, N = \text{Update}\}$ (5)

$O_{567567} = \{T_{10009986}, N = \text{MetadataV } 3\}$ (6)

$R_{t11} = \{S_{T_{20013284}}, O_{T_{22222222}}\}$ (7)

$R_{t22} = \{S_{T_{11}}, O_{T_{10009986}}\}$ (8)

$R_{t33} = \{S_{T_{20013284}}, O_{T_{22222222}}, I_{O_{T_{10009986}}}\}$ (9)

This is the setup needed to assert the following facts:

$R_{999} = \{R_{t11}, s_{234234}, o_{456456}\}$ (10)

$R_{1000} = \{R_{t22}, s_{999}, o_{567567}\}$ (11)

Scope Specific Properties

2637		Project <i>explicitly involves</i> Classification
10034282		Project explicitly includes Classification <i>specifies</i> <i>value for</i> Project Specifiable Relationship Type
10034283		Object <i>is supplied value for</i> Project Specified Relationship Type
10050690		Descriptor <i>is supplied value for</i> Project Specified Relationship Type (see above)

Physical Table Design

OID	OBJ_TP	PPN_DT	PPN_USR
1166	I	2000-09-01	DI2359

SBJ_OID	VERB_OID	OBJ_OID	RANK	OID	EFF_DT	END_DT
1166	2763	4567	9999	2009765	2000-01-01	9999-12-31

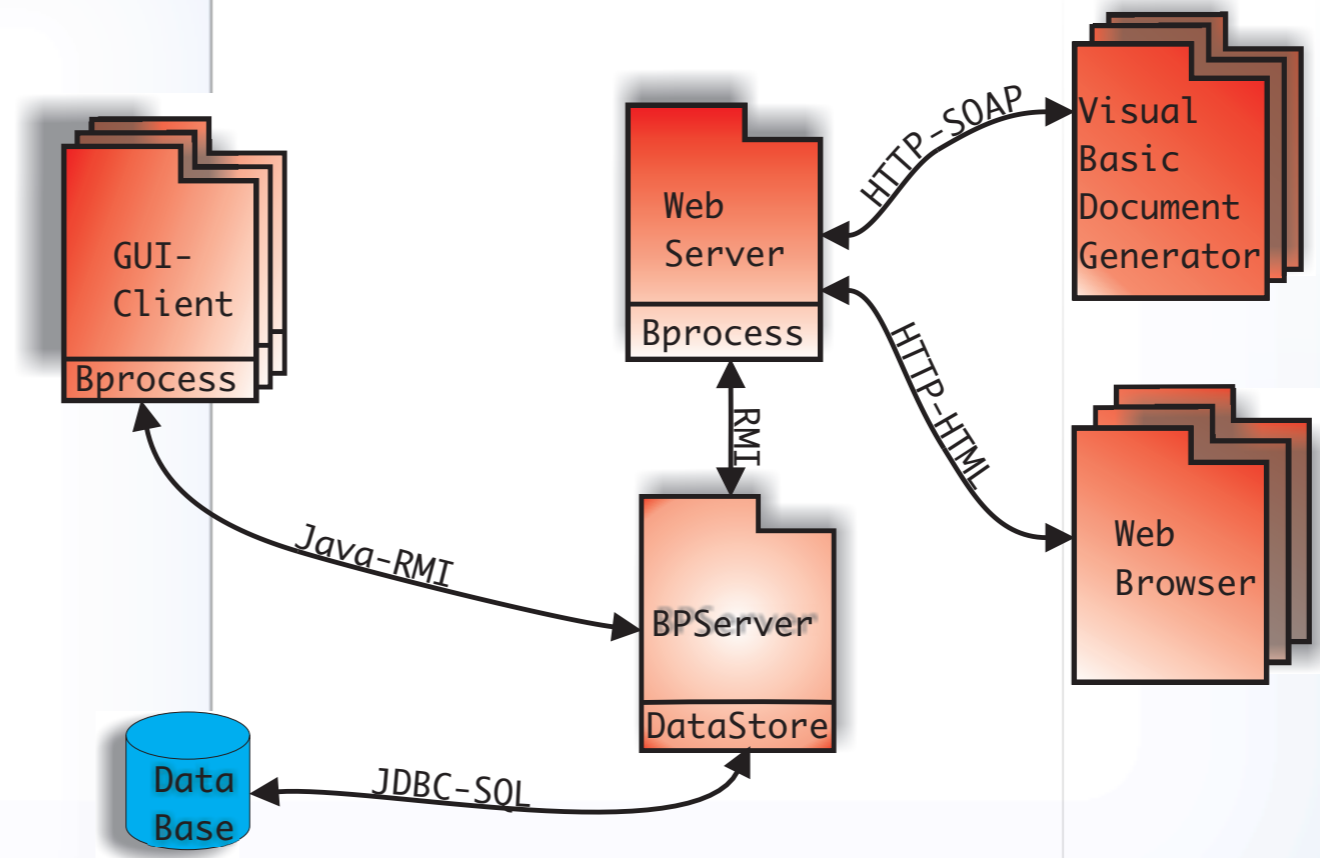
dsctr_x_obj_oid	obj_oid	nm
2710	1166	Involved Party

(Only Three Tables)

Components

Communication to VB
& MS Office through
SOAP (as a webservice)

Three Tier Architecture
with Application Server



The package
structure conforms
more or less to these
components

Versioning Mechanism

- Relationship instances have effective date and end date
- Every version of Every relationship is saved, by only setting its end date and never physically deleting it
- Every historic deliverable is reproducible
- A project is a subtype of Event; one timestamp suffices to save an entire project version.

Graphical User Interface



Swing

Look & Feel

Netbeans

The Tree

Swing - Some Misconceptions

- Swing is ugly and slow
- Swing is hard to understand if you're not into Smalltalk Model - View - Controller
- Swing does not look like Windows at all
- Swing can't use threads



Actually ...

- You have to care for its appearance
- It is not slow at all - slowness is mostly your own doing
- You have to work on application startup to get it faster - multithread and load through introspection

The screenshot shows the 'Repository []' application window. The main area displays a classification hierarchy under 'Data Concept' which 'classifies' 'Fundamental Object'. The hierarchy includes: Involved Party (highlighted), Product, Condition, Location, Resource Item, Arrangement, Accounting Unit, Event, and Classification.

Below the hierarchy, the 'Involved Party' concept is detailed:

Name: Involved Party
This can be any party, such as an Individual, an Organization, an Organization Unit etc. about which ABN AMRO wishes to maintain information.

Attributes & Relations table:

Attributes & Relations...	C...	Description
Involved Party OID	1:1	The generated unique identifier assigned to an Involved Party.
Involved Party Type	1:1	A classification that distinguishes the different sub-types of Involved Party according to their inherent characteristics and Specifies the Community of Interest an Individual is part of.
Community Of Interest	0:M	
Object Status	1:1	Distinguishes between real and virtual objects.
Involved Party Life Cycle Status Type	0:M	Distinguishes between the stages in the life cycle of an Involved Party
Primary Name	1:1	Specifies the primary name of the Involved

2004-03-27 14:18:37.278 ready.

We use the Alloy Look and Feel

- For Cross-Platform consistency
- Frames and Widgets look better than native Swing (ok, not on Macintosh)
- JTree behaviour is more consistent - it seems to be influenced by the look and feel component



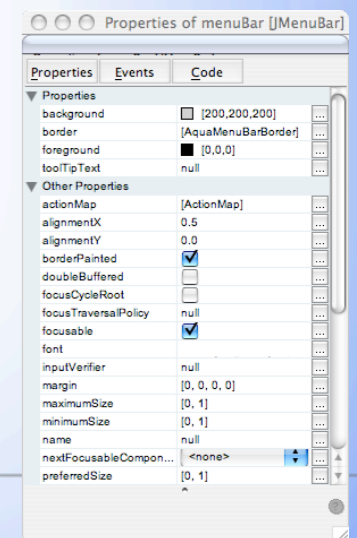
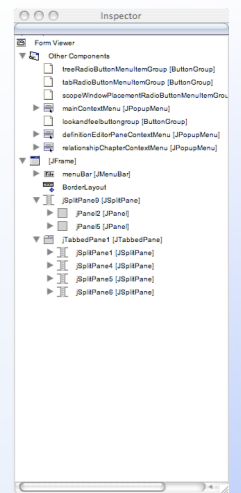
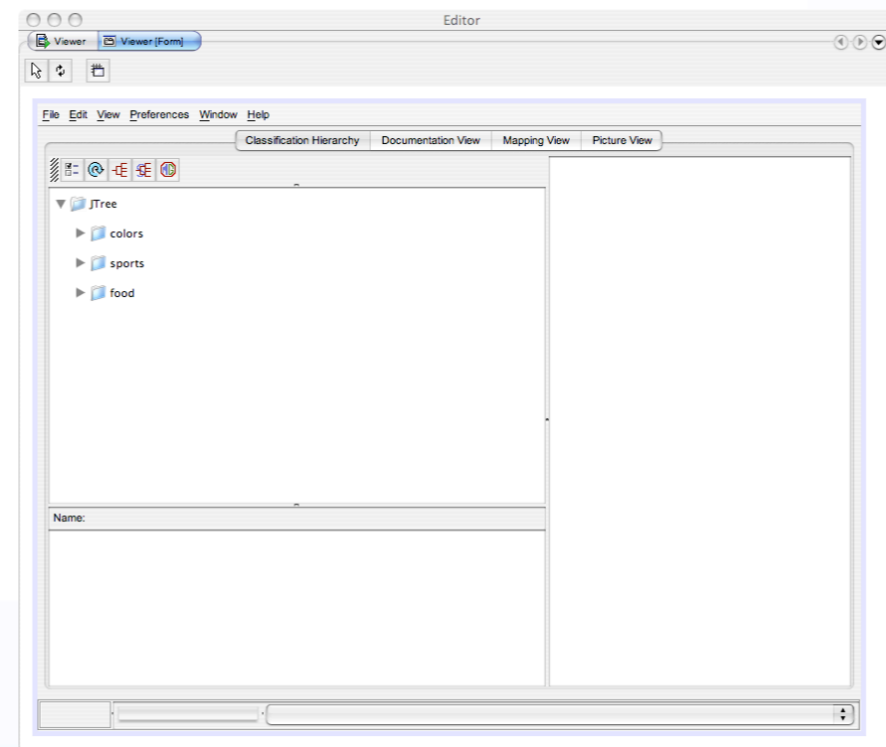
The Alloy Look and Feel
Better looks and nicer feelings

All of GUI made with NetBeans

- Paint the screens
- Add the widgets
- Double click
- Add call to NetRexx code
- NetBeans is pure Java
- Works on all platforms



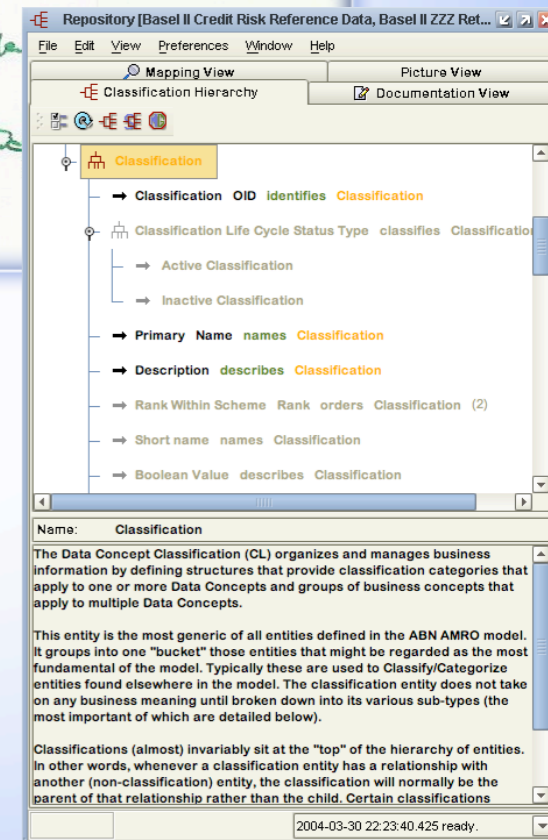
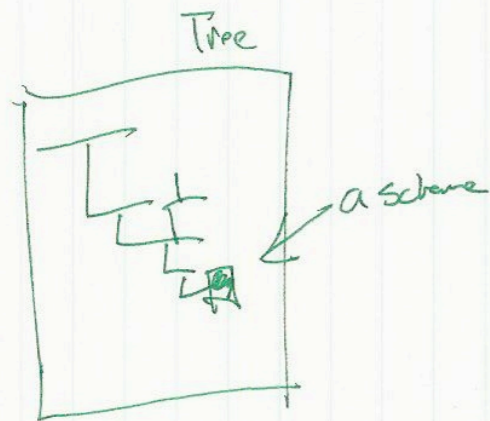
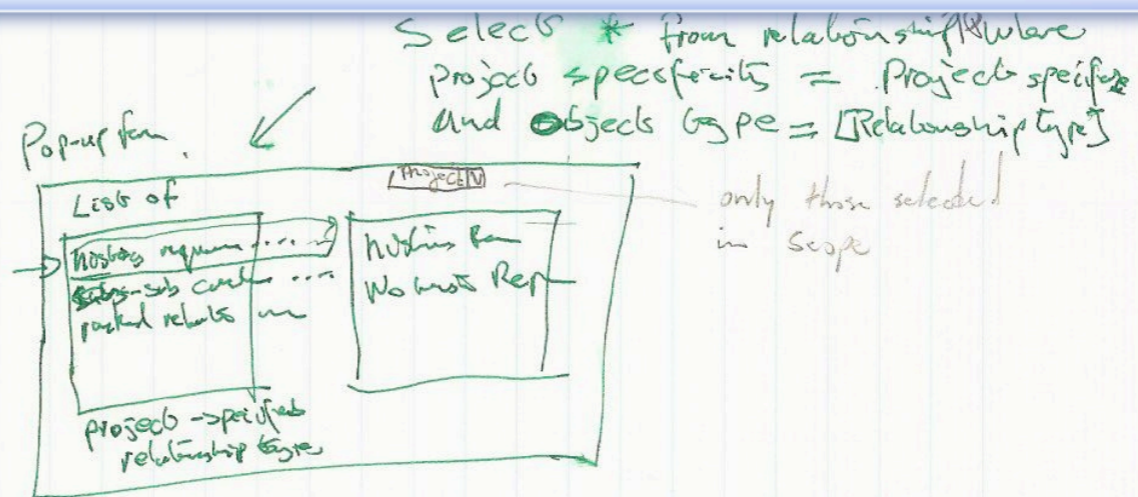
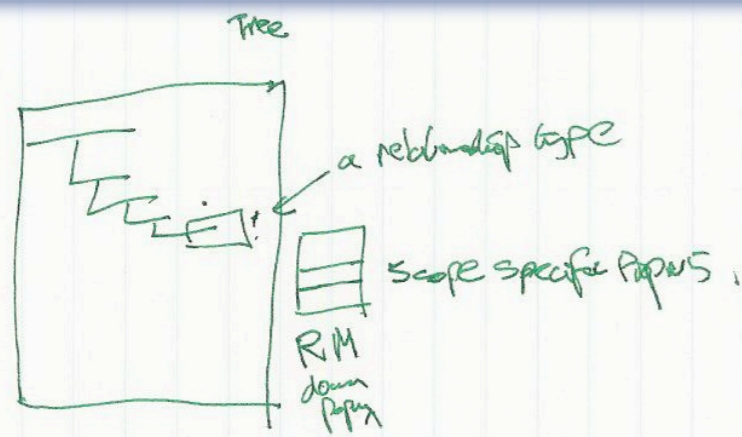
netBeans.ORG



Adding calls to NetRexx methods

```
private void exitMenuItemActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST  
med  
    try {  
        this.bp.BPDisconnect(System.getProperty("user.name"));  
    } catch (Exception s) {  
        JOptionPane.showMessageDialog(this, s.getMessage());  
    }  
    System.exit(0);  
}//GEN-LAST:event_exitMenuItemActionPerformed
```

Catch an event from a GUI Widget
and call a method in a NetRexx Class



The Famous Tree GUI Design

by Kieran McKeown

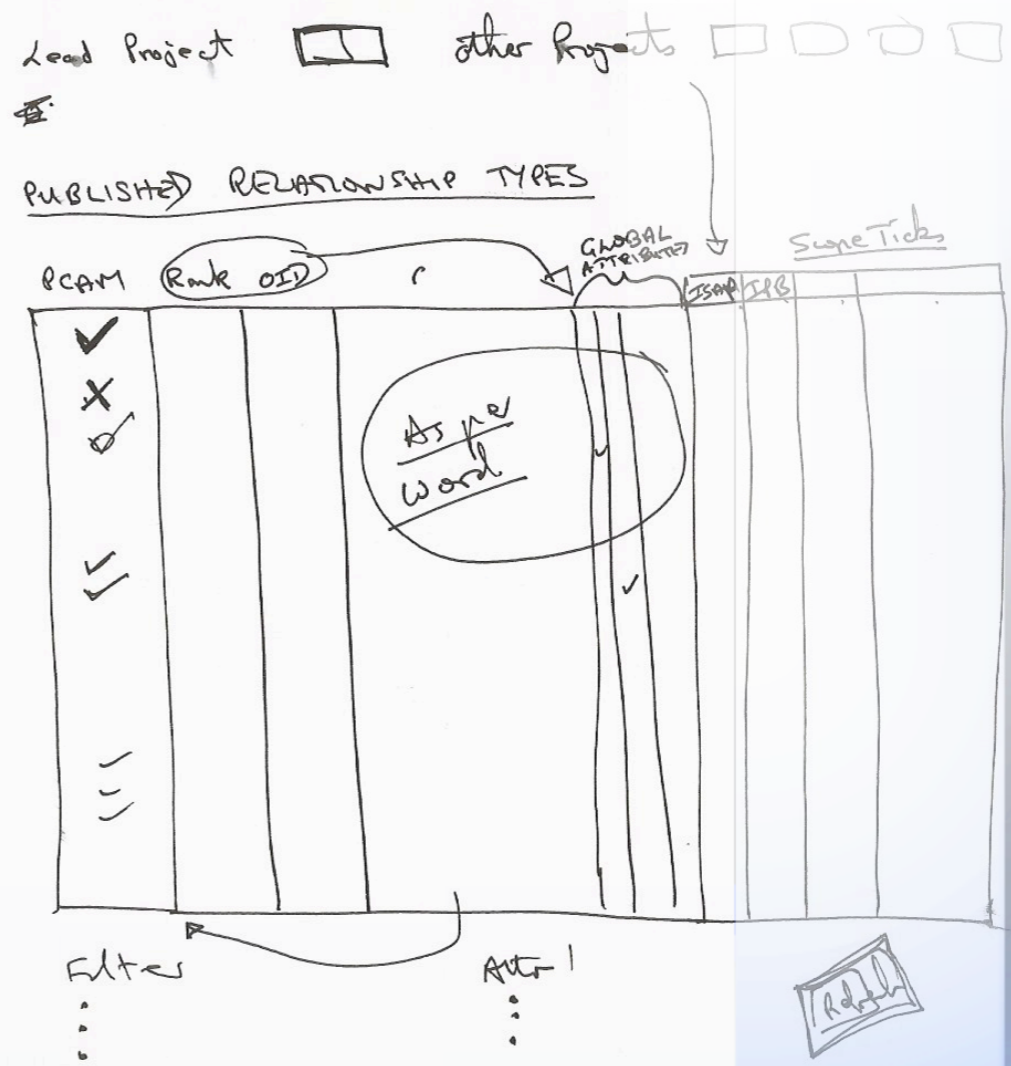
Relationship Types Screen Spec

The famous relationship types screen design by Mike George

Repository [Basel II Credit Risk Reference Data, Basel II ZZZ Retail Credit Risk]

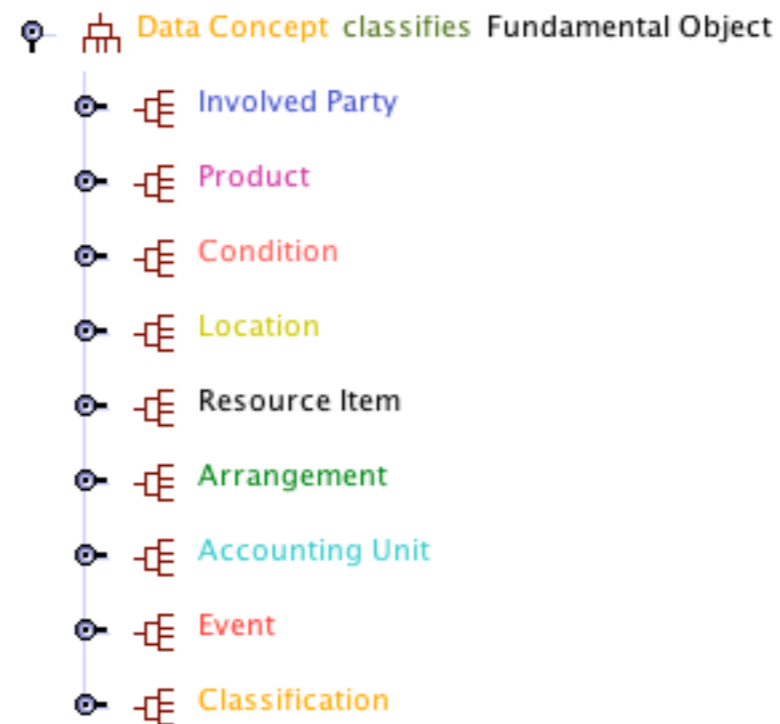
Rank	Card	Subject Role	Subject	Relationship	Object Role	Object	Basel II Cr...	Basel II ZZ...
empt...								
170	(0,M,1...	Debit	Interest Computation Cale...	applies to calculation of d...		Credit Facility Arrangement		
180	(0,M,1...		Legal Entity	is reporting entity for		Credit Facility Arrangement		
250	(0,M,1...		Counterparty	is counterparty in		Product Arrangement		
610	(0,M,1...		Committed Facility Indicator	classifies		Credit Facility Arrangement		
1450	(0,M,0...		Arrangement Exposure M...	classifies		Account Arrangement		
1460	(0,M,1...		Drawing Arrangement Indl...	classifies		Account Arrangement		
1590	(0,M,1...		Credit Facility Arrangement	sets limits on		Drawing Arrangement		
empt...								
130	(0,M,1...		Credit Facility Arrangement	is covered by		Collateral Arrangement		
empt...								
230	(0,M,1...		Involved Party Type	classifies		Involved Party		
280	(0,M,0...		Involved Party Role Type	classifies		Involved Party		
350	(0,M,1...		Legal Capacity Type	classifies		Involved Party		
empt...								
100	(0,M,1...		Basel II Counterparty Type	classifies		Counterparty		
empt...								
190	(0,M,1...	Incorporation	Country	is country of incorporation...		Organization		
200	(0,M,1...	Consolidate...	Organization	has majority interest in		Organization		
250	(0,M,1...		AAB Global Industry Clas...	classifies		Organization		
330	(0,M,1...		Basel II Exposure Class	classifies		Organization		
empt...								
13011	(0,M,1...		Organization Unit Function...	classifies		Organization Unit		
99999	(0,M,0...		IRB Model	deployment is approved by		Credit Authority		
99999	(0,M,0...		Internal Rating Scale	deployment is approved by		Credit Authority		
99999	(0,M,0...		External Rating Scale	assessments are receive...		Credit Authority		
empt...								
580	(0,M,1...	Residence	Country	is country of residence of		Individual		
590	(0,M,1...		AAB Global Industry Clas...	classifies		Individual		
empt...								
620	(0,M,...	Guaranteed	Credit Facility Arrangement	is covered by		Credit Facility Guarantee ...		
670	(0,M,1...		Arrangement Type	classifies		Arrangement		
850	(0,M,1...		Customer	credit exposures are mitig...		Credit Risk Mitigation Arra...		
1000	(0,M,1...		Arrangement Measure Ty...	classifies		Arrangement Measure		
1010	(0,M,1...		Unit Of Measure	classifies		Arrangement Measure		
1030	(0,M,1...		Period Balance Type	classifies		Arrangement Measure		
empt...								

2004-03-30 22:36:18.461 BPServer 1 User logged on to Group Finance/MIS Repository



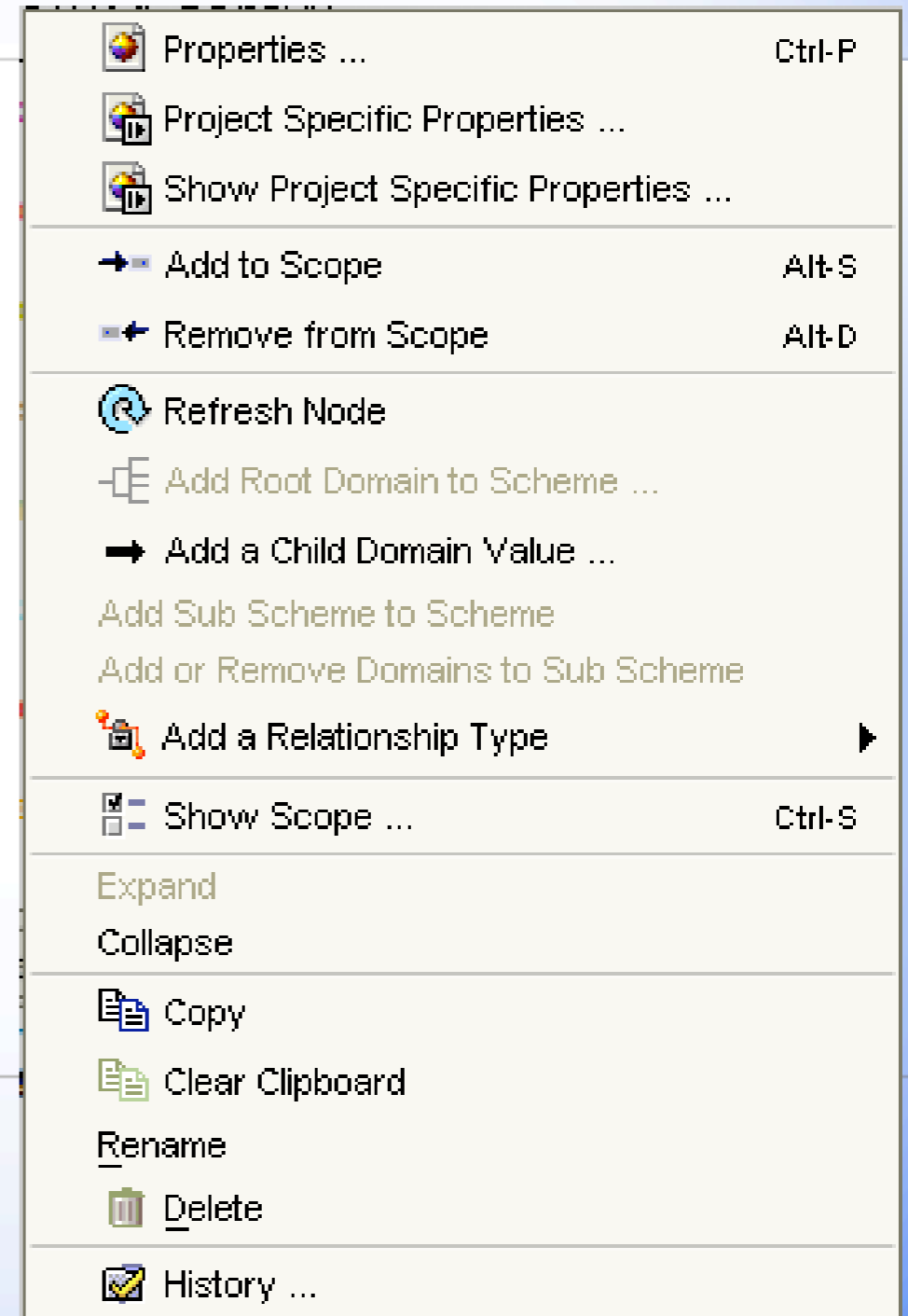
The Tree

- Is a JTree
- Action is in the tree Model
- Our most performance critical component
- Delivers to the user a scoped view to a shared object model



Right Clicking the Tree

- On every object in the repository
- Does scoping of the Common Model and additions and deletions
- Add Relationship Types



Adding a Relationship Type
















Partitioning (adds a scheme)

Object Type

Subj-Obj Verbphrase

Obj-Subj Verbphrase

Subject Type

-  Data Concept classifies Fundamental Object
-   Involved Party
-   Product
-   Condition
-   Location
-   Resource Item
-   Arrangement
-   Accounting Unit

Subj-Obj Cardinality Remember Selected Type Obj-Subj Cardinality

Relationship Type Description:

Generic Object Editor

Edits any object thrown at it

Uses beanpatterns and introspection to determine type of editor



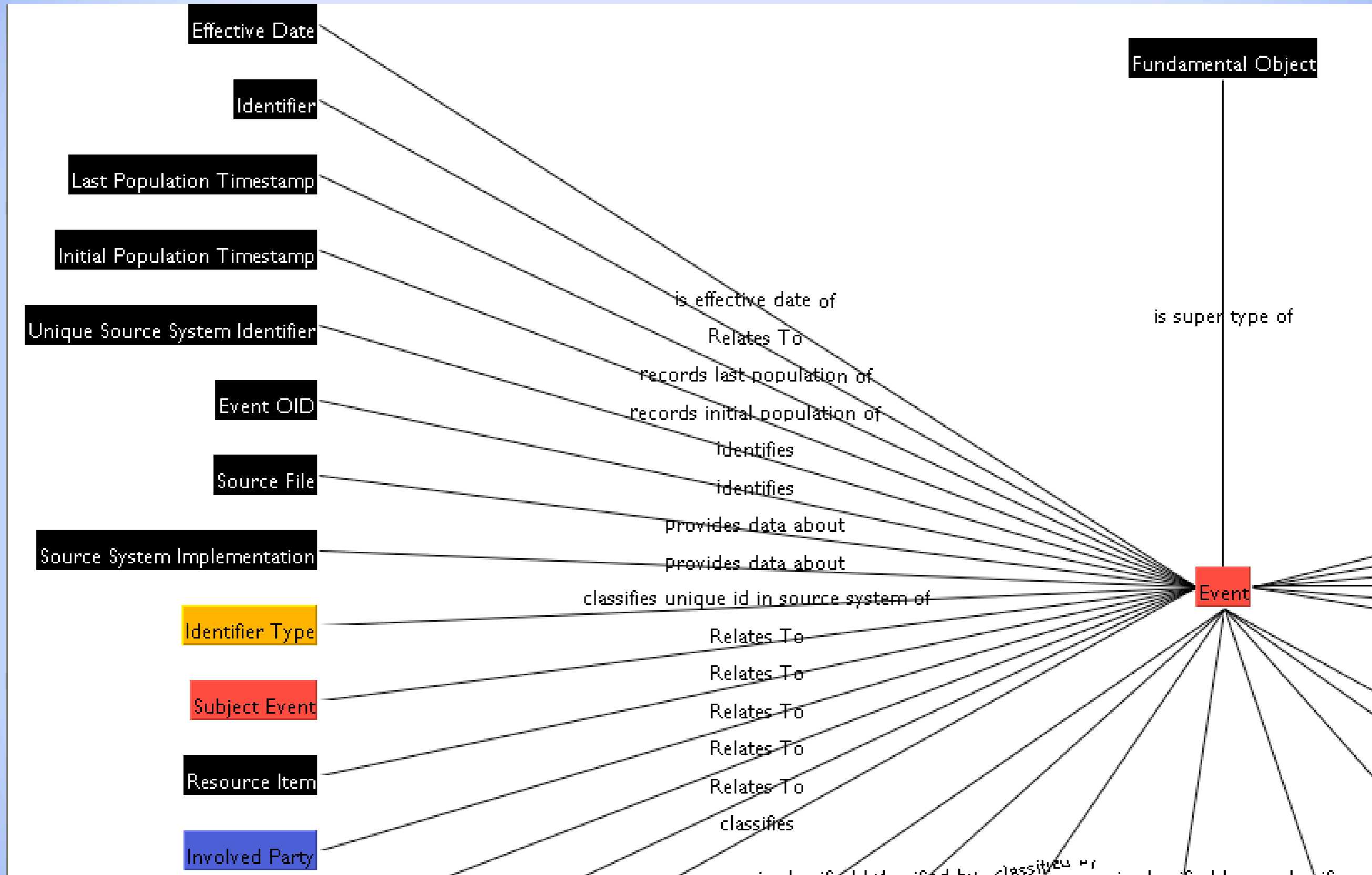
Property	Value
OID	1166
Primary Name	Involved Party
Abbreviated Name	IP
Description	This can be any party, such as an Ind...
Super Type	Fundamental Object
Published Scheme	Data Concept
Formal Scheme	Data Concept
Rank Within Scheme Rank	110
Class	class com.abnamro.midms.modelbase...
Classification Source Type	Core Model Classification
Determining Type	Involved Party
Included In Projects	[VC Advice MIS, Sales Activity Manag...
Initial Population Timestamp	1900-01-01 00:00:00
Last Population Timestamp	2003-03-13 15:24:20
Objectifies Relationship Types	[]
Object Of Relationship Types	[Central Bank CoA Counterparty Cat...
Parent In Quoted Tree	Data Concept classifies Fundamental ...
Parent In Schemed Quoted Tree	Data Concept classifies Fundamental ...
Partitioning Relationship Type	

The Editor is a Visitor

```
do
  /* check whether the getter returns an object instance. if it
   * does, we pass it an EditorVisitor instance that handles the
   * editing this of course polymorphically with double dispatch
   * on the indirect object.
   */
  invokeResult = this.globalGetter.getMethod().invoke(this.globalObject, null)
  /* if the result from the Getter invocation is null, we
   * instantiate a new object and also have it accept an
   * editorvisitor.
   */
  if invokeresult = null then
    do
      do
        cls = Class.forName(this.globalGetter.getMethod().getReturnType().getName())
        clz = cls.newInstance()
        (Visited clz).accept(edV)
        edV.getEditor.setFont(this.dialogFont)
        ppp.validate()
        this.panel.validate()
      catch Exception
        say "Exception instantiating object-to-be-edited"
      end
    end
  else
    do
      (Visited invokeResult).accept(edV)
      edV.getEditor.setFont(this.dialogFont)
      ppp.validate()
      this.panel.validate()
    end
  end

```

Graphical Navigator Screen



The Server



Why?

RMI

Caching Objects

*Deconstructing
Objects*

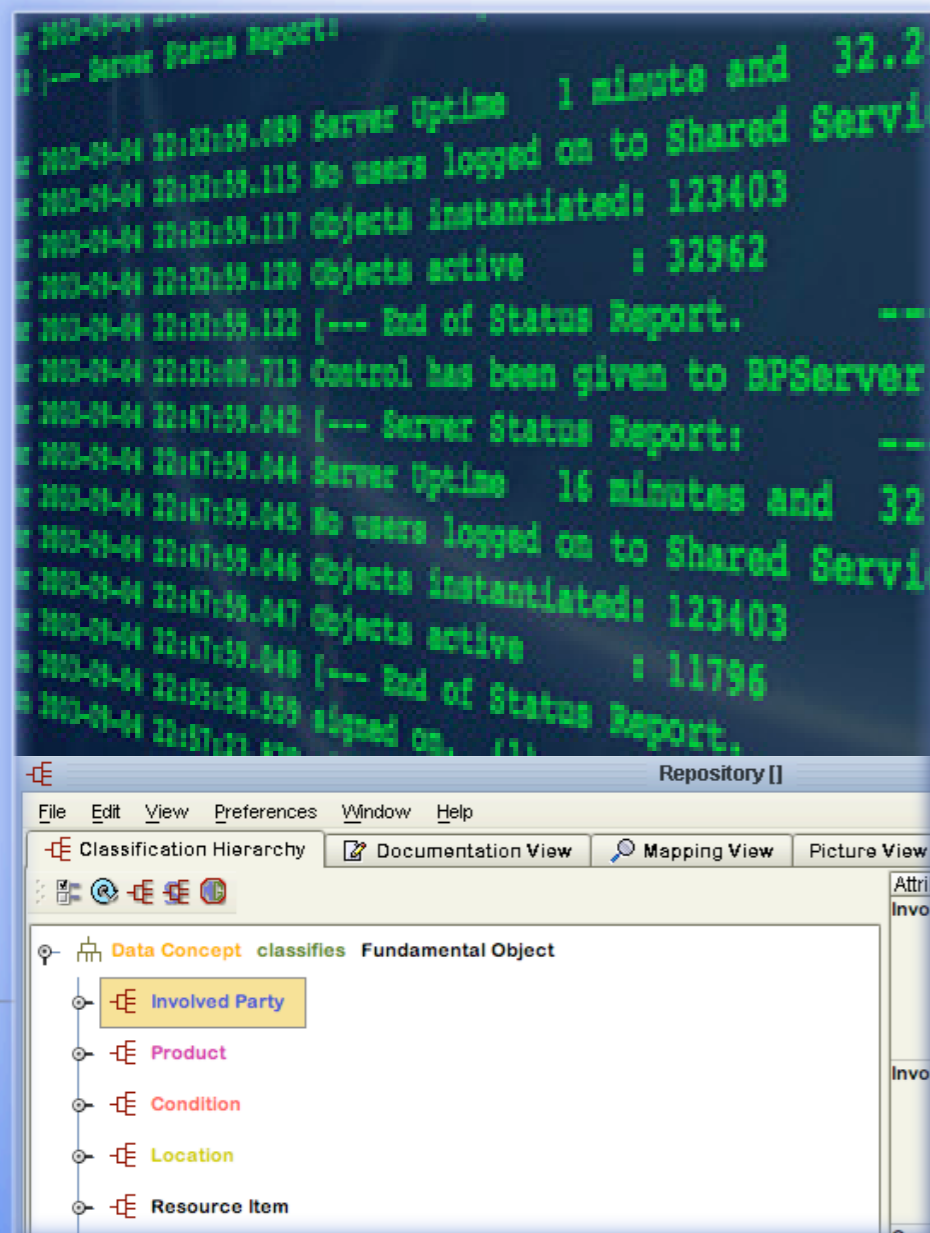
*EX COOVI ARGENTII VII
DEVS INSTAR ETAVRI
COE TIBSADIP FINGOANTE
EST SACRIS*

Why an Application Server?

Needed robust multiuser access to the repository

Handles transactions

Caches Objects in storage

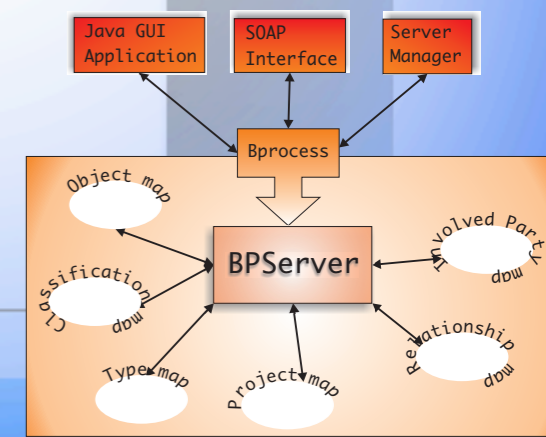


The Server Component

The Server is a text mode NetRexx-only Application that can run on any Java 2 VM. At startup the Relational storage is converted to Objects that are indexed and stored on Class and their participation in Relationships.

```
1:pool...
Server 2003-01-04 22:32:59.930 Req-...
1:54.111 --- Server Status Report:
---
Server 2003-01-04 22:32:59.989 Server Uptime 1 minute and 32.24 seconds
Server 2003-01-04 22:32:59.115 No users logged on to Shared Services/MIS Repository
Server 2003-01-04 22:32:59.117 Objects instantiated: 123403
Server 2003-01-04 22:32:59.120 Objects active : 32962
Server 2003-01-04 22:32:59.122 [--- End of Status Report. ---]
Server 2003-01-04 22:33:00.713 Control has been given to BPServer.
Server 2003-01-04 22:47:59.042 [--- Server Status Report: ---]
Server 2003-01-04 22:47:59.044 Server Uptime 16 minutes and 32.36 seconds
Server 2003-01-04 22:47:59.045 No users logged on to Shared Services/MIS Repository
Server 2003-01-04 22:47:59.046 Objects instantiated: 123403
Server 2003-01-04 22:47:59.047 Objects active : 11796
Server 2003-01-04 22:48:59.159 signed on. (1)
Server 2003-01-04 22:57:23.878
```

Note the cute “Control has been given to ...



Is a Remote Object

BPServer.nrx: /Volumes/Workspace/com/abnamro/midms/RepositoryTool/BPServer.nrx

```
options strictcase
-- we do not usually use STRICTCASE but in this file it is necessary
-- because the Collections class has a static method synchronizedList
-- and also an inner class SynchronizedList etc.

package com.abnamro.midms.RepositoryTool
import com.abnamro.midms.modelbase
import com.abnamro.midms.modelbase.soap
import com.abnamro.midms.util.
import com.abnamro.midms.util.pool.
import com.abnamro.midms.util.exceptions.
import com.abnamro.midms.util.ssl.
import java.rmi.
import java.util.
import java.sql.

/**
 * The Business Process Server is the interface between the application layer
 * and the database, and between the data and the client application. <br>
 * The database is accessible via DataStore, but only the Business Process
 * Server may access it. A DBMS connectionpool is set up, and every user
 * (client) of this server uses a separate connection lease to do the work;
 * this work can thus be individually committed or rolled back.<br>
 * SK 13092002: added security manager to authenticate the user connecting to
 * BPServer.
 * @see DataStore
 * @author <a href=http://www.rvjansen.com target=new>R.V. Jansen</a>
 * @author <a href=http://zaaf.tripod.com target=new>A.J. Bos</a>
 */

class BPServer extends UnicastRemoteObject implements BPServerInterface, BPClientInterface, ScopeChanging final

properties static inheritable
db = DataStore
oidObjectMap = ObjectMap
oidRelationshipMap = TreeMap
oidRelationshipTypeMap = RelationshipTypeMap
```

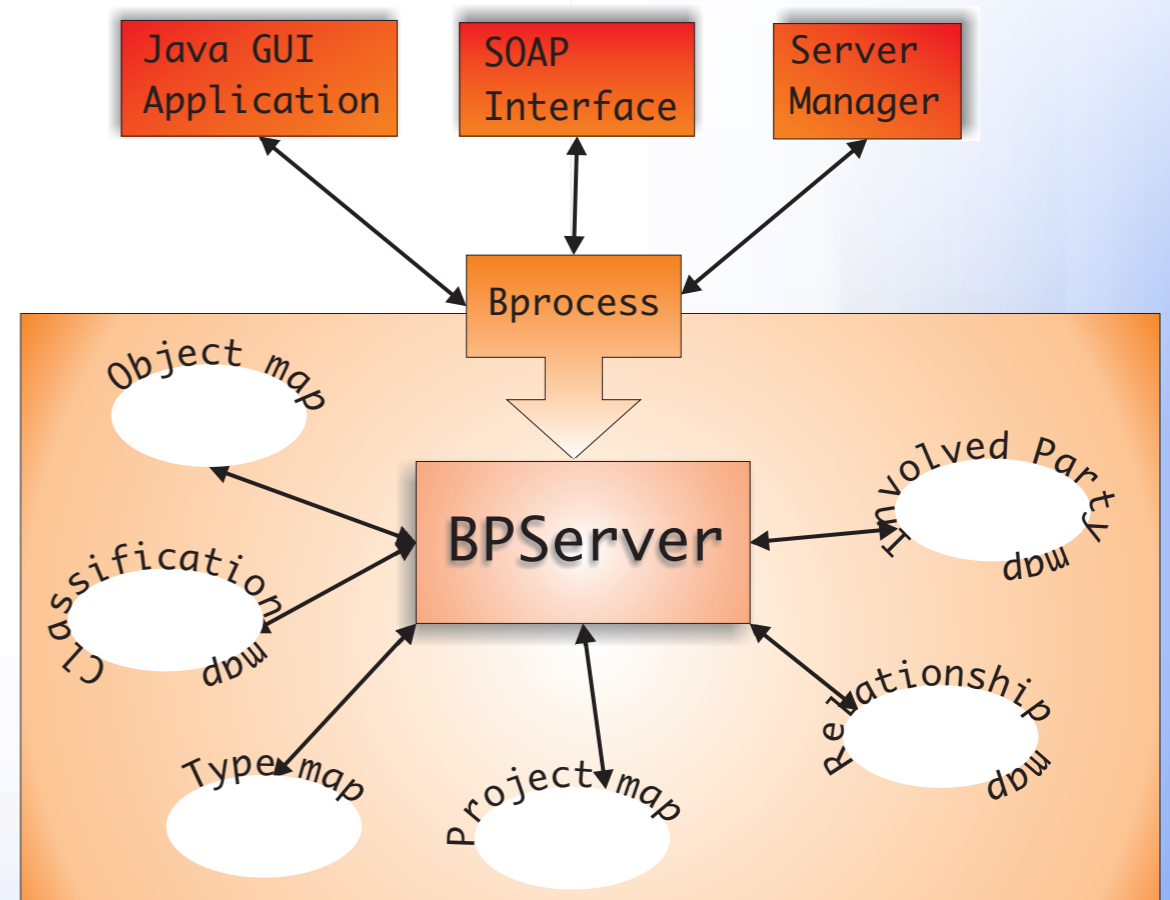

Object TreeMaps in Server

```
* @author <a href=http://www.rvjansen.com target=new>R.V. Jansen</a>  
* @author <a href=http://zaaf.nl target=new>A.J. Bos</a>  
*/
```

```
class BPServer extends UnicastRemoteObject implements BPServerInte
```

properties static inheritable

logger_	= Logger.getLogger("BPServer")
sh	= ConsoleHandler()
db	= DataStoreInterface
oidObjectMap	= ObjectMap
oidRelationshipMap	= TreeMap
oidRelationshipTypeMap	= RelationshipTypeMap
oidTypeMap	= TypeMap
oidSchemeMap	= TreeMap
oidRlnTpPblGrpMap	= TreeMap
oidProjectMap	= TreeMap
oidProjectVersionMap	= TreeMap
oidScopeMap	= TreeMap
oidScopeVersionMap	= TreeMap
oidClassificationMap	= TreeMap
oidInvolvedPartyMap	= TreeMap
oidProjectSpecificMap	= TreeMap
verbOidSbjRelsCache	= TreeMap
verbOidObjRelsCache	= TreeMap
serverLog	= ArrayList
tracing	= boolean
sessionsMap	= LinkedHashMap
oidPropertiesMap	= TreeMap



Update: Hook the local Setters

Meta Model Objects have
NetRexx Indirect Properties

Setter Methods are overridden
to do remote update

```

    * t_. It then also adds itself :
    * (see #addSubType
    */
method setSuperType(t_ = Type) signals InvalidSupertypeException

    if this.bp <> null then -- we are in the client
    do
        oldSuperType = this.superType
        if this.superType = null then
        do
            this.superType = t_
            t_.addSubType(this)
        end
        if this = t_ then
        do
            signal InvalidSupertypeException()
        end
        this.bp.updateSupertype(this.getOID(), oldSuperType.getOID(), t_)
    catch RemoteException
        System.err.println("RemoteException in Type.setSupertype(" t_ ")")
    end

    if this.superType = null then
    do
        this.superType = t_
        t_.addSubType(this)
    end
    else
    do
        if this = t_ then
        do
            signal InvalidSupertypeException()
        end
        else
        do
            this.superType = t_
            t_.addSubType(this)
            if oldSuperType <> null then oldSuperType.
        end
    end
end

```

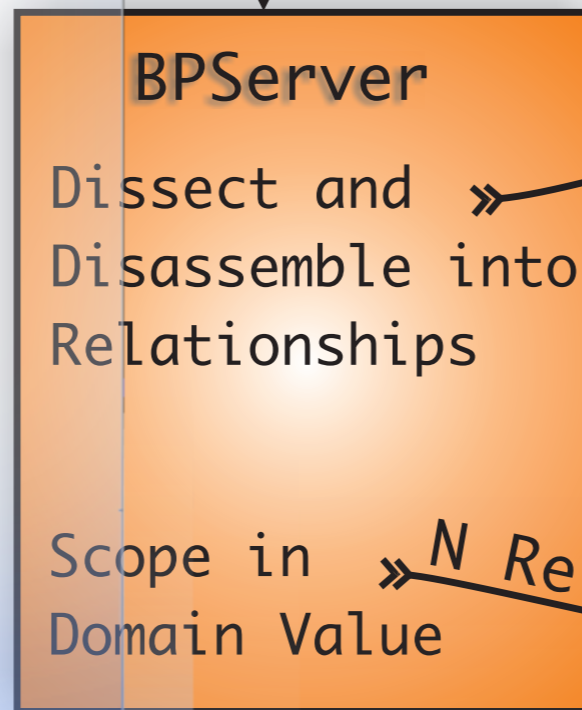
Object *Decomposition*



Java Client

» New Domain Value

For every new domain value, 5 new relationships are added to the system, and as much scoping relationships as there are active scopes.



» 5 new Relationships

» N Relationships



Data Base

The **bint** Language

batch interpreter

daughter (arabic)

*a strict headmaster
(in a story by F.
Bordewijk)*

*lower class girl
(british slang,
usage: outdated)*

Why?

Syntax

Examples

Antlr Grammar

Usage in Client

bint

Next to the Graphical User Interface, we also defined a specialized metadata access language, called **bint**.

bint

Due to the use of the generic universal relation, SQL access to the metadata soon becomes very cumbersome. Bint uses the objects after they are assembled in the Object Factory.

Syntax of **bint**

Syntax is very loosely inspired by CMS Pipelines, APL and Predicate Logic

Works on stacked maps of **key:Oid** and **value:Object**

The data appears to flow through pipes with stages



Interaction between Antlr and NetRexx in construction of **bint**

Antlr .g
grammar file



.nrx
language
methods
interface



.java
Lexer
Class

.java
Parser
Class



.nrx Driver
and language
methods

```
header
{
    package com.abnamro.midms.bint;
}

{
    import java.io.*;
    import java.rmi.*;
}

class bintParser extends Parser;
options {
    k = 2;
    exportVocab=bint;
    codeGenMakeSwitchThreshold = 2;
    codeGenBitsetTestThreshold = 3;
    buildAST = false;
}

{
    public bintInterface bintInstance ;
}

program
    : (statement)+ EOF
    ;

statement
    : connectto
    | disconnect
    | settimer
    | setverbose
    | setcolumnseparator
    | setsyntaxcheck
    | collect
    | subset
    | list
    | listproperties
```


Infrastructure and Security



Platform

*Development
Environment*

*Middleware
Components*

RMI & SSL

*JNI Based User
Authentication*

Platform



Due to the Application being all NetRexx, it runs unchanged on Windows NT, MacOS X, Windows XP and Linux.



No testing has been done on z/OS, but we are confident that it will run within a day.



Production Server is a Dual Xeon with 1 GB storage under NT 4.

Development Environment

Emacs, Java, NetRexx, Netbeans,
CVS, Make

← Switched recently to *Subversion*

On NT, we used *Cygwin* (so we
have (the taste of) Unix anywhere)

NetRexx editor mode is very
important (color, indentation)
(Elisp, cross-platform)

The NetRexx Compiler Server

DBMS



DB2 UDB 8.1 is used for production

Development and regular testing takes place on the Open Source DBMS'ses MySQL and PostgreSQL

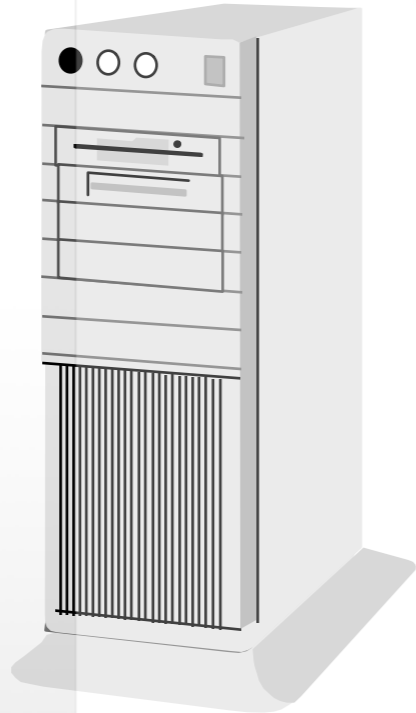
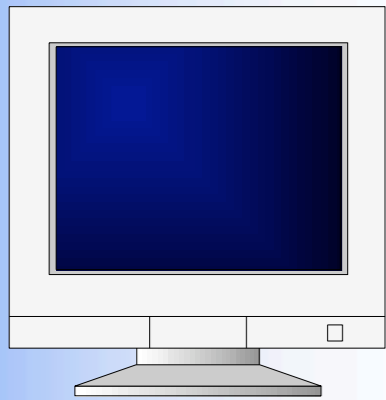
PostgreSQL



The Server Component can run off MS-Access via ODBC-JDBC Bridge (for people who need to travel with copies on generic Windows Laptops)

All DBMS access is done by Server Component using JDBC in NetRexx

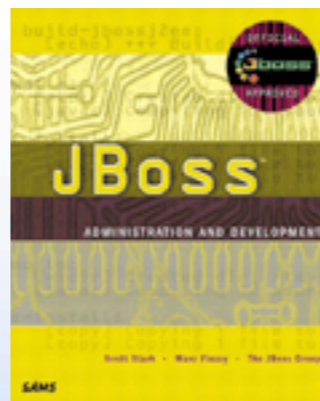
Middleware



Tomcat is used as Servlet Container



Axis is used for SOAP access to server



We just migrated these to JBoss

RMI and SSL Encryption

```
package com.abnamro.midms.util.ssl
import java.io.
import java.net.
import java.rmi.server.
import javax.net.ssl.
import java.security.KeyStore
import javax.security.cert.X509Certificate
-- mind: if this does not compile you probably do not have jsse.jar on your classpath
class RMIServerSocketFactory implements RMIServerSocketFactory, Serializable

method createServerSocket(port=int) returns ServerSocket signals IOException
do
  -- set up key manager to do server authentication
  passphrase = char[]
  passphrase = "passphrase".toCharArray()

  ctx      = SSLContext.getInstance("TLS")
  kmf      = KeyManagerFactory.getInstance("SunX509")
  ks       = KeyStore.getInstance("JKS")

  ks.load(ClassLoader.getSystemClassLoader().getResourceAsStream("dmskey"), passphrase)
  kmf.init(ks, passphrase)
  ctx.init(kmf.getKeyManagers(), null, null)
  ssf = ctx.getServerSocketFactory()

catch e=Exception
  e.printStackTrace()
end

return ssf.createServerSocket(port)
```

JNI Based User Authentication

```
JNIEXPORT jstring JNICALL Java_com_abnamro_midms_platform_NTPlatformSecurity_getUserId(JNIEnv *env, jobject o)
{
    jchar * buffer[100];

    DWORD length = 100;
    NET_API_STATUS rc = 0;

    rc = GetUserName((LPTSTR)buffer, &length);
}
```

```
/** This Class is the implementation of the methods of PlatformSecurity for the Windows NT Operating System.
    Most of the methods are native WIN32 code, implemented in NTPlatformSecurity.c and loaded from
    NTPlatformSecurity.dll. It is know to run on NT and W2K */
```

```
class NTPlatformSecurity extends PlatformSecurity
```

```
/** This constructor loads the NTPlatformSecurity Dynamic Link Library for Windows NT */
```

```
method NTPlatformSecurity()
```

```
System.loadLibrary("NTPlatformSecurity")
```

```
/** This method overrides PlatformSecurity.getUserId() and is implemented in a native method, which uses the
    call <code>
```

```
rc = GetUserName((LPTSTR)buffer, &length);
```

```
</code>
```

```
to get its results. This is deemed more secure than using the Java System Property user.name
```

```
*/
```

```
method getUserId() native returns String
```

Post Mortem

These points were moot since we had a working prototype database in MS-Access

That sometimes failed spectacularly, for example when adding RI dropped a random index ...

Our three-tier NetRexx solution never failed yet.

- We wasted some time by being not generic enough, for examples in the hooks in the setters - we invented class metadata in BeanInfo objects
- We should have used more association objects instead of collections in classes - only one place to update and less RMI trouble
- Dyadic relationship modelling is hard

Questions?



- Ask them now
- By email
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- Or alternatively
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Thank you very much for your attention!