Roda Data Model

Description Objects

Representation Objects
Roda Data Model

Description Objects

Representation Objects

Preservation Objects
Implementation Requisites

- Graphical Interface for Ingestion process
- Producer registry
- SIP production tool
- Ingestion feedback
- Partial Ingestion
- "Quarantine" zone: cache, ingestion buffer
- SIP validation
- Error reporting
- Persistent identifiers
- PREMIS event generation
- DIP digital signature
- ...

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Development framework
Requisites based comparison

Ingestion
AIP Management
Dissemination

DSpace
Fedora

Ingestion Management Dissemination
Matching data models

DSpace

Diagram showing relationships between Community, Collection, Item, Bundle, Bitstream, Format, and other entities with various associations like owns, includes, parent-of, represented-by, and characterized-by.
Architecture

- RODA's Web User Interface
- Content adaptor
- RODA Information Services
- LDAP Auth Server
- Fedora Services
- Fedora Generic Search
- Web services communication interface
DO Anatomy

Conceptual level

Database
Text Doc.
Still Image

Logical level

SQL Server
Access
PDF Doc.
Ms Word Doc.
PNG image

Physical level

Hard Disc
Tape
...

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If one of these levels becomes obsolete we loose access to the DO
DO Preservation Strategies

• Focusing the physical/logical object
  o Centered in preserving information in her logical format or/and physical support
  o Uses original technology associated to these objects to ensure the access to them
  o Technology preservation

• Focusing the conceptual object
  o Centered in preserving the object core properties in a way that is independent from hardware and software
  o Conceptual object preservation
Migration: periodic DO transfer from one hw/sw configuration into an updated one (centered in preserving significant properties other than preserving the original bit stream).

Advantages
- DO are disseminated in formats known to users
- No need to preserve the original hw/sw platform
- Most used strategy and the only that has worked so far

Disadvantages
- Possible loss of information during conversion
- Continued maintenance is needed
- In the long term perspective costs are high
Conceptual object preservation

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What are the significant properties?
Distributed Migration

- Remote conversion services
  - known APIs
  - descriptive metadata for localization and invocation (UDDI)

- Advantages
  - Platform independency
  - Redundancy/multiple migration paths
  - Compatible with other migration strategies
    - Normalization, migration on request
  - Generalized cost reduction

- Disadvantages
  - Bandwidth requirements
  - Slow
Distributed Preservation Services

t1
<.9, .8, .95, .1>
t2
<.5, .3, .95, .6>
t3
<.7, .5, .65, .1>
t4
<.9, .6, .9, .7>
t5
<1, .6, .9, .1>
t6
<3, .6, .95, .1>
t7
<5, .3, .95, 1>
Distributed Preservation Services

CRiB project: http://crib.dsi.uminho.pt
CRiB: architecture
Migration Broker

- Carries out format conversions
  - Invokes the necessary conversion services
- Measures the performance of the conversion process
  - Availability
  - Stability
  - Throughput
  - Scalability
  - Cost
  - Size ratio
  - File count ratio
Object Evaluator

- Determines the amount of data loss involved in migration
- Detects similarity between significant properties of digital objects
  - Object class dependent;
  - Different significant properties for bitmap images, text documents, relational databases, etc.
- Produces evaluation reports in PREMIS format
  - Datetime of intervention
  - Description of involved agents
  - Type of event (i.e. Migration)
  - Outcome of intervention
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*Not implemented for databases*
Text Documents and Still Images
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- EAD elements capture most of the significant properties: provenance, producer history, context, ...
- Content is kept in a normalized format: PDF and uncompressed TIFF.
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General big questions...
What are the salient features of a database that should be preserved? (*significant properties...*)
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• How can we measure the quality of preservation strategies when they are applied to databases? (*quality assurance...*)
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Databases: goals

• How do we store them?
• How do we access them?
Databases: goals

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• How do we access them?

RODA questions...
Databases

- Data?
- Structure?
- Views?
- Reports?
- Stored Procedures?
- ...

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Normal evolution path:
Data => Structure => Semantics
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Normal evolution path:
Data => Structure => Semantics

First prototype:
- Data
- Structure
- Only “frozen” DBs
HOW?

The need for an intermediate representation

Input Formats (M)  Output Formats (N)
HOW?

The need for an intermediate representation

Input Formats (M)    Output Formats (N)

M*N migrators
IR: DBML

Input Formats (M)   Output Formats (N)

For each new output or input format you only need to code one new migrator.
DBML design Principles

- Hardware independent;
- Software independent;
- Easy to process;
- Descriptive;
- It should be possible to add metadata;
- It should be possible to add semantics;
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XML was the obvious choice
SIP Structure (DB Example)
SIP Structure (DB example)
**SIP Structure (DB example)**

**KEEPS Employees**

- **DBML:**
  - Data;
  - Structure;
  - Other metadata.

- **Descriptive Metadata (EAD):**
  - producer
  - collection
  - ...

- **Manifest**
SIP Structure (DB example)

Binaries

DBML:
- Data;
- Structure;
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Manifest

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SIP Structure (DB example)

Technical Metadata:
- color
- dimensions
- ...

Manifest

Descriptive Metadata (EAD):
- producer
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Binaries

Manifest

Compressed File

KEEPS Employees
Databases: RODA Answers

- How do we store them?
  - DBML + binaries + technical metadata
- How do we access them?
  - PhpMyAdmin (hacked version)
Databases: RODA Answers

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DBML: input converters

- SQL Server (tested on 2005 version);
- Postgres (tested, demo tomorrow);
- MySQL (tested, demo tomorrow);
- DBML (tested, demo tomorrow);
- MS Access (tested, demo tomorrow);
- ODBC (tested, with problems...).

Input being harvested from...
**DBML: output converters**

- SQL Server (tested on 2005 version);
- Postgres (tested, demo tomorrow);
- MySQL (tested, demo tomorrow);
- DBML (tested, demo tomorrow);
- MS Access (tested, demo tomorrow);
- PhpMyAdmin optimized SQL (tested, ...);
- Postgres SQL.

Output format being generated...
Some problems

- Extracting data is easy:
  ✦ SELECT * FROM ...

- Extracting the structure is not:
  ✦ DBMS protect this information;
  ✦ Each DBMS stores it differently;
  ✦ Different versions of the same DBMS can also act differently;
  ✦ We have to “prepare/hack” the DBMS.
SIP Builder

SIP Creator

SQL Server Mediator

Access Mediator

Oracle Mediator

Metadata

DBML

Files

SIP Packaging

SIP
Real Scenario

- Many archives have ARQBASE/WINISIS databases;
- Others have CALM databases;
- They want to migrate to a newer system;
- Those systems export XML.

With DBML we are one XSLT stylesheet distance from solving the problem...
Browser
Metadata Editor

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Preservation Metadata Viewer
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Final thoughts

“Data Preservation is a people problem”
Michael Lesk
Final thoughts

“Data Preservation is a people problem”
Michael Lesk

• People need to be trained to save data in a proper way.
• What to preserve? Data, Structure, Semantics...
• Preservation is for future users but only today users vote on budget
• We need to make data collecting people have preservation concerns
• Preservation is fault tolerance. All systems are imperfect
**Business model**

- CRiB is free: mferreira@keep.pt
- RODA is *free*: property of Portuguese National Archives
- RODA community is being created
- Support, maintenance and internationalization: KEEP Solutions Lda, [www.keep.pt](http://www.keep.pt)
Let’s Preserve Tomorrow’s History...

Questions?

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