Architecture Model
State of the Art and Open Issues

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Digital Library “Systems” Evolution: Conceptual aspects

From *content-centric*

- in charge of simply organising and providing access to particular collections of data

... to *person-centric*

- aiming at providing facilities for communication, collaboration and any kind of user interaction

... to *person-wide oriented*

- aiming at supporting the whole set of actors working to realise the person-centric systems view, i.e. End-users, DL Designers, DL System Administrators, DL Application Developers
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The request for Digital Libraries has changed

- enabling tools supporting virtual communities
- dynamic aggregative nature resulting from a task
- highly evolving requirements
- limited time-frames
- limited budget

...invalidating current delivery practices, namely “from-scratch” and ad hoc solutions

Moving DL “systems” development from an art to a discipline

- strong and widely accepted models as foundations
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Moving DL “systems” development from an art to a discipline
- strong and widely accepted models as foundations
to have a uniform and common terminology to describe competing systems at different level of abstractions
- to help decision makers and stakeholders in judging different solutions
- to help DL System Administrators in controlling potentially complex systems and making this automatic as much as possible (e.g., monitoring, dynamic deployment)
- to help DL Application Developers in implementing “standard” solutions that re-use/integrate existing assets and can be re-used/integrated (cross/self-fertilisation)

The aim is to identify the minimal set of unifying concepts (Reference Model), abstract solutions (Reference Architecture), and blueprints (Concrete Architecture) to implement Digital Library “systems”
Architecture: a Foundational Concept with Modelling Issues

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A Comprehensive and Programmatic Concretisation Stack

Reference Model

Reference Architecture

Concrete Architecture

Implementation

Related Work
- Best Practices
- Research
- Protocols
- Standards
- Specifications
- Off the shelf Components and Systems

Goals
- Requirements
- Motivations
- Market

Input
- accounts for
- guided by
- derived by
- constrained by
- use

Inspired by “Reference Model for Service Oriented Architecture 1.0”

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Architecture Model: State of the Art and Open Issues
Many models exist (even standard), highly heterogeneous in goal and scope

- Architecture of the World Wide Web (W3C)
- Web Services Architecture (W3C)
- Ontologies, e.g. CSO/COSC/COWS, OWL-S, WSMO

...promoted patterns need to be tailored and adapted to the specific context(s) in a systematic way

Current wide-in-scope models in the Digital Library area

- 5S: Streams, Structures, Spaces, Scenarios, Societies
- The DLF Framework
- The DELOS Framework (in progress)

...having different focus on Architectural Models and their concretisation
Component-oriented Approach

From system theory: the more complex a system is, the more “unknowns” it contains and thus, the harder it is to automate it

- decomposing complex systems into smaller, more manageable ones that are easier to control
- treating the whole system as a composition of its parts

This also happens in software systems development²

Component as a new Resource Type

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Architecture Model: State of the Art and Open Issues
Reference Architecture(s)

Layers organizing “different” functions

- Application Framework
- Enabling Components
- DL Application Components
Reference Architecture(s)

Supports component operation

- DL Application Components
- Enabling Components
- Application Framework
Supports component to component cooperation
Reference Architecture(s)

Provides application functions

- Application Framework
- Enabling Components
- DL Application Components
Reference Architecture(s)

Functional areas group homogeneous functions
### How Many Reference and Concrete Architecture(s)?

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<tbody>
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<td></td>
<td>(concepts &amp; relationships)</td>
<td>(abstract solutions)</td>
<td>(blueprint)</td>
</tr>
<tr>
<td>Personal DL</td>
<td>Repository</td>
<td>local &amp; centralised</td>
<td>JDBC</td>
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<tr>
<td></td>
<td>Search</td>
<td>local</td>
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<td>Large Scale DL</td>
<td>Repository</td>
<td>remote &amp; distributed</td>
<td>OAI-PMH</td>
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<td>Search</td>
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- **Ref. Model**: Reference Model
- **Ref. Arch.**: Reference Architecture
- **Conc. Arch.**: Concrete Architecture

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Architecture Model: State of the Art and Open Issues
A comprehensive and fully-fledged Architectural Framework is a mandatory “tool” to promote and support

- software and systems interoperability
- assets sharing and re-use
- distributed and co-operative development

Open Questions

- Is the Architectural Framework a DL Community need?
- Has the Digital Architectural Framework specific peculiarities w.r.t. an Information System architecture?
- How many classes of Digital Library “systems” exist, i.e. how many Reference and Concrete Architecture need to be addressed?

Thank you!

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Thank you!
Additional slides
The DELOS Resource Model

Background & Motivations
Architecture Model
Open Issues

The DELOS Resource Model

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