On The Process of Systems Integration

Wilhelm (Willi) Hasselbring
Infolab, Tilburg University

Viewpoints:

• Traditional bottom-up integration
• Top-down integration
• Combined yo-yo approach
Traditional Bottom-Up Integration

- Export schema 1
  - Filtering (extraction)
  - Component schema 1
    - Transformation
    - CDBS 1 local schema

- Export schema 2
  - Filtering (extraction)
  - Component schema 2
    - Transformation
    - CDBS 2 local schema

- Common federated schema
  - Integration (merging)
Example: Two Local Schemas

Assumptions: PersonU and PersonL do overlap; EmployeeB and StudentB are subsets of EmployeeU and Student, respectively.
Integration with the “Upward Inheritance Principle”
Additional Assumption: Employees of the library are employees of the university
Another Example

Adopted from:
Initial Result of the Integration
Minimizing the number of classes through vertical merging
Minimizing the number of classes through horizontal merging
Top-Down Integration as an Alternative

common federated schema (based on some standards)

- export schema 1
  - mapping
  - component schema 1
    - transformation
    - CDBS 1
      - local schema
  - mapping
  - component schema 2
    - transformation
    - CDBS 2
      - local schema

filtering (extraction)

top-down integration process
Domain-Specific Software Architecture Development Process

Emphasis on separation of

- Domain Engineering and
- Application Engineering.
Artifacts and Roles

Domain models should be based on domain-specific standards.
Combined Yo-Yo Approach

- **Export Schema 1**
  - Component Schema 1 (Local Schema)
  - CDBS 1
- **Export Schema 2**
  - Component Schema 2 (Local Schema)
  - CDBS 2

- **Common Federated Schema** (Based on Some Standard)
  - Integration (Merging)
  - Filtering (Extraction)

- **Combined Integration Process**
  - Transformation
  - Mapping
Domain/Application Engineering and FDBS

- Domain specific
  - (based on some standard)
  - filtering (extraction)
  - mapping
  - transformation

- Application specific
  - integration (merging)
  - filtering (extraction)
  - transformation

- Common federated schema
- Export schema
- Component schema
- Local schema
Domain Facilitators & Mediators

- Global Application
- Application Mediator
- Domain Facilitator
- Domain Model A
- Integration Mediator
- Wrapper
- Local Application
- Local System

- Global Application
- Application Mediator
- Domain Facilitator
- Domain Model B
- Integration Mediator
- Wrapper
- Local Application
- Local System
Summary

Jim Kleewein at VLDB ‘96:

``Schema integration is one aspect of usability that impedes federation. There are often thousands of tables or views involved in a federation making maintenance of a global schema difficult.”

Basing the global schema on standards-based domain models should avoid changes to the fundamental structure of this schema, making integration more usable and scalable.

Approach:

• Shifting the responsibility for the integration from the multidatabase level towards the local level.

• The integration mediators have to do more, the domain facilitators do less.

Any comments?