

## Living Documents – Micro Servers for Documents



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<http://www.living-documents.org>

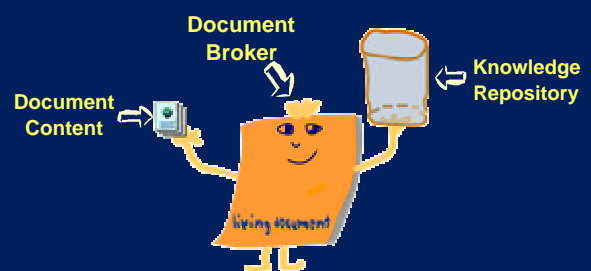
## Outline

- Motivation
- What are Living Documents ?
- Architecture
- Applications
- Implementation
- Summary

## Motivation

- Organizing documents
  - Individual file structures and folders stress on hierarchical structures
  - Databases provide a predefined set of attributes
- Finding documents
  - Focus on location, not on properties of documents
- Documents are mostly passive information
  - Behavior is inside (document) applications
  - Adding new behavior is difficult
- Automating document interaction
  - “Shift more responsibility to documents themselves”
  - Provide a mechanism to automate the interaction with documents

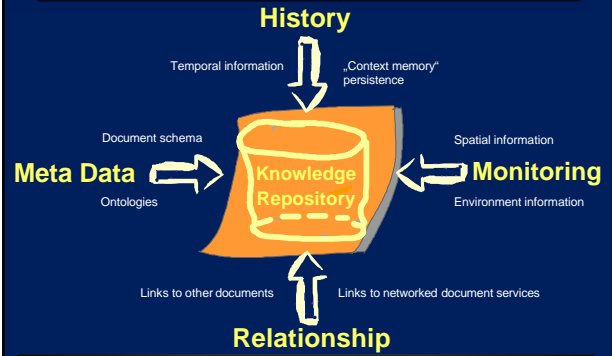
## Living Documents – Main Components



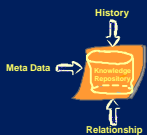
## Why are they called „Living“ Documents ?

- Document Brokers
  - Migrating, roaming networks
  - Active, reactive and pro-active capabilities
  - Document functionality as mobile code
- Knowledge Repository
  - Documents' memory
  - Changes in size
- Environment
  - Documents sense and interact with their environment

## Document State Information (DSI)

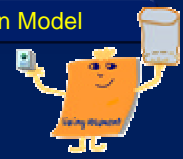


## Knowledge Repository – Managing Document State Information



- Platform independent representation
  - XML, Specto Markup Language
- Uniform access to elements and attributes
  - Middleware
- Separated process of interpretation
  - Ontologies
- Service facilities
  - Retrieval and deduction services

## Programming and Interaction Model

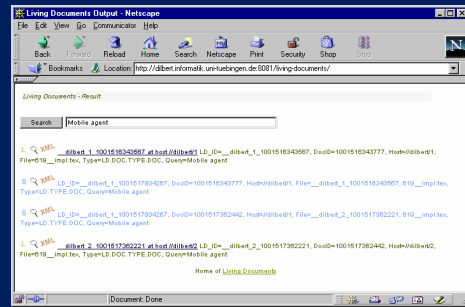


- Agents as Document Brokers
  - KQML
  - Object-oriented
- XML
  - Specification, accessing, interpretation of Document State Information
- Interaction
  - Local interaction by sending messages between agents
- Coordination
  - Event model
  - Loosely coupled coordination
  - Publish/subscribe communication

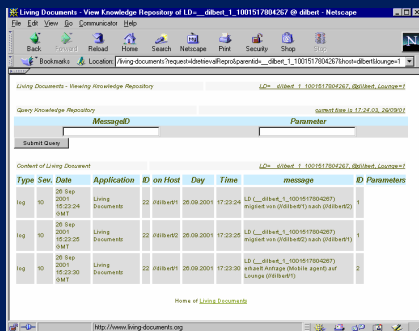
## Applications - Examples

- Web information systems
  - N-tier client-server architecture
  - Relational database at the backend tier
  - Example: *PaperBase – Creating Personal Information Workspaces*  
<http://www.sr.informatik.uni-uebingen.de/~schimkat/pb>
  - Digital document archive
- Living Hypertext
  - Web information retrieval
  - Inter-linked Living Documents
  - Topic distillation
  - Calculation of hub and authority scores
- Workflow applications

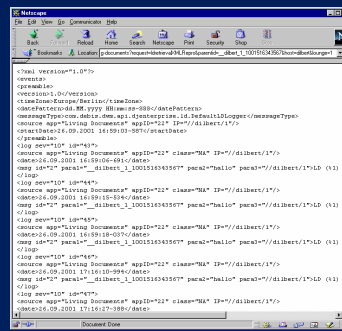
## Screenshots – Searching Living Documents



## Screenshots – Knowledge Repository Retrieval Interface



## Screenshots – Knowledge Repository as Native XML



## Implementation

- Mobile agents
  - *Okeanos* – mobile agent framework
  - Java (JDK 1.3)
  - *JESS* (Java Expert System Shell)
- XML-based knowledge repository
  - *Specto* Markup Language
  - Simple query language
- Coordination middleware
  - *Siena* – global, content-based event notification middleware
  - *Mitto* – lightweight, subject-based event notification middleware

## Summary

- Living Documents
- Assigning lightweight databases to documents
- Documents with active and pro-active capabilities
- Middleware for interesting new kinds of applications

## Further Informations

Visit HomePage at <http://www.living-documents.org>

