Chapter 1 – Overview
Overview

- "Content"
  - data, documents, multi-media objects, ... accessible in computer networks
  - content is published
  - by editor, author

- "Content" in a digital library
  - documents, multi-media objects, ... of long-term value
  - content is archived
  - user: reader, customer, librarian
Content

- Information, to be "published" (made available) in LANs oder WANs (web)
  - structured, semi-structured, unstructured
  - > 85% of enterprise content resides outside a DB
    - file systems, specialized audio/video systems

- Examples
  - bills, reports, ...
  - scanned paper/fax documents
  - structured data in Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) systems
  - e-mail
  - office documents, mail
  - audio, video, images
  - web content
Content Management

- Process of managing content to be made available in a LAN/WAN
  - especially management of multi-media content
- Management functionality
  - data & document creation/authoring, editing, storing, searching, archiving, ...
  - core aspects
    - extraction/creation of meta data to further describe documents
    - search based on meta data and content
- storage and search
  - RDBMS
  - Multi-media DBMS
  - Document Management Systems
Separation of Structure, Content, and Presentation

- "Anatomy" of a document

![Pie chart showing separation of structure, content, and presentation]

- Structure
- Content
- Presentation
  - Templates, Stylesheets
  - Raw Data
  - Document Type Definition
Web Content Management

- Restricted view of content management: to publish on the web
  - web site management
  - further restriction: management of dynamic web pages (fed by DB)
    - even more restricted: authoring tools for dynamic web pages
- Important capabilities
  - separation of content and layout
    - page templates
    - content authoring independent from web site programming
    - creation/modification of standardized layouts
  - automatic creation and maintenance of web site based on content updates
  - support for different kinds of users
    - content author, template author, editor, administrator
    - usually employs workflow management systems/techniques
Document Management

- Creation and management of multi-media documents
- Representation and control of document workflow
  - document routing
- Usually employed in a closed, intra-enterprise environment, not the web
- Advantages over web content management systems: document management systems often also manage the content (i.e., the documents)
- Document: often an office document with limited, standardized meta data
- Documents in digital libraries: structured meta data depending on document type
Workflow management is an integral component

- Start Node
- Collection Point
- Work Node

- Start
- Continue
- Review Application
- Approve
- Reject
- Update LOB Database
- Completed

- Wait for Documents
- Send Approval
- Send Rejection
- Completed

- End Node
Enterprise Content Management

- Idea: all kinds of (unstructured) content are managed by a repository
  - independent of individual applications using/accessing the content
  - see: development of DBMS
- Management and access
  - storage, search
  - access control
  - versioning, check-out/check-in
  - warehousing vs. federation (materialized vs. virtual integration)
- "Intelligence"
  - analysis and mining for unstructured content
- Information Integration
  - integration with structured content
Phases Of Content Management

- "Level 1": focus on creation/publishing
  - creation of content, documents
  - gathering, integration of (external) documents
  - authoring, editing
  - review, approval
  - publication

- "Level 2": focus on storage/management (⇒ content repository)
  - catalogue/store
  - manage
  - query/retrieval
  - distribution
  - archiving

⇒ requires generalization of traditional DBMS functionality to support multimedia documents
"Classic" Library

- Collects, provides access to, and archives documents of long-term value
- Registers meta data and makes it available to readers for retrieval purposes
- Resembles single access point for users to all publications, regardless of document publisher
More Information Every Day

- Example: scientific journals
  - 1951: 10.000
  - today: ~160.000
  - some with only 100 subscribers, cost per year per subscription can reach 10.000 Euros

Problems
- How to find relevant literature
- How to pay for the literature (Uni KL: reduced budget for computer science journal subscriptions, but subscription rates are rising)

Digital libraries as potential solution?
Digital Libraries

- Digital library is
  - a collection of documents with long-term value,
  - which are described and retrievable using meta data,
  - remain referencable for a long time,
  - may be versioned, but individual documents remain unchanged,
  - can be considered as digital
  - may be bought/owned by customer

- Digital library is
  - a software system to support document creation, access, description, storage, distribution, search, presentation, usage, and archiving
  - may be distributed world-wide, may include authors, content providers (publishers), mediators (libraries) and users
DL: a "Showcase" for Applied CS?

Digital Libraries: modern information system with many challenges
- information retrieval and search in DBMS (object-relational, semi-structured, ...)
- multi-media retrieval, MMDBMS
- notification, alerting
- document representation
- distribution, storage media
- user interface (usability)
- archiving
- business models (electronic commerce, payment models)
- international exchange (standards, ...)
- legal issues
Content Management vs. Digital Libraries

- **Digital Libraries**
  - long-term management of meta data and documents
  - provider-side and customer-side content management
  - Emphasize different phases of the CM life cycle

- **Content Management**
  - creation and presentation of content
  - author, publisher
  - focus is more on level 1 of the content management phases

- **Digital Library**
  - collecting, storing, archiving, searching/retrieving, and using content
  - library, reader/customer
  - focus is more on level 2 of the content management phases
Multimedia Database Management Systems

- Extend the functionality of DBMS to manage multi-media objects
  - similarity search
  - specialized access paths
  - storage structures
    - large objects
  - data "delivery"
- ... but keep the well-known advantages of DBMS
  - data models, data independence
  - query languages, content-based search
  - transactions
  - ...
XML Databases

- Management of XML data and documents
- Object-relational or hybrid XML/SQL DBMS with
  - data type XML
  - import/export capabilities for XML (shredding of documents)
- XML DBMS
- XML search engines for document management systems
Course Outline

- Two major blocks
  - Block 1: Content and Document Repositories
    - Concepts and Definitions
    - Multimedia Data and Information Retrieval
    - Documents and Hypermedia
    - DBMS-support
      - Multimedia Databases
      - Object-Relational DBMS (with multi-media/XML support)
  - Block 2: Additional Aspects for Content Management and Digital Libraries
    - Functionality
    - Systems and Architectures

- Literature references will be provided for each chapter separately