

Learning Objects

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Leaders in Learning

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Assumptions

- There are thousands of colleges
- They teach common course topics, say, sine wave functions
- They decide to put these course topics online

Premise

- The world does not need thousands of similar descriptions of sine wave functions available online
- It needs one, or maybe a dozen

Courses? No, Not Courses

- Online learning listings offer only courses
- But course articulation is a complex business, and tends to be regional in nature
- Very few courses offer the same contents
- Thus, courses are *not* suitable candidates for sharing

Sharing the Old Way

- We already share. Examples include:
 - Textbooks
 - Wall maps
 - Videos and movies
 - Software
- Sharing the old way involves (a) fee or purchase, and (b) are *parts* of classes

Contemporary Sharing

- Many institutions – usually private or government agencies – provide learning materials online. Examples:
 - SchoolNet
 - Merlot
 - MarcoPolo
- But these institutions require (a) manual submission, and (b) manual search

What We Need

- Better systems of categorization and searching
- Robust mechanisms for updating and submissions
- Resources tied to learning objectives
- Structure and definition of types of resources

Creating Online Courses Today

- Bates: takes 37 days of subject matter expert and HTML specialists' time
- \$110,000 for 40 students
- Involves authoring all content from scratch
- And Bates is *conservative*

Rapid Application Design (RAD)

- Software engineers' re-use of program components within a CASE
- Designers can select and apply pre-defined subroutines using only drag and drop
- A common methodology, found also in kitchens and garages

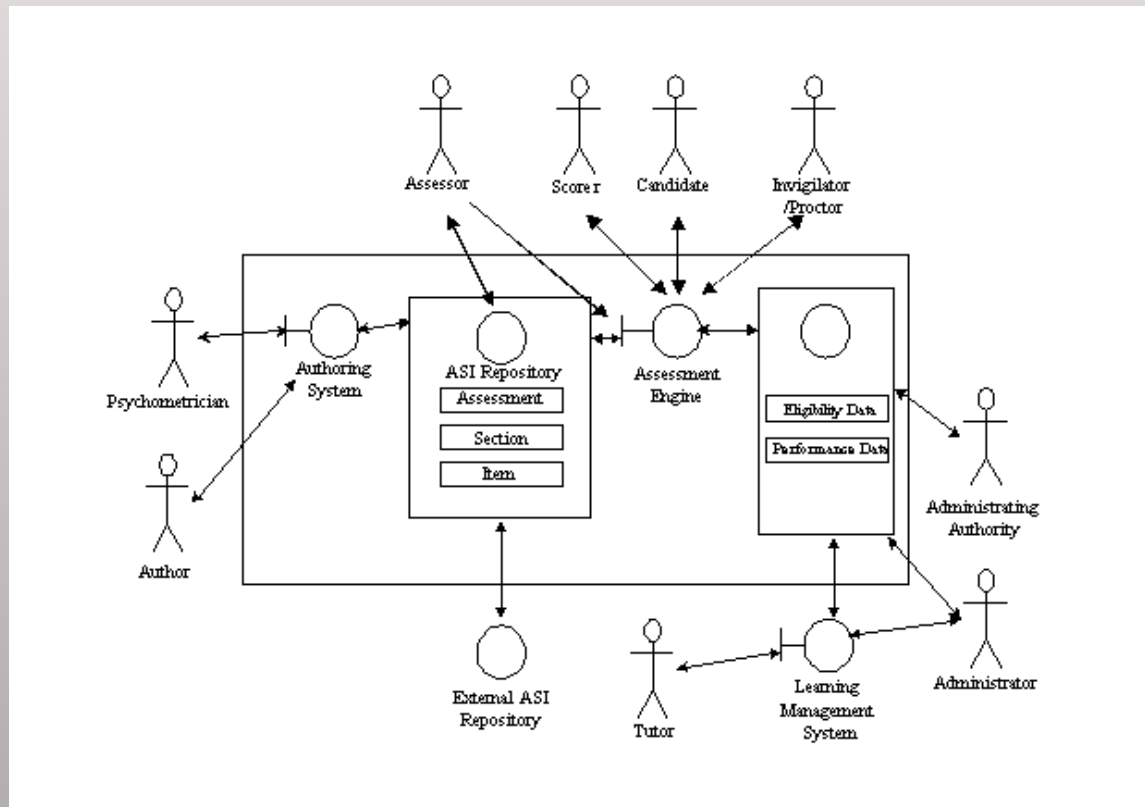
Object-Oriented Design

- Begins with the creation of a prototype
- Copies are ‘cloned’ and assigned values
- Objects in a type hierarchy ‘inherit’ properties from higher level entities
- Objects contain other objects, and interact with each other

IMS and SCORM

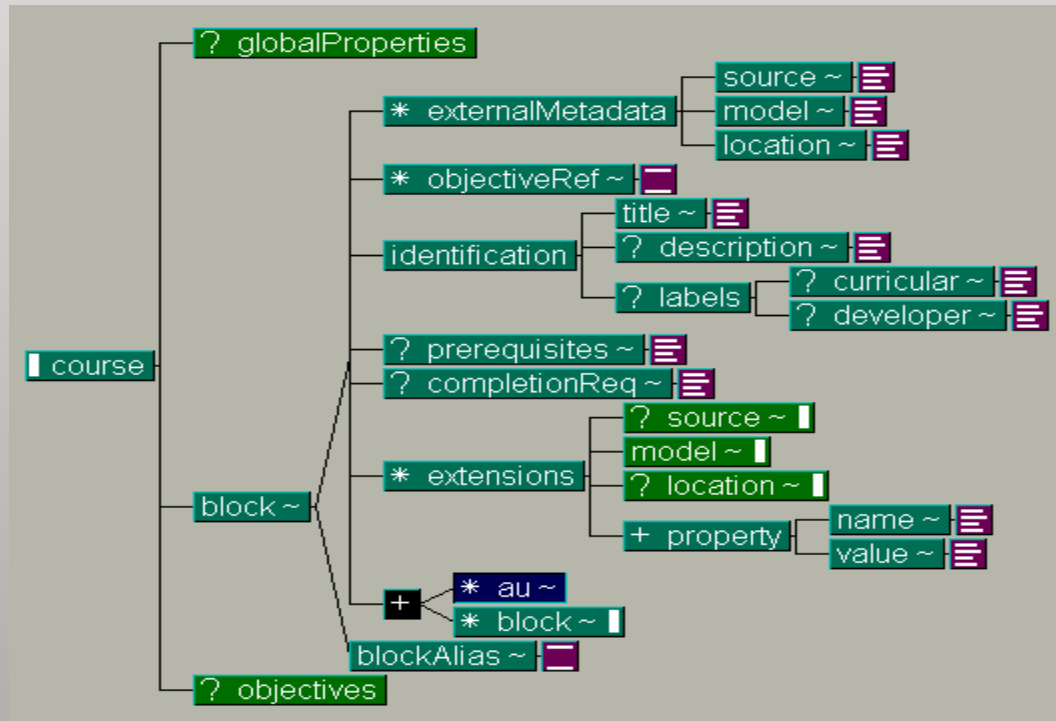
- Adopt methodologies of RAD and OOD
- Designed to support distributed learning environments and content from multiple authors
- At the core: the definition of prototype objects

Example: Questions & Tests



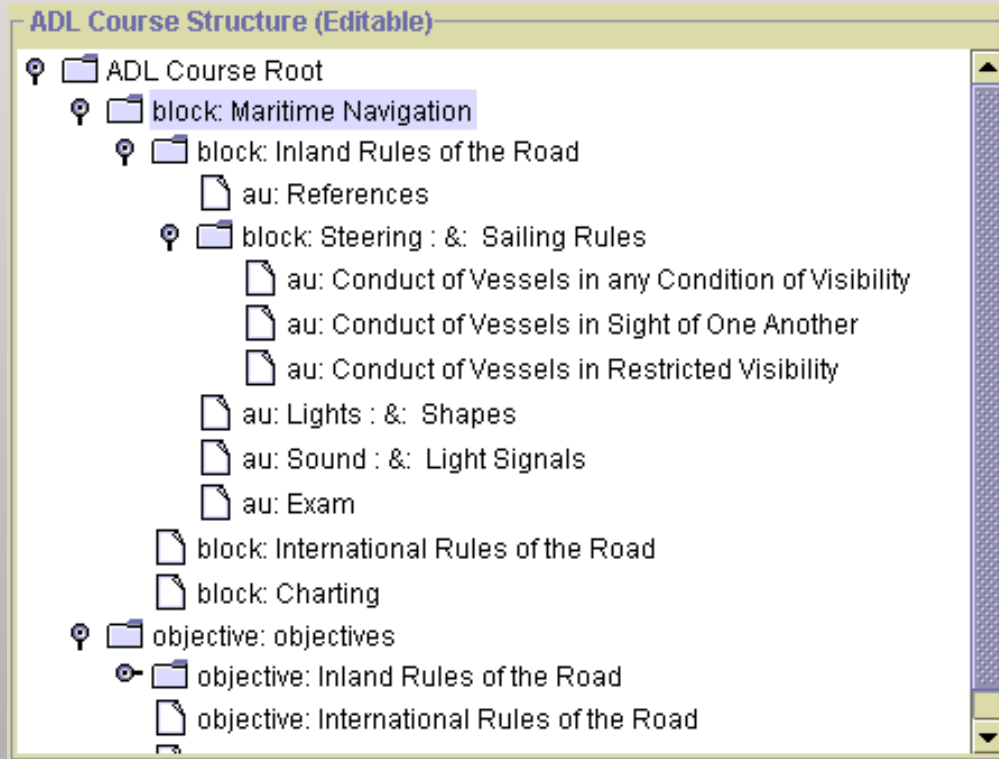
Source: IMS

Example: Hierarchies



Source: SCORM

Example: Course Components



Sopurce: SCORM

A Common Language

- XML – a structured means of representing hierarchies and properties
- Tagged language
- Used by IMS, SCORM and by many other agencies around the world

Example: In the Beginning....

```
<tome name="Bible">
```

```
  <book name="Genesis">
```

```
    <chapter name="1">
```

```
      <verse name="1">
```

```
In the beginning God created the heaven and the earth.
```

```
      </verse>
```

```
      <verse name="2">
```

```
And the earth was without form, and void; and darkness was upon the  
face of the deep. And the Spirit of God moved upon the face of the  
waters.
```

```
      </verse>
```

```
    ...
```

```
  </chapter>
```

```
  ...
```

```
</book>
```

```
...
```

```
</tome>
```


Advantages of XML

- Structured – allows definition of hierarchies
- Extensible – new tags and definitions of tags may be created as needed
- Machine readable and writable

XML is to structured information what HTML is to structured documents

Authoring - Data

- Today most documents are authored in HTML
- Intermediate stage – authoring in SGML (eg., Open Learning Agency)
- Ultimate: authored in XML

Authoring – Data (2)

- XML content will be portable
- And can be displayed through different devices, eg. screen, printer, wireless
- Context-specific XML editors used to author text

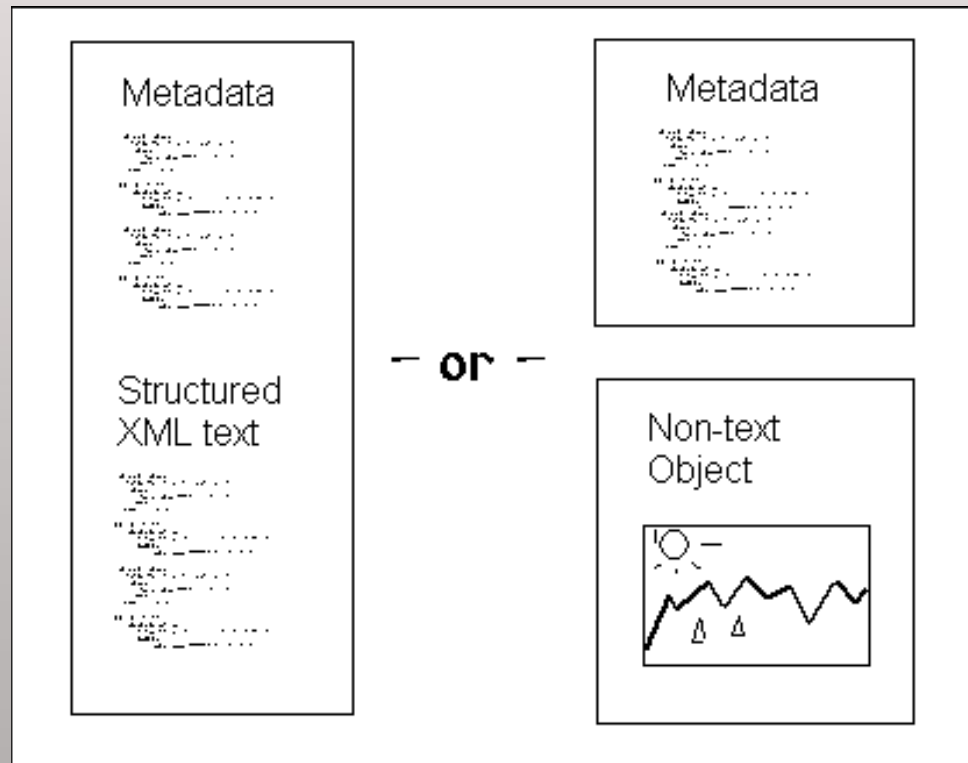
Authoring - Multimedia

- Ascendence of non-textual multimedia resources
- Today: usually available as CD-ROMS, but will all be available online
- Authors use specialized editors to create videos, animations, etc.

Authoring: Metadata

- Metadata required defined by type of object
- Will usually be generated *via* forms-based input within a Metadata editor
- Editors will determine form fields with reference to schemas – ie., prototypes
- Schemas available online

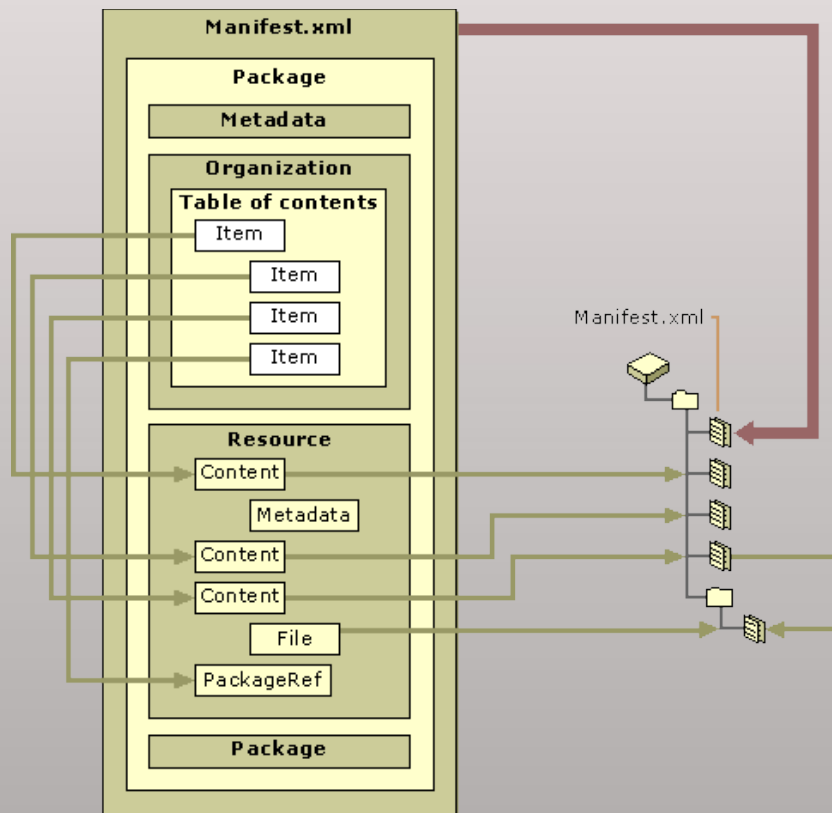
Simple Learning Objects



Complex Learning Objects

- Also written in XML
- Contain (and interact with) simple learning objects
- Schemas also defined online

Complex Learning Objects (2)



Source: Microsoft

Authoring – Complex L.O.

- Authored within an LMS Environment
- Author selects to insert type of object – may create a new one on the fly or select from existing objects
- Existing objects selected from menu
- Menu derived from focussed search of Learning Objects Repository

Selecting Materials

- Course information – eg., subject, grade level, etc. inherited from higher level object
- Other search criteria may also be defined, eg. cost, standards or credentials, or learning objectives

Learning Object Repositories

- There already exist large resource bases
- Core: database of learning objects
- Concept: multiple uses, of which online learning is only one
- Metadata automatically retrieved, filtered by learning object repositories

Syndication

- The essential concepts are already in operation
- News supplies provide content and metadata
- Syndication agencies select and filter
- Users create customized ‘newspapers’

Displaying Learning Objects

- Request to server from online course user
- Server sends material (and the bill to the institution)
- User displays in print, on screen, etc.

