
Intelligent Tagger for E-Learning

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Presentation Outline

- n Introduction
- n Objective
- n Technical Background
- n Design Considerations
- n Implementation
- n Evaluation
- n Conclusion and Future Work

Introduction ..

§ Popularity of XML

- Data storage, Information Exchange
- Describe the data in a structured manner
- Separation of content and presentation
- Used in Educational Technology

§ Basic issues in Education Technology

- Produce and deliver quality of content
- Mix and match content from other resources
- Develop interchangeable content
- Basic unit is called 'Learning Object'

§ Learning Objects

- Entities used, re-used or referenced during technology supported learning

Introduction

§ Intelligent Knowledge Management Environment (*IKME*)

- q Reusability & Extensibility.
- q Faster delivery of content.
- q Using XML as data format for publishing.

Objective

- § System to Learn the users preferences from the users history
- § Help decrease the effort required to create new Learning Objects.

Technical Background ..

n Reusable Learning Objects

- q Problems with traditional content development techniques.
- q Chunks of information.
- q Reusability.
- q Reduction of development time.

Technical Background ..

n Native XML databases

- q Databases designed specially to store *XML* documents.
- q Defines a (logical) model for an *XML* document and stores and retrieves documents according to that model.
- q Has an *XML* document as its fundamental unit of storage.
- q Provides support features commonly found in common RDBMS.

Technical Background

n XML-RPC

- q specification and set of implementations that allow remote procedure calls.
- q Uses HTTP as transport and XML as encoding.
- q Allows integration of disparate systems running in different environments.
- q Serializing & Un-Serializing of data (XML format).

Design Considerations

§ Process of Creating Learning Objects

- q Initially Sample Template initialized with blank values.
- q Sample template is loaded and displayed on the screen.
- q Store the Learning Object into database.
- q For each enumerated field determine the default values.
- q Update Sample Template (XML file) with the default values of enumerated fields.

Design Considerations..

n Why eXist ?

q Limitations of flat-file mechanism

- Data is isolated and separated
- file structure has to be defined
- Incompatible file formats
- Change in file structure may need a change in the code
- wastage of space.

Design Considerations ..

- Limitations of Cookies

- Can identify only the last preference of the user but not the longer user activity history trend.

Design Considerations ..

- q Database approach chosen because
 - n No wastage of space
 - n No redundancy in storing and defining data
 - n Flexibility to choose the history size
 - n Documents are stored in chronological order, hence recent user activity can be known.

Design Considerations

- n Determining the default value from the users history
 - n From the Schema, identify the enumerated fields.
 - n For each enumerated field, Query the eXist database for recent N Learning Objects.
 - n Extract the enumerated field content from the results.
 - n Choose the most common value as the default value.
 - n Data structures used are one-dimensional arrays.

Implementation

- n Perl Version 5.0 and later
- n Apache Web Server
- n eXist V0.9 and later
- n Additional Perl Modules
 - q RPC::XML
 - q RPC::XML::Client
 - q XML::Twig
 - q XML::Sablotron
 - q Data::Dumper
 - q CGI

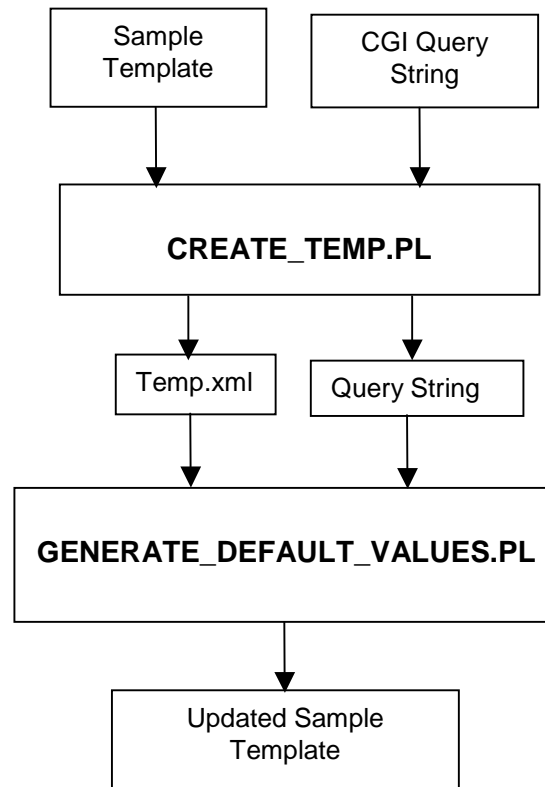
Implementation ..

n Major sections:

- q Parse_Schema.pl
- q Create_Temp.pl
- q Generate_Default_Values.pl

Implementation ..

n System Design



Implementation ..

n System Inputs

q Sample Template file:

XML file, that has all the required fields for creating Learning Object.

q CGI Query String:

The array of attribute values obtained from the users Web Page as a cgi query string.

Implementation ..

n Example of Sample Template

<object>

<metadata>

<portionmark></portionmark>

<environment></environment>

→ Empty enumerated fields

....

</metadata>

.....

<tracking>

</tracking>

</object>

Implementation ..


n System Output - Updated Sample Template

- q The Sample template now has default values assigned for each enumerated field.

Implementation ..

n Example of Updated Sample Template

```
<object>
  <metadata>
    <portionmark> T </portionmark>
    <environment> NBC </environment>
    .....
  </metadata>
</object>
```



Updated enumerated fields

Implementation ..

- n Intermediate Output - *Temp.xml*
 - q Temporary XML file that has all the sub-fields of a highest level field in the XML Schema.
 - q Its overwritten each time when user creates new Learning Object.

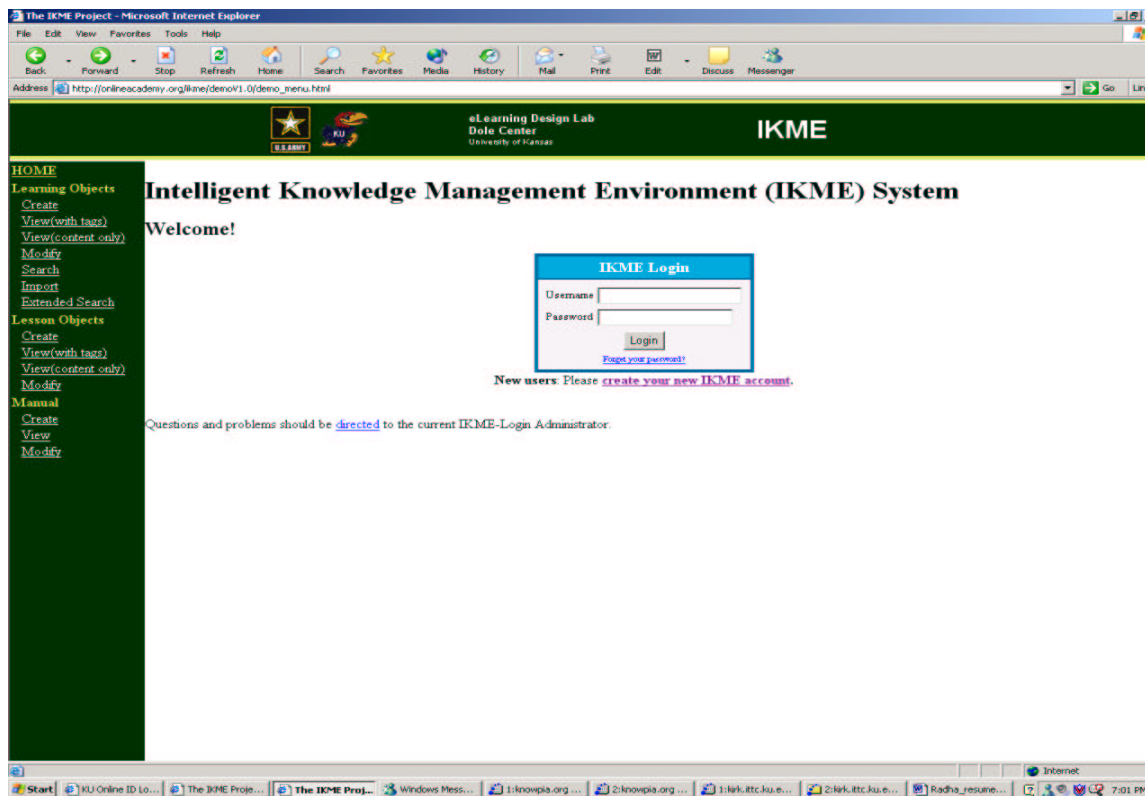
Implementation

n **Example of *Temp.xml*:**

```
<metadata>
  <security>
    <classification> Confidential </classification>
    <portionmark/> T </portionmark>
  </security>
  .....
  <description>
    <object_category> preparation </object_category>
    <object_type/>
    <proponent/>
    <vital_record/>
  </description>
  .....
</metadata>
```

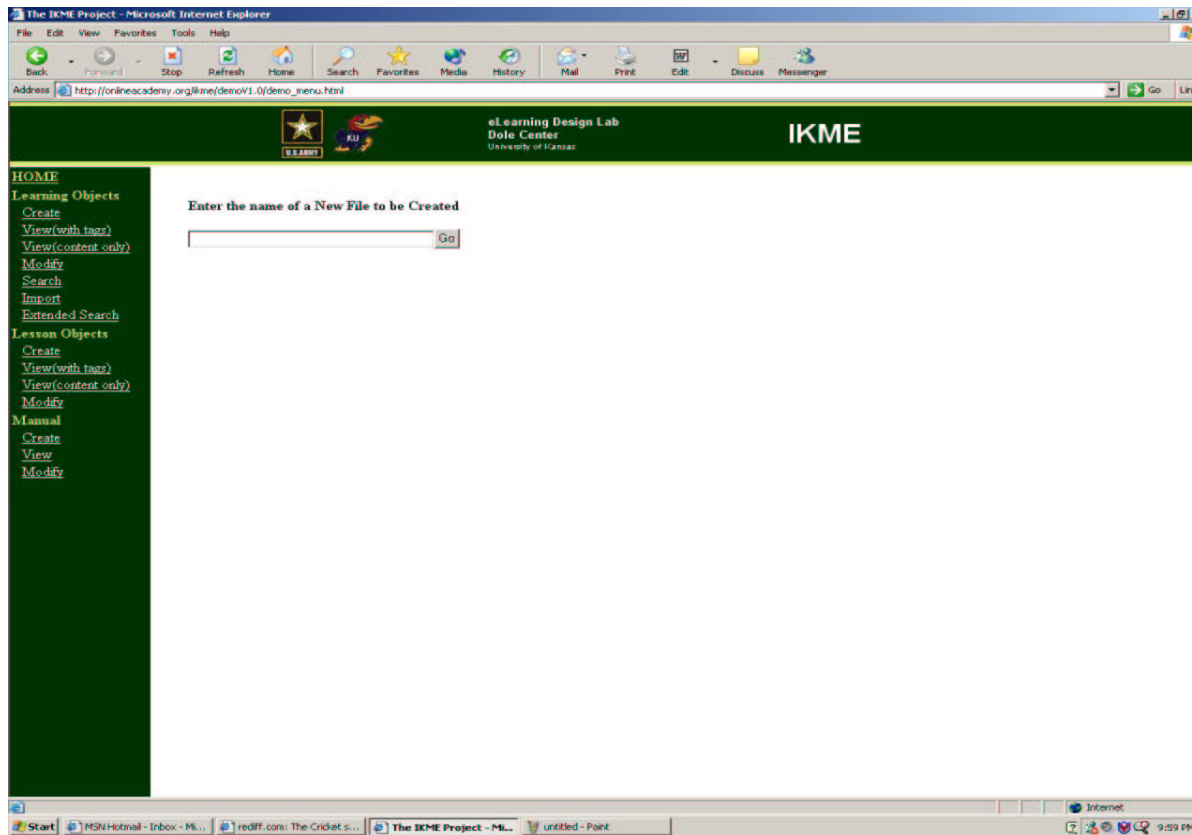
Evaluation

n Login Page - Restricts access to DB



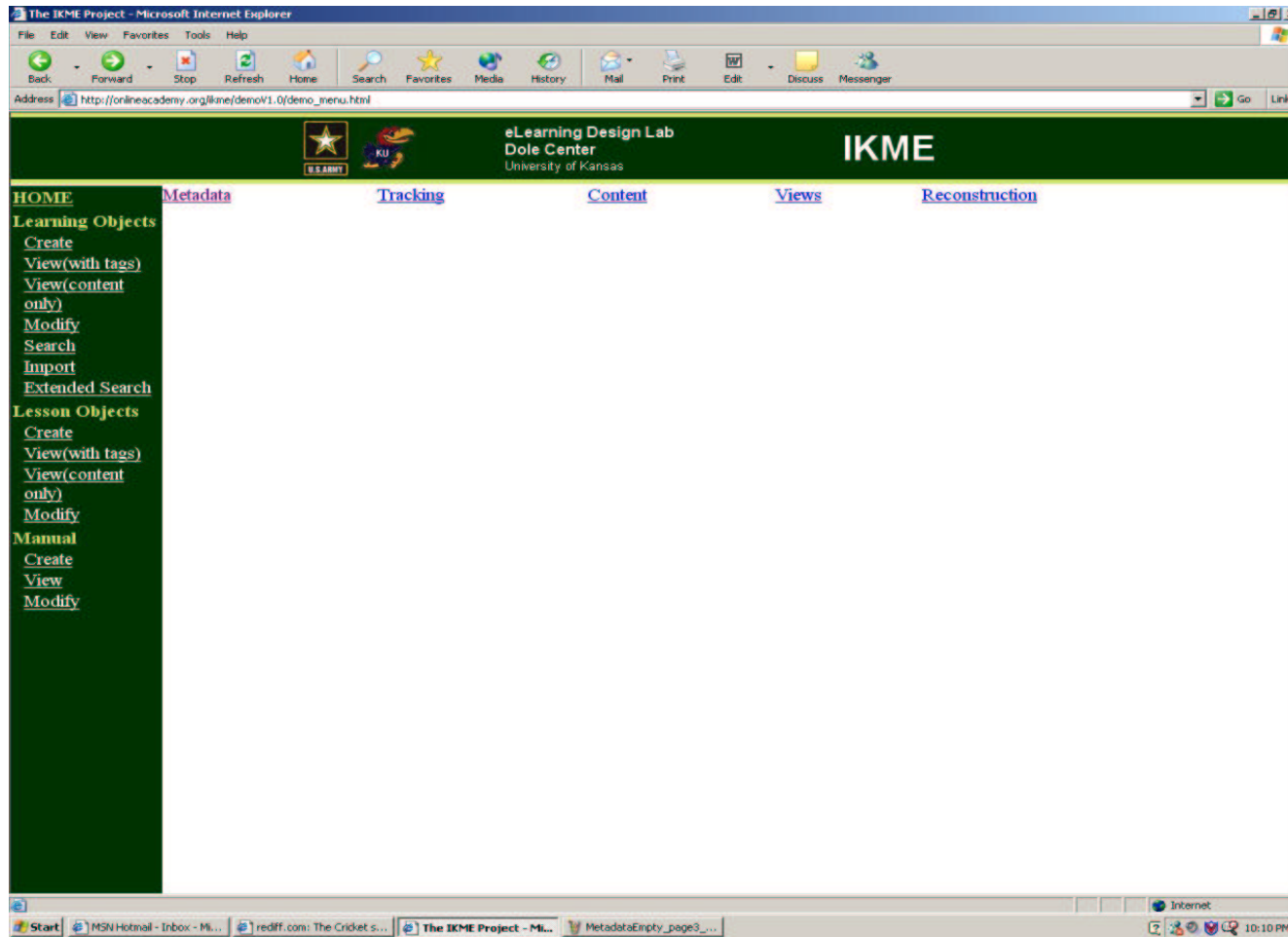
Evaluation ..

n Name the Learning Object



Evaluation ..

- n Highest level fields of Learning Object



Evaluation ..

- n Metadata and its sub-fields

The screenshot shows a web browser window titled "The IKME Project - Microsoft Internet Explorer" with the address bar displaying "http://onlineacademy.org/ikme/demoV1.0/demo_menus.html". The page header includes logos for "eLearning Design Lab", "Dole Center", and "University of Central Florida", along with the acronym "IKME".

The main content area is titled "Create Learning Object" and contains the following sections:

- File Name:** A text input field containing "dec26_doc1.xml".
- Number of Docs to be included for Users-History (Default = 5):** A numeric input field with a value of "5".
- Metadata:**
 - Security:** Includes a "Classification" dropdown menu set to "Unclassified" and a "Portionmark" dropdown menu.
 - Add Restriction:** A button labeled "Restriction".
 - Source:** A section titled "Source Document Header" with several text input fields: "Title of the Source Document", "Publication (if source was in a larger publication)", "Edition (if applicable)", "Date of the source document", and "Comment about the Source".
 - Add:** A button labeled "Event Information".
 - Description:** Includes a "Category" dropdown menu and an "Object type" label.

Dashed lines from the text "Empty Tags" point to the "Classification", "Portionmark", and "Category" dropdown menus, indicating that these fields are currently empty or have no selected value.

Evaluation ..

n Metadata and its sub-fields

The screenshot shows a web browser window titled "The IKME Project - Microsoft Internet Explorer" with the address bar displaying "http://onlineacademy.org/ikme/demo/v1.0/demo_menu.html". The page header includes the "eLearning Design Lab Dale Center" logo and the text "IKME".

The main content area is a metadata form with the following sections and fields:

- HOME** (left sidebar):
 - Learning Objects: Create, View(with tags), View(content only), Modify, Search, Import, Extended Search
 - Lesson Objects: Create, View(with tags), View(content only), Modify
 - Manual: Create, View, Modify
- Topic**:
 - Add: Revision Date
 - Topic Node: [Text Input]
 - Add: Topic Acronym
 - Taxonpath: [Text Input]
 - Add: Cross Reference
- Applicability**:
 - Add: indicator
 - Branch: [Dropdown Menu]
 - Add Branch: Branch
 - Add Echelon: Echelon
 - Add Unittype: Unittype
 - Add Executor: Executor
 - Environment: [Dropdown Menu]
 - Add Environment: Environment
- File**:
 - Document Scheme: [Text Input]
 - Name: [Text Input]
 - Format: [Dropdown Menu (MIME Type)]
 - Location: [Text Input]

A diagram of dashed lines connects the "Add" buttons for "Revision Date", "Cross Reference", "Environment", and "Indicator" to a box labeled "Empty Tags".

The browser's taskbar at the bottom shows several open applications: Start, MSN Hotmail - Inbox - M..., rediff.com: The Cricket s..., The IKME Project - M..., and untitled - Paint. The system tray shows the Internet icon and the time 10:12 PM.

Evaluation ..

- n Metadata – next logins, enumerated fields with default values

The screenshot shows a web browser window titled "The IKME Project - Microsoft Internet Explorer". The address bar shows "http://onlineacademy.org/ikme/demoV1.0/demo_menu.html". The page header includes the IKME logo and "eLearning Design Lab Dole Center University of Idaho".

The main content area is titled "Create Learning Object". It contains the following sections:

- File Name:** A text input field containing "dec26_doc1.xml".
- Number of Docs to be included for Users-History (Default = 5):** A radio button selection with options 5, 10, and 20. The "5" option is selected.
- Metadata**
 - Security:** A "Classification" dropdown menu set to "Confidential" and a "Portionmark" dropdown menu set to "T".
 - Add Restriction:** A button labeled "Restriction".
 - Source:**
 - Source Document Header:** A text input field.
 - Title of the Source Document:** A text input field.
 - Publication(if source was in a larger publication):** A text input field.
 - Edition(if applicable):** A text input field.
 - Date of the source document:** A text input field.
 - Comment about the Source:** A text input field.
 - Add:** A button labeled "Event Information".
 - Description:** A "Category" dropdown menu set to "Preparation".

Dashed lines from the text "Predicted Values" on the right point to the "Confidential" dropdown, the "T" dropdown, and the "Preparation" dropdown.

The browser's taskbar at the bottom shows several open tabs: "Start", "MSN Hotmail - Inbox - Mi...", "rediff.com: The Cricket s...", "The IKME Project - ML...", and "MetadataEmpty_page3...". The system clock shows "10:13 PM".

Evaluation

- n Metadata – next logins, enumerated fields with default values

The screenshot displays the IKME Project web application interface. The browser window title is "The IKME Project - Microsoft Internet Explorer". The address bar shows the URL: http://onlineacademy.org/ikme/demoV1.0/demo_menu.html. The page header includes the U.S. Army logo, "eLearning Design Lab", "Dole Center", "University of Idaho", and the acronym "IKME".

The main content area is a metadata form with the following sections and fields:

- HOME** (Navigation menu on the left):
 - Learning Objects: Create, View(with tags), View(content only), Modify, Search, Import, Extended Search
 - Lesson Objects: Create, View(with tags), View(content only), Modify
 - Manual: Create, View, Modify
- Revision Date**: Add: [Text input]
- Topic**:
 - Topic Node: [Text input]
 - Add: Topic Acronym: [Text input]
 - Taxenpath: [Text input]
- Cross Reference**: Add: [Text input]
- Applicability**:
 - Add: indicator: [Text input]
 - Branch: [Dropdown menu, selected: Transportation]
 - Add Branch: Branch [Text input]
 - Add Echelon: Echelon [Text input]
 - Add Unittype: Unittype [Text input]
 - Add Executor: Executor [Text input]
 - Environment: [Dropdown menu, selected: NBC]
 - Add Environment: Environment [Text input]
- File**:
 - Document Scheme: [Text input]
 - Name: [Text input]
 - Format: [Dropdown menu, selected: Non-Digital]
 - Location: [Text input]

A dashed line labeled "Predicted Values" points to the "Branch" dropdown menu.

The bottom of the browser window shows the taskbar with several open applications: Start, MSN Hotmail - Inbox - M..., rediff.com: The Cricket s..., The IKME Project - M..., and MetadataProcessed_pag... The system clock shows 10:15 PM.

Benefits and Costs

n Benefits

- q Nothing has to be put on clients machine, user can thus work from any machine.
- q No redundancy in storing and defining data.
- q User has the flexibility to choose the total Learning Objects for his history.

Benefits and Costs continued

n Costs

- q User must login each time.
- q Cost involved in accessing and updating the database.
 - Database has to be queried M times,
 M = Size of history.

Future work

- n Extend the functionality of login system to support multiple users with individual logins.
- n Also, learn the preferences on optional enumerated fields.
- n Investigate the size of history to get best default values.
- n Investigate the methods of weighting recent values higher than older values.

Questions ?