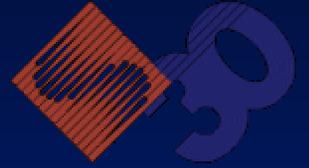


Use of Database and XML Technology for Retrieval and Repurposing of DL Contents



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Outline

- **Description of ACM SIGGRAPH Education Committee and the Digital Library (ASECDL)**
- **Search and Retrieval Issues**
- **Specific Questions**
- **Repurposing of Materials**
- **Current Status**
- **Conclusion and Issues**



ASEC Objective

- To support both **Computer Graphics & Visualization** education and the use of these in education (**Computer Science, Mathematics, Art & Design, other areas**)
- **Target age groups: K - Gray**
- **ASEC has many different projects and members from around the world**
- **Annual budget of \$50 – \$100,000 from ACM SIGGRAPH (5,000 members and annual SIGGRAPH Conference has 30-50,000 attendees)**



ASEC Taxonomy Project

- **Goal is to create a complete taxonomy of Computer Graphics (and later Visualization)**
- **Have Taxonomy reviewed by experts in the field**
- **Have Educators create curricular views based on this taxonomy, e.g. Art, Computer Science, Mathematics, etc.**

ASEC Digital Library (ASECDL) **(www.education.siggraph.org)**



- Contains Curriculum Recommendations, Activities, Results of Special Projects, Education Directory, and Instructional Materials**
- Educator usage is increasing: In past 6 months have gone from 300 to almost 500 visits per day from > 80 countries**



ASECDL Materials

- **From SIGGRAPH Conference (Reviewed)**

- Course Notes
- Education Slide Sets
- Educators Program Papers
- SIGGRAPH Video Reviews (SVRs)
- SPACE Posters

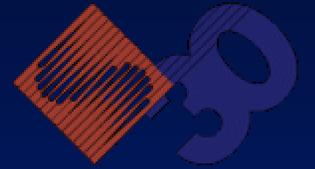
- **Other Sources**

- HyperGraph & HyperVis (Supported by previous NSF Grants and an AGOCC Grant (Ken Brodlie, Leeds))



Issues

- **DL is getting large (currently 650 mbytes and > 6500 individual files) and rapidly growing**
- **Users want to search for specific information**
- **Users want different views of material (Curricular Views from Taxonomy Project)**



Search for Specific Information

- **Database type queries:**

- Are there any SPACE Posters from GSU?
- Is there any instructional material on CG Lighting methods?
- Is there any instructional material on the Blinn lighting model?



Different Views of Material

- **I teach a computer science CG course and I want materials on ray tracing and radiosity**
- **I teach a course in computer animation in Art and I want materials on ray tracing and radiosity**



XML/XSLT/XSL

- **XML (eXtensible Markup Language)**

- Semantic markup not presentation markup (HTML)

- **XSLT (XSL Transformation) –**

- Transforms one XML document into another XML document

- **XSL (XML Style Language)**

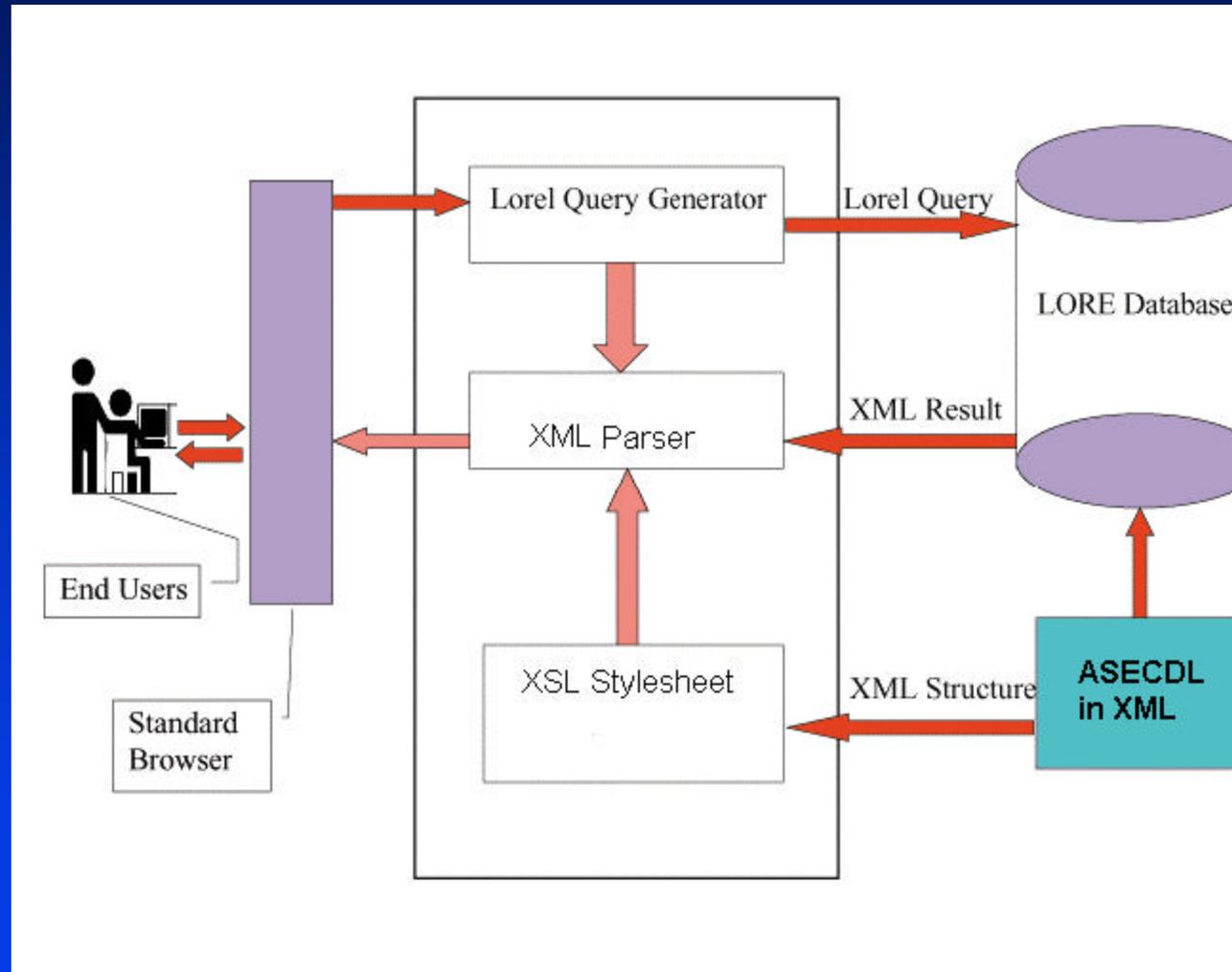
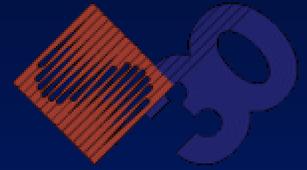
- Presentation of XML documents



Database queries: LORE Database

- Lore (Lightweight Object Repository) developed at Stanford
- Uses XML
- Process:
 - Convert HTML Documents to XML
 - Feed XML Documents to Lore – creates database
 - Use query language (Lorel) for queries
 - Uses XSL Stylesheet to display query results

Database queries: LORE Database





Current Status - Lore

- **Using SPACE Poster Gallery**
- **Have developed user – unfriendly demo**
 - **Uses socket programming in Java to communicate between browser and Lore database system**
 - **Hand coded HTML to XML**
- **Automating HTML to XML transformation**
 - **Put HTML pages in a consistent format**
- **Creating User – friendly front end**



Different Views of Materials

- **Create a Document Type Definition (DTD) based on Computer Graphics Taxonomy Project of ASEC**
- **Also use Curricular Views in DTD**
- **Develop different XSL Transformations – one for each desired view**
- **User self identifies interests, queries system and gets a different view of material.**

Example in Radiosity Rendering : Art XSLT



The Form Factor is defined as the fraction of energy leaving one surface that reaches another surface. It is a purely geometric relationship, i.e. independent of viewpoint or surface attributes. It is constant unless the geometry of the scene changes.

Example in Radiosity Rendering : Computer Science XSLT



The Form Factor

The form factor is defined as the fraction of energy leaving one surface that reaches another surface. It is a purely geometric relationship, independent of viewpoint or surface attributes.

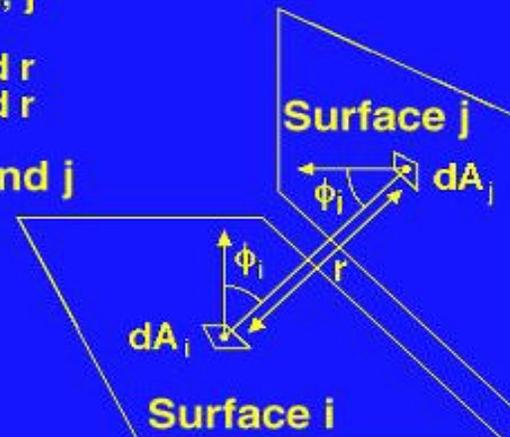
Between differential areas, the form factor equals:

$$F_{dA_i dA_j} = \frac{\cos\phi_i \cos\phi_j}{\pi |r|^2}$$

dA_i, dA_j = differential area of surface i, j
 r = vector from dA_i to dA_j
 ϕ_i = angle between Normal _{i} and r
 ϕ_j = angle between Normal _{j} and r

The overall form factor between i and j is found by integrating:

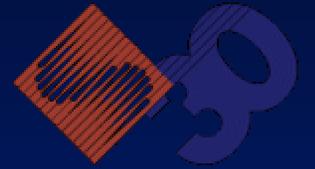
$$F_{ij} = \frac{1}{A_i} \int_{A_i} \int_{A_j} \frac{\cos\phi_i \cos\phi_j}{\pi |r|^2} dA_i dA_j$$



Current Status – Repurposing Materials



- **Have begun to create Graphics DTD from Taxonomy Project**
- **Have begun to create Curricular View style sheets for transformations**
- **Simple tests for “Rendering”**



Conclusion and Other Issues

- **SIGGRAPH Course notes sometimes are in PDF**
 - Adobe working on PDF/XML but nothing yet
- **Hand coding of XML in HTML documents very time consuming – should be automated**
- **Will accommodate disabilities (W3C Web Accessibility Initiative – WAI)**