2. Introduction to Digital Media Format

Digital Asset Management
数字媒体资源管理

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Using JavaScript

• What is JavaScript

• Web programing with JS
  – Node.js
  – Sails

—...
Overview of XML

• Extensible Markup Language
  • Aim at data searching

– Similar to HTML
  • More restrict grammar checking
  • User defined tags to describe data structure
  • Flexible data displaying schemes
  • Cross-platform, language and application independent
  • DTD and XML Schema.

• http://www.brics.dk/~amoeller/XML/overview.html
Rhubarb Cobbler made with bananas as the main sweetener. It was delicious. Basicly it was

<table>
<thead>
<tr>
<th>Amount</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 1/2 cups</td>
<td>diced rhubarb</td>
</tr>
<tr>
<td>2 tablespoons</td>
<td>sugar</td>
</tr>
<tr>
<td>2</td>
<td>fairly ripe bananas</td>
</tr>
<tr>
<td>1/4 teaspoon</td>
<td>cinnamon</td>
</tr>
<tr>
<td>dash of</td>
<td>nutmeg</td>
</tr>
</tbody>
</table>

Combine all and use as cobbler, pie, or crisp.

Related recipes: <a href="#GardenQuiche">Garden Quiche</a>
A conceptual view of XML

XML documents as text with markup

...<foo attr="val" ...>...</foo>...

- an attribute with name attr and value val, values enclosed by ' or "
- an element start tag with name foo
- the contents of the element
- a matching element end tag
A conceptual view of XML

- An XML document is a (Unicode) text with markup tags and other meta-information.
- An XML document **must be well-formed**:
  - start and end tags must match
  - element tags must be properly nested
  - + some more subtle syntactical requirements
- XML is **case sensitive**!
- Special characters can be escaped using Unicode character references:
  - &lt; and &lt; both yield <
A conceptual view of XML

• An **XML document** is an ordered, labeled tree:
  - **character data** leaf nodes contain the actual data (text strings)
    • usually, character data nodes must be non-empty and non-adjacent to other character data nodes
  - **elements** nodes, are each labeled with
    • a name (often called the element type), and
    • a set of attributes, each consisting of a name and a value,
A conceptual view of XML

- XML trees may contain other kinds of leaf nodes:
  - processing instructions - annotations for various processors
  - comments - as in programming languages
  - document type declaration
The XML vision offers:

- **common extensions to the core XML specification**
  - a namespace mechanism, document inclusion, etc.
- **schemas**
  - grammars to define classes of documents
- **linking between documents**
  - a generalization of HTML anchors and links
- **addressing parts of read-only documents**
  - flexible and robust pointers into documents
- **transformation**
  - conversion from one document class to another
- **querying**
  - extraction of information, generalizing relational databases
To use XML

- Define your XML language
  - use XML Schema to define its syntax

- Exploit the generic XML tools
  - XSLT and XQuery processors

- As a generic protocols, and the generic programming frameworks
  - DOM or SAX to build application tools
Summary: HTML and XML

• Both of them are useful today for different applications
JSON

- [Link](http://www.w3schools.com/json/)
- JavaScript Object Notation (JSON) Example

```json
"employees":[
  {"firstName":"John", "lastName":"Doe"},
  {"firstName":"Anna", "lastName":"Smith"},
  {"firstName":"Peter", "lastName":"Jones"}
]
```
2.5. Graphics formats
Graphics ≠ Images

• Representation ability
  – Graphics are usually described in vectors which can provide arbitrary precision
  – Images are usually sampled in fragments/pixels which can only provide limited precision

• Application area
  – Graphics are mainly applied in CAD, model design, computer animation, system simulation and printing.
  – Images are mainly used for photo display and image processing etc.
Classification of different graphics formats

- **Graphics**
  - **2D Graphics**
  - **3D Graphics**
    - **Printing**
      - **Animation**
      - **Scene**
        - **Rendering**
          - **Modeling**
    - **SGI Inventor**
      - **.obj .3ds .off .ply .md5 .dwg ...**
      - **VRML/X3D**
      - **Flash, SVG**
      - **PDF, PS, AI**
Overview of SVG

• [http://www.w3.org/Graphics/SVG/About.html](http://www.w3.org/Graphics/SVG/About.html)

• 什么是SVG?
  – SVG 指可伸缩矢量图形 (Scalable Vector Graphics)
  – SVG 用来定义用于网络的基于矢量的图形
  – SVG 使用 XML 格式定义图形
  – SVG 图像在放大或改变尺寸的情况下其图形质量不会有所损失
  – SVG 是万维网联盟的标准
  – SVG 与诸如 DOM 和 XSL 之类的 W3C 标准是一个整体
Elements of 3D graphics format

- Global scene description
  - Parameters of light and camera, other system configurations

- Geometric model description
  - Curves and surfaces
    - Line, plane, quadratic surface, spline …
  - Mesh surfaces = vertex coordinates + topology connectivity
  - Texture coordinates, normals

- Material description
  - Reflectance model, texture image

- Animation description
  - Skeleton model …
Main problems for 3D graphics format

- CAD and computer animation software
  - Different application area
  - Different system design principles
  - Different types of geometric representation combinations

- Mainstream commercial software employ different types of 3D graphics model.
  - It is **hard** to **obtain a uniform graphics format**.
  - **Data exchange and sharing** become key issues for 3D designing system.
Overview of X3D

• X3D [ Extensible 3D ] is an international standard of 3D graphics. It defines how to integrate and access interactive 3D content in a multimedia environment.

• The former of X3D is VRML which is established on 1998 as a network graphics ISO standard (ISO/IEC14772).

• X3D decompose scene descriptions of VRML97 into components. Therefore it is very convenient to extend original VRML functions by adding new components.
New 3D graphics standard - X3D

• Ten years from VRML to X3D

1994.10 通过VRML1.0三维文件格式
1996.7  公布VRML2.0草案加入交互特性
1998.1  通过VRML97国际标准
1998.11 改名为Web3D联盟，推荐结合
1999.2  启动X3D
1999-2002实现了grip、Universal-Media-Libraries、GeoVRML、DIS-Java-VRML、H-Anim、BAI
2002.4  VRML标准修订，正式加入UTF-8、BAI、GeoVRML、NURBS曲面特性
2002.7  X3D宣布草案
2002.12 X3D进入ISO审议
2003.2  X3D编码规格进入ISO审议
2003.3  X3D语言结合标准进入ISO的最后审议阶段
2004   通过X3DISO国际标准
X3D 教程

- http://x3d.esoe.ntu.edu.tw/
- Use FreeWRL as a player
COLLADA (SONY)

- Wildly used in PS3/PSP games
- XML based, and similar to X3D

http://www.khronos.org/collada/
http://www.opencollada.org/home.html
3D mesh surface compression

- Terrain data can be compressed by JPEG related methods

- MPEG-4 defines a compression method:
  - Compress **topological connectivities**: relationships among vertices
  - Compress **geometric position information**: vertex positions, normal vectors, texture coordinates …
  - Compress texture images …
About the Course Project

• Organize the team first!