2. Introduction to Digital Media Format
Using Python

- What is python
- Web programing with python
  - Flask
  - Django
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.

Rhubarb Cobbler made with bananas as the main sweetener. It was delicious. Basically it was

```
<recipe id="117" category="dessert">
  <title>Rhubarb Cobbler</title>
  <author><email>Maggie.Herrick@bbs.mhv.net</email></author>
  <date>Wed, 14 Jun 95</date>

  <description>
    Rhubarb Cobbler made with bananas as the main sweetener.
    It was delicious.
  </description>

  <ingredients>
    <item><amount>2 1/2 cups</amount><type>diced rhubarb</type></item>
    <item><amount>2 tablespoons</amount><type>sugar</type></item>
    <item><amount>2</amount><type>fairly ripe bananas</type></item>
    <item><amount>1/4 teaspoon</amount><type>cinnamon</type></item>
    <item><amount>dash of</amount><type>nutmeg</type></item>
  </ingredients>

  <preparation>
    Combine all and use as cobbler, pie, or crisp.
  </preparation>

  <related url="#GardenQuiche">Garden Quiche</related>
</recipe>
```
A conceptual view of XML

XML documents as text with markup
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

XML documents as labeled trees
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
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
  - PDF, PS, AI
    - Flash, SVG
      - VRML/X3D
      - SGI Inventor
      - .pov
      - .rib
      - .obj .3ds .off .ply .md5 .dwg ...

13年9月26日 星期四
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
1999.2  启动X3D
1999 - 2002 实现了 gzip、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X3D ISO 国际标准
X3D 教程

- [http://x3d.esoe.ntu.edu.tw/](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!