Digital Asset Management
数字媒体资源管理

2. Introduction to Digital Media Format
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Outline

• Image format and coding methods
• Audio format and coding methods
• Video format and coding methods
• Introduction to HTML and XML
• Graphics format and coding methods
Key points

• To grasp features of different types of digital media

• To understand principles of coding different types of digital media
2.4. HTML and XML
Overview of HTML

- Hypertext Markup Language
  - Developed by Tim Berners-Lee.
    - lightweight markup language vs. complex SGML.
  - Based on pure text format

- Rich abilities to display multimedia information.
  - Later added tags to support image and videos.

- HTML 3.2 => HTML 4.0 => HTML 5.0
  - Different browser has their own display effects.
Overview of all HTML elements


```html
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
    <title>Apple中国</title>
    <meta http-equiv="content-type" content="text/html; charset=gb2312">
    ...
</head>
<body>
</body>
</html>

```
Overview of all HTML elements


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<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
<html>
  <head>
    <title>Apple中国</title>
    <meta http-equiv="content-type" content="text/html; charset=gb2312">
    ...
  </head>
  <body>
    <!-- Tag for Activity Group: General, Activity: Apple China - Homepage -->
    ...
  </body>
</html>
```

Overview of HTML - Head elements

- **TITLE** - Document title
- **ISINDEX** - Primitive search
- **META** - Meta-information
- **LINK** - Site structure
- **BASE** - Document location
- **SCRIPT** - Inline script
- **STYLE** - Style information
Overview of HTML - Body elements

- **Block level elements**
  - Headings: H1 => H6
  - Lists: UL, OL, DIR, MENU, LI, DL, DT, DD
  - Text Containers: P, PRE, BLOCKQUOTE, ADDRESS
  - others: DIV, CENTER, FORM, HR, TABLE
Overview of HTML - Body elements

- Text-level elements
  - Logical markup: EM ...
  - Special markup: A, IMG, APPLET ...
  - Physical markup: B, ...
  - Forms: INPUT ...
  - Tables: CAPTION, TR, TH, TD
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.

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A conceptual view of XML

XML documents as text with markup

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

- an element start tag with name foo
- an attribute with name `attr` and value `val`, values enclosed by `'` or `"`
- 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,
    - and these nodes can have child nodes
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
      └─ Printing
          └─ Animation
              └─ Scene
                  └─ Rendering
                      └─ Modeling
                          └─ PDF, PS, AI
                              └─ Flash
                                  └─ VRML/X3D SGI Inventor
                                      └─ .pov
                                          └─ .rib
                                              └─ .obj .3ds .off .ply .md5 .dwg ...

Overview of FLASH SVG

- http://www.w3.org/Graphics/SVG/About.html

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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
1998.11 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 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
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 …
Homework

• Build a simple image browser that can convert different types of images.