



浙江大学计算机学院
数字媒体与网络技术

Digital Asset Management

数字媒体资源管理

2. Introduction to Digital Media Format



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About Homework 2

- python flask
 - <http://flask.pocoo.org>
 - <https://testdriven.io/developing-a-single-page-app-with-flask-and-vuejs>



Using JavaScript

- What is JavaScript
- Web programming with JS
 - Node.js
 - Sails
 - Yeoman: <http://yeoman.io/codelab/setup.html>
 - ...



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>



HTML v.s. XML

```
<h1>Rhubarb Cobbler</h1>
<h2>Maggie.Herrick@bbs.mhv.net</h2>
<h3>Wed, 14 Jun 95</h3>
```

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

```
<table>
<tr><td> 2 1/2 cups <td> diced rhubarb
<tr><td> 2 tablespoons <td> sugar
<tr><td> 2 <td> fairly ripe bananas
<tr><td> 1/4 teaspoon <td> cinnamon
<tr><td> dash of <td> nutmeg
</table>
```

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

Related recipes: Garden Quiche

```
<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

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

a matching element end tag

the contents of the element

an attribute with name `attr` and value `val`, values enclosed by ' or "

an element start tag with name `foo`

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

XML documents as text with markup



A conceptual view of XML

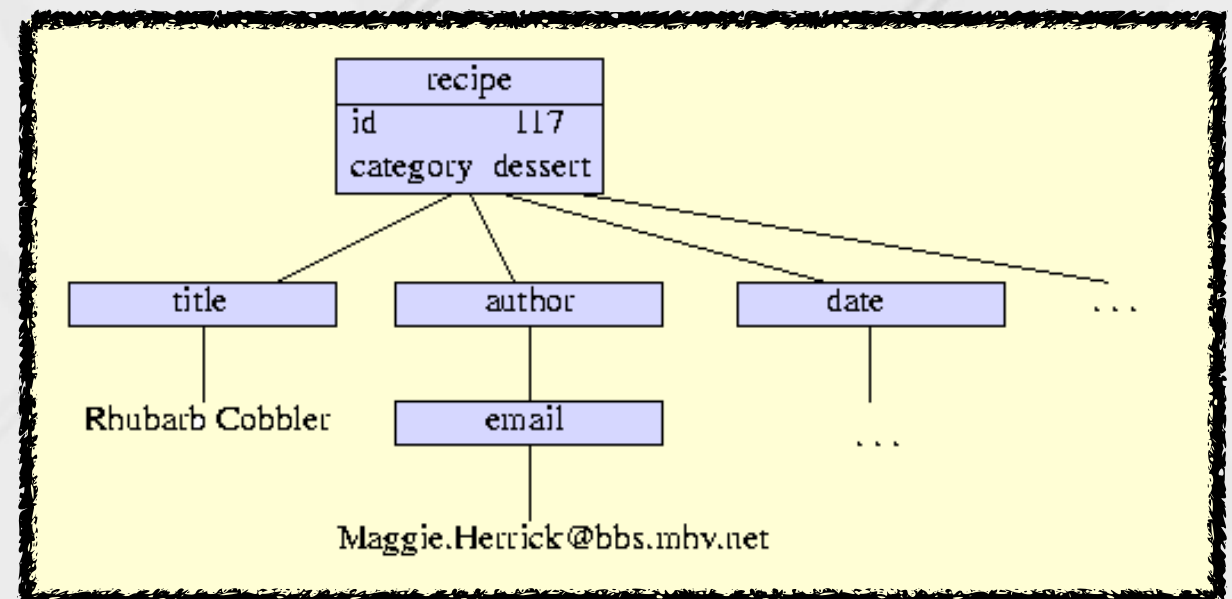
- An XML document is a (Unicode) text with markup tags and other meta-information.
- An XML document **must be well-formed**:
 - start and end tags must match
 - element tags must be properly nested
 - + some more subtle syntactical requirements
- XML is **case sensitive**!
- Special characters can be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

XML documents as
labeled trees



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



JSON

- <http://www.w3schools.com/json/>
- JavaScript Object Notation
- JSON Example
- ```
{"employees": [
 {"firstName": "John", "lastName": "Doe"},
 {"firstName": "Anna", "lastName": "Smith"},
 {"firstName": "Peter", "lastName": "Jones"},
]}
```





## 2.5. Graphics formats

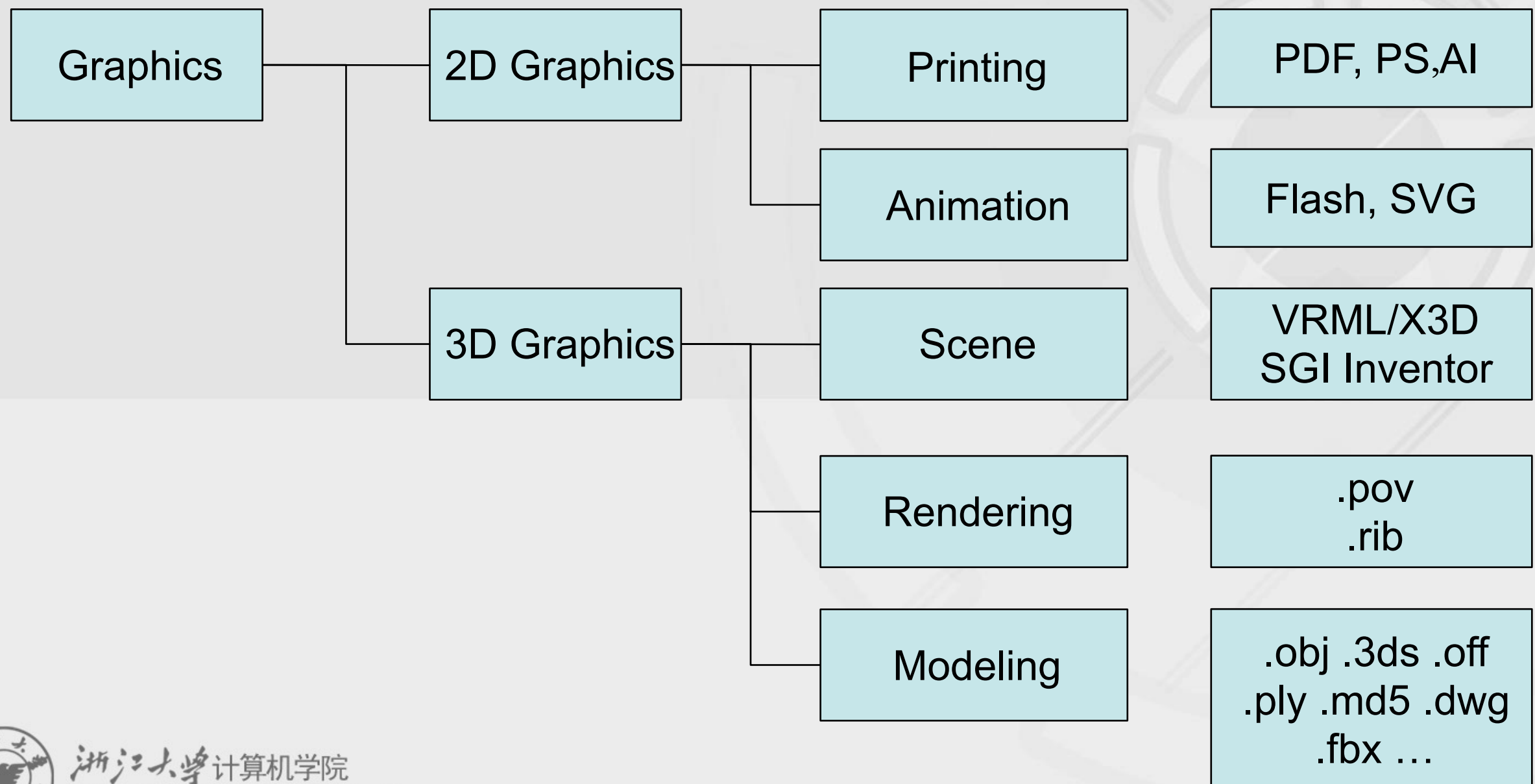


# Graphics ≠ Images

- 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





# Overview of SVG

- <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



# SVG examples



- [http://www.w3school.com.cn/svg/svg\\_examples.asp](http://www.w3school.com.cn/svg/svg_examples.asp)
- [https://upload.wikimedia.org/wikipedia/commons/thumb/f/fd/Ghostscript\\_Tiger.svg/1024px-Ghostscript\\_Tiger.svg.png](https://upload.wikimedia.org/wikipedia/commons/thumb/f/fd/Ghostscript_Tiger.svg/1024px-Ghostscript_Tiger.svg.png)

# 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 gzip、Universal-Media-Libraries、GeoVRML、DIS-Java-VRML、H-Anim、EAI

2002.4 VRML标准修订，正式加入UTF-8、EAI、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/>
- Use FreeWRL as a player



# COLLADA (SONY)



- Wildly used in PS4/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 ...



# 3D Geographic data

- <http://www.opengeospatial.org/standards/community>
- CityGML



# About the Course Project

- Organize the team first!
- ...

