Using JavaScript

- What is JavaScript

- Web programing 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: <a href="#GardenQuiche">Garden Quiche</a>
```

```
<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" ... />...
```

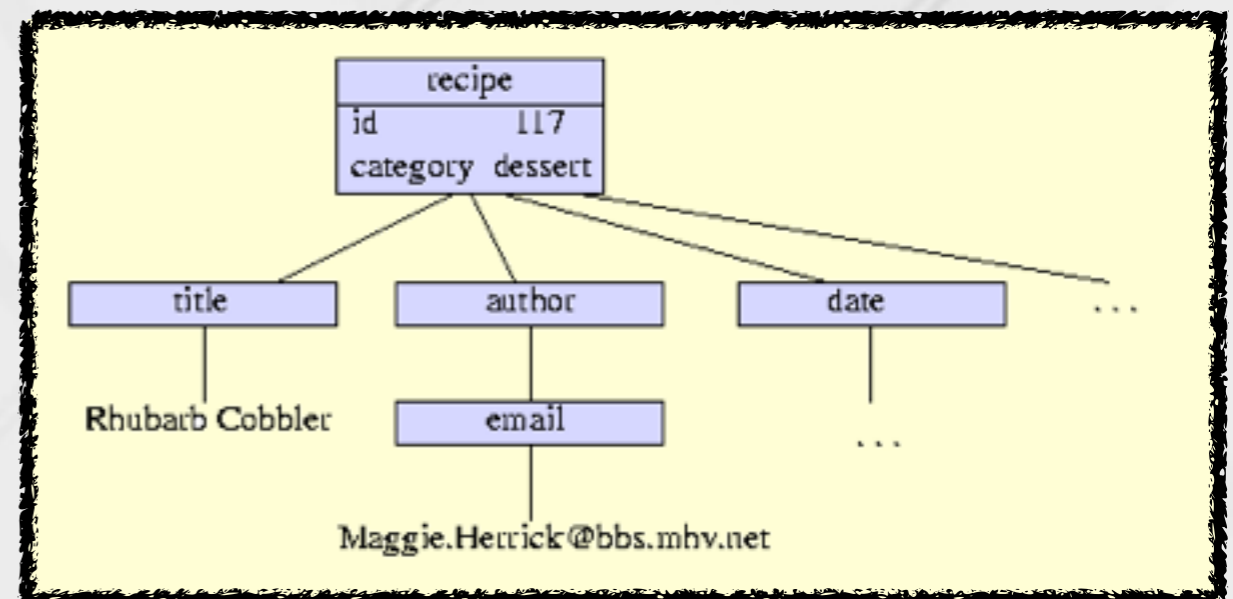XML documents as text with markup

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,

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 NotationJSON Example

- {"employees":[
-    {"firstName":"John", "lastName":"Doe"},
-    {"firstName":"Anna", "lastName":"Smith"},
-    {"firstName":"Peter", "lastName":"Jones"}
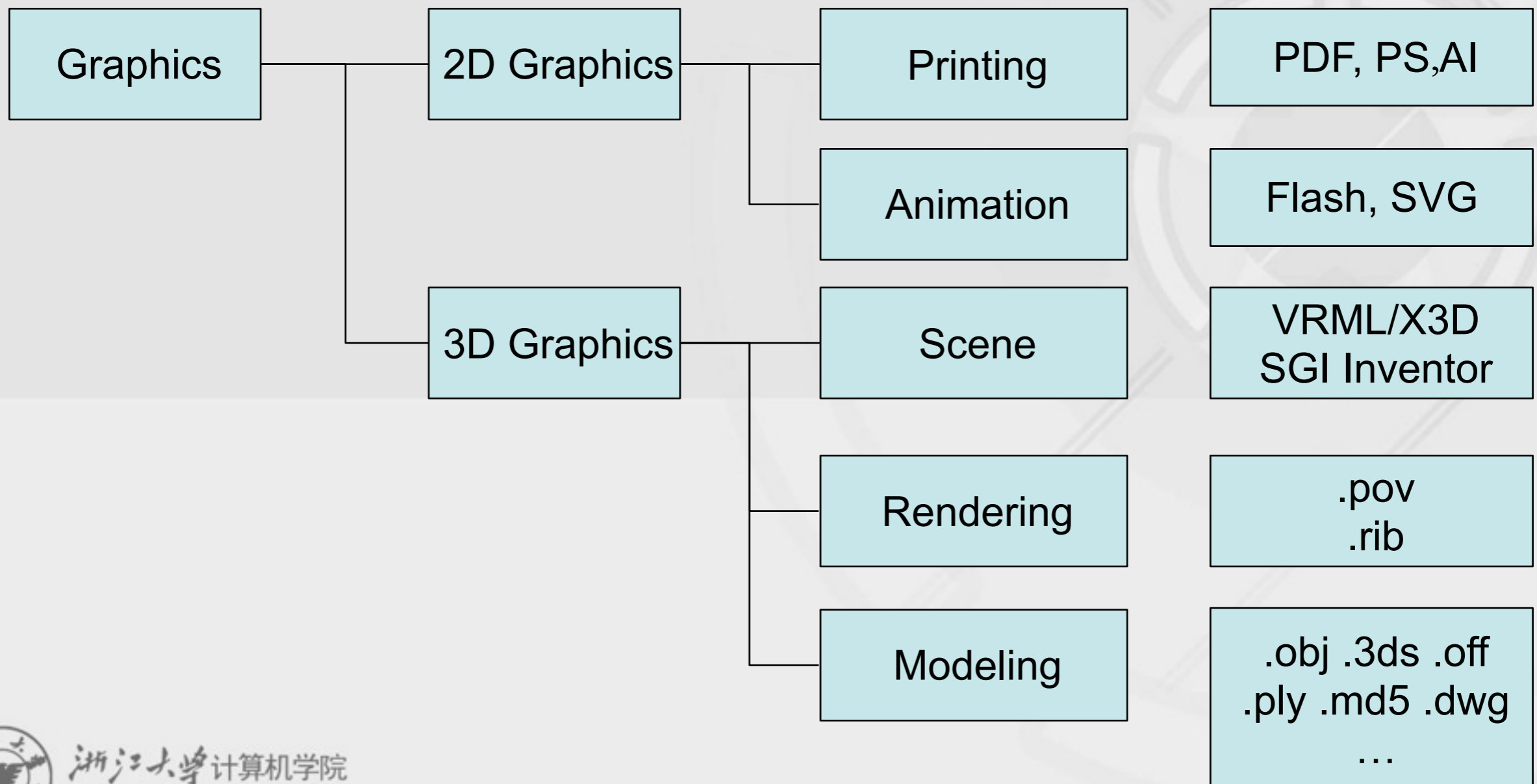-]}

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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.

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Classification of different graphics formats

Graphics	2D Graphics	Printing	PDF, PS,AI
		Animation	Flash, SVG
	3D Graphics	Scene	VRML/X3D SGI Inventor
		Rendering	.pov .rib
		Modeling	.obj .3ds .off .ply .md5 .dwg …

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

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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.

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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 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 ...

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About the Course Project

- Organize the team first!