Server-Side Graphics

SET09103 Advanced Web Technologies

School of Computing Napier University, Edinburgh, UK Module Leader: Uta Priss

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Outline

Graphics

Graphs

Graphics

Extensive use of interactive graphics needed \rightarrow use Java Applets or Java Servlets.

Static graphics or vector graphics \rightarrow scripting languages with graphics extensions are suitable.

Graphics on the WWW

- ► Raster graphics (gif, jpg, png).
- ► HTML Image maps (<MAP>, raster graphics + coordinates).
- ▶ Binary vector graphics: Flash.
- ► XML-based: SVG (Scalable Vector Graphics).

HTML image maps

Raster graphics

- ▶ Pixel based: points of colours.
- ► Examples: photographs, paintings, ...
- ► Formats: jpg, gif, png, ...
- ► Cannot be indefinitely scaled; has a maximum resolution



Vector graphics

- ► Constructed from basic shapes: point, line, curve, polygon.
- ► Examples: maps, UML diagrams, line drawings, ...
- ► Formats: svg, flash, XML graph formats, ...
- ► Can be indefinitely scaled (depends on the rendering device).
- ► Can be manipulated by programs.
- ► Smaller file size than raster graphics.



SVG example for drawing a rectangle

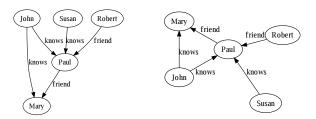


How to use SVG files

- ► All modern web browsers (except MS IE) render SVGs directly.
- ► Microsoft IE supports VML instead; requires plugin for SVG.
- ▶ There are compatibility issues for more advanced features.
- ▶ Many vector graphics tools support SVG.
- ► APIs for programming languages:
 - PHP: XML_SVG, Perl: SVG, Java: Batik SVG Toolkit

Graphs are special kinds of vector graphics

- ► They contain nodes and edges.
- ▶ Moving or removing a node affects its edges.
- Graph editors provide graph layout algorithms.
- ► Examples: tree structures (XML), flow charts, UML diagrams.



Graph layout software/editors

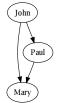
- ► TouchGraph, spring embedder algorithms
- ▶ Java toolkits: Prefuse, ...
- ► Graphviz: open source graph visualisation software

Graphviz

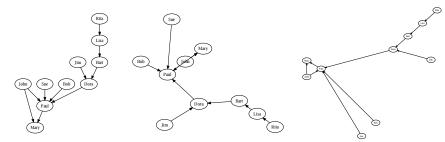
- ▶ www.graphviz.org
- ▶ Directed and undirected graphs.
- ► Graph layouts: hierarchies, spring, radial, circular.
- ► Simple text-based format (called "dot format").
- ► APIs for different programming languages exist.
- ► Many output formats: gif, jpg, svg, pdf, ...

The "dot format"

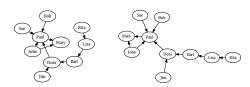
```
digraph names {
node0 [label="John"]
node1 [label="Mary"]
node2 [label="Paul"]
node0 -> node1
node0 -> node2
node2 -> node1
}
```



Hierarchical, radial, circular layouts:



Spring layouts:



Sample Graphviz Applications

For visualisation of ...

- ► Database schemata
- ► XML DTDs and class hierarchies
- ► Web site paths traversed by users
- ► Apache log files and firewall rules
- ► UML diagrams from program code

Graphviz doesn't use XML

The dot format only needs to be written, not parsed. Data can still be stored as XML.

Recommended workflow:

