Server-Side Graphics

SET09103 Advanced Web Technologies

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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).

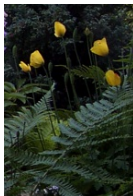## HTML image maps

```
<body>
<map name="somemap">
<area shape="rect" coords="400,250,500,300"
          href="file.html#part1">
<area shape="rect" coords="300,180,400,230"
          href="file.html#part2">
</map>
<img src="picture.jpg" usemap="#somemap">
</body>
```

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.
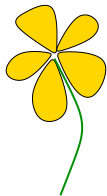
SVG example for drawing a rectangle

```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"
"http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">

<svg width="100%" height="100%" version="1.1"
          xmlns="http://www.w3.org/2000/svg">

<rect width="300" height="100" style="fill:rgb(0,0,255)"/>

</svg>
```

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.


Graphics
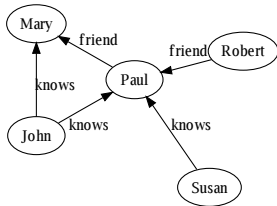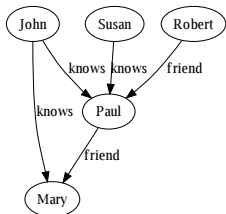
Graph layout software/editors

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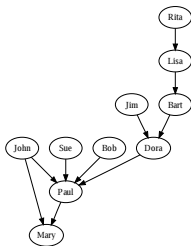
Graphviz

- ▶ 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, ...
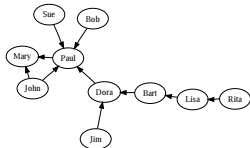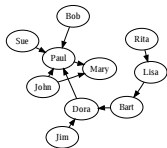
The "dot format"

```
digraph names {
node0 [label="John"]
node1 [label="Mary"]
node2 [label="Paul"]
node0 -> node1
node0 -> node2
node2 -> node1
}
```
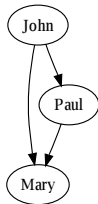
Hierarchical, radial, circular layouts:
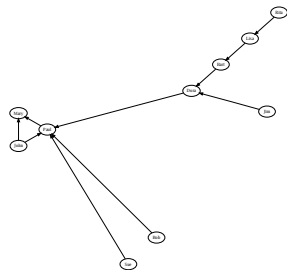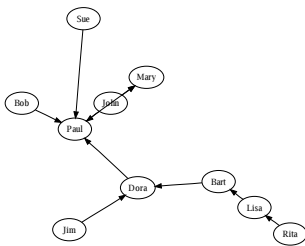
Spring layouts:

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: