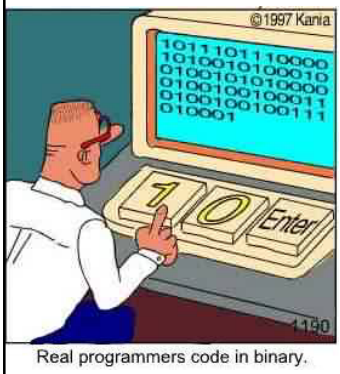


Real programmers code in binary.

Software Visualization

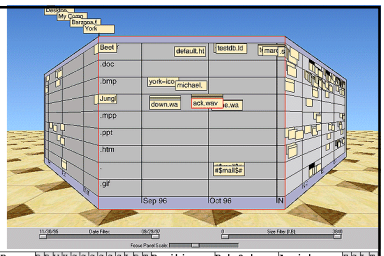
Information Visualization Techniques

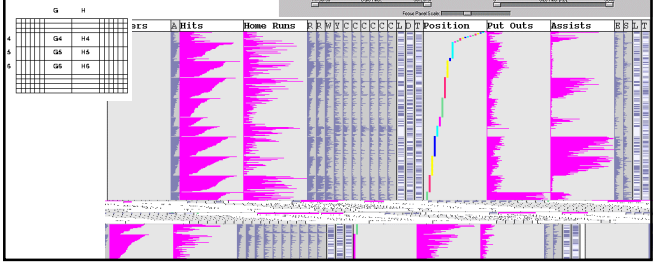
Information Visualization

- Different Techniques for structured data
  - Textual data and tables
  - Hierarchical data
  - Networks → Graphs (later!)
- A closer look at tree maps

Visualization of Textual Data

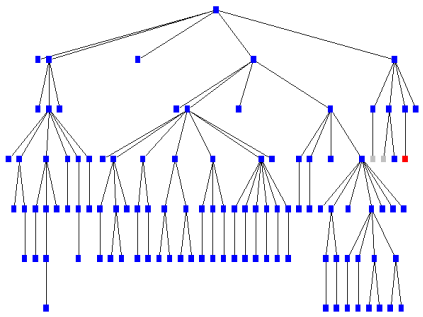
- Perspective Wall
- SeeSoft
- Table Lens





Visualization of Hierarchies

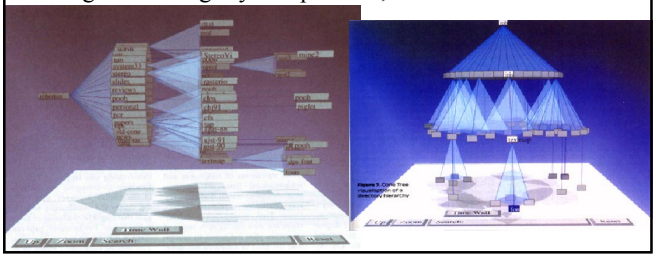
Traditional Method: Tree Diagrams



Visualization of Hierarchies

Cone Trees

- Three-dimensional extensions of tree diagrams
- Layers of the tree are put on discs
- Shadow as two-dimensional hint
- Navigation is slightly complicated, rotation of discs

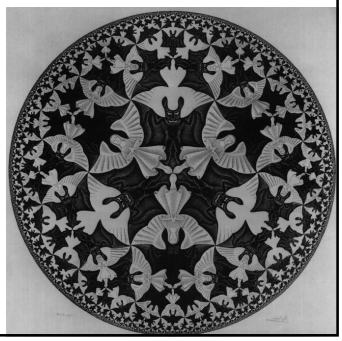


Visualization of Hierarchies

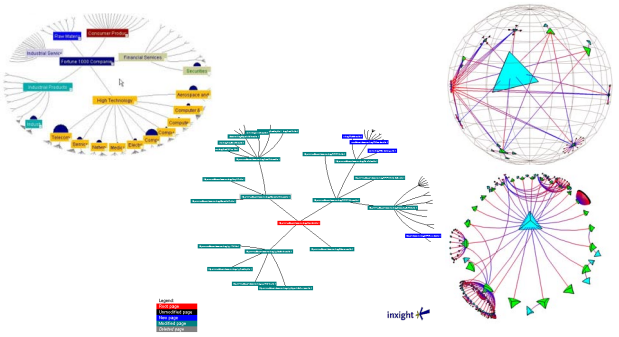
Hyperbolic Trees

- Hyperbolic Plane
  - Instead of Euclidean plane
  - Area of a circle increases exponential with its radius
  - parallels diverge
- „Focus+Context“ Interface
  - Inspired by M.C.Escher's *Heaven and Hell*

see [Lamping&Rao:94]

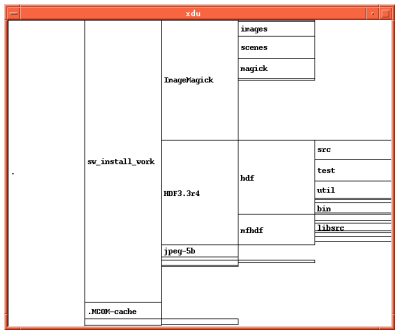


Visualization of Hierarchies



Visualization of Hierarchies

- Xdu
  - Vertical split



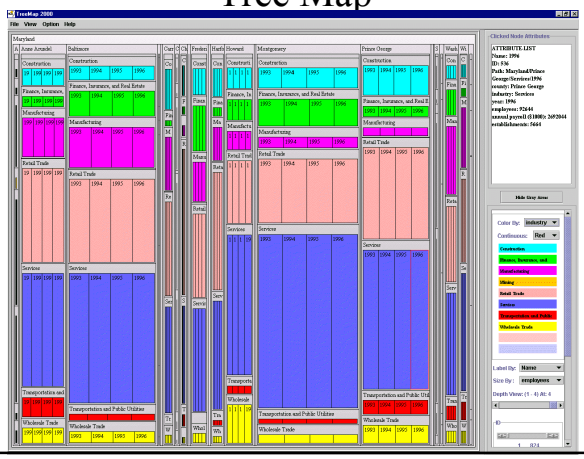
Visualization of Hierarchies

Tree Maps

- Space-filling trees
- Hierarchy is mapped recursively on rectangles
  - Alternating vertical and horizontal split
- Information encoded by rectangles:
  - Type or age by color
  - Size by size of area
  - In addition text labels

See [Johnson&Shneiderman:91]

Tree Map



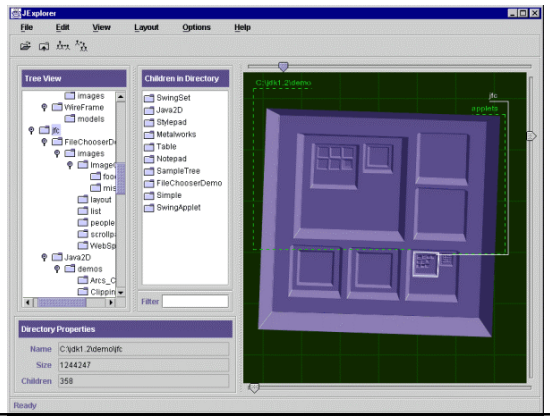
Visualization of Hierarchies

See [Andrews_et_al:97]

Information Pyramids

- Largest plateau represents the root of the tree. The children of the root are put on top of this plateau and so on.
- The size of each plateau is proportional to the size of its contents.
- Good overview, foccusing difficult

Information Pyramids



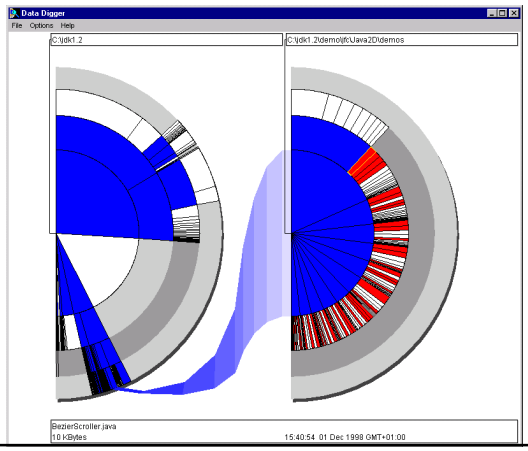
Visualization of Hierarchies

See [Andrews&Heidegger:98]

Semi-Circular Discs

- Two semi-circular discs
- Each discs represents several levels of the hierarchy
- „Focus+Context“ Interface
- Focus: Expansion of a subtree on the second disc

Semi-Circular Discs



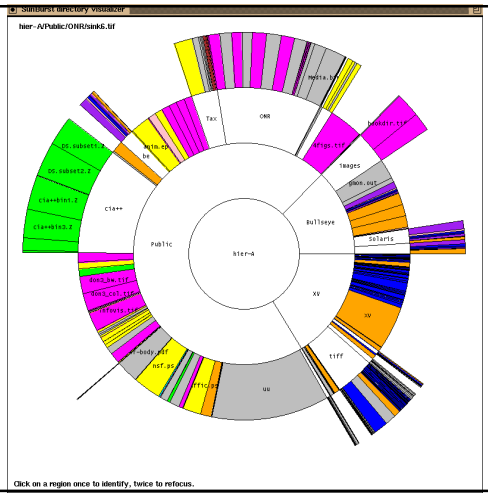
Visualization of Hierarchies

See [Stasko&Zhang:2000]

Sunburst

- Space-filling views
- Combines Focussing of Semi-Circular Discs with animated, smooth transitions
- To display focus and context there are 3 different selection methods:
  - *Angular Detail:* Detail is shown as a partial outer ring
  - *Detail Outside:* Detail is shown as an outer ring
  - *Detail Inside:* Detail is shown as an inner ring

Sunburst



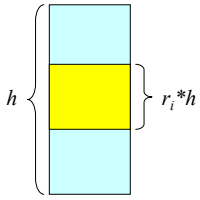
Visualization of Networks

- Graph Layout → lecture next year

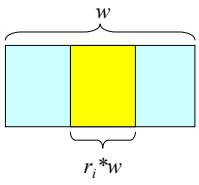
A closer look at tree maps

Let s_i be the size of the i-th element in a directory. Then the total size is $s = \sum_{1 \le i \le n} s_i$ and the ratio r_i of the box for this element is $r_i = \frac{s_i}{s}$

Horizontal split

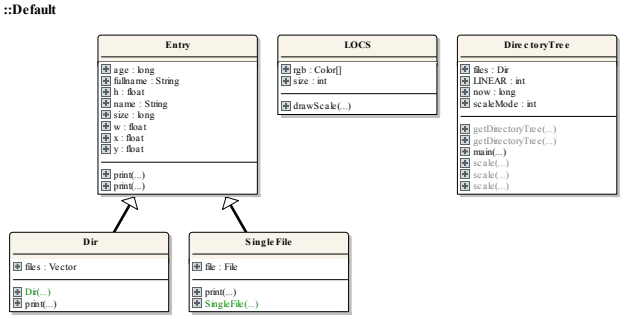


Vertical split



Auxilliary Classes for Project

- File DirectoryTree.java can be downloaded from lecture homepage.



Some hints for the project

- Use floats for computations of coordinates and Math.round() when you actually draw on screen.
- You could implement a recursive function

```
void drawTreeMap(Dir d,            // Directory tree to be visualized
                 Graphics g,       // AWT Graphics object of frame, window, etc.
                 float xx,         // (xx,yy) upper left corner of box for directory
                 float yy,
                 float ww,         // (ww,hh) width and height of box
                 float hh,
                 boolean horizontal)  // split box horizontally for
                                      // subdirectories and files
```