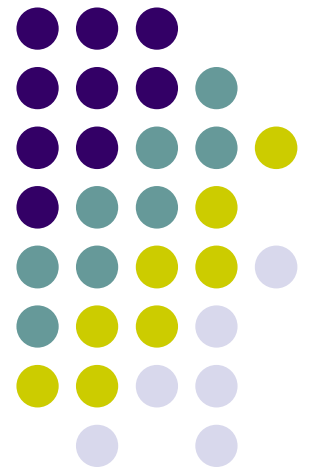# Hierarchical Data Visualization

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IAT 814

February 21, 2007

Outline

- Introduction
- Techniques
- Treemap
- SpaceTree
- Comparison

Introduction

- Hierarchical Data
  - Directory structure
  - Genealogy trees
  - Biological taxonomy
  - Business structure
  - Project structure

  …

- Challenges
  - Visualization of large data
  - Dynamic hierarchy
  - Searching and filtering

Visualization Techniques

- Treemap

Extending the Usability of Treemaps with Flexible Hierarchy, G. Chintalapani, C. Plaisant and B. Shneiderman, Proc. IV'04.

- SpaceTree

SpaceTree: Supporting Exploration in Large Node Link Tree, Design Evolution and Empirical Evaluation, C. Plaisant, J. Grosjean and B. Bederson, Proc. InfoVis'02.

Treemap

- Space-filling method of visualizing large hierarchical data sets

- Usually visualize two dimensional dataset
  - One mapped to the area of the rectangles
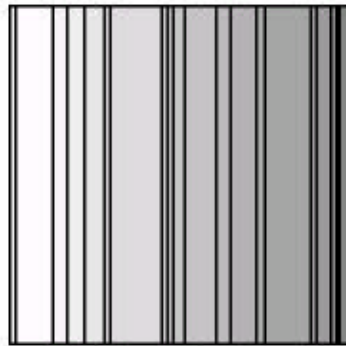 - The other mapped to the color of the rectangles
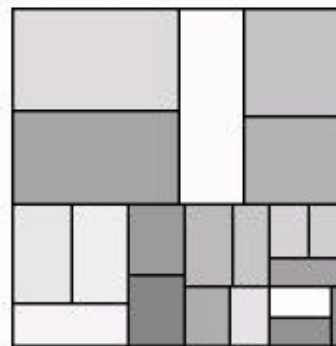
Treemap Basic Layouts

Slice-and-dice

Cluster

Squarified

Strip

Extended strip layout

Treemap Features

- Three layout options

- User specification of the hierarchy

- Aggregation

- Dealing with imposed variable depth hierarchy

- Dynamic queries and filter

Treemap Example – Project Structure Visualization

Outline

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- Techniques

- **Treemap**
  - Introduction
  - Basic Layouts
  - Features
  - **Example**

- SpaceTree
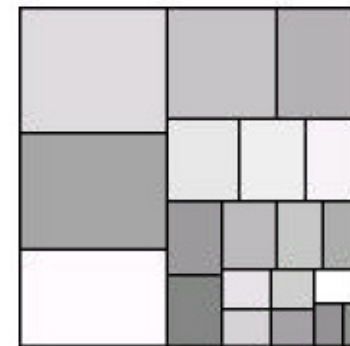 - Introduction
  - Example
  - Features

- Comparison
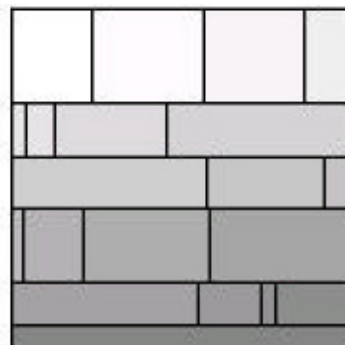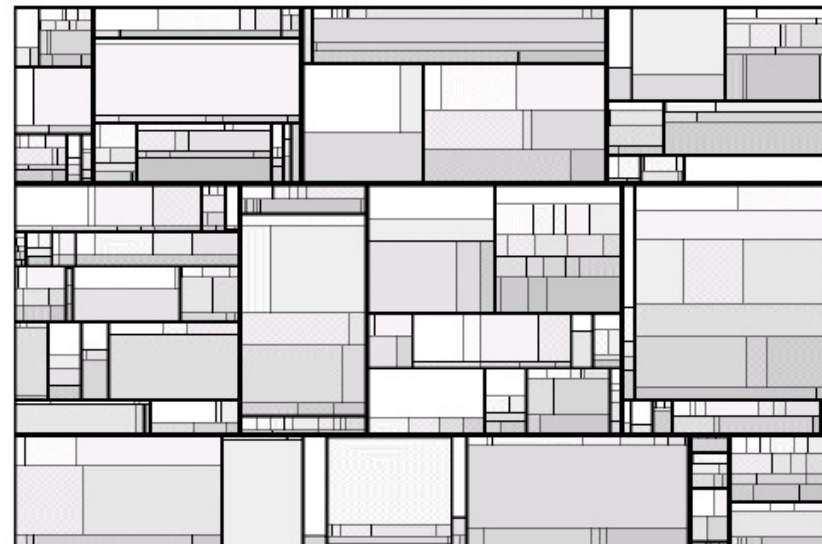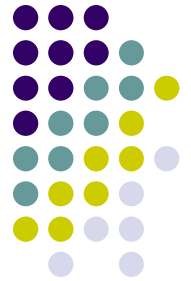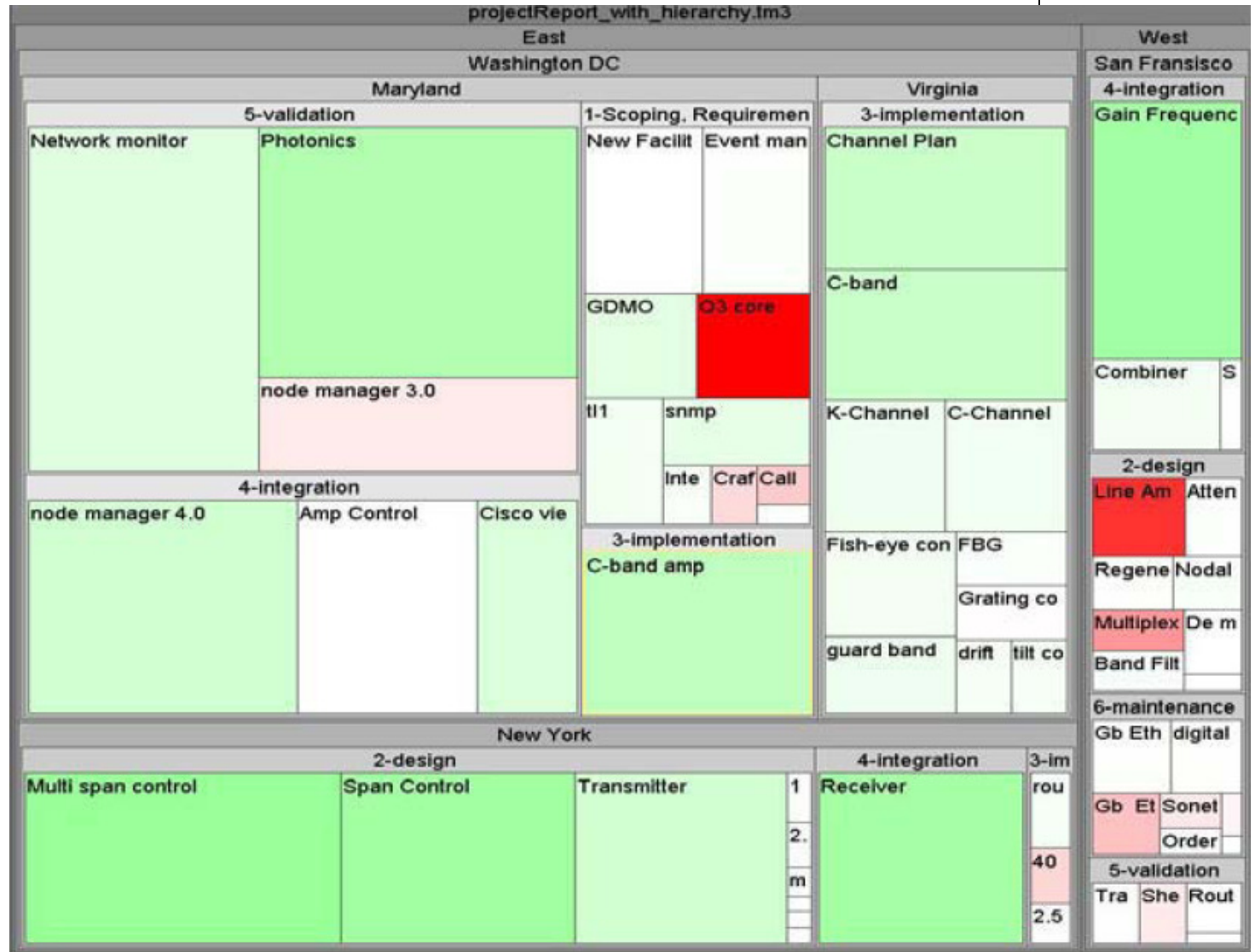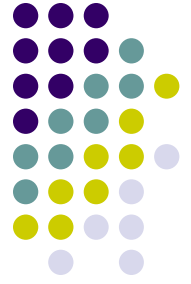
SpaceTree

- Builds on the conventional node link tree diagrams

- Combined with a zooming environment that dynamically lays out branches of the tree to best fit the available screen space

SpaceTree Example – Animal Taxonomy Visualization

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- **SpaceTree**
  - Introduction
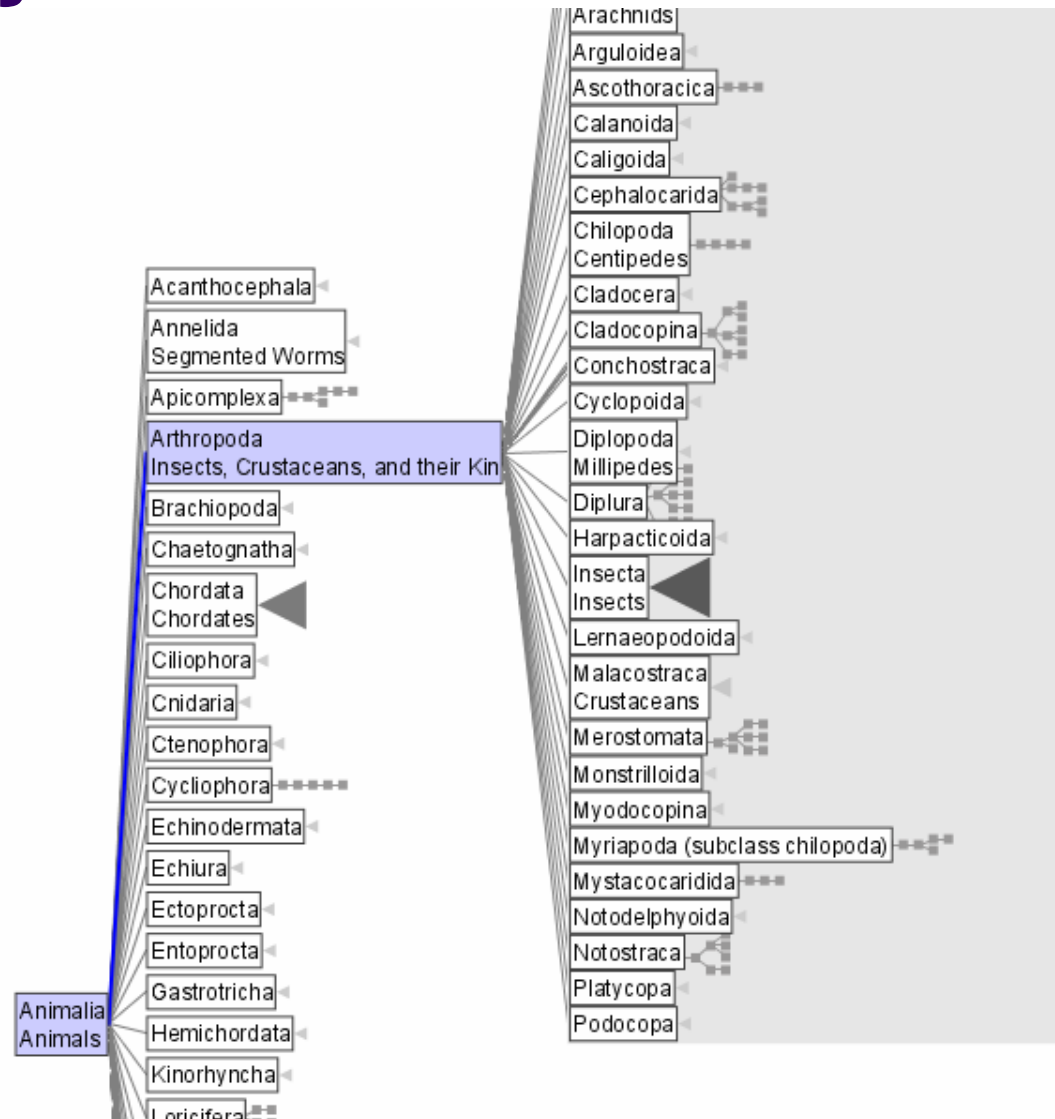 - **Example**
  - Features

- Comparison

SpaceTree Features

- Several layout options
- Branches that do not fit on the screen are summarized by **triangles**
  - Shading: Total number of nodes in the subtree
  - Height: Depth of the subtree
  - Base: Average width (i.e. number of items/depth)

SpaceTree Features

- Progressive opening of branches by clicking on a node
  - Maximizing the number of levels opened at any time
  - Decomposed tree animation: trim, translate, and grow
- Dynamic queries and filtering

Comparison

Treemap	SpaceTree
1. Flexible hierarchy	1. Fixed hierarchy
2. Single screen visualization of large data	2. Progressive visualization
3. Size and color coding of attributes	3. Attributes can only be labeled
4. Unclear hierarchical structure	4. Obviously visible hierarchy
5. Unconventional tree representation	5. Regular node-edges tree representation
6. Require user training	6. More intuitive to user