Selected RQ1s

• Can we have more examples of hierarchical and networked data? For example on a PC, is "My computer > My documents > folders > files" considered a hierarchical data structure? Are the people on Facebook considered a networked data structure (within the software)?

(submitted by Adrienne)

Clicker question

• What type of data structure would you use to represent the **files and folders on your desktop**?

A) Networked  
B) Hierarchical  
C) Tabular array  
D) Tabular table  
E) Any of the above

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Clicker question

• What type of data structure would you use to represent the **social networks on Facebook**?

A) Networked  
B) Hierarchical  
C) Tabular array  
D) Tabular table  
E) Any of the above

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Selected RQ1s

• In what way could a data structure have more than 2 dimensions?

(submitted by Amber)
Learning Goals [review]

you should be able to

• recognize examples of data types and illustrate how properties associated with familiar data types can influence the behaviour of computer applications which act on these data types

• recognize examples of data structures and classify data structures as networked, hierarchical, and/or tabular when applicable

Selected RQ1s

• What is the difference between / role of directed and undirected links in a networked data structure?

Clicker question

• What type of data structure is depicted here? (Links represent the relationship “likes”.)

A) directed network  B) undirected network
C) linear (table)  D) none of the above

Directed vs Undirected Networks

Symmetrical relationships -> undirected networks:
• people, animals: A is a relative of B
• people: A is a friend of B (e.g., on Facebook)
• countries: A trades with B

Examples for asymmetrical:
- people: A is an ancestor of B
- people: A likes B (people)
- folders/files: A contains B
- courses: A is a prerequisite for B
Data Structures

• data may be organized in more than one way at the same time
• this is often the case on web pages, which provide different menus for accessing information
• in what ways might the contents of a textbook be organized? (networked? hierarchical? tabular?)

Learning Goals

you should be able to

• convert between small instances of graphical and text based representations of hierarchical structure

Clicker question

• Which hierarchical representation correctly represents the nesting of parentheses in this expression: 
  \[(A+(B+(C+D)))\]

Matching Parentheses

• parentheses provide a text-based way to describe hierarchical structure
• what are pros and cons of text-based and graphical representations?

(A+(B+(C+D)))
**Convert: Text → Graphical**

**Step 1** (match the parentheses):
working from left to right,
- when you reach a “)”, match it with the last un unmatched “(“ to its left
- use an arc to connect the pair of matched ( )’s so you remember which ones are matched
repeat until you get to the end

```
( A + ( B + ( C + D ) ) )
```

**Matching Parentheses**

**Step 2** (build the tree):
- put a node in the tree for each arc, and add links from each to the arcs and letters *directly nested* within it

```
( A + ( B + ( C + D ) ) )
```
Matching Parentheses

- this is our first example of an algorithm in this class!

```
( A + ( B + ( C + D ) ) )
```

Perspective

- means to visualize and analyze huge data structures is valuable in many fields


Exercise: Graphical → Text

- can you convert this phylogenetic tree from graphical to text based representation?

Learning Goals [review]

**you should be able to**

- recognize examples of data types and illustrate how properties associated with familiar data types can influence the behaviour of computer applications which act on these data types

- recognize examples of data structures and classify data structures as networked, hierarchical, and/or tabular when applicable
Module I: Data Organization

HTML

Learning Goals [for today + lab]
you should be able to

• use HTML to design networked, hierarchical and tabular structures in webpage content, and use analysis and debugging skills to correct and avoid html errors

Clicker Question: Which result?

A

B

Clicker Question: Which result?

A

B
Important concepts

• **Source code vs displayed result**
  indentation / line-breaks in HTML source do not get rendered literally

• **Comments and commenting out**
  <!-- ... -->

• **Preformatting vs semantic markup**
  <pre> ... </pre> vs <p>, <br>

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