CSC 212: Data Structures and Abstractions

14: Trees

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University of Rhode Island

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THINK BIG WE DO℠

Trees

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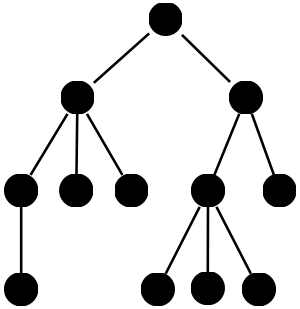

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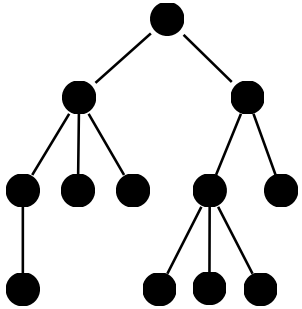
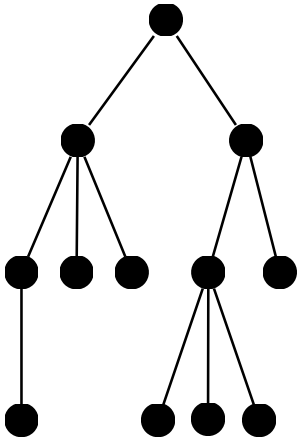


General Trees (definition)



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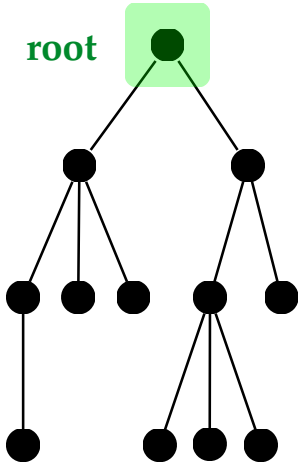

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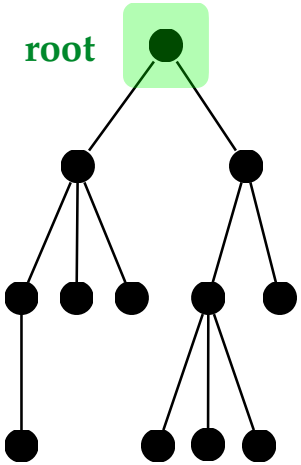

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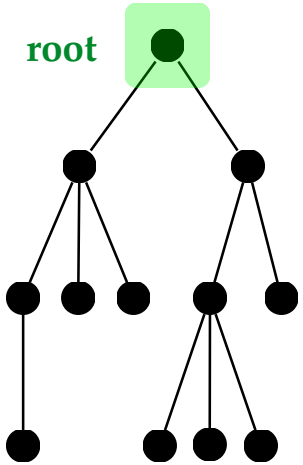

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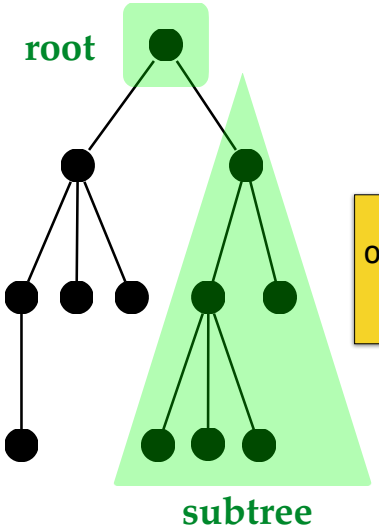

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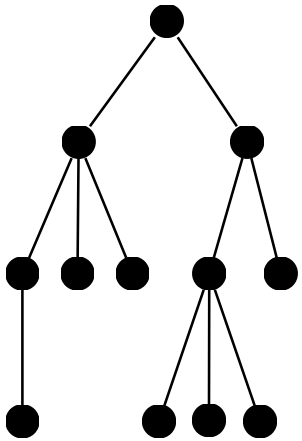

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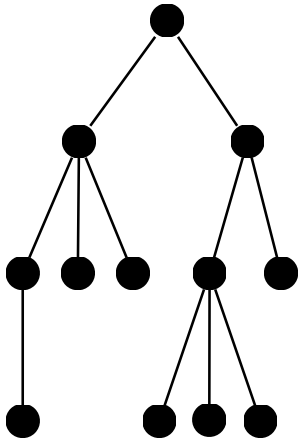

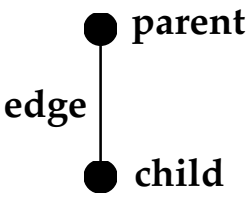

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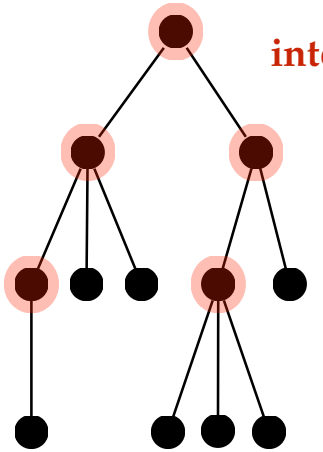
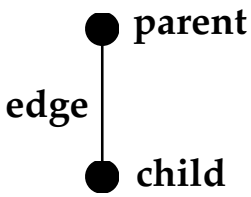


internal nodes



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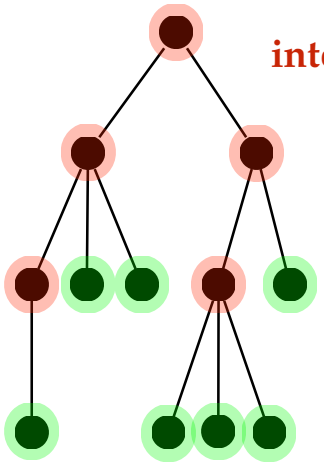

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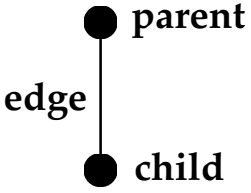

leaves

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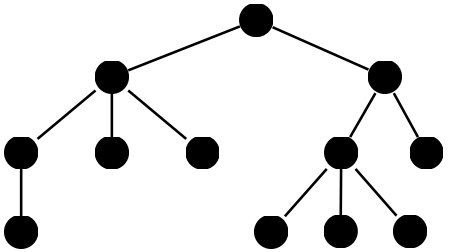

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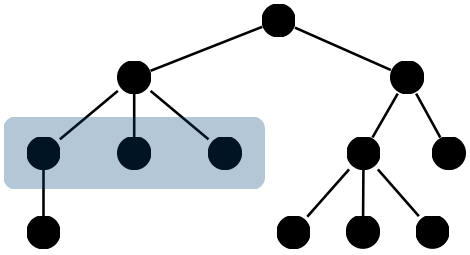

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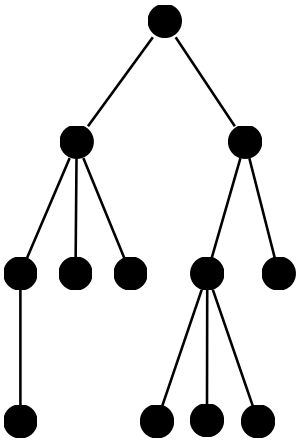

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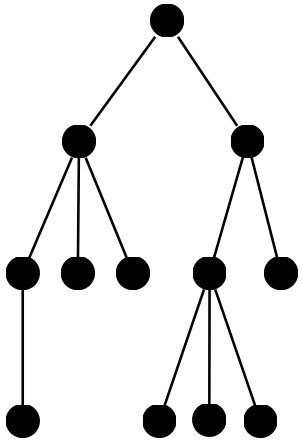

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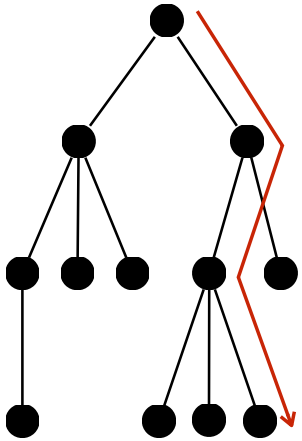

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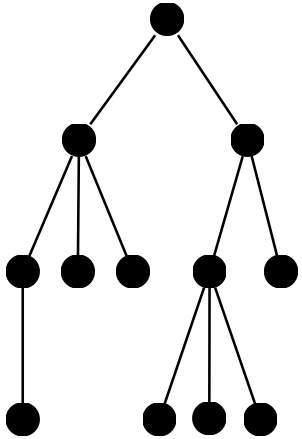

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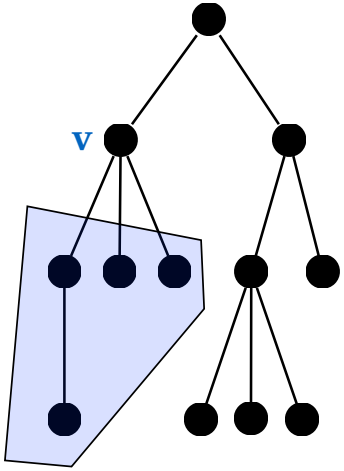

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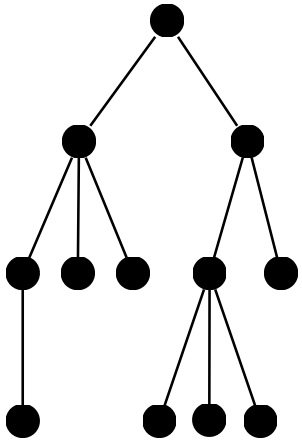

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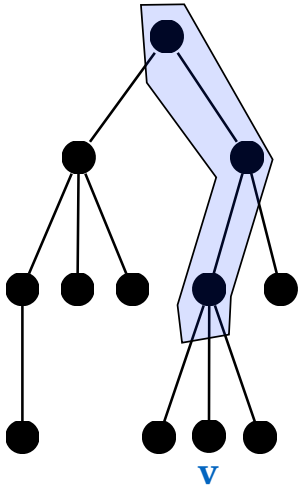

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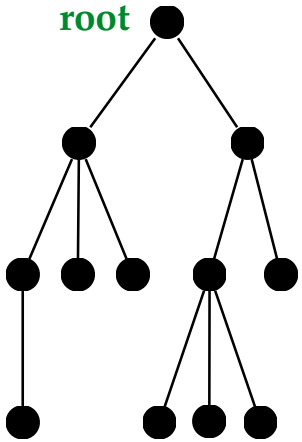

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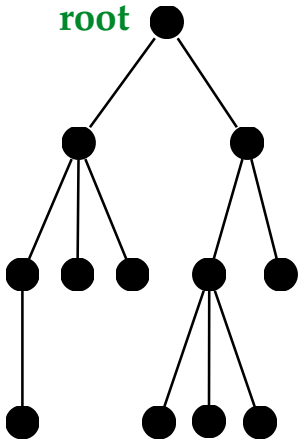

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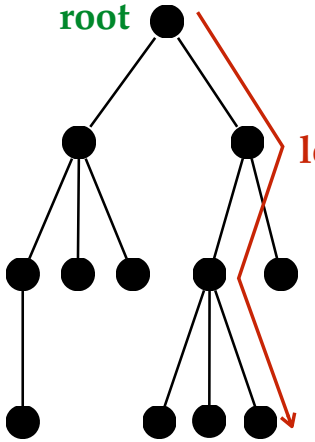

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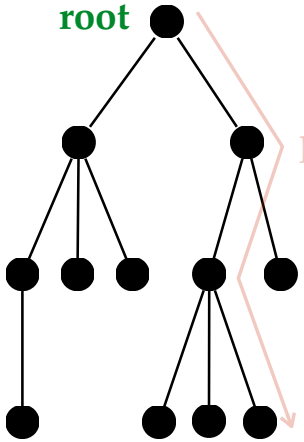

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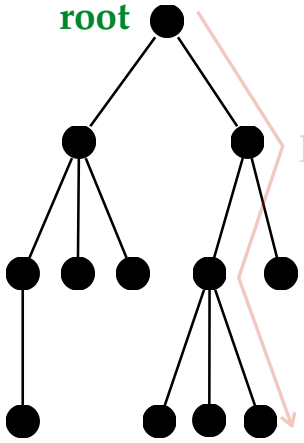

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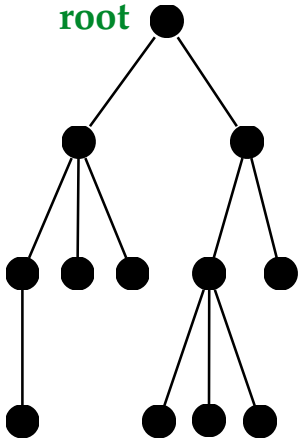
Tree Properties



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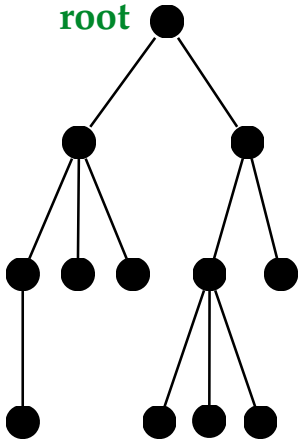

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The **height of the tree** is the height of the root

How to implement general trees?

Node:

data
parent
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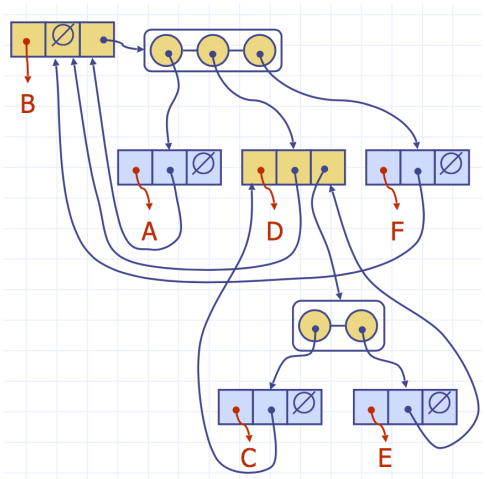
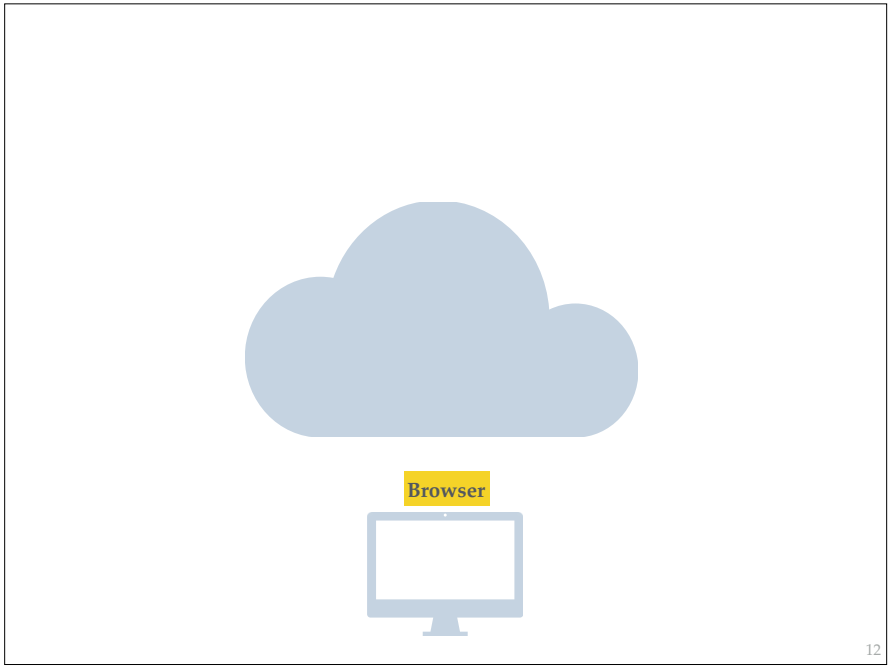
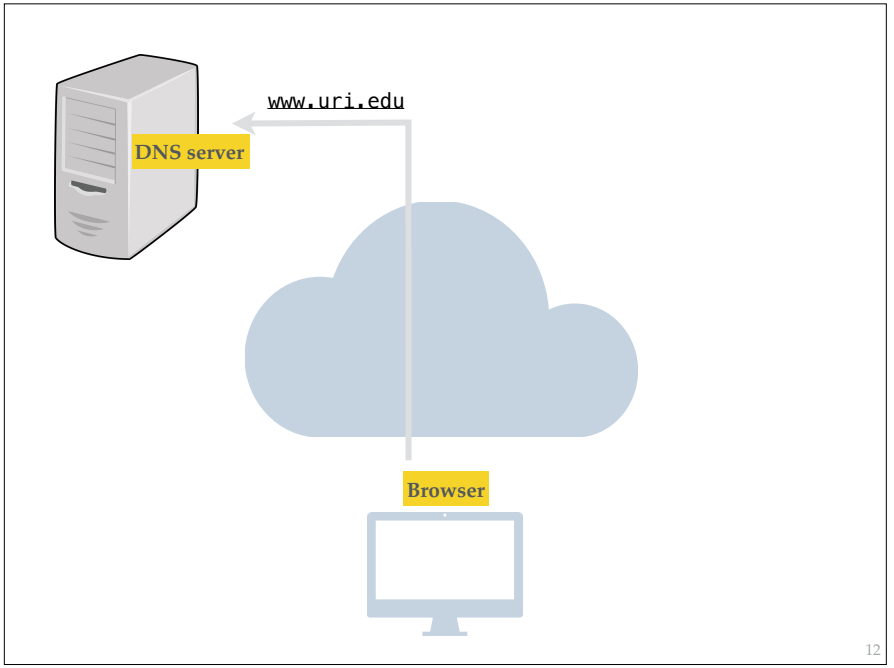


From Algorithm Design and Applications, Goodrich & Tamassia

Traversals


Browser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DNS server
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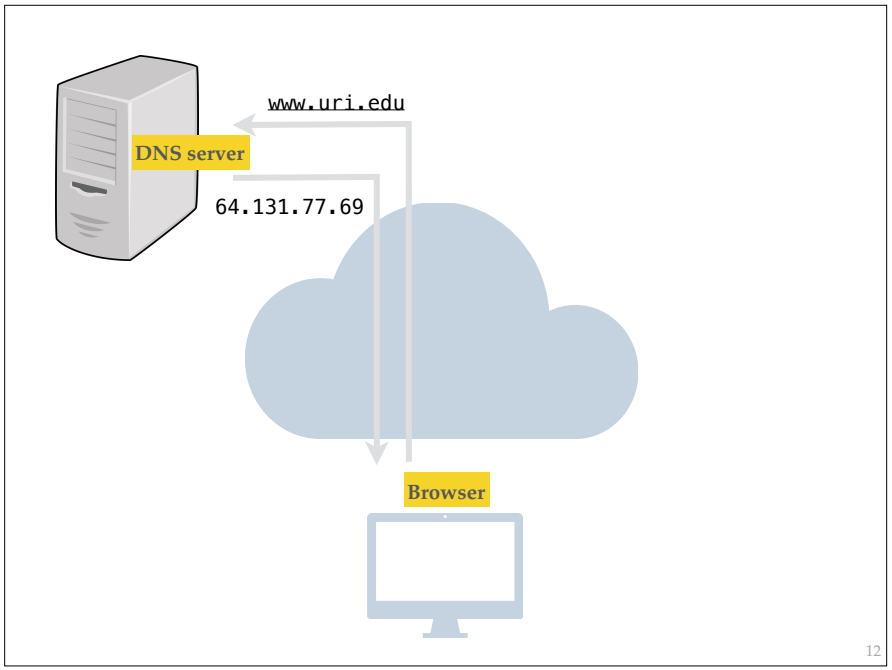
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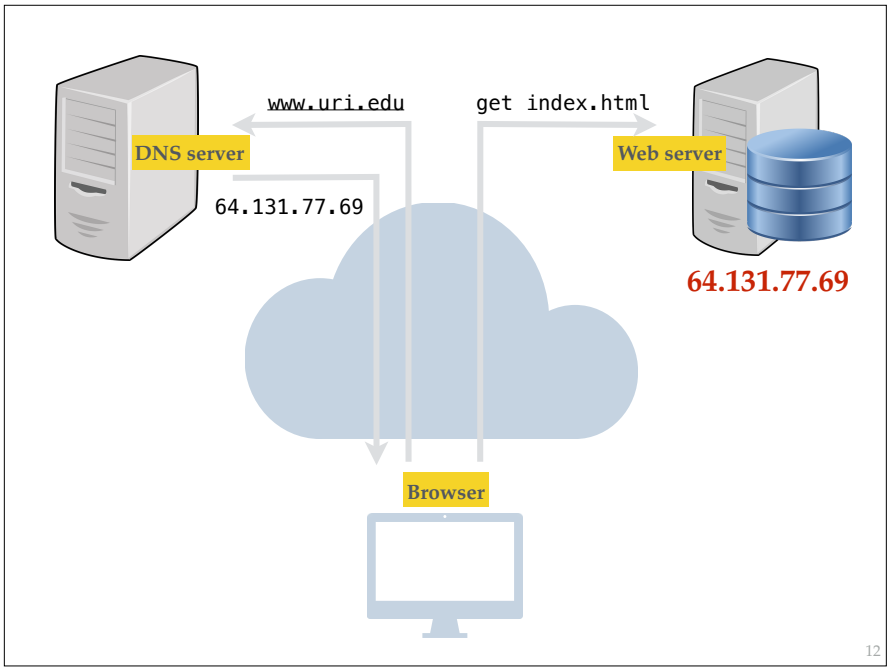
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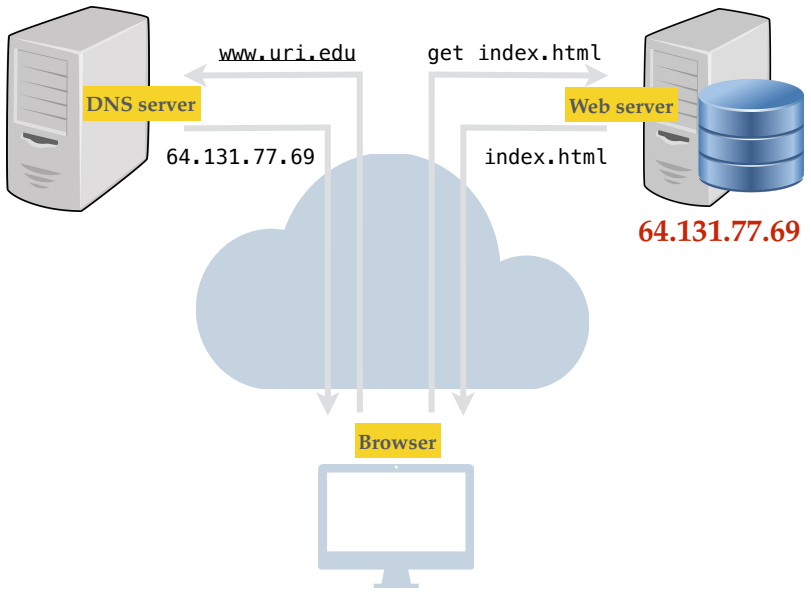


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 5 </head>
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 7 <body>
 8 <h1>A Heading</h1>
 9 <a href="http://www.uri.edu">Link Text</a>
10 </body>
11
12 </html>
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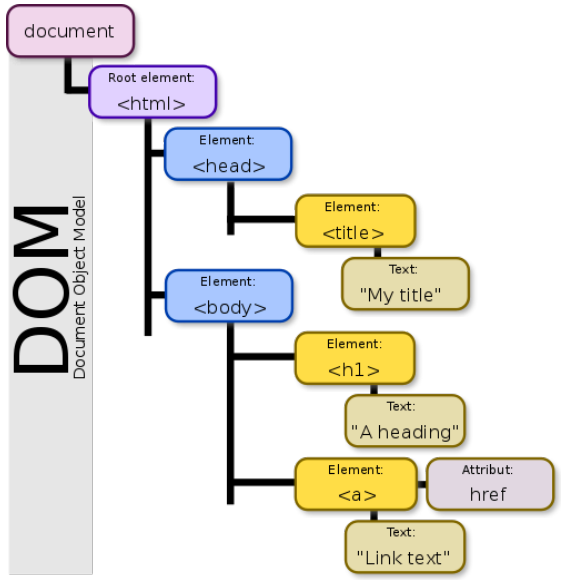

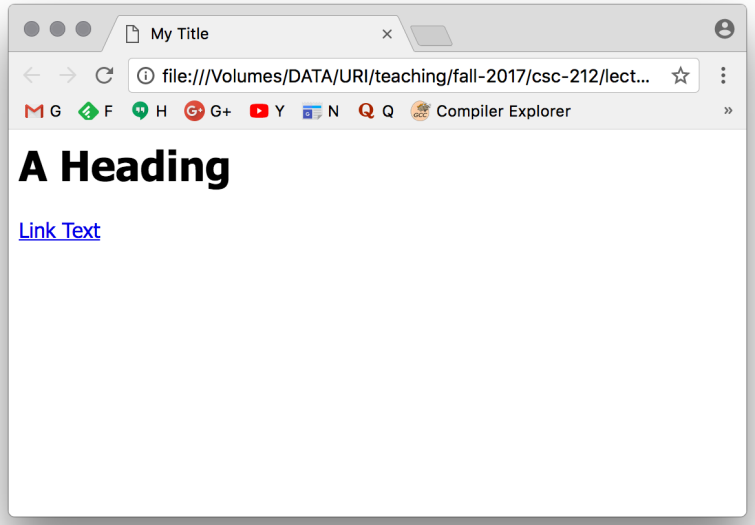

Traversing a tree

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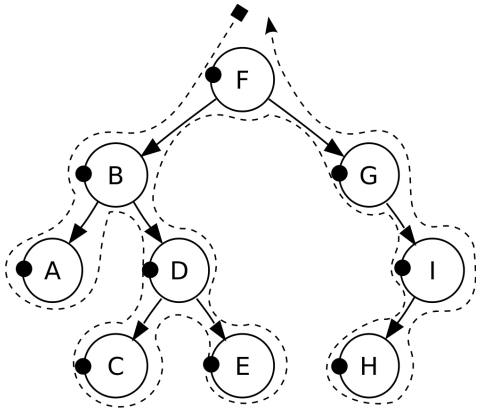

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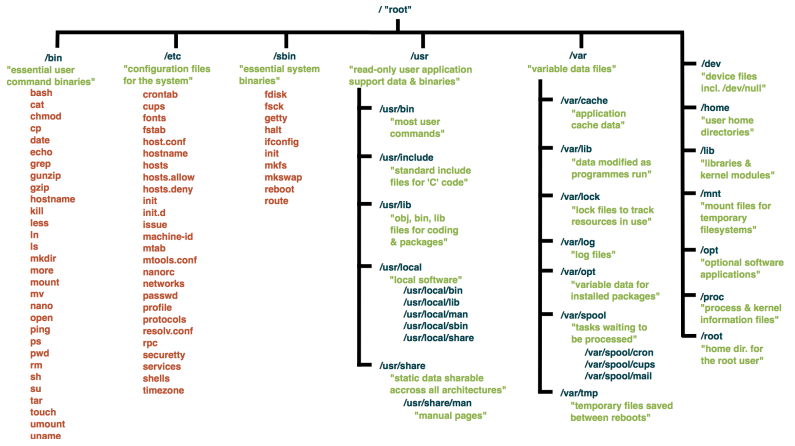
Preorder Traversal

```
1 algorithm preorder(p) {
2     visit(p)
3     for each child c of p {
4         preorder(c)
5     }
6 }
```


UNIX File System



How to compute amount of space used by files in folders and subfolders?

Postorder Traversal

```
1 algorithm postorder(p) {
2     for each child c of p {
3         postorder(c)
4     }
5     visit(p)
6 }
```