Fakultas Informatika
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CSG2A3
ALGORITMA dan STRUKTUR DATA

Tree Data Structure

Definition

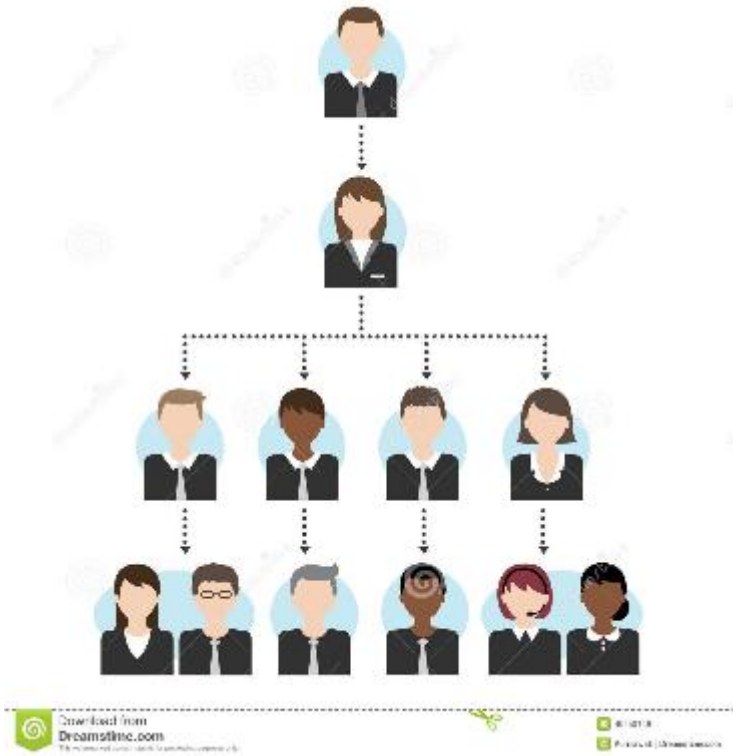
- The data structure consists of a root, and sub trees in a hierarchical arrangement.
- A form of non-linear data structures

Definition

- Usually used to describe, hierarchical data relationships, such as :
  - organizational structure
  - classification tree / genealogy
  - syntax tree / tree expression

Example

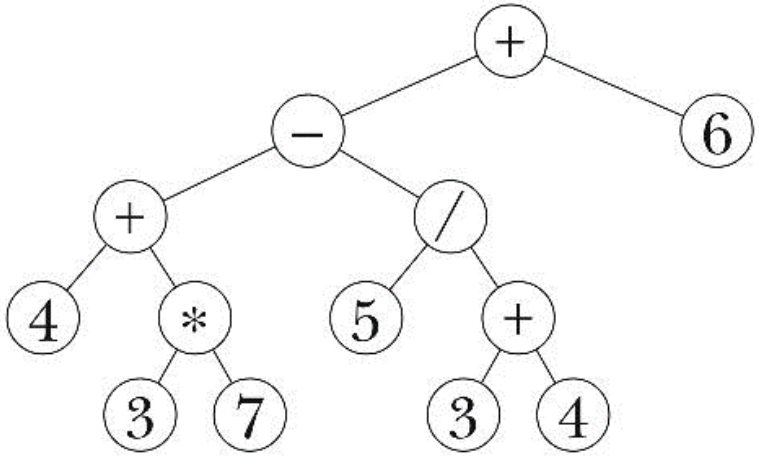
- Organization Structure
  - Family tree
  - Tournament tree



Example

- Organization Structure
- Arithmetic expression

  Example : (4+3*7)-(5/(3+4)+6

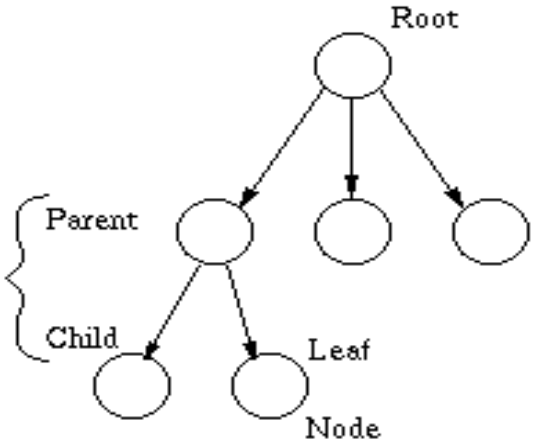


Example

- Organization Structure
- Arithmetic expression
- Decision Tree

Tree Terminology

- Leaf
- Connection between nodes
  - (parent, child, sibling)
- Level
- Degree
- Height and depth
- Ancestor and Descendant
- Forest



Tree Terminology

- Tree is a collection of many **nodes**
- Each node may have **0 or more successor**
- Each node has precisely **one predecessor**
  - except the peak node (**root**)
- **Root** is the top node in a tree
- Links that connect a node to its successors are called **branches / edges**

Tree Terminology

- Successors of a node are called **children** (child)
- Predecessor of a node is called **parent**
- Nodes with the same parent are called **siblings**
- Nodes with no children are called **leaf/external node**
- Number of children / sub trees of a node is called **degree**

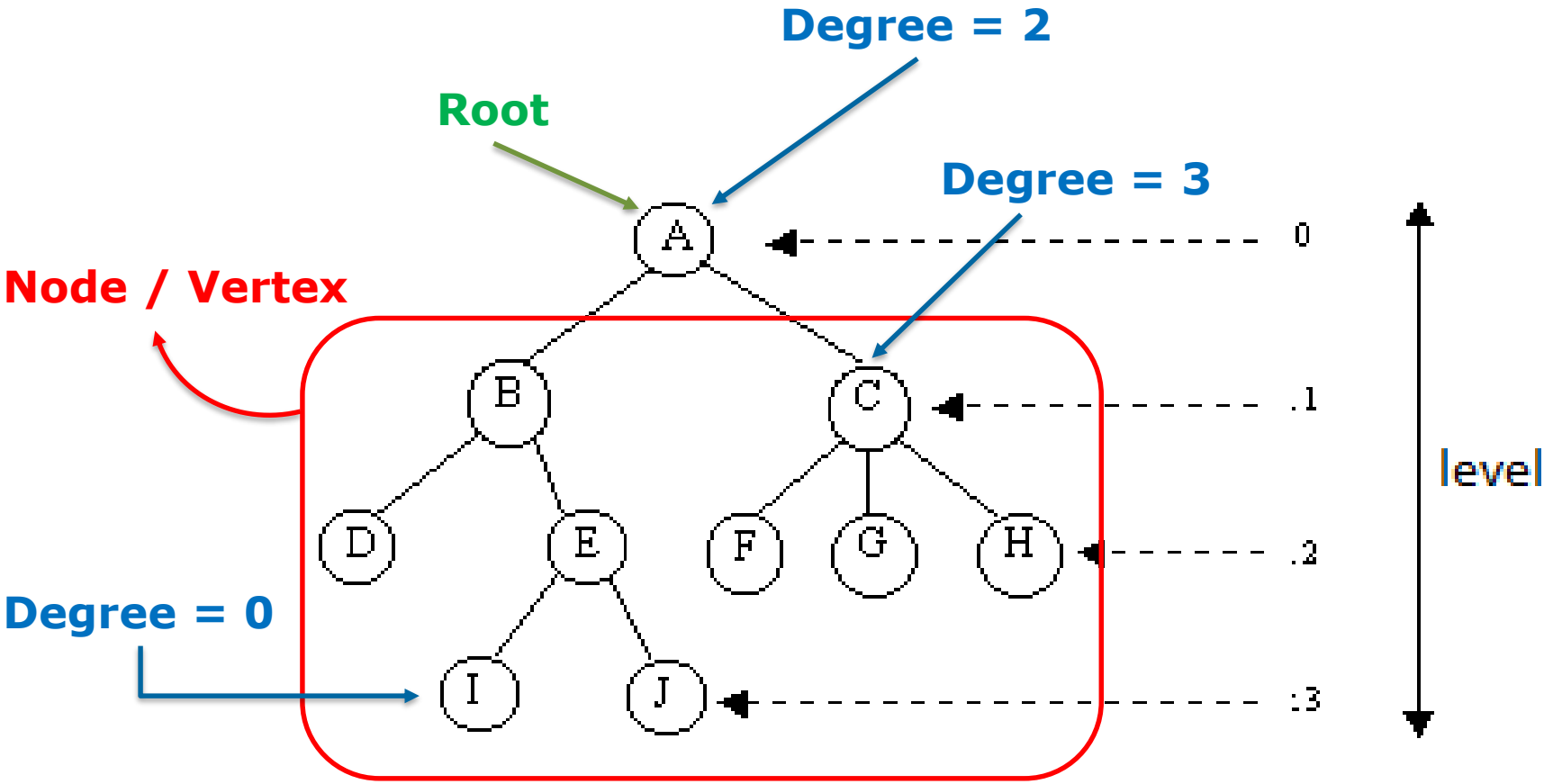
Tree Terminology

- **Descendant** is a list of all child / successor to the leaf
- **Ancestor** is a list of predecessor / from parent to root
- The **level** of a node is defined by 1 + the number of connections between the node and the root.

Tree Terminology

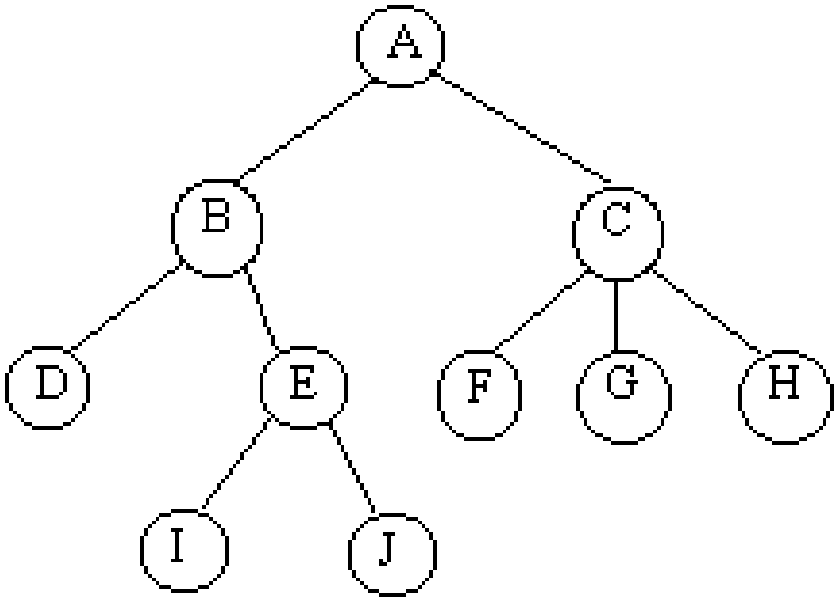
- The **height** of a tree is the number of edges on the longest downward path between the root and a leaf.
- The **height** of a node is the number of edges on the longest downward path between that node and a leaf.
- The **depth** of a node is the number of edges from the node to the tree's root node

Terminology



Exercise on Tree Terminology

- Root =
- Sibling C =
- Parent F =
- Child B =
- Leaf =
- Internal Node =
- Level E =
- Tree height =
- Degree B =
- Ancestor I =
- Descendant B =



Exercise on Tree Terminology

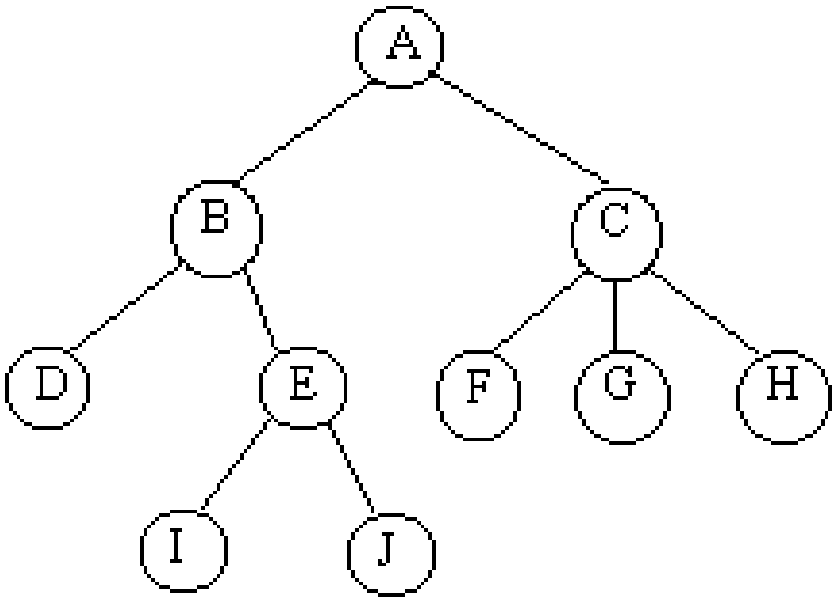
- Create the tree
- Dataset: {A, X, W, H, B, E, S}
- Root: A
- Ancestor of S: {E, A}
- {X, W, E} are siblings
- {H, B} are descendant and both are children of W

Question?

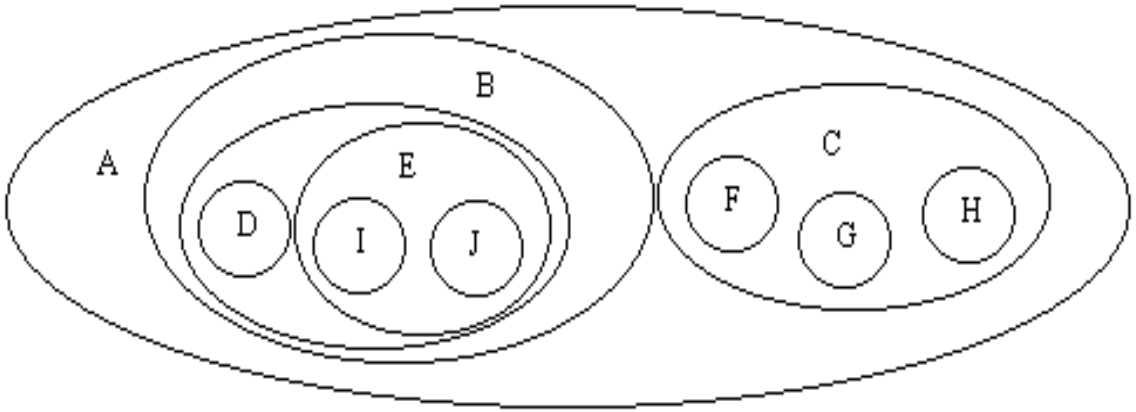
Tree Notations / Representing Tree

- Tree Diagram Notation
  - Classical node-link diagrams
- Venn Diagram Notation
  - Nested sets / Tree Maps
- Bracket Notation
  - Nested Parentheses
- Level Notation
  - Outlines / tree views

Tree Diagram Notation



Venn Diagram Notation

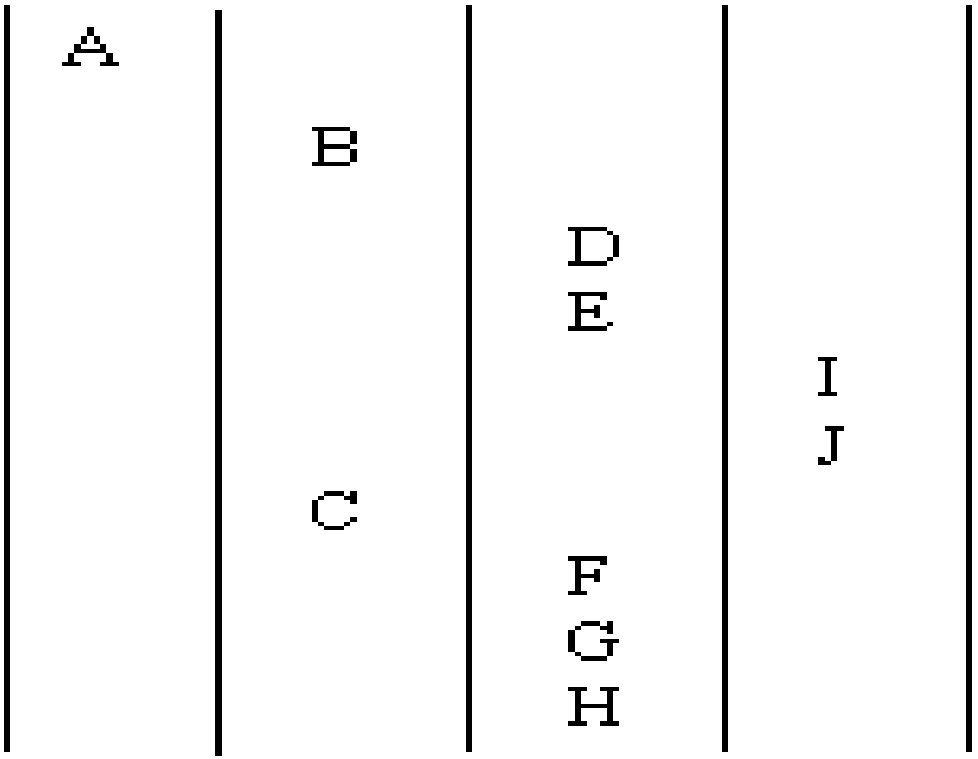


Bracket Notation

(A(B(D,E(I,J)),C(F,G,H)))

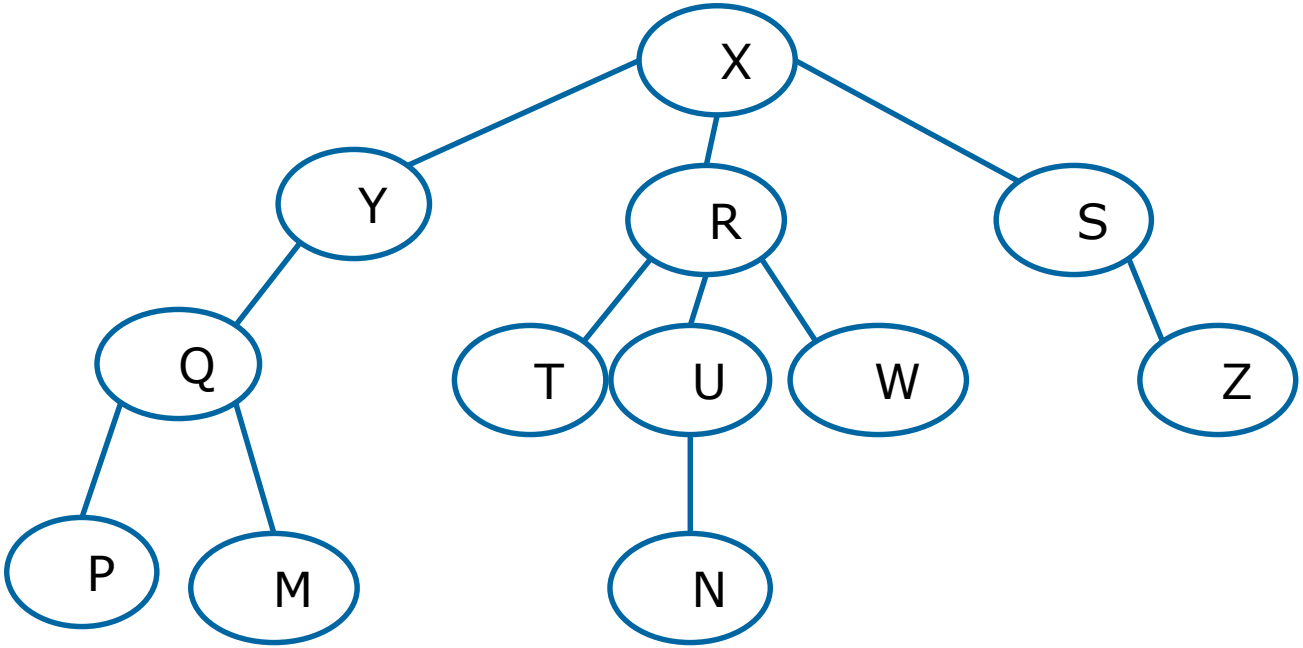
(A (B(D)(E(I)(J))) (C(F)(G)(H)))

Level Notation



Exercise on Tree Notation

- Create the tree in Venn Diagram, Bracket, and level notation



Question?

THANK YOU