Introduction To Tree

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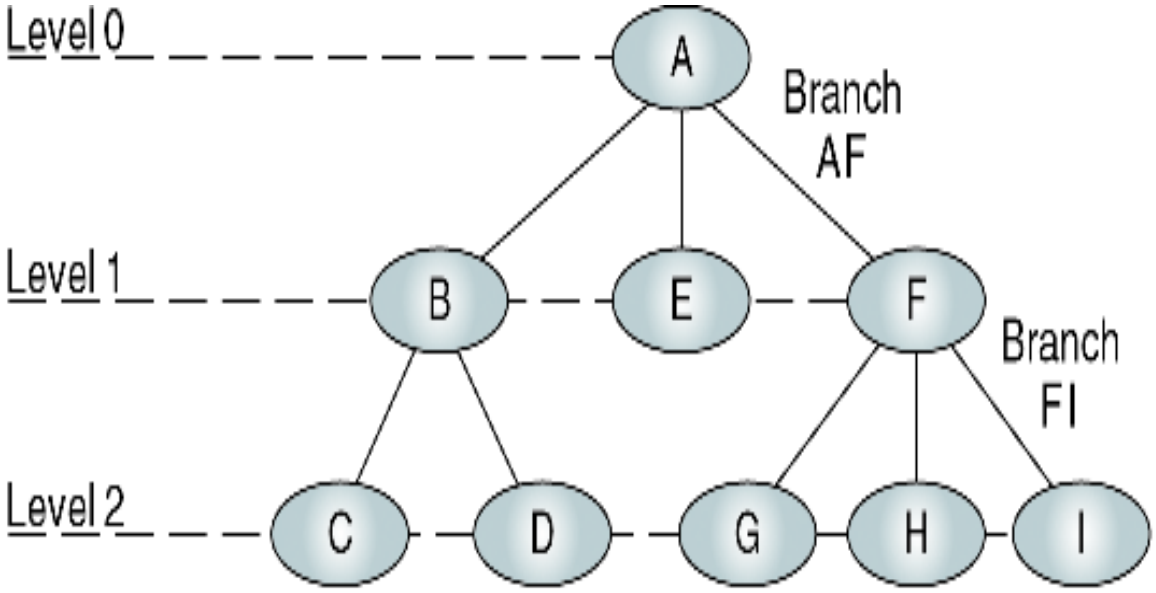
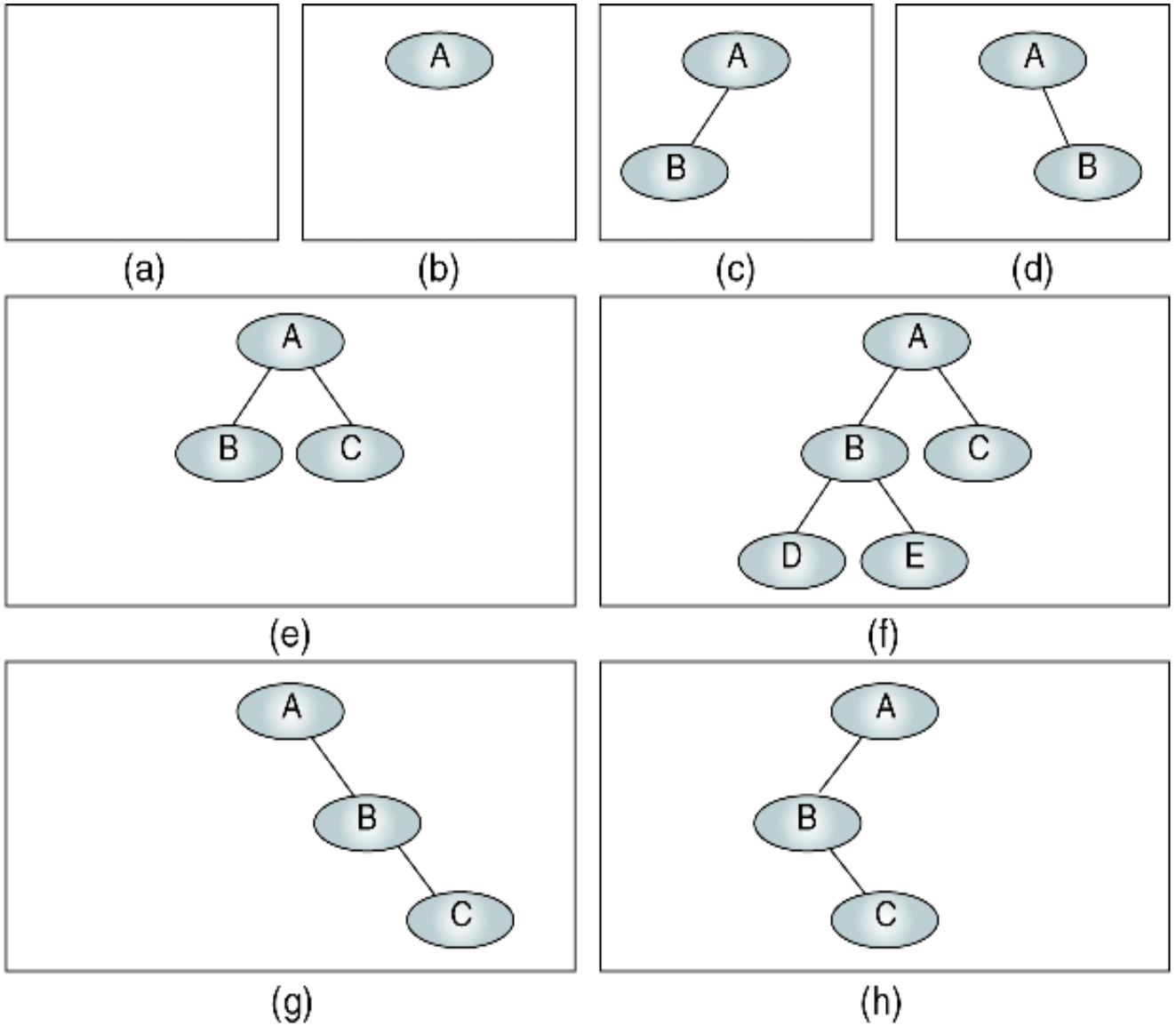
Tree Terminologies



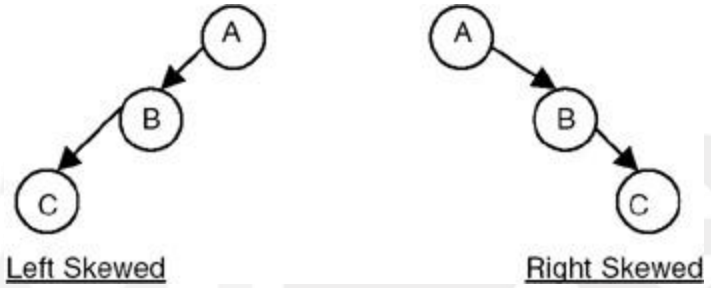
Root: A	Siblings: {B,E,F}, {C,D}, {G,H,I}
Parents: A, B, F	Leaves: C,D,E,G,H,I
Children: B, E, F, C, D, G, H, I	Internal nodes: B,F

Binary Tree



Binary Tree Properties

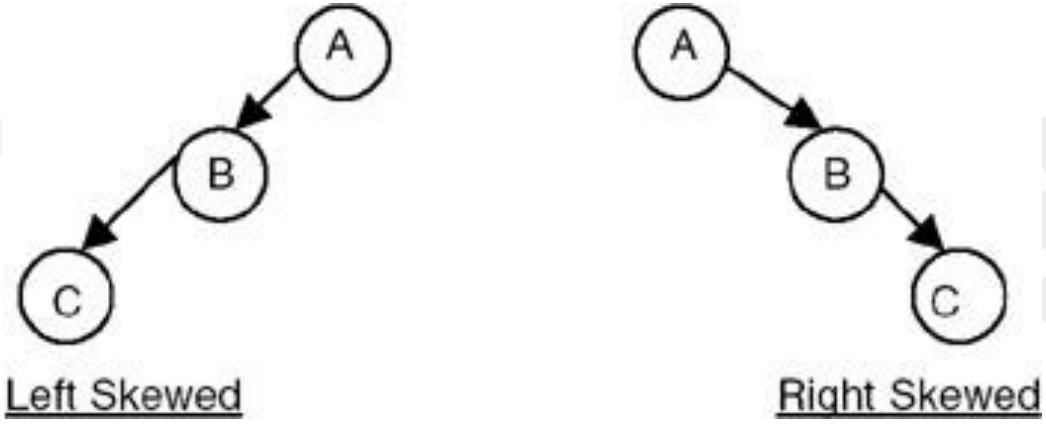
- Maximum Height : $H_{\max} = N$



- Minimum Height : $H_{\min} = \lceil \log_2 N \rceil + 1$

- Nodes at level L : 2^L

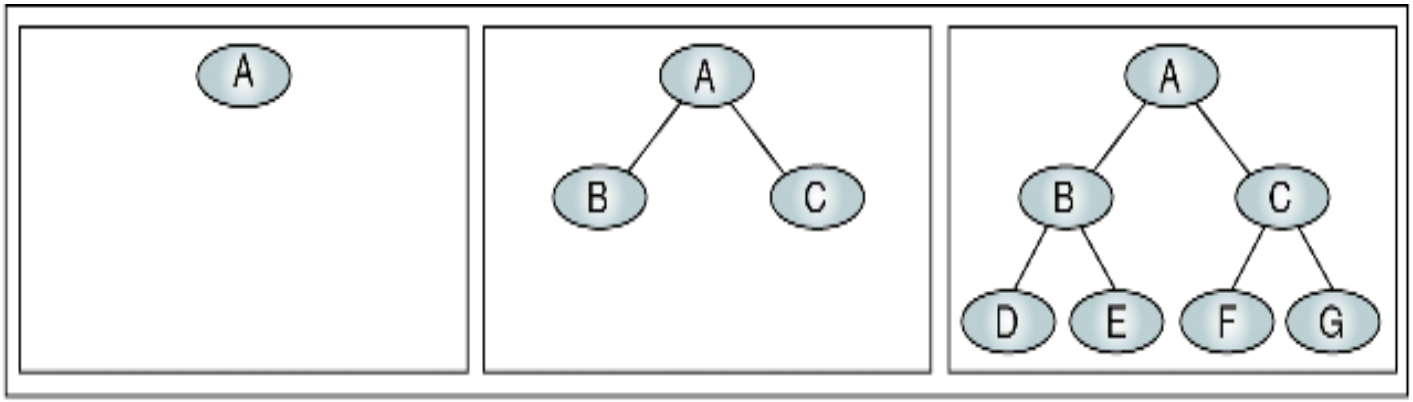
- Minimum Nodes $N_{\min} = H$



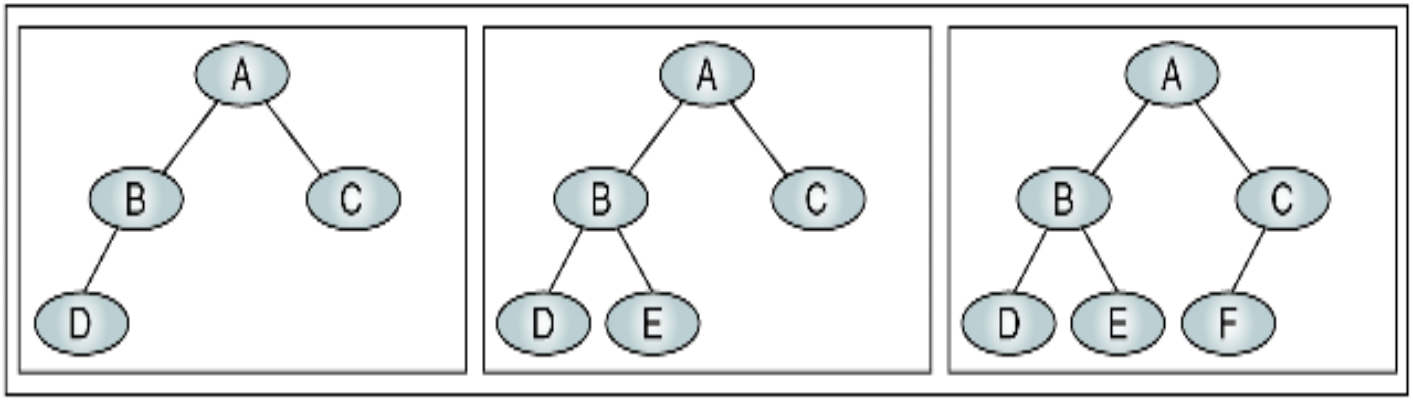
- Maximum Nodes : $N_{\max} = 2^{H} - 1$

Binary Tree Types

- Complete Tree
  - Maximum number of entries for its height.
- Nearly Complete
  - Minimum height for its nodes and all nodes in the last level are found on the left
- Strictly binary Tree
  - Either two subtrees or no node



(a) Complete trees (at levels 0, 1, and 2)



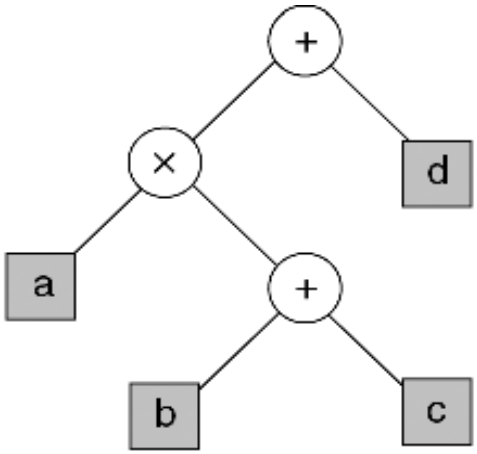
(b) Nearly complete trees (at level 2)

Properties

- A strictly binary tree with L leaves must have 2L-1 nodes
- A x-ary complete tree with L leaves , I internal nodes is given by L=(x-1)I + 1
- Note : I internal node also includes parent node

Expression Tree

a × (b + c) + d



- Step 1 : Convert infix to postfix/prefix expression

  a * **bc+** + d

  abc+* + d

  abc+*d+

- Step 2 : Perform Postfix evaluation to generate tree

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