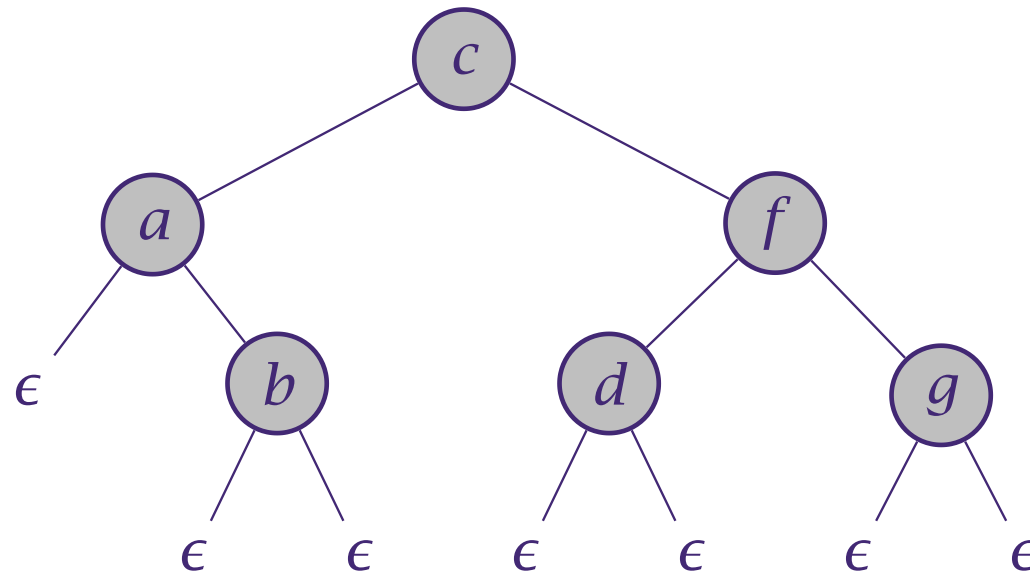# 6.1   Binary trees: size and height

- the *size* of a tree is the total number of nodes
- the *maximal height* of a tree is the maximal number of nodes on any path from the root to a leaf
- the *minimal height* of a tree is the minimal number of nodes on any path from the root to a leaf

- the tree has size 6, minimal height 2, and maximal height 3

6.1   Binary trees: size and height

- size of a binary tree

$$size :: Tree\ some \rightarrow Int$$
$$size\ (Leaf) \qquad = 0$$
$$size\ (Node\ t\ a\ u) = size\ t + 1 + size\ u$$

- minimal and maximal height ($\downarrow$ is minimum, $\uparrow$ is maximum)

$$minHeight, maxHeight :: Tree\ some \rightarrow Int$$
$$minHeight\ (Leaf) \qquad\quad = 0$$
$$minHeight\ (Node\ t\ a\ u)\ = (minHeight\ t \downarrow minHeight\ u) + 1$$

$$maxHeight\ (Leaf) \qquad\quad = 0$$
$$maxHeight\ (Node\ t\ a\ u) = (maxHeight\ t \uparrow maxHeight\ u) + 1$$