ARCHITECTURE GRAPHICS

Prepared by :
Jr. Instructor (Architecture)
Daffodil Institute of IT,Ctg

A binary tree is a tree with the following properties:

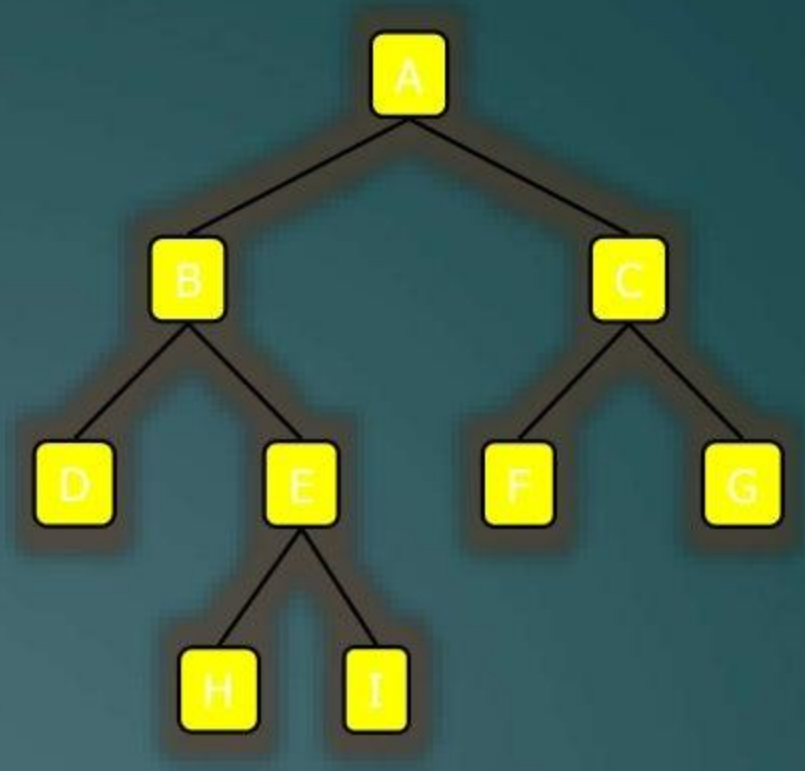
- Each internal node has at most two children (degree of two)
- The children of a node are an ordered pair

We call the children of an internal node left child and right child

Alternative recursive definition: a binary tree is either

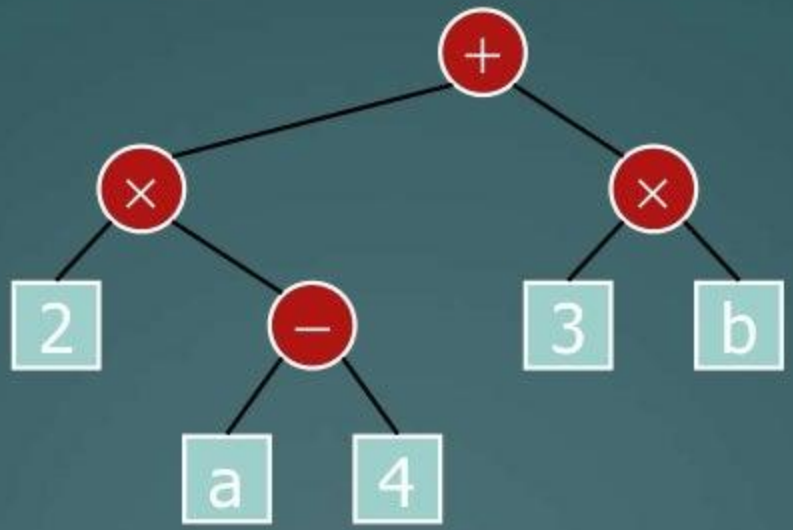
- a tree consisting of a single node, OR
- a tree whose root has an ordered pair of children, each of which is a binary tree

- Applications:
  - arithmetic expressions
  - decision processes
  - searching



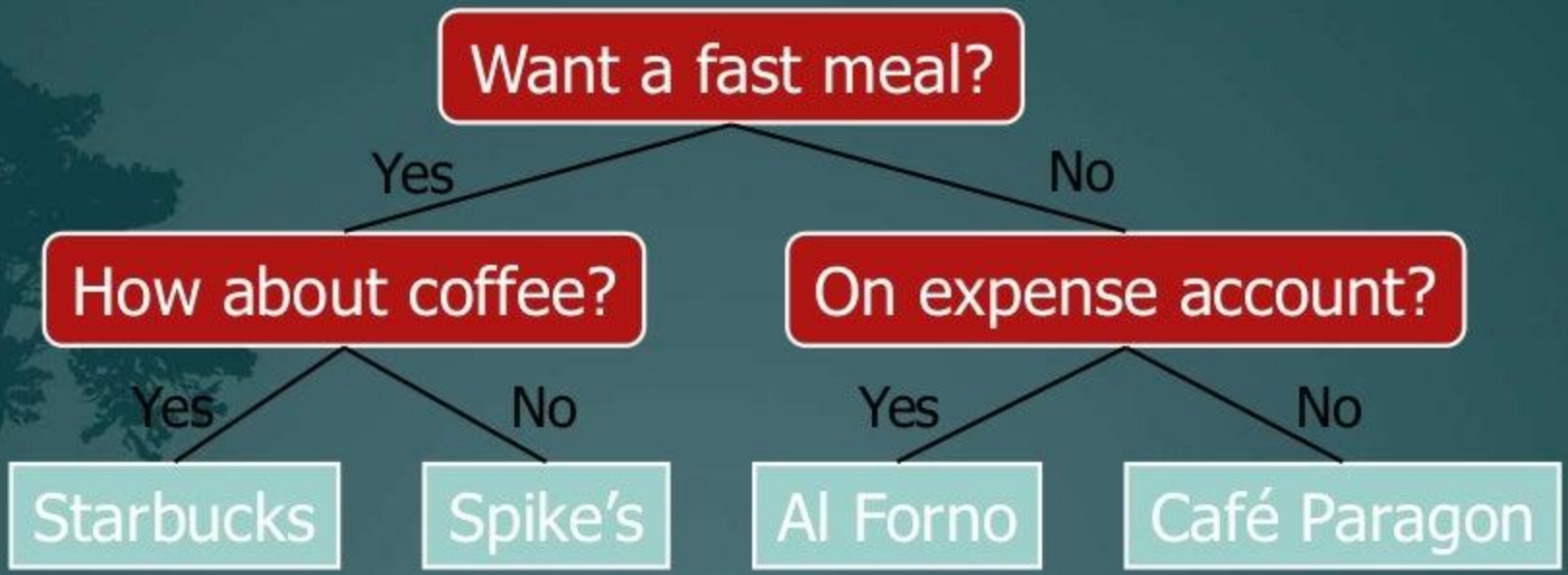
Arithmetic Expression Tree

- Binary tree associated with an arithmetic expression
  - internal nodes: operators
  - external nodes: operands
- Example: arithmetic expression tree for the expression (2 × (a - 4) + (3 × b))



Decision Tree

- Binary tree associated with a decision process
  - internal nodes: questions with yes/no answer
  - external nodes: decisions
- Example: dining decision



- Binary Search Tree - Used in many search applications where data is constantly entering/leaving, such as the map and set objects in many languages' libraries.
- Binary Space Partition - Used in almost every 3D video game to determine what objects need to be rendered.
- Binary Trees - Used in almost every high-bandwidth router for storing router-tables.
- Hash Trees - used in p2p programs and specialized image-signatures in which a hash needs to be verified, but the whole file is not available.
- Heaps - Used in implementing efficient priority-queues, which in turn are used for scheduling processes in many operating systems, Quality-of-Service in routers, and A* (path-finding algorithm used in AI applications, including robotics and video games). Also used in heap-sort.
- Huffman Coding Tree (Chip Uni) - used in compression algorithms, such as those used by the .jpeg and .mp3 file-formats.

- GGM Trees - Used in cryptographic applications to generate a tree of pseudo-random numbers.
- Syntax Tree - Constructed by compilers and (implicitly) calculators to parse expressions.
- Treap - Randomized data structure used in wireless networking and memory allocation.
- T-tree - Though most databases use some form of B-tree to store data on the drive, databases which keep all (most) their data in memory often use T-trees to do so.
- B-Tree : we use B-Tree in indexing large records in database to improve search