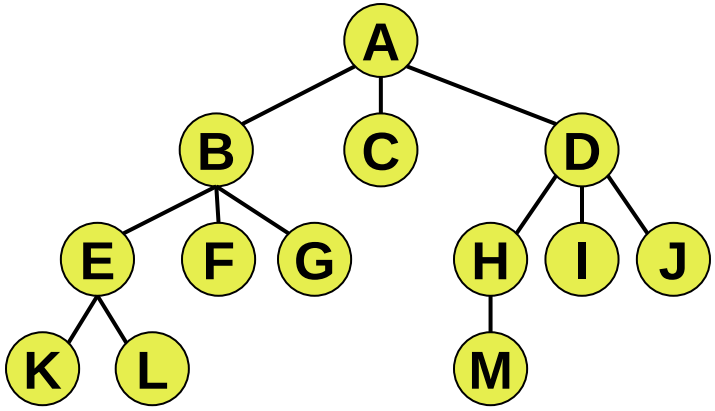
The Problem

- In this assignment, you will implement initialization and traversal of general trees, where a node can have any number of children.
- **Preorder**, **postorder**, and **level-order** traversal are defined for general trees, so you will implement them. (On the other hand, inorder traversal is not defined and therefore is not required in this assignment.)
- The class name is `GeneralTree`.
- The data field of a tree node contains a single integer.
- The tree is to be in **left-child-right-sibling** representation.

The Problem



- Preorder: **A B E K L F G C D H M I J**
- Postorder: **K L E F G B C M H I J D A**
- Level-order: **A B C D E F G H I J K L M**
- Initialization string:

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

The Problem

- The list of functionalities:
  - Constructor:
    - `GeneralTree(const std::string &str);`
    - Initialize the tree from the input string.
    - Can be implemented recursively or with a stack. Pick one yourself.
  - Destructor:
    - `~GeneralTree();`
    - You have to do this carefully so that it will not crash and there will be no memory leak.
    - Do this recursively.

The Problem

- The list of functionalities (continued):
  - Preorder / postorder traversal:
    - `void preorder_rec();`
    - `void preorder_nonrec();`
    - `void postorder_rec();`
    - `void postorder_nonrec();`
    - Just print out the traversal string.
    - Implement both recursive and non-recursive versions.
  - Level-order traversal:
    - `void levelorder();`
    - No recursion; use a queue.

The Guidelines (Programming Part)

- Allowed programming environment: VS2015 only.
- For simplicity of submission, put the whole class, including the implementation, in **a single header file**.
- You need to write your own `main` function to test your code. You do not need to include this `main` function in your submission.
- STL class templates: Only these two are allowed:
  - `std::string` (actually from `std::basic_string`)
  - `deque`: can be used as a stack or a queue
- Include documentation; this will be part of your grade.
- Demo: Only a randomly selected subset of students; the list will be announced separately after the due date.

Submission

- Use E3 only.
- For the code, submit it under "**Assignment #1 – Programming Part**". Name your code `P3_xxxxxx.h`, where `xxxxxx` is your ID. **Do not** submit your `main` function or any file that is not your code (such as the *.sln file). No compressed file (*.zip, *.rar, etc.) accepted.
- Due date: **11/29/2016**. There's a grace period of 3 days with 10% deduction per day. (The deduction kicks in only when you have accumulated more than three days of delay during the semester.)