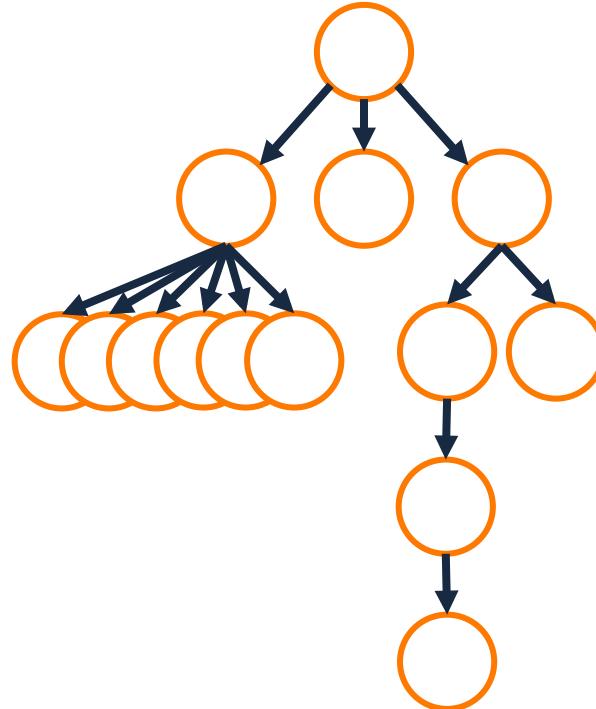


# Tree Terminology

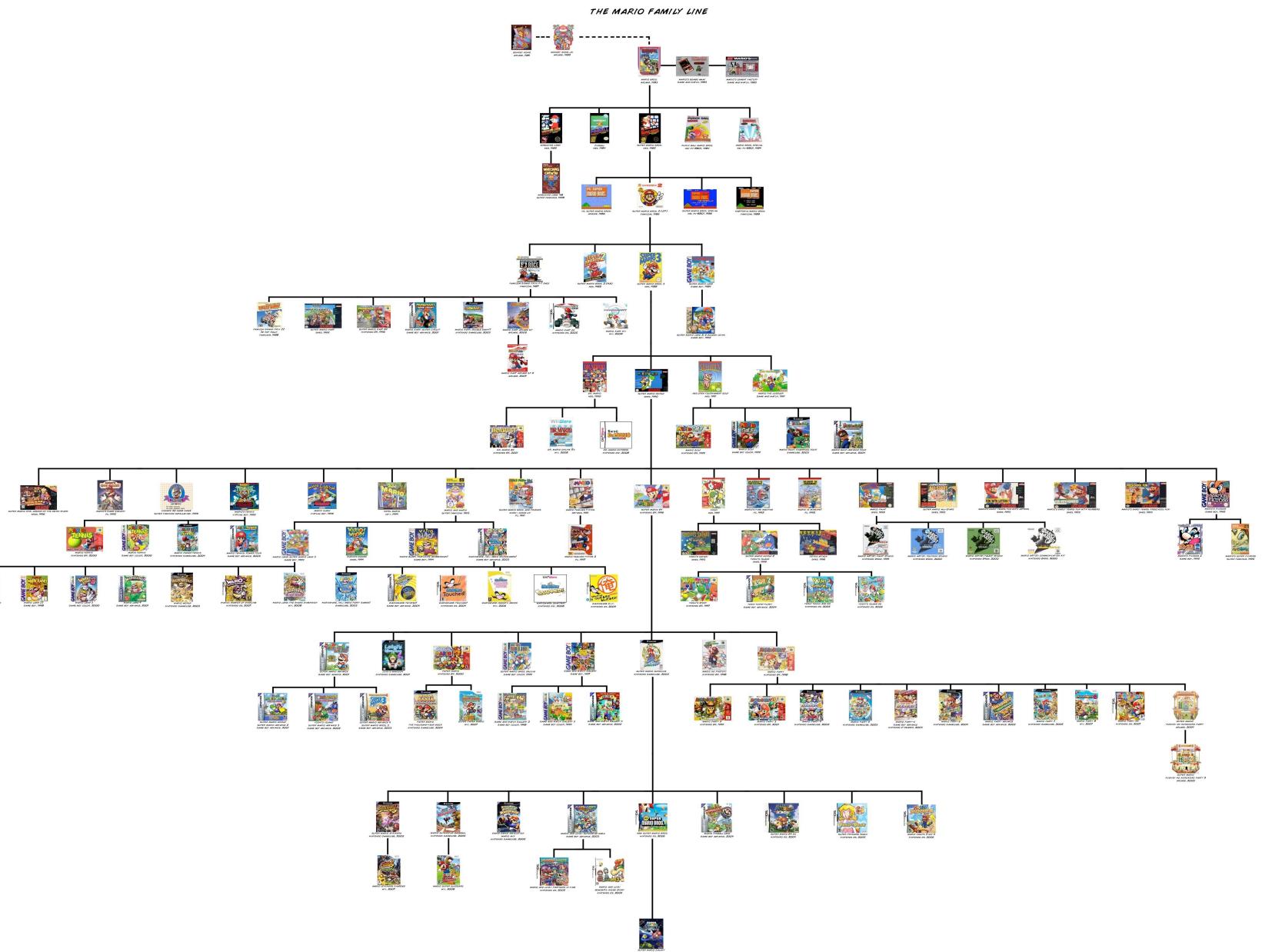
Prof. Wade Fagen-Ulmschneider

I ILLINOIS

A tree is a linked structure with a sense of ancestry (parents, children, siblings, and more)!



# Example:

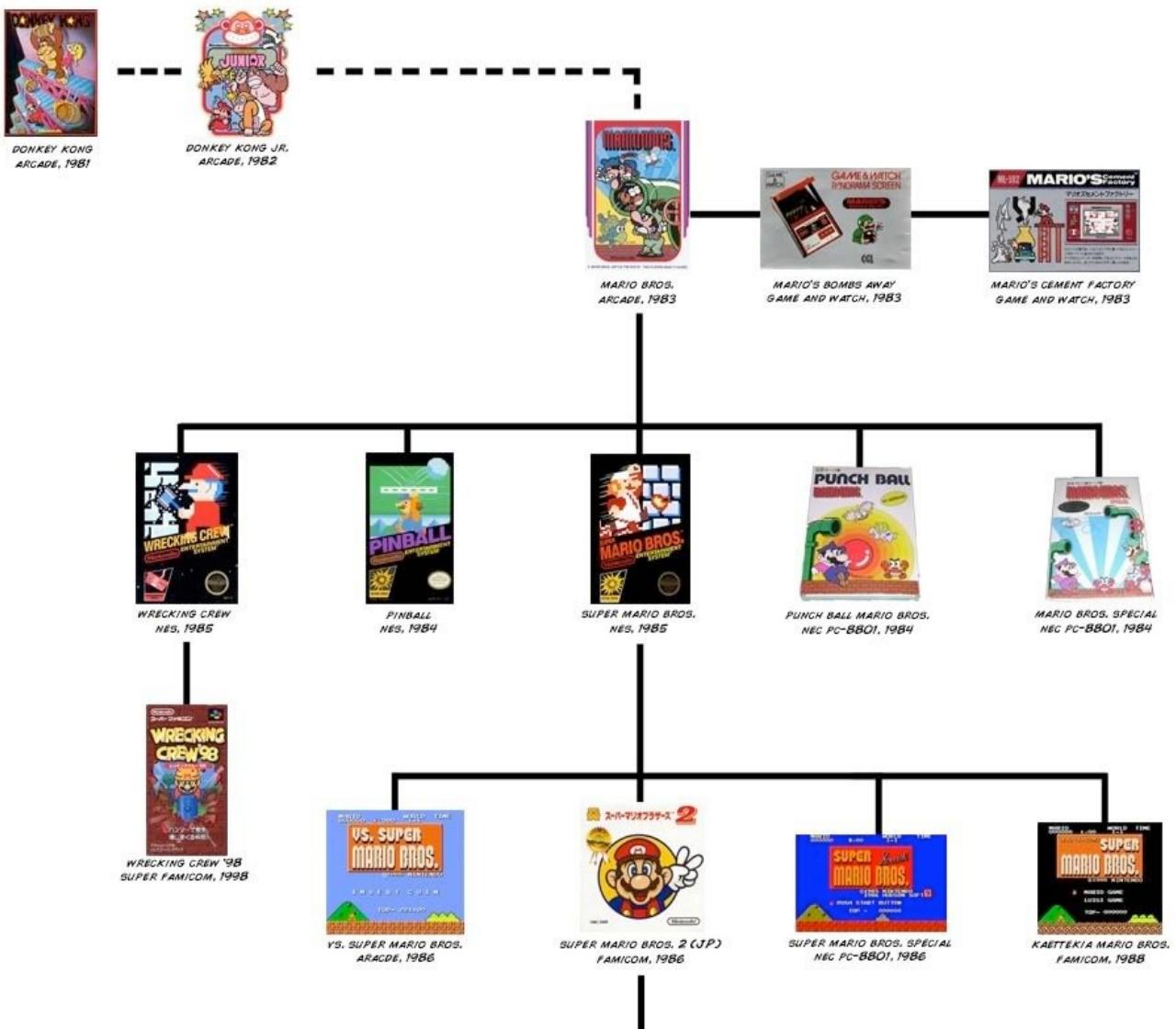


I

Source: “*Mario Family Line*” <<http://limitbreak.gameriot.com/blogs/Caveat-Emptor/Mario-Family-Line>>

# Example:

## THE MARIO FAMILY LINE



I

Source: "Mario Family Line" <<http://limitbreak.gameriot.com/blogs/Caveat-Emptor/Mario-Family-Line>>

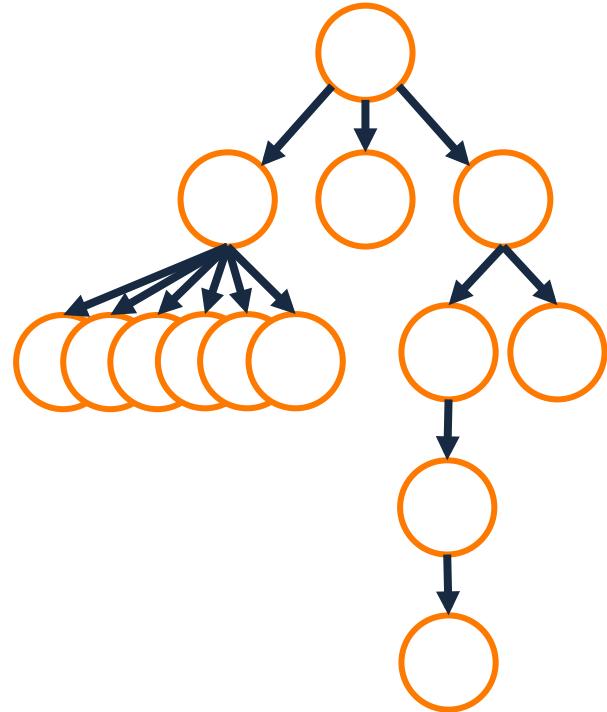
# Example:



I

Source: “*Mario Family Line*” <<http://limitbreak.gameriot.com/blogs/Caveat-Emptor/Mario-Family-Line>>

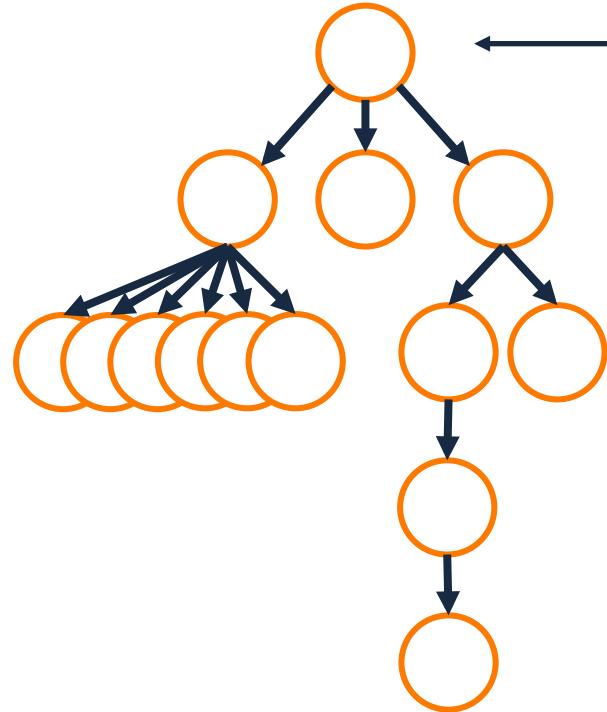
# Terminology



Each element in our tree is a **node**: ○

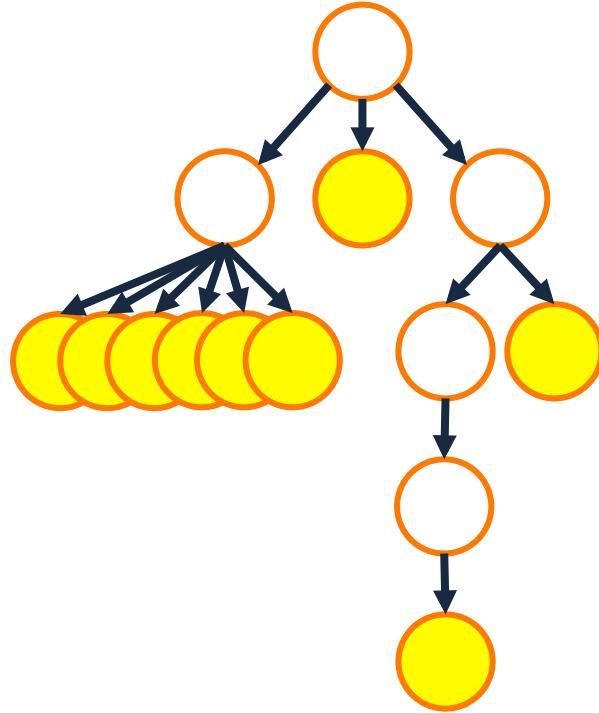
Each connection between two nodes is an **edge**: →

# Terminology



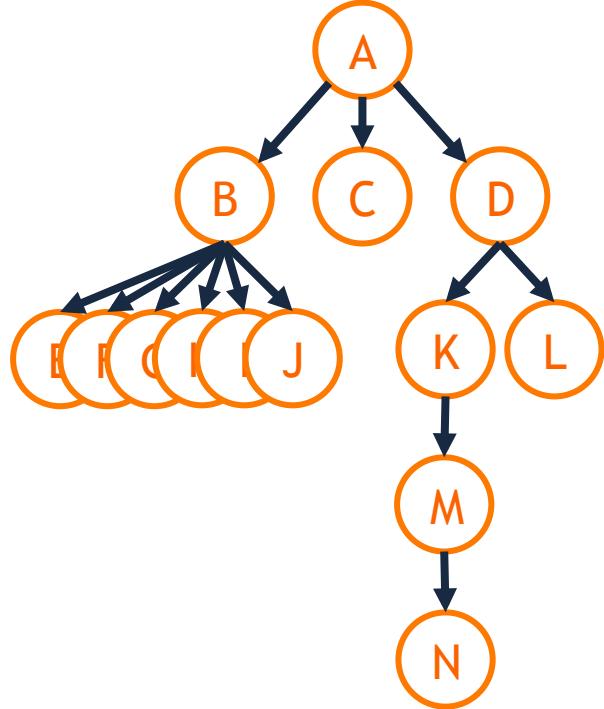
Trees must always contain a **root node** that has no incoming edges.

# Terminology



Nodes that contain no outgoing edges are called **leaf nodes**.

# Terminology

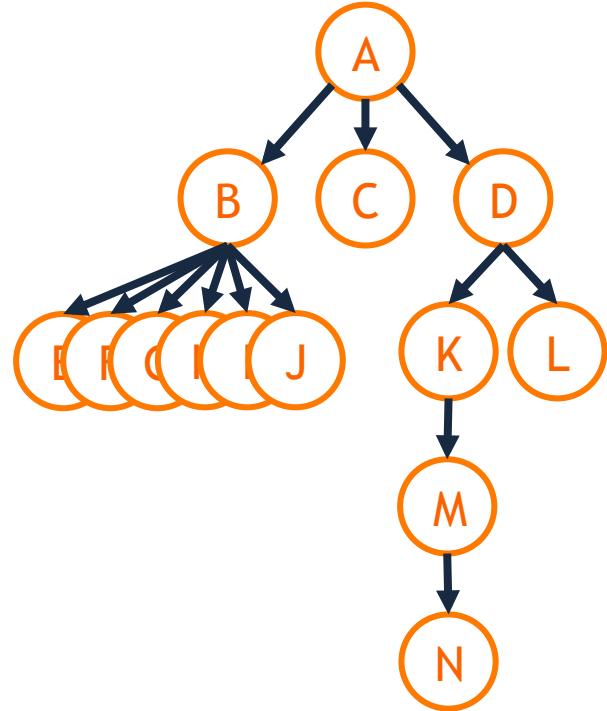


In a tree, the nodes will store data and may be labeled: **A**

Edges do not have names, but are referred to by the nodes they connect: **K**



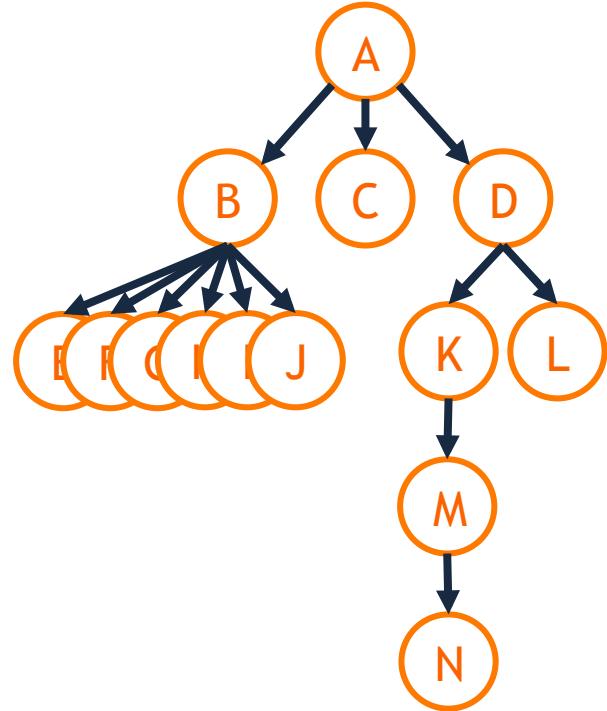
# Terminology



Every node, except the root node, has exactly one parent node.

- The parent of **B** is **A**. Once 's incoming edge comes from . **A**
- The parent of **K** is **D**.
- The parent of **L** is also **D**.

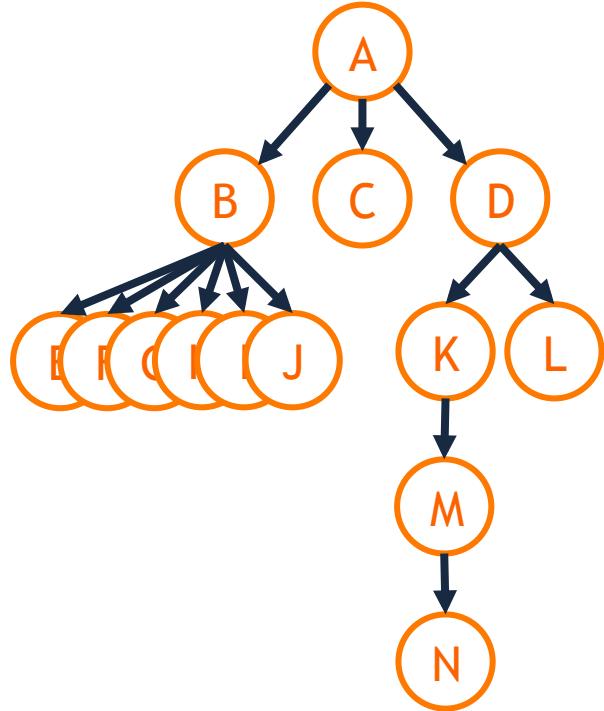
# Terminology



A node's **children** are the nodes with that node as its parent. (*It's possible to have anywhere from 0 to infinite children.*)

- A has three children: **B** **C** **D**.
- C is no children.
- M is one child: **N**.

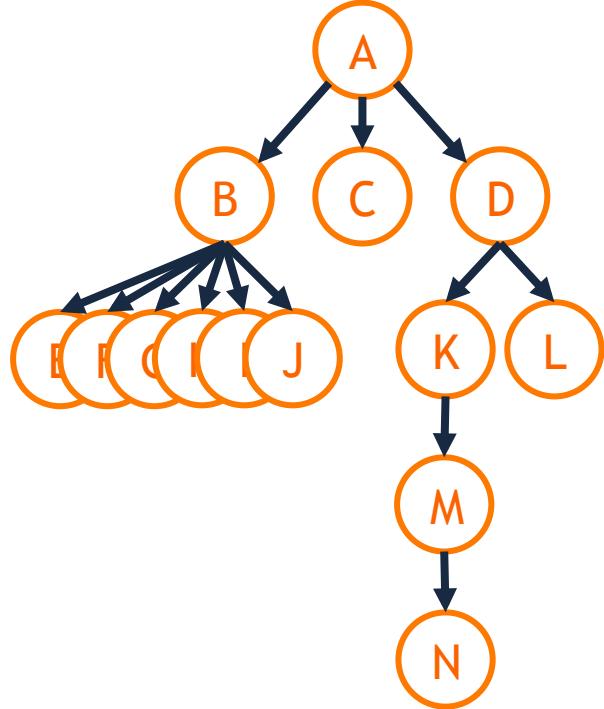
# Terminology



Most ancestry terms apply as expected:

- **Sibling**  
*B and D are siblings.*
- **Ancestor**  
*M, L, and D share A as a common ancestor.*
- **Grandchild / grandchildren**  
*M is a D's grandchild.*
- **Grandparent**  
*D is M's grandparent.*

# Terminology



Finally, to be a **tree**, three conditions **must** be true:

- Must have a root
- Must have directed edges
- Must not have a cycle

We say a tree is a “**rooted, directed, and acyclic**” structure.

# Tree Terminology

- Trees formed with nodes and edges.
- Trees must be rooted, directed, and acyclic.
- The relationship between nodes in a tree follow classical ancestry terms (parent, child, etc).

