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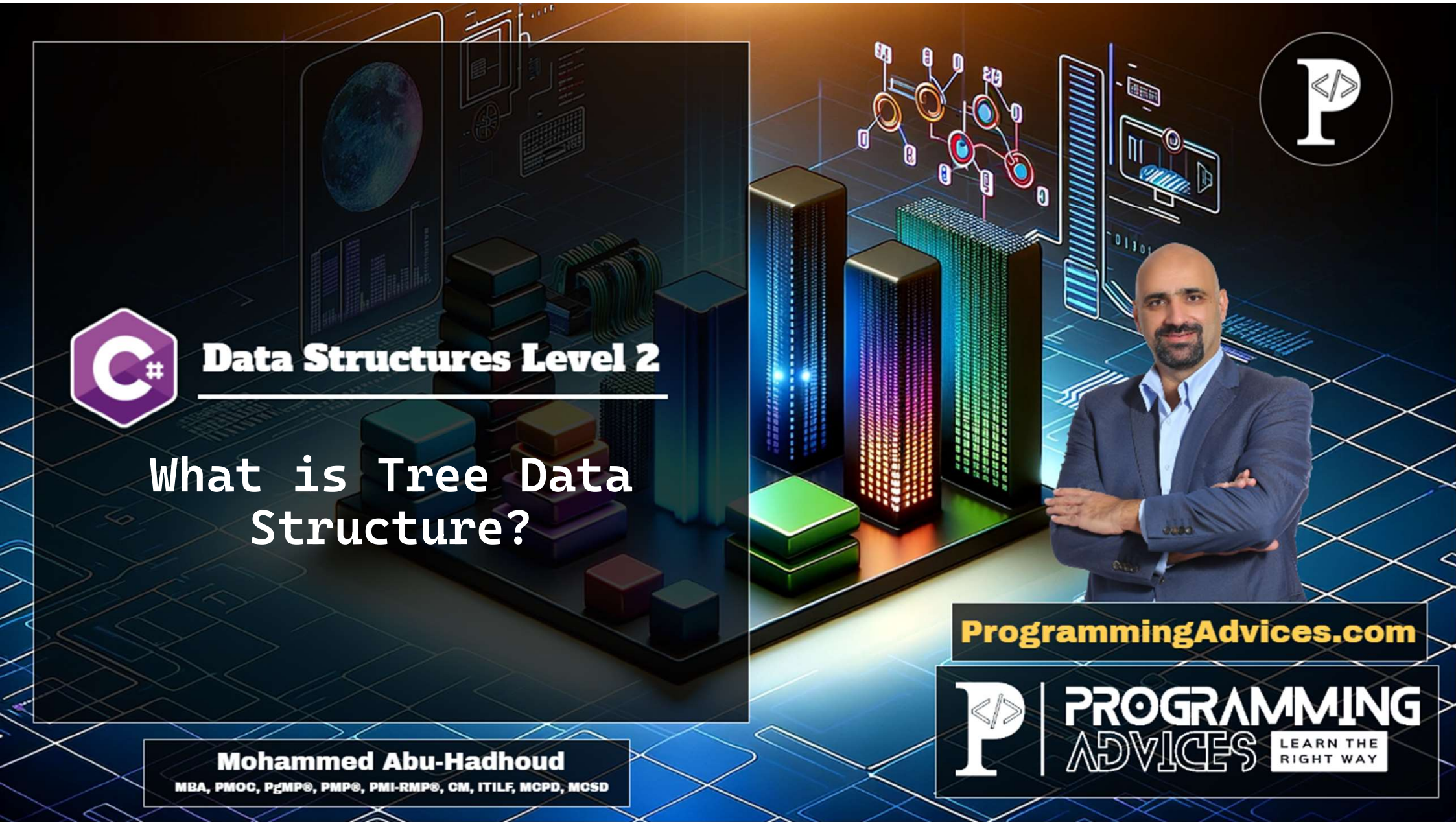
Data Structures Level 2
What is Tree Data Structure?
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What is Tree Data Structure?

- Trees are hierarchical data structures widely used in computer science for representing hierarchical relationships between elements.
- They consist of nodes connected by edges, with one node designated as the root and every other node having a parent-child relationship.
- Trees find applications in various fields like computer science, data organization, and more.

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What is Tree Data Structure?

- A tree is a hierarchical data structure consisting of nodes connected by edges.
- Unlike linear data structures (e.g., arrays, linked lists), trees have a branching structure.
- Key terminologies: root, parent, child, sibling, leaf, depth.

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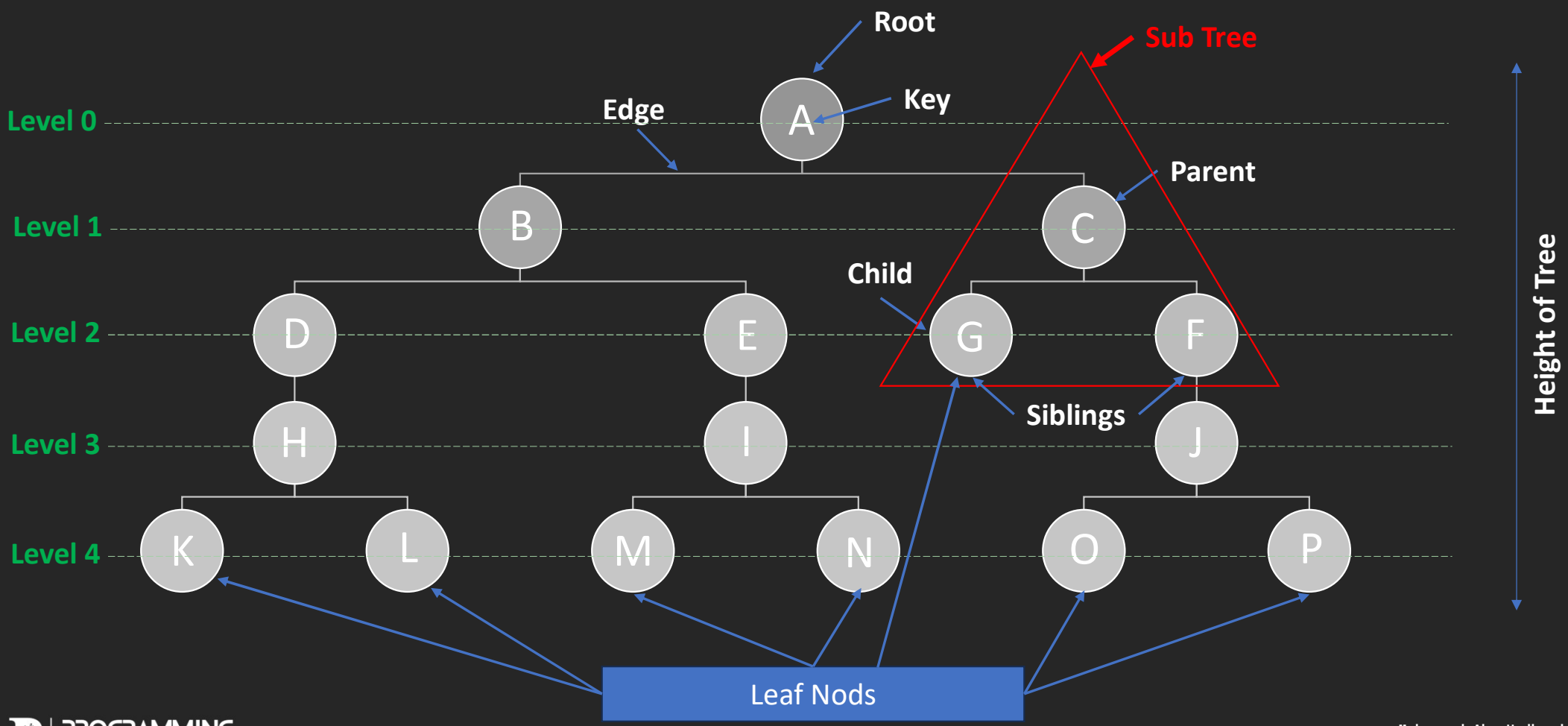
Tree Data Structure?



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Basic Terminologies In Tree Data Structure:

- Node: An element in the tree that stores data and references to its child nodes.
- Root Node: The topmost node of a tree or the node which does not have any parent node is called the root node. {A} is the root node of the tree. A non-empty tree must contain exactly one root node and exactly one path from the root to all other nodes of the tree.
- Parent Node: The node which is a predecessor of a node is called the parent node of that node. {B} is the parent node of {D, E}.
- Child Node: The node which is the immediate successor of a node is called the child node of that node. Examples: {D, E} are the child nodes of {B}.
- Leaf Node or External Node: The nodes which do not have any child nodes are called leaf nodes. {K, L, M, N, O, P, G} are the leaf nodes of the tree.
- Ancestor of a Node: Any predecessor nodes on the path of the root to that node are called Ancestors of that node. {A,B} are the ancestor nodes of the node {E}

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Basic Terminologies In Tree Data Structure:

- Depth/Level: The distance between a node and the root. The count of edges on the path from the root node to that node. The root node has level 0
- Descendant: descendants in a tree data structure are all the nodes that can be reached by following paths downward from a specific node, including its children, grandchildren, and further generations down the tree. {E,I,M,N} are the descendants of the node {B}.
- Sibling: Children of the same parent node are called siblings. {D,E} are called siblings.
- Internal node: A node with at least one child is called Internal Node.
- Neighbor of a Node: Parent or child nodes of that node are called neighbors of that node.
- Subtree: Any node of the tree along with its descendant.
- Height: The length of the longest path from a node to a leaf. The height of a tree is the height of its root node.

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