# Binary Tree Data Structure

[**‘Recent Articles’ on Binary Tree**](https://www.geeksforgeeks.org/category/data-structures/tree/)  
**Topic :**

* [Introduction](https://www.geeksforgeeks.org/binary-tree-data-structure/#Introduction)
* [Traversals](https://www.geeksforgeeks.org/binary-tree-data-structure/#traversals)
* [Construction & Conversion](https://www.geeksforgeeks.org/binary-tree-data-structure/#construction)
* [Longest Common Ancestor](https://www.geeksforgeeks.org/binary-tree-data-structure/#lca)
* [Misc](https://www.geeksforgeeks.org/binary-tree-data-structure/#misc)
* [Quick Links](https://www.geeksforgeeks.org/binary-tree-data-structure/#quick)

**Introduction :**

1. [Binary Tree | Set 1 (Introduction)](https://www.geeksforgeeks.org/binary-tree-set-1-introduction/)
2. [Binary Tree | Set 2 (Properties)](https://www.geeksforgeeks.org/binary-tree-set-2-properties/)
3. [Binary Tree | Set 3 (Types of Binary Tree)](https://www.geeksforgeeks.org/binary-tree-set-3-types-of-binary-tree/)
4. [Handshaking Lemma and Interesting Tree Properties](https://www.geeksforgeeks.org/handshaking-lemma-and-interesting-tree-properties/)
5. [Enumeration of Binary Trees](https://www.geeksforgeeks.org/enumeration-of-binary-trees/)
6. [Applications of tree data structure](https://www.geeksforgeeks.org/applications-of-tree-data-structure/)
7. [BFS vs DFS for Binary Tree](https://www.geeksforgeeks.org/bfs-vs-dfs-binary-tree/)

**Traversals :**

1. [Tree Traversals](https://www.geeksforgeeks.org/tree-traversals-inorder-preorder-and-postorder/)
2. [Level Order Tree Traversal](https://www.geeksforgeeks.org/level-order-tree-traversal/)
3. [Print level order traversal line by line | Set 1](https://www.geeksforgeeks.org/print-level-order-traversal-line-line/)
4. [Inorder Tree Traversal without Recursion](https://www.geeksforgeeks.org/inorder-tree-traversal-without-recursion/)
5. [Inorder Tree Traversal without recursion and without stack!](https://www.geeksforgeeks.org/inorder-tree-traversal-without-recursion-and-without-stack/)
6. [Iterative Preorder Traversal](https://www.geeksforgeeks.org/iterative-preorder-traversal/)
7. [Morris traversal for Preorder](https://www.geeksforgeeks.org/morris-traversal-for-preorder/)
8. [Iterative Postorder Traversal | Set 1 (Using Two Stacks)](https://www.geeksforgeeks.org/iterative-postorder-traversal/)
9. [Iterative Postorder Traversal | Set 2 (Using One Stack)](https://www.geeksforgeeks.org/iterative-postorder-traversal-using-stack/)
10. [Reverse Level Order Traversal](https://www.geeksforgeeks.org/reverse-level-order-traversal/)
11. [Print Postorder traversal from given Inorder and Preorder traversals](https://www.geeksforgeeks.org/print-postorder-from-given-inorder-and-preorder-traversals/)
12. [Level order traversal line by line | Set 2 (Using Two Queues)](https://www.geeksforgeeks.org/level-order-traversal-line-line-set-2-using-two-queues/)
13. [Diagonal Traversal of Binary Tree](https://www.geeksforgeeks.org/diagonal-traversal-of-binary-tree/)
14. [Inorder Non-threaded Binary Tree Traversal without Recursion or Stack](https://www.geeksforgeeks.org/inorder-non-threaded-binary-tree-traversal-without-recursion-or-stack/)
15. [Check if leaf traversal of two Binary Trees is same?](https://www.geeksforgeeks.org/check-if-leaf-traversal-of-two-binary-trees-is-same/)
16. [Print a Binary Tree in Vertical Order | Set 1](https://www.geeksforgeeks.org/print-binary-tree-vertical-order/)
17. [Print a Binary Tree in Vertical Order | Set 2 (Hashmap based Method)](https://www.geeksforgeeks.org/print-binary-tree-vertical-order-set-2/)
18. [Boundary Traversal of binary tree](https://www.geeksforgeeks.org/boundary-traversal-of-binary-tree/)
19. [Perfect Binary Tree Specific Level Order Traversal](https://www.geeksforgeeks.org/perfect-binary-tree-specific-level-order-traversal/)
20. [Perfect Binary Tree Specific Level Order Traversal | Set 2](https://www.geeksforgeeks.org/perfect-binary-tree-specific-level-order-traversal-set-2/)
21. [If you are given two traversal sequences, can you construct the binary tree?](https://www.geeksforgeeks.org/if-you-are-given-two-traversal-sequences-can-you-construct-the-binary-tree/)

**Construction & Conversion :**

1. [Construct Tree from given Inorder and Preorder traversals](https://www.geeksforgeeks.org/construct-tree-from-given-inorder-and-preorder-traversal/)
2. [Construct a tree from Inorder and Level order traversals](https://www.geeksforgeeks.org/construct-tree-inorder-level-order-traversals/)
3. [Construct Complete Binary Tree from its Linked List Representation](https://www.geeksforgeeks.org/given-linked-list-representation-of-complete-tree-convert-it-to-linked-representation/)
4. [Construct Full Binary Tree from given preorder and postorder traversals](https://www.geeksforgeeks.org/full-and-complete-binary-tree-from-given-preorder-and-postorder-traversals/)
5. [Construct a special tree from given preorder traversal](https://www.geeksforgeeks.org/construct-a-special-tree-from-given-preorder-traversal/)
6. [Construct tree from ancestor matrix](https://www.geeksforgeeks.org/construct-tree-from-ancestor-matrix/)
7. [Construct Ancestor Matrix from a Given Binary Tree](https://www.geeksforgeeks.org/construct-ancestor-matrix-from-a-given-binary-tree/)
8. [Construct Special Binary Tree from given Inorder traversal](https://www.geeksforgeeks.org/construct-binary-tree-from-inorder-traversal/)
9. [Construct Binary Tree from given Parent Array representation](https://www.geeksforgeeks.org/construct-a-binary-tree-from-parent-array-representation/)
10. [Construct a Binary Tree from Postorder and Inorder](https://www.geeksforgeeks.org/construct-a-binary-tree-from-postorder-and-inorder/)
11. [Create a Doubly Linked List from a Ternary Tree](https://www.geeksforgeeks.org/create-doubly-linked-list-ternary-ree/)
12. [Creating a tree with Left-Child Right-Sibling Representation](https://www.geeksforgeeks.org/creating-tree-left-child-right-sibling-representation/)
13. [Convert a given Binary Tree to Doubly Linked List | Set 1](https://www.geeksforgeeks.org/in-place-convert-a-given-binary-tree-to-doubly-linked-list/)
14. [Convert a given Binary Tree to Doubly Linked List | Set 2](https://www.geeksforgeeks.org/convert-a-given-binary-tree-to-doubly-linked-list-set-2/)
15. [Convert a given Binary Tree to Doubly Linked List | Set 3](https://www.geeksforgeeks.org/convert-given-binary-tree-doubly-linked-list-set-3/)
16. [Convert a given Binary Tree to Doubly Linked List | Set 4](https://www.geeksforgeeks.org/convert-a-given-binary-tree-to-doubly-linked-list-set-4/)
17. [Convert an arbitrary Binary Tree to a tree that holds Children Sum Property](https://www.geeksforgeeks.org/convert-an-arbitrary-binary-tree-to-a-tree-that-holds-children-sum-property/)
18. [Convert a Binary Tree to Threaded binary tree | Set 1 (Using Queue)](https://www.geeksforgeeks.org/convert-binary-tree-threaded-binary-tree/)
19. [Convert a Binary Tree to Threaded binary tree | Set 2 (Efficient)](https://www.geeksforgeeks.org/convert-binary-tree-threaded-binary-tree-set-2-efficient/)
20. [Convert left-right representation of a binary tree to down-right](https://www.geeksforgeeks.org/convert-left-right-representation-bianry-tree-right/)
21. [Convert a given tree to its Sum Tree](https://www.geeksforgeeks.org/convert-a-given-tree-to-sum-tree/)
22. [Change a Binary Tree so that every node stores sum of all nodes in left subtree](https://www.geeksforgeeks.org/change-a-binary-tree-so-that-every-node-stores-sum-of-all-nodes-in-left-subtree/)
23. [Write an Efficient Function to Convert a Binary Tree into its Mirror Tree](https://www.geeksforgeeks.org/write-an-efficient-c-function-to-convert-a-tree-into-its-mirror-tree/)
24. [Convert a normal BST to Balanced BST](https://www.geeksforgeeks.org/convert-normal-bst-balanced-bst/)
25. [Convert a Binary Tree into Doubly Linked List in spiral fashion](https://www.geeksforgeeks.org/convert-a-binary-tree-into-doubly-linked-list-in-spiral-fashion/)
26. [Convert a Binary Tree to a Circular Doubly Link List](https://www.geeksforgeeks.org/convert-a-binary-tree-to-a-circular-doubly-link-list/)
27. [Convert a tree to forest of even nodes](https://www.geeksforgeeks.org/convert-tree-forest-even-nodes/)
28. [Convert a given Binary tree to a tree that holds Logical AND property](https://www.geeksforgeeks.org/convert-given-binary-tree-tree-holds-logical-property/)
29. [Convert Ternary Expression to a Binary Tree](https://www.geeksforgeeks.org/convert-ternary-expression-binary-tree/)

**Longest Common Ancestor :**

1. [Lowest Common Ancestor in a Binary Tree | Set 1](https://www.geeksforgeeks.org/lowest-common-ancestor-binary-tree-set-1/)
2. [Find distance between two nodes of a Binary Tree](https://www.geeksforgeeks.org/find-distance-between-two-nodes-of-a-binary-tree/)
3. [Lowest Common Ancestor in a Binary Search Tree](https://www.geeksforgeeks.org/lowest-common-ancestor-in-a-binary-search-tree/)
4. [Print common nodes on path from root (or common ancestors)](https://www.geeksforgeeks.org/print-common-nodes-path-root-common-ancestors/)
5. [More articles on LCA](https://www.geeksforgeeks.org/tag/lca/)

**Misc :**

1. [Write a program to Delete a Tree](https://www.geeksforgeeks.org/write-a-c-program-to-delete-a-tree/)
2. [Write a Program to Find the Maximum Depth or Height of a Tree](https://www.geeksforgeeks.org/write-a-c-program-to-find-the-maximum-depth-or-height-of-a-tree/)
3. [Write Code to Determine if Two Trees are Identical](https://www.geeksforgeeks.org/write-c-code-to-determine-if-two-trees-are-identical/)
4. [Write a program to Calculate Size of a tree](https://www.geeksforgeeks.org/write-a-c-program-to-calculate-size-of-a-tree/)
5. [Root to leaf path sum equal to a given number](https://www.geeksforgeeks.org/root-to-leaf-path-sum-equal-to-a-given-number/)
6. [How to determine if a binary tree is height-balanced?](https://www.geeksforgeeks.org/how-to-determine-if-a-binary-tree-is-balanced/)
7. [Diameter of a Binary Tree](https://www.geeksforgeeks.org/diameter-of-a-binary-tree/)
8. [Check for Children Sum Property in a Binary Tree](https://www.geeksforgeeks.org/check-for-children-sum-property-in-a-binary-tree/)
9. [Program to count leaf nodes in a binary tree](https://www.geeksforgeeks.org/write-a-c-program-to-get-count-of-leaf-nodes-in-a-binary-tree/)
10. [The Great Tree-List Recursion Problem](https://www.geeksforgeeks.org/the-great-tree-list-recursion-problem/)
11. [Given a binary tree, print out all of its root-to-leaf paths one per line](https://www.geeksforgeeks.org/given-a-binary-tree-print-out-all-of-its-root-to-leaf-paths-one-per-line/)
12. [Populate Inorder Successor for all nodes](https://www.geeksforgeeks.org/populate-inorder-successor-for-all-nodes/)
13. [Connect nodes at same level using constant extra space](https://www.geeksforgeeks.org/connect-nodes-at-same-level-with-o1-extra-space/)
14. [Connect nodes at same level](https://www.geeksforgeeks.org/connect-nodes-at-same-level/)
15. [Check if a binary tree is subtree of another binary tree | Set 1](https://www.geeksforgeeks.org/check-if-a-binary-tree-is-subtree-of-another-binary-tree/)
16. [Check if a given Binary Tree is SumTree](https://www.geeksforgeeks.org/check-if-a-given-binary-tree-is-sumtree/)
17. [Print Ancestors of a given node in Binary Tree](https://www.geeksforgeeks.org/print-ancestors-of-a-given-node-in-binary-tree/)
18. [Get Level of a node in a Binary Tree](https://www.geeksforgeeks.org/get-level-of-a-node-in-a-binary-tree/)
19. [Print nodes at k distance from root](https://www.geeksforgeeks.org/print-nodes-at-k-distance-from-root/)
20. [Foldable Binary Trees](https://www.geeksforgeeks.org/foldable-binary-trees/)
21. [Maximum width of a binary tree](https://www.geeksforgeeks.org/maximum-width-of-a-binary-tree/)
22. [Double Tree](https://www.geeksforgeeks.org/double-tree/)
23. [Given a binary tree, print all root-to-leaf paths](https://www.geeksforgeeks.org/given-a-binary-tree-print-all-root-to-leaf-paths/)
24. [Linked complete binary tree & its creation](https://www.geeksforgeeks.org/linked-complete-binary-tree-its-creation/)
25. [Check whether a given Binary Tree is Complete or not | Set 1 (Iterative Solution)](https://www.geeksforgeeks.org/check-if-a-given-binary-tree-is-complete-tree-or-not/)
26. [Find the maximum sum leaf to root path in a Binary Tree](https://www.geeksforgeeks.org/find-the-maximum-sum-path-in-a-binary-tree/)
27. [Vertical Sum in a given Binary Tree | Set 1](https://www.geeksforgeeks.org/vertical-sum-in-a-given-binary-tree/)
28. [Sum of all the numbers that are formed from root to leaf paths](https://www.geeksforgeeks.org/sum-numbers-formed-root-leaf-paths/)
29. [Find next right node of a given key](https://www.geeksforgeeks.org/find-next-right-node-of-a-given-key/)
30. [Deepest left leaf node in a binary tree](https://www.geeksforgeeks.org/deepest-left-leaf-node-in-a-binary-tree/)
31. [Extract Leaves of a Binary Tree in a Doubly Linked List](https://www.geeksforgeeks.org/connect-leaves-doubly-linked-list/)
32. [Remove all nodes which don’t lie in any path with sum>= k](https://www.geeksforgeeks.org/remove-all-nodes-which-lie-on-a-path-having-sum-less-than-k/)
33. [Print Left View of a Binary Tree](https://www.geeksforgeeks.org/print-left-view-binary-tree/)
34. [Check if all leaves are at same level](https://www.geeksforgeeks.org/check-leaves-level/)
35. [Find depth of the deepest odd level leaf node](https://www.geeksforgeeks.org/find-depth-of-the-deepest-odd-level-node/)
36. [Difference between sums of odd level and even level nodes of a Binary Tree](https://www.geeksforgeeks.org/difference-between-sums-of-odd-and-even-levels/)
37. [Custom Tree Problem](https://www.geeksforgeeks.org/custom-tree-problem/)
38. [Iterative Method to find Height of Binary Tree](https://www.geeksforgeeks.org/iterative-method-to-find-height-of-binary-tree/)
39. [Tree Isomorphism Problem](https://www.geeksforgeeks.org/tree-isomorphism-problem/)
40. [Check if a binary tree is subtree of another binary tree | Set 2](https://www.geeksforgeeks.org/check-binary-tree-subtree-another-binary-tree-set-2/)
41. [Find the maximum path sum between two leaves of a binary tree](https://www.geeksforgeeks.org/find-maximum-path-sum-two-leaves-binary-tree/)
42. [Threaded Binary Tree](https://www.geeksforgeeks.org/threaded-binary-tree/)
43. [Reverse alternate levels of a perfect binary tree](https://www.geeksforgeeks.org/reverse-alternate-levels-binary-tree/)
44. [Print Right View of a Binary Tree](https://www.geeksforgeeks.org/print-right-view-binary-tree-2/)
45. [Print all nodes at distance k from a given node](https://www.geeksforgeeks.org/print-nodes-distance-k-given-node-binary-tree/)
46. [Find distance between two given keys of a Binary Tree](https://www.geeksforgeeks.org/find-distance-two-given-nodes/)
47. [Print all nodes that don’t have sibling](https://www.geeksforgeeks.org/print-nodes-dont-sibling-binary-tree/)
48. [Check if a given Binary Tree is height balanced like a Red-Black Tree](https://www.geeksforgeeks.org/check-given-binary-tree-follows-height-property-red-black-tree/)
49. [Print all nodes that are at distance k from a leaf node](https://www.geeksforgeeks.org/print-nodes-distance-k-leaf-node/)
50. [Find the closest leaf in a Binary Tree](https://www.geeksforgeeks.org/find-closest-leaf-binary-tree/)
51. [Diagonal Sum of a Binary Tree](https://www.geeksforgeeks.org/diagonal-sum-binary-tree/)
52. [Bottom View of a Binary Tree](https://www.geeksforgeeks.org/bottom-view-binary-tree/)
53. [Print Nodes in Top View of Binary Tree](https://www.geeksforgeeks.org/print-nodes-top-view-binary-tree/)
54. [Serialize and Deserialize an N-ary Tree](https://www.geeksforgeeks.org/serialize-deserialize-n-ary-tree/)
55. [Check if a given graph is tree or not](https://www.geeksforgeeks.org/check-given-graph-tree/)
56. [Print nodes between two given level numbers of a binary tree](https://www.geeksforgeeks.org/given-binary-tree-print-nodes-two-given-level-numbers/)
57. [Find Height of Binary Tree represented by Parent array](https://www.geeksforgeeks.org/find-height-binary-tree-represented-parent-array/)
58. [Minimum no. of iterations to pass information to all nodes in the tree](https://www.geeksforgeeks.org/minimum-iterations-pass-information-nodes-tree/)
59. [Check if two nodes are cousins in a Binary Tree](https://www.geeksforgeeks.org/check-two-nodes-cousins-binary-tree/)
60. [Find Minimum Depth of a Binary Tree](https://www.geeksforgeeks.org/find-minimum-depth-of-a-binary-tree/)
61. [Maximum Path Sum in a Binary Tree](https://www.geeksforgeeks.org/find-maximum-path-sum-in-a-binary-tree/)
62. [Expression Tree](https://www.geeksforgeeks.org/expression-tree/)
63. [Iterative Search for a key ‘x’ in Binary Tree](https://www.geeksforgeeks.org/iterative-search-for-a-key-x-in-binary-tree/)
64. [Find maximum (or minimum) in Binary Tree](https://www.geeksforgeeks.org/find-maximum-or-minimum-in-binary-tree/)
65. [Find sum of all left leaves in a given Binary Tree](https://www.geeksforgeeks.org/find-sum-left-leaves-given-binary-tree/)
66. [Remove nodes on root to leaf paths of length < K](https://www.geeksforgeeks.org/remove-nodes-root-leaf-paths-length-k/)