

# Drawing Tree with Tikz Package

Sumaiya Tabassum

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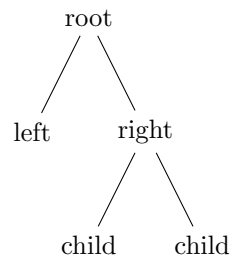
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# 1 Introduction to the Child Operation:

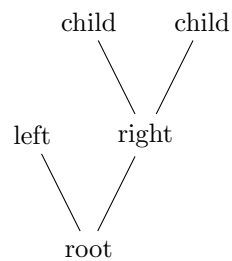
## 1.1 Basic Tree(Downward):

```
1 \begin{tikzpicture}
2   \node {root}
3     child {node{left}}
4     child {node {right}}
5       child {node {child}}
6       child {node{child}}
7   };
8 \end{tikzpicture}
```



## 1.2 Basic Tree(Upward):

```
1 \begin{tikzpicture}
2   \node {root} [grow'=up]
3     child {node {left}}
4     child {node {right}}
5       child {node {child}}
6       child {node {child}}
7   };
8 \end{tikzpicture}
```



### 1.3 Using foreach and specified distance:

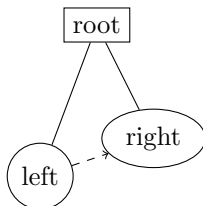
```
1 \begin{tikzpicture}[level distance = 4mm, level/.style={sibling
  distance=8mm/#1}]
2   \coordinate
3   child foreach \x in {0,1}
4     {child foreach \y in {0,1}
5       {child foreach \z in {0,1}}};
6 \end{tikzpicture}
```



## 2 Child Paths and Child Nodes

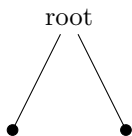
### 2.1 Different Node Shapes:

```
1 \begin{tikzpicture}[sibling distance = 15mm]
2   \node[rectangle,draw] {root}
3   child {node[circle,draw, yshift=-5mm](left node) {left}}
4   child {node[ellipse,draw] (right node) {right}};
5   \draw[dashed,->] (left node) -- (right node);
6 \end{tikzpicture}
```



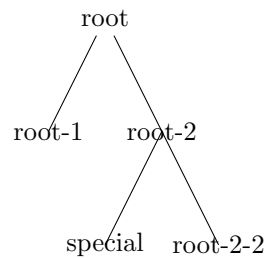
### 2.2 Dot Child:

```
1 \begin{tikzpicture}
2   \node {root}
3   child {[fill] circle(2pt)}
4   child {[fill] circle(2pt)};
5 \end{tikzpicture}
```



### 3 Naming Child Nodes:

```
1 \begin{tikzpicture}
2   \node(root){root}
3     child
4       child{
5         child{coordinate(special)}}
6         child
7       };
8
9   \node at (root-1){root-1};
10  \node at (root-2) {root-2};
11    \node at (special) {special};
12    \node at (root-2-2) {root-2-2};
13 \end{tikzpicture}
```



### 4 Specifying Options for Trees and Children:

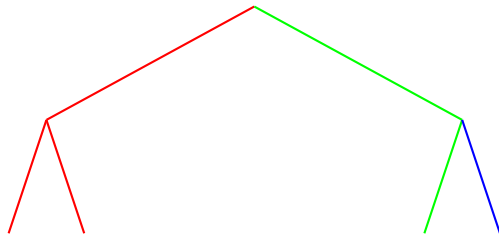
```
1 \begin{tikzpicture}
2   \scoped
3     [...]           % Options apply to the whole tree
4     \node[...] {root} % Options apply to the root node only
5       [...]         % Options apply to all children
6       child[...]    % Options apply to this child and all its
7         children
8       {
9         node[...] {} % Options apply to the child node only
10        ...
11      }
12      child[...]    % Options apply to this child and all its
13        children
14    ;
15 \end{tikzpicture}
```

## 4.1 Branch colors:

```

1 \begin{tikzpicture}[thick,level 1/.style={sibling distance=55mm},
   level 2/.style={sibling distance=10mm}]
2   %\node {}
3   \coordinate
4   child[red] {child child}
5   child[green]{child child[blue]};
6 \end{tikzpicture}

```

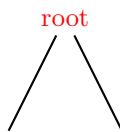


## 4.2 Node Colors:

```

1 \begin{tikzpicture}[thick]
2   \node [red] {root}
3     child
4     child;
5 \end{tikzpicture}

```

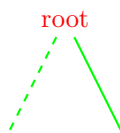


## 4.3 Node and Edge Colors:

```

1 \begin{tikzpicture}[thick]
2   \node [red] {root}
3     [green] % option applies to all children
4     child[dashed]
5     child;
6 \end{tikzpicture}

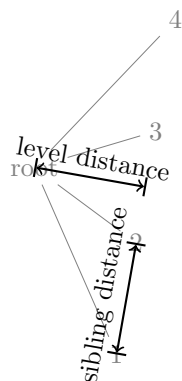
```



## 5 Default Growth Function:

### 5.1 Distances:

```
1 \begin{tikzpicture}[sibling distance=15mm, level distance=15mm]
2   \path [help lines]
3     node (root) {root}
4     [grow=-10]
5     child {node {1}}
6       child {node {2}}
7       child {node {3}}
8       child {node {4}};
9
10    \draw[|<->,thick] (root-1.center)
11      -- node[above,sloped] {sibling distance} (root-2.center);
12
13    \draw[|<->,thick] (root.center)
14      -- node[above,sloped] {level distance} +(-10:\tikzleveldistance);
15 \end{tikzpicture}
```

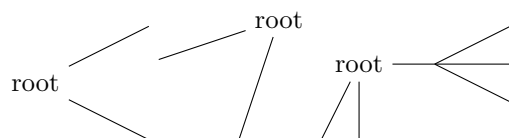


## 5.2 Growth Values:

```

1 tikz \node {root} [grow=right] child child;
2 \tikz \node {root} [grow=south west] child child;
3 \begin{tikzpicture}[level distance=10mm,sibling distance=5mm]
4   \node {root}
5     [grow=down]
6     child
7     child
8     child[grow=right] {
9       child child child
10    };
11 \end{tikzpicture}

```

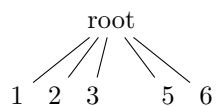


## 6 Missing Children:

```

1 \begin{tikzpicture}[level distance=10mm,sibling distance=5mm]
2   \node {root} [grow=down]
3     child { node {1} }
4     child { node {2} }
5     child { node {3} }
6     child[missing] { node {4} }
7     child { node {5} }
8     child { node {6} };
9 \end{tikzpicture}

```



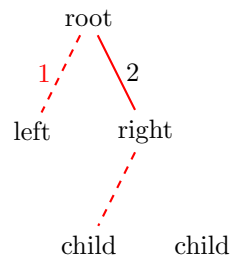
## 7 Edges From the Parent Node:

### 7.1 Straight Edge Variations:

```

1 \begin{tikzpicture}[edge from parent/.style={draw,red,thick}]
2   \node {root}
3     child[dashed] { node {left} edge from parent[dashed] node[left]
4       ]{1}}
5     child {node {right}
6       child[dashed] {node {child}}
7       child {node {child} edge from parent[draw=none]}
8       edge from parent node[black,right]{2}
9     };
\end{tikzpicture}

```

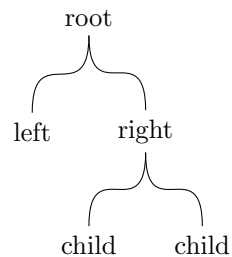


### 7.2 Curved Edge:

```

1 \begin{tikzpicture}[level distance=15mm, sibling distance=15mm,
2   edge from parent path=
3   {(\tikzparentnode.south) .. controls +(0,-1) and +(0,1)
4     .. (\tikzchildnode.north)}]
5   \node {root}
6     child {node {left}}
7     child {node {right}}
8       child {node {child}}
9       child {node {child}}
10  };
11 \end{tikzpicture}

```

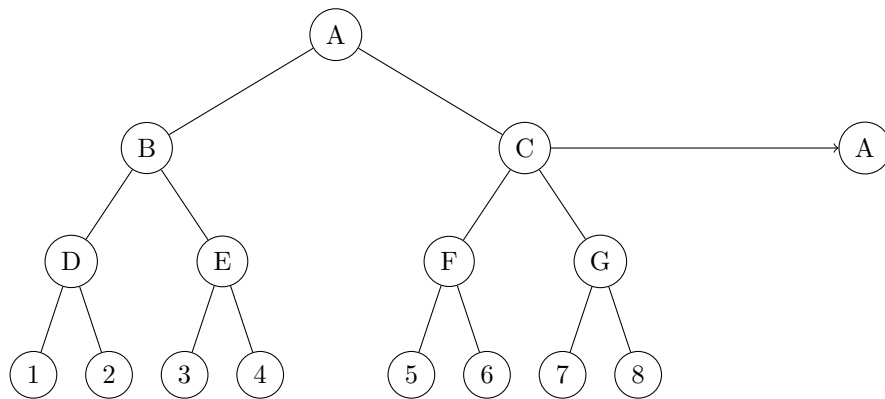




## 8 Practice

### 8.1 Practice 01:

```
1 \begin{tikzpicture}
2   [every node/.style={circle,draw},
3   level 1/.style={sibling distance=50mm},
4   level 2/.style={sibling distance=20mm},
5   level 3/.style={sibling distance=10mm}]
6   \node{A}
7     child {node {B}
8       child{node{D}
9         child{node{1}}
10        child{node{2}}
11      }
12      child{node {E}
13        child{node{3}}
14        child{node{4}}
15      }
16    }
17   child {node(1) {C}
18     child{node{F}
19       child{node{5}}
20       child{node{6}}
21     }
22     child{node{G}
23       child{node{7}}
24       child{node{8}}
25     }
26   };
27   \node(2) at (7,-1.5){A};
28   \draw[->](1) to (2);
29 \end{tikzpicture}
```



## 8.2 Practice 02:

```

1 \begin{tikzpicture}
2   [level distance=10mm,
3   every node/.style={fill=red!60,circle,inner sep=1pt},
4   level 1/.style={sibling distance=20mm,nodes={fill=red!45}},
5   level 2/.style={sibling distance=10mm,nodes={fill=red!30}},
6   level 3/.style={sibling distance=5mm,nodes={fill=red!25}}]
7   \node {31}
8     child {node {30}
9       child {node {20}
10        child {node {5}}
11        child {node {4}}
12      }
13      child {node {10}
14        child {node {9}}
15        child {node {1}}
16      }
17    }
18    child {node {20}
19      child {node {19}
20        child {node {1}}
21        child[missing]
22      }
23      child {node {18}}
24    };
25 \end{tikzpicture}

```

