

# Node

```
1 struct node
2 {
3     int entry;
4     int balance;
5     struct node *left;
6     struct node *right;
7 };
```

## Make node

```
1  struct node * make_node(int new_entry)
2  {
3      struct node * a_node=(struct node *)malloc(sizeof
4      a_node->entry=new_entry;
5      a_node->balance=0;
6
7      return a_node;
8  }
```

## LL rotation

```
1  struct node * rotate_ll(struct node * here)
2  {
3      struct node * left = here->left;
4      here->left=left->right;
5      left->right=here;
6      here->balance=0;
7      here=left;
8      here->balance=0;
9
10     return here;
11 }
```

## RR rotation 1

```
1  struct node * rotate_lr(struct node * here)
2  {
3      struct node * left=here->left;
4      struct node * left_right=left->right;
5
6      left->right=left_right->left;
7      left_right->left=left;
8
9      here->left=left_right->right;
10     left_right->right=here;
```

## RR rotation 2

```
11     if ( left_right ->balance==1)
12         here->balance=-1;
13     else
14         here->balance=0;
15
16     if ( left_right ->balance==-1)
17         left ->balance=1;
18     else
19         left ->balance=0;
20
21     here=left_right ;
22     here->balance=0;
23
24     return  here ;
25 }
```

## Balance factors - overall structure

```
1  struct node * add_node_r(struct node * here ,
2                          int new_entry ,
3                          int * work_needed)
4  {
5      if( here==NULL)
6      {
7          *work_needed = 1;
8          return make_node(new_entry);
9      }
10     if( new_entry<here->entry )
11         LEFT STUFF
12     else
13         RIGHT STUFF
14
15     return here;
16 }
```

## Balance factors - LEFT STUFF 1

```
1  here->left = add_node_r( here->left , new_entry ,
2                               work_needed );
3  if( *work_needed )
4  {
5      switch( here->balance )
6      {
7          case -1:
8              here->balance=0;
9              *work_needed=0;
10             return here;
11         case 0:
12             here->balance=1;
13             return here;
```

## Balance factors - LEFT STUFF 2

```
14         case 1:
15             if (here->left->balance==1)
16                 here=rotate_ll(here);
17             else
18                 here=rotate_lr(here);
19             *work_needed=0;
20             return here;
21     }
22 }
```