# Comparative Analysis of Hospital Management System using Splay Tree and Vanilla Tree

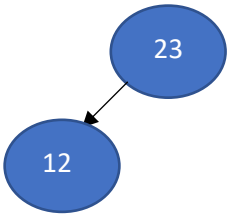
## Admitting of patients Analysis:

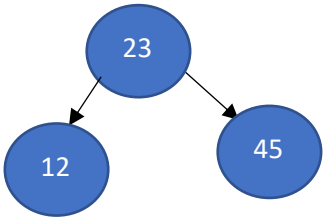
Admit the patients with Sr. no.

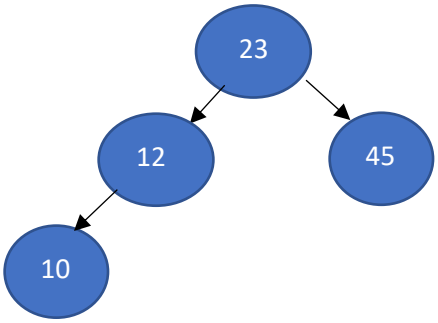
23, 12, 45, 10, 15, 50, 40, 13, 11, 17

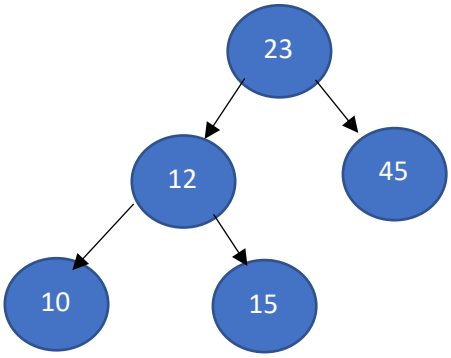
Vanilla Tree:

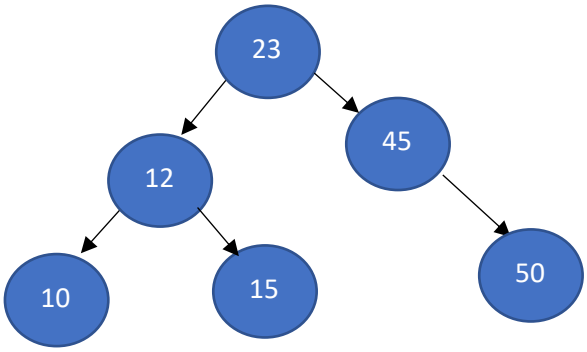
In vanilla tree, patient with small Sr no. is added to left and large Sr no. is added to right subtree.

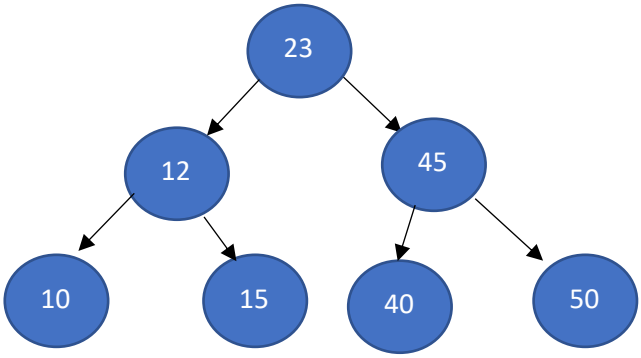


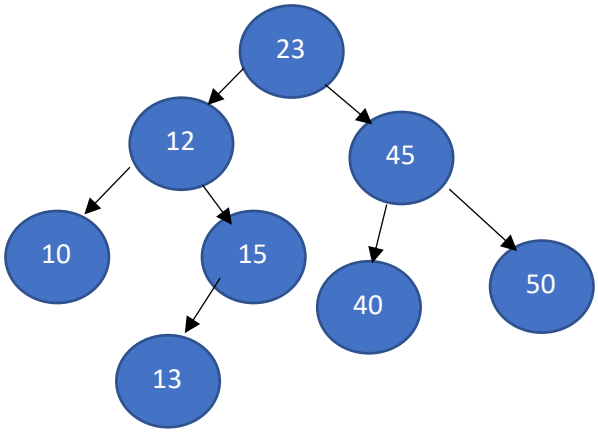



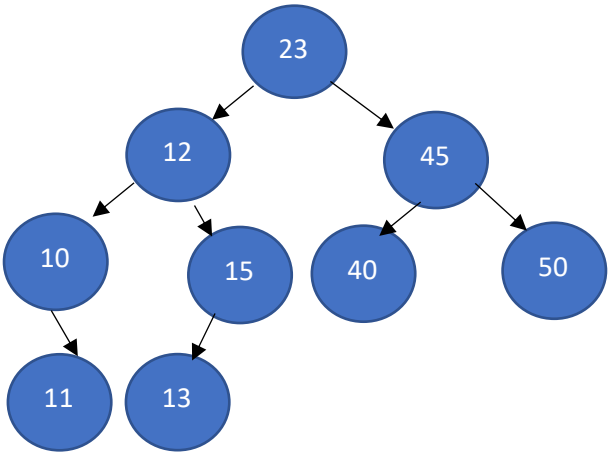



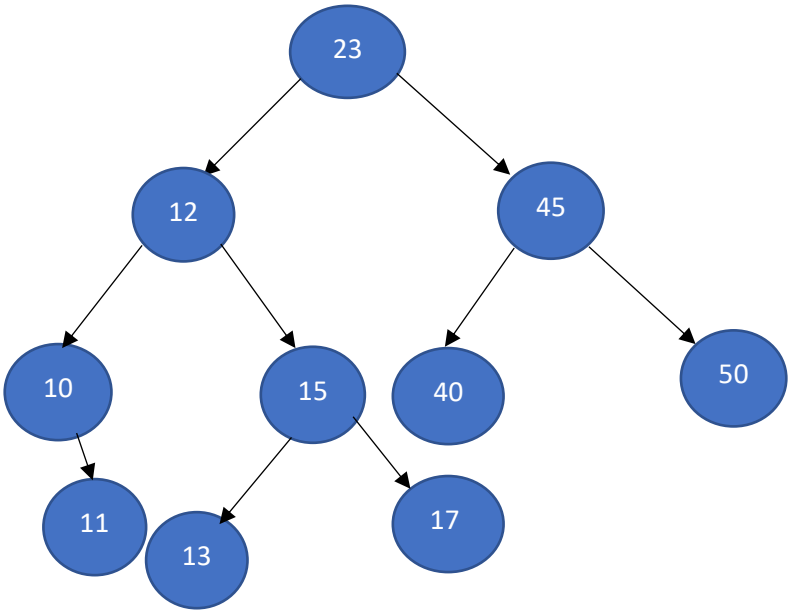






Vanilla Tree after admitting the patients

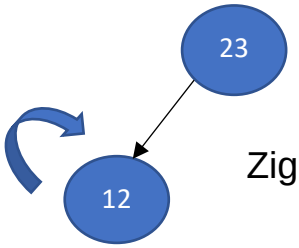
To search the recently admitted patient, we need O(logn) time complexity.

n = number of patients admitted

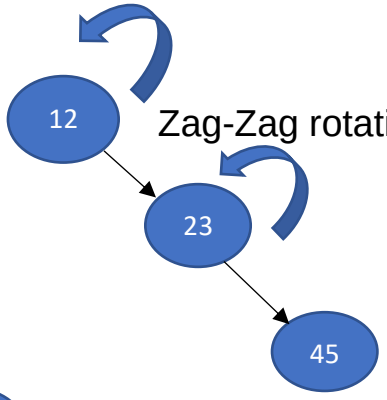
Here, to search recently admitted patient 17, we need 3 comparisons.

Splay Tree:

23 and 12 admitted

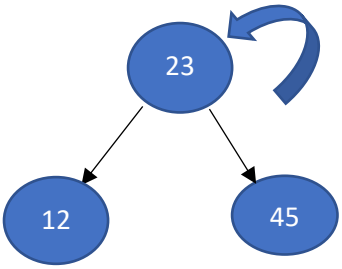


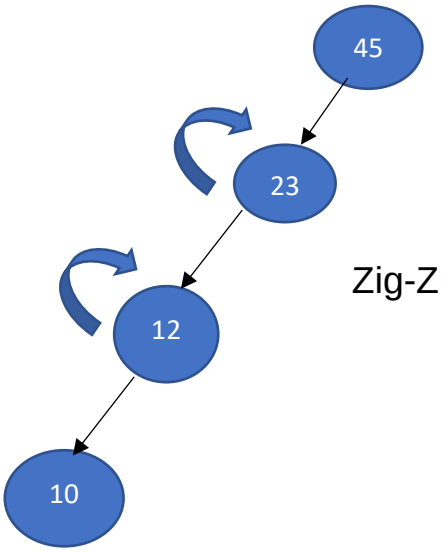

Zig rotation




Zag-Zag rotation

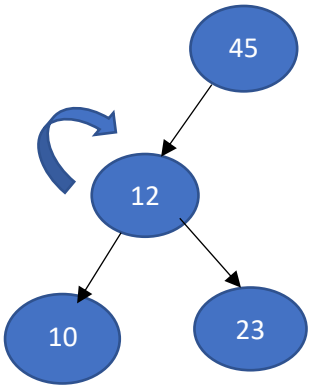
45 admitted



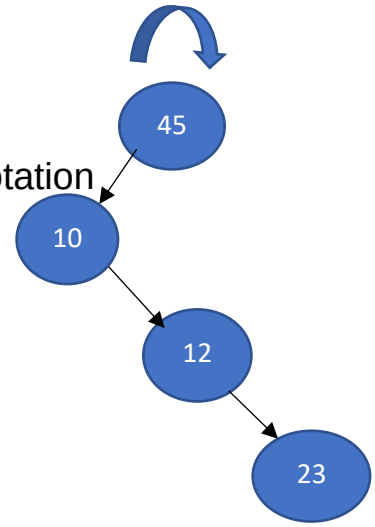




Zig-Zig rotation

10 admitted

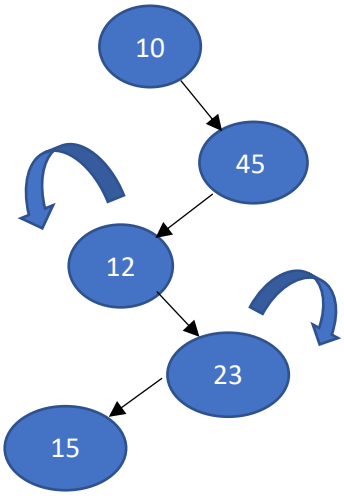


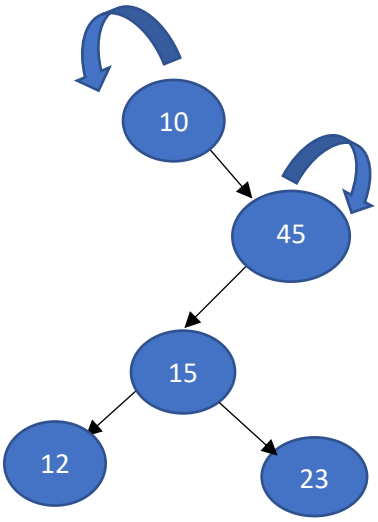

Zig rotation

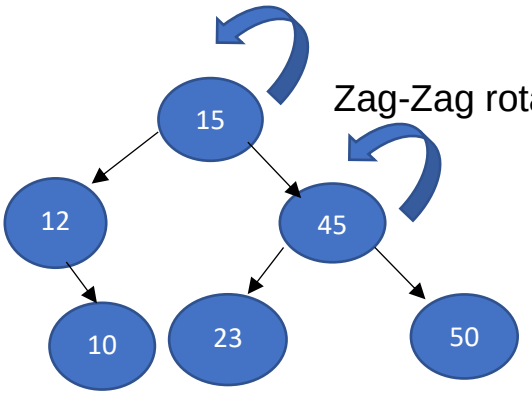



15 admitted

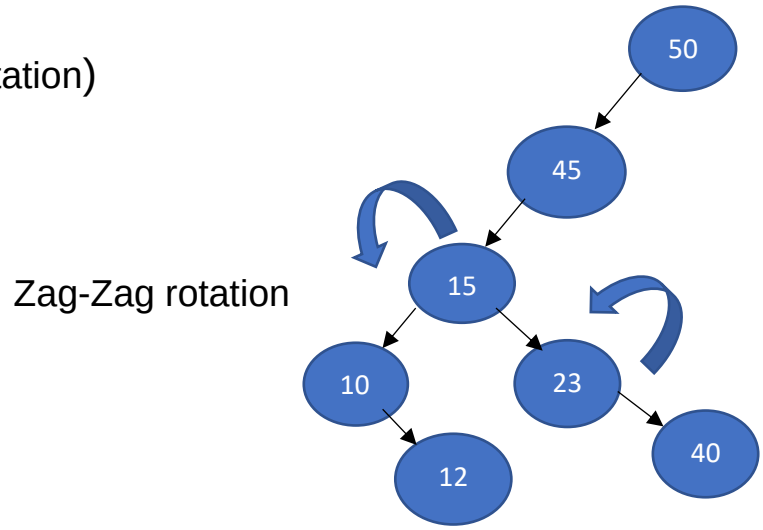
2 Zig-Zag rotation



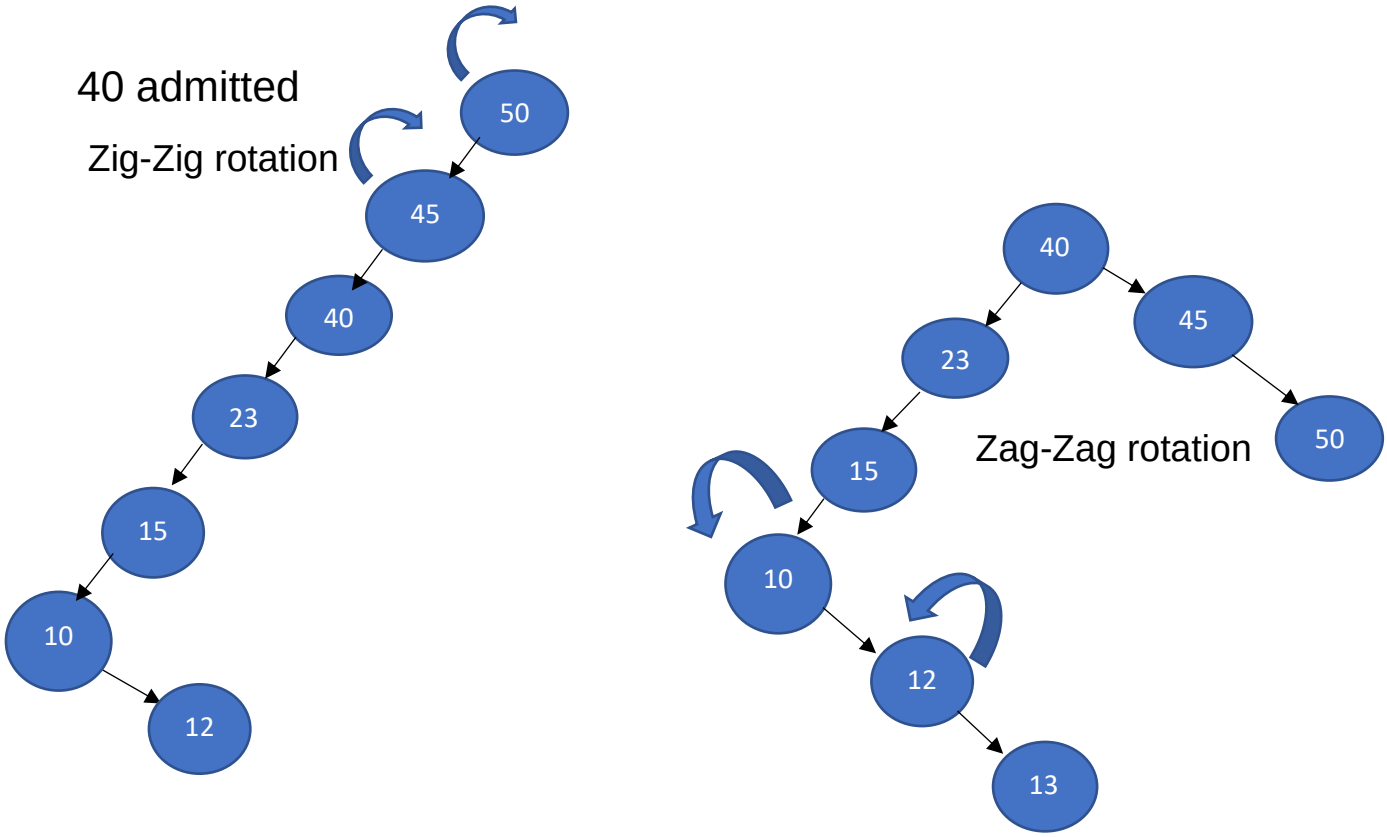





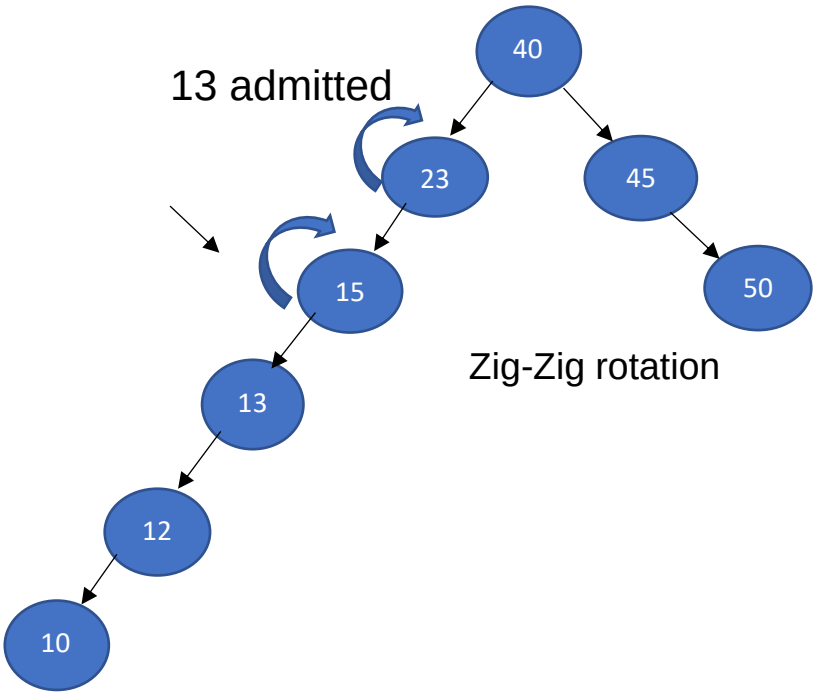

50 admitted (Zag-Zag rotation)




40 admitted

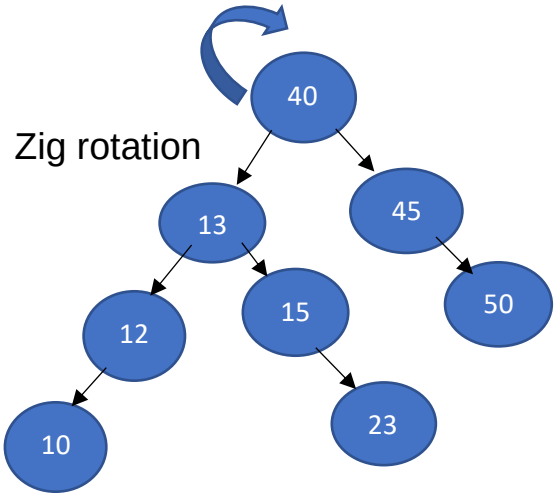


13 admitted



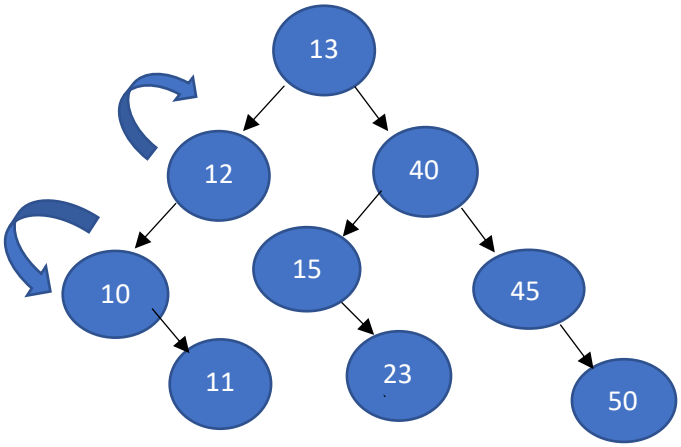

Zig-Zig rotation

Zig rotation

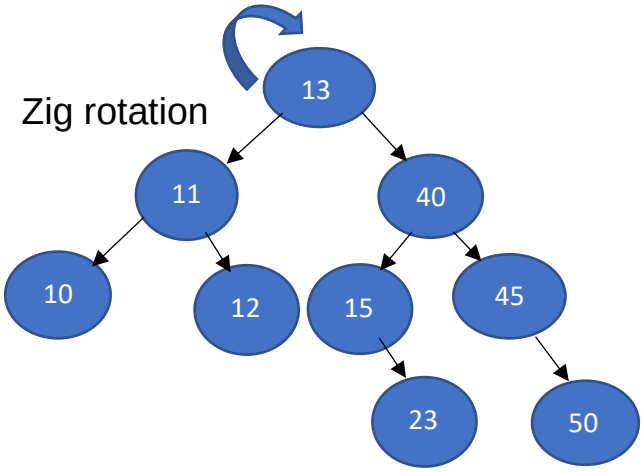



11 admitted

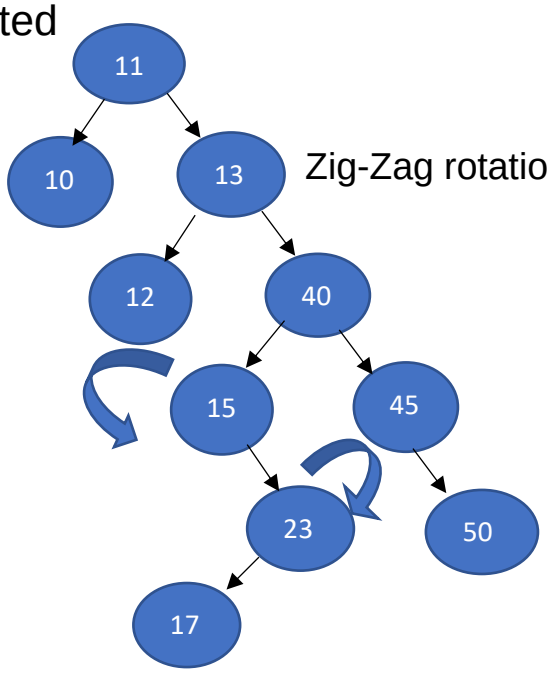
Zag-Zig rotation



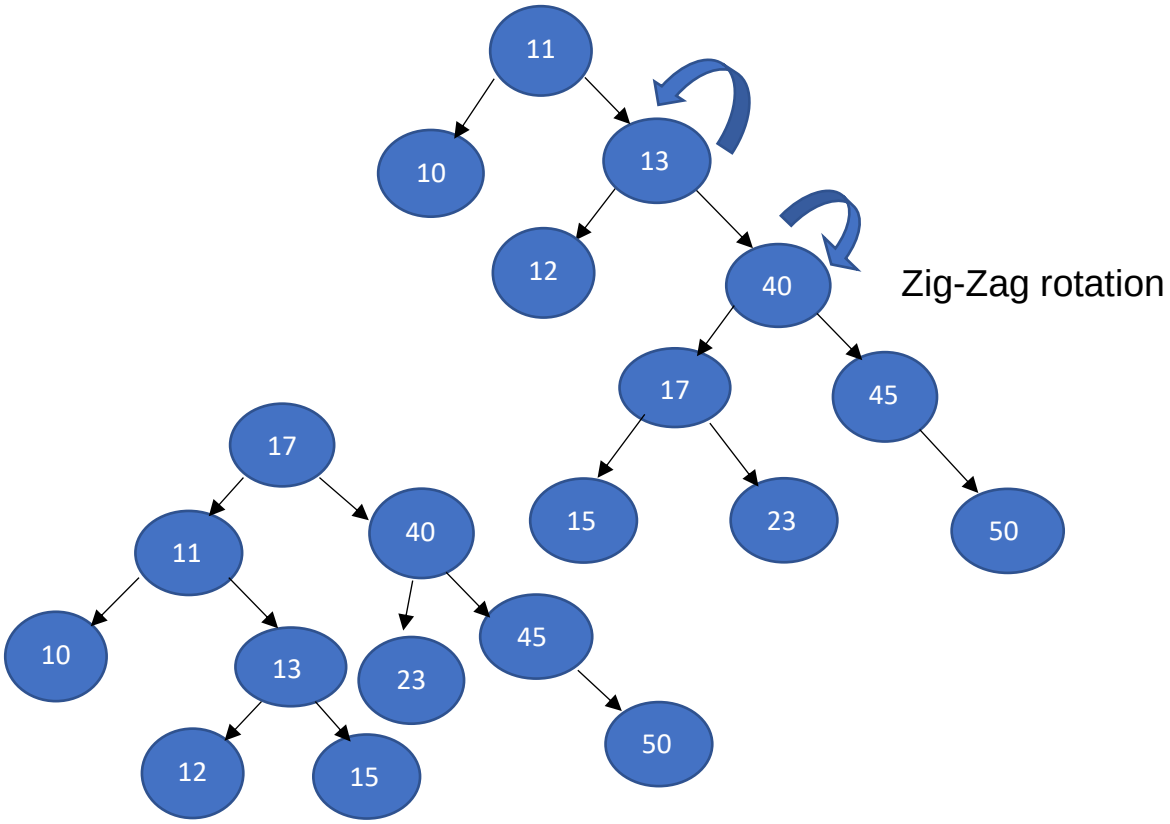

Zig rotation



17 admitted




Zig-Zag rotation




## Splay tree after admitting the patients

In Splay Tree, splaying is performed on recently added patient. After splaying the newly added patient is at root node.

Hence, we need O(1) time complexity for details of recently admitted patient.

## Searching for patient Analysis:

Search the recently search patient:

Recently added patient is at root position.

We can get details of recently admitted patient in O(1) time.

Search patient 13:

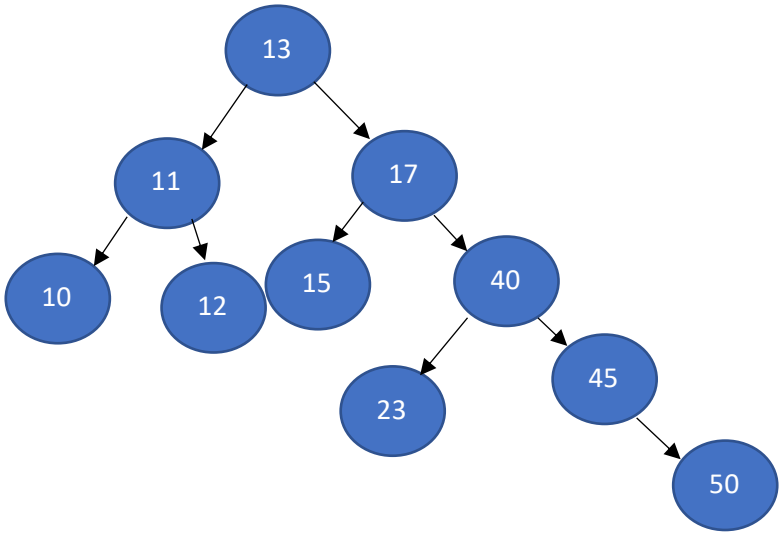
Vanilla tree needs 3 comparisons and Splay tree needs 2 comparisons.

Get details of recently searched patient: (13)

Vanilla tree needs same time complexity as previous.

But in Splay tree, splaying operation is performed on the searched node. After splaying 13 is at root node, Hence it requires O(1) time complexity.

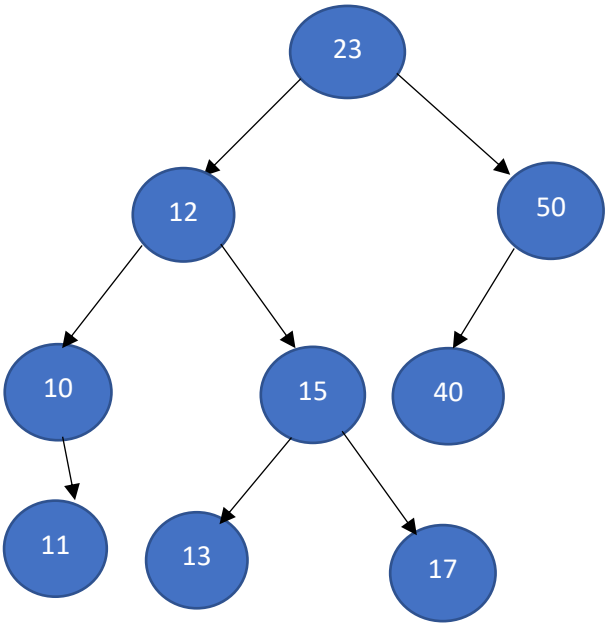
For searching 13, Zig rotation required



# Discharging of patient Ananalysis:

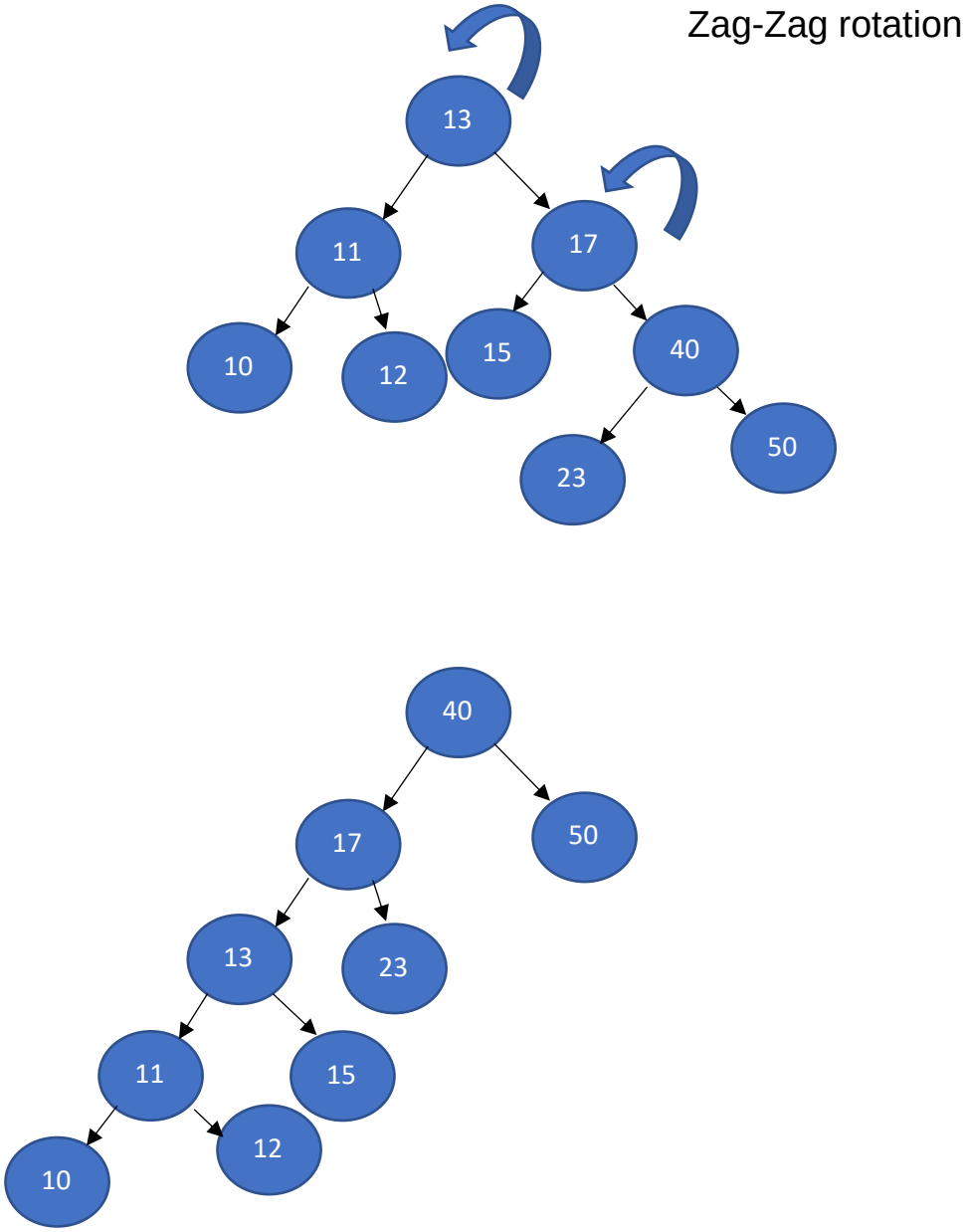
## Discharge a patient 45:

## Vanilla Tree:




Patient is discharged, the root remains same.

Splay Tree:




Splaying of parent node to the root required after discharging the patient

If patient is not present, the splay the node where search ended to the root.

Time Complexity Analysis for Recently Admitted Patients:

Vanilla Tree: O(logn)

Splay Tree: O(1)

Time Complexity Analysis for Recently Searched Patients:

Vanilla Tree: O(logn)

Splay Tree: O(1)

The average time complexity of admitting, searching and discharging of patients in Vanilla tree and Splay tree is O(logn).

The worst time complexity of all operations in Vanilla tree and splay tree is O(n).In splay tree, it is rare case.