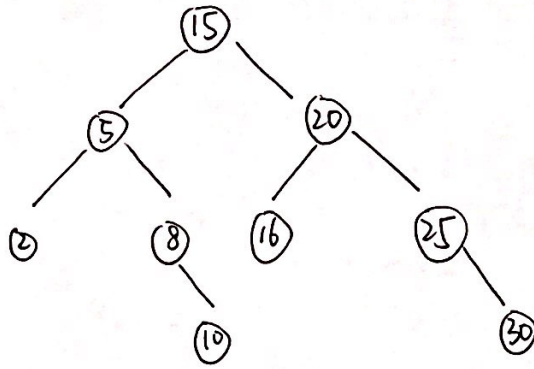
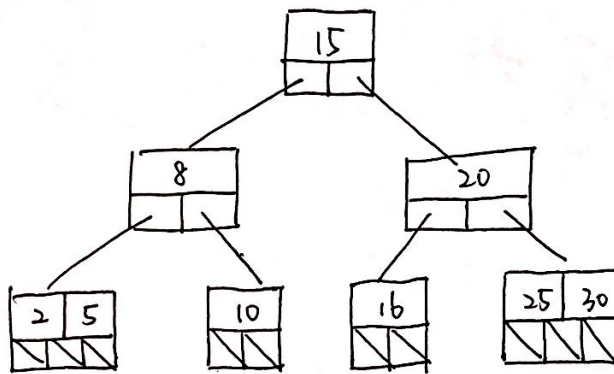


# Binary Search Tree

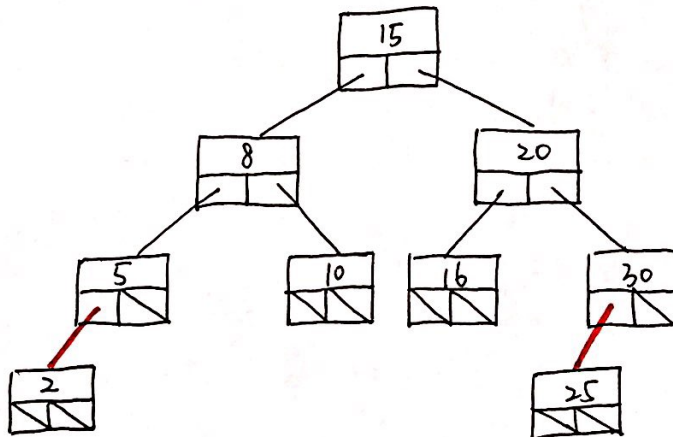
Larinta Wang  
# 1473704



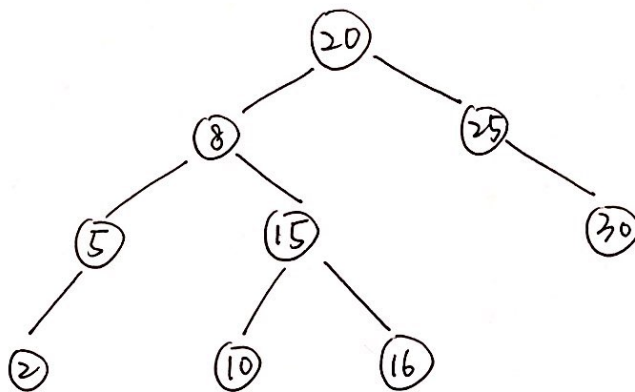
## 2-3 Tree



## Left-leaning Red Black Tree



# AVL Tree



String	Formula	Hash Code	Mod 31	Index
"hello"	$104 \times 31^4 + 101 \times 31^3 + 108 \times 31^2 + 108 \times 31^1 + 111 \times 31^0$	99162322	18	0
"hELLO"	$104 \times 31^4 + 69 \times 31^3 + 108 \times 31^2 + 108 \times 31^1 + 111 \times 31^0$	98209010	18	1
"heLlo"	$104 \times 31^4 + 101 \times 31^3 + 76 \times 31^2 + 108 \times 31^1 + 111 \times 31^0$	99131570	18	2
"heLLo"	$104 \times 31^4 + 101 \times 31^3 + 108 \times 31^2 + 76 \times 31^1 + 111 \times 31^0$	99161330	18	3
"HeLlO"	$72 \times 31^4 + 101 \times 31^3 + 108 \times 31^2 + 108 \times 31^1 + 79 \times 31^0$	69609618	17	4
"hELL0"	$104 \times 31^4 + 69 \times 31^3 + 76 \times 31^2 + 76 \times 31^1 + 79 \times 31^0$	98177234	17	5
"HeLL0"	$72 \times 31^4 + 101 \times 31^3 + 76 \times 31^2 + 76 \times 31^1 + 79 \times 31^0$	69577874	17	6
"HElLO"	$72 \times 31^4 + 69 \times 31^3 + 108 \times 31^2 + 76 \times 31^1 + 79 \times 31^0$	68655314	17	7
"HELlO"	$72 \times 31^4 + 69 \times 31^3 + 76 \times 31^2 + 108 \times 31^1 + 79 \times 31^0$	68625554	17	8
"hELL0"	$104 \times 31^4 + 69 \times 31^3 + 76 \times 31^2 + 76 \times 31^1 + 111 \times 31^0$	98177266	18	9

Number of collisions = 8  
 18 appeared 5 times and 17 appeared 5 times.