Report for Homework#7

Q3)

Regular Binary Search Tree

Time is milisecond.

10000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (10000): 18,305100
 Time elapsed for  tree extra 10 element : 0,080200
 Time elapsed for  tree extra 10 deletion element : 0,123300
 Time elapsed for tree (10000): 5,070500
 Time elapsed for  tree extra 10 element : 0,011700
 Time elapsed for  tree extra 10 deletion element : 0,039400
 Time elapsed for tree (10000): 4,336300
 Time elapsed for  tree extra 10 element : 0,013200
 Time elapsed for  tree extra 10 deletion element : 0,033800
 Time elapsed for tree (10000): 4,329200
 Time elapsed for  tree extra 10 element : 0,021600
 Time elapsed for  tree extra 10 deletion element : 0,008500
 Time elapsed for tree (10000): 4,341700
 Time elapsed for  tree extra 10 element : 0,009400
 Time elapsed for  tree extra 10 deletion element : 0,008400
 Time elapsed for tree (10000): 4,658400
 Time elapsed for  tree extra 10 element : 0,017300
 Time elapsed for  tree extra 10 deletion element : 0,014100
 Time elapsed for tree (10000): 6,388700
 Time elapsed for  tree extra 10 element : 0,041300
 Time elapsed for  tree extra 10 deletion element : 0,017800
 Time elapsed for tree (10000): 3,530900
 Time elapsed for  tree extra 10 element : 0,011300
 Time elapsed for  tree extra 10 deletion element : 0,017300
 Time elapsed for tree (10000): 3,550500
 Time elapsed for  tree extra 10 element : 0,009300
 Time elapsed for  tree extra 10 deletion element : 0,010600
 Time elapsed for tree (10000): 3,480400
 Time elapsed for  tree extra 10 element : 0,011600
 Time elapsed for  tree extra 10 deletion element : 0,010100

Process finished with exit code 0
```

Avarage of binary search tree insertion = 5,79 ms
Avarage of binary search tree 10 extra insertion = 0,0223 ms
Avarage of binary search tree 10 deletion = 0,0260 ms

Time is milisecond.
20000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (20000): 29,642000
 Time elapsed for  tree extra 10 element : 0,027800
 Time elapsed for  tree extra 10 deletion element : 0,131400
 Time elapsed for tree (20000): 12,987400
 Time elapsed for  tree extra 10 element : 0,012900
 Time elapsed for  tree extra 10 deletion element : 0,042800
 Time elapsed for tree (20000): 11,103300
 Time elapsed for  tree extra 10 element : 0,066100
 Time elapsed for  tree extra 10 deletion element : 0,049900
 Time elapsed for tree (20000): 10,705300
 Time elapsed for  tree extra 10 element : 0,041300
 Time elapsed for  tree extra 10 deletion element : 0,023300
 Time elapsed for tree (20000): 9,027400
 Time elapsed for  tree extra 10 element : 0,008600
 Time elapsed for  tree extra 10 deletion element : 0,008100
 Time elapsed for tree (20000): 9,551900
 Time elapsed for  tree extra 10 element : 0,010900
 Time elapsed for  tree extra 10 deletion element : 0,014800
 Time elapsed for tree (20000): 11,676600
 Time elapsed for  tree extra 10 element : 0,013600
 Time elapsed for  tree extra 10 deletion element : 0,012100
 Time elapsed for tree (20000): 10,671300
 Time elapsed for  tree extra 10 element : 0,015600
 Time elapsed for  tree extra 10 deletion element : 0,014000
 Time elapsed for tree (20000): 10,762100
 Time elapsed for  tree extra 10 element : 0,014000
 Time elapsed for  tree extra 10 deletion element : 0,011500
 Time elapsed for tree (20000): 6,519400
 Time elapsed for  tree extra 10 element : 0,027500
 Time elapsed for  tree extra 10 deletion element : 0,018300

 Process finished with exit code 0
```

Avarage of binary search tree insertion = 12,26 ms
Avarage of binary search tree 10 extra insertion = 0,0222 ms
Avarage of binary search tree 10 deletion = 0,0322 ms

Time is milisecond.
40000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (40000): 44,483200
 Time elapsed for  tree extra 10 element : 0,036700
 Time elapsed for  tree extra 10 deletion element : 0,107600
 Time elapsed for tree (40000): 28,017800
 Time elapsed for  tree extra 10 element : 0,045400
 Time elapsed for  tree extra 10 deletion element : 0,072200
 Time elapsed for tree (40000): 25,267300
 Time elapsed for  tree extra 10 element : 0,022500
 Time elapsed for  tree extra 10 deletion element : 0,053500
 Time elapsed for tree (40000): 22,741000
 Time elapsed for  tree extra 10 element : 0,020900
 Time elapsed for  tree extra 10 deletion element : 0,017100
 Time elapsed for tree (40000): 16,125000
 Time elapsed for  tree extra 10 element : 0,007900
 Time elapsed for  tree extra 10 deletion element : 0,011400
 Time elapsed for tree (40000): 16,818000
 Time elapsed for  tree extra 10 element : 0,010600
 Time elapsed for  tree extra 10 deletion element : 0,021000
 Time elapsed for tree (40000): 21,130800
 Time elapsed for  tree extra 10 element : 0,042700
 Time elapsed for  tree extra 10 deletion element : 0,037900
 Time elapsed for tree (40000): 15,969900
 Time elapsed for  tree extra 10 element : 0,042600
 Time elapsed for  tree extra 10 deletion element : 0,007800
 Time elapsed for tree (40000): 15,646000
 Time elapsed for  tree extra 10 element : 0,023500
 Time elapsed for  tree extra 10 deletion element : 0,009900
 Time elapsed for tree (40000): 21,657300
 Time elapsed for  tree extra 10 element : 0,008500
 Time elapsed for  tree extra 10 deletion element : 0,008000

Process finished with exit code 0
```

Avarage of binary search tree insertion = 22,75 ms
Avarage of binary search tree 10 extra insertion = 0,0253 ms
Avarage of binary search tree 10 deletion = 0,0342 ms

Time is milisecond.
80000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (80000): 103,710900
 Time elapsed for  tree extra 10 element : 0,068200
 Time elapsed for  tree extra 10 deletion element : 0,117900
 Time elapsed for tree (80000): 82,630200
 Time elapsed for  tree extra 10 element : 0,095500
 Time elapsed for  tree extra 10 deletion element : 0,097200
 Time elapsed for tree (80000): 56,691600
 Time elapsed for  tree extra 10 element : 0,087300
 Time elapsed for  tree extra 10 deletion element : 0,084200
 Time elapsed for tree (80000): 69,839300
 Time elapsed for  tree extra 10 element : 0,045000
 Time elapsed for  tree extra 10 deletion element : 0,020400
 Time elapsed for tree (80000): 57,922000
 Time elapsed for  tree extra 10 element : 0,012500
 Time elapsed for  tree extra 10 deletion element : 0,017100
 Time elapsed for tree (80000): 52,181400
 Time elapsed for  tree extra 10 element : 0,046000
 Time elapsed for  tree extra 10 deletion element : 0,010400
 Time elapsed for tree (80000): 49,759100
 Time elapsed for  tree extra 10 element : 0,030300
 Time elapsed for  tree extra 10 deletion element : 0,026600
 Time elapsed for tree (80000): 50,656900
 Time elapsed for  tree extra 10 element : 0,036800
 Time elapsed for  tree extra 10 deletion element : 0,011000
 Time elapsed for tree (80000): 48,294400
 Time elapsed for  tree extra 10 element : 0,027200
 Time elapsed for  tree extra 10 deletion element : 0,018700
 Time elapsed for tree (80000): 34,128900
 Time elapsed for  tree extra 10 element : 0,009500
 Time elapsed for  tree extra 10 deletion element : 0,010200

Process finished with exit code 0
```

Avarage of binary search tree insertion = 60,55 ms
Avarage of binary search tree 10 extra insertion = 0,0447 ms
Avarage of binary search tree 10 deletion = 0,0403 ms

Red Black Tree in the Book

Time is milisecond.

10000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (10000): 34,354400
 Time elapsed for  tree extra 10 element : 0,024600
 Time elapsed for  tree extra 10 deletion element : 0,139200
 Time elapsed for tree (10000): 7,346300
 Time elapsed for  tree extra 10 element : 0,060100
 Time elapsed for  tree extra 10 deletion element : 0,027300
 Time elapsed for tree (10000): 10,974600
 Time elapsed for  tree extra 10 element : 0,022100
 Time elapsed for  tree extra 10 deletion element : 0,031800
 Time elapsed for tree (10000): 4,854700
 Time elapsed for  tree extra 10 element : 0,010200
 Time elapsed for  tree extra 10 deletion element : 0,036100
 Time elapsed for tree (10000): 4,763100
 Time elapsed for  tree extra 10 element : 0,011800
 Time elapsed for  tree extra 10 deletion element : 0,090000
 Time elapsed for tree (10000): 4,641900
 Time elapsed for  tree extra 10 element : 0,007100
 Time elapsed for  tree extra 10 deletion element : 0,030000
 Time elapsed for tree (10000): 4,875700
 Time elapsed for  tree extra 10 element : 0,044800
 Time elapsed for  tree extra 10 deletion element : 0,083900
 Time elapsed for tree (10000): 5,883400
 Time elapsed for  tree extra 10 element : 0,011500
 Time elapsed for  tree extra 10 deletion element : 0,017700
 Time elapsed for tree (10000): 3,881200
 Time elapsed for  tree extra 10 element : 0,012100
 Time elapsed for  tree extra 10 deletion element : 0,016200
 Time elapsed for tree (10000): 3,869700
 Time elapsed for  tree extra 10 element : 0,006500
 Time elapsed for  tree extra 10 deletion element : 0,011100

Process finished with exit code 0
```

Avarage of binary search tree insertion = 8,54 ms
Avarage of binary search tree 10 extra insertion = 0,0201 ms
Avarage of binary search tree 10 deletion = 0,0480 ms

Time is milisecond.
20000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (20000): 32,005400
Time elapsed for  tree extra 10 element : 0,020400
Time elapsed for  tree extra 10 deletion element : 0,114800
Time elapsed for tree (20000): 13,916000
Time elapsed for  tree extra 10 element : 0,014400
Time elapsed for  tree extra 10 deletion element : 0,048300
Time elapsed for tree (20000): 12,674900
Time elapsed for  tree extra 10 element : 0,017900
Time elapsed for  tree extra 10 deletion element : 0,038000
Time elapsed for tree (20000): 12,013900
Time elapsed for  tree extra 10 element : 0,044400
Time elapsed for  tree extra 10 deletion element : 0,073800
Time elapsed for tree (20000): 8,861000
Time elapsed for  tree extra 10 element : 0,010100
Time elapsed for  tree extra 10 deletion element : 0,062300
Time elapsed for tree (20000): 8,932900
Time elapsed for  tree extra 10 element : 0,010600
Time elapsed for  tree extra 10 deletion element : 0,048700
Time elapsed for tree (20000): 15,257200
Time elapsed for  tree extra 10 element : 0,020800
Time elapsed for  tree extra 10 deletion element : 0,118600
Time elapsed for tree (20000): 9,872600
Time elapsed for  tree extra 10 element : 0,022300
Time elapsed for  tree extra 10 deletion element : 0,032200
Time elapsed for tree (20000): 7,221300
Time elapsed for  tree extra 10 element : 0,005900
Time elapsed for  tree extra 10 deletion element : 0,010900
Time elapsed for tree (20000): 7,571300
Time elapsed for  tree extra 10 element : 0,010100
Time elapsed for  tree extra 10 deletion element : 0,016000
```

Avarage of binary search tree

insertion = 12,82 ms
Avarage of binary search tree 10 extra insertion = 0,0201 ms
Avarage of binary search tree 10 deletion = 0,0480 ms

Time is milisecond.

40000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (40000): 58,960400
 Time elapsed for  tree extra 10 element : 0,033600
 Time elapsed for  tree extra 10 deletion element : 0,113200
 Time elapsed for tree (40000): 34,410300
 Time elapsed for  tree extra 10 element : 0,050800
 Time elapsed for  tree extra 10 deletion element : 0,065800
 Time elapsed for tree (40000): 33,640600
 Time elapsed for  tree extra 10 element : 0,020100
 Time elapsed for  tree extra 10 deletion element : 0,040900
 Time elapsed for tree (40000): 33,832600
 Time elapsed for  tree extra 10 element : 0,037800
 Time elapsed for  tree extra 10 deletion element : 0,066800
 Time elapsed for tree (40000): 22,991100
 Time elapsed for  tree extra 10 element : 0,008200
 Time elapsed for  tree extra 10 deletion element : 0,063100
 Time elapsed for tree (40000): 17,582800
 Time elapsed for  tree extra 10 element : 0,013200
 Time elapsed for  tree extra 10 deletion element : 0,036200
 Time elapsed for tree (40000): 16,646200
 Time elapsed for  tree extra 10 element : 0,008500
 Time elapsed for  tree extra 10 deletion element : 0,056800
 Time elapsed for tree (40000): 24,243600
 Time elapsed for  tree extra 10 element : 0,033000
 Time elapsed for  tree extra 10 deletion element : 0,101800
 Time elapsed for tree (40000): 19,886800
 Time elapsed for  tree extra 10 element : 0,013900
 Time elapsed for  tree extra 10 deletion element : 0,017400
 Time elapsed for tree (40000): 20,616300
 Time elapsed for  tree extra 10 element : 0,011100
 Time elapsed for  tree extra 10 deletion element : 0,018200

 Process finished with exit code 0
```

Avarage of binary search tree insertion = 28,27 ms
Avarage of binary search tree 10 extra insertion = 0,0226 ms
Avarage of binary search tree 10 deletion = 0,0572 ms

Time is milisecond.

80000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (80000): 84,175700
 Time elapsed for  tree extra 10 element : 0,081500
 Time elapsed for  tree extra 10 deletion element : 0,165900
 Time elapsed for tree (80000): 56,099300
 Time elapsed for  tree extra 10 element : 0,021100
 Time elapsed for  tree extra 10 deletion element : 0,064200
 Time elapsed for tree (80000): 42,315900
 Time elapsed for  tree extra 10 element : 0,011600
 Time elapsed for  tree extra 10 deletion element : 0,026500
 Time elapsed for tree (80000): 50,913400
 Time elapsed for  tree extra 10 element : 0,014900
 Time elapsed for  tree extra 10 deletion element : 0,043000
 Time elapsed for tree (80000): 38,912500
 Time elapsed for  tree extra 10 element : 0,007300
 Time elapsed for  tree extra 10 deletion element : 0,039900
 Time elapsed for tree (80000): 40,424300
 Time elapsed for  tree extra 10 element : 0,009300
 Time elapsed for  tree extra 10 deletion element : 0,071000
 Time elapsed for tree (80000): 42,244900
 Time elapsed for  tree extra 10 element : 0,012500
 Time elapsed for  tree extra 10 deletion element : 0,022300
 Time elapsed for tree (80000): 37,942500
 Time elapsed for  tree extra 10 element : 0,010300
 Time elapsed for  tree extra 10 deletion element : 0,014400
 Time elapsed for tree (80000): 36,797800
 Time elapsed for  tree extra 10 element : 0,008400
 Time elapsed for  tree extra 10 deletion element : 0,014100
 Time elapsed for tree (80000): 36,983700
 Time elapsed for  tree extra 10 element : 0,008000
 Time elapsed for  tree extra 10 deletion element : 0,019100

 Process finished with exit code 0
```

Avarage of binary search tree insertion = 46,65 ms
Avarage of binary search tree 10 extra insertion = 0,0181 ms
Avarage of binary search tree 10 deletion = 0,0477 ms

Red Black Tree in java
Time is milisecond.

10000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (10000): 19,392900
 Time elapsed for  tree extra 10 element : 0,028500
 Time elapsed for  tree extra 10 deletion element : 0,103700
 Time elapsed for tree (10000): 5,401300
 Time elapsed for  tree extra 10 element : 0,010300
 Time elapsed for  tree extra 10 deletion element : 0,025200
 Time elapsed for tree (10000): 8,894200
 Time elapsed for  tree extra 10 element : 0,017100
 Time elapsed for  tree extra 10 deletion element : 0,022900
 Time elapsed for tree (10000): 8,367100
 Time elapsed for  tree extra 10 element : 0,011200
 Time elapsed for  tree extra 10 deletion element : 0,024100
 Time elapsed for tree (10000): 5,955600
 Time elapsed for  tree extra 10 element : 0,010100
 Time elapsed for  tree extra 10 deletion element : 0,023200
 Time elapsed for tree (10000): 5,498300
 Time elapsed for  tree extra 10 element : 0,009300
 Time elapsed for  tree extra 10 deletion element : 0,024100
 Time elapsed for tree (10000): 5,363500
 Time elapsed for  tree extra 10 element : 0,047500
 Time elapsed for  tree extra 10 deletion element : 0,051100
 Time elapsed for tree (10000): 5,213200
 Time elapsed for  tree extra 10 element : 0,017700
 Time elapsed for  tree extra 10 deletion element : 0,037900
 Time elapsed for tree (10000): 4,945200
 Time elapsed for  tree extra 10 element : 0,011900
 Time elapsed for  tree extra 10 deletion element : 0,032100
 Time elapsed for tree (10000): 4,942300
 Time elapsed for  tree extra 10 element : 0,012800
 Time elapsed for  tree extra 10 deletion element : 0,047500

Process finished with exit code 0
```

Avarage of binary search tree insertion = 7,38 ms
Avarage of binary search tree 10 extra insertion = 0,0172 ms
Avarage of binary search tree 10 deletion = 0,0437 ms

Time is milisecond.
20000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (20000): 29,305900
 Time elapsed for  tree extra 10 element : 0,020000
 Time elapsed for  tree extra 10 deletion element : 0,212100
 Time elapsed for tree (20000): 10,339900
 Time elapsed for  tree extra 10 element : 0,011800
 Time elapsed for  tree extra 10 deletion element : 0,031600
 Time elapsed for tree (20000): 13,513300
 Time elapsed for  tree extra 10 element : 0,011200
 Time elapsed for  tree extra 10 deletion element : 0,034300
 Time elapsed for tree (20000): 10,576700
 Time elapsed for  tree extra 10 element : 0,046000
 Time elapsed for  tree extra 10 deletion element : 0,040700
 Time elapsed for tree (20000): 8,887600
 Time elapsed for  tree extra 10 element : 0,057800
 Time elapsed for  tree extra 10 deletion element : 0,023700
 Time elapsed for tree (20000): 18,243500
 Time elapsed for  tree extra 10 element : 0,044800
 Time elapsed for  tree extra 10 deletion element : 0,023300
 Time elapsed for tree (20000): 8,907700
 Time elapsed for  tree extra 10 element : 0,007800
 Time elapsed for  tree extra 10 deletion element : 0,015100
 Time elapsed for tree (20000): 8,138200
 Time elapsed for  tree extra 10 element : 0,014400
 Time elapsed for  tree extra 10 deletion element : 0,021200
 Time elapsed for tree (20000): 9,379700
 Time elapsed for  tree extra 10 element : 0,008800
 Time elapsed for  tree extra 10 deletion element : 0,023000
 Time elapsed for tree (20000): 10,522200
 Time elapsed for  tree extra 10 element : 0,010500
 Time elapsed for  tree extra 10 deletion element : 0,016600

Process finished with exit code 0
```

Avarage of binary search tree insertion = 12,77 ms
Avarage of binary search tree 10 extra insertion = 0,0228 ms
Avarage of binary search tree 10 deletion = 0,0415 ms

Time is milisecond.
40000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (40000): 49,019600
 Time elapsed for  tree extra 10 element : 0,027400
 Time elapsed for  tree extra 10 deletion element : 0,147800
 Time elapsed for tree (40000): 28,950500
 Time elapsed for  tree extra 10 element : 0,032900
 Time elapsed for  tree extra 10 deletion element : 0,031100
 Time elapsed for tree (40000): 46,060500
 Time elapsed for  tree extra 10 element : 0,049600
 Time elapsed for  tree extra 10 deletion element : 0,022300
 Time elapsed for tree (40000): 27,417900
 Time elapsed for  tree extra 10 element : 0,023200
 Time elapsed for  tree extra 10 deletion element : 0,040200
 Time elapsed for tree (40000): 14,097500
 Time elapsed for  tree extra 10 element : 0,033700
 Time elapsed for  tree extra 10 deletion element : 0,018100
 Time elapsed for tree (40000): 16,489400
 Time elapsed for  tree extra 10 element : 0,006600
 Time elapsed for  tree extra 10 deletion element : 0,017300
 Time elapsed for tree (40000): 16,896100
 Time elapsed for  tree extra 10 element : 0,015300
 Time elapsed for  tree extra 10 deletion element : 0,047800
 Time elapsed for tree (40000): 21,991200
 Time elapsed for  tree extra 10 element : 0,009500
 Time elapsed for  tree extra 10 deletion element : 0,018100
 Time elapsed for tree (40000): 16,459700
 Time elapsed for  tree extra 10 element : 0,011800
 Time elapsed for  tree extra 10 deletion element : 0,027100
 Time elapsed for tree (40000): 13,724700
 Time elapsed for  tree extra 10 element : 0,008500
 Time elapsed for  tree extra 10 deletion element : 0,027400

Process finished with exit code 0
```

Avarage of binary search tree insertion = 25,05 ms
Avarage of binary search tree 10 extra insertion = 0,0213 ms
Avarage of binary search tree 10 deletion = 0,0386 ms

Time is milisecond.

80000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (80000): 73,987300
 Time elapsed for  tree extra 10 element : 0,048800
 Time elapsed for  tree extra 10 deletion element : 0,131200
 Time elapsed for tree (80000): 78,021300
 Time elapsed for  tree extra 10 element : 0,043500
 Time elapsed for  tree extra 10 deletion element : 0,017600
 Time elapsed for tree (80000): 49,657100
 Time elapsed for  tree extra 10 element : 0,051500
 Time elapsed for  tree extra 10 deletion element : 0,029600
 Time elapsed for tree (80000): 54,488000
 Time elapsed for  tree extra 10 element : 0,026300
 Time elapsed for  tree extra 10 deletion element : 0,066400
 Time elapsed for tree (80000): 51,930800
 Time elapsed for  tree extra 10 element : 0,036200
 Time elapsed for  tree extra 10 deletion element : 0,017600
 Time elapsed for tree (80000): 45,220100
 Time elapsed for  tree extra 10 element : 0,017500
 Time elapsed for  tree extra 10 deletion element : 0,031500
 Time elapsed for tree (80000): 46,852000
 Time elapsed for  tree extra 10 element : 0,024200
 Time elapsed for  tree extra 10 deletion element : 0,039800
 Time elapsed for tree (80000): 43,429200
 Time elapsed for  tree extra 10 element : 0,013500
 Time elapsed for  tree extra 10 deletion element : 0,027000
 Time elapsed for tree (80000): 46,122500
 Time elapsed for  tree extra 10 element : 0,007500
 Time elapsed for  tree extra 10 deletion element : 0,026000
 Time elapsed for tree (80000): 43,742400
 Time elapsed for  tree extra 10 element : 0,011500
 Time elapsed for  tree extra 10 deletion element : 0,019100

 Process finished with exit code 0
```

Avarage of binary search tree insertion = 53,34 ms
Avarage of binary search tree 10 extra insertion = 0,0220 ms
Avarage of binary search tree 10 deletion = 0,0380 ms

B-Tree in the Book

Time is milisecond.

10000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (10000): 26,114600
 Time elapsed for  tree extra 10 element : 0,036200
 Time elapsed for  tree extra 10 deletion element : 0,056800
 Time elapsed for tree (10000): 12,455800
 Time elapsed for  tree extra 10 element : 0,018100
 Time elapsed for  tree extra 10 deletion element : 0,018700
 Time elapsed for tree (10000): 9,267800
 Time elapsed for  tree extra 10 element : 0,025700
 Time elapsed for  tree extra 10 deletion element : 0,022100
 Time elapsed for tree (10000): 13,552300
 Time elapsed for  tree extra 10 element : 0,031300
 Time elapsed for  tree extra 10 deletion element : 0,016800
 Time elapsed for tree (10000): 11,263900
 Time elapsed for  tree extra 10 element : 0,037500
 Time elapsed for  tree extra 10 deletion element : 0,019400
 Time elapsed for tree (10000): 9,138500
 Time elapsed for  tree extra 10 element : 0,025200
 Time elapsed for  tree extra 10 deletion element : 0,017900
 Time elapsed for tree (10000): 10,899000
 Time elapsed for  tree extra 10 element : 0,048800
 Time elapsed for  tree extra 10 deletion element : 0,044200
 Time elapsed for tree (10000): 9,579200
 Time elapsed for  tree extra 10 element : 0,018100
 Time elapsed for  tree extra 10 deletion element : 0,015900
 Time elapsed for tree (10000): 9,942300
 Time elapsed for  tree extra 10 element : 0,029300
 Time elapsed for  tree extra 10 deletion element : 0,023500
 Time elapsed for tree (10000): 7,685600
 Time elapsed for  tree extra 10 element : 0,025800
 Time elapsed for  tree extra 10 deletion element : 0,016100

Process finished with exit code 0
```

Avarage of binary search tree insertion = 10,87 ms
Avarage of binary search tree 10 extra insertion = 0,0411 ms
Avarage of binary search tree 10 deletion = 0,0335 ms

Time is milisecond.
20000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (20000): 42,974400
 Time elapsed for  tree extra 10 element : 0,108300
 Time elapsed for  tree extra 10 deletion element : 0,070400
 Time elapsed for tree (20000): 39,627000
 Time elapsed for  tree extra 10 element : 0,025700
 Time elapsed for  tree extra 10 deletion element : 0,019300
 Time elapsed for tree (20000): 27,645000
 Time elapsed for  tree extra 10 element : 0,035600
 Time elapsed for  tree extra 10 deletion element : 0,018600
 Time elapsed for tree (20000): 25,365300
 Time elapsed for  tree extra 10 element : 0,054500
 Time elapsed for  tree extra 10 deletion element : 0,035000
 Time elapsed for tree (20000): 27,029200
 Time elapsed for  tree extra 10 element : 0,019800
 Time elapsed for  tree extra 10 deletion element : 0,014600
 Time elapsed for tree (20000): 28,302200
 Time elapsed for  tree extra 10 element : 0,028400
 Time elapsed for  tree extra 10 deletion element : 0,019200
 Time elapsed for tree (20000): 26,417700
 Time elapsed for  tree extra 10 element : 0,033800
 Time elapsed for  tree extra 10 deletion element : 0,015700
 Time elapsed for tree (20000): 20,431300
 Time elapsed for  tree extra 10 element : 0,015400
 Time elapsed for  tree extra 10 deletion element : 0,014400
 Time elapsed for tree (20000): 17,989500
 Time elapsed for  tree extra 10 element : 0,024500
 Time elapsed for  tree extra 10 deletion element : 0,017100
 Time elapsed for tree (20000): 21,641300
 Time elapsed for  tree extra 10 element : 0,024500
 Time elapsed for  tree extra 10 deletion element : 0,014900

 Process finished with exit code 0
```

Avarage of binary search tree insertion = 18,15 ms
Avarage of binary search tree 10 extra insertion = 0,0306 ms
Avarage of binary search tree 10 deletion = 0,0310 ms

Time is milisecond.
40000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (40000): 65,775900
Time elapsed for  tree extra 10 element : 0,035000
Time elapsed for  tree extra 10 deletion element : 0,037700
Time elapsed for tree (40000): 39,329800
Time elapsed for  tree extra 10 element : 0,076000
Time elapsed for  tree extra 10 deletion element : 0,057300
Time elapsed for tree (40000): 39,295900
Time elapsed for  tree extra 10 element : 0,028400
Time elapsed for  tree extra 10 deletion element : 0,014500
Time elapsed for tree (40000): 43,285400
Time elapsed for  tree extra 10 element : 0,035800
Time elapsed for  tree extra 10 deletion element : 0,012600
Time elapsed for tree (40000): 54,974100
Time elapsed for  tree extra 10 element : 0,024700
Time elapsed for  tree extra 10 deletion element : 0,013000
Time elapsed for tree (40000): 44,891400
Time elapsed for  tree extra 10 element : 0,036800
Time elapsed for  tree extra 10 deletion element : 0,013400
Time elapsed for tree (40000): 41,291600
Time elapsed for  tree extra 10 element : 0,022200
Time elapsed for  tree extra 10 deletion element : 0,025600
Time elapsed for tree (40000): 20,927500
Time elapsed for  tree extra 10 element : 0,031400
Time elapsed for  tree extra 10 deletion element : 0,012900
Time elapsed for tree (40000): 19,746500
Time elapsed for  tree extra 10 element : 0,010100
Time elapsed for  tree extra 10 deletion element : 0,016100
Time elapsed for tree (40000): 19,216800
Time elapsed for  tree extra 10 element : 0,011000
Time elapsed for  tree extra 10 deletion element : 0,013900

Process finished with exit code 0
```

Avarage of binary search tree insertion = 49,72 ms
Avarage of binary search tree 10 extra insertion = 0,0404 ms
Avarage of binary search tree 10 deletion = 0,0262 ms

Time is milisecond.
80000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (80000): 152,517800
 Time elapsed for  tree extra 10 element : 0,053500
 Time elapsed for  tree extra 10 deletion element : 0,055800
 Time elapsed for tree (80000): 102,513600
 Time elapsed for  tree extra 10 element : 0,029300
 Time elapsed for  tree extra 10 deletion element : 0,012000
 Time elapsed for tree (80000): 128,434200
 Time elapsed for  tree extra 10 element : 0,050400
 Time elapsed for  tree extra 10 deletion element : 0,015200
 Time elapsed for tree (80000): 54,967200
 Time elapsed for  tree extra 10 element : 0,021300
 Time elapsed for  tree extra 10 deletion element : 0,028700
 Time elapsed for tree (80000): 50,017100
 Time elapsed for  tree extra 10 element : 0,011800
 Time elapsed for  tree extra 10 deletion element : 0,014100
 Time elapsed for tree (80000): 58,980700
 Time elapsed for  tree extra 10 element : 0,010900
 Time elapsed for  tree extra 10 deletion element : 0,016500
 Time elapsed for tree (80000): 63,688100
 Time elapsed for  tree extra 10 element : 0,020800
 Time elapsed for  tree extra 10 deletion element : 0,021000
 Time elapsed for tree (80000): 67,381100
 Time elapsed for  tree extra 10 element : 0,020400
 Time elapsed for  tree extra 10 deletion element : 0,017300
 Time elapsed for tree (80000): 59,838300
 Time elapsed for  tree extra 10 element : 0,017600
 Time elapsed for  tree extra 10 deletion element : 0,019500
 Time elapsed for tree (80000): 45,875600
 Time elapsed for  tree extra 10 element : 0,011500
 Time elapsed for  tree extra 10 deletion element : 0,014500

Process finished with exit code 0
```

Avarage of binary search tree insertion = 83,92 ms
Avarage of binary search tree 10 extra insertion = 0,0321 ms
Avarage of binary search tree 10 deletion = 0,0278 ms

Skip List in the Book

Time is milisecond.

10000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (10000): 24,434100
 Time elapsed for  tree extra 10 element : 0,025500
 Time elapsed for  tree extra 10 deletion element : 0,107600
 Time elapsed for tree (10000): 6,827500
 Time elapsed for  tree extra 10 element : 0,010500
 Time elapsed for  tree extra 10 deletion element : 0,032400
 Time elapsed for tree (10000): 6,578800
 Time elapsed for  tree extra 10 element : 0,013900
 Time elapsed for  tree extra 10 deletion element : 0,033800
 Time elapsed for tree (10000): 6,584900
 Time elapsed for  tree extra 10 element : 0,024200
 Time elapsed for  tree extra 10 deletion element : 0,066200
 Time elapsed for tree (10000): 6,365400
 Time elapsed for  tree extra 10 element : 0,015900
 Time elapsed for  tree extra 10 deletion element : 0,033400
 Time elapsed for tree (10000): 6,706500
 Time elapsed for  tree extra 10 element : 0,014500
 Time elapsed for  tree extra 10 deletion element : 0,033800
 Time elapsed for tree (10000): 6,356500
 Time elapsed for  tree extra 10 element : 0,046300
 Time elapsed for  tree extra 10 deletion element : 0,075500
 Time elapsed for tree (10000): 5,885400
 Time elapsed for  tree extra 10 element : 0,021600
 Time elapsed for  tree extra 10 deletion element : 0,036900
 Time elapsed for tree (10000): 6,580200
 Time elapsed for  tree extra 10 element : 0,019500
 Time elapsed for  tree extra 10 deletion element : 0,059200
 Time elapsed for tree (10000): 7,375600
 Time elapsed for  tree extra 10 element : 0,022300
 Time elapsed for  tree extra 10 deletion element : 0,087800

Process finished with exit code 0
```

Avarage of binary search tree insertion = 8,51 ms

Avarage of binary search tree 10 extra insertion = 0,0165 ms

Avarage of binary search tree 10 deletion = 0,0484 ms

Time is milisecond.

20000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (20000): 33,555600
 Time elapsed for  tree extra 10 element : 0,053600
 Time elapsed for  tree extra 10 deletion element : 0,113300
 Time elapsed for tree (20000): 26,748000
 Time elapsed for  tree extra 10 element : 0,026800
 Time elapsed for  tree extra 10 deletion element : 0,049000
 Time elapsed for tree (20000): 15,591700
 Time elapsed for  tree extra 10 element : 0,018600
 Time elapsed for  tree extra 10 deletion element : 0,032300
 Time elapsed for tree (20000): 17,096800
 Time elapsed for  tree extra 10 element : 0,039800
 Time elapsed for  tree extra 10 deletion element : 0,047200
 Time elapsed for tree (20000): 14,772700
 Time elapsed for  tree extra 10 element : 0,010500
 Time elapsed for  tree extra 10 deletion element : 0,031400
 Time elapsed for tree (20000): 16,440100
 Time elapsed for  tree extra 10 element : 0,015400
 Time elapsed for  tree extra 10 deletion element : 0,033500
 Time elapsed for tree (20000): 14,359000
 Time elapsed for  tree extra 10 element : 0,019000
 Time elapsed for  tree extra 10 deletion element : 0,044600
 Time elapsed for tree (20000): 12,646200
 Time elapsed for  tree extra 10 element : 0,013000
 Time elapsed for  tree extra 10 deletion element : 0,034400
 Time elapsed for tree (20000): 12,497700
 Time elapsed for  tree extra 10 element : 0,010000
 Time elapsed for  tree extra 10 deletion element : 0,064400
 Time elapsed for tree (20000): 13,020100
 Time elapsed for  tree extra 10 element : 0,015000
 Time elapsed for  tree extra 10 deletion element : 0,037300

Process finished with exit code 0
```

Avarage of binary search tree insertion = 15,68 ms
Avarage of binary search tree 10 extra insertion = 0,0186 ms
Avarage of binary search tree 10 deletion = 0,0550 ms

Time is milisecond.

40000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (40000): 56,389300
 Time elapsed for  tree extra 10 element : 0,041700
 Time elapsed for  tree extra 10 deletion element : 0,115300
 Time elapsed for tree (40000): 38,824400
 Time elapsed for  tree extra 10 element : 0,034200
 Time elapsed for  tree extra 10 deletion element : 0,050400
 Time elapsed for tree (40000): 38,514000
 Time elapsed for  tree extra 10 element : 0,014800
 Time elapsed for  tree extra 10 deletion element : 0,037000
 Time elapsed for tree (40000): 45,820700
 Time elapsed for  tree extra 10 element : 0,025500
 Time elapsed for  tree extra 10 deletion element : 0,045100
 Time elapsed for tree (40000): 33,885900
 Time elapsed for  tree extra 10 element : 0,021200
 Time elapsed for  tree extra 10 deletion element : 0,067700
 Time elapsed for tree (40000): 41,793600
 Time elapsed for  tree extra 10 element : 0,016900
 Time elapsed for  tree extra 10 deletion element : 0,037600
 Time elapsed for tree (40000): 38,271400
 Time elapsed for  tree extra 10 element : 0,017700
 Time elapsed for  tree extra 10 deletion element : 0,042700
 Time elapsed for tree (40000): 31,105400
 Time elapsed for  tree extra 10 element : 0,014600
 Time elapsed for  tree extra 10 deletion element : 0,040300
 Time elapsed for tree (40000): 29,491900
 Time elapsed for  tree extra 10 element : 0,028000
 Time elapsed for  tree extra 10 deletion element : 0,064400
 Time elapsed for tree (40000): 39,760900
 Time elapsed for  tree extra 10 element : 0,028400
 Time elapsed for  tree extra 10 deletion element : 0,042600

Process finished with exit code 0
```

Avarage of binary search tree insertion = 35,72 ms
Avarage of binary search tree 10 extra insertion = 0,0267 ms
Avarage of binary search tree 10 deletion = 0,0654 ms

Time is milisecond.

80000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (80000): 112,477000
 Time elapsed for  tree extra 10 element : 0,067900
 Time elapsed for  tree extra 10 deletion element : 0,119700
 Time elapsed for tree (80000): 96,446300
 Time elapsed for  tree extra 10 element : 0,031100
 Time elapsed for  tree extra 10 deletion element : 0,098500
 Time elapsed for tree (80000): 78,307800
 Time elapsed for  tree extra 10 element : 0,015000
 Time elapsed for  tree extra 10 deletion element : 0,036000
 Time elapsed for tree (80000): 78,705400
 Time elapsed for  tree extra 10 element : 0,018200
 Time elapsed for  tree extra 10 deletion element : 0,061000
 Time elapsed for tree (80000): 66,818800
 Time elapsed for  tree extra 10 element : 0,011300
 Time elapsed for  tree extra 10 deletion element : 0,034300
 Time elapsed for tree (80000): 68,636200
 Time elapsed for  tree extra 10 element : 0,039600
 Time elapsed for  tree extra 10 deletion element : 0,036200
 Time elapsed for tree (80000): 65,252900
 Time elapsed for  tree extra 10 element : 0,040800
 Time elapsed for  tree extra 10 deletion element : 0,039300
 Time elapsed for tree (80000): 80,252500
 Time elapsed for  tree extra 10 element : 0,014800
 Time elapsed for  tree extra 10 deletion element : 0,035200
 Time elapsed for tree (80000): 89,446300
 Time elapsed for  tree extra 10 element : 0,025900
 Time elapsed for  tree extra 10 deletion element : 0,071800
 Time elapsed for tree (80000): 114,112500
 Time elapsed for  tree extra 10 element : 0,014900
 Time elapsed for  tree extra 10 deletion element : 0,040900

Process finished with exit code 0
```

Avarage of binary search tree insertion = 75,10 ms
Avarage of binary search tree 10 extra insertion = 0,0221 ms
Avarage of binary search tree 10 deletion = 0,0520 ms

Skip List in java

Time is milisecond.
10000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (10000): 34,749300
 Time elapsed for  tree extra 10 element : 0,047300
 Time elapsed for  tree extra 10 deletion element : 0,158400
 Time elapsed for tree (10000): 5,848500
 Time elapsed for  tree extra 10 element : 0,011800
 Time elapsed for  tree extra 10 deletion element : 0,052300
 Time elapsed for tree (10000): 5,662300
 Time elapsed for  tree extra 10 element : 0,023900
 Time elapsed for  tree extra 10 deletion element : 0,050100
 Time elapsed for tree (10000): 5,588200
 Time elapsed for  tree extra 10 element : 0,009800
 Time elapsed for  tree extra 10 deletion element : 0,031700
 Time elapsed for tree (10000): 5,231800
 Time elapsed for  tree extra 10 element : 0,008900
 Time elapsed for  tree extra 10 deletion element : 0,031100
 Time elapsed for tree (10000): 5,366300
 Time elapsed for  tree extra 10 element : 0,014900
 Time elapsed for  tree extra 10 deletion element : 0,032700
 Time elapsed for tree (10000): 7,470800
 Time elapsed for  tree extra 10 element : 0,046600
 Time elapsed for  tree extra 10 deletion element : 0,061000
 Time elapsed for tree (10000): 4,782900
 Time elapsed for  tree extra 10 element : 0,014400
 Time elapsed for  tree extra 10 deletion element : 0,048200
 Time elapsed for tree (10000): 4,696100
 Time elapsed for  tree extra 10 element : 0,010300
 Time elapsed for  tree extra 10 deletion element : 0,056700
 Time elapsed for tree (10000): 4,761200
 Time elapsed for  tree extra 10 element : 0,014700
 Time elapsed for  tree extra 10 deletion element : 0,046500

Process finished with exit code 0
```

Avarage of binary search tree insertion = 14,64 ms
Avarage of binary search tree 10 extra insertion = 0,0405 ms
Avarage of binary search tree 10 deletion = 0,143 ms

Time is milisecond.

20000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (20000): 41,215100
 Time elapsed for  tree extra 10 element : 0,046800
 Time elapsed for  tree extra 10 deletion element : 0,133500
 Time elapsed for tree (20000): 12,080200
 Time elapsed for  tree extra 10 element : 0,014400
 Time elapsed for  tree extra 10 deletion element : 0,071100
 Time elapsed for tree (20000): 15,011600
 Time elapsed for  tree extra 10 element : 0,019700
 Time elapsed for  tree extra 10 deletion element : 0,048700
 Time elapsed for tree (20000): 26,375000
 Time elapsed for  tree extra 10 element : 0,053000
 Time elapsed for  tree extra 10 deletion element : 0,066800
 Time elapsed for tree (20000): 25,664800
 Time elapsed for  tree extra 10 element : 0,026100
 Time elapsed for  tree extra 10 deletion element : 0,037800
 Time elapsed for tree (20000): 21,889600
 Time elapsed for  tree extra 10 element : 0,013800
 Time elapsed for  tree extra 10 deletion element : 0,028100
 Time elapsed for tree (20000): 12,376700
 Time elapsed for  tree extra 10 element : 0,020800
 Time elapsed for  tree extra 10 deletion element : 0,054400
 Time elapsed for tree (20000): 10,658300
 Time elapsed for  tree extra 10 element : 0,027000
 Time elapsed for  tree extra 10 deletion element : 0,043100
 Time elapsed for tree (20000): 8,909000
 Time elapsed for  tree extra 10 element : 0,010000
 Time elapsed for  tree extra 10 deletion element : 0,029500
 Time elapsed for tree (20000): 8,688300
 Time elapsed for  tree extra 10 element : 0,010600
 Time elapsed for  tree extra 10 deletion element : 0,029200

Process finished with exit code 0
|
```

Avarage of binary search tree insertion = 18,86 ms
Avarage of binary search tree 10 extra insertion = 0,0180 ms
Avarage of binary search tree 10 deletion = 0,113 ms

Time is milisecond.

40000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (40000): 54,118600
 Time elapsed for  tree extra 10 element : 0,041800
 Time elapsed for  tree extra 10 deletion element : 0,135600
 Time elapsed for tree (40000): 32,526600
 Time elapsed for  tree extra 10 element : 0,055400
 Time elapsed for  tree extra 10 deletion element : 0,074400
 Time elapsed for tree (40000): 28,054100
 Time elapsed for  tree extra 10 element : 0,017300
 Time elapsed for  tree extra 10 deletion element : 0,082200
 Time elapsed for tree (40000): 28,776900
 Time elapsed for  tree extra 10 element : 0,027400
 Time elapsed for  tree extra 10 deletion element : 0,083300
 Time elapsed for tree (40000): 25,143900
 Time elapsed for  tree extra 10 element : 0,010900
 Time elapsed for  tree extra 10 deletion element : 0,037600
 Time elapsed for tree (40000): 31,464900
 Time elapsed for  tree extra 10 element : 0,016300
 Time elapsed for  tree extra 10 deletion element : 0,055000
 Time elapsed for tree (40000): 29,324900
 Time elapsed for  tree extra 10 element : 0,019500
 Time elapsed for  tree extra 10 deletion element : 0,054000
 Time elapsed for tree (40000): 57,824700
 Time elapsed for  tree extra 10 element : 0,031200
 Time elapsed for  tree extra 10 deletion element : 0,040200
 Time elapsed for tree (40000): 21,284300
 Time elapsed for  tree extra 10 element : 0,009200
 Time elapsed for  tree extra 10 deletion element : 0,049000
 Time elapsed for tree (40000): 20,861500
 Time elapsed for  tree extra 10 element : 0,013100
 Time elapsed for  tree extra 10 deletion element : 0,030300

Process finished with exit code 0
```

Avarage of binary search tree insertion = 35,77 ms
Avarage of binary search tree 10 extra insertion = 0,0255 ms
Avarage of binary search tree 10 deletion = 0,127 ms

Time is milisecond.

80000 element and 10 extra element and 10 deletion

```
Time elapsed for tree (80000): 126,148200
 Time elapsed for  tree extra 10 element : 0,062300
 Time elapsed for  tree extra 10 deletion element : 0,062300
 Time elapsed for tree (80000): 96,684900
 Time elapsed for  tree extra 10 element : 0,046100
 Time elapsed for  tree extra 10 deletion element : 0,134700
 Time elapsed for tree (80000): 110,459100
 Time elapsed for  tree extra 10 element : 0,035500
 Time elapsed for  tree extra 10 deletion element : 0,083900
 Time elapsed for tree (80000): 79,370800
 Time elapsed for  tree extra 10 element : 0,025500
 Time elapsed for  tree extra 10 deletion element : 0,054800
 Time elapsed for tree (80000): 79,634200
 Time elapsed for  tree extra 10 element : 0,012500
 Time elapsed for  tree extra 10 deletion element : 0,031400
 Time elapsed for tree (80000): 49,311400
 Time elapsed for  tree extra 10 element : 0,013500
 Time elapsed for  tree extra 10 deletion element : 0,029600
 Time elapsed for tree (80000): 48,695400
 Time elapsed for  tree extra 10 element : 0,012100
 Time elapsed for  tree extra 10 deletion element : 0,029400
 Time elapsed for tree (80000): 53,515300
 Time elapsed for  tree extra 10 element : 0,013000
 Time elapsed for  tree extra 10 deletion element : 0,030200
 Time elapsed for tree (80000): 51,005500
 Time elapsed for  tree extra 10 element : 0,012400
 Time elapsed for  tree extra 10 deletion element : 0,029900
 Time elapsed for tree (80000): 48,290400
 Time elapsed for  tree extra 10 element : 0,011100
 Time elapsed for  tree extra 10 deletion element : 0,031400

Process finished with exit code 0
```

Avarage of binary search tree insertion = 65,86 ms
Avarage of binary search tree 10 extra insertion = 0,0226 ms
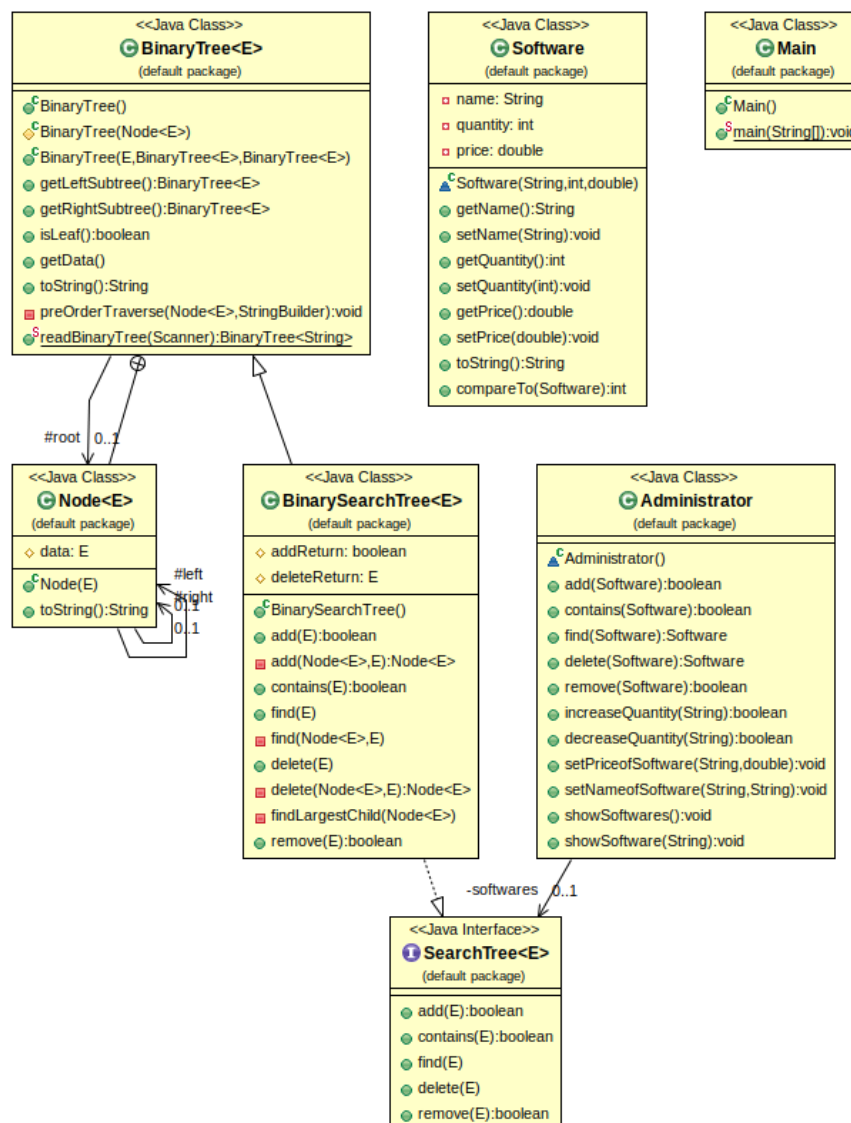Avarage of binary search tree 10 deletion = 0,122 ms

When we compare the times , they are so closely but in skip list in java , it has bigger delation time than the others.

Q4)

Problem Solution Approach

There is a software store system.It has search tree interface and it seacrh only entering name becouse Software class that is implemented by me has only one compareTo method and it compares only names.So It searches only entering name.Administrator has all features.He/she update imformations or sell software or add or delete etc.This is my approach so close to that.

Class Diagram

Test Cases

	Task	Parameters	Expected Results	Pass/Not
1)	Add Software	Software	Should add	Pass
2)	Increase quantity of software	name	Should increase	Pass
3)	Search Software	name	Shoud show software	Pass
4)	Sell software	name	Should sell software	Pass
5)	Update name of software	OldName , newName	Should update	Pass
6)	Delete Sotware	name	Should delete	Pass

Running Results

1)

```
Welcome to Software Store System

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

1
Enter password
1234

1 : Add Software
2 : Delete Software
3 : Update Informations
1
Enter Name of Software :
Mustafa Tokgöz
Enter Price of Software :
25,25

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

3
```

```
Name : AdobeFlash 3.3  Quantity : 1  Price : 0.0
Name : AdobeFlash 4.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.2  Quantity : 1  Price : 0.0
Name : Mustafa Tokgöz  Quantity : 1  Price : 25.25
Name : Norton 4.5  Quantity : 1  Price : 0.0
Name : Norton 5.5  Quantity : 1  Price : 0.0


Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit
```

2)

```
Welcome to Software Store System

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

1
Enter password
1234

1 : Add Software
2 : Delete Software
3 : Update Informations
1
Enter Name of Software :
Mustafa Tokgöz
Enter Price of Software :
25,25

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

3
Name : AdobeFlash 3.3  Quantity : 1  Price : 0.0
Name : AdobeFlash 4.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.2  Quantity : 1  Price : 0.0
Name : Mustafa Tokgöz  Quantity : 1  Price : 25.25
Name : Norton 4.5  Quantity : 1  Price : 0.0
Name : Norton 5.5  Quantity : 1  Price : 0.0


Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit
```

1
Enter password
1234

1 : Add Software
2 : Delete Software
3 : Update Informations
3
1 : Update Name
2 : Increase Quantity of Software
3 : Sell Software
4 : Change price of the Software
2
Name : AdobeFlash 3.3 Quantity : 1 Price : 0.0
Name : AdobeFlash 4.0 Quantity : 1 Price : 0.0
Name : AdobePhotoshop 6.0 Quantity : 1 Price : 0.0
Name : AdobePhotoshop 6.2 Quantity : 1 Price : 0.0
Name : Mustafa Tokgöz Quantity : 1 Price : 25.25
Name : Norton 4.5 Quantity : 1 Price : 0.0
Name : Norton 5.5 Quantity : 1 Price : 0.0

Enter the name of the Software
Mustafa Tokgöz

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by name
3 : Look Softwares
0 : Exit

3
Name : AdobeFlash 3.3 Quantity : 1 Price : 0.0
Name : AdobeFlash 4.0 Quantity : 1 Price : 0.0
Name : AdobePhotoshop 6.0 Quantity : 1 Price : 0.0
Name : AdobePhotoshop 6.2 Quantity : 1 Price : 0.0
Name : Mustafa Tokgöz Quantity : 2 Price : 25.25
Name : Norton 4.5 Quantity : 1 Price : 0.0
Name : Norton 5.5 Quantity : 1 Price : 0.0

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by name
3 : Look Softwares
0 : Exit

3)

Enter Software name
AdobeFlash 4.0
Name : AdobeFlash 4.0 Quantity : 1 Price : 0.0

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by name
3 : Look Softwares
0 : Exit

4)

```
Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

1
Enter password
1234

1 : Add Software
2 : Delete Software
3 : Update Informations
3
1 : Update Name
2 : Increase Quantity of Software
3 : Sell Software
4 : Change price of the Software
3
Name : AdobeFlash 3.3  Quantity : 1  Price : 0.0
Name : AdobeFlash 4.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.2  Quantity : 1  Price : 0.0
Name : Mustafa Tokgöz  Quantity : 2  Price : 25.25
Name : Norton 4.5  Quantity : 1  Price : 0.0
Name : Norton 5.5  Quantity : 1  Price : 0.0

Enter name of the Software
Norton 4.5

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

3
Name : AdobeFlash 3.3  Quantity : 1  Price : 0.0
Name : AdobeFlash 4.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.2  Quantity : 1  Price : 0.0
Name : Mustafa Tokgöz  Quantity : 2  Price : 25.25
Name : Norton 5.5  Quantity : 1  Price : 0.0


Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit
```

5)

```
Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

1
Enter password
1234

1 : Add Software
2 : Delete Software
3 : Update Informations
3
1 : Update Name
2 : Increase Quantity of Software
3 : Sell Software
4 : Change price of the Software
1
Name : AdobeFlash 3.3  Quantity : 1  Price : 0.0
Name : AdobeFlash 4.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.2  Quantity : 1  Price : 0.0
Name : Mustafa Tokgöz  Quantity : 2  Price : 25.25
Name : Norton 5.5  Quantity : 1  Price : 0.0

Enter name of an Software
AdobeFlash 3.3
Enter new name of the Software
AdobeFlash 10.6

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

3
Name : AdobeFlash 10.6  Quantity : 1  Price : 0.0
Name : AdobeFlash 4.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.2  Quantity : 1  Price : 0.0
Name : Mustafa Tokgöz  Quantity : 2  Price : 25.25
Name : Norton 5.5  Quantity : 1  Price : 0.0


Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit
```

6)

```
Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

1
Enter password
1234

1 : Add Software
2 : Delete Software
3 : Update Informations
2
Enter name of the Software to delete
Name : AdobeFlash 10.6  Quantity : 1  Price : 0.0
Name : AdobeFlash 4.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.2  Quantity : 1  Price : 0.0
Name : Mustafa Tokgöz  Quantity : 2  Price : 25.25
Name : Norton 5.5  Quantity : 1  Price : 0.0

Mustafa Tokgöz

Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit

3
Name : AdobeFlash 10.6  Quantity : 1  Price : 0.0
Name : AdobeFlash 4.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.0  Quantity : 1  Price : 0.0
Name : AdobePhotoshop 6.2  Quantity : 1  Price : 0.0
Name : Norton 5.5  Quantity : 1  Price : 0.0


Choose one of them to continue
1 : Enter the system as a Administrator
2 : Search software by  name
3 : Look Softwares
0 : Exit
```

Mustafa Tokgöz 171044077