1. 1. ceil(log2(6)) = 3 comparisons

A>B

A>C

B>C

B>C

A>C

A

B

B

C

C

A

* 1. Algorithm has 3 comparisons max.

1. Assuming the first element of the double linked list’s predecessor is the last element.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Unsorted, singly linked | Sorted, singly linked | Unsorted, doubly linked | Sorted, doubly linked |
| SEARCH(L, K) | O(n) | O(n) | O(n) | O(n) |
| INSERT(L, x) | O(1) | O(n) | O(1) | O(n) |
| DELETE(L, x) | O(n) | O(n) | O(n) | O(n) |
| SUCCESSOR(L, x) | O(n) | O(n) | O(n) | O(n) |
| PREDECESSOR(L, x) | O(n^2) | O(n^2) | O(n) | O(n) |
| MINIMUM(L, x) | O(n) | O(1) | O(n) | O(1) |
| MAXIMUM(L, x) | O(n) | O(n) | O(n) | O(1) |

1. 1. Down is linked list, right is hash table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| empty | 28 | 20 | 12 | empty | 5 | 15 | empty | 17 |
|  | 19 | nil | nil |  | nil | 33 |  | nil |
|  | 10 |  |  |  |  | nil |  |  |
|  | nil |  |  |  |  |  |  |  |



|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Linear | 22 | 88 |  |  | 4 | 15 | 28 | 17 | 59 | 31 | 10 |
| quadratic | 22 |  | 88 | 17 | 4 |  | 28 | 59 | 15 | 31 | 10 |
| Double hashing | 22 |  | 59 | 17 | 4 | 15 | 28 | 88 |  | 31 | 10 |



|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Unordered Array |  | Ordered Array |  | Bin search Tree | Assuming not balanced | Hash Table |  |
|  | Best | Worst | Best | Worst | Best | Worst | Best | Worst |
| insert | O(1) | O(1) | O(1) | O(n) | O(logn) | O(n) | O(1) | O(n) |
| delete | O(1) | O(n) | O(n) | O(n) | O(logn) | O(n) | O(1) | O(n) |
| search | O(n) | O(n) | O(n) | O(n) | O(logn) | O(n) | O(1) | O(n) |