Key

Good	Fair	Poor

Data Structures

Data Structure	Time Complexity								Space Complexity
	Average				Worst				Worst
	Indexing	Search	Insertion	Deletion	Indexing	Search	Insertion	Deletion	
Basic Array (Array)	O(1)	O(n)	-	-	O(1)	O(n)	-	-	O(n)
Dynamic Array (List<T> and ArrayList)	O(1)	O(n)	O(n)	O(n)	O(1)	O(n)	O(n)	O(n)	O(n)
Singly-Linked List	O(n)	O(n)	O(1)	O(1)	O(n)	O(n)	O(1)	O(1)	O(n)
Doubly-Linked List (LinkedList<T>)	O(n)	O(n)	O(1)	O(1)	O(n)	O(n)	O(1)	O(1)	O(n)
Skip List	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(n)	O(n)	O(n)	O(n)	O(n log(n))
Hash Table (HashSet<T> Dictionary<TKey, TValue> and Hashtable)	-	O(1)	O(1)	O(1)	-	O(n)	O(n)	O(n)	O(n)
Binary Search Tree (SortedDictionary<TKey, TValue>)	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(n)	O(n)	O(n)	O(n)	O(n)
Sorted Array using Binary Search (SortedList<TKey, TValue>)	O(log(n))	O(?)	O(1)	O(1)	O(log(n))	O(?)	O(n)	O(n)	O(?)
Cartesian Tree	-	O(log(n))	O(log(n))	O(log(n))	-	O(n)	O(n)	O(n)	O(n)
Splay Tree	-	O(log(n))	O(log(n))	O(log(n))	-	O(log(n))	O(log(n))	O(log(n))	O(n)
Red-Black Tree (SortedSet<T> No Duplicates)	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(n)
AVL Tree	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(n)
B-Tree	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(n)

Searching

Algorithm	Data Structure	Time Complexity		Space Complexity
		Average	Worst	Worst
Depth First Search (DFS)	Graph of |V| vertices and |E| edges	-	O(|E| + |V|)	O(|V|)
Breadth First Search (BFS)	Graph of |V| vertices and |E| edges	-	O(|E| + |V|)	O(|V|)
Binary search (Array.BinarySearch or List<T>.BinarySearch)	Sorted array of n elements	O(log(n))	O(log(n))	O(1)

Linear (Brute Force)	Array	O(n)	O(n)	O(1)
Shortest path by Dijkstra, using a Min-heap as priority queue	Graph with |V| vertices and |E| edges	O((|V| + |E|) log |V|)	O((|V| + |E|) log |V|)	O(|V|)
Shortest path by Dijkstra, using an unsorted array as priority queue	Graph with |V| vertices and |E| edges	O(|V|^2)	O(|V|^2)	O(|V|)
Shortest path by Bellman-Ford	Graph with |V| vertices and |E| edges	O(|V||E|)	O(|V||E|)	O(|V|)

Sorting

Algorithm	**Data Structure**	**Time Complexity**			**Worst Case Auxiliary Space Complexity**
		Best	**Average**	**Worst**	**Worst**
Quicksort (Array.Sort and List<T>.Sort and Enumerable.OrderBy<TSource, TKey>)	Array	O(n log(n))	O(n log(n))	O(n^2)	O(n)
Mergesort	Array	O(n log(n))	O(n log(n))	O(n log(n))	O(n)
Heapsort	Array	O(n log(n))	O(n log(n))	O(n log(n))	O(1)
Bubble Sort	Array	O(n)	O(n^2)	O(n^2)	O(1)
Insertion Sort	Array	O(n)	O(n^2)	O(n^2)	O(1)
Select Sort	Array	O(n^2)	O(n^2)	O(n^2)	O(1)
Bucket Sort	Array	O(n+k)	O(n+k)	O(n^2)	O(nk)
Radix Sort	Array	O(nk)	O(nk)	O(nk)	O(n+k)

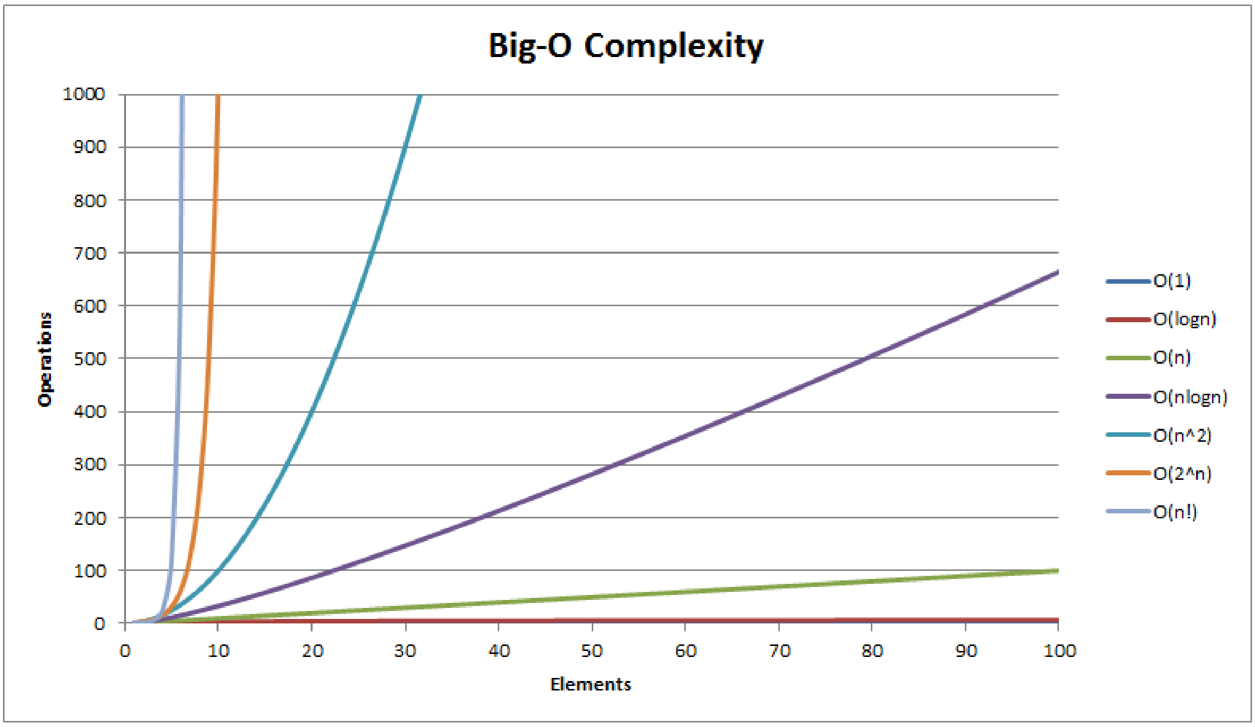
Heaps

Heaps	**Time Complexity**						
	Heapify	**Find Max**	**Extract Max**	**Increase Key**	**Insert**	**Delete**	**Merge**
Linked List (sorted)	-	O(1)	O(1)	O(n)	O(n)	O(1)	O(m+n)
Linked List (unsorted)	-	O(n)	O(n)	O(1)	O(1)	O(1)	O(1)
Binary Heap	O(n)	O(1)	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(m+n)
Binomial Heap	-	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))	O(log(n))
Fibonacci Heap	-	O(1)	O(log(n))*	O(1)*	O(1)	O(log(n))*	O(1)

Graphs

Node / Edge Management	**Storage**	**Add Vertex**	**Add Edge**	**Remove Vertex**	**Remove Edge**	**Query**
Adjacency list	O(|V|+|E|)	O(1)	O(1)	O(|V| + |E|)	O(|E|)	O(|V|)
Incidence list	O(|V|+|E|)	O(1)	O(1)	O(|E|)	O(|E|)	O(|E|)
Adjacency matrix	O(|V|^2)	O(|V|^2)	O(1)	O(|V|^2)	O(1)	O(1)
Incidence matrix	O(|V| · |E|)	O(|V| · |E|)	O(|V| · |E|)	O(|V| · |E|)	O(|V| · |E|)	O(|E|)

Big-O Complexity Chart


Big-O Complexity
Operations
Elements
O(1)
O(logn)
O(n)
O(nlogn)
O(n^2)
O(2^n)
O(n!)