1) What is an array?

An array is a collection of variables of the same type that are referenced by a common name. It is a reference data type. An array is initialized and declared like - int arr[] = new int [5];

2) What are the advantages and disadvantages of using an array?

Advantages -

(a) Arrays represent multiple data items of the same type using a single name.

(b) In arrays, any elements can be accessed randomly by using the index number.

Disadvantages -

(a) Data in arrays is stored in fixed memory locations.

(b) The number of elements to be stored in the array have to be known in advance. The size of arrays cannot be changed once defined.

3) What are the types of arrays

There are two types of arrays - One dimensional arrays and multidimensional arrays consisting of two or more dimensions of arrays.

Note: Indexing of arrays starts with 0 not 1. The first element of arr[] is arr[0], then arr[1] and so on. Also, arr[].length function gives us the number of elements in the array.

4) Explain linear and binary search

Linear search is the searching technique where each element of the array is compared with the search element one by one till the match is found or all elements have been compared.

for (int i = 0; i < arr1.length; i++) {

if (arr1[i] == element) {

System.out.println ("Element found at " + (i+1) + "th index");

flag = 1;

break;

}

}

if (flag == 0)

System.out.println ("Element not found");

Binary search is the technique which only works in sorted arrays. The search element is compared with the middle element of the array. If the search element matches the middle element, search finishes. If the search element is less than middle, perform binary search in the first half of the array, otherwise perform binary search in the latter part of the array.

int l = 0, u = (arr.length-1);

int m;

while (l <= u) {

m = (l+u)/2;

if (element > arr2[m])

l = m+1;

else if (element < arr2[m])

u = m-1;

else {

System.out.println ("Element found at " + (m+1));

flag = 1;

break;

}

}

if (flag == 0)

System.out.println ("Element not found");

6) Difference between Linear and Binary Search

|  |  |
| --- | --- |
| Linear Search | Binary Search |
| Works in all arrays | Works only in sorted arrays |
| Linear search finds an element in a list by sequentially checking the elements of the list until finding the matching element. | Binary search is an algorithm that finds the position of a element within a sorted array and only checks in half of the array. |
| In large arrays, linear search is inefficient. | In large arrays, binary search is more efficient. |

7) Explain bubble sort and selection sort *with code*

In ascending Bubble Sort, the adjoining values are compared and exchanged if they are not in order. After one pass, the largest element is put in the end.

int temp = 0;

flag = 0;

for (int i = 0; i < arr2.length; i++) {

for (int j = 0; j < ((arr2.length)-i-1); j++) {

if (arr2[j] > arr2 [j+1]) {

temp = arr2[j];

arr2[j] = arr2 [j+1];

arr2[j+1] = temp;

flag++;

}

}

if (flag == 0)

break;

else

flag = 0;

}

In ascending order Selection Sort, the smallest element from the unsorted array is searched for and put in the sorted array. After one pass, the smallest element is put in the starting.

int min, temp;

for (int i = 0; i < arr1.length; i++) {

min = i;

for (int j = (i+1); j < arr1.length; j++) {

if (arr1[j] < arr1[min])

min = j;

}

temp = arr1[i];

arr1[i] = arr1[min];

arr1[min] = temp;

}