**Algorithm\_Data Structures**

**Exercise 4: Employee Management System**

**Arrays:**

This project asks us to build a employee management system using the datastructures called arrays. Arrays is one of many data structures that uses contiguous memory to store elements. Arrays are static; whose size has to be declared before the program gets compiled. Arrays can only contain elements of a single datatype and do not accept elements of different datatypes.

1) Arrays in Java (and most languages) are contiguous blocks of memory.

2) Each element is stored sequentially and accessed by its index.

3) Any element in arr[i] can be accessed in constant time (O(1)).

For example, an array int[] arr = new int[5]; reserves space for 5 integers in memory, placed one after the other.  
  
**Time Complexity for each operation:**

**Add-** This function adds a new record of employee details. Element is added at the end of the array using index pointer. Takes constant time (O(1)).

**Search-** This function searches for a given employeeId and prints if the employee record bearig that id is found. Since it uses linear search, which loops through every element until the search element is found; the time complexity is O(n).

**Traverse**- This function traverses through each and every element through a for loop. So the time complexity depends on the size of the array (n). So the time complexity is O(n).

**Delete**- This function deletes the specified employee record and shift all elements after it to fill the gap. The time complexity is O(n).

**Limitations of Array:**

1) Once an array is declared, array size can't grow. This leads to wasted space or overflow errors.

2) Resizing means creating a new array and copying everything (O(n) time) in the new array.

3) Inefficient insertions/deletions, especially in the middle of the array, as it requires shifting of the elements.

4) Contiguous and sequential which may not fit for every scenario.

5) Only holds the elements of a single datatype.