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2023_27_II_EIE 2_Data Structures_lab

DATA STRUCTURES_ASSESSMENT_WEEK 11

Attempt : 1
Total Mark : 20
Marks Obtained : 20

Section 1 : Coding

1. Problem Statement

Write a program to implement the Shell Sort algorithm to sort a given set of numbers in ascending order.

Answer

```
// You are using GCC
#include <stdio.h>
int shellSort(int arr[],int n)
{
   for(int gap=n/2;gap>0;gap/=2)
   {
      for(int i=gap;i<n;i+=1)
```

```
        {
        int temp=arr[i];
        int j;
        for(j=i;j>=gap&&arr[j-gap]>temp;j-=gap)        arr[j]=arr[j-gap];
        arr[j]=temp;
        }
    }
return 0; }
void printArray(int arr[],int n)
{
    for(int i=0;i<n;i++)     printf("%d ",arr[i]);
}
int main()
{     int n;
    scanf("%d",&n);     int arr[n];
    for(int i=0;i<n;i++)
    {
        scanf("%d",&arr[i]);
    }
    shellSort(arr,n);     printArray(arr,n);     return 0; }
```

Status : Correct **Marks : 10/10**

2. Problem Statement

Imagine you own a logistics company where you run N number of trucks. Each truck has a unique loading capacity. Now use quadratic probing to arrange the trucks in the truck shed.

Assume the hashtable size is 10. Write a code to find out in which index the truck that has the highest loading capacity stands.

Implement a hash function that calculates the hash index for each key using the modulo operation with the table size (10). The hash index should be calculated as follows: Hash index = key % table size.

Answer

```
// You are using GCC
#include <stdio.h>
int main() {
```

```
   int tableSize = 10;     int numKeys,i;     scanf("%d", &numKeys);     int
keys[numKeys];
   for ( i = 0; i < numKeys; i++)
   {
      scanf("%d", &keys[i]);
   }
   int hashTable[tableSize];
   for ( i = 0; i < tableSize; i++)
   {
      hashTable[i] = -1;
   }
   for ( i = 0; i < numKeys; i++)
   {
      int key = keys[i];
      int hashIndex = key % tableSize;         int j = 0;
      while (hashTable[hashIndex] != -1)
      {            j++;
         hashIndex = (hashIndex + j * j) % tableSize;
      }
      hashTable[hashIndex] = key;
   }
   int max=hashTable[0];     int in=0;
   for ( i = 0; i < tableSize; i++)
   {
      if(hashTable[i]!=-1 && max<hashTable[i])
      {
         max=hashTable[i];
         in=i;
      }
   }
   printf("The lorry that has high load capacity is in index %d.",in); }
```

Status : Correct **Marks : 10/10**