

UNIX ASSIGNMENT – 3

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SECTION: A

Create shell scripts for generating static and dynamic libraries.

CODE TEXT:

```
//bubblesort.c
```

```
#include <stdio.h>
```

```
// Function to perform Bubble Sort on an array
```

```
void bubbleSort(int arr[], int n) {
```

```
    for (int i = 0; i < n - 1; i++) {
```

```
        for (int j = 0; j < n - i - 1; j++) {
```

```
            // Swap if the element found is greater than the next element
```

```
            if (arr[j] > arr[j + 1]) {
```

```
                int temp = arr[j];
```

```
                arr[j] = arr[j + 1];
```

```
                arr[j + 1] = temp;
```

```
            }
```

```
        }
```

```
    }
```

```
}
```

```
// Function to print elements of an array
```

```
void printArray(int arr[], int size) {
```

```
    for (int i = 0; i < size; i++)
```

```
        printf("%d ", arr[i]);  
    printf("\n");  
}
```

```
// diffminmax.c
```

```
#include <stdio.h>
```

```
// Function to find the difference between the minimum and maximum elements in a sorted  
array
```

```
int findDifference(int arr[], int n) {  
    // Assuming n is greater than 1  
    return arr[n - 1] - arr[0];  
}
```

```
// minmax.c
```

```
#include <stdio.h>
```

```
// Function to find the minimum and maximum elements in a sorted array
```

```
void findMinMax(int arr[], int n, int *min, int *max) {  
    *min = arr[0];  
    *max = arr[n - 1];  
}
```

```
//squthree.c
```

```
#include <stdio.h>
```

```
// Function to find the sum of squares of the three smallest numbers in a sorted array
```

```
int sumOfSquaresOfThreeSmallest(int arr[], int n) {  
    if (n < 3) {  
        printf("The array should have at least three elements.\n");  
        return -1; // Return an error value  
    }  
  
    int sum = 0;  
    for (int i = 0; i < 3; i++) {  
        sum += arr[i] * arr[i];  
    }  
  
    return sum;  
}
```

```
//main.c
```

```
#include<stdio.h>
```

```
#include "head.h"
```

```
int main() {  
    int arr[] = {64, 34, 25, 12, 22, 11, 90};  
    int n = sizeof(arr) / sizeof(arr[0]);
```

```
    printf("Original array: ");  
    printArray(arr, n);
```

```
    // Perform Bubble Sort
```

```
bubbleSort(arr, n);
```

```
printf("Sorted array: ");
```

```
printArray(arr, n);
```

```
int min, max;
```

```
findMinMax(arr, n, &min, &max);
```

```
printf("Minimum element: %d\n", min);
```

```
printf("Maximum element: %d\n", max);
```

```
if (n < 2) {
```

```
    printf("The array should have at least two elements.\n");
```

```
    return 1;
```

```
}
```

```
int difference = findDifference(arr, n);
```

```
printf("Difference between min and max: %d\n", difference);
```

```
int result = sumOfSquaresOfThreeSmallest(arr, n);
```

```
if (result != -1) {
```

```
    printf("Sum of squares of three smallest numbers: %d\n", result);
```

```
}
```

```
return 0;
```

```
}
```

```
//head.h
```

```

void bubbleSort(int arr[], int n);

void printArray(int arr[], int size);

void findMinMax(int arr[], int n, int *min, int *max);

int findDifference(int arr[], int n);

int sumOfSquaresOfThreeSmallest(int arr[], int n);

```

1. STATIC:

```

student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ls
bubblesort.c diffminmax.c head.h main.c minmax.c squthree.c
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ gcc -c bubblesort.c -o bubblesort_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ gcc -c minmax.c -o minmax_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ gcc -c diffminmax.c -o diffminmax_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ gcc -c squthree.c -o squthree_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ gcc -c main.c -o main_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ar rcs eg_static.a bubblesort_obj.o minmax_obj.o diffminmax_obj.o squthree_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ls
bubblesort.c bubblesort_obj.o diffminmax.c diffminmax_obj.o eg_static.a head.h main.c main_obj.o minmax.c minmax_obj.o squthree.c squthree_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ gcc -o main_result main_obj.o -L. eg_static.a
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ./main_result
Original array: 64 34 25 12 22 11 90
Sorted array: 11 12 22 25 34 64 90
Minimum element: 11
Maximum element: 90
Difference between min and max: 79
Sum of squares of three smallest numbers: 749
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ls
bubblesort.c bubblesort_obj.o diffminmax.c diffminmax_obj.o eg_static.a head.h main.c main_obj.o main_result minmax.c minmax_obj.o squthree.c squthree_obj.o

```

2. DYNAMIC:

```

student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ls
bubblesort.c bubblesort_obj.o diffminmax.c diffminmax_obj.o eg_static.a head.h main.c main_obj.o main_result minmax.c minmax_obj.o squthree.c squthree_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ gcc *.c -shared -o eg_dynamic.so
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ls
bubblesort.c diffminmax.c eg_dynamic.so head.h main_obj.o minmax.c squthree.c
bubblesort_obj.o diffminmax_obj.o eg_static.a main.c main_result minmax_obj.o squthree_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ gcc -o main_result main_obj.o -L. eg_dynamic.so
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ./main_result
./main_result: error while loading shared libraries: eg_dynamic.so: cannot open shared object file: No such file or directory
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ sudo cp eg_dynamic.so /usr/lib
[sudo] password for student:
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ./main_result
Original array: 64 34 25 12 22 11 90
Sorted array: 11 12 22 25 34 64 90
Minimum element: 11
Maximum element: 90
Difference between min and max: 79
Sum of squares of three smallest numbers: 749
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ sudo rm /usr/lib/eg_dynamic.so
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ pwd
/home/student/Desktop/422127_unixlab
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ export LD_LIBRARY_PATH=./Desktop/422127_unixlab
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ./main_result
Original array: 64 34 25 12 22 11 90
Sorted array: 11 12 22 25 34 64 90
Minimum element: 11
Maximum element: 90
Difference between min and max: 79
Sum of squares of three smallest numbers: 749
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ls
bubblesort.c diffminmax.c eg_dynamic.so head.h main_obj.o minmax.c squthree.c
bubblesort_obj.o diffminmax_obj.o eg_static.a main.c main_result minmax_obj.o squthree_obj.o
student@nit-OptiPlex-7070:~/Desktop/422127_unixlab$ ldd main_result
linux-vdso.so.1 (0x00007ffecdb98000)
eg_dynamic.so (0x00007ff39c3e1000)
libc.so.6 => /lib/x86_64-linux-gnu/libc.so.6 (0x00007ff39bfff000)
/lib64/ld-linux-x86-64.so.2 (0x00007ff39c7e7000)

```