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Course Name: BSc (Hons) Computer Science

Paper Name: Operating Systems Practical Exam (2021 – 22)

Semester: 3rd

CODE

```c
/*
Write a multhreaded program that calculates
Average, Minimum and maximum from a list
of numbers.
*/

#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>

int arr[50], i; // array to store numbers and i is used to iterarion
int n;          // this variable is being used to store the input

/*
 average, minimum, and maximum
 values will be stored globally
*/
float average;
int minimum;
int maximum;

//thread1 for calculating average
void *th()
{
    int sum = 0;
    for (i = 1; i <= n; i++)
    {
```

```
        sum = sum + arr[i];
        average = sum / n;
    }
}

//thread2 for calculating minimum value
void *th1()
{
    minimum = arr[1];
    for (int i = 1; i < n; i++)
    {
        if (minimum > arr[i])
        {
            minimum = arr[i];
        }
    }
}

//thread3 for calculating maximum value
void *th2()
{
    maximum = arr[1];
    for (int i = 1; i <= n; i++)
    {
        if (maximum < arr[i])
        {
            maximum = arr[i];
        }
    }
}

int main(int argc, char *argv[])
{
    int count = 0;
    /*
     a series of numbers on the command line is passing
    */
    for (int i = 1; i < argc; i++)
    {
        arr[i] = atoi(argv[i]);
        count++;
```

```
    }
    n = count;

    printf("%d numbers has been entered using command line arguments  \n",
count);
    for (int i = 1; i <= n; i++)
    {
        printf("%d\t", arr[i]);
    }

    printf("\n\n");
    int t, i;

    //three objectof worker threads are t1 ,t2 and t3
    pthread_t t1;
    pthread_t t2;
    pthread_t t3;

    //creating threads
    t = pthread_create(&t1, NULL, &th, NULL);
    pthread_join(t1, NULL);

    t = pthread_create(&t2, NULL, &th1, NULL);
    pthread_join(t2, NULL);

    t = pthread_create(&t3, NULL, &th2, NULL);
    pthread_join(t3, NULL);

    /*main is the parent thread.
    the parent thread will output the values
    once the workers have exited.
    */
    printf("Average Value: %f", average);
    printf("\nMinimum Value: %d", minimum);
    printf("\nMaximum Value: %d", maximum);

    return 0;
}
```

OUTPUT

```
PS C:\Users\nisha\Desktop\OSFinalPractical> gcc .\multithreaded.c -o .\multithreaded.exe
PS C:\Users\nisha\Desktop\OSFinalPractical> .\multithreaded.exe 12 7 4 9
4 numbers has been entered using command line arguments
12      7       4       9

Average Value: 8.000000
Minimum Value: 4
Maximum Value: 12
PS C:\Users\nisha\Desktop\OSFinalPractical>
```