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# Section:CSE-Section A

Roll No:422163

# Assignment-5

1)Using SSH Commands execute three programs on two different machines

```
Activities Terminal Mar 30 16:26
student@ai-HP-ProDesk-600-G4-NT:~
```



```
student@ai-HP-ProDesk-600-G4-NT:~$ ls
-rw-rw-r-- 1 student student 623 Jan 31 2023 vechile.class
drwxr-xr-x 3 student student 4096 Feb 10 11:26 Videos
-rw-rw-r-- 3 student student 3069 Sep 27 2023 wc.jar
drwxrwxr-x 8 student student 4096 Nov 8 2021 wekafiles
-rw-rw-r-- 1 student student 1739 Sep 27 2023 WordCountSintSumReducer.class
-rw-rw-r-- 1 student student 1491 Sep 27 2023 WordCountSintSumReducerMapper.class
-rw-rw-r-- 1 student student 2098 Sep 27 2023 WordCount.java
-rw-rw-r-- 1 student student 2655 Mar 7 2023 yan19.py
-rw-rw-r-- 1 student student 666 Mar 7 2023 yan1119.py
-rw-rw-r-- 1 student student 0 Jan 18 2023 znbaw
student@ai-HP-ProDesk-600-G4-NT:~$ 'spanning tree (prims & kruskls)-1.pdf'
student@ai-HP-ProDesk-600-G4-NT:~$ ls: command not found
student@ai-HP-ProDesk-600-G4-NT:~$ logout
Connection to 172.50.1.217 closed.
student@ai-HP-ProDesk-600-G4-NT:~$ ssh student@172.50.1.217
student@172.50.1.217's password:
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.11.0-43-generic x86_64)

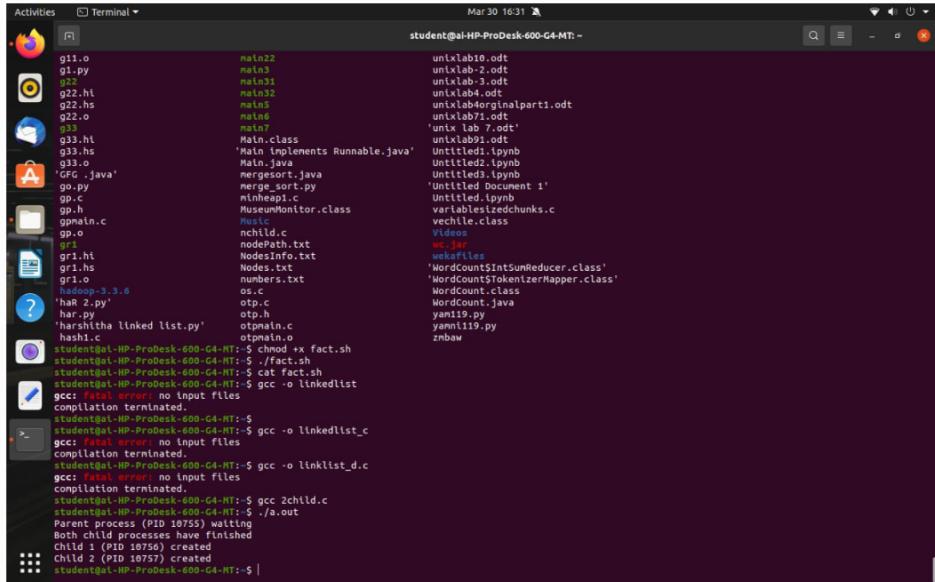
 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

1 device has a firmware upgrade available.
Run 'fwupdmgr get-upgrades' for more information.

607 updates can be applied immediately.
497 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

New release '22.04.3 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Your Hardware Enablement Stack (HWE) is supported until April 2025.
Last login: Sat Mar 30 16:17:11 2024 from 172.50.4.167
student@ai-HP-ProDesk-600-G4-NT:~$ ls
1.txt           heatsort.py          op.o
2343.py         hello.c            Package.java
2child.c        hw                personal.class
411975_des.py   i10.py            Pictures
420134_big_data_lab k10.pl           pid2.c
521356_ipy     k11.pl           prat
521356_ipy     k12.pl           prat2
521356_ipy     k13.pl           pratc
521356_ipy     k14.pl           pratne
521356_ipy     k15.pl           pratnne
521356_ipy     k16.pl           pratnneb
```



```
student@al-HP-ProDesk-600-G4-MT: ~
g11.o          main22
g11.py         main3
g22.h          main31
g22.hs        main32
g22.o        main5
g22.o        main6
g22.o        main7
g23.hl        Main.class
g23.hl        'Main Implements Runnable.java'
g23.hl        Main.java
g23.hl        mergeSort.java
g23.hl        mergeSort.py
g23.hl        minheap1.c
g23.hl        NodeMonitor.class
g23.hl        music
g23.hl        nchild.c
g23.hl        nodePath.txt
g23.hl        NodesInfo.txt
g23.hl        Nodes.txt
g23.hl        numbers.txt
g23.hl        os.c
g23.hl        otp.c
g23.hl        otp.h
g23.hl        'otp 2.py'
g23.hl        otpaln.c
g23.hl        otpaln.c
g23.hl        zmbaw
student@al-HP-ProDesk-600-G4-MT: ~$ chmod +x fact.sh
student@al-HP-ProDesk-600-G4-MT: ~$ ./fact.sh
student@al-HP-ProDesk-600-G4-MT: ~$ cat fact.sh
student@al-HP-ProDesk-600-G4-MT: ~$ gcc -o linkedlist
gcc: fatal error: no input files
compilation terminated.
student@al-HP-ProDesk-600-G4-MT: ~$ gcc -o linkedlist_c
gcc: fatal error: no input files
compilation terminated.
student@al-HP-ProDesk-600-G4-MT: ~$ gcc -o linklist_d.c
gcc: fatal error: no input files
compilation terminated.
student@al-HP-ProDesk-600-G4-MT: ~$ gcc 2child.c
student@al-HP-ProDesk-600-G4-MT: ~$ ./s.out
Parent process (PID 10755) waiting
Both child processes have finished
Child 1 (PID 10756) created
Child 2 (PID 10757) created
student@al-HP-ProDesk-600-G4-MT: ~$
```

## a)2child.c

```
#include <stdio.h>
#include <sys/types.h>
#include <unistd.h>
```

```
int main() {
    pid_t child1, child2;
    child1 = fork();

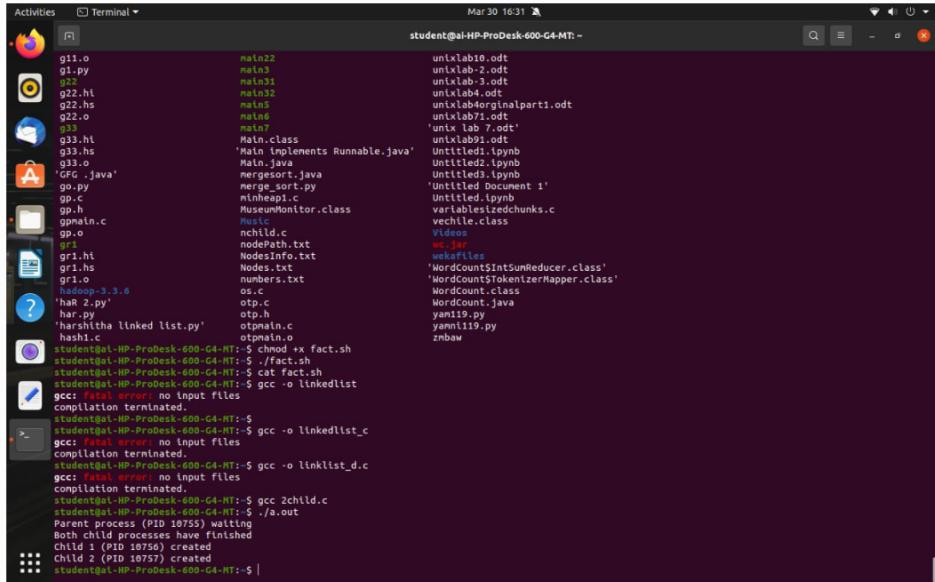
    if (child1 < 0) {
        perror("Fork 1 failed");
        return 1;
    } else if (child1 == 0) {
        printf("Child 1 (PID %d) created\n",
        getpid());
```

```
 } else {
    child2 = fork();

    if (child2 < 0) {
        perror("Fork 2 failed");
        return 1;
    } else if (child2 == 0) {
        printf("Child 2 (PID %d) created\n",
getpid());
    } else {
        printf("Parent process (PID %d)
waiting\n", getpid());
        printf("Both child processes have
finished\n");
    }
}

return 0;
}
```

Output:



```
Activities Terminal Mar 30 16:31 student@al-HP-ProDesk-600-G4-MT: ~
g11.o main22
g11.py main3
g22.h main31
g22.hs main32
g22.o main5
g22.o main6
g22.o main7
g23.h Main.class
g23.hl 'Main Implements Runnable.java'
g23.hs Main.java
g23.o mergesort.java
g23.o merge_sort.py
g23.o minheap.c
g23.o NodeMonitor.class
g23.o music
g23.o nchild.c
g23.o nodePath.txt
g23.o NodesInfo.txt
g23.o Nodes.txt
g23.o numbers.txt
g23.o os.c
g23.o sas-1_3_6
g23.o har2.py
g23.o otp.c
g23.o otp.h
g23.o harshitha linked list.py
g23.o otpmain.c
g23.o otpmain.o
g23.o stdlib-1.0.6-HP-ProDesk-600-G4-MT: ~ chmod +x fact.sh
student@al-HP-ProDesk-600-G4-MT: ~ ./fact.sh
student@al-HP-ProDesk-600-G4-MT: ~ cat fact.sh
student@al-HP-ProDesk-600-G4-MT: ~ gcc -o linkedlist
gcc: fatal error: no input files
compilation terminated.
student@al-HP-ProDesk-600-G4-MT: ~ gcc -o fact.sh
gcc: fatal error: no input files
compilation terminated.
student@al-HP-ProDesk-600-G4-MT: ~ gcc -o linklist_d.c
gcc: fatal error: no input files
compilation terminated.
student@al-HP-ProDesk-600-G4-MT: ~ gcc 2child.c
student@al-HP-ProDesk-600-G4-MT: ~ ./s.out
Parent process (PID 10755) waiting
Both child processes have finished
Child 1 (PID 10756) created
Child 2 (PID 10757) created
student@al-HP-ProDesk-600-G4-MT: ~ |
```

## b)Sorting.c

```
#include <math.h>
#include <stdio.h>
#include <stdlib.h>
#include <time.h>
```

```
double time1, timedif;
```

```
void insertionSort(int arr[], int n);
```

```
void printArray(int arr[], int n);
```

```
//void mergeSort(int arr[], int l, int r);
```

```
int main(){
```

```
    int arr[] = { 12, 22, 54, 3, 45, 71, 19, 11,
```

```
13, 5, 6 };

int n = sizeof(arr) / sizeof(arr[0]);
int option = 7;
printf("Given array is \n");
printArray(arr, n);
printf("Enter option 1 or 2 , Neo. ");
scanf("%d",&option);
switch(option){
case 1:
    time1 = (double) clock();
    time1 = time1 / CLOCKS_PER_SEC;
    insertionSort(arr, n);
    timedif = ( ((double) clock()) /
CLOCKS_PER_SEC) - time1;
    printf("\nSorted array by insertionSort
\n");
    printArray(arr, n);
    printf("Time elapsed: %f seconds\n",
timedif);
    break;
case 2:
```

```
    time1 = (double) clock();
    time1 = time1 / CLOCKS_PER_SEC;
    mergeSort(arr, 0, n - 1);
    timedif = ( ((double) clock()) /
CLOCKS_PER_SEC) - time1;
    printf("\nSorted array by mergeSort
\n");
    printArray(arr, n);
    printf("Time elapsed: %f seconds\n",
timedif);
    break;
default:
    if(option != 0)
        printf("Invalid option,Neo!");
}
}

return 0;
}

//insertion sort
```

```
void insertionSort(int arr[], int n){  
    int temp;  
    for (int i = 1; i < n; i++) {  
        temp = arr[i];  
        int j = i - 1;  
        /*sorted insertion*/  
        while (j >= 0 && temp < arr[j]) {  
            arr[j + 1] = arr[j];  
            j = j - 1;  
        }  
        arr[j + 1] = temp;  
    }  
}
```

```
//merge sort  
//void merge(int arr[], int l, int m, int r){  
int i, j, k;  
int n1 = m - l + 1;  
int n2 = r - m;  
//splitting  
int L[n1], R[n2];
```

```
for (i = 0; i < n1; i++)
    L[i] = arr[l + i];
for (j = 0; j < n2; j++)
    R[j] = arr[m + 1 + j];
//merging back
i = 0;
j = 0;
k = l;
while (i < n1 && j < n2) {
    if (L[i] <= R[j]) {
        arr[k] = L[i];
        i++;
    }
    else {
        arr[k] = R[j];
        j++;
    }
    k++;
}
//copying remaining elements of L[]
```

```
while (i < n1) {  
    arr[k] = L[i];  
    i++;  
    k++;  
}  
  
// Copying remaining elements of R[]  
while (j < n2) {  
    arr[k] = R[j];  
    j++;  
    k++;  
}  
}
```

```
void mergeSort(int arr[], int l, int r){  
    if (l < r) {  
        int m = l + (r - l) / 2;  
        // Sort first and second halves  
        mergeSort(arr, l, m);  
        mergeSort(arr, m + 1, r);  
        merge(arr, l, m, r);  
    }  
}
```

```
    }  
//}
```

```
//printing  
void printArray(int arr[], int n){  
    int i;  
    for (i = 0; i < n; i++)  
        printf("%d ", arr[i]);  
    printf("\n");  
}
```

Output:

```
studentgal-HP-Precision-600-G4-R1:~$ gcc sorting.c  
studentgal-HP-Precision-600-G4-R1:~$ ./a.out  
Given array is  
12 22 54 3 45 71 19 11 13 5 6  
Enter option 1 or 2 , Neo. 1  
Sorted array by InsertionSort  
3 5 6 11 12 13 19 22 45 54 71  
Time elapsed: 0.000005 seconds
```

c)Shortest.c

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

```
struct Process {  
    int id;  
    int burst_time;  
};
```

```
void calculateTimes(struct Process
```

```
processes[], int n) {  
    int completion_time = 0;  
    int total_turnaround_time = 0;  
    int total_response_time = 0;  
  
    for (int i = 0; i < n; i++) {  
        completion_time +=  
processes[i].burst_time;  
  
        int turnaround_time =  
completion_time;  
        total_turnaround_time +=  
turnaround_time;  
  
        int response_time = turnaround_time -  
processes[i].burst_time;  
        total_response_time +=  
response_time;  
  
        printf("Process %d - Turnaround Time:  
%d, Response Time: %d\n", processes[i].id,
```

```
turnaround_time, response_time);  
}  
  
float avg_turnaround_time =  
(float)total_turnaround_time / n;  
float avg_response_time =  
(float)total_response_time / n;
```

```
printf("\nAverage Turnaround Time:  
%.2f\n", avg_turnaround_time);  
printf("Average Response Time: %.2f\n",  
avg_response_time);  
}
```

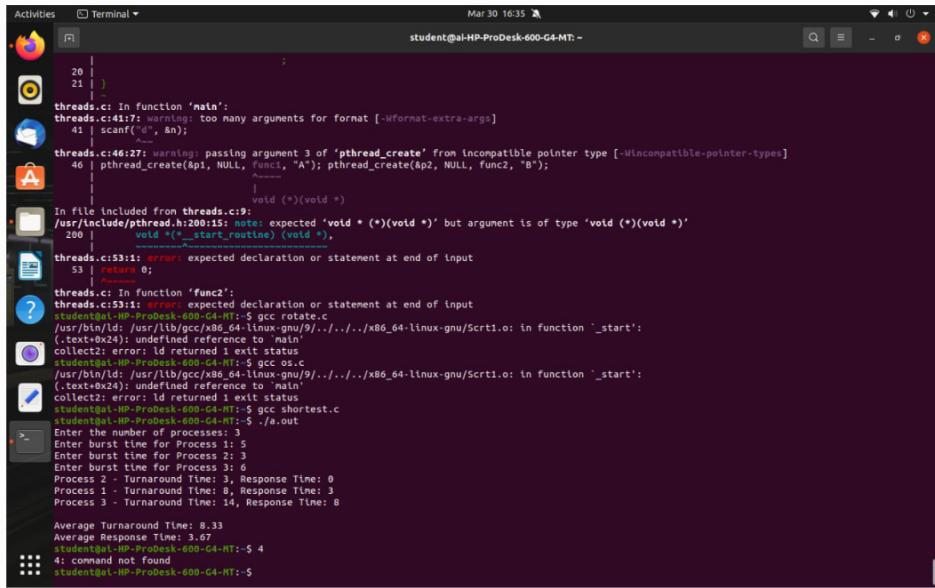
```
int main() {  
    int n;  
    printf("Enter the number of processes: ");  
    scanf("%d", &n);  
  
    struct Process processes[n];
```

```
for (int i = 0; i < n; i++) {  
    processes[i].id = i + 1;  
    printf("Enter burst time for Process  
%d: ", i + 1);  
    scanf("%d", &processes[i].burst_time);  
}  
  
for (int i = 0; i < n - 1; i++) {  
    for (int j = 0; j < n - i - 1; j++) {  
        if (processes[j].burst_time >  
processes[j + 1].burst_time) {  
            struct Process temp =  
processes[j];  
            processes[j] = processes[j + 1];  
            processes[j + 1] = temp;  
        }  
    }  
}  
  
calculateTimes(processes, n);
```

return 0;

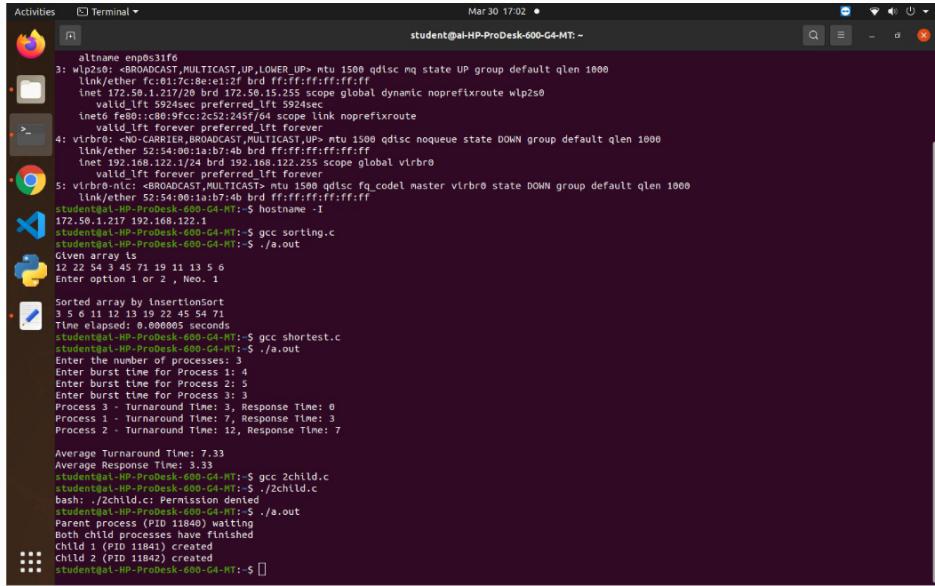
}

## Output:



```
student@ai-HP-ProDesk-600-G4-MT: ~
20 |
21 |
threads.c: In function 'main':
threads.c:4:17: warning: too many arguments for format [-Wformat-extra-args]
  41 |     scanf("%d", &n);
     |             ^
threads.c:46:27: warning: passing argument 3 of 'pthread_create' from incompatible pointer type [-Wincompatible-pointer-types]
  46 |     pthread_create(&pi, NULL, func1, "A"); pthread_create(&pi2, NULL, func2, "B");
     |             ^
     |             void (*)()
In file included from threads.c:9:
/usr/include/pthread.h:200:15: note: expected 'void * (*)void *)' but argument is of type 'void (*)void *)'
  200 |         void * (*_start_routine) (void *),
     |             ^
threads.c:53:1: error: expected declaration or statement at end of input
  53 |     return 0;
     |             ^
threads.c: In function 'func2':
threads.c:53:1: error: expected declaration or statement at end of input
student@ai-HP-ProDesk-600-G4-MT: ~$ gcc rotate.c
/usr/bin/ld: ./rotate.o: undefined reference to `main'
collect2: error: ld returned 1 exit status
student@ai-HP-ProDesk-600-G4-MT: ~$ gcc os.c
/usr/bin/ld: ./os.o: undefined reference to `main'
collect2: error: ld returned 1 exit status
student@ai-HP-ProDesk-600-G4-MT: ~$ gcc shortest.c
student@ai-HP-ProDesk-600-G4-MT: ~$ ./os
Enter the number of processes: 3
Enter burst time for Process 1: 5
Enter burst time for Process 2: 3
Enter burst time for Process 3: 0
Process 1 - Turnaround Time: 8, Response Time: 0
Process 2 - Turnaround Time: 8, Response Time: 3
Process 3 - Turnaround Time: 14, Response Time: 8
Average Turnaround Time: 8.33
Average Response Time: 3.67
student@ai-HP-ProDesk-600-G4-MT: ~$ 4: command not found
student@ai-HP-ProDesk-600-G4-MT: ~$
```

## Output on Machine 2 for three problems



```
student@ai-HP-ProDesk-600-G4-MT: ~
3: wlp2s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
  link/ether fc:01:7c:be:e1:2f brd ff:ff:ff:ff:ff:ff
  inet 172.50.1.217/20 brd 172.50.1.255 scope global dynamic noprefixroute wlp2s0
    valid_lft 5924sec preferred_lft 5924sec
  inet 192.168.122.1/24 brd 192.168.122.255 scope link noprefixroute
    valid_lft forever preferred_lft forever
4: vlrbr0: <NO-CARRIER,BROADCAST,MULTICAST> mtu 1500 qdisc noqueue state DOWN group default qlen 1000
  link/ether 52:54:00:1a:b7:4b brd ff:ff:ff:ff:ff:ff
  inet 192.168.122.1/24 brd 192.168.122.255 scope global vlrbr0
    valid_lft forever preferred_lft forever
5: vlrbr0-nic: <NO-CARRIER,BROADCAST,MULTICAST> mtu 1500 qdisc fq_codel master vlrbr0 state DOWN group default qlen 1000
  link/ether 52:54:00:1a:b7:4b brd ff:ff:ff:ff:ff:ff
student@ai-HP-ProDesk-600-G4-MT: ~$ hostname 1
172.50.1.217 192.168.122.1
student@ai-HP-ProDesk-600-G4-MT: ~$ gcc sorting.c
student@ai-HP-ProDesk-600-G4-MT: ~$ ./a.out
Give array to sort:
22 12 19 74 19 11 13 5 6
Enter option 1 or 2 , Neo. 1
Sorted array by insertionSort
3 5 6 11 12 13 19 22 45 54 71
Time elapsed: 1.000005 seconds
student@ai-HP-ProDesk-600-G4-MT: ~$ gcc shortest.c
student@ai-HP-ProDesk-600-G4-MT: ~$ ./a.out
Enter the number of processes: 3
Enter burst time for Process 1: 4
Enter burst time for Process 2: 5
Enter burst time for Process 3: 0
Process 1 - Turnaround Time: 8, Response Time: 0
Process 2 - Turnaround Time: 12, Response Time: 3
Process 3 - Turnaround Time: 12, Response Time: 7
Average Turnaround Time: 7.33
Average Response Time: 3.67
student@ai-HP-ProDesk-600-G4-MT: ~$ gcc 2child.c
student@ai-HP-ProDesk-600-G4-MT: ~$ ./2child.c
bash: ./2child.c: Permission denied
student@ai-HP-ProDesk-600-G4-MT: ~$ ./a.out
Parent process (PID 11840) waiting
Both child processes have finished
Child 1 (PID 11841) freed
Child 2 (PID 11842) created
student@ai-HP-ProDesk-600-G4-MT: ~$
```



