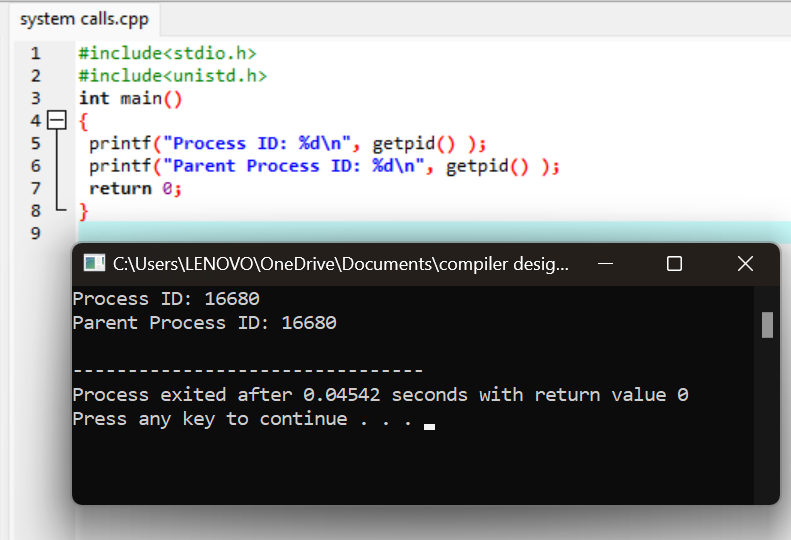
**CSA0410 – OPERATING SYSTEM LAB PROGRAMS**

**DAY 1**

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**1. Create a new process by invoking the appropriate system call. Get the process identifier of the currently running process and its respective parent using system calls and display the same using a C program.**



**2.Identify the system calls to copy the content of one file to another and illustrate the same using a C program**.

#include <stdio.h>

#include <stdlib.h>

int main(){

FILE \*fptr1, \*fptr2;

char filename[100], c;

printf("Enter the filename to open for reading ");

scanf("%s",filename);

fptr1 = fopen(filename, "r");

if (fptr1 == NULL){

printf("open file %s ", filename);

exit(0);

}

printf("Enter the filename to open for writing ");

scanf("%s", filename);

fptr2 = fopen(filename, "w");

if (fptr2 == NULL){

printf("Cannot open file %s ", filename);

exit(0);

}

c = fgetc(fptr1);

while (c != EOF){

fputc(c, fptr2);

c = fgetc(fptr1);

}

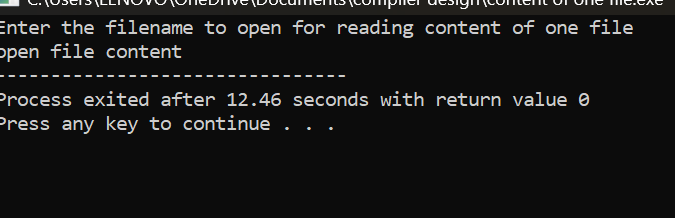
printf("Contents copied to %s", filename);

fclose(fptr1);

fclose(fptr2);

return 0;

}



**3.Design a CPU scheduling program with C using First Come First Served technique with the following considerations**.

**a. All processes are activated at time 0.**

**b. Assume that no process waits on I/O devices.**

#include <stdio.h>

int main()

{

int A[100][4];

int i, j, n, total = 0, index, temp;

float avg\_wt, avg\_tat;

printf("Enter number of process: ");

scanf("%d", &n);

printf("Enter Burst Time:\n");

for (i = 0; i < n; i++) {

printf("P%d: ", i + 1);

scanf("%d", &A[i][1]);

A[i][0] = i + 1;

}

for (i = 0; i < n; i++) {

index = i;

for (j = i + 1; j < n; j++)

if (A[j][1] < A[index][1])

index = j;

temp = A[i][1];

A[i][1] = A[index][1];

A[index][1] = temp;

temp = A[i][0];

A[i][0] = A[index][0];

A[index][0] = temp;

}

A[0][2] = 0;

for (i = 1; i < n; i++) {

A[i][2] = 0;

for (j = 0; j < i; j++)

A[i][2] += A[j][1];

total += A[i][2];

}

avg\_wt = (float)total / n;

total = 0;

printf("P BT WT TAT\n");

for (i = 0; i < n; i++) {

A[i][3] = A[i][1] + A[i][2];

total += A[i][3];

printf("P%d %d %d %d\n", A[i][0],A[i][1], A[i][2], A[i][3]);

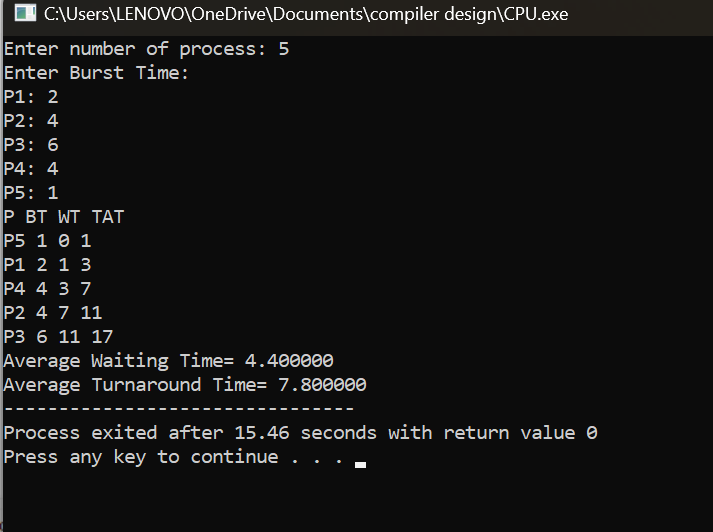
}

avg\_tat = (float)total / n;

printf("Average Waiting Time= %f", avg\_wt);

printf("\nAverage Turnaround Time= %f", avg\_tat);

}



**4.Construct a scheduling program with C that selects the waiting process with the smallest execution time to execute next.**

#include<stdio.h>

int main()

{

int bt[20],p[20],wt[20],tat[20],i,j,n,total=0,pos,temp;

float avg\_wt,avg\_tat;

printf("Enter number of process:");

scanf("%d",&n);

printf("nEnter Burst Time:n");

for(i=0;i<n;i++)

{

printf("p%d:",i+1);

scanf("%d",&bt[i]);

p[i]=i+1;

}

for(i=0;i<n;i++)

{

pos=i;

for(j=i+1;j<n;j++)

{

if(bt[j]<bt[pos])

pos=j;

}

temp=bt[i];

bt[i]=bt[pos];

bt[pos]=temp;

temp=p[i];

p[i]=p[pos];

p[pos]=temp;

}

wt[0]=0;

for(i=1;i<n;i++)

{

wt[i]=0;

for(j=0;j<i;j++)

wt[i]+=bt[j];

total+=wt[i];

}

avg\_wt=(float)total/n;

total=0;

printf("nProcesst Burst Time tWaiting TimetTurnaround Time");

for(i=0;i<n;i++)

{

tat[i]=bt[i]+wt[i];

total+=tat[i];

printf("np%dtt %dtt %dttt%d",p[i],bt[i],wt[i],tat[i]);

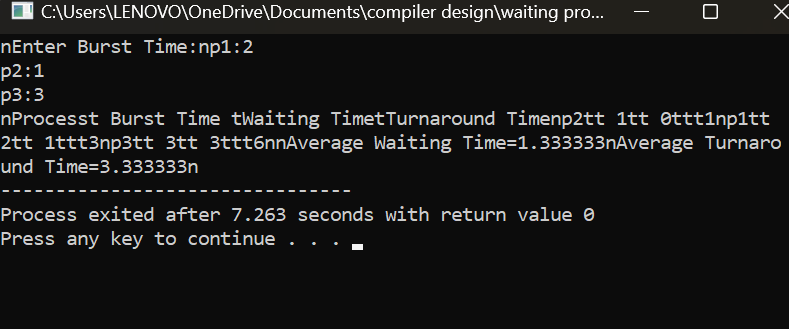
}

avg\_tat=(float)total/n;

printf("nnAverage Waiting Time=%f",avg\_wt);

printf("nAverage Turnaround Time=%fn",avg\_tat);

}



**5.Construct a scheduling program with C that selects the waiting process with the highest priority to execute next.**

#include<stdio.h>

struct priority\_scheduling {

char process\_name;

int burst\_time;

int waiting\_time;

int turn\_around\_time;

int priority;

};

int main() {

int number\_of\_process;

int total = 0;

struct priority\_scheduling temp\_process;

int ASCII\_number = 65;

int position;

float average\_waiting\_time;

float average\_turnaround\_time;

printf("Enter the total number of Processes: ");

scanf("%d", & number\_of\_process);

struct priority\_scheduling process[number\_of\_process];

printf("\nPlease Enter the Burst Time and Priority of each process:\n");

for (int i = 0; i < number\_of\_process; i++) {

process[i].process\_name = (char) ASCII\_number;

printf("\nEnter the details of the process %c \n", process[i].process\_name);

printf("Enter the burst time: ");

scanf("%d", & process[i].burst\_time);

printf("Enter the priority: ");

scanf("%d", & process[i].priority);

ASCII\_number++;

}

for (int i = 0; i < number\_of\_process; i++) {

position = i;

for (int j = i + 1; j < number\_of\_process; j++) {

if (process[j].priority > process[position].priority)

position = j;

}

temp\_process = process[i];

process[i] = process[position];

process[position] = temp\_process;

}

process[0].waiting\_time = 0;

for (int i = 1; i < number\_of\_process; i++) {

process[i].waiting\_time = 0;

for (int j = 0; j < i; j++) {

process[i].waiting\_time += process[j].burst\_time;

}

total += process[i].waiting\_time;

}

average\_waiting\_time = (float) total / (float) number\_of\_process;

total = 0;

printf("\n\nProcess\_name \t Burst Time \t Waiting Time \t Turnaround Time\n");

printf("------------------------------------------------------------\n");

for (int i = 0; i < number\_of\_process; i++) {

process[i].turn\_around\_time = process[i].burst\_time + process[i].waiting\_time;

total += process[i].turn\_around\_time;

printf("\t %c \t\t %d \t\t %d \t\t %d", process[i].process\_name,

process[i].burst\_time, process[i].waiting\_time, process[i].turn\_around\_time);

printf("\n-----------------------------------------------------------\n");

}

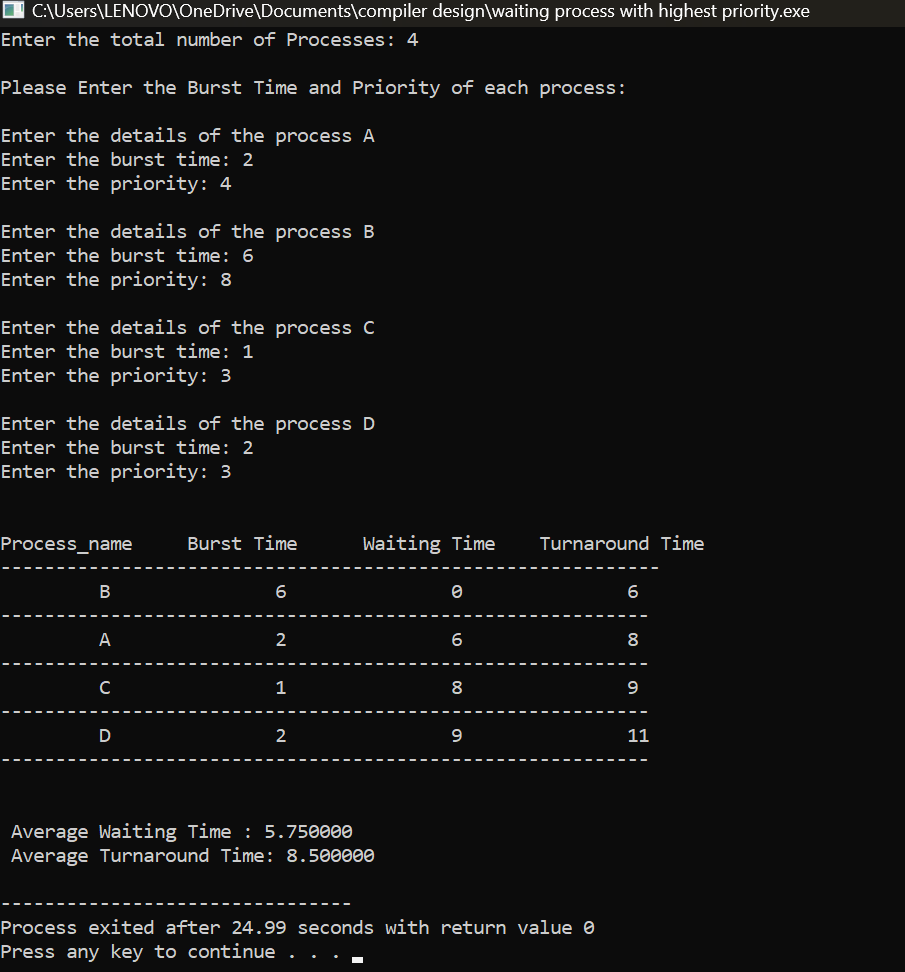
average\_turnaround\_time = (float) total / (float) number\_of\_process;

printf("\n\n Average Waiting Time : %f", average\_waiting\_time);

printf("\n Average Turnaround Time: %f\n", average\_turnaround\_time);

return 0;

}



**6.Construct a C program to implement pre-emptive priority scheduling algorithm.**

#include<stdio.h>

#include<conio.h>

int main()

{

int i, NOP, sum=0,count=0, y, quant, wt=0, tat=0, at[10], bt[10], temp[10];

float avg\_wt, avg\_tat;

printf(" Total number of process in the system: ");

scanf("%d", &NOP);

y = NOP;

for(i=0; i<NOP; i++)

{

printf("\n Enter the Arrival and Burst time of the Process[%d]\n", i+1);

printf(" Arrival time is: \t");

scanf("%d", &at[i]);

printf(" \nBurst time is: \t");

scanf("%d", &bt[i]);

temp[i] = bt[i];

}

printf("Enter the Time Quantum for the process: \t");

scanf("%d", &quant);

printf("\n Process No \t\t Burst Time \t\t TAT \t\t Waiting Time ");

for(sum=0, i = 0; y!=0; )

{

if(temp[i] <= quant && temp[i] > 0)

{

sum = sum + temp[i];

temp[i] = 0;

count=1;

}

else if(temp[i] > 0)

{

temp[i] = temp[i] - quant;

sum = sum + quant;

}

if(temp[i]==0 && count==1)

{

y--;

printf("\nProcess No[%d] \t\t %d\t\t\t\t %d\t\t\t %d", i+1, bt[i], sum-at[i], sum-at[i]-

bt[i]);

wt = wt+sum-at[i]-bt[i];

tat = tat+sum-at[i];

count =0;

}

if(i==NOP-1)

{

i=0;

}

else if(at[i+1]<=sum)

{

i++;

}

else

{

i=0;

}

}

avg\_wt = wt \* 1.0/NOP;

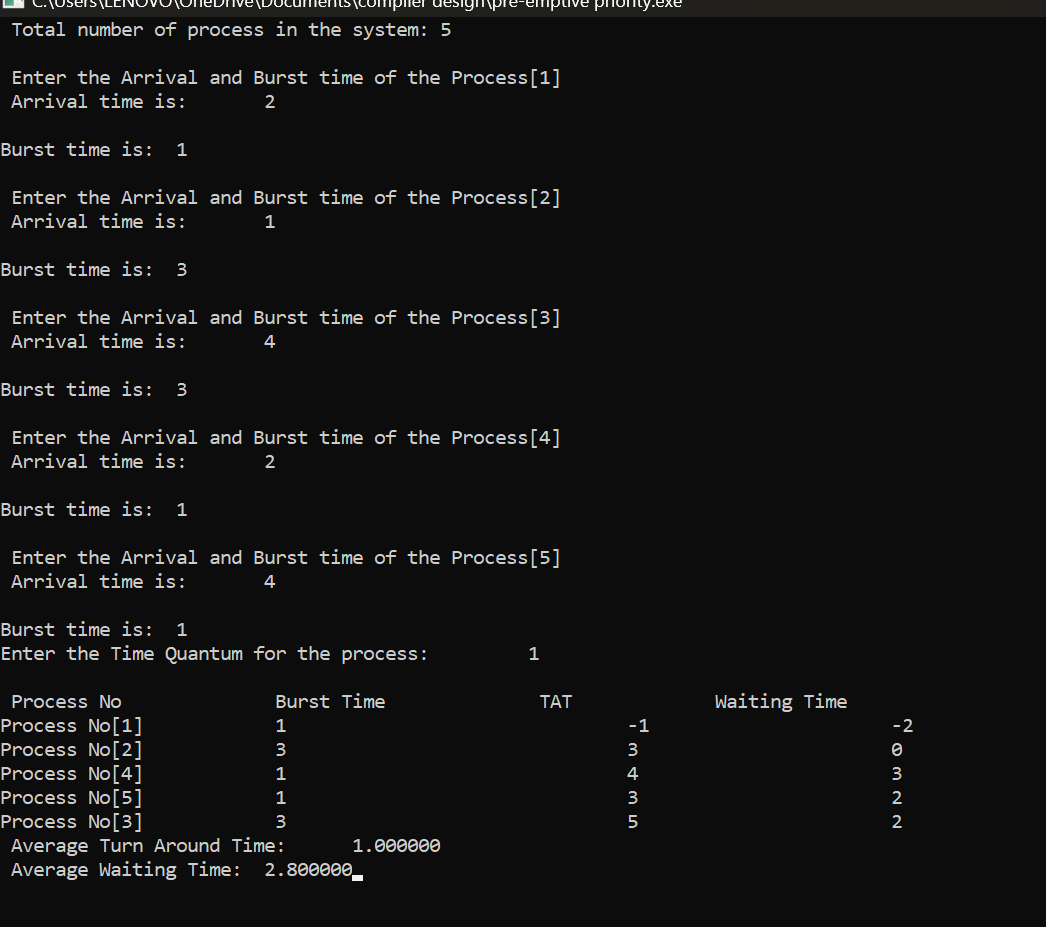
avg\_tat = tat \* 1.0/NOP;

printf("\n Average Turn Around Time: \t%f", avg\_wt);

printf("\n Average Waiting Time: \t%f", avg\_tat);

getch();

}



**7.Construct a C program to implement non-preemptive SJF algorithm.**

#include <stdio.h>

#include <stdlib.h>

typedef struct {

int pid;

int burst;

} Process;

void swap(Process \*a, Process \*b) {

Process temp = \*a;

\*a = \*b;

\*b = temp;

}

void sort(Process \*processes, int n) {

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

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

if (processes[j].burst > processes[j + 1].burst) {

swap(&processes[j], &processes[j + 1]);

}

}

}

}

void calculateTimes(Process \*processes, int n, int \*waitingTime, int \*turnaroundTime) {

waitingTime[0] = 0;

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

waitingTime[i] = waitingTime[i - 1] + processes[i - 1].burst;

}

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

turnaroundTime[i] = waitingTime[i] + processes[i].burst;

}

}

void calculateAverages(int \*waitingTime, int \*turnaroundTime, int n, float \*avgWaitingTime, float \*avgTurnaroundTime) {

int totalWaitingTime = 0, totalTurnaroundTime = 0;

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

totalWaitingTime += waitingTime[i];

totalTurnaroundTime += turnaroundTime[i];

}

\*avgWaitingTime = (float)totalWaitingTime / n;

\*avgTurnaroundTime = (float)totalTurnaroundTime / n;

}

void display(Process \*processes, int \*waitingTime, int \*turnaroundTime, int n, float avgWaitingTime, float avgTurnaroundTime) {

printf("Process\tBurst Time\tWaiting Time\tTurnaround Time\n");

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

printf("%d\t%d\t\t%d\t\t%d\n", processes[i].pid, processes[i].burst, waitingTime[i], turnaroundTime[i]);

}

printf("Average Waiting Time: %.2f\n", avgWaitingTime);

printf("Average Turnaround Time: %.2f\n", avgTurnaroundTime);

}

int main() {

int n;

printf("Enter the number of processes: ");

scanf("%d", &n);

Process \*processes = (Process \*)malloc(n \* sizeof(Process));

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

printf("Enter burst time for process %d: ", i + 1);

scanf("%d", &processes[i].burst);

processes[i].pid = i + 1;

}

sort(processes, n);

int \*waitingTime = (int \*)malloc(n \* sizeof(int));

int \*turnaroundTime = (int \*)malloc(n \* sizeof(int));

calculateTimes(processes, n, waitingTime, turnaroundTime);

float avgWaitingTime, avgTurnaroundTime;

calculateAverages(waitingTime, turnaroundTime, n, &avgWaitingTime, &avgTurnaroundTime);

display(processes, waitingTime, turnaroundTime, n, avgWaitingTime, avgTurnaroundTime);

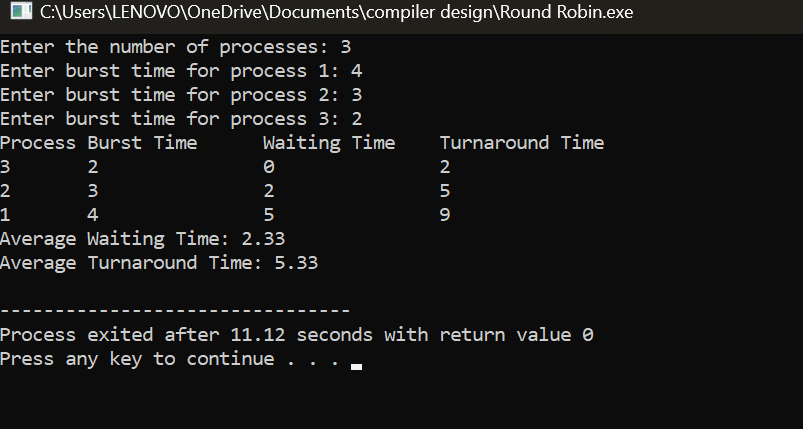
free(processes);

free(waitingTime);

free(turnaroundTime);

return 0;

}



**8.Construct a C program to simulate Round Robin scheduling algorithm with C.**

#include<stdio.h>

#include<conio.h>

int main()

{

int i, NOP, sum=0,count=0, y, quant, wt=0, tat=0, at[10], bt[10], temp[10];

float avg\_wt, avg\_tat;

printf(" Total number of process in the system: ");

scanf("%d", &NOP);

y = NOP;

for(i=0; i<NOP; i++)

{

printf("\n Enter the Arrival and Burst time of the Process[%d]\n", i+1);

printf(" Arrival time is: \t");

scanf("%d", &at[i]);

printf(" \nBurst time is: \t");

scanf("%d", &bt[i]);

temp[i] = bt[i];

}

printf("Enter the Time Quantum for the process: \t");

scanf("%d", &quant);

printf("\n Process No \t\t Burst Time \t\t TAT \t\t Waiting Time ");

for(sum=0, i = 0; y!=0; )

{

if(temp[i] <= quant && temp[i] > 0)

{

sum = sum + temp[i];

temp[i] = 0;

count=1;

}

else if(temp[i] > 0)

{

temp[i] = temp[i] - quant;

sum = sum + quant;

}

if(temp[i]==0 && count==1)

{

y--;

printf("\nProcess No[%d] \t\t %d\t\t\t\t %d\t\t\t %d", i+1, bt[i], sum-at[i], sum-at[i]-bt[i]);

wt = wt+sum-at[i]-bt[i];

tat = tat+sum-at[i];

count =0;

}

if(i==NOP-1)

{

i=0;

}

else if(at[i+1]<=sum)

{

i++;

}

else

{

i=0;

}

}

avg\_wt = wt \* 1.0/NOP;

avg\_tat = tat \* 1.0/NOP;

printf("\n Average Turn Around Time: \t%f", avg\_wt);

printf("\n Average Waiting Time: \t%f", avg\_tat);

getch();

}

