## AD52: Operating System Laboratory Programs

**Program 1: Program For System Calls Of Unix Operating System (fork, getpid, exit)**

#include<stdio.h>

#include<unistd.h>

main()

{

int pid,pid1,pid2;

pid=fork();

if(pid==-1)

{

printf(“ERROR IN PROCESS CREATION \n”);

exit(1);

}

if(pid!=0)

{

pid1=getpid();

printf(“\n the parent process ID is %d\n”, pid1);

}

else

{

pid2=getpid();

printf(“\n the child process ID is %d\n”, pid2);

}

}

**2)FCFS**

#include <stdio.h>

int main()

{

int pid[15];

int bt[15];

int n;

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

scanf("%d",&n);

printf("Enter process id of all the processes: ");

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

{

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

}

printf("Enter burst time of all the processes: ");

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

{

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

}

int i, wt[n];

wt[0]=0;

//for calculating waiting time of each process

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

{

wt[i]= bt[i-1]+ wt[i-1];

}

printf("Process ID Burst Time Waiting Time TurnAround Time\n");

float twt=0.0;

float tat= 0.0;

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

{

printf("%d\t\t", pid[i]);

printf("%d\t\t", bt[i]);

printf("%d\t\t", wt[i]);

//calculating and printing turnaround time of each process

printf("%d\t\t", bt[i]+wt[i]);

printf("\n");

//for calculating total waiting time

twt += wt[i];

//for calculating total turnaround time

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

}

float att,awt;

//for calculating average waiting time

awt = twt/n;

//for calculating average turnaround time

att = tat/n;

printf("Avg. waiting time= %f\n",awt);

printf("Avg. turnaround time= %f",att);

}

**3)SJF**

#include<stdio.h>

int main()

{

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

}

//sorting of burst times

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;

//finding the waiting time of all the processes

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

{

wt[i]=0;

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

//individual WT by adding BT of all previous completed processes

wt[i]+=bt[j];

//total waiting time

total+=wt[i];

}

//average waiting time

avg\_wt=(float)total/n;

printf("\nProcess\t Burst Time \tWaiting Time\tTurnaround Time");

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

{

//turnaround time of individual processes

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

//total turnaround time

totalT+=tat[i];

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

}

//average turnaround time

avg\_tat=(float)totalT/n;

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

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

}

**Program 4: To write a C program for implementation of Priority scheduling algorithms.**

/\*

 \* C Program to Implement Priority Scheduling

 \*/

#include<stdio.h>

int main()

{

int bt[20],p[20],pri[20],wt[20],tat[20],i,j,n,total=0,totalT=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("Enter Burst time p%d:",i+1);

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

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

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

p[i]=i+1;

}

//sorting of burst times

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

{

pos=i;

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

{

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

pos=j;

}

temp=pri[i];

pri[i]=pri[pos];

pri[pos]=temp;

temp=pri[i];

bt[i]=bt[pos];

bt[pos]=temp;

temp=p[i];

p[i]=p[pos];

p[pos]=temp;

}

wt[0]=0;

//finding the waiting time of all the processes

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

{

wt[i]=0;

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

//individual WT by adding BT of all previous completed processes

wt[i]+=bt[j];

//total waiting time

total+=wt[i];

}

//average waiting time

avg\_wt=(float)total/n;

printf("\nProcess\t Burst Time \tPriority \t Waiting Time\tTurnaround Time");

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

{

//turnaround time of individual processes

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

//total turnaround time

totalT+=tat[i];

printf("\np%d\t\t %d\t\t %d\t\t%d\t\t\t%d",p[i],bt[i],wt[i],pri[i],tat[i]);

}

//average turnaround time

avg\_tat=(float)totalT/n;

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

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

}

**Program 5: To write a C-program to implement the producer – consumer problem using semaphores.**

## PROGRAM:

#include<stdio.h>

int mutex=1,full=0,empty=3,x=0; main()

{

int n;

void producer(); void consumer();

int wait(int);

int signal(int);

printf("\n1.PRODUCER\n2.CONSUMER\n3.EXIT\n");

while(1)

{

printf("\nENTER YOUR CHOICE\n");

scanf("%d",&n);

switch(n)

{

case 1:

if((mutex==1)&&(empty!=0))

producer();

else

printf("BUFFER IS FULL");

break;

case 2:

if((mutex==1)&&(full!=0))

consumer();

else

printf("BUFFER IS EMPTY");

break;

case 3:

exit(0);

break;

}

}

}

int wait(int s)

{

return(--s); }

int signal(int s)

{

return(++s); }

void producer()

{

mutex=wait(mutex);

full=signal(full);

empty=wait(empty);

x++;

printf("\nproducer produces the item%d",x);

mutex=signal(mutex);

}

void consumer()

{

mutex=wait(mutex);

full=wait(full);

empty=signal(empty);

printf("\n consumer consumes item%d",x);

x--;

mutex=signal(mutex);

}

**Program 6: To write a c program to implement IPC using shared memory.**

**PROGRAM:**

#include<stdio.h>

#include<stdlib.h>

#include<unistd.h>

#include<string.h>

#include<sys/ipc.h>

#include<sys/shm.h>

#include<sys/types.h>

#define SEGSIZE 100

int main(int argc, char \*argv[ ])

{

int shmid,cntr; key\_t key; char \*segptr;

char buff[]="poooda ";

key=ftok(".",'s');

if((shmid=shmget(key, SEGSIZE, IPC\_CREAT | IPC\_EXCL | 0666))== -1)

{

if((shmid=shmget(key,SEGSIZE,0))==-1)

{

perror("shmget"); exit(1);

}

}

else

{

printf("Creating a new shared memory seg \n");

printf("SHMID:%d",shmid);

}

system("ipcs –m");

if((segptr=(char\*)shmat(shmid,0,0))==(char\*)-1)

{

perror("shmat"); exit(1);

}

printf("Writing data to shared memory…\n"); strcpy(segptr,buff);

printf("DONE\n");

printf("Reading data from shared memory…\n"); printf("DATA:-%s\n",segptr);

printf("DONE\n");

printf("Removing shared memory Segment…\n");

if(shmctl(shmid,IPC\_RMID,0)== -1)

printf("Can‟t Remove Shared memory Segment…\n");

else

printf("Removed Successfully");

}

**7)Bankers algorithm**

#include <stdio.h>

int main()

{

// P0, P1, P2, P3, P4 are the Process names here

int n, m, i, j, k;

n = 5; // Number of processes

m = 3; // Number of resources

int alloc[5][3] = {{0, 1, 0}, // P0 // Allocation Matrix

{2, 0, 0}, // P1

{3, 0, 2}, // P2

{2, 1, 1}, // P3

{0, 0, 2}}; // P4

int max[5][3] = {{7, 5, 3}, // P0 // MAX Matrix

{3, 2, 2}, // P1

{9, 0, 2}, // P2

{2, 2, 2}, // P3

{4, 3, 3}}; // P4

int avail[3] = {3, 3, 2}; // Available Resources

int f[n], ans[n], ind = 0;

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

{

f[k] = 0;

}

int need[n][m];

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

{

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

need[i][j] = max[i][j] - alloc[i][j];

}

int y = 0;

for (k = 0; k < 5; k++)

{

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

{

if (f[i] == 0)

{

int flag = 0;

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

{

if (need[i][j] > avail[j])

{

flag = 1;

break;

}

}

if (flag == 0)

{

ans[ind++] = i;

for (y = 0; y < m; y++)

avail[y] += alloc[i][y];

f[i] = 1;

}

}

}

}

int flag = 1;

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

{

if (f[i] == 0)

{

flag = 0;

printf("The following system is not safe");

break;

}

}

if (flag == 1)

{

printf("Following is the SAFE Sequence\n");

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

printf(" P%d ->", ans[i]);

printf(" P%d", ans[n - 1]);

}

return (0);

}

**8)First fit**

#include<stdio.h>

void main()

{

int bsize[10], psize[10], bno, pno, flags[10], allocation[10], i, j;

for(i = 0; i < 10; i++)

{

flags[i] = 0;

allocation[i] = -1;

}

printf("Enter no. of blocks: ");

scanf("%d", &bno);

printf("\nEnter size of each block: ");

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

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

printf("\nEnter no. of processes: ");

scanf("%d", &pno);

printf("\nEnter size of each process: ");

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

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

for(i = 0; i < pno; i++) //allocation as per first fit

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

if(flags[j] == 0 && bsize[j] >= psize[i])

{

allocation[j] = i;

flags[j] = 1;

break;

}

//display allocation details

printf("\nBlock no.\tsize\t\tprocess no.\t\tsize");

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

{

printf("\n%d\t\t%d\t\t", i+1, bsize[i]);

if(flags[i] == 1)

printf("%d\t\t\t%d",allocation[i]+1,psize[allocation[i]]);

else

printf("Not allocated");

}

}

**9)Best fit**

#include<stdio.h>

void main()

{

int fragment[20],b[20],p[20],i,j,nb,np,temp,lowest=9999;

static int barray[20],parray[20];

printf("\n\t\t\tMemory Management Scheme - Best Fit");

printf("\nEnter the number of blocks:");

scanf("%d",&nb);

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

scanf("%d",&np);

printf("\nEnter the size of the blocks:-\n");

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

{

printf("Block no.%d:",i);

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

}

printf("\nEnter the size of the processes :-\n");

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

{

printf("Process no.%d:",i);

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

}

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

{

for(j=1;j<=nb;j++)

{

if(barray[j]!=1)

{

temp=b[j]-p[i];

if(temp>=0)

if(lowest>temp)

{

parray[i]=j;

lowest=temp;

}

}

}

fragment[i]=lowest;

barray[parray[i]]=1;

lowest=10000;

}

printf("\nProcess\_no\tProcess\_size\tBlock\_no\tBlock\_size\tFragment");

for(i=1;i<=np && parray[i]!=0;i++)

printf("\n%d\t\t%d\t\t%d\t\t%d\t\t%d",i,p[i],parray[i],b[parray[i]],fragment[i]);

}