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

#define MAX 10

typedef struct process
{
    char name[20];
    int at, bt, wt, ct, tat;
}process;

process p[MAX];

int processcount, currenttime;
float totaltat, totalwt;
float avgtat, avgwt;

void sort()
{
    int i, j;
    process t;

    for(i=0; i<processcount; i++)
    {
        for(j=i+1; j<processcount; j++)
        {
            if(p[i].at > p[j].at)
            {
                t=p[i];
                p[i]=p[j];
                p[j]=t;
            }
        }
    }
}

void readprocess()
{
    int i;
    printf("\nEnter number of processes:");
    scanf("%d", &processcount);
    srand(time(NULL));

    for(i=0; i<processcount; i++)
    {
        printf("\nEnter process name:");
        scanf("%s", p[i].name);

        //printf("\nEnter process arrival time:");
        //scanf("%d", &p[i].at);
        p[i].at=rand()%10; //set range according to you

        //printf("\nEnter process burst time:");
        //scanf("%d", &p[i].bt);
        do{
            p[i].bt=rand()%5; //set range according to you
        }while(p[i].bt==0); //bt shouldn't be zero
    }
}
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    }
    sort();
}

void scheduleprocess()
{
    int i=0,cnt=0;
    printf("\n*****Gantt Chart*****\n");
    while(1)
    {
        if(currenttime<p[i].at) //when cpu is idle
        {
            printf("%d idle ",currenttime);
            currenttime=p[i].at;
            printf("%d|",currenttime);
        }
        else
        {
            printf("%d ",currenttime);
            p[i].wt=currenttime-p[i].at;
            currenttime=currenttime+p[i].bt;
            p[i].ct=currenttime;
            p[i].tat=p[i].wt+p[i].bt; //p[i].tat=p[i].ct-p[i].at;

            totaltat=totaltat+p[i].tat;
            totalwt=totalwt+p[i].wt;

            printf("%s ",p[i].name);
            printf("%d|",currenttime);

            i++;
            cnt++;
            if(cnt==processcount)
                break;
        }
    }

    avgtat=totaltat/processcount;
    avgwt=totalwt/processcount;
}

void displayprocess()
{
    int i;
    printf("\nName\tArrival\tBurst\tWaiting\tCPU time\tTurnAround");
    for(i=0;i<processcount;i++)
    {
        printf("\n%s\t%d\t%d\t%d\t%d\t\t%d",p[i].name,p[i].at,p[i].bt,p[i].wt,p[i].ct,p[i].tat);
    }
    printf("\nTotal Turnaround time %f",totaltat);
    printf("\nTotal Waiting time %f",totalwt);
    printf("\nAverage Turnaround time %f",avgtat);
    printf("\nAverage Waiting time %f",avgwt);
}

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int main()  
{  
    readprocess();  
    scheduleprocess();  
    displayprocess();  
    return 0;  
}
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