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CSE-316 OPERATING SYSTEMS

SIMULATION PROJECT

ASSIGNMENT QUESTIONS – 08,19

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SUBMITTING TO:

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REMARKS

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Question:08

code:

```
 #include<stdio.h>

 int main()
{
  int process,resource,i,j,instanc,k=0,count1=0,count2=0; //count,k      variables are taken for counting
purpose
  printf("\n\t Enter No. of Process:-\n");
  printf("\t\t");
  scanf("%d",&process);                           //Entering No. of Processes
  printf("\n\tEnter No. of Resources:-\n");
  printf("\t\t");
  scanf("%d",&resource);                      //No. of Resources

  int avail[resource],max[process][resource],allot[process][resource],need[process]
[resource],completed[process];

  for(i=0;i<process;i++)
  completed[i]=0;                              //Setting Flag for uncompleted Process

  printf("\n\tEnter No. of Available Instances\n");

  for(i=0;i<resource;i++)
  {
    printf("\t\t");
    scanf("%d",&instanc);
    avail[i]=instanc;                        // Storing Available instances
  }

  printf("\n\tEnter Maximum No. of instances of resources that a Process need:\n");

  for(i=0;i<process;i++)
  {
    printf("\n\t For P[%d]",i);
    for(j=0;j<resource;j++)
     {
        printf("\t");
        scanf("%d",&instanc);
        max[i][j]=instanc;
     }
  }
  printf("\n\t Enter no. of instances already allocated to process of a resource:\n");

  for(i=0;i<process;i++)
  {
    printf("\n\t For P[%d]\t",i);
    for(j=0;j<resource;j++)
     {
        printf("\t\t");
        scanf("%d",&instanc);
        allot[i][j]=instanc;
        need[i][j]=max[i][j]-allot[i][j];       //calculating Need of each process
     }
 }
printf("\n\t Safe Sequence is:- \t");

 while(count1!=process)
 {
  count2=count1;
  for(i=0;i<process;i++)
  {
    for(j=0;j<resource;j++)
    {
        if(need[i][j]<=avail[j])
          {
            k++;
          }
    }
    if(k==resource && completed[i]==0 )
     {
       printf("P[%d]\t",i);
       completed[i]=1;
 for(j=0;j<resource;j++)
        {
          avail[j]=avail[j]+allot[i][j];
         }
        count1++;
     }
     k=0;
   }

     if(count1==count2)
     {
     printf("\t\t Stop ..After this.....Deadlock \n");
     break;
   }
 }
 return 0;
}
```

DESCRIPTION

Bankers Algrithm: Bankers Algorithm,sometimes referred to as the detection algorithm.By simulating the allocation of predetermined maximum possible amounts of all resources, and then makes an "s-state" check to test for possible deadlock conditions for all other pending activities, before deciding whether allocation should be allowed to continue.

For the Banker's algorithm to work, it needs to know three things:

- How much of each resource each process could possibly request[MAX]
- How much of each resource each process is currently holding[ALLOCATED]
- How much of each resource the system currently has available[AVAILABLE]

ALGORITHM FOR BANKER'S

Let ‘n’ be the number of processes in the system and ‘m’ be the number of resources types.

Available :

- It is a 1-d array of size **‘m’**indicating the number of available resources of each type.
- Available[j] = k means there are **‘k’**instances of resource type $\mathbf{R_j}$

Max :

- It is a 2-d array of size ‘**n*m’**that defines the maximum demand of each process in a system.
- Max[i, j] = k means process $\mathbf{P_i}$ may request at most **‘k’**instances of resource type $\mathbf{R_j}$**.**

Allocation :

- It is a 2-d array of size **‘n*m’**that defines the number of resources of each type currently allocated to each process.
- Allocation[i, j] = k means process $\mathbf{P_i}$ is currently allocated **‘k’**instances of resource type $\mathbf{R_j}$

Need :

- It is a 2-d array of size **‘n*m’**that indicates the remaining resource need of each process.
- Need [i, j] = k means process $\mathbf{P_i}$ currently allocated **‘k’**instances of resource type $\mathbf{R_j}$
- Need [i, j] = Max [i, j] – Allocation [i, j]

CONSTRAINTS

1. To calculate available from the given number of resources

```
printf("\n\nEnter the Available Resources : ");
for(i = 0; i < r; i++)
    scanf("%d", &avail[i]);
```

2. To calculate maximum form the given number of processes and resources

```
printf("\n\nEnter the Max Matrix for each process : ");
    for(i = 0; i < p; i++)
    {
        printf("\nFor process %d : ", i + 1);
        for(j = 0; j < r; j++)
            scanf("%d", &Max[i][j]);
    }
```

3. To calculate available form the given process and resources

```
   printf(“\n\nEnter the allocation for each process:”);
    for(i=0;i<p;i++)
{
printf(“\nFor process%d:”i+1);
for(j=0;j<r;j++)
scanf(“%d”,&alloc[i][j]);
}
```

4. To calculate need from given process and resources

```
       for(i=0;i<p;i++)
{
   for(j=0;j<r;j++)
{
need[i][j]=Max[i][j]-alloc[i][j];
}
}
```

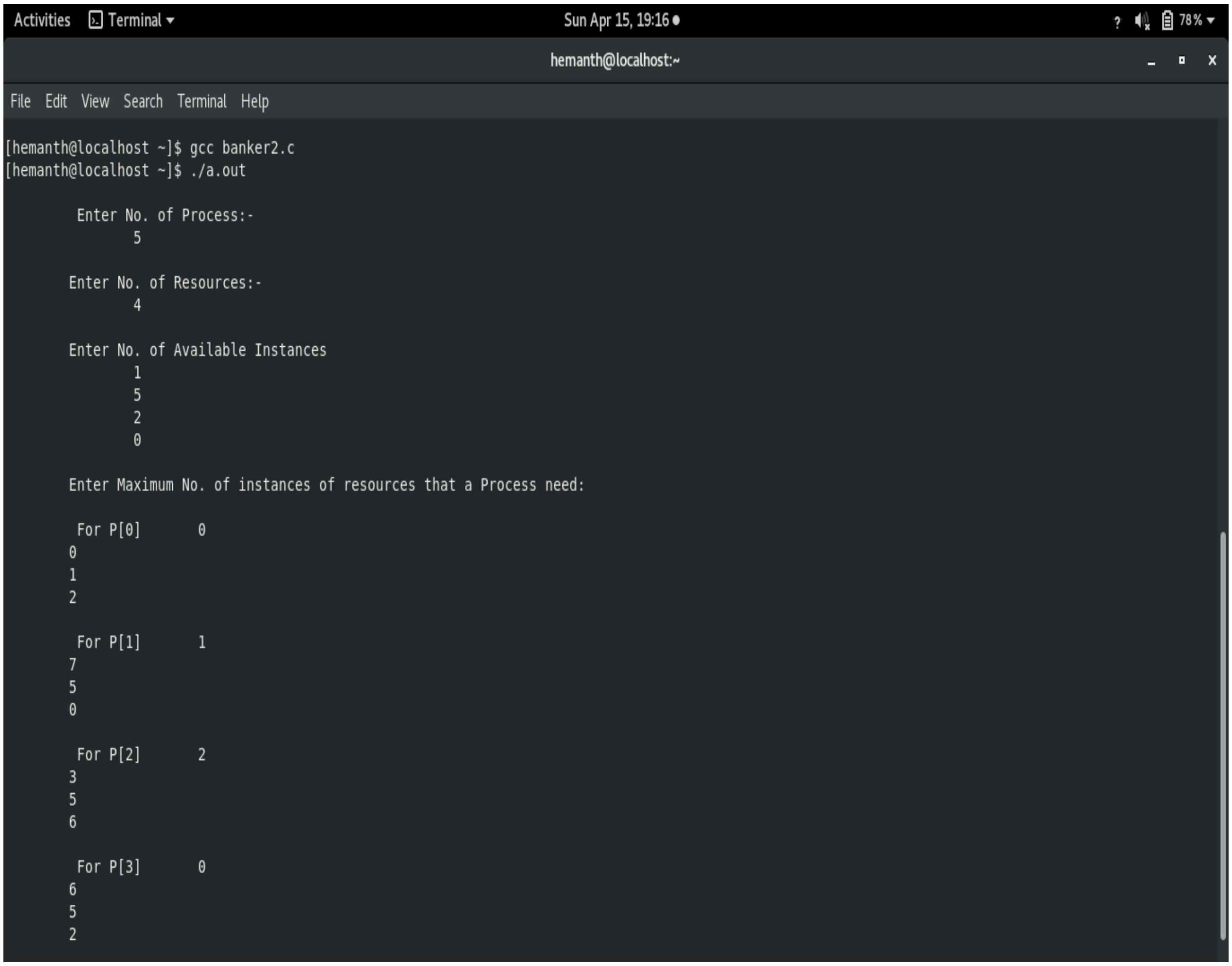
COMPLEXITY

Lines	Complexity
Total Complexity:	O(n*m)

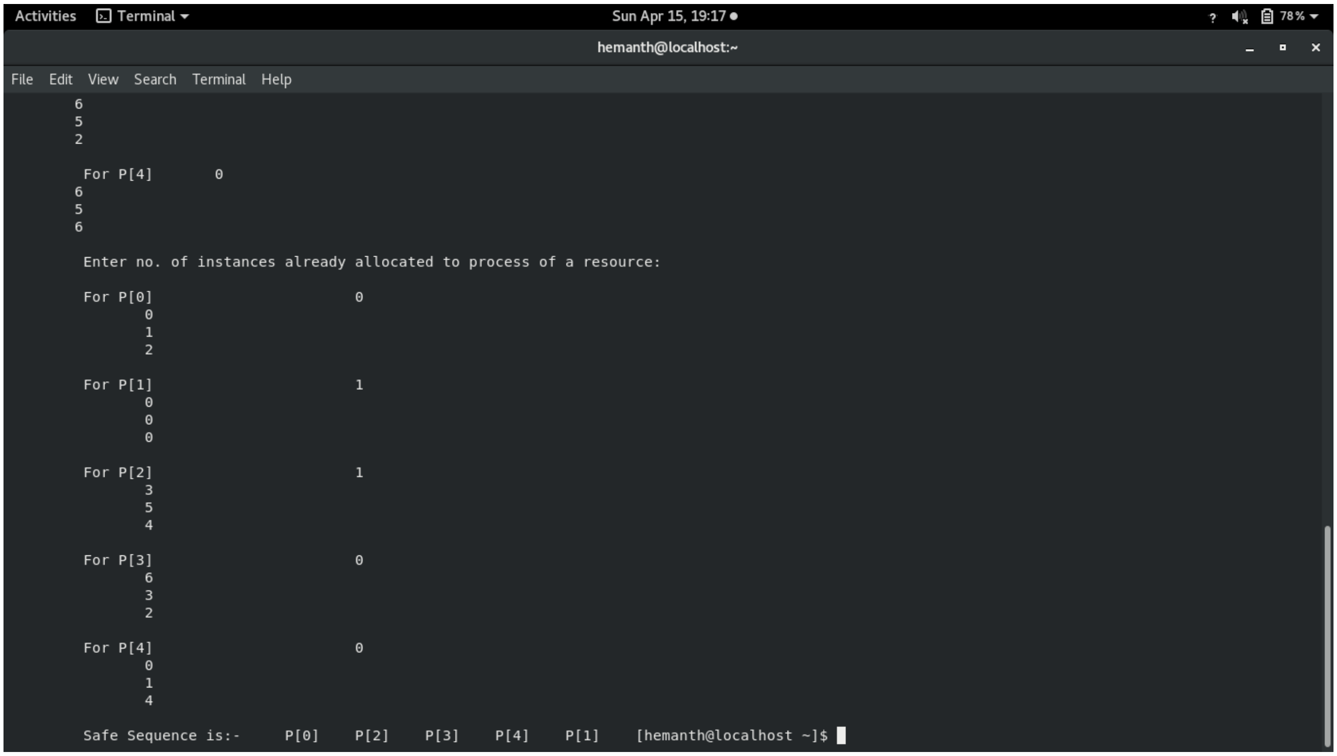
TEST CASES

PROCESS		ALLOCATION			MAX					NEED		
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	0	0	0	0
P1	1	0	0	0	1	7	5	0	0	7	5	0
P2	1	3	5	4	2	3	5	6	1	0	0	2
P3	0	6	3	2	0	6	5	2	0	0	2	0
P4	0	0	1	4	0	6	5	6	0	5	1	6

AVAILABLE			
A	B	C	D
1	5	2	0



```
[hemanth@localhost ~]$ gcc banker2.c
[hemanth@localhost ~]$ ./a.out

         Enter No. of Process:-
                5

        Enter No. of Resources:-
                4

        Enter No. of Available Instances
                1
                5
                2
                0

        Enter Maximum No. of instances of resources that a Process need:

         For P[0]       0
        0
        1
        2

         For P[1]       1
        7
        5
        0

         For P[2]       2
        3
        5
        6

         For P[3]       0
        6
        5
        2
```



```
        6
        5
        2

         For P[4]       0
        6
        5
        6

         Enter no. of instances already allocated to process of a resource:

         For P[0]                       0
                0
                1
                2

         For P[1]                       1
                0
                0
                0

         For P[2]                       1
                3
                5
                4

         For P[3]                       0
                6
                3
                2

         For P[4]                       0
                0
                1
                4

         Safe Sequence is:-     P[0]    P[2]    P[3]    P[4]    P[1]    [hemanth@localhost ~]$
```

- ➔ SAFE SEQUENCE is:P[0]   P[2]   P[3]   P[4]   P[1]
- ➔ The System is in Safe State.

GITHUB LINK:
https://github.com/Vhr5196/os-assigment-k1654-B37