ASSIGNMENT – 5

DEKKER'S AND PETERSON ALGORITHM

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Question: Implement of Dekker's Algorithm for two threads
Answer:

Code for the following:

```
// Dekkers algorithm implementation

// Free from satrvation
// Mutual Exlusion satsisfied
// Free from deadlock

#include<bits/stdc++.h>
#include<pthread.h>
using namespace std;

int turn=1;
bool wantp=false,wantq=false;
int x=0;

// Critical Section
void critical_section(){
	x++;
}

// process P
void* p(){
	while(1){
		if(x>=50){
			return NULL;
		}
		wantp=true;
		while(wantq){
			if(turn==2){
				wantp=false;
				while(turn!=1){

				}
				wantp=true;
			}
		}
		cout<<"Critical Section of P starts here"<<endl;
		critical_section();
```

```
                cout<<"Critical Section of P ends here"<<endl;
                turn=2;
                wantp=false;
        }
}

// process Q
void* q(){
        while(1){
                if(x>=50){
                        return NULL;
                }
                wantq=true;
                while(wantp){
                        if(turn==1){
                                wantq=false;
                                while(turn!=2){

                                }
                                wantq=true;
                        }
                }
                cout<<"Critical Section of Q starts here"<<endl;
                critical_section();
                cout<<"Critical Section of Q ends here"<<endl;
                turn=1;
                wantq=false;
        }
}

// start P
void* start_p(void* arg){
        p();
        return (void*)0;
}

// start q
void* start_q(void* arg){
        q();
        return (void*)0;
}


int main(){
        pthread_t pid,qid;
        // creating two thread
        pthread_create(&pid,NULL,&start_p,NULL);
```

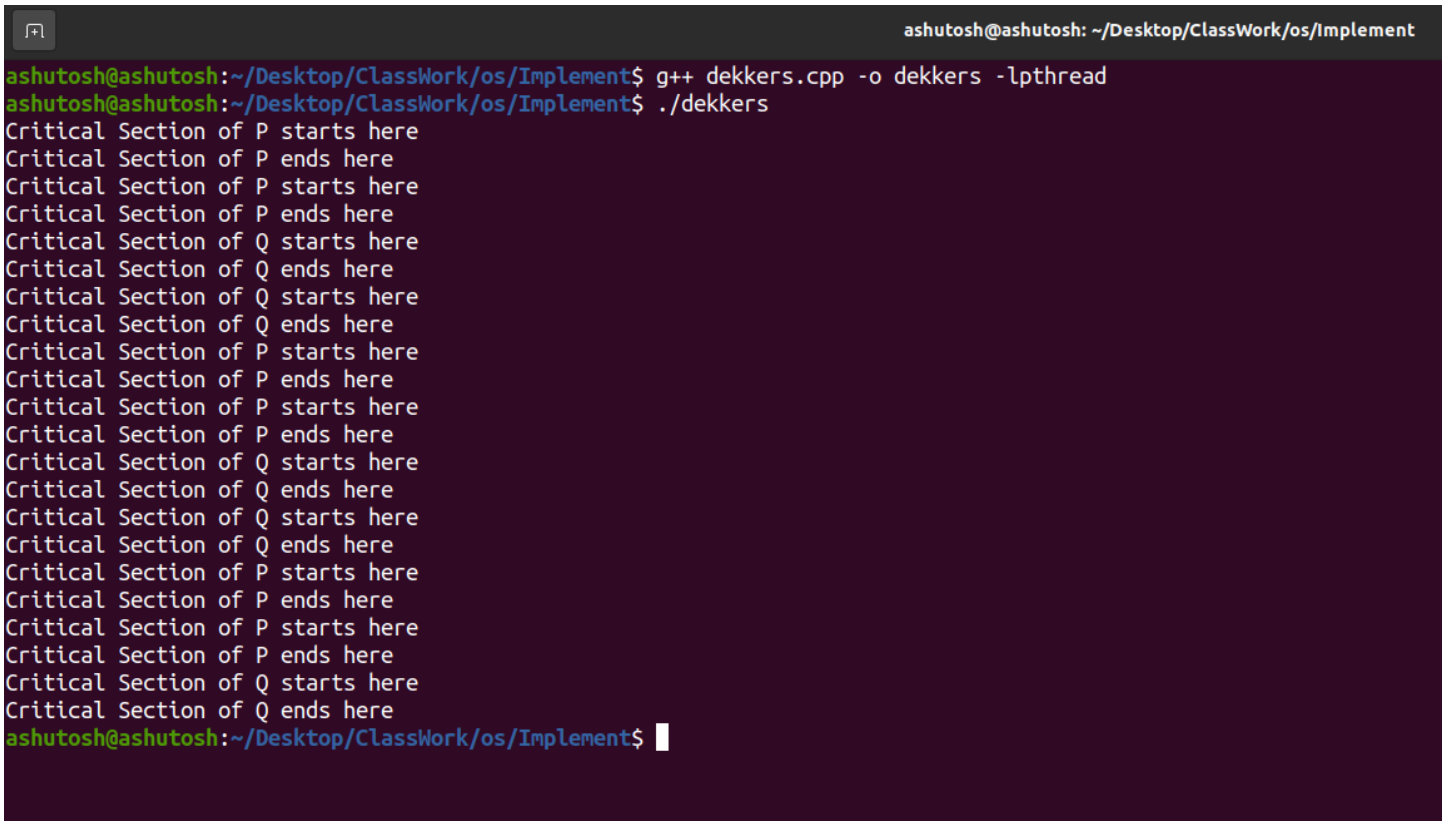
```
        pthread_create(&qid,NULL,*start_q,NULL);

        // Joining threads
        pthread_join(pid,NULL);
        pthread_join(qid,NULL);

        // Exit
        pthread_exit(NULL);

        return 0;
}
```

Output for the following:



Question: Implement of Peterson's Algorithm for two threads.
Answer:

Code for the following:

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

        int n= 20;
        int flag[20]; //change 10 with number n
        int turn;
        const int MAX = 100;
```

```
int ans = 0;

//in start of program
void lock_init()
{
	int i;
	for(i=0;i<n;i++)
	{
		flag[i] = 0;
	}
	turn = 0;
}

// Before entering critical section
void lock(int self)
{
	//flag[self]=1 show that process self want to enter in critical section
	if(self <=n-1 && self >=0)
	{
		flag[self] = 1;
	}

	// first give chance to another process
	turn = n-self;
	//wait untill other process are in critical section
	if(n-1-self != self)
	{
		while (flag[n-1-self]==1 && turn==n-self) ;

	}
	else if(n-2-self >= 0)
	{
		while (flag[n-2-self]==1 && turn==n-self) ;
	}
}

//when goes out of critical section
void unlock(int self)
{
	//flag[self] = 0 show that process self going out of critical section
	if(self <=n && self >=0)
	{
		flag[self] = 0;
	}
}
```

```
//every process run the same function
void* func(void *s)
{
	int i = 0;
	int* temp = (int*)s;
	int self=*temp;

	lock(self);
	//critical section starts here

	printf("Thread Entered: %d\n", self);
	//ans variable changed by every thread
	for (i=0; i<MAX; i++)
		ans++;
	//critical section ends here
	unlock(self);
	return (void*)0;
}

// Driver code
int main()
{
	pthread_t threads[n];
	lock_init();

	void *retvals[n];
	int count;
	for (count = 0; count < n; ++count)
	{
		int *temp= &count;
		void* temp1 =(void*)temp;
		if (pthread_create(&threads[count], NULL,func,temp1) != 0)
		{
		  fprintf(stderr, "error: Cannot create thread # %d\n", count);
		  break;
		}
	}
	for (int i = 0; i < n; ++i)
	{
		if (pthread_join(threads[i], &retvals[i]) != 0)
		{
		  fprintf(stderr, "error: Cannot join thread # %d\n", i);
		}
	}

	//if both are same then we say that our solution is correct
	printf("Ans variable after each thread: %d | Ans should be : %d\n", ans, MAX*n);
```

```
        return 0;
    }
```

Output for the following: