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### **ASSIGNMENT NO. 6**

**TITLE:** Dining Philosophers Problem (Using Semaphore or mutex)

Program:

```
#include
```

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

```
include<pthread.h>
```

```
#define N 5
```

```
#define THINKING 0
```

```
#define HUNGRY 1
```

```
#define EATING 2
```

```
sem_t mutex;
```

```
sem_t S[N];
```

```
void * philosopher(void *num);
```

```
void take_fork(int);
```

```
void put_fork(int);
```

```
void test(int);
```

```
int state[N];
```

```
int phil_number[N] = {0,1,2,3,4};
```

```
int main()
```

```

{
    int i;
    pthread_t thread_id[N];
    sem_init(&mutex,0,1);

    for(i = 0;i<N;i++)
        sem_init(&S[i],0,0);

    for(i=0;i<N;i++)
    {
        pthread_create(&thread_id[i],NULL,philosopher,&phil_number[i]);
        printf("philosopher %d is thinking\n",i+1);
    }
    for(i = 0;i<N;i++)
        pthread_join(thread_id[i],NULL);

    return 0;
}

```

```

void *philosopher(void *num)
{
    while(1)
    {
        int *i = num;
        sleep(1);
    }
}

```

```
    take_fork(*i);  
    sleep(0);  
    put_fork(*i);  
}  
}
```

```
void take_fork(int ph_num)  
{  
    sem_wait(&mutex);  
    state[ph_num] = HUNGRY;  
    printf("Philosopher %d is hungry\n",ph_num+1);  
    test(ph_num);  
    sem_post(&mutex);  
    sem_wait(&S[ph_num]);  
    sleep(1);  
}
```

```
void test(int ph_num)  
{  
    if (state[ph_num] == HUNGRY && state[(ph_num+4)%N] != EATING && state)  
    {  
        state[ph_num] = EATING;  
        sleep(2);  
        printf("Philosopher %d takes fork %d and %d\n",ph_num+1,((ph_num)));  
        printf("Philosopher %d is Eating\n",ph_num+1);  
    }
```

```

        sem_post(&S[ph_num]);
    }
}

void put_fork(int ph_num){
    sem_wait(&mutex);

    printf("Philosopher %d putting fork %d and %d
down\n",ph_num+1,((ph_num+4)%N)+1,ph_num+1);

    printf("Philosopher %d is thinking\n",ph_num+1);

    test((ph_num+4)%N);

    test((ph_num+1)%N);

    sem_post(&mutex);
}

```

Output :

```

main.c:49:9: warning: implicit declaration of function 'sleep' [-Wimplicit-function-declaration]
main.c:74:51: warning: format '%d' expects a matching 'int' argument [-Wformat=]
philosopher 1 is thinking
philosopher 2 is thinking
philosopher 3 is thinking
philosopher 4 is thinking
philosopher 5 is thinking
Philosopher 4 is hungry
Philosopher 4 takes fork 3 and 4
Philosopher 4 is Eating
Philosopher 2 is hungry
Philosopher 2 takes fork 1 and 2
Philosopher 2 is Eating
Philosopher 1 is hungry
Philosopher 1 takes fork 0 and 1
Philosopher 1 is Eating
Philosopher 3 is hungry
Philosopher 5 is hungry
Philosopher 4 putting fork 3 and 4 down
Philosopher 4 is thinking
Philosopher 2 putting fork 1 and 2 down
Philosopher 2 is thinking
Philosopher 1 putting fork 0 and 1 down
Philosopher 1 is thinking
Philosopher 2 is hungry
Philosopher 4 is hungry
Philosopher 4 takes fork 3 and 4
Philosopher 4 is Eating
Philosopher 1 is hungry
Philosopher 1 takes fork 0 and 1
Philosopher 1 is Eating
Philosopher 4 putting fork 3 and 4 down
Philosopher 4 is thinking

```