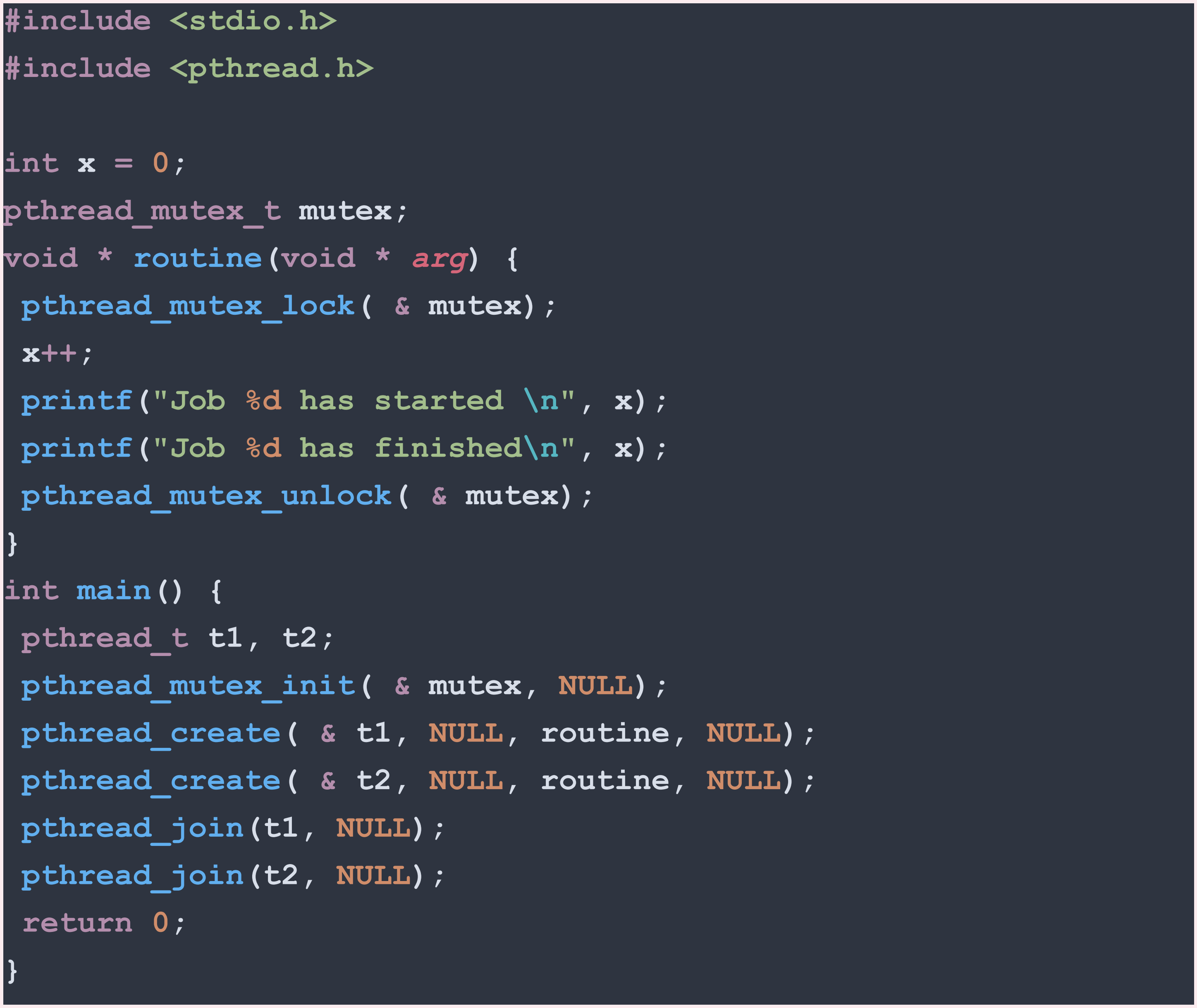
Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 41
OS Practical 7

Question - 1 : Solve Job Log Master Problem - as per Instructions given by Instructor and Design C program for the same.

Code :



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

int x = 0;
pthread_mutex_t mutex;
void * routine(void * arg) {
 pthread_mutex_lock( & mutex);
 x++;
 printf("Job %d has started \n", x);
 printf("Job %d has finished\n", x);
 pthread_mutex_unlock( & mutex);
}
int main() {
 pthread_t t1, t2;
 pthread_mutex_init( & mutex, NULL);
 pthread_create( & t1, NULL, routine, NULL);
 pthread_create( & t2, NULL, routine, NULL);
 pthread_join(t1, NULL);
 pthread_join(t2, NULL);
 return 0;
}
```

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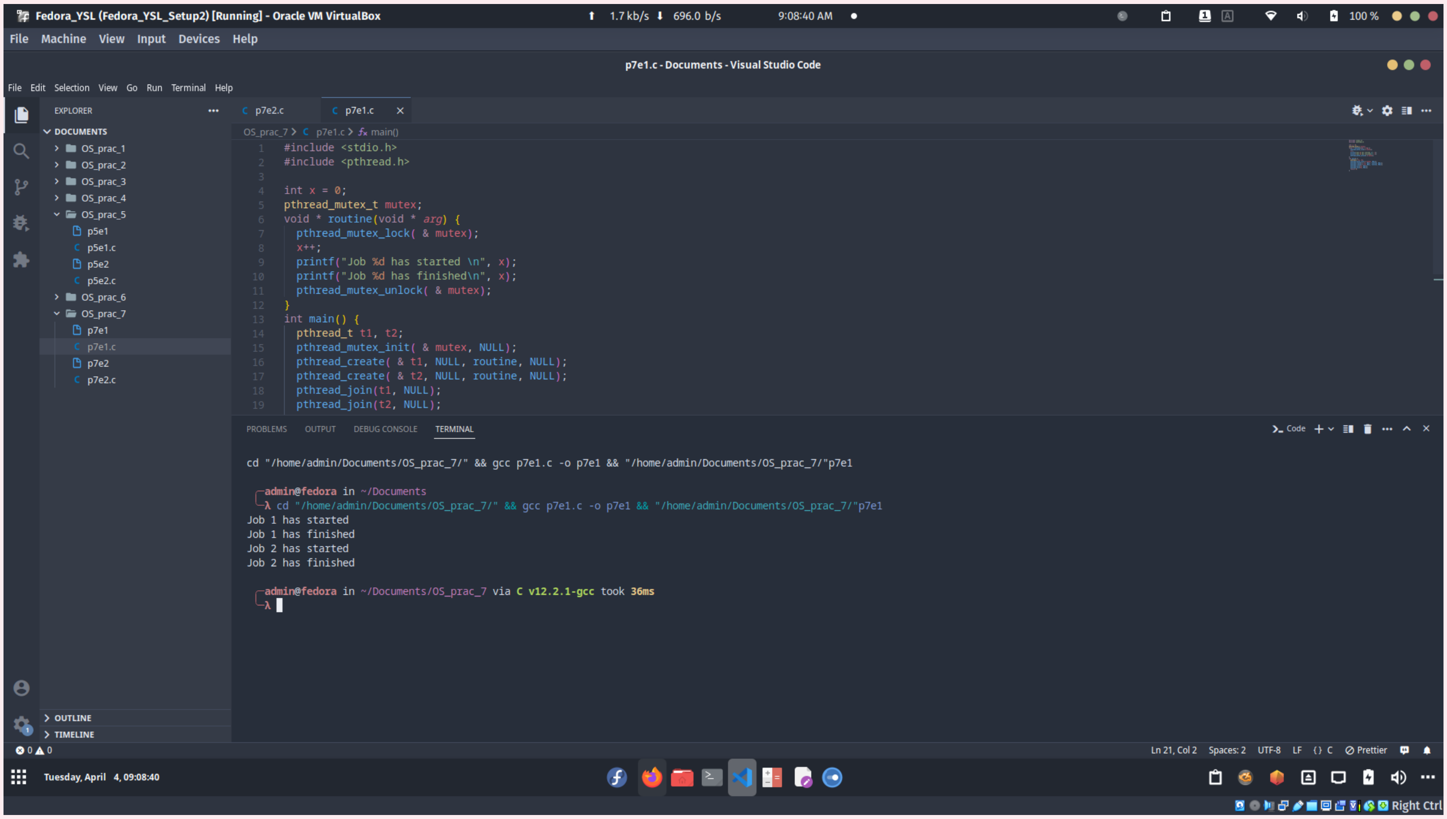
Output :



Fedora_YSL (Fedora_YSL_Setup2) [Running] - Oracle VM VirtualBox
p7e1.c - Documents - Visual Studio Code
p7e2.c
p7e1.c
OS_prac_7 > p7e1.c > main()

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

int x = 0;
pthread_mutex_t mutex;
void * routine(void * arg) {
  pthread_mutex_lock( & mutex);
  x++;
  printf("Job %d has started \n", x);
  printf("Job %d has finished\n", x);
  pthread_mutex_unlock( & mutex);
}
int main() {
  pthread_t t1, t2;
  pthread_mutex_init( & mutex, NULL);
  pthread_create( & t1, NULL, routine, NULL);
  pthread_create( & t2, NULL, routine, NULL);
  pthread_join(t1, NULL);
  pthread_join(t2, NULL);
```

```
cd "/home/admin/Documents/OS_prac_7/" && gcc p7e1.c -o p7e1 && "/home/admin/Documents/OS_prac_7/"p7e1

╭─admin@fedora in ~/Documents
╰─λ cd "/home/admin/Documents/OS_prac_7/" && gcc p7e1.c -o p7e1 && "/home/admin/Documents/OS_prac_7/"p7e1
Job 1 has started
Job 1 has finished
Job 2 has started
Job 2 has finished

╭─admin@fedora in ~/Documents/OS_prac_7 via C v12.2.1-gcc took 36ms
╰─λ
```

Question - 2 : Solve Dining Philosopher Problem as per below algorithm using Semaphores & Mutex.

Code :

```c
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <semaphore.h>

#define N 4

sem_t forks[N];
```

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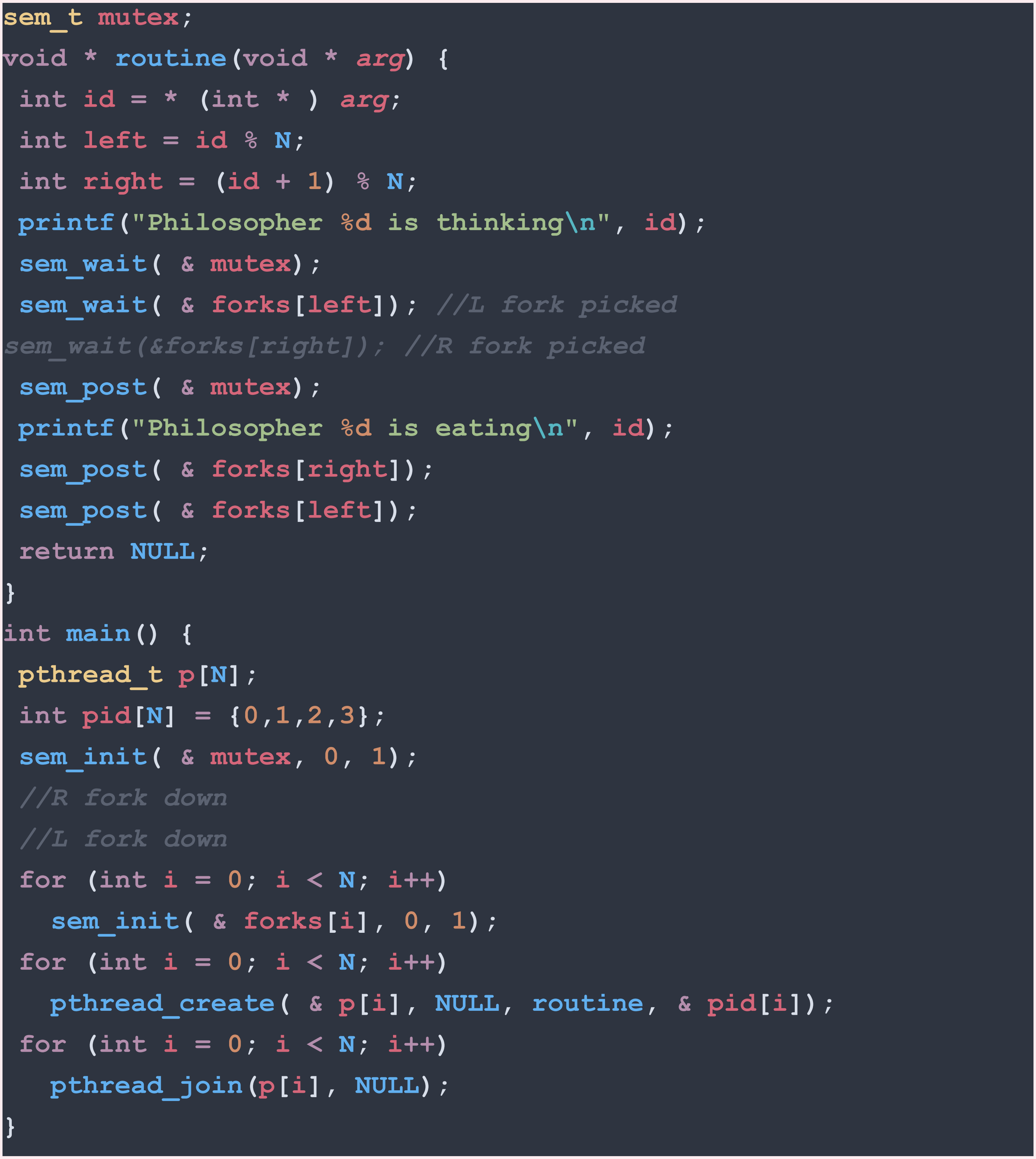

```
sem_t mutex;
void * routine(void * arg) {
 int id = * (int * ) arg;
 int left = id % N;
 int right = (id + 1) % N;
 printf("Philosopher %d is thinking\n", id);
 sem_wait( & mutex);
 sem_wait( & forks[left]); //L fork picked
sem_wait(&forks[right]); //R fork picked
 sem_post( & mutex);
 printf("Philosopher %d is eating\n", id);
 sem_post( & forks[right]);
 sem_post( & forks[left]);
 return NULL;
}
int main() {
 pthread_t p[N];
 int pid[N] = {0,1,2,3};
 sem_init( & mutex, 0, 1);
 //R fork down
 //L fork down
 for (int i = 0; i < N; i++)
   sem_init( & forks[i], 0, 1);
 for (int i = 0; i < N; i++)
   pthread_create( & p[i], NULL, routine, & pid[i]);
 for (int i = 0; i < N; i++)
   pthread_join(p[i], NULL);
}
```

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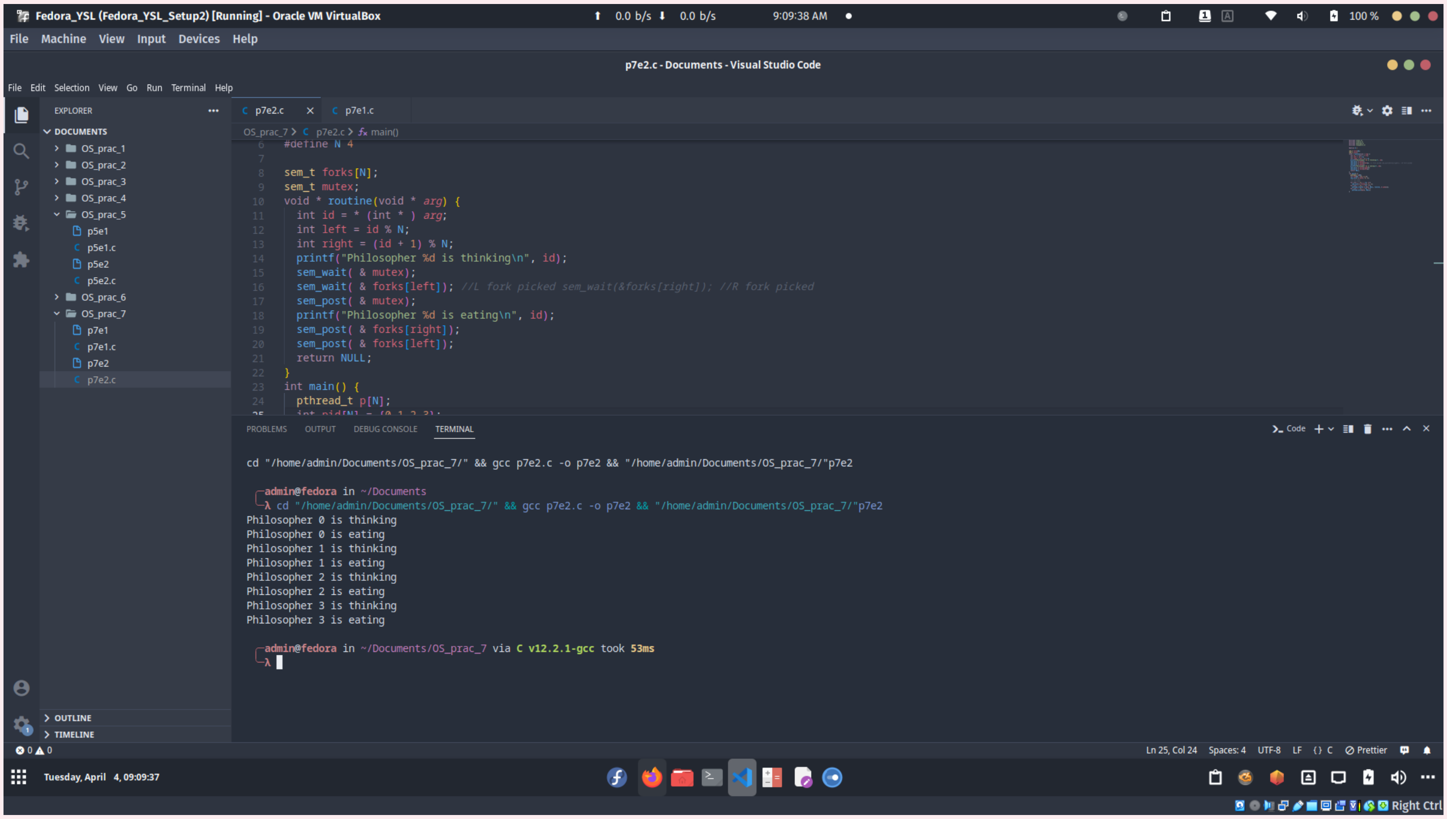
Output :


Fedora_YSL (Fedora_YSL_Setup2) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
p7e2.c - Documents - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
DOCUMENTS
OS_prac_1
OS_prac_2
OS_prac_3
OS_prac_4
OS_prac_5
p5e1
p5e1.c
p5e2
p5e2.c
OS_prac_6
OS_prac_7
p7e1
p7e1.c
p7e2
p7e2.c
OUTLINE
TIMELINE
p7e2.c
p7e1.c
OS_prac_7 > p7e2.c > main()
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Ln 25, Col 24
Spaces: 4
UTF-8
LF
C
Prettier
Tuesday, April 4, 09:09:37

```c
#define N 4

sem_t forks[N];
sem_t mutex;
void * routine(void * arg) {
  int id = * (int * ) arg;
  int left = id % N;
  int right = (id + 1) % N;
  printf("Philosopher %d is thinking\n", id);
  sem_wait( & mutex);
  sem_wait( & forks[left]); //L fork picked sem_wait(&forks[right]); //R fork picked
  sem_post( & mutex);
  printf("Philosopher %d is eating\n", id);
  sem_post( & forks[right]);
  sem_post( & forks[left]);
  return NULL;
}
int main() {
  pthread_t p[N];
  int pid[N] = {0,1,2,3};
```

```
cd "/home/admin/Documents/OS_prac_7/" && gcc p7e2.c -o p7e2 && "/home/admin/Documents/OS_prac_7/"p7e2

╭─admin@fedora in ~/Documents
╰─λ cd "/home/admin/Documents/OS_prac_7/" && gcc p7e2.c -o p7e2 && "/home/admin/Documents/OS_prac_7/"p7e2
Philosopher 0 is thinking
Philosopher 0 is eating
Philosopher 1 is thinking
Philosopher 1 is eating
Philosopher 2 is thinking
Philosopher 2 is eating
Philosopher 3 is thinking
Philosopher 3 is eating

╭─admin@fedora in ~/Documents/OS_prac_7 via C v12.2.1-gcc took 53ms
╰─λ
```