OPERATING SYSTEMS LAB

LAB # 9
Threads

Simultaneous execution of two or more threads

Threads:

A thread is a single sequence stream within a process. Threads are executed within a process. They are sometimes called *lightweight processes*. In a process, threads allow multiple executions of streams.

Threads are popular way to improve application through parallelism. The CPU switches rapidly back and forth among the threads giving illusion that the threads are running in parallel. Like a traditional process i.e., process with one thread, a thread can be in any of several states (Running, Blocked, Ready or terminated).

Thread Programming:

thread_create : It is used to create a new thread.

Syntax : int pthread_create(pthread_t *thread, const pthread_attr_t *attr ,
void *(*start_routine, void*),void *arg);

Pthread_t : It is defining a thread pointer. When a thread is created identifier is written into the variable to which the pointer points. *This identifier helps to refer to thread.*

Pthread_attr_t : It is used to set the thread attributes. Usually there is no need to set the thread attributes. Pass this argument as NULL.

Name of function : The name of the function to be started by the thread for execution.

Arguments to be passed to the function: When a new thread is created it executes the function pointed by the function variable name.

pthread_join: It is used to wait for the thread represented in the thread_join call. It waits for the thread represented in the call to finish executing. It waits for the specified thread to complete, and gathers information about the thread's exit status.

Syntax :Int pthread_join(pthread_t thread , void *threadreturn);
First argument is the thread for which to wait. Second argument is pointer that points to return value from the thread.

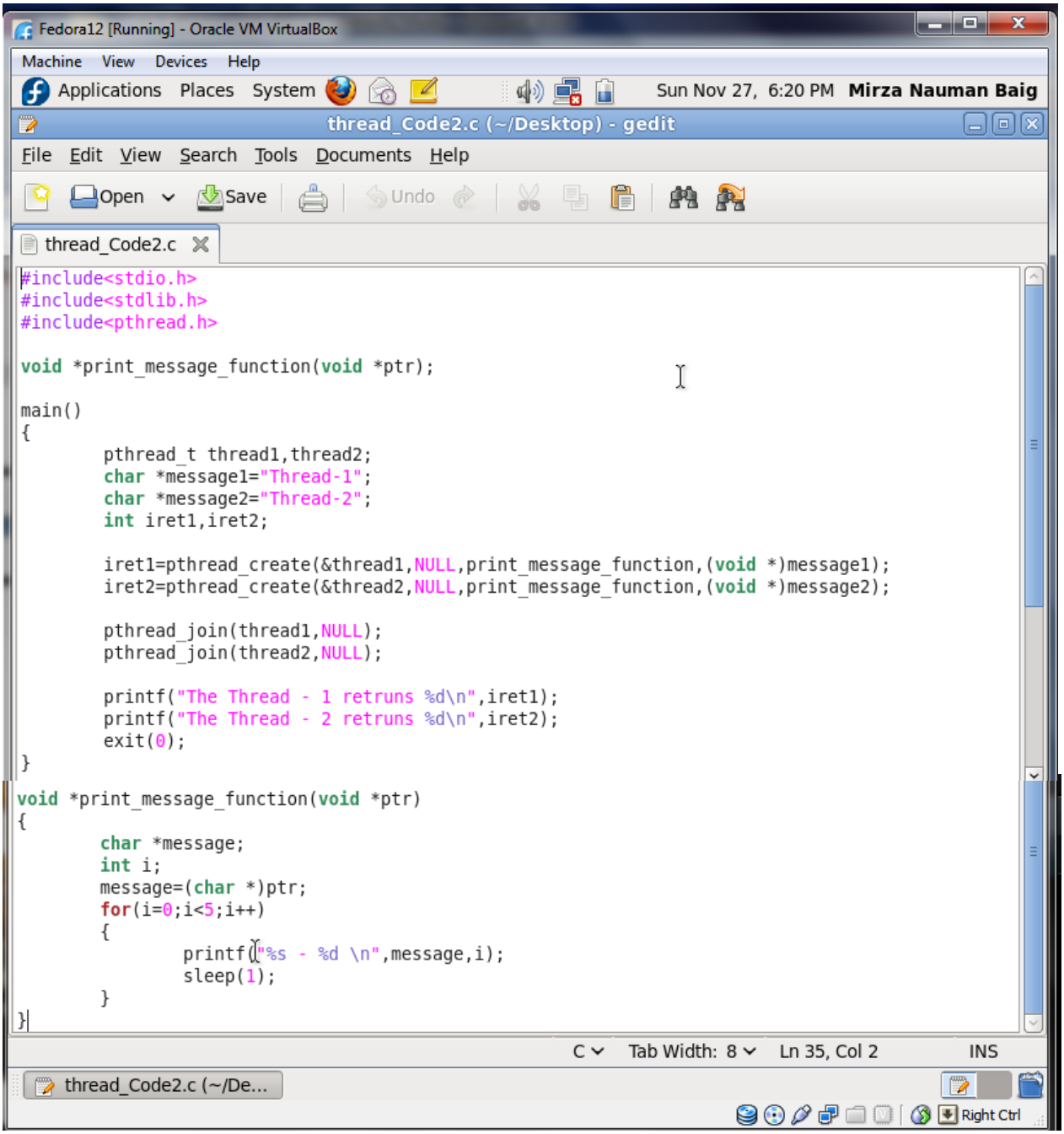
Pthread_exit: This function is used to terminate the calling thread.
Syntax :Void pthread_Exit(void *retval);

Example:

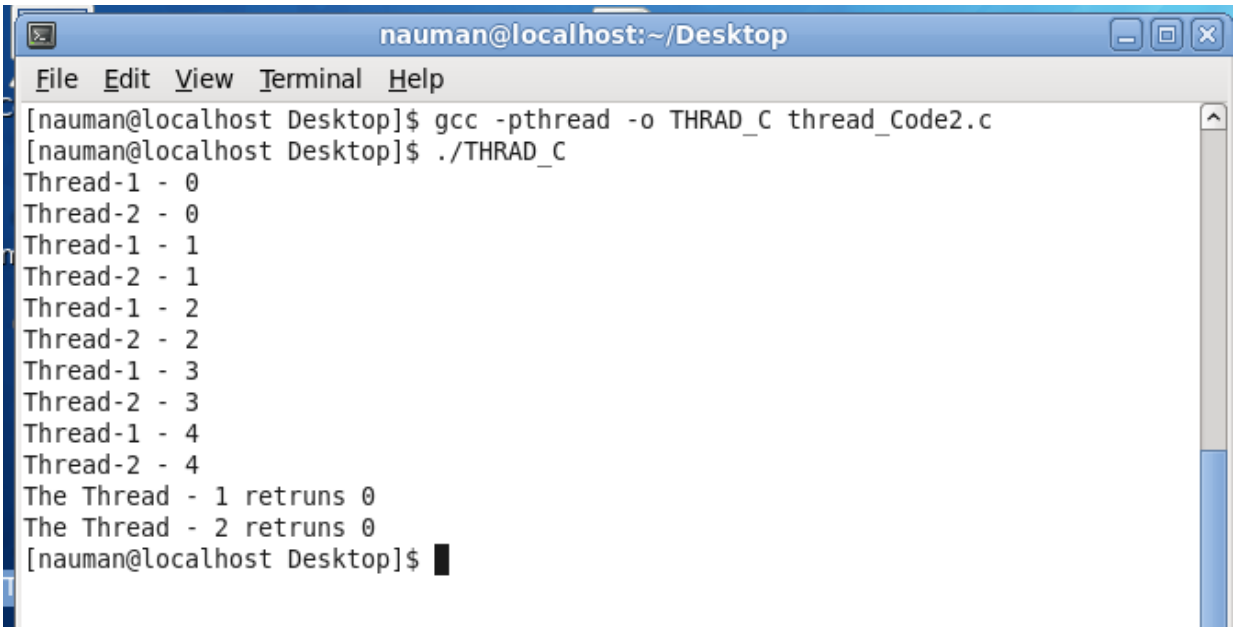
```
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>

void *print_message_function( void *ptr );

main()
{
    pthread_t thread1, thread2;
    char *message1 = "Thread 1";
    char *message2 = "Thread 2";
    int  iret1, iret2;

   /* Create independent threads each of which will execute function */

    iret1 = pthread_create( &thread1, NULL, print_message_function, (void*) message1);
    iret2 = pthread_create( &thread2, NULL, print_message_function, (void*) message2);

    /* Wait till threads are complete before main continues. Unless we  */
    /* wait we run the risk of executing an exit which will terminate   */
    /* the process and all threads before the threads have completed.   */

    pthread_join( thread1, NULL);
    pthread_join( thread2, NULL);

    printf("Thread 1 returns: %d\n",iret1);
    printf("Thread 2 returns: %d\n",iret2);
    exit(0);
}

void *print_message_function( void *ptr )
{
    char *message;
    message = (char *) ptr;
    printf("%s \n", message);
}
```

Compile: gcc –pthread –o a mt.c
Run:./a.out

Code :

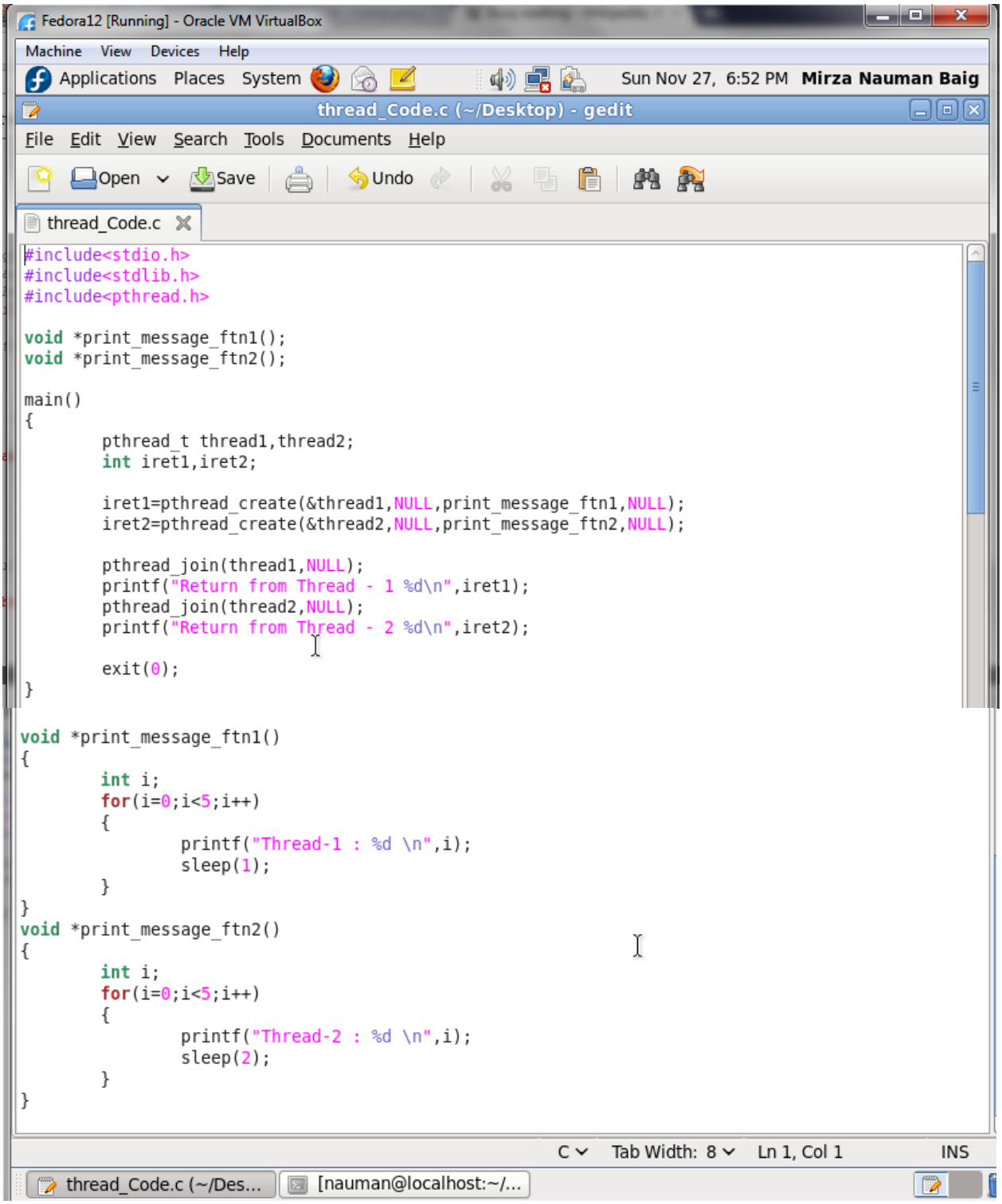

Fedora12 [Running] - Oracle VM VirtualBox
Machine View Devices Help
Applications Places System
Sun Nov 27, 6:20 PM Mirza Nauman Baig
thread_Code2.c (~/Desktop) - gedit
File Edit View Search Tools Documents Help
Open Save Undo
thread_Code2.c
#include<stdio.h>
#include<stdlib.h>
#include<pthread.h>
void *print_message_function(void *ptr);
main()
{
pthread_t thread1,thread2;
char *message1="Thread-1";
char *message2="Thread-2";
int iret1,iret2;
iret1=pthread_create(&thread1,NULL,print_message_function,(void *)message1);
iret2=pthread_create(&thread2,NULL,print_message_function,(void *)message2);
pthread_join(thread1,NULL);
pthread_join(thread2,NULL);
printf("The Thread - 1 retruns %d\n",iret1);
printf("The Thread - 2 retruns %d\n",iret2);
exit(0);
}
void *print_message_function(void *ptr)
{
char *message;
int i;
message=(char *)ptr;
for(i=0;i<5;i++)
{
printf("%s - %d \n",message,i);
sleep(1);
}
}
C Tab Width: 8 Ln 35, Col 2 INS
thread_Code2.c (~/De...
Right Ctrl

OUTPUT :

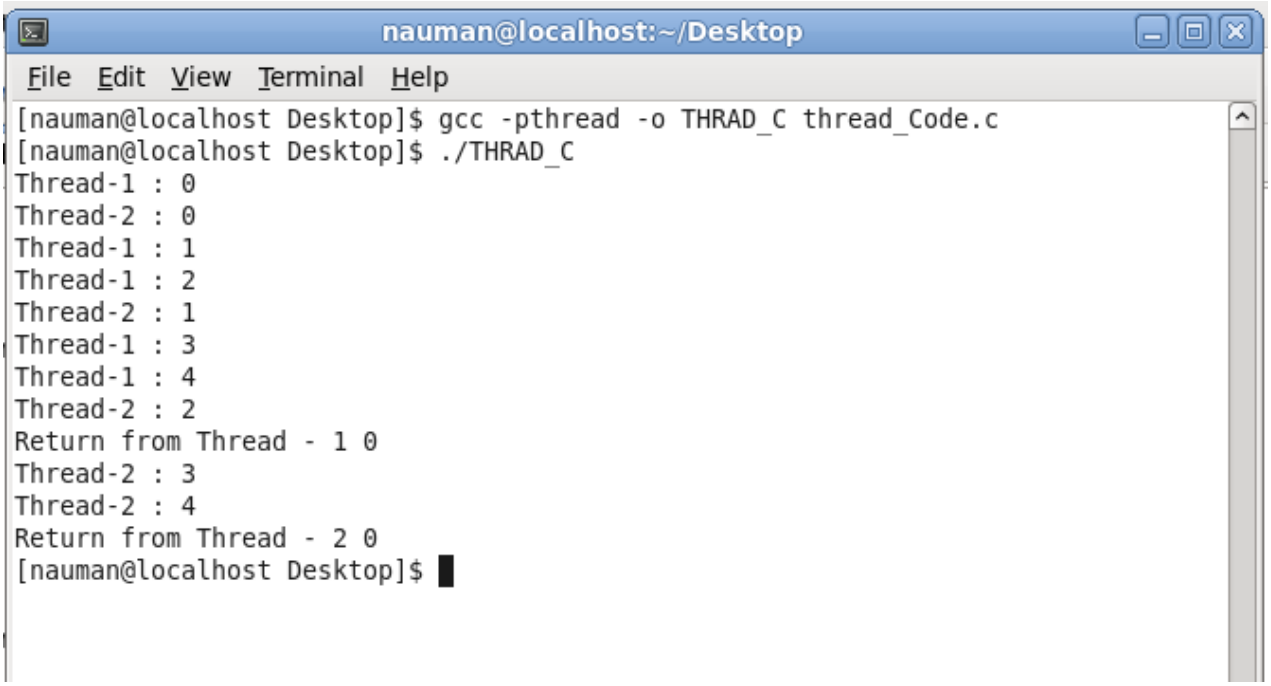


Pthread_join comment these and see what happened

Another CODE for understanding threads


Fedora12 [Running] - Oracle VM VirtualBox
Machine View Devices Help
Applications Places System
Sun Nov 27, 6:52 PM Mirza Nauman Baig
thread_Code.c (~/Desktop) - gedit
File Edit View Search Tools Documents Help
Open Save Undo
thread_Code.c
#include<stdio.h>
#include<stdlib.h>
#include<pthread.h>
void *print_message_ftn1();
void *print_message_ftn2();
main()
{
pthread_t thread1,thread2;
int iret1,iret2;
iret1=pthread_create(&thread1,NULL,print_message_ftn1,NULL);
iret2=pthread_create(&thread2,NULL,print_message_ftn2,NULL);
pthread_join(thread1,NULL);
printf("Return from Thread - 1 %d\n",iret1);
pthread_join(thread2,NULL);
printf("Return from Thread - 2 %d\n",iret2);
exit(0);
}
void *print_message_ftn1()
{
int i;
for(i=0;i<5;i++)
{
printf("Thread-1 : %d \n",i);
sleep(1);
}
}
void *print_message_ftn2()
{
int i;
for(i=0;i<5;i++)
{
printf("Thread-2 : %d \n",i);
sleep(2);
}
}
C Tab Width: 8 Ln 1, Col 1 INS
thread_Code.c (~/Des...
[nauman@localhost:~/...

OUTPUT:



LAB TASK: Create 2 treads

Use while loop in thread 1 while(i<=10) and increment i in thread 2

Hint : use pthread_exit when work is done by thread