Operating Systems

University at Albany
Department of Computer Science
ICSI 412

Assignment-7

Assigned: Thursday, April 14th, 2022
   Due: Thursday, April 21st through your Blackboard account by 11:59 PM. Submissions
      with 20% penalty will be accepted by Tuesday, April 26th, by 11:59 PM.
Student Name:

OBJECTIVES

To develop a multithreading program with the use of the pthread library and semaphores.

PROBLEM

You are to use any distribution of the Linux operating system to create a C program that uses two threads in an interleaving way. Your solution must include the pthread library and semaphores. It must be based on the *shopping.c* program provided in this document and modify it such that *Salad* will be always printed before *Butter* and *Milk* will be always printed before *Apples*. The following syntax is used to express this requirement where the symbol **<** is used to indicate "*printed before*".

Salad **<** Butter and Milk **<** Apples.

SAMPLE CODE

```c
/* shopping.c */
#include <stdio.h>
#include <unistd.h>
#include <pthread.h>
#include <semaphore.h>

void *print_produce( void * );
void *print_dairy( void * );

void *print_dairy(void *items)
{
  int i = 0;
  char** array = (void*)items;
  {
    printf("got %s\n", (array[i++]) );
    printf("got %s\n", (array[i++]) );
  }
  return( NULL );
}

void *print_produce(void *items)
{
  int i = 0;
  char** array = (void*)items;
  {
    printf("got %s\n", (array[i++]) );
    printf("got %s\n", (array[i++]) );
  }
  return( NULL );
}
```

```
int main()
{
  char *produce[] = { "Salad", "Apples", NULL };
  char *dairy[] = { "Milk", "Butter", NULL };
  pthread_t th1, th2;
  pthread_create( &th1, NULL, print_produce, (void*)produce);
  pthread_create( &th2, NULL, print_dairy, (void*)dairy);
  pthread_join(th1, NULL);
  pthread_join(th2, NULL);
}
```

WHAT TO SUBMIT

You are to be submitted through Blackboard the following:

       a) The source code of your modified *shopping.c* program and,

       b) And a screenshot of the output of your solution illustrating the printing sequences produced.