BAHRIA UNIVERSITY (KARACHI CAMPUS)

OPEN ENDED LAB II – **Fall22**

(System Programing (LAB) **CSC-454)**

Class: BSE [4]-5 (B) (Morning)

Course Instructor: **Engr Rizwan Fazal / Engr Rehan Baig**

Time Allowed: **1.5 Hour**

Max Marks: **6**

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Reg. No: 69986____

Instructions:

1. Submit your answers within file against each question with screenshot of both code and solution output.
2. File must be submitted in .pdf.

[CLO#05, 6 marks]

SCENARIO:

You are working as a system engineer in a Microsoft vendor company that creates Apps for Microsoft store.
Your Project manager assigned you a task to design an application for code editor for Microsoft store. For that you need to analyze the basics of NotePad/WordPad applications that comes built-in with Microsoft windows. You need to create a process and analyze the following for notepad and WordPad.

Q1: Run a loop or Use Recursion which enable program to print 5 times following for both Notepad and WordPad **(versionId, ThreadId, processId)**, meanwhile use exit thread function that-should be interrupt when counter reaches on 4rth iteration. (**4 Marks**)

CODE:

```
#include <iostream>
#include <thread>
#include <unistd.h>

void print_app_info(int counter) {
    if (counter == 4) {
        exit(0);
    }

    std::string app;
    if(counter % 2 == 0)
        app = "Notepad";
    else
        app = "WordPad";
```

```
    std::cout << "Name: " << app << ",Thread ID: " << std::this_thread::get_id() << ",Process
ID: "
    << getpid() << std::endl;
}

int main() {

    for (int i = 0; i <= 4; i++) {
        std::thread t(print_app_info, i);
        t.join();
    }
    return 0;
}
```

OUTPUT:

```
PS E:\Bahria Uni Semester 5\System Programing Lab\OEL2> cd "e:\Bahria Uni Semester 5\System Programing Lab\OEL2\" ; if ($?) { g++ task1.cpp -o task1 } ; if ($?) { .\task1 }
Name: Notepad,Thread ID: 2,Process ID: 5944
Name: WordPad,Thread ID: 3,Process ID: 5944
Name: Notepad,Thread ID: 4,Process ID: 5944
Name: WordPad,Thread ID: 5,Process ID: 5944
PS E:\Bahria Uni Semester 5\System Programing Lab\OEL2>
```

Q2: Write a code for any two synchronization objects from following. (**2 Marks**)

1. Events
2. Semaphores
3. Mutexes

CODE:

```
#include <iostream>
#include <thread>
#include <mutex>
#include <semaphore.h>

std::mutex lock;
sem_t sem;
int buffer[10];
int count = 0;

void produce() {
for (int i = 0; i < 5; i++) {
    sem_wait(&sem);
    lock.lock();
    buffer[count++] = i;
    std::cout << "Produced: " << i << std::endl;
```

```
    lock.unlock();
    sem_post(&sem);
  }
}

void consume() {
for (int i = 0; i < 5; i++) {
    sem_wait(&sem);
    lock.lock();
    std::cout << "Consumed: " << buffer[--count] << std::endl;
    lock.unlock();
    sem_post(&sem);
  }
}

int main() {
sem_init(&sem, 0, 1);

std::thread t1(produce);
std::thread t2(consume);

t1.join();
t2.join();

sem_destroy(&sem);
return 0;
}
```

OUTPUT:

```
PS E:\Bahria Uni Semester 5\System Programing Lab\OEL2> cd "e:\Bahria Uni Semester 5\System Programing Lab\OEL2\" ; if ($?) { g++ task2.cpp -o task2 } ; if ($?) { .\task2 }
Produced: 0
Consumed: 0
Produced: 1
Consumed: 1
Produced: 2
Consumed: 2
Produced: 3
Consumed: 3
Produced: 4
Consumed: 4
PS E:\Bahria Uni Semester 5\System Programing Lab\OEL2>
```