Walchand College of Engineering ,Sangli

Department of Computer Science & Engineering

Class: Final Year(Computer Science &Engineering)

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Semester 1

Course: High Performance Computing Lab

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Batch : B4

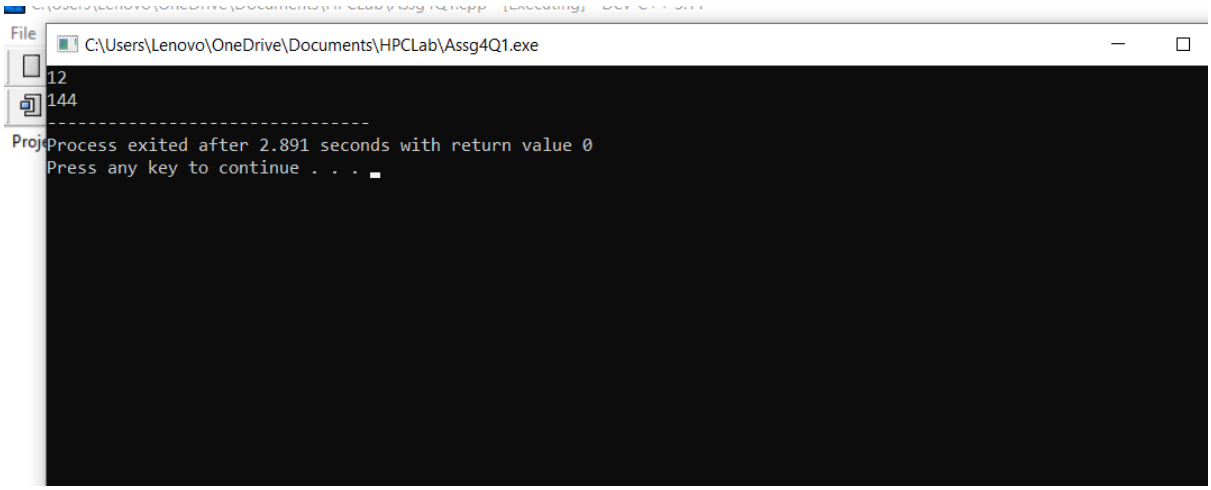
Q1) /Fibonacci Series using Dynamic code

```
#include<stdio.h>
#include<omp.h>
int fib(int n)
{
 int f[n+2];
 int i;
 f[0] = 0;
 f[1] = 1;
 #pragma omp ordered
 for (i = 2; i <= n; i++)
 {
```

```
 f[i] = f[i-1] + f[i-2];
 }
 return f[n];
}
int main ()
{
 int n;
 scanf("%d", &n);
 printf("%d", fib(n));
 getchar();
 return 0;
}
```

Output

Used #pragma omp ordered to compute the fibonnaci sum sequentially



Q2: Analyse and implement a Parallel code for below programs using OpenMP considering synchronization requirements. (Demonstrate the use of different clauses and constructs wherever applicable)

Producer Consumer Problem

Code

```
#include <stdio.h>

#include <stdlib.h>

#include<omp.h>

// Initialize a mutex to 1

int mutex = 1;


// Number of full slots as 0

int full = 0;


// Number of empty slots as size

// of buffer

int empty = 10, x = 0;


// Function to produce an item and

// add it to the buffer

void producer()

{

 // Decrease mutex value by 1

 --mutex;


 // Increase the number of full

 // slots by 1

 ++full;


 // Decrease the number of empty
```

```
// slots by 1
--empty;

// Item produced
x++;
printf("\nProducer produces"
"item %d",
x);

// Increase mutex value by 1
++mutex;
}

// Function to consume an item and
// remove it from buffer
void consumer()
{
// Decrease mutex value by
--mutex;

// Decrease the number of full
// slots by 1
--full;

// Increase the number of empty
// slots by 1
++empty;
```

```
 printf("\nConsumer consumes "
 "item %d",
 x);
 x--;

 // Increase mutex value by 1
 ++mutex;
}

// Driver Code
int main()
{
 int n, i;
 printf("\n1. Press 1 for Producer"
 "\n2. Press 2 for Consumer"
 "\n3. Press 3 for Exit");

// Using '#pragma omp parallel for'
// can give wrong value due to
// synchronisation issues.

// 'critical' specifies that code is
// executed by only one thread at a
// time i.e., only one thread enters
// the critical section at a given time
#pragma omp critical
```

```
for (i = 1; i > 0; i++) {

printf("\nEnter your choice:");
scanf("%d", &n);

// Switch Cases
switch (n) {
case 1:

// If mutex is 1 and empty
// is non-zero, then it is
// possible to produce
if ((mutex == 1)
&& (empty != 0)) {
producer();
}

// Otherwise, print buffer
// is full
else {
printf("Buffer is full!");
}
break;

case 2:

// If mutex is 1 and full
```

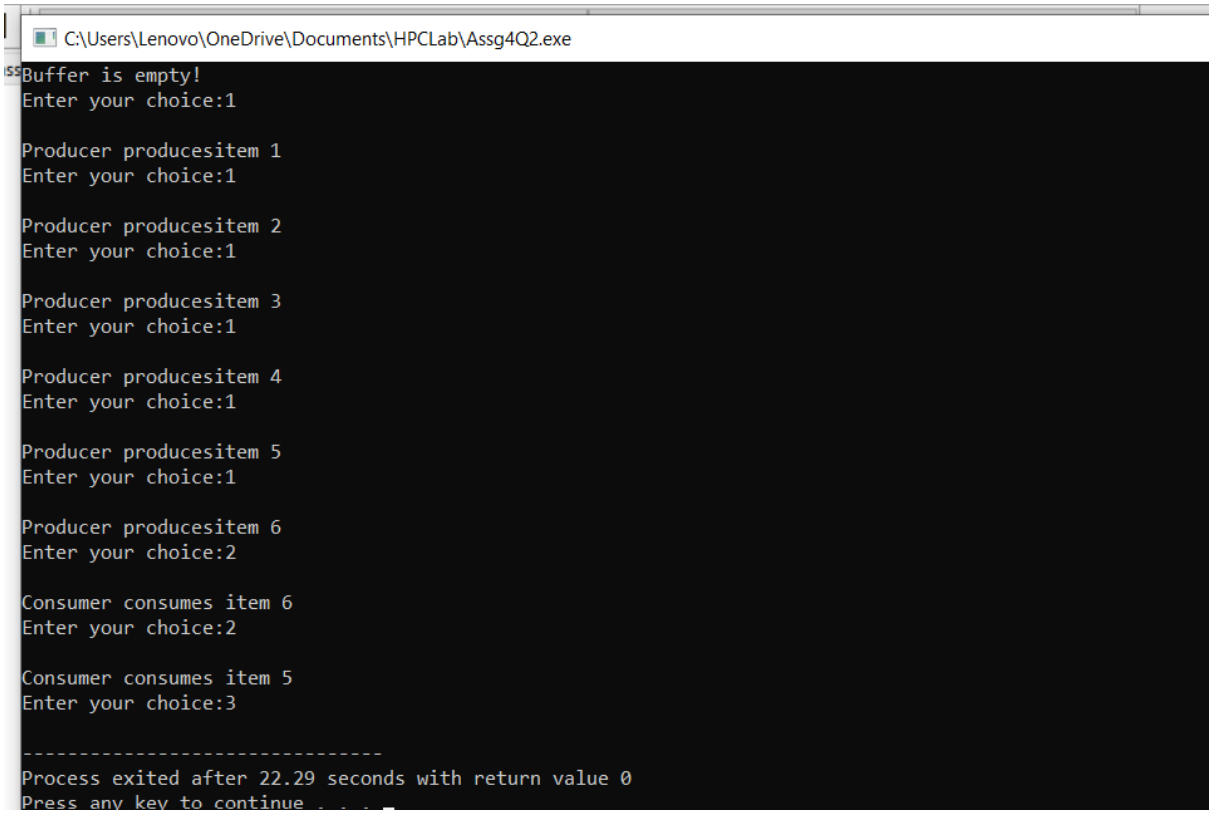
```
// is non-zero, then it is
// possible to consume
if ((mutex == 1)
&& (full != 0)) {
consumer();
}

// Otherwise, print Buffer
// is empty
else {
printf("Buffer is empty!");
}
break;

// Exit Condition
case 3:
exit(0);
break;
}
}
}
```

Output

Using #pragma omp critical , we use the concept of parallel programming and Critical Section to implement the Producer-Consumer problem in C language using OpenMP.



Github link: https://github.com/SiddharthM29/HPC_lab/tree/main/Assignment%204