

LAB 4

4. Write a C program to simulate the producer-consumer problem using semaphores.

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

#define BUFFER_SIZE 5

int mutex = 1;
int full = 0;
int empty = BUFFER_SIZE;
int x = 0;

void wait(int *S) {
    if (*S > 0) {
        --(*S);
    }
}

void signal(int *S) {
    ++(*S);
}

void producer() {
    if (empty > 0) {
        wait(&mutex);
        signal(&full);
        wait(&empty);
        x++;
        printf("Producer has produced: Item %d\n", x);
        signal(&mutex);
    } else {
        printf("Buffer is full!\n");
    }
}

void consumer() {
    if (full > 0) {
        wait(&mutex);
        wait(&full);
        signal(&empty);
        printf("Consumer has consumed: Item %d\n", x);
    }
}
```

```
        x--;\n        signal(&mutex);\n    } else {\n        printf("Buffer is empty!\\n");\n    }\n}\n\nint main() {\n    int choice;\n    while (1) {\n        printf("\\nEnter 1. Producer 2. Consumer 3. Exit\\n");\n        printf("Enter your choice: ");\n        scanf("%d", &choice);\n\n        switch (choice) {\n            case 1:\n                producer();\n                break;\n            case 2:\n                consumer();\n                break;\n            case 3:\n                return 0;\n            default:\n                printf("Invalid choice! Try again.\\n");\n        }\n    }\n    return 0;\n}
```

OUTPUT:

```
Enter 1. Producer 2. Consumer 3. Exit
Enter your choice: 1
Producer has produced: Item 1

Enter 1. Producer 2. Consumer 3. Exit
Enter your choice: 1
Producer has produced: Item 2

Enter 1. Producer 2. Consumer 3. Exit
Enter your choice: 1
Producer has produced: Item 3

Enter 1. Producer 2. Consumer 3. Exit
Enter your choice: 2
Consumer has consumed: Item 3

Enter 1. Producer 2. Consumer 3. Exit
Enter your choice: 2
Consumer has consumed: Item 2

Enter 1. Producer 2. Consumer 3. Exit
Enter your choice: 2
Consumer has consumed: Item 1

Enter 1. Producer 2. Consumer 3. Exit
Enter your choice: 2
Buffer is empty!

Enter 1. Producer 2. Consumer 3. Exit
Enter your choice: 3
PS C:\Users\STUDENT>
```