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LAB – 7

Producers Consumers Problem

Code:

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 int mutex = 1;
4 int full = 0;
5 int empty = 10, x = 0;
6 void producer()
7 {
8     --mutex;
9     ++full;
10    --empty;
11    x++;
12    printf("\nProducer produces item %d",x);
13    ++mutex;
14 }
15 void consumer()
16 {
17     --mutex;
18     --full;
19     ++empty;
20    printf("\nConsumer consumes "
21           "item %d",
22           x);
23    x--;
24    ++mutex;
25 }
26 int main()
27 {
28     int n, i;
29     printf("\n1. Press 1 for Producer"
30           "\n2. Press 2 for Consumer"
31           "\n3. Press 3 for Exit");
32     for (i = 1; i > 0; i++) {
33         printf("\nEnter your choice:");
34         scanf("%d", &n);
35         switch (n) {
36             case 1:
37                 if ((mutex == 1)
38                     && (empty != 0)) {
39                     producer();
40                 }
41                 else {
42                     printf("Buffer is full!");
43                 }
44             case 2:
45                 consumer();
46             case 3:
47                 return 0;
48             default:
49                 continue;
50         }
51     }
52 }
```

```

43         }
44         break;
45
46     case 2:
47         if ((mutex == 1)
48             && (full != 0)) {
49             consumer();
50         }
51         else {
52             printf("Buffer is empty!");
53         }
54         break;
55     case 3:
56         exit(0);
57         break;
58     }
59 }
60 }
61

```

Output:

```

alaric@alaric-virtual-machine:~/Desktop$ ./a.out

```

```

1. Press 1 for Producer
2. Press 2 for Consumer
3. Press 3 for Exit
Enter your choice:1

Producer produces item 1
Enter your choice:1

Producer produces item 2
Enter your choice:1

Producer produces item 3
Enter your choice:2

Consumer consumes item 3
Enter your choice:2

Consumer consumes item 2
Enter your choice:2

Consumer consumes item 1
Enter your choice:3

```

Readers Writers Problem

Code:

```
1 #include <pthread.h>
2 #include <semaphore.h>
3 #include <stdio.h>
4
5 sem_t wrt;
6 pthread_mutex_t mutex;
7 int cnt = 1;
8 int numreader = 0;
9
10 void *writer(void *wno)
11 {
12     sem_wait(&wrt);
13     cnt = cnt*2;
14     printf("Writer %d modified cnt to %d\n",*((int *)wno),cnt);
15     sem_post(&wrt);
16 }
17
18 void *reader(void *rno)
19 {
20
21     pthread_mutex_lock(&mutex);
22     numreader++;
23     if(numreader == 1) {
24         sem_wait(&wrt);
25     }
26     pthread_mutex_unlock(&mutex);
27
28     printf("Reader %d: read cnt as %d\n",*((int *)rno),cnt);
29
30     pthread_mutex_lock(&mutex);
31     numreader--;
32     if(numreader == 0) {
33         sem_post(&wrt);
34     }
35     pthread_mutex_unlock(&mutex);
36 }
37
38 int main()
39 {
40
41     pthread_t read[10],write[10];
42     pthread_mutex_init(&mutex, NULL);
43     sem_init(&wrt,0,1);
44
45     int a[10] = {1,2,3,4,5,6,7,8,9,10};
46
47     for(int i = 0; i < 10; i++) {
48         pthread_create(&read[i], NULL, (void *)reader, (void *)&a[i]);
49     }
50     for(int i = 0; i < 10; i++) {
51         pthread_create(&write[i], NULL, (void *)writer, (void *)&a[i]);
52     }
53
54     for(int i = 0; i < 10; i++) {
55         pthread_join(read[i], NULL);
56     }
57     for(int i = 0; i < 10; i++) {
58         pthread_join(write[i], NULL);
59     }
60
61     pthread_mutex_destroy(&mutex);
62     sem_destroy(&wrt);
63
64     return 0;
65 }
66
67
```

Output:

```
alaric@alaric-virtual-machine:~/Desktop$ gcc readers_writers.c -lpthread
alaric@alaric-virtual-machine:~/Desktop$ ./a.out
Reader 1: read cnt as 1
Reader 4: read cnt as 1
Reader 5: read cnt as 1
Reader 7: read cnt as 1
Reader 3: read cnt as 1
Reader 2: read cnt as 1
Reader 6: read cnt as 1
Reader 8: read cnt as 1
Reader 9: read cnt as 1
Reader 10: read cnt as 1
Writer 2 modified cnt to 2
Writer 3 modified cnt to 4
Writer 4 modified cnt to 8
Writer 5 modified cnt to 16
Writer 8 modified cnt to 32
Writer 6 modified cnt to 64
Writer 1 modified cnt to 128
Writer 10 modified cnt to 256
Writer 9 modified cnt to 512
Writer 7 modified cnt to 1024
```