

$22bps_{1059}$

first

```
File Edit View Search Terminal Help
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <unistd.h>
4 #include <pthread.h>
5
6 void userfunction() {
7     fflush(stdout);
8     printf("just a user function\n");
9 }
10 void* worker() {
11     //calls a system call sleep
12     userfunction();
13     printf("This is thread1 id: %ld\n", pthread_self());
14     sleep(1);
15     pthread_exit(0);
16 }
17
18 void* worker2() {
19     printf("This is thread2 id: %ld\n", pthread_self());
20     sleep(2);
21     pthread_exit(0);
22 }
23 int main() {
24     pthread_t t1;
25
26     int start = clock();
27     if( pthread_create(&t1, NULL, worker, NULL ) != 0 ) {
28         perror("cannot create thread\n");
29         exit(1);
30     }
31     int end = clock();
32     printf("time taken by thread 1 is %d\n", end - start);
33
34     pthread_t t2;
35     int start1 = clock();
36     if( pthread_create(&t2, NULL, worker2, NULL) !=0 ) {
37         perror("error creating thread 2");
38         exit(1);
39     }
40     int end1 = clock();
41     printf("time taken by thread 2 is %d\n", end1 - start1);
42
43     pthread_join(t1,NULL);
44     pthread_join(t2,NULL);    return 0;}
onetime.c 1,1 All
[0] 0:~bash* "thecuber-ThinkPad-E14" 15:46 29-Sep-23
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second

```
File Edit View Search Terminal Help
1 #include <pthread.h>
2 #include <stdio.h>
3 #include <semaphore.h>
4 #include <unistd.h>
5
6 void* f1();
7 void* f2();
8
9 int shared = 1;
10 sem_t s;
11
12 int main() {
13     sem_init(&s,0,1);
14     pthread_t thread1,thread2;
15     pthread_create(&thread1,NULL,f1,NULL);
16     pthread_create(&thread2,NULL,f2,NULL);
17     pthread_join(thread1,NULL);
18     pthread_join(thread2,NULL);
19     printf("Final value of shares is %d\n", shared);
20 }
21 void* f1() {
22     int x;
23     sem_wait(&s);
24     x = shared;
25     printf("Thread1 reads the value as %d\n", x);
26     x++;
27     printf("local updation by thread 1: %d\n", x);
28     sleep(1);
29     shared=x;
30     printf("Value of shared variable updated by thread 1 is %d\n", shared);
31     sem_post(&s);
32 }
33 void* f2() {
34     int y;
35     sem_wait(&s);
36     y = shared;
37     printf("Thread 2 reads the value of %d\n", y);
38     y--;
39     printf("local updation by thread2: %d\n", y);
40     sleep(1);
41     shared = y;
42     printf("value of shared variable updated by thread2 is %d\n", shared);
43     sem_post(&s);
44 }
twosemaphore.c [+] 42,1 All
:~bash* "thecuber-ThinkPad-E14" 15:48 29-Sep-23
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third

```
File Edit View Search Terminal Help
1 #include <semaphore.h>
2 #include <unistd.h>
3 #include <stdio.h>
4 #include <pthread.h>
5 void* produceControl(void*);
6 void* consumerControl(void*);
7 void producer();
8 void consumer();
9 int current_index = 0;
10 int field[10] = {};
11 sem_t arraylock;
12 sem_t indexlock;
13 int main() {
14     sem_init(&arraylock, 0, 1);
15     sem_init(&indexlock, 0, 1);
16     pthread_t consumer_thread, producer_thread;
17     printf("initial array\n");
18     for(int i = 0; i<10; i++) printf("%d ", field[i]);printf("\n");
19     pthread_create(&producer_thread, NULL, produceControl, NULL);
20     pthread_create(&consumer_thread, NULL, consumerControl, NULL);
21     pthread_join(producer_thread, NULL);
22     pthread_join(consumer_thread, NULL);
23     printf("final array values \n");
24     for(int i = 0; i<10; i++) printf("%d ", field[i]);printf("\n");
25 }
26
27 void* produceControl(void*) {
28     producer();
29     producer();
30     producer();
31     producer();
32 } /* W: control reaches end of non-void function [-Wreturn-type]
33
34 void producer() {
35     sem_wait(&arraylock);
36     sem_wait(&indexlock);
37     field[current_index++] = 1;
38     printf("item produced\n");
39     for(int i = 0; i<10; i++) printf("%d ", field[i]);printf("\n");
40     sem_post(&arraylock);
41     sem_post(&indexlock);
42 }
43
44 void* consumerControl(void*) {
37     field[current_index++] = 1;
38     printf("item produced\n");
39     for(int i = 0; i<10; i++) printf("%d ", field[i]);printf("\n");
40     sem_post(&arraylock);
41     sem_post(&indexlock);
42 }
43
44 void* consumerControl(void*) {
45     consumer();
46     consumer();
47 } /* W: control reaches end of non-void function [-Wreturn-type]
48
49 void consumer() {
50     sem_wait(&arraylock);
51     sem_wait(&indexlock);
52     field[--current_index] = 0;
53     printf("item consumed nom\n");
54     for(int i = 0; i<10; i++) printf("%d ", field[i]);printf("\n");
55     sem_post(&arraylock);
56     sem_post(&indexlock);
57 }
threeproducer.c [R0] 57,1 Bot

cardi~/coding/os/lab20sep_lab6 make threeproducer
cc threeproducer.c -o threeproducer
cardi~/coding/os/lab20sep_lab6 ./threeproducer
initial array
0 0 0 0 0 0 0 0 0 0
item produced
1 0 0 0 0 0 0 0 0 0
item produced
1 1 0 0 0 0 0 0 0 0
item produced
1 1 1 0 0 0 0 0 0 0
item produced
1 1 1 1 0 0 0 0 0 0
item consumed nom nom
1 1 1 0 0 0 0 0 0 0
item consumed nom nom
1 1 0 0 0 0 0 0 0 0
final array values
1 1 0 0 0 0 0 0 0 0
cardi~/coding/os/lab20sep_lab6 scrot --focused three.png

[0] 0: bash* "thecuber-ThinkPad-E14" 15:51 29-Sep-23
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fourth

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File Edit View Search Terminal Help
1 #include <stdio.h>
2 #include <semaphore.h>
3 #include <unistd.h>
4 #include <pthread.h>
5 #define size 10
6
7 struct roundtable {
8     int places[size];
9 };
10
11 void printCircle(struct roundtable r1);
12 void algorithm(int left, int center, int right);
13 void* p0f(void*);
14 void* p1f(void*);
15 void* p2f(void*);
16 void* p3f(void*);
17 void* p4f(void*);
18
19 sem_t forkaccess;
20 struct roundtable table;
21 //just for printing
22
23 void* p0f(void*) {
24     sem_wait(&forkaccess);
25     algorithm(9, 0, 1);
26     sem_post(&forkaccess);
27 };
28 void* p1f(void*) {
29     sem_wait(&forkaccess);
30     algorithm(1, 2, 3);
31     sem_post(&forkaccess);
32 };
33 void* p2f(void*) {
34     sem_wait(&forkaccess);
35     algorithm(3, 4, 5);
36     sem_post(&forkaccess);
37 };
38 void* p3f(void*) {
39     sem_wait(&forkaccess);
40     algorithm(5, 6, 7);
41     sem_post(&forkaccess);
42 };
43 void* p4f(void*) {
44     sem_wait(&forkaccess);
45
47 int main() {
48     // here 0s represent diners and 1 represents
49     // the forks
50     // in order for a philo to be done dining th
51     ey require 2 forks
52     pthread_t p1, p2, p3, p4, p0;
53     for(int i = 0; i<size; i++) {
54         if(i%2 == 0) table.places[i] = 0;
55         else table.places[i] = 1;
56     }
57     printCircle(table);
58     sem_init(&forkaccess, 0, 1);
59     pthread_create(&p0, NULL, p0f, NULL);
60     pthread_create(&p1, NULL, p1f, NULL);
61     pthread_create(&p2, NULL, p2f, NULL);
62     pthread_create(&p3, NULL, p3f, NULL);
63     pthread_create(&p4, NULL, p4f, NULL);
64
65     pthread_join(p0, NULL);
66     pthread_join(p1, NULL);
67     pthread_join(p2, NULL);
68     pthread_join(p3, NULL);
69     pthread_join(p4, NULL);
70
71     printf("all philosophers done eating\n");
72     printCircle(table);
73     return 0;
74 }
75
76 void printCircle(struct roundtable r1) {
77     printf("    %d\n", r1.places[0]);
78     printf("    %d\n", r1.places[1]);
79     printf("    %d\n", r1.places[2]);
80     printf("    %d\n", r1.places[3]);
81     printf("    %d\n", r1.places[4]);
82     printf("    %d\n", r1.places[5]);
83     printf("    %d\n", r1.places[6]);
84     printf("    %d\n", r1.places[7]);
85     printf("    %d\n", r1.places[8]);
86     printf("    %d\n", r1.places[9]);
87 }
73     return 0;
74 }
75
76 void printCircle(struct roundtable r1) {
77     printf("    %d\n", r1.places[0]);
78     printf("    %d\n", r1.places[1]);
79     printf("    %d\n", r1.places[2]);
80     printf("    %d\n", r1.places[3]);
81     printf("    %d\n", r1.places[4]);
82     printf("    %d\n", r1.places[5]);
83     printf("    %d\n", r1.places[6]);
84     printf("    %d\n", r1.places[7]);
85     printf("    %d\n", r1.places[8]);
86     printf("    %d\n", r1.places[9]);
87 }
88
89 void algorithm(int left, int center, int right) {
90     printf("\n philosopher %d eat
91     ing\n", center/2);
92     table.places[left]--;
93     table.places[right]--;
94     table.places[center]++;
95     table.places[center]++;
96     printCircle(table);
97     table.places[center]--;
98     table.places[center]--;
99     table.places[left]++;
100     table.places[right]++;
101 }
102
103 all philosophers done eating
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