LAB-9

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- **Producer-Consumer**
- **Sem_init**

  #include <semaphore.h>
  int sem_init(sem_t *sem, int pshared, unsigned int value);
  sem_init() initializes the unnamed semaphore at the address pointed to by sem. The value
  argument specifies the initial value for the semaphore.

  The pshared argument indicates whether this semaphore is to be shared between the threads of a process, or between processes.

- If pshared has the value 0, then the semaphore is shared between the threads of a process, and should be located at some address that is visible to all threads.
- If pshared is nonzero, then the semaphore is shared between processes, and should be located in a region of shared memory. sem_init() returns 0 on success; on error, -1 is returned, and errno is set to indicate the error.

- **Sem_wait**

  #include <semaphore.h>
  int sem_wait(sem_t *sem);

  sem_wait() decrements (locks) the semaphore pointed to by sem. If the semaphore's value is greater than zero, then the decrement proceeds, and the function returns, immediately.

  If the semaphore currently has the value zero, then the call blocks until either it becomes possible to perform the decrement.

  This function returns 0 on success; on error, the value of the semaphore is left unchanged, -1 is returned, and errno is set to indicate the error.

- **Sem_post**

  #include <semaphore.h>
  int sem_post(sem_t *sem);

  sem_post() increments (unlocks) the semaphore pointed to by sem. If the semaphore's value consequently becomes greater than zero, then another process or thread blocked in a sem_wait call will be woken up and proceed to lock the semaphore.

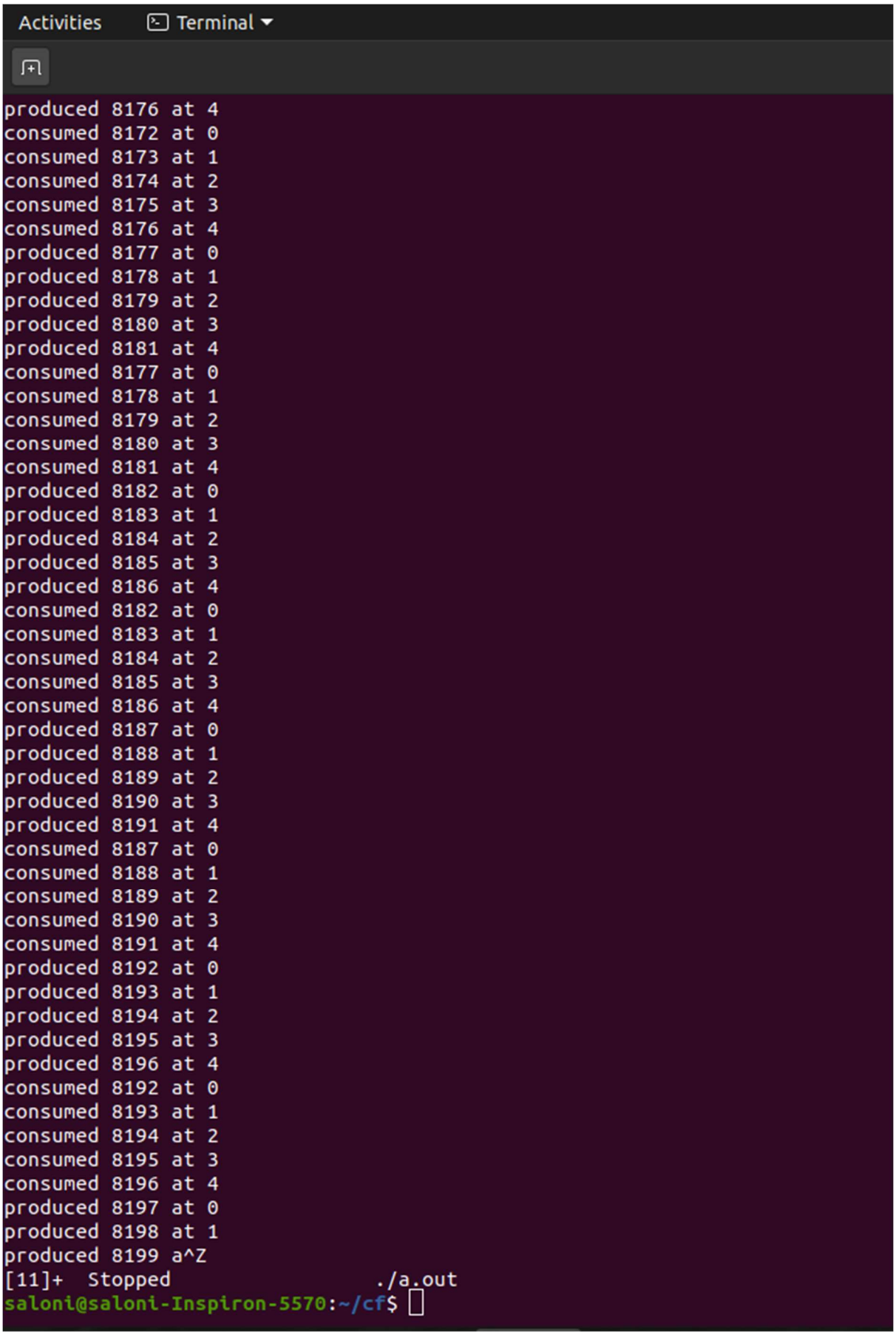
  sem_post() returns 0 on success; on error, the value of the semaphore is left unchanged, -1 is returned, and errno is set to indicate the error.

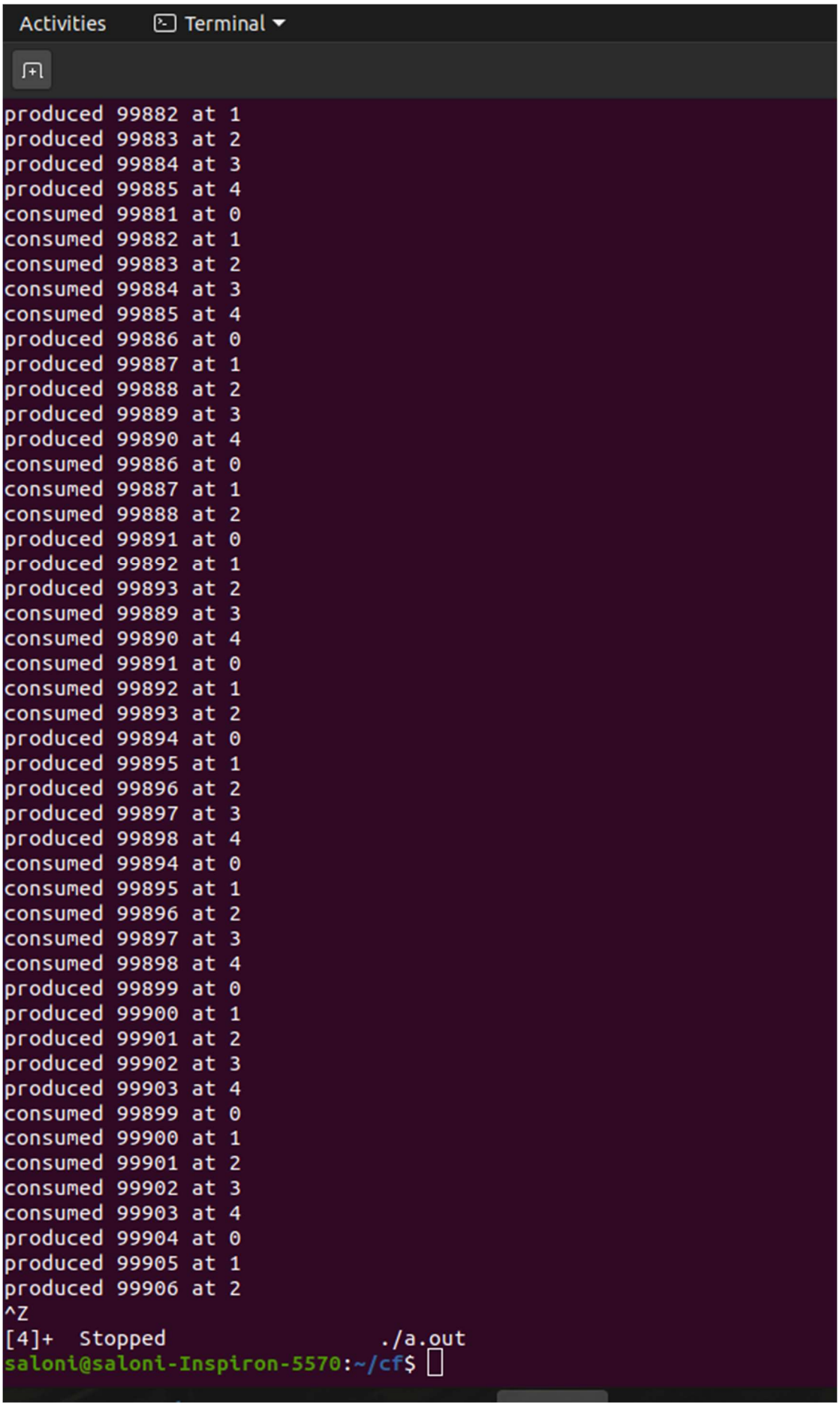
Code:

```
#include<stdio.h>
#include<semaphore.h>
#include<pthread.h>
void *producer();
void *consumer();
sem_t s;
sem_t n;
sem_t e;
int items[5];
int f=-1,r=-1;
int i=0;
void enqueue(int ele)
{
        if(f==-1)
                f=0;
        r=(r+1)%5;
        items[r]=ele;
        printf("produced %d at %d\n",ele,r);

}
void dequeue()
{
        int ele;
        ele=items[f];
        printf("consumed %d at %d\n",ele,f);
        if(f==r)
        {
                f=-1;
                r=-1;
        }
        else
        {
                f=(f+1)%5;
        }
}
void main()
```

```
{

        sem_init(&s,0,1);
        sem_init(&n,0,0);
        sem_init(&e,0,5);

        pthread_t pro;
        pthread_t con;

        pthread_create(&pro,NULL,producer,NULL);
        pthread_create(&con,NULL,consumer,NULL);
        pthread_join(pro,NULL);
        pthread_join(con,NULL);

}
void *producer()
{
        while(1)
        {
                i++;
                sem_wait(&e);
                sem_wait(&s);
                enqueue(i);
                sem_post(&s);
                sem_post(&n);
        }
}
void *consumer()
{
        while(1)
        {
        sem_wait(&n);
        sem_wait(&s);
        dequeue();
        sem_post(&s);
        sem_post(&e);
        }
```

}
Snapshot:


Activities
Terminal
produced 8176 at 4
consumed 8172 at 0
consumed 8173 at 1
consumed 8174 at 2
consumed 8175 at 3
consumed 8176 at 4
produced 8177 at 0
produced 8178 at 1
produced 8179 at 2
produced 8180 at 3
produced 8181 at 4
consumed 8177 at 0
consumed 8178 at 1
consumed 8179 at 2
consumed 8180 at 3
consumed 8181 at 4
produced 8182 at 0
produced 8183 at 1
produced 8184 at 2
produced 8185 at 3
produced 8186 at 4
consumed 8182 at 0
consumed 8183 at 1
consumed 8184 at 2
consumed 8185 at 3
consumed 8186 at 4
produced 8187 at 0
produced 8188 at 1
produced 8189 at 2
produced 8190 at 3
produced 8191 at 4
consumed 8187 at 0
consumed 8188 at 1
consumed 8189 at 2
consumed 8190 at 3
consumed 8191 at 4
produced 8192 at 0
produced 8193 at 1
produced 8194 at 2
produced 8195 at 3
produced 8196 at 4
consumed 8192 at 0
consumed 8193 at 1
consumed 8194 at 2
consumed 8195 at 3
consumed 8196 at 4
produced 8197 at 0
produced 8198 at 1
produced 8199 a^Z
[11]+ Stopped ./a.out
saloni@saloni-Inspiron-5570:~/cf$


Activities
Terminal
produced 99882 at 1
produced 99883 at 2
produced 99884 at 3
produced 99885 at 4
consumed 99881 at 0
consumed 99882 at 1
consumed 99883 at 2
consumed 99884 at 3
consumed 99885 at 4
produced 99886 at 0
produced 99887 at 1
produced 99888 at 2
produced 99889 at 3
produced 99890 at 4
consumed 99886 at 0
consumed 99887 at 1
consumed 99888 at 2
produced 99891 at 0
produced 99892 at 1
produced 99893 at 2
consumed 99889 at 3
consumed 99890 at 4
consumed 99891 at 0
consumed 99892 at 1
consumed 99893 at 2
produced 99894 at 0
produced 99895 at 1
produced 99896 at 2
produced 99897 at 3
produced 99898 at 4
consumed 99894 at 0
consumed 99895 at 1
consumed 99896 at 2
consumed 99897 at 3
consumed 99898 at 4
produced 99899 at 0
produced 99900 at 1
produced 99901 at 2
produced 99902 at 3
produced 99903 at 4
consumed 99899 at 0
consumed 99900 at 1
consumed 99901 at 2
consumed 99902 at 3
consumed 99903 at 4
produced 99904 at 0
produced 99905 at 1
produced 99906 at 2
^Z
[4]+ Stopped ./a.out
saloni@saloni-Inspiron-5570:~/cf$