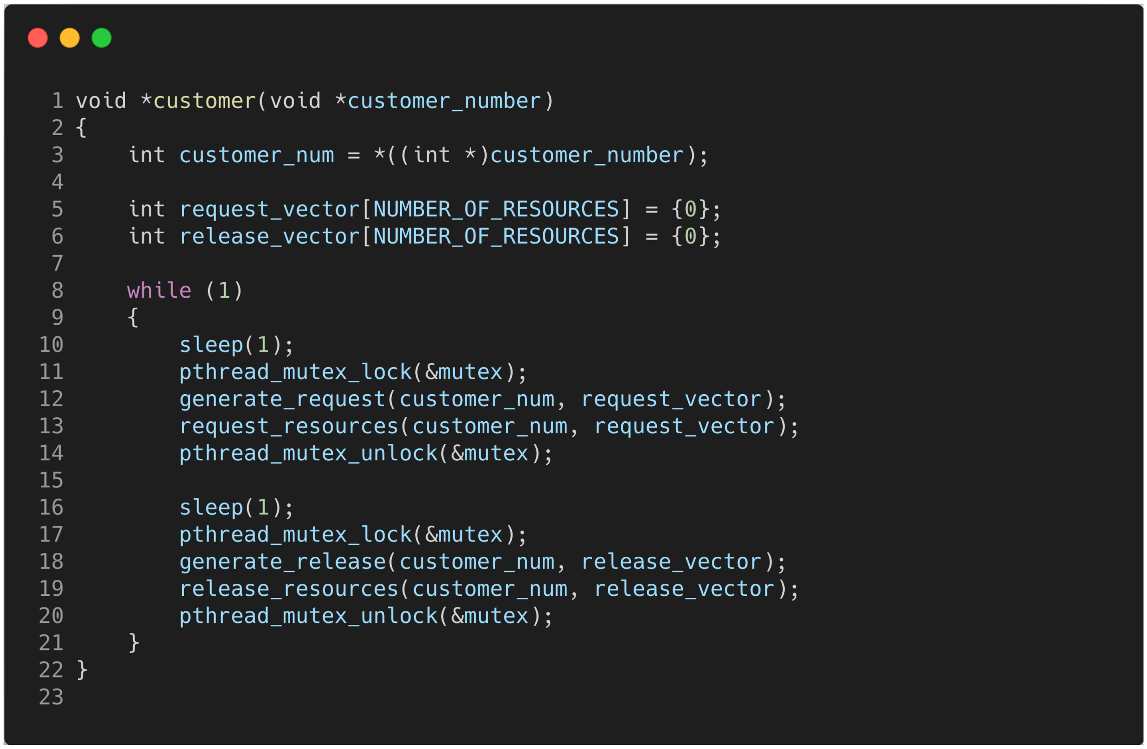
گزارش کار آزمایش هفتم

۱. روند کلّی برنامه به این صورت است که به تعداد NUMBER_OF_CUSTOMERS، نخ برای مشتری‌ها ایجاد می‌شود.
تابع هر مشتری به صورت زیر است

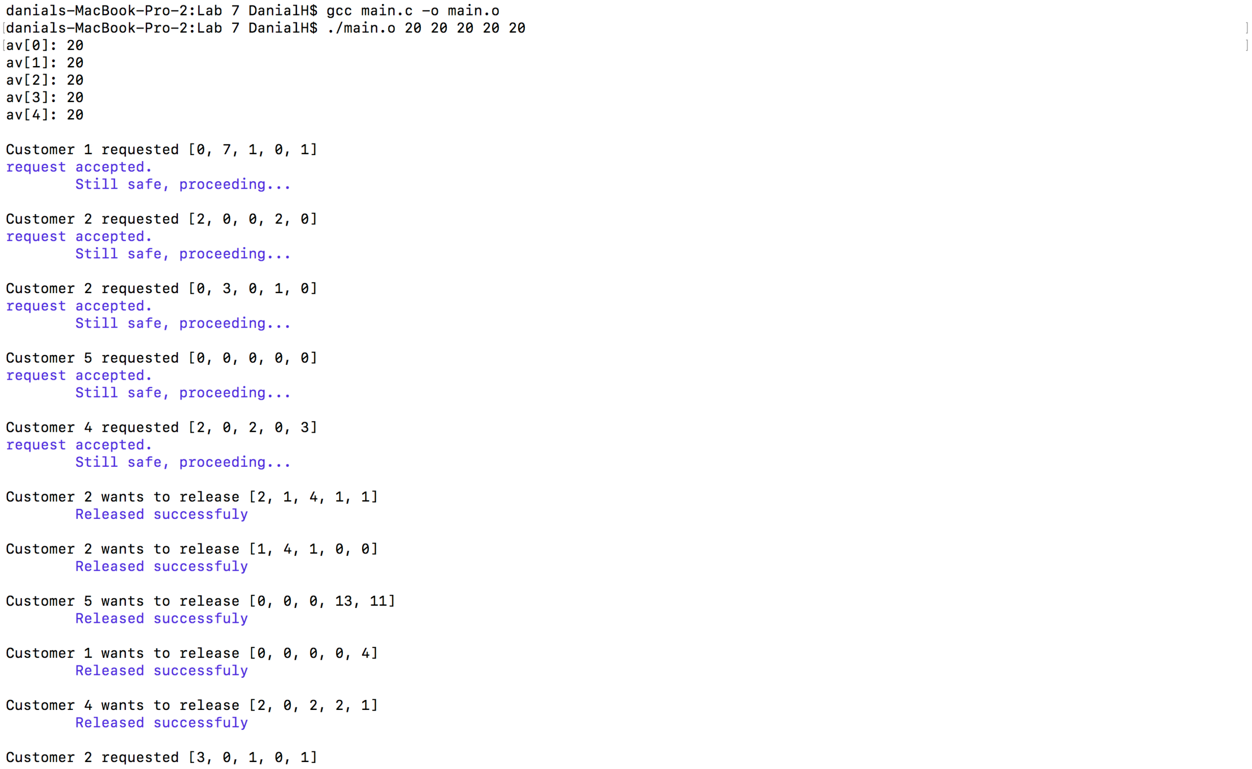


```
void *customer(void *customer_number)
{
    int customer_num = *((int *)customer_number);

    int request_vector[NUMBER_OF_RESOURCES] = {0};
    int release_vector[NUMBER_OF_RESOURCES] = {0};

    while (1)
    {
        sleep(1);
        pthread_mutex_lock(&mutex);
        generate_request(customer_num, request_vector);
        request_resources(customer_num, request_vector);
        pthread_mutex_unlock(&mutex);

        sleep(1);
        pthread_mutex_lock(&mutex);
        generate_release(customer_num, release_vector);
        release_resources(customer_num, release_vector);
        pthread_mutex_unlock(&mutex);
    }
}

```

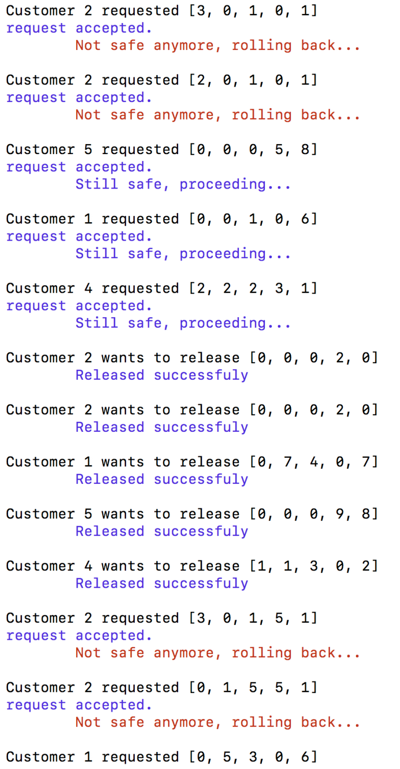
هر مشتری با customer_number خود مشخص می‌شود. سپس در یک حلقه‌ی بی‌نهایت، به طور مداوم، یک درخواست منابع می‌سازد (generate_request)، و آن را ارسال می‌کند. (request_resources)
برای آن که در بازه‌ی زمانی پردازش درخواست این مشتری، مشتری‌های دیگر وضعیت منابع را تغییر ندهند، از یک قفل استفاده می‌کنیم. (pthread_mutex_lock)
همین روند برای آزاد کردن منابع هم تکرار می‌شود.

در توابع request_resources, release_resources, is_safe هم دقیقاً شبه‌کد داده شده پیاده‌سازی شده است.

نمونه‌ی خروجی ۱:

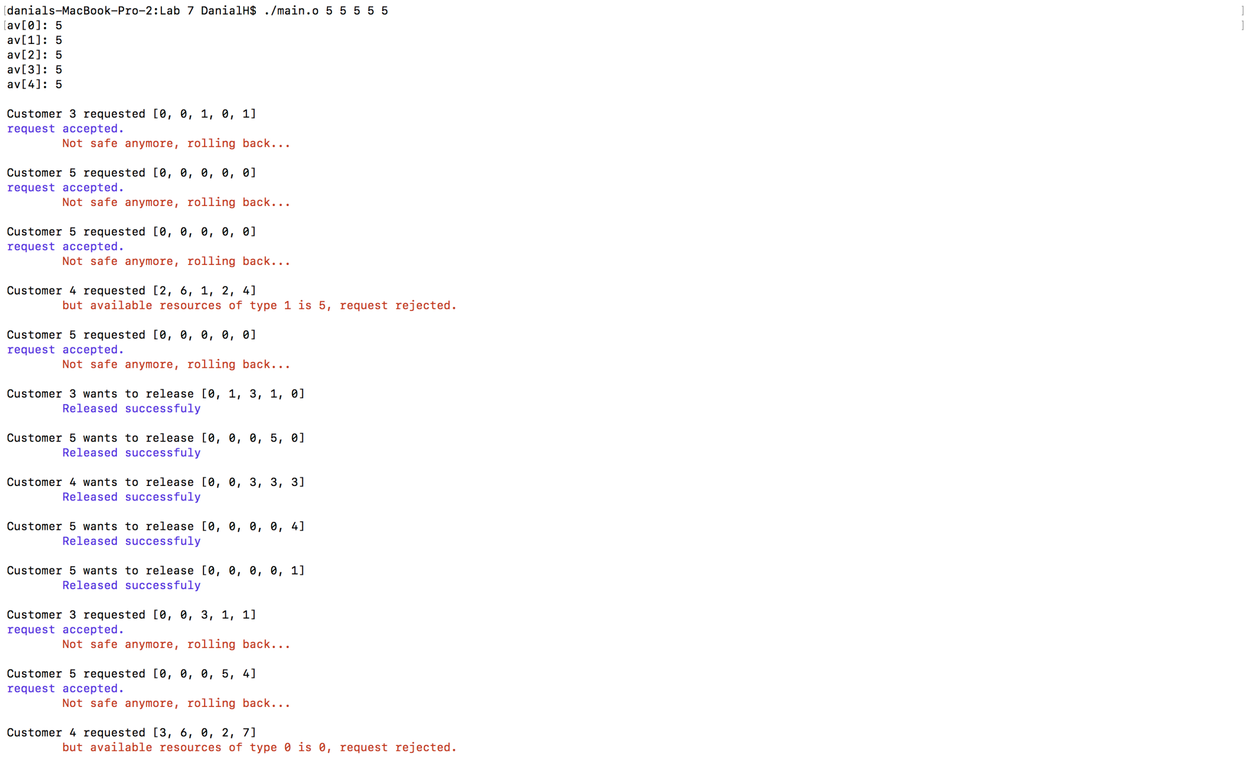


```
danials-MacBook-Pro-2:Lab 7 DanialH$ gcc main.c -o main.o
danials-MacBook-Pro-2:Lab 7 DanialH$ ./main.o 20 20 20 20 20
av[0]: 20
av[1]: 20
av[2]: 20
av[3]: 20
av[4]: 20

Customer 1 requested [0, 7, 1, 0, 1]
request accepted.
        Still safe, proceeding...

Customer 2 requested [2, 0, 0, 2, 0]
request accepted.
        Still safe, proceeding...

Customer 2 requested [0, 3, 0, 1, 0]
request accepted.
        Still safe, proceeding...

Customer 5 requested [0, 0, 0, 0, 0]
request accepted.
        Still safe, proceeding...

Customer 4 requested [2, 0, 2, 0, 3]
request accepted.
        Still safe, proceeding...

Customer 2 wants to release [2, 1, 4, 1, 1]
        Released successfuly

Customer 2 wants to release [1, 4, 1, 0, 0]
        Released successfuly

Customer 5 wants to release [0, 0, 0, 13, 11]
        Released successfuly

Customer 1 wants to release [0, 0, 0, 0, 4]
        Released successfuly

Customer 4 wants to release [2, 0, 2, 2, 1]
        Released successfuly

Customer 2 requested [3, 0, 1, 0, 1]
```



```
Customer 2 requested [3, 0, 1, 0, 1]
request accepted.
        Not safe anymore, rolling back...

Customer 2 requested [2, 0, 1, 0, 1]
request accepted.
        Not safe anymore, rolling back...

Customer 5 requested [0, 0, 0, 5, 8]
request accepted.
        Still safe, proceeding...

Customer 1 requested [0, 0, 1, 0, 6]
request accepted.
        Still safe, proceeding...

Customer 4 requested [2, 2, 2, 3, 1]
request accepted.
        Still safe, proceeding...

Customer 2 wants to release [0, 0, 0, 2, 0]
        Released successfuly

Customer 2 wants to release [0, 0, 0, 2, 0]
        Released successfuly

Customer 1 wants to release [0, 7, 4, 0, 7]
        Released successfuly

Customer 5 wants to release [0, 0, 0, 9, 8]
        Released successfuly

Customer 4 wants to release [1, 1, 3, 0, 2]
        Released successfuly

Customer 2 requested [3, 0, 1, 5, 1]
request accepted.
        Not safe anymore, rolling back...

Customer 2 requested [0, 1, 5, 5, 1]
request accepted.
        Not safe anymore, rolling back...

Customer 1 requested [0, 5, 3, 0, 6]
```

نمونه خروجی ۲:



```
danials-MacBook-Pro-2:Lab 7 DanialH$ ./main.o 5 5 5 5 5
av[0]: 5
av[1]: 5
av[2]: 5
av[3]: 5
av[4]: 5

Customer 3 requested [0, 0, 1, 0, 1]
request accepted.
        Not safe anymore, rolling back...

Customer 5 requested [0, 0, 0, 0, 0]
request accepted.
        Not safe anymore, rolling back...

Customer 5 requested [0, 0, 0, 0, 0]
request accepted.
        Not safe anymore, rolling back...

Customer 4 requested [2, 6, 1, 2, 4]
        but available resources of type 1 is 5, request rejected.

Customer 5 requested [0, 0, 0, 0, 0]
request accepted.
        Not safe anymore, rolling back...

Customer 3 wants to release [0, 1, 3, 1, 0]
        Released successfuly

Customer 5 wants to release [0, 0, 0, 5, 0]
        Released successfuly

Customer 4 wants to release [0, 0, 3, 3, 3]
        Released successfuly

Customer 5 wants to release [0, 0, 0, 0, 4]
        Released successfuly

Customer 5 wants to release [0, 0, 0, 0, 1]
        Released successfuly

Customer 3 requested [0, 0, 3, 1, 1]
request accepted.
        Not safe anymore, rolling back...

Customer 5 requested [0, 0, 0, 5, 4]
request accepted.
        Not safe anymore, rolling back...

Customer 4 requested [3, 6, 0, 2, 7]
        but available resources of type 0 is 0, request rejected.
```