Homework1

System Programming 2017

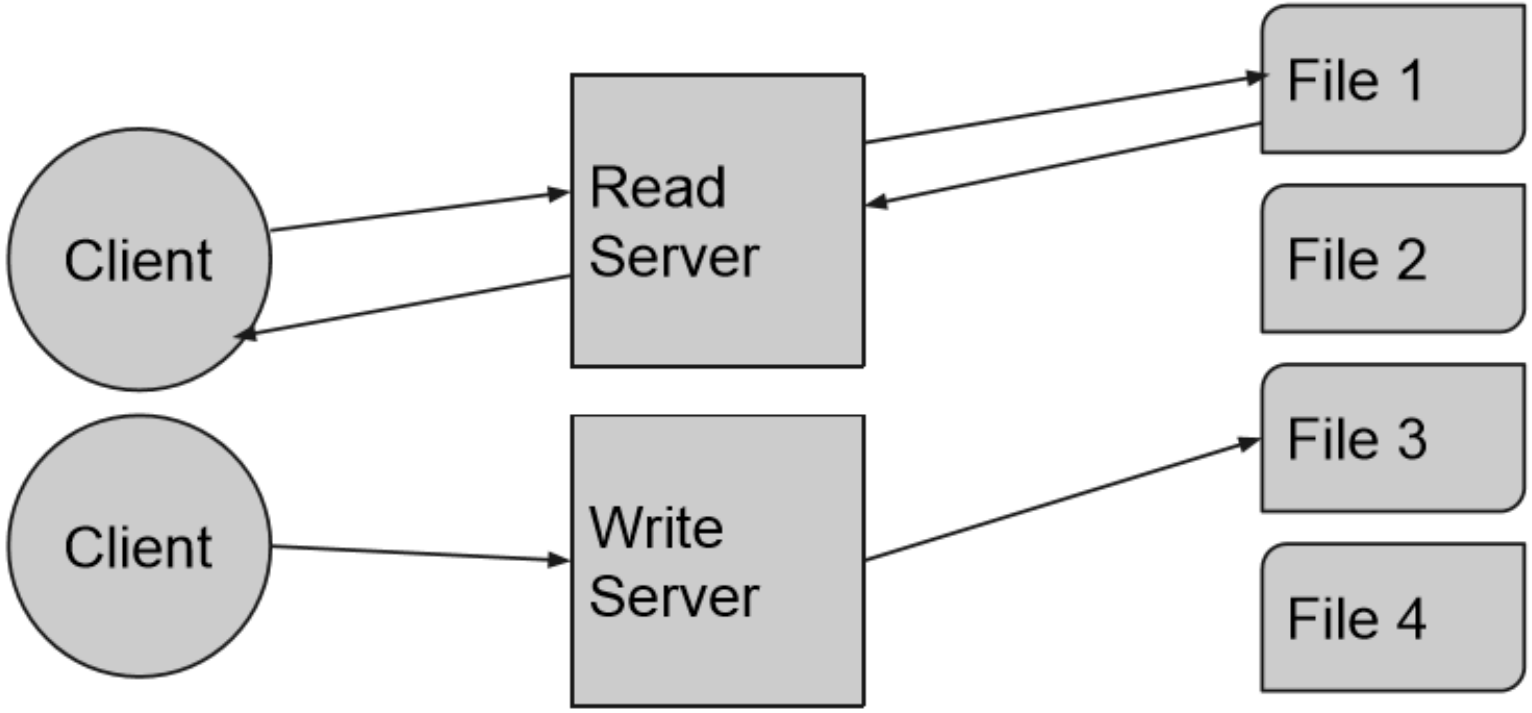
Introduction

In this assignment, you have to modify a simple read/write Server, implement I/O multiplexing and file locking on it.

You don’t have to handle the network communication. We will handle that part.

We will provide

- A Simple Read And Write Server
- Handle only one request at a time.



DEMO

Server:

```
~/SP$ ./read_server 4000

starting on     , port 4000, fd 3, maxconn 1024...
getting a new request... fd 4 from 127.0.0.1
Opening file [sp_sample_file.txt]
Done reading file [sp_sample_file.txt]
getting a new request... fd 4 from 127.0.0.1
Opening file [Makefile]
Done reading file [Makefile]
```

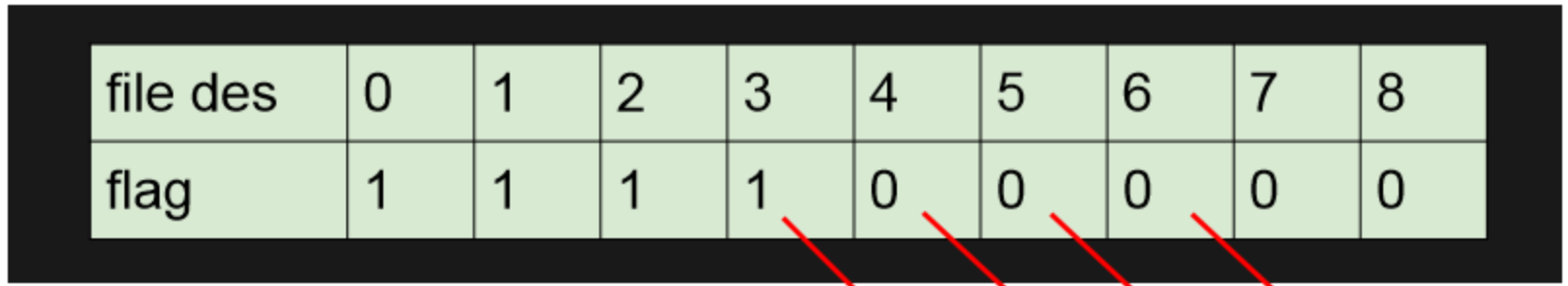
Inputs (request from client) are colored purple, to distinguish from the response from server.

Client:

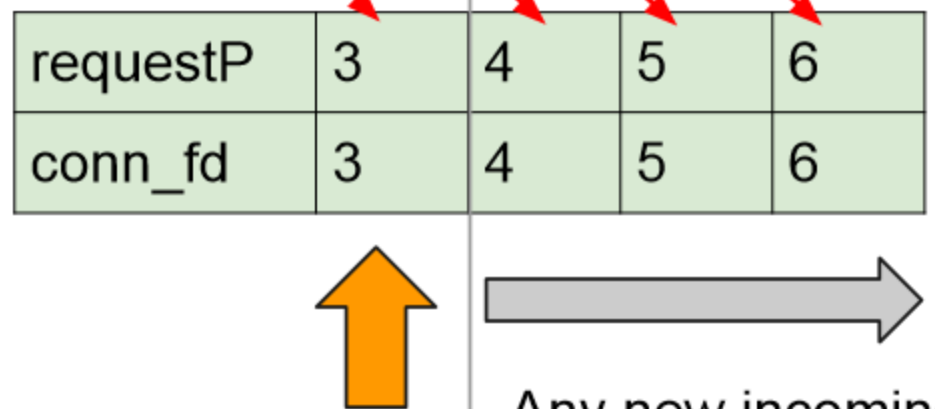
```
~/SP$ telnet 127.0.0.1 4000
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
sp_sample_file.txt
ACCEPT
sp_sample_content
Connection closed by foreign host.
~/SP$ telnet 127.0.0.1 4000
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Makefile
ACCEPT
all: server.c
        gcc server.c -o write_server
        gcc server.c -D READ_SERVER -o read_server

clean:
        rm -f read_server write_server
Connection closed by foreign host.
```

Your job is

- A Multiplexing Read and Write Server
- Handle multiple requests simultaneously.
- Lock files when doing operations on them.




```
typedef struct {
    char host[512];
    int conn_fd;
    char buf[512];
    size_t buf_len;
    char* filename;
    int header_done;
} request;
```



Use a requestP table to simulate the file descriptor table!!

What should you do?

select()

Allows a program to monitor multiple file descriptors. Waits until one or more of the file descriptors become “ready” for some class of I/O operation. If we have a nonblocking descriptor that we want to read from, we call select() with timeout value of, say, 5 sec, and select() will block for up to 5 seconds.

fcntl()

Allows a program to obtain a lock for a file.

Detail

You can download the files and spec from:

1. CEIBA
2. Facebook group: System Programming 2017

How can I get full score

1. **read_server** returns the file content correctly.
2. **write_server** reads the request and writes to the file correctly.
3. Two requests issued to **read_server**.
4. Two requests issued to **write_server**.
5. Requests to **read_server** and **write_server** at the same time.
6. Multiple request to **read_server** and **write_server**.

Example

Server:

```
~/SP$ ./write_server 4000
starting on     , port 4000, fd 3, maxconn 1024...
getting a new request... fd 4 from 127.0.0.1
Opening file [file1]
getting a new request... fd 5 from 127.0.0.1
Opening file [file2]
Done writing file [file2]
getting a new request... fd 6 from 127.0.0.1
[file1] is locked, request rejected.
Done writing file [file1]
```

Inputs (request from client) are colored purple, to distinguish from the response from server.

Clients:

```
~/SP$ telnet 127.0.0.1 4000
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
file1
ACCEPT
content of file 1
^]
telnet> quit
Connection closed.
```

```
~/SP$ telnet 127.0.0.1 4000
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
file2
ACCEPT
content of file 2
^]
telnet> quit
Connection closed.
```

```
~/SP$ telnet 127.0.0.1 4000
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
file1
REJECT
Connection closed by foreign host.
```

Pseudo code

```
while (1) {
  use select() to find which file descriptors are ready.
  accept() new connections if there's any.
  for each request with file descriptor ready {
    use handle_read to read from the request.
    if this is the first time read of the request {
      check lock and obtain lock for the file, reject when can't lock.
      responds to client that the request is accepted.
      open the file descriptor for the file.
    }
    if is write server {
      read from the request, and write it to the file.
    } else {
      get part of the file to buffer, and responds them back to client.
    }
  }
}
```

Submission

1. **server.c (as well as all other *.c)**
2. **Makefile**
3. **README.txt**

You should put files in a directory named with your student id, and tar the directory.

If your name and student ID is b02902000

The tared file will be named SPHW1_b02902000.tar.gz And the first please do not use .rar or other file type.

Submit your program before 10/10 23:59

Question

Come to lab302

or

Write an e-mail (Prefix your e-mail title with [SP])

or

Facebook group: System Programming 2017