



Birla Institute of Technology & Science, Pilani

Pilani Campus

II SEMESTER 2019-2020

Assignment-2

Course No.: IS F462

Course Title: Network Programming

Deadline: 25th April 2020

Maximum Marks: 72M (18%)

Note:

- Maximum of three students per group.
- Upload code in <https://nalanda.bits-pilani.ac.in> Name your file idno1_idno2_idno3_assignment1.tar
- Group information to be submitted in group.txt file.

P1. Write a program webserver.c for concurrent web server supporting HTTP GET requests. It supports concurrency through an event-driven model, using epoll() edge-triggered notifications.

- server maintains a message queue to queue the events.
- main thread waits on epoll_wait() to get IO notifications from kernel. For each IO notification, it adds an event to the message queue.
- "process" thread waits on message queue msgrcv() call. It gets a message and responds according to its state. While processing the message it may add new events to the queue.
- each client request goes through states: READING_REQUEST, HEADER_PARSING, READING_DISKFILE, WRITING_HEADER, WRITING_BODY, DONE. Next state is reached only after the previous one is complete.
- All IO (read and write) operations are non-blocking. This necessitates buffer management.
- data pertaining to client's request is stored in a central data structure such as hash table. This is to avoid unnecessary copying of data which may happen if we keep client data in the message queue itself.
- When a request reaches DONE state, connection remains open for another request. Client connection is closed only when EOF is received from client. That may happen during any state.
- Web server testing tools such apache ab or httpperf can be used as clients.

Deliverables:

- Brief Design Document (.pdf)
- Screenshots/video of the demo
- webserver.c

[27 M]

P2. Write a C program multicast.c for IP Multicast that does the following.

- It takes multicast group ip and port on command line. It joins the group and waits for messages.



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- It sends a "hello-" + time() every 15 seconds to count how many members are present in the group.
- Any member who receives "hello-"+time(), simply echoes the same.
- The member which has sent hello, counts the replies received within 5 seconds and displays count on the screen.
- Same program is run multiple times to create multiple members.
- Each member prints the sender ip and message received every time a message is received.
- Member exits only when Ctrl-c is pressed. Before it exits, it sends "bye-" +time() to all in the group.

Deliverables:

- Brief Design Document (.pdf)
- Screenshots/video of the demo
- multicast.c

[12 M]

P3. Write a program synflood.c using raw sockets which works in the following way.

- it takes server hostname and port on command-line.
- it creates TCP SYN segment and appends ip header and sends to the remote host. It uses IP_HDRINCL socket option to include IP header.
- it sends TCP SYN segment every 1 second, every time with a different source ip and source port. These addresses/port can be random numbers in valid range.
- it should display the received replies (SYN+ACK) from the server using libpcap library.
- Program will not send any reply (ACK) segment to web server

Deliverables:

- synflood.c
- Screenshots/video of the demo

[18 M]

P4. Present design and implementation of a program "error_packets.c" which when run on a host h, keeps printing the source ip, destination ip, source port, destination port and protocol of the packets sent by h and dropped by any of the routers on the way. Deliverables:

- error_packets.c
- Screenshots/video of the demo

[15 M]