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Lab #6

Does it make any difference whether a variable that will store a port number
is declared signed or unsigned? Take the code below and compile with the 'int
port' signed and unsigned. Is there any difference?

```c
#include <stdio.h>
#include <stdlib.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <unistd.h>

#define BUFFER_SIZE 1024
#define on_error(...) { fprintf(stderr, __VA_ARGS__); fflush(stderr);
exit(1); }

int main (int argc, char *argv[]) {
  if (argc < 2) on_error("Usage: %s [port]\n", argv[0]);

  int port = atoi(argv[1]);

  int server_fd, client_fd, err;
  struct sockaddr_in server, client;
  char buf[BUFFER_SIZE];

  server_fd = socket(AF_INET, SOCK_STREAM, 0);
  if (server_fd < 0) on_error("Could not create socket\n");

  server.sin_family = AF_INET;
  server.sin_port = htons(port);
  server.sin_addr.s_addr = htonl(INADDR_ANY);

  int opt_val = 1;
  setsockopt(server_fd, SOL_SOCKET, SO_REUSEADDR, &opt_val, sizeof
opt_val);

  err = bind(server_fd, (struct sockaddr *) &server, sizeof(server));
  if (err < 0) on_error("Could not bind socket\n");

  err = listen(server_fd, 128);
  if (err < 0) on_error("Could not listen on socket\n");

  printf("Server is listening on %d\n", port);

  while (1) {
    socklen_t client_len = sizeof(client);
    client_fd = accept(server_fd, (struct sockaddr *) &client,
&client_len);

    if (client_fd < 0) on_error("Could not establish new
connection\n");
```

```
        while (1) {
            int read = recv(client_fd, buf, BUFFER_SIZE, 0);

            if (!read) break; // done reading
            if (read < 0) on_error("Client read failed\n");

            err = send(client_fd, buf, read, 0);
            if (err < 0) on_error("Client write failed\n");
        }
    }

    return 0;
}
```

When I ran the program, there was no difference between running it with the port designated as signed or signed. In this case I utilized my HW 1 Echo Client as the program to test this program. I do not anticipate any issues with the change from signed to unsigned in unless the integer storing the port number is very large such that it is larger than the max value of a signed int. Otherwise the only difference should be with regards to the encoding of the sign bit.