

Below is the screenshot of the program and the command-line of my solution for Homework6 Problem1.



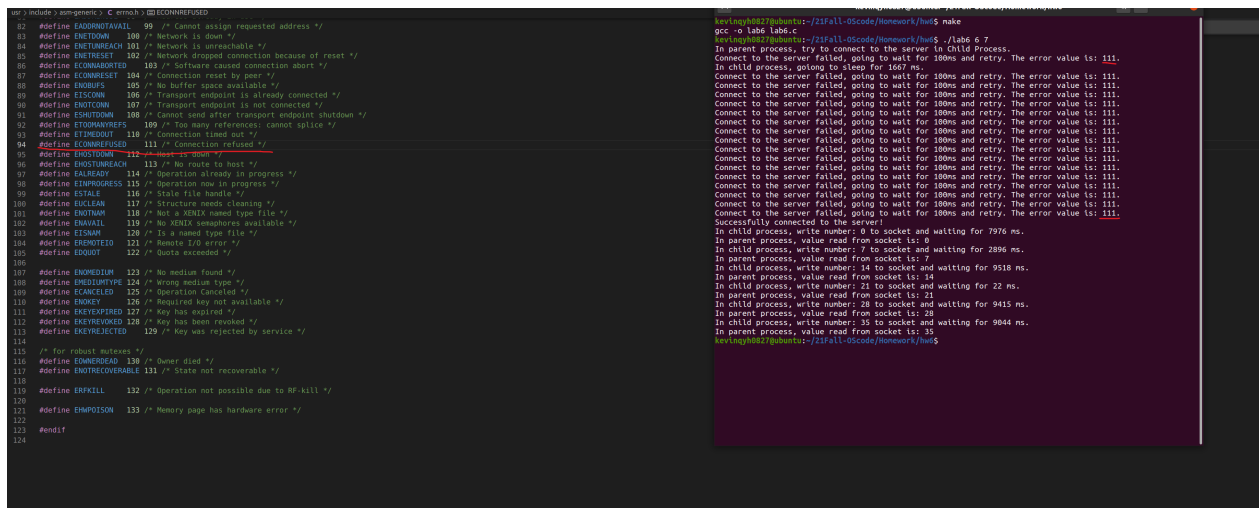
## Problem 2

1. The blocking calls are: `connect()`, `accept()`, `read()`, `write()`.  
The non-blocking calls are: `socket()`, `bind()`, `listen()`, `close()`.

Blocking calls means “synchronous”. It means that the process calling the blocking system call will become blocked, not in running or ready state before a specific event happens.

2. Socket is a form of indirect communication. Because messages are transmitted through specified port numbers.
3. When the `connect()` function failed to build the connection between parent and child process, its return value is -1. Meanwhile it going to set the global variable “`errno`” in “`errno.h`” which is specified for the certain type of error.

According to the content of “`errno.h`”, when the server is not ready, the value of “`errno`” is 111 which is defined as the macro “`ECONNREFUSED`”.



```
82 #define EADDRINUSE 98 /* Cannot assign requested address */
83 #define EADDRNOTAVAIL 99 /* Network is down */
84 #define EAFNOSUPPORT 100 /* Network is unreachable */
85 #define EAGAIN 101 /* Network dropped connection because of reset */
86 #define EALREADY 102 /* Software caused connection abort */
87 #define EBADF 103 /* Connection reset by peer */
88 #define EBADMSG 104 /* No buffer space available */
89 #define EBUSY 105 /* Transport endpoint is already connected */
90 #define ECANCELED 106 /* Transport endpoint is not connected */
91 #define ECHILD 107 /* Cannot send after transport endpoint shutdown */
92 #define ECONNABORTED 108 /* Too many references; cannot splice */
93 #define ECONNREFUSED 109 /* Connection timed out */
94 #define EDEADLOCK 110 /* Connection refused */
95 #define EDESTADDRREQ 111 /* No route to host */
96 #define EEXIST 112 /* Operation already in progress */
97 #define EFAULT 113 /* State file handle */
98 #define EFBIG 114 /* Structure needs cleaning */
99 #define EHOSTDOWN 115 /* Not a XENIX shared type file */
100 #define EHOSTUNREACH 116 /* No XENIX semaphores available */
101 #define EIDRM 117 /* Is a named type file */
102 #define EISNAM 118 /* Remote I/O error */
103 #define EINTR 119 /* Quota exceeded */
104 #define EINVAL 120 /* No medium found */
105 #define EIO 121 /* Wrong medium type */
106 #define EIOERR 122 /* Operation canceled */
107 #define EISDIR 123 /* Required key not available */
108 #define EKEYEXPIRED 124 /* Key has expired */
109 #define EKEYREJECTED 125 /* Key has been revoked */
110 #define EKEYREVOKED 126 /* Key was rejected by service */
111 #define EKEYSIZE 127 /* Key was rejected by service */
112 #define EKEYUNRECOVERABLE 128 /* State not recoverable */
113 #define EMLINK 129 /* Operation not possible due to RF-kill */
114 #define EMFILE 130 /* Memory page has hardware error */
115 #define EMSG 131 /* Memory page has hardware error */
116 #define ENAMETOOLONG 132 /* Memory page has hardware error */
117 #define ENOTDIR 133 /* Memory page has hardware error */
118 #define ENOTEMPTY 134 /* Memory page has hardware error */
119 #define ENOTRECOVERABLE 135 /* State not recoverable */
120 #define ENOSPC 136 /* Operation not possible due to RF-kill */
121 #define ENOSYS 137 /* Memory page has hardware error */
122 #define ENOTTY 138 /* Memory page has hardware error */
123 #define EPERM 139 /* Memory page has hardware error */
124 #define EPIPE 140 /* Memory page has hardware error */
```

```
1 In parent process, try to connect to the server in Child Process.
2 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
3 In child process, going to sleep for 100ms.
4 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
5 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
6 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
7 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
8 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
9 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
10 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
11 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
12 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
13 Connect to the server failed, going to wait for 100ms and retry. The error value is: 111.
14 Successfully connected to the server!
15 In child process, write number: 0 to socket and waiting for 7976 ms.
16 In parent process, value read from socket is: 0
17 In child process, write number: 7 to socket and waiting for 2896 ms.
18 In parent process, value read from socket is: 7
19 In child process, write number: 14 to socket and waiting for 9518 ms.
20 In parent process, value read from socket is: 14
21 In child process, write number: 21 to socket and waiting for 22 ms.
22 In parent process, value read from socket is: 21
23 In child process, write number: 28 to socket and waiting for 9415 ms.
24 In parent process, value read from socket is: 28
25 In child process, write number: 35 to socket and waiting for 9044 ms.
26 In parent process, value read from socket is: 35
```

Figure 2: Screenshot of command line and contents of `errno.h`.

4. If two processes on different machines want to communicate using socket, the client should know the server’s IP address and corresponding port number before connecting to it.