CS454/654 Assignment 3

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Motivation

- reduce amount of time spent on tools used in A3
  - many students last term had trouble with Makefiles and even submitted final solution with broken Makefiles
- less time we spend marking and debugging students submission
- less students waste their time appealling their assignment mark

Makefile

- using an example I will demonstrate:
  - how to make a library
  - how to use the library when creating an executable

Makefile - Interface.h

```
1 #ifdef __cplusplus
2 extern "C" {
3 #endif
4
5 extern int sum(int a, int b);
6
7 #ifdef __cplusplus
8 }
9 #endif
```

Makefile - Impl.cpp

```
1 #include "Interface.h"
2
3 int sum(int a, int b) {
4   return a + b;
5 }
```

Makefile - Consumer.cpp

```
1 #include "Interface.h"
2 #include <stdio.h>
3
4 int main( int argc, const char* argv[] ) {
5    printf("sum(%d, %d) = %d\n", 1, 2, sum(1,2));
6 }
```

Makefile - Code

```
1  # targets that should be called on 'make'
2  default: libsum.a
3
4  # compile all of the object files
5  # put them into the libray file
6  # generates a file libsum.a
7  libsum.a: Interface.h Impl.cpp
8    g++ -c Interface.h Impl.cpp
9    ar -cvq libsum.a Impl.o
10
11 Consumer.o:
12   g++ -c Interface.h Consumer.cpp
13
14 consumer: Consumer.o libsum.a
15   g++ -L. Consumer.o -lsum -o consumer
16
17 # do not put -l<library> before the object files
18 # -l paramater follows the convention of -l<drop lib>
19 # for why see http://stackoverflow.com/questions/45135/
       linker-order-gcc
20 consumer-bad: Consumer.o libsum.a
21   g++ -L. -lsum Consumer.o -o consumer-bad
```

What We Run to Compile Your Code

```
make
g++ -L. client.o -lrpc -o client
```

- If you do not specify it in your README, we will assume the second line to link our client.
- If you want something different, specify it in your README file.
- Some of you might use the pthread library:

```
g++ -L. client.o -lrpc -pthread -o client
```

This is how we will run your binder:

```
./binder
```

What if it Doesn't Work

Taken from the assignment:

> *If your makefile does not create the library or binder, or our clients/server do not compile with your library on this environment, we shall apply an automatic 10% penalty.*

- We will make minimal effort trying to compile it
- If we cannot get it to work, we give you a 0
  - You then have to go to the office hour of the TA who marked it (or schedule an appointment) to give him or her a working Makefile
  - If the TA messed up, then you won't get the 10% deduction
- So, please, please test your solution on the student environment
- Use the sample code on the course website
  - `https://cs.uwaterloo.ca/~kdaudjee/courses/cs454/assignments.html`

How We Run It

Getting executables ready (client.o and server.o are the TA's code that consume your librpc.a

```
make
g++ -L. client.o -lrpc -o client
g++ -L. server_functions.o server_function_skels.o
    server.o -lrpc -o server
```

On binder host:

```
./binder
BINDER_ADDRESS ubuntu1204-004.student.cs.uwaterloo.ca
BINDER_PORT 45483
```

How We Run It

On one of the server hosts:

```
1 export BINDER_ADDRESS=ubuntu1204-004.student.cs.
      uwaterloo.ca
2 export BINDER_PORT=45483
3 ./server
```

On one of the client hosts:

```
1 export BINDER_ADDRESS=ubuntu1204-004.student.cs.
      uwaterloo.ca
2 export BINDER_PORT=45483
3 ./client
```

Summary of Delivarables

- Makefile
- Makefile produces binder executable
- Makefile produces librpc.a library
- README documenting how consumer of library links code it it differs from the default given in assignment spec
- Documentation and System Manual

Questions?

References

[1] Landon; Johannes Schaub.
Linker order - gcc, 2013.
[Online; accessed 2014-06-18].