

CSE216 Programming Abstractions

Install a C compiler

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Install a C compiler

- E.g. Install gcc and gdb
 - Linux:
 - apt update
 - apt install build-essential
 - Mac:
 - brew install gcc (??)
 - brew install gdb (??)



Install a C compiler

- E.g. Install gcc (cont'd)

- Windows:

- MinGW-w64 (gcc)

- Download/run [MinGW-W64-install.exe](#) from

- <https://sourceforge.net/projects/mingw-w64/files/>

- If MinGW-W64-install.exe fails

- Download/unzip mingw-w64.zip from

- <http://www3.cs.stonybrook.edu/~youngkwon/cse216/mingw-w64.zip>

- Move `mingw-w64w` folder to "`c:\Program Files (x86)\`"

- Add to your `PATH` variable, `C:\Program Files (x86)\mingw-w64\i686-8.1.0-posix-dwarf-rt_v6-rev0\mingw32\bin`

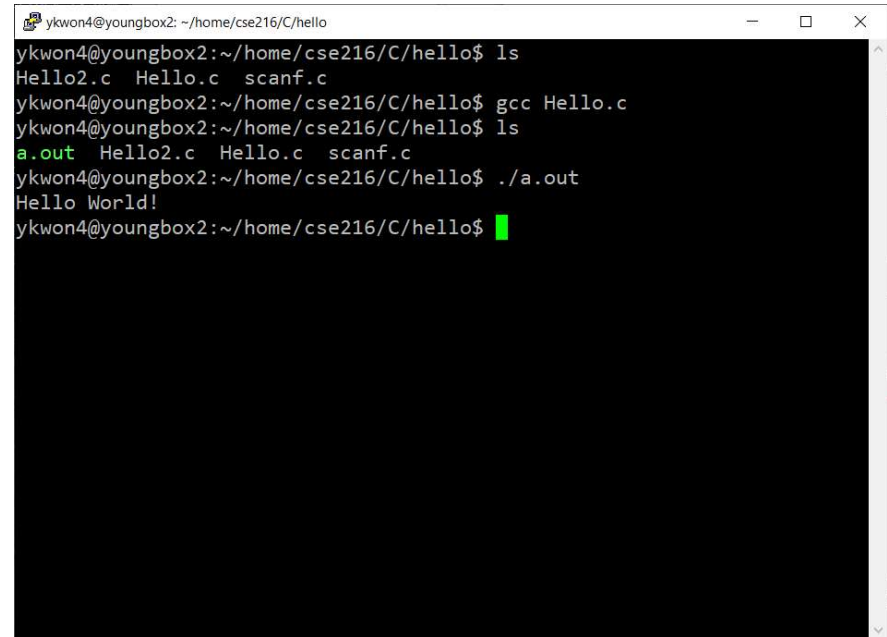


Write Hello.c

```
//  
// Hello.c  
//  
#include <stdio.h>  
  
int main() {  
    printf("Hello World!\n");  
    return 0;  
}
```

Compilation and Execution

- To compile
 - gcc Hello.c
- To execute
 - ./a.out (Linux)
 - ./a.out (Mac)
 - a.exe (Windows)



```
ykwon4@youngbox2: ~/home/cse216/C/hello
ykwon4@youngbox2:~/home/cse216/C/hello$ ls
Hello2.c Hello.c scanf.c
ykwon4@youngbox2:~/home/cse216/C/hello$ gcc Hello.c
ykwon4@youngbox2:~/home/cse216/C/hello$ ls
a.out Hello2.c Hello.c scanf.c
ykwon4@youngbox2:~/home/cse216/C/hello$ ./a.out
Hello World!
ykwon4@youngbox2:~/home/cse216/C/hello$
```

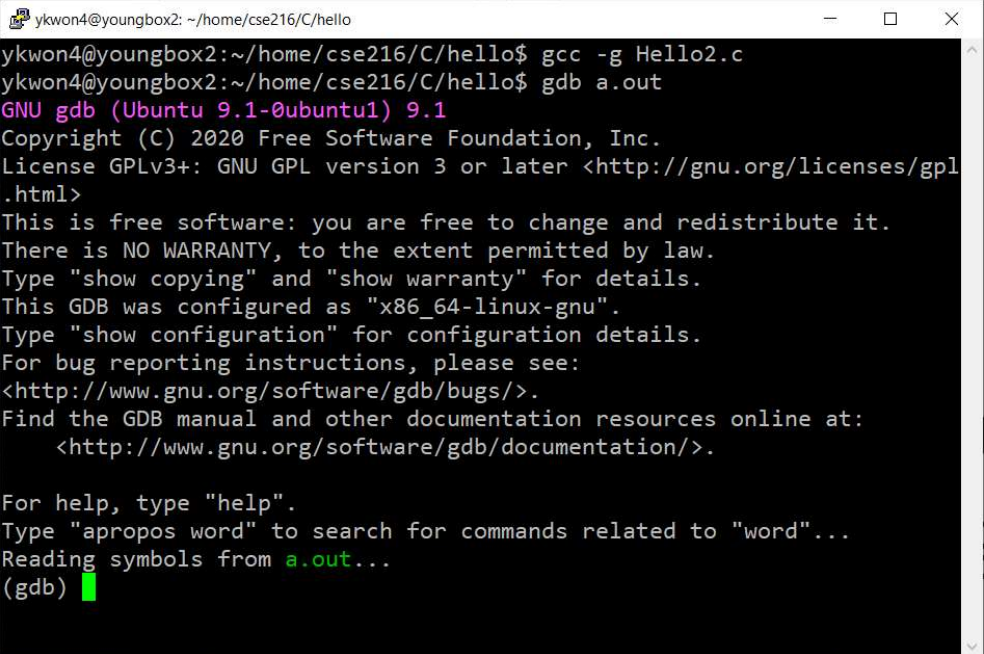
Debugging

- Write Hello2.c
- Compile Hello2.c with debugging enabled
 - `gcc -g Hello2.c`
- To debug
 - `gdb a.out`

```
//Hello2.c
#include <stdio.h>

void greeting() {
    char name[100];
    printf("Enter your name: ");
    scanf("%s", name);
    printf("Hello %s.\n", name);
}

int main() {
    greeting();
    return 0;
}
```



A terminal window showing the compilation and debugging process. The window title is "ykwon4@youngbox2: ~/home/cse216/C/hello". The terminal output is as follows:

```
ykwon4@youngbox2:~/home/cse216/C/hello$ gcc -g Hello2.c
ykwon4@youngbox2:~/home/cse216/C/hello$ gdb a.out
GNU gdb (Ubuntu 9.1-0ubuntu1) 9.1
Copyright (C) 2020 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl
.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
Type "show copying" and "show warranty" for details.
This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.

For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from a.out...
(gdb) █
```

Debugging

- To set a break point
 - break main
 - break Hello2.c:7
- To start the program
 - run
- Next/Step/Continue/Finish
 - n s c finish
- To see the stack trace
 - bt
- To examine a variable
 - p name
- To stop debugging
 - quit

```
ykwon4@youngbox2: ~/home/cse216/C/hello
Reading symbols from a.out...
(gdb) break main
Breakpoint 1 at 0x11fc: file Hello2.c, line 11.
(gdb) break Hello2.c:7
Breakpoint 2 at 0x11b5: file Hello2.c, line 7.
(gdb) run
Starting program: /home/ykwon4/home/cse216/C/hello/a.out

Breakpoint 1, main () at Hello2.c:11
11     int main() {
(gdb) n
12     greeting();
(gdb) s
greeting () at Hello2.c:4
4     void greeting() {
(gdb) c
Continuing.

Breakpoint 2, greeting () at Hello2.c:7
7     scanf("%s", name);
(gdb) bt
#0  greeting () at Hello2.c:7
#1  0x000055555555520e in main () at Hello2.c:12
(gdb) n
Enter your name: YoungMin
8     printf("Hello %s.\n", name);
(gdb) p name
$1 = "YoungMin", '\000' <repeats 24 times>, "@@UUUU\000\000\377\265\360
\000\000\000\000\000\302\000\000\000\000\000\000\000\027\340\377\377\37
7\177\000\000\026\340\377\377\377\177\000\000mRUUUU\000\000\350\062\370
\367\377\177\000\000 RUUUU\000\000\000\000\000"
(gdb) finish
Run till exit from #0  greeting () at Hello2.c:8
Hello YoungMin.
main () at Hello2.c:13
13     return 0;
(gdb) c
Continuing.
[Inferior 1 (process 729477) exited normally]
(gdb) quit
ykwon4@youngbox2:~/home/cse216/C/hello$
```