UC San Diego

C Programming

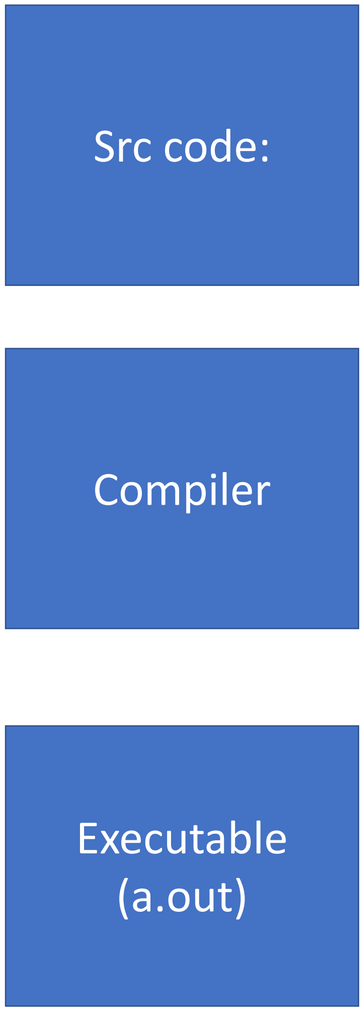
- Portable – many platforms
- Procedural thought process
- No built-in objects

  data separate from methods/functions

- Low memory overhead v. Java
  - No overhead of classes
  - No abstract machine – compile directly to ISA
  - Fast – write OS kernel in C
- Heap memory management manual
- Pointers can manipulate shared data (but with few checks)

The C Runtime Environment - Overview

- In Java, the compiler is javac and the executable are java byte codes
- In C, the compiler is cc (or gcc) and the executable are machine instructions

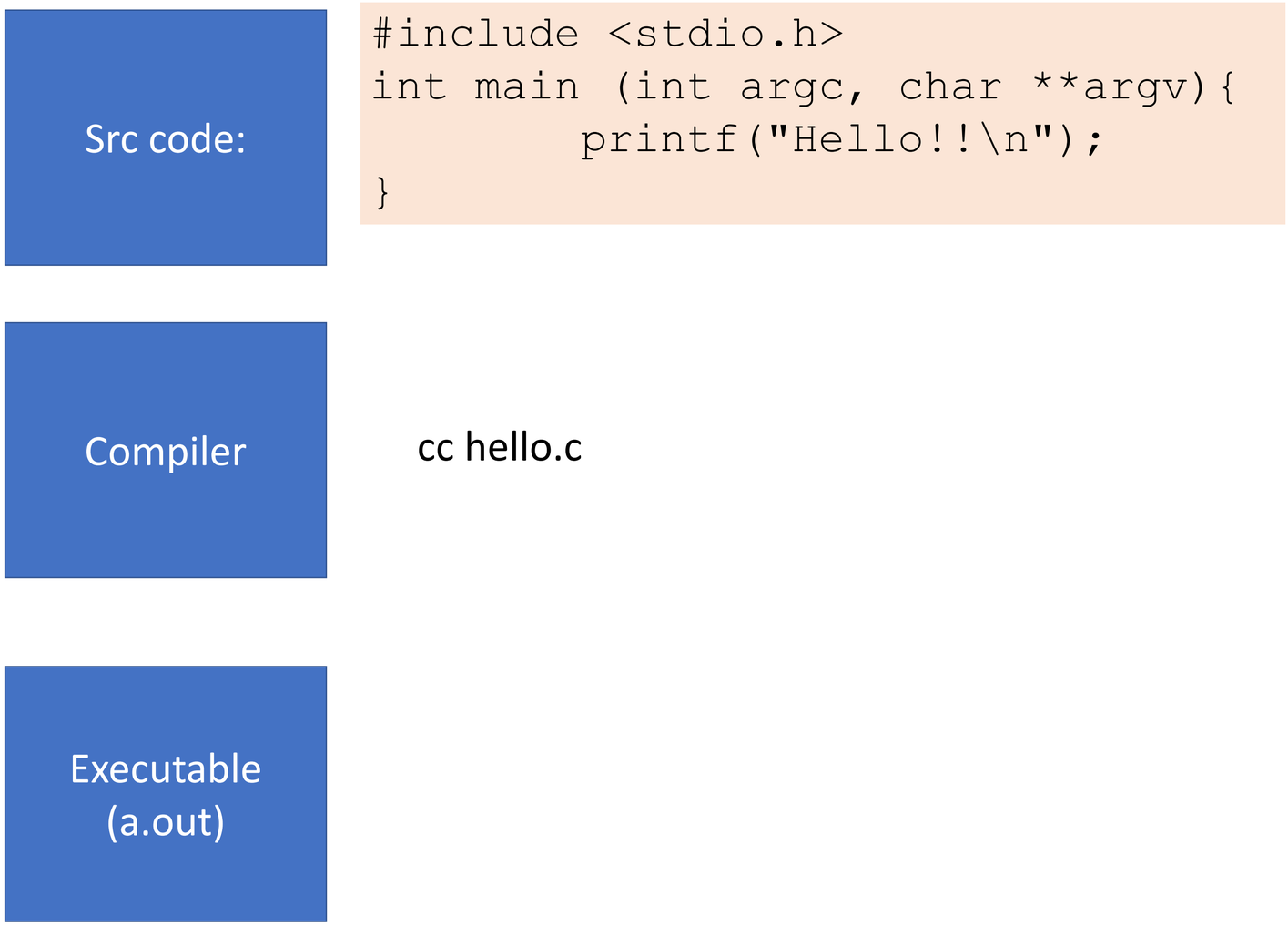



```
#include <stdio.h>
int main (int argc, char **argv){
        printf("Hello!!\n");
}
```

cc hello.c

The C Runtime Environment - compilation

- **cc** (or gcc – the GNU c compiler)
- The C compiler takes the source and converts it to machine code:
- 2 stages
  - Compiling
  - Linking – link all compile output together and associate with libraries
  - (plus assembly)
- By default, cc does both compile and link phase.



The C Runtime Environment - Execution

- By default, binary (executable) is called a.out.
- The “1” and “0” ‘s represent machine instructions

```
bwc@bryanWindoze:~/cse30/tmp$ ./a.out
Hello!!
bwc@bryanWindoze:~/cse30/tmp$
```

Src code:

```
#include <stdio.h>
int main (int argc, char **argv){
        printf("Hello!!\n");
}
```

Compiler

Executable (a.out)

```
0002560 f839 8948 74e5 4819 058b 0a5a 0020 8548
0002600 74c0 5d0d e0ff 2e66 1f0f 0084 0000 0000
0002620 c35d 1f0f 0040 2e66 1f0f 0084 0000 0000
0002640 8d48 693d 200a 4800 358d 0a62 0020 4855
0002660 fe29 8948 48e5 fec1 4803 f089 c148 3fe8
0002700 0148 48c6 fed1 1874 8b48 2105 200a 4800
0002720 c085 0c74 ff5d 66e0 1f0f 0084 0000 0000
0002740 c35d 1f0f 0040 2e66 1f0f 0084 0000 0000
```