
CSE 351 Section 1

Binary, C
Winter 2023

Us!

<TA1, talk about yourself>

<Why are you here? What do you want from this space?>

<TA2 talk about yourself>

<Why are you here? What do you want from this space?>

Y'all!

- *Science says* that learning happens best in groups that relate to each other!
- Name, pronouns if you like, and...
- Why are you taking 351? Any hopes for this space?
- Favorite thing about winter?
- Favorite breakfast and/or late night snack (they're basically the same for me)
 - Do you do anything to make it yours?

Binary and Hexadecimal

- The (decimal) value of the digit d in position i in base b is: $d \times b^i$
 - Digits are numbered starting from 0 from right-to-left
- Pay special attention to base indicators
 - Subscripts: 8, 10_2 , BA_{16}
 - Prefixes: 0b (binary), 0x (hex)
- Common pitfalls
 - Arithmetic in hex
 - Digit widths and leading zeros

Binary	Decimal	Hex
0b0000	0	0x0
0b0001	1	0x1
0b0010	2	0x2
0b0011	3	0x3
0b0100	4	0x4
0b0101	5	0x5
0b0110	6	0x6
0b0111	7	0x7
0b1000	8	0x8
0b1001	9	0x9
0b1010	10	0xA
0b1011	11	0xB
0b1100	12	0xC
0b1101	13	0xD
0b1110	14	0xE
0b1111	15	0xF

Converting TO Decimal

- Use the formula: $d \times b^i$
- Let's try it: Convert 345_8 into decimal:

Converting FROM Decimal

- Remember: write down powers of the base, it's like long-division
- Let's try it: Convert 234 into base 7 (powers of 7 are 1, 7, 49):

Converting Binary TO Hexadecimal

- Convert each group of 4 binary digits into one hex digit
- Let's try it: Translate 0b111100 into hex:

Binary	Decimal	Hex
0b0000	0	0x0
0b0001	1	0x1
0b0010	2	0x2
0b0011	3	0x3
0b0100	4	0x4
0b0101	5	0x5
0b0110	6	0x6
0b0111	7	0x7
0b1000	8	0x8
0b1001	9	0x9
0b1010	10	0xA
0b1011	11	0xB
0b1100	12	0xC
0b1101	13	0xD
0b1110	14	0xE
0b1111	15	0xF

Converting Binary FROM Hexadecimal

- Convert each hex digit into binary
- Let's try it: Translate 0x1AB into binary:

Binary	Decimal	Hex
0b0000	0	0x0
0b0001	1	0x1
0b0010	2	0x2
0b0011	3	0x3
0b0100	4	0x4
0b0101	5	0x5
0b0110	6	0x6
0b0111	7	0x7
0b1000	8	0x8
0b1001	9	0x9
0b1010	10	0xA
0b1011	11	0xB
0b1100	12	0xC
0b1101	13	0xD
0b1110	14	0xE
0b1111	15	0xF

Binary Practice Slide (Worksheet)

Binary	Decimal	Hexadecimal
0b10010011		
		0x16
	63	
0b100100		
		0xC30
	0	
		0xBAD
	437	

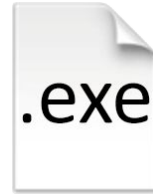
C Workflow

1) Edit source file(s)



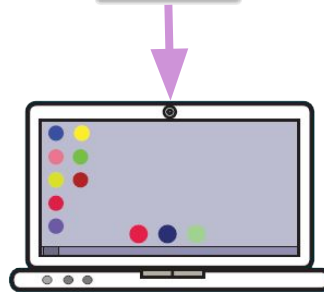
Text editor
(e.g., vim, emacs)

2) Build executable



Compiler
(e.g., gcc)

3) Run process



Command line
(e.g., ./a.out)

Compilation Options (C's a bit antiquated)

```
gcc -Wall -Wextra -Werror -g -std=c18 -o foo  
foo.c
```

- `-Wall` turns on compiler warnings (all of them)
- `-Wextra` turns on more warnings (more than “all”)
- `-Werror` turns warnings into errors (so they’re not missed)
- `-g` turns on debugging symbols
- `-std` specifies which “standard” of C we are using
- `-o` changes the name of the resulting executable
- `foo.c` is the source file being compiled

Compiling and Executing Slide (Ed Lessons)

printf Format Specifiers

The printf function prototype:

```
int printf(const char* format, ... );
```

- %d for signed integers
- %u for unsigned integers
- %f for floating point numbers
- %s for "string"
- %x for hexadecimal
- %p for pointer

printf Slide (Ed Lessons)