Discussion 2

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Outline

- gcc command
- basic C syntax
- Bit manipulation

Compiler command

- gcc hello.c
- gcc -o hello

Structure of hello world program

- comment
- include
- function call
- escape sequence: \n
  - \r, \t, \", \\
- semicolon

Format Strings

Format Strings

- %c
- %d
- %e
- %E
- %f
- %s
- %u
- %x

Data Types in 32-bit Linux/x86 environment

In C: char
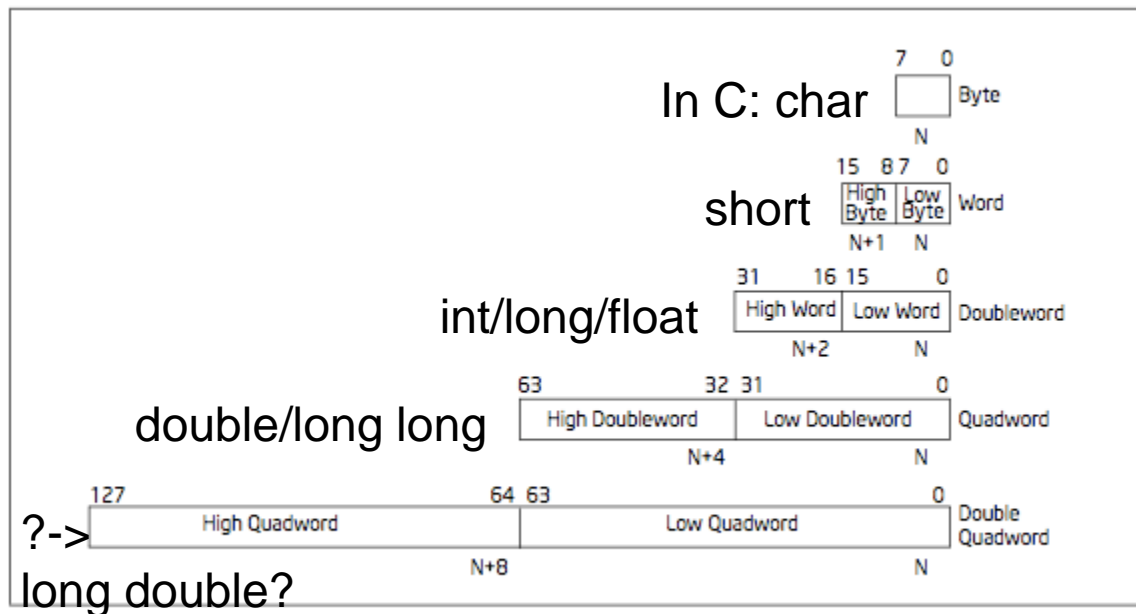
short

int/long/float

double/long long

?-> long double?

Figure 4-1. Fundamental Data Types

iclicker question

float x = 2.3
What is the size of x?
(A) 1 byte
(B) 2 bytes
(C) 4 bytes
(D) 8 bytes

Bit Manipulation

- * bitwise MULTIPLY
- + bitwise ADD
- ^ bitwise XOR
- & bitwise AND
- | bitwise OR
- ~ one's complement
- \>> right shift
- << left shift
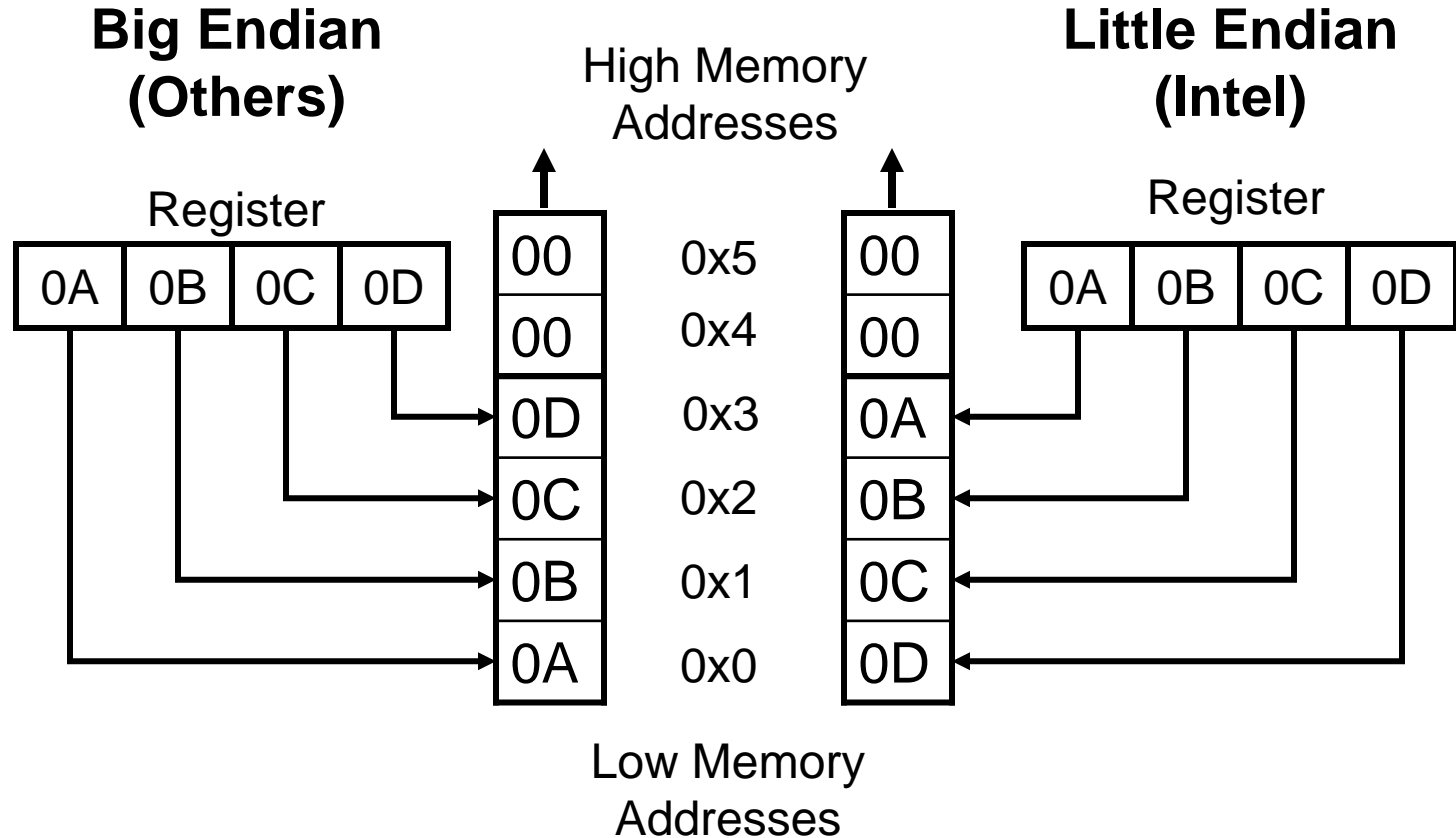 - assigning bytes in to an integer

In-class activity

Work the following operations. Assume that operands are eight-bit numbers.
- 00000100 * 00000011= ?
- 00000111 << 2 = ?
- 11111101 >> 2 = ? (signed shift)
- 11111101 >> 2 = ? (unsigned shift)
- 00001011 & (~0 << 2) = ?
- 00001101 ^ 00000101 = ?
- 00000100 | 00001011 = ?

Endianess

Big Endian (Others)

Register

0A	0B	0C	0D

Little Endian (Intel)

Register

0A	0B	0C	0D

High Memory Addresses

Big Endian	Address	Little Endian
00	0x5	00
00	0x4	00
0D	0x3	0A
0C	0x2	0B
0B	0x1	0C
0A	0x0	0D

Low Memory Addresses

Common bit task

Get ith bit
- – Left shift 1 over i bits
- – Perform AND
- – Compare result to 0

Set ith bit
- – Left shift 1 over i bits
- – Perform OR

Clear ith bit
- – Left shift 1 over i bits and negate it
- – Perform AND

End