16.216: ECE Application Programming

Summer 2015

Lecture 9: Key Questions
June 16, 2014

1. Describe how to represent decimal values in binary (base 2) and hexadecimal (base 16) and how to convert between those bases.

2. Describe the C bitwise operators.

3. Explain C bit shift operators and their uses.

4. **Example:** Evaluate each of the following expressions if you have the following `unsigned int` variables: `A = 7, B = 10, and C = 0xFFFFFFFF`

a. `A & B`

b. `A | ~B`

c. `A ^ C`

d. `A << 4`

e. `B >> 5`

f. `A | (B << 2)`

5. **Example:** Given an `unsigned int`, `n`, and a number, `b`, how would you:

a. Clear all bits of `n`?

b. Clear the lower 16 bits of `n` (mask out lower bits)?

c. Flip all bits of `n`?

d. Flip bit `b` of `n`?

e. Set bit `b` of `n` (i.e., make sure bit `b` is 1)?

f. Clear bit `b` of `n` (i.e., make sure bit `b` is 0)?

6. Describe how, in general, you perform the operations below on a bit or range of bits:
a. Setting bit(s) (desired bit(s) = 1, all others unchanged)

b. Clearing bit(s) (desired bit(s) = 0, all others unchanged)

c. Flipping bit(s) (desired bit(s) change from 0→1 or 1→0, all others unchanged)

7. Describe how to extract a group of bits from a larger value.

8. Describe how to print hexadecimal values.