16.216: ECE Application ProgrammingSpring 2015

Lecture 31: Key Questions April 22, 2015

1. a.	Example: Given an unsigned int, n, and a number, b, how would you: 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)?

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- 2. 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 $0 \rightarrow 1$ or $1 \rightarrow 0$, all others unchanged)

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

4. Describe how to print hexadecimal values.

5. Describe what a structure is in C, and how structures can be useful.

6. Explain how we can essentially declare our own types using structures.

7. Show how variables of a given structure type can be declared and initialized.

8. Show how elements within a structure can be accessed.

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9. **Example:** What does the following program print?

```
#include <stdio.h>
typedef struct {
     double real;
     double imag;
} Complex;
int main() {
     Complex a = \{1, 2\};
     Complex b = \{3.4, 5.6\};
     Complex c, d, e;
     printf("A = %.21f + %.21fi\n", a.real, a.imag);
    printf("B = %.21f + %.21fi\n", b.real, b.imag);
     c = a;
     d.real = a.real + b.real;
     d.imag = a.imag + b.imag;
     e.real = a.real - b.real;
     e.imag = a.imag - b.imag;
     printf("C = %.21f + %.21fi\n", c.real, c.imag);
     printf("D = %.21f + %.21fi\n", d.real, d.imag);
     printf("E = %.21f + %.21fi\n", e.real, e.imag);
     return 0;
}
```