CS1520 Computer Architecture

# Revision

How to manage complexity

Abstraction

Discipline

The three y’s

- hierarchy

A system divided into modules and sub modules

- modularity

Having well-defined functions and interfaces

- regularity

Encouraging uniformity so modules can be easily reused.

Binary quantities only take 2 states- on or off.

## Number systems

Decimal:

1234510 = 1\*104 + 2\*103 + 3\*102 + 4\*101 + 5\*100

Binary:

11012 = 1\*24 + 1\*23 + 0\*21 + 1\*20

Convert from decimal to binary: Repeatedly divide number by 2, put down the remainder (0 or 1), read final binary value bottom up (in reverse).

How many values? 10n

Range = [0,10n -1]

E.g. 3 digit decimal number

103 = 1000

range = [0,999]

Binary:

2n

Range [0,2n -1]

E.g. 3 digit binary number

23 = 8 possible values

Hexadecimal:

Each letter/number represents a 4-bit binary value.

e.g.

4AFh (h is for hexadecimal)

0x4AF (different way to represent hex)

Convert hex to decimal

4AF16 = (4\*162) + (10\*162) + (15\*162)

Binary addition – add up 0’s and 1’s, two 1’s carry over to the next bit

# Signed Integers

Signed integers use the most significant bit (leftmost one) to show if the number is negative or positive, - or +.