Reading Journal

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**Week 01**

**Base (or Radix) is the number of different countable digits used in a number system.** To read numbers you must look at the placement of the digits. In a decimal two-digit number, the leftmost digit is actually ten times the value of the presented digit. For example, in the number 36, the ‘3’ is actually 3x10. In binary, however, there are only two digits, 0 and 1. Counting in binary is a little different as the leftmost digit is multiplied by 2 to the power of the digit’s position. Hexadecimal uses 16 digits, 0-9 A-F. You can convert binary to hex by splitting the binary number into groups of four digits (if the amount of digits left isn’t four, you can add zeroes as padding) and convert the smaller numbers. To convert hex to binary you separate the individual digits in the hex number and convert them into binary.

Computers use binary (or bits) as a way to store and process information. Most computers nowadays process binary in 64-bit chunks called ‘words’. **A word is the number of bits a computer can process in one go and has a defined bit length.** The rightmost bit in a word is the least significant bit, and the leftmost is the most significant bit. Without encoding, each bit has a unique coding, but with Two’s Complement encoding the most significant bit can be used as a way to differentiate between positive and negative numbers. If the most significant bit is a 1 the number is negative, and if it is 0 it is positive. I’m a little confused about w bits. If there is an unsigned number that needs more bits you must use a zero extension, which is simply adding more zeroes to the left of the number until it reaches the desired number of bits. For a signed number, you must perform a sign extension. To do this, you continue to add the word’s sign bit until it reaches the desired length.