

Notes

Binary, bytes and hexadecimals, Unit 2

Bits

A bit is a single entry of data, a 1 or 0 that the computer can read and understand as on or off. These bits are combined together to tell the computer everything it needs to know. These conversions are stored in a format called ASCII.

Bytes

Computer storage works 8 bits at a time. With hat many bits in a row we can create 256 unique combinations. To make it easier for people using computers we call these sections bytes. 8 bits are 1 byte. Bits are read left to right and have a space in the middle (0100 0001).

Usually the operating system tells your computer how to break up your bytes, you most likely have a x64 bit OS (when downloading files this is important). The 64 bit means that data is usually stored in a 8 byte format for instance: (a = 00000000 00000000 00000000 00000001)

For developers we always deal in groups of 8 bits or 1 byte so we say (1= 0000 0001, 1011 = 0000 1011, 10001 = 0001 0001) (52 = 0011 0100)

Byte Conversions

Saying we have 1,000,000 bytes of storage is annoying, so we convert every 1000 into a shorter way of saying it. For example, 1,02 bytes is a kilobyte and 1,048,576 bytes is a megabyte. And now we can use code to help us with conversions.

Bytes to Decimal to Hexadecimal

Every counting system is done with a base in mind, how many times you count before moving to the next digit. We count in a base 10 system. 0-9 and then we move to the tens place which has its own 0-9. Bytes are in binary which is a base 2 system. 0-1 and then it moves to the next digit. Hexadecimal is in base 16. 0-9, A, B, C, D, E, F and then it changes to the next digit.

Example: (18/16 = 1R2, 1/16 = 0R1, 18 = 12)

Byte to Number Conversion

0110 1010. The first 0 (right to left) is 1, then 2, 4, 8, 16, 32, 64, 128. So that means 0110 1010 is 106.

Hexadecimal to Number Conversion

A1. The first 1 (right to left) is 1, then 16, then 32 etc. So that means A1 is 161.

Hexadecimal to Binary

AA. A is equal to 10, and 10/2 is 5R0, 5/2 is 2R1, 2/2 is 1R0, 1/2 is 0R1, so AA is 1010 1010

Binary to Hexadecimal

1011 0110. 0 (right to left) is 1, 2, 4, 8 and 1 (right to left) is 1, 2, 4, 8. So 1011 0110 is B6