Internal Representation of Information

All information is represented in binary within the computer

Registers and memory hold information as bit patterns

- integers (signed and unsigned)
- real numbers (floating point)
- instructions
- characters

Information is stored using digital devices

- These devices can represent 1 (on) or 0 (off)
- Hence binary (base 2) is a natural representation

The meaning of the patterns depend on their interpretation

- And on the context in which they are used
- The same bit pattern can mean entirely different things

MIPS registers and memory words hold 32 bits

The 32-bit pattern can represent:

- a single 32-bit integer (signed or unsigned)
- a single precision floating point number
- a single machine instruction
- a group of 4 ASCII characters

A 32-bit pattern can be written as 8 hex digits:

Example: given the pattern 0x21626364

As an integer it represents **560096100** (decimal)

As floating point it represents **1.7686579×2^{-61}**

As a machine instruction it is **addi $2,$11,25444**

As ASCII characters it represents **!bcd**

The following videos explain these different encodings

They also review integer and floating point arithmetic

This will serve as a basis for discussing:

- The ALU operation and implementation
- The design and operation of the floating point hardware