ISA - Instruction Set Architecture (V)

Real Instruction Formats

**PDP-8**
- Released in 1965, discontinued in 1970
- Simplest instruction design for general purpose computers
- 12-bit fixed length, 12-bit words
- A single GPR, Accumulator
- Three instruction formats

**PDP-10**
- Released in 1966, discontinued in 1983
- Designed for large-scale time-shared system
- Emphasis on making system easy to program regardless the hardware expenses
- Other elements of an instruction are independent of the opcode
- Each arithmetic data type should have a complete and identical set of operations
- 36-bit fixed length instruction
- 36-bit word length: 9 bits for opcode, 18-bit address field

**PDP-11**
- Released in 1970, discontinued in early 1990s
- Most popular minicomputer, the first officially named version of Unix ran on it
- Uses variable-length instructions
- 13 instruction formats, encompassing 0-, 1-, and 2-memory address instruction types
- Usually one word (16-bit) long. For multiple memory address instructions, 32- and 48-bit instructions are used
- 6 bits for register reference: 3 bits identify the register (employ 8 16-bit GPRs), and 3 bits for addressing mode
- Instruction set and addressing capability are complex. Increase hardware cost and programming complexity. But more compact program can be developed.