

### 32-bit instruction format

**32-bit instruction format fields:**

- opcode (1 byte)
- ext (2 bit)
- reg (4 bit)
- imm (4 bit)
- fp (1 bit)
- flag (1 bit)
- gr0 (4 bit)
- gr1 (4 bit)
- len (3 bit): length of 2nd operand

**Instructions and opcodes:**

| Instruction | Opcode |
|-------------|--------|
| push        | 0      |
| pop         | 1      |
| add         | 2      |
| sub         | 3      |
| mul         | 4      |
| div         | 5      |
| and         | 6      |
| or          | 7      |
| xor         | 8      |
| shl         | 9      |
| ldr (ld)    | 10     |
| ldm (ld)    | 11     |
| cmp         | 12     |
| jmp         | 13     |
| jg          | 14     |
| jz          | 15     |
| jl          | 16     |
| nop         | 17     |

### 16-bit instruction format

**16-bit instruction format fields:**

- len (1 byte)
- reg (1st operand) (4 bit)
- padding (1 byte)
- immediate or register (2nd operand) (12 bit)

**16-bit instruction format examples:**

| Instruction | len     | reg (1st operand) | padding | immediate or register (2nd operand) |
|-------------|---------|-------------------|---------|-------------------------------------|
| add         | {SPACE} | 1st operand       | ,       | 2nd operand                         |
| pop         | {SPACE} | 2nd operand       |         |                                     |