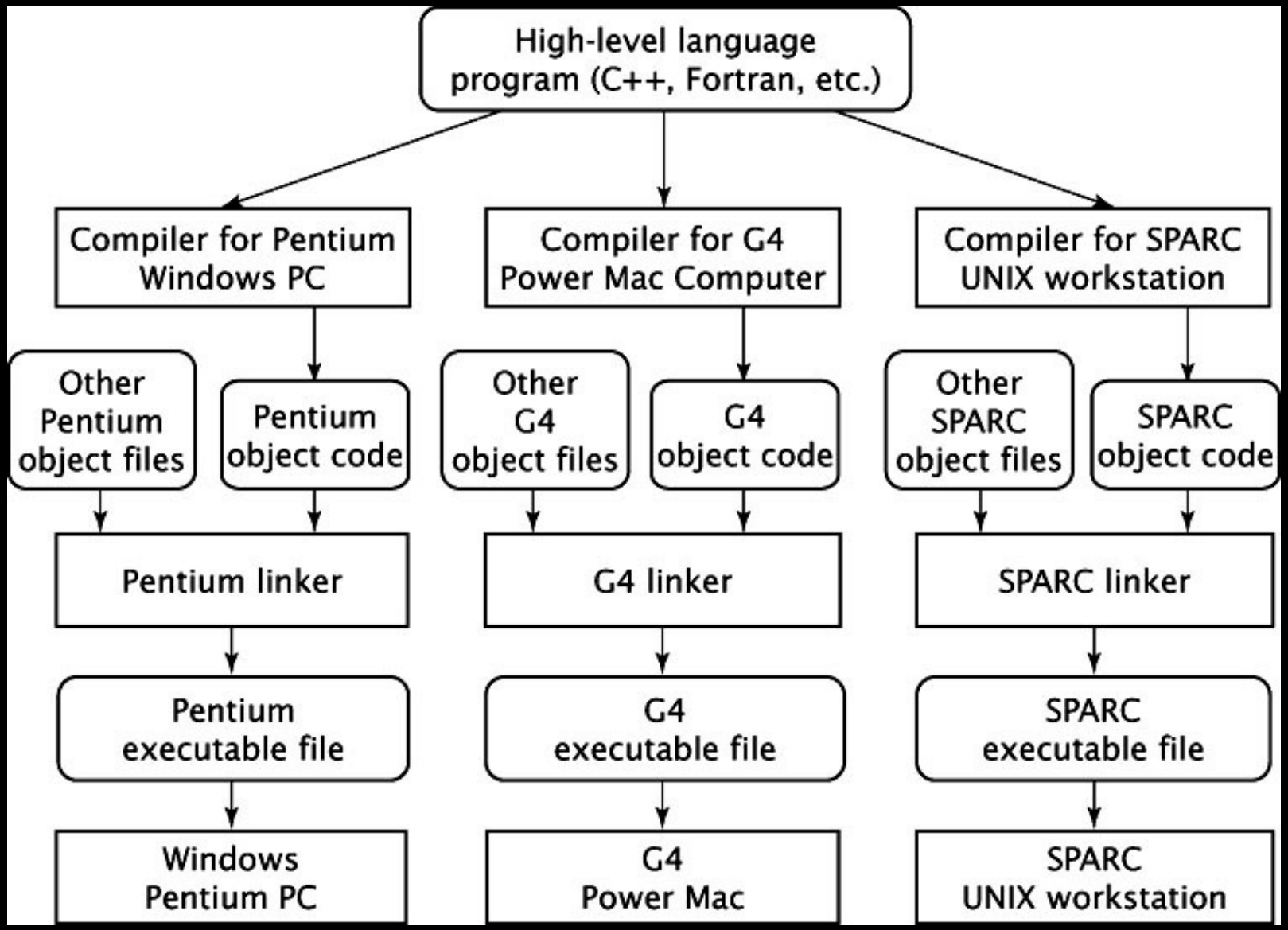
Instruction Set Architectures

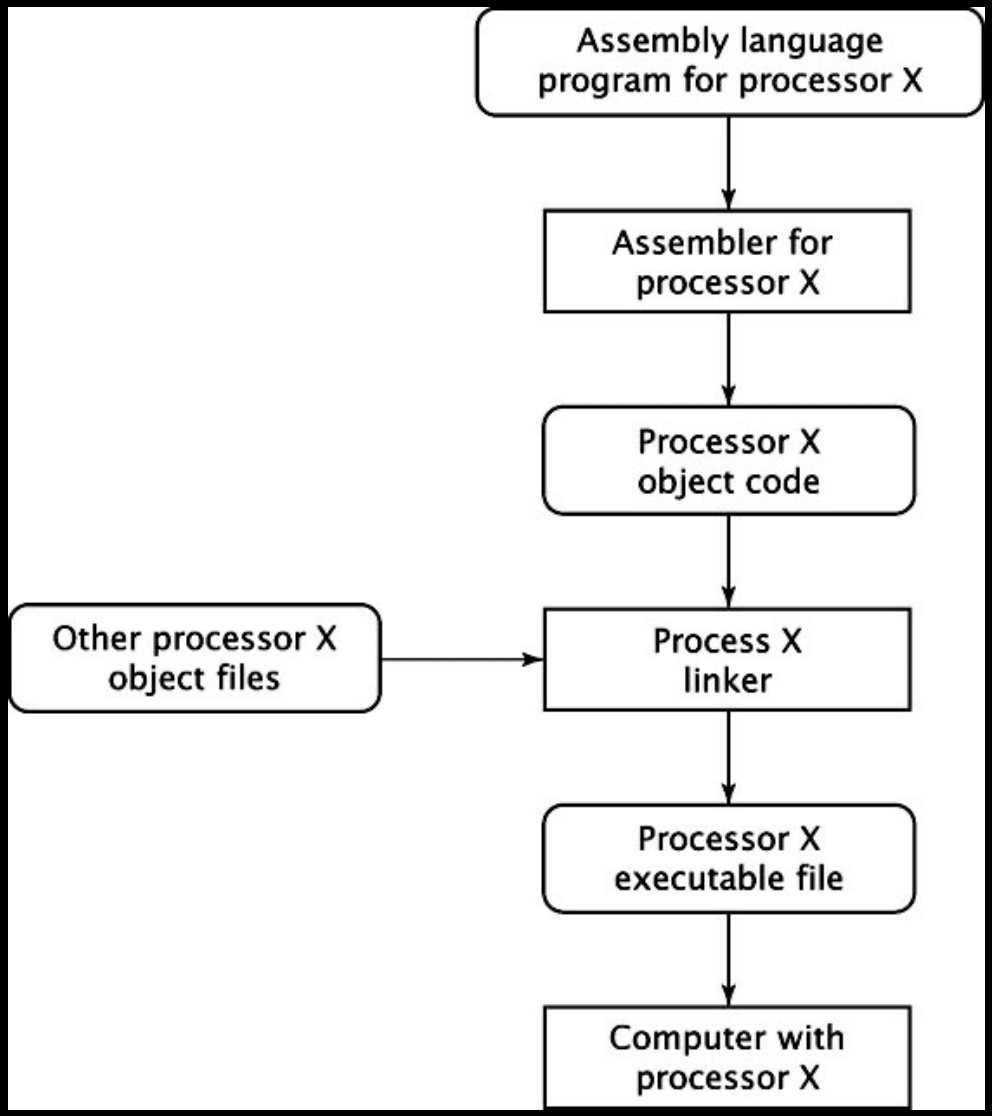
Programming Languages

- High level languages
- Assembly languages
- Machine languages

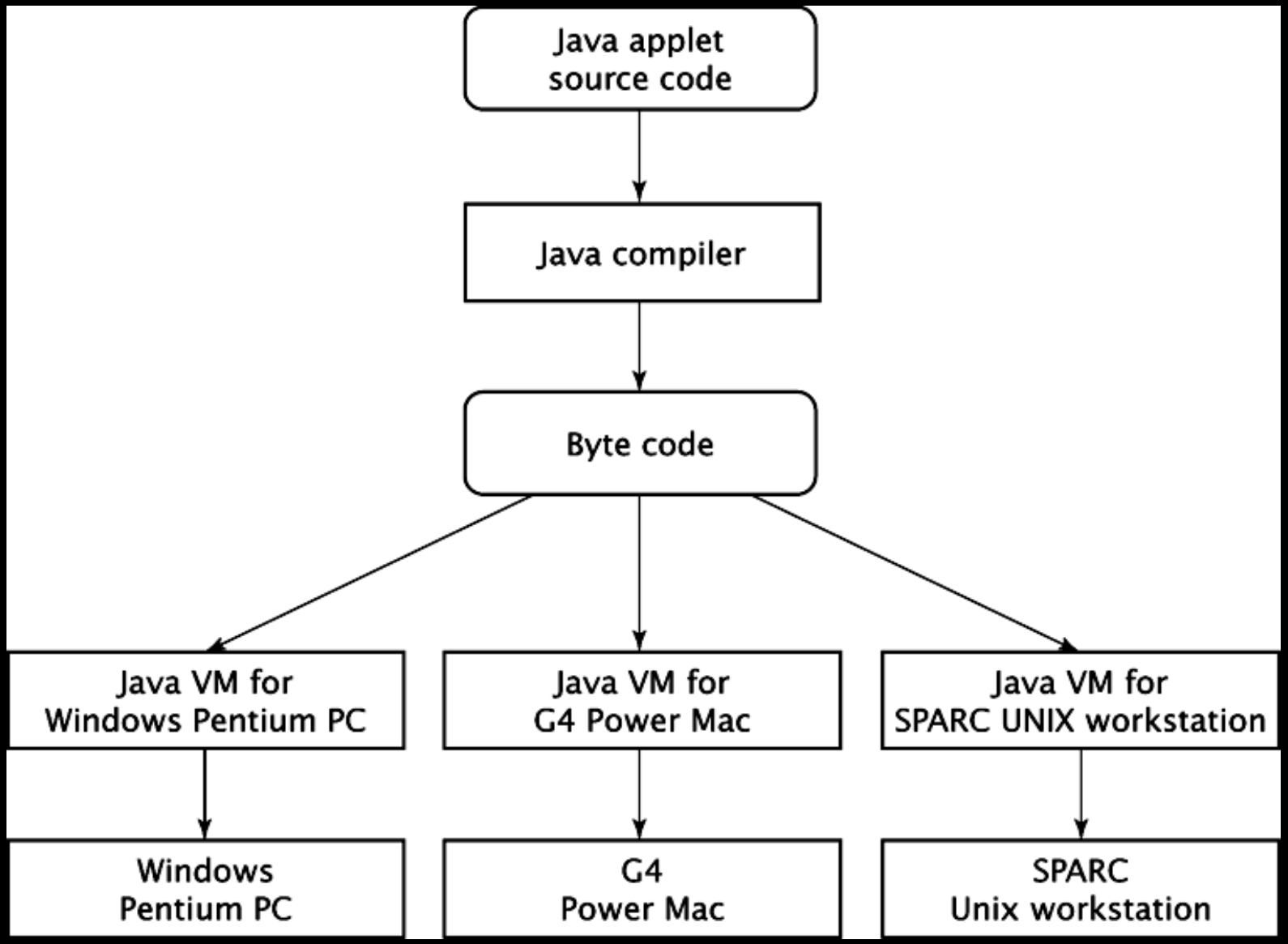
Compilation Process



Assembly Process



Java Applets



Assembly Language Attributes

- Instruction types
- Data types
- Addressing modes
- Instruction formats

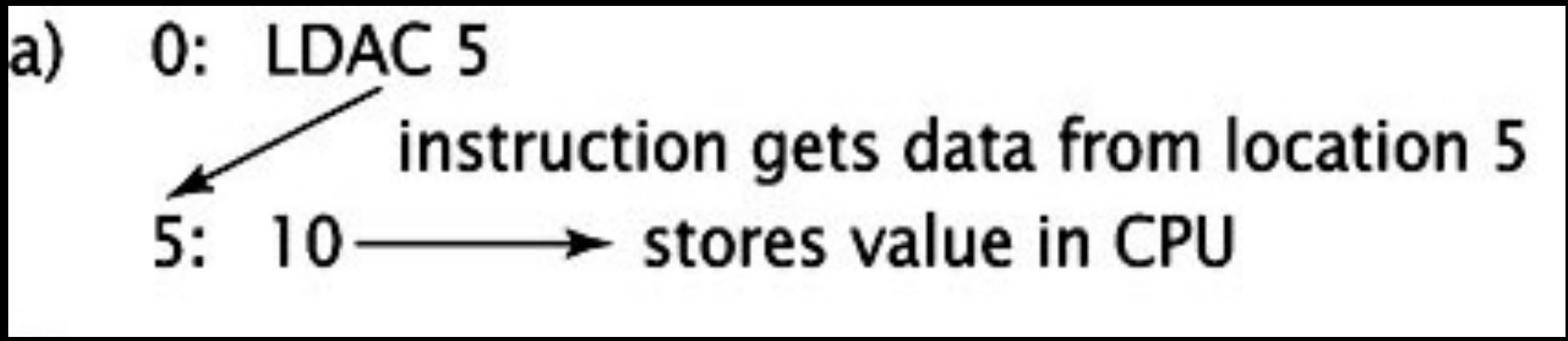
Instruction Types

- Data transfer
- Data operation
- Program control

Data Types

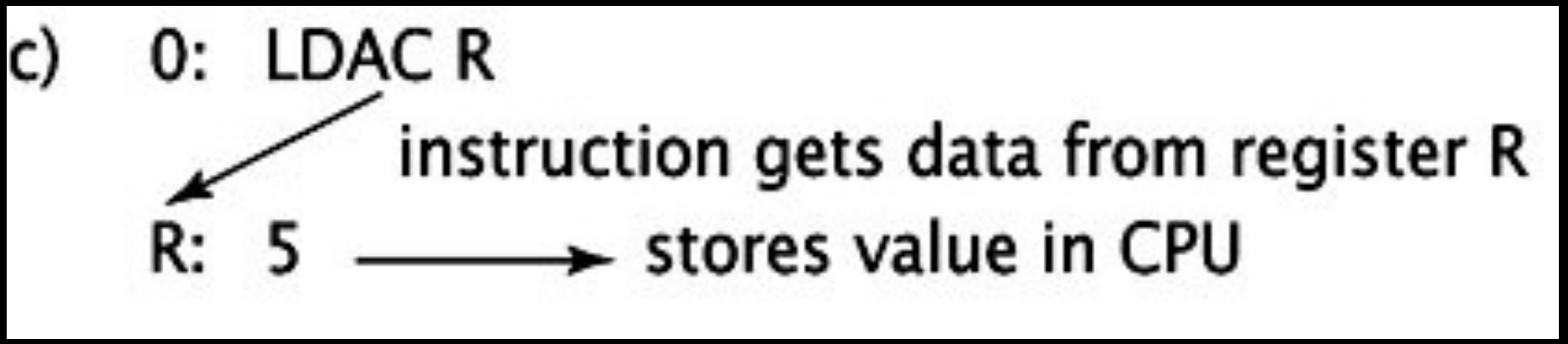
- Numeric (integer, floating point)
- Boolean (true, false)
- Character (ASCII, Unicode)

Addressing modes - Direct



Addressing modes - Indirect

Addressing modes - Register Direct

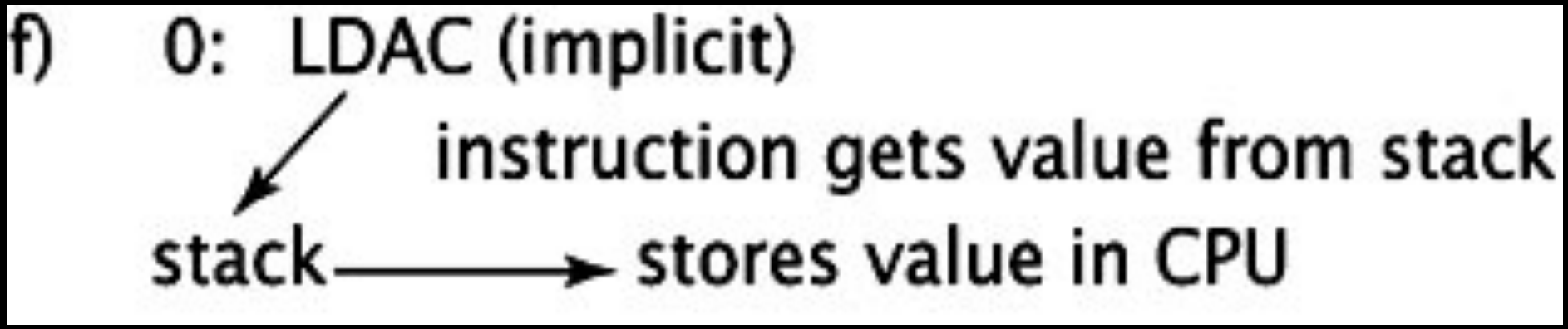


Addressing modes - Register Indirect

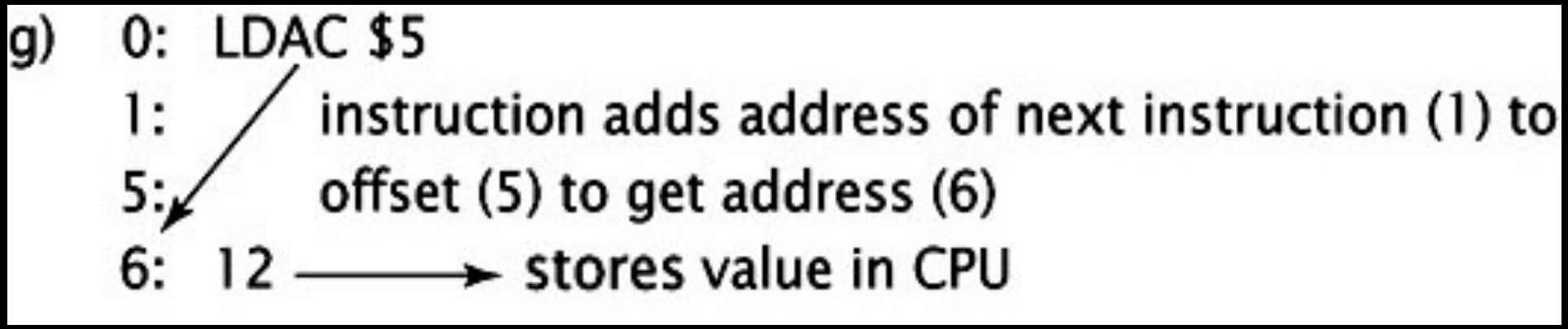
Addressing modes - Immediate

e) 0: LDAC #5 ⟶ stores value from instruction in CPU

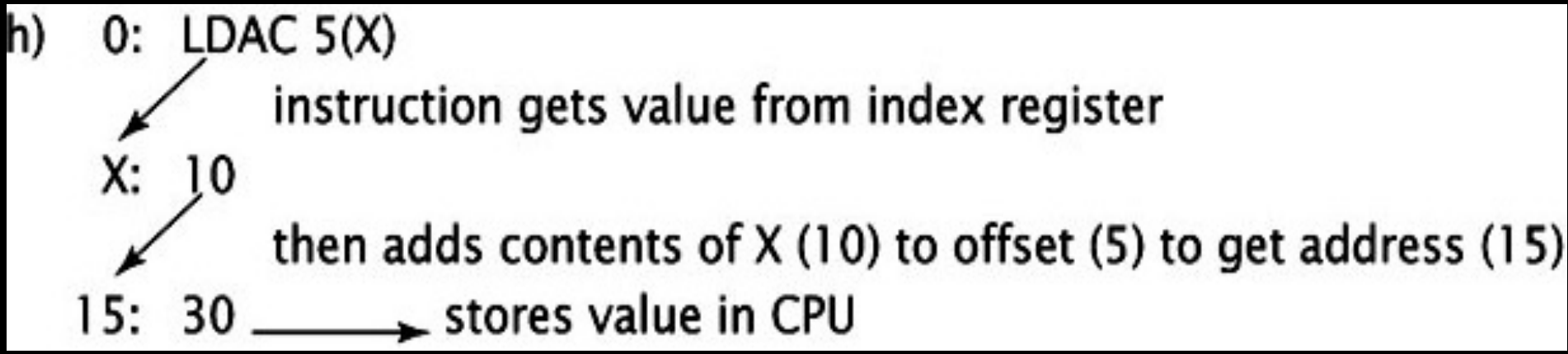
Addressing modes - Implicit



Addressing modes - Relative



Addressing modes - Indexed

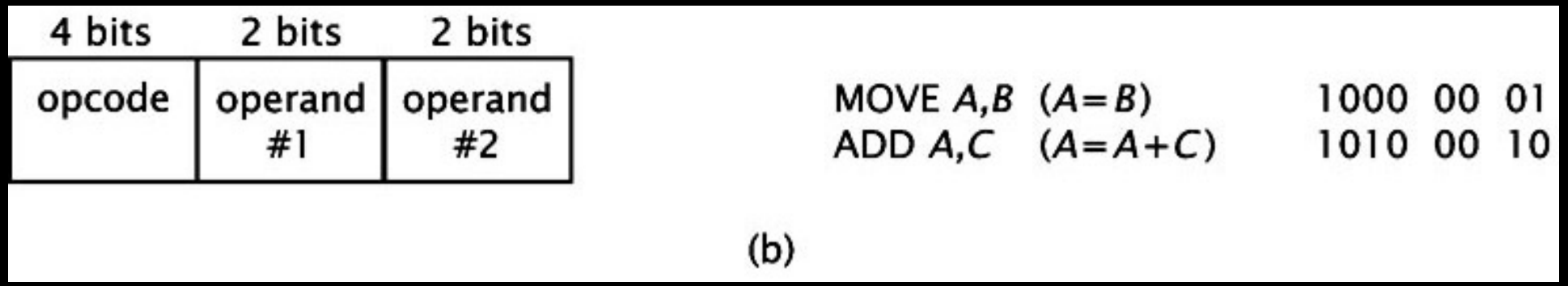


Instruction Formats

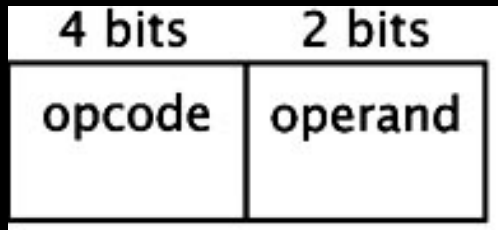
- More operands = less instructions
- More operands = larger words

3-operand Instructions

2-operand Instructions



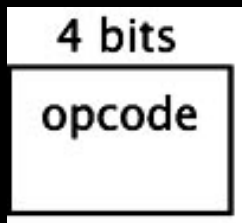
1-operand Instructions



LOAD *B*	(*Acc*=*B*)	0000 01
ADD *C*	(*Acc*=*Acc*+*C*)	1010 10
STORE *A*	(*A*=*Acc*)	0001 00

(c)

0-operand Instructions



PUSH *B*	(Stack=*B*)	0101
PUSH *C*	(Stack=*C*,*B*)	0110
ADD	(Stack=*B*+*C*)	1010
POP *A*	(*A*=stack)	1100

(d)