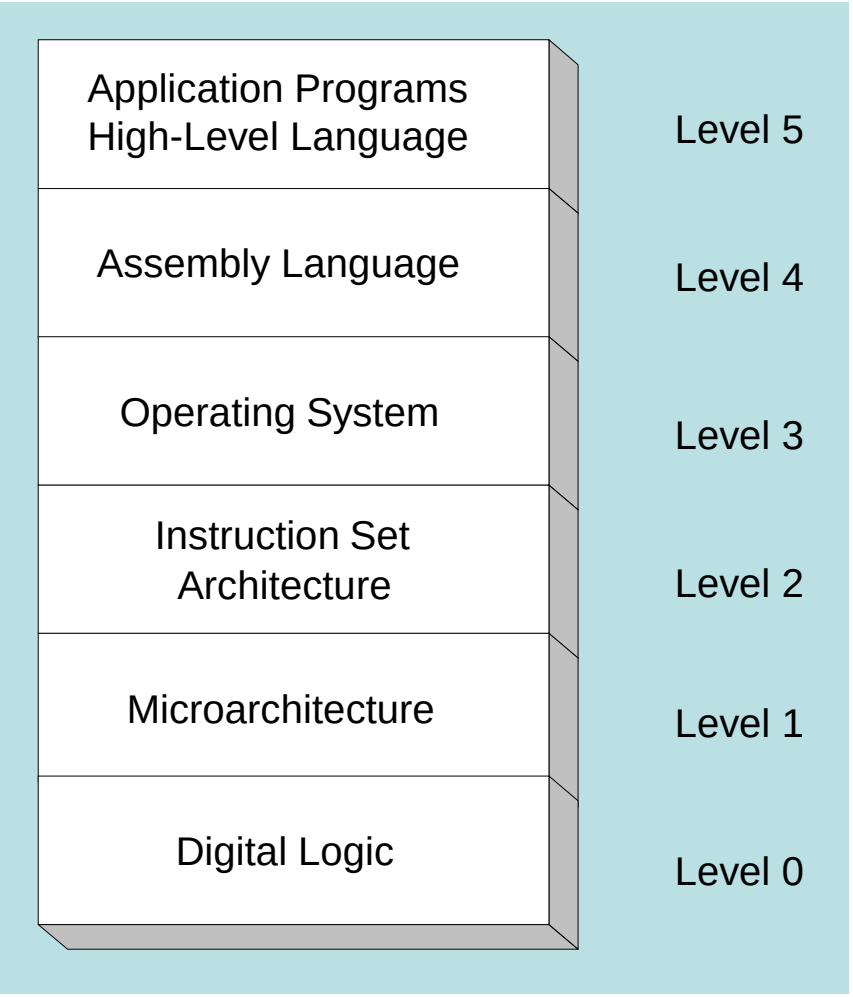
Programmer's View of a Computer System

Increased level of abstraction



Each level hides the details of the level below it

Programmer's View – 2

- Application Programs (Level 5)
  - Written in high-level programming languages
  - Such as Java, C++, Pascal, Visual Basic . . .
  - Programs compile into assembly language level (Level 4)
- Assembly Language (Level 4)
  - Instruction mnemonics are used
  - Have one-to-one correspondence to machine language
  - Calls functions written at the operating system level (Level 3)
  - Programs are translated into machine language (Level 2)
- Operating System (Level 3)
  - Provides services to level 4 and 5 programs
  - Translated to run at the machine instruction level (Level 2)

Programmer's View – 3

- Instruction Set Architecture (Level 2)
  - Specifies how a processor functions
  - Machine instructions, registers, and memory are exposed
  - Machine language is executed by Level 1 (microarchitecture)
- Microarchitecture (Level 1)
  - Controls the execution of machine instructions (Level 2)
  - Implemented by digital logic (Level 0)
- Digital Logic (Level 0)
  - Implements the microarchitecture
  - Uses digital logic gates
  - Logic gates are implemented using transistors

Instruction Set Architecture (ISA)

- Collection of assembly/machine instruction set of the machine
- Machine resources that can be managed with these instructions
  - Memory
  - Programmer-accessible registers.
- Provides a hardware/software interface