CHAPTER 5

- **Address space:** The number of memory cells that can be addressed individually for a given address size.
- **Arithmetic/logic unit (ALU):** The subsystem of a Von Neumann architecture that handles computations based in arithmetic, comparisons, or logical operations.
- **Cache memory:** A small, special-purpose, very fast memory used to temporarily store data values the computer is currently using in order to improve the computer's operation speed. Values are replaced in the cache as new values are used by the system.
- **Cell:** The smallest addressable collection of bits in a computer; these days cells are almost always 8 bits, or one byte, in size.
- **Computer organization:** The study of ways in which circuits and other functional units can be combined to create a fully functional computer.
- **Control unit:** The subsystem of a Von Neumann architecture that manages the execution of a program in the computer's memory by communicating with the other subsystems to fetch, decode, and execute the program's instructions.
- **Direct access storage device:** An archival storage device, such as a hard drive or a DVD, in which individual data values are stored and retrieved by address, with all locations essentially equal in retrieval times.
- **Fetch:** The process of retrieving a value from a memory location in order to put it in a register or pass it to a processing unit.
- **Functional units:** The different subsystems of a computer, each of which performs some specific portion of the computer's overall task. Functional units may include memory, computational, and control circuits to carry out their tasks.
- **I/O controller:** A special-purpose processor that mediates between the main computer processor and a specific input or output device. The processor records the request made by the main processor, leaving it free to continue other tasks, and interrupts the main processor when the input or output task is complete.
- **Input/Output:** The subsystem responsible for managing communications with external devices, including external memory storage devices, other processors, and human interaction devices.
- **Instruction set:** The set of codes that describe all the legal operations a particular computer can execute.
- **Interrupt signal:** The signal sent by an I/O controller to the main processor when its I/O task is complete.
- **Machine language:** The instruction set and rules for each instruction's operands that form the fundamental language for describing algorithms at the hardware/architecture level.
- **Memory:** The subsystem responsible for storing data values and moving values to and from memory locations.
- **Memory address:** An unsigned binary integer of some standard length that refers to a particular memory cell.
- **MIMD (multiple instruction stream, multiple data stream):** A parallel computer architecture in which multiple processors operate on their own sets of data with their own sets of instructions to perform multiple tasks simultaneously.

- **Op code:** An unsigned binary integer that is assigned to a specific task the hardware can perform.
- **Parallel processing:** An area of study of non-Von Neumann architecture that focuses on systems that can perform multiple instructions at the same time.
- **Random access memory (RAM):** The typical computer memory where each cell is addressed individually, and may be updated or accessed in time that is independent of the cell's location.
- **Read-only memory (ROM):** A memory that is usually very similar to RAM, except it may only be accessed, not updated.
- **Register:** A special kind of very fast memory that is referred to by name rather than by a memory address number. Registers often hold data values that are currently in use by the ALU or other subsystems of the architecture.
- **Sequential access storage device:** An archival device for storing data, such as a tape, where the data is stored sequentially on the tape, and access times depend on the position of the data on the tape.
- **Sequential execution of instructions:** A key component of a Von Neumann architecture, it is the idea that instructions are listed in some sequential order, and the computer executes one instruction at a time.
- **SIMD (single instruction stream, multiple data stream):** A parallel computer architecture in which multiple processors execute the same sequence of instructions on different pieces of data.
- **Store:** The process of writing a value to a memory cell.
- **Stored program concept:** A key component of a Von Neumann architecture in which the algorithm the computer executes is stored inside the computer in its memory, just like the data upon which the algorithm operates.
- **Von Neumann architecture:** The theoretical organization of a computer, developed by John Von Neumann, which has formed the basic architecture for most modern computers during the past fifty years.