Final Vocabulary

accessor method: A method that accesses an object or instance variable but does not change it.

ACK: “Acknowledgement message”, contains the sequence number of the correctly received packet. Notifies the node that it can discard its local copy and send the next message.

actual parameter: the expression/value supplied for a formal parameter of a method by the caller. Also known as arguments. (IE. In “a.transfer(b, 100.0)” the actual parameter is 100.0; also, the input 200.0 given when the method processDeposit is called).

address: the location where memory is stored in a computer. Each location (also known as a cell) has a unique address. Addresses are also known as identifiers.

algorithm: A well-ordered collection of unambiguous, effectively computable operations that when executed, produces a result and halts in a finite amount of time.

API: “Application Programming Interface”, a code library for building programs.

argument: A value supplied in a method call, or one of the values combined by an operator.

arithmetic/Logic Unit (ALU): is the subsystem that performs mathematical and logical operations such as addition, subtraction, and comparison for equality. Operations include AND, OR, XOR, and NOT. Part of Von Neumann architecture. A part of the processor (aka the CPU).

ARQ Algorithm: “Automatic Repeat Request”, is the basis for all Data Link Control protocols in current use. Used to detect that an error has occurred and retransmit a new and unblemished copy of the original message.

ASCII (American Standard Code for Information Interchange): It is currently the most widely used code for representing characters internally in a computer system. It is a character encoding scheme based on the ordering of the English alphabet. It uses 8 bits to represent each character, so it is able to encode a total of 2^8 = 256 different characters. These are assigned to integer values 0-255; however, the numbers 32-126 have been assigned so far to printable characters. The remainder either are unassigned or are used for non-printing control characters such as tab, form fee, and return. (ie. integer 32 = 01000001, which prints the letter “A”).

Assembly language: a language designed for people as well as computers. Assembly languages created a more productive, user-oriented environment, and assemblers were one of the first pieces of system software to be widely used. Today, assembly languages are more properly called low-level programming languages.

binary: A way to represent data using two variables, 1s and 0s. It is a base-2 positional numbering system. The value, or worth, of a digit depends not only on its absolute value but also on its specific position within a number.

bit: Representation of data with computers where a bit is the most basic unit of data with the value of 0 or 1. A single bit rarely conveys any meaningful information, but bits are combined into groups of eight called bytes.

boolean: A binary value that is either true or false. Named after Geroge Boole.

boolean expression: an expression that evaluates to true or false

boolean operator: operations that manipulate true or false expressions, an operator that can be applied to Boolean values, Java has three, &&, ||, and !.

byte: a unit of memory on a computer representing 8 bits. Essentially all currently manufactured computers use a byte as the smallest unit of storage in memory.

Bytecode: instructions for the Java virtual machine.

cache memory: is a cache used by the CPU of a computer to reduce the average time to access memory. The cache is small and accesses memory faster than RAM and stores copies of the data that is most frequently used on the computer. hx + (1-h)(x+y) where h = hit rate \* look on stack overflow

cast: Explicitly converting a value from one type to a different type. For example, the cast from a floating-point number x to an integer is expressed in Java by the cast notation (int) x.

Church-Turing Thesis: If there exists an algorithm to do a symbolic manipulation problem, then there exists a Turing machine to do that problem. Named for Alan Turing to answer the question: are there symbolic manipulation problems that are “doable” by an algorithm but not “doable” by a Turing machine?

class: a programmer-defined data type.

Compiler: a program that translates code in a high-level language (such as Java) to machine instructions (such as bytecode for the Java virtual machine).

Computability: that which can be done by symbolic manipulation algorithms. What can be done by an algorithm is doable by a Turing machine, and what is not doable by a Turing machine cannot be done by an algorithm.

Computer network: computers connected together for the purpose of exchanging personal messages, resources, and information. If information can be represented in binary, it can be transmitted across a network.

computer science: the discipline that seeks to build a scientific foundation for topics such as computer design, computer programming, information processing, algorithmic solutions of problems, and the algorithmic process itself. The study of algorithms including their formal and mathematical properties, their hardware and linguistic realizations, and their applications.

Computing agent: an abstract concept representing any object capable of understanding and executing instructions. A computing agent must be able to comprehend instructions, receive input, store and access data, act in accordance with algorithm instructions, and produce output because the outcome of an algorithm must be an observable result.

constructor: A sequence of statements that initializes the instance variables.

control unit: it contains the circuitry for coordinating the machine's activities. It activates the proper circuitry in the ALU to perform the desired instruction. Its task is to (1) fetch the next instruction from memory, (2) decode it (figure out what is to be done), and (3) execute it.

DASD: “Direct Access Storage Devices”, one of the two forms of mass storage devices where every unit of information still has a unique address, but the time needed to access that information depends on its physical location and the current state of the device. (IE. CDs, DVDs, hard drives, etc.)

DNS: “Domain Name System”, an Internet application that converts from a symbolic host name to its equivalent 32-bit IP address (IE. Maclaster.edu to 141.140.1.5). A massive database, distributed over thousands of machines that, in total, contain the host name-to-IP address mappings for the 818 million host computers on the Internet.

Ethernet: the most widely used broadband technology in the commercial and office environment. Originally designed to operate at 10Mbps using coaxial cable.

encapsulation: the concept of making methods and variables private within different classes of a program. It limits the accessibility of certain variables in the class and certain methods so that an outside user cannot be malicious by using the program.

explicit parameter: a parameter of a method other than the object on which the method is invoked. (ie. Math.sqrt(x) where Math is the method, sqrt is the implicit parameter, and x is the explicit parameter).

flops: floating point operations per second//to compare performance among different makes of computers by giving the number of arithmetic operations, such as additions or subtractions of real numbers, that each one can do in 1 second.

formal parameter: a variable in a method definition; it is initialized with an actual parameter when the method is called (ie. amount is a formal parameter of the method processDeposit); Formal parameters are also used as a name for explicit and implicit parameters.

gigabyte: roughly one billion bytes, a measurement of memory capabilities on a computer.

Halting problem: The problem of determining whether or not a Turing machine has a solution. “Decide, given any collection of Turing machine instructions together with any initial tape contents, whether that Turing machine will ever halt if started on that tape.” This is an incomputable problem; no Turing machine exists to solve this problem.

HTTP: “Hypertext Transfer Protocol”, the protocol that defines communication between web browsers and web servers.

I/O buffer: an area of computer memory used to temporarily store data and instructions transferred into and out of a computer, permitting several such transfers to take place simultaneously with processing of data.

I/O controller: a device that interfaces between an input or output device and the computer or hardware device. The tape recorded that fastforwards information from the input/output memory device to the RAM/computer.

IDE (Integrated Development Environment): A programming environment that includes an editor, compiler, and debugger. (ie. Eclipse, MobaDermX)

implicit parameter: The object on which a method is invoked (ie. Math.sqrt(x) where Math is the method, sqrt is the implicit parameter, and x is the explicit parameter).

Interface (in Java): a type with no instance variables, only abstract methods and constants.

Inheritance (in Java): The “is-a relationship” (is a relationship where one class A is a subclass of another class B) between a more general superclass and a more specialized subclass.

initialize: to set a variable to a well-defined value when it is created.

Instance: an occurrence or a copy of an object. The object whose type is that class.

instance variable: a variable defined in a class for which every object of the class has its own value. It can be accessed throughout the entire class.

Instantiation: construction of an object of that class. (IE. <http://docs.oracle.com/javase/tutorial/java/javaOO/objectcreation.html_>)

Internet protocol: “IP”, the Network layer in the Internet. The IP delivers packets from the source host to the destination host based on the IP addresses in the packet headers. It creates a universal addressing scheme for all network nodes, and delivers messages between any two nodes in the network.

Instruction register: “IR”, holds a copy of the instruction fetched from memory. The IR holds both the op code portion of the instruction, and the address(es) abbreviated.

instruction set: The set of all operations that can be executed by a processor, and the choice of exactly what operations to include or exclude from the instruction set is one of the most important and difficult decisions in the design of a new computer.

Kilobyte: a unit of memory or data equal to 1024 bytes. 2^10 bytes.

LAN: “Local Area Network”, a network that is located in a geographically contiguous area such as a room, a building, or a campus. It is composed of personal computers, and special shared resources called servers, all interconnected via a high-speed link made of coaxial or fiber-optic cable.

local variable: a variable that only exists within a certain method.

logic gate: A circuit with several inputs but only one output that can be activated by particular combinations of inputs. Logic gates are used to calculate operations in Boolean algebra. Types of logic gates include AND, OR, XOR, and NAND.

Loop: a sequence of instructions that is executed repeatedly.

MAC: “Media Access Control protocols”, determine how to arbitrate (decide) ownership of a shared communication line when multiple nodes want to send messages at the same time.

machine language: the representation of instructions that can be decoded and executed by the control unit of a computer. Instructions in this language are expressed in binary.

mass storage: because the main memory is small and volatile, most computers have mass storage. It is less volatile and has larger storage capabilities, but requires mechanical motion to store and retrieve data.

Megabyte: 2^20 bytes of binary data on a computer

Memory: the functional unit of a computer that stores and retrieves the instructions and the data being executed

Memory Address Register (MAR): holds the address of the cell to be accessed. The MAR must be capable of holding any address thus, it must be N bits wide, where 2^N is the address space of the computer.

Memory Data Register (MDR): contains the data value being fetched or stored. The size of MDR is usually a multiple of 8. Typical values are 32 and 64 bits, which allows us to fetch, in a single step, either an integer or a real value, respectively.

Method: a sequence of statements that have a name, may have formal parameters, and may return a value. A method can be invoked any number of times, with different values for its parameter variables.

mutator method: a method that changes an object or instance variable of an object

object: an instance of a class. a value of a class type.

object reference: a value that denotes the location of an object in memory. In Java, a variable whose type is a class contains a reference to an object of that class

object-oriented programming: designing a program by discovering objects, their properties, and their relationships.

Op code: “Operation code”, is a unique unsigned integer code assigned to each machine language operation recognized by the hardware. (IE. 0 could be an ADD, 1 could be a COMPARE, and so on.)If the op code field contains k bits, then the max number of unique machine language op codes is 2k.

Operating system: the software that launches application programs and provides services (such as a file system) for those programs.

Overloading a method: giving more than one meaning to a method name.

Parameter: a variable of a method that is initialized with a value when the method is called.

parameter passing: specifying expressions to be arguments for a method when it is called

portability: the measure of how easily software can be transferred from one computer environment to another. “Porting” means to modify software and make it adaptable to work on a different computer system. Also used to describe the flexibility of the use of data (IE. Some file formats are less portable than others).

polymorphism: selecting a method among several methods that have the same name on the basis of the actual types of the implicit parameters.

primitive data type: a basic type of data provided by a programming language as a basic building block. In Java, it includes double, integer, short, char, byte, float, long, and boolean.

Protocol: is a mutually agreed-upon set of rules, conventions, and agreements for the efficient and orderly exchange of information.

Protocol stack: “Protocol hierarchy/TCP/IP”, has five layers: Application, Transport, Network, Logical Link Control, Medium Access Control, and Physical. A hierarchy with each layer addressing one aspect of the overall communications task. They are structured this way because of the volatility of telecommunications and networking.

Pseudocode: a high-level description of the actions of a program or algorithm, using a mixture of English and information programming language syntax

Random Access Memory: the main memory on a computer where data can be stored and accessed immediately indented of the data’s location and its relationship to surrounding data

register: a storage cell that holds the operands of an arithmetic operation and that, when the operation is complete, holds its result.

SASD: “Sequential Access Storage Devices”, one of the two forms of mass storage devices that does not require that all units of data be identifiable via unique addresses. To find a given data item, it searches all data sequentially.

scope: the part of a program in which a variable is defined. An instance variable can be accessed throughout the entire class whereas a variable declared within a method only exists and has a scope within that method. An area in which the variable is accessible.

software: The intangible instructions and data that are necessary for operating a computer or another device.

Static variable: a variable defined in a class that has only one value for the whole class, and which can be accessed and changed by any method of that class.

static method: A method with no implicit parameters (ie. Integer.parseInt() where Integer is a class, and parseInt() is a static method).

stored program concept: a sequence of machine language instructions stored as binary values in memory. A characteristic of the Von Neumann architecture.

syntax: rules that define how to form instructions in particular programming languages. It defines how declarations, functions, commands, and other statements should be arranged.

terabyte: 1000 gigabytes/ 1trillion bytes/ 2^40 bytes

time complexity: quantifies the amount of time taken by an algorithm to run. It is commonly expressed using big O notation, which excludes coefficients and lower order terms.

transistor: constructed from semiconductors, it is a solid-state device that has no mechanical or moving parts, and can switch states (ON/OFF) electronically. They are used to build up circuits.

TCP: “Transmission Control Protocol”, the pair of communication protocols that is used to establish reliable transmission of data between two computers on the Internet.

truth table: a mathematical table used to compute the functional values of logical expressions on each of their function arguments.

Turing machine: a very simple model of computation that is used in theoretical computer science to explore computability of problems.

Von Neumann architecture: the structure and organization of computers are based on a Neumann’s model of computer design. The architecture is based on three characteristics: (1) Four major subsystems called memory, input/output, the arithmetic/logic unit (ALU), and the control unit, (2) the stored program concept, in which the instructions to be executed by the computer are represented as binary values and stored in memory, and (3) sequential execution of instructions, in which one instruction at a time is fetched from memory and passed to the control unit, where it is decoded and executed.

white space: any sequence of only space, tab, and newline characters. Allows a program to be more readable to the human eye

WAN: “Wide Area Network”, connects devices that are not in close proximity but rather are across town, across the country, or across the ocean. Because WANs cross public property, users must purchase telecommunications services from an external provider.