# A:

**Analog** – Used to describe types of information, signals, or waves. Describes signals or information that can take any level from of a continuous range of levels (e.g. voltage, temperature levels). The opposite is "digital." *Example: the mercury thermometer reported temperature as an analog value anywhere between -40 to +170 °F.*

**Application** – Also referred to as programs, applications are the software a computer uses to perform various tasks. *Example: Microsoft Paint is an application used to draw and edit images.*

**Application Programming Interface (API)** – Used to provide a method of communication between programs. These can be utilized for programs running on the same machine, or the internet can be used to allow the programs to communicate from separate machines, possibly on different networks.

**Arrays** – A collection of a certain type of data elements stored in computer memory that can be accessed via its index. The index normally starts at 0. *Example: a one-dimensional array of integers would be: [10, 1343, 452, 80]. A two-dimensional array of real numbers (floats) would be:* $\begin{bmatrix} 10.5 & 0.4 \\ 6.68 & -1.1 \end{bmatrix}$ *otherwise written [[10.5, 0.4],[6.68, -1.1]].*

**ASCII** – Pronounced "Ask-ee", refers to an encoding system for converting different characters (e.g. letters of the alphabet) to numbers for storage in computers. These stored numbers are stored in binary form. *Example: the ASCII identifier for the letter 'A' is 65. In binary, that is 0100 0001.*

# B:

**Bandwidth** – A range of frequencies used in a band for data communication.

**Binary** - Base 2 number system, using only the digits 0 and 1. *Examples: The binary version of decimal number 3 is 11. The binary version of decimal number 4 is 100.*

**Bit** - The smallest unit of information a computer can store. Either 1 or 0.

**Broadband** – Communication using wide bandwidth, allowing for sending and receiving many signals simultaneously. *Wide bandwidth just means the data can move very fast!*

**Bug** – Improper behavior of a program due to an error in the code or the equipment used to run it.

**Byte** – A group of eight bits. Computers mostly store information in bytes. *Example: the ASCII identifier for the letter 'A' requires one byte of data: 0100 0001.*

# C:

**Cache** – A form of storage that can be accessed more quickly than the usual method. For instance, a video game will cache important data like the player's inventory to allow the player to quickly view its contents. This cache exists in the RAM (random access memory), which is faster than reading from a hard drive.

**Callback Function** – A piece of executable code used as an argument for another function, with the expectation of this other function executing, or calling, this function. *Example: If A is our function and B is our callback function, B is passed to A and, at some point during its execution, A will "call back" to function B.*

**Capacitance** – the ability of a component or circuit to collect and store electric charge.

**Carrier Wave** – A wave used as the foundation for a signal that contains data. Add data to the carrier wave with modulation, and extract the data from the carrier wave with demodulation. *Example: an audio signal (someone's voice) is modulated onto an RF carrier (1000 kHz) so that it can be broadcast through the skies over AM radio. Audio signals don't go very far, but RF signals can travel for many, many miles – so they "carry" the signal for us.*

**Central Processing Unit (CPU)** – Also referred to as the processor, the brain of the computer. Handles logical tasks best but can also perform mathematical computations with ease.

**Chip** – A major component of many computers, chips are small versions of *very* complex circuitry that has been reduced to a very small scale.

**Client** – A user of a network application using a server/client architecture. See "Server/Client Architecture" for more details.

**Console** – Also referred to as a terminal, takes in text commands to perform operations. Some operating systems are terminal based. *Example: MS-DOS was a console-based operating system that Bill Gates turning into Microsoft corporation!*

**Cookie** – A form of data storage used by webservers. They can store information about the user, their computer, or their activity.

**Crash** – An unexpected failure of a device or its software due to a malfunction in the hardware or software. Data will likely be lost and may even cause permanent damage to the device.

**Current** – The flow of electric charge. Measured in Amps(A), which is the same as coulombs per second. Think of it like the electric analog for the amount of water flowing in a pipe (gallons per minute).

**Cursor** – An indicator of where the user is currently working. On a desktop, we see a mouse cursor. In a terminal or console, the cursor shows where the user is currently typing.

# D:

**Database** – An organized method of storing information. Different software allows for different methods of accessing this data. Commonly abbreviated as DB.

**Debug** – The process of finding and removing bugs in a program.

**Demodulation** – The process of separating a carrier wave and its data.

**Desktop** – In operating systems, a desktop is the highest level of interaction in the user interface. Usually contains icons that can be used to access other programs and files.
- In computer hardware, a desktop is the "tower" of a computer that is stationary.

**Digital** – Used to describe types of information, signals, or waves. Describes the signals or information that can only take discrete (limited number) of levels (e.g. voltage, temperature, levels). The opposite is "analog." *Example: the red warning light on a car dashboard indicates only two temperature levels: normal and overheated.*

**Directory** – Location on a computer that stores files. Directories can have subdirectories (folders) that are also referred to as directories. *Example: think of directories like folders inside a file cabinet. The file cabinet is like the computer's hard drive. Data is stored in an organized fashion by separating it into directories or folders within the file cabinet.*

**Disk** – A physical medium for storing data. Can be found in a hard drive. More modern hard drives are "solid state" meaning they use chips instead of disks to store data.

**Domain** – A name associated with an IP address. For instance, the address 142.250.68.164 is associated with the domain www.google.com, and can be accessed by typing the domain. Domains are also seen at the end of email addresses.

**Dynamic Host Configuration Protocol (DHCP)** –leases local IP addresses to devices when connecting.

# E:

**Encryption** – The process of protecting data by programmatically scrambling the bits that represent the information in such a way that it can be unscrambled. *Example: we could encrypt words by shifting every letter of the alphabet by one letter. The encrypted version of PETE would then be QFUF. Real encryption schemes are much more secure!*

**Ethernet** – Wired network, usually connected to the internet.

# F:

**File Transfer Protocol (FTP)** – Protocol (or rules) for transferring files. See Protocols.

**Firewall** – A security program that only allows certain connections to be made between the internet and your computer.

**For Loop** - A programming structure in which code repeats (or loops) "for" a specific number of times (we call each repetition an 'iteration').

**Frequency Band** – A group of frequencies used for telecommunications. *Example: AM radio uses the frequency band of 635-1700 kHz. FM radio uses the frequency band of 88-108 MHz.*

# G:

**General Purpose Input/Output (GPIO)** – is a designation given to pins on a microprocessor chip. These pins serve no specific purpose until a developer (programmer) codes the pin to read some input or write some output. Typically of a digital input/output variety.

**Gigabyte (GB)** – 1,024 Megabytes, or 1,048,576 Kilobytes, or 1,073,741,824 Bytes. Also referred to as a "Gig"

**Glitch** – Source of a computer's problem or a problem in the software running on a computer.

**Graphical User Interface (GUI)** – Makes navigation of a computer of software easier by giving the user a visual representation of available commands.

**Graphics Processing Unit (GPU)** – Similar to a processor, but specifically designed for mathematical computations, usually for rendering graphics.

# H:

**Hacking** – The process of gaining access to a system without the proper authorizations. Can be done for good reasons. See "Penetration Testing"

**Hard Drive** – A computer component that stores information permanently or until deleted. *Example: my old hard drive used spinning magnetic disks to store my data, but now I have a solid state hard drive (SSD) that stores my information on chips.*

**Hardware** – The physical components of a computer or system. For example, the processor (CPU), the Hard Drive, and keyboard are pieces of hardware.

**HTML** – Short for Hypertext Markup Language, this is used to mark sections of text for formatting, commonly for websites. *Example: I had to learn to write HTML code so that I could create my first website.*

**HTTP** – Hypertext Transfer Protocol, rules used to send and receive HTML Documents between the internet and your computer.

**HTTP REST API** – Web based API used to communicate with online services. Commands such as "GET", "POST", and "DELETE" specify what is to be done with the data, and a body is sent with the request containing additional information, specified by the API.

**HTTPS** – Same as HTTP, but far more secure – the 'S' means it has security built in (typically encryption).

# I:

**Internet** – Interconnected networks\servers\computers. Smaller networks of computers are connected together to make up the larger internet. The smaller networks belong to businesses as well as individuals. All of which are just there to serve the requestor with some information, whether a file or routing info.

**Internet of Things (IoT)** – Simple devices that can be used to send data over the internet.

**Internet Protocol (IP) Address** – Like a street address, represents the location of a device connected to the internet. *Example: my home router assigned the following IP address to my computer: 192.168.001.012.*

# J:

# K:

**Kilobyte (KB)** – 1024 Bytes.

# L:

**Linux** – An open-source Unix based operating system

**Local Area Network (LAN)** – The network that the device is connected to. This network connects devices allowing them to use a local address to communicate.

**Local IP Address** – A separate IP address used only on your local network.

**LoRa** – Short for Long Range. *The LoRa communication protocol in the United States uses frequencies near 915 MHz to enable long-distance, wireless data transfers.*

# M:

**Macro** – A script written to perform a repetitive task automatically.

**Megabyte (MB)** – 1,024 Kilobytes, 1,048,576 Bytes

**Microcomputer** – A small computer that can be used for general purpose processing. Generally chosen for projects when either several tasks or on more complicated tasks needs to be performed.

**Microcontroller** – A small device used for controlling sensors or other devices. Generally chosen for projects when one simple task needs to be performed. Not quite as powerful as a microcomputer.

**Microprocessor** – Same as a microcomputer.

**Modem** – A device that modulates and demodulates signals to transfer data between devices.

**Modulate** – The process of putting data onto a carrier wave. See Carrier Wave.

**Monitor** – Computer peripheral used to display an image.

# N:

**Network** – A system that connects multiple devices. An example of this is the internet, in which millions of devices are connected.

**NoSQL (Nonrelational)** – A database without strict structuring, allowing partially complete data to be added to the table. For instance, a "student" table might have "name", "date of birth", and "favorite movie" as values. If you do not know a student's favorite movie, they can still be added to the table with the "favorite movie" value left blank.

# O:

**Open source** – Describes hardware and software in which their inner workings and designs are available to everyone. This allows more people to develop these projects, and improvements can be made more quickly.

**Operating System** – Program that tells the computer how to operate. This includes how to store files, how to display images, how to read and write to USB ports, and much more. Two of the most common operating systems are Microsoft Windows and Macintosh OSX.

# P:

**Package Installer for Python (PIP)** – Package management system for Python. This system connects to the Python Package Index to allow you to easily install the packages (or libraries) that you can use in your own programs. Think of PIP like a convenient way to add pre-built code to your Python project.

**Parallel (as in communication)** – At the same time. The opposite is 'serial.' *Example: parallel data ports were used in old computers to speed up communication to a printer. Serial ports were too slow.*

**Partition Key (DynamoDB)** – This Key is used to identify data in a table. To add new data to a table, the partition key must be unique.

**Penetration Testing** – The process of finding vulnerabilities in system or network for the purpose of making the software safer. *Example: if a penetration tester does his/her job correctly, hackers will find it difficult to access a computer system.*

**Peripheral** – In computing, a peripheral is an external component of the computer. For example, monitors, printers, mice, and keyboards are all computer peripherals.

**Pins** – A connection on a computer chip used to send and receive signals. Also, the metal connections on the edge of the board were included in the PETE-Kit.

**Printed Circuit Board (PCB)** – A board that has a circuit etched into it. The Raspberry Pi is a PCB with a microprocessor, RAM, USB ports, and other devices as part of the circuit.

**Processor** – The brain of the computer. Handles logical tasks best but can also perform mathematical computations with ease. Commonly abbreviated (CPU)

**Programming Language** – A set of commands used to communicate with the computer and have it perform tasks. Some examples include C, C++, Java, Python, and Javascript. It's basically a translation between human language and computer language.

**Protocol** - In computing, refers to an agreed upon set of rules for performing a task. For instance, the Transmission Control Protocol (TCP) is a set of rules for sending and receiving packets of information over the internet.

**Public IP Address** – IP Address that is available to the public internet. Anyone can see this address and it is how people can gain access to your network.

# Q:

**Query** – A request for information.

# R:

**Random Access Memory (RAM)** – Temporary form of data storage that can be accessed significantly faster than long term solutions (such as hard drives).

***Read-Only Memory (ROM)*** *– Memory that cannot be altered in any way, only read from.*

***Resistance*** – The amount of force preventing electric current flow. Measured in Ohms(Ω). *Example: in a water pipe analogy this would be like a valve. Closing the valve increases the resistance, preventing as much water from flowing.*

**Raspberry Pi** – Also referred to as the "RPi", the Raspberry Pi is a microcomputer. With about the length and width of a credit card, the Raspberry Pi is a powerful device that can be used in many ways. It is the core of the Pete-Kit!

# S:

**Secure Shell (SSH)** - Method of accessing a remote terminal. Instead of seeing a desktop, everything action is performed by typing in specific commands.

**Serial (as in communication)** – In order. The opposite is 'parallel.' *Example: parallel data ports were used in old computers to speed up communication to a printer by sending eight bits at a time. Serial ports sent data bits in order, one at a time, and were too slow.*

**Server** – Can refer to hardware or software. When referring to hardware, a server is a machine specifically designed for sharing data with clients. When referring to the software, a server is the application that serves data to the clients.

**Server/Client Architecture** – A network architecture in which one server can serve many clients (users). The server resides in a centralized location, and shares data with all clients simultaneously.

**Software** – Computer Applications or Programs.

**SQL** - A database with strict structuring, allowing only complete data to be added to the table. For instance, a "student" table might have "name", "date of birth", and "favorite movie" as values. If you do not know a student's favorite movie, they cannot be added to the table with the "favorite movie" value left blank. A placeholder can be used when a value is unknown.

**Sudo** – In a linux terminal, sudo gives your command administrator privileges.

# T:

**Table (Database)** – Holds a specific set of values in a database. For instance, an employer might have a database with an "employee" table that stores information on their employees and a "supplier" table that stores information on all the company's material suppliers.

**Terabyte (TB)** – 1,024 Gigabytes

# U:

**Uniform Resource Locator (URL)** – Protocol for identifying the location of resources on the internet. Also referred to as a web address. *Example: Type the following URL to access a Google search: https://www.gooogle.com.*

**Universal Serial Bus (USB)** – A standardized connection interface that allows devices to be powered and transmit or receive data. Several variations of this connection exist, such as the micro-USB or USB-C connections commonly seen in mobile phones.

**Unix** – A very powerful operating system that is used as the basis for other operating systems and applications.

# V:

**Voltage** – The force acting to push electric current through a circuit. Measured in volts (V). *Example: in a water pipe analogy this would be like a pump. Increasing the power to a water pump increases the water pressure. Fire hydrants have higher pressure than home spigots, just like power stations have higher voltages than home circuits.*

# W:

**Wide Area Network (WAN)** – Combination of many local area networks. Combining LAN networks into a WAN allows for communication between the LAN networks.

**Wi-Fi** – Standard data communication protocol for connecting devices to the internet. Short range.

# X:

# Y:

Z: