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Final Project

3.) B.)

The two programming languages used in this project is Python and Visual Basic. Visual Basic was develop at Dartmouth College by John Kemeney and Thomas Kurtz in the 1960s. During its initial release it was very slow and couldn’t be compile down to an executable. When versions 5-6 came out it allowed us to compile the language down to an executable. The compiler would take language and would turn into machine language that would allow it to run faster. Later in the 1970s it became standard to teach Visual Basic to students. Visual Basic went on through history to be known as GW-BASIC that came with versions of Microsoft-DOS. Then came QBASIC -which was interpreter language version of which existed within Microsoft-DOS. This version supported sophisticated features of BASIC and would later replace GW-BASIC. Later, Visual Basic was released with a tool that could be used to create and modify Visual Basic Applications. This tool was called Visual Basic Editor. It later became included within all Office programs. Visual Basic later went to become popular in years. The language became popular due its simplicity and its addons to its objected oriented features. Along with being popularity due its feature to make applications and features for the Microsoft Office Suite, know as Visual Basic for Applications. Visual Basic is meant to be very simple and easy to learn. The language meant to be easy learn and later be used to make effective GUI’s with very little coding involved. Visual Basic is also kept up and maintain to stay modern. It is object and component oriented. The language is also structured and produces efficient programs along with being able to be compiled on variety of computer platforms.

Python is a High-level Programming Language that was released in 1991 was develop by Guido Van Rossum. The name Python was inspired from The BBC’s TV show Monty Python’s Flying Circus. The developer was huge fan of the TV Show. He wanted unique and mysterious name to match the name of the language. Python uses a fewer line of codes to express its concept compared to Java, C++ & C and other languages that exist. In October 2000 Python 2.0 was released which brough new features such as cycle-detecting garbage collector and Unicode support. In December 2008 Python 3.0 was released there were some revisions that were made along with new features being added. Due to its new features and revisions it became very simplistic language to learn. Because of its simplistic design in syntax it allows programmers to it read and understand it better. Also allows new developers and programmers to pick coding a lot faster and transition another language faster. Python is the second largest most popular language other than the R language to be used for Machine learning and Cloud Computing. Python was adapted by Google in the early years of the company. At Facebook Python is the third most common language used. Python has the third largest infrastructure code base at the company. Due to its large following Python has a large index of libraries to back to it. Which allows developers to be more creative and develop a lot quicker. Python comes shipped and installed in all Mac and Linux systems. The language. Not only Python can be used for data science and software development, but it can be also used for Web Development. Python has a free and open-source web framework that is called Django. Django is a high-level Python web framework. Django objective is to build a better and more efficient web applications quickly and with less code.

C.)

**Visual Basic**

* **Readability:** Visual Basic is very straight forward. The language is meant for any new beginner programmer to pick up and make efficient. Which makes the syntax easier to read and understand what’s going on. The way that everything is organize by buttons and functions makes it very convenient to read. Visual Basic is designed to be “Human readable” so it easily understood without an immense amount of comments.
* **Write Ability:** Because of its simplicity anyone can learn Visual Basic overnight and can make efficient programs right away. The syntax is every straightforward and can be written like English. The simplistic design of the language allows a programmer to make efficient program with a GUI with little amount of coding. The programmer can click on the buttons give them functionality right away. In Visual Basic each button is considered a function. As soon as your drag button into the form its already set and define as a function. The language is built around the .Net Framework. VB.Net provides users to several control-flow statements identified. Structured programming is supported through two execution constructs such as If, Then, Else, End If, etc.
* **Reliability:** Visual Basic can use Try and Catch Error statements to stop errors and continue with the programs. Namespaces and datatypes can be reference. We can give namespace, or a variable can be renamed into a shorter namespace or variable.
* **Cost:** The cost would be low because there is plethora of people that know Visual Basic. It would cheap and less time consuming to teach someone Visual Basic. But would it be costly to pay for the IDE that you need to code in it. Visual Studios has come free with the Community Edition but any other versions other that you need to pay for. It would cost some time and maintenance to the keep up the programs. As with Visual Basic you need to keep up the programs with today’s standards.

**Python**

* **Readability:** Python is just as straightforward as Visual Basic. Majority of programmers also know Python which makes it easier for other programmers to read. The language also uses spaces and index to that makes neater and organize. The language is very flexible which means the syntax is flexible. Constructors are easy to read and following. The language expresses itself very well. Fewer lines of code but a lot more efficient. The language also follows the Top Down structure which allow us to read it very better.
* **Write Ability:** Due to its flexible you can build code like building blocks. Parameter passing is very easy when each function is called. Parameters can easy be redefine and change throughout the code. As well as variables can be redefined and change throughout a script. Python is not only just scripting language but can be used for Object Oriented Programming. The language is very abstract which makes very convenient to use and deploy a program easily
* **Reliability:** You can be dependent on Python for anything from Objected Oriented Programming to Web design and Backend Programming. Its very programmer friendly. Whenever the compiler comes across error it says the lines and what type of error it is. Which makes its convenient for the programmer to make and Try and Catch statements. Python has been to know to handle complex algorithms and complex data structures. As well as Machine Learning and Artificial Intelligence.
* **Cost:** The cost of training would be low or could cost nothing. Most programmers learn Python as their first language and become proficient in it. Even if the programmer didn’t know the language it wouldn’t take much time to learn Python because its simple and beginner friendly. It compiles and executes faster than most languages. Since the language is flexible and can be used for multiple things its saves on hiring more programmers. The language can be used for automation so it can cut down on other expenses. It doesn’t take much to maintain the language. If you can code it correctly you can have a program maintain itself with Python.

**C#**

* **Readability**: C# is very straight forward. If you know Java it would be very easy to read. The syntax is very flexible and data types have all different combinations. Some special words are changed and flipped around such as functions are called methods. If, else, and else if statements are easier to use in C#.
* **Writability**: C# can be written very easily due to its syntax flexibility. It be can used for mobile and web development along with windows software development. The language can also be compiled into native given it superior performance to other languages. The language is very easy to learn and is not very complex as other languages. C# can be learned from two-three months. It is very beginner-friendly and is a great first language to learn. Since it’s a great first language to learn there can be more mobile, web, and software development because of its cross-platform.
* **Reliability**: C# programs run on the .NET Framework which is integrated into a Windows component called the Common Language Runtime also know as CLR. Which gives C# a development environment to work together with other languages and libraries. When executed it employs automatic memory management that allocates and frees memory. It does this by implementing a garbage collector. It is growing in popularity and fact is being used widely. Which means it will be updated consistently and will stay in use for a while.
* **Cost**: C# can be easy to learn for people who already know Java. It shares a lot of syntax similarities to Java which allows Java programmers to pick it up easier. Also, can easily pick up because of how simple and straight forward the syntax is. It would also save time on learning other languages because of its cross-platform which is transferable to other devices. C# can also be written Visual Studios and Visual Studio code. Both compilers are free to download and have paid versions. But one is less heavy than the other. Visual Studio Code can be downloaded and run on practically any desktop or laptop, because of this C# can be written on any operating system and device. Another benefit of this it doesn’t take to much compile and execute because it doesn’t need high-end specifications. Which means it doesn’t take long to execute and compile at all. The only downside to C# is that it is dependent on the .Net Framework. Which takes up a lot of space on the hard drive and needs to be updated consistently.

**JAVA**

* **Readability:**  Java is fairly simple for programmers that have been exposed to objected-oriented languages. Brackets to represent the blocks in a program that improves neatness and organization of complex algorithms. Due to Java being case sensitive variables and reserved words must be the same capitalization and keywords must be stay lowercase. This allows readers to read the code better since everything is case sensitive and the compiler catch misspelled errors faster. This increase better writability.
* **Writability:** Java is not beginner friendly it requires experience object-oriented programmers. Java structure is like other object-oriented formats such as C#, C++, JavaScript. Which allows experience programmers to write code better and more naturally. The language expresses itself through constructs. They don’t have to return an object which gives more flexibility. Also, when a new object is created a new constructor is called. If you name one the compiler will create a default name for you. There are plethora of ways to shorten and encapsulate data within Java. There ways to define data into one single type of data. Along with using to be abstract data type.
* **Reliability:** Java has multiple applications to the real world. Java is within our smart phone apps, thermostats, and cars. This shows how safe and trustworthy it can be especially when it’s made by an experience Java Developer. Since Java has been released for awhile and constantly being updated there are plenty of experience Java developers can create a reliable Java application. The language is also cross-platform which allows applications to taken from one computer to another without worrying about changing configurations and downloading anything. It is also self-memory managed which means the programmer or the compiler doesn’t have to do anything.
* **Cost:** Since only good Java applications are made by great Java developers its going to cost a lot to hire good developers. Java also has few security problems along with it too. This will require hiring cyber security professionals to look over your code before publishing your applications. Other than that, due to its high reliability there wouldn’t be that much cost to it.

**C++:**

**Readability:** C++ supports user defined operators overloading which causes confusion because it can be a single operator symbol. The language is also not beginner friendly. Which requires programmers to know a little bit of lower level programming languages. Newer programmers wouldn’t being to read or understand what is going on in the code. The language also lacks orthogonality which translates to having the ability overlapped and having ability overlap constructs and variables.

* **Writability:** C++ offers abstractions and plethora of set operators. This lets programmers to able to problem solve any small or big problem. The language also supports generic types which improves the writability. The language has a powerful flexible control statements which backs the problem-solving ability.

**Reliability:** C++ has been around for years because of that are tons libraries that support it. This enhances the language reliability. It comes included a strong pointer data types which can be access directly and can be used for flexible use. Programmer can also use the C string library. It will make more programs more reliable for use. Which replaces the standard library and char arrays.

**Cost:** C++ uses the compiler implementation method which means compilation and execution decreases. But it makes it up by its flexibility and efficiency since it does not require run-time checking. It requires a lot more maintenance that most languages but has a faster execution speed that most languages. C++ construct also increases and improves the maintainability of the language.

d.)

 