Principles of Programming: A Hypothetical Approach

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ABSTRACT

In this paper, we are going to introduce about the evaluation of programming languages. In recent days, E-learning is going to play a key role in the engineering education. In this scenario, few subjects like Flat, Compiler Design etc. are developed in the form of VR application. So that a layman can easily understand typical subjects. In this paper, we are going to present the concept evaluation of programming languages in 2D view that resembles in 3D view.

Keywords: Virtual Reality (VR) application, Evaluation, 2D, 3D

I. INTRODUCTION

Computer play many important roles in the society, helping to promote communication and interaction with the others and providing users a way to shop, play games, and have access to education.

We live in a fast-moving world where almost everything must come instantly to us. In this computer era, we depend on the computer to help us complete tasks, and to solve problems.

Significance of Computer Programming:

Computers are used in various fields like business, pharmacy, music, education, engineering, defense, transportation, and cooking as they help to ease certain tasks, provide information faster, and speed.

A language is the main medium of communicating between the computer systems and the most common are the programming languages. Computer only understands binary numbers that is 0 and 1 to perform various operations but the languages are developed for different types of work on a Computer.

A language consists of all the instructions to make a request to the system for processing a task.

Principle of programming languages:

Programming is the process of coding, testing, troubleshooting, debugging, and maintaining a system. Programming principles help you to write excellent quality code and maintain a good coding practice.

Program Efficiency Principles

1. **Readability**
   All developers were in a team able to understand the code.

2. **Extensibility**
   In the software world, we should not blame the change requests; it’ll come at any time. So our code is always easy to extend without breaking existing business rules.

3. **Maintainability**
   It’s easy to maintain by the development team and the production support team too because the application is loosely coupled.
4. Modularity
Divide a program into reusable pieces: functions, modules, libraries

Types of Programming Principles

1. DRY (Don’t Repeat Yourself)
Duplication can lead to maintenance nightmares, poor factoring, and logical contradictions. "Every piece of knowledge must have a single, unambiguous, authoritative representation within a system". In other words, a piece of logic should only be represented once in an application.
- Duplication is the root of all software evils.
- DRY is also known as Duplication is Evil (DIE) or Once And Only Once.

2. KISS (Keep It Simple, Stupid)
Nowadays programming languages frameworks, and APIs have powerful means to create sophisticated solutions for various kinds of problems. Sometimes developers might feel tempted to write “clever” solutions that use all these complex features.

The KISS principle states that most systems work best if they are kept simple rather than making them complex; therefore simplicity should be a key goal in design and unnecessary complexity should be avoided.

This principle can be applied to any scenario, including many business activities, such as planning, designing, and development.

3. YAGNI (You Aren’t Gonna Need It)
As developers, we’ll always think a lot about the future usability of the project and try to do some extra features coding in a mind that “just in case we need them” or “we will eventually need them”. Just one word… Wrong! I’ll repeat it this way: You didn’t need it, you don’t need it, and in most of the cases…

There are two main reasons to practice YAGNI
- You save time because you avoid writing code that you turn out not to need.
- Your code is better because you avoid polluting it with ‘guesses’ that turn out to be more or less wrong but stick around anyway.

4. SOLID
SOLID principle supports good object-oriented design and programming. Five of these principles are described as SOLID: Single responsibility, Open-closed, Liskov substitution, Interface segregation, and Dependency inversion.

5. Composition > Inheritance
The "composition over inheritance" principle states that objects with complex behaviors should do so by containing instances of objects with individual behaviors rather than inheriting a class and adding new behaviors. Overreliance on inheritance can lead to two major issues. First, the inheritance hierarchy can become messy in the blink of an eye. Second, you have less flexibility for defining special-case behaviors, particularly when you want to implement behavior from one inheritance branch in another inheritance branch:

Composition is a lot cleaner to write, easier to maintain, and allows for near-infinite flexibility as far as what kinds of behaviors you can define. Each
individual behavior is its own class, and you create complex behaviors by combining individual behaviors.

6. Single Responsibility
The single responsibility principle says that every class or module in a program should only concern itself with providing one bit of specific functionality. As Robert C. Martin puts it, “A class should have only one reason to change.”

Classes and modules often start off this way, but as you add features and new behaviors, it’s easy for them to evolve into God classes and God modules that take up hundreds, or even thousands, of lines of code. At this point, you should break them up into smaller classes and modules.

7. Separation of Concerns
The separation of concerns principle is like the single responsibility principle but on a more abstract level. In essence, a program should be designed so that it has many different non-overlapping encapsulations, and these encapsulations shouldn’t know about each other.
A well-known example of this is the model-view-controller (MVC) paradigm, which separates a program into three distinct areas: the data (“model”), the logic (“controller”), and what the end user sees (“view”). Variations of MVC are common in today’s most popular web frameworks.

For example, the code that handles the loading and saving of data to a database doesn’t need to know how to render that data on the web. The rendering code may take input from the end user, but then passes that input to the logic code for processing. Each part handles itself. This results in modular code, which makes maintenance much easier. And in the future, if you ever need to rewrite all of the rendering code, you can do so without worrying about how the data gets saved or the logic gets processed.

8. Avoid Premature Optimization
The no premature optimization principle is similar to the YAGNI principle. The difference is that YAGNI addresses the tendency to implement behaviors before they’re necessary while this principle addresses the tendency to speed up algorithms before it’s necessary.

The problem with premature optimization is that you can never really know where a program’s bottlenecks will be until after the fact.

9. Refactor, Refactor, Refactor
One of the hardest truths to accept as an inexperienced programmer is that code rarely comes out right the first time. It may feel right when you implement that shiny new feature, but as your program grows in complexity, future features may be hindered by how you wrote that early one.

Codebases are constantly evolving. It’s completely normal to revisit, rewrite, or even redesign entire chunks of code — and not just normal, but healthy to do so. You know more about your project’s needs now than when you did at the start, and you should
regularly use this newly gained knowledge to refactor old code.

10. Clean Code > Clever Code
Speaking of clean code, leave your ego at the door and forget about writing clever code. You know what I’m talking about: the kind of code that looks more like a riddle than a solution and exists solely to show off how smart you are. The truth is, nobody really cares.

One example of clever code is packing as much logic into one line as possible. Another example is exploiting a language’s intricacies to write strange but functional statements. Anything that might cause someone to say “Wait, what?” when poring over your code

II. METHODS AND MATERIAL
The application of learning the principles starts with the evolution of programming languages is designed with the help of a tool called construct2d

Installing Construct 2
If you haven’t already, grab a copy of the latest release of Construct 2. The Construct 2 editor is for Windows only, but the games you make can run anywhere, such as Mac, Linux or iPad. Construct 2 can also be installed on limited user accounts. It’s also portable.

Getting started
Now you’re set up, launch Construct 2. Click the File button, and select New.

You will see the 'Template or Example' dialog box.

This shows a list of examples and templates that you can investigate at your leisure. For now, just click on 'Open' at the bottom of the box to create a blank, empty new project. Construct 2 will keep the entire project in a single .capx file for us. You should now be looking at an empty layout - the design view where you create and position objects.

Think of a layout like a game level or menu screen. In other tools, this might have been called a room, scene or frame.

Inserting objects
1) Tiled Background
The first thing we want is a repeating background tile. The Tiled Background object can do this for us. First, here’s your background texture - right click it and save it to your computer somewhere:

Now, double click a space in the layout to insert a new object. (Later, if it’s full, you can also right-click and select Insert new object.) Once the Insert new
object dialog appears, double click the Tiled Background object to insert it.

III. RESULTS AND DISCUSSION

This is a sort of E-Learning methodology where we compare evolution of programming languages with the evolution of vehicles.

This type of comparison helps for a lay man to understand the concept of programming.

The below screen shot explains about the evolution of vehicles.

The application starts with the above text evolution of programming languages whenever the user clicks on the evolution of programming languages a wheel comes first.

When the user click on the wheel the first language that is evolved is displayed and thereby the user can understand the characteristics of first language.

And the below screen shot explains the second generation of programming language by clicking the arrow 2\textsuperscript{nd} generation of wheel that is cycle is displayed thus we can understand 2\textsuperscript{nd} generation of programming language.
The user by clicking the cycle 2nd generation programming language is evolved that is the C programming language. The user using this application can easily identify the programming languages evolution and characteristics easily.

IV. CONCLUSION

This paper is a base to evaluate new era of E-Learning methodologies. The imagination of the user is coming in the form of technology in recent days in 3 dimensional forms called virtual reality.

By applying the same code by using the virtual reality applications will be a much better approach for the understanding of the student.

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VI. BIBIOGRAPHY

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