19CSE201 ADVANCED PROGRAMMING ASSIGNMENT

Team 7

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Question: Compare and contrast the similarities, differences and code efficacy between C++ 17 and Python3 with a real-world example

Real world Example: (Describe the detailed real-world scenario you are planning to model in 100- 250 words)

Traditional maintenance of physical records of customer bills and the available stocks becomes a tedious task and hence we move onto creating a system to maintain things. Inventory and Billing System is one of the most prevalent systems used in almost every business arena.

Inventory system involves in keeping record of the current stock, and changes data accordingly to customer's purchase and notifies the owner on dead stocks which needs to replenished, management of available products and also of the expiry date of product

Transaction system on the other hand deals with payment bills, calculating tax on bills. Recording all transactions taken place over the period of time(Be it week, month or year). Helps in calculating revenue generated

We start with design of having two classes – Inventory and Bill

Inventory for adding product details like product name, unit price, stock available

Bill for adding the products bought by the customer into the cart and calculating the total based on what they have bought

The customer user can see the inventory, buy the products and pay the bill

The shop can add new products into the inventory and check the stock and inform if product is unavailable and generate the bill when the customer purchases

Argue why this language is the best option by mentioning the pros and cons, reliability and execution speed of each language in this context (500 - 800 words)

1. Heading1

Python is easier to write code since it is a high level language with easier semantics and uses less lines of code and simplified compared to C++ where much time is taken to understand the syntax, easier for small business to start on their own from scratch

2. Dynamic Typing

In python explicit declaration of variables like c++ is not needed. C++ belongs to static typing where data type needs to be assigned by user, this gives the advantage of the programmer knowing what type it is but it decreases the flexibility and Increases coding time. Advantages of static typing comes only when we need absolute control over datatype and use of templates, since these advantages doesn't affect the model we want, we prefer dynamic typing.

3. Syntax Differences

Whitespace/Indentations define the scope of a statement which is quite different from the format of using {} for defining scope in c++ there might not be much difference and may belong to personal preferences of the programmer

Similarly for Boolean values are represented as True/False in Python but 0/1 in C++ , as we understood from dynamic typic of python 0/1 could be taken as INT values rather than Boolean values when defining variables. (This may cause quite some change in our model due to the reason of return values of various functions)

4. Easier Debugging

Python interprets line by line in case of any error it reports the error and stops interpreting further, whereas C++ shows error after fully compiling. Our model makes it easier to check in python since we'll be using many classes and functions, and none of the syntax is skipped out because it is not in use unlike c++

5. Memory efficiency

Python is a high level language far away from hardware and has less control over memory management, which becomes a con generally but our model does not have the requirement of detailed memory management and this can be ruled out

6. Cross-Platform and Faster Execution

A cpp file has to be recompiled(code might be needed to change) for each processor and OS, whereas in python it compiles to a bytecode which could be run/intepretted on Python virtual machine on a specific hardware. From this we can conclude as our model have various variety of users we choose the more portable python.

But as we can observe from above this portability brings back a slower execution time, we have to trade it off for smaller datasets , but when it comes to bigger datasets we can use frameworks like numpy and Scipy which makes execution time faster.

7. Garbage Collection

As we had seen before , python does not have direct memory control but indeed have garbage collection which free allocated memory location using reference counting collector and generational collector, This might be considered as an advantage but it may take a longer time to do this and hence for our model during edge conditions of having limited time it may be a bad choice.

8. Object Oriented Programming

Both languages support OOP model but there might be few noticeable differences

In python constructor cannot be called automatically like c++, multiple inheritance works in python (A bonus point for our model) , but disadvantages of python in comes under the case that it has weaker encapsulation support(no concept of access modifier)

9. basic framework

In C++:

1. Create a main menu to display the list of services and products.

2. Develop a function to input product information such as name, quantity, price, etc.

3. Create a function to display the list of available products and services.

4. Develop a function to store the product information in a database.

5. Develop a function to input customer information such as name, address, contact number, etc.

6. Develop a function to calculate the total cost of the products and services purchased.

7. Create a function to generate and print out invoices.

8. Develop a function to store the customer information in a database.

9. Develop a function to track the quantity of the products and services.

10. Create a function to generate and print out reports.

In Python:

1. Create a main menu to display the list of services and products using Tkinter library.

2. Develop a function to input customer information (name, address, contact number, etc.) and product information (name, quantity, price, etc.)

4. Create a function to display the list of available products and services using Pandas library.

5. Develop a function to calculate the total cost of the products and services purchased using Numpy library.

6. Create a function to generate and print out invoices/reports using ReportLab library.

7. Develop a function to store the customer information/product information in a database using SQLite library.

8. Develop a function to track the quantity of the products and services using SQLite library.

As we had seen from above we can deduce that C++ may not have access to easier to use GUI and will not be able to have a easier linking with database, the multiple libraries provided by Python further strengthens the fact

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