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1.12: Worksheet 1

For each of the questions which require you to write code, you should add your answers to the Python file you started within the practical session. It will be a good idea if you were to put a comment above stating which question you are answering. Comments are started with a hashtag (#):



Work your way through these questions at your own pace. If you need some help after trying to find the answer for yourself, please ask your module tutor.

1. Complete the following table relating to programming paradigms:

| **Paradigm** | **Description** | **Positives** | **Negatives** | **Examples** |
| --- | --- | --- | --- | --- |
| Imperative | It performs step by step task by changing state. Its focus is on how to achieve the goal, the paradigm consists of several statements and after execution of all, the results is stored. | 1. Very simple to implement 2. It contains loops, variables, etc. | 1. Complex problems cannot be solved. 2. Less efficient and less productive. | 1. C; by Dennis Ritchie and Ken Thompson 2. Fortran; by John Backus 3. Basic; by G J Kemeny and T E Kurts |
| Procedural | It emphasises on procedure, in terms of underlying machine model.  This involves writing down a list of instructions to tell the computer what to do in a step by step to finish the task at hand. Predefines functions, local variables, modularity, parameter passing. | 1. The program flow can be tracked easily. 2. Excellent for general purpose programming. 3. Has the ability to reuse the code. | 1. Program code is harder to write. 2. Difficult to relate to real world objects. 3. Data is exposed to the whole program, making it not so much security friendly. | 1. Fortran. 2. COBOL 3. PASCAL 4. ALGOL |
| Object-oriented | OOP can encapsulate, each object in the program is self-sustainable, meaning all the components that make up the object are within the object itself.  Objects can be taken from one program and used to resolve another problem at hand with little or no alterations. | 1. Due to modularity and encapsulation, OOP offers ease of management. 2. OOP mimics the real world making it easier to understand. 3. Since objects are whole within themselves, they are reusable in other programs. | 1. Programs being built with OOP may take longer to be created 2. Over generalisation 3. It tends to be slower and uses high amount of memory | 1. Java 2. C++ 3. C# 4. Python 5. R 6. JavaScript 7. Ruby |
| Declarative | It is a style that expresses logic of computation without its control flow. The focus is about what needs to be done rather than how it should be done.  It basically emphasises on what the code is doing. | 1. Short efficient code. 2. Could be implemented using methods not known yet at the time of programming. | 1. Sometimes hard to understand for external people. 2. For others, it is based on an unfamiliar conceptual model (Solution State) | 1. HTML 2. XML 3. CSS 4. SQL 5. Prolog 6. F# 7. Lisp |
| Logic | Could be termed as abstract model of computation.  Main emphasis is on knowledge base and the problem.  It solves logical problems like puzzles, series, etc. | 1. Classified as high-level language as it implements logic computations rather than mechanics. 2. Allows data to be represented both extensionally and intentionally. | 1. The programs execution can be slow. 2. True/False statements cannot solve most problems at all. 3. Limited to which types of problem it can efficiently solve. | 1. Prolog |
| Functional | It is the oldest programming paradigm. Functional programming also known as applicative programming and value-oriented programming*.* Basically, functional programming is a declarative type of programming. In functional programming, everything is a function returning values instead of modifying data. | 1. Mutability makes the function code free of side effect. 2. Variables can be replaced by their values since the evacuation of expression can be done anytime. | 1. Since there is no state and no update of variables allowed, loss of performance will take place. | 1. JavaScript 2. Haskwell 3. Erlang 4. Lisp 5. Clojure |
| Database Processing | This is based on data and its movement. Program statement are defined by data rather than hard coding a series of steps.  It is the heart of a business information system and provides file creation, data entry, update, query, and reporting functions. | 1. Reduces data redundancy. 2. Improved data security 3. Reduces updating error and increases consistency. | 1. Damaged to database will affect virtually all applications programs. 2. Substantial hardware and software start-up costs. | 1. Microsoft SQL 2. MySQL 3. Amazon Relational Database Service (RDS) 4. ORACLE RDBMS 5. Knack |

1. As you have seen both in the previous question and in the class, programming paradigms each have their own uses. Investigate which paradigms are used most within industry and how they are utilized.

Answer: These are the most popular programming paradigms in the world of software development. Though other programming paradigms exist, the pure implementation of any one paradigm in a programming language is very difficult to find. Most languages are multiparadigmatic in nature.

1. Another type of Software Development Tool are frameworks and libraries.
   1. In terms of software development, what is a framework?
   2. In terms of software development, what is a library?
   3. How are frameworks and libraries used within software development?
   4. What are the differences between frameworks and libraries?
   5. What are the benefits of frameworks and libraries?
   6. What are the drawbacks of frameworks and libraries?
   7. On balance, do you think the benefits outweigh the drawbacks?
   8. Name at least three frameworks for Python and discuss their uses
   9. Name at least three libraries available in Python and discuss their uses
2. Enter the following code into your Python file, then run it:

print("123.456789 just using 0 is: {0}".format(123.456789))

print("123.456789 just using 0:0.2f is: {0:0.2f}".format(123.456789))

* 1. What do you think the {0:0.2f} part does?
  2. Change this to {0:10.2f}, what is happening now?
  3. If you were required to print a number to 3 decimal places, how would you do this using the format command?