Self Review

Exercise 1.1

Fill in the blanks in each of the following statements

a)Programs

b)The input unit, output unit, memory unit, arithmetic and logic unit(ALU), central processing unit(CPU), and secondary storage unit.

c)Machine language, assembly language, and high-level language.

d)Compilers

e)Android

f)Stable

g)Accelerometer

Exercise 1.2

a)Java

b)Javac

c).java

d).class

e)Bytecodes

Exercise 1.3

a)Encapsulation

b)Classes

c)Object-Oriented analysis and design (OOAD)

d)Inheritance

e)Unified Modeling Language (UML)

f)Attributes

Exercise 1.4

a)Input unit

b)Programming

c)Assembly language

d)Output unit

e)Primary storage (RAM) and secondary storage (hard disk, SSD)

f)Arithmetic and logic unit (ALU)

g)Control unit

h)High level languages

i)Machine language

j)Control unit

Exercise 1.5

a)Java Programming language

b)C

c)The Transmission Control Protocol (TCP)

d)The C++

Exercise 1.6

a)Edit, compile, load, verify, and execute.

b)Integrated development environment (IDE)

c)Java Virtual Machine (JVM)

d)Virtual Machine

e)Class loader

f)Bytecode verifier

Exercise 1.7

The two compilation phases of java programs

Compilation phase (Java compiler-javac): Here the java source code (.java files) is compiled by the java compiler(javac). The compiler translates the human-readable java code into bytecode, which is stored in .class files.

The Execution phase: Here the java viertual machine(JVM) loads the bytecode(.class file) and executes them.

Exercise 1.8

Object-Oriented Concepts Applied to a watch

Object: A watch is an object.

Attribute: Size, color, weight, brand, battery life, etc.

Behaviors: Showing time, setting an alarm, stopwatch function.

Class: “Watch” is a class, and different brands/models are objects of the class.

Inheritance: An alarm clock inherits features from a basic watch and adds an alarm function.

Modeling: A watch can be modeled in a software system with appropriate attributes and behaviors.

Messages: A watch receives a message when the user presses a button to adjust time.

Encapsulation: The internal mechanism of time keeping is hidden from the user.

Interface: Buttons and screen allow interaction with the user.

Information Hiding: The user doesn’t need to know how the watch’s quartz oscillator works, only how to read the time.

Exercise 1.9

To prepare for developing your own carbon footprint calculator, its essential to understand the methodologies and formulas used to estimate greenhouse gas (GHG) emissions. A carbon footprint represents the total GHG emissions caused directly by an individual, organization, event, or product, typically measured in equivalent tons of carbon dioxide (CO2e).

If an individual consumes 10,000 kWh of electricity annually, and the emission factor for their electricity source is 0.5 kg CO2e per kWh, their emissions from electricity usage would be: 10,000 kWh x 0.5 kg COe/kWh =5,000 kg Coe

Exercise 1.10

Body Mass Index (BMI) is a numerical value derived from an individual’s weight and height, serving as an indicator of body fatness and potential health risks associated with being underweight, overweight, or obese. It’s a widely used screening tool but does not diagnose body fatness or health directly.

BMI Calculation Formulas: BMI = weight (kg) /height (m)2

Here weight is measured in kilograms and height in meters.

Exercise 1.11

Hybrid vehicles combine internal combustion engines with electric motors to enhance fuel efficiency and reduce emissions. Below is an overview of hybrid-related attributes for several popular models, including their fuel economy and battery specifications.

Toyota Prius

Fuel Efficiency:

City: 54 mpg

Highway: 50 mpg

Combined: 52 mpg

Battery Specifications:

Type: Nickel-Metal Hydride (NiMH)

Nominal Voltage: 7.2V per module

Nominal Capacity: 6.5Ah

Weight: Approximately 1.04kg per module

Dimensions: 19.6 mm (W) x 106 mm (H) x 285 mm (L) per module

Ford Escape Hybrid

Fuel Efficiency:

City: 44 mpg

Highway: 37mpg

Combined: 41 mpg

Battery Specifications:

Type: Lithium-Ion (Li-Ion)

Nominal Voltage: Approximately 300V

Capacity: Varies by model year

Weight: Approximately 54 kg

Exercise 1.12

By following a structured algorithm, gender-specific words can be accurately replaced with gender neutral terms while avoiding issues like malformed words (“woperchild”). In future java implementations, techniques like regular expressions and string manipulation methods can be used to automate this process efficiently.