DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code & Name : **23CST201-Object Oriented Programming**

Course Faculty : Ms.G.Devi, AP/CSE

Puzzles / In Class Activities

Topics Covered: **Unit 3**

Puzzle 1

The Blueprint and the House

Imagine you're an architect designing a new housing complex. You create a detailed blueprint that outlines the structure: number of rooms, layout, materials, etc. Each house built from this blueprint is unique but follows the same design—some might have different paint colors or furniture.

Real-time example: In a car manufacturing plant (relevant for automotive electronics), the "class" is like the blueprint for a car model (e.g., Tesla Model 3), defining features like engine type, wheels, and battery system.

Each "object" is an individual car produced from that blueprint, with unique attributes like color or VIN number.

Puzzle: If two houses (objects) are built from the same blueprint (class), why might one collapse while the other stands strong?

Puzzle 2: The Factory Mold

Think of a toy factory producing action figures. The mold shapes the figure's body, head, and limbs uniformly. But each figure can be painted differently or given accessories.

Real-time example: In electrical engineering, a "class" is like a circuit board template for a smartphone motherboard, specifying components like resistors and capacitors.

Each "object" is a physical board assembled from it, customized with different chipsets.

Puzzle: If the mold (class) has a flaw in the arm design, how does it affect all toys (objects)?

Constructors

Puzzle 1: The Baby's First Cry

When a baby is born, it automatically cries, breathes, and opens its eyes—these are initial actions that happen without being told.

Real-time example: device initialization, like powering on a microcontroller (e.g., Arduino), the constructor is like the boot-up sequence that sets default voltage levels and pin modes right at startup.

Puzzle: Why can't the baby (object) start walking immediately after birth, even if walking is part of its potential?

Puzzle 2: Assembling a Gadget Kit

You buy a drone kit; upon opening, the instructions guide you to first charge the battery and attach propellers before flying.

Real-time example: In power systems, constructing a transformer involves initializing core windings and insulation layers first.

Puzzle: If you skip charging the battery (constructor), why does the drone fail to lift off?

Finalizer

Puzzle 1: The Last Will and Testament

Before someone passes away, they write a will to distribute assets, close accounts, and say goodbyes—actions that happen at the end of life.

Real-time example: In ECE for embedded systems, when shutting down a sensor network, the finalizer is like a cleanup routine that saves last readings and powers off safely to avoid data corruption.

Puzzle: Why might the will (finalizer) not always be executed if the person dies suddenly?

Puzzle 2: Demolishing a Building

When tearing down an old factory, you first remove hazardous materials, disconnect utilities, and recycle parts before bulldozing.

Real-time example: In EEE for circuit decommissioning, finalizing a relay system involves discharging capacitors to prevent shocks.

Puzzle: If the demolition crew skips recycling (finalizer), what hidden dangers remain?

Visibility Modifiers

Puzzle 1: The Bank's Vault Levels

A bank has public lobbies anyone can enter, private offices for staff only, and protected vaults accessible to family members or authorized personnel.

Real-time example: In ECE for hardware security, public modifiers are like exposed USB ports on a device (anyone can access), private like internal firmware code (only the manufacturer), and protected like shared protocols in a family of chips.

Puzzle: Why can't a customer (external class) open the vault (private member) even if they know it's there?

Puzzle 2: Family Recipe Secrets

A grandmother's recipe book has public recipes shared with everyone, protected ones for family only, and private notes just for her.

Real-time example: In EEE for grid management software, public methods allow users to read meter data, private ones handle internal calculations, and default (package) for related modules.

Puzzle: If a neighbor (different package) tries a protected recipe, why do they get incomplete instructions?

Methods and Objects

Puzzle 1: The Remote Control Buttons

A TV remote has buttons like power, volume up/down—pressing them performs actions on the TV itself.

Real-time example: In ECE for robotics, methods are like commands (e.g., moveForward()) that an object (robot) executes, changing its state like position or speed.

Puzzle: Why does pressing "volume up" on one remote (object) not affect another TV in a different room?

Puzzle 2: Vending Machine Operations

Inserting money and selecting a drink triggers the machine to dispense; it "remembers" its inventory.

Real-time example: In EEE for smart meters, methods like calculateBill() process the object's stored usage data.

Puzzle: If two machines (objects) have the same design (class) but different stock levels, why does one dispense while the other rejects?

Inbuilt Classes like String, Character, String Buffer, File

Puzzle 1: The Immutable Signboard (String)

A street sign reads "Main Road" and can't be painted over without replacing the whole sign.

Real-time example: In ECE for data logging, Strings store fixed sensor labels like "Temperature: "; they're immutable to avoid accidental changes in critical displays.

Puzzle: Why create a new sign (new String) instead of editing the old one?

Puzzle 2: The Single Key (Character)

A keyboard key represents one letter, like 'A', and you can't stretch it to hold more.

Real-time example: In EEE for signal processing, Characters handle individual ASCII codes in protocol messages.

Puzzle: Why treat '1' differently from 1 in a puzzle lock?

Puzzle 3: The Expandable Notebook (String Buffer)

A spiral notebook lets you add pages or insert notes without rewriting everything.

Real-time example: In ECE for buffering serial data, StringBuffer efficiently appends incoming packets without recreating the string each time.

Puzzle: Why use an expandable notebook over a fixed one for a growing story?

Puzzle 4: The Document Cabinet (File)

A filing cabinet stores and retrieves documents, with locks for security.

Real-time example: In EEE for logging faults in a substation, File class handles reading/writing error logs to disk.

Puzzle: Why can't you read a file that's been shredded?

this Reference

Puzzle 1: The Mirror in the Room

In a crowded room, you look in a mirror to see yourself clearly amid others. *Real-time example:* In ECE for object-oriented sensor classes, 'this' distinguishes the current sensor's reading from a parameter with the same name in a method.

Puzzle: Why does the mirror (this) show only you, not the person next to you?

Puzzle 2: The Self-Addressed Envelope

When mailing a letter to yourself, you write your own address on it to ensure it returns correctly.

Real-time example: In EEE for chained device configurations, 'this' passes the current object to another method for setup.

Puzzle: If two envelopes (objects) are identical, how does the post office know which is yours?