

software engineering / développement

CODQUEST

WHERE CODE AND FUN COLLIDE

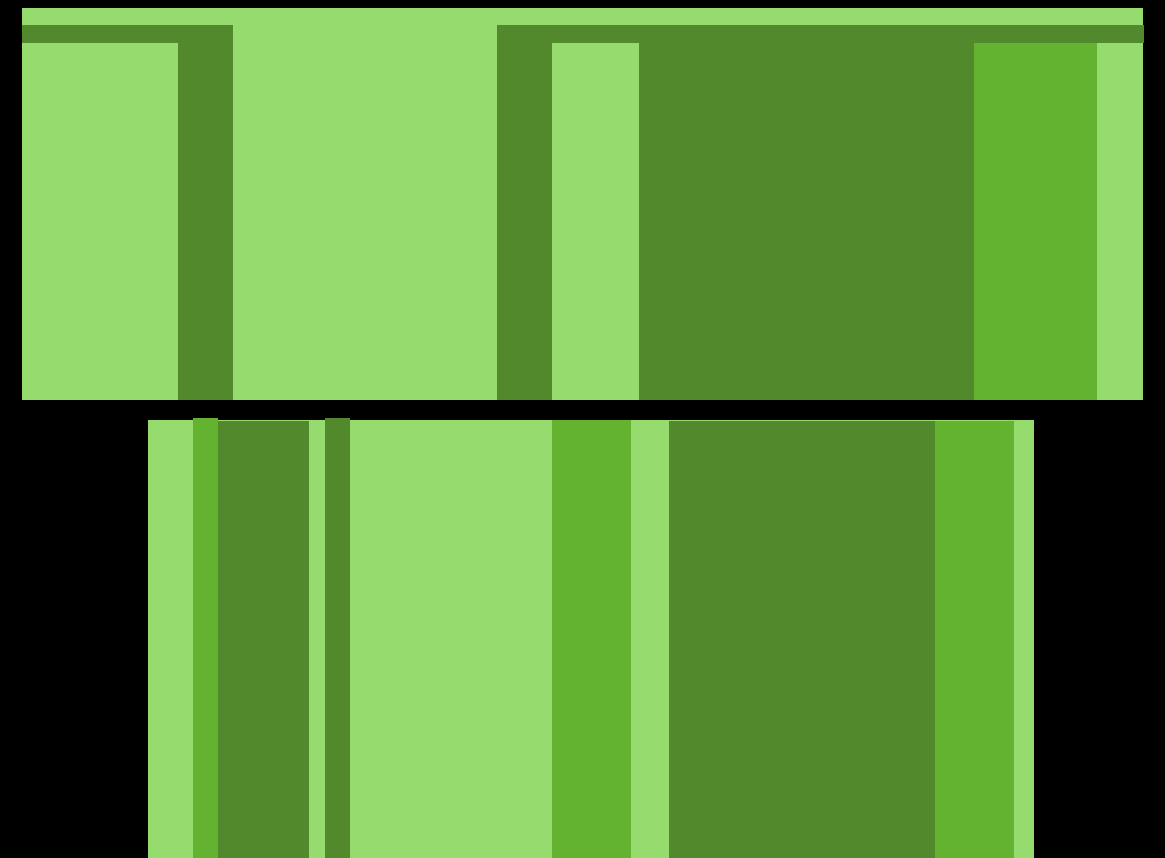
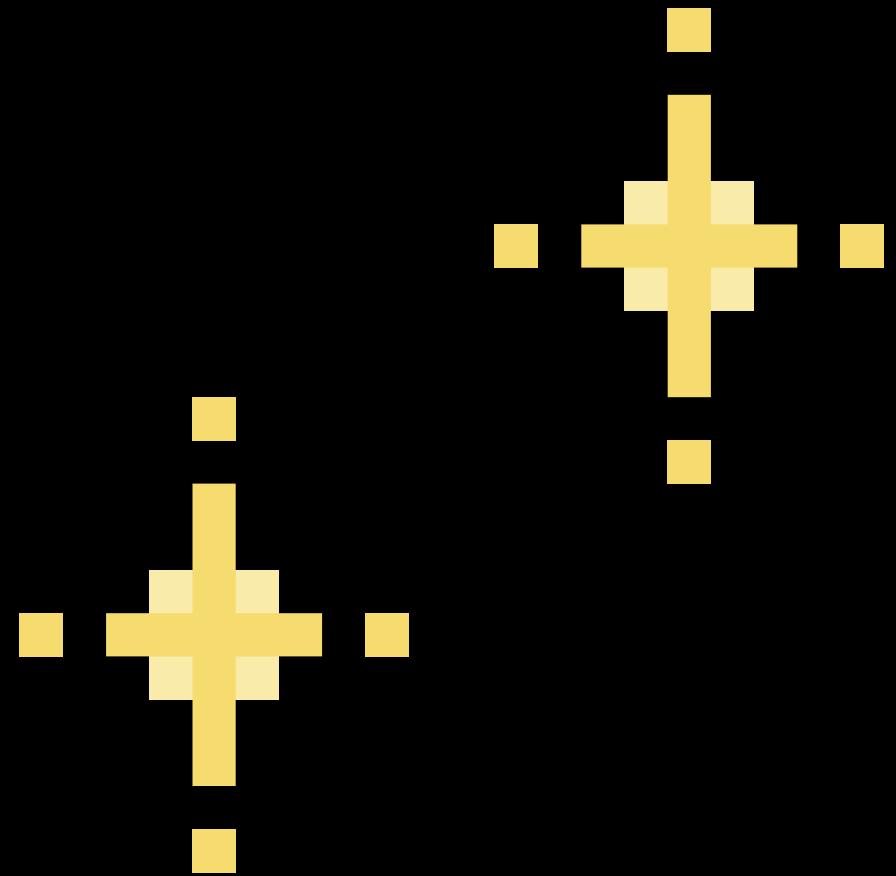
mohamed amine el bacha

younes menfalouti

Ok

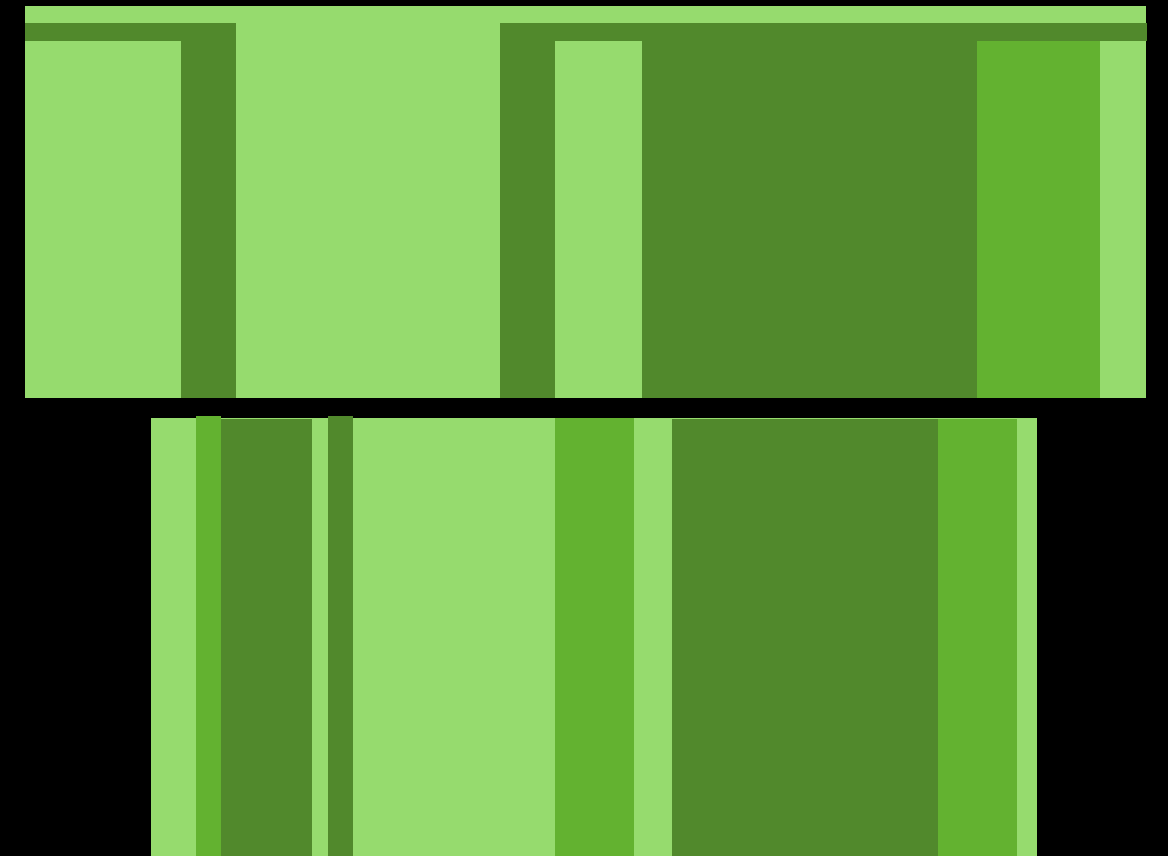
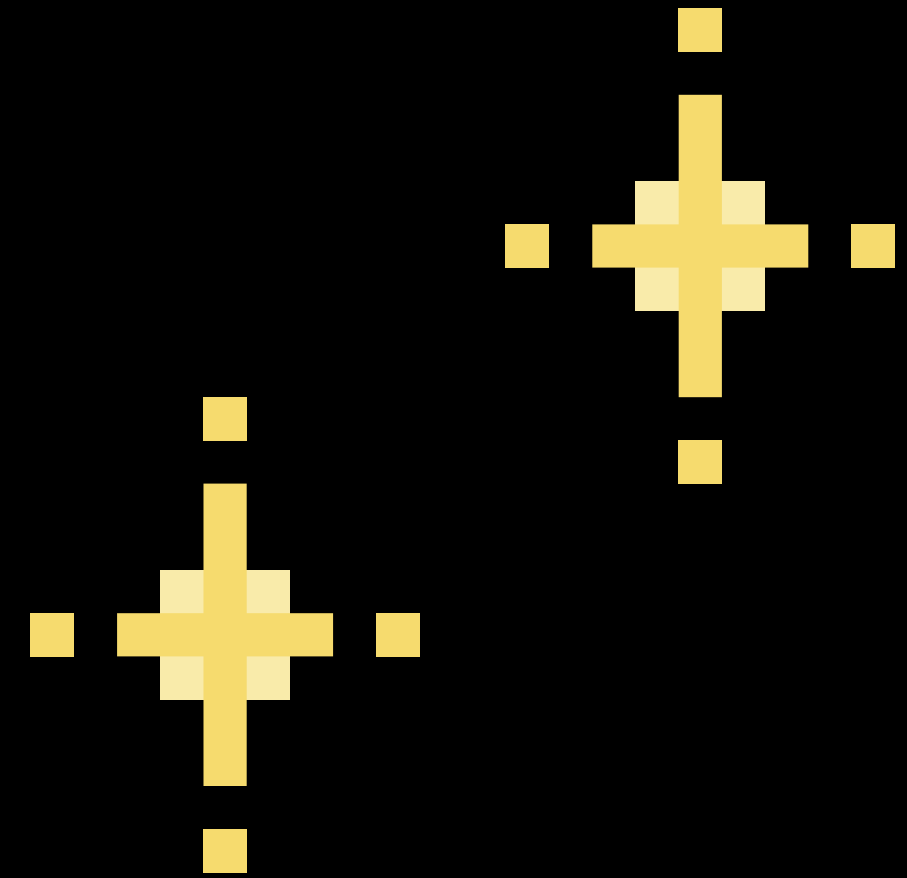


INTRODUCTION



MAIN PROBLEME

Programming education lacks engagement and immediate practical context.



CONCRET MANIFESTATION

DISCONNECTED ABSTRACTION

Students learn concepts {for, if, variables} without seeing their immediate usefulness in a real context

DELAYED FEEDBACKS

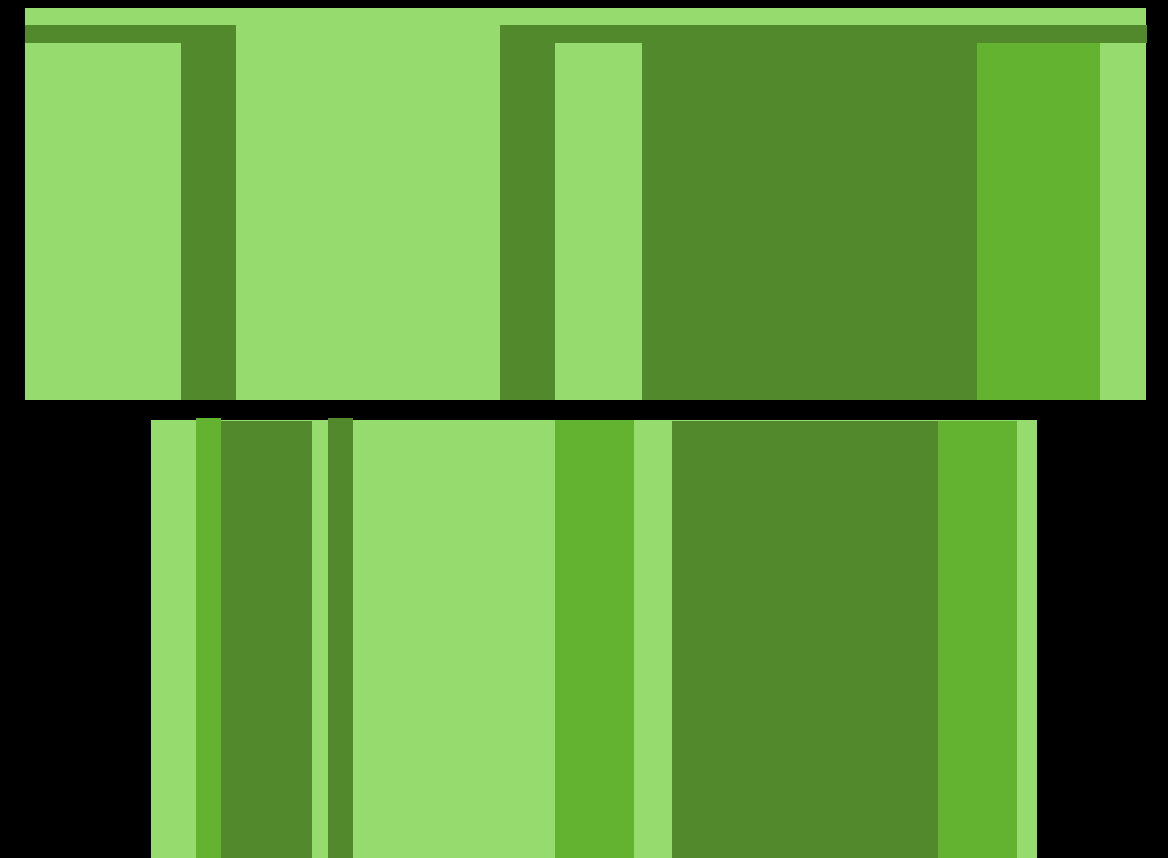
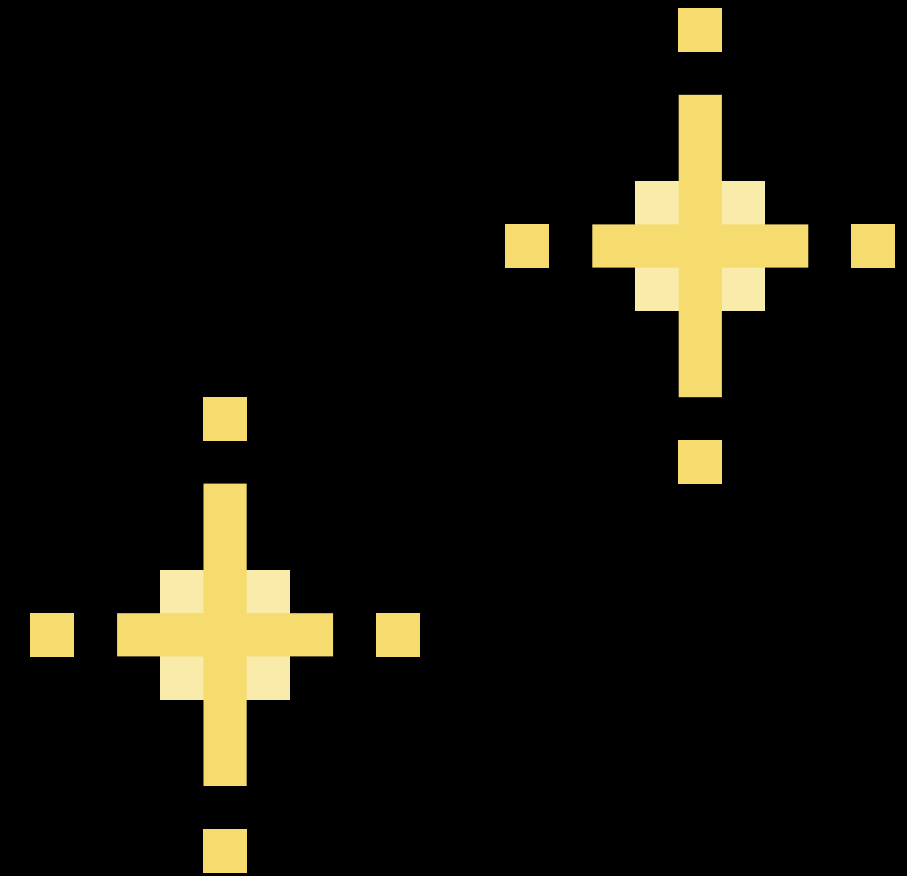
In traditional environments, you must compile/execute → wait → see result → restart

STEEP LEARNING CURVE

Going directly from "Hello World" to complex programs without natural progression

LIMITED MOTIVATION

Classic exercises {calculating factorials, sorting arrays} don't create emotional engagement



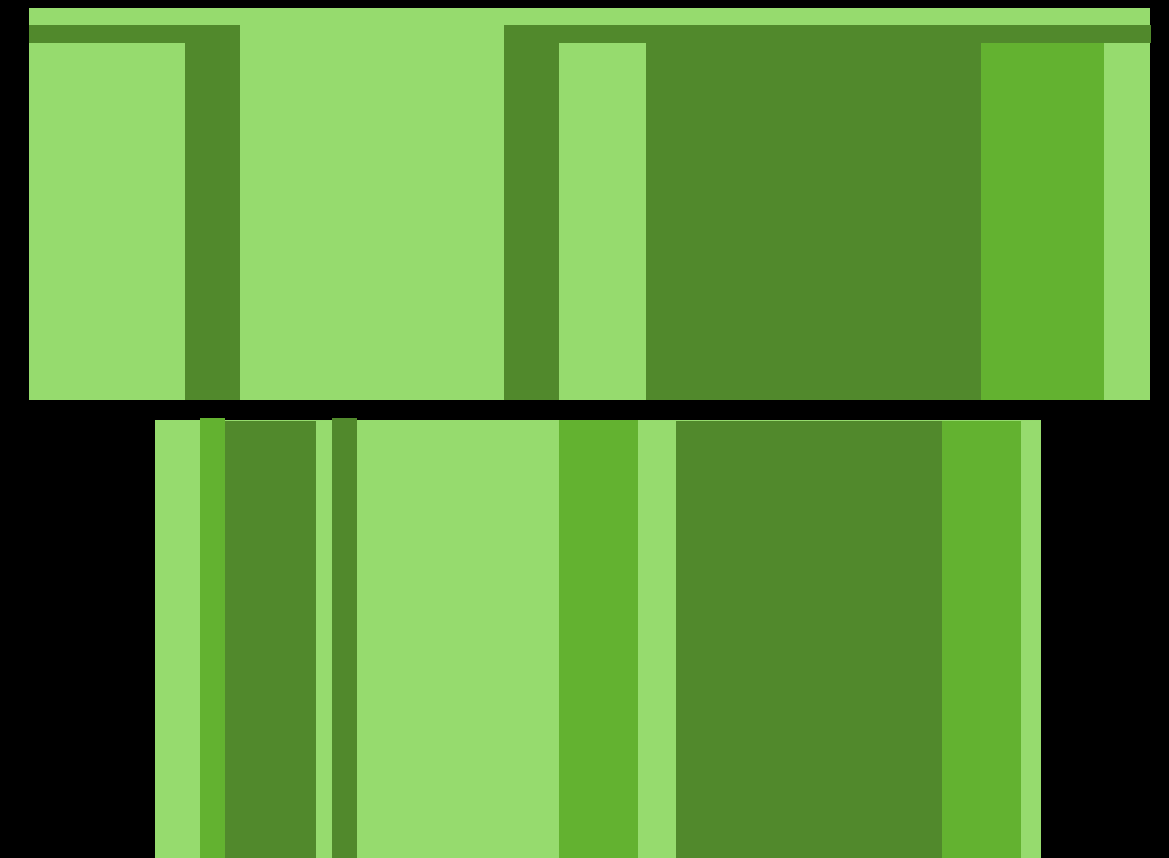
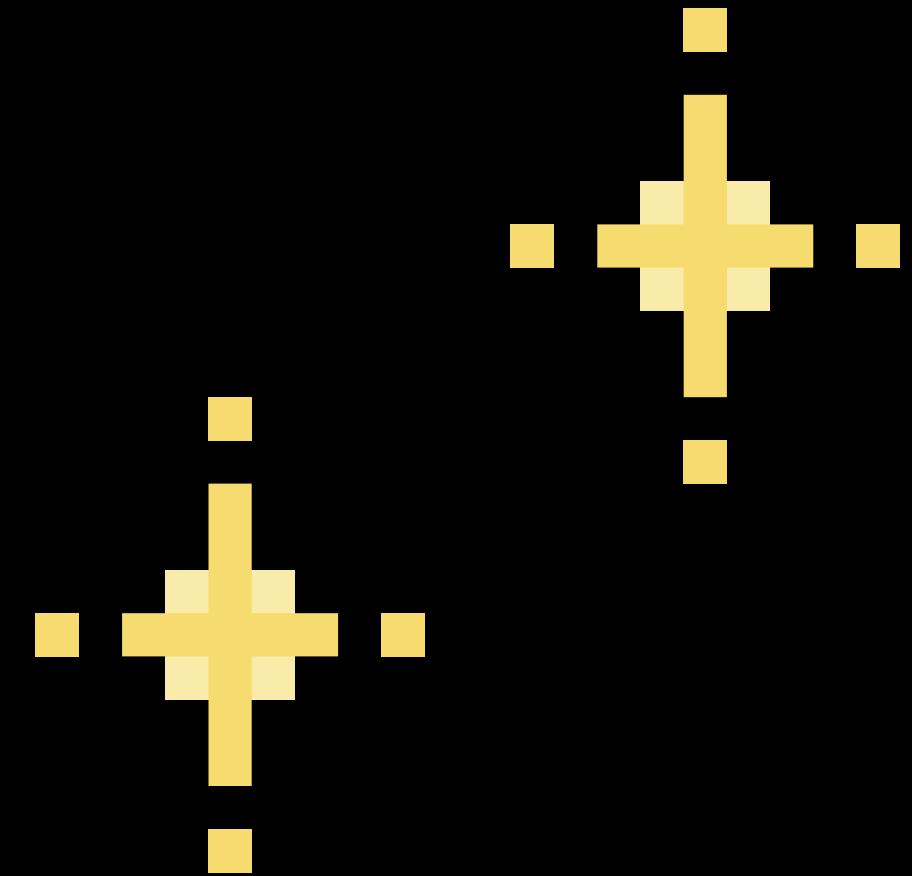
LIMITATION OF EXISTING SOLUTIONS


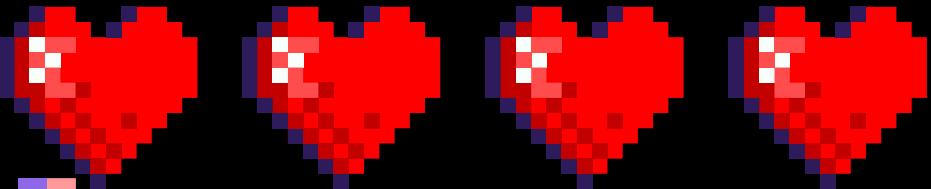
EXISTING OF OVER-SIMPLIFICATION SOLUTIONS (SCRATCH, BLOCKY):

- Going directly from "Hello World" to complex programs without natural progression
- Isolated exercises without narrative context
- visual blocks are different from real life coding experience

EXISTING OF OVER-COMPLICATION SOLUTIONS:

- Diving directly into complete languages without pedagogical progression
- Text-only interface, no immediate visualisation
- Full syntax from the beginning without understanding the core concept



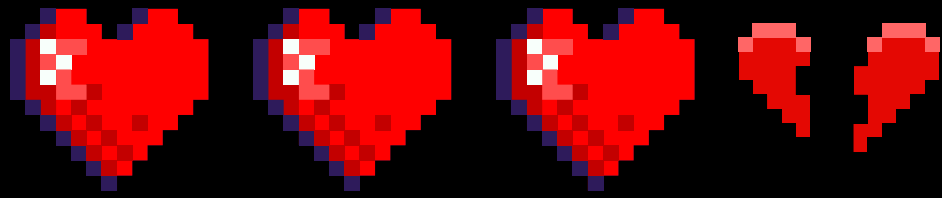


SOLUTION

CODE QUEST

CodeQuest is a 3D educational game that teaches programming fundamentals through interactive gameplay where players control their character by writing real Python-style code commands.



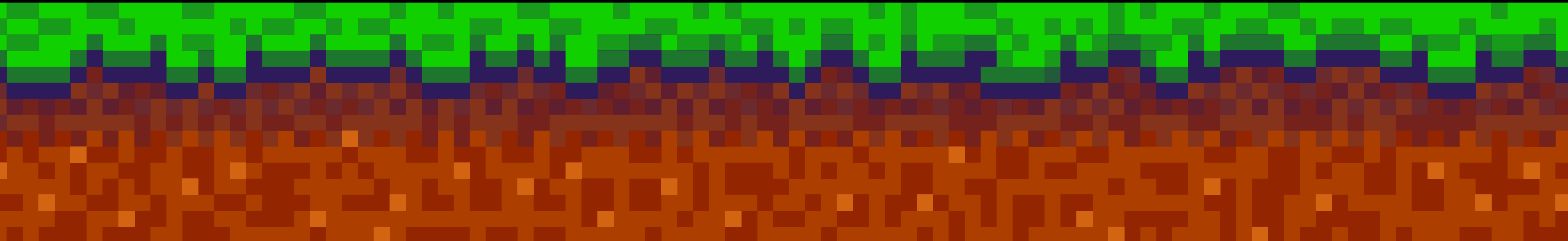


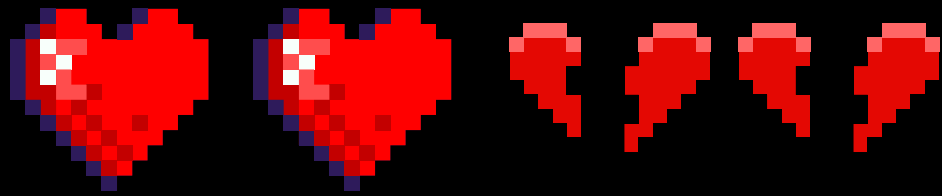
MAIN USERS

PERSONNA 1

SARAH - THE BEGINNER STUDENT

- Age: 14-16 years old
- Education: Middle school/High school
- Programming Experience: None or very limited
- Tech Comfort: Uses smartphones/tablets daily





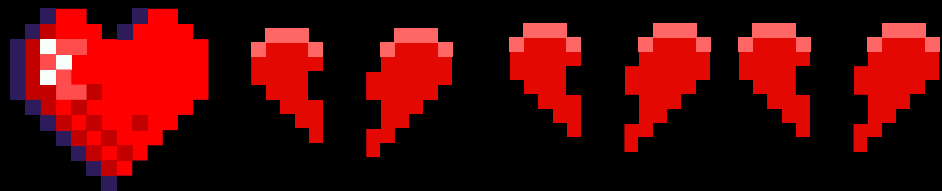
MAIN USERS

PERSONNA 2

KHALID - A HIGHT SCHOOL TEACHER

- Age: 30-45 years old
- Role: Computer Science/STEM teacher
- Class Size: 20-30 students
- Tech Resources: Computer lab with projector





MAIN USERS

PERSONNA 3

AMINA - THE PARENT

- Age: 35-50 years old
- Role: Parent helping child or private tutor
- Programming Knowledge: Limited to moderate
- Investment: Wants child to learn valuable skills





TECHNICAL FEASIBILITY

TOOLS

java 25.0.1

TEAM SKILLS

foundational java and
knowledge and
game development basic
understanding

GAP ANALYSIS

the team has the
knowledge and ressources
to pass this challenge

KEY CHALLENGE

executing player challeges
without arbitrary game
execution and game
crashes

SCHEDULE FEASIBILITY

PLANNING AND DESIGN

DELIVERABLES :
FEASIBILITY STUDY

WEEK 1

ADVANCED FEATURES

DELIVERABLES :
PYTHON COMMAND
INTEGRATION

WEEK 4 - 5

PLANNING AND DESIGN

DELIVERABLES :
FINAL POLISH

WEEK 7

WEEK 2 - 3

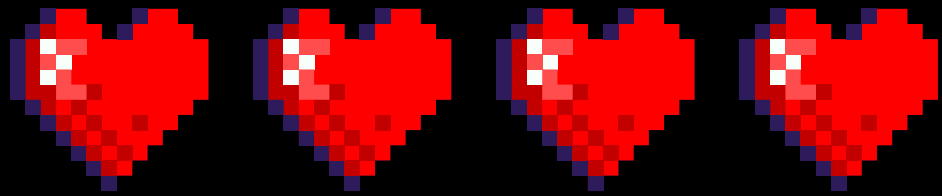
CORE DEVELOPEMENT

DELIVERABLES :
BASIC GAME MECHANICS

WEEK 6

TESTING

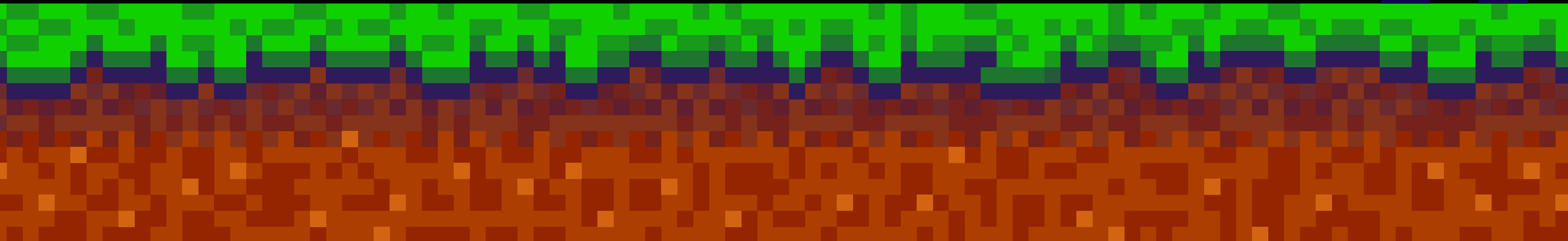
DELIVERABLES :
INTERNAL TESTING

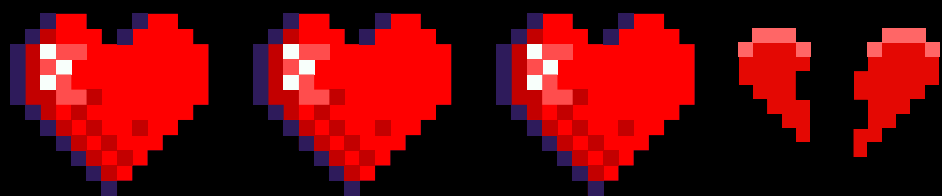


DESIGNED PATTERN

CODEQUEST HAS SEVEREAL DESIGN PATTERNS

- singleton : single asset manager
- Factory : centralised object creation
- Observer : auto UI update





SINGLETON DESIGN PATTERN

- Prevents loading same images multiple times
- Centralized asset management
- Memory efficiency: all sprites loaded once

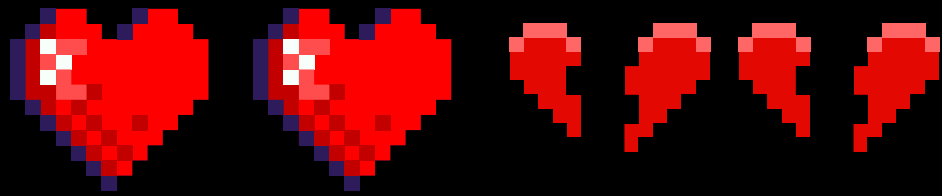
IMPLEMENTATION

```
// Singleton class that loads and manages all game images (Singleton pattern)
public class AssetHandler {
    private static AssetHandler instance; // Single instance 3 usages
    private java.util.HashMap<String, BufferedImage> assets; // Map of name -> image 5 usages

    // Private constructor prevents external instantiation
    private AssetHandler() { 1 usage
        assets = new java.util.HashMap<>();
        loadAssets(); // Load all assets on creation
    }

    // Get the single instance (creates it if it doesn't exist)
    public static AssetHandler getInstance() {
        if (instance == null) {
            instance = new AssetHandler();
        }
        return instance;
    }
}
```





FACTORY DESIGN PATTERN

- Separates object creation from usage
- Easy to add new object types
- Consistent initialization of complex objects

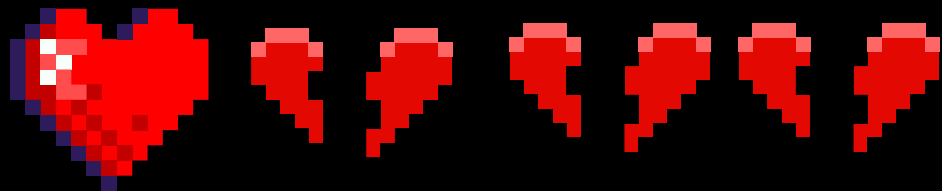
IMPLEMENTATION

```
public static MapObject createObject(String name, int x, int y) { 1 usage
    MapObject obj = new MapObject();
    obj.name = name;

    switch (name) {
        case "wall":
            // Standard wall - full tile collision
            obj.collison = true;
            obj.solidArea = new Rectangle(x: 0, y: 0, width: 64, height: 64);
            obj.solidAreaDefaultX = obj.solidArea.x;
            obj.solidAreaDefaultY = obj.solidArea.y;
            obj.image = AssetHandler.getInstance().getImage(key: "wall");
            break;

        case "wall2":
            // Top corner wall - extended height (96px) with vertical offset
            obj.collison = true;
            obj.solidArea = new Rectangle(x: 0, y: -32, width: 64, height: 96);
            obj.solidAreaDefaultX = obj.solidArea.x;
            obj.solidAreaDefaultY = obj.solidArea.y;
            obj.image = AssetHandler.getInstance().getImage(key: "wall_top_corner");
```





OBSERVER DESIGN PATTERN

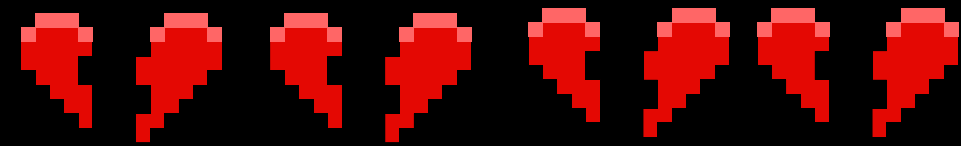
- Decouples game logic from UI
- Automatic synchronization
- Multiple UI elements can observe same data

IMPLEMENTATION

- Observer interface

```
/**
 * Observer interface - part of the Observer Design Pattern
 * Observers are notified when the Subject they're watching changes state
 * Used for updating UI elements when game systems (health, keys, chests) change
 */
public interface Observer { 18 usages 1 implementation
    /**
     * Called when the observed Subject's state changes
     * Implementing classes should update their display or state accordingly
     */
    void update(); 1 implementation
}
```





OBSERVER DESIGN PATTERN

- Decouples game logic from UI
- Automatic synchronization
- Multiple UI elements can observe same data

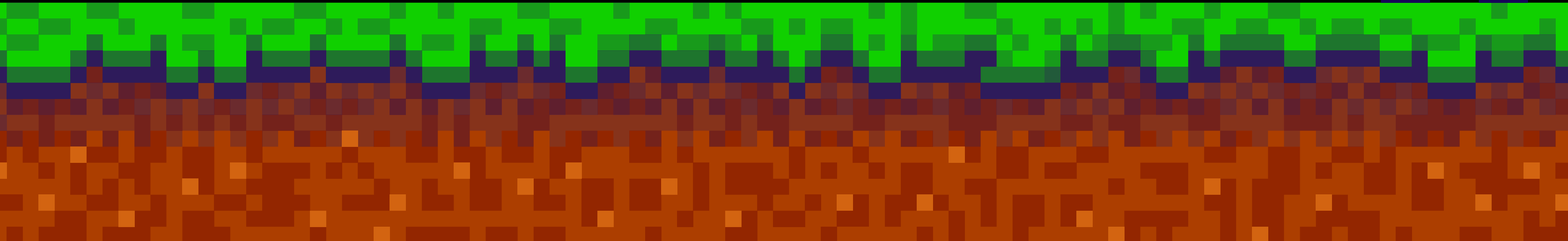
IMPLEMENTATION

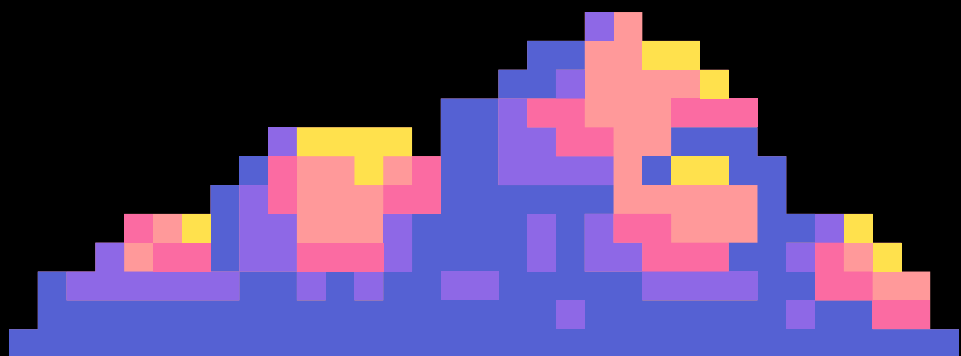
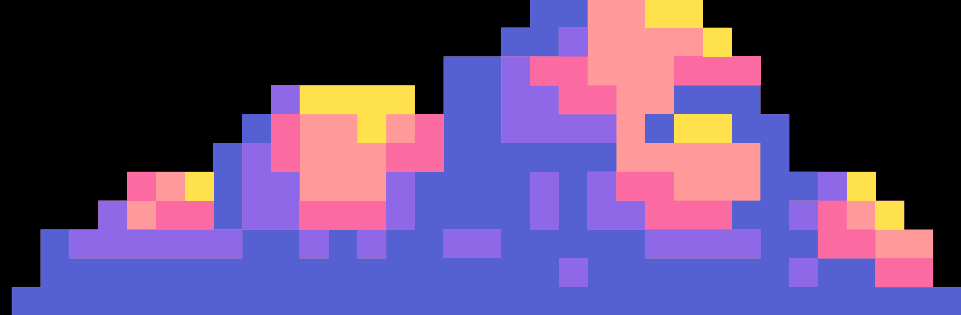
- subject interface

```
public interface Subject { 6 usages 3 implementations
    /**
     * Add an Observer to the notification list
     * @param o The Observer to register
     */
    void registerObserver(Observer o); 3 usages 3 implementations

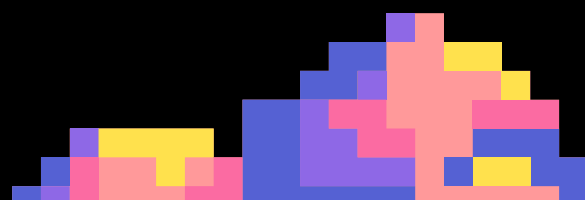
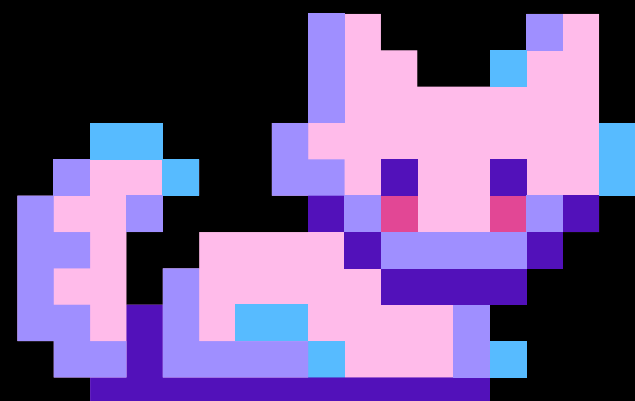
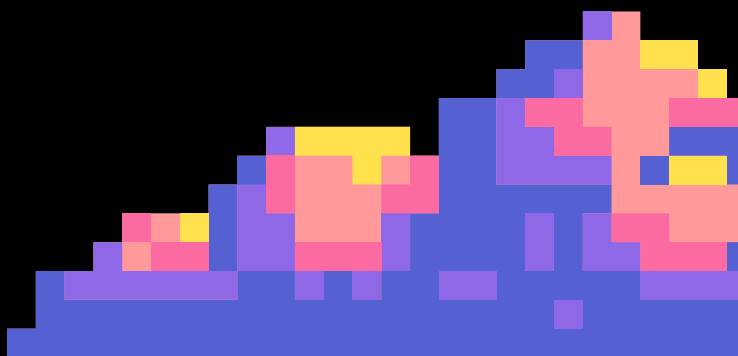
    /**
     * Remove an Observer from the notification list
     * @param o The Observer to unregister
     */
    void unregisterObserver(Observer o); no usages 3 implementations

    /**
     * Notify all registered Observers that state has changed
     * Calls update() on each Observer
     */
    void notifyObservers(); 6 usages 3 implementations
}
```





DEMO



THANKS FOR YOUR ATTENTION

LOG OUT

