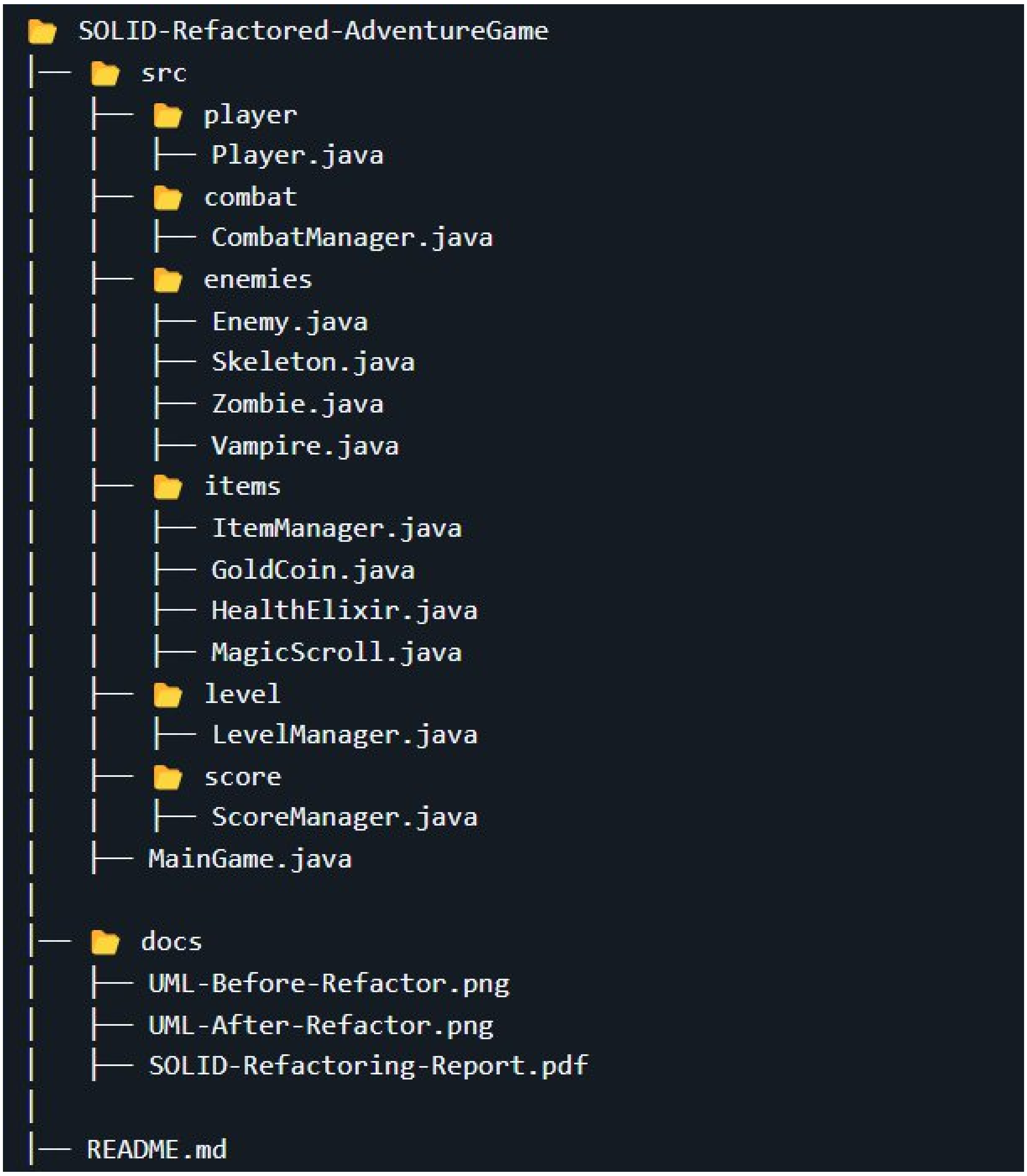
Refactoring MonolithicAdventureGame Using SOLID Principles

1.Project Overview

MonolithicAdventureGame is a console-based RPG where a player fights enemies, collects items, gains experience, and levels up.

After refactoring, the code follows SOLID principles, making it modular, maintainable, and scalable.

2. Project Structure



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📁 SOLID-Refactored-AdventureGame
|── 📁 src
|   ├── 📁 player
|   |   ├── Player.java
|   ├── 📁 combat
|   |   ├── CombatManager.java
|   ├── 📁 enemies
|   |   ├── Enemy.java
|   |   ├── Skeleton.java
|   |   ├── Zombie.java
|   |   ├── Vampire.java
|   ├── 📁 items
|   |   ├── ItemManager.java
|   |   ├── GoldCoin.java
|   |   ├── HealthElixir.java
|   |   ├── MagicScroll.java
|   ├── 📁 level
|   |   ├── LevelManager.java
|   ├── 📁 score
|   |   ├── ScoreManager.java
|   ├── MainGame.java
|
|── 📁 docs
|   ├── UML-Before-Refactor.png
|   ├── UML-After-Refactor.png
|   ├── SOLID-Refactoring-Report.pdf
|
|── README.md
```

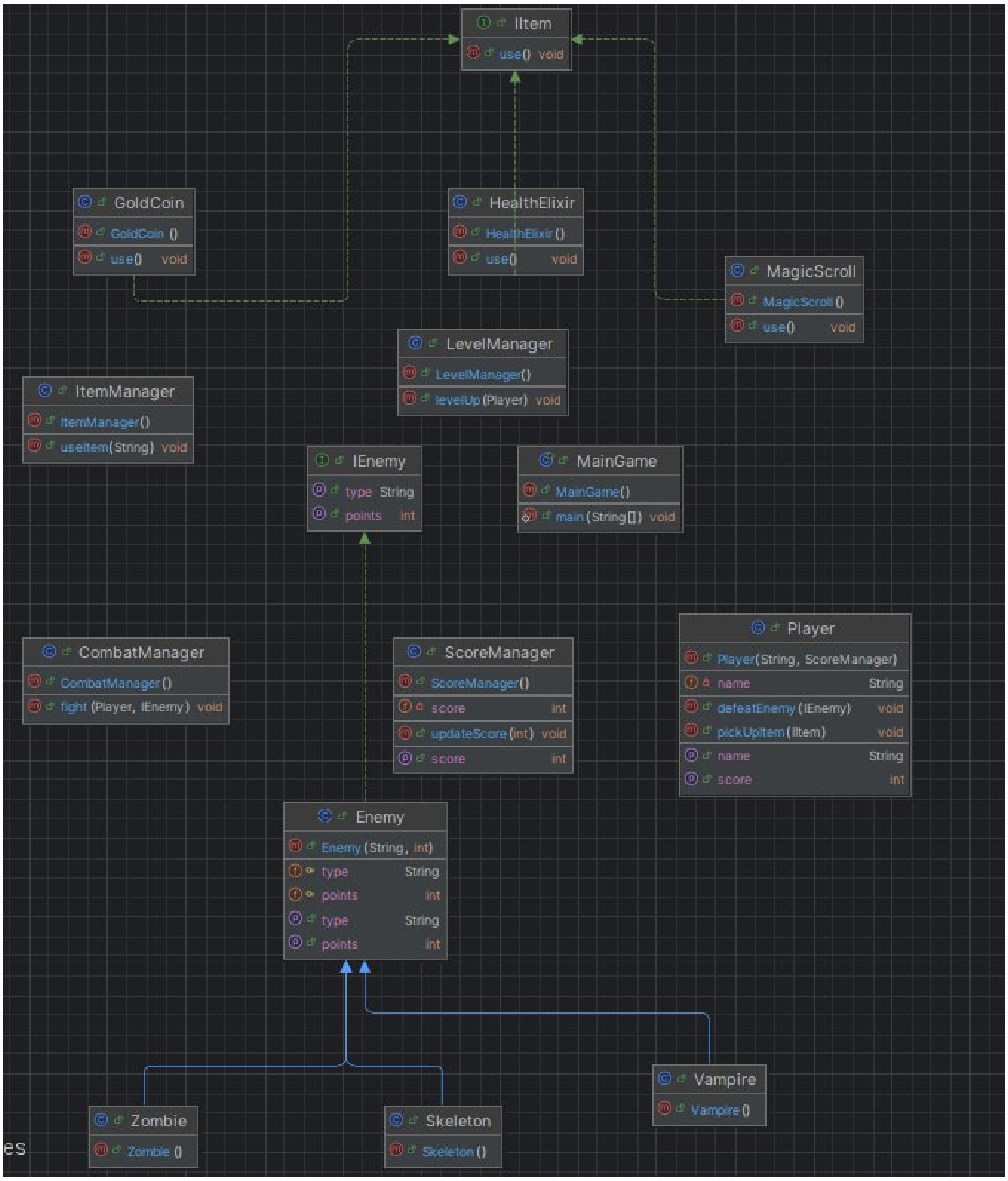
Principle	**Implementation in Code**
SRP (Single Responsibility Principle)	Each class has only **one responsibility** (separate classes for Player, Enemy, Items, Combat, Levels, and Score).
OCP (Open/Closed Principle)	New enemies and items can be **added without modifying** existing code (using **IEnemy** and **IItem** interfaces).
LSP (Liskov Substitution Principle)	**Zombie, Vampire, and Skeleton** can replace **Enemy** without breaking the game.
ISP (Interface Segregation Principle)	Split **IEnemy** and **IItem** instead of using one large interface.
DIP (Dependency Inversion Principle)	**CombatManager** depends on **IEnemy**, not specific enemy classes, making it flexible.

3. SOLID Principles Applied

4. Key Files & Classes

- **MainGame.java (Main File)**
  - Initializes the player, score manager, level manager, and combat system.
  - Creates enemy instances and triggers battles.
  - Levels up the player and uses items.
- **Player.java (Player Class)**
  - Stores the player's name and score.
  - Handles enemy defeats and item usage.
- **CombatManager.java (Combat System)**
  - Manages battles between the player and enemies.
  - Calls the **defeatEnemy()** method from the player class.
- **Enemy.java & Subclasses (Skeleton.java, Zombie.java, Vampire.java)**
  - Implements different enemy types.
  - Uses an interface (IEnemy) for flexibility.
- **ItemManager.java & Items (GoldCoin.java, HealthElixir.java, MagicScroll.java)**
  - Manages item interactions.

- Implements the IItem interface for modularity.



IItem
use() void
GoldCoin
GoldCoin ()
use() void
HealthElixir
HealthElixir ()
use() void
MagicScroll
MagicScroll ()
use() void
LevelManager
LevelManager()
levelUp (Player) void
ItemManager
ItemManager()
useItem(String) void
IEnemy
type String
points int
MainGame
MainGame()
main (String[]) void
CombatManager
CombatManager ()
fight (Player, IEnemy) void
ScoreManager
ScoreManager()
score int
updateScore (int) void
score int
Player
Player(String, ScoreManager)
name String
defeatEnemy (IEnemy) void
pickUpItem (IItem) void
name String
score int
Enemy
Enemy (String, int)
type String
points int
type String
points int
Vampire
Vampire ()
Zombie
Zombie ()
Skeleton
Skeleton ()
es