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Problem Statement

In many role-playing games (RPGs), players are required to manage their characters' equipment, such as weapons and armor, to enhance their combat effectiveness. However, managing these items can become complex, especially when different character types (e.g., warriors, mages) have unique rules for equipping items and calculating combat power.

Currently, there is a need for a lightweight and efficient system that allows players to:
1. Create and manage characters of different types (e.g., warriors, mages).
2. Equip and unequip weapons and armor, with clear limits on the number of items that can be equipped.
3. Calculate the combat power of each character based on their equipped items and character type.

The goal of this project is to design and implement an RPG Character Equipment Management System that addresses these needs. The system will provide a simple and intuitive way for players to manage their characters' equipment and calculate their combat power, while adhering to the rules of the game.

This system will demonstrate the application of Object-Oriented Programming (OOP) principles, including abstraction, encapsulation, inheritance, and polymorphism, as well as SOLID principles and design patterns, to create a modular, maintainable, and scalable solution.

Key Points in the Problem Statement:
- Core Problem: Managing character equipment and calculating combat power in RPGs can be complex and time-consuming.

- Target Audience: Players of RPGs who want a lightweight system to manage their characters' equipment and combat effectiveness.

- Solution: A lightweight RPG Character Equipment Management System that allows players to create characters, equip/unequip items, and calculate combat power.

- Technical Focus: The system will demonstrate OOP principles, SOLID principles, and design patterns.

Business Requirements

1. Character Management
    a. The system shall allow players to create characters of different types (e.g., Warrior, Mage).

b. Each character shall have a unique name and a set of attributes (e.g., equipped weapons, equipped armor).
c. The system shall support at least two character types initially: Warrior and Mage.

2. Equipment Management
   a. The system shall allow players to equip weapons and armor to their characters.
   b. Each character can equip a maximum of 2 weapons and 3 armor pieces.
   c. The system shall allow players to unequip weapons and armor from their characters.
   d. The system shall prevent players from equipping more items than the allowed limit.

3. Combat Power Calculation
   a. The system shall calculate the combat power of each character based on their equipped items and character type.
   b. Warrior characters shall have a combat power formula that emphasizes weapon attack power.
   c. Mage characters shall have a combat power formula that emphasizes armor defense power.
   d. The combat power calculation shall be dynamic and updated automatically when equipment is changed.

4. User Interface (Basic)
   a. The system shall provide a simple way for players to:
   b. Create characters.
   c. View a character's details (name, type, equipped items, combat power).
   d. Equip and unequip items.

5. Rules and Constraints
   a. Each character type shall have unique rules for combat power calculation.
   b. Equipment limits shall be enforced:
   c. Maximum of 2 weapons per character.
   d. Maximum of 3 armor pieces per character.
   e. The system shall not allow invalid operations (e.g., equipping more items than the limit).

6. Scalability
   a. The system shall be designed in a modular way to allow for future expansion:
   b. Adding new character types (e.g., Archer, Rogue).
   c. Adding new equipment types (e.g., accessories, potions).
   d. Modifying combat power formulas without breaking existing functionality.

Nous:
- Character
- Player
- Warrior

- Mage
- Weapon
- Armor
- Combat Power
- Name
- Type
- Attribute
- Equipment
- Limit
- Rules
- Formula
- Attack Power
- Defense Power
- Details
- System
- User Interface
- Expansion
- Maximum
-

- Create
- Equip
- Unequip
- Calculate
- View
- Prevent
- Emphasize
- Enfore
- Update
- Support
- Allow
- Modify
- Expand
- Add

Classes

Class	Attributes
Character	name, type, equipped_weapons, equipped_armors, combat_power
Warrior	attack_multiplier, defense_multuplier
Mage	attack_multiplier, defense_multuplier
Weapon	name, attack_power

Armor	name, defense_power
CombatPowerCalculator	formula
EquipmentManager	weapon_limit, armor_limit
CharacterFactory	character_types

Identify User and User Dimensions

User: Player

Dimensions:
- Players want to enhance the game experience by creating and managing characters
- Players hope to improve the combat effectiveness of their characters through equipment management in order to achieve better results in the game.

User Persona

Persona 1: Casual Gamer

1. Profile & Backstory
    a. Name: Alex
    b. Age: 25
    c. Occupation: Software Developer

2. Background: Alex is a young software developer with a busy work schedule. In his free time, he enjoys playing lightweight RPG games. He prefers games that are easy to pick up and play without needing to dive deep into complex mechanics.

3. Behavior & Motivation
    a. Behavior:
        i. Likes to quickly create characters and start playing.
        ii. Prefers simple character types (e.g., Warrior) and straightforward equipment management.
        iii. Doesn't want to spend too much time managing equipment; focuses on the core gameplay experience.

  b. Motivation:
    i. Wants to enhance his character's combat effectiveness with minimal effort.
    ii. Enjoys the role-playing aspect of games but doesn't want to be bogged down by complicated rules.

4. Reason to Need This Game Feature
  a. This app provides a lightweight equipment management system that allows Alex to quickly create characters, equip weapons and armor, and view combat power without needing to learn complex rules.
  b. The intuitive interface and clear equipment limits make it easy for Alex to manage his characters and focus on the fun parts of the game.

Persona 2: Hardcore Gamer
1. Profile & Backstory
  a. Name: Sarah
  b. Age: 30
  c. Occupation: Game Designer

2. Background: Sarah is a game designer with a deep passion for RPGs. She enjoys exploring game mechanics and experimenting with different character builds and equipment combinations to optimize performance.

3. Behavior & Motivation
  a. Behavior:
    i. Enjoys trying out different character types (e.g., Warrior, Mage) and equipment combinations.
    ii. Focuses on understanding combat power formulas and optimizing equipment to maximize effectiveness.
    iii. Likes to challenge system rules and find the most efficient solutions.

  b. Motivation:
    i. Wants to dive deep into the game mechanics to create the most powerful character builds.
    ii. Enjoys the process of exploring and optimizing game systems.

4. Reason to Need This Game Feature
  a. This app offers clear combat power formulas and equipment limits, allowing Sarah to experiment and optimize her character's performance.
  b. The modular design of the system supports different character types and equipment combinations, satisfying her desire to explore and challenge game mechanics.

Persona 3: Dungeon Master

1. Profile & Backstory
   a. Name: Mike
   b. Age: 40
   c. Occupation: Teacher

2. Background: Mike is a high school teacher and an avid player of Dungeons & Dragons (D&D). He often takes on the role of Dungeon Master (DM), designing game scenarios and managing player characters.

3. Behavior & Motivation
   a. Behavior:
      i. Needs to create and manage multiple characters for different players.
      ii. Focuses on balancing characters to ensure fairness in the game.
      iii. Prefers using tools to simplify character and equipment management.

   b. Motivation:
      i. Wants to streamline the process of managing player characters and equipment to reduce his workload.
      ii. Aims to ensure game balance and fairness to enhance the players' experience.

4. Reason to Need This Game Feature
   a. This app provides a robust character and equipment management system that helps Mike quickly create and manage multiple characters.
   b. The combat power calculation and equipment limit features ensure character balance, allowing Mike to focus on designing engaging game scenarios and stories.

User Story

Character Management

1. As a player, I want to create a new character by selecting a name and character type (Warrior or Mage), so that I can start managing my character.
2. As a player, I want to view my character's details, including name, type, equipped items, and combat power, so that I can assess my character's current state.
3. As a player, I want to delete a character if I no longer need it, so that I can manage my list of active characters efficiently.

Equipment Management

1. As a player, I want to equip a weapon for my character, so that I can increase their attack power and improve their combat effectiveness.

2. As a player, I want to equip an armor piece for my character, so that I can increase their defense power and improve their survivability.

3. As a player, I want to unequip a weapon or armor from my character, so that I can replace it with another item.

4. As a player, I want the system to prevent me from equipping more than 2 weapons, so that I follow the game's rules.

5. As a player, I want the system to prevent me from equipping more than 3 pieces of armor, so that I follow the game's rules.

Combat Power Calculation

1. As a player, I want my character's combat power to be updated automatically when I equip or unequip an item, so that I can see the impact of my choices in real time.

2. As a Warrior, I want my combat power to prioritize weapon attack power, so that I can deal more damage in combat.

3. As a Mage, I want my combat power to prioritize armor defense power, so that I can enhance my magical resilience.

4. As a player, I want to view a breakdown of my combat power calculation, so that I can understand how my equipped items contribute to my effectiveness.

User Interface and Experience

1. As a casual gamer, I want a simple interface where I can easily equip and unequip items, so that I can manage my character without spending too much time.

2. As a hardcore gamer, I want detailed stats and combat power formulas to be accessible, so that I can optimize my character's equipment.

3. As a dungeon master, I want to create and manage multiple characters at once, so that I can balance the game for my players.

4. As a dungeon master, I want to ensure that characters follow equipment limits, so that the game remains fair and balanced.

Future Expansion and Scalability

1. As a player, I want to be able to create new character classes beyond Warrior and Mage, so that I can experiment with different playstyles.

2. As a player, I want to equip additional item types (e.g., accessories, potions) in future updates, so that I have more customization options.

3. As a developer, I want the system to allow easy modification of combat power formulas, so that I can balance the game without breaking existing functionality.

4. As a developer, I want to be able to add new equipment types without rewriting large parts of the code, so that the system remains maintainable and scalable.

UML Diagram

UML Diagram

Interface Mockup

RPG Equipment Management UI mockup

AI Usage:

- User Persona, the prompt that I gave ChatGPT 4o is Casual player, hardcore gamer which has knowledge of game design, and the master player of RPG game. I think the response AI gave me makes sense because it covers players from different dimensions logically.
- I ask ChatGPT 4o to summarize the key points in Problem Statement, and the prompt is the entire Problem Statement, and the summary is precise.
- I ask ChatGPT 4o to help me implement the Business Requirement in case that I miss something. The prompt is the Business Requirement that I wrote. It did help me add something about Scalability and Rules & Constraints which are both significant to RPG Games.
- I also talked to ChatGPT 4o a lot to discuss whether some of my ideas were logical or not.