CptS 487
Software Design and Architecture

Lesson 10

Analysis Case Study Pt. 1

Instructor: Bolong Zeng

WASHINGTON STATE
UNIVERSITY
World Class. Face to Face.

Outline of this Class

- Use the Plants vs Zombie game example to go over requirements elicitation and analysis stages.

Sample Game Play

- https://www.youtube.com/watch?v=hQLsVTXb5RA

- If you're not familiar with the game, watch the video above.
  — It's a basic tower defense game that was popular for a while.
 — As the player, you plant various "Plants" to defeat the "Zombies" invasion and protect your brain.

Usually…

- I ask students to identify basic classes and their attributes/operations immediately first.
  — You should try before moving forward with this lesson too.

- Slightly disoriented and unorganized.
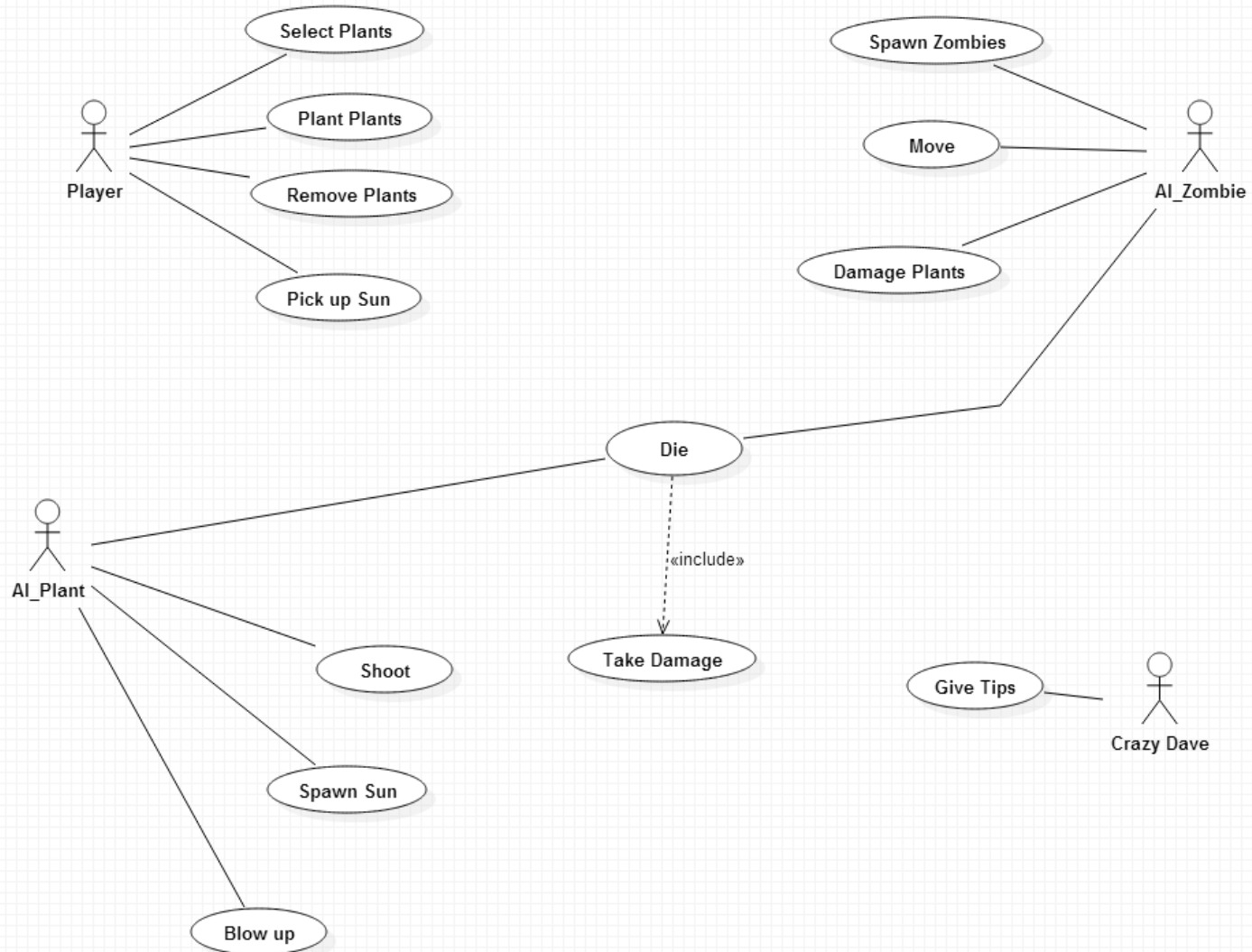 — Possible mistakes and missing pieces.

Start with Use Cases

- Noun-verb analysis to find the use cases (verbs/actions)

- Actors
  — Since this is a game, we'll need to have an AI actor.

Start with Use Cases
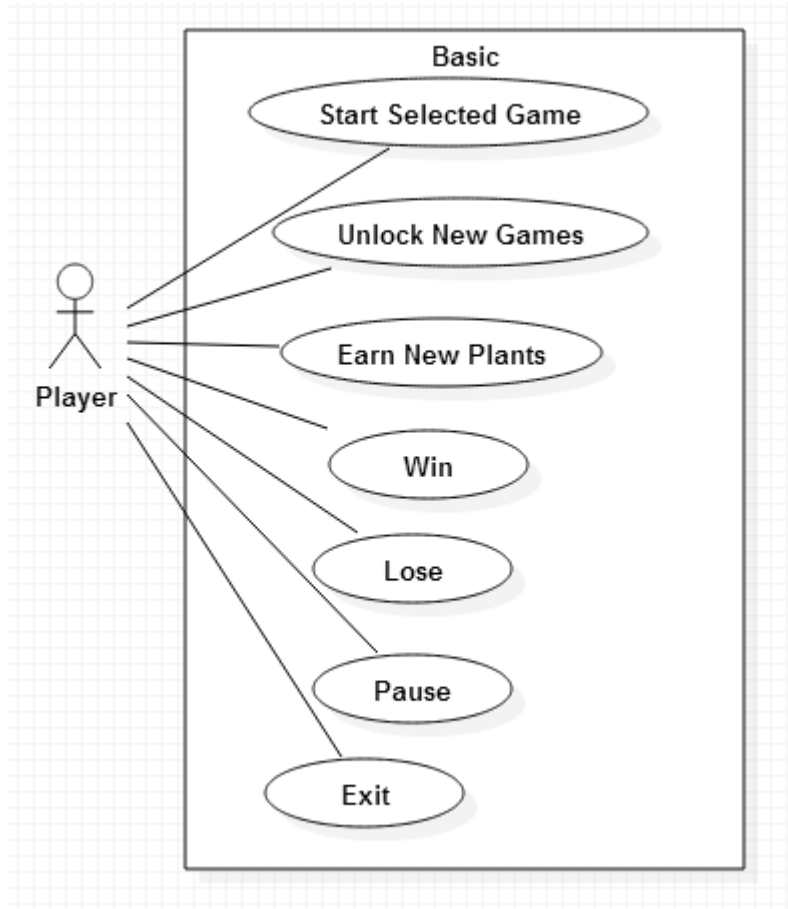
Start with Use Cases

Details for Use Cases

- Player – Plant Plants
  - 1. Player picks up an available plant card from the bar.
  - 2. Player clicks on a grid on the lawn.
  - 3. System deducts the cost from player's balance.
  - 4. System spawns the corresponding plant at the grid.
  - 5. System deactivates the plant card.
  - *Alternatives? Exceptions?
    - Unavailable card; Invalid grid; Insufficient cost…
- AI_Plant – Shoot
  - 1. AI detects a zombie in the same lane
  - 2. AI sends a signal to shoot a bullet.
  - 3. System spawns a bullet traveling forward in the lane.
- AI_Zombie – Take Damage
  - 1. AI detects a bullet collides with a zombie.
  - 2. AI sends a signal to damage the zombie.
  - 3. System reduces zombie's health.
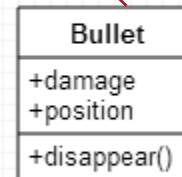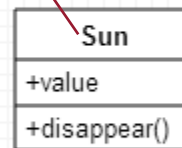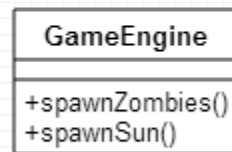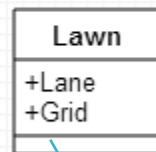
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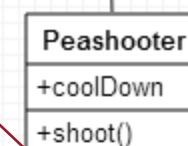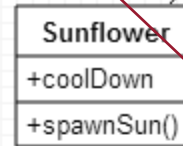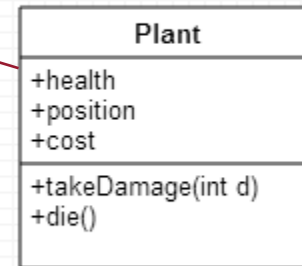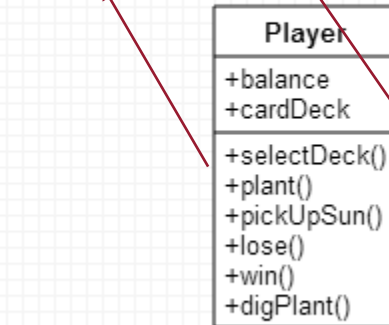 - 1. Player pickup an available plant card from the bar.
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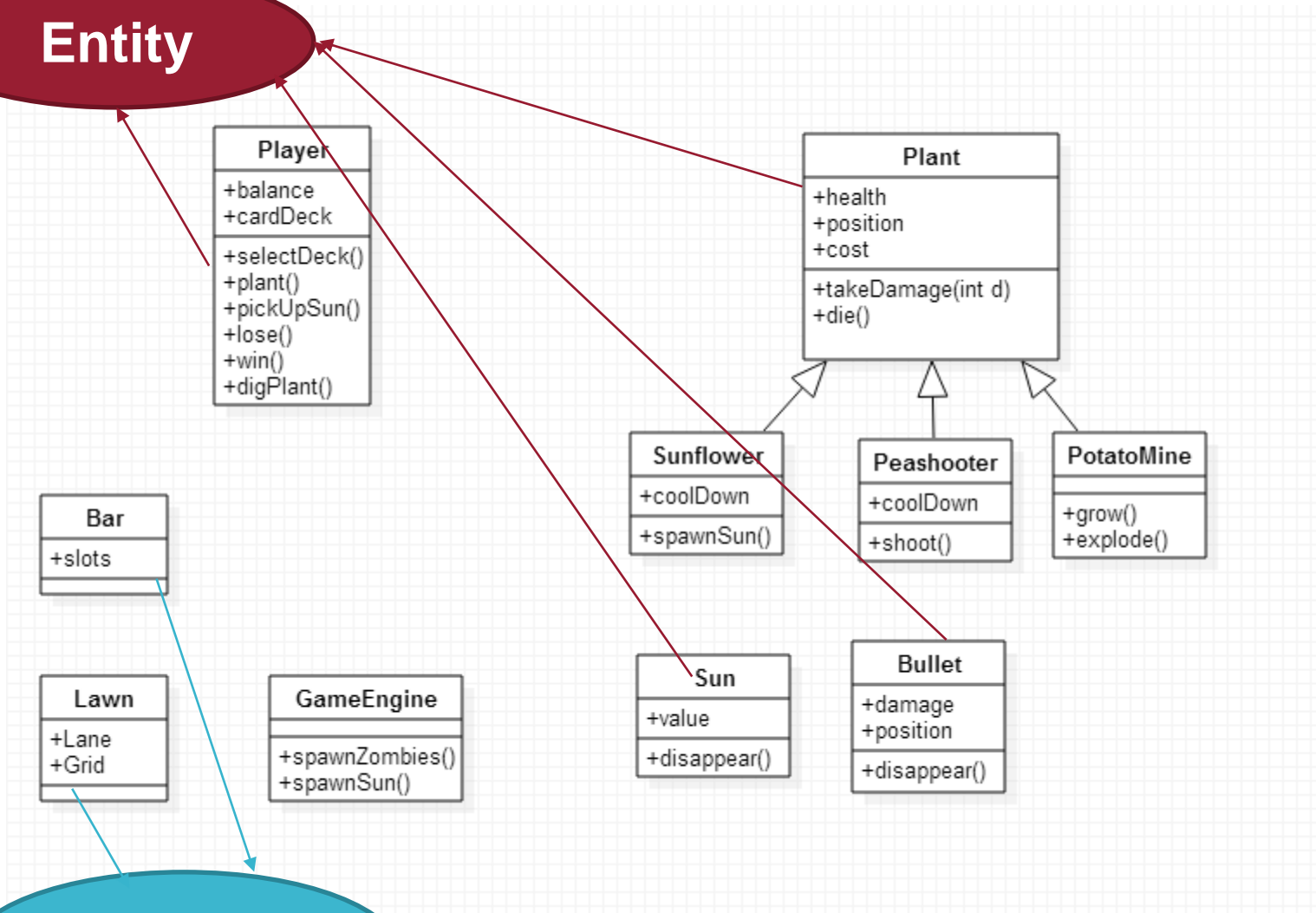
Identify Classes

- Noun-verb analysis to find the classes/attributes/operations.
- Potential classes:
  - Entity:
    - Player; Bullet; Sun; (AI?)
    - Zombies; Plants
      - Sunflower; Peashooter; Mushroom
      - Regular zombies; Roadcone Zombies; Bucket Zombies
  - Boundary:
    - Plant card; Bar; Lawn
  - Attributes:
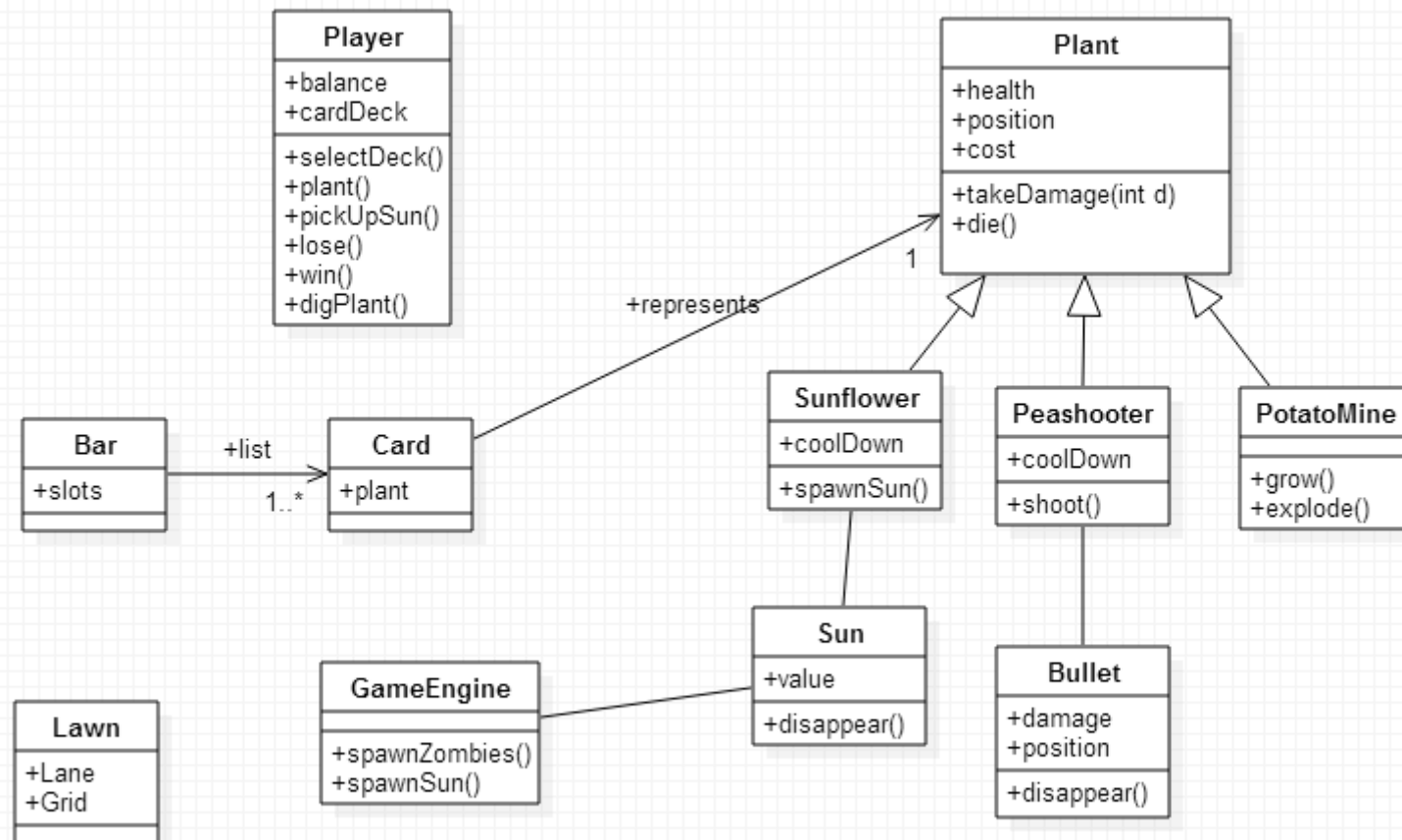   - Cost; Balance; Health; Signal;
    - Grid; Lane;

Classes

Entity

Boundary

Player
+balance
+cardDeck

+selectDeck()
+plant()
+pickUpSun()
+lose()
+win()
+digPlant()

Plant
+health
+position
+cost

+takeDamage(int d)
+die()

Sunflower
+coolDown

+spawnSun()

Peashooter
+coolDown

+shoot()

PotatoMine
+grow()
+explode()

Bar
+slots

Lawn
+Lane
+Grid

GameEngine
+spawnZombies()
+spawnSun()

Sun
+value

+disappear()

Bullet
+damage
+position

+disappear()
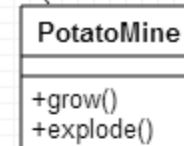
Next: Relations

Further Analysis

- Sequence diagram of use case(s)
  - 1. How does a player pick up a sun?
  - 2. How does a plant shoot and damage a zombie?