

# **The Modular Adaptive Game**

## ***Student Teams:***

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## ***Project Overview***

### ***Background Info:***

The current gaming landscape is dominated by meticulously handcrafted open-world games, offering visually stunning yet predictable experiences. Conversely, games leveraging randomness or procedural generation remain rare, often limited in scope or lacking coherence. NPCs in most games are rigidly pre-programmed, following strict, repetitive behaviors that break immersion. This project aims to break that mold by embracing the excitement of randomness and unpredictability through generative, modular world-building and adaptive NPCs, fostering a dynamic, immersive, and endlessly replayable experience.

### ***Goal:***

This project aims to develop a proof-of-concept (POC) for a fully modular and adaptive game. The game features:

- ***Modular World Generation:*** A procedurally generated game world built from modular tiles. Each tile represents a self-contained, pre-designed scene seamlessly connecting to others, creating a dynamic yet coherent open world. This approach ensures both variety and consistency across gameplay.
- ***Immersive NPC Behavior:*** Non-player characters (NPCs) simulate logical, task-oriented behavior and adapt dynamically to the player character's (PC's) actions.

The game aspires to create a richly immersive environment that evolves unpredictably with endless replayability by combining generative modularity and dynamic NPC interactions.

### ***Key Features:***

1. ***Tile-Based Open-World Generation:*** A randomly generated world that maintains logical coherence across tiles.
2. ***Adaptive NPC Behavior:*** NPCs respond intelligently and dynamically to the player's actions, fostering an engaging, interactive simulation.
3. ***Possible future game implementation:*** Given enough time and effort the project may end up as a game-making toolkit and thus integration features can be developed.

## ***Initial Roadmap:***

### ***Team #1 - Modular World Development***

- **Foundation:**
  - Build a single modular game tile (a self-contained scene that serves as a building block for the larger world).
  - Integrate transitions between tiles (ensuring seamless movement of the player and NPCs from one tile to another without breaking immersion).
- **Expansion:**
  - Scale up with more pre-built tiles (each new tile exponentially increases the variety of possible world configurations, allowing for a myriad of unique combinations and enhancing the game's replayability).
  - Develop logic for generating multi-tile worlds.
  - Ensure intra-tile consistency to maintain immersion.
- **Optimization:**
  - Manage memory and rendering for seamless transitions.
  - Expand the number of tiles to create a vast open world (a larger tile library increases the world's complexity, necessitating optimized systems for efficient tile management and smooth gameplay at scale).

### ***Team #2 - NPC AI Development***

- **Foundation:**
  - Implement basic stationary NPCs.
  - Develop simple pathing and movement.
  - Add event injection/interrupt functionality (introduce a system of flags and interrupts that trigger different NPC actions, enabling NPCs to react dynamically to specific events or conditions in the world, such as alarms, player actions, or environmental changes).
- **Expansion:**
  - Introduce NPC types and tags (establish distinct NPC categories based on roles or functions, such as merchants, guards, or villagers, and assign tags that define specific behaviors, attributes, or interactions, allowing for more diverse and context-sensitive NPC actions).
  - Enrich NPC actions with diverse interaction scripts.
  - Enable tile-based behavior variations for NPCs.
- **Advanced AI:**
  - Create a decision-making system based on contextual factors like tile type and player actions.