

Underground Resource Discovery and Survival Game Summary

Group number: 3

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Overview

The Underground Resource Discovery and Survival Game is a single-player simulation game that takes place in a changing underground environment. Players dig tunnels, explore underground areas, collect resources, and manage survival factors like oxygen, hydration, energy, and tunnel stability. Unlike many survival games that focus mostly on combat or basic crafting, this project puts more attention on how the environment reacts to the player's actions, such as changes in airflow, water movement, and possible tunnel collapse. The final design organizes these ideas into a modular software system that supports this style of gameplay in a clear and structured way.

Key Features

The project includes several core gameplay and system features.

- **Dynamic Environment Simulation:** The underground environment reacts to the player.
- **Resource Collection System:** Players gather resources in order to survive and make progress.
- **Survival Mechanics:** Players must monitor oxygen levels, hydration, nutrition in order to survive.
- **Environmental Hazards:** Flooding, collapsing, and resource depletion introduce realistic challenges.

System Design

The system follows a modular software architecture where each major feature is handled by different components. This improves maintainability, scalability, and clarity.

- **Player Module:** It handles player stats, experience, movement and state.
- **Environmental Module:** Simulates underground conditions such as airflow.
- **Resource Module:** Manage Spawning, collection and resources usage.
- **Physics Module:** Controls tunnel stability and environmental reactions
- **Game Controller Module:** coordinates interactions between all systems.

Main Classes and Subsystems

At the center of the design is the GameController, which is mainly responsible for controlling the overall flow of the game and helping the different subsystems work together. The World, TerrainGrid, and Resource Node classes are used to represent the underground environment and how resources are placed in it. Environmental changes are handled by EnvironmentManager, AirflowSystem, WaterSystem, and StabilitySystem, which allow the world to react when the player digs or changes the environment. The Player, PlayerStatus, and Inventory classes are used

to store the player's current condition and the items they have collected. The CraftingSystem, BuildingSystem, and Shelter classes handle things like making tools and building safe spaces in the game. The HUD is used to show the player important information while they play, and the SaveManager handles saving progress. Together, these classes support the main features the game needs.

Testing

The final report also includes testing considerations to show how the design could be checked later during implementation. Acceptance tests were connected to important parts of the system, including excavation, survival mechanics, crafting, shelter building, environmental hazards, and save/load reliability. This helps show that the design is not just an idea on paper, but something that can actually be tested and validated once the system is built.

Dynamic Modelling and Interaction

The design also includes dynamic modelling to show how the system would behave during important gameplay events. Sequence diagrams were used for key use cases like tunnel excavation and shelter building. These diagrams help show how the classes interact during gameplay and make the roles of major parts like the GameController, World, EnvironmentManager, Inventory, BuildingSystem, and HUD easier to understand. By showing how actions move through the system, they also help connect the requirements to the class design and subsystem structure.

Conclusion

Overall, the final design provides a clear and organized foundation for implementing the Underground Resource Discovery and Survival Game. By combining modular subsystems, key classes, dynamic modelling, and testing considerations, the project creates a design that is easier to understand, maintain, and extend. The result is a system that supports the project's main goal of creating a survival game where the underground environment reacts directly to the player's actions.