Design Document: Player Home Integration

1. Overview

This feature introduces a persistent "Home" area for the player. This area is a safe zone generated within the initial maze chunk. It serves as the mandatory spawn point for a new game and enforces specific gameplay rules: no entity spawning, no weather rendering, and dampened ambient audio.

2. Technical Architecture Changes

A. Maze Data Structure (`Maze.java`)

We need to flag specific coordinates within the grid as "Home Tiles."

- **Change:** Add a `Set<GridPoint2> homeTiles` to the `Maze` class.
- **Reason:** This allows O(1) lookups for `isHomeTile(x, y)` checks used by the renderer, sound manager, and spawn logic.

B. Generation Logic (`MazeChunkGenerator.java`)

The tile stitching algorithm is currently random. We must inject a specific "Home Tile" template into the generation grid.

- **Logic Update:** In `createMazeFromArrayTiles`, if generating the initial chunk (0,0), force the placement of the provided `homeTile` String array into a central slot of the `TileInfo[][]` map layout.
- **Coordinate Mapping:** After generating the final text layout, map the local coordinates of the Home Tile to the global `Maze` grid and populate the `maze.homeTiles` set.
- **Player Spawn:** Update `findPlayerStart` to prioritize a coordinate that exists within `maze.homeTiles`.

C. Spawning Restrictions (`SpawnManager.java`)

The home area must remain clear of enemies and debris.

- **Logic Update:** In the constructor, after identifying `validSpawnPoints` (floor tiles), filter out any points that are present in the `maze.homeTiles` set. This ensures the `WeightedRandomList` logic never picks a home tile for monsters or items.

D. Audio & Atmosphere (`SoundManager.java` & `WorldManager.java`)

- **Audio:** `WorldManager.update()` needs to check if the player's current position is within a Home Tile. If `true`, tell `SoundManager` to dampen volume.
- **Visuals:** `WeatherRenderer` (which draws rain/snow overlay) needs to check `maze.isHomeTile(playerX, playerY)`. If true, it should act as if the level > 1 (ceiling exists) and stop rendering precipitation.

E. Persistence (`ChunkData.java`)

- **Serialization:** The `homeTiles` set must be saved to JSON so that when the chunk is reloaded, the game remembers which tiles are the home (to maintain audio/visual rules).

Project Plan

Here is the step-by-step plan to implement this feature. I have broken this down into milestones.

Milestone 1: The Data Layer & Generation

Goal: The game generates the specific Home Tile in the middle of the first chunk, allows the player to spawn there, and saves this data. **Steps:**

1. **Update `Maze`**: Add storage for home tile coordinates.
2. **Update `ChunkData`**: Add JSON serialization for home tile coordinates.
3. **Update `MazeChunkGenerator`**:
    - Accept the new `String[] homeTile`.
    - Logic to force-place this tile in the center of the tile array.
    - Logic to calculate which (x,y) coordinates belong to the home and pass them to the `Maze` object.
    - Logic to force player spawn within this region.
4. **Verification:** We will compile and run. You should see the custom room generated, and the player standing inside it.

Milestone 2: Spawning Rules

Goal: Ensure the home is safe (no monsters/items inside). **Steps:**

1. **Update `SpawnManager`**: specific logic to remove `homeTiles` from the `validSpawnPoints` list before the spawning algorithms run.
2. **Verification:** We will run the game multiple times to ensure no "Trash," "Monsters," or "Loot" appear inside the house.

Milestone 3: Atmosphere (Audio & Visuals)

Goal: Implement the "Ceiling" effect and audio dampening. **Steps:**

1. **Update `WorldManager`**: Add a check in `update()` to detect if the player is in a home tile.
2. **Update `SoundManager`**: Add a method `setVolumeDamping(boolean isDamped)` to lower ambient loops.
3. **Update `WeatherRenderer`**: Modify the render condition to skip drawing weather if the player is in a home tile.
4. **Verification:** Walk in and out of the house. Rain should stop falling, and wind sounds should get quieter when inside.
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