Labyrinth
“Get in the Maze”

6.1111 Final Project
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Players are trapped inside a maze and must navigate to the center.

Players can only see what is in front of them (in a 3D view) and a mini-map showing their general location.

Players can move forward/back and turn left/right.
Block Diagram

Labyrinth Block Diagram
Maps are Randomly Generated

- A new random map is generated for every new game
- Players are presented with a new challenge every time they play
- Another layer of complexity
Map Generation

- Start every map with concentric squares
- Add/Remove walls to create maze
Map Generation

Use random number generator module to choose which walls to add or remove.

After adding a wall make sure some set of invariants are never broken:
- At least 1 path to everywhere on the map
- Limited number of paths to center of map
Game Logic

- Take as input up/down/left/right keys
- Update position if the move is possible according to the map (prevent player from walking through walls)
- Output the current position of the player and the player’s viewing angle
Video

- Present the players a 3D view of the world
Ray Casting to Simulate 3D

- For every angle, find out how far the nearest wall is, and scale based on that distance.
- Currently, each player has a 60 degree field of view, but depending on speed after testing, this might be adjusted.
Writing Columns to Memory

- SceneRenderer outputs a distance and column number to ColumnRenderer.
- ColumnRenderer scales the specified column and writes it to the video buffer.
Double Buffering

- The monitor shows one buffer while the other buffer is being written
- Once SceneRenderer says a new frame is ready, the video switches to the other buffer
Timeline

- **November 20th**
  - SceneRenderer outputting correct distance for every angle
  - Random Number Generator and initial map generator complete

- **November 27th**
  - ColumnGenerator writing columns to memory
  - MapGenerator complete
  - Initial Collision Detection

- **December 4th**
  - All subsystems working separately

- **December 8th**
  - Everything working together
Any Questions?