Design Document

Team Name: Raging Hamsters

Team: Arielle Chongco, Jasmine Hunter, Luke Lohden, Jaysen Gan, Matthew Ruiz, Akihiro Izumi

Game Choice: Bomberman
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How the Game is Played

Players: 2 - 4

Player Controls:

	Input
Movement	[ASDW] or [Arrow Keys]
Place Bombs	Space Bar
Detonate Bomb (requires Trigger Power-Up)	R

Objective: Players aim to score the most points with the aid of power ups that randomly spawn across the map. The methods of scoring points varies on the game mode explained

Game Modes:

Current Game Mode:

- Death Match
    - The objective of the game mode is to kill the most players while avoiding the Trogdolytes that roam the map. Killing other players with bombs increases a player's score by one point. Suicide by his/her own bomb or death by Trogdolyte decrements the player's score by one point.

Potential Future Game Modes:

- King of the Hill
    - The objective of the game mode is to try and stay in a set area for the most amount of time. The longer the player stays in the set area, the more points the player obtains. Death does not decrement points but it does reset players back to a spawn point away from the set area.
- Last Ham Standing
    - The objective of the game mode is to be the last hamster standing. There are no points in this game mode. Instead, players are ranked based on the order they were killed in.

- Monster Slayers
    - The objective of the game mode is to team up with other players to outlast the Trogdolyte horde. The longer the game goes on, the more Trogdolytes. that spawn across the map. Players have limited lives and are out of the game once they run out. However, a power-up unique to this game mode allows players to resurrect each other. Points are scored by killing Trogdolytes.

Game Objects:

- BomberHam
    - The player controlled unit. Each BomberHam is controlled by a player. The BomberHam is able to move in all directions in the 2D space and plant bombs. BomberHams can be damaged by explosions and Trogdolytes. Once damaged, BomberHams are forced to respawn at given spawn locations on the map. In certain game modes BomberHams may no longer respawn if they no longer have lives remaining. Picking up powerups can increase a BomberHam's speed, the amount of bombs they can place, or allow the BomberHam to trigger the bomb to explode rather than let the bomb go off from a timer. There can be anywere from 2 to 4 BomberHams in a game.
- Bomb
    - Static once placed by BomberHam. Explodes in 4 directions. On contact with its explosion, it damages players, kills Trogdolytes, and destroys breakable blocks. By default, the bomb is timed based and creates an explosion that is one tile unit long from its center in all 4 directions. Explosions cannot pass through unbreakable walls and can stopped from spreading in one direction by breakable walls even after the wall is broken.
- (Trogdolytes)
    - Move randomly in 4 directions. They have collision and are unable through each other, wall blocks, players, and bombs. They can damage the player through contact.
- Power Ups
    - Powerups are temporary timed additions to the game that randomly spawn both under exploded boxes and on open areas of the game map. Power ups take effect when passed by a bomberman. One a bomberman picks up the Power-Up, the power-up disappears from the map.
    - Expand Explosion
        - Expands bomb explosion length by approximately one tile unit in all 4 directions. Effect can stack.
    - Increase amount of bombs to be planted
        - Bombermen can place more bombs on the field at a time
    - Change Bomb Type -> Timed to trigger based
        - Bombs by default explode after a given amount of time. The power up changes bombs to explode after a trigger button is pressed.
    - (Ham of Salvation)

        - Limited to Monster Slayer game mode. Enables the next bomb the player placed to resurrect their teammates with a life-giving explosion.
- Unbreakable Wall
    - Static. Sets the boundaries for the game world which neither the bombermen or explosions can pass. Cannot be broken in-game.
- Breakable Walls
    - Static. Bombs can be used to destroy the breakable walls. Cannot be passed through by bombermen or enemies.

Making BomberHam MultiPlayer

In order to create multiplayer functionality for our BomberHam game, our team plans on using the socketing libraries to create an open connection at a specific ip address and port. We would like to allow users who aren't creating games to select from a list of joinable games. This would be implemented using interface created in unity. Users would be assigned BomberHam playable-characters by order of joining the game, with player IDS varying in numbers from 1-4. All clients connect to the server, and which serves as a relay for all player commands on each remote game. The PlayerController Script will read all input both provided by the server and the active player - Input provided by the player using the arrow keys (or WASD) will be read and implemented by the PlayerController Script, then sent to the server. All moves made by other players joined on the server will be sent back to the game and read, also, by the Player Controller script.

To play, one of the players must first create a game. They do this by clicking on the 'Create a Game' button in the main menu. Once they do this, they create a server on the local computer that will run the game. Players can then connect to that player's server using connection information given to them by the hosting player and can play a game.

Networking Architecture

Two Server Types:

- Central player database server
  - Contains player login information and scores
  - Scores obtained at the start of each game
  - Scores updated at the end of each game
- Local Gameplay Server
  - Created by players to host a game
  - Manages changing gamestates between players in one game

Server-Client Connection Structure

- Synchronisation: Lock-Step
  - All player input sent to gameplay server, server sends updated gamestate to clients.
- Protocol: TCP
  - All communications will be tracked
  - Speed not a significant concern because of there being few commands/inputs
- Authority: Server
  - Server ultimate authority on gamestate and clients simply render gamestates given to them.

Game Creation and Connection

- Players can either connect to an existing game, or request the server to host a new game.
  - Upon clicking the ‘Play’ button, players may ‘Connect to Game’ or ‘Create a Game’
  - ‘Connect to Game’ requires player to enter an address of an existing game. This would be proided by another player who has created a game.
  - ‘Create a Game’ runs a server locally on the player’s computer and provides the player the information for other to connect.
    - Once the game is created and at least 1 other player connects, the host can begin the game.

Player Credentials and Score Tracking

- Players must log in through the main menu in order to play.
  - Player login server maintains database of all player credentials
  - Login information verified with login server
  - New player information stored on the server upon new account creation
- Score tracking: Scores stored on login server
  - Statistics based off of players killed and games won
  - Stats obtained at the start of a game
  - Server updated with new scores after a game completes