

Sprint 1 Planning

CS 307 Group 16 | Kyle Day, Jason Seeley, Stefan Gerber, Yuchuan Huang

Sprint 1 Overview

This sprint will be responsible for yielding the main basis of the game. There will be two main distinct parts of the project developed, the finalization of the game engine and the beginning of the algorithm creation.

SCRUM master: Kyle Day.

Weekly Meetings:

With Coordinator: Standup meeting every Tuesday 6PM - 7PM

Risks and Challenges for this sprint:

- Connectivity between the backend and the frontend to ensure the gameplay follows the algorithms and the rules
- Designing procedural level generation algorithms to generate levels with different maps and entities based on the difficulty levels.

Current Sprint Detail

Game Engine:

1. As a user I would like the ability to play the game on a website.

Number	Description	Estimated Time	Owner
1	Get access to Fathomless.io domain and associated webserver	1 hour	Stefan
2	Create a basic client template to process and properly display json maps. Display variable sized grid. Test on different screen sizes. Test on resizing screen. Test with different sized square and non square maps. Display all textures from json map. Test multiple objects on a single tile. Test object scaling on screen resize. Test exception behavior with malformed map input	2 hours	Stefan
3	Allow control of the player character with the	3 hours	Stefan

	keyboard. Allow for event listeners to update player position. Test wasd key movements. Test arrow key movements. Test across different browsers. Send updated player position and heading to restful map api. Probe AJAX call to ensure the proper request is made. Test xmlhttp response test. Verify map update to be correct		
4	Create menus. Homescreeen – Test styling on different browsers. Test styling on different screen sizes. Utilize lighthouse speed testing. Login – Test account creation and password requirements. Test log in with valid and invalid credentials. Test validity of session id. Settings – Test settings webhook with manual settings entries. Test exception handling of sliders that exceed the max range. Verify settings are saved across sessions	3 hours	Stefan

Acceptance Criteria:

- Given access to a personal computer with an internet connection When I connect to <https://fathomless.io> on my web browser, then I should be greeted with The Fathomless Caverns of Peril game.
- Given the intent to play the game when I want to quickly load a new guest session, then I should be able to access the login menu with the guest button.
- Given intent to play as a guest when I click the guest button, then a newly generated map will appear.
- Given a state in which the player session is accessing a map when an arrow key or w/a/s/d button is pressed Then the player position or heading should be updated.
- Given a valid player session, when pressing the settings button or key, a full menu of togglable settings will appear to adjust properties of the game engine.

2. As a user I would like to have the ability to play the game on my mobile device.

Number	Description	Estimated Time	Owner
1	Create on screen buttons to allow for player control	6 hrs	Stefan

	on a touchscreen device. Movement buttons – Test button positions so they do not collide with the map.		
2	Test for multi click behavior to make no zoom event occur. Test content heights to make no potential for horizontal scroll. Settings buttons	1.5 hrs	Stefan
3	Test buttons on different mobile browsers. Test setting labels on smaller screen sizes for collisions. Test to ensure the ability to return to the previous screen	1.5 hrs	Stefan

Acceptance Criteria:

- Given a state in which the player session is accessing a map, when I wish to move the character around the world, then I should be able to tap the on screen movement buttons to update its position and rotation.
- Given that the player is on a mobile device, when the user rotates their device and changes its orientation, the client will respond by updating the map scaling.
- Given a mobile player performing actions in the game, the client will automatically be able to adjust texture resolutions to better optimize for service latencies and mobile performance.

3. As a guest I would like to be able to play the game with no save functionality.

Number	Description	Estimated Time	Owner
1	Create a login screen with a guest button that only saves a temp json map file.	1 hr	Stefan
2	Create guest session: Create a UUID stored in the session variables.	0.5 hr	Stefan
3	Test guest button webhook manually.	0.5 hr	Stefan
4	Test guest button visibility and styling across platforms.	0.25 hr	Stefan
5	Test distinction between guest session and user session.	0.5 hr	Stefan
6	Test if the associated session is created successfully.	0.25 hr	Stefan
7	Test if the created session is still active.	0.5 hr	Stefan

8	Test creation of temp json map.	0.5 hr	Stefan
9	Load game engine with map supplied by map api.	1 hr	Stefan
10	Test that map received by api matches with stored map.	0.25 hr	Stefan
11	Test that map is displayed correctly for all objects.	0.25 hr	Stefan
12	Test destruction of guest map after inactivity with cron job	0.5 hr	Stefan

Acceptance Criteria:

- Given a valid guest game session When I keep my browser open Then the game state should save.
 - Given a valid guest session When I am idle for an excess of time or my session clears Then my saved data will be lost.
 - Given a valid guest session When I have played for some time and wish to save my work Then I will be able to create an account.
 - Given a guest session that wishes to create an account When the account is created Then the account should act no differently than an account created on startup.
 - Given a valid player session When accessing any portion of the game Then the session parameters will always be immutable.
4. As a user, I would like to add sound effects on actions, e.g., when the player fires at a mob, a firing sound would generate, when the player gets hit by a bullet a sound would generate etc. (Stefan 6hrs)

Number	Description	Estimated Time	Owner
1	Create audio channel field to be imported for each level's criteria.	0.5 hours	Stefan
2	Check if audio files are already cached.	0.5 hours	Stefan
3	Test the ability for resources to be properly cached.	0.5 hours	Stefan
4	Test the server caching policy.	0.5 hours	Stefan
5	Test that cached resources are valid.	0.5 hours	Stefan

6	Cache required audio resources that are uncached.	0.5 hours	Stefan
7	Test the difference between the cache and what is required.	0.5 hours	Stefan
8	Test that audio resources do not load on a false audio setting.	0.5 hours	Stefan
9	Test that audio does not unload if the setting is toggled.	0.5 hours	Stefan
10	Load sound into buffer on event.	0.5 hours	Stefan
11	Test that the correct sound effect plays for all events.	0.5 hours	Stefan
12	Test multiple sound effects at the same time.	0.5 hours	Stefan
13	Test for a track to play in back of the sound effect	0.5 hours	Stefan

Acceptance Criteria:

- Given a valid guest game session When I toggle the audio setting to be true
Then the game should begin to load required audio files .
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- Given the audio setting is set to true When any event occurs in the game
Then the corresponding sound effect should play.
- Given the audio setting is set to false When any event occurs in the game
Then no sound effects will be played at all.
- Given that the audio setting is set to true When the setting is then set to false
Then the audio resources are not removed until the cache is cleared.
- Given the music setting is set to true When triggering any in game event
Then both the music track and the sound effect will be played.

Level Generation:

5. As a user, I would like a level map to be made up of multiple components including rooms, items, hallways, doors, decorations, and hazards like water, fire, rocks, and spikes.

Number	Description	Estimated	Owner
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		Time	
1	Define a list of potential components with corresponding game object types. Each component will have attributes (size, appearance, interaction) and potential behaviors (opening/closing doors, interaction with hazards, etc.).	2 hours	Kyle
2	Create game object classes for all components. Implement game objects for each component type. Ensure they are rendered and interactable using the game engine.	2 hours	Kyle
3	Implement hazard collision detection. Write code for hazard types like water, fire, rocks, and spikes to detect when the player interacts with them (collision damage, movement blocking, etc.).	2 hours	Kyle
4	Place and test decorations and doors in level layout. Write logic for placing decorations randomly without obstructing gameplay. Implement door behavior (links to another room).	2 hours	Kyle
5	Integration testing for level components. Test level as a whole to verify that all components are placed correctly and interact properly with the player, such as hazards blocking movement and doors opening when approached.	2 hours	Kyle

Acceptance Criteria:

- Given that the player is exploring a procedurally generated level, When rooms, hallways, doors, decorations, and hazards are generated, Then each component must be present and placed logically without overlap.
- Given that the player moves position on the level map, When the player is on a door space, Then the door must successfully open and allow the player to pass through to the associated next room.
- Given that the player collides with a hazard (fire, water, spikes), When the collision occurs, Then the player must lose health or be blocked from progressing, based on the hazard type.
- Given that a room is generated with decorations, When the player navigates through the room, Then the decorations should not block the player's movement or interfere with other game objects.

- Given that the player encounters a hazard, When the player avoids the hazard, Then the player must be able to move around the hazard without collision issues.

6. As a user, I would like there to be 22 different levels based on the story.

Number	Description	Estimated Time	Owner
1	Define what generation criteria each of the 22 levels will contain. Dimensions (number of rooms and hallways). Specific game objects. General level themes. Sounds. Bosses.	2 hours	Kyle
2	Each level starts when a player steps on a staircase. A text screen is displayed for each new level entered.	2 hours	Kyle
3	Implement specific level criteria from number 1. Test that all characteristics (dimensions, items/objects, themes, etc.) of levels are present and functioning properly.	6 hours	Kyle

Acceptance Criteria:

- Given that the player starts a new game, When the first few levels are generated, Then the levels must progressively increase in size, complexity, and difficulty.
- Given that each level has specific items or objects, When the player enters a level, Then the correct game objects (e.g., potions, weapons) must appear according to the defined distribution for that level.
- Given that a level is generated with a specific theme (forest, cave, etc.), When the player explores the level, Then the correct environmental assets and sounds must be present.
- Given that a player reaches a boss level, When the level is generated, Then the boss and associated hazards (e.g., traps, environmental dangers) must be present as specified.

7. As a user, I would like each game playthrough to be unique, where the level maps and mob spawns are all procedurally generated.

Number	Description	Estimated Time	Owner
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1	Create algorithms to generate open terrain based on level criteria. Generate empty random level maps with varying layouts (rooms, hallways, decorations) using probabilities of level classes. Test that each generated map adheres to gameplay requirements, such as access to all areas and correct placement of doors and staircases. Ensure that the generated levels get progressively more complex	6 hours	Kyle
2	Populate level maps with entities and items Generate levels to have increasing amounts of enemies, hazards, and items.	4 hours	Kyle
3	Test that all newly added elements function as intended (for example, when the player runs into fire their health decreases)	1 hr	Kyle
4	Test that the placement of these features adheres to gameplay requirements (items, hazards, and enemies don't obstruct gamepath)	1 hr	Kyle

Acceptance Criteria:

- Given that the player starts a new game, When the algorithm generates the first level, Then the level must contain an open terrain layout with rooms, hallways, and decorations, ensuring all rooms are accessible and the player can move through the entire map without being blocked.
- Given that the player progresses through the game, When subsequent levels are procedurally generated, Then the levels must show progressively more complex layouts, with more intricate paths, varied room sizes, and increased hazards and items.
- Given that a map is procedurally generated, When doors and staircases are placed in the level, Then all doors and staircases must connect the rooms logically, and staircases must provide access to the next level without blocking the player's progression.
- Given that entities and items are placed in the level, When the player moves through the level, Then the placement of hazards (fire, spikes) must not obstruct the main path, and items must be reachable without excessive backtracking or obstruction.
- Given that entities and items are generated on the map, When the level is tested, Then all entities (enemies, items) must interact correctly with the player and other game elements, such as items being picked up or enemies reacting to player actions.
- Given that the levels are procedurally generated, When the player progresses to a new playthrough, Then the generated maps must be different from previous playthroughs, ensuring unique layouts, enemy placements, and item locations each time.

8. As a user, I want both the player and the mobs to be confined to the logical boundaries of the map. Rooms, hallways, and decorations have edges that cannot be passed through or moved by the player. Jason (9hrs)

Number	Description	Estimated Time	Owner
1	Populate generated maps with obstacles and hazards	3 hour	Jason
2	Remove portions of terrain to act as hallways or narrow passages	3 hour	Jason
3	Populate generated maps with predefined structures	2 hour	Jason
4	Test that players cannot pass through specified elements	1 hour	Jason

Acceptance Criteria:

- Given that the map is populated with obstacles and hazards, When the player attempts to move through any obstacle (e.g., walls, hazards, room edges), Then the player must be blocked and unable to pass through or move the obstacle.
- Given that the map contains rooms and hallways, When the player or mobs move within the level, Then both the player and mobs must be confined to the predefined paths and rooms without crossing through walls or other boundaries.
- Given that the game logic for boundaries is implemented, When the level is tested, Then both the player and mobs should only move within the logical boundaries of the map and adhere to the defined gameplay areas without any clipping or boundary-breaking behavior.

Entity Intelligence:

9. As a user, I would like mobs to move around only when the player makes a move.
(Yuchuan 10 hrs)

Number	Description	Estimated Time	Owner
1	Create rest api that receives player movement <ul style="list-style-type: none">- Validate player session- Validate player movements against the current map- Refresh all entity positions	4 hrs	Yuchuan
2	Respond with updated map	5hrs	Yuchuan

3	Unit tests to verify player and mob's movement	1 hr	Yuchuan
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Acceptance Critiria:

- Given that the player's session is valid, When the player submits a movement request, the system will check the move against the current map for valid positions.
- Given that the player has not made any move, When the game updates the map state, Then mobs will remain stationary until the next player action.
- Given that the player's movement is valid, When the player's position is updated, Then the system will refresh the positions of all entities, including mobs, on the map.
- Given that the player makes an invalid move (e.g., out-of-bounds, collides with an obstacle), When the system validates the movement, Then the system will return an error and no updates to player or mob positions should occur.

10. As a developer, I want to implement a user tracking algorithm. (Yuchuan 10hrs)

Number	Description	Estimated Time	Owner
1	Receive entity positions	2hrs	Yuchuan
2	Align entity's heading to intersect the player's coordinates	3hrs	Yuchuan
3	Update entity position to next available tile	5hrs	Yuchuan

Acceptance Critias:

- Given that in a valid game, When the tracking algorithm is executed, all entities' positions will be received.
- Given that the entity positions are received, When the system processes the positions, Then all positions must be validated as being within the map boundaries.
- Given that the system has the player and mob's coordinates, When the mob entity's heading is calculated, Then the system will determine the most direct path from the mob's current position to the player's position.
- Given that the mob entity is not blocked by obstacles, When the mob aligns its heading, Then it will be adjusted to face the player's direction (based on the pathfinding).
- Given that the tile in the mob's path is occupied or blocked, When the system attempts to update the mob's position, Then the mob will find the next best alternative tile to move closer to the player without breaking the movement rules.
- Given that the mob successfully moves, When the system updates the mob's position, Then the new position will be reflected in the game state and updated on the map.

11. As a user, I would like there to be different tiers of mobs, the weakest tier seldom moves around and attacks the player, and the strongest tier tracks the user heavily and attacks often. (Yuchuan 10hrs)

Number	Description	Estimated Time	Owner
1	Assign different weights to entity game object attributes: speed and aggression	2hrs	Yuchuan
2	Create path finding algorithm to take the entity attributes into account	6hrs	Yuchuan
3	Writing tests to check if the mobs are moving based on their attributes	2hrs	Yuchuan

Acceptance Critias:

- Given that a mob entity is created or initialized, When the entity is assigned attributes (speed, aggression, and tracking range), Then each attribute must have a weight corresponding to the mob's tier (e.g., weakest tier has lower values, strongest tier has higher values).
- Given that the pathfinding algorithm is calculating the movement of a mob, When the system processes the mob's attributes, Then the mob's speed must influence how far it can move per turn.
- Given that the pathfinding algorithm is running, When the system processes the mob's aggression attribute, Then mobs with higher aggression must attempt to attack the player more frequently or move toward the player more aggressively.
- Given that the pathfinding algorithm is running, When the system processes the mob's tracking range attribute, Then mobs with longer tracking ranges must be able to detect and follow the player from further distances, while weaker mobs detect the player only when nearby.

Game Balancing:

12. As a user, I would like mobs to have many of the same statistics as the player to easily understand their capabilities. Jason (7hrs)

Number	Description	Estimated Time	Owner
1	Determine capabilities of entities and player	2hrs	Jason
2	Implement player and mob classes	3 hour	Jason
3	Test that mobs and player have same statistics	2 hour	Jason

Acceptance Criteria:

- Given that the player levels up or improves their stats, When they encounter mobs in later levels, Then the mobs' stats should scale in difficulty relative to the player's level and stats to maintain a consistent comparison.
- Given that mobs and players share similar statistics, When the player engages in combat, Then the player should be able to easily compare their stats (health, attack, defense) with those of the mob to inform strategic decisions.
- Given that the player levels up or improves their stats, When they encounter mobs in later levels, Then the mobs' stats should scale in difficulty relative to the player's level and stats to maintain a consistent comparison.

13. As a user, I would like to select a game difficulty that is persistent throughout the playthrough which alters the length (number of rooms) of each level, user and enemy statistics, number of enemies, and available items. Jason (8hrs)

Number	Description	Estimated Time	Owner
1	Implement an api i.e. a game difficulty api which will retrieve the information of the difficulty level	3hrs	Jason
2	Receive information from game difficulty api	2 hr	Jason
3	Create scaling curves to define each level's entity, player, and room statistics	3 hrs	Jason

Acceptance criteria:

- Given that the api is implemented correctly, the api will show exactly one difficulty level as the current difficulty level
- Given that the api is implemented correctly, if the user updates the difficulty or reaches to a new level, the api should also respond with the updated difficulty level
- Given that the scaling curve is implemented correctly, the difficulty level has to be reflected by the gameplay statistics

14. As a user, I would like each level to get more difficult, with more map complexity and monsters. Jason (6hrs)

Number	Description	Estimated Time	Owner
1	Define criteria for each stage level	3hrs	Jason

2	Generate levels based on the criteria	3hr	Jason
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Acceptance Criteria:

- When implemented correctly, level i+1 should have more number or more difficult monsters in terms of power and movement capability than level i
- Each level i should have certain criteria that is different than the other level j
- When implemented correctly, the user will not be able to move on to level i+1 unless one beats the monster of level i or reaches the stairs at level i.

Summary of Efforts

Member Name	Focus	Effort in Hours
Stefan	Game Engine	30
Kyle	Level Generation	30
Jason	Player Statistics	30
Yuchuan	Enemy Movement	30

Gantt Chart:

<https://docs.google.com/spreadsheets/d/1pvm-ZRG59CaVJ1eLMxG5XkFxiOVykZs5VJlqOtbMc4/edit?gid=0#gid=0>

[illegible]

Test that all characteristics	Sub Task	Kyle
each game playthrough to be unique	Main Task	Kyle
Create algorithms to generate open terrain based on level criteria	Sub Task	Kyle
Generate empty random level maps with varying layouts	Sub Task	Kyle
Test that each generated map adheres to gameplay requirements	Sub Task	Kyle
Ensure that the generated levels get progressively more complex	Sub Task	Kyle
Populate level maps with entities and items	Sub Task	Kyle
Generate levels to have increasing amounts of enemies, hazards, and items.	Sub Task	Kyle
Test that all newly added elements	Sub Task	Kyle
Test that the placement of these features adheres to gameplay requirements	Sub Task	Kyle
Entity Intelligence:		
both the player and the mobs to be confined to the logical boundaries of the map	Main Task	Jason
Populate generated maps with obstacles and hazards	Sub Task	Jason
Remove portions of terrain to act as hallways or narrow passages	Sub Task	Jason
Populate generated maps with predefined structures	Sub Task	Jason
Test that players cannot pass through specified elements	Sub Task	Jason
make the game turn based, Entity moves only when the player moves	Main Task	Yuchuan
Create rest api that receives player movement	Sub Task	Yuchuan
Validate player session	Sub Task	Yuchuan
Validate player movements against the current map	Sub Task	Yuchuan
Refresh all entity positions	Sub Task	Yuchuan
Respond with updated map	Sub Task	Yuchuan
implement a user tracking algorithm	Main Task	Yuchuan
Receive entity positions	Sub Task	Yuchuan
Align entity’s heading to intersect the player’s coordinates	Sub Task	Yuchuan
Update entity position to next available tile	Sub Task	Yuchuan
Make different move algorithm for different mobs that has different properties	Main Task	Yuchuan
Assign different weights to entity game object attributes	Sub Task	Yuchuan
Create Speed values	Sub Task	Yuchuan
Create Aggression values	Sub Task	Yuchuan
Create path finding algorithm to take the entity attributes into account	Sub Task	Yuchuan
Game Balancing:		
Determine capabilities of entities and players		
Receive information from game difficulty api		
Create scaling curves to define each level’s entity, player, and room statistics		
Define criteria for each stage level that will generally influence the level generation		

3. Remaining User Stories: Backlog

- (a) Include all the other user stories from your Product Backlog document.

Game Engine:

1. As a user I would like the ability to log into my profile and save my game states.
2. As a user, I would like there to be a home screen with the title of the game and start game button.
3. As a user, I would like a pause game button, which brings me to the settings screen.
4. As a user, I would like there to be an end screen, for when a player dies and doesn't beat the game, also for when the player beats the game.
5. As a user I would like certain mobs to have the ability to destroy the terrain.
6. As a user I would like the ability to be able to view or examine terrain and enemy stats on mouse click.

Level Generation:

1. As a user, I want to complete a level by finding the staircase(s) to the next level. Defeating all mobs or collecting all items is not necessary.
2. As a user, I want the procedurally generated level maps to make sense and be completable. Staircase to the next level is accessible because all rooms are connected.

Gameplay and Statistics:

1. As a user, I would like to have statistics including: health, attack, defense, level according to experience points, and special abilities that boost or diminish user related movement, speed, attack range, and enemy tracking.
2. As a user, I would like there to be the same bosses, some of which are optional depending on path selected, across each new game playthrough.
3. As a user, I would like to start out with maximum health and have the game end when I run out of health.
4. As a user, I would like a mob to die and leave a corpse behind when it runs out of health.
5. As a user, I would like the ability to pick up and use different items, including: potions which increase certain statistics temporarily and armor/gear that I can wear/use until it breaks.
6. As a user, I would like mobs to attack me through melee attacks/shooting/spells.
7. As a user, I would like there to be non-playable characters with optional dialogue. The NPCs will talk with the player by displaying text on the screen if the player chooses the option to talk.
8. As a user, I would like there to be an overarching narrative/story that is presented to the user through text (boxes and screens), so that I understand why I am going through the dungeon and defeating enemies.
9. As a user, I would like to have an overall score, that increase with defeating monsters, collecting items
10. As a user, I would like the score to be displayed that will be displayed within the game and on a competitive leaderboard

Audio/Visual:

1. As a user, I want a music track to play for each level.

2. As a user, I would like to add sound effects on actions, e.g., when the player fires at a mob, a firing sound would generate, when the player gets hit by a bullet a sound would generate etc.
3. As a user, I want the ability to change the volume settings of music and sound effects in the pause menu.
4. As a user, I would like there to be changes in the map textures based on the different level themes (caves, sewer, ziggurat, etc. have their own styles).
5. As a user, I would like to see animated sprites and textures.
6. As a user, I would like the ability to change textures, meaning edit player and mob sprites as well as the map components.