

POSSESSION

A 3D Platformer by Team Casper

GAME DESIGN DOCUMENT



TEAM CASPER

DAN CARLOZZI
JOHN CHUMLEY
CHRIS DELIZ
PETER FERGUSON
KELSIE FRESHOUR
KEVIN LI

CONTENTS

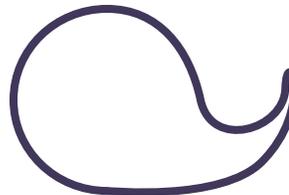
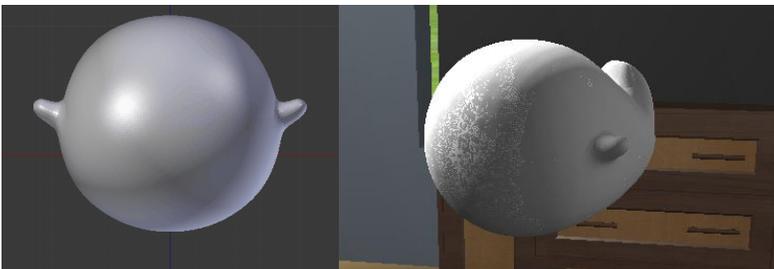
2	Introduction
2	Characters and Classes
4	Rough Plot
5	Gameplay Description
5	Artistic Style Outline
7	Systematic Breakdown of Components
-	Asset Breakdown
9	Art Assets
9	Text Assets
10	Sound Assets
10	Game Flow Diagram
11	Project Timeline

INTRODUCTION

Late one night, a lonely young boy tosses and turns in his sleep. Enter his dreams and make your way through the problems within them. From disastrous birthday parties, to exploring ancient tombs, and even the depths of the sea - possess your way into making these nightmares into pleasant dreams!

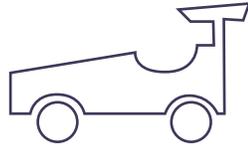
CHARACTERS AND CLASSES

Ghost



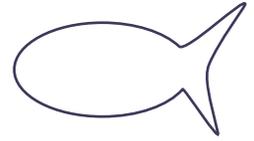
Whether is the ghost is a long dead remnant or an otherworldly entity, the being's mission has become investigating the dreams of a lonely little boy. Bursting with imagination, the boy's dreams are filled with a variety of landscapes. The ghost is silent, manipulating the world of the dream to progress. What the being is and what its ultimate goal is remain a mystery throughout the game.

Race Car



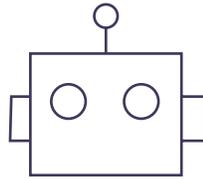
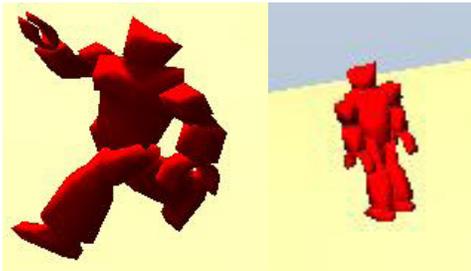
This race car has long been neglected by the boy. Received as present at a much younger age, this toy is a reminder of days past. The race car's small size allows it to move through passages impassable by other classes.

Goldfish



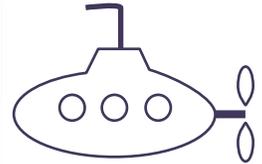
The only living being, the goldfish demonstrates the boy's worries and fears over his first pet. The goldfish is found swimming through the water in its tank. It picks up objects by swimming near them and can drop them on switches.

Robot



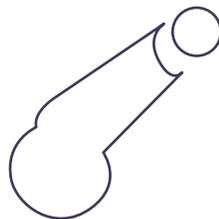
The favorite toy of the boy, the robot appears in many of his dreams and imaginings. Often exploring and conquering enemies, the robot represents the embodiment of the boy's wishes to overcome his fears. The robot can jump between platforms and carry objects.

Submarine



Based on a naval submarine the boy saw, the USS Greenville, the submarine is a miniaturized version that the boy pilots in his daydreams. With a similarly complex control scheme, the sub is fitting of its origin. It can also shoot missiles.

Cannon



A toy cannon that shoots plastic pellets, the cannon most frequently appears in dreams of strife, where it can stun enemies and trigger distant switches.

Rowboat



The combined memories of the boy's first fishing trip, the rowboat's paddles are controlled separately to move. It can also fish to pull up objects far below it.

ROUGH PLOT

The overarching story is that the ghost is entering a young boy's dreams as he sleeps, with each dream being disconnected to the others. This is further emphasized by the list selection on the main menu with the goal to clear each dream.

With all levels, win sounds and loading the main menu indicate that the level is complete.

In the tutorial, the lights need to be switched off. This is indicated through a UI message in the upper left corner of the screen. The order of using the classes is arbitrary and allows the player to learn how to play through more UI messages in the middle of the screen.

Several presents are missing from the birthday party and must be returned to the gift table. The presents are scattered throughout the house and enemy robots block our path - they destroy the green robot and can be stunned with the cannons. The goal to find the gifts is stated in a UI message in the top of the screen.

The ancient tomb is a series of levels with the main goal to proceed through all the levels and collect the treasure. While goal is not explicitly started like the tutorial level, players are left to explore and find their way through.

- The first section is a maze with a hole to the next section - players navigate the random maze to the hole.
- The second section is a platforming section with a series of items that need to be brought to their respective alcoves - color makes this very obvious.
- The third section is a platforming section with a constantly moving platform - the item floating at the end of the section draws the players to complete the section.
- The fourth section is a boss fight where players stun the boss and drops rocks on the boss to kill him. This section is the most difficult to understand with plenty of trial and error.
- The fifth and final section is a second boss fight (because he's not really dead), who is killed through the robot shooting with the new rocket upgrade. This is done through trial and error as well, but similar controls in the cannon make this less confusing to the player.

The aquarium has a new goldfish that needs to be trained. Colored balls are scattered throughout and are used with pressure plates to open doors. The sound of glass breaking makes the switch trigger indicate that a glass panel is now open. Since the fish is the only possessable object, it makes it obvious that it is the class to use. The fact the blue fish can kill you is indicated by the fish resetting and being knocked out of it into ghost form. The aim of the middle red button comes from the order the panels are opened and pressure plates accessible.

Water world is easy in goal - with the rowboat trying to pull up sunken treasure, which is stated in the UI message. The reason this is not obvious is the fact the chest is in one of the blocks floating around, that must be blown up before revealing the treasure chest.

GAMEPLAY DESCRIPTION

There are two distinct modes of gameplay - ghost form and physical form.

In ghost form, the 3rd-person camera follows the ghost, which can navigate the level unhindered by gravity and physics. Since you can view the level from a height, the ghost form is useful for solving puzzles or navigating mazes with the limitations from the possessed classes. It is also used to switch between possessable classes.

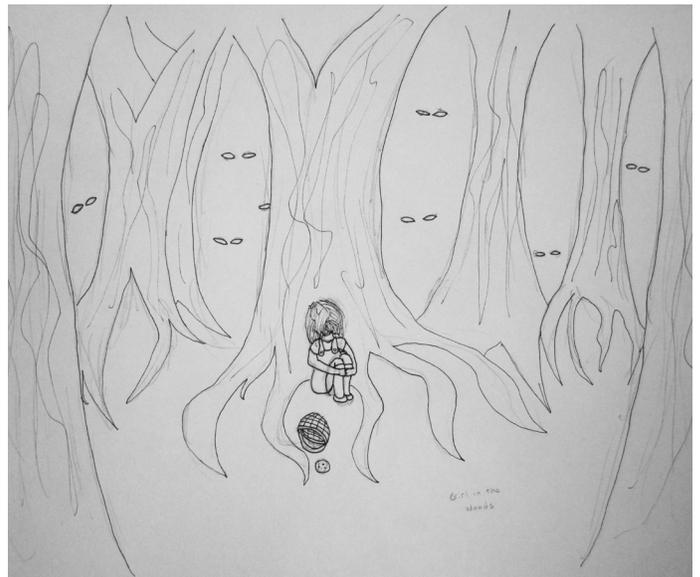
In physical form, the ghost possesses one of the object classes. Since they are physical objects, they are affected by gravity and can interact with switches and carry other objects. This is the main mode of gameplay.

ARTISTIC STYLE OUTLINE

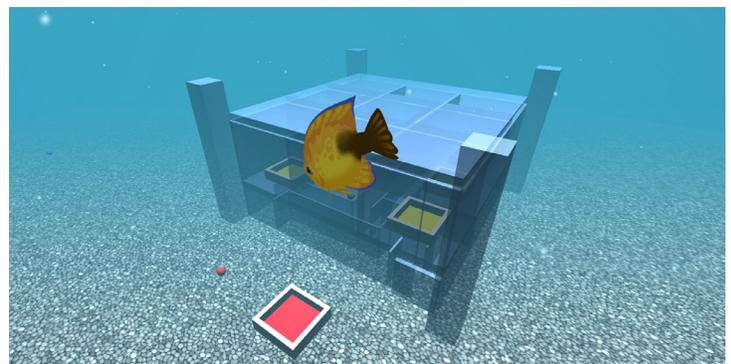
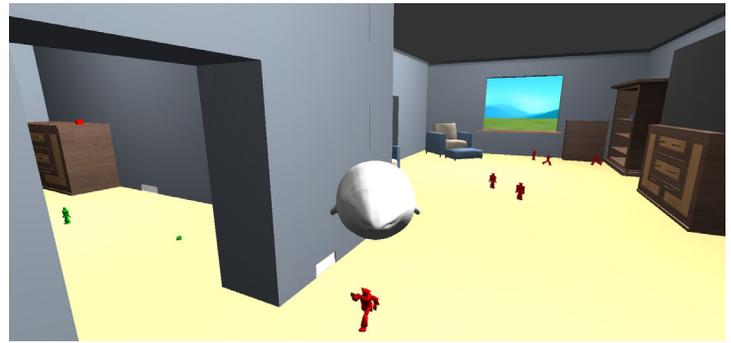
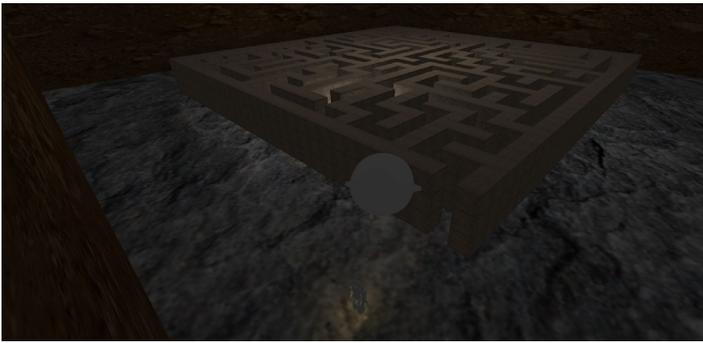
Consistent across the levels is a slightly realistic feel, as depicted in the types of objects and textures. However, due to the changing natures of dreams, each level has its own feel and look. The aquarium level is very mellow and relaxed, which is emphasized with its music. The tomb level is very dark, encouraging you to explore dark corners with an upbeat background music. The birthday party/house level is well-lit and welcoming, much like a house in the daytime. The water world level is dark and objects move with the tide, creating the feel of the deep sea.

Many things changed from the initial rough sketches of the potential levels. Since the story has changed from an active role in the boy's life to one of influencing his dreams, the tone of what each level has focused on has changed. The birthday party/house level is closest to this original concept.

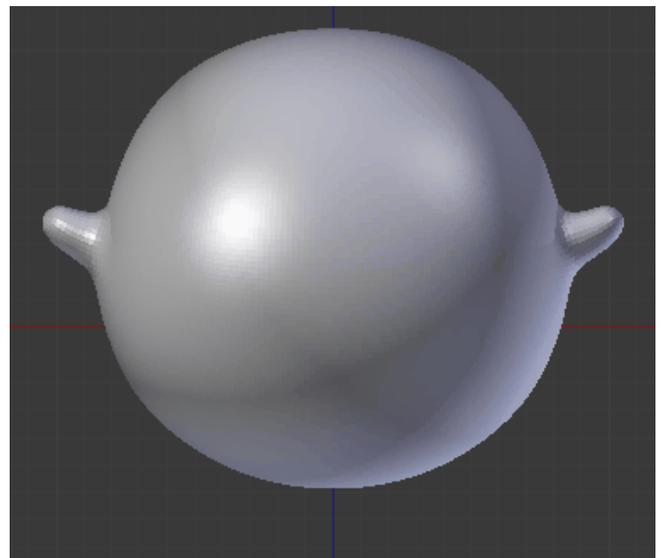
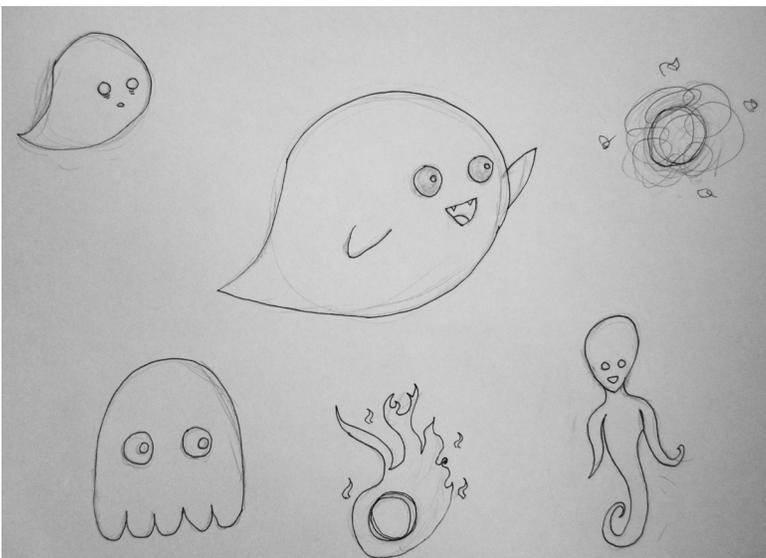
Here are a couple of the original sketches:



You can tell the difference between those and the current levels:



There have been several changes to the ghost as well, though much less than the levels. The original sketches are actually very similar to the ghost model. This is probably because of the early development of the ghost, including modeling and animation.

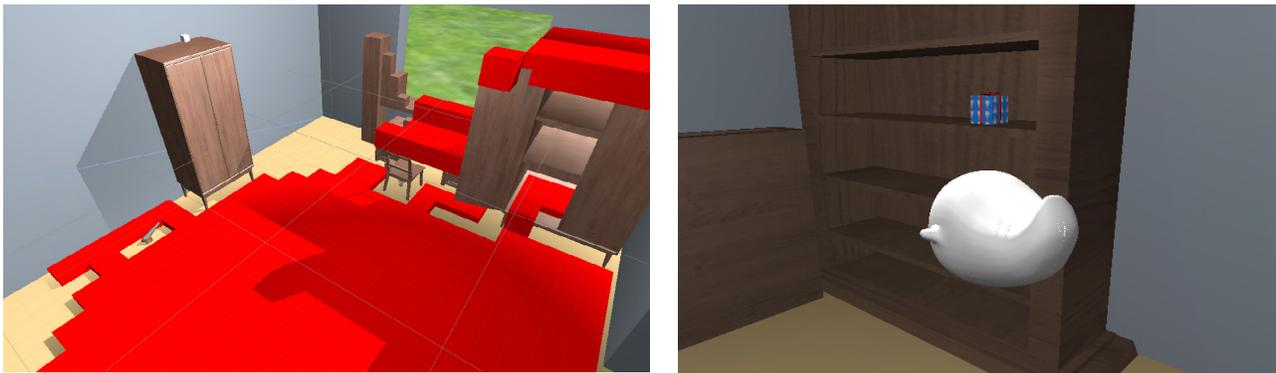


SYSTEMATIC BREAKDOWN OF COMPONENTS

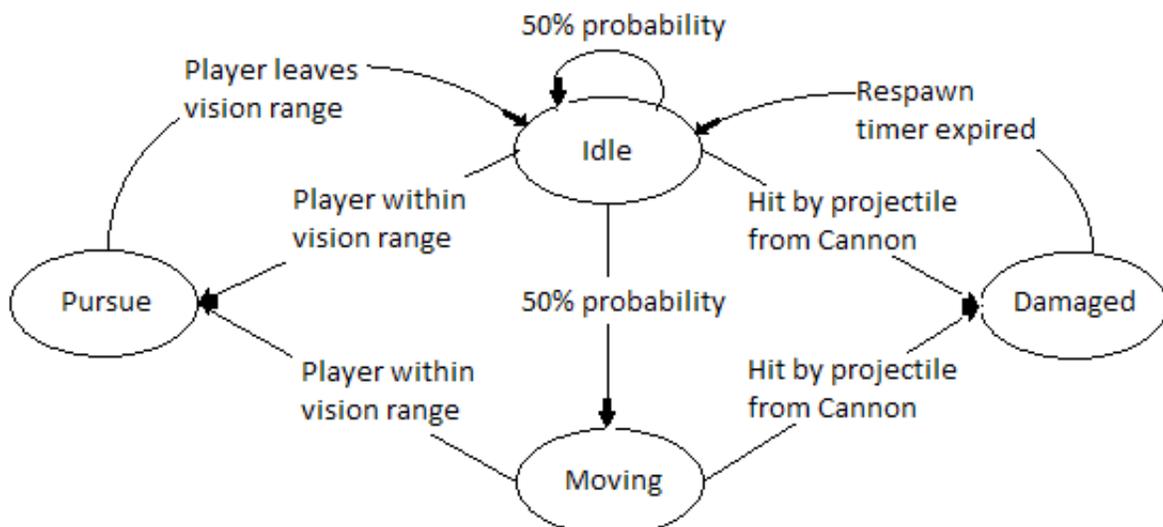
The main technical components are maze generation, a flood fill algorithm, artificial intelligence, and water physics. The other aspects, such as rendering, lighting, and collisions were done through the Unity engine itself.

The maze in the tomb level is randomly generated through use of a depth-first search algorithm, which takes a graph of points and generates paths to every point in the graph. This algorithm ensures that the maze is different every time, and that it is always able to be solved.

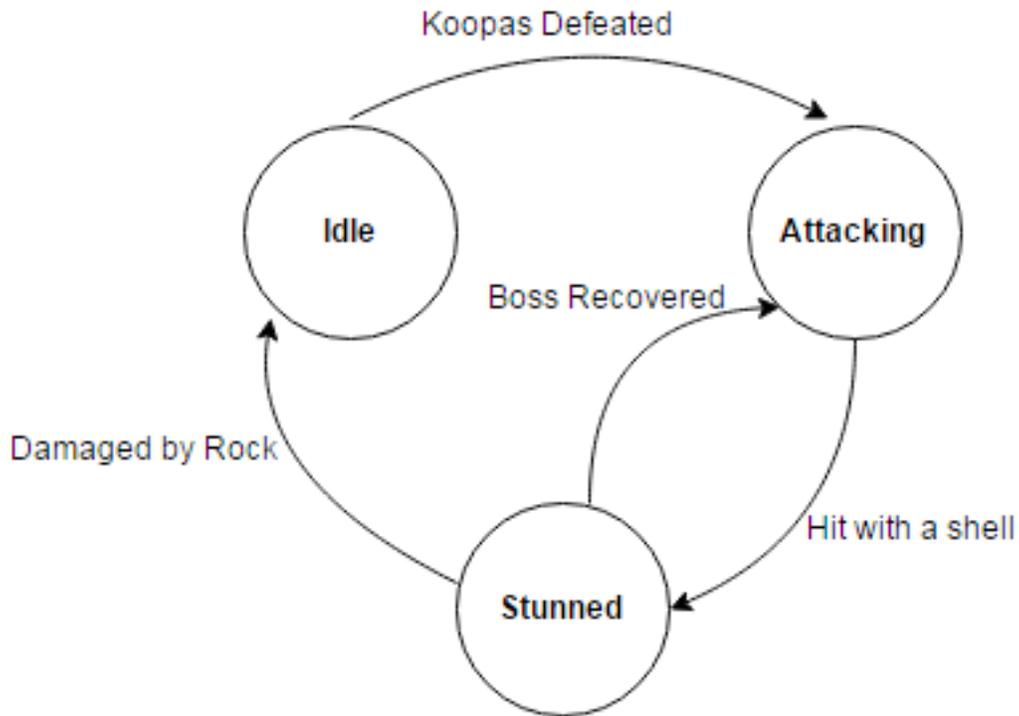
A Flood Fill algorithm was used to place gifts randomly in the House level. The algorithm recurses over the entire level finding flat spots which can hold objects. Valid locations are written into a text file, and those values are selected to place the gifts at runtime. This ensures the random placement of gifts and also helps prevent long loading times as the locations are calculated before run time. Below is a graphic representation of the algorithm and a final rendering:



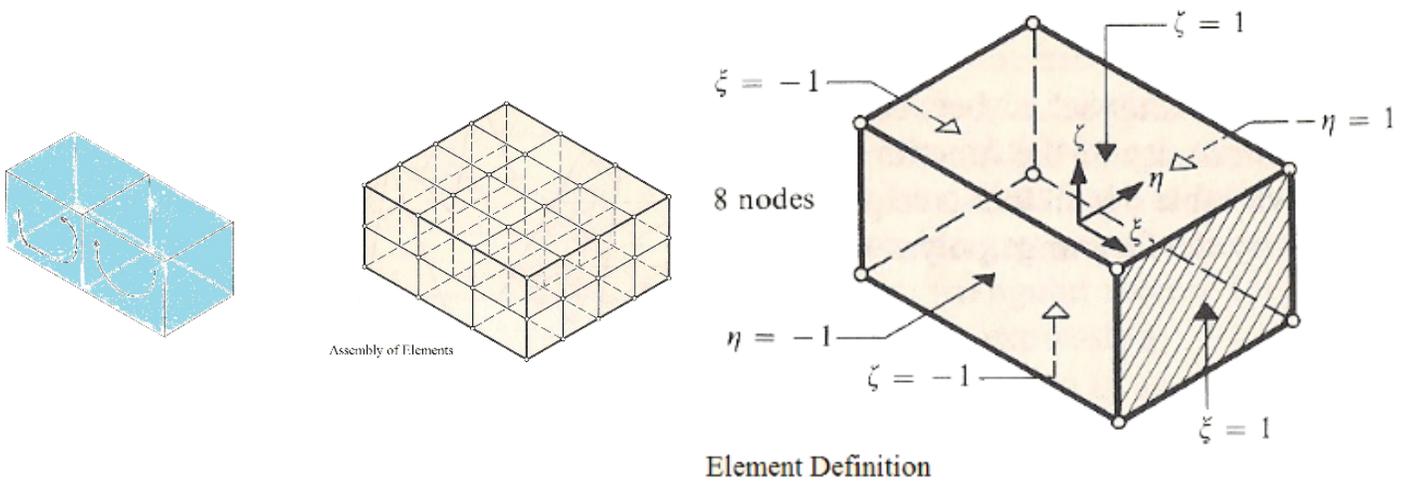
Artificial intelligence is implemented to create computer-controlled 'agents' with more interesting behaviors. The behavior is implemented through the use of state machines. There are four different AI in the game: enemy robots, enemy fish, and the two bosses in the tomb level. The enemy fish use a simple follow and wait cycle, where they will follow the fish if it is within a certain range. The state machines for the robots and bosses are below:



Boss State Machine



The water world level implements real-world water physics. The submarine is subject to physics-based effects such as currents and gravity. To maintain good performance, the effects of such things are approximated to reasonable accuracy rather than being directly computed. In order to simulate currents, the space around the submarine is defined and broken into sections. Each section is analyzed for forces at 8 different points, and the resulting effects are processed and then applied to the submarine. The diagrams below detail this visually:



ASSET BREAKDOWN

ART ASSETS

Most of the models and textures were imported the project as needed. The following assets were bought or imported:

- Big Furniture Pack
- Christmas Gift Pack
- Fish Project
- Interior Furniture Pack
- Male Character Pack
- Simple Wooden Boat
- Simple Furniture
- Stony Ground Package
- Free bush, pillar, and rock packs
- Most of the textures
- Unity's Standard Water Asset Pack

The other assets were made by members of the team. Modeling and animation was done for the ghost, robot, race car, cannon, and submarine. This was done in Blender for all but the submarine, which was done in Maya. Models were done for a few pieces of furniture, mostly used in the tutorial. Textures for the glass and colored panels in the aquarium level were created in Adobe Photoshop.

With the documentation, everything was made by the team. The team logo, title art, and class icons were all made in Adobe Illustrator.

The menu and UI are created through scripting and use standard fonts. This document uses Gotham font, which is proprietary.

Levels were created by members of the team through either manipulation of basic Unity meshes or modeling in Blender. Particle effects within the levels are created through the Unity engine.

All concept art was done by hand on sketch paper with pencil.

TEXT ASSETS

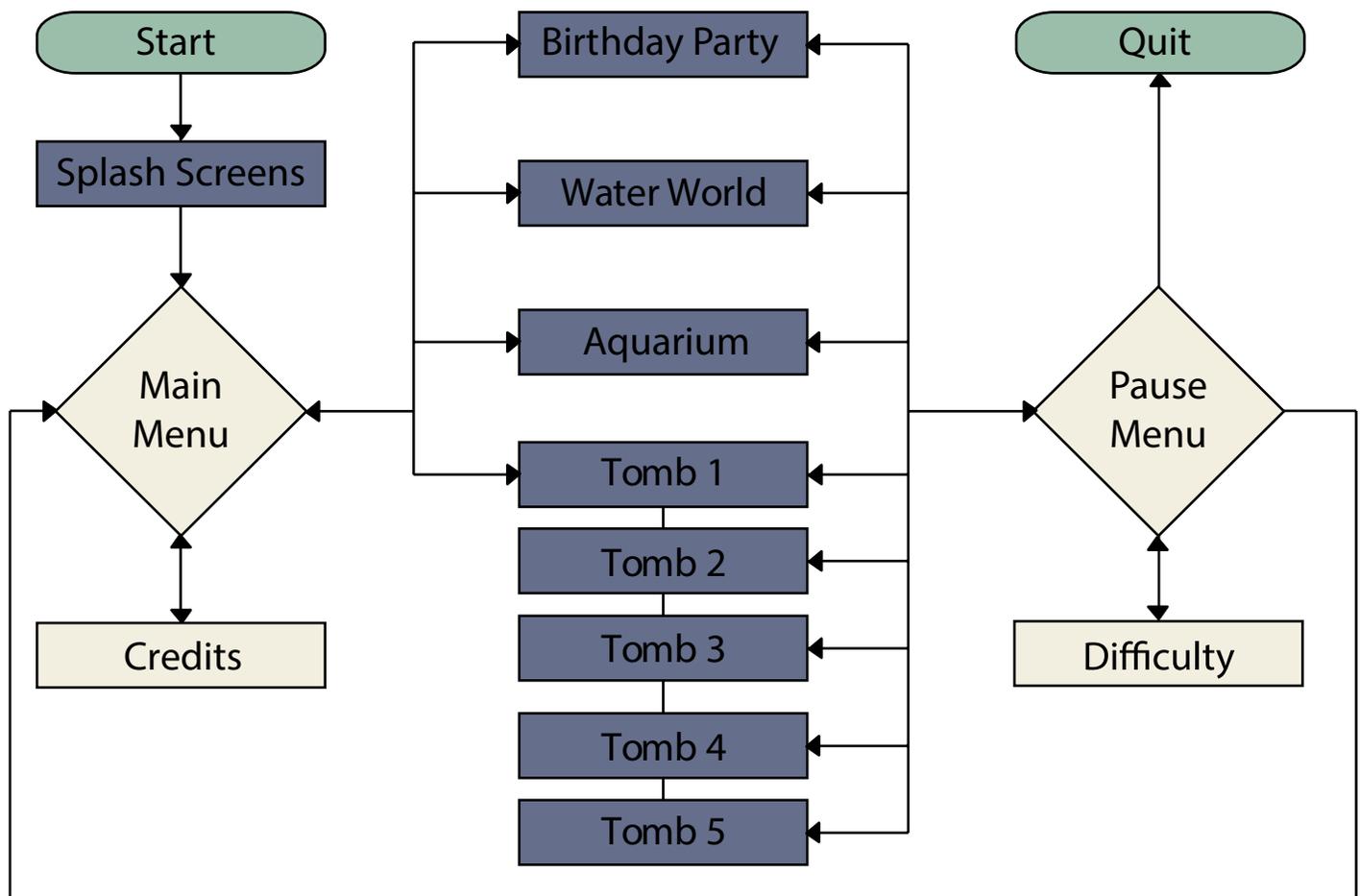
Text asset were primarily done through scripting. UI messages and the menus are created with scripting and have preset messages. The scripts also handle the timing on control messages.

The posters and documentation outside of the game, including this document, were done by members of the team using Adobe InDesign.

SOUND ASSETS

Music and sound effects were found on the Internet and not produced by the team. All had free-use or creative commons licenses and are credited within the game itself when required, such as with the creative commons license.

GAME FLOW DIAGRAM



This is the game flowchart, where off-white are menus and purple are levels and loaded scenes. Levels go back to the main menu once complete and can be resumed or restarted from the pause menu. Excluded is the tutorial, which has the same layout to the other levels. The tomb level is a series of five consecutive scenes - where the first level is selected from the main menu with the “Ancient Tomb” selection. Restarting during these levels will reload the current scene.

PROJECT TIMELINE

Since the project is more-or-less complete at the time of submitting the Game Design Document, this is a breakdown of the work over the course from the Timebox checkpoints.

Timebox 1

Concept Art
Initial Gameplay Ideas

Timebox 2

Basic Models for Ghost, Robot, and Race Car
Animation for Ghost
Basic gameplay controls - including pickup and possession mechanics
Main Menu

Timebox 3

Polished models for Ghost, Robot, and Race Car
Modeled and Animated Cannon
Added Animations for Robot
Models for Basic Furniture
Tutorial Level Completed

Timebox 4

Birthday Party/House Level Completed
Modeled Submarine
Collect Packs for Rowboat

Timebox 5

Flood Fill Algorithm for House
Maze Generation for Tomb
Maze, Puzzle, and Platforming Levels of Tomb Completed
Aquarium Level Created

Timebox 6

Enemy Robots, Additional Furniture, and More Presents in House Level
Aquarium Completed with Pressure Plates, Keys, and Buttons
Swimmer Class Completed for Aquarium
Difficulty Setting for Enemy Robots
Boss Fights for Tomb Level
Pause Menu

Post-Timebox 6 (Up until final build)

Documentation - Game Design Document and Presentation Posters
Aquarium populated with objects, water camera effect, and enemy fish AI
Water World level and Boss Fight 2 for Tomb Level Completed
Texturing, Music, and Sound Effects added where needed
Splash screens added and main menu updates
Overall bug fixing, code refactoring, and file clean-up