

# COMP2501 – Project proposal

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## Part 1: Game Design

The player is a diver looking for a long-lost treasure in an underwater ruin. Equipped with some basic equipment, they must dive deeper and deeper into the ruins, finding treasure and improving their equipment until they can finally reach the final treasure. Their path will be blocked by monsters and old defense systems, but through exploration and upgrades, they will be able to find shortcuts to make subsequent dives easier.

The player will dive in the ruins until their supply of air runs out, at which point they will be sent back to the surface with their collected treasure for buying upgrades. Treasure do not respawn and getting hit will make the player lose some of their reserve of air as well as drop some treasure, which can be picked back up. Monsters respawn and also drop treasures, which prevent the player from locking themselves out of the lower parts by buying the wrong upgrades.

The entities in the game will be:

- The world itself is filled with water, each tile the player swims in will apply a form of weak gravity that the player will have to fight against to control themselves.
- The walls of the ruins (Including the floor), they will be solid and the player – upon contact – will be able to stick to them to prevent the effect of the water's gravity. This is safer, but much slower than swimming. They also prevent the player from moving past them.
- Secret walls will be available within the game that can only be destroyed from one side. They are destroyed after they take enough damage.
- The player entity will be controlled by the player and be able to swim within the game world.
- The player has a few weapons, the trident will be an entity that simply moves horizontally in the angle of the mouse. It will move a few pixels forward, then come back to the player as a form of melee attack.
- The player also has a gun, which will fire quick bullets in the direction of the mouse.
- The player will have a laser gun which will create a horizontal line on the screen from the player to the end of the screen in the direction of the mouse.
- Treasure will exist within the game world and can be collected by the player upon contact.
- The fish is an enemy which will charge at the player once they are within their line of sight.
- The smoker is an enemy which do not move, but they blow out smoke in a specific direction and block progression.
- The jellyfish is the last enemy and will shoot the player from a safe distance using electricity, they will retreat to a safer player when the player comes too close.

- Powerups can be dropped from enemies, which will be affected by gravity like the player does and slowly move to the ground for the player to pick up.

Player are given a few tools to make their dives possible:

- The player can swim in the water to move fast or touch a wall and stick to it for slower movement. When the player swims, they are affected by the water's gravity and will slowly sink to the bottom, making movement more difficult. Sticking to walls remove that gravity.
- The player's health and time is represented as air. It is a counter in seconds that will go down in real time. Getting hit removes 10 seconds off the counter.
- The player can hit things with their trident. Upon contact with an enemy, the trident will do massive amounts of damage.
- The player can shoot with their gun – which need to be bought as an upgrade – to fire small and quick bullets in quick succession. Upon contact with an enemy, the bullet will do small amount of damage.
- The player can use their laser gun to fire a laser in one direction. The laser hits everything it touches and do massive amounts of damage but takes some time to recharge.
- Any weapon attack hitting a secret wall from the destructible side will destroy that wall forever, creating a shortcut.
- Monsters drop powerup, the first of which is the armor. The armor will make the player invincible for a short amount of time.
- The second powerup is the tank of air, which will add 30 seconds of air to the player air counter.
- The third powerup is the pepper, which will double the damage of the player for a short amount of time.
- The player can use the arrow keys to move the camera around slightly and plan their next move. Otherwise, the camera follows the player.
- Collecting treasure will increase the treasure counter and make that treasure permanently collected. Treasure do not respawn but getting hit will drop 25% of the current treasure back on the ground to be collected again. Monsters also drop small amount of treasure.

The player progressed in two ways: The first is by diving deeper and finding shortcuts and the other is through upgrades. At the start of the game, the player has 2 minutes of air and only the harpoon weapon. They can buy more upgrades using treasure after diving. A dive ends when the player runs out of air or hit a special key. Each upgrade has 5 levels. The upgrades are:

- Air tank upgrades add x seconds to the air meter. The number of seconds will go up as the price of upgrades go up, but 5 upgrades should be enough for the player to go to the final treasure.
- Air safety upgrades make the player lose less air when hit. At the fifth upgrade, they only lose 1 second.
- Harpoon upgrades add damage and reach to the harpoon.

- Buying the gun allows the player to access that weapons and the next 4 upgrades increase its reach and damage.
- Buying the laser gun allows the player to access that weapons and the next 4 upgrades increase its reload speed.
- Suit upgrades lowers the amount of lost treasure when hit. The fifth upgrade makes the player only lose 5% of their treasure.
- Flippers upgrades will make the player less affected by the effects of the water's gravity and make them swim faster.

The player wins by reaching the final treasure room at the end of the third level. There are currently three level planned. Reaching the exit in each level will allow the player to load into the next level. If a player finds a hidden wall within a later level, they can access an exit that brings them back to an earlier level and open a shortcut. Each level will be more difficult than the last with more enemies and bigger levels making air management more important.

## Part 2: Technical planning

The plan is to start by making a rough engine of the game using the framework from the assignments, something that can load a level with the player in it and make them move around. Then we would slowly add mechanics into this rough level, starting with treasure, then the player's weapons, then enemies and finishing off with treasure and secrets.

The hope is to build generic systems along the way that can easily be reused throughout the advanced mechanics and when polishing the game. For example, a counter system that can count time and apply or remove effect when it finished. Another example would be a level system that allows a developer to define a level through some kind of array representation and load it in.

To show the game's possibilities, the vertical slice should also include some base "spawning" controls that allow the player to add air, upgrades or treasure to test their effects.

Starting next week as of the submission date of this planning document February 9<sup>th</sup> up to March 4<sup>th</sup>, there are 4 weeks of work to plan for. Here is a rough schedule divided into half weeks:

Week	Plans
1 <sup>st</sup> week, first half	Create the rough engine, it should load a rough hardcoded and have some camera controls with a player sprite. The player sprite should use a generic entity class to reuse its logic for other entities.
1 <sup>st</sup> week, second half	Add player controls and player collisions, make sure that the player can swim and stick to walls. Create this as a generic gravity collision system so it can be reused for other entities.
2 <sup>nd</sup> week, first half	Add treasure and powerups into the game. They should be collectable and have their effects shown on screen to some degree.

	Reuse the gravity system to have them sink in water.
2 <sup>nd</sup> week, second half	Add air counter to the game and start working on player damage. When hit, the player should drop treasure and lose air in some programmatic way.
3 <sup>rd</sup> week, first half	Add enemies idle and collision with the player. Getting hit should trigger the hit code from last week.
3 <sup>rd</sup> week, second half	Add enemies behavior, they should act as described in the game design section. Take some time for the fish AI, but leave the jellyfish flee AI for later when we start polishing things.
4 <sup>th</sup> week, first half	Add a “real-ish” level with possible exit that shows level can be left or entered in. For now, leaving the level brings you back to that same level. This should also include making sure that treasure stays despawned.
4 <sup>th</sup> week, second half	Project submission. If time permits, upgrade should be added so that the programmatic things we defined in earlier weeks can be changed using some commands.

Once this schedule is completed, it's time to start the polish and adding menus. There are four weeks until the final submission on April 7<sup>th</sup>. Here is a schedule of the planned polish for each week.

Week	Plans
1 <sup>st</sup> week	Add the game state machine and level transition. To make our lives easier, let's use polymorphism as the state machine. Levels and menus should have a controls, update and render method that is inherited from a virtual type and switching the current “state” switches that object. Implement all menus.
2 <sup>nd</sup> week	Implement upgrade buying and other “mid-level” interactions. Polish the game so it feels great to dive in the base level, collect stuff then upgrade. Also add some particles effect into the game.
3 <sup>rd</sup> week	Add the remaining levels using the generic level creation system from the March 4 <sup>th</sup> schedule. Take the time to make them feel good and be playable.
4 <sup>th</sup> week	Final polish, make the best out of the remaining time.

