TTT

Technical Design Document

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Overview:

The game is portrayed as a simple top-down RTS with basic visuals that are mostly designed to easily distinguish various units and their upgrades at a glance. The game's working title, TTT, is mainly a means to convey the core essence of the game, although a more polished title should be revised as the project is developed. TTT mainly serves as an acronym for 'Trains, Turrets, and Tanks' as those will serve as the primary units present in the game. In this sense, the game will likely focus more on the first unit, the trains, as they will serve as the more prominent component for resource gathering, defending, and combat throughout each game. As such, the basic goal of the game will revolve around a source of 'credit' gathering, which may mostly be based on a combination of resources, actions, and objectives present throughout the game. Therefore, the game will likely be developed with multiplayer intended, as the AI design for enemy players might be more time-consuming, although it could be a possibility if multiplayer research in itself is too much. However, the game would concentrate mostly on creating an environment for 2-4 players in which all players start with a base, and from there players utilize resources to build tracks to connect various resources scattered around the map to their initial station. From there, trains can be deployed on the tracks that will gather resources and return earnings to the station, thus allowing the player to upgrade the trains, create turret towers along the tracks, and eventually deploy tanks that can serve as mobile combatants against enemy structures.

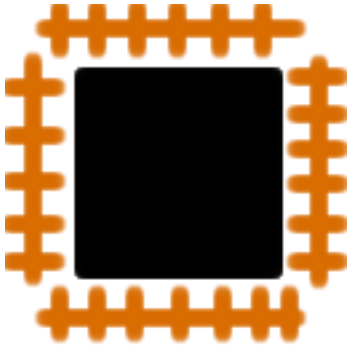
Core Design

The following section will focus on the overall design of the game in detail, thus creating a more concise visual before the risks, challenges, and technical requirements are discussed.

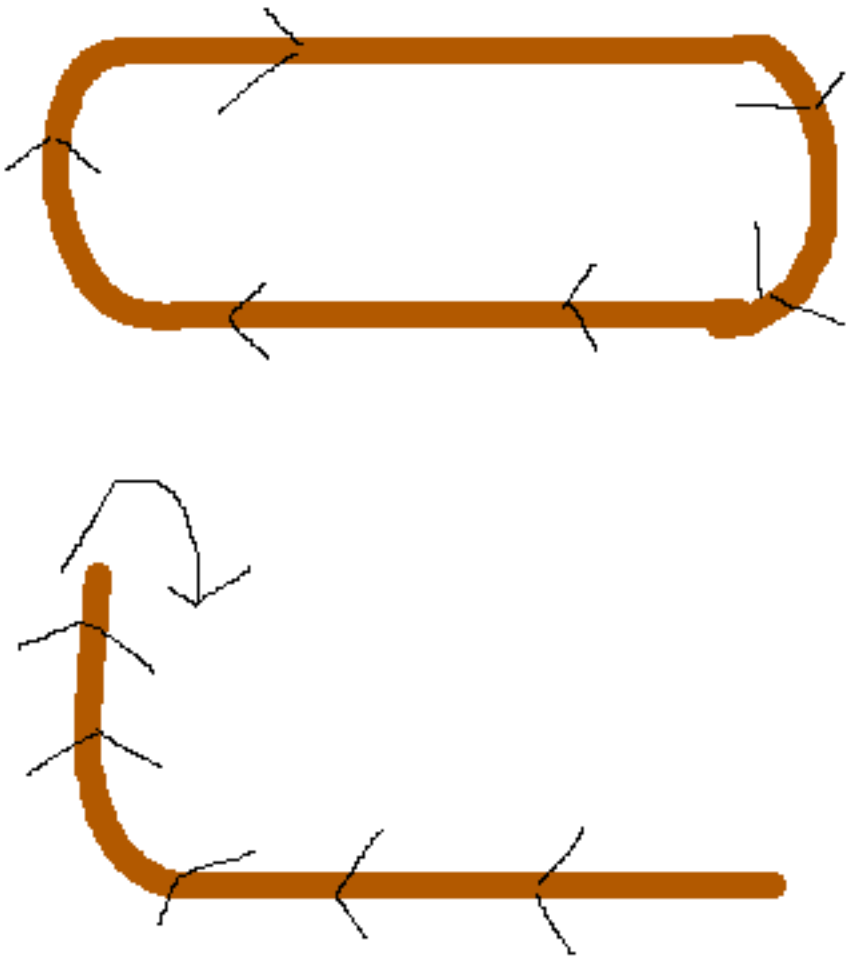
Basic Gameplay Overview

TTT is a top-down RTS game that will place 2-4 players against each other in a struggle for credits. Once achieving a certain number of credits, or hitting a time limit, the player with the top amount of credits will win the game. Credits are gained by collecting resources, destroying enemy units and structures, as well as completing smaller objectives throughout the game.

All players start with starting station that has four tracks surrounding its exterior.



All players start with a set amount of **Wood, Steel,** and **Fuel**. Building additional tracks requires a small amount of wood and steel. At the start of the game, players will need to use some of their resources to paint a track using the **Spacebar** to toggle the track mode. Tracks that connect back to the original track allow the train to move forward without reversing, otherwise, incomplete tracks will cause the train to reverse at half the speed in order to return to the station to deposit resources.



As such, trains can exist on non-looping tracks, but they'll go in reverse at a slower speed upon return.

Trains that bypass any of the three resources along the track can stop and collect resources from the node. A train can only fill one car at each node, and therefore the addition / purchase of additional cars will only serve to allow for the train to stop at more nodes along the track before returning to the station. When going in reverse, the train will not stop at any nodes, and therefore tracks on incomplete tracks will not be able to gather from the same node twice. Trains that pass the same node twice in the same duration (before returning to the station) will also be unable to gather until their load is reset at the station.

Gathering from a node causes the train to stop temporarily, allowing for a progress bar to be displayed, thus indicating the loading process for the train's car. Each car can hold a certain amount of a given resource. Upon clicking on a train, the player will be given a number of

options in order to deal with the actions of the train. The player will be given some of the following options.

- Speed
    - The player can set the maximum speed of the train, thus indicating whether the train should stop, move quickly, move slowly, or move in reverse.
- Bypass Resources
    - The player can tell the train to bypass all resources if desired.
        - This will also stop a gathering train and move it onwards, which can allow the player to escape from danger or simply stop the resource gathering prematurely. All resources gathered will still be retained, but the car won't be completely full.
- Purchase Car
    - A train can put in a request for an additional car with the given amount of resources required. This car will be added upon looping through the station.
- Tree
    - A train can be upgraded to fit different designs, these upgrades will be noted later.
- Repair
    - A train can request a repair, which be enacted at the station and will required the train to remain still for the duration.

As such, the train's primary objective is to move along the painted tracks and gather resources for the player to utilize over the course of the game. The process of gathering will generate credits toward the end objective, but only a small amount. The player can purchase additional aspects by clicking on the station.

- Purchase Train
    - The player can purchase a train for a given track (N, S, E, W). There may be a max of 2-3 trains per track.
- Deploy Tank
    - The player can purchase a tank for a large amount of wood, steel, and fuel. The tank will take some time to deploy, and will serve as the player's mobile combat unit.
- Build Turret

    - The player can place a turret structure along any of the station's tracks. The turret will take a medium amount of wood, steel, and fuel. These turrets can assist in defending resource nodes, trains, the station, and key combat areas.

Trains purchased will run along the track with an initial 1 car attached. Further cars can be purchased through resources, and the train will move along the track, gather resources, and return them to the station. Tracks can be built to allow for intersections between any train, allied or enemy. Allied trains cannot collide with each other, but instead, the train with the 'right of way' (nearest to the center of the intersection) will go onward while the other train makes a stop and waits for its move. Enemy trains that collide in this manner will also stop in a similar way, but will damage each other.

As a result of limit of credits gathered early in the game, a core component of the game will involve the painting of tracks closer to enemy territory, thus allowing for enemy trains to potentially collide with each other, and for trains to be effectively able to create tracks near enemy territory to allow for turrets to be built adjacent to enemy resources and trains. A delay may be added to resources in order to allow for enemies to steal resources by arriving at a node, gathering resources, and then rendering it inactive for a certain amount of time. Also, upon collision, enemy trains colliding into the side of a train will take less damage and deal more damage as a result of the collision.

Deal damage and destroying enemy units will allow for an increase gain of credits, thus giving the player an incentive to involve themselves with combat with other players.

Turrets

As noted beforehand, turrets can be purchased through a given station and placed along its tracks. Turrets can be offensive and defensive, as they can defend nodes from enemy trains, create conflict at intersections, or provide vision on enemy movements. Turrets have the following purchase options.

- Vision / Range
    - Increases the vision and range of a turret.
- Damage
    - Increases the damage and firing rate of a turret.
- Armor / Health
    - Increases the armor and health of a turret.
- Repair
    - Repairs the turret over time.

Tanks

Tanks can be purchased and deployed through the station. Tanks do not have any purchase options at the moment, due to their potentially short life-spans, but this could be altered later in development. Tanks will allow for mobile patrol units to defend key areas and assault enemy resource gathering.

Tanks be grouped, stopped, and allowed to patrol between two points.

Station

Most of the station features have already been noted, but upon purchasing a train for every track, the player can then create another station on the map. This station may be limited by a set distance surrounding the current station, and may potentially be weaker than the starting station.

Train Trees

Each train has three different upgrade paths that it can follow, thus appealing to the player's style of gameplay and how they want their train to interact with the world. These upgrades may cost a small amount of resources, and may also have other requirements surrounding the train's travel amount / time alive.

The trees are defined as **Special, Combat, Transport**. Each tree, once delved into, renders other trees inaccessible. Each train can only purchase one upgrade from each of the levels within the tree.

Special

- Level 1
    - Turrets the train passes by heal for 5%, and temporarily gain 25% additional damage for 30 seconds.
    - Allied tanks take 25% reduced damage when nearby the train.
- Level 2
    - The train can activate a magnetic field to push away all enemy tanks surrounding it.
    - The train can activate a smoke bomb that prevents all enemy projectiles for the next 5 seconds.

- Level 3
    - An additional cart is added to the back of the train that allows for the transportation of two tanks. These tanks can enter by moving them onto the cart, and they can exit by clicking the 'deploy' button on the train.
    - The train will drop a temporary 10 second turret behind it every 20-30 seconds, damage enemies before vanishing after its duration.

Combat

- Level 1
    - A Basic Turret is added onto the train's head.
    - Units the train collides with take 100% more damage, enemy tanks are destroyed instantly upon collision.
- Level 2
    - Train takes 25% reduced damage.
    - Adds as static shielding that damages enemies as it passes by. This static exists surrounding the train, and cannot damage the same unit within 3 seconds of an initial shock.
- Level 3
    - Adds an additional car at the back that has an anti-tank cannon. This cannon has increased firing rate and damage when the train is not in motion.
    - Adds a metallic shell that has a 25% chance to cause projectiles to damage the owner. Also reduces damage by 10%.

Transport

- Level 1
    - Train now has a max speed of +3, and reversing only reduces speed by 25%.
    - Cars fill up 30% faster.
- Level 2
    - The train can now be repaired while in motion, and the train takes 20% reduced damage while gathering.
    - Transporting materials gives the train a bonus.
        - Wood → Increases gathering rate by 25%.
        - Steel → Reduces damage by 25%.
        - Fuel → Adds a temporary turret to the head.
- Level 3
    - Activates a magnetic field when gathering that has a 40% chance to stop enemy projectiles.

- As the train moves, its cars are filled up slowly. These increases stack with the amount that will be filled up at each node.

Technical Challenges

While a lot of content has been noted, there would be too programmers on the project that would be able to constantly test, debug, and balance the game's content. Most of the features are relatively simple and certainly manageable, as the majority of the AI would be primarily focused on turret tracking and slight AI pathing / following.

Trains would have to be designed to following their set paths, while enemy tanks would require input commands for movements and attacks, while also having the ability to move and attack when not being specifically designated too. At the core of the game, a number of features and options would have to be developed to allow for the proper UI and implementation of the numerous features.

The visuals wouldn't be too much of a task, but the process of intergrading all of the upgrades and commands would take a large amount of time to debug and properly balance and test. There's also the question of how the actual gameplay would work, as it would require multiplayer, and thus, the game would require research into online networking. Which, given the extent of the game, might be worse learning regardless. Still, the amount of other features required surrounding all of the minor upgrades, trees, features, combat, balancing, and strategy components will probably make this, in many ways, an extensive project.

Therefore, it might be of value to develop some more design documents for other games, although this certainly could be a potential path given the proper amount of work and revisions to the gameplay.