Tower Defense #9

Project Plan

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Scope of the Project

The goal of the project is to create a functional tower defense game, showed in figure 1. The game needs to look decent and be enjoyable to play, therefore, the team focuses on creating a well working simple game with minimum requirements, rather than a complex game with lots of bugs and illogicalities. If there is time to spare, more advanced functionalities will be implemented.

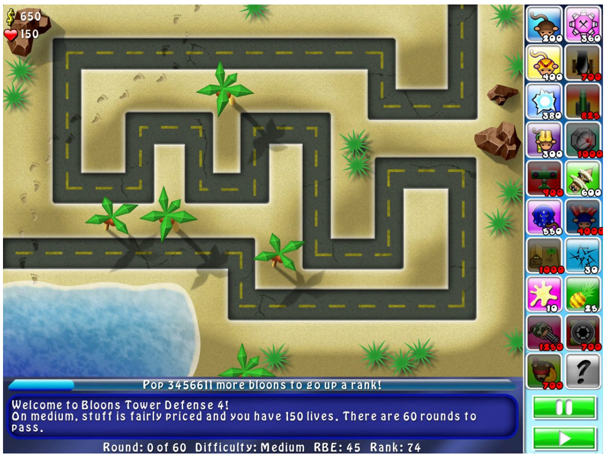
The basic concept is to have multiple levels, which each has multiple enemy waves with increasing difficulty. The difficulty of the game comes from tower placing and money spendage. High score ranking will be based on passing levels and waves. Due to the wave structure of the game, pause and speed-up functionalities will be implemented to achieve more pleasant gaming experience. The ability to save the game at any point, is a desirable function, but not among the most important priorities.

Game graphics should be more than just black and white boxes, but rather actual graphics. Game sounds are something that makes the experience much more pleasant, thus implementing at least 8-bit sounds is amongst mid-level priorities.

Each level starts with a certain amount of money. The only target money is spent on are towers. The player will increase wealth by destroying enemies and gaining possible bonuses. Money can be spent only before wave start, which is wave specific and time based.

Player

The game is going to be made into single player mode. The player has certain health (hit points, Hp), which is decreased by enemies passing the route of the map being played. When the player Hp is depleted, the game ends. Player gets money from destroyed enemies and other possible bonuses.

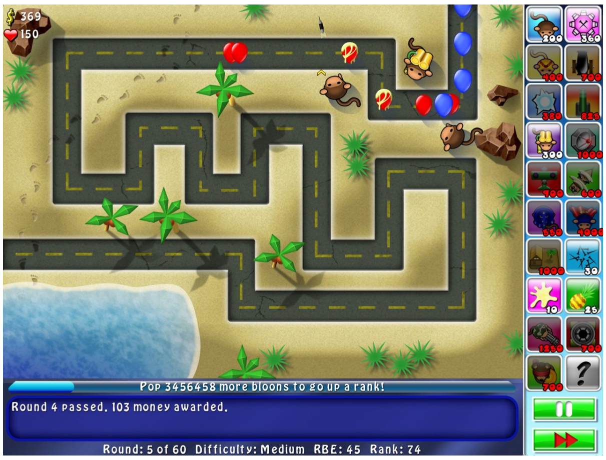


Pop 3456611 more bloons to go up a rank!

Welcome to Bloons Tower Defense 4!
On medium, stuff is fairly priced and you have 150 lives. There are 60 rounds to pass.

Round: 0 of 60 Difficulty: Medium RBE: 45 Rank: 74

Figure 1: Gameplay from Bloons TD4

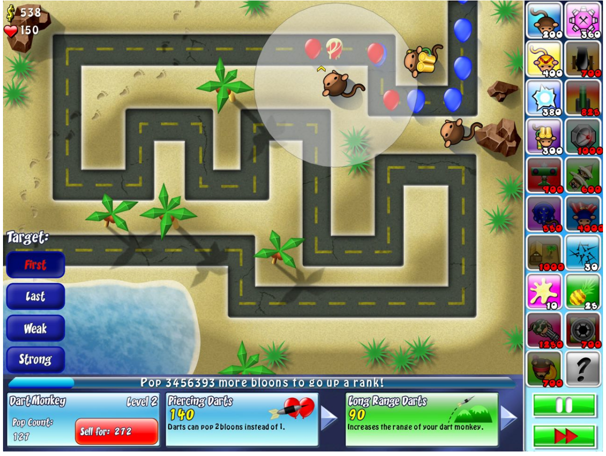


Pop 3456458 more bloons to go up a rank!

Round 4 passed. 103 money awarded.

Round: 5 of 60 Difficulty: Medium RBE: 45 Rank: 74

Figure 2: Gameplay from Bloons TD4



Pop 3456393 more bloons to go up a rank!

Dart Monkey Level 2
Pop Count: 127
Sell for: 272

Piercing Darts
140
Darts can pop 2 bloons instead of 1.

Long Range Darts
90
Increases the range of your dart monkey.

Figure 3: Gameplay from Bloons TD4

Map

We are going to have support for Tiled Map Editor (http://www.mapeditor.org/) i.e. generating maps with it and using .tmx format for the map files. We will use https://github.com/edoren/STP as a framework for SFML. The maps have start and finish points and a route between them for enemies to move from start to finish. Towers can't be positioned on the route or on top of other towers other than that there's no limitations for tower positioning. In the code we assume the map is generated with correct layers for the enemy route and tower locations. Our goal is that users can easily create their own maps with Tiled Map Editor.

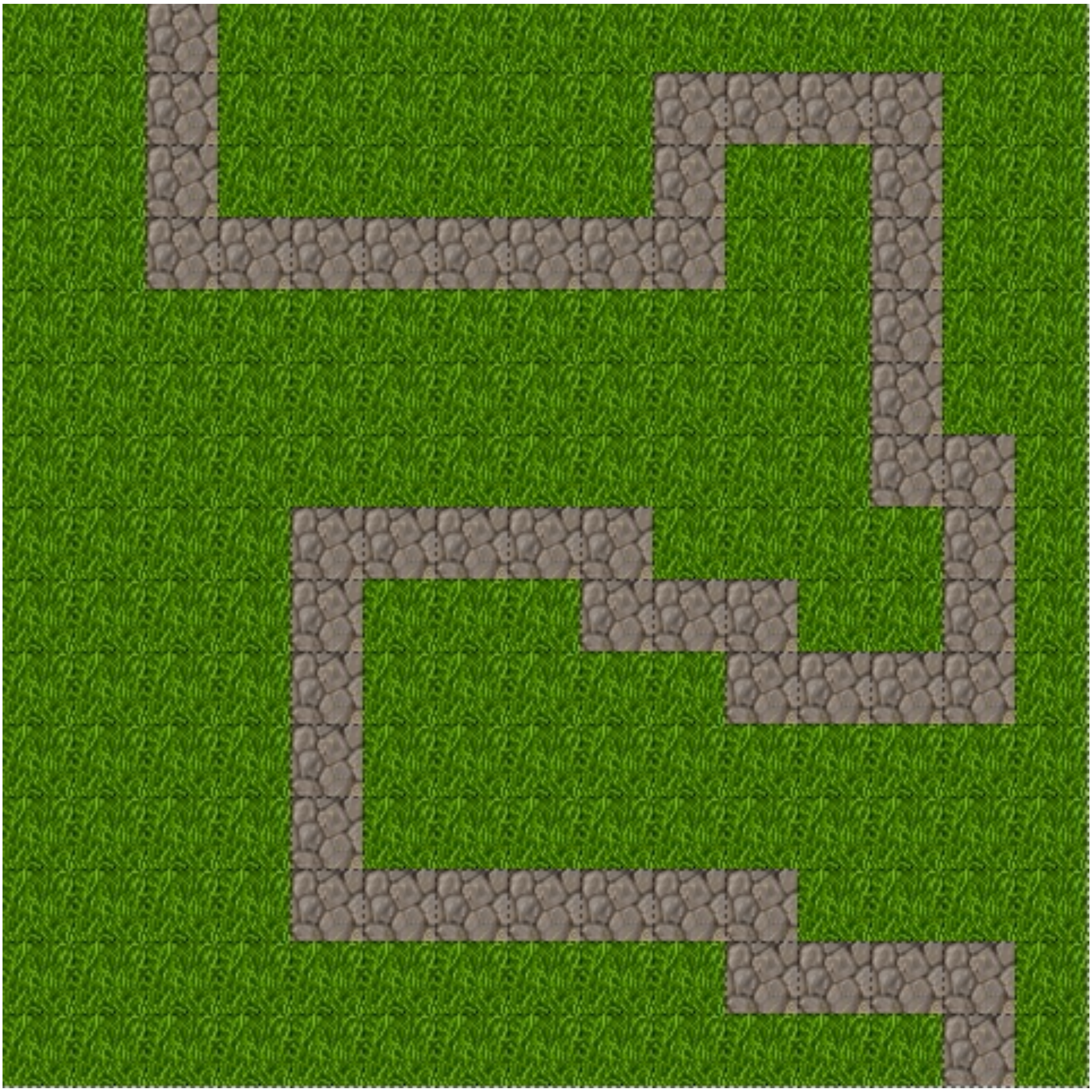


Figure 4: Example map generated with Tiled Map Editor.

Towers

Towers are the (primary) way to defend against enemies. Each tower will have a

- specific placement cost
- hit-points
- attack type, attack speed, and range
- targeting logic, possibly based on attack type
- location that is reserved for it and prevent other towers from being placed on top of it
- upgrade options, with specific price(s), mutually exclusive (probably)

For simplicity and reduced annoyance, towers will always hit their targets.

Basic towers will shoot a single enemy at a time, dealing (probably) fairly low damage and possibly upgradable to a better single-target tower.

Multi-shot towers will, as their name implies, shoot several enemies each time they fire, for example up to 3 enemies at a time.

Slowing towers will of course slow down enemies, and possibly prioritize enemies that aren't slowed with each shot. Slowing effect will simply modify target's speed variable by specific amount for specific duration, probably through function within an enemy-object that will affect speed for specific number or ”ticks” (game-clock).

Splash-damage towers or Explosive(s) towers damage everything in an area of specific size, possibly causing more damage to:

- primary target if they target an enemy, or
- near the center of explosion if they ”target the ground”

These towers will have some overlap with multi-shots, so they should probably be better when hitting more targets and worse if they hit less than a multi-shot.

Enemy

Different kind of enemies

At every level more enemies will try to pass players defence. At the start there will be only a low number of mild enemies so that player is able to build some towers up. After the player has built a nice pack of towers, computer starts really to test tower combinations and location of towers. Enemies will be stronger and faster. Unless player doesn’t use his/hers cash wisely and put towers to clever positions, enemy will get through and take life points.

Every enemy unit have their own specs

- Hitpoints
  Enemies will have a certain amount of hitpoints. If the enemy walks under a towers range, the tower will decrease the amount of the hitpoints by a certain number. This depends on how strong the tower is.
- Speed
  Every enemy unit has a certain speed. The faster the enemy unit is the less time towers have time to do damage to enemies. This means by higher speed enemies are more dangerous.
- Speciality (extra)
  Enemies can have different type of specialties. For example some enemies can’t be hit by every tower so you need specific towers to get certain enemies down.

- Coordinates on the map
  Every enemy has its own coordinates which tells the location of enemies on map. This is the way the towers can hit the enemies.
- Money
  Player will get payed for every killed enemy so every enemy must be ranked by certain amount of cash. The money can be spent by deploying towers.

Game

Major Architectural Decisions

- Main
- Level/Map-files
- Level and Wave specifications
- Tower class
- Enemy class

Workflow and team dynamics

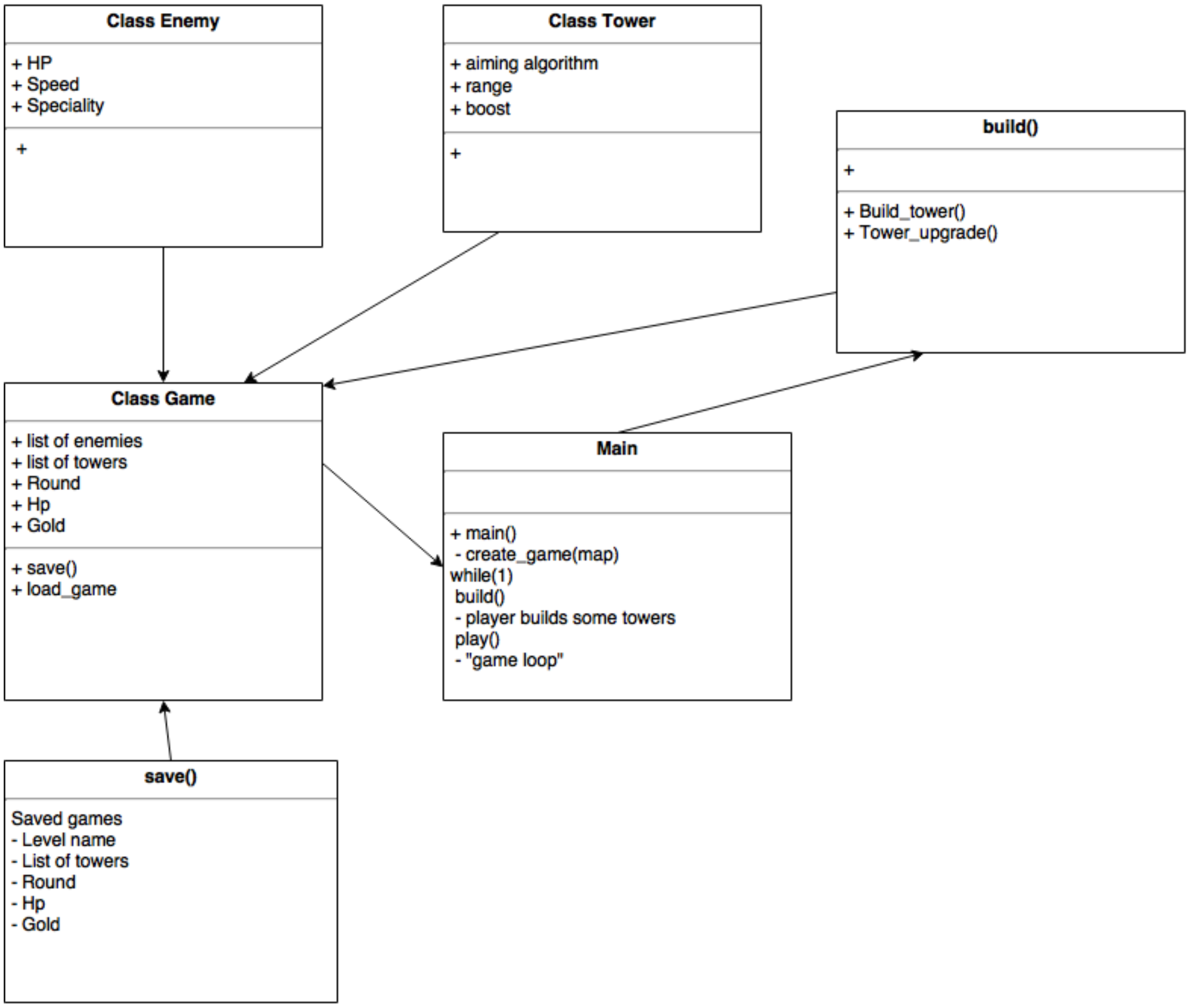
- Guidelines for git
  - Everything in master (at least at first)
  - Small commits with descriptive message
  - Always check that code builds before push
  - Keep your local code updated (pull regularly)
- General guidelines
  - SFML version 2.3.2 http://www.sfml-dev.org/download/sfml/2.3.2/
  - Active use of slack
  - Weekly meetings
  - Try keep the code understandable
  - Tab width is 4 spaces

- Frame: main window
- Map
- Objects: tower, enemy

Preliminary Schedule

- Preliminary meeting 11.11.2016
  - Project plan finished
- Mid-point meeting 25.11.2016
  - Tower and Enemy abstract class and functionality
  - Map functionality and generation
  - GUI
- Finished game 11.12.2016
  - Working game
- Demonstrations 12-16.12.2016
  - Tweaking

UML


Class Enemy
+ HP
+ Speed
+ Speciality
+
Class Tower
+ aiming algorithm
+ range
+ boost
+
build()
+
+ Build_tower()
+ Tower_upgrade()
Class Game
+ list of enemies
+ list of towers
+ Round
+ Hp
+ Gold
+ save()
+ load_game
Main
+ main()
- create_game(map)
while(1)
build()
- player builds some towers
play()
- "game loop"
save()
Saved games
- Level name
- List of towers
- Round
- Hp
- Gold