



Game Design Document

Game Overview

Introduction

Ping Pong is here to help you get rid of your boredom. The simplistic game of making sure you hit the ball with your paddle to save your lives now available on your PC. This game has been developed using java, swing and socket programming. This is a multiplayer ping pong game where you can play with as many friends as you want. This game also offers you the option to play a single player against bots for when you are offline or want to practice. This game is simple yet addictive, so get ready to Ping Pong !!!

Genre

Ping Pong is a PvP MMORPG. This is an arcade game with sound effects in a dark themed world.



PING PONG

connecting....

Game Overview

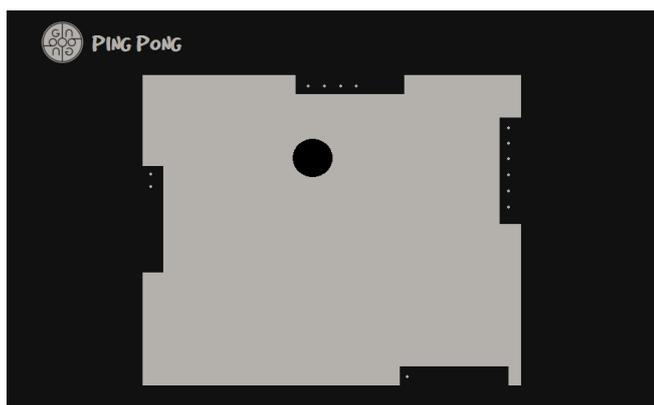
Game Flow

Ping Pong is intended to be a multiplayer game, where any number of players can come together on a local network and play together.

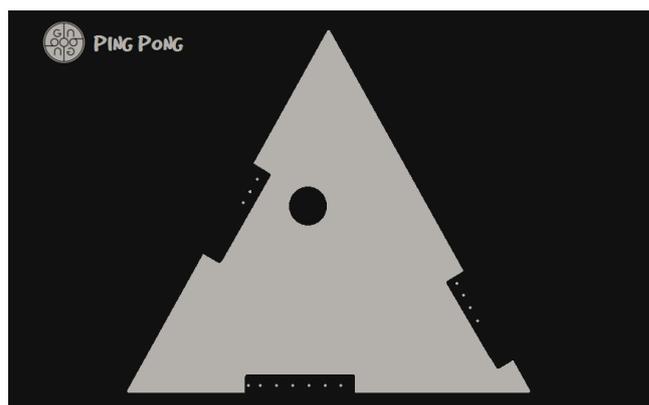
Game starts with " n " players with their paddles aligned along the edges of an " n " sided polygon. The size of the paddles depending on the size of the edge. Initially each player starts with a fixed number of hit points. As a player's HP depletes to zero, the player is eliminated from the game and is given the choice to either spectate or leave. The polygon now transforms to an " $n-1$ " sided polygon and the game continues for the rest of the players.

- A game mode can be initially selected to decide the initial HP of players.
- On the local machine the user's paddle is shown at the bottom of the gameboard.
- Each user can control his/her paddle using the left and right arrow keys.
- The HP of each player is shown as white dots on the player's paddle

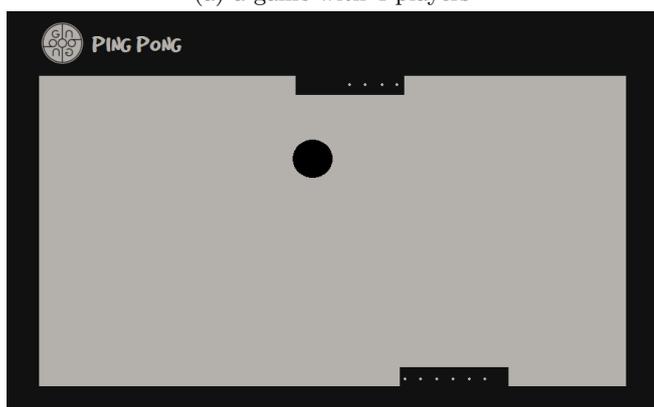
In the single player mode one can choose to practice in which you face a bot of your choosing while in the quest mode you face a sequence of AI opponents as a character of your choosing and try to beat them all.



(a) a game with 4 players



(b) elimination of a player transforms the table to a triangle



(c) further eliminations leads to a vs 2 final showdown

Process Overview

Inspiration (Visual)

Ping Pong is intended to be a multiplayer game, visuals would be inspired from the following games



Figure 2: Limbo is an indie puzzle-platform video game, by Danish game developer Playdead



Figure 3: developed in 2011 by Ukrainian developer Mokus, art was created by artist Mihai Tymoshenko



Figure 4: Miseric, an android based game offered By RatJar Games (2013)

Process Overview

Scope

The scope of the game is extended to include the following

- Role Playing - Picking a character with a specific powerup associated to play the game. These powerups will be special powers like making the ball faster, giving extra spin, being wider etc.
- Practice - Play with as many bots of whatever difficulty level you want.
- Massively Multiplayer - Connect with as many players as you like. The gaming environment will customise itself accordingly.
- Quest Mode - You play a sequence of AIs that increase in level of difficulty
- Game Modes - In multiplayer environment you can pick one of the available modes to determine the initial HP of the players.

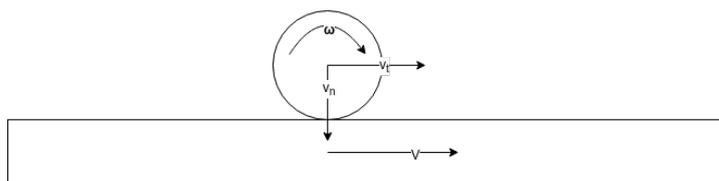
Physics

- Every entity has its own position, velocity and acceleration along its center of mass, and its dimensions ex. the ball would have its radius, while the paddle its width and height.
- Position of every entity is updated after a fixed time interval which is an approximation of the equations of motions i.e.

$$v = \frac{dx}{dt}$$

$$a = \frac{d^2x}{dt^2}$$

- As we are using very basic equations for the motion of entities, introducing collision would be trivial
- The following illustrates the equations to be used in case of a ball and paddle collision
- The mass of the paddle has been taken as infinity so that the speed of paddle would not be affected when hitting the ball



$$v'_n = -v_n$$

$$v'_t = v_t - \min\{v_t - \omega r - V, 2\mu v_n\}$$

$$\omega' = \omega + \min\{v_t - \omega r - V, 2\mu v_n\}/r$$

- to extend the scope we could an entity like a black hole which would constantly attract/repel the ball on the basis of its distance by giving it an acceleration along the normal direction.
- Providing the ball any arbitrary acceleration may also give exciting results

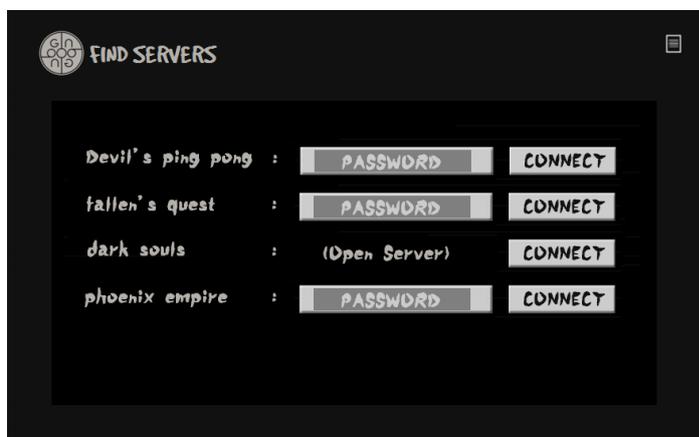
Algorithm for AI

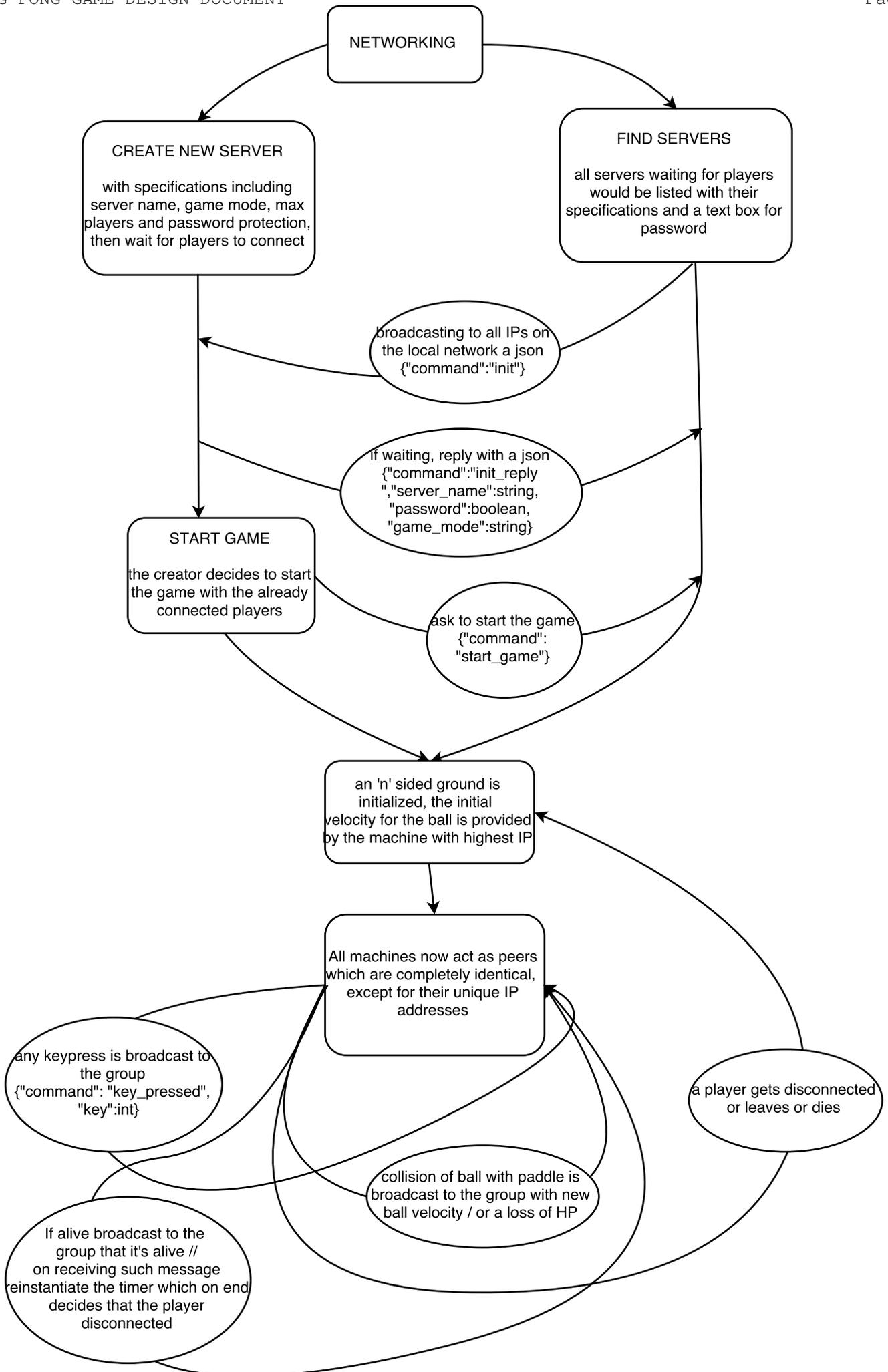
- The perfect AI would linearly interpolate the velocity of the ball to get its probable position and move with absolutely no reaction time and hence would have negligible probability of missing the ball
- The difficulty levels will be decided by controlling the error that we ensure in these parameters.
 - Hard - Reaction time maximum, Error in Interpolation high , speed of paddle slowest
 - Harder - Reaction time high, Error in interpolation high, speed of paddle slow
 - Hardest - Reaction time high, Error in interpolation low, speed of paddle same as player
 - Hardester - Reaction time low, Error in interpolation low, speed of paddle slightly faster than that of the player
 - Hardestest - Reaction time negligible, Error in interpolation negligible, speed of the paddle very fast
- In the quest mode these AIs will come one by one in increasing order of difficulty and the player will have to defeat them all
- In the practice mode you could select one of these to hone your skills with

Process Overview

Networking

- Java Sockets make the process of creating networked games pretty easy.
- We only need an IP address to communicate with that game instance
- The messages between the instances will all be very short and of mime-type text in JSON format
- Having JSON format eases the need of adding any (property*value) tuple to the message
- We will use UDP connections for all communications







PING PONG

Loading....