Project Overview

DannyKart Racing is a 3D racing game created last semester by Chico State Student Daniel Phelps. The basic goal of my project is to extend DannyKart Racing by adding multiplayer features.

DannyKart Racing is written in C#© utilizing XNA Game Studio©, the JigLibX© physics engine and the Lidgren.Network© UDP networking library.

This project is split up into two main components. The DannyKart Server and the DannyKart Game Client. Multiple game clients can connect to a single server in order to race against each other. The server is in charge of handling input from clients and each client is in charge of rendering the game.

Design

A big part of this project was understanding the previous project design so that a design for the multiplayer portion could fit in sensibly without removing any functionality. This was done by designing the client part of this project so that it fit into the old design and only making necessary changes to the surrounding structure. Network communication was abstracted away from the actual game so that the network architecture could be changed and tuned without changing the game. This can be seen in the object model for the Game Client below.

Game Client Class Diagram

Starting a Game

Basic Functionality

- A user can select a server to connect to
- A user can select a game they wish to join
- Each server can host multiple races at once (each with different maps)
- Number of races a server can support is configurable depending on available resources
- When enough players have joined a game the race will countdown and start
- Server accepts input from clients, processes it, and then broadcasts the positions of all vehicles for each client to render individually

Network Communication

- Communication is accomplished over the UDP networking protocol
- No insurance of reliability, order or integrity of data packets
- Much faster than TCP
- Important data packets, that are not speed critical, are ensured delivery through the Lidgren© Networking Library for C#
- High frequency, speed critical packets such as position updates are sent unreliably
- Old information is ignored but delivery is not guaranteed
- Positions are interpolated between updates for smooth drawing when there is higher latency

Future Development

- Users choose different types of cars to race
- Server keeps a global score tracking list
- Central place for clients to pull updated server lists from

1 DannyKart Racing was created by Daniel Phelps. Fall, 2010.