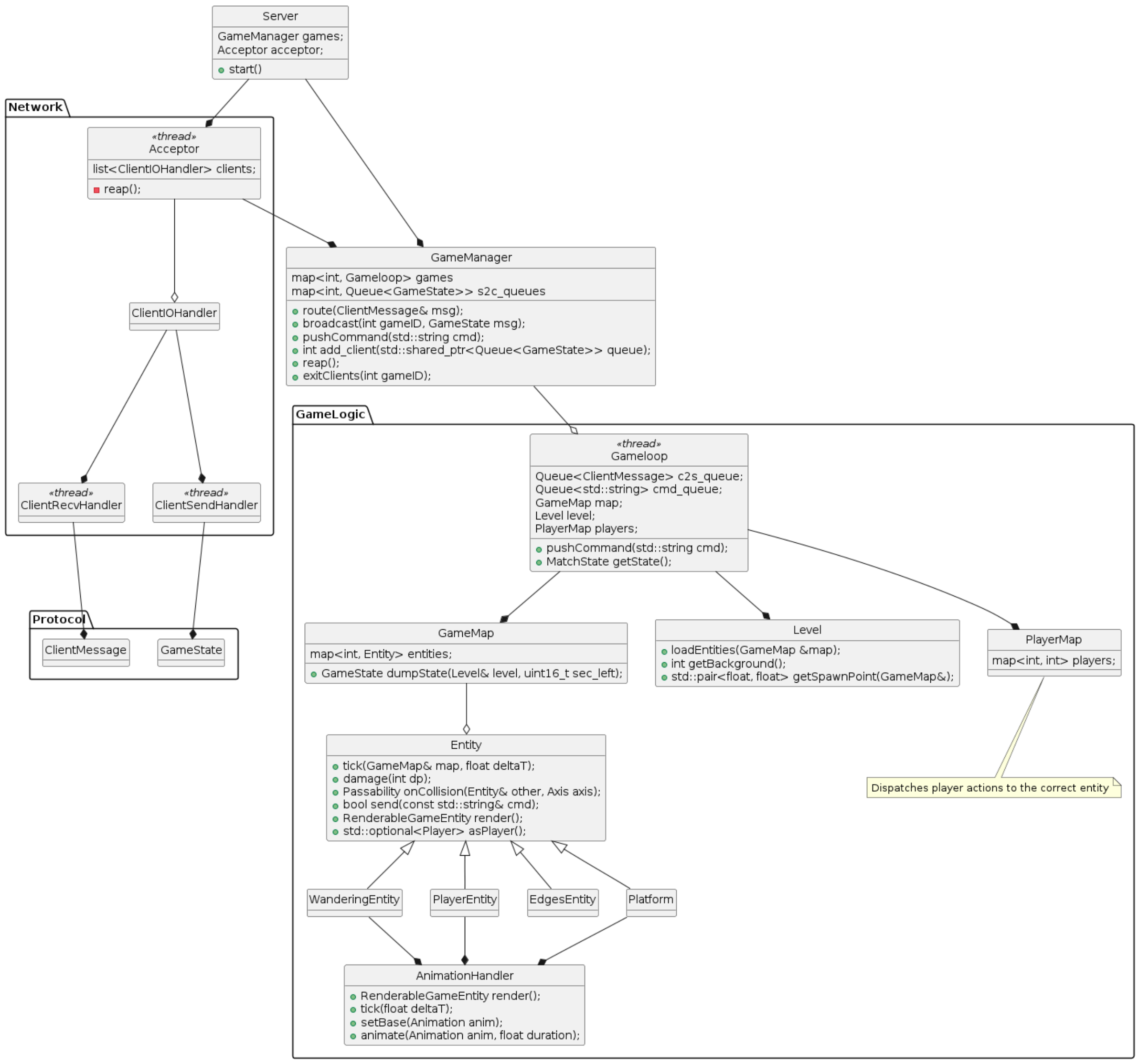
Jack Jazz Rabbit 2

Server Technical Documentation

Contents

Architecture


Server
GameManager games;
Acceptor acceptor;
start()
Network
«thread»
Acceptor
list<ClientIOHandler> clients;
reap();
ClientIOHandler
«thread»
ClientRecvHandler
«thread»
ClientSendHandler
Protocol
ClientMessage
GameState
GameManager
map<int, Gameloop> games
map<int, Queue<GameState>> s2c_queues
route(ClientMessage& msg);
broadcast(int gameID, GameState msg);
pushCommand(std::string cmd);
int add_client(std::shared_ptr<Queue<GameState>> queue);
reap();
exitClients(int gameID);
GameLogic
«thread»
Gameloop
Queue<ClientMessage> c2s_queue;
Queue<std::string> cmd_queue;
GameMap map;
Level level;
PlayerMap players;
pushCommand(std::string cmd);
MatchState getState();
GameMap
map<int, Entity> entities;
GameState dumpState(Level& level, uint16_t sec_left);
Level
loadEntities(GameMap &map);
int getBackground();
std::pair<float, float> getSpawnPoint(GameMap&);
PlayerMap
map<int, int> players;
Dispatches player actions to the correct entity
Entity
tick(GameMap& map, float deltaT);
damage(int dp);
Passability onCollision(Entity& other, Axis axis);
bool send(const std::string& cmd);
RenderableGameEntity render();
std::optional<Player> asPlayer();
WanderingEntity
PlayerEntity
EdgesEntity
Platform
AnimationHandler
RenderableGameEntity render();
tick(float deltaT);
setBase(Animation anim);
animate(Animation anim, float duration);

Network

The `Acceptor` class takes care of accepting incoming connections and creating an object (`ClientIOHandler`, which serves as glue to start/stop the send/recv threads) and registering it with `GameManager`, which assigns it a client ID. `GameManager` is tasked with routing messages between clients and games, and handling the lifecycle of games (creation, joining, ending).

Recv (C2S) path

There are three cases for a C2S message: actions within a game, creating/joining a game and listing games.

In-game

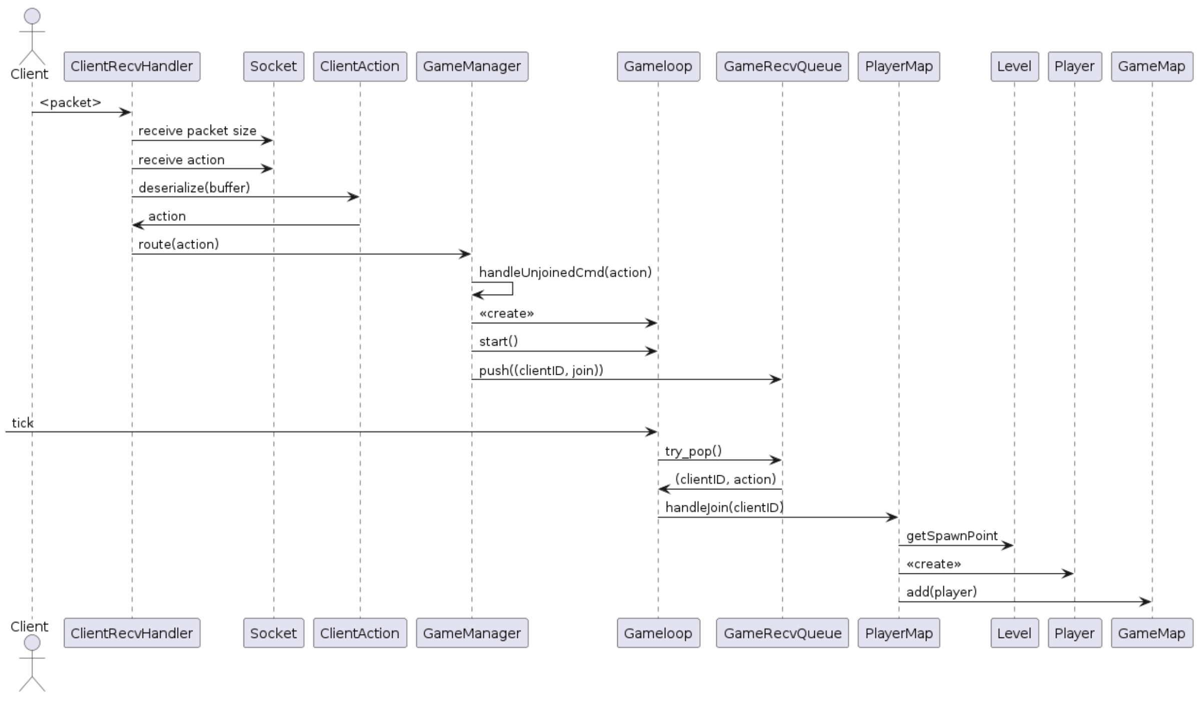
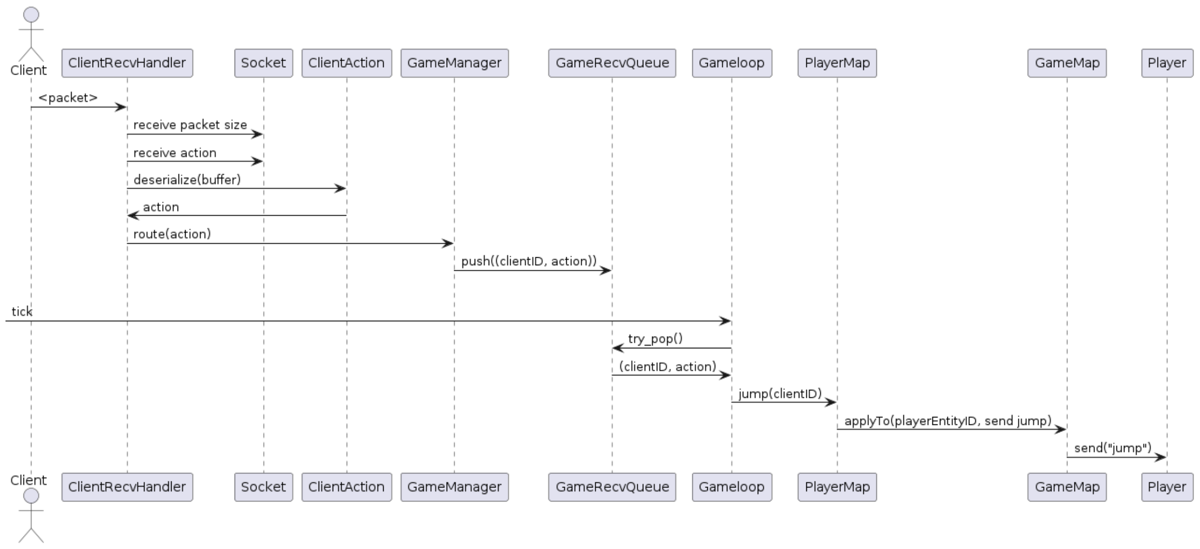


Figure 1: Player jumping

Creation/Joining



Joining is similar but doesn't need to create a new game.

Listing games

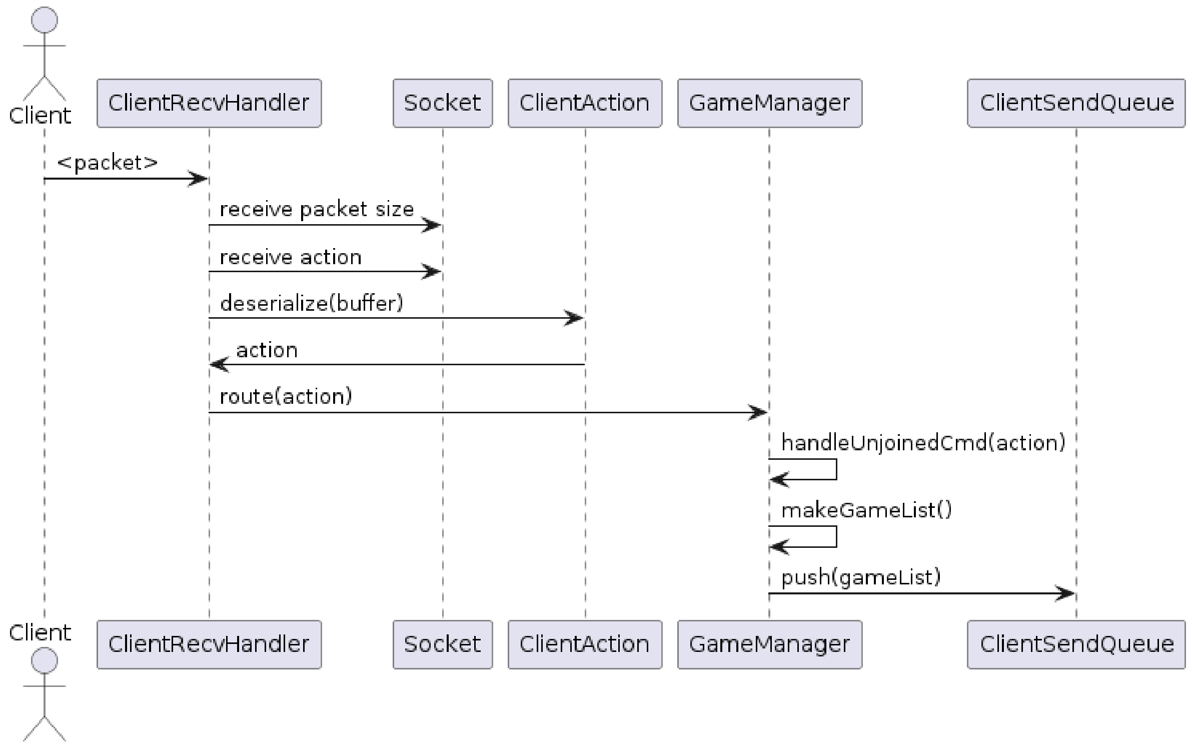


Figure 2: Player listing games

Send (S2C) path

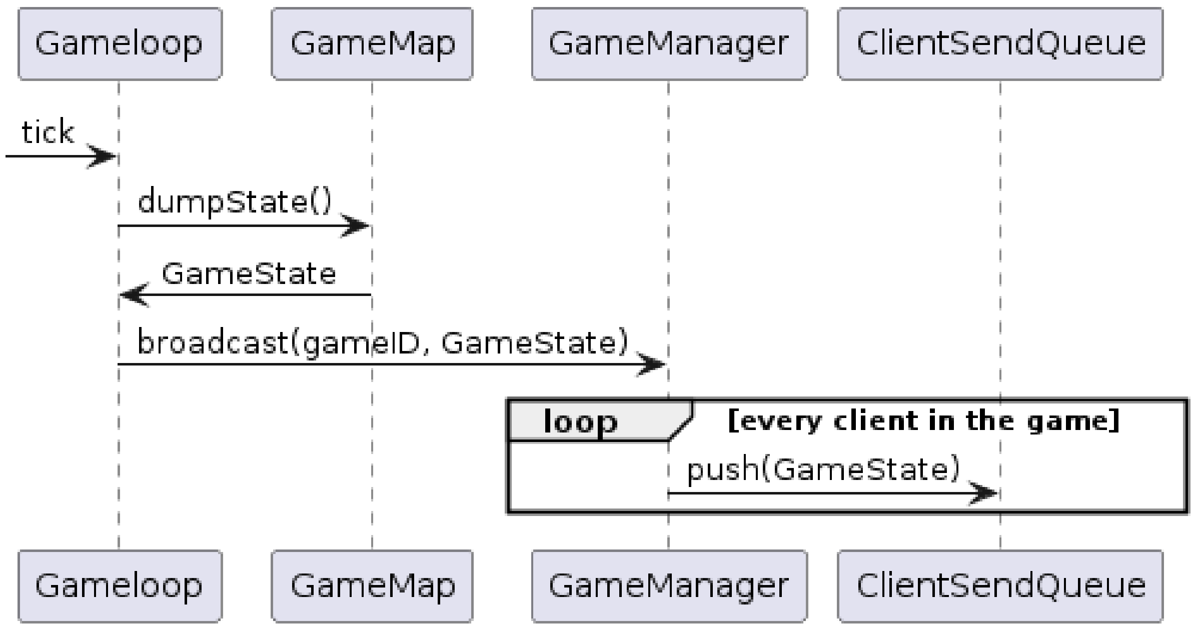


Figure 3: Server sending update

Protocol

All values are serialized in network order (BE).

F16/16 refers to fixed-point decimal with a u16 decimal part and a u16 fractional part. Serialized as an u32.

Client-to-Server

Header

The header consists of an u8 size field, that contains the size of the rest of the packet, and a u8 type action field.

The action field can take the following values:

Action	Value
Create	'C'
List	'L'

Action	Value
Join	‘J’
Quit	‘Q’
Left	‘A’
Right	‘D’
Down	‘S’
Up	‘W’
Shoot	‘P’
Jump	’ ’
Combo	‘X’
SwitchGun	‘E’
StopMoving	‘d’
Ammo	‘F’

NOTE: While most action values come from the keys that trigger them, a one-to-one correspondence shouldn’t be assumed.

Additional Values

Some actions take additional parameters

Create Create takes a u16 characterID (see `AnimationState`), and a string containing the username serialized as an u8 size and the string itself.

Join Create takes a u16 game id, a u16 characterID (see `AnimationState`), and a string containing the username serialized as an u8 size and the string itself.

Left/Right Both take a u8 containing 1 if the player is moving fast and 0 otherwise.

Server-to-Client

Header

The header consists of a u16 containing the size of the payload and a u8 containing the type of message.

The type field can take the following values:

Type	Value
GameList	0
GameState	1

GameList

GameList informs the client of it's client ID and gives a list of available games. It's format is a u16 containing the ID, and a list of `AvailableGame` (the quantity can be inferred from the length of the packet).

AvailableGame

AvailableGame has a u16 game ID, a u8 with the amount of players joined and an u8 with the amount of players needed.

GameState

Consists of an u8 containing the background, u16 containing seconds left in the game, u8 containing the player count, that amount of `Player`s, and the remainder of the packet contains `RenderableGameEntity`s

Player

Each player contains a u16 ID, a u8 with it's healh, a u16 with it's score, a `RenderableGameEntity` with it's properties, and it's username in "u8 length + string" format.

RenderableGameEntity

Contains X and Y in F16/16 format, a u8 entity type (see `AnimationState`), a u8 containing the animation (see `AnimationState`), a u8 containing the frame within the animation, and a i8 containing the direction (± 1).

Game Logic

For every game tick, the following actions are performed. - execute player actions - apply gravity - tick every entity - reap dead entities - send new state to the clients

Entities

The `Entity` class provides both an interface that all entities must adhere to, and default implementations for all methods.

Of the methods, a couple might need additional explanation.

onCollision

Should be called whenever an entity tries to move onto another.

The return value indicates how the entity that tried to move should behave: - Transparent: you *should* go over the entity. Example: decorative signs - Passable: you *may* go over the entity. Example: enemies - Impassable: you *should not* go over the entity. Example: walls

send

Sends an arbitrary message. Is mostly used to signal to players. An example is the `coin` event.

Returns whether the entity knew how to handle the message.

Commands

The server supports several commands, for debugging purposes. Some commands require a gameID prefix (with a space between the ID and the command).

listGames

`listGames` lists games, both active and inactive

[id] list

List all entities

[id] players

List all players

[id] damage

Deals `dmg` points of damage to entity with ID `entity`

[id] tp

Teleports entity `entity` to (`x`, `y`), if possible.

[id] enableDebug

Enables debug mode, which runs list every tick.

[id] disableDebug

Disables debug mode

[id] pause

Pauses the game. This doesn't prevent time from passing. Only use for debugging.

[id] unpause

Unpauses the game.

[id] tick

Manually ticks the game.

[id] level

Manually loads a level *without removing the current one.* Only use for debugging.

Levels

Levels are indicated by path when joining a game. Type refers to the implementation, ID refers to the entity type (for animation purposes), x and y are the initial coordinates of the top-left corner of the entity.

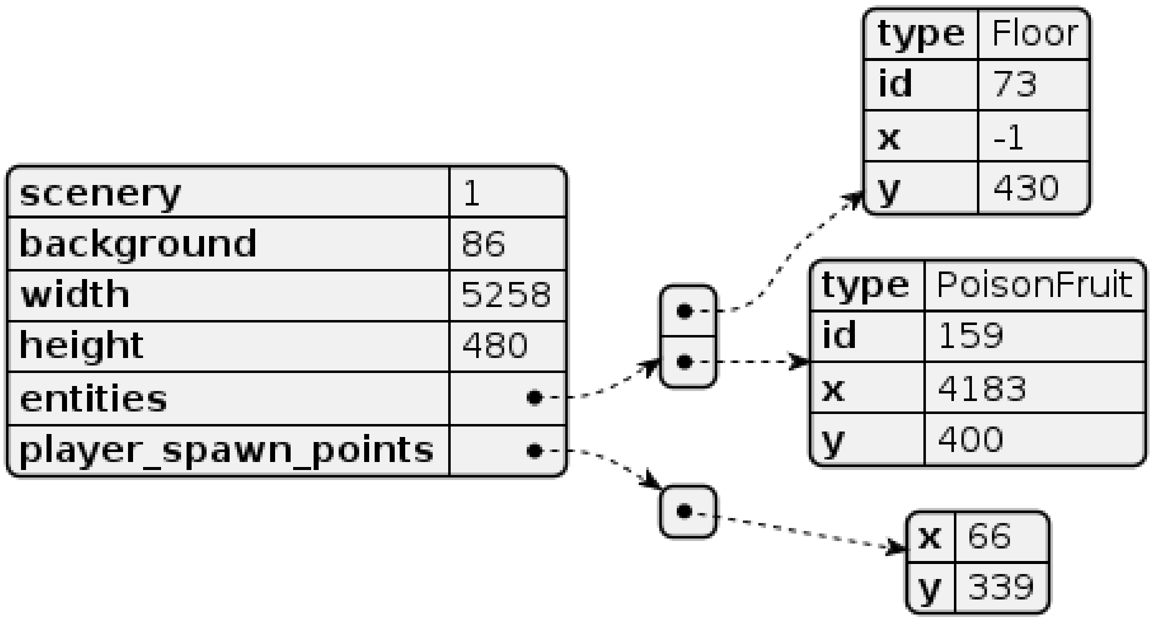


Figure 4: Example level layout

Configuration

There are several configuration options available. Using dots in the name refers to nesting within the yaml structure.

Options are per-game-second, not per-tick.

Important options

Important options most users will want to change or review.

listen_port

Changes listen port.

game.length_secs

Changes length of games, in game seconds (equal to real seconds by default).

game.players

Amount of players per game. The game will not start until there are enough players.

Debug Options

Useful for development/debugging.

start_paused

Every game starts paused if enabled.

physics.scaler

Scale between game time and real time. Makes time run faster (or slower) by that factor.

Tuning Options

Lets you change game behavior.

physics.tps

Changes simulation speed. Do not set too high or clients won't be able to keep up.

physics.gravity

Acceleration applied to every object.

physics.impact_speed_reduction_factor

Convergence speed when impacting objects. Setting too low might hinder performance, setting too high might cause objects to hoover instead of fully making contact.

entities.wandering.drops

Every enemy pulls drop information from here. Each entry represents a drop type (`gem`, `rocket` and `fireball` are currently supported) and contains a probability. Each drop type is evaluated in order until one is chosen or there are no more types.

entities.[type].health

Health for entities of [type].

entities.[type].damage

Damage for entities of [type].

Known Bugs and Limitations

Creating more than 2^{16} games or clients will lead to bugs. This is easy to fix. There is no easy way to describe non-rectangular hitboxes. Client must obtain knowledge about available levels out-of-band. Drop information can’t be set for every enemy type.