MOG in Clojure
Attack of the clones
(Episode II)

Hello!

I am **Mey Beisaron**

- Software engineer
- Infra Developer at FORTER
- Writing in : Clojure, Nodejs, Groovy, Python
- Public speaker & Mentor
- Sworn Star Wars fan

I know why you're here…

@Ladymey

You want to develop a MOG!

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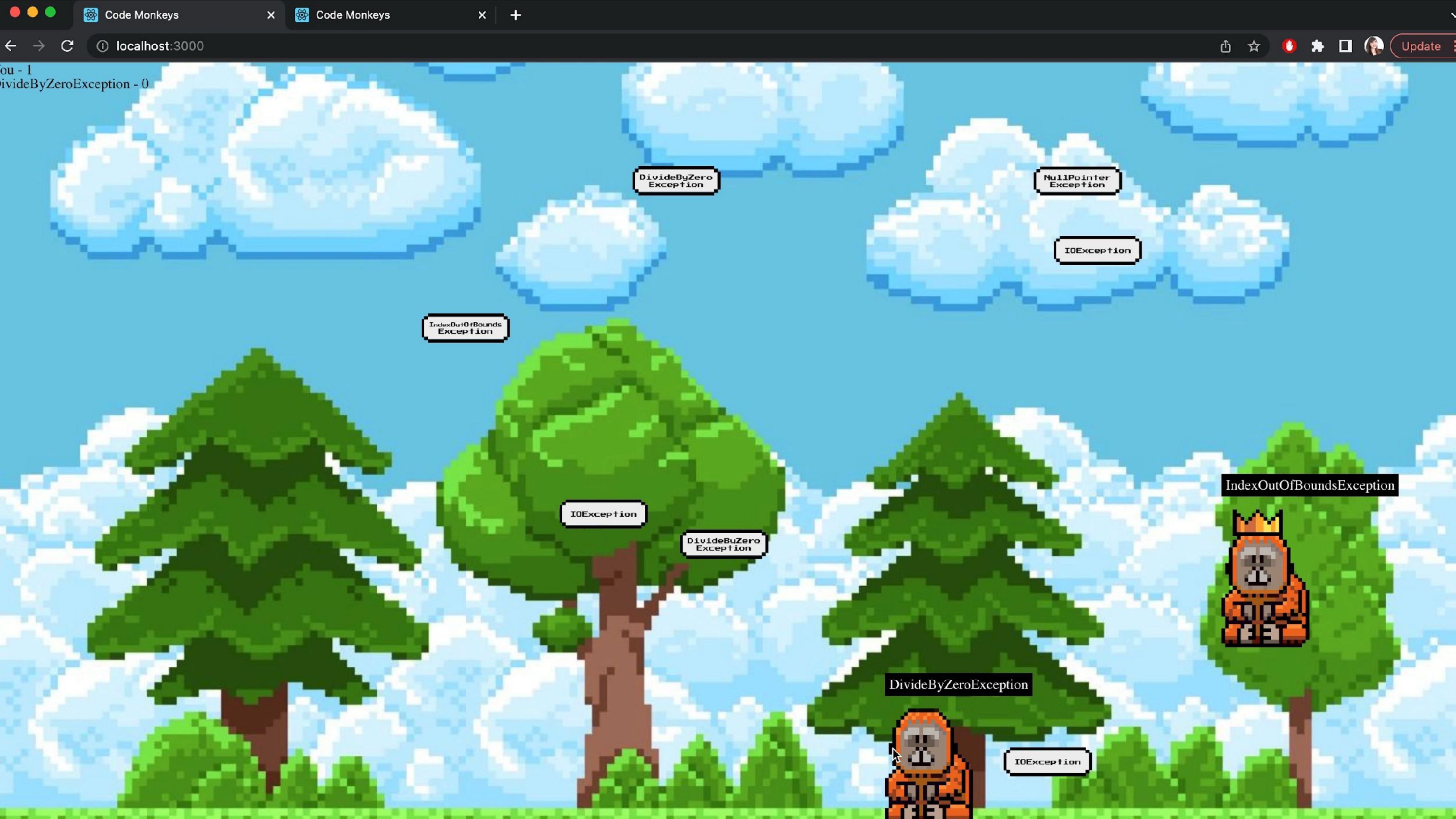
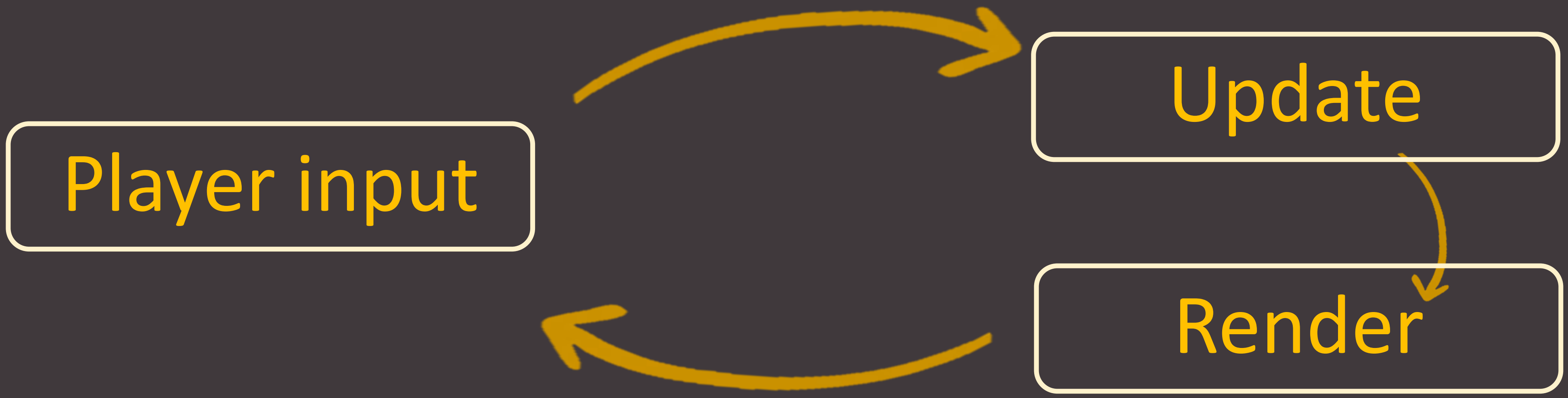
it won’t be
Star Wars Battlefront II



```
ou - 1
ivideByZeroException - 0
```

The Game Loop



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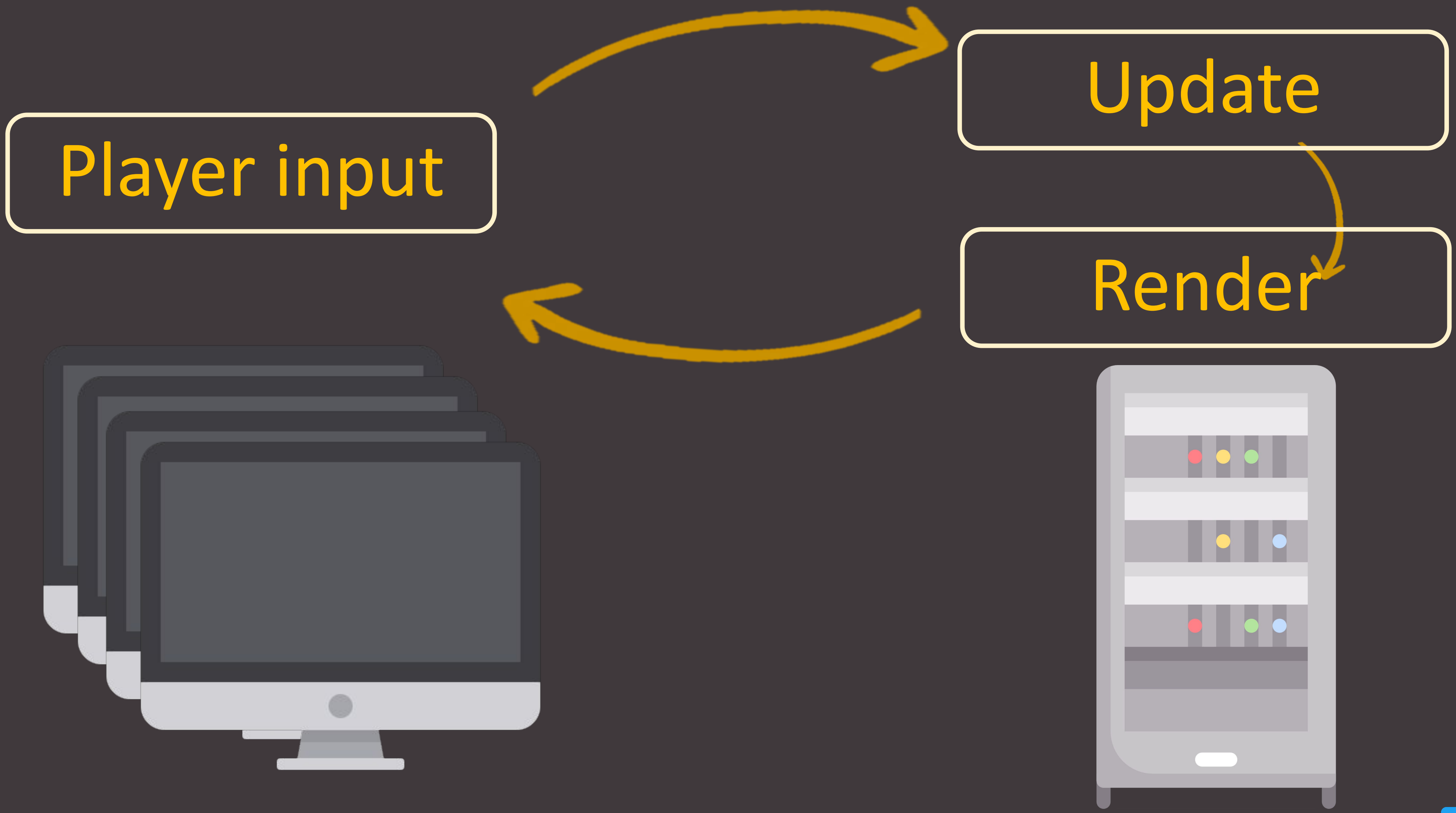
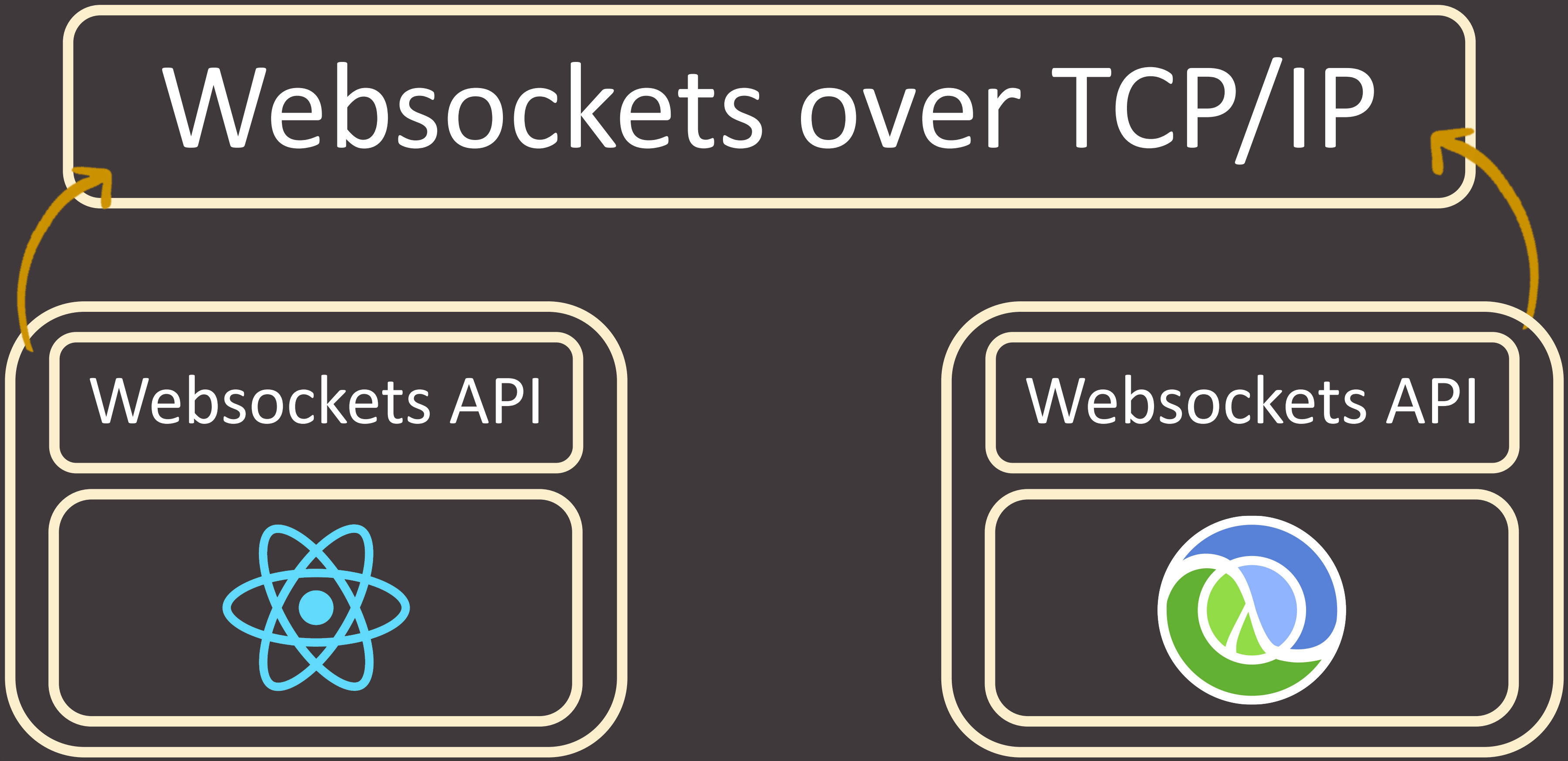
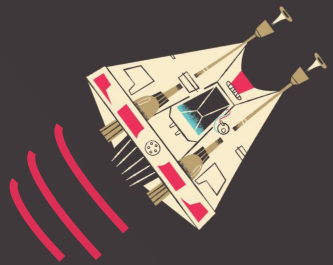
The Game Loop (online)



Game Architecture





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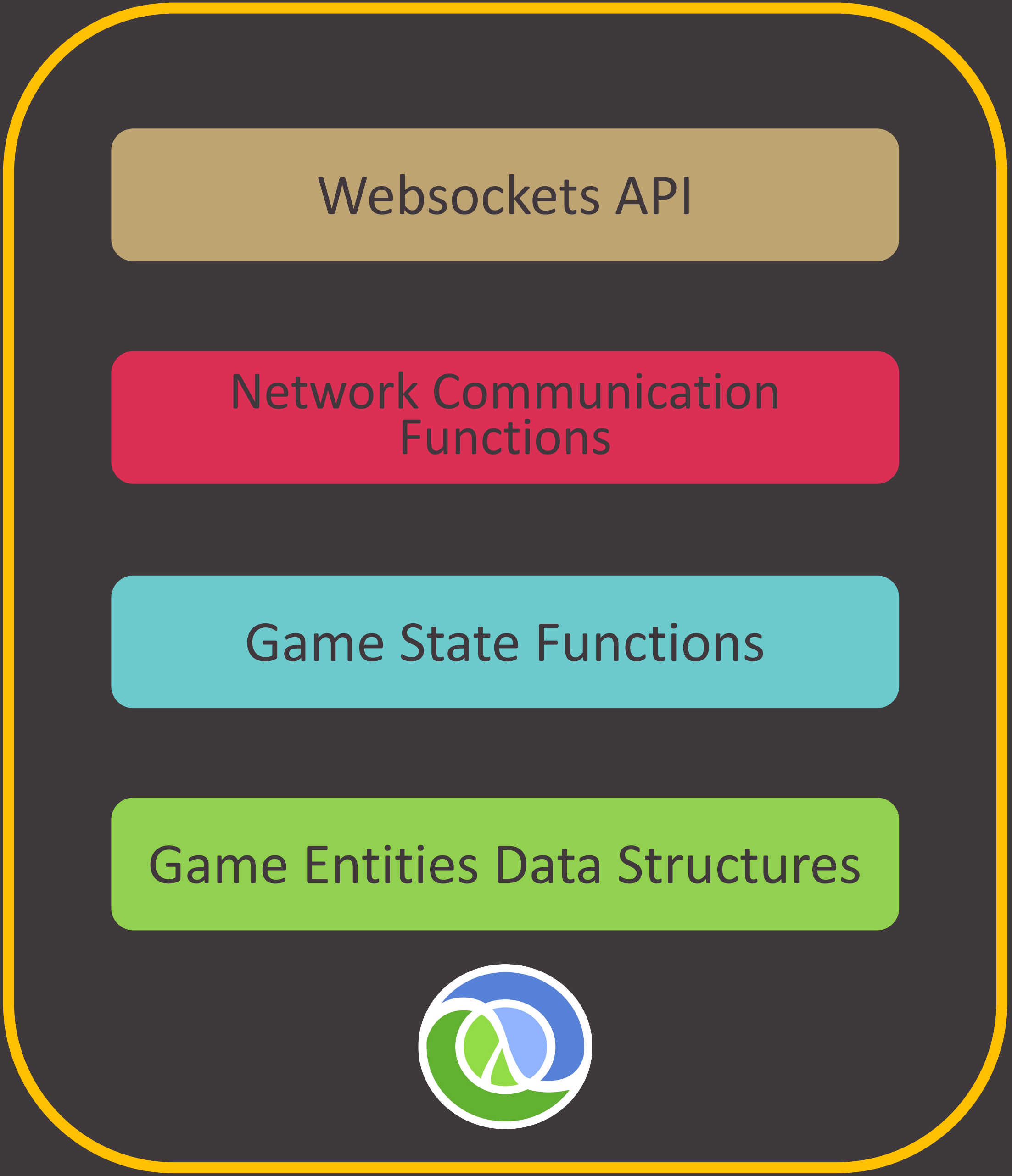
Server Architecture


Websockets API
Network Communication Functions
Game State Functions
Game Entities Data Structures

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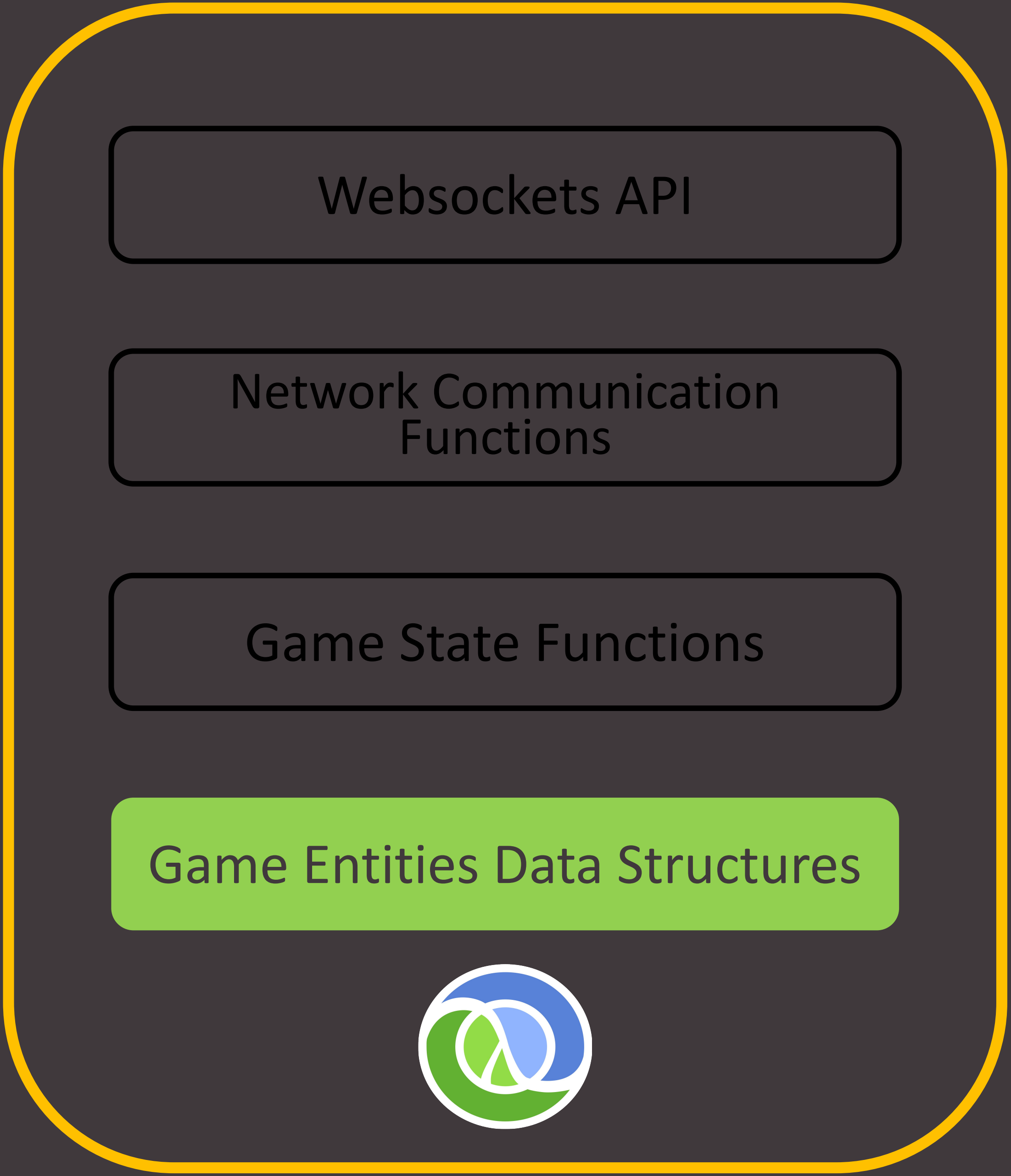
Server Architecture



Websockets API
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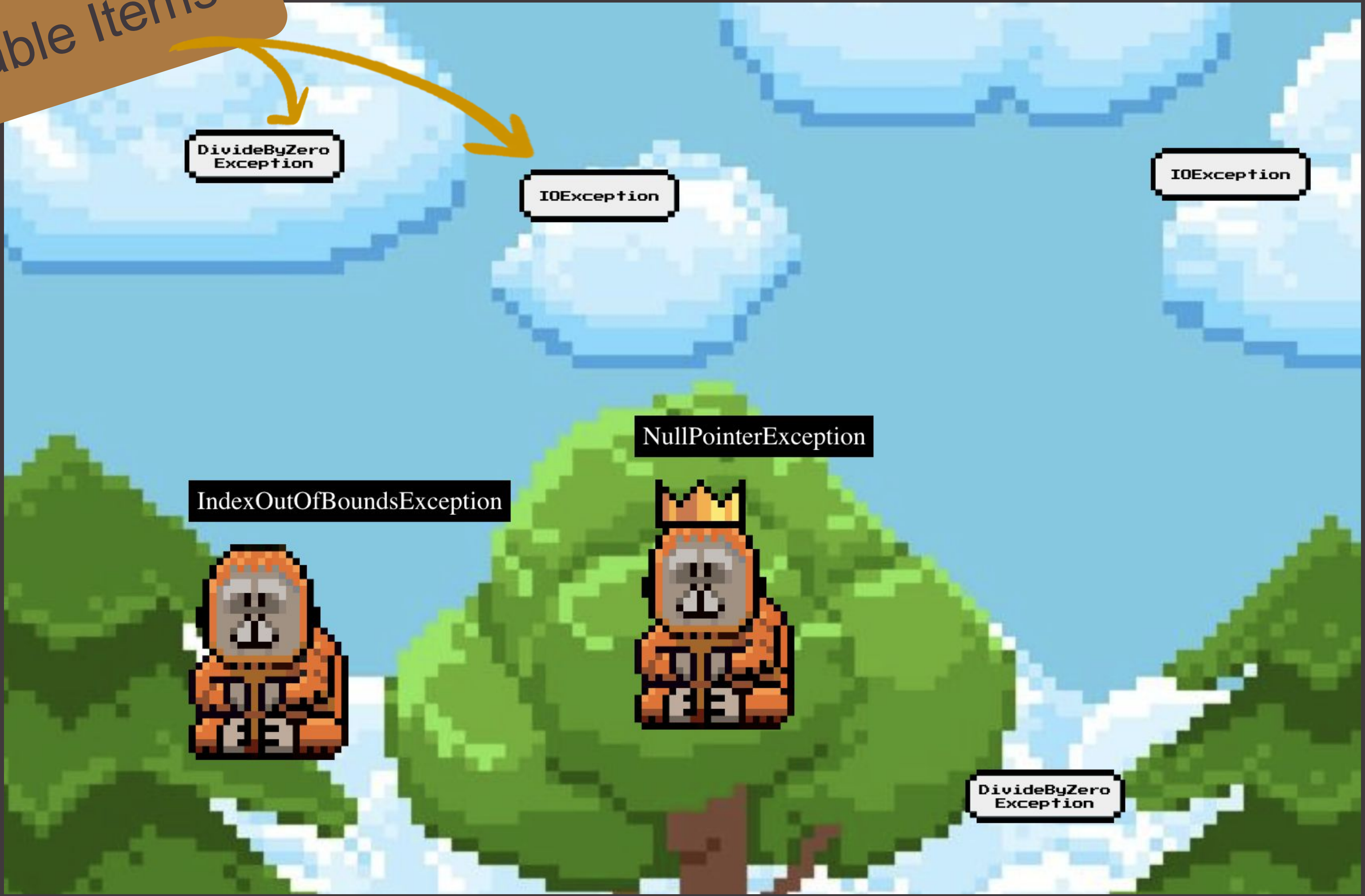
Collectable Items



DivideByZero Exception
IOException
IOException
Players
NullPointerException
IndexOutOfBoundsException
DivideByZero Exception

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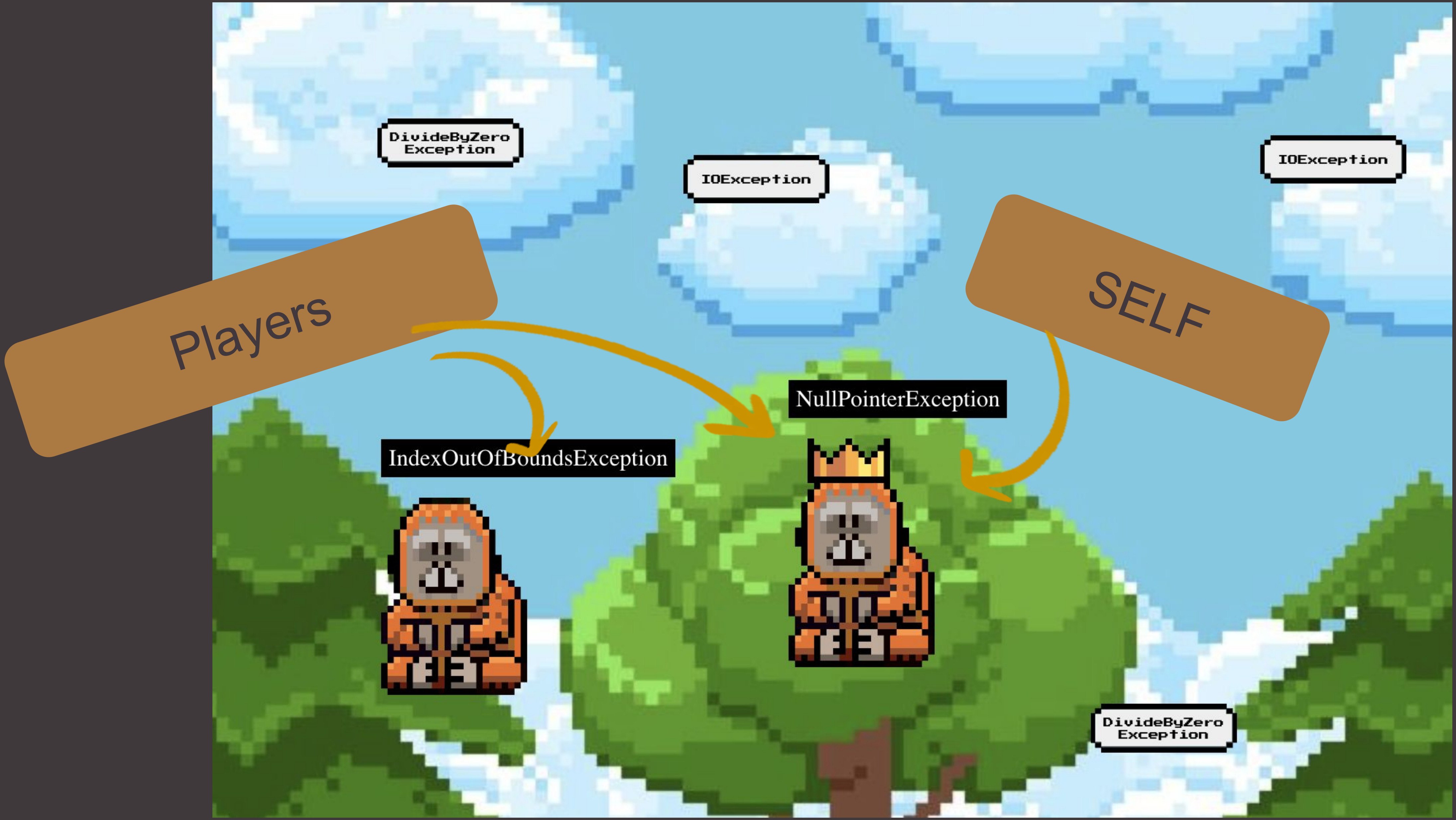
DivideByZero Exception
IOException
IOException
Players
SELF
NullPointerException
IndexOutOfBoundsException
DivideByZero Exception

Game Entities Data Structures

```clojure
(def exceptionTypes ["IOException", "DivideByZeroException",
                     "NullPointerException", "IndexOutOfBoundsException"])
(def items (atom {}))
(def players (atom {}))
```

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Game Entities Data Structures

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Game Entities Data Structures

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Game Entities Data Structures

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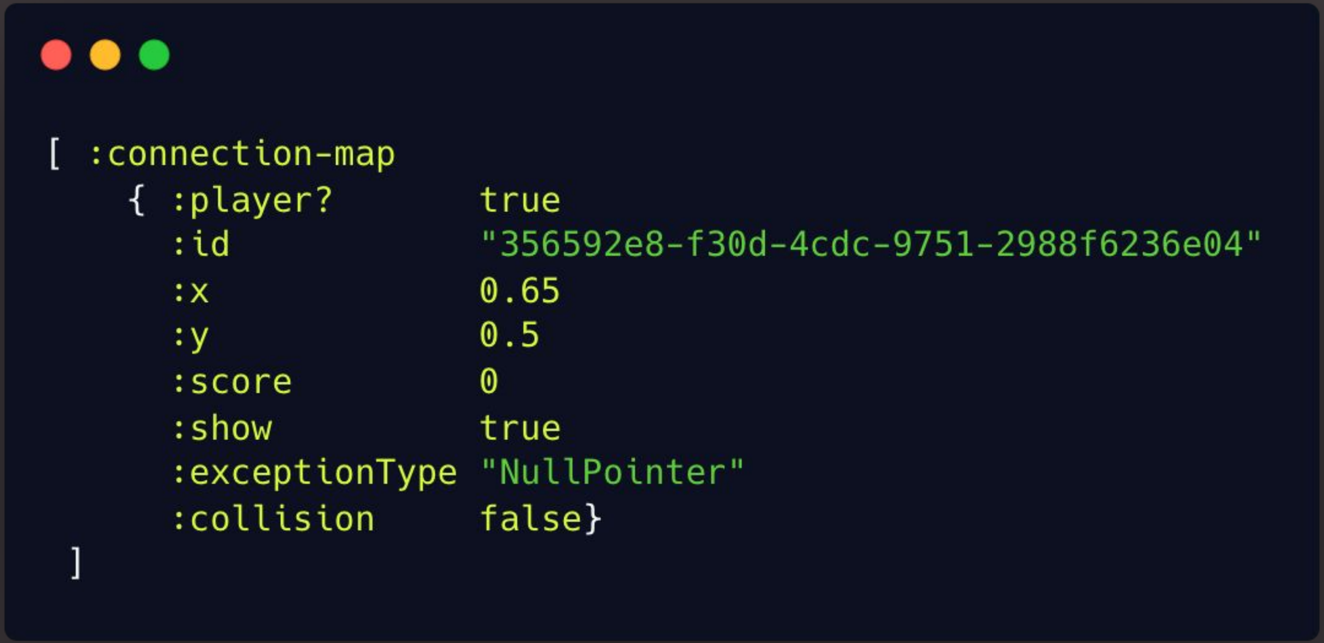

```
[ :connection-map
    { :player?        true
      :id             "356592e8-f30d-4cdc-9751-2988f6236e04"
      :x              0.65
      :y              0.5
      :score          0
      :show           true
      :exceptionType "NullPointer"
      :collision      false}
 ]
```

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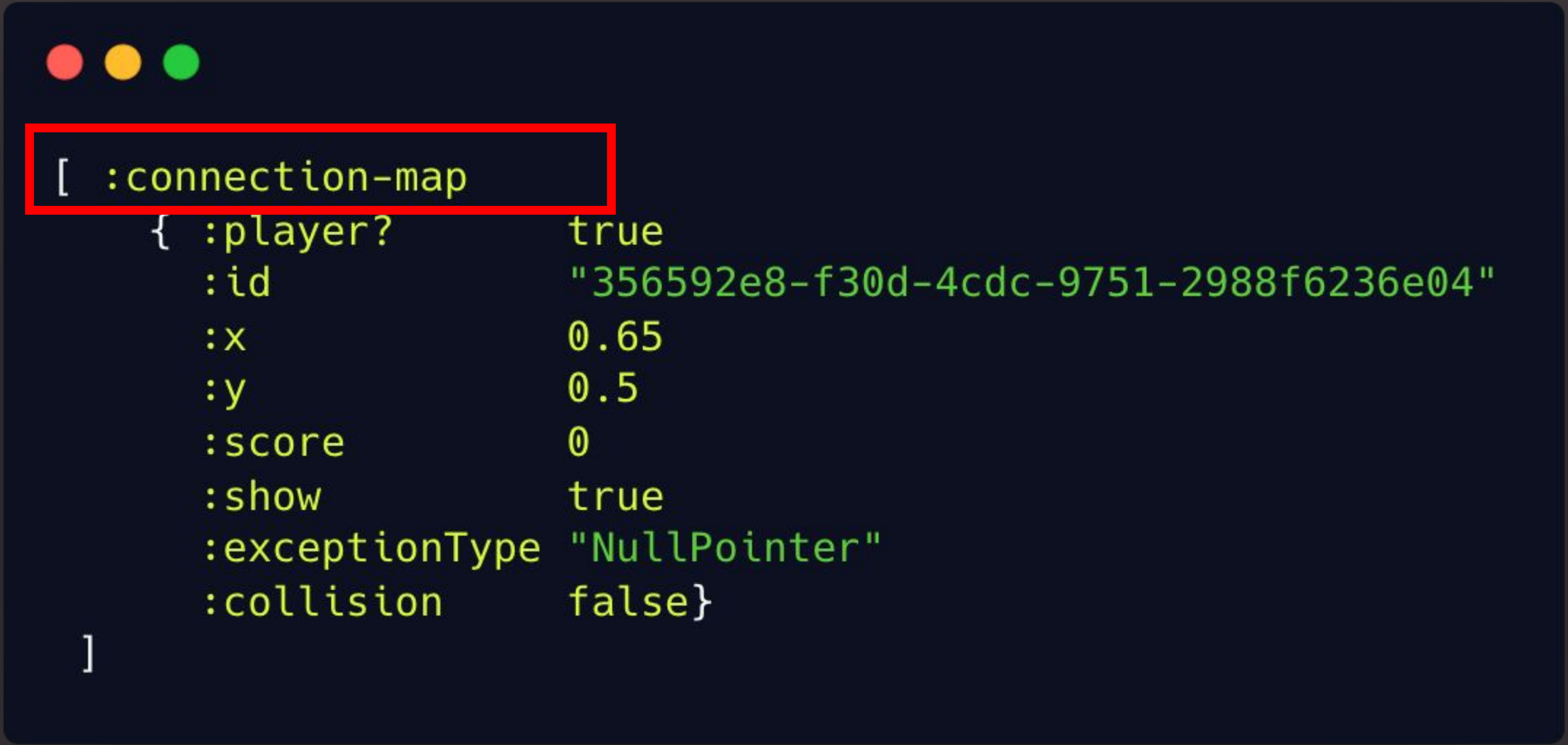
Game Entities Data Structures



```
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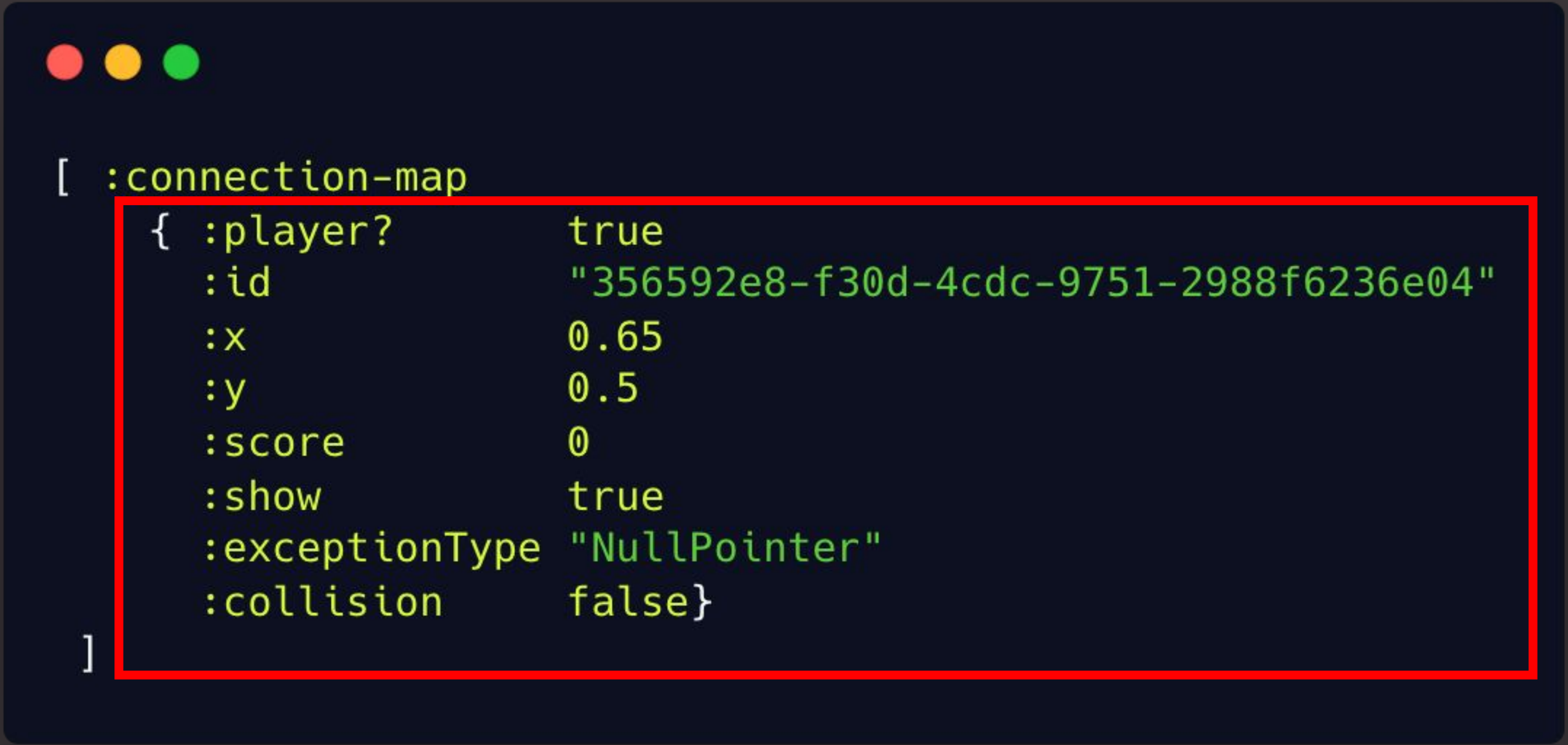
Game Entities Data Structures



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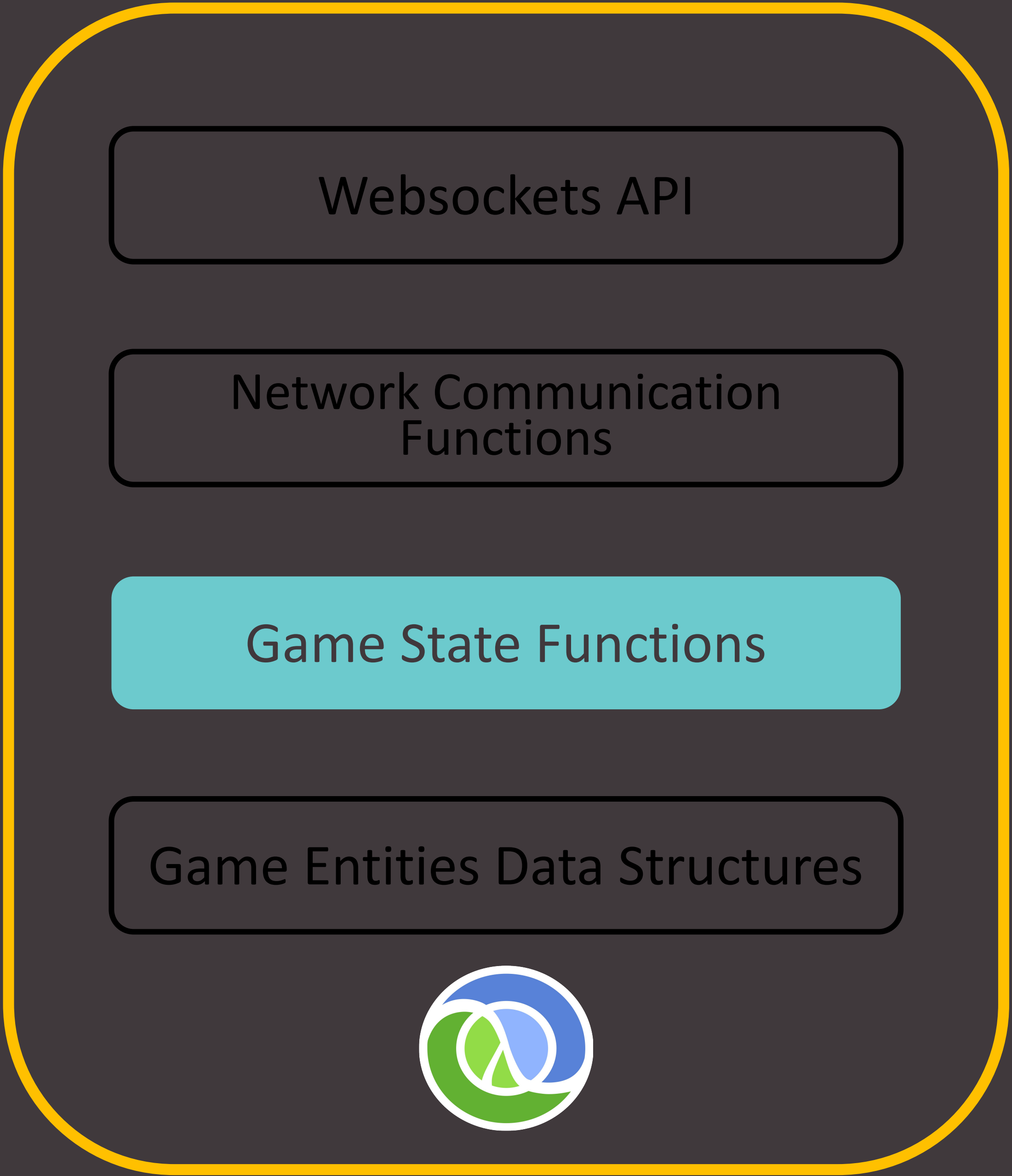
Server Architecture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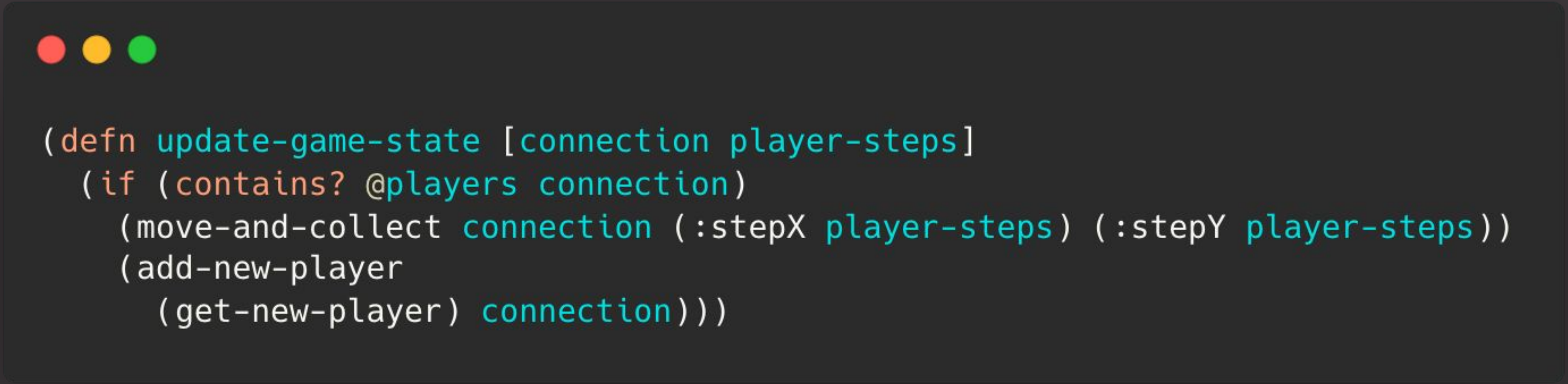
Manage Game State



```
(defn update-game-state [connection player-steps]
  (if (contains? @players connection)
    (move-and-collect connection (:stepX player-steps) (:stepY player-steps))
    (add-new-player
      (get-new-player) connection)))
```

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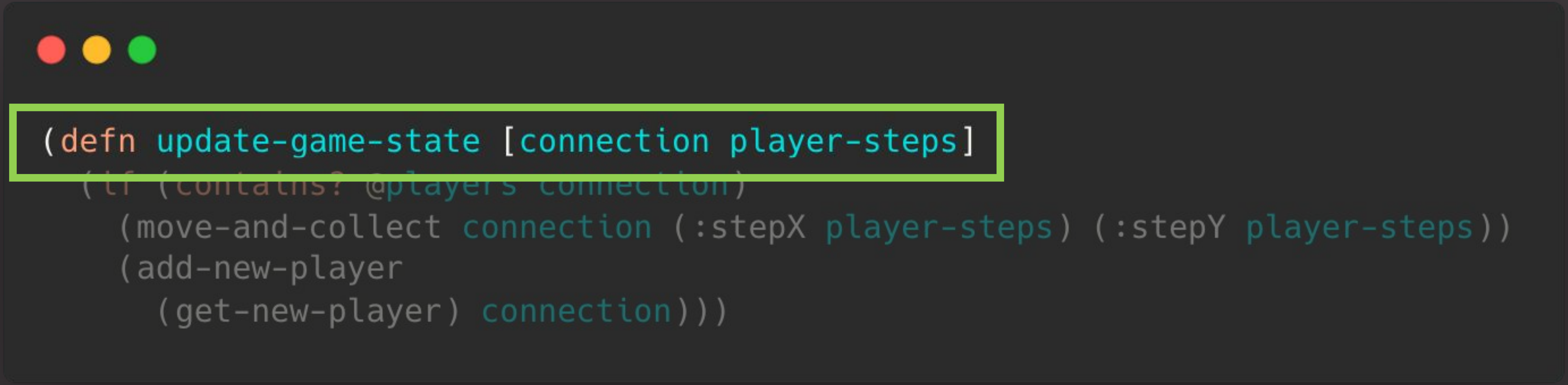
Manage Game State



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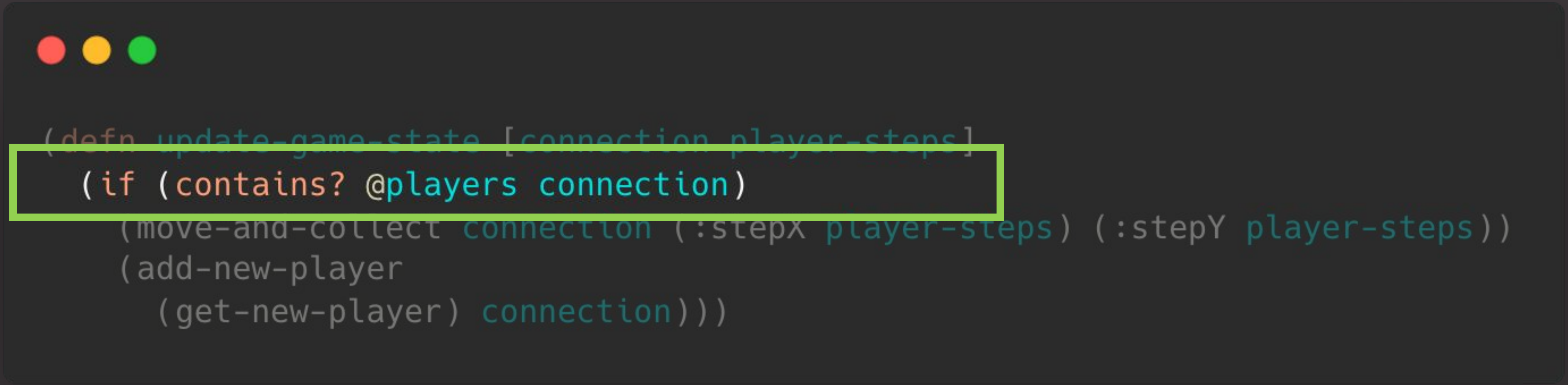

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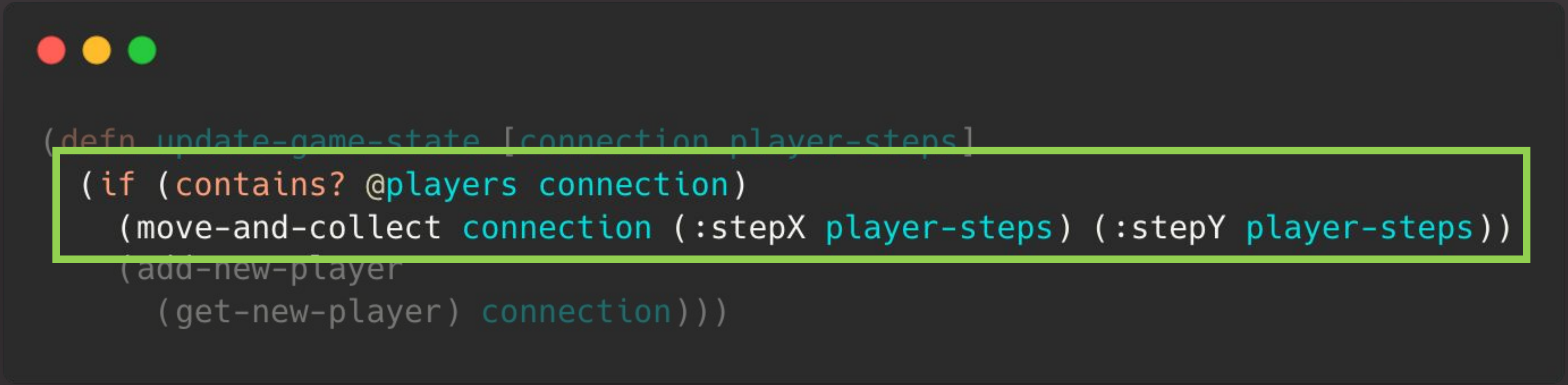

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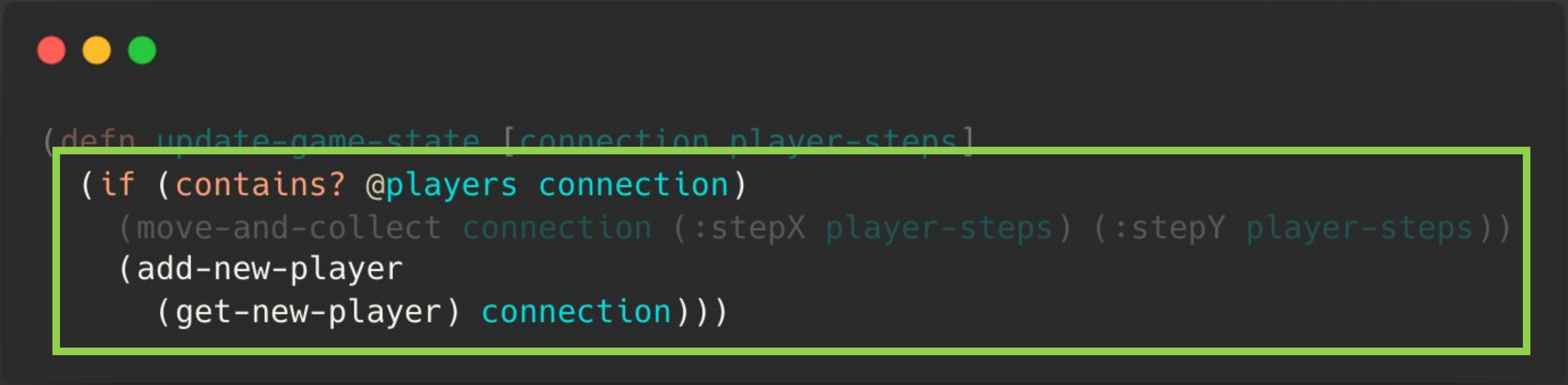

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Manage Game State

1. Add new player
2. Player movement
3. Player left the game
4. Handle collectable items

Manage Game State

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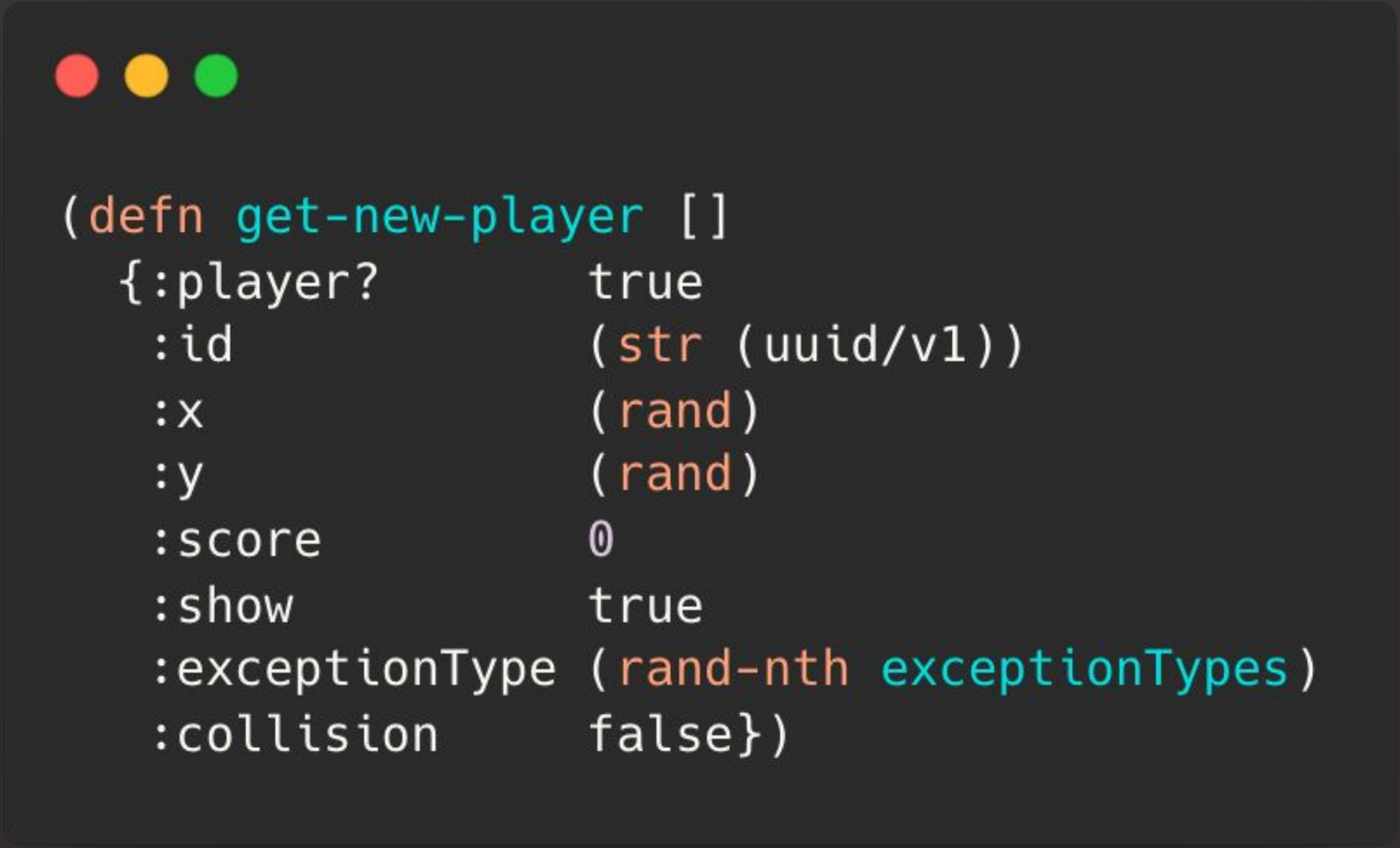

```
(defn get-new-player []
  {:player?        true
   :id             (str (uuid/v1))
   :x              (rand)
   :y              (rand)
   :score          0
   :show           true
   :exceptionType (rand-nth exceptionTypes)
   :collision      false})
```

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Manage Game State

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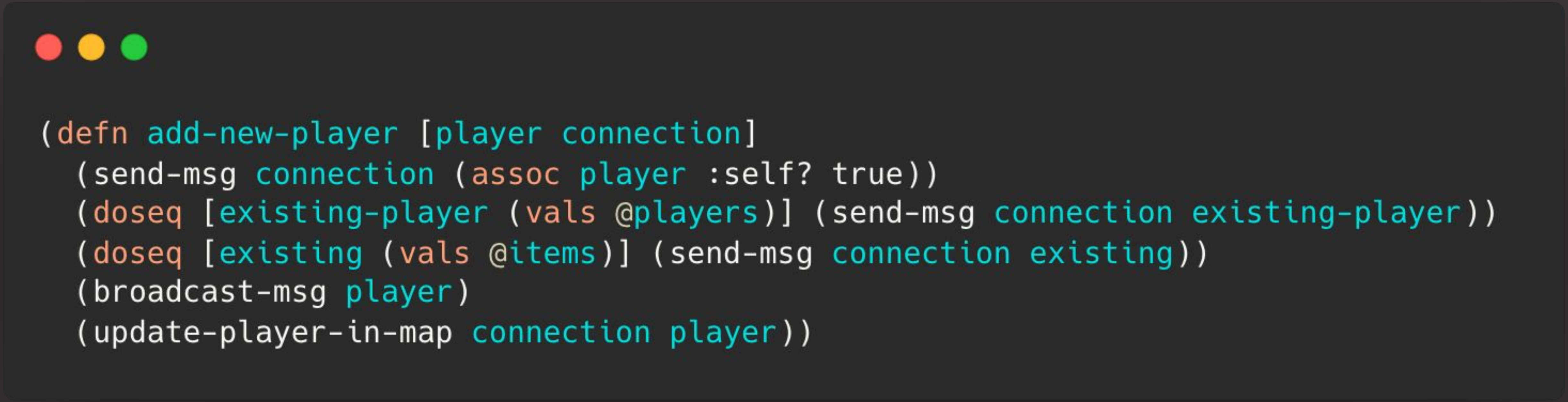

```
(defn add-new-player [player connection]
  (send-msg connection (assoc player :self? true))
  (doseq [existing-player (vals @players)] (send-msg connection existing-player))
  (doseq [existing (vals @items)] (send-msg connection existing))
  (broadcast-msg player)
  (update-player-in-map connection player))
```

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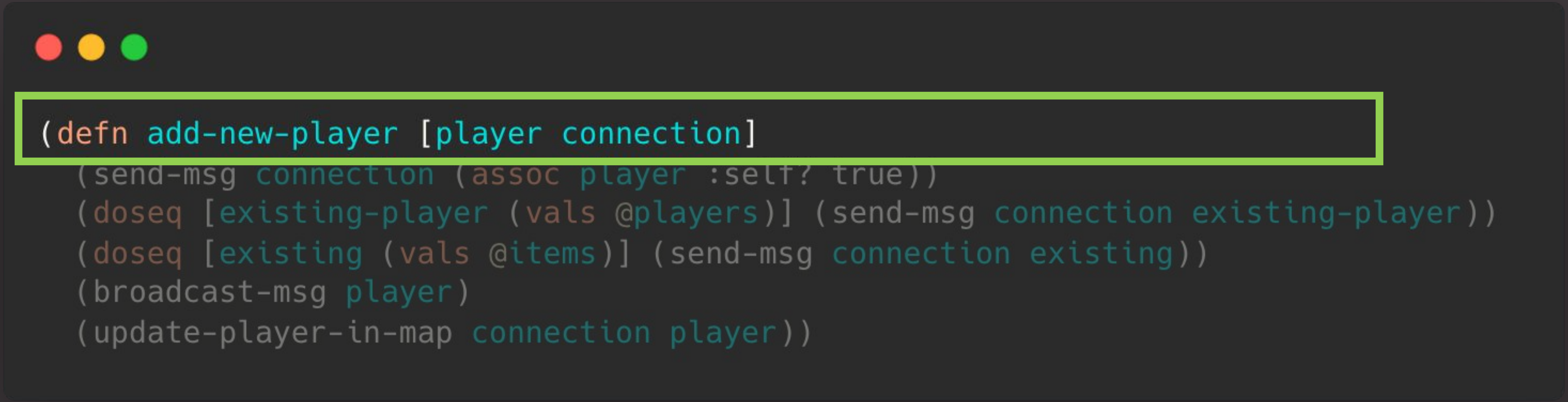
Manage Game State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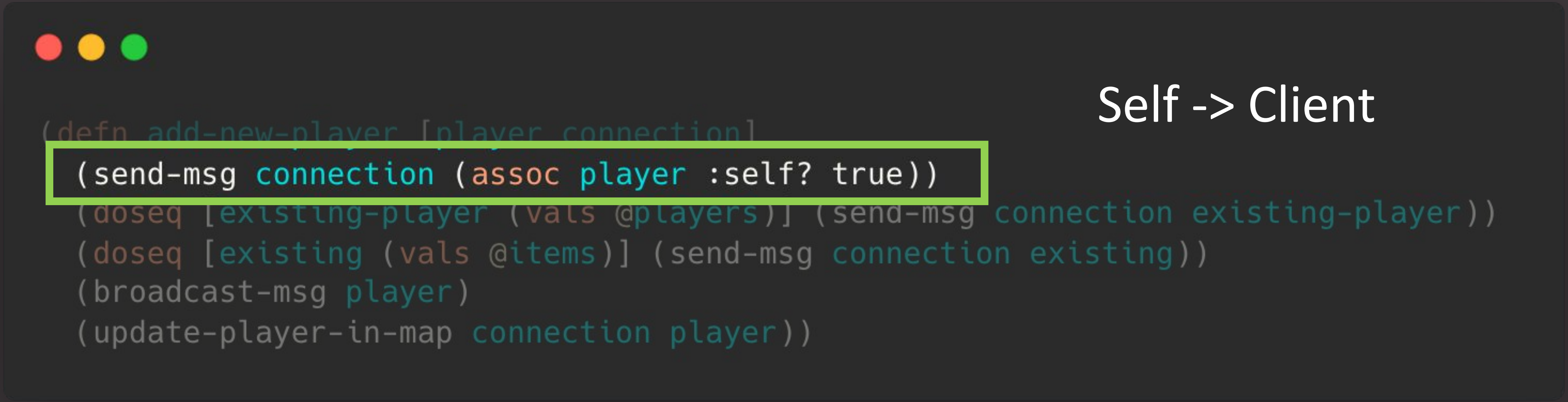
Manage Game State



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```

Self -> Client

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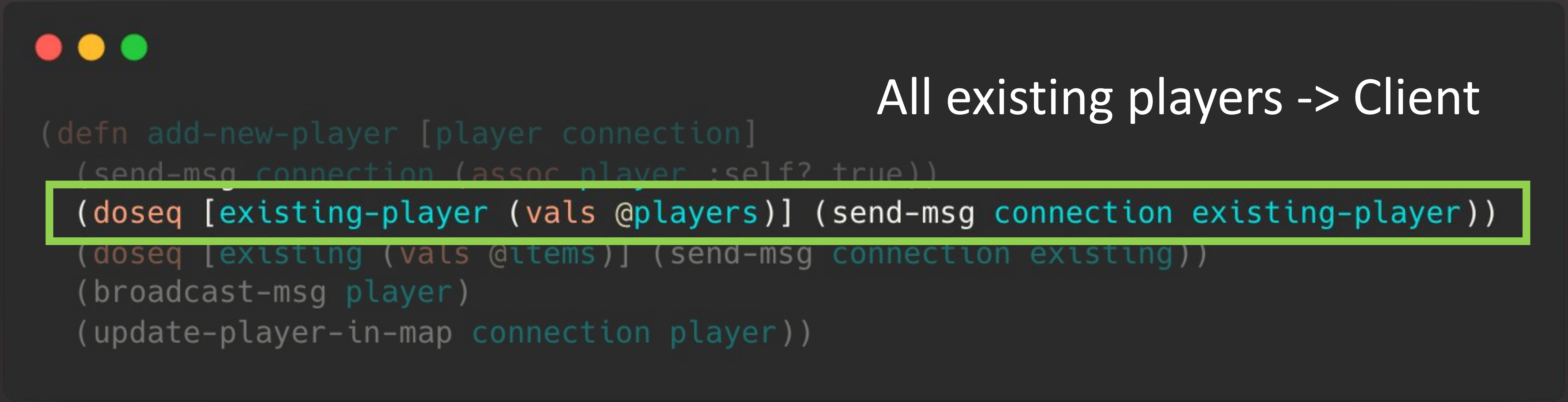
Manage Game State



All existing players -> Client

```clojure
(defn add-new-player [player connection]
  (send-msg connection (assoc player :self? true))
  (doseq [existing-player (vals @players)] (send-msg connection existing-player))
  (doseq [existing (vals @items)] (send-msg connection existing))
  (broadcast-msg player)
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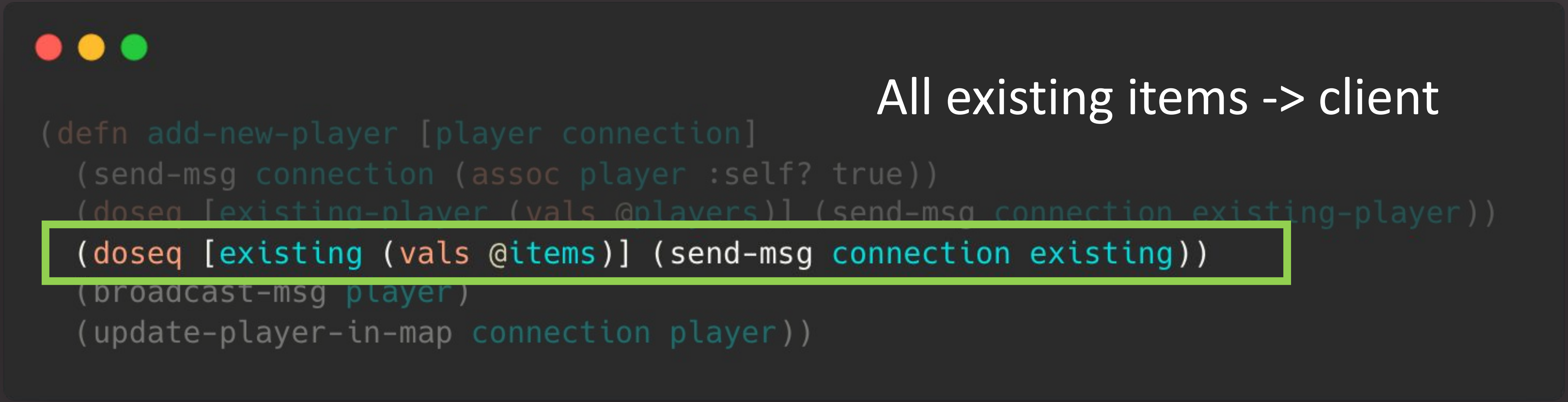
Manage Game State



All existing items -> client

```
(defn add-new-player [player connection]
  (send-msg connection (assoc player :self? true))
  (doseq [existing-player (vals @players)] (send-msg connection existing-player))
  (doseq [existing (vals @items)] (send-msg connection existing))
  (broadcast-msg player)
  (update-player-in-map connection player))
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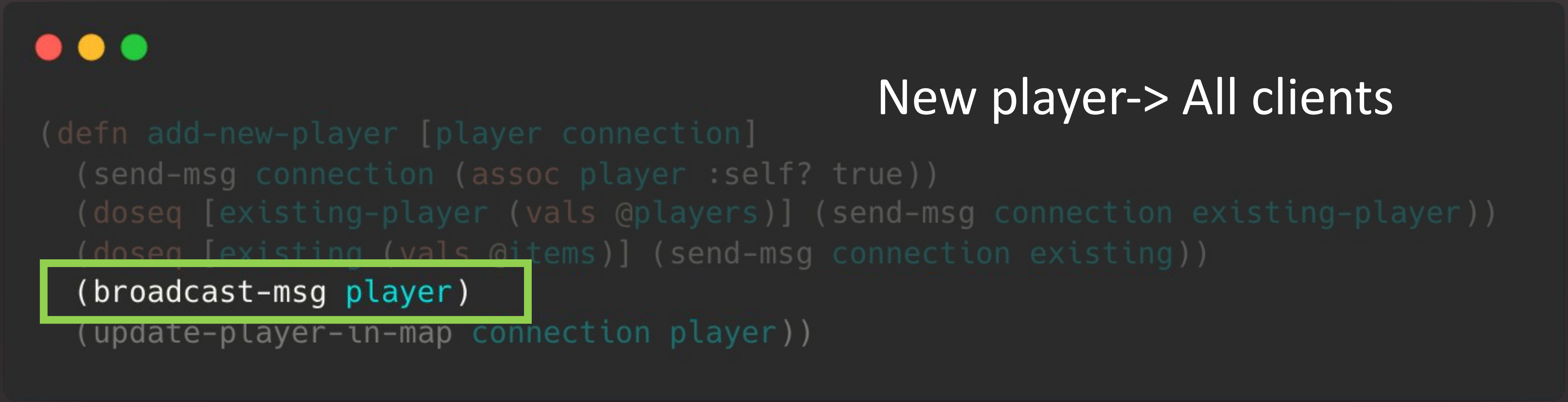
Manage Game State



New player-> All clients

```
(defn add-new-player [player connection]
  (send-msg connection (assoc player :self? true))
  (doseq [existing-player (vals @players)] (send-msg connection existing-player))
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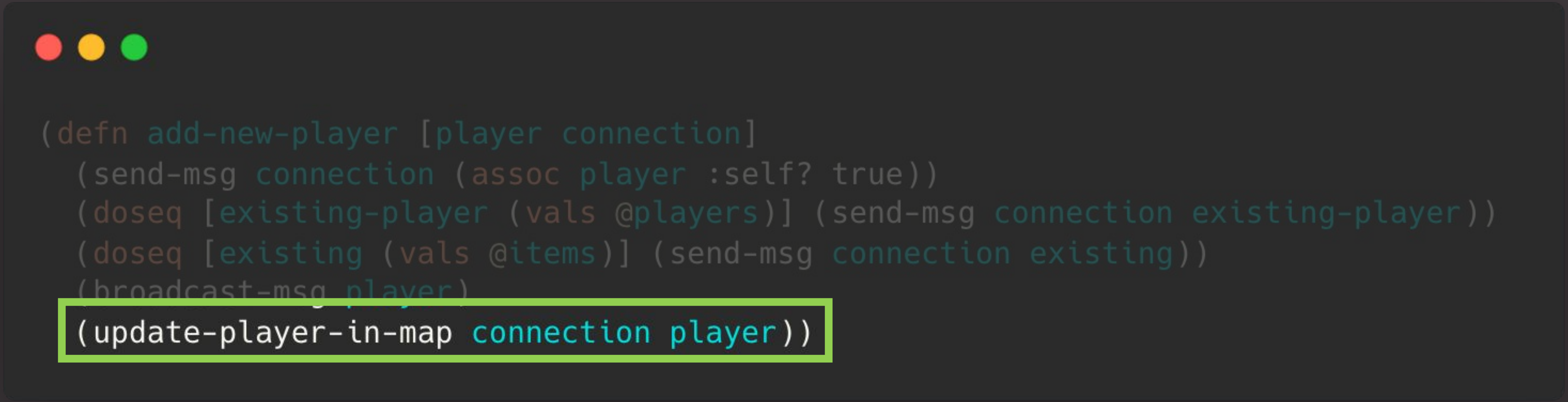
Manage Game State



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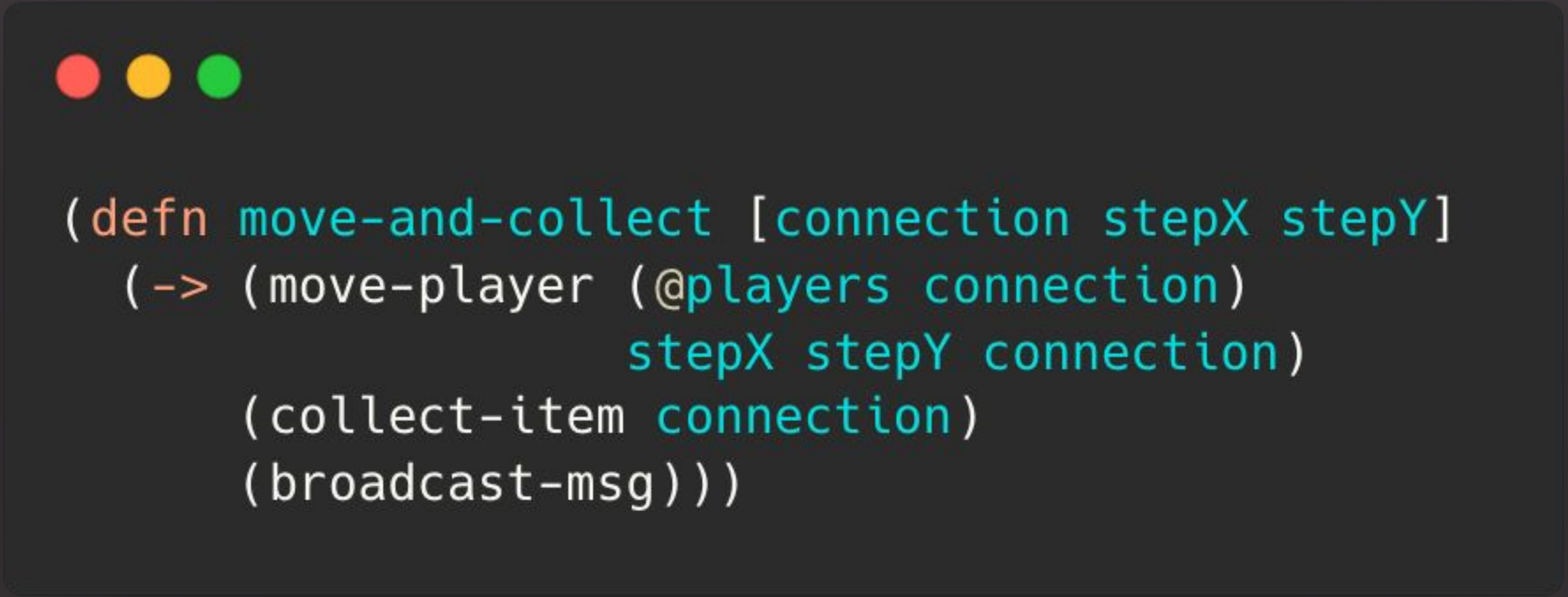
Manage Game State

1. Add new player
2. Player movement
3. Player left the game
4. Handle collectable items



```clojure
(defn move-and-collect [connection stepX stepY]
  (-> (move-player (@players connection)
                   stepX stepY connection)
      (collect-item connection)
      (broadcast-msg)))
```

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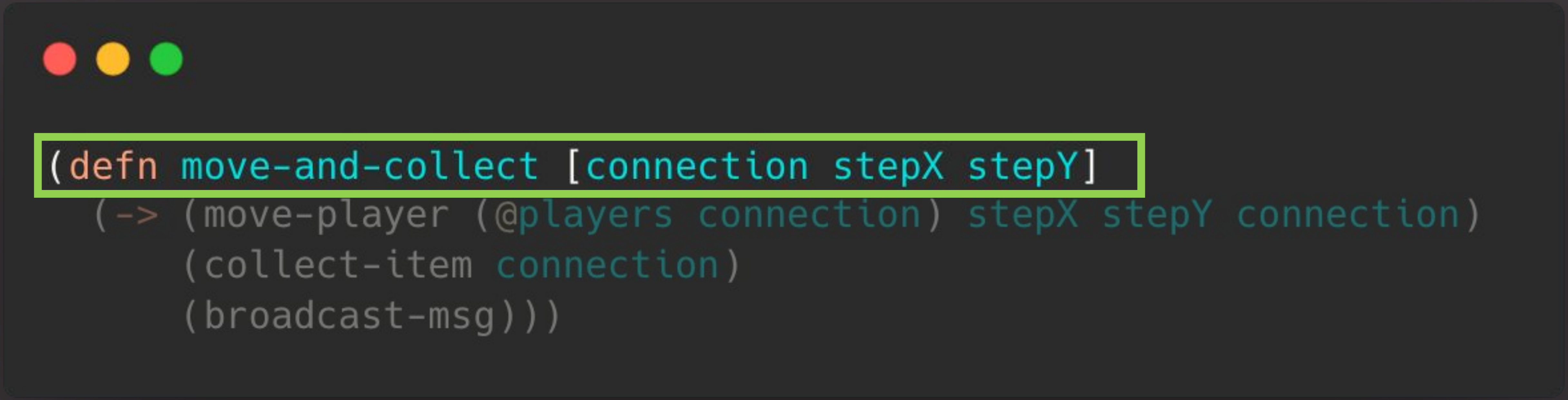
Manage Game State



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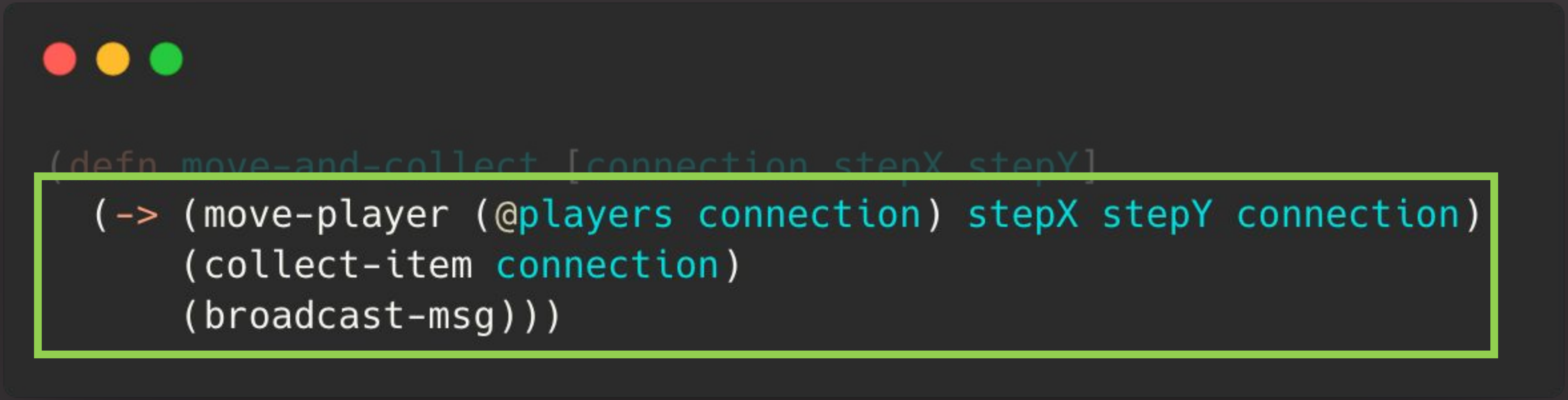
Manage Game State



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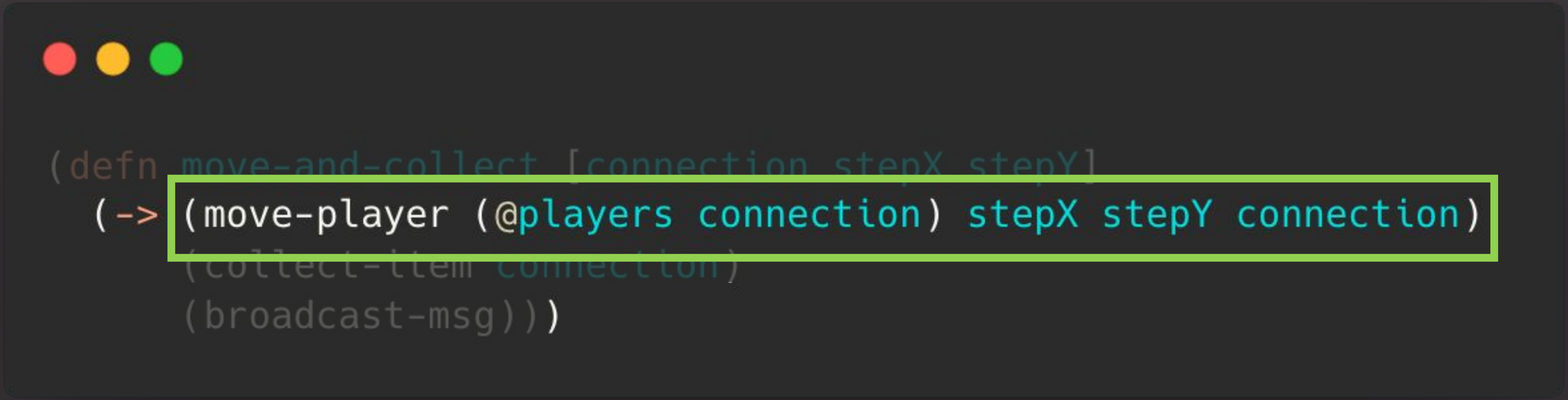

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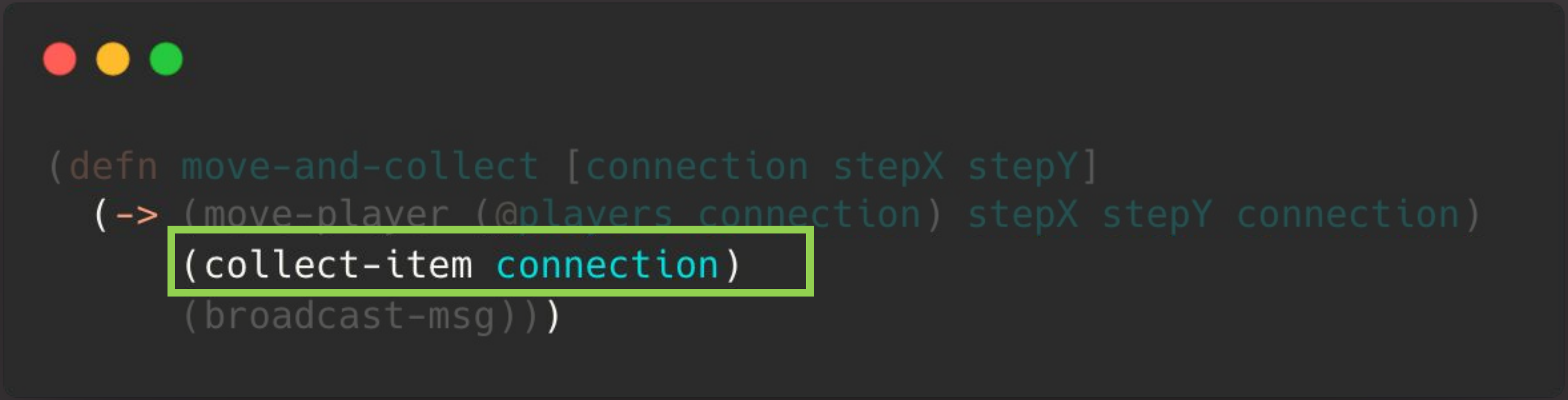
Manage Game State



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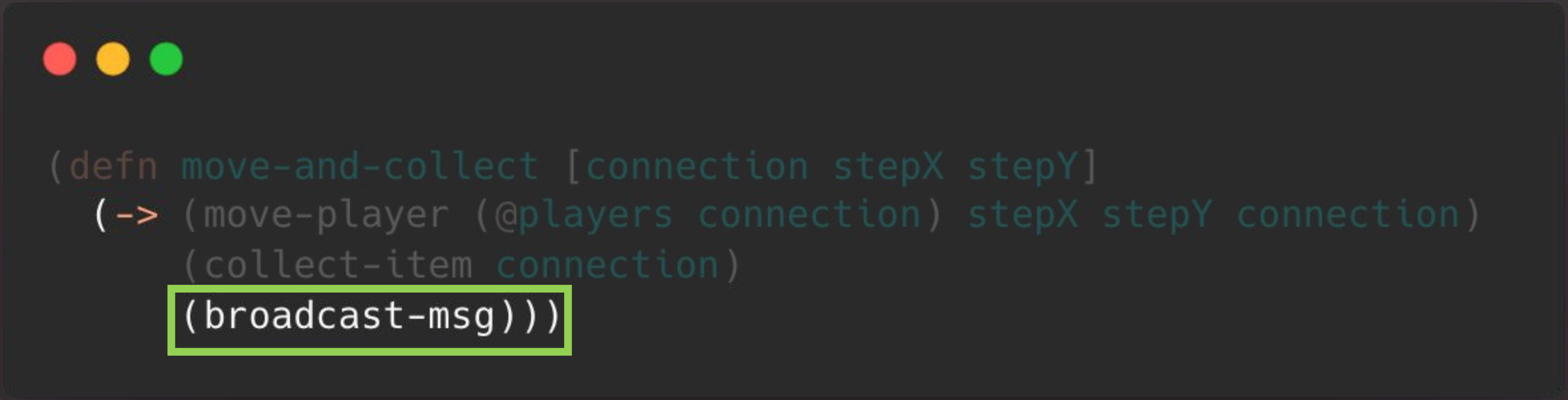
Manage Game State



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```

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Manage Game State

1. Add new player
2. Player movement
3. Player left the game
4. Handle collectable items

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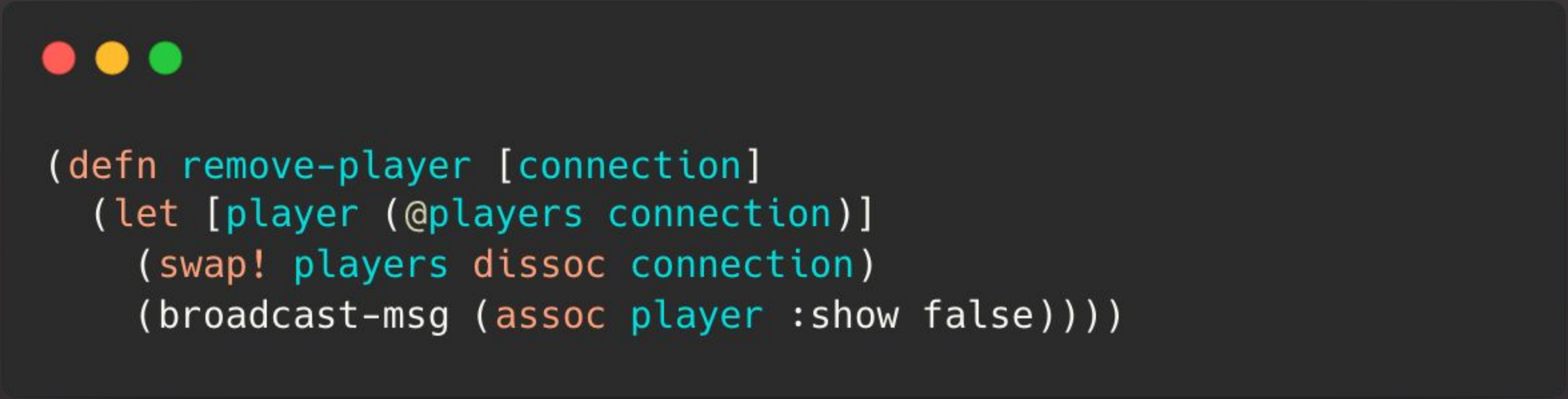
Manage Game State

1. Add new player
2. Player movement
3. Player left the game
4. Handle collectable items

- Delete the player entity
- Update all players with the new game state



```clojure
(defn remove-player [connection]
  (let [player (@players connection)]
    (swap! players dissoc connection)
    (broadcast-msg (assoc player :show false))))
```

Manage Game State

1. Add new player
2. Player movement
3. Player left the game
4. Handle collectable items

- Generate collectables

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Manage Game State

1. Add new player
2. Player movement
3. Player left the game
4. Handle collectable items
   - Generate collectables
   - Detect collisions

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Manage Game State

1. Add new player
2. Player movement
3. Player left the game
4. Handle collectable items
   - Generate collectables
   - Detect collisions
   - Handle when collected:
     -- Update game state (players map, items map)
     -- Update all players with the new game state

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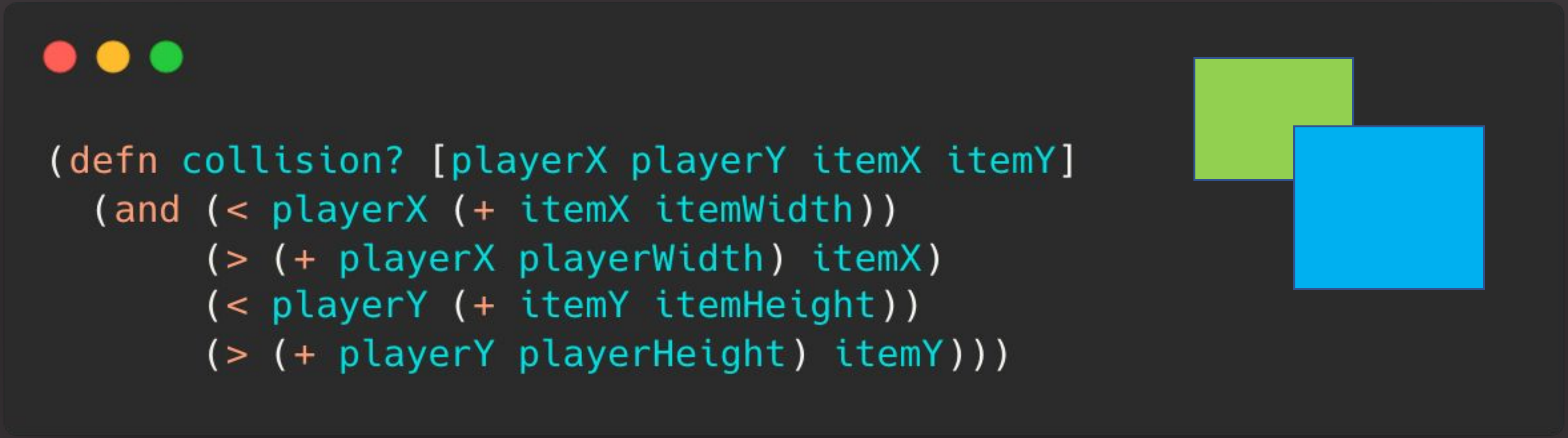
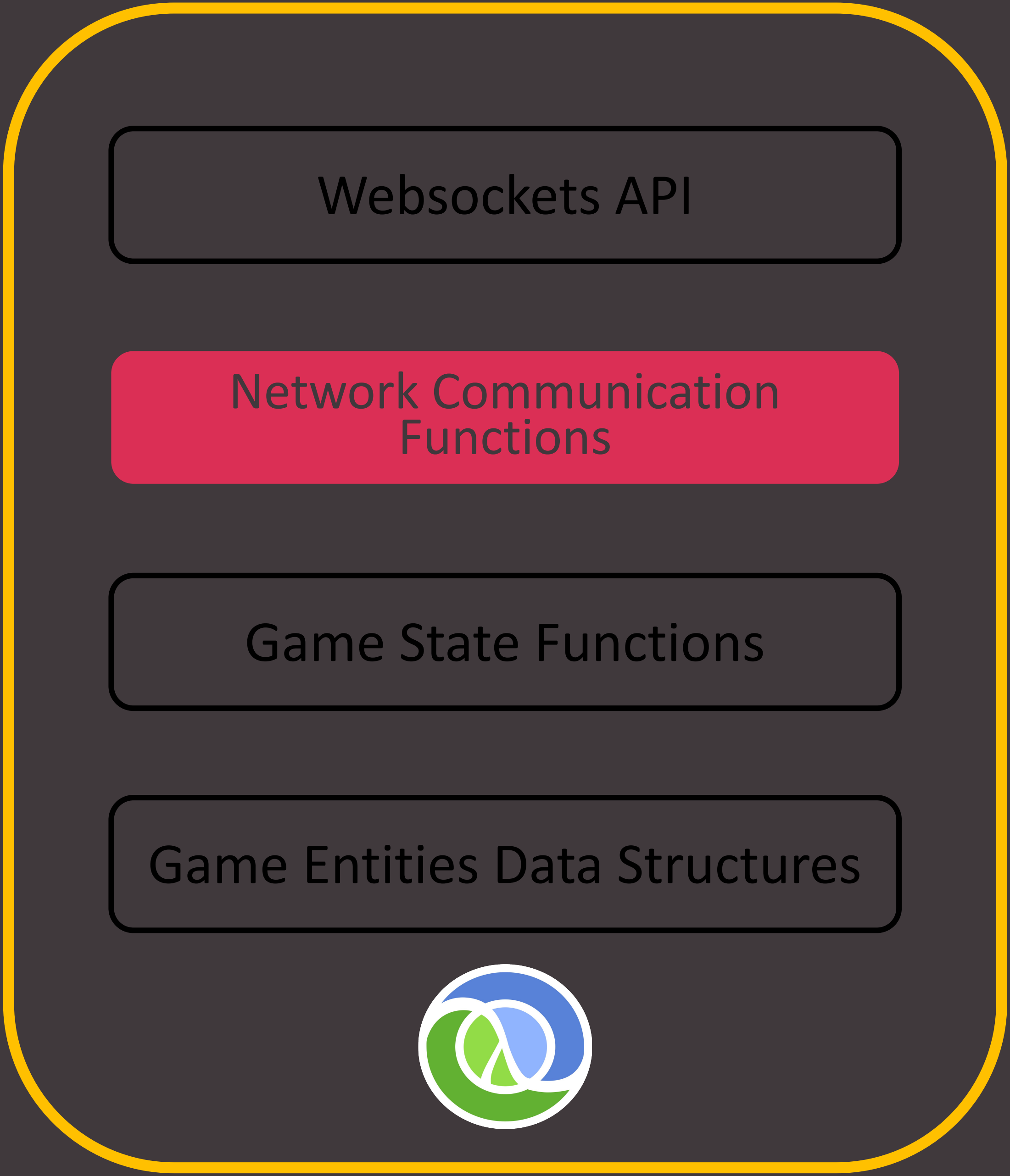
Manage Game State

1. Add new player
2. Player movement
3. Player left the game
4. Handle collectable items - Detect collisions



```
(defn collision? [playerX playerY itemX itemY]
  (and (< playerX (+ itemX itemWidth))
       (> (+ playerX playerWidth) itemX)
       (< playerY (+ itemY itemHeight))
       (> (+ playerY playerHeight) itemY)))
```

Server Architecture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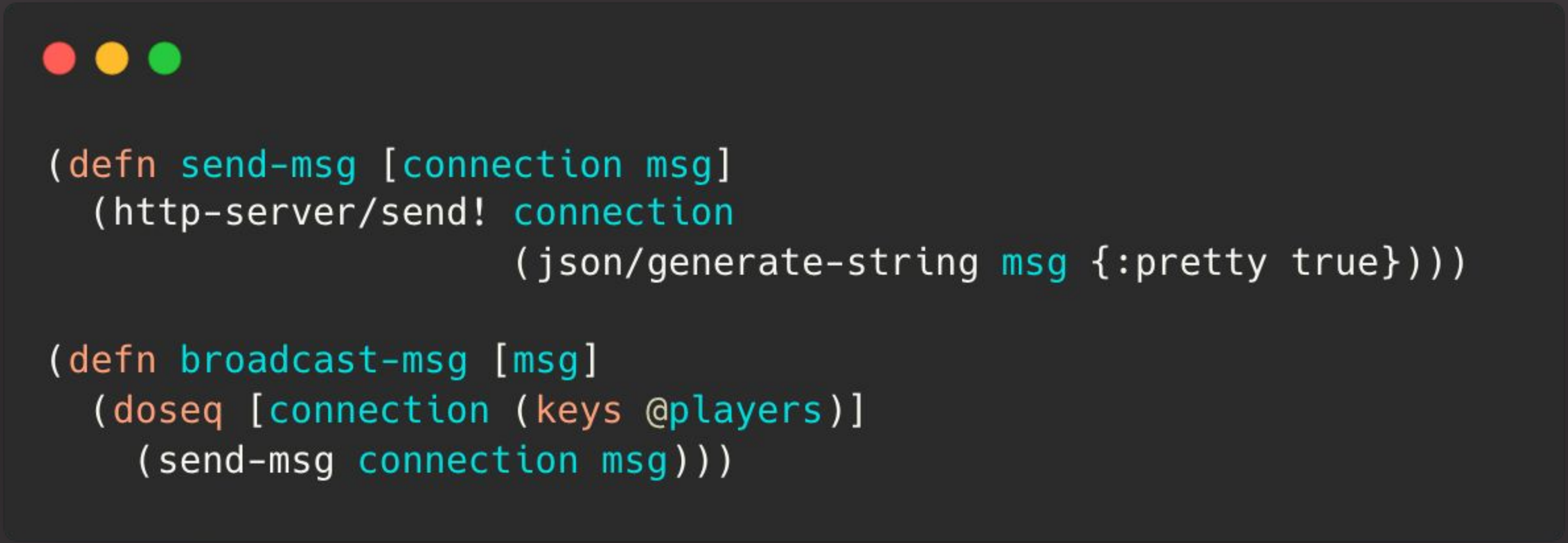
Network Communication Functions



```clojure
(defn send-msg [connection msg]
  (http-server/send! connection
                     (json/generate-string msg {:pretty true})))

(defn broadcast-msg [msg]
  (doseq [connection (keys @players)]
    (send-msg connection msg)))
```

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Server Architecture

Websockets API

Network Communication Functions

Game State Functions

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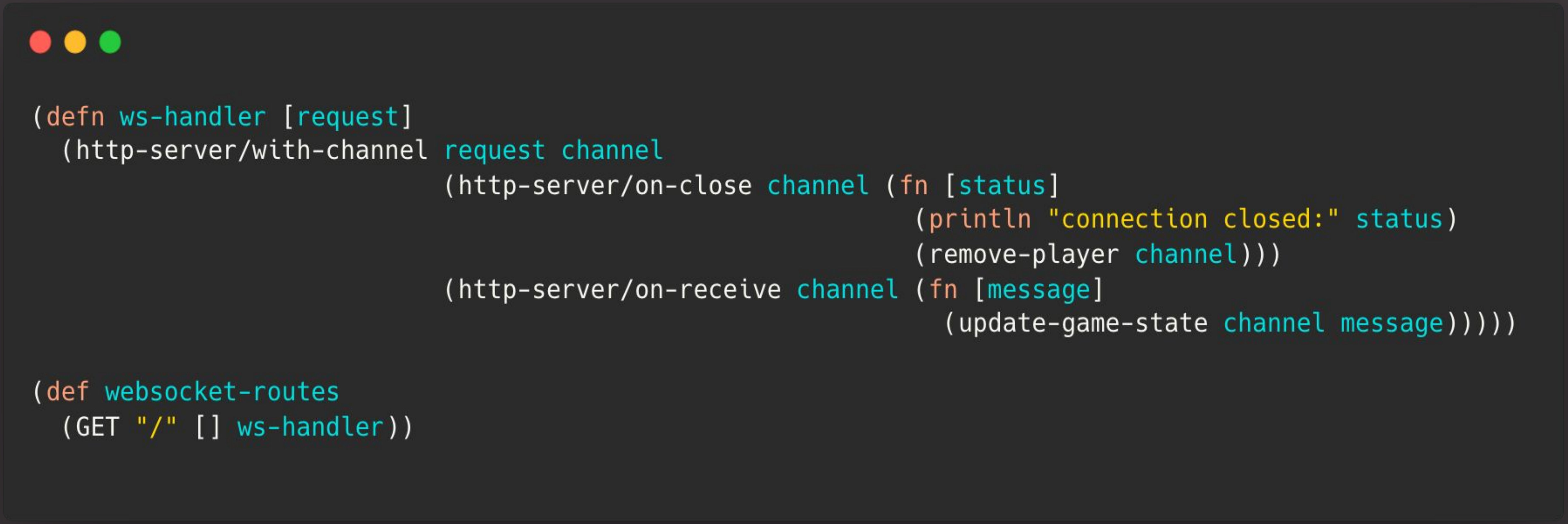
Websockets API



```clojure
(defn ws-handler [request]
  (http-server/with-channel request channel
                            (http-server/on-close channel (fn [status]
                                                            (println "connection closed:" status)
                                                            (remove-player channel)))
                            (http-server/on-receive channel (fn [message]
                                                              (update-game-state channel message)))))

(def websocket-routes
  (GET "/" [] ws-handler))
```

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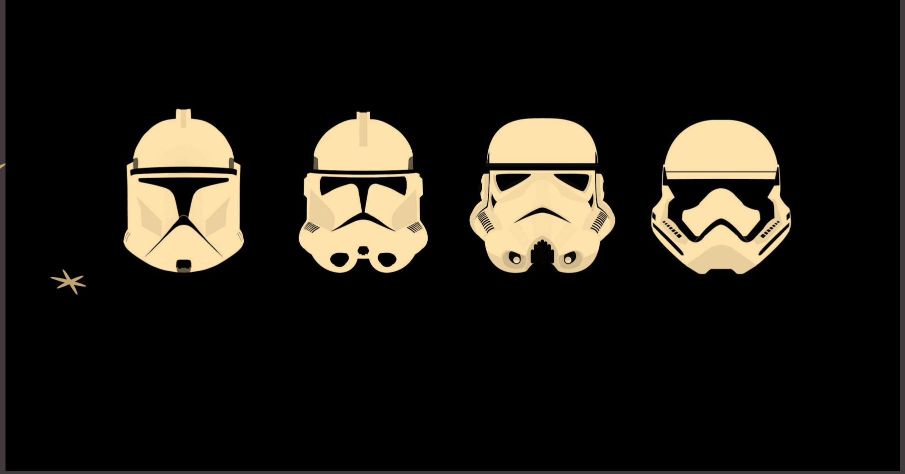

Summary

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Server Architecture

Websockets API

Network Communication Functions

Game State Functions

Game Entities Data Structures

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Challenges

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Latency

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Scale

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Go develop a MOG!

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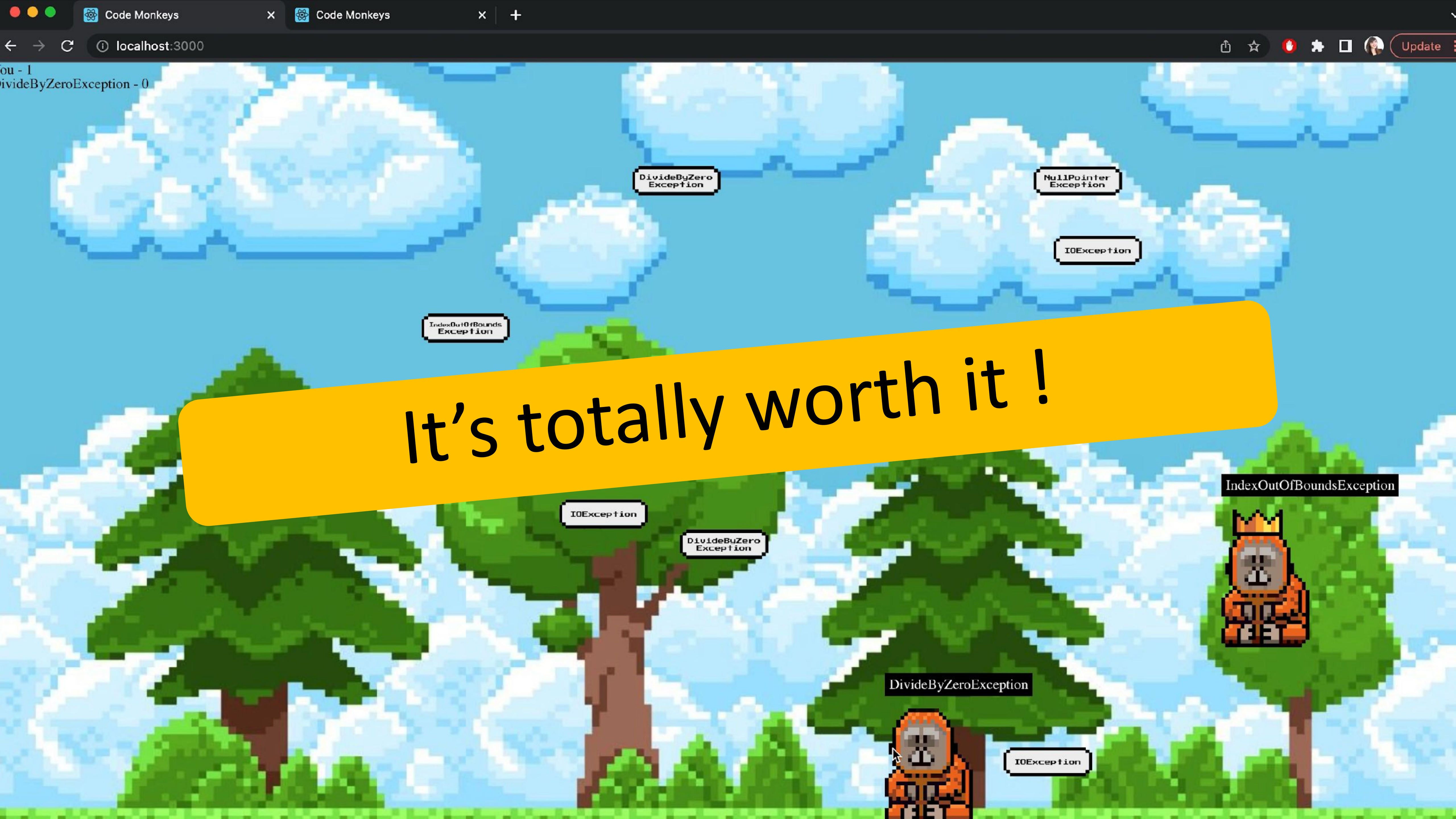
Although it won’t be Star Wars Battlefront II



It’s totally worth it !

Thank you!

@ladymeyy

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