Documentation for Zappy

1. Project overview

The Zappy project is an online multiplayer game that simulates a virtual world where ai characters collaborate to survive and level up. The game is designed for the player to oversee the AI players while they autonomously carry out tasks.

The goal of this game is for the AI players, representing different teams, to gather resources and develop their character abilities to level up and win.

This project is divided into 3 co dependant parts: User interface, Artificial Intelligence, and Server.

User Interface

The User Interface (UI) component of the Zappy project is responsible for providing a graphical interface for the human user to interact with the game. The UI allows the user to start the game, monitor the progress of the AI players.

Key features of the **UI c**omponent:

- **Start Game:** The UI provides a start button for the user to initiate the game session. Once the game is started, the UI displays the game environment, including the map, AI player positions, and available resources.
- **Real-Time Monitoring:** The UI continuously updates the game state, showing the current positions and actions of the AI players. It provides real-time information about resource collection, character levels, and team progress.
- **User Interaction:** The UI enables players to select tiles from the map to display all the available resources on said tile.
- **Death counter:** The UI provides a visual counter of all dead players.
- **Level:** The UI enables players to see the number of players that are on each level.

Key features of the **AI** component:

The Artificial Intelligence (AI) component of the Zappy project is responsible for controlling the behaviour and decision-making of the AI players within the game. The AI players autonomously carry out tasks, gather resources, and collaborate with other AI players to achieve the team's objectives.

- **Character Control:** The AI component controls the movements, actions, and interactions of the AI players. It ensures that the AI players navigate the map, gather resources, and perform specific tasks.

- **Decision-Making:** The AI component employs decision-making algorithms and strategies to guide the AI players' actions. It considers factors such as resource availability, team objectives, and character statistics to make informed decisions.

Key features of the **Server** component:

The Server component of the Zappy project acts as the central hub for communication between the UI, AI, and multiple game instances. It manages the game sessions, facilitates data exchange, and ensures synchronization between the different components.

- **Game Session Management:** The server manages the creation and termination of game sessions. It allows multiple users to connect, initiate game instances, and synchronize the game state across all connected clients.

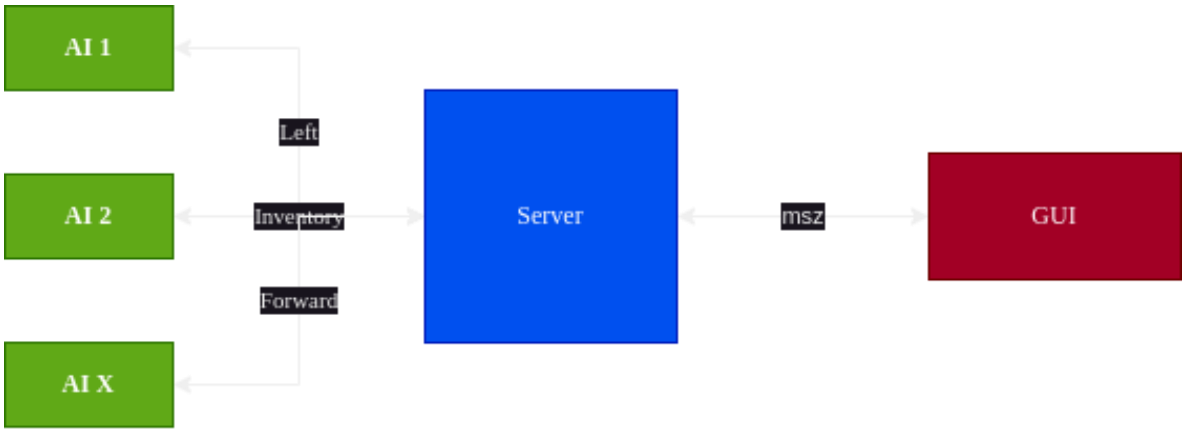
- **Data Exchange:** The server facilitates the exchange of game-related data between the UI, AI, and other connected clients. It handles commands to ensure consistent gameplay and communication between all participants.

- **Scalability and Multiplayer Support:** The server component is designed to accommodate many connected clients. It ensures scalability and smooth gameplay experience for all participants and UI.

- **Protocol Implementation:** The server implements a standardized protocol for communication, ensuring compatibility between the UI, and AI. It defines the format of commands, responses, and data structures exchanged during gameplay.

2. Architecture

The Zappy project follows a client-server architecture, with multiple clients (UI and AI) connecting to a central server, which coordinates the game sessions and facilitates communication between the clients and the AI players.



Interactions:

- **UI-Server Interaction:** The UI communicates with the Server to initiate game sessions and receive updates and notifications about the game state. The UI requests the creation of game instances and receives real-time information about the AI players' actions, movement, and progress.

- **Server-AI Interaction:** The Server receives actions and status updates from the AI players and ensures synchronization between the players. The Server coordinates the game flow and manages the game state.

- **AI-AI Interaction:** The AI players collaborate within the game world to achieve team objectives. They share information, coordinate actions, and exchange data related to resource collection, task allocation, and strategic decision-making. The AI players communicate with each other through the Server, exchanging updates and coordinating their actions.

3. Communication protocol

1. GUI - Server

The communication between the GUI (client) and the server in the Zappy project involves sending and receiving messages using a specific set of commands and symbols. These messages serve different purposes, such as requesting information, updating the game state, or notifying events.

The different command symbols:

Symbol	Meaning	Symbol	Meaning
X	width or horizontal position	N	Player number
Y	Height or vertical position	O	orientation: 1(N), 2(E), 3(S), 4(W)
q0	resource 0 (food) quantity	L	Player or incantation level
q1	resource 1 (linemate) quantity	E	Egg number
q2	resource 2 (deraumere) quantity	T	Time unit
q3	resource 3 (sibur) quantity	N	Name of the team
q4	resource 4 (mendiane) quantity	R	Incantation result
q5	resource 5 (phiras) quantity	M	Message
q6	resource 6 (thystame) quantity	i	Resource number

The different commands:

Server	Client	Details
msz X Y\n	msz\n	Map size
bct X Y q0 q1 q2 q3 q4 q5 q6\n	bct X Y\n	Content of a tile
bct X Y q0 q1 q2 q3 q4 q5 q6\n * nbr_tiles	mct\n	Content of all tiles
tna N\n * nbr_teams	tna\n	Name of all teams
pnw #n X Y O L N\n		New player connection
ppo n X Y O\n	ppo #n\n	Player position
plv n L\n	plv #n\n	Player level
pin n X Y q0 q1 q2 q3 q4 q5 q6\n	pin #n\n	Player inventory
pex n\n		Explulsion
pbc n M\n		broadcast
pic X Y L n n . . . \n		Start of incantation
pie X Y R\n		End of incantation
pdr n i\n		Resource dropping
pgt n i\n		Resource collecting
pdi n\n		Death of a player
sgt T\n	sgt\n	Time unit request
sst T\n	sst T\n	Time unit modification
seg N\n		End of game
smg M\n		Message from server
suc\n		Unknown command
sbp\n		Command parameter

2. AI – Server commands

The AI players in the Zappy project interact with the server by sending and receiving messages to perform actions and gather information. These messages allow the AI players to navigate the game world, gather resources, and coordinate their actions with other players.

The different commands:

Action	Command	Time limit	Response
Move up one tile	Forward	7/f	ok
Turn 90° to the right	Right	7/f	ok
Turn 90° to the left	Left	7/f	ok
Look around	Look	7/f	[tile1, tile2,...]
Inventory	Inventory	1/f	[linemate n, sibur n,...]
Broadcast text	Broadcast text	7/f	ok
Unused team slots	Connect_nbr	-	value
Eject player from tile	Eject	7/f	ok/ko
Death of a player	-	-	dead
Take object	Take object	7/f	ok/ko
Set object down	Set object	7/f	ok/ko
Start incantation	Incantation	300/f	Elevation underway Current level: k/ko