My Project

Chapter 1

Simple LAN Chat (SLCP)

Ein leichtgewichtiges, dezentral organisiertes Chatprogramm für Text- und Bildnachrichten im lokalen Netzwerk (LAN). Entwickelt im Rahmen eines Hochschulprojekts an der Frankfurt UAS auf Basis des Simple Local Chat Protocol (SLCP).

1.1 Features

- **SLCP-Kommunikation**

  - UDP-Broadcast: JOIN, LEAVE, WHO

  - TCP-Verbindungen: zuverlässige Bildübertragung (IMG)

- **Text- & Bildnachrichten**

- **Interprozesskommunikation (IPC)**

  - Prozesse für UI, Netzwerk & Discovery

  - Thread-safe Queues für Datenaustausch

- **Kommandozeilen-Interface (CLI)**

  - Nachrichten senden/empfangen

  - Konfigurationswerte bearbeiten

- **Discovery-Service**

  - Erkennung und Pflege aktiver Peers

- **Zentrale Konfiguration**

    – `config.toml` mit Netzwerk-, UI- und Nutzer-Einstellungen

    – Bei Programmstart: interaktive CLI-Eingabe oder GUI-Eingabe (z. B. Benutzername)

1.2 Technologien & Abhängigkeiten

- **Sprache:** Python 3.8+

- **Entwicklungsumgebung:** Visual Studio Code

- **Bibliotheken:**

    – `socket` (UDP/TCP)

    – `threading` / `queue` (Nebenläufigkeit & IPC)

    – `toml` (Laden/Speichern der Konfiguration)

    – `tkinter` (optionales GUI)

    – `os`, `sys`, `time` (System- und Timing-Utilities)

Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 3

Class Documentation

3.1 chat_client.ChatClient Class Reference

Public Member Functions

- **__init__** (self, Dict[str, Any] config, str username)
- bool **send_text_message** (self, str target_ip, int target_port, str target_handle, str message)
- bool send_image_message (self, str target_ip, int target_port, str target_handle, str image_path)

Public Attributes

- **config**
- **username**

3.1.1 Member Function Documentation

3.1.1.1 send_image_message()

```
bool chat_client.ChatClient.send_image_message (
            self,
          str target_ip,
          int target_port,
          str target_handle,
          str image_path )
```

```
Sendet eine SLCP-Bildnachricht über TCP
```

The documentation for this class was generated from the following file:

- chat_client.py

3.2 gui.ChatGUI Class Reference

Public Member Functions

- **__init__** (self, root)
- update_active_users (self)
- **start_user_update_loop** (self)
- **start_message_polling** (self)
- **poll_messages** (self)
- **display_message** (self, message)
- **display_system_message** (self, text)
- **username_abfragen** (self)
- **send_message** (self)
- **on_user_double_click** (self, event)

- **refresh_users** (self)
- **disconnect_from_server** (self)
- **clear_chat** (self)

Public Attributes

- **root**
- **chat_display**
- **users_listbox**
- **on_user_double_click**
- **message_entry**
- **send_button**
- **clear_button**
- **disconnect_button**
- **refresh_button**
- **username**
- **ipc_handler**
- **discovery**
- **autoreply_active**
- **chat_client**
- **chat_server**
- **is_connected**
- **start_user_update_loop**
- **poll_messages**
- **config**

3.2.1 Member Function Documentation

3.2.1.1 update_active_users()

```
gui.ChatGUI.update_active_users (
            self )
```

Aktualisiert die Liste der aktiven Nutzer

The documentation for this class was generated from the following file:

- gui.py

3.3 chat_server.ChatServer Class Reference

Public Member Functions

- **__init__** (self, Dict[str, Any] config, ipc_handler)
- int **get_free_tcp_port** (self)
- **start** (self)
- **stop** (self)
- **accept_connections** (self)
- **handle_client** (self, socket.socket client_socket, addr)

Public Attributes

- **config**
- **ipc_handler**
- **running**
- **server_socket**

The documentation for this class was generated from the following file:

- chat_server.py

3.4 cli.CLI Class Reference

Public Member Functions

- **__init__** (self, Dict[str, Any] config, ipc_handler, chat_client, discovery_service)
- **start** (self)
- **stop** (self)
- **show_welcome** (self)
- **show_help** (self)
- **command_loop** (self)
- **inactivity_monitor** (self)
- **process_command** (self, str command)
- **show_help** (self)
- **show_active_users** (self)
- **send_broadcast_message** (self, str message)
- **send_private_message** (self, str username, str message)
- **send_image_to_user** (self, str username, str image_path)
- **display_messages** (self)
- **show_message** (self, Dict[str, Any] message)
- run (self)

Public Attributes

- **config**
- **ipc_handler**
- **chat_client**
- **discovery_service**
- **running**
- **last_input_time**
- **inactivity_timeout**
- **autoreply_active**

3.4.1 Member Function Documentation

3.4.1.1 run()

```
cli.CLI.run (
            self )

Dies ist die Hauptschleife der CLI.
Sie ruft für jede Eingabe die neue handle_command Methode auf.
```

The documentation for this class was generated from the following file:

- cli.py

3.5 discovery.DiscoveryService Class Reference

Public Member Functions

- **__init__** (self, Dict[str, Any] config, ipc_handler, str username, int chat_tcp_port)
- **start** (self)
- **stop** (self)
- **listen_loop** (self)
- **handle_message** (self, str message, str sender_ip)
- **send_udp_broadcast** (self, str text)
- **send_join** (self)
- **send_leave** (self)

- **request_discovery** (self)
- **send_knowusers** (self, str target_ip)
- **send_to_all_known_peers_as_knowuser** (self)
- **change_handle** (self, str new_username, str config_file_path="config.toml")

Public Attributes

- **config**
- **ipc_handler**
- **username**
- **chat_tcp_port**
- **running**
- **broadcast_ip**
- **discovery_port**
- **listen_socket**

The documentation for this class was generated from the following file:

- discovery.py

3.6 ipc_handler.IPCHandler Class Reference

Public Member Functions

- **__init__** (self)
- **send_message** (self, Dict[str, Any] message)
- **get_message** (self, timeout=1)
- **send_discovery_update** (self, Dict[str, Any] user_info)
- **get_discovery_update** (self, timeout=1)
- **update_user_list** (self, str username, str ip_address, int tcp_port, float timestamp=None)
- **get_active_users** (self, only_visible=True)
- **set_visibility** (self, bool visible)
- bool **is_visible** (self)
- **remove_user** (self, str username)
- **remove_user_by_name** (self, str username)
- **cleanup_inactive_users** (self, timeout=60)

Public Attributes

- **message_queue**
- **discovery_queue**
- **lock**
- **active_users**
- **self_visible**

The documentation for this class was generated from the following file:

- ipc_handler.py

3.7 main.SimpleChatApp Class Reference

Public Member Functions

- **__init__** (self, config_path="config.toml", username="")
- str **get_local_ip** (self)
- dict **load_config** (self, str path)
- **start** (self)
- **cleanup_loop** (self)
- **shutdown** (self)
- **signal_handler** (self, signum, frame)

Public Attributes

- **config**
- **username**
- **ipc_handler**
- **chat_server**
- **discovery**
- **chat_client**
- **cli**
- **running**
- **signal_handler**

The documentation for this class was generated from the following file:

- main.py