Semester Long Internship Report

On

Tracker Tool For eSim(main project)
and
KiCad Upadter for eSim-Windows (mini task)

Submitted by

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Finally, we would like to thank everyone who contributed directly or indirectly to the successful completion of our internship. We hope to apply the lessons learned from this experience to make a positive impact in the future.

Contents

Chapter 1

Introduction

1.1 eSim

FOSSEE (Free/Libre and Open Source Software for Education) encourages the adoption of open-source software in educational settings, with eSim being a leading project. eSim is a powerful open-source Electronic Design Automation (EDA) tool for circuit design, simulation, and PCB design.

1.2 Tool Tracker

The Tool Tracker for eSim monitors user activity, tracks session durations, and generates analytics, all while ensuring security through consent-based tracking. It supports multi-user functionality, empowering users to visualize their data and improve engagement with the platform. Additionally, an eSim web interface allows administrators to access user activity data, monitor trends, and perform detailed data analysis. This dashboard provides real-time insights, helping educators and developers optimize user experience and improve the tool's adoption. It provides web-based data analytics and a real-time dashboard.

1.3 Motivation for Developing the Tool Tracker

As the adoption of eSim grows, understanding user engagement and usage patterns becomes crucial for its continuous improvement. By implementing the Tool Tracker, the eSim development team aims to create a more responsive and user-centric EDA tool. The Tool Tracker is conceived to address this need by:

- **Monitoring User Activity:** Tracking metrics such as session durations and frequency of use to gain insights into how users interact with eSim.
- **Enhancing User Experience:** Identifying common usage patterns and potential pain points to inform the development of new features and improvements.
- **Supporting Educational Objectives:** Providing educators with data to assess how students utilize the tool, thereby aiding in curriculum development and instructional strategies.

- **Assisting Developers in Feature Optimization:** By analyzing user interaction data, developers can identify underutilized or complex features, streamline workflows, and introduce enhancements that align with user needs.

1.4 Objectives

The objectives of the Tool Tracker for eSim project are as follows:

- **Develop a Secure User Activity Tracker:** Implement a tracking mechanism to monitor user sessions and log essential metrics such as session duration and active user count.
- **Provide Real-Time Data Visualization:** Design an interactive dashboard to present analytics on user activity, including session statistics, trends, and usage patterns.
- **Ensure User Privacy and Security:** Implement a consent-based tracking system where users must explicitly allow session monitoring. Provide options for users to view, export, or delete their tracked data.
- **Enhance eSim User Engagement:** Analyze user behavior and interactions with the platform to optimize features, improve usability, and enhance overall engagement.
- **Enable Multi-User Support:** Develop a system capable of handling multiple users by tracking data separately and ensuring accurate reporting for individual sessions.
- **Facilitate Data-Driven Decisions:** Provide administrators and developers with actionable insights to improve platform adoption, identify common usage trends, and address potential challenges.

Chapter 2

Problem Statement

The goal of this project is to develop a system that tracks user activity on eSim to understand usage patterns and collect insights. The system should focus on logging the number of hours a user works on eSim and the number of active users, while maintaining security and operating only with user consent.

The requirements for the system are as follows:

- **Activity Tracking:**
  - Design a Python script to monitor user activity within eSim.
  - Log the total hours spent in eSim during a session.
  - Handle session detection (start and stop) without interfering with the tool's performance.
- **User Analytics Dashboard:**
  - Store tracked data in a database (e.g., SQLite or any other lightweight database).
  - Create a simple interface (CLI or web-based) to visualize the data:
    - Number of active users.
    - Total hours logged.
    - Average time spent per session.
- **Security and Consent Management:**
  - Implement a user consent mechanism to ensure tracking only starts after explicit permission.
  - Provide an option for users to view, export, and delete their data.
- **Multi-User Support:**
  - Allow the tool to handle multiple users by tracking data separately for each user.
  - Use a simple authentication system (username-based or email-based).

The above requirements aim to provide an efficient, secure, and user-friendly tool to monitor eSim usage, benefiting both the developers and users by providing valuable insights.

Chapter 3

System Architecture

3.1 Overview of System Components

The eSim Tool Tracker is designed to monitor user activity and track session durations while ensuring security and user consent. It consists of several core components:

- **eSim**: The open-source EDA tool that users interact with.
- **Tool Tracker**: A monitoring system that records session activity and logs user interactions.
- **Flask API**: A web-based backend that processes tracking data and provides an interface for fetching it.
- **PostgreSQL Database**: A relational database used to store session logs securely.
- **Admin Dashboard**: A web-based visualization tool that allows administrators to monitor and analyze user activity.
- **User Dashboard**: An application interface that enables users to view their own tracking data.

3.2 Workflow Diagram

The following diagram illustrates the high-level architecture of the system, showing how different components interact with each other.

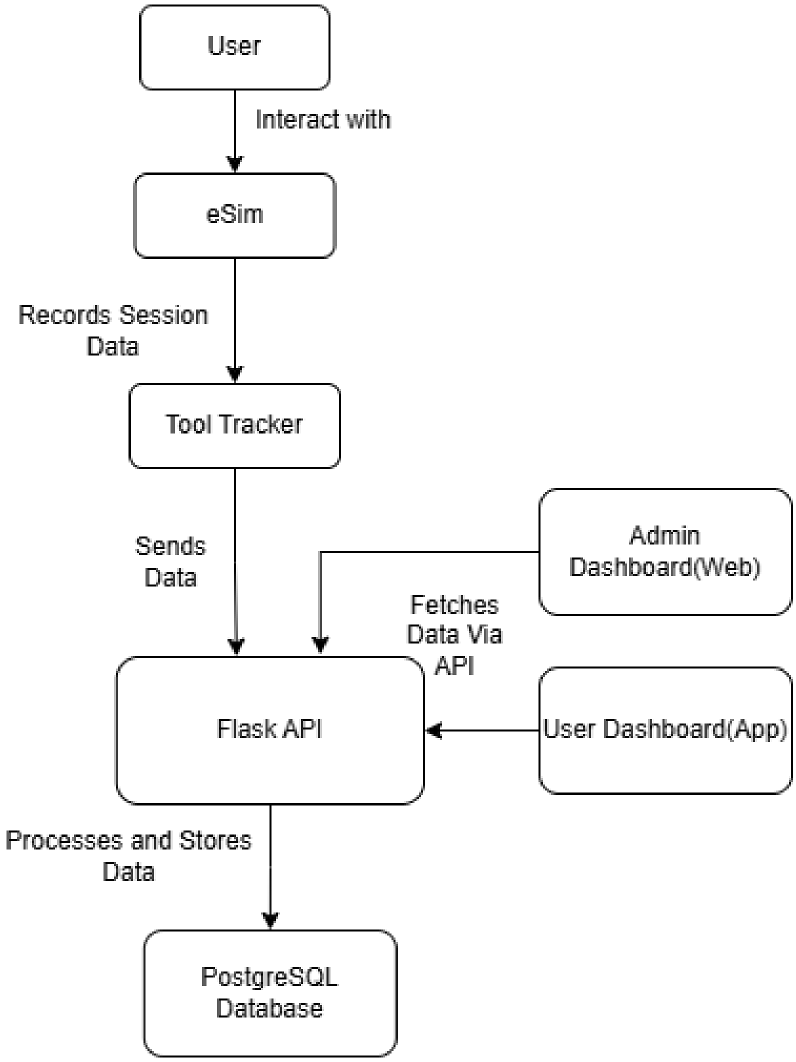


Figure 3.1: System Workflow

3.3 Data Flow and Interaction Between Components

The interaction between different components is structured in a way that ensures seamless data collection, storage, and retrieval. The flow of data occurs as follows:

1. A user launches **eSim** and starts a session.
2. The **Tool Tracker** detects this activity and prompts the user for consent if tracking preferences are not already saved.
3. If tracking is enabled, session data is recorded, including start time and periodic activity monitoring.
4. When eSim is closed, the Tool Tracker logs the end time, calculates session duration, and sends this data to the **Flask API**.
5. The **Flask API** processes the received data and stores it in the **PostgreSQL Database**.

6. Admins can access user activity data via the **Admin Dashboard**, while users can check their session logs via the **User Dashboard**.

3.4 User Workflow

The following diagram represents the step-by-step process of user interaction with the Tool Tracker, emphasizing consent management and activity monitoring.

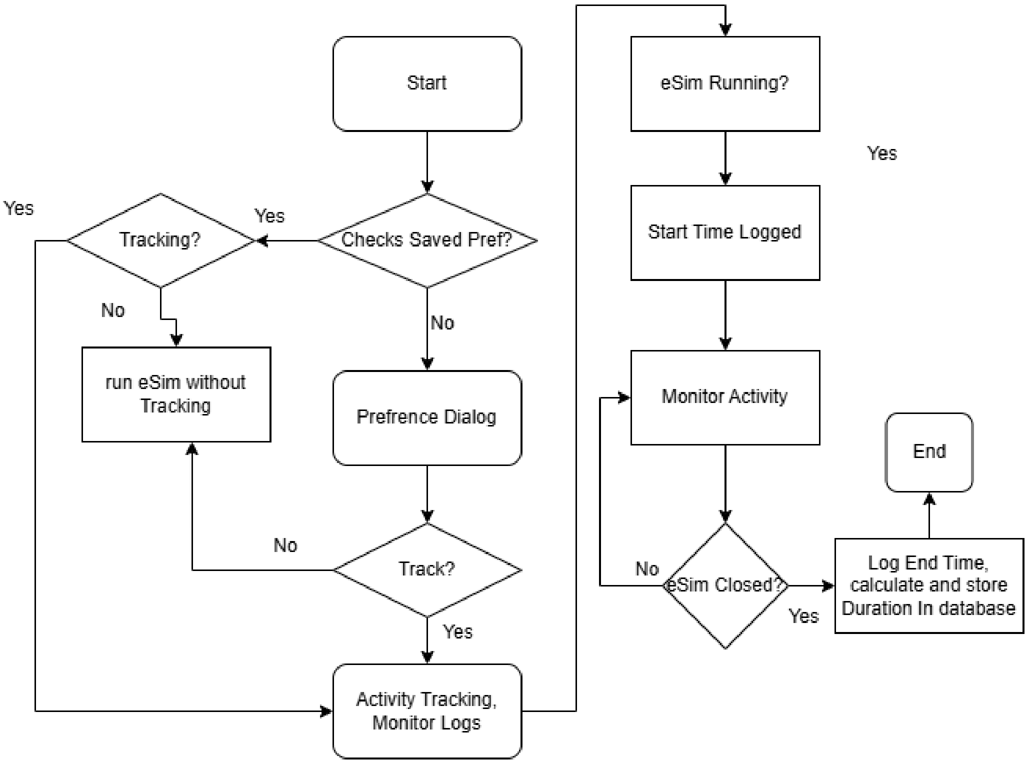


Figure 3.2: User Workflow

3.5 Core Concepts

3.5.1 Process Monitoring

The Tool Tracker continuously monitors the activity of the eSim application using Python libraries like `psutil`. This library helps track system-level processes such as CPU usage, memory consumption, and active processes, enabling the tracking of how long users spend in eSim and which features they interact with most frequently.

3.5.2 Privacy and Consent Management

One of the key aspects of the Tool Tracker is its emphasis on user privacy. Tracking only begins after explicit user consent. Before data is collected, users are presented with a consent form, ensuring they are aware of what data will be tracked. Additionally, users can view, export, and delete their session data at any time, giving them full control over their information.

3.6 Technologies Used

3.6.1 Python and psutil

Python is the primary language used to develop the Tool Tracker. The `psutil` library is used for monitoring system processes and gathering performance metrics. This library helps collect data on user activity, which is essential for analyzing session durations and tracking feature usage.

3.6.2 PostgreSQL

For data storage, the Tool Tracker uses PostgreSQL, a powerful, server-based relational database management system. PostgreSQL provides robust support for handling large-scale datasets and concurrent connections, making it ideal for tracking user session data in the system.

3.6.3 Web Interface

The Tool Tracker includes a web interface for administrators to monitor user activity data. This interface is built using HTML, CSS, and JavaScript, providing a user-friendly dashboard for visualizing session analytics. The dashboard enables administrators to view key metrics such as the total number of active users, the most used features, and average session durations.

3.6.4 Data Visualization with JavaScript and matplotlib

The user activity data is visualized using JavaScript libraries such as Chart.js and python libraries such as matplotlib . The web interface displays various charts and graphs, allowing administrators to easily interpret user engagement trends and identify areas that need improvement.

3.6.5 Consent Management System

The consent management system is implemented using standard web technologies, ensuring that users can easily give or withdraw consent for data collection. This is a key feature that upholds the ethical standards of the project, ensuring transparency and user control over their data.

Chapter 4

Implementation

4.1 User Dashboard

The user dashboard is an integral part of the eSim application, providing users with essential tracking functionalities. Upon launching the eSim app, users are presented with a preference dialog that determines their tracking choices.

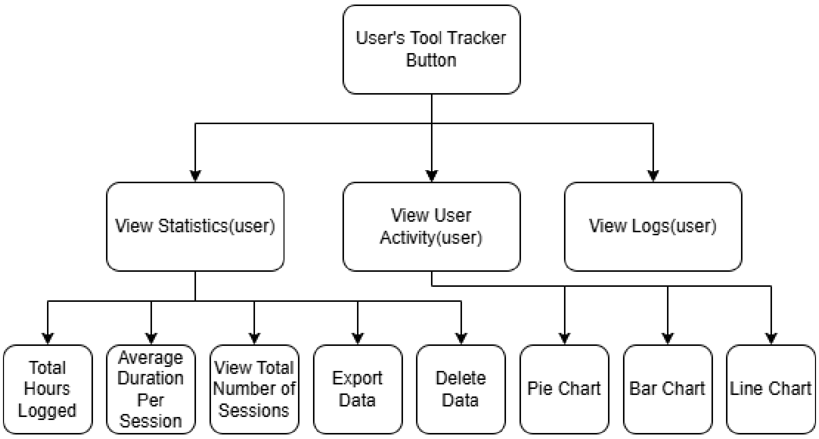
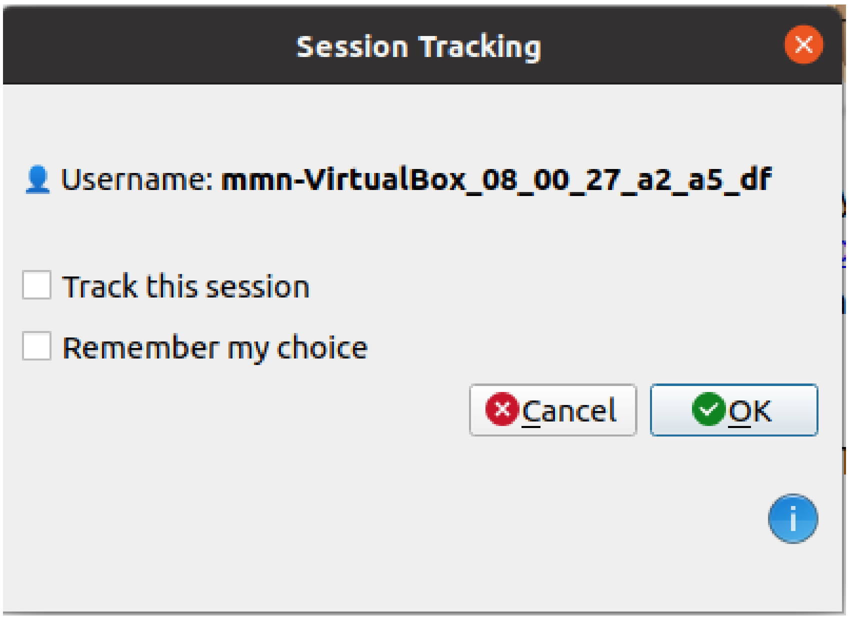


Figure 4.1: User Actions

4.1.1 Tracking Preferences

When a user launches the eSim application, they are prompted with a tracking preference dialog, as shown in Figure 4.2. This dialog asks whether the user wants to enable session tracking.



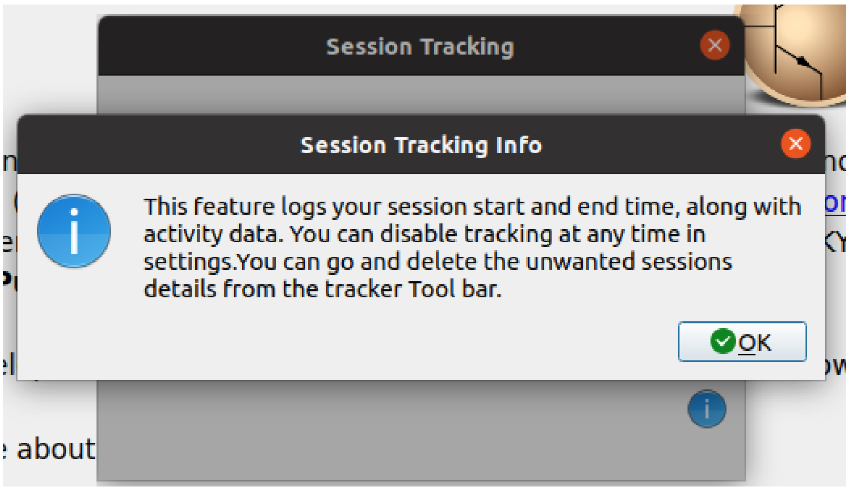
Username: **mmn-VirtualBox_08_00_27_a2_a5_df**

□ Track this session

□ Remember my choice

Figure 4.2: Tracking preference prompt upon launching eSim

If the user clicks on the information icon within this dialog, additional details about tracking are displayed, as illustrated in Figure 4.3.



This feature logs your session start and end time, along with activity data. You can disable tracking at any time in settings.You can go and delete the unwanted sessions details from the tracker Tool bar.

Figure 4.3: Tracking information details upon user request

Moreover, if the user selects the option to remember their choice, the preference dialog will not appear in future launches of the eSim application.

4.1.2 Tracker Tool Integration

The tracking tool is seamlessly integrated into the eSim application. It can be accessed via the toolbar, where a dedicated tracker tool icon is present, as shown in Figure 4.4.

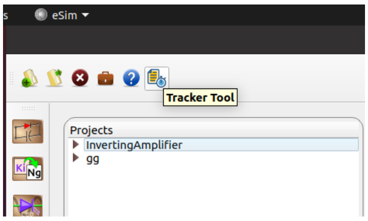


Figure 4.4: Tracker tool icon in the eSim toolbar

When the user clicks on the tracker tool icon, the tracker dashboard window appears, as depicted in Figure 4.5.

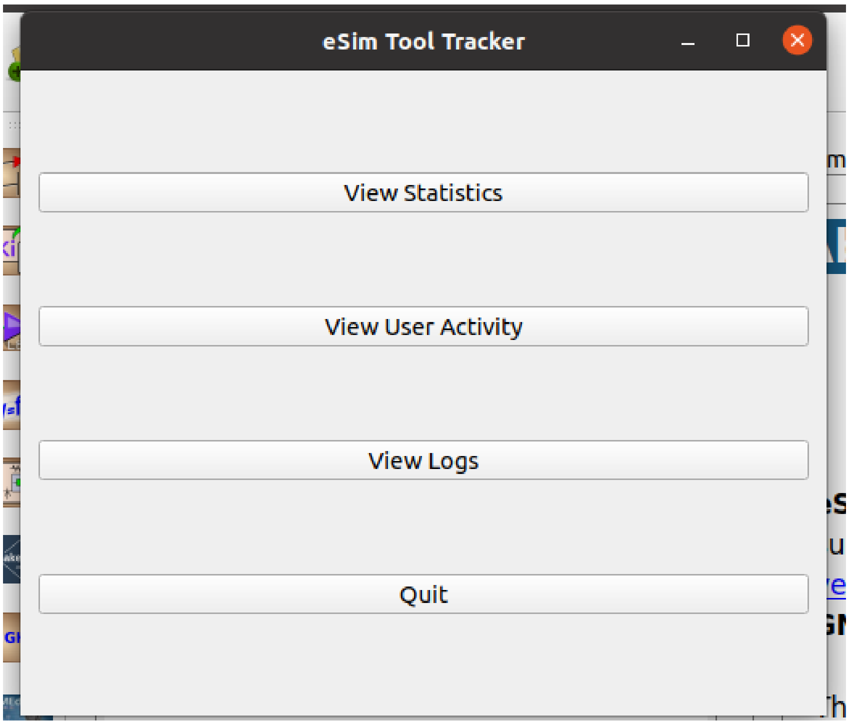
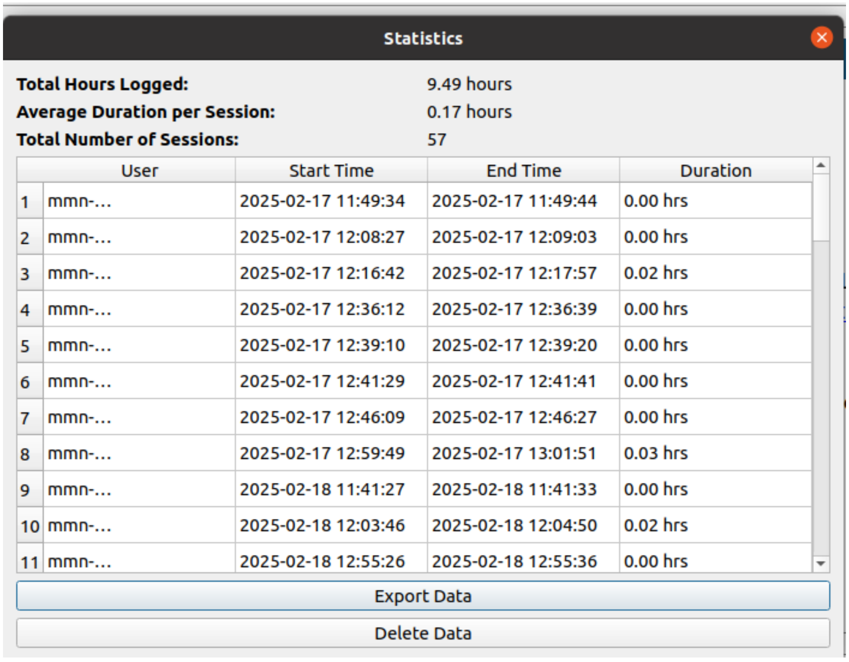


Figure 4.5: Tracker tool interface

This dashboard provides users with the following options: - View Statistics - View User Activity - View Logs

4.1.3 Viewing Statistics

Upon selecting the "View Statistics" option, the statistics dashboard opens, as shown in Figure 4.6.

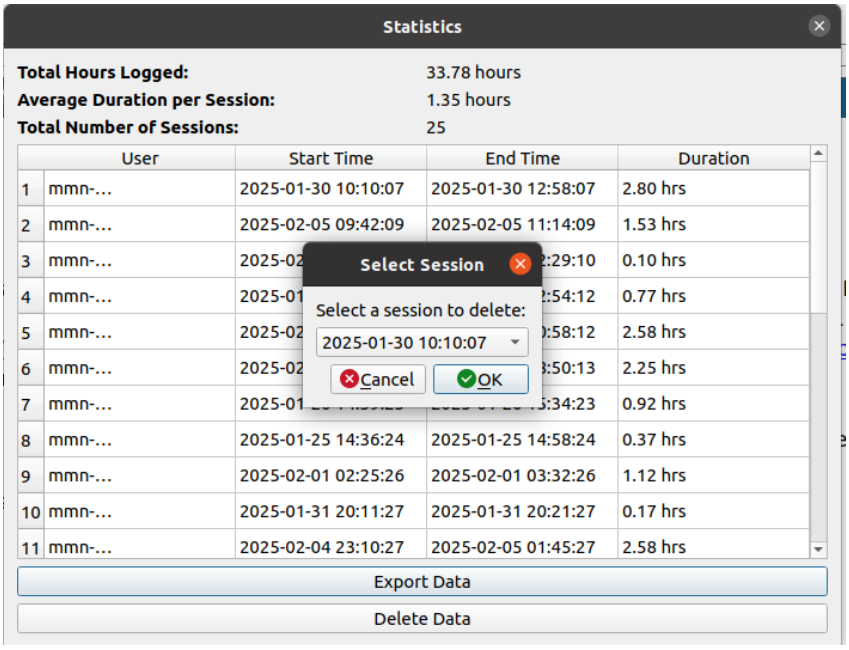


Total Hours Logged: 9.49 hours
Average Duration per Session: 0.17 hours
Total Number of Sessions: 57

	User	Start Time	End Time	Duration
1	mmn-...	2025-02-17 11:49:34	2025-02-17 11:49:44	0.00 hrs
2	mmn-...	2025-02-17 12:08:27	2025-02-17 12:09:03	0.00 hrs
3	mmn-...	2025-02-17 12:16:42	2025-02-17 12:17:57	0.02 hrs
4	mmn-...	2025-02-17 12:36:12	2025-02-17 12:36:39	0.00 hrs
5	mmn-...	2025-02-17 12:39:10	2025-02-17 12:39:20	0.00 hrs
6	mmn-...	2025-02-17 12:41:29	2025-02-17 12:41:41	0.00 hrs
7	mmn-...	2025-02-17 12:46:09	2025-02-17 12:46:27	0.00 hrs
8	mmn-...	2025-02-17 12:59:49	2025-02-17 13:01:51	0.03 hrs
9	mmn-...	2025-02-18 11:41:27	2025-02-18 11:41:33	0.00 hrs
10	mmn-...	2025-02-18 12:03:46	2025-02-18 12:04:50	0.02 hrs
11	mmn-...	2025-02-18 12:55:26	2025-02-18 12:55:36	0.00 hrs

Figure 4.6: Statistics dashboard view

Within this interface, the user can interact with various tracking options and settings. If the user wishes to export or delete their data, they can do so using the functionalities displayed in Figures 4.7 and 4.8.

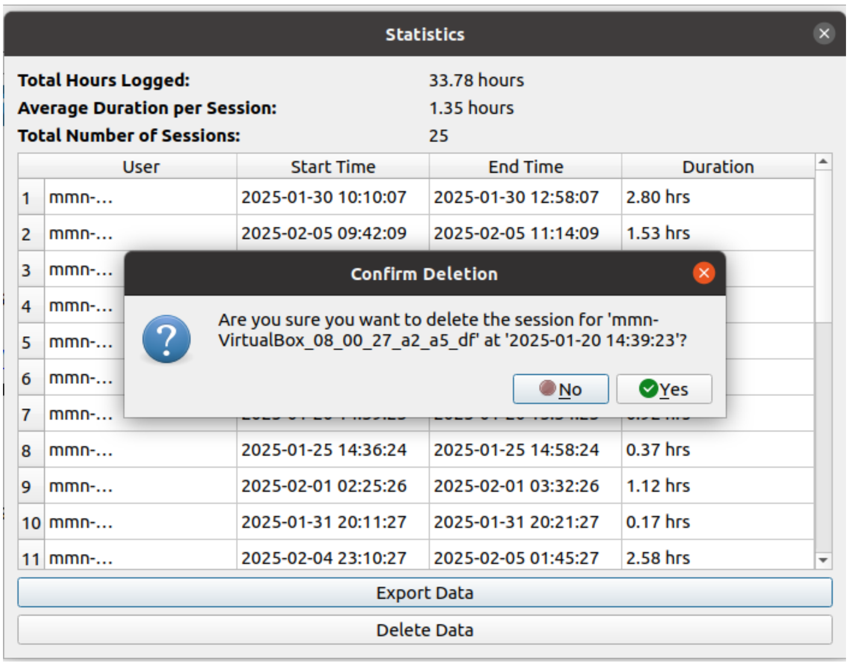


Total Hours Logged: 33.78 hours
Average Duration per Session: 1.35 hours
Total Number of Sessions: 25

	User	Start Time	End Time	Duration
1	mmn-...	2025-01-30 10:10:07	2025-01-30 12:58:07	2.80 hrs
2	mmn-...	2025-02-05 09:42:09	2025-02-05 11:14:09	1.53 hrs
3	mmn-...	2025-02	:29:10	0.10 hrs
4	mmn-...	2025-01	:54:12	0.77 hrs
5	mmn-...	2025-02	:58:12	2.58 hrs
6	mmn-...	2025-02	:50:13	2.25 hrs
7	mmn-...	2025-01	:34:23	0.92 hrs
8	mmn-...	2025-01-25 14:36:24	2025-01-25 14:58:24	0.37 hrs
9	mmn-...	2025-02-01 02:25:26	2025-02-01 03:32:26	1.12 hrs
10	mmn-...	2025-01-31 20:11:27	2025-01-31 20:21:27	0.17 hrs
11	mmn-...	2025-02-04 23:10:27	2025-02-05 01:45:27	2.58 hrs

Select a session to delete: 2025-01-30 10:10:07

Figure 4.7: Exporting or deleting user data



Statistics

Total Hours Logged: 33.78 hours
Average Duration per Session: 1.35 hours
Total Number of Sessions: 25

	User	Start Time	End Time	Duration
1	mmn-...	2025-01-30 10:10:07	2025-01-30 12:58:07	2.80 hrs
2	mmn-...	2025-02-05 09:42:09	2025-02-05 11:14:09	1.53 hrs
3	mmn-...			
4	mmn-...			
5	mmn-...			
6	mmn-...			
7	mmn-...			
8	mmn-...	2025-01-25 14:36:24	2025-01-25 14:58:24	0.37 hrs
9	mmn-...	2025-02-01 02:25:26	2025-02-01 03:32:26	1.12 hrs
10	mmn-...	2025-01-31 20:11:27	2025-01-31 20:21:27	0.17 hrs
11	mmn-...	2025-02-04 23:10:27	2025-02-05 01:45:27	2.58 hrs

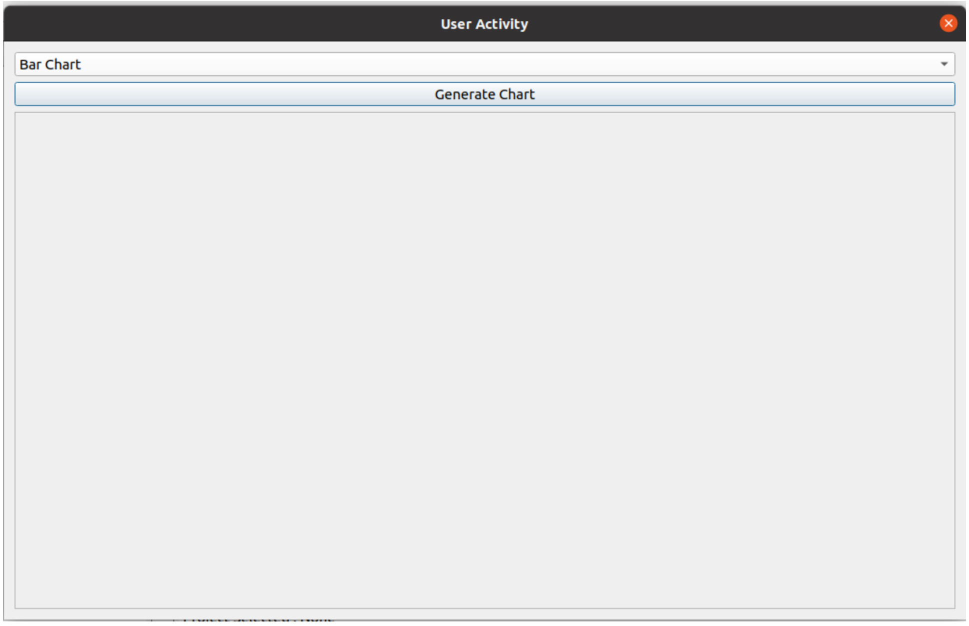
Confirm Deletion

Are you sure you want to delete the session for 'mmn-VirtualBox_08_00_27_a2_a5_df' at '2025-01-20 14:39:23'?

Figure 4.8: Additional user data management options

4.1.4 View User Activity

Users can analyze their session activity by selecting the ”View User Activity” option. The interface allows them to choose from different chart representations, as shown in Figure 4.9.



User Activity

Bar Chart

Figure 4.9: User activity visualization selection screen.

The system provides three types of visualizations: bar charts, line charts, and pie charts. When selected, they are displayed as follows:

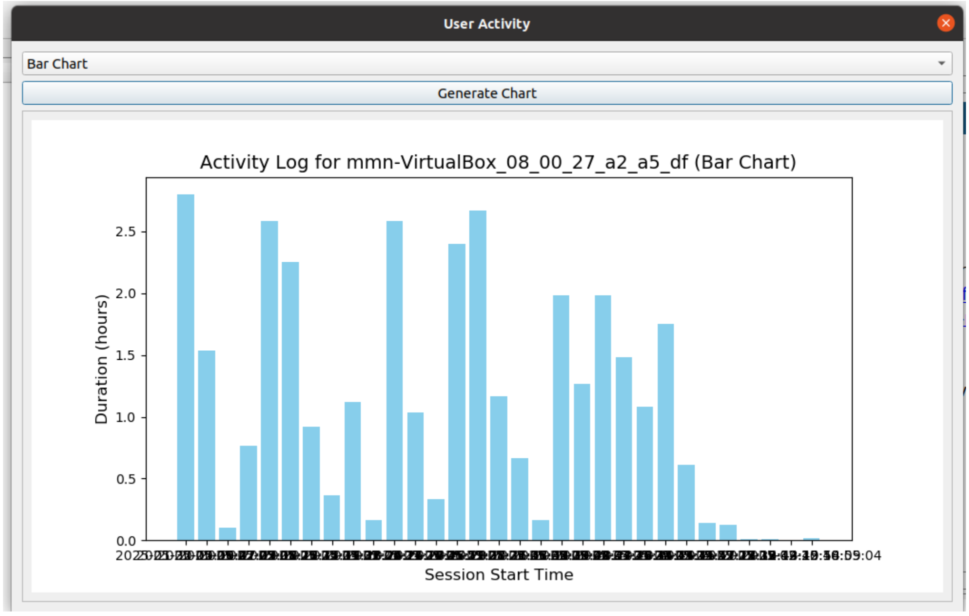


Figure 4.10: User activity represented as a bar chart.

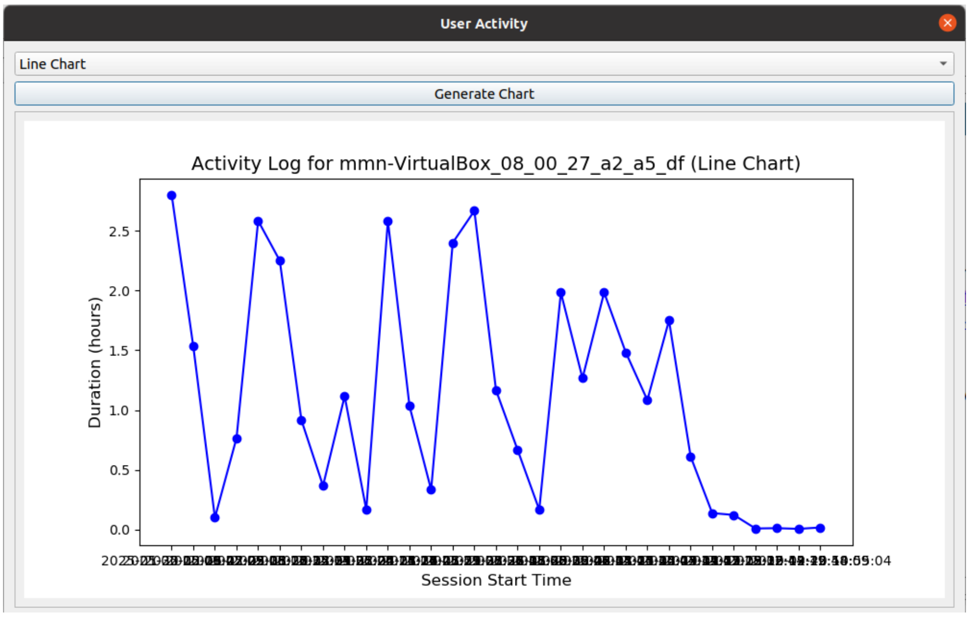


Figure 4.11: User activity represented as a line chart.

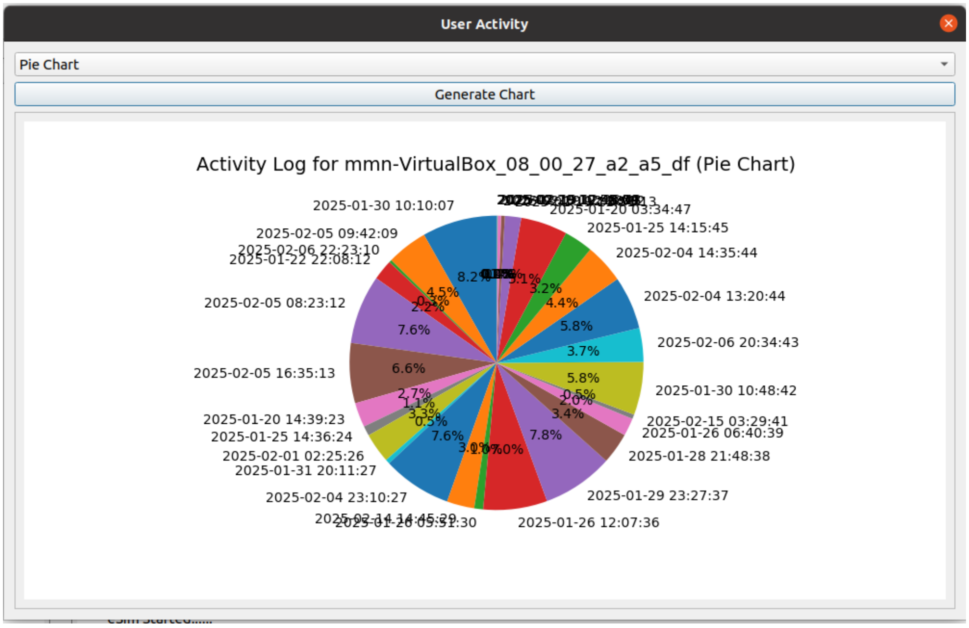
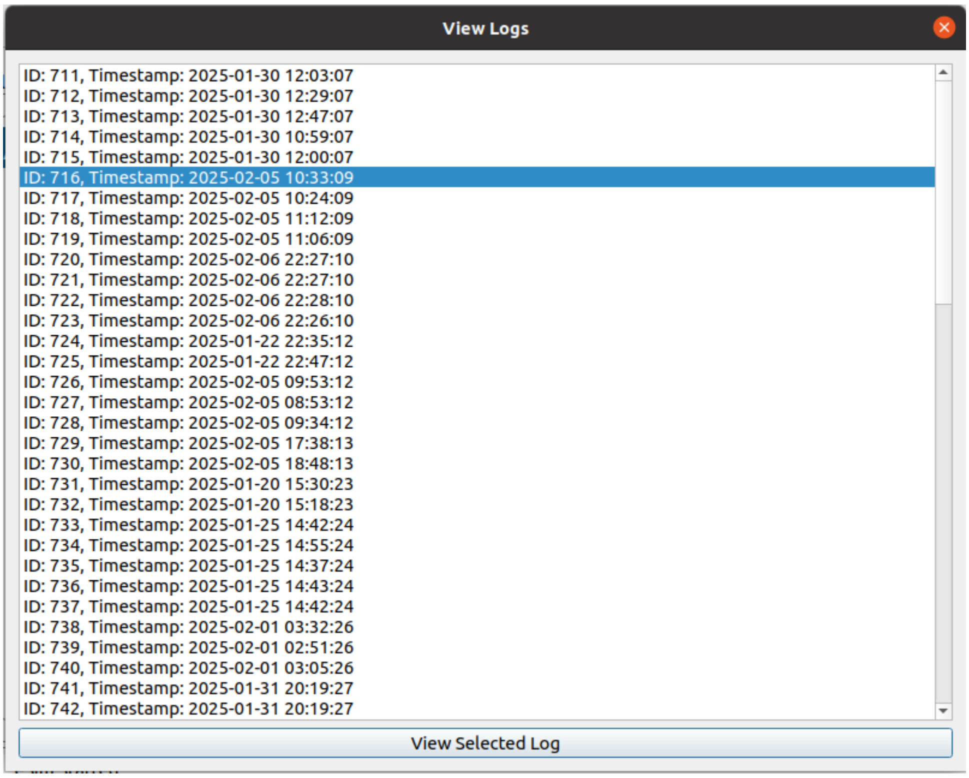


Figure 4.12: User activity represented as a pie chart.



```
ID: 711, Timestamp: 2025-01-30 12:03:07
ID: 712, Timestamp: 2025-01-30 12:29:07
ID: 713, Timestamp: 2025-01-30 12:47:07
ID: 714, Timestamp: 2025-01-30 10:59:07
ID: 715, Timestamp: 2025-01-30 12:00:07
ID: 716, Timestamp: 2025-02-05 10:33:09
ID: 717, Timestamp: 2025-02-05 10:24:09
ID: 718, Timestamp: 2025-02-05 11:12:09
ID: 719, Timestamp: 2025-02-05 11:06:09
ID: 720, Timestamp: 2025-02-06 22:27:10
ID: 721, Timestamp: 2025-02-06 22:27:10
ID: 722, Timestamp: 2025-02-06 22:28:10
ID: 723, Timestamp: 2025-02-06 22:26:10
ID: 724, Timestamp: 2025-01-22 22:35:12
ID: 725, Timestamp: 2025-01-22 22:47:12
ID: 726, Timestamp: 2025-02-05 09:53:12
ID: 727, Timestamp: 2025-02-05 08:53:12
ID: 728, Timestamp: 2025-02-05 09:34:12
ID: 729, Timestamp: 2025-02-05 17:38:13
ID: 730, Timestamp: 2025-02-05 18:48:13
ID: 731, Timestamp: 2025-01-20 15:30:23
ID: 732, Timestamp: 2025-01-20 15:18:23
ID: 733, Timestamp: 2025-01-25 14:42:24
ID: 734, Timestamp: 2025-01-25 14:55:24
ID: 735, Timestamp: 2025-01-25 14:37:24
ID: 736, Timestamp: 2025-01-25 14:43:24
ID: 737, Timestamp: 2025-01-25 14:42:24
ID: 738, Timestamp: 2025-02-01 03:32:26
ID: 739, Timestamp: 2025-02-01 02:51:26
ID: 740, Timestamp: 2025-02-01 03:05:26
ID: 741, Timestamp: 2025-01-31 20:19:27
ID: 742, Timestamp: 2025-01-31 20:19:27
```

Figure 4.13: View Logs interface allowing users to browse and select recorded sessions.

4.1.5 View Logs

After selecting **”View Logs”** from the dashboard, the **View Logs** window appears, as shown in Figure 4.13. This interface allows users to browse through their recorded sessions, each identified by a unique ID and timestamp. Users can select a specific log entry from the list to view detailed information about that session. This feature helps users track their activity and analyze past sessions efficiently.

4.2 Admin Dashboard

The Admin Dashboard provides administrators with essential tools to monitor and manage user activities within the eSim tracker system. It includes features for session tracking, user management, and data visualization.

4.2.1 Admin Tool Tracker Page

The Admin Tool Tracker Page allows administrators to oversee active user sessions, manage tracking settings, and access system logs. Figure 4.14 illustrates the interface of this tool.

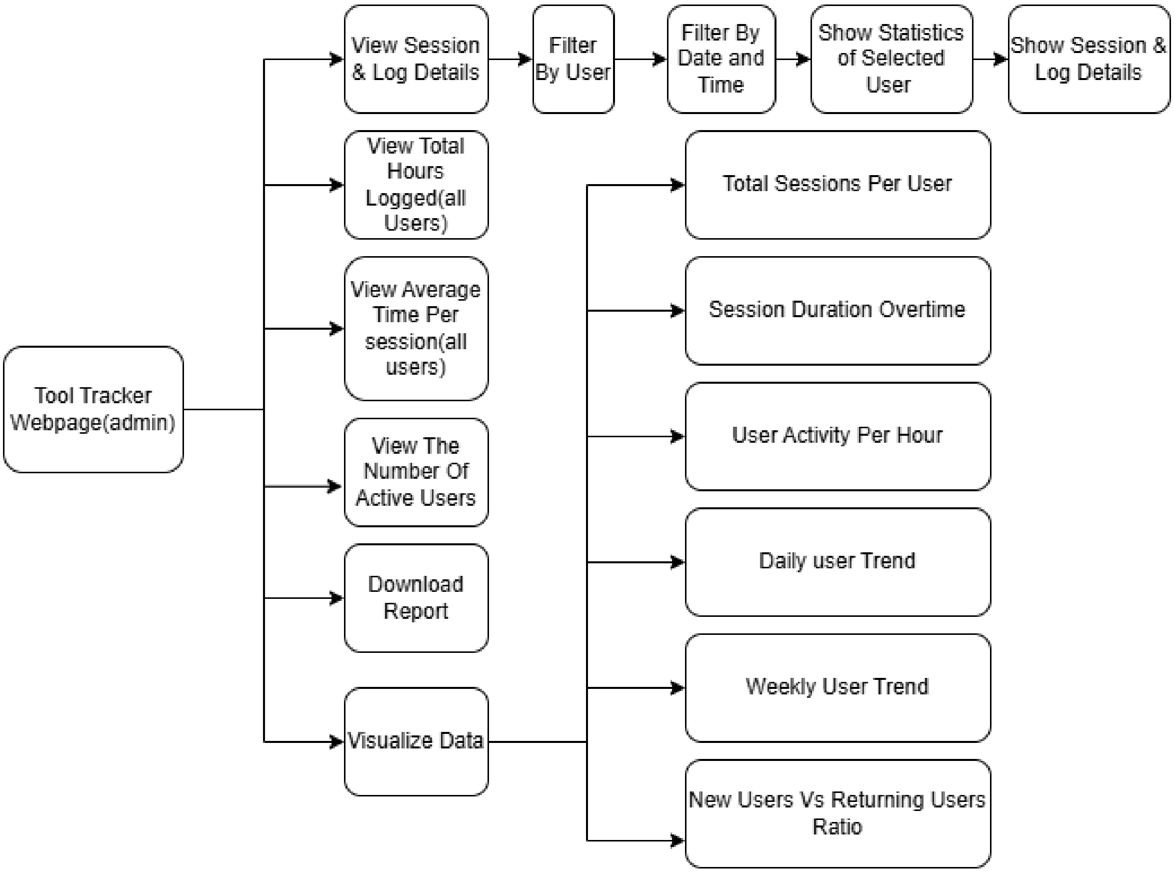
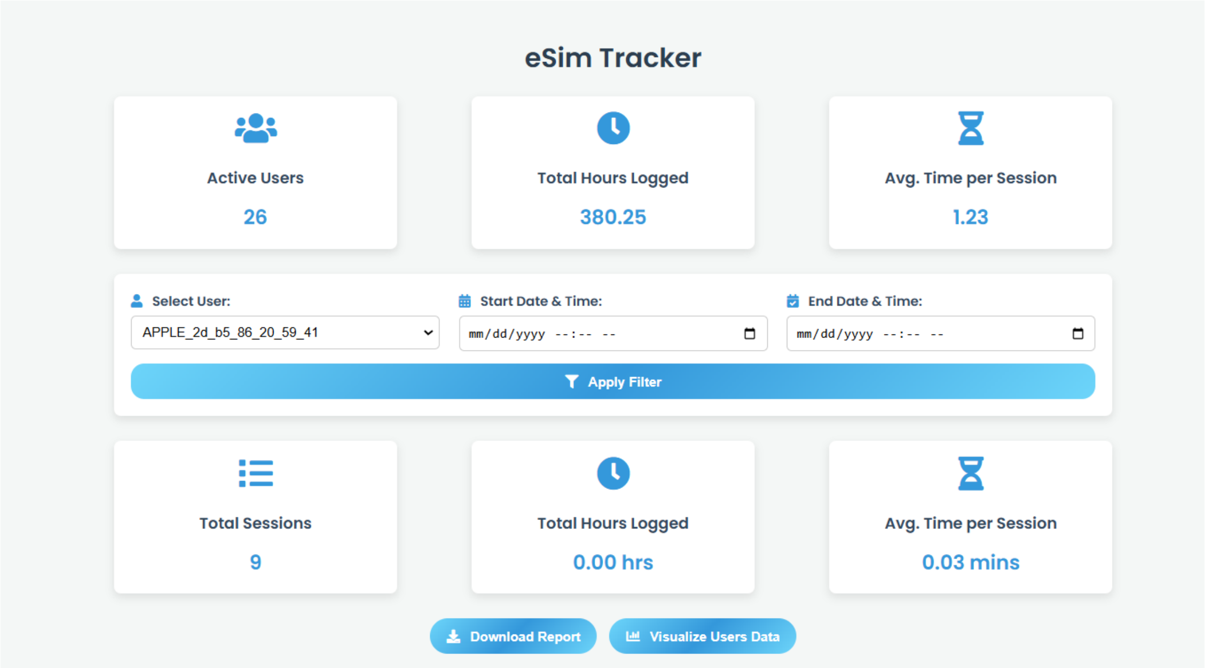

Tool Tracker Webpage(admin)
View Session & Log Details
Filter By User
Filter By Date and Time
Show Statistics of Selected User
Show Session & Log Details
View Total Hours Logged(all Users)
View Average Time Per session(all users)
View The Number Of Active Users
Download Report
Visualize Data
Total Sessions Per User
Session Duration Overtime
User Activity Per Hour
Daily user Trend
Weekly User Trend
New Users Vs Returning Users Ratio

Figure 4.14: Admin Tool Tracker Page displaying session details and user activities.

4.2.2 Dashboard Overview

The main Admin Dashboard presents a summary of system activities, including user session statistics, active users, and relevant logs. This overview helps administrators gain insights into system usage trends, as shown in Figure 4.15.



eSim Tracker

Active Users 26

Total Hours Logged 380.25

Avg. Time per Session 1.23

Select User: APPLE_2d_b5_86_20_59_41

Start Date & Time: mm/dd/yyyy --:-- --

End Date & Time: mm/dd/yyyy --:-- --

Total Sessions 9

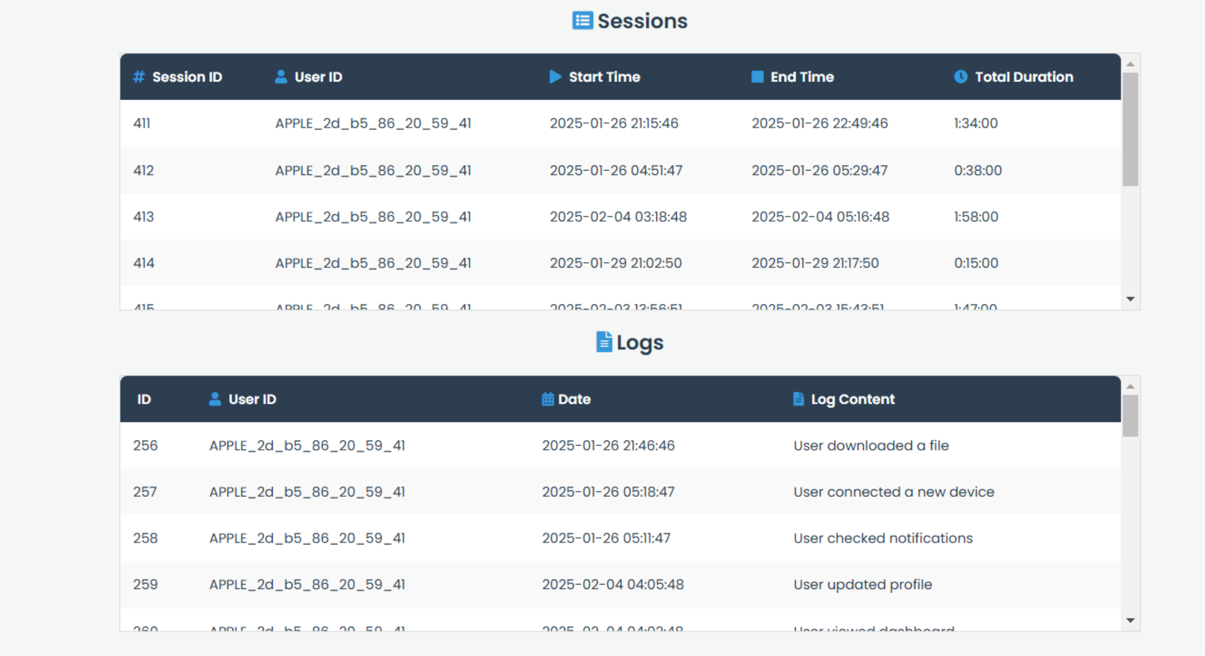
Total Hours Logged 0.00 hrs

Avg. Time per Session 0.03 mins

Figure 4.15: Admin Dashboard Actions

4.2.3 Session Logs

Administrators can review detailed session logs to track user activities and monitor session durations. Figure 4.16 presents a log interface listing session records.



Sessions

# Session ID	User ID	Start Time	End Time	Total Duration
411	APPLE_2d_b5_86_20_59_41	2025-01-26 21:15:46	2025-01-26 22:49:46	1:34:00
412	APPLE_2d_b5_86_20_59_41	2025-01-26 04:51:47	2025-01-26 05:29:47	0:38:00
413	APPLE_2d_b5_86_20_59_41	2025-02-04 03:18:48	2025-02-04 05:16:48	1:58:00
414	APPLE_2d_b5_86_20_59_41	2025-01-29 21:02:50	2025-01-29 21:17:50	0:15:00
415	APPLE_2d_b5_86_20_59_41	2025-02-03 13:56:51	2025-02-03 15:43:51	1:47:00

Logs

ID	User ID	Date	Log Content
256	APPLE_2d_b5_86_20_59_41	2025-01-26 21:46:46	User downloaded a file
257	APPLE_2d_b5_86_20_59_41	2025-01-26 05:18:47	User connected a new device
258	APPLE_2d_b5_86_20_59_41	2025-01-26 05:11:47	User checked notifications
259	APPLE_2d_b5_86_20_59_41	2025-02-04 04:05:48	User updated profile
260	APPLE_2d_b5_86_20_59_41	2025-02-04 04:02:48	User viewed dashboard

Figure 4.16: Session Logs displaying detailed records of user activities.

4.2.4 User Activity Visualization

The system offers data visualization tools to help administrators analyze user behavior over time. Various charts and graphical representations assist in identifying trends and optimizing system performance. Figure 4.17 shows an example of such a visualization.

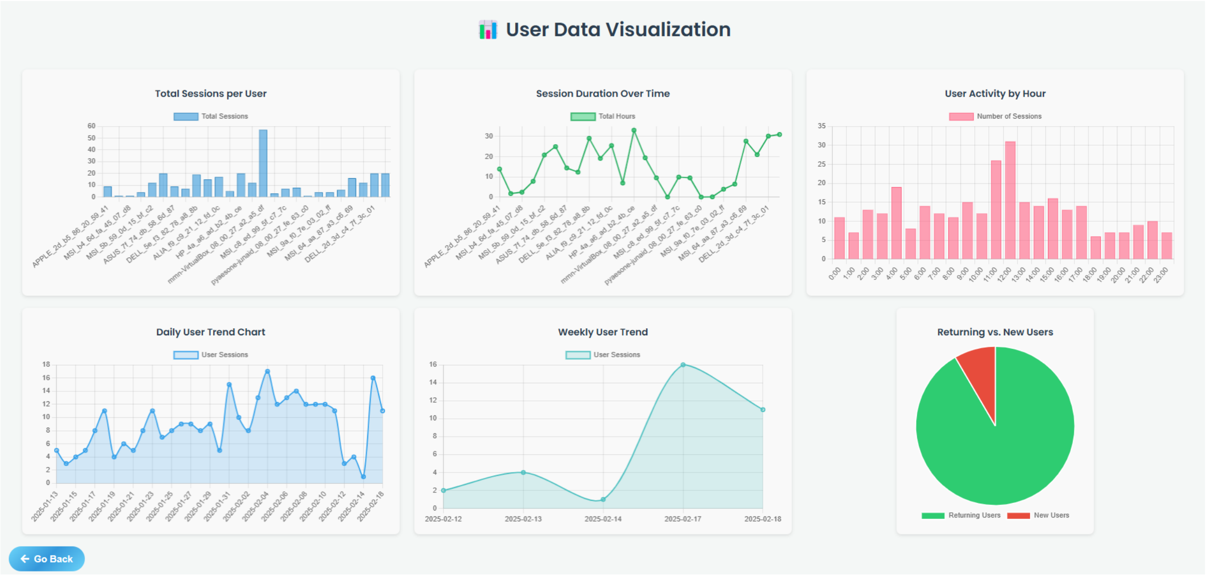


Figure 4.17: User activity visualization for analyzing session trends and patterns.

The Admin Dashboard ensures effective monitoring and management of the eSim tracker system by providing real-time insights and actionable data for administrators.

4.3 Database & API Integration

The eSim tracker system relies on a PostgreSQL database hosted on Render, with a Flask-based API handling data interactions. This section details the database setup, API implementation, and deployment process.

4.3.1 Database Setup

The PostgreSQL database is hosted on Render, providing a scalable and managed environment for handling user session data. The setup process involves the following steps:

1. **Render Account Setup:** A Render account was created to manage hosting services.
2. **Database Creation:** A new PostgreSQL database instance was set up on Render.
3. **Database Credentials:** The database credentials (host, port, database name, username, and password) were obtained from Render.
4. **Configuration in Flask Application:** These credentials were added to the database setup file and Flask API to establish a connection.

The database is responsible for storing user sessions, logs, and tracking data, ensuring efficient data management and retrieval.

4.3.2 Flask API Implementation

The backend API is implemented using Flask, enabling communication between the frontend and the database. The API performs various operations such as fetching user sessions, retrieving logs, and visualizing data. Key aspects of the API implementation include:

- **CORS Configuration:** The Flask app is configured with Cross-Origin Resource Sharing (CORS) to allow communication with the frontend.
- **Database Connection:** The API connects to the PostgreSQL database using `psycopg2`.
- **Session Tracking Endpoints:** The API provides endpoints for retrieving session logs and user statistics.

A simplified version of the database connection setup is shown below:

```
 import psycopg2
 import os

def connect_db():
return psycopg2.connect(
dbname="esim_tracker_3xaz",
user="esim_tracker_user",
password="kHvUbm2oKEbn3EXbfT0gRRh0YYqS9jy1",
host="dpg-cuqnkclumphs73etncb0-a.oregon-postgres.render.com",
port="5432"
)

 conn = connect_db()
 cursor = conn.cursor()
```

4.3.3 Deployment on Render

The deployment of the eSim tracker system involves hosting both the database and the web application on Render. The deployment steps are as follows:

1. **GitHub Repository:** The Flask application (`app.py`) and frontend (`index.html`) were first stored in a GitHub repository.
2. **Render Web Service Creation:** A web service was created on Render and linked to the GitHub repository.
3. **Database Connection:** The web service was configured to connect to the PostgreSQL database on Render.

4. **Easy One Click Deployment:**To Trigger any updates pushed to GitHub, only one click is needed for deployment on Render.

This setup ensures that the API and database are accessible via a publicly hosted web service, enabling seamless integration between the frontend and backend.

Chapter 5

Conclusion & Future Enhancements

5.1 Summary of Findings

The implementation of the eSim tracker system successfully integrates a PostgreSQL database hosted on Render, a Flask-based API for backend communication, and a user-friendly dashboard for monitoring session activities. The system provides various features, including:

- **User Session Tracking:** Enables users to monitor their session activity, including duration and usage patterns.
- **Data Visualization:** Provides graphical insights into session data using bar charts, line charts, and pie charts.
- **Database Management:** Securely stores user session logs and tracking data using a cloud-hosted PostgreSQL database.
- **API Integration:** Implements RESTful endpoints to retrieve, analyze, and visualize user session data.
- **Deployment on Render:** Ensures seamless access by hosting both the database and the web service on Render, integrated with GitHub for continuous updates.

The system effectively achieves its goal of providing an intuitive platform for tracking and analyzing eSim usage, benefiting users by offering detailed insights into their activity.

5.2 Limitations & Challenges

Despite the successful implementation, several challenges and limitations were encountered during development:

- **Data Latency:** There can be slight delays in retrieving and displaying session logs due to API response time and database queries.
- **Limited Data Filtering:** Currently, users can view their session data, but advanced filtering options (such as session type) are not fully implemented.

- **Scalability Concerns:** The current setup is suitable for moderate usage, but large-scale adoption may require database optimization and API performance improvements.
- **Security Considerations:** While basic security measures are in place, additional features such as authentication, role-based access, and data encryption could further enhance security.
- **Render Service Limitations:** Since Render has resource limitations for free-tier accounts, prolonged usage may require upgrading to a paid plan for better performance.

5.3 Possible Improvements & Future Work

To enhance the functionality and performance of the eSim tracker system, the following improvements and future work are proposed:

5.3.1 User Authentication and Role-Based Access

To enhance security and user control, a login-based authentication system can be integrated:

- Implement user authentication using JWT (JSON Web Token) or OAuth.
- Introduce role-based access control, where administrators can manage user privileges.
- Enable encrypted storage of user credentials for improved security.

5.3.2 Improved Data Visualization

The existing visualization tools can be enhanced by:

- Adding interactive charts with dynamic updates.
- Providing comparison graphs to analyze session trends over time.
- Introducing downloadable reports for the visualized data in PDF or CSV format for data analysis.

5.3.3 Performance Optimization

To enhance system efficiency and reduce response times:

- Optimize database queries using indexing and caching mechanisms.
- Implement asynchronous processing for API calls to improve responsiveness.
- Upgrade hosting resources on Render to support larger datasets and high traffic.

5.4 Conclusion

The eSim tracker system provides a solid foundation for monitoring and analyzing session activities through an intuitive dashboard, a well-structured database, and a seamless API integration. While the system successfully meets its initial objectives, several areas for improvement remain. By incorporating advanced data management features, optimizing performance, and enhancing security measures, the system can evolve into a more comprehensive and scalable solution for eSim tracking in future iterations.

Chapter 6

KiCad Updater for eSim - Windows

6.1 Introduction

The **KiCad Updater for eSim - Windows** is a critical component of the **Tool Manager for eSim**, designed to manage and update KiCad installations efficiently. The Tool Manager for eSim is an automated software tool that ensures users have the correct versions of essential EDA (Electronic Design Automation) tools such as KiCad, NGSpice, GHDL, and Verilator, providing a seamless experience in circuit design and simulation.

6.2 Theory Background

6.2.1 eSim

eSim is an open-source EDA tool developed for circuit design, simulation, and PCB layout. It integrates various software tools to create a comprehensive electronic design environment.

Key components of eSim include:

- **KiCad**: Used for PCB layout and schematic capture.
- **NGSpice**: A powerful circuit simulation tool.
- **GHDL**: A VHDL simulator for digital circuit verification.
- **Verilator**: A high-performance Verilog simulator.

6.2.2 Tool Manager for eSim

The **Tool Manager for eSim** is a centralized utility that automates the installation and updating of these essential tools. Instead of manually tracking updates and installing them individually, users can rely on the Tool Manager to ensure they have the latest stable versions with full compatibility.

6.2.3 Importance of KiCad Updates

KiCad is one of the most widely used open-source PCB design software, playing a vital role in circuit design workflows. Keeping KiCad updated is crucial for:

- **Compatibility**: Ensuring it works seamlessly with the latest eSim features.
- **Stability**: Addressing bugs and improving performance.
- **Security**: Receiving necessary patches and fixes.
- **New Features**: Accessing the latest tools and functionalities in PCB design.

6.3 Implementation

The **KiCad Updater for eSim - Windows** provides a graphical user interface (GUI) that allows users to:

- Check the currently installed version of KiCad.
- Compare it with the latest available version.
- Update KiCad if an outdated version is detected.
- Manage related configuration files to ensure smooth operation post-update.

6.3.1 Workflow

The update process follows these steps:

1. **Open the KiCad Updater GUI**: Users start the updater through the eSim Tool Manager.
2. **Display the currently installed KiCad version**: The updater retrieves and shows the current version.
3. **Version comparison**: The updater checks for the latest available version.
4. **Prompt for update**: If an outdated version is detected, the user is notified.
5. **User selects the desired version**: The dropdown allows selection of the latest or a specific version.
6. **Initiate the update**: Clicking **Update KiCad** starts the process.
7. **Update execution**:
   - Download and install the selected KiCad version.
   - Copy necessary KiCad libraries and symbols.
   - Update the configuration files and JSON data.
8. **Completion confirmation**: Once updated, the GUI displays a success message.

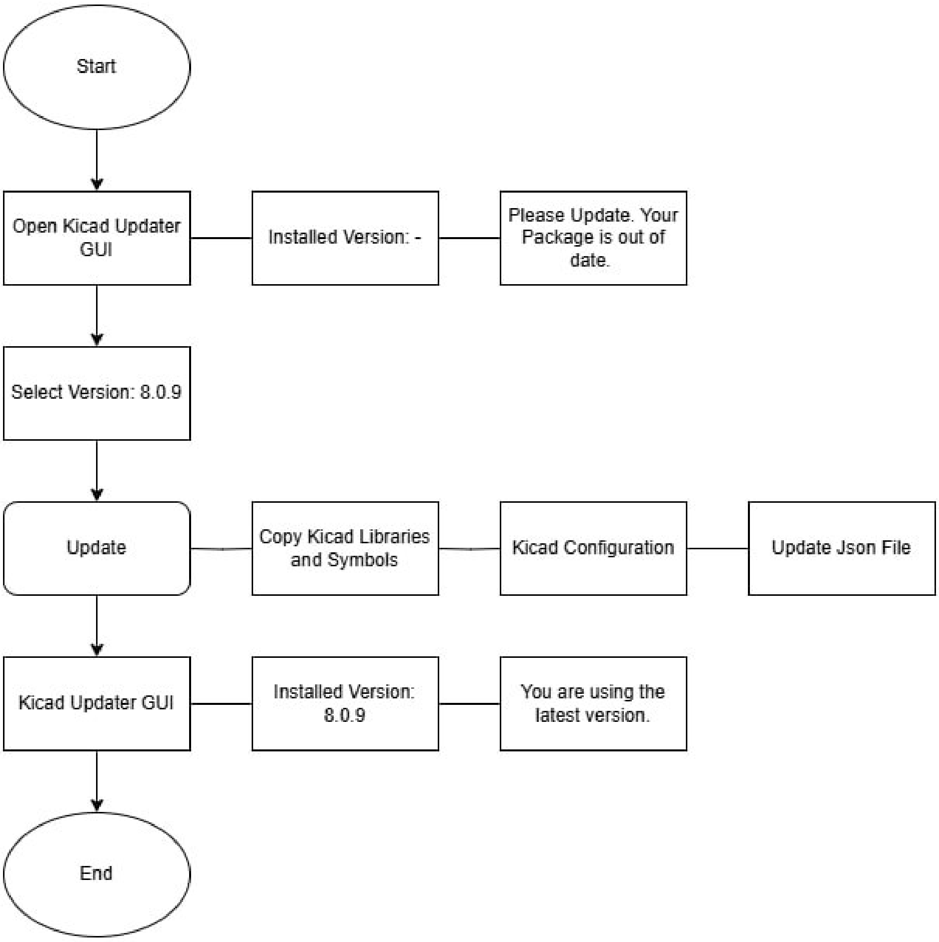
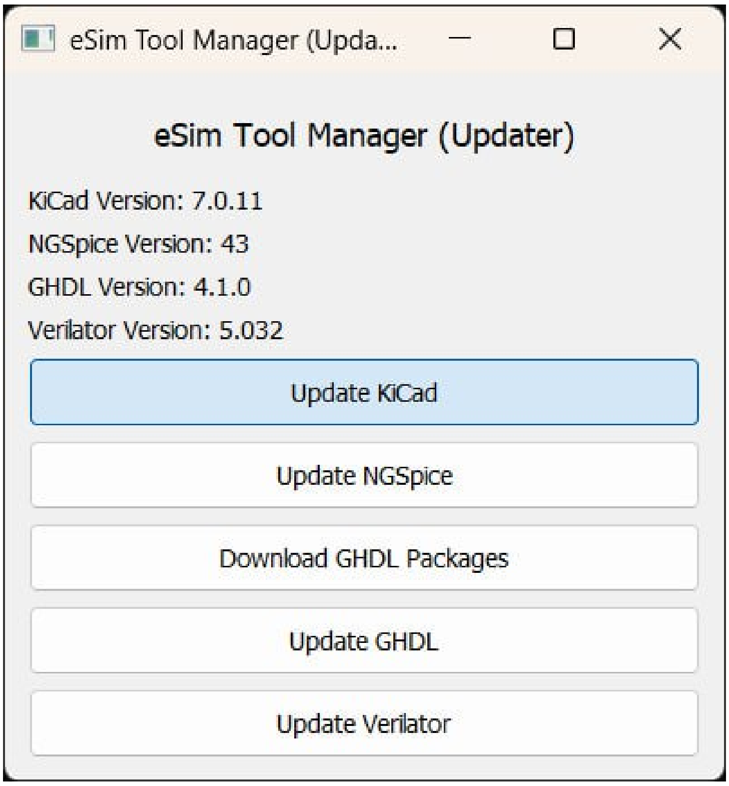


Figure 6.1: Workflow of the KiCad Updater in Windows for eSim

6.3.2 KiCad Update Process

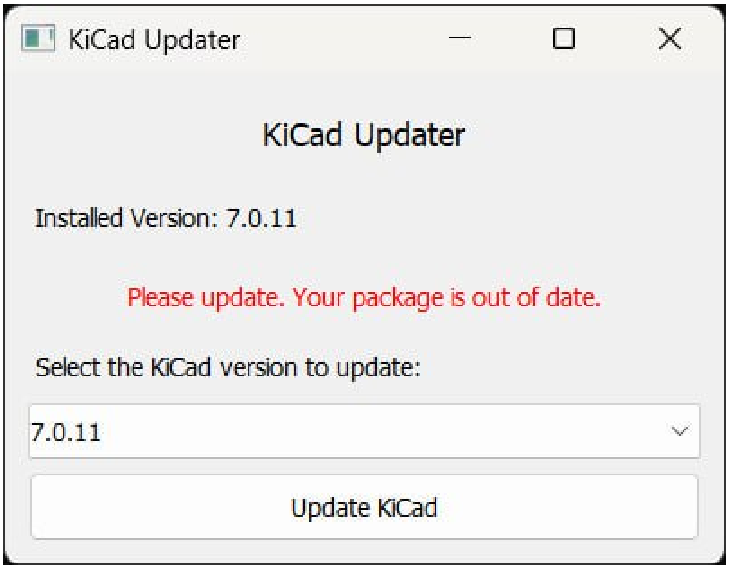


eSim Tool Manager (Updater)

KiCad Version: 7.0.11
NGSpice Version: 43
GHDL Version: 4.1.0
Verilator Version: 5.032

Figure 6.2: Tool Manager of eSim for Windows.

When the user opens the eSim Tool Manager, they are presented with a list of tools, including KiCad, NGSpice, GHDL, and Verilator, along with their installed versions. The user can choose to update any of these tools.



KiCad Updater

Installed Version: 7.0.11

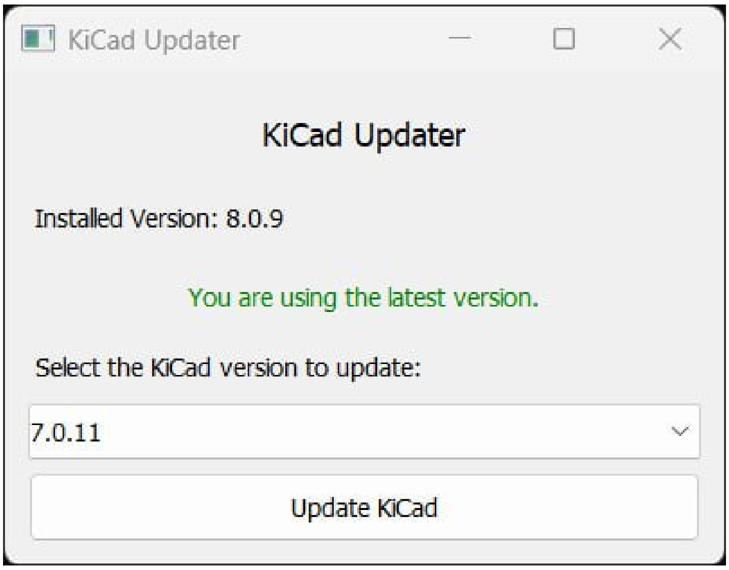
Please update. Your package is out of date.

Select the KiCad version to update:

7.0.11

Figure 6.3: KiCad Updater

After clicking on ”Update KiCad,” the KiCad Updater window appears, showing the currently installed version. The user can select a newer version from the dropdown list before proceeding with the update.



KiCad Updater

Installed Version: 8.0.9

You are using the latest version.

Select the KiCad version to update:

7.0.11

Figure 6.4: KiCad updater with installed version information

Once the update is complete, the KiCad Updater notifies the user that they are using the latest version, ensuring that all necessary components are installed and configured correctly.

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