# Blockchain–Based
# Traffic Violation Logging & Penalty
# Management System

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# 1. Introduction

## 1.1 Overview

This user manual serves as a detailed guide for end-users, including traffic authorities and drivers, on the effective operation of the web-based ChainGuard system. ChainGuard is designed to streamline traffic violation management through a secure and user-friendly platform that facilitates efficient communication between enforcement agencies and the public. The manual also provides detailed coverage of essential system requirements for accessing the platform across various devices, as well as operational guidelines for utilizing all available features. Users will find step-by-step instructions for common tasks, navigation procedures, and best practices to ensure optimal system performance and user experience.

## 1.2 System Requirements

The system requirements cover both hardware and software aspects necessary for optimal performance of the ChainGuard system. These specifications ensure reliable access and functionality across different computing environments, as detailed in the following table:

| Component | Requirement |
|---|---|
| Operating System | Ubuntu/Debian Linux |
| Architecture | ARM64 or x86_64 |
| RAM | Minimum 4GB (8GB recommended) |
| Storage | Minimum 20GB free space |
| Network | Internet connection for downloads |

## 1.3 User Access Levels

The ChainGuard system operates with two distinct user access levels, each designed with specific functionalities and visual interfaces to accommodate different operational roles.

| User Group | Interface | Access Purposes |
|---|---|---|
| Driver (User) | User page (Blue-coloured) | View pending violations<br>View violation history<br>View and submit appeals<br>Profile viewing and management |
| Traffic Authority (Admin) | Admin page (Green-coloured) | Generate reports based on statistics<br>Log violation history<br>Manage appeals<br>Manage user accounts |

# 2. Getting Started

This section focuses on the initial setup procedures for accessing the ChainGuard system. It covers the application access methods, account creation processes, and sign-in procedures for both user types.

## 2.1 Accessing the Application

To access the ChainGuard system, ensure that all prerequisites from the installation kit have been successfully configured. The application can be accessed through the following steps:

1.  Open any standard web browser
2.  Navigate to the website using: http://[IP_ADDRESS]
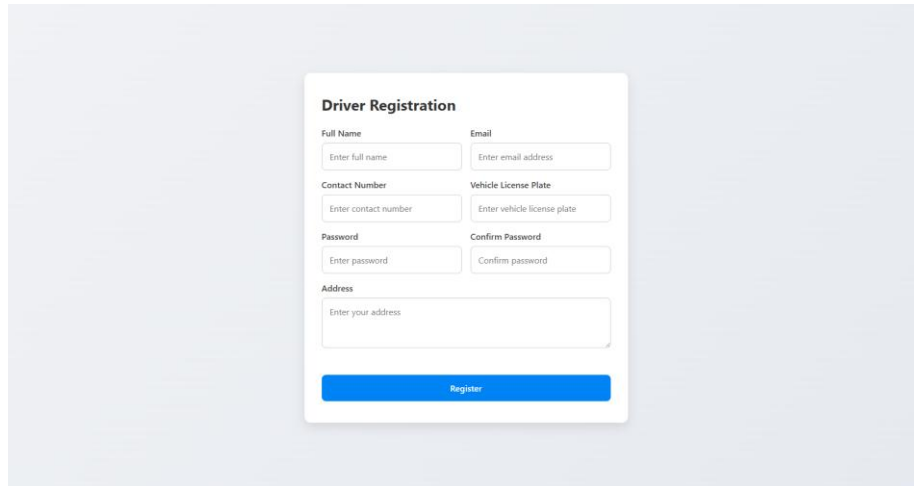3.  The system login page will be displayed upon successful connection
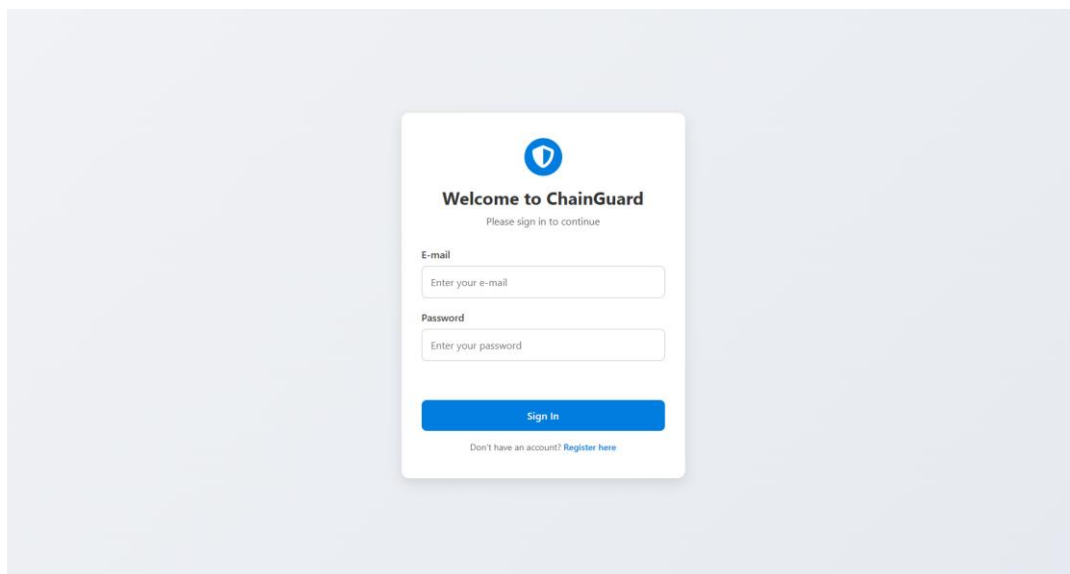


## 2.2 Creating an Account / Signing In

The ChainGuard system supports two types of user registrations with distinct access methods and requirements.

**Driver Account Registration**

To create a driver account, follow these procedures:

1.  From the login page, click "Register here"
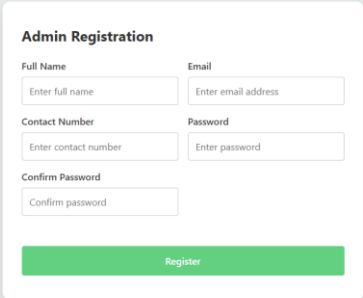2.  The system will navigate to the Driver Registration Page

3. Complete the required user information fields:

   - **Full Name**: Cannot be empty; must not contain numbers

   - **Email**: Cannot be empty; must be valid email format

   - **Contact Number**: Must follow Malaysian phone number format

   - **Vehicle License Plate**: Must follow Malaysian license format (letters I and O cannot be used)

   - **Password**: Minimum 8 characters with at least 1 special character, 1 number, and 1 capital letter

   - **Confirm Password**: Must match the password field

   - **Address**: Optional field

4. Complete the registration process

5. An email notification will be sent confirming successful registration

6. Navigate to the login page to begin using the system

**Traffic Authority (Admin) Registration**

To create an admin account, follow these procedures:

1. Navigate directly to: http://[IP_ADDRESS]/php/admin_registration.php

2. The system will navigate to the Admin Registration Page

3. Complete the required user information fields:

   - **Full Name**: Cannot be empty; must not contain numbers

   - **Email**: Cannot be empty; must be valid email format

   - **Contact Number**: Must follow Malaysian phone number format

   - **Password**: Minimum 8 characters with at least 1 special character, 1 number, and 1 capital letter

   - **Confirm Password**: Must match the password field

3. Complete the registration process

4. Navigate to the login page to access the admin interface

# 3. Using ChainGuard System – Driver

## 3.1 Sign In

1. Navigate to the login page at http://IP_Address

2. Enter the required fields

   - Email: Valid email registered before

   - Password: Password corresponding to the registered account

3. Click the "Sign In" button to complete the authentication process

## 3.2 Pending Violations Viewing

The pending violations page serves as the main screen after successful login and displays all outstanding violations requiring payment.
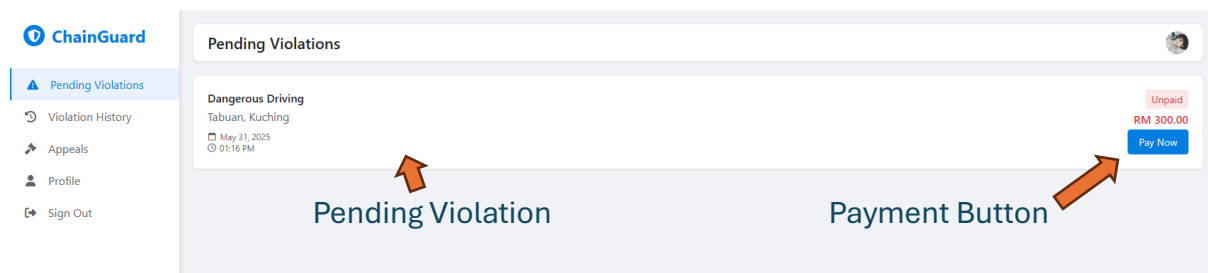


1. View all pending violation(s) recorded in the system upon login

2. Click the "Pay Now" button to proceed with payment processing
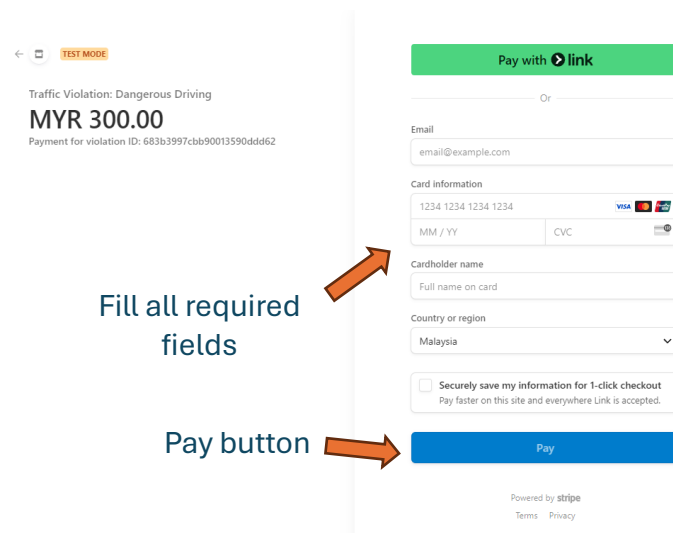


3. Complete the payment form with the following required information:

   - **Email**: Contact email address

   - **Card Information**: Valid credit/debit card number

   - **Expiry Date**: Card expiration date

- **CVC**: Card verification code

- **Cardholder Name**: Name as shown on the card

4.  Click the "Pay" button to process the payment

5.  The system will redirect user back to the pending violations page

6.  Successfully paid violations will no longer appear in the pending list

## 3.3 Violation History Viewing

This page provides access to all violation records with various status types and search capabilities.



1.  View all violations recorded in the system (Pending, Approved, Rejected, Paid)

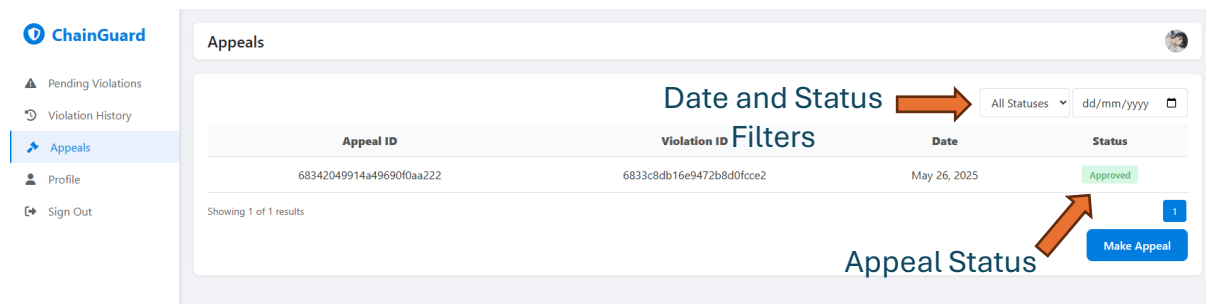2.  Click on any violation entry to display a detailed popup with complete violation information



3.  Copy the violation ID from the popup (required for appeal submissions)

4.  Use the search function to locate violations by violation type

5.  Apply date filters to narrow down violation records by specific time periods

## 3.4 Appeal Viewing and Submission

The appeals page allows user to monitor existing appeals and submit new appeal requests for violations.



1. View all appeals submitted with their current status (Approved, Rejected, Pending)

2. Click on any appeal entry to display a detailed popup with complete appeal information

3. Use filters to sort appeals by date and status

4. Click the "Make Appeal" button to initiate a new appeal submission
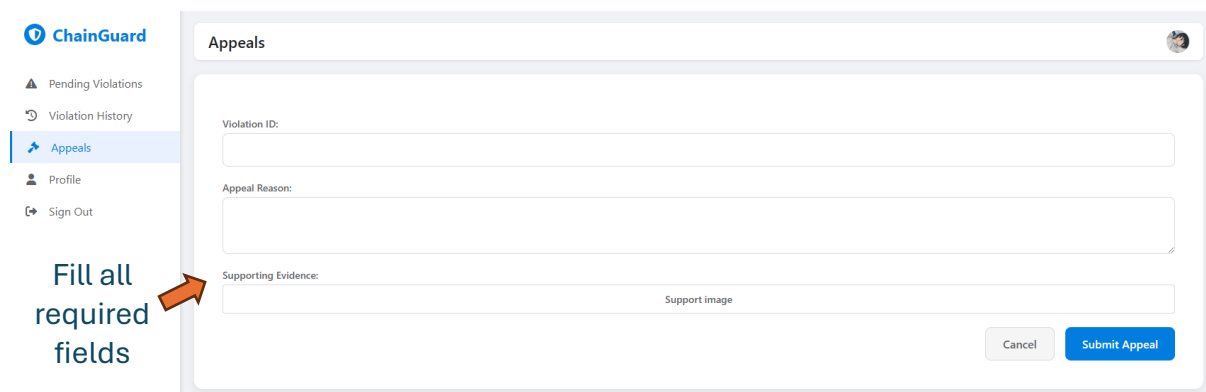


5. Complete the appeal form with the following required information:

   • **Violation ID**: Copy Violation ID

   • **Appeal Reason**: Detailed explanation for the appeal request

   • **Supporting Evidence**: Upload relevant documentation or evidence

6. Click "Submit" to successfully log the appeal in the system

## 3.5 Profile Viewing and Management

The profile section provides access to user account information and allows for personal data updates.
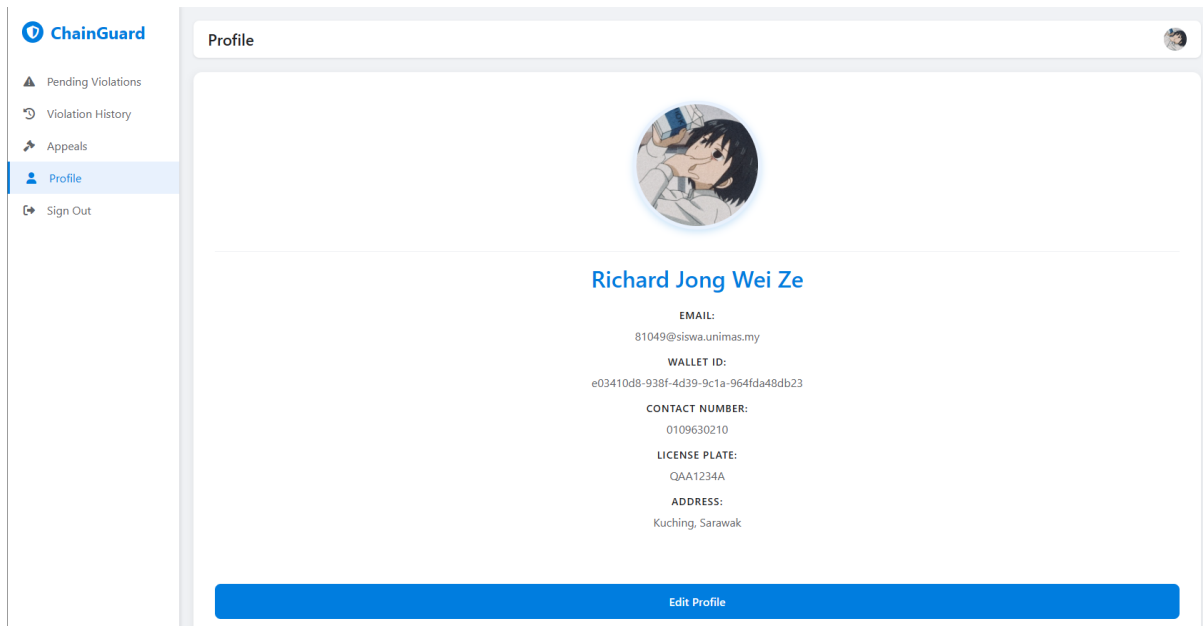


1.  View all current user information in user profile

2.  Click the "Edit Profile" button to modify account details

3.  The system will navigate to the edit profile page

4.  Update any field except the wallet ID (read-only)

5.  Click the "Save Changes" button to confirm and save modifications

6.  Click the "Cancel" button to return to the profile page without saving changes

## 3.6 Sign Out

To securely exit user account session:

1.  Click the "Sign Out" option from the navigation menu

2.  The system will automatically redirect user to the login screen

3.  The session will be terminated for security purposes

# 4. Using ChainGuard System – Traffic Authority

## 4.1 Sign In

1. Navigate to the login page at http://IP_Address

2. Enter the required fields

   - Email: Valid email registered before

   - Password: Password corresponding to the registered account

3. Click the "Sign In" button to complete the authentication process

## 4.2 Statistic Viewing and Reporting

The statistics dashboard provides real-time data analysis and reporting capabilities for violation and appeal records.
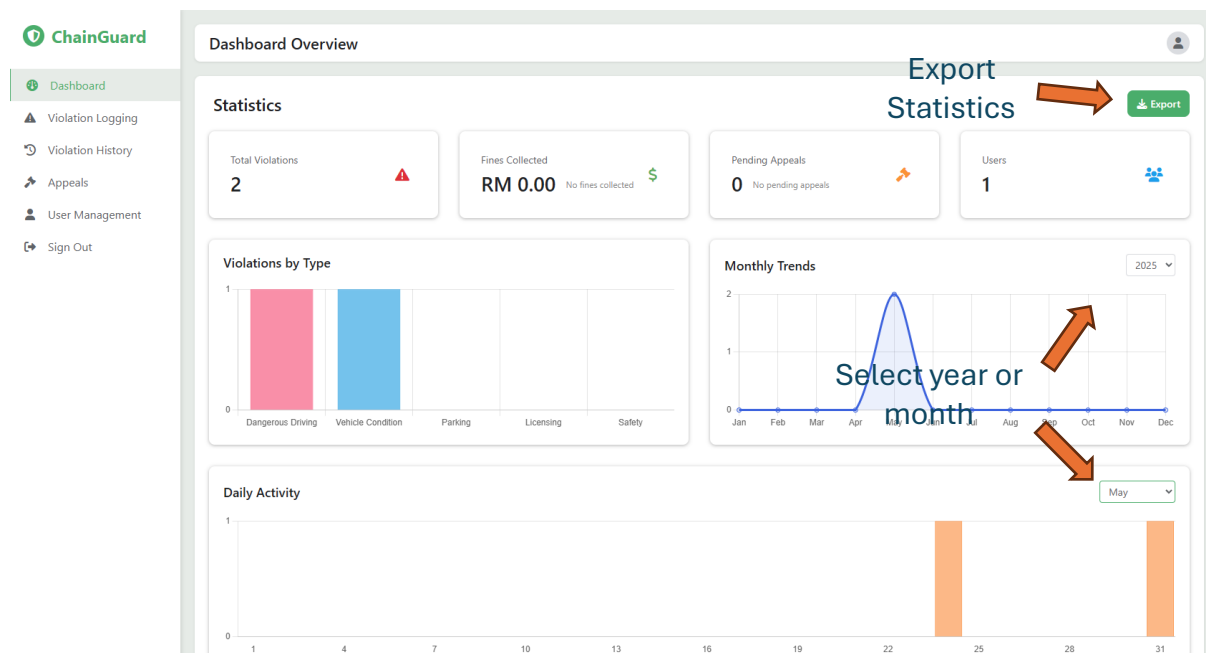


1. View real-time statistics of violations and appeals recorded in the system

2. Interact with monthly and daily graphs to apply precise filtering options

3. Click the "Export" button to generate statistical reports

Save as PDF
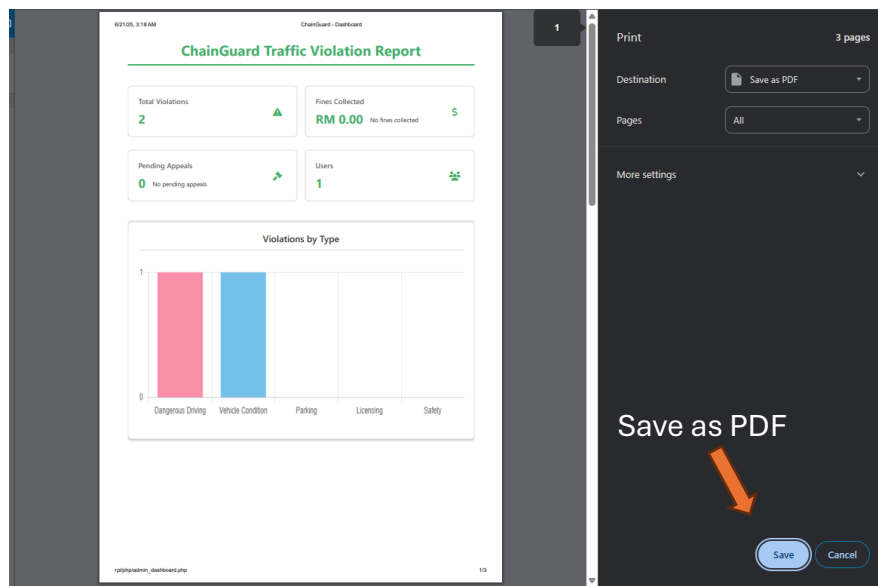
4.  Save the exported statistics as PDF format for record-keeping purposes

## 4.3 Violation Logging

The violation logging function allows traffic authorities to create new violation records directly into the blockchain ledger.



Fill all required fields

Refresh violations

Save log

1.  Complete the violation record form with the following required information:

- **Violation Type**: Select appropriate violation category

- **Location**: Specify exact location of the violation

- **Time**: Record date and time of the violation

- **License Plate Number**: Enter the vehicle's license plate

- **Penalty Amount**: Input the fine amount for the violation

- **Violation Image**: Upload photographic evidence

2. Click the "Save Changes" button to save the violation record and create a block on the ledger

3. Click the "Refresh Violations" button to push any on-hold data to the blockchain ledger

## 4.4 Violation History Viewing

This page provides access to all violation records with enhanced administrative search and filtering capabilities.



1. View all violations recorded in the system (Pending, Approved, Rejected, Paid)

2. Click on any violation entry to display a detailed popup with complete violation information

3. Use the search function to locate violations by violation type

4. Apply date filters to narrow down violation records by specific time periods

5. Apply license plate filters to view violations for specific vehicles

## 4.5 Appeal Management

The appeal management section provides administrative control over all appeal submissions and decision-making processes.



1. View all appeals submitted to the system with their current status

2. Click on any appeal entry to display a detailed popup with complete appeal information

3. Review supporting evidence and appeal reasoning provided by drivers

4. Select appropriate action to either approve or reject the appeal based on review findings

5. Filter appeals with license plate number searching or date selection

## 4.6 User Account Management

This administrative function provides control over all user accounts registered in the system.
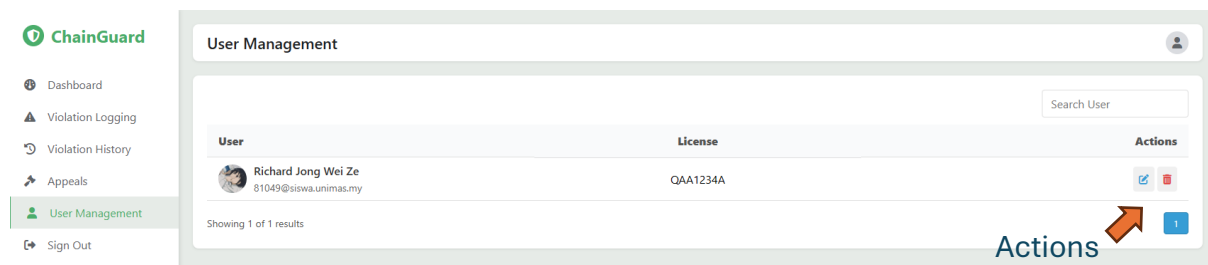


1. View all user accounts registered in the system

2. Click on any user account to display detailed account information

3. Search users with account information

4. Edit user account information as required for administrative purposes

5. Delete user accounts when necessary (caution with this function)

## 4.7 Sign Out

To securely exit admin account session:

1. Click the "Sign Out" option from the navigation menu

2. The system will automatically redirect admin to the login screen

3. The session will be terminated for security purposes

# 5. Monitoring and System Management

## 5.1 Portainer

To access and manage Docker containers through the Portainer dashboard:

1. Open the web browser and navigate to https://<server-ip>:9000/

2. Sign in using administrator credentials

3. The dashboard will display all current system Docker containers

4. Select any container to view detailed information and logs

5. For fabricAPI logs specifically:

   - Navigate to the fabricAPI container

   - Click on "Logs" to monitor registration status

   - View violation logging activities

   - Check appeal status updates
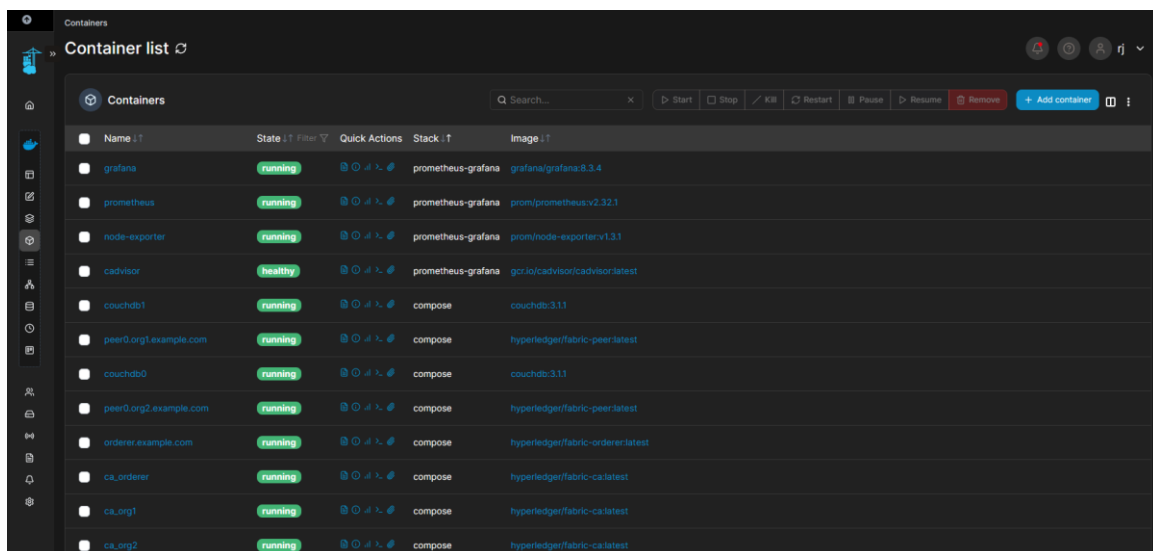


## 5.2 Grafana and Prometheus

To monitor system statistics and blockchain metrics:

1. Open the web browser and navigate to http://<server-ip>:3002/

2. Log in with administrator credentials

3. The main dashboard will display system performance metrics including:

   - Memory usage statistics

   - Storage utilization

   - Blockchain network metrics

4. Use the navigation menu to access different monitoring dashboards

5. Configure alerts and notifications as needed through the settings panel
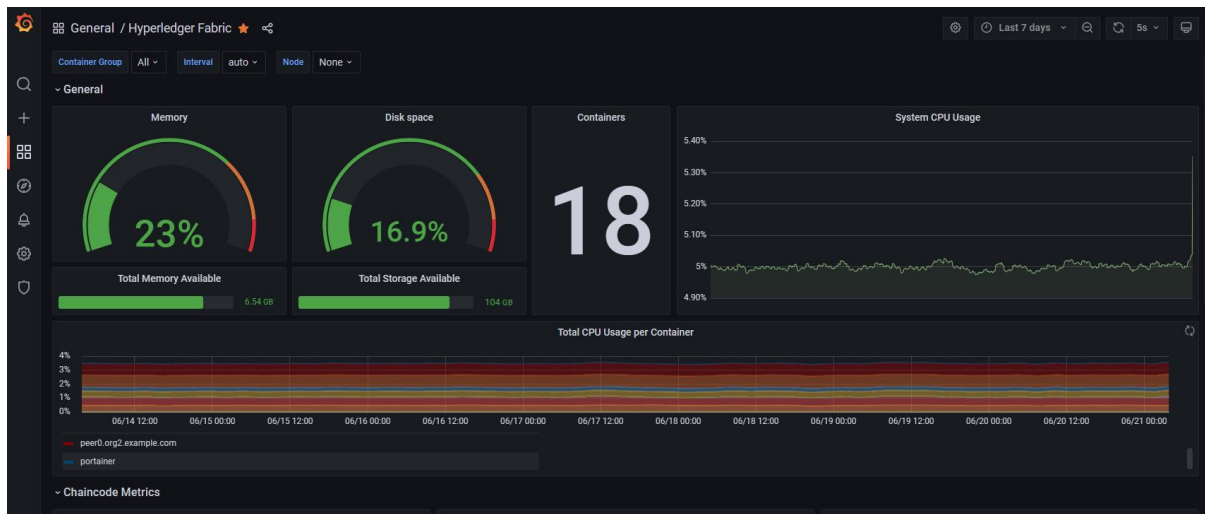


## 5.3 Hyperledger Explorer

To view detailed blockchain ledger information:

1. Open the web browser and navigate to http://<server-ip>:8081/

2. The explorer will automatically connect to the blockchain network

3. View comprehensive blockchain metrics including:

   o Real-time block creation monitoring

   o Current block height information

   o Transaction history and details

   o Network node status

4. Use the search functionality to locate specific blocks or transactions
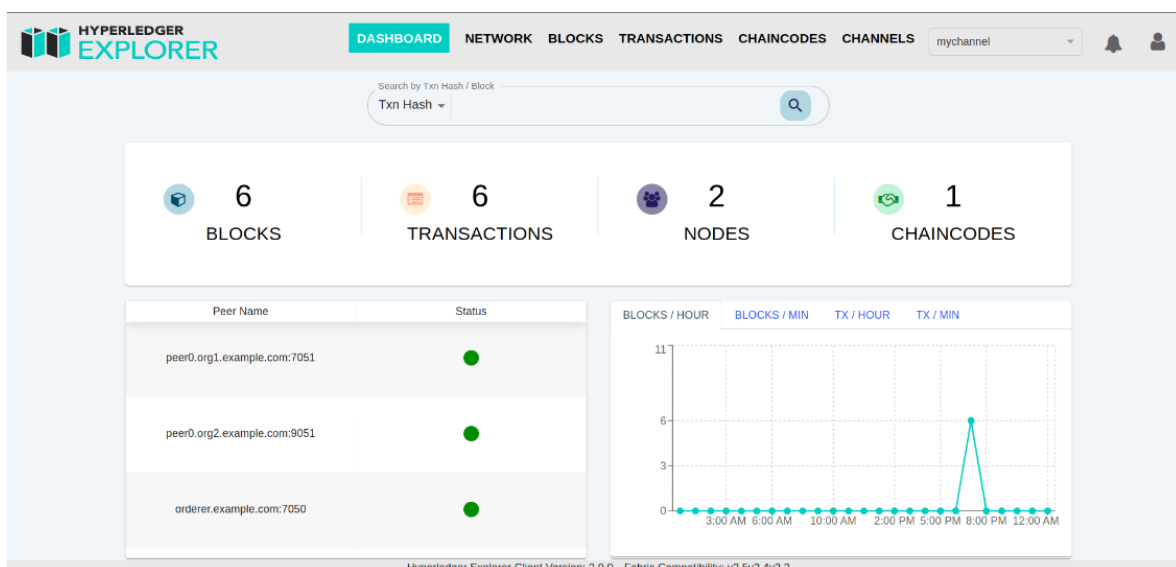
## 6. Contact and Support

For any inquires or technical issues, please reach out to:

- Email: 81049@siswa.unimas.my / richardjong01@gmail.com
- Contact Number: +60 10-963 0210