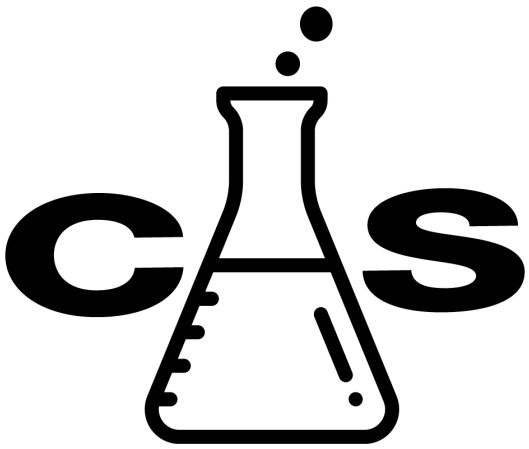
CSLabs Project Extension, Team 1 – 2021–2022

Programmer Manual



CS Labs

Content

1. Vision statement

CSLab's Vision is to provide an open source, no setup required, learning environment with clean cut architecture and separation of duties. We envision this software integrating with various virtualization software to provide the most versatile product.

2. Introduction

In this document we will explain the components of CSLabs and how they fit together. We will be explaining the jobs of each component and the methodologies that we applied to keep this system simple and understandable.

3. Component Overview

Front end

This is everything the user sees and interacts with. The frontend is built with React and calls the API to retrieve resources to display.

API

The API powers the backend for CSLabs. It is written in C# .NET with Linux support. This component provides all the routes needed for the frontend to get its data. The API communicates with Proxmox and the database to keep the application state in sync.

Proxmox

We utilize Proxmox for CSLabs, which is one of the most popular open-source virtualization solutions available. Proxmox allows us to interact with it via an API to create and destroy virtual machines along with networking devices.We integrate CHR as our virtual routing platform to provide private lab environments.

Database

The database is stored in a MariaDB database management system. This is used to store all the entities for our system. This state is synced with the proxmox's application state.

4. Tool overview

React

React is used to simplify the flow from state to UI. It makes it quite simple to view the mapping from state to UI components so that the code base stays maintainable.

Formik

Formik is a library that hooks into react that lets us perform more advanced form validation and editing. This is used in the Auth forms, contact request, and module editors.

.NET

This is used as the runtime environment for the backend. The backend is written in C# and uses .NET 6 to run on Linux servers.

EF Core

EF Core is used as the ORM (Object Relational Mapper). It maps or converts the database tables into objects using standard class files that can be queried with great ease.

5. Project Repository

CSLabs-Webapp

Link: https://github.com/ius-csg/cslabs-webapp

a. Software

- React
- Formik
- Redux
- And other dependencies can be seen in package.json

b. Test Cases

- All test cases are stored in *.test.tsx files

c. Documentation

- Documentation can be found in the project's README

d. Test platform description

- The test platform is running on top of puppeteer which is a headless chrome client

e. Test scripts

- Run yarn test in the project directory after installation

CSLabs-Backend

Link: https://github.com/ius-csg/cslabs-backend

a. Software

- .NET 6

b. Test Cases

- Test cases are stored in the CSLabs.Tests Project

c. Documentation

- All documentation for the project is provided in the project's README

d. Test platform description

- This project uses NUnit to perform automated unit tests on the backend

e. Test scripts

- Test scripts are automated using Nunit, all that is needed to do is run the CSLabs.Tests project in the repository using visual studio or Rider

CSLabs-Proxmox-Automation

Link: https://github.com/ius-csg/cslabs-proxmox-automation

a. Software

- Python

b. Test Cases

- Tests are performed manually for this application. It requires an nginx config file and network access to a proxmox server.

c. Documentation

- All documentation for the project is provided in the project's Readme.

d. Test platform description

- Centos 7

e. Test scripts

- Tests are performed manually for this application. It requires an nginx config file and network access to a proxmox server.

6. Installation for new install

For new installations, follow the setup guide on the README of the project.

7. Installation for new platform

The application is platform independent. Follow the setup guide on README to setup a new instance of the application.

8. Further development statement

Below is a list of features and fixes that could be implemented in the future.

- Metrics/monitoring features
- Migrate to VyOS and CHR
- Revise Ice Box
- Minio integration, S3 storage
- Integration with VSphere
- Add additional labs
- Improve user interface

References

Gallavin, Jason et al. " CS Labs – Web Software Requirements Specification." 1 Oct. 2019, https://github.com/ius-csg/CSLabs-Capstone-Documentation/tree/master/cslabs-web-2019-2020/DesignDocs. 21 Feb. 2022