Programmers Manual

For

Indiana University Southeast

CS Labs

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.

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.

Component Overview

Proxmox

Proxmox is the first in many possible virtualization providers for CSLabs. Proxmox allows us to interact with it via an api to create and destroy virtual machines along with networking devices. We use CHR as our virtual routing platform to provide private lab environments.

Api

The api is the powerhouse of the CSLabs. It is written in C# ASP.Net core with Linux support. This component provides all of the routes needed for the frontend to get it's data. The Api communicates with Proxmox and the database to keep the application state in sync.

Database

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

Front end

This is everything the user sees. The frontend is built with react and calls the api to retrieve resources to display.

Tool overview

React

React is used to simplify the flow from state to UI.It makes it really 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.

ASP.Net Core

This is used as the runtime environment for the backend. The backend is written in C# and uses asp.net core to run on linuz.

EF Core

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

Project Repository

CSLabs-Webapp

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

a. Software

- React
- Formik
- Redux

b. Test Cases

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

c. Documentation

Documentation is found in the project 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

ASP.Net Core

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 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.

Installation for new install

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

Installation for new platform

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

Further development statement

Below is a list of features and fixes we would like to implement in the future.

- A network graph based Lab Setup GUI
- Progression checklist
- Explore page Filtration (filter by difficulty)
- Admin Page
- Integrate Elasticsearch
- Kerberos, ldap, and/or SAML integration
- Integration with VSphere
- Add additional labs
- Improve user interface