2020 CSLabs Extension Project

Software Architecture Specification Report

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November 8th, 2020

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# 1. Proposed Software Architecture

### 1.1 Overview

CSLabs is a virtual lab learning environment created and operated by the Indiana University Southeast (IUS) Computer Security Group (CSG). It is used by IUS faculty and students to practice computer security and learn other aspects of computer science using virtual machines (VM).

The CSLabs 2020 Capstone project is an extension of the previous year’s Capstone projects. The extension project does not aim to overhaul the existing system architecture. The project objectives are to add new functionalities, system quality enhancements, and user experience improvement to the CSLabs Webapp and backend application.

According to according to Clifton et al. (2019), the CSLabs system is comprised of several components: the frontend webapp, the backend application server, the MariaDB database server, and the Proxmox virtual environment cluster.

The frontend webapp is bootstrapped with Facebook’s React JavaScript library. The webapp uses Create-React-App with Typescript for building the user interfaces. According to Gallavin et al. (2019), this will provide maximum type safety in the project.

The backend application server is built with the DotNet Core framework in C#.

Using the DotNet Core framework allows the project to host the C# application on a Linux server. The backend application server receives API calls from the frontend webapp for data and authentication. According to Gallavin et al. (2019), this setup provides maximum type safety for validating requests.

The previous project developers have advised that the backend application server also uses Rundeck open source automation service to issue scripted commands to the Proxmox virtual environment cluster. Proxmox will be running, and housing VMs that are controlled by the Rundeck scripts

**1.2 Subsystem Decomposition**

**1.3 Hardware / Software Mapping**

### 1.4 Persistent Data Management

### 1.5 Access Control and Security

### 1.6 Global Software Control

### 1.7 Boundary Conditions

# **2. Basic components Project Description**

### 2.1 Use Cases

### 2.2 Functions

### 2.3 Triggers

### 2.4 Data Stores

### 2.5 Data Flows

### 2.6 Data Elements

### 2.7Processors

### 2.8 Data Storage

### 2.9 Data Connections

### 2.10 Actors/External Entities

**3. Key Personnel and Contribution Breakdown**

|  |  |  |
| --- | --- | --- |
| Position | Name | Contribution |
| Project leader | Lu, Yiliang | Conduct primary and secondary research; draft and edit reports; coordinate events and meetings; establish a liaison with external parties and advisors. |
| Full Stack Developer | Bello, Junet | Create and manage backlogs; project feasibility consulting; primary developer for the CSLabs backend; alternate project POC |
| Full Stack Developer | Martin, Cooper | Primary developer for the CSLabs web-app frontend; alternate event coordinator; unit testing |

Works Cited

Clifton, Zac et al. "CS labs Infrastructure Hardware Requirements Specication for CSlabs Operations and Application."  15 Oct. 2019, <https://github.com/ius-csg/CSLabs-Capstone-Documentation/tree/master/cslabs-Infra-2019-2020/REPORTS>.  27 Oct. 2020

Gallavin, Jason et al. " CS Labs – Web Software Architecture Specification." 14 Oct. 2019, <https://github.com/ius-csg/CSLabs-Capstone-Documentation/tree/master/cslabs-web-2019-2020/DesignDocs>.  27 Oct. 2020