Student Laptop Online Inventory System

Technical Design Document

Application Team

IT Department

Western Technical College

Version 1.0

April 2021

Western Technical College

Contents

Introduction

Purpose

This document provides a detailed technical documentation of the student laptop online inventory system design, development, and implementation on the WTC's internal production web server (https://legolas.westerntech.edu/apps/). The student laptop online inventory system will facilitate the IT HelpDesk staff's inventory workflow by enabling them to be able to establish and track online records of student laptops with detailed information (e.g., SN, inventory location, inventory status, department, assigned student name and student ID). In addition, this system will also allow program directors to track their own department student laptop inventory and assign computers to students by updating assigned status of the online records.

Intended Audience and Pertinent Sections

WTC IT Department staff, including the web developer, system analyst, and the IT director.

Project Scope

Like other web-based applications developed at WTC, the student laptop online inventory system enables client-side TLS/SSL user authentication and user login for user restriction and authentication. It also enables the https protocol using server-side SSL certificate (signed by WTC CA) for data encryption when date is being transferred between the end users and the web server.

This application consists of four major functions:

1. An inventory table view for the users to track the status of all student laptop inventory; update records; create new records; export records; search (simple and advanced) for records.
2. A scanning function that will automatically store all the records by scanning bar codes based on the end user's reconfiguration (i.e., order and types of codes (SN, MAC, and WLAN), asset type, inventory locations, etc.).

3. A dashboard that provide both pie and bar charts that allows the users to visually see the general statistics of the HR's inventory status.

4. An inventory table view that is only viewable by PDs. The PD is able to only view the student laptop inventory that belongs to his/her program(s) and assign computers to students as needed.

Document Conventions

WTC – Western Technical College

PD – Program Director

TDD – Technical Design Document

SSL – Secure Sockets Layer (predecessor of TLS)

TLS – Transport Layer Security

CMS – content management system

References

1. Client Authentication During SSL Handshake - https://docs.oracle.com/cd/E19424-01/820-4811/aakhe/index.html

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Requirements of External Interface

User Interface

The user interface consists of **four major sections**: the **inventory table views** (**HelpDesk Staff** and **PDs**), the **inventory scanning view**, and the **dashboard view**.

The inventory table view for the IT HelpDesk staff will allow them to easily track all records of current student laptop inventory status that are both in stock and assigned. The table view also provides useful functions including updating records; creating new records; assigning computers to students (i.e., change computer assigned status and add assigned student name and student ID); and conducting simple and complex queries on the inventory.

Figure 1 – The Inventory Table View for IT HelpDesk Staff

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The advanced search function will allow the IT staff to be able to identify records based on two to three search conditions such as asset type, department name, computer brand, etc.


Figure 2 – The Advanced Search

The Inventory Table View for PDs is only accessible to PDs and the table will show respective department's laptop inventory based on the user's account. For instance, when an Automotive Technology Program Director logs in to this application, it will show the inventory that belongs to the Automotive Technology program. The PD has the edit permission to update the assigned status of computers (i.e., add assigned student's name and ID).

Figure 2 - The Inventory Table View for Program Directors

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The scanning view will allow IT HelpDesk Staff to pre-configure the base information of each batch of scanned records (e.g., asset type, department name, inventory location, brand) and continuously scan laptop bar codes such as SN, MAC, and/or WLAN address. All the scanned records will populate on the preview window (left area of the screen) as the staff scans the laptops before they are saved into the database.
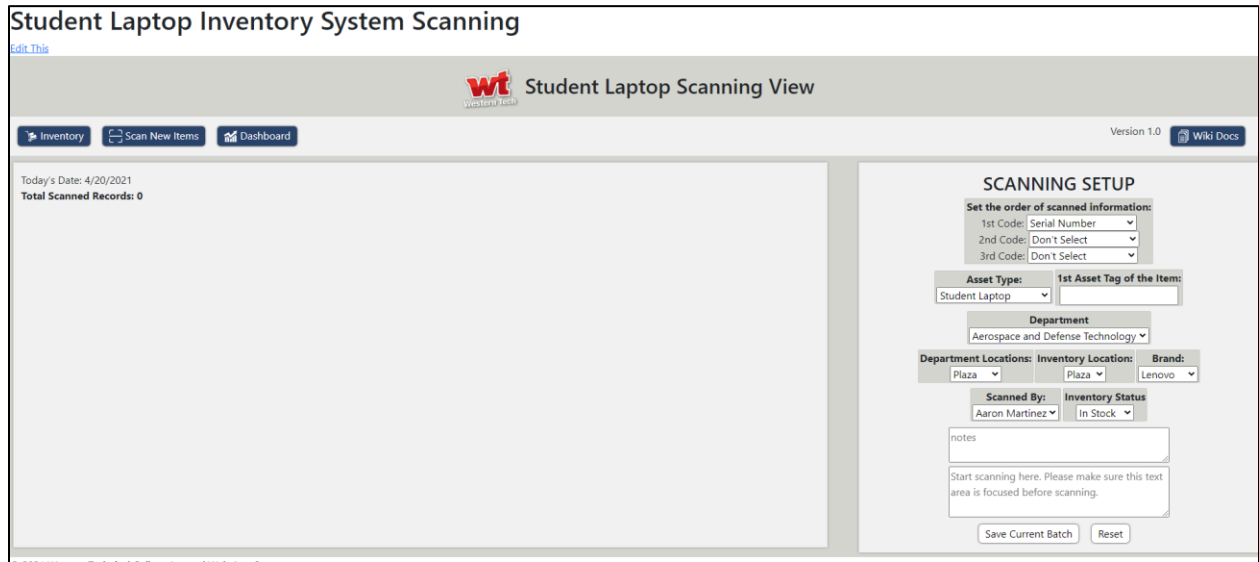
Figure 3 – The Scanning View for IT HelpDesk Staff

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The dashboard view will generate pie and bar charts for statistical status of the whole inventory. It provides a high-level understanding of the inventory status (e.g., total assigned vs total in-stock by month or department)
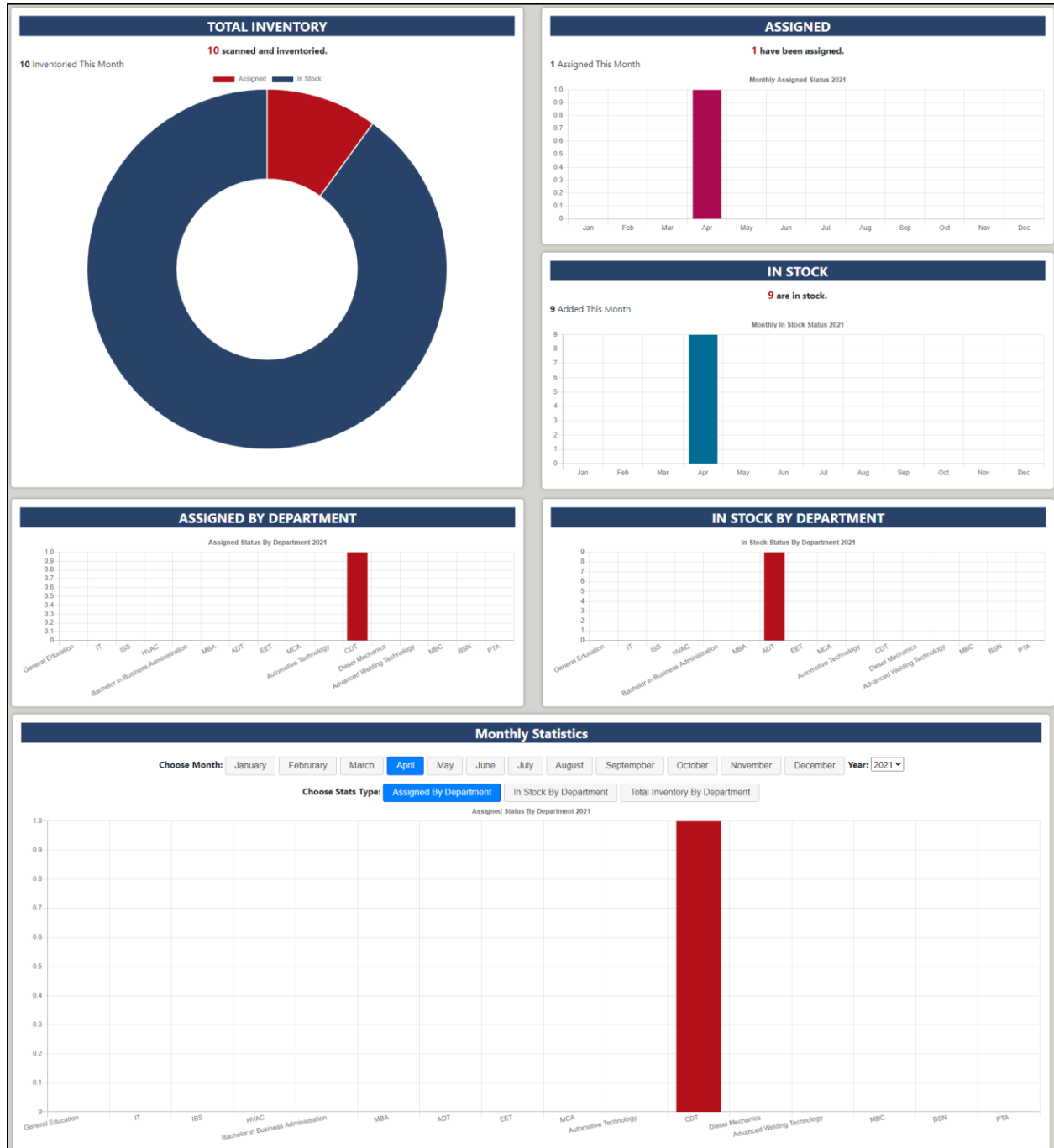

Figure 4 - The Dashboard View for Statistical Status of the Overall Inventory

Hardware Interfaces

1. The physical server is located at WTC and managed by the IT's infrastructure team.

2. **VM Hardware Configuration**:
   a. 1 CPU
   b. 8 GB Memory
   c. 60 GB Storage

Software Interfaces

1. The student laptop online inventory system was developed using HTML, JS, CSS for the front-end and PHP for the backend. For all the charts, the Chart.js JS library was utilized (for more detail: https://www.chartjs.org/).
   a. **JS files**:
      i. /var/www/html/apps/wp-content/uploads/js/inventorySystem.js
      ii. /var/www/html/apps/wp-content/uploads/js/inventorySystemStats.js
      iii. /var/www/html/apps/wp-content/uploads/js/inventorySystemScanning.js
      iv. /var/www/html/apps/wp-content/uploads/js/inventorySystemPD.js
      v. /var/www/html/apps/wp-content/uploads/js/inventorySystemNavigation.js
   b. **CSS file**: /var/www/html/apps/wp-content/uploads/css/inventoryStyle.css
   c. **PHP file**:
      i. /var/www/html/apps/wp-content/plugins/wt-student-laptop-inventory-system/wt-student-laptop-inventory-system.php
      ii. /var/www/html/apps/wp-content/plugins/wt-student-laptop-inventory-system-pd/wt-student-laptop-inventory-system-pd.php

2. It uses WordPress as the CMS for user role/permissions management (i.e., what content can be viewed/edited by who). See figure 5.
   a. Currently, there are five active roles set up in WordPress:
      i. **Administrator** (for web developer to update codes)
      ii. **Admin** (for IT staff to view all pages)

iii. **Help Desk** (for Help Desk staff to view all pages except user private pages)

iv. **Program Director** (for PDs to view their applications only)

v. **HR Staff** (for HR staff to view their applications only)
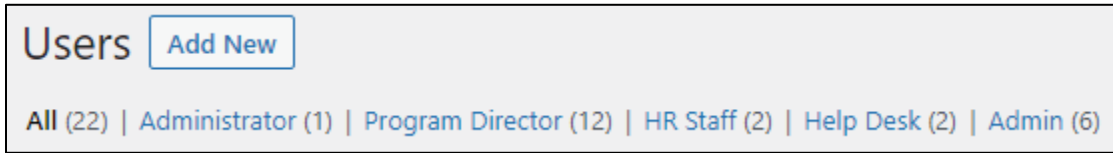
Figure 5 – Current Available User Roles Setup

Communication Interfaces

For data transmission, the web application uses REST API and sends POST and GET requests to the web server and web server will process requests accordingly to pull and/or push data to MySQL server. The server-side SSL has been implemented via HTTPS protocol and all data transmissions between the webserver and the end-user are encrypted.

All end-users will need to have the valid client-side SSL certificate signed by WTC's internal CA: DIWS19ADBU-CA and valid login username and password to be able to access the student laptop online inventory system. All the REST API end points are secured and only accessible to logged in users with appropriate user roles/permissions.

Technical Design Diagram

This web application is designed based on good web security practice by implementing TLS/SSL protocol for both user authentication and data encryption.
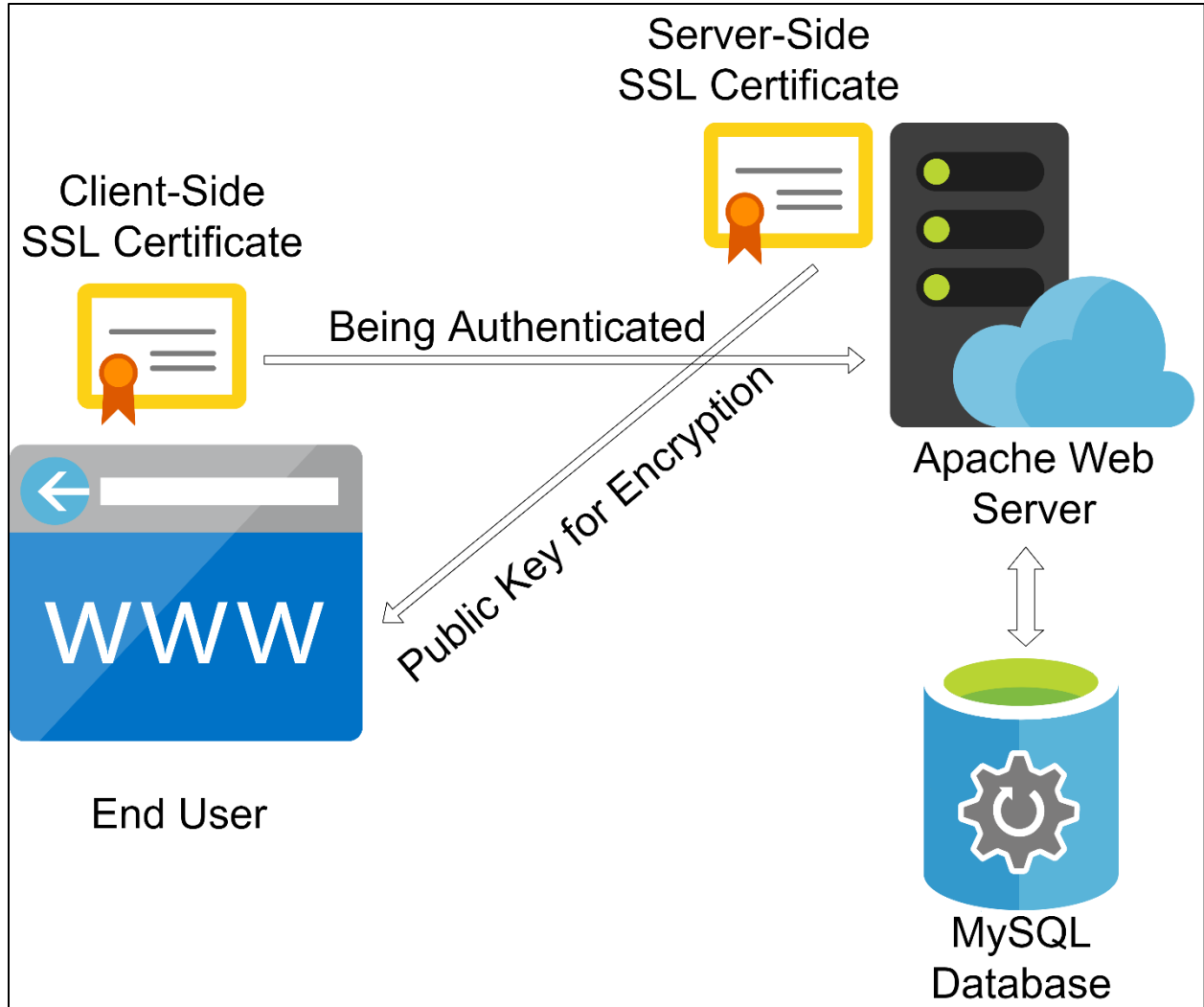

Figure 6 – Application Technical Design

This application sends dynamic data (student laptop records) to the end-user based on the web application URL and user account role (e.g., Admin Role for IT Staff and Program Director Role for PDs).

The IT staff view allows the user to view all records from the database and upload new records of the inventory to the database. The program director view will check the user's account and display the inventory of the user's department. See Figure 7.
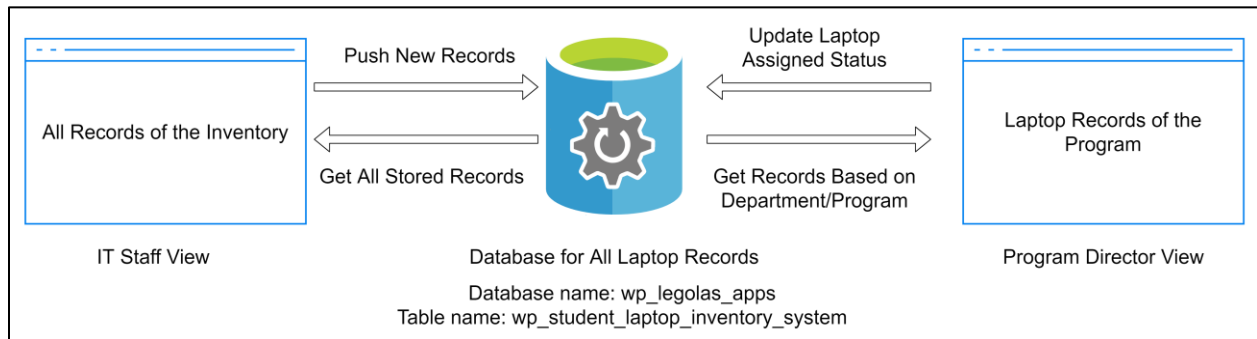
Figure 7 – Application Dataflow Diagram

Technical Specifications

Virtual Machine

    a. CentOS Linux 7 64-bit (Version 3.28.2)

Web Server

    a. Apache/2.4.6

Database

    a. MySQL Server 8.0.23

    b. PHPMyAdmin (web-based GUI for SQL operations) 5.1.0

Access Requirement

The access requirement will be on VPN or WTC network. The end user's computer needs to have a WTC CA signed client-side SSL certificate installed and valid WordPress account with appropriate user role to access the HR online inventory system.

By design, the system is supposed be used by IT dept. staff with full edit access. It can also be viewed by PDs with limited edit access (i.e., update computer assigned status).

Storage Needs of Databases

The current storage of the virtual machine is 60 GB. It's supposed to be sufficient for the student laptop online inventory system. Extended storage will be added when needed.

Application Internal Release Notes

The following chart is used to log of all edit/updates made to student laptop online inventory system.

Version	Date of edit/update	Author of edit/update	Description of edit/update
1.0	4/21/2021	Nan Ye	Creation of the TDD

Security

Security features:

1. client-side SSL certificate
2. server-side SSL certificate
3. WTC's firewall
4. WordPress user authentication
5. WordPress content control by user role permissions.