

# Danfoss Enterprise Layered Process Auditing

## Design Document

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Zach Carlson

Jamie Countryman

Mitch Valenta

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## Overview

### Project Statement

In this project, our group will design and implement a web application to simplify and centralize Danfoss' auditing process. The current process lends itself to time-consuming or incomplete audits with too many possible points of failure. Simplifying this process will allow audits to be completed quicker with more flexibility, creating a safer workplace and higher-quality work output.

### Deliverables

#### First Semester

- Documentation of auditing process flow
- UI prototype

#### Second Semester

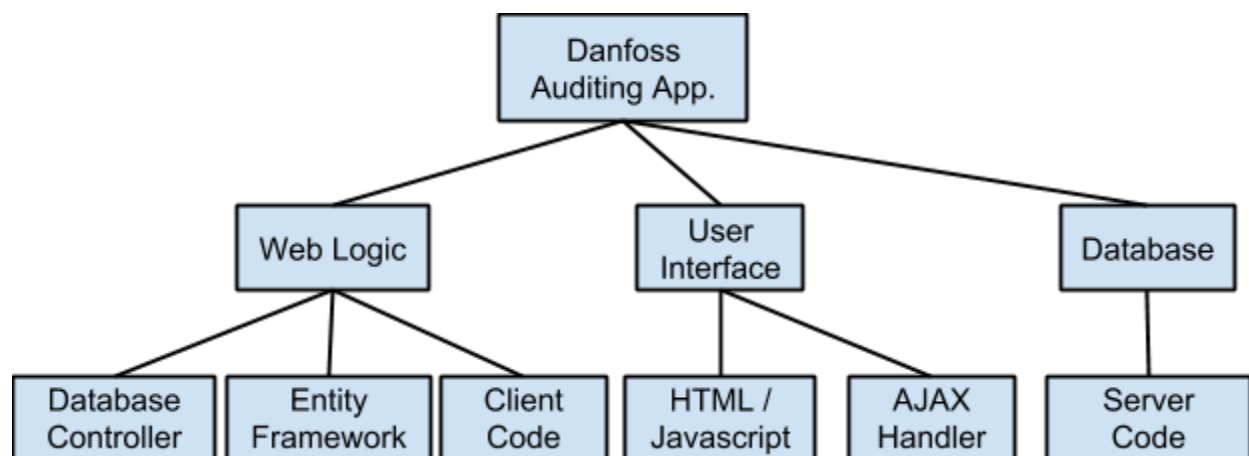
- A working web app
- A database backend to support the web app.

### Specifications

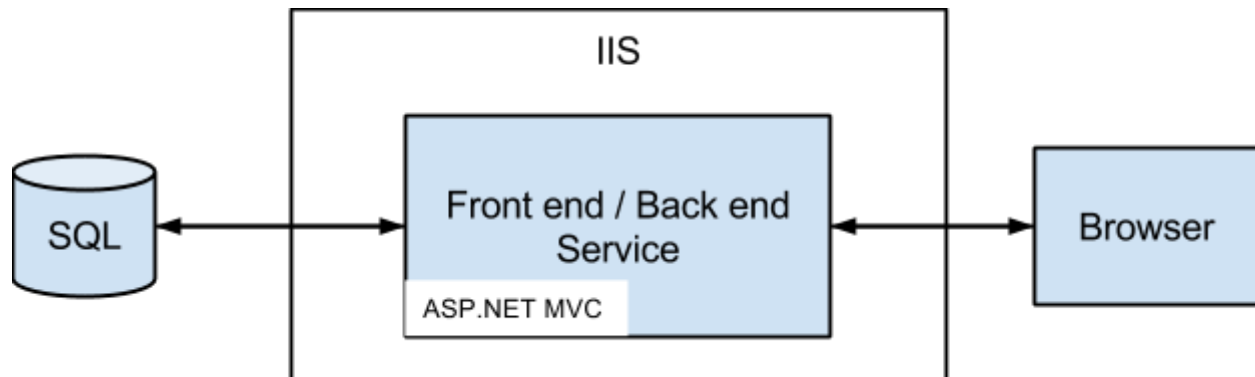
Auditing system must work for both PC and iPad platforms. This allows for mobile completion on the shop floor as well as in the office. The code should be developed using Stylecop standards.

### System Level Design

#### Module Design Diagram



## Structural Diagram



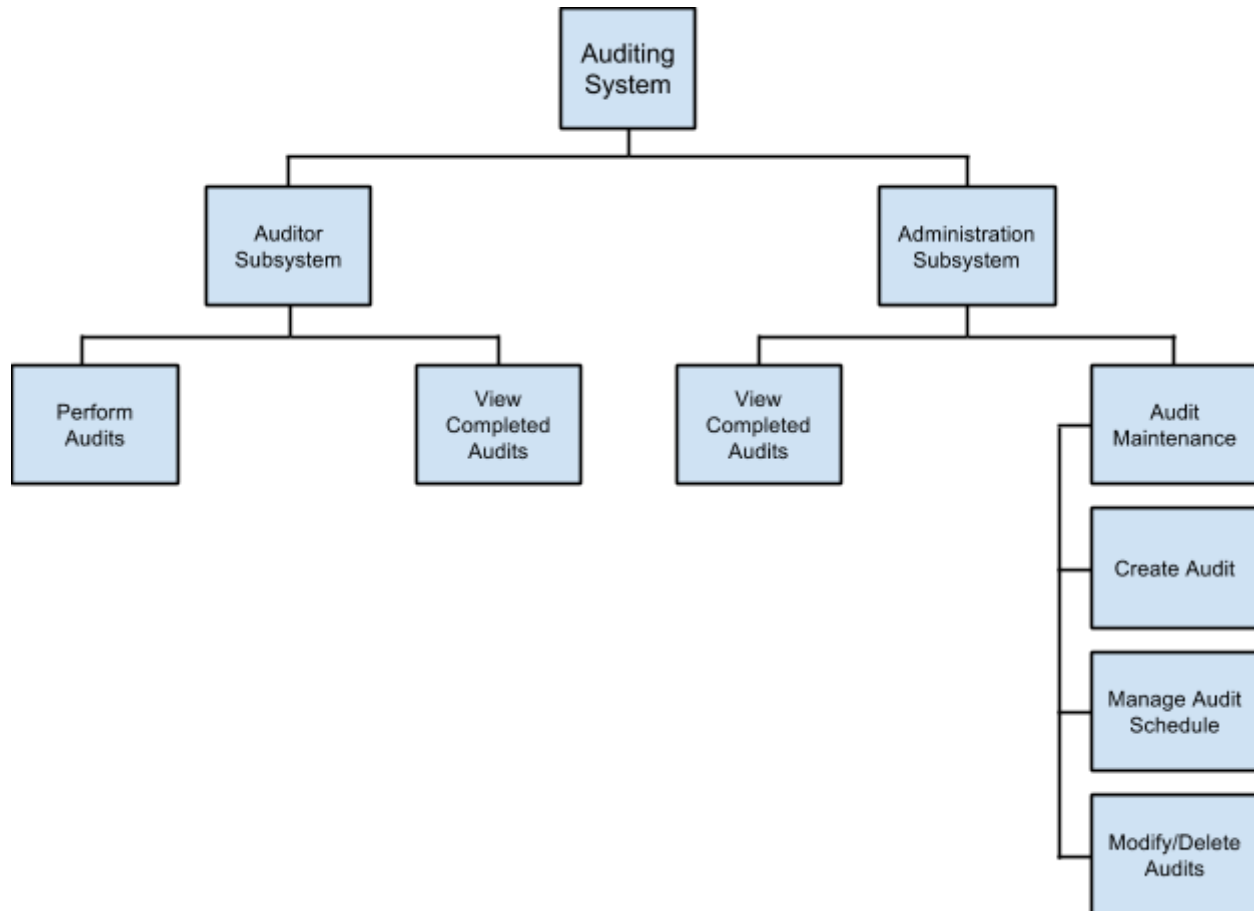
## Database Schema

Database schema will be included once it has been finalized.

## System Requirements

- Ability to answer audit questions
- Automatic selection of auditors with defined rotation
  - Select from list with managers, directors, and guests in defined rotation
  - Guest can be inserted at random and does not change the rotation
- Automatic notification by e-mail to auditor of upcoming audit
- Automatic notification by e-mail if audit is not complete when due
- 'Base' audit for to use when starting audits in a cell/area
- List of questions for audit by category to select when changes to the audit are desired by a cell/area
- How and where defined for questions
  - How to determine answer to question
  - Where to look for information to answer question
- Dropdown list of responses to audit questions
  - Automatic tracking of individual audit questions
    - Automatic notification when audit question competency is reached
  - Automatic tracking of total audit score (chart)
- Number of 'no' responses is limited on each question
- Standard work to be audited displays the current standard work from Navigator

## Functional Decomposition



## System Analysis

### Use Case 1

Auditor is required to do their scheduled audit.

#### Preconditions

User is logged in

#### Postconditions

A new audit entry is added into the application

#### Main Success Scenario

1. Auditor opens the application
2. Application displays the audits that the auditor needs to do
3. Auditor selects the audit they need to do
4. Application displays audit questions one at a time
5. Auditor fills out entire audit

#### Exceptions

1. Server is unable to be reached

## Use Case 2

Alternate auditor has to do an audit.

### Preconditions

User is logged in

### Postconditions

Auditor is added into audit schedule

### Main Success Scenario

1. Administrator clicks option to view audit schedule
2. Administrator selects audit location
3. Application displays audit schedule and allows for addition and removal of auditors into schedule
4. Administrator adds auditor to schedule
5. Application updates schedule with new auditor in schedule

### Exceptions

1. Server is unable to be reached

## Use Case 3

A user wishes to see audit results.

### Preconditions

User is logged in

### Postconditions

Audit results are portrayed to the user

### Main Success Scenario

1. User selects location of audit results
2. Application retrieves results of audits for specified location
3. Application view displays historical chart of audits and their results

### Exceptions

1. Server is unable to be reached
2. No audits have been made at the location

## Use Case 4

A user wishes to change the audit form

### Preconditions

User is logged in

### Postconditions

Audit form is changed

Main Success Scenario

1. Administrator clicks the option to edit audit forms
2. Administrator selects audit location to be edited
3. Application displays the audit questions for the selected location
4. Administrator alters/adds/deletes questions as desired

Exceptions

1. Server is unable to be reached

## Detail Description

### I/O Specification

Input	Output
Keyboard input Touch input Mouse input	Images .NET chart data Unicode Text

### Mockups

Listed below are UI Mockups of high level parts of the Danfoss Auditing System. It covers the Administrator dashboard and completing an audit. The look and feel of the system is subject to change once the Danfoss standard project setup is in place.

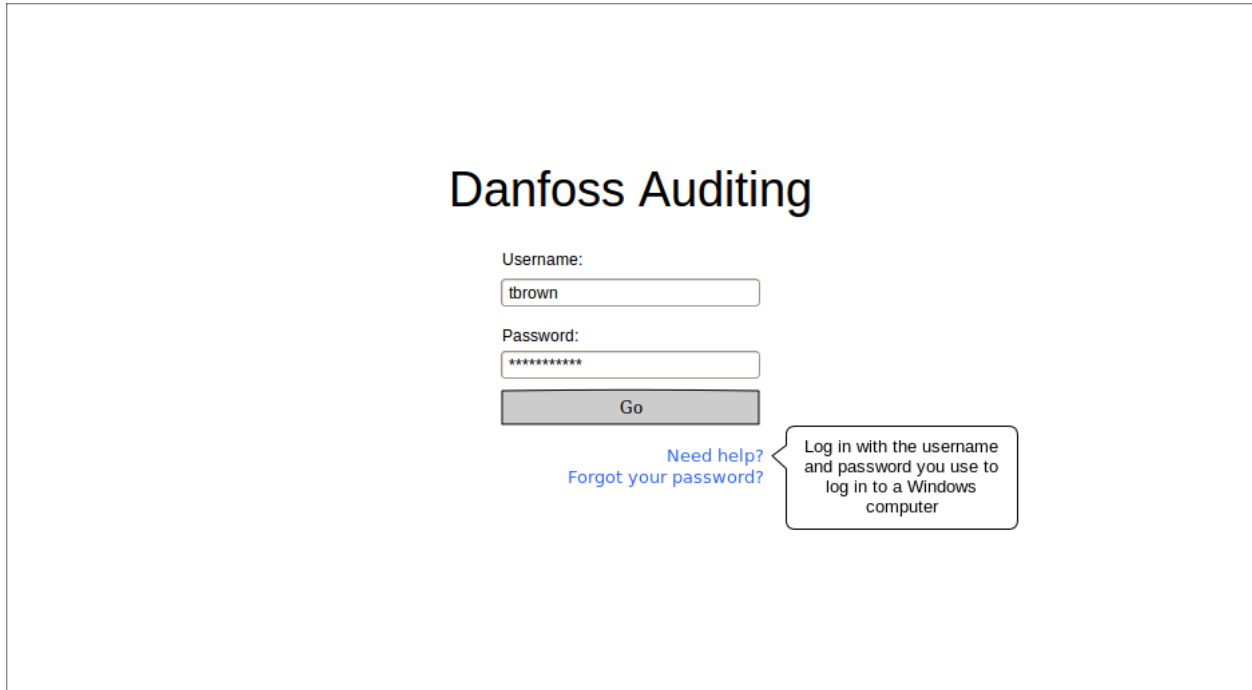


Figure 1 - Login with Active Directory

Figure 1 (shown above) displays what a user will see when presented with our system. The login credentials are provided with Active Directory. A tooltip or popover bubble will display if the user needs help logging into the system. After logging in, the user is presented with a dashboard shown in Figure 2.

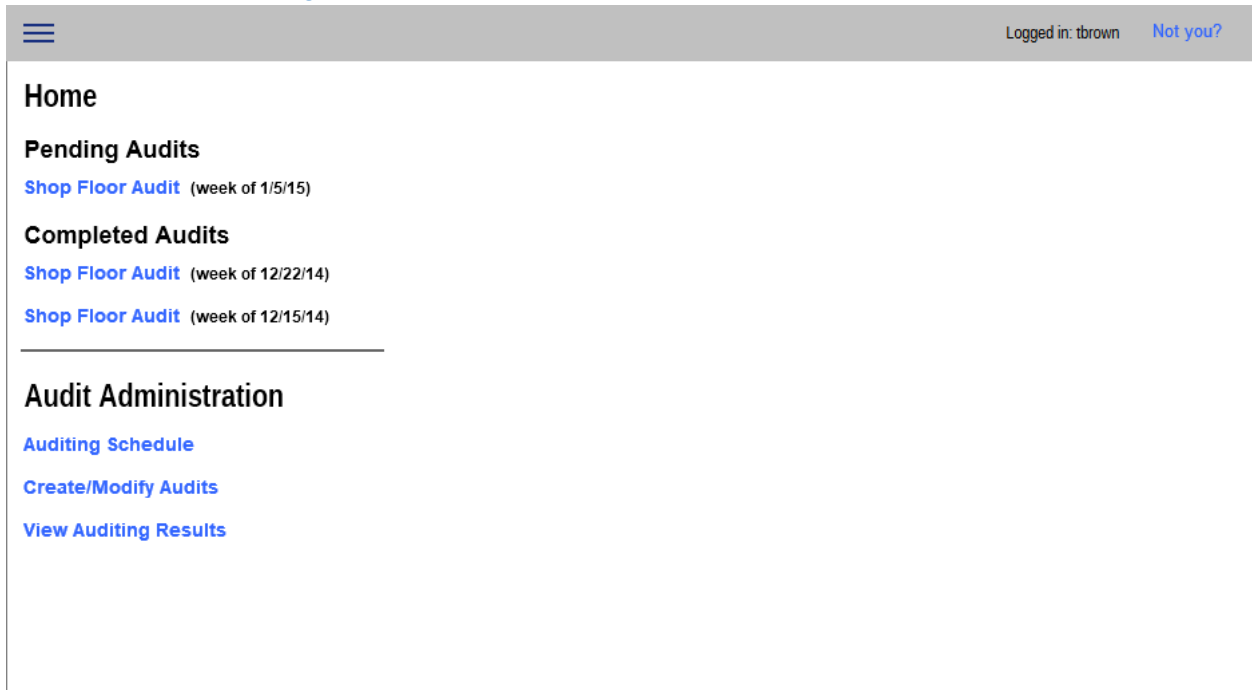


Figure 2 - Administrator Dashboard



This dashboard (Figure 2) is what a user sees after logging into the Danfoss Auditing System. Pending Audits are audits that need to be completed. Clicking on the blue title of the audit takes the user to Figure 4 described later. Completed audits has a list of already completed audits this user has. If this user is an administrator, then below the line has some additional system functions. Auditing Schedule presents a list of currently scheduled auditors. Create/Modify Audits allows administrators to edit or create a new audit. View Auditing Results presents the administrator with a graph that displays the current status of all audits. Figure 3 shows the view after the three lines button is pressed.

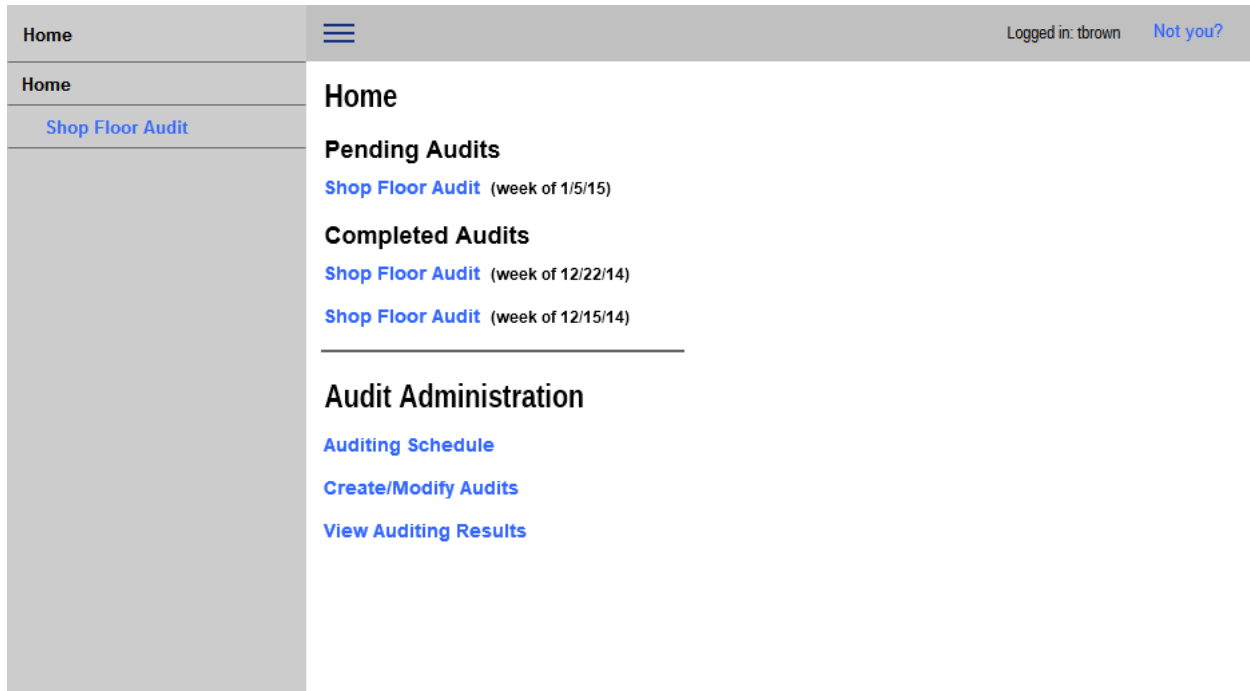


Figure 3 - Administrator Dashboard with Menu

Once a user has selected an audit to complete, a screen similar to Figure 4 is presented. “Shop Floor Audit” is the title of the current audit being completed. “Safety” is the subject or category of the current question. Then it asks the user a question followed by a dropdown list of responses. If comments are necessary, a textbox is provided for the user to fill out. To the right of the question is a tooltip or popover bubble that shows how or where to find the answer to the current audit question.

Figure 4 - Completing an Audit

### Hardware/Software Specifications

The application and web service will use ASP .NET 4.0+ framework, and will run on Windows Server. The database will run on Microsoft SQL Server. This application will be able to work on PC and iPad.

### Simulations and Modeling

We are in the process of creating a UI Prototype using HTML / CSS and the .NET frameworks provided. It will provide simulated calls to the database and backend services.

### Implementation Issues and Challenges

Danfoss has a system design specification for internal web applications. This could result in potential implementation difficulties for our team with no prior experience.

Our team hasn't had any experience with ASP.NET MVC development. This challenges team members to quickly learn new technology to create a dynamic web application.

### Testing Procedures and Specifications

For testing, we will be using NUnit for unit testing. The unit tests will ensure functionality of requirements, such as the auditing schedules and ability to alter the audit schedule. Developing these test cases will also allow for regression testing if new features are introduced into the system. Below is a table of our requirements and an acceptance test for each. Once we can reach a success to an acceptance test, that requirement is officially complete.

Requirement	Acceptance Test or Fit Criteria
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Ability to answer audit questions	Verify that the Danfoss Auditing System will save answers to audit questions into the database as well as provide an interface to answer questions
Automatic selection of auditors with defined rotation	Verify that the Danfoss Auditing System will provide a list of auditors and will automatically select a defined rotation based on the time constraint given
Automatic notification by e-mail to auditor of upcoming audit	Verify the Danfoss Auditing System will send an email notification before an audit based on the time constraint given by sending test notifications to a potential user of the system
Automatic notification by e-mail if audit is not complete when due	The Danfoss Auditing System will send an email notification after an audit is due based on the time constraint given by sending test notifications to a potential user of the system
'Base' audit for to use when starting audits in a cell/area	Check to see that a user starts in a 'Base' audit when starting in a cell/area
List of questions for audit by category to select when changes to the audit are desired by a cell/area	Check with the client that the Danfoss Auditing System accurately displays a list of questions for the audit by category
How and where defined for questions	Verify that the Danfoss Auditing System provides a tooltip or popover information module to display helpful hints on where and how to answer the specific audit question
Dropdown list of responses to audit questions	Verify that the Danfoss Auditing System provides a dropdown list of responses to appropriate audit questions
Number of 'no' responses is limited on each question	Run a check that the user is given a message stating that the limit of 'no' responses after responding a specified number
Standard work to be audited displays the current standard work from Navigator	Verify that the Danfoss Auditing System correctly displays the current standard work from the Navigator by comparing the data

Table 1 - Validation and Acceptance Test Requirement Table

## Conclusion

This web application will simplify and centralize Danfoss' auditing process. It will provide an easy to use question system and result analytics. Notifying users to complete an audit will result

in higher completion rate than before. Editing current questions will be easier than the current system in place.