ECE 435 Fall 2013

NM HIDTA DATABASE

FINAL PROJECT REPORT

Creating a database for NM HIDTA to enhance ECE student collaboration in a professional work context

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1 Overview

1.1 Executive Summary

Our project was an engineering collaboration to develop a website for NM HIDTA (New Mexico High Intensity Drug Trafficking Association). The focus of this project was to leverage the various skills we've learned throughout our academic careers to create a working website that met requirements set by HIDTA. We designed the website based on their requirements, planned tasks, delegated roles, and worked toward finding solutions.

Team Members:

Bhim Subedi
Amanda Gonzales
Julian Lucero
Kurt Hollowell,
Freddy Fragoso
Shu-Jie Chen
Dominic Quintana
Thomas Mondragon
Elijah Wolfe

Instructor

Edward Nava

1.2 Abstract

The purpose of this project was to create a user-friendly website for NM HIDTA. The project was intended to gauge our knowledge in project planning, our ability to work and communicate as a part of a team, our knowledge in making appropriate software design decisions, our ability to obey common and conventional programming practices, and our general knowledge of various other aspects of engineering. Most importantly, we were tasked with making a system that was a suitable replacement to HIDTA's current system.

1.3 End System

The end system of our semester project is a working prototype that can be used by NM HIDTA. The website met the majority of the requirements agreed upon at the beginning of the semester with the exception of a few features that we weren't able to implement due to time constraints. Being that end result is incomplete, the project may be expanded upon by future classes, other student groups, or possibly programmers hired by HIDTA, so as to implement the features that we could not should HIDTA choose to use our design.

2 Problem Description

The project required that we build a website without any previous version to use act as a foundation. The engineering facets involved in the project were the following.

- **Interface Design:** Design an interface that heavily emphasized ease of use.
- **Choosing Tools:** Independently make the decision on which software tools would be appropriate to suit our needs as well as the user's.
- **Planning the Project:** Given their requirements, discern any potential implicit requirements, create a roadmap for the development process, divide the workload amongst the team members, and collaborate to make decisions in order to complete a project of this size and magnitude.

2.1 Project Goals

Define Requirements

The first milestone of this project was to agree upon a set of requirements with NMHIDTA. Initially, they gave us a presentation about the current system, it's faults, and what they would like the new system to do. We took this information and created a basic outline of the system's intended functionality. After this was done we presented our ideas back to them, and we agreed upon the requirements for the end system.

Choose Tools

After the requirements for our project were outlined, we had to choose the right software tools that would be capable of meeting the requirements. After researching development tools for about a week, our team decided to use Ruby On Rails to create the website since several people on our team had experience using this software tool.

Design Interface

The requirement that was stressed the most by NM HIDTA was that our interface must be very user-friendly. The main fault of their current system is that it was difficult to learn and difficult to use. We researched similar websites and designed the interface and website flow over the course of several group meetings.

Programming

Once planning and design was complete, we began the programming phase. Using the rails scaffold, we were able to easily create a basic database interfaced by a non-stylistic website. Next, we focused on adding key features from the requirements using Rails, while trying to maintain a friendly user interface through the HTML.

Documentation

Being that this project is intended to be continued and expanded upon over time, one of the main requirements was that we document the process, design decisions, and system requirements. We put a focus on documenting our code and using tools that had a lot of support.

3 Progress Toward A Solution

The basic requirements of the website outlined in the beginning of the semester were the following:

Database Requrements:

- Used by 15 or so people
- CRUD operations
- Meet the federal regulations
- Info is only accessible to those with need to know.
- After 5 years, the info must deleted if no other records have been added
- Add a notification that certain items were deleted
- Update the time when items are “refreshed”.
- Maintain a few hundred thousand records.
- Hold a person’s data, Name, picture, DOB, SSN, Address, etc.
- Safegaurds:
    - Who entered it
    - Who looked at it
    - Who was the info given to
    - Info location
    - The facility
    - The server
    - Etc

User Requirements

- Ease of use
- Number of steps required to enter and access information must be kept to a minimum
- Must be searchable
- Author: person who generated the info
- “Refresh this Record” button, signifying they’re suspect again.
- Can’t collect info regarding political or religious views, unless it contributes to an example to criminal activity. Views + criminal activity, allows you to record the views. Otherwise you can’t record the views.
- Web interface, accessed from multiple locations
- Think about drop downs/easy entering where applicable. The type of drug, etc.
- Maybe a multi-tabbed view
- Audit trail needs to exist as long as the related record is in the system.
- Who inquired about them,
- Who sent the info, etc.
- Each user needs a unique identity with authentication.

- Servers and IT stuff is in Las Cruces. Info accessible from anywhere over a VPN.
- Documentation and Tutorial

We were able to meet all of the functional requirements except for the auditing system. It should also be noted that we need to test the requirements related to deployment such as 15 users, and thousands of data entries. More work will likely need to be done in order to deploy our website and database.

3.1 Project Approach

Our approach was a linear one, similar to the waterfall method. The system was designed, outlined, developed, tested, then refined. However this could also be described as the prototype method, since we demonstrated our progress to HIDTA and our instructor several times, and started back at the design stage to add or modify features.

3.2 Results

In the end we were able to produce a working prototype that met most of the functional and user requirements outlined in the beginning of the semester. Our website will need to be developed further before it can be deployed. The audit trail and record deletion will need to be implemented first in order to satisfy the legal requirements before it can officially be used.

3.3 Iterations and Redefinitions

The iterations of this project were mostly related to the user interface and design. As we added functionality we constantly had to update our design to maximize usability. It was important that we knew early on that usability was to be highly stressed, so that we could factor it into our design throughout the development process.

3.4 Future Work

Future work for this project involves adding in the remaining features that we couldn't include due to time constraints and because they were requested late in the development phase. Our website will also need extensive testing to ensure there are no errors. The website will also need to be deployed and used by HIDTA to make sure it satisfies their needs.

4 Constraints

Our project was constrained by the time we had to work on it. Because we only had one semester to work on this project, we focussed on what we thought were the vital requirements. We were also constrained by our team size, and background. The group members are all studying computer engineering, but not everyone had developed web applications before. As such we had to do a lot of learning, and split up the team correctly to play on everyone different strengths and weaknesses.

5 Personnel Interactions

5.1 Teamwork

Our team worked together for most of the project. Where necessary, we split into groups and integrated our work during team meetings. The table below shows a high level breakdown of the work and contribution of each team member.

Team Member	Roles	Specific Contributions
Bhim Subedi	Main Programmer	Database design, HTML coding, Rails coding, Team instruction and tutorials
Amanda Gonzales	Team management, presentation, documentation	Initial Requirements Presentation, research on existing database designs and interfaces, programmer's guide
Kurt Hollowell	Team organization, Presenting, Documentation.	Requirements Doc, Final Report, PP presentations to class and HIDTA, Design.
Elijah Wolfe		Database design, navigation/architectural design, final documentation (users manual, requirements spec)
Jose Fragoso	testing functionality	Providing feedback
Tomas Mondragon		Cleaning up and maintaining the github repository, inserting images into documentation.
Shu-Jie Chen	Testing and Documentation	Application feedback and inspection, General system guide.
Dominic Quintana	Planning, developing, research, documentation	Researching potential development evironments (e.g. Rails, MySQL, etc), documentation, and some minor programming.
Julian Lucero	Network Testing, Documentation, Brainstorming	Operator's Manual, Testing system on a remote server, Brainstorming with Bhim on how to improve features

Table 6: Roles

5.2 Meetings & Development

We met everyday after class to delegate weekly tasks. We also held regular meetings on Saturdays for design and development. The bulk of our efforts were coordinated through Facebook, however, email was also used. We used a private GitHub repository and made heavy use of commit messages.

6 Summary & Conclusions

This project was a great learning experience, especially from a design and teamwork perspective. It was challenging working with such a large team, but it helped us to be innovative and strategic in our communication techniques and project planning. Throughout the life of this project, we constantly revisited design decisions, and referred to proper engineering practices taught in class to guide us to completion. We all gained an insight into developing a real world application in a classroom *and* professional setting. The challenges and unexpected roadblocks proved to make the end result even more rewarding for all of us. We all wish we had more time and future guidance to explore every aspect in depth that this project offered.

Future recommendations for this project would include more specific guidelines for working documentation. Although this was stressed from the beginning, we were really unsure how to best document our progress besides taking notes at every meeting. Feedback on our documentation would be immensely beneficial, as these types of documents are new to us.