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Administrative Cost Reimbursement Online

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Administrative Cost Reimbursement Online

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Honors Research Project

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Abstract

Administrative Cost Reimbursement (ACR) is a program funded by the state of Ohio that reimburses non-public elementary and high schools for having employees perform a series of mandated activities. ACR Consultants is a company that collects data from schools that contains the amount of time each teacher spent on any of the mandated activities. The president of ACR Consultants is a neighbor and longtime family friend. Currently, to collect the time data, the company goes to each school it services and gives each teacher a large paper spreadsheet for them to fill in with the amount of time they spend on each activity. The company then collects those sheets at the end of each quarter and manually enters the data into a system it uses to calculate how much reimbursement the state of Ohio owes each school. The goal of my project is to eliminate the need for the company to use the paper spreadsheets by creating a website that teachers can log into and enter the data themselves. The site will be programmed with an Angular 4 front end tied to a DotNet Core backend storing the data in a Microsoft SQL Server instance.
Administrative Cost Reimbursement Online

Introduction

Thinking of what to do for my senior honors project was not difficult at all. For the past year I have been trying to find time to start a project for my neighbor’s company. That company is ACR Consultants whose president, my neighbor and longtime family friend, was very excited when I told her that I would be doing my senior honors project for her company. Administrative Cost Reimbursement (ACR) is a program funded by the state of Ohio that reimburses non-public elementary and high schools for having employees perform a series of mandated activities. The state reimburses the schools for the time and cost spent on these activities. The state has designated 14 different categories of activities that can be completed for reimbursement; ranging from activities such as performing fire drills or taking daily attendance to serving on an accreditation team or designing school curriculum.

The work that ACR Consultants does is not incredibly difficult. It involves teachers recording the amount of time they spend doing any of the activities mandated by the state and then ACR Consultants uses that information to calculate the amount of money the state of Ohio owes the school for reimbursement. The part of the process that my project aims to help out with is collecting all the data. Currently my neighbor goes around to each school under contract and gives every teacher in each school a large, yellow-paper spreadsheet where the teachers record their time. At the end of each quarter, she returns to each school to collect all of the yellow spreadsheets which have been individually filled out by the teachers. Her partner and herself then spend countless hours going through every spreadsheet to enter the time
information into a computer. Once she finally gets all the information into the computer, she has a program that calculates the amount of money the school will be reimbursed.

   My project aims to end the need for the yellow spreadsheets entirely. I created a web application where each teacher will be able to log in and enter their time information directly into the database. The teachers need to record their time, in minutes, for each day of the quarter. The company has found that most teachers do not enter their information daily, but wait until the end of the quarter and fill in the entire quarter. The web application I have created allows a teacher to enter his/her time for each day of the week once, and then uses that information to enter data for that teacher for the entire quarter. Most teachers have said using a website to record their time would make the process much easier and ACR Consultants would save a great deal of time that they usually spend entering information into a database.

![Figure 1](image_url): The yellow spreadsheet that the teachers are currently give to record their time information.
Design/Planning

Since the person I have created the web application for is my long-time neighbor I already have a pretty good understanding of what the application would need to do for her business. The website would definitely need a log in system so that the time entered could be broken down into which teacher entered it. The teachers would need to be able to enter their information by week, since that is how the information is currently broken down on the paper spreadsheet. Talking with the president of ACR Consultants before starting this project I learned that most of the teachers she works with do not enter their time information weekly, but usually wait till the end of the quarter to fill out all eleven weeks. Along with waiting till the end of the quarter most teachers enter the same values for each week. Knowing this I realized that it would be a good idea not only to have the teachers be able to enter the information on a weekly basis, but also have an option to enter the values once and the system would record their information for the entire quarter.

When planning how to write this web application I was not sure which technologies I should use. I interned with a company over the summer where I had to maintain many webpages written using an Angular 4 frontend with a Microsoft ASP.Net Core backend. After my summer internship the company they offered me a full-time position once I graduate, which I accepted. I decided to create this app using the same technologies I used over the summer even though I still was not especially skilled using them because I figured it would be good practice for when I join their team in May. So, for this project I used an Angular 4 frontend tied to a .Net Core backend hooked up to a Microsoft SQL database. I am glad I decided to use these technologies because now I feel even more prepared to start my full-time position in May.
Implementation

Since the website’s main purpose is to allow teachers to login and enter, edit, or delete their time data, my main focus during this project was to create the pages needed for a teacher to be able to perform these tasks. My original plan was to implement the login functionality first, but I had many troubles in the beginning getting it to work correctly. Not wanting to spend too much time trying to figure out authentication, I decided to implement the enter, edit, and delete functionality first and then come back to authentication.

I implemented creating a new entry. I designed the website to store the time information by week. Each week object in the database has a user id which indicates which teacher entered it, a category id which indicates which of the 14 categories this entry is used for, a week id which indicates which week of which quarter this entry is from, a field for each day of the week that stores the time in minutes spent on that particular category, and a field that holds the date of the time that entry was last updated. I then created a simple form where the user can enter all of that information. When the user hits submit that week entry is stored in the database.
After implementing the form where a user is able to enter an individual week entry, I decided to implement a page where a user can see the week entries he/she has already submitted. I created a page that lists all of the week entries that a user has entered. This page lists the entries in pages of ten records. A user can click on the view button on the end of each entry in the list to view that entry’s details and see options to edit/delete the entry. This page has a feature that allows the user to filter the list of entries. The user can filter the entries by quarter, week, or category. When the filters are applied only the entries matching the filter criteria are displayed to the user. To get rid of the filters and see the entire list the user simply clicks the “Reset Filters” button.
Figure 3: The page that lists all of the entries the user has already submitted

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Week</th>
<th>Category</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
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<tr>
<td>1</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>View</td>
</tr>
</tbody>
</table>

Figure 4: By clicking the View button on an entry a user can go to a details page that has buttons to Edit or Delete the current entry.
After implementing these pages, I sat down with the president of ACR Consultants to show her the progress I was making and get any feedback she had. She said she liked how everything looked but had one major issue with how the teachers were going to enter their time. She said that almost all of the teachers enter their time for the entire quarter at once instead of doing it every week. Also, she preferred that the actual time information be entered horizontally instead of vertically. After getting this feedback I knew that I would have to make some big changes to implement the features she requested.

After talking it over with my project sponsor I realized that the changes that had to be made would not be as drastic as I had thought. I thought that I was going to have to change the database schema to store the time information in terms of entire quarters instead of as individual weeks. My sponsor made me realize I should still store the data as weeks for the case that a teacher has to make a change to an individual day.
Realizing this, it was not difficult to implement entering an entire quarter at a time. I created a new form that had a design that was more to the liking of the president of the company. At first when a user would hit the submit button the program executed a loop in the Angular frontend which called the create function in the backend the correct number of times to enter enough weeks to span the entire quarter. This functionality took a bit of time, especially if a user entered time for every category which ended up being 154 individual week entries. To make this process faster I implemented the loop in the backend API instead of calling the API multiple times from Angular. Making one call to the backend made the process of submitting 154 entries into the database much faster.

![Figure 5: The form for entering an entire quarter. Click on a category to display the boxes for Monday through Friday.](image)

Finally, I had to go back to where I started and implement authentication. Not wanting to spend time creating my own login functionality I decided to use a service called Auth0. Auth0
is a company who can handle authentication and authorization for many types of applications. Their website and documentation made setting it up for my application pretty easy. I did run into one issue where a user could not log in even though they were already in the Auth0 database. Customer service was very helpful and I was able to jump on a call with a representative from the company and fix my issue within minutes. All of the user data is handled by Auth0. When I log into my Auth0 account I see a nice dashboard where I can see things like which users recently logged on and if there were any new signups made. When creating an account, a user can choose to create a local account and set up an email address and password or they are able to login with their Google account. Even though all the user accounts are handled by Auth0 I still wanted a User table in my local database to be able to tie Users to Schools. Auth0 uses JSON Web Tokens for authentication. When a user logs in I am able to get their name, email address, and their unique auth0-id from the token. If this is the user’s first time logging in, I store this information in a local user table in my database along with a school id of 0. Adding teachers to schools will be a process to go through once I get that information from the company. Lastly, on the Auth0 site I can assign users to different roles. By default, every user who logs in gets assigned a role of Teacher. I then am able to go back in add different roles for admins. In the future I plan to create new pages where admins can make
changes.

Figure 6: When a user clicks the Login button a popup is displayed where the user can login or create a new account.

Figure 7: The Auth0 dashboard. Authentication and authorization and user accounts can be managed from here.
All of the above features have been implemented on the website and all seem to be working as expected. With the currently implemented features teachers are able to create an account and login to the ACR Consultants online system and record their time data.

Closing

This project taught me much about what it is like to start a software project from nothing. I had never started a project this large from scratch and work on it exclusively alone. Although at times it was a struggle not knowing what to do next, I see the completion of this project as something that taught me many things and something that I can be proud of. Knowing that I am capable of creating a web application of this level alone it makes me excited about joining the workforce and creating projects even more exciting while working with a group of developers.

My biggest takeaway from this project is my new understanding of how to use the DotNet Core and Angular technologies. I had had little experience with both of these technologies from my most recent summer internship. Both my most recent internship and the internship that I did two summers ago made me more comfortable writing applications using DotNet Core and C#. Just during this last summer did I get a taste of what it is like using Angular as a frontend framework. Completing this project has made me even more comfortable and confident with these technologies and gets me excited to start working after graduation where I will be able to work on my skills even more.

Source Code: https://github.com/lucian044/ACR2