

Capstone 2022

Napolini Express Application



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Abstract

The Napolini Express Applications were developed over a 15 week period, with the goal of creating an application to be used by the community around the Hempstead/Uniondale area and the staff at Napolini Express. A beginning survey of Hofstra students showed that if there was an application for Napolini Express, they would use it. Background research showed that third-party apps are mainly used among the community, with orders averaging between multiple times a week to a few times a month. Using Android Studio, Microsoft SQL Server Management Studio, Visual Studio, Google Firebase, and Tableau, the mobile and web application were created for a popular Italian restaurant by Hofstra University. Today, technology is an integral part of society and the intent is to build up morale and stay connected within the community. Important features for the mobile app include registration, login, authentication, verification emails, interactive ordering system, checkout, and account management. A convenient, easy to use app is essential for customer use and restaurant productivity. When first opening the app, users are prompted to either sign in or sign up. The application checks through Google Firebase if the user is already registered and will be prompted to sign up if not. Users register and login with their email address, where an email is sent to verify their account. Forgot password is also implemented. The data is stored in SQL Server and authentication is through Firebase. Analysis of the data can be found in Tableau and on the management tool, using live data. The major questions needed to be answered include: what is the distribution of customers around the restaurant, what are the most popular items ordered, and how much is the restaurant making each week/month/year? With the data collected, it is easier to visualize these questions with charts and graphs. Tableau and the web application has been an important tool used for this application and has been given to management. Future plans

include cross-platform mobile applications, extra features, and implementation of live charts in the web app.

Problem Statement

Napolini Express is a small, local Italian restaurant right next to Hofstra University. Having been an employee for 2 years and seen how third-party apps take advantage of businesses and its customers, I thought a mobile application would promote convenient ordering. Many businesses, especially small businesses, have struggled during COVID because people are staying home and ordering food instead of dining in. Napolini Express has many customers that are students from Hofstra, Nassau County Community College, and Adelphi University. There is a large demographic of students around the restaurant and finding something that will attract them is essential. An app is something that is easy to get and use right on your phone. This would be easier for students and customers to order and they would get the same quality, service, and satisfaction as ordering on the phone or in the restaurant. Another goal was to create a management tool for the business to keep better track of their data, sales, and inventory. Both applications would be a positive step for the business. I firmly believe that these applications would improve business and allow for them to capture more customers' attention. Therefore, I decided to create an Android mobile application and a web management tool for Napolini Express to use and for customers to stay engaged. Apps for businesses, especially restaurants, are important in this day and age because everything revolves around technology and having this source would improve both ends. The goal of this project was to create a working, easy to use application, as well as an effective tool for management.

Technologies Used

The main application used was Android Studio. Although Visual Studio was an option for the mobile application, Android Studio felt more familiar. To store all of the data such as menu items, customers, employees, etc, I used Microsoft SQL Server Management Studio. I still had access to Microsoft SQL Server Management Studio through VMware vSphere from a previous development class. Therefore, I used VMware to insert data and create stored procedures within SQL. When developing the mobile application, I realized I needed user authentication for registration and login. I have previous experience with Google Firebase and thought it would be a good way to authenticate users. When users sign up, they receive a confirmation email and their information is both stored in SQL and Firebase. All passwords and emails are stored in Firebase to ensure they are secure. Firebase is a properly controlled and credible platform that will not enter bad data. Firebase also checks to see if their account already exists and lets them know if they already have an account. Users also have the option to get an email if they forget their password. Passwords must be at least 6 characters long and emails must be real. After creating the application in Android Studio, I decided to create a management tool where the managers and employees can easily access their data. Although there are no live data charts in this tool currently, I hosted this information in Tableau. This allows them to see where their customers are located, track most purchased items, and other data that could be helpful to see visually. Bar charts, bubble charts, and geocharts were the main visualizations used. When creating the management tool on Visual Studio, I connected the database and created CRUD pages. This will help management tremendously because they have no electronic database to host their information. Management can easily create, access, update, and delete information to

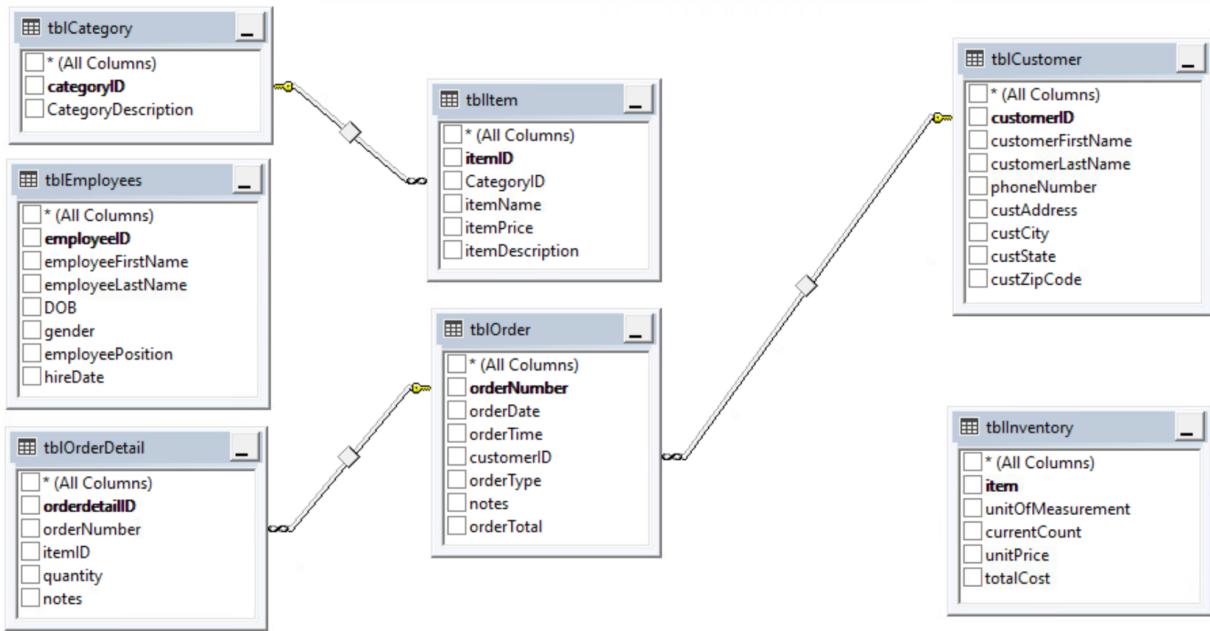
reflect what goes on day-to-day. This information is automatically updated within the mobile application as well.

Similar Solutions

Although ordering services are helpful and are a central place to find food around the area, they overcharge and can be unreliable at times. Napolini Express uses many different ordering apps such as DoorDash, UberEats, Slice.com, and 9fold. Customers can also order online on their website but with their location within walking distance of Hofstra University, students are not going to want to go on a computer to order. The convenience of ordering food on an app on your phone is something that won't change. Third-party companies like UberEats charge way more for the food and delivery of restaurants. This could potentially deter students and other locals from wanting to order food from restaurants because if two items are \$20+ to deliver, they will most likely not order it.

There are many management softwares out there for small businesses, but require a fee for that other business to manage the data. Although it can take responsibility off the managers, there is not a central place for businesses to both look at their data visually and update their data in real-time. The management tool I created is one solution that will make a big difference for the Napolini Express staff and decision makers.

ERD



There are 7 tables within SQL Server that are important for management and the mobile application. It's essential for management to keep track of orders, menu items, employees, customers, and inventory. Management will be able to update and keep employee data up to date, even scheduling as well. Another thing management will need to know is their inventory, where they can keep records of what specifically they buy in bulk, how much of each, its unit price, and the overall cost. This will allow managers to see how much they spend on inventory each week, month, and year. They can then look at orders and figure out how much money is going in and out each week/month. Having electronic records can be an integral part of running a restaurant because papers stack up, get lost, and can be unrecoverable. This management tool will host a central location for all the data from different parts of the restaurant. Customer data is another important aspect for management to look for. They can now easily track, update, and add customer information.

When customers are placing an order, management needs to keep track of when the order comes in, when they need it, the order type (either pickup or delivery), who is ordering, notes for the staff, and the total amount due. Order detail is what exactly is being ordered, the quantity, and specific customizations. Lastly, the category data is directly related to the item data so customers and managers can figure out what category is sold the most. For example, pizza is a popular menu item and they can look at how much pizza is ordered, when it's ordered the most, etc.

Objective

What I hoped to get out of this was a way for customers to be more involved and connected to the business. I also wanted a tool for the staff and managers to be able to use to update their data. Many times there will be items out of stock or items that they no longer carry, but it's not updated on their menu or website. I communicated with the staff at Napolini's to ensure the data was properly designed of the right data type and figured out what they wanted out of the data. This is how I decided I wanted a graphic interface for management to keep track of what happens in the back. The plan was to make the backend robust enough so that the managers and employees can use this tool to control inventory, make wiser decisions on customer habits and usage, and stay on top of orders. The consumer side of this project is to have a nice interface and an easier way to order. On the other hand, the management side was to help them manage their business better and improve productivity.

Management Analysis

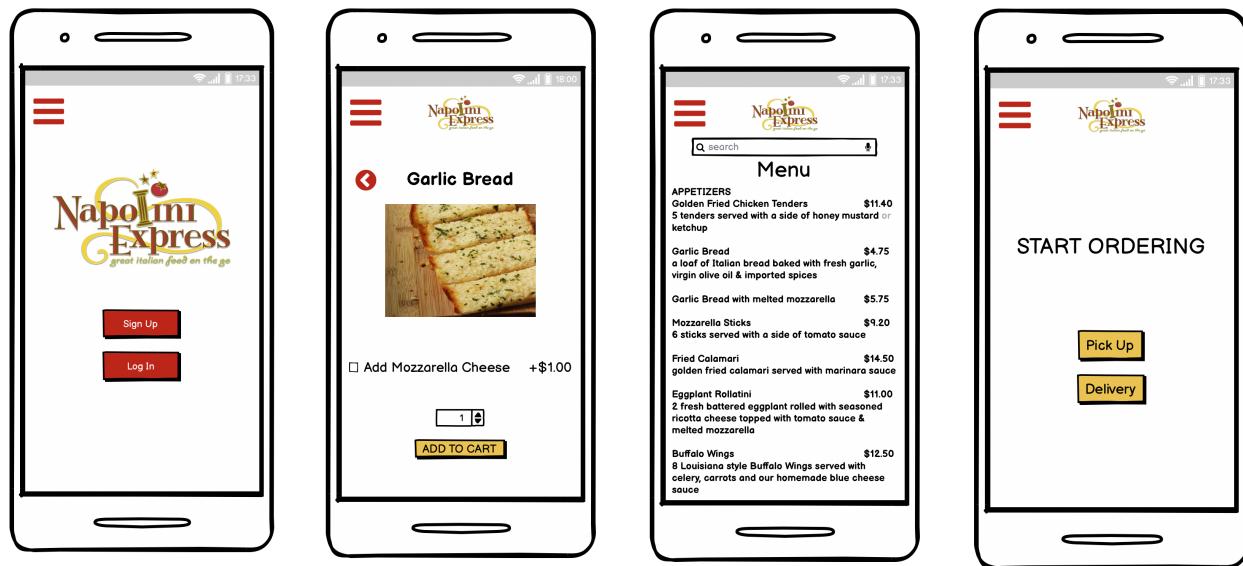
The image displays three separate windows of a web-based management system:

- Home page - Napolini Express M...**: Shows a welcome message "Welcome Napolini Management" and navigation links for Home, Categories, Customers, Employees, Inventory, Menu Items, Orders, and Order Details.
- Customers - Napolini Express M...**: A table listing customer information with columns: CustomerFirstName, CustomerLastName, PhoneNumber, CustAddress, CustCity, CustState, CustZipCode. The data includes four entries: Laramine Hunter (2012490939), Megan Leary (4017428107), Nicole Lin (9179070858), and Julia Ortiz (5182255152). Each row has "Edit | Details | Delete" links.
- Inventory - Napolini Express M...**: A table listing inventory items with columns: Item, UnitOfMeasurement, CurrentCount, UnitPrice, TotalCost. The data includes six entries: Basil Pesto (30 oz. - 3/CASE), Boneless Prosciutto (10lbs), Canoli Cream (4/case), Canoli Shells (48/case), Cauliflower Pizza Crust (24/Case), and Cheddar Cheese (10 lb. Solid Block). Each row has "Edit | Details | Delete" links.

Management analysis was a necessary part of the application. I decided to create a management tool to help the company be more productive and efficient. For the management side, it will assist the managers, employees, and decision makers figure out what's going on and help them manage the business better. This management tool will allow them to track inventory, the most popular items sold, what customers order the most, the average order amount, their busiest times, and more. Being able to visualize and

edit data will be a tool that will be used for the rest of the years to come. The tool currently has pages for each table in the database where management can update, edit, and delete directly. If an item is out of stock or no longer sold, they can remove it from the database and it will reflect on their end, as well as the consumer side.

Initial Design & Development



When I first began this project, I decided to figure out what data I wanted to collect from the app. I made up data while waiting for actual data from Napolini Express to start development. While gathering information and data for the database, I wanted to create mock-up screens to visualize what I wanted for the application. I used Balsamiq, a basic UI wireframing tool, to create a few screens for my app. This allowed me to create a framework of what I wanted to base my app off of. After creating an ERD diagram and mock-up screens, I made multiple queries and inserted the data into the database. After that I then began development in Visual Studio. I wanted to create an app that was

cross-platform and Visual Studio easily connected to Microsoft SQL Server. I ran into some problems when developing the app and decided to move development to only Android Studio. The initial design had a bar at the top to show the screens. Later in development, I chose to go with the bottom navigation. These were helpful for the development process. Development was fast in the beginning and slowed down towards the middle. I set up Google Firebase and picked email to authenticate and login.

I took a waterfall methodology approach for this project. I researched current solutions, looked at which applications would be the best fit, and scheduled when everything would need to be accomplished. I designed prototypes after research, and mapped out which screens would have certain information. I began development as soon as I designed prototypes and the tables in SQL. After mobile development, I implemented the management tool using Visual Studio. Taking this approach was best with a deadline and figuring out exactly what was needed in the application. I corresponded with the owner of Napolini Express to receive data and any input in features. With no clear or strict constraints, I designed the app to what I thought was necessary and would add more features in the future.

Verify your email for Napolini Express [External](#) [Inbox](#)  

 noreply@napolinexpress-329be.firebaseioapp.com to me 

Thu, May 12, 10:53 PM (6 hours ago)   

Hello,

Follow this link to verify your email address.

https://napolinexpress-329be.firebaseioapp.com/_auth/action?mode=verifyEmail&oobCode=ygoxcslJU31K4ASgjThhoQ0YfjcjBYml_kEaqYSVW_QgAAAGAu1X5hg&apiKey=AIzaSyCTxLIP-KssPoMGvGlnAJN0wn0Nr5Mj4ME&lang=en

If you didn't ask to verify this address, you can ignore this email.

Thanks,

Your Napolini Express team

Research

I performed research on how to implement the checkout feature for the application. I knew how to implement Firebase, SQL Server, and the authentication aspect of Android Studio, but many features I wanted to include were more sophisticated than what I learned. While coding and designing the app, I ran into many errors and issues with certain functions. One unexpected finding was that a class I wanted to use was deprecated. After some research, I found another class in place of it and was able to figure it out. I also had to refresh my skills for Visual Studio and the process of creating a web application.

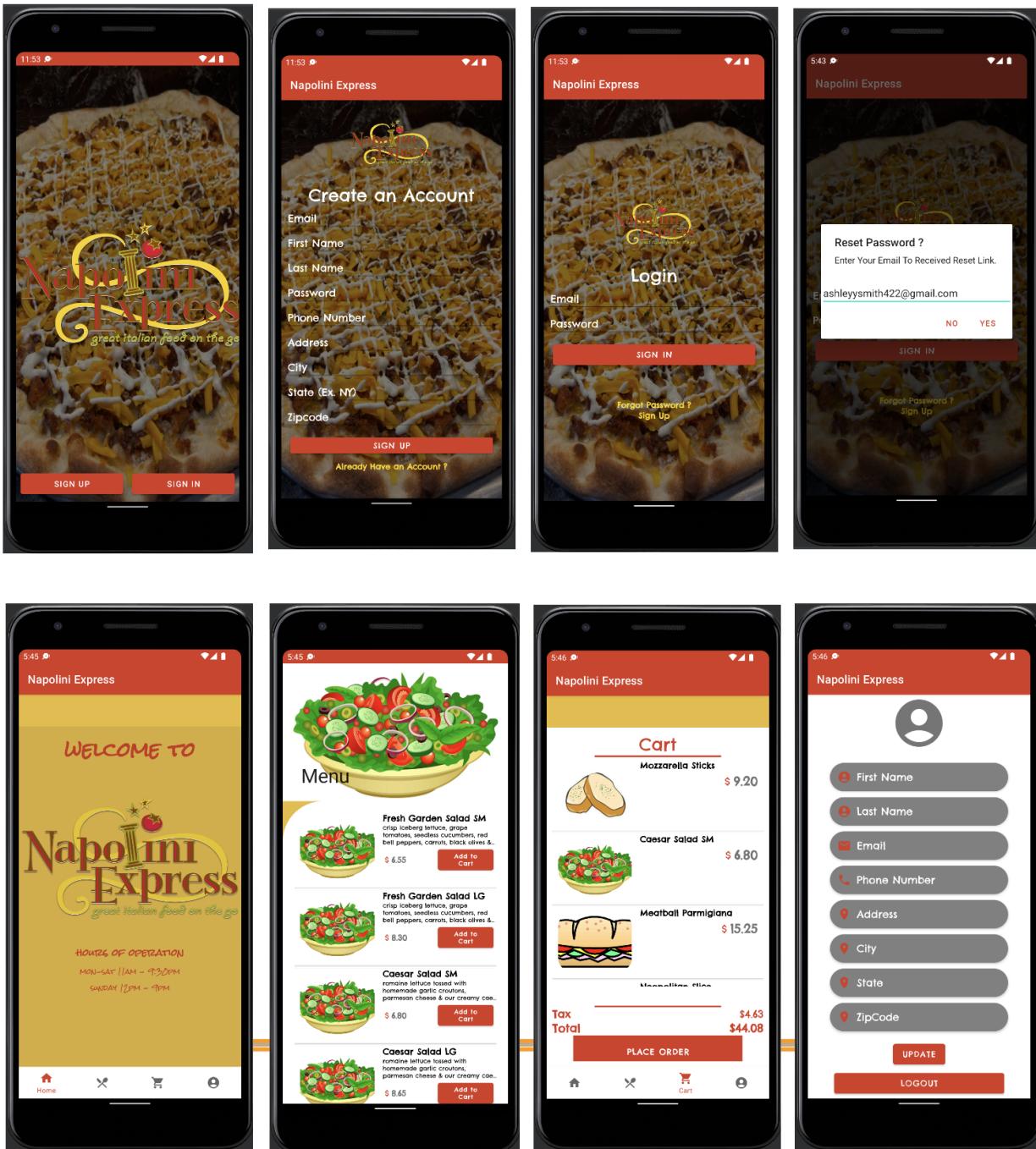
In January 2022, I conducted an anonymous survey, through SurveyMonkey, that asked students at Hofstra a series of questions about online ordering. I received about 100 responses, most of which were freshman and seniors. When asked about how often they order online, 40% said a few times a week. A different study showed that in March 2020, 38% of Americans have ordered on a food delivery app, and then a year later, it jumped to 47% [1]. This shows that since the pandemic, consumers have been significantly ordering more online. My survey also showed that more people ordered from a third-party app, rather than from the restaurant application. Although many smaller restaurants don't have the money or resources for an app, the third-party apps display a wide variety of different types of food. Another question from the survey asked when ordering food, do you order pickup or delivery. Surprisingly, 90% order delivery when ordering from an app. This proves the convenience of an application. Lastly, when asked if they would use an app for Napolini Express, 70% said yes. This survey was important to this project because developers create applications if there is a need or want from the public. Those who said no have never heard

of Napolini Express and were freshmen. A goal from this project is to also reach those who are unfamiliar with the restaurant. Students are more likely to order if it's from their phone.

Process

After initial design and prototypes, I started developing the mobile app. Authentication, signup, and login took about 2 weeks to complete. This is the first thing that users see and is important to the application. To sign up, users insert their email address, first name, last name, address, and phone number. This data is then checked in the database to ensure there are no errors and that the primary key (their email address) inputted was not duplicated. To verify and to reset password, the customer must input their email, which will be sending verification/reset password email to them. There are 4 main fragments in the mobile app: Home, Menu, Cart, and Account Settings. The home page displays the logo and hours of operation. The menu page is interactive and modern. It first displays the categories, such as appetizers, salads, pizza, desserts, etc., and then displays the items within that category. Each item has an image placeholder, its name, description, and price. There is also a button for each item to add to the cart. When clicked, the detail item recycler view is added to the cart recycler view. The items displayed in the cart show their image, name, and price. The tax and total amounts are calculated and displayed to the user. Final checkout was not implemented yet but will be able to take their account information from login and give the customer an option to pay with card or cash at the restaurant. Deliveries have a 15 dollar minimum, and will also be implemented. The last page is the Account settings page. Customers are able to update their first and last name, their phone number, and their address. They are able to update just one of those if needed. There is also a logout button that will log them out of their account and Firebase,

and bring them to the main page. Most pages are scroll views due to the large amounts of data. Although this app is a start, there are plans to fully implement the extra features and publish the app.



The screenshot shows an email from noreply@napolinexpress-329be.firebaseioapp.com to me. The subject is "Reset your password for Napolini Express". The email body contains a link to reset the password: https://napolinexpress-329be.firebaseioapp.com/_auth/action?mode=resetPassword&oobCode=C-P5bAqI9uoer7SP77H-0ry-jXywGN23gTzuvv1PP08AAAGAvQl9g&apiKey=AIzaSyCTxLjB-KssPoMGvGlpAJN0woNn5MJ4ME&lang=en. It also includes a note about ignoring the email if it wasn't requested and a message of thanks from the Napolini Express team.

After developing the mobile app, I went on to create a web application for management. I used Visual Studio to host the analysis of the data. I scaffolded the tables created in SQL Server to create CRUD pages for each. This allows the staff to update any information day-to-day. They currently have the Tableau analysis and access to the CRUD pages. Everything on the management side is tied to the backend and it will be important to not let customers manipulate the data by accident. The stored procedures and views created will also be implemented so that they don't have to rely on Tableau, in the case that something happens. Having the data and analysis in one place will make it easier for the management. Customers will not have access to this tool, but can enjoy the benefits of a mobile app.

Potential Benefits

I wanted to create an app for Napolini Express to help out a local restaurant and to make it more convenient for customers/students. There are many benefits for both the customer and restaurant. For the customers, they get a convenient app that saves their data and won't be charged extra fees. It would also save time for them to order on the app and either have it delivered or picked up. This also would potentially help the restaurant get

more business. Since COVID, many people are staying home more and ordering takeout. Approximately "68% of consumers say they're more likely to order takeout in 2021 than they were pre-pandemic" [1]. This is huge for companies because they need to adjust to life-changing events, such as the pandemic. This app would also help the owner track sales and more analytics for the business. Tableau is a resourceful tool to help look at data, but cannot be a forever solution. Publishing my Tableau data ensures a secure connection and since it's using live data, it will be automatically updated when data is edited, added, or deleted. Further analysis will be inserted into the management tool to have a one place to look at the data, graphs, and charts.

Setbacks

Although I have created apps in Android Studio, I was unfamiliar with how much really goes into an app. When I first began, my VM was slow and laggy, making it hard to code or input data. In addition, after using Visual Studio for a week, my free subscription expired and would not allow me to access everything I worked on. From then I decided to use Android Studio. There were points when I thought about just implementing a website and dropping the app idea, but after everything I did, I followed through and created an application that I am proud of. Throughout the 15 weeks, I also was sick and had some personal issues that delayed the process. But with good planning and dropping some features, I was able to finalize the deliverable.

Dropped Features

Originally, I was going to create an Android and iOS application but due to time and inexperience with Xcode, I decided to only do an Android application. I started to use Visual

Studio for the mobile application but decided to only use it for the management side. There were many features dropped for the presentation, such as order/pickup option and order tracking, but I plan to implement them for the final product. In addition to developing the app, I went back and forth between bottom navigation and navigation drawer view. I ended up figuring out how to implement bottom navigation but most likely will end up changing back to the navigation drawer activity in the future. In regards to the management tool, I created many stored procedures that will eventually be live data graphs and charts, but didn't want to risk the users messing with the data in the backend. This is something that I plan to implement in the future.

Future Plans

I truly enjoyed this experience and never thought I would get through this on my own. I put countless hours into creating a working application that I was proud of. Although this application was for a project, I plan to continue working on the application and management tool. An iOS application is part of the plan, as well as add some features I was unable to. For example, students get a 10% discount at Napolini Express. Not many students know this, therefore, I would like to develop a way for the app to scan a student or faculty ID. This would be stored in the app and database so that when they place an order, it takes off the 10% automatically. I would also like to move all the data to one central database, instead of two, such as AWS. To have a stable app, I believe all the data should be stored in one place for easier access. Additionally, another feature I hope to implement is a rewards system. To have a successful app, I believe a rewards system will help capture the younger generation. Napolini Express does have a card in store where when you buy 10

pizzas, you get one free, but something that has more rewards will be useful. Everyone enjoys free things so this feature will be essential in the future.

I am currently in the process of collecting data dumps of online chatter about the business. The goal is to scrape various sites, such as twitter, social media, facebook, etc., for chatter about the company, whether it be positive or negative. Machine learning could potentially help with this task. This will allow management to figure out what is being said about their business, find ways to improve, or know what they're doing right. Public perception is big in the business world, therefore this analysis and research will be integral to their management tool. There is much work to be done with both the backend and frontend of this hybrid platform, and I am eager to continue the analysis, research, and development for the Napolini Express application.

References

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