Systems Analysis and Design Phase 5
Stark State College
April 23rd 2020
Keith Metropulos, Clayton Boecker, Troy Stricker, Nate Beidle

Request for Information Services:

The Mobile Vending Company

6200 Frank Ave NW

North Canton, Ohio 44720

Dear UB Advertising,

Our company is interested in the possibility of an advertising campaign. We have an application that will show locations of vending machines. The advertisements could expand the product and help people in cities, college campuses, and anywhere else with a vending machine. We would appreciate it if you could provide us with your rates and other information needed for your business.

We hope to hear from you and thank you for your attention to our request.

Project Proposal:

Summary -

Smartphones and the internet of things are both highly growing fields in today's economy. Our mobile application, Vending Mobile, will tap into both of those fields by creating a resource to help consumers quickly locate, compare, and purchase from vending machines in their area. This app would be especially useful to vacation goers, people in big cities, and people on college campuses. Often times these groups are unaware of the options vending machines provide in their areas, and are unaware that the prices may be lower than the prices from stores around them.

Statement of Need -

Consumers are not the only ones to benefit from this application, vending machine owners would arguably benefit more. In the past, vending machine sales were more or less based on the location of the machine, and its inventory exclusively. With our app, owners could run sales, give coupons and rewards, and actively advertise on a scale that has never been accessible to them before.

Budget -

One of the best parts about this project is that most of the infrastructure needed is in place in modern vending machines already. The costs for the application would mostly pertain to developing and maintaining. First not only developing an app that users interface with, but a seperate app as well for owners. Then once these two apps are completed, they would need to be maintained over time to ensure lasting success. As well servers would need to be purchased to

support the data used by the application, the amount and size of which would hopefully, naturally increase over time.

Company History:

The company Mobile Vending was founded in late 2019 by Keith Metropulos, Clayton Boecker, Troy Stricker, and Nathan Beidle. Mobile Vending rose due to a gap in the market for locating vending machines and making pre-orders. During the company's short rise in late 2019, already 2000 vending machines have been located and mapped around northeast Ohio, along with the tasty snacks inside of those vending machines. Today, Mobile Vending is working on expanding its number of vending machines mapped, and is looking to expand its area.

Business Description:

The company Mobile Vending is a partnership located at 6200 Frank Ave NW, North Canton, OH. The company as a whole answers to the board of directors, with the CEO, CTO, and CFO overseeing the two main divisions of the business, IT and Marketing. The management team consists of a Director of Project management and Director of marketing. The company's primary source of income would be through small fees through the application when someone uses the application to order from the vending machine. Vendors would also be charged a small fee to have their vending machines put on the map. This application would be something snack vendors would want their vending machine services to have for increased exposure and sales.

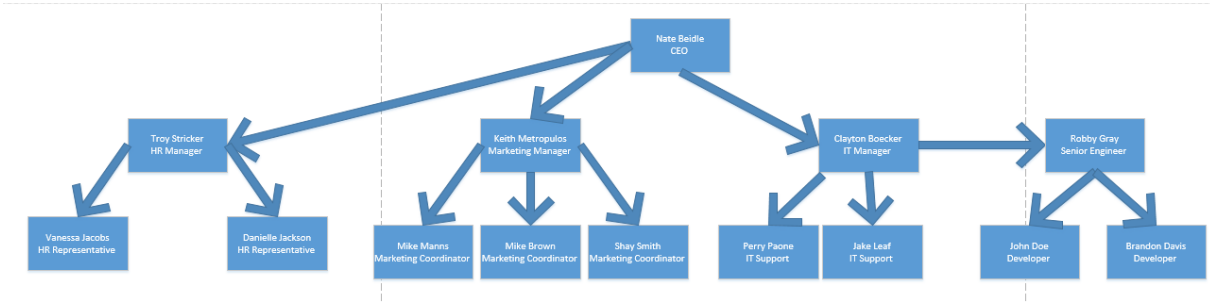
Company Organization:

Our company currently has 3 departments: IT, Marketing, and Human Resources. We have 14 employees.

CEO: Nate Beidle
HR Department:
HR Manager: Troy Stricker
HR Representatives: Vanessa Jacobs, Danielle Jackson

Marketing Department:
Marketing Manager: Keith Metropulos
Marketing Coordinators: Mike Manns, Mike Brown, Shay Smith

IT Department:
IT Manager: Clayton Boecker
IT Support: Perry Paone, Jake Leaf
Senior Engineer: Robby Gray
Software Developers: John Doe, Brandon Davi


Nate Beidle
CEO
Troy Stricker
HR Manager
Keith Metropulos
Marketing Manager
Clayton Boecker
IT Manager
Robby Gray
Senior Engineer
Vanessa Jacobs
HR Representative
Danielle Jackson
HR Representative
Mike Manns
Marketing Coordinator
Mike Brown
Marketing Coordinator
Shay Smith
Marketing Coordinator
Perry Paone
IT Support
Jake Leaf
IT Support
John Doe
Developer
Brandon Davis
Developer

Stakeholder Description:

Stakeholder	**Responsability**
Owners of Company	Profitability, growth, sustainability, market share
Sales and Marketing Department	Growth, pay, and job security
Development Department	Quality, job security
Vendors/Suppliers	Geographic area, customer outreach
Customer	Value, easy to use application, Deals
Investors	Profitability, Growth, Return on Investment
Community	Jobs, Greater community funding via taxation

Project Charter:

Project Conception -

One member of our company came up with this idea while vacationing in Las Vegas. He noticed not only the large amount of vending machines with a wide variety of items, but he also noticed how the items in those machines were often at a lower price than at the restaurants and tourist traps around him. With a mission initially to save regular people money, he set forth to found Vending Mobile the following semester.

Project Objectives -

As aforementioned, one of the big goals of this project/application is to save people money. This app would show people options they previously didn't know existed and allow them to take advantage of special deals and offers by vending machine owners. As well owners will have a new platform to promote their machines, prices and inventories. It will also connect them to Google Pay and Apple Pay services, truly bringing them into the new decade.

Scope -

The potential scope of this company can range anywhere from local to international. Currently, Mobile Vending is a local company looking to expand nationally, then internationally afterwards. Business will have to give permission, if they want us to come in and put their vending machines on our application.

Business Constraints -

Our application relies heavily on a strong partnership between our team, and vending machine owners nationally. Owners need to understand all the benefits and subsequent business our app will bring to them and use our app to its fullest potential for

it to succeed. Our other large constraint is the size of our team. As it stands, our team consists of four people whereas the full scale project would take a team of maybe six or more.

Technology Constraints -

Google maps (the most important module of this project) is largely a 2D platform, with only basic features for indicating which floor an object is on. Since many vending machines are inside multistory buildings, this would need to be addressed. As well, a system to link the inventory of many different machines to our application would need to be implemented.

Resource Constraints:

Mobile developers and project funding are the two main resources our company would need to thrive. As it stands, our company consists of junior programmers, severely lacking in mobile development experience. With hopes of porting our application to IOS and other mobile devices, the need for a senior mobile developer to step in at the top level of the company is paramount.

Documentation and Communication:

Mobile vending will need to thoroughly document things such as machine locations, vending machine type (coffee, snack, pop), and what is currently in the vending machine's inventory. The application needs to be easy to use for customers, and vendors alike. Customer feedback will be documented and reviewed by the development team.

We also believe it's important to provide fleshed out and well developed documentation on the code we've made/used in this process. Since part of our application relies on Google's premade map interface, it's important to include this, along with other programming guides used during the process.

Lastly, documentation on sales, customer preferences, and other transaction details will be invaluable to both us, and the companies we work with. They'll provide key details on where and how to further improve along the way.

Analysis:

	Optimistic	Pessimistic	Most Likely
Programming - Android	3 Weeks	6 Weeks	4 Weeks
Programming - IOS	3 Weeks	6 Weeks	4 Weeks
Database Design	1 Week	3 Weeks	2 Weeks
Integration w/ Vending Machines	6 Weeks	9 Weeks	8 Weeks
Debugging	2 Weeks	4 Weeks	3 Weeks

Business Requirement Statement:

Summary- Mobile vending intends to provide an application that maximizes the profitability of an application, while keeping maintenance costs at a minimum. After identifying a gap in the market, and various internal discussions, it has been deemed feasible for Mobile Vending to pursue this venture. The cost-benefit analysis is low-risk with medium to high reward and the timeline acceptable.

Objective - The objective of this project would be to increase the company's revenue cost, while having minimal maintenance costs, maximizing profitability in the process. If successful, this application should be rather timeless, bringing in money for the company for years to come with minimal updates needed.

Background- Currently, a gap in the market has been identified. As of late 2019/ early 2020 no vending machine application has currently been identified, and this can be marketed to the consumer as a way to save money in places such as vacation areas and carnivals to avoid pricey alternatives for food.

Scope - The scope of the business is scalable, and could be as widespread as trying to map every vending machine around the entire world, or targeting specific areas such as vacation hotspots, and universities.

Financial Statements - The current financial outlook for this should looks promising, with most of the cost at the time of development and minimal maintenance costs, the profitability should be long term.

Functional Requirements and Features- Several functional requirements will be needed for Mobile Vending to have a successful application and business. The application will need to easily be able to provide a user with a location, type and what is in a given vending machine. Businesses who stock the vending machines will also need to be able to easily update their application and offer deals through the application.

SWOT analysis- Some strengths of this project would be that it would be a one of a kind application, and can offer deals with vending machines, along with accepting things like apple and google pay. Some weaknesses of the application is that it could be seen as niche, and may not get much use outside of tourist-like areas.

Personnel Needs- During the time of initial development and marketing, personnel needs will be the highest. After application launch and reasonable growth, only minimal marketing and technical expertise will be needed for maintenance.

Timeline - The current timeline to have a working prototype in operational condition will take roughly 16 weeks. Full development and implementation could take upwards of a year depending on the future scope of the project.

Assumptions- Vending machine vendors such as AVI foods and places like pepsi, freedolay, and coca-cola will also be on board with the application.

Cost and benefit- Currently, the cost-benefit analysis is low risk-high reward for future potential growth.

Alternatives Considered:

As always, there are alternatives to be considered with this project. While there is no current vending machine application on the play store, there will be different ways to obtain data for this project. The first would be from vending machine companies, and have client side software so they can easily update their application. Another way would be to go out and manually map out each vending machine and their contents every so often. While going out and

manually updating the applications data every month, this would be impractical. Another way of data acquisition would be through the vending machine companies and the vendors themselves.

System Improvement Objectives:

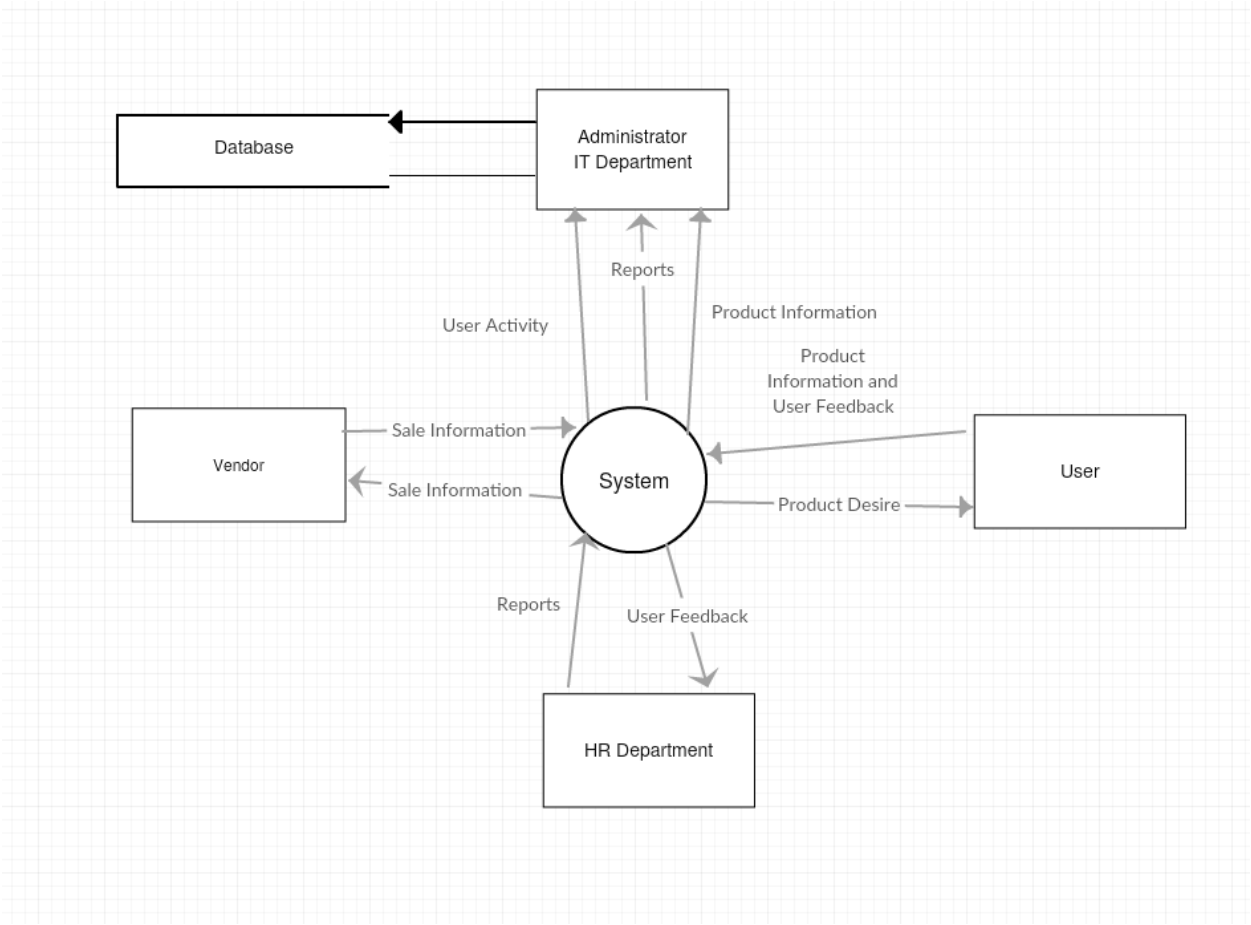
The three main ways to improve our app over time will be -

1. Hire experienced developers to maintain and improve the app over time.
2. Continue to work closely with vending machine companies to make sure our app is being used to the best of its ability.
3. Open independent machines in high traffic areas.

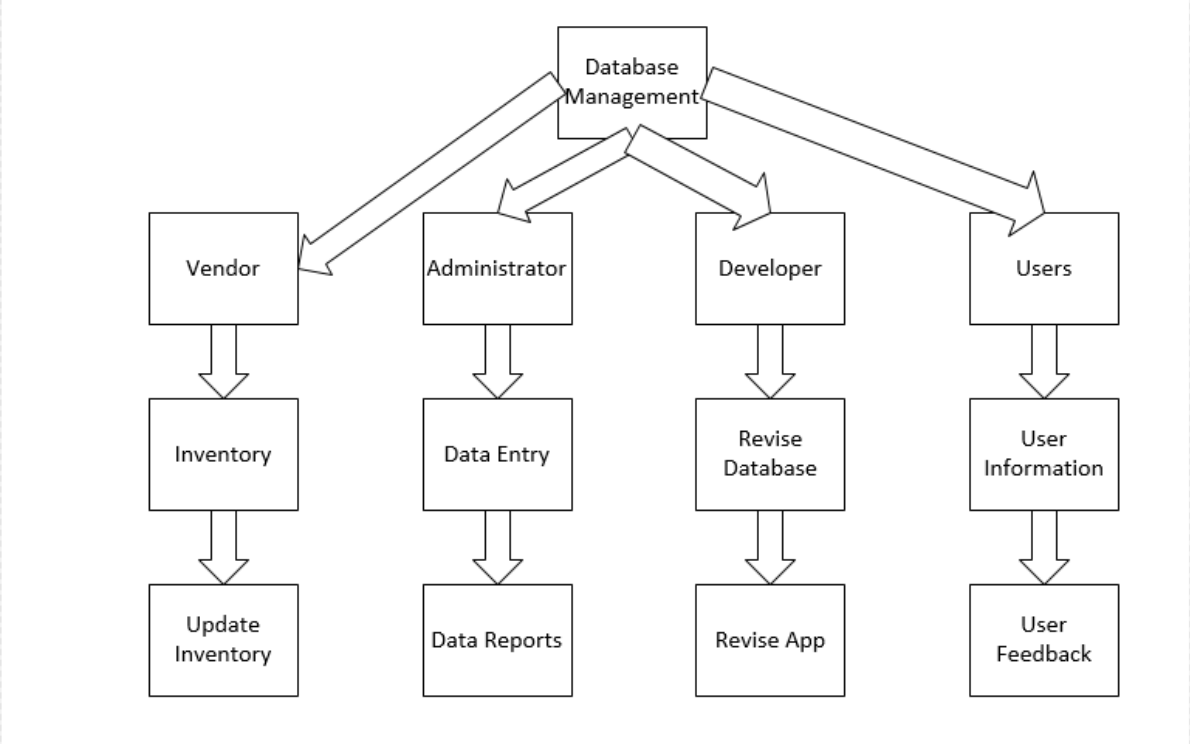
Hiring experienced developers needs no further explanation, they are vital to a software company. Working closely with vending machine companies will also be vital because without that partnership, our business will have no platform to run on. Lastly, once we understand where high traffic areas are, and what machines profit the most, we can open up our own machines in key locations. These machines would be the most profitable for us, as we would not be dealing with a middle man. As well they would be located in the most profitable areas, with an idealized inventory.

Logical Process Models

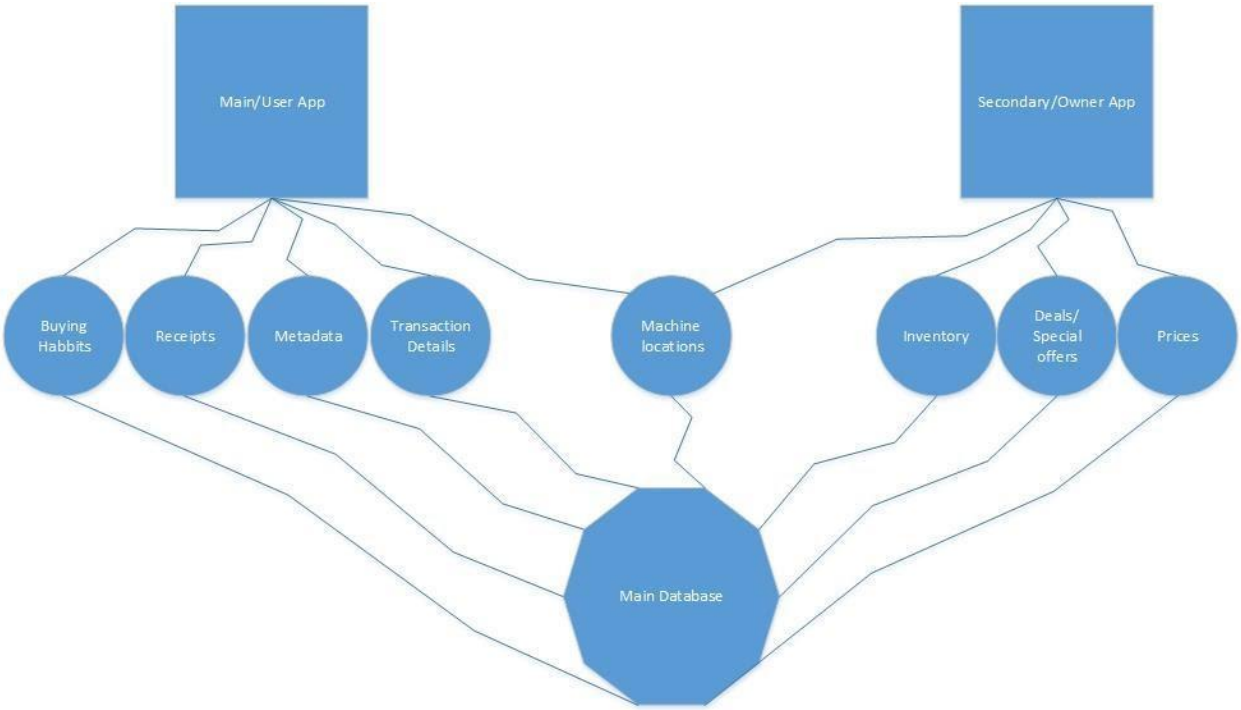
Context Diagram:



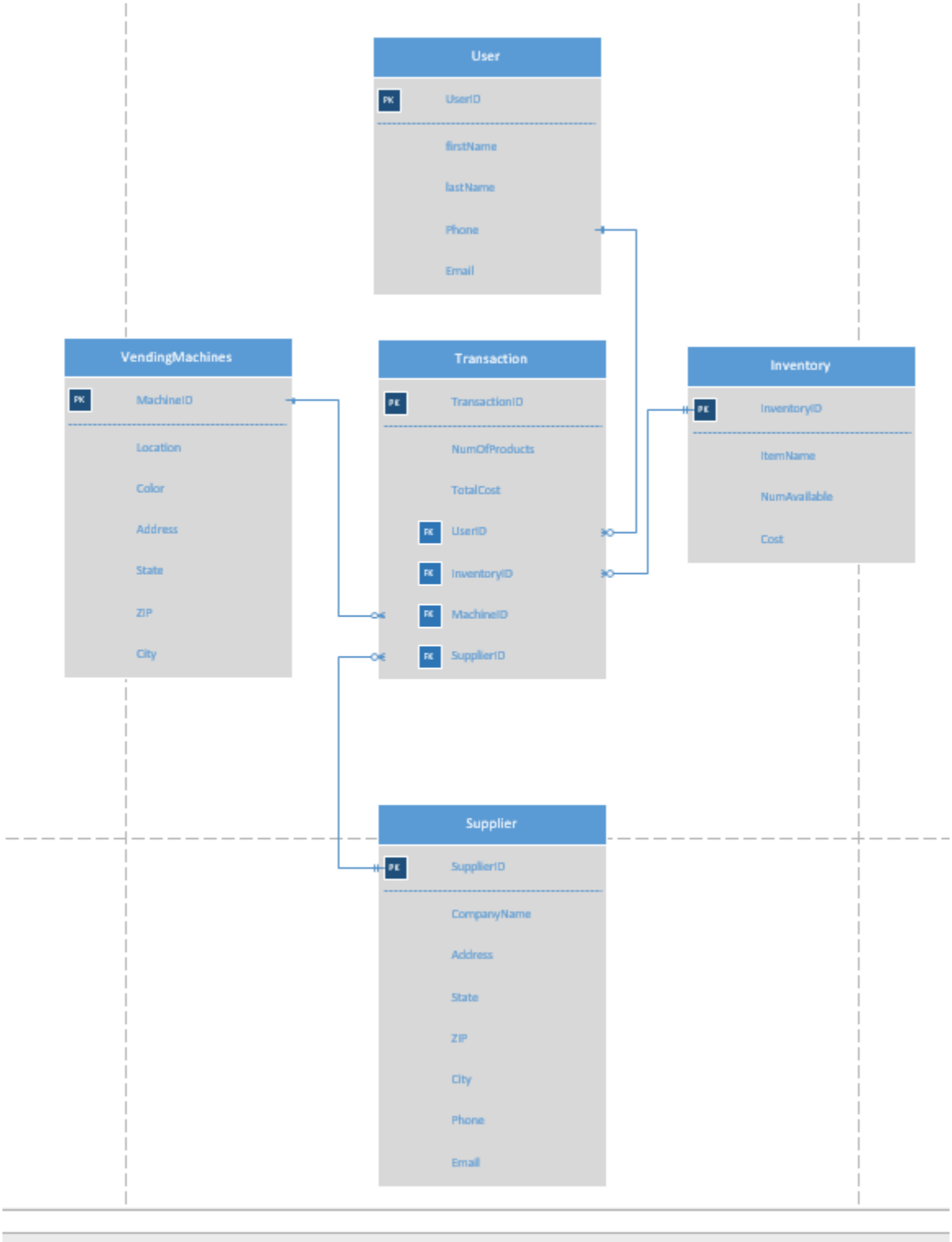
Decomposition Diagram:



Data Flow Diagram:



ERD:


User
PK
UserID
firstName
lastName
Phone
Email
VendingMachines
PK
MachineID
Location
Color
Address
State
ZIP
City
Transaction
PK
TransactionID
NumOfProducts
TotalCost
FK
UserID
FK
InventoryID
FK
MachineID
FK
SupplierID
Inventory
PK
InventoryID
ItemName
NumAvailable
Cost
Supplier
PK
SupplierID
CompanyName
Address
State
ZIP
City
Phone
Email

Data Dictionary -

VendingMachines | Transaction | **Inventory** | U

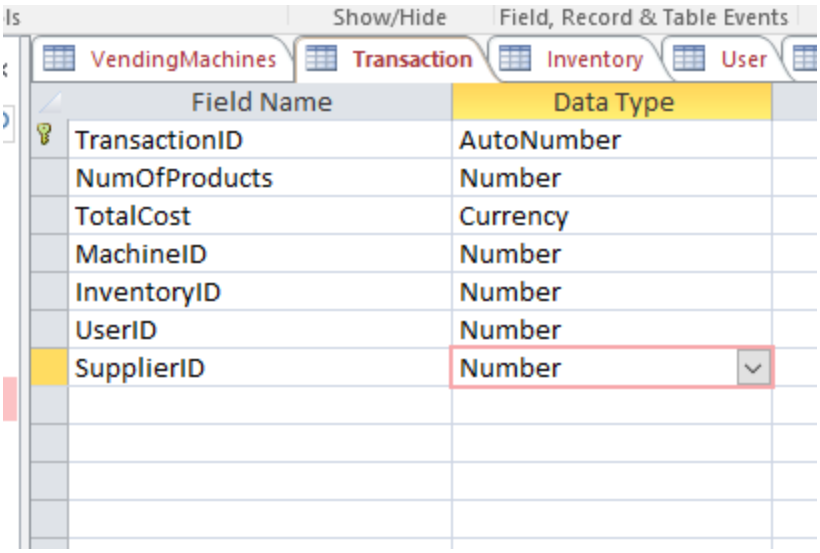
Field Name	Data Type
InventoryID	AutoNumber
ItemName	Short Text
NumAvailable	Number
Cost	Currency

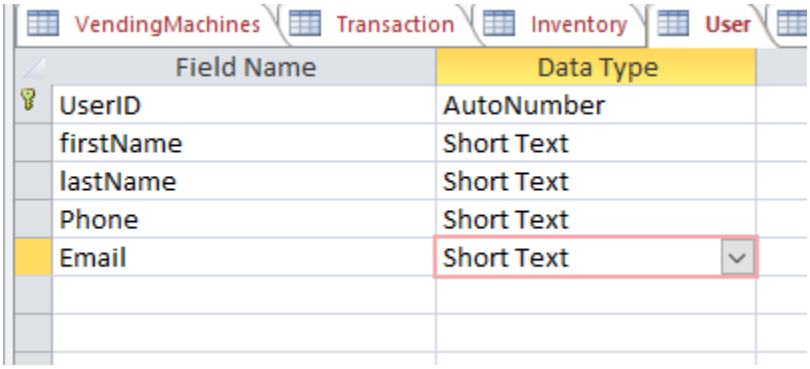
VendingMachines | Transaction | Inventory | User

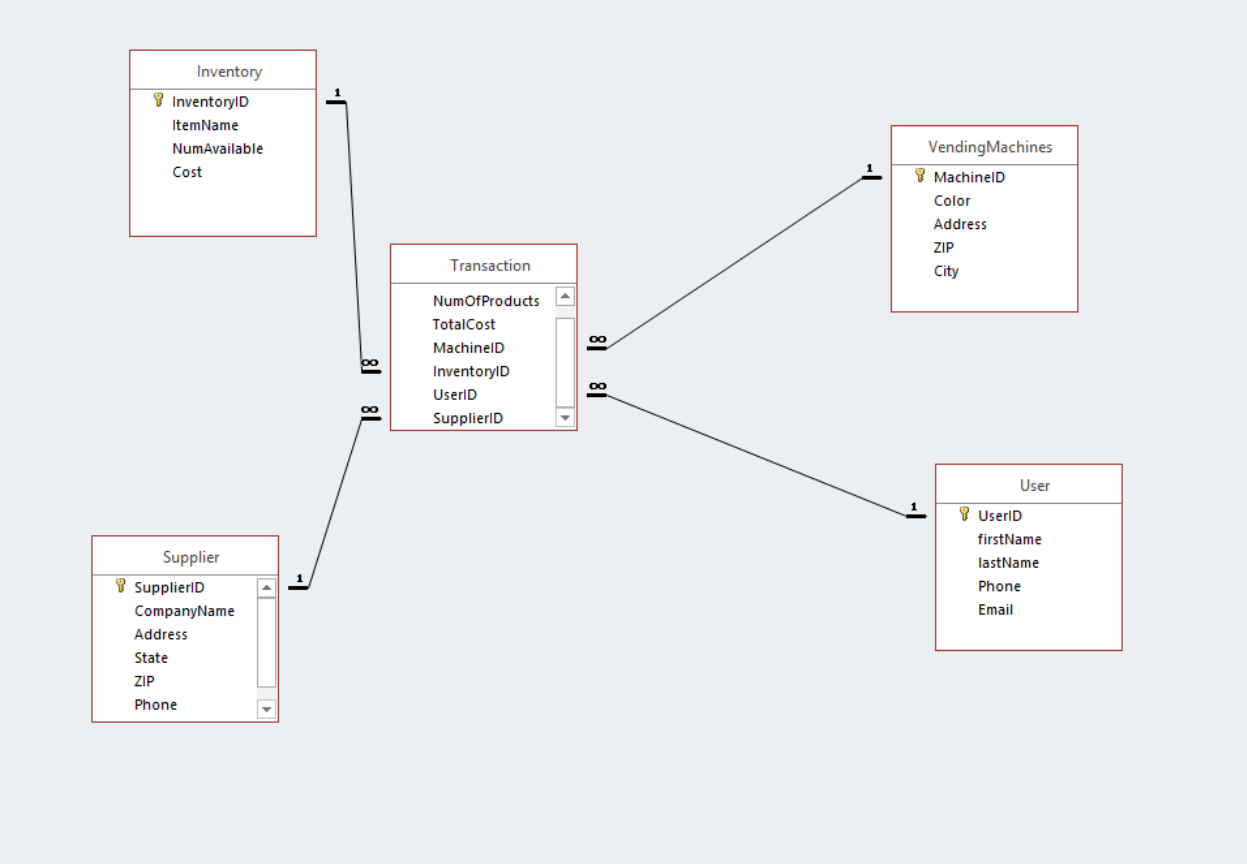
Field Name	Data Type
MachineID	AutoNumber
Color	Short Text
Address	Short Text
ZIP	Number
City	Short Text

VendingMachines | Transaction | Inventory | User | Supplier

Field Name	Data Type
SupplierID	AutoNumber
CompanyName	Short Text
Address	Short Text
State	Short Text
ZIP	Number
Phone	Short Text
Email	Short Text


Show/Hide
Field, Record & Table Events
VendingMachines
Transaction
Inventory
User
Field Name
Data Type
TransactionID
AutoNumber
NumOfProducts
Number
TotalCost
Currency
MachineID
Number
InventoryID
Number
UserID
Number
SupplierID
Number


VendingMachines
Transaction
Inventory
User
Field Name
Data Type
UserID
AutoNumber
firstName
Short Text
lastName
Short Text
Phone
Short Text
Email
Short Text


Inventory
InventoryID
ItemName
NumAvailable
Cost
Transaction
NumOfProducts
TotalCost
MachineID
InventoryID
UserID
SupplierID
VendingMachines
MachineID
Color
Address
ZIP
City
User
UserID
firstName
lastName
Phone
Email
Supplier
SupplierID
CompanyName
Address
State
ZIP
Phone
1
∞

Feasibility Matrix -

	Weight	Option 1	Option 2
Description	Total % of weight	Client Side Software	Manually Mapping out Vending Machines
Operational Feasibility	30%	100	50
Technical Feasibility	30%	70	100
Schedule Feasibility	25%	100	50
Economic Feasibility	15%	70	70
Total Score	100%	86.5%	68%
Rank		1	2

As long as the company that owns the vending machines provides a client side software, it would be much more feasible to use this to make changes and implement the database for this project. It would be far too time consuming to manually map out all the vending machines and consistently check on all the changes being made to them. The biggest issue with this would be if there are slight price changes being made constantly. This would take a lot of work to make sure everything is up to date at all times. Having a client side software that automatically updates the database when changes are made would just be much more simple and in the long run, much more effective.

Alternatives Matrix -

	Weight	Option 1	Option 2
Description	Total % of weight	Client Side Software	Manually Mapping out Vending Machines
Long Term Efficiency	30%	100	50
Cost	30%	80	50
Ability to Adapt	20%	100	20
Development period	10%	70	20
Easy of learning	10%	100	20
Total Score	100%	91%	38%
Rank		1	2

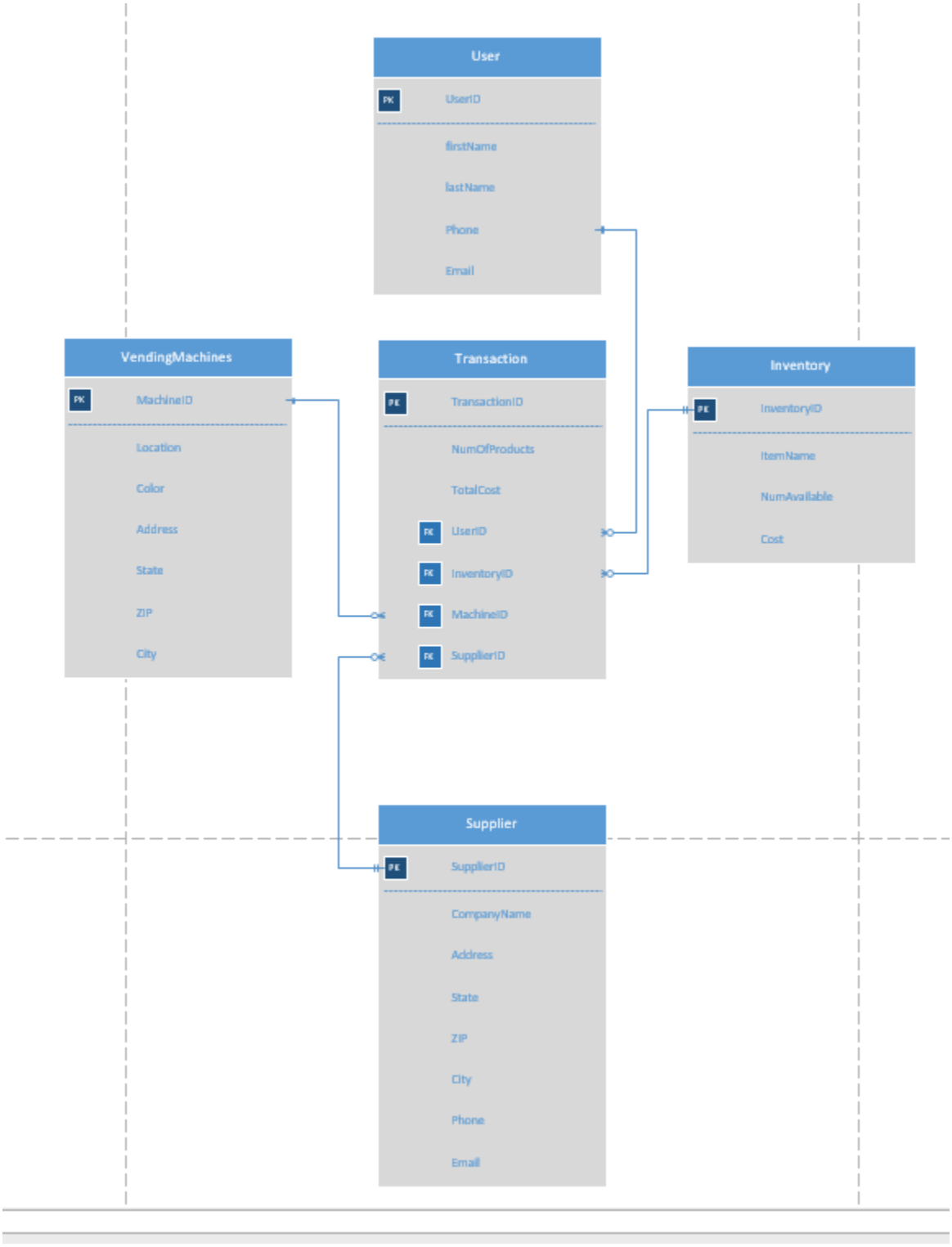
We Chose to go with using a client side software to gather the data. The reason being is because it is way more cost effective to implement. It is also a lot easier to update the database as products and locations of vending machines change.

Appendix -

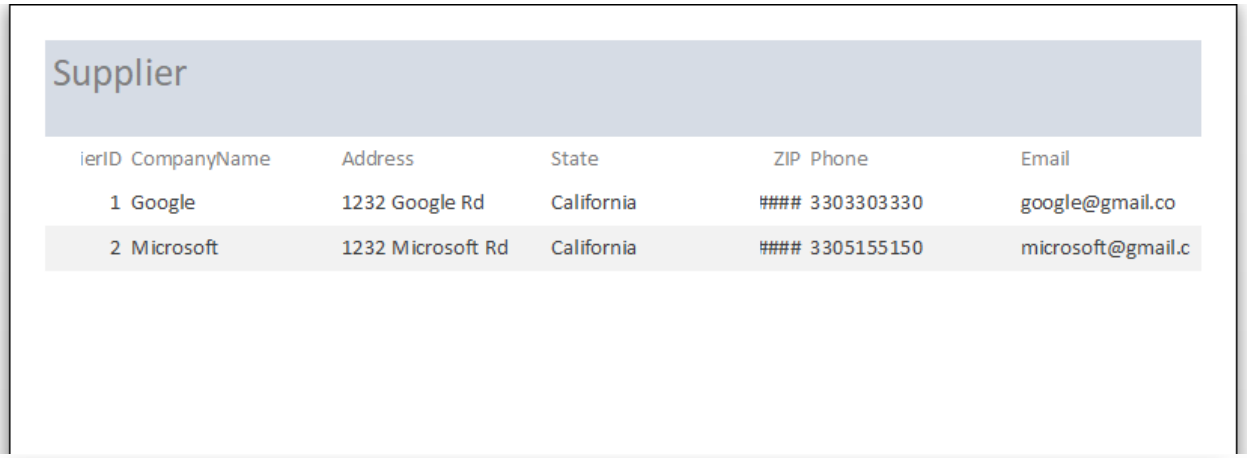
https://developer.android.com/guide - step by step guide on how to develop for android devices
https://www.thebalancesmb.com/how-to-prepare-a-business-requirements-document-4147657 - description of business requirements document.

https://www.skysilk.com/blog/2018/how-to-connect-an-android-app-to-a-mysql-database/ - information on connecting an android app to a database.

Database Design:

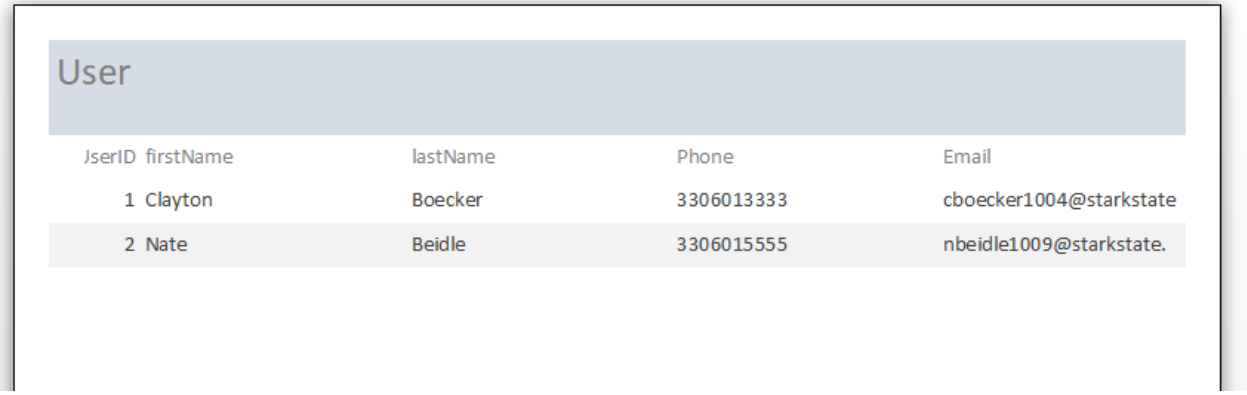


Input, Output & Report Design:



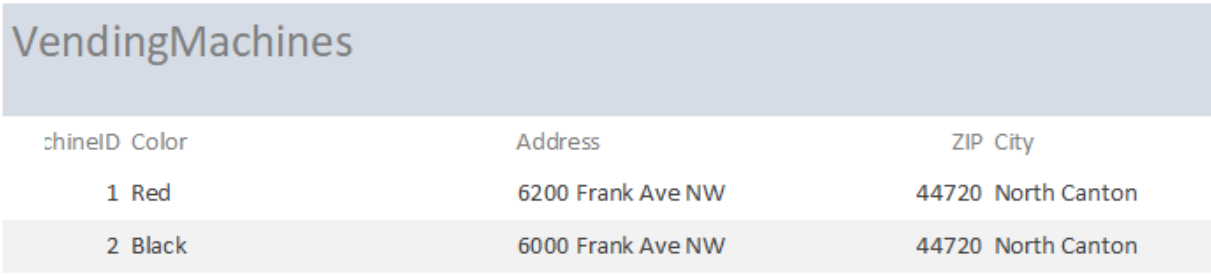
Supplier

ierID	CompanyName	Address	State	ZIP	Phone	Email
1	Google	1232 Google Rd	California	####	3303303330	google@gmail.co
2	Microsoft	1232 Microsoft Rd	California	####	3305155150	microsoft@gmail.c



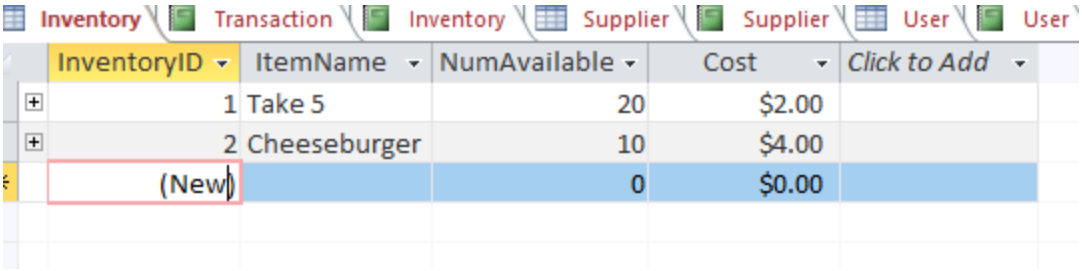
User

JserID	firstName	lastName	Phone	Email
1	Clayton	Boecker	3306013333	cboecker1004@starkstate
2	Nate	Beidle	3306015555	nbeidle1009@starkstate.



VendingMachines

chineID	Color	Address	ZIP	City
1	Red	6200 Frank Ave NW	44720	North Canton
2	Black	6000 Frank Ave NW	44720	North Canton



Inventory

InventoryID	ItemName	NumAvailable	Cost
1	Take 5	20	$2.00
2	Cheeseburger	10	$4.00

System Test Plan:

Overview: To Start the testing process we first need to understand the application we are testing and the environment in which the application will be used.

Testing Strategy: The application, mobile vending is most likely to be used when people are in environments unfamiliar to themselves. The testing process will do its best to mimic these circumstances. Also gain B2B feedback, about the version of the application offered to vendors.

Testing Objectives:

1. Determine whether the application helps the user find their way to the vending machine
2. Gain user feedback, on interface, design, layout, and ease of use.
3. Determine things that are further optimized from a technical aspect, looking for performance issues.

Test Environment: The testing environment will be around and on Stark State campus. Ideally people who are not familiar with the campus should be brought in to test the application.

Test Criteria: Several things will need to be determined when testing:

1. Is the application clear and concise, i.e are deals offered clearly.
2. Is there a practical use for this application?
3. Is the application consistent?
4. Is the application complete? Or are there additional features that could be added.

Schedule and estimation: The testing will take place shortly after the prototypes are operational to get as much feedback as possible. The cost of the testing is estimated to cost around $2000, mostly in man hours, walking around ensuring the application takes the user to the correct vending machine.

Data Conversion Plan:

The data conversion plan will be an automated data transfer from the vending machine companies DBMS to ours. We will run a system of reports to check to make sure all the essential data for our DBMS is transfered, or updated. It should be a smooth and painless transition to the new system. We will then have each user register on our application and fill out a report.

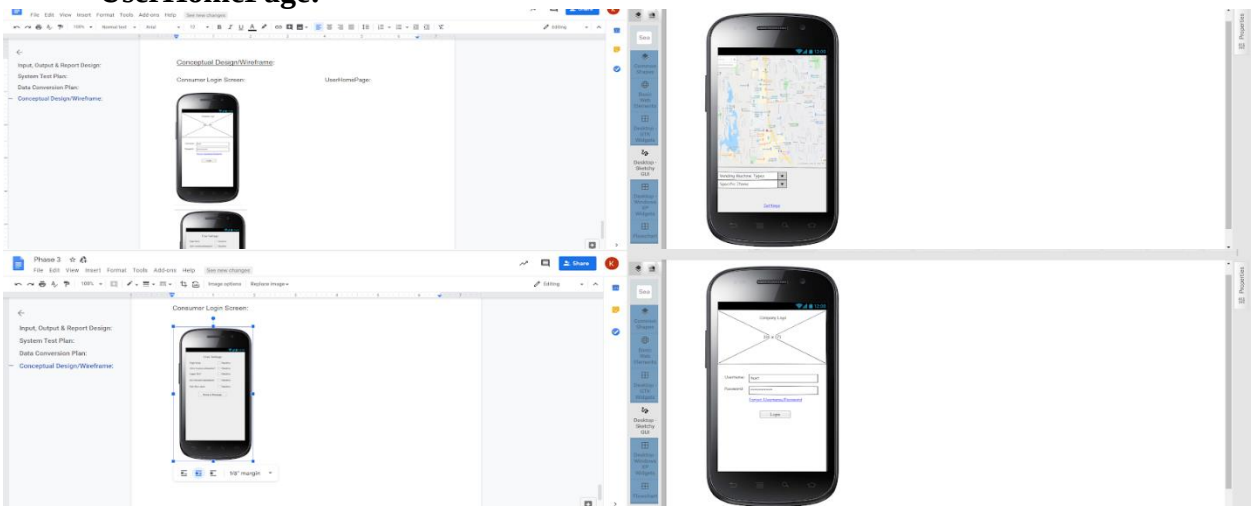
We will need to run validation on the data to make sure the main components are there. Any data that is not required for our database will not be transfered over. Next we can standardize the data that will be transferred and format it to meet our requirements. We can make any amendments that need to be made through reports. Next we can integrate the data into the new system, and make sure that the data was converted correctly and in the right format.

Any future updates on pricing or new products will be provided by the vending machine company. This will then go through the same process to update our DBMS and check for errors in the data entered.

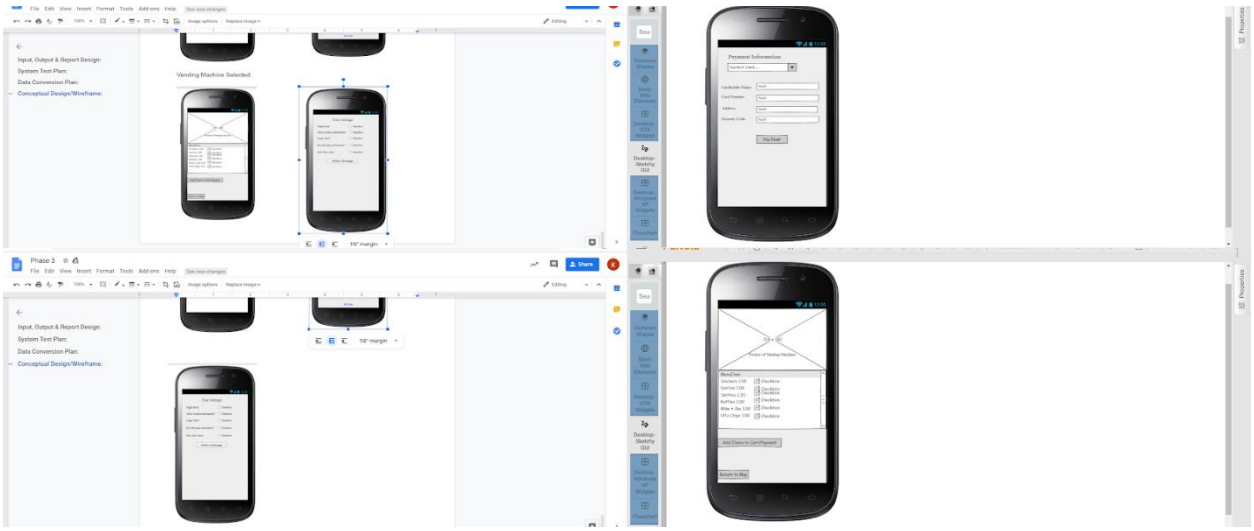
Conceptual Design/Wireframe:

Consumer Login Screen:

UserHomePage:



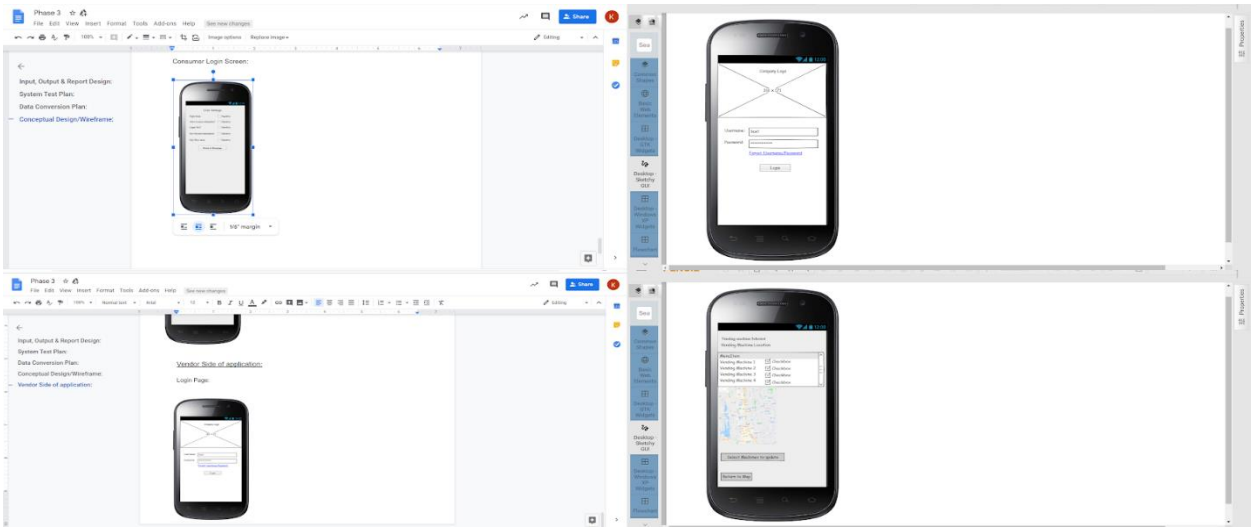
Vending Machine Selected: **Payment Screen:**



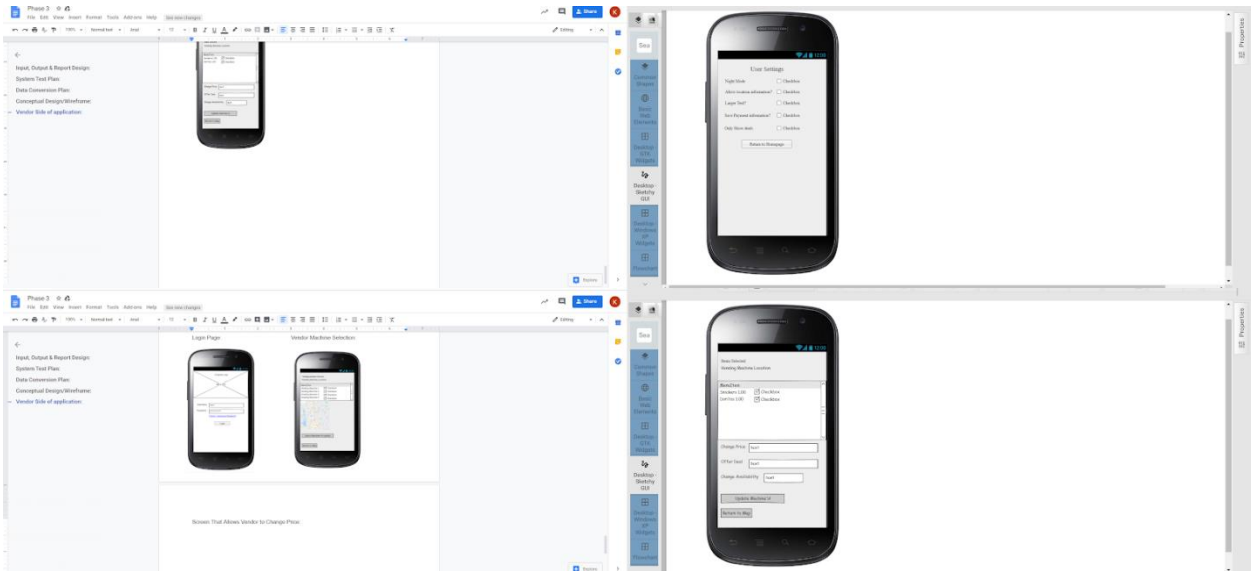
User Settings:

Vendor Side of application:

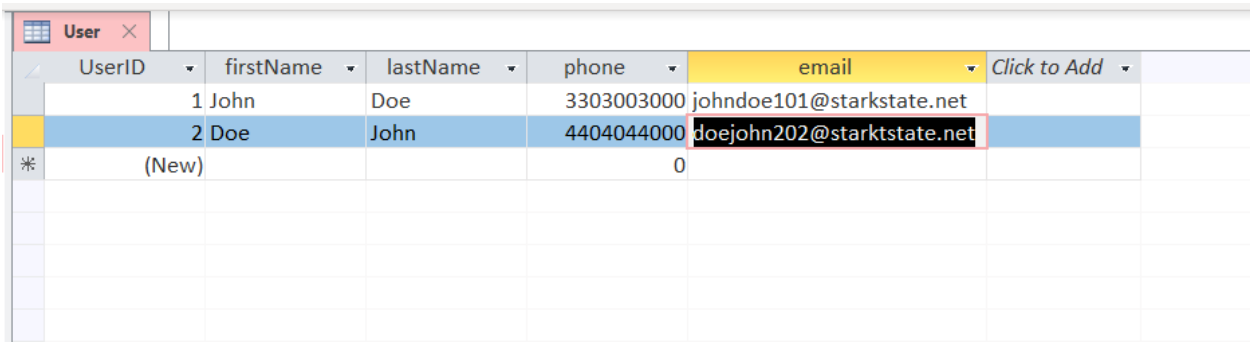
Login Page: **Vendor Machine Selection:**



Change Item Attributes: **Settings:**



Database:



User

UserID	firstName	lastName	phone	email	Click to Add
1	John	Doe	3303003000	johndoe101@starkstate.net	
2	Doe	John	4404044000	doejohn202@starktstate.net	
(New)			0		

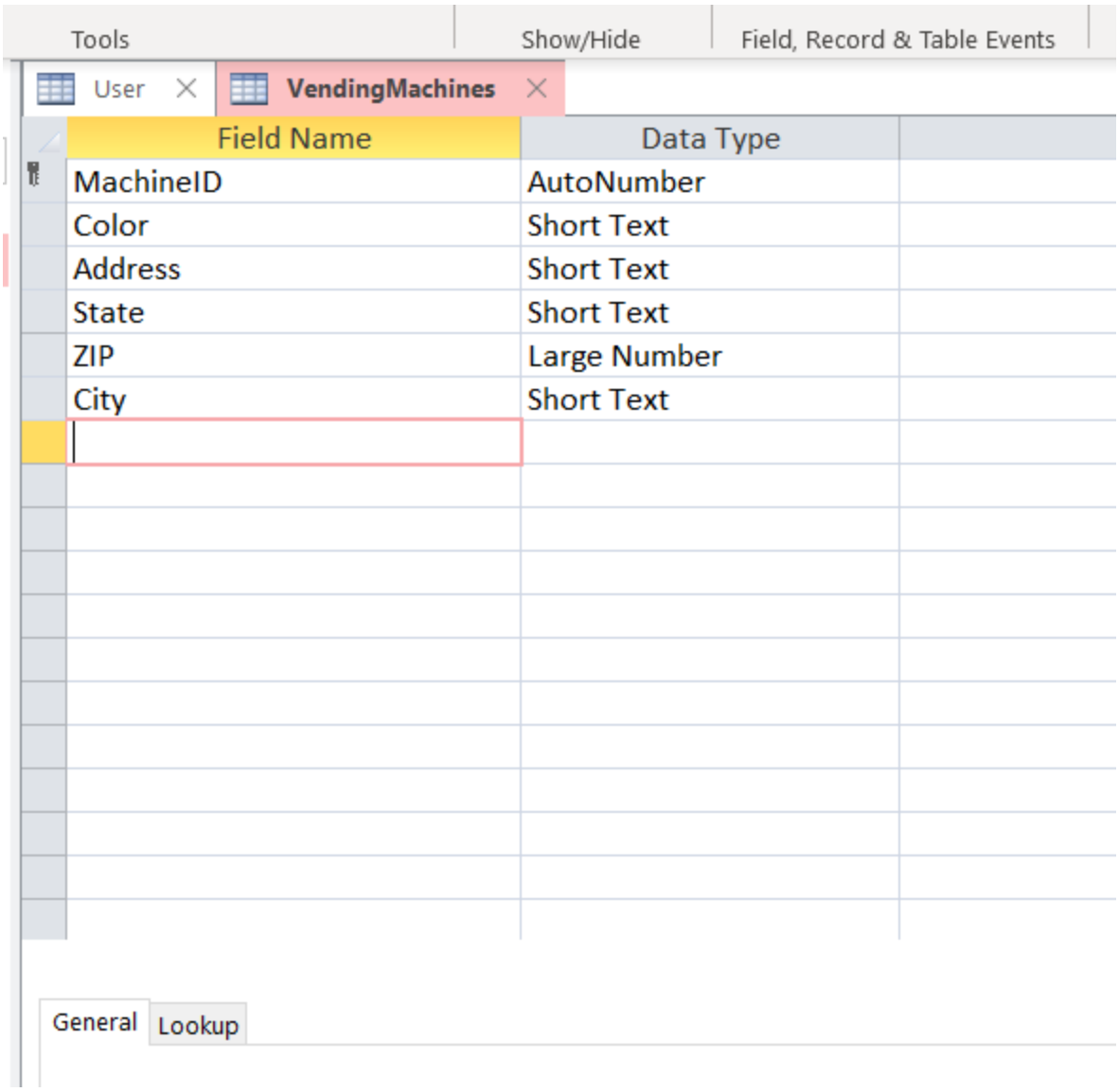
User

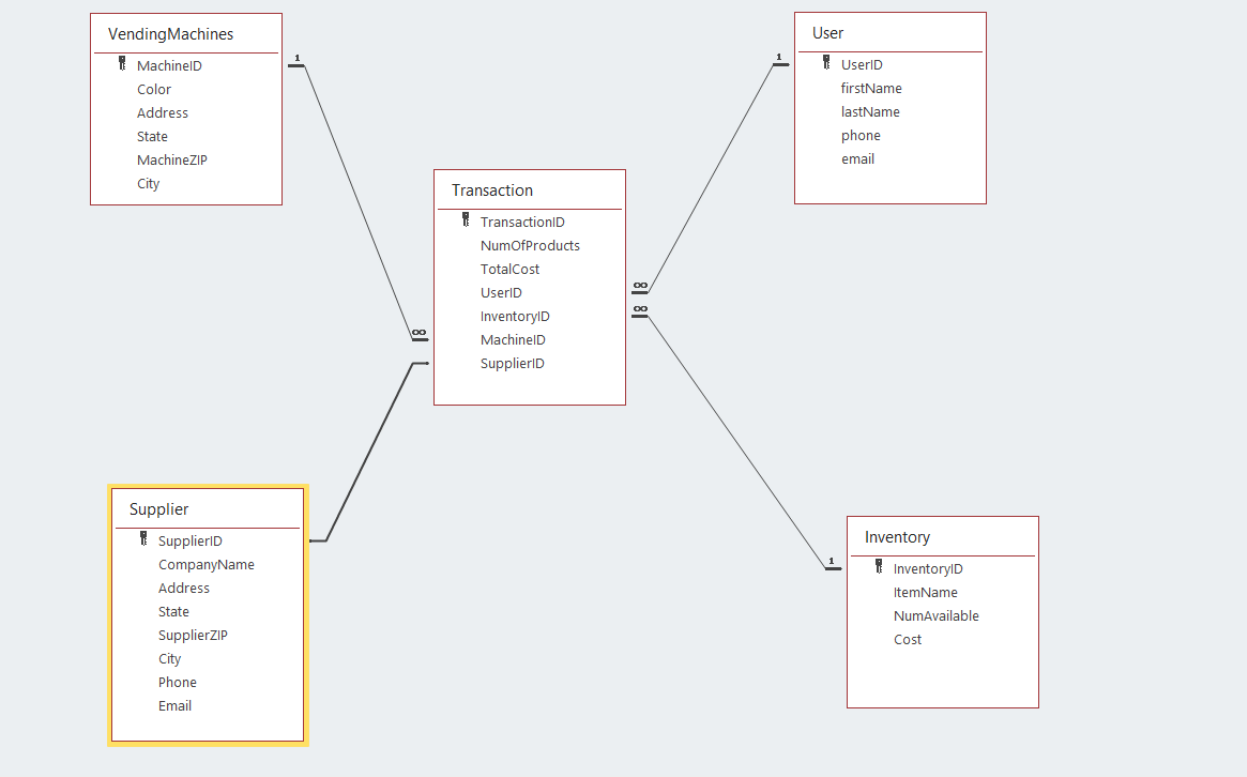
Field Name	Data Type
UserID	AutoNumber
firstName	Short Text
lastName	Short Text
phone	Number
email	Short Text

General | Lookup

Field Size	255
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	Yes
Allow Zero Length	Yes
Indexed	No
Unicode Compression	Yes
IME Mode	No Control
IME Sentence Mode	None
Text Align	General

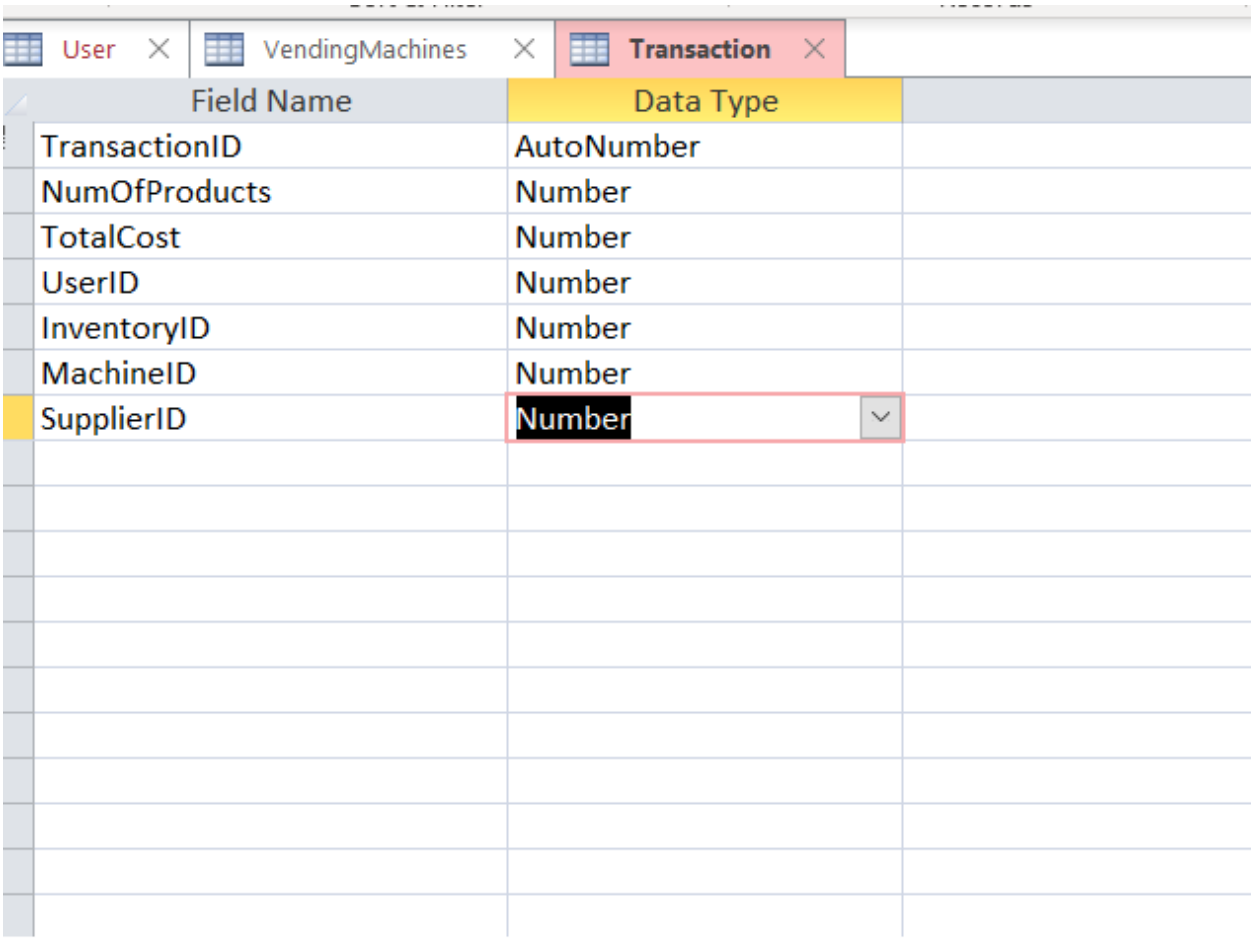
= Help.


Tools
Show/Hide
Field, Record & Table Events
User
VendingMachines
Field Name
Data Type
MachineID
AutoNumber
Color
Short Text
Address
Short Text
State
Short Text
ZIP
Large Number
City
Short Text
General
Lookup



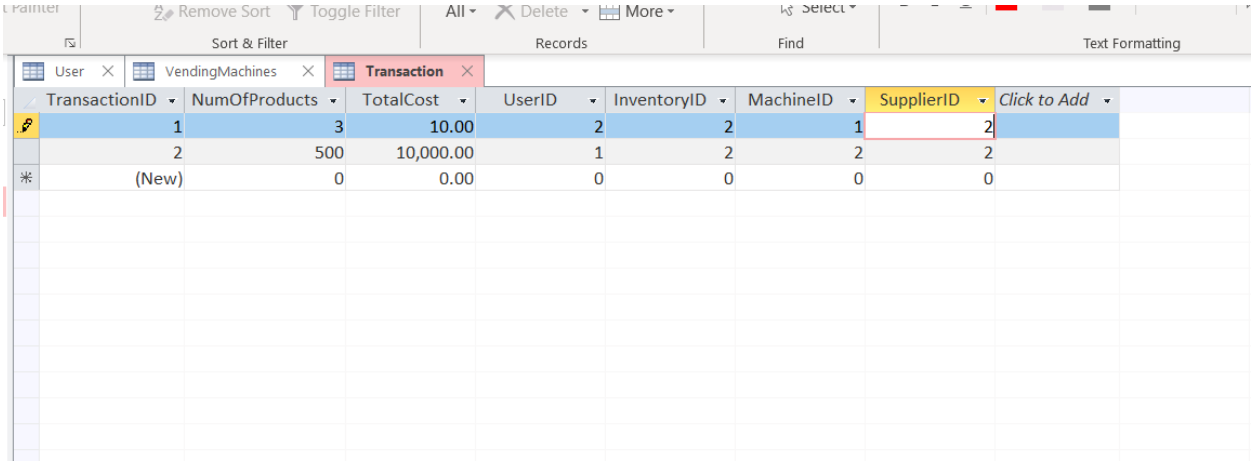
User | VendingMachines

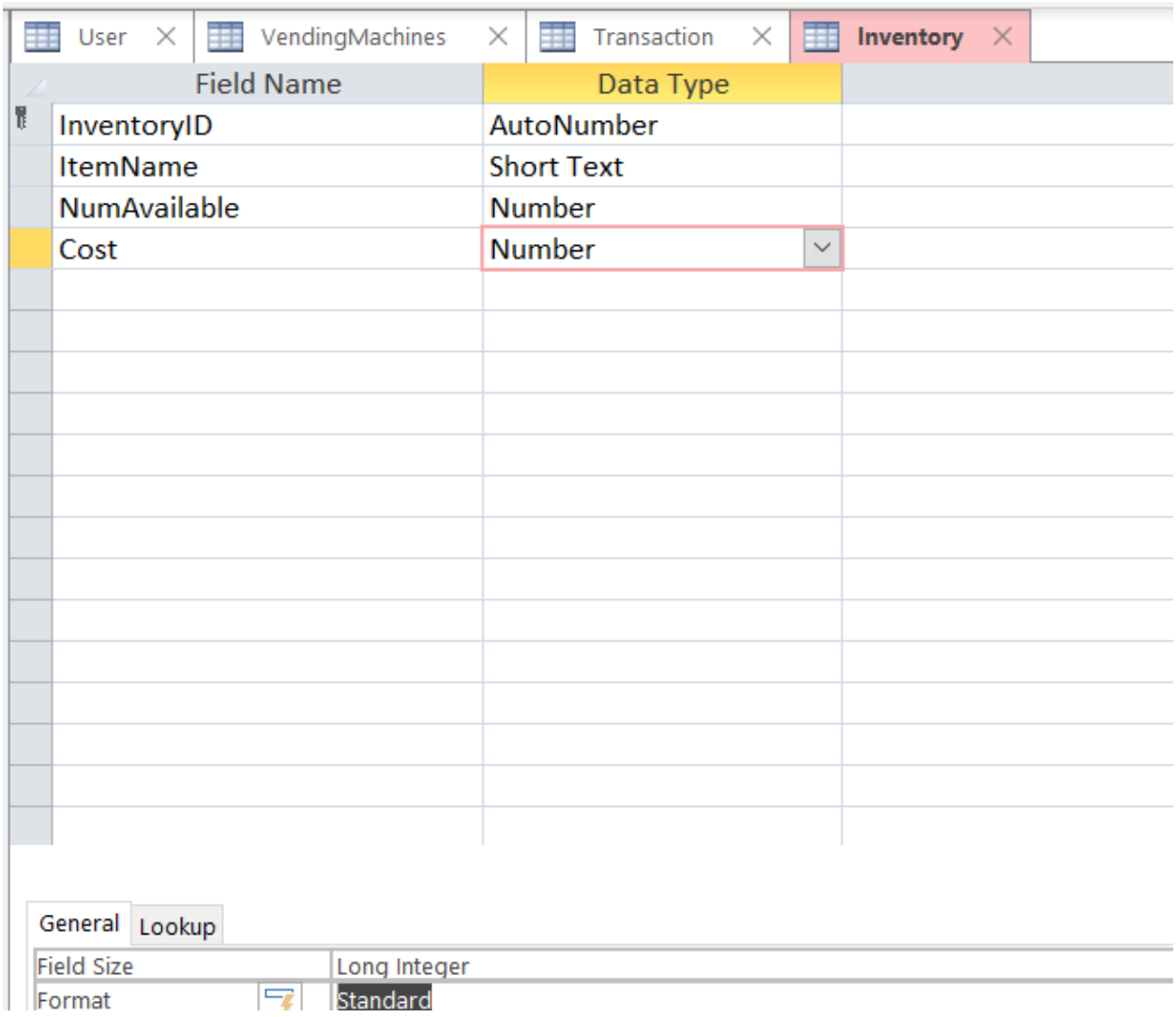
MachineID	Color	Address	State	ZIP	City	Click to Add
1	Red	1222 Stark State St	Ohio	44720	North Canton	
2	Green	2233 Stark State St	Ohio	44720	North Canton	
(New)				0		

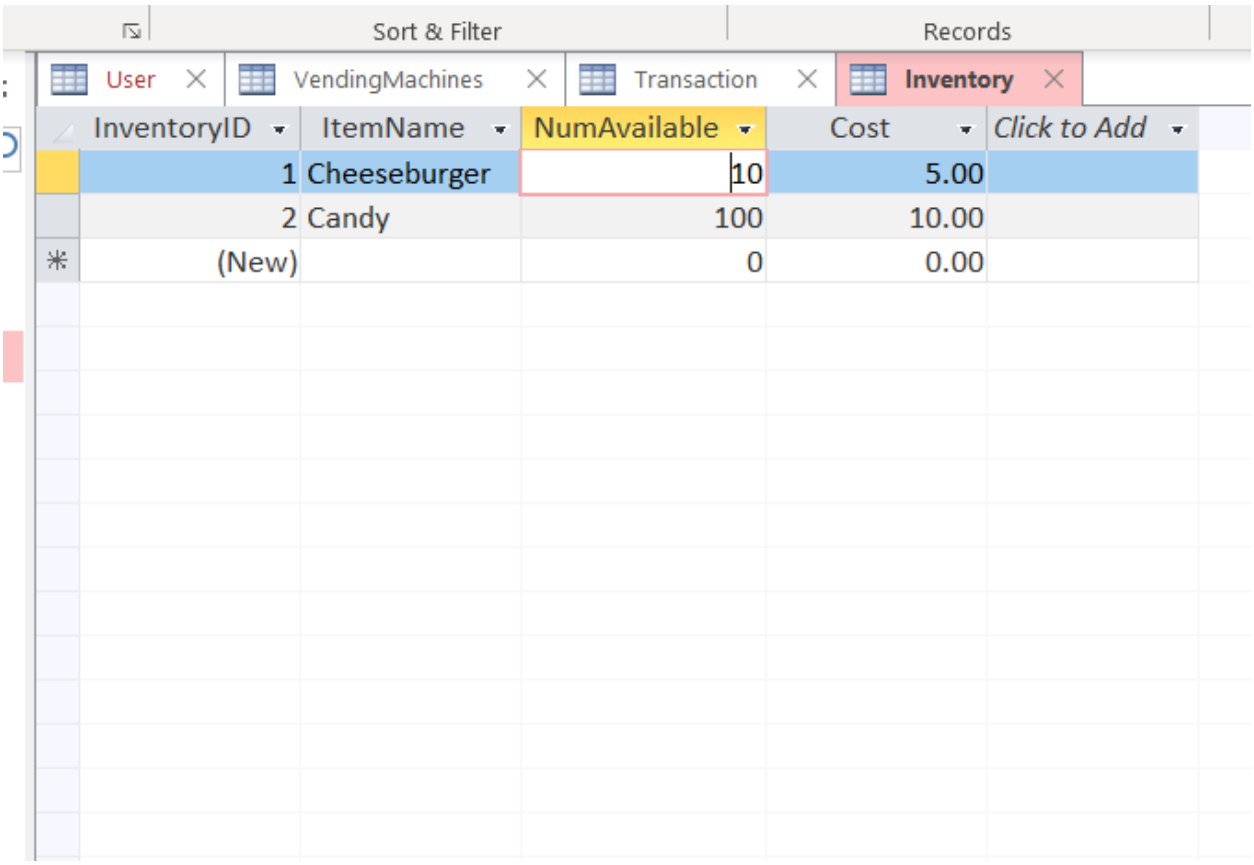


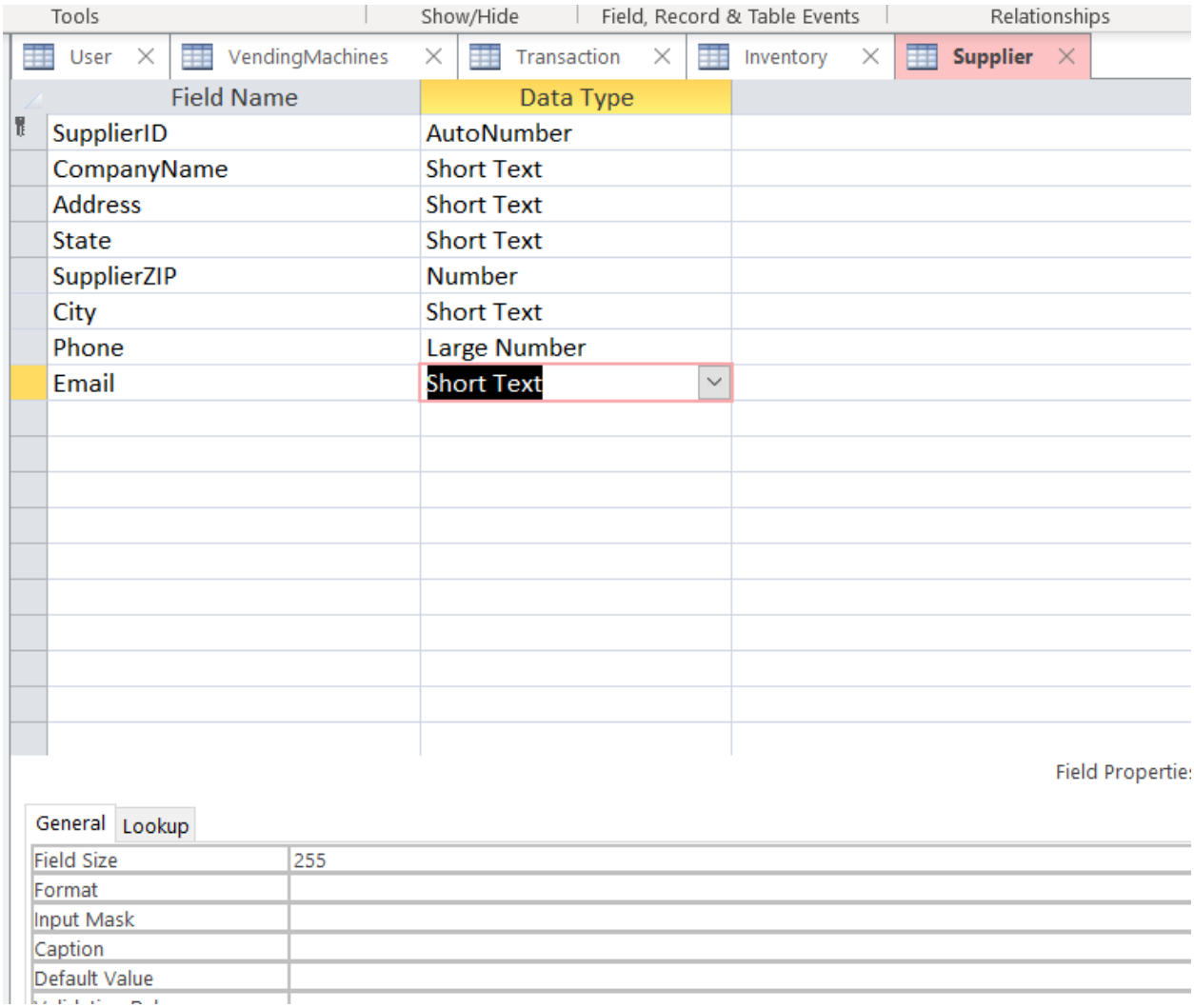
General | Lookup

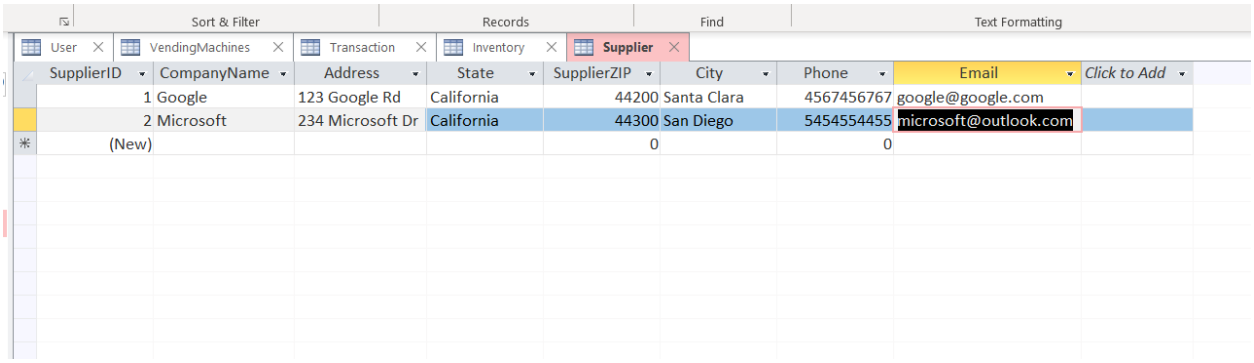
Field Size	Long Integer
Format	
Decimal Places	Auto
Input Mask	
Caption	
Default Value	0
Validation Rule	
Validation Text	
Required	No
Indexed	Yes (Duplicates OK)
Text Align	General


Remove Sort
Toggle Filter
Sort & Filter
All
Delete
More
Records
Find
Text Formatting
User
VendingMachines
Transaction
TransactionID
NumOfProducts
TotalCost
UserID
InventoryID
MachineID
SupplierID
Click to Add
1 3 10.00 2 2 1 2
2 500 10,000.00 1 2 2 2
(New) 0 0.00 0 0 0 0


User
VendingMachines
Transaction
Inventory
Field Name
Data Type
InventoryID
AutoNumber
ItemName
Short Text
NumAvailable
Number
Cost
Number
General
Lookup
Field Size
Long Integer
Format
Standard


Sort & Filter
Records
User
VendingMachines
Transaction
Inventory
InventoryID
ItemName
NumAvailable
Cost
Click to Add
1
Cheeseburger
10
5.00
2
Candy
100
10.00
(New)
0
0.00


Tools
Show/Hide
Field, Record & Table Events
Relationships
User
VendingMachines
Transaction
Inventory
Supplier
Field Name
Data Type
SupplierID
AutoNumber
CompanyName
Short Text
Address
Short Text
State
Short Text
SupplierZIP
Number
City
Short Text
Phone
Large Number
Email
Short Text
Field Properties
General
Lookup
Field Size
255
Format
Input Mask
Caption
Default Value


Sort & Filter
Records
Find
Text Formatting
User
VendingMachines
Transaction
Inventory
Supplier
SupplierID
CompanyName
Address
State
SupplierZIP
City
Phone
Email
Click to Add
1 Google
123 Google Rd
California
44200
Santa Clara
4567456767
google@google.com
2 Microsoft
234 Microsoft Dr
California
44300
San Diego
5454554455
microsoft@outlook.com
(New)
0
0

Training Plan:

The training plan for the application will mostly consist of the vendor side. The training plan will need to start out on a small scale, as there are vending machines all around the world, so many different companies from many different backgrounds will need to be trained. This needs to be taken into consideration. People from both the marketing side and the technical side will need to be trained on this application to gain an idea of what can be done on this application.

User Manual:

The user manual will be used to inform the users on how to best use this application. This can range from the end-user to a company using this application for help sell their product. The vendor side user manual should consist of things like how to offer deals, how to update products in said vending machines. The end-user side of the application should consist of a tutorial on how to use the application from, how to select a vending machine, how to take advantage of things like deals and coupons vendors use, and how to properly and securely checkout, and lastly how to get their items from the vending machine. Companies should then expand their training plan from there as needed.

System Conversion Plan:

Overview: The application mobile vending, will need to be available across many different platforms across many different countries. The plan for the systems conversion plan would be an early alpha/beta plan across the different platforms. One of the biggest challenges of this would be to have many different platforms work with many different vending machines. After the alpha/beta the systems the rest of the data should be in place and the rest of the project implemented.

Support and Maintenance Plan:

Overview: The application ideally will have a life span of ten plus years. This means that the application will be needed to work coherently with legacy technology as well as across many different platforms.

Scope: The scope of this plan encompasses many potentially thousands of vending machines as well as potentially millions of mobile devices across many different platforms.

Schedule: To ensure as little down time as possible and continuity of service, working with major developers like Microsoft, Android, Samsung, and Apple will be a key factor in keeping mobile vending up and running. Keeping contact with these companies will a key factor and potentially getting an alpha or beta version of their newest software will be critical so then mobile vending's application can be up to date and working across all platform.