

Project report guidelines for CMPSC431W

Hongyu Guo

Table of Contents

1.Introduction.....	2
2.Requirement Analysis.....	3
2.1Users introductions.....	4
2.2Buyers:	
i. How to become a Buyer.....	5
ii. What can I do as a Buyer.....	6
iii. Buyer become Seller.....	6
2.3Sellers:	
i. Overview.....	7
ii. How to become a Seller.....	7
iii. General steps.....	7
iv. Rules for local business owner.....	8
3. Seller system	
3.1 description of Seller system.....	9
3.2. Category of Seller system.....	10
3.3 functions of seller system.....	10
4. Bidding system.....	12
5.Products	
5.1 Products limit.....	14
5.2 Duplicate Products Rules.....	15
6. Order place system	

6.1 Place Order.....	16
6.2 Return Policy	16
7. Category hierarchy	18
8. Conceptual Database Design	
8.0 ERD.....	18
8.1 Attributes	20
8.2 Description for Overall ERD	23
9. Technology Survey.....	25
10. Work Cite.....	29

1. Introduction

Our Nittany Market is an online shopping site that based on DBMS system. Nittany Market is mainly focus on Nittany Members who wants to sell their used Items. We give a planform that Member of Nittany State can become a seller or a buyer that freely publish a item or buying an item by looking it category. Once spot item buyers like, online purchase function can help to make a transaction. For help local business growing, local vendors can join our market with some extra steps. Our market has two buying/selling method, bidding system and regular selling system. Those system are fixable and offering more opinations to users.

2. Requirement analysis

2.1 Users introductions

For Nittany Market, we have three types of users, sellers who sell their own products on Nittany Market. Buyers who porches products from sellers. As well as an administrator, who is a super user, managing the system. Nittany Market is a place that people can buy/sell goods, system will display the products with following information: price, quantity, products details, seller information, seller location (city and state). Since there are many products, system will also have functions that browse by category.

2.2Buyers

I. How to become a Buyer

Buyers are mainly the people who live and work for the Nittany State. Everyone who first sign up will start as a buyer account for the Nittany Market, and they be able to decide later if they want to become a seller. To sign up, people can use their email address as the username, with a password at least 8 character long, contain at least one upper-case letter, one lower-case letter and one symbol. Everyone will also be assigned an unique NittanyMarket ID, which is automatically generated by the system.

Once they sign up, the follow up page will be asked for personal information, include name; age; gender; job; phone number; address. Of course, they are able to skip this page and start shopping immediately. But for successfully process any goods, they need to come back later to personal information page to complete information. For the personal information page, this page will display all information about individual. They be able to check and modified, but username and NittanyMarket ID are unable to change. We will also have a page that let users to modify their payment information, this is only display to the individual users, this page includes functions like add card, delete card, change billing address, billing phone numbers.

II. What can I do as a Buyer

Buyers are able to place order to any products they would like to buy, they will be asked to pay the amount that product list for. Once payment is set, the seller is response to ship the product, and after receive product, this transaction is success complete all process. And the list for this product will be no longer showing to other buyers.

System will also include a review function; this review function is design for buyers to review any product that they have been bought. This is a function is not obligated and buyers can choose to ignore it. But this is good way to evaluate reputation of the seller, and a good reference for future buyers who purchase product from same seller. This system is based on five-star rate system. Buyers can give rate anywhere from zero being lowest and five being highest.

III. Buyer become Seller

If buyers want to become a seller to supply goods for the community, they can simply require an online application from to fill out. After necessary checking process from administrator, they may get approved to successfully become a seller of the NittanyMarket.

2.3 Sellers

I. Overview:

Seller in NittanyMarket are mainly two types, Nittany Member and Local business vendors.

II. How to become a Seller:

For general, all sellers are required to sign up as a buyer account at first (regular account). Then they can choose to become a seller by choose the “become a seller” button in seller page. Once they hit the button, there will be an application form to fill out. For the application process, Nittany Member and Local business Vendors are slightly different. Please reference to the specific section under Seller to find more information. Once the application form is filled out and submit, last step is wait for the admin review, all sellers need the approve from admin to successfully enroll seller program.

iii. General steps

For general sellers who are members of Nittany State, if they decide to become a seller of NittanyMarket. All seller account will have same login page as buyers have. First step is to sign up for a Buyers account (regular account). Once they set up the account and choose to become a seller, they have to fill out an application form as Nittany Member seller. This form require member to identified them self as member of Nittany State, and all other information remain same as a Buyer account. Those

information are mandatory to fill the application form. Once all information is submitted, next stage is to let the admin process the application, all sellers must be approved by admin. They can log in into the seller account page just by entry the log in ID and password from main log in portal.

IV. Rule for Local Vendors

As they are business that provide goods to service our community, to ensure more products diversity and add convenient to everyone in Nittany State. Seller are not only students and faculty team from Nittany State, also could be any local business vendors. Local vendors have additional opportunity to list any of their unique item, such as any homemade products or any self-brand products. Those products are protected and can only sell by the local maker who sign up for NittanyMarket. Once local vendors decide to leave the partnership with NittanyMarket, system will automatically erase all the Information of products sell by this particular seller. TO ensure the right owned by the local vendor are protected. For the account setting up, local vendors will be asked for additional information after they first enroll to the system. Additional information includes business name, business address, product category, customer service phone number, customer service hours. And those dates are mandatory to fill in the application form. Once all information is summitted, next stage is to let the admin process and approve the application, just like all other type of sellers.

3.Seller System

3.1 description of Seller system

After login, sellers can publish their products in the system, which system will automatically add those products in the listing. Sellers will be able see their products information, such as price, quantity, number of sold, and sold time. We also have a build in communicated function, which buyers can leave message or questions to the seller. And seller be able to see the message and respond for that. For every transaction successfully paid, seller is responsible for shipping in limit of time. Once buyer received the product, seller will receive the money right away. There is also a build in rate system that rate seller from zero star till five star, five being highest. This function given an opportunity to the buyers if there's anything goes wrong, as well as a great way to show a seller's honestly to the rest of committee. And a review system allows any buyers who have purchased this product to leave a review. This is a combine feature with rating system. Sellers can check their review on particular product as well as the rating at any time.

3.2. Category of Seller system:

Our system also gives the order of the products by using the category hierarchy. All the products can be found under the hierarchy of different category, with a highlight of category under the product description. Sellers are required to provide specific category when they publish any product on the NittanyMarket. For any categories that already exist, seller will only need to choose that category and list the item. But for any category that not already exist, sellers are required to fill out an application to create a new one. This process will need the admin prove to be successfully publish.

3.3 functions of seller system

Sellers can always edit the item discretions, price, quantities. The only thing that cannot change is the category of the product. The only way to change category is delete the listing and republish same item. The item quantities will decrease in number as same as the amount that anyone purchased. When the product is out of stock, the item information will be out of the buyer's interface. But all the reviews, rating are remained in the system, incase if item will back to stock, or incase sellers want to check that information. As our NittanyMarket are mainly design for sell used item from personal, every product can be only list and sold by one seller. Once a same item is listing, no one can relist this same item. And every product is required to have only one category, no item can have no category, or no item can have two categories. Sellers can list as many item as they want as same time, there are no limit for number of items they can

list. But for the local vendors, if their item is mass production and get sold out, or if they decide to leave business. The listing history will not get deleted. This is purpose for the future cooperation.

4. Bidding system

Due to the fact our NittanyMarket are a system based on selling used items from mainly students and facilities. In this case, those people are not that sensitive to the market price of what they are selling, they may underestimate the value of the item, they may regret later for selling that item. Also, the lack of understanding to the market can cause selling price too high, and this may potentially distress the order of the market. All of those things can happen that will lead to a very unpleasant experience for using our system. End up may cause bigger problems like law issues or cause system abandon by users. To ensure the fair trade in the market and maintaining the development of the system. We are decided to add a bidding function. This will be a build in function inside the seller's system. When the seller publishing an item, they can choose to use the bidding mode. This mode will allow sellers to add a start bidding price, a wish price. The starting price is a where the bidding price start from. Other set up is we have the wish price function, this function allows seller to set up a limit, any price blow this limit will be fail sell automatically. Only bidding price are higher wish price, seller is agreeing to sell. We suggest putting a low price on this part. Since that wish price will ensure seller not to accidentally sell the item blow the wish price line. The lower start bidding price can visually get buyers interested on this item, since they may get the item at lower price than they expected. This may be a good thing to do to helps selling process. We will also have a timer that count down for 120 hours(5days) once a item is published, this is the time for any item to bid. For

now, we don't have any experience or data to support whether we should have more time options. So we set this 120 hours to all items that go bidding, and we may change a few things about this timer in the future.

To run over the full experience, sellers are able to publish an item using the bidding function, the price will start at what the seller set up to. And buyers can start bidding now, the system will show everyone who's the highest bidder and how much they decide to bid on. And the bidding is limited under 120 hours, 5 days. Once time is up, the highest bidder whose bidding price is passing the wish price line, will eventually get the item. If there are no bidders join in the bidding process or not meet seller's wish price. This may imply that either starting price or wish price are too high, sometimes both are higher than the market is possible. If bidding prices are higher than sellers' wish and many people join the bidding, this may imply the item is a rare or hot item. Could potentially stimulate the local economy, give business vendors an indication of what item maybe the market favorites.

5. Products

5.1 Products limit

For the system that we design, we will have every product in exactly one category. With no same item can be sold by more than one seller. If someone such as a local business vender seller who wants to be publishing more than one item, the system allows them to publish as much items as they want, but all of those item are under the ID of this seller. As we maintain in the seller system, they have to add detail descriptions for the product, this way we can let system search the key words to help buyers who want to any specific item. For example, I want to buy some used mouse for my old PC, I could just search for “mouse” or “computer mouse” to get the right results. Products that missing information will not able to publish the listing, all products must have information of name, title, price, discretion, and the only category that defined product. For the local business venders, they will have to fill out additional information like company name, business phone number, business address, business hours.

5.2 Duplicate Products Rules

All products sold in NittanyMarket will automatically generate a unique listing_ID, this is the way we use to identify the right item. Let’s say if two seller both decide to sell an exactly identical Nittany-brand computer mouse, then the listing_ID is what use to difference those two mouses. Those rules apply to our

bidding system as well, every product on bidding list will have unique Listing_ID as well. Some buyers may bid same item twice from different sellers, if they want two of them. Listing_ID ensure our system know which seller is responsible for the item. After the bidding end, they ship item out to the buyers separately no matter if buyer is same person.

6. Order place system

6.1 Place Order

Once buyer decided to buy an item, they must pay the listing price online in the system. System will automatically generate a Buyer_transaction_detail. In this transaction will be detail information like what time the item sold, amount of the money paid, who placed this order, card number, shipping address. That information will help seller to check the specific detail about this sold. And those detail will leave in the history in case seller want to check back later.

Similarly, buyers can have detail information as well after they purchases something. They will be able to see the item description, purchase time, amount of the money paid, where this item is sending to.

6.2 Return Policy

Because we are mainly selling used item from individual as a private seller. Often buyers will found out that they are not satisfied about the item. Or sometimes just because the communication between seller and buyers goes wrong, they may misunderstand each other's need. And there are many more situations can lead to a cancellation of sell. Both seller and buyers can cancel a sell, even if the transaction is already made. They will need to communicate with each other's and get a mutual agreement. After that they must both submit a request to admin, to properly cancel this sell. Cancellation rules are same to our bidding system as well. After admin approve, the money will directly refund to the buyer's card/account. After whole

cancellation process are done, money have received by buyer, the order history in both buyers and sellers will show purchase is canceled. And no information will be delete.

7. Category hierarchy

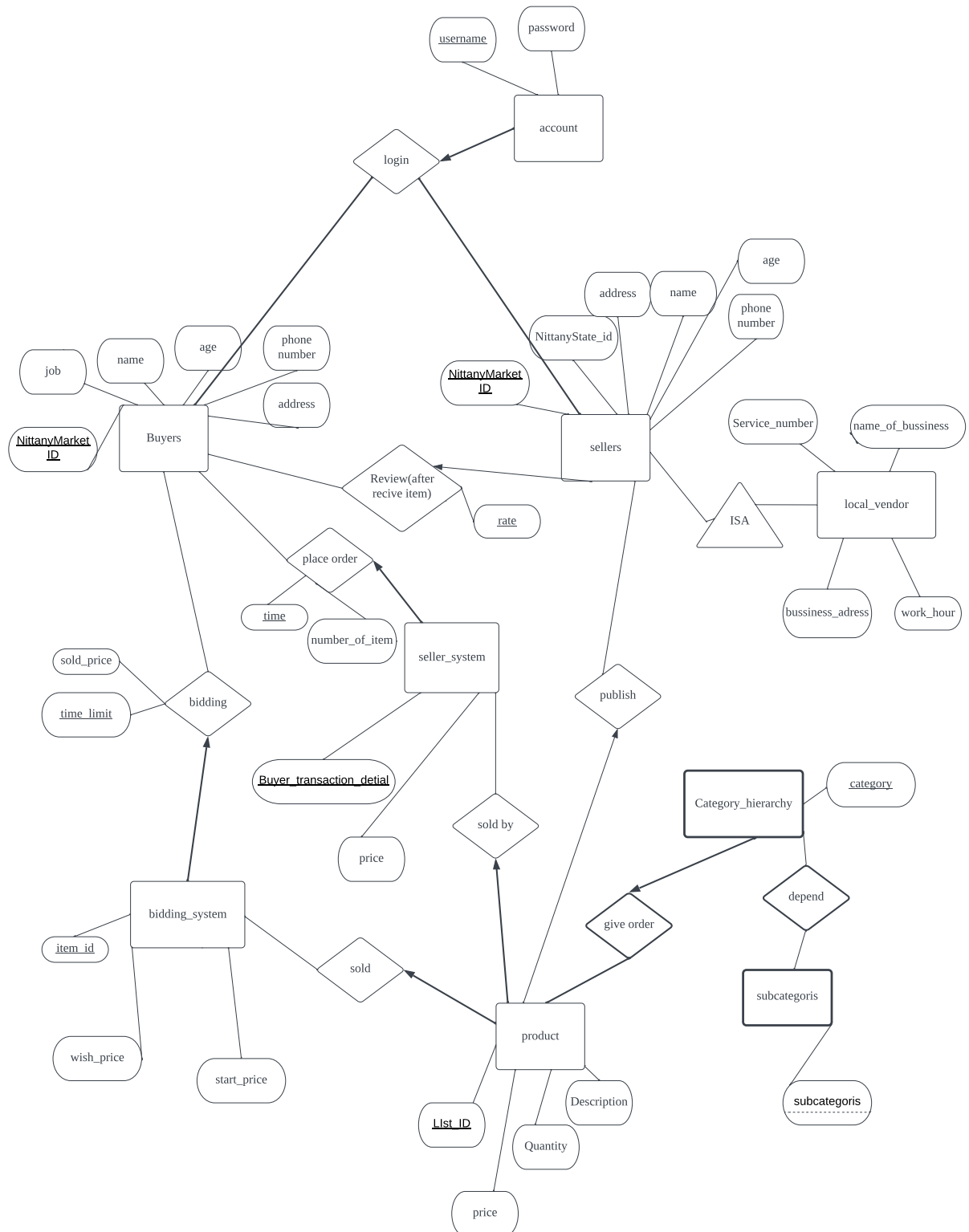
As we motioned in seller system section, we will use category function to give order to all the product that sold on NittanyMarket. Every item must have one category and can be only have one. We store those categories under category hierarchy. One category may have many subcategories, except...

The system will have some default category before we publish the NittanyMarket to the public. Those categories that come deftly are created by the developer team and under their limit knowledge. We are certainly sure that out there will be so much more category we could add to NittanyMarket to help our buying/selling process smoother. We are encouraging that any seller can ask to publish a new category if it is not exiting in the system. They need to send a request to the admin to get approve for this category, approved category will be added manually by admin. This category function will give buyer a great way to find what they want, they could find specific category and then traverse subcategory, this should narrow the products down to a reasonable number, then they can find the one they need.

Bidding system will have same rules as general products. Only different will be after buyer find the item they want by scan thrown the category and sub category. They may find some products that are bidding products, they can choose to join the bid or not.

8. Conceptual Database Design

Finger 1:



Finger 1. Overall ER-diagram of Nittany Market

8.1 attributes

Attributes of Entity Account:

- Username (key attribute)
- Password
- Username and password are used to set up account, and later use for login.

Attributes of Entity Buyers:

- Job
- Name
- Age
- Phone number
- Address
- (key attribute) NittanyMarket_ID
- All of those attributes are personal information that required of buyers, and only NittanyMarket_ID is a unique ID that system automatically generated

Attributes of Entity Sellers:

- NittanyState_ID
- Address
- Name
- Age
- Phone number
- (key attribute) NittanyMarket_ID

- Sellers are required to fill those information, and NittanyState_ID is a proof that they are Nittany Member, NittanyMarket_ID is a unique ID that system automatically generated.

Attributes of Weak Entity Local Vender:

- Business address
- Work hour
- Name of business
- Service number
- Name of business
- Local vender is requiring more

Attributes of Entity Category hierarchy:

- (key attribute) category
- Subcategories

Attributes of Entity Seller System:

- Buyer transaction detail
- Price
- (key) List_ID
- Seller system will automatically generated buyer transaction detail and that will be record to become history. Seller can check this later.

Attributes of Entity product:

- (key)List_ID
- Price

- Quantity
- Description
- Products will have unique List_Id that generated by system, and description is expect in detail when seller publish a list.

Attributes of Entity bidding System:

- (key)List_ID
- item
- wish price
- start price
- List_Id is unique generated by system; Item is the name of item. Wish price is what seller block any sell blow this price limit. Start price is what price start bidding from.

8.2 description for Overall ERD

Entity Account have a relationship Login with Buyers and Sellers. The bold line with arrow point to Login indicate that all the Buyers and Sellers can only login to one account. And the bold line starts from Login connect entity Buyers and Sellers mean that they are required to have at least one account that they login to.

Entity Sellers have relationship to Publish Product, they can publish one product each time. Entity Local_vendor is an ISA hierarchies of entity Sellers, all attributes of sellers are attributes of Local_vendor. Since they can become Sellers by given extra information.

Entity Buyers have relationship that can Place_order to Seller_system. The arrow from Seller_system indicate that Buyers can only place one order each time. And once they place order, order can't be empty. Order placed time and number_of_item will be record.

Also that entity Buyers have relationship Bidding with Bidding_system, Buyers cannot bidding two things at same time, once they bidding order, order can't be empty. And the sold_price with time_limit are record at the when they sold by bidding_system.

After order complete, Buyers have relationship Review with Sellers, they can review their exercise and the rate will be recorded. Review is not required, and they can only review once for any order completed.

Entity Products is in relationship set, it can be sold by Bidding system, sold by Seller system, and publish by sellers. They can be required sold at least one or more if anyone trying to buy it using any system. And they can only buy one specific product at each transaction. Product also have a weak entity Category_hierarchy that depend by Product. Products are required to have one category and can have only one category. Category also have a weak entity that is Subcategories, which can be add under Category with unlimited number.

9. Technology Survey

Today, the database system technology is growing in a stunning speed. The market tends to become so big to a point that basically our modern life is based on the database system, everything that we use to connect with others, connect with rest of the world is based on database system. The fast-growing lead to a very large potation of profit. We have wide range of choice of the tools that help use to develop this NittanyMarket system.

What DBMS I would choose for is MySQL over SQLite and other system like Microsoft SQL. First that MySQL and SQLite are open source, they have more compatibility to all kind of operation system. Other DBMS like Microsoft SQL server is original build for Windows system, even now days it supports other OS system as well, but still have higher potential to running in to troubles then open-source DBMS. When we compare the MySQL with SQLite that teaching team suggested for. Although MySQL take much more storage space than SQLite. Because that SQLite is a server-less database and with functions that are self-contained, MySQL in other hand will need a server to run. Because the server that MySQL natively support much more data types then SQLite, for this complicated project we may need more data types then what SQLite could offering. Beside data type, SQLite does not have any user management function build in, if many users entry DBMS at same time and work on it. SQLite will allow them read and write on the directly on main database without checking their identity. This could lead to some accident that user's entry to the database. Or at constriction stage we happened have a team to create category to our

market, there will be a potential threat that someone falsely delete database or manipulate others portion of database. MySQL have built in user management will check the identity to ensure that no one can accidentally entry to the database without permission. Also, that MySQL is a widely used DBMS that ca finds ton of information or tuition through internet. Due to the wider support of data types, great build-in user management function, much more higher security features, and good amount of information we can find. MySQL will be our pick for Database Management System.

For the most important part of our project, what language should we choose. I think we are going to use Python with Structured Query language (SQL) for DBMS set up. When we compare python with java or R. Python is much easier to set up and require less typing than R or Java language. Since this is a teamwork, we need make sure to pick a language that that everybody has experiences or have relatively low learning curve. Since our team members are mainly students in PSU, our first programming language class was Python, and we all have good experiences with this language. And since SQL is the language that most of us studied in our 431W class. Majority of us should have good amount of exercise with this SQL. And SQL is a mess use language for DBMS construction over the IT filed, there are massive number of tuitions online, cover basically everything we going to need for this project. Due to the easy use, massive information support, relatively low learning curve, and best language to connect with other team member, SQL with Python will be clear winner for our Nittany Market.

For the IDE, I think the Visual Studio Code is better than another candidate. PyCharm is other IDE that majority people choose to use for, it is a full IDE that exactly developed for python language. It has slightly more function on Python than VS code. But it not a free IDE, for our project that require work on web Python development with SQL, HTML, JS. We will need professional version, since community version is only for pure Python development. professional version cost about \$199 per user per year. In other hand that VS code is a free, open-source software, anyone can download freely at their website. Vs code is mainly built more as a text-editor, all of the running in Python is based on the extension that run the language. This gives the flexibility allow user to add any extensions that support most of the program languages that people frequently used. This is a good function to have since our development team is mainly people who are EECS students at Penn state university. We are using many versions of programming languages for different school tasks. Vs code allow users work on same IDE for different languages, this gives more overall use ability of IDE. Since many of us may have already use VS code for other languages, we are more familiar with the layout, functions, short keys of VS code over other IDE. Also, we can be more organized since VS code can be used for any other classes that require programming. Even if someone never experienced VS code before, this may be a good chance to try this software, end up this app may replace all other IDEs, save them good amount of time and disk space.

Now days because everything is based on the DBMS, and we have so many tools to use for building DB. Almost every filed are able to enjoy the convenient of the DB

technology. Some of the company like Twitter, Facebook are even build entirely on top of the DB and become a top company. DB technology burring so many values and possibilities to our life. Even Chinese government are using DB technology to track COVID-19 and manage right move to prevent the separation of the virus. This could save millions of lives. And the value of DB technology has much higher potential that we are not able to use yet. I cannot imagine one day that everything is connect by big data and artificial intelligence. I am look forward to witness that day to come with this technology.

10. Work cites

1. “VS Code versus Pycharm: The Smackdown.” *Arbisoft*, 10 June 2019, <https://arbisoft.com/blog/vs-code-versus-pycharm-the-smackdown/>.
2. *What Is the Difference between a Database Framework*
(E.g ... <https://www.quora.com/What-is-the-difference-between-a-database-framework-e-g-ActiveRecord-and-database-e-g-PostgreSQL>).
3. PowerPoint from PSU CMPSC431W