

SUBJECT : BA 186
PROFESSOR : Mr. Vincent Roy Canseco
COMPANY : Multibright Living Innovations
TOPIC : Customer Retention Management
MEMBERS : ALEMANIA, APOSTOL, LEE, QUERIJERO, TABILISMA
DATE : December 03, 2019

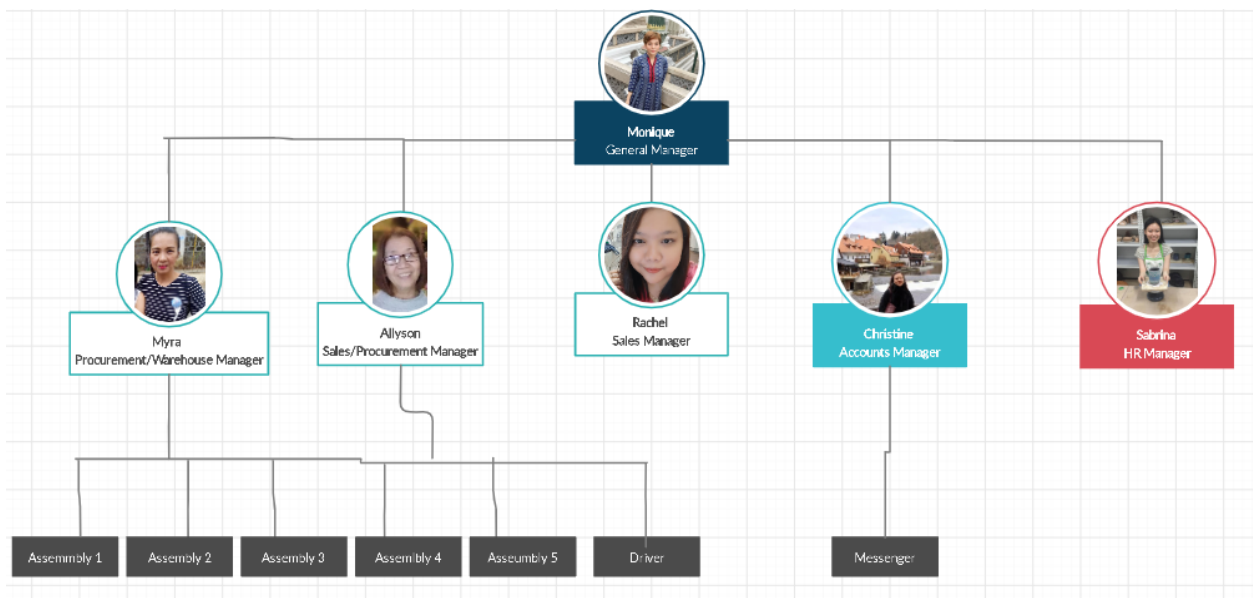
I. About the Project

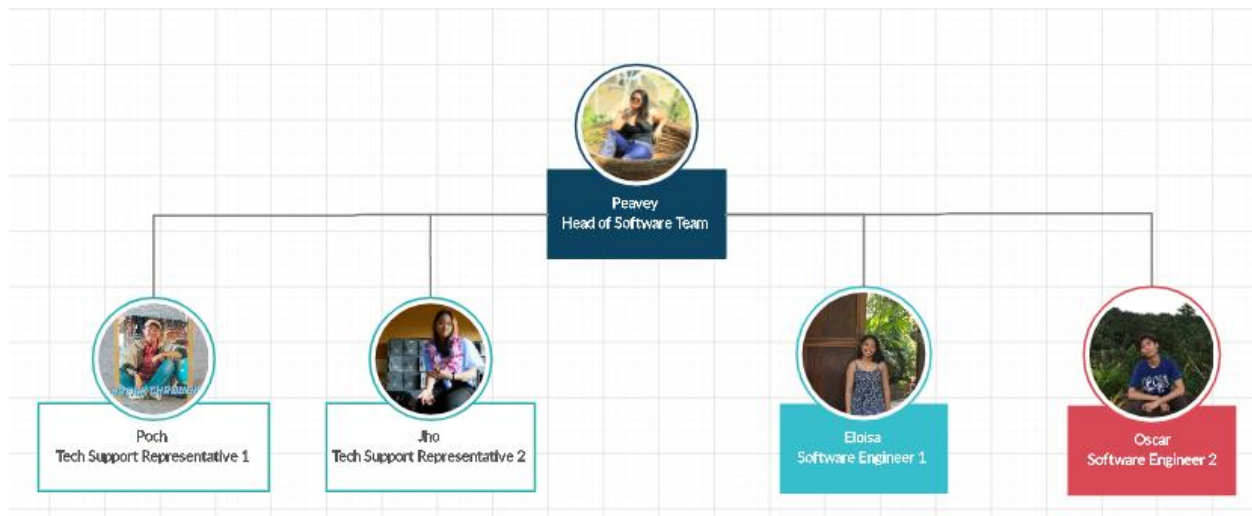
A. Project Identification and Selection

The group decided to focus on Customer Relations Management (CRM) as it is integral when it comes to the sustainability of every business in the long run. Without a CRM that would greatly cater to customer needs, no business would be able to capture its target market effectively. The group realized the importance of systems when it comes to CRM and the best way to apply the lessons learned in the mentioned subject/course is through connecting with a certain company that might need it the most, a small or a medium enterprise. These types of businesses are usually not equipped with technological systems, specifically the one that best fits a CRM system, for they rely more on manual systems. It is only recently that more businesses are comfortable with using updated technology when it comes to dealing with clients and continuing their business operations.

Multibright Lighting Innovation fits the company that the group would have to propose a system to. The company currently is in a technological transition from using traditional forms of systems when it comes to business operations. The company is currently undergoing some technological changes such as the attendance system which was recently computerized. The company has yet to implementation on its CRM. Currently, it is struggling when it comes to tracking customers' orders and payables. Accounts Receivable Management, as part of CRM, is also currently under a manual system. With this information, the company really needs a fundamental technological change.

B. Meet the Team





C. Relationship with the Company

A member of the group has a close relationship with the owner of Multibright Lighting Innovation. With this, the company gave the group a privilege to conduct interviews, visit the office, and observe the workplace. Moreover, the company willingly provided the group some information about their products and operations. With this, the group is grateful to the management of Multibright Lighting Innovations.

II. Company Background

Multibright Lighting Innovations (formerly known as Multibright Enterprises) was founded in 1994 by Jane Ty, a Chinese Filipino businesswoman. The company aims to provide the market with energy-efficient and affordable lighting. The company is a warehouse-retail (80/20) business. It imports, manufactures, and customize lights in accordance to the customer needs. Currently, the sole proprietorship is led by Monique Lee, the daughter of Jane Ty. The company is located in San Juan City, the center of Metro Manila.

Vision: *"Multibright Lighting Innovations is working on a vision to be the industry leader in providing superior and high-quality energy-saving lighting solutions as well as provide our customers with state of the art lighting fixtures that will give the difference"*

Mission: *"Multibright Lighting Innovations aims to provide and introduce new innovations and artistic designs for various lighting fixtures for corporate, commercial and residential customers which offer compelling functionality and value for money"*

Through the years, Multibright Lighting Innovations has expanded its project portfolio, from small residential projects to restaurant chains and skyscrapers. Despite its small size, Multibright Lighting Innovations is the preferred lighting supplier of all Starbucks and BonChon branches across the Philippines. The streetlight on government roads such as Ortigas Avenue, Daang Hari and Roxas Boulevard were also supplied by the company. In line with its mission and vision, the company has started to offer lighting design services to help clients understand their lighting needs. It helps clients maximize the efficiency of their lights without sacrificing cost.

At present, the management and its employees are equipped with iPads, Macbooks and a Windows 7 desktop. Since 2005, the company has started to implement new technologies to modernize its system. Typewriters were disposed in favor of desktop computers and tablets. The internet speed has drastically improved since 2017, from 1MBPS to 25 MBPS, which helped the company handle bigger data. The attendance system is now using Timestation, an iOS application that utilizes QR codes on the employee IDs to track attendance and tardiness. The inventory system is starting to bear fruit after delays. Challenges, however, remain amid a backlog of needed technological transformation within the company. Internally, the company still lacks an automated Customer Relations Management system. The Accounts Executive relies on a "logbook" style of recording. As such, there were some errors that have happened before in billing clients. Some clients have been billed too late or too early. Emails/calls have to be done manually due to the lack of automatic system linking the email to an accounts receivable system. Customer accounts or orders are computerized but are not compacted in the system. As such, it is quite hard for the employees handling sales to keep track of customers who are continuously ordering or who already stopped.

III. Determining System Requirements: Interview

A. CEO of the Company

Monique Lee, the CEO or the General Manager of the company, gave a brief background of the company and gave the authority to conduct a research based on the company's technological needs as well as the improvements that can be made. On average, the company has around hundreds of projects per year, but customers are usually medium to large corporations. The current credit terms that the company follows are around 30-60 days. Ms. Lee explained that the company has the power to lengthen or shorten the credit terms depending on the needs of the client and the paying ability of the client. Moreover, warranty costs are also factored in. Accounts Receivable, Sales, Inventory, and Customer retention data are the ones needed every month of the company, however, the Inventory system, the Accounts Receivable System, and the data on Customer Retention have been the roadblock in ensuring efficiency. Rachel, the Sales Manager recently complained about how inefficient the system is, especially with updating the inventory, and Ms. Lee mentioned that the company needs time to fix this problem. Ms. Lee also mentioned that the company almost missed collecting a huge sum of receivable due to the "forgetfulness" of the Accounts Manager. It was only when the HR Manager, since job rotation is quite common in the firm, verified that the records show that it missed the collection by almost 2 weeks already. For the detailed interview questions and answers, please refer to **Table 2**.

B. Sales Manager

Rache de Monteverde, the manager and secretary of the company, discussed how the system of the company works. She mentioned how the system is "mano-mano" or manual which is usually inefficient and time-consuming. To add to that, she mentioned about the incidents wherein the accounts manager or secretary would usually forget to bill the clients due to forgetfulness and the large amount of entries in the logbook which makes the company's data confusing. According to Ms. Monteverde, the company has not focused its attention to technological changes until recently when the company have encouraged its employees to use iPads, desktops, and laptops. These materials provided the perfect foundation to implement technological changes. Moreover, she mentioned about the absence

of the E-R Diagrams and DFDs that was shown to her. The group's E-R Diagram and DFD shall serve as the foundation for the company's future technological changes in terms of handling data such as Inventory, Accounts Receivable, and Customer Retention. For the detailed interview questions and answers, please refer to **Table 3**.

IV. System Implementation Features

A. Customer Retention Management

This application will contain a Customer Retention feature that will keep track of the customer's relevant information details such as their name, location, nature of the company, contact details, and more. In addition, whenever a new customer orders from the company, they must sign-up by giving the necessary information needed as seen in **Image 15**. Afterwards, considering the nature of the company, the customer lists down the initial order by indicating the quantity and type of light product that he would like to purchase. Once the order is placed, the customer can keep track of the product and delivery through the *Status Tab*.

After the purchase is finalized and recognized by Multibright Lighting Innovations, the profile of the new customer is saved to the company's database which is part of the customer retention program of the management. Using the customer's profile, the company would be able to observe what types of light products the customer specifically purchased and how frequently do the customer place an order. With the data provided, Multibright Lighting Innovations would be able to analyze the purchasing patterns of a particular customer and which types of products would suit in future transactions with the company. Furthermore, the company would be able to classify customers and group them into certain subgroups based on the activity and the sales they contribute to the overall sales of the company periodically. This is necessary in order for the company to determine which customers are highly valuable, the frequent and high paying customers. Likewise, it also enables the company to keep track of customers who have not purchased from the company for a certain period. With this knowledge, the company can spend more funds in order to attract these customers once again to avail their products. With all the information of the customers saved in the database, Multibright Lighting Innovations can inform customers about new products by sending newsletters, follow-up emails, and feedbacks as seen in **Image 14**.

B. Accounts Receivable (A/R) Notification

One very relevant feature of the system would be the Accounts Receivable (A/R) tracker made available especially for the accounting and sales department. Aside from customer information, the system would also contain a database with transaction details of the customers, both from recent and past transactions. This would keep track of the collection patterns made to each customer and to all the customers in general. Information such as job order number, specific product type, the amount of purchase, the date of purchase, and the due of accounts collection can be seen in the database.

The moment the notifications are sent may vary depending on the collection patterns of the customers, however, once a week is the standard and the latest time for the notification to be sent out. If based on the collection pattern, the customer pays beyond the due date, Multibright Lighting Innovations may schedule notifications a month before the due date. When sending out

notifications, the button *Email Company* could be seen, just like in **Image 18**, to give a signal that an email should be sent out to respective customers about the upcoming due date of the payment/s. Moreover, a pre-composed email will be sent out where the details are already placed once Multibright Lighting Innovations has received a job order in order to inform the customer about the order status of his requested products. Lastly, once Multibright Lighting Innovations has received the payment, a confirmation email will be sent to the client and the company's name will be gone from the *Order Status* tab found in **Image 17** but will still be retained in the database.

V. Requirements Structuring

A. Proposed Decision Tables

For the proposed decision table in regards to the Multibright's discount system, the following conditions are defined by the type of customer that orders from Multibright Living Innovations which are classified as either new or old customers. They are also distinguished by the total cost of a customer's single purchase as seen in **Table 5**. In regards to our courses of action, discounts are given based on the established conditions which are customer type and total amount purchased for a particular project. To illustrate, 2% discount rate is offered to an old customer whenever they order a total amount between Php 200,000 to Php 500,000 while a new customer is only given a 1% discount for the same amount. Furthermore, in order for the company to warrant a 5% discount, a new customer must have a total purchase amount of Php 3,000,000 and above, while an old customer may have a minimum purchase of Php 2,000,000 worth of products to attain the same discount rate.

In addition, for the proposed decision table regarding the company's email system as seen in **Table 6**, it mainly has two conditions which are 1) the type of customer and 2) weeks elapsed since last purchase of a specific customer. In regards to our courses of action, regardless of customer type, every customer will receive a monthly newsletter containing updates from the company and product suggestions that a specific buyer may be interested in. Then, after eight (8) weeks, the company will be sending an initial follow-up email reminding the customer that they have not made a purchase for that particular time period. Lastly, if the customer has not replied for twelve (12) weeks, the company will be sending a second follow-up email, reminding their customers once again.

B. Proposed Data Flow Diagram

As seen in the Proposed Level 1 Data Flow Diagram, the customer discusses the project specifics with the company, specifically selecting which products are necessary for the said project. Then, the customer fills up the order form containing such requirements and consequently pays for the downpayment agreed on by the two stakeholders. Then, during the Warehouse/Assembly Personnel Work phase, the progress of the said project is monitored by formal project reports up until its completion. Afterwards, the Customer's Successful Purchase History Data is then updated and monitored by inputting the latest completed purchase of the customer. With the following data, Management will be producing and sending automatic promotion emails to customers with poor orders or who have not made a single purchase for a given time period. Simultaneously, the company's Accounts Receivable Data is updated as well and transferred to its Outstanding File. Then, with the consolidated data, the company will also

be sending out automatic billing emails for clients with an outstanding A/R balance that has to be paid for a given due date. To illustrate, please refer to **Exhibit A and Exhibit B**.

C. Proposed E-R Diagram

First, when a new customer inputs its first order from Multibright, the customer must fill-up a registration form that requests for its profile details such as the customer's name, telephone number, and email address. Then, as the customer proceeds to order, an order number is assigned, and the order's attributes such as its date, timestamp, project location, etc. are recorded. Along with its order form, the company's payment details are also taken into account in regards to the final amount and payment date of order. In addition, a transaction number is assigned for future reference of the company. After the order is placed and processed, the following customer, order, and payment attributes are consolidated and recorded by its employees and such information is distributed to the other departments of the company. To illustrate, the Accounting Department takes note of the total amount purchased by its customers based on the order and payment details previously provided. This information is then integrated into the company's financial statements by monitoring its sales credit, cash inflows, and outflows, etc. for every order. Then, the Logistics Department monitors the production of the company's products based on the inputted orders of its customers. In regards to the company's inventory for raw materials, they are obtained from a designated supplier by batches which are consequently recorded through its batch and shipment number. Then, they are placed in the warehouse and it is highly recommended for the company to classify its materials by order number in order to systematically keep track of its inventory levels. Finally, with the given inventory, manpower, and order details, the production of such products commence and its starting and ending time in regards to the project completion are taken into account. In retrospect, attributes such as the order number, customer ID, transaction number, etc. are deemed to be important as it enables the company to efficiently track its orders and to monitor the relationships of any two entities within the organization. To illustrate, please refer to **Exhibit C to Exhibit G**.

VI. Normalized E-R Diagram Relations

Entity Relationship Diagrams (ER Diagrams) were used to produce a database design appropriate for the conditions of Multibright Lighting Innovations. The main consideration in making the database was the usability of the system. The researchers did their best in making the different entities close to the old standard procedure followed by the employees. The attributes of these entities were also patterned from the column headings used by Multibright Lighting Innovations in its existing logbooks. This was done to ensure that the employees of Multibright Lighting Innovations who will use the program can adjust easily to the system. The researchers believe that it would be hard for Multibright Lighting Innovations to face heavy changes in the system and with this, implementing the system in a less traditional manner while still using the familiarity of the employees working in Multibright Lighting Innovations would be the perfect mix to start off with.

Aside from only tracking the job orders that the business has to process, it is suggested that Multibright Lighting Innovations should also keep track of the orders that they are placing with the suppliers (**Table 7**). This involves listing the name of the supplier along with a contact number, the job order number which specifically needs the products ordered, the date when it is needed,

and a shipment number for better tracking on the warehouse. From this shipment number, another entity is established. This describes in detail what the materials that arrived or ordered are along with the quantities and again, the order number is part of the attributes so that it would be easy for the warehouse to group the materials and deploy the materials where they are needed (**Table 8**). Another entity is affected when the lights needed arrive from the suppliers. This is mainly for the Logistics Department's tracking of when the lights were received. This way, Multibright Lighting Innovations will also be able to track when the payments for these supplies are due (**Table 11**). In the event that there are excess materials, they will get recorded at the entity concerned with inventory management (**Table 12**). Here, the materials that are available and those which are needed but are not available get recorded.

The lights needed for the projects are also categorized according to the type of lights (the specific model as listed in the catalog) and the project type (be it a condominium, a coffee shop, a hotel, etc.) This is done in order to give Multibright Lighting Innovations a faster way to find lighting suggestions for the same type of project (**Table 10**). If the customer, for example, says that he likes the lighting in a specific coffee shop serviced by Multibright, it would be easy for Multibright to shortlist all of the coffee shops it has serviced in the past as well as find out the specific lights that were used for the project.

For each project, Multibright Lighting Innovations records the start date of the project. As part of the suggestion for the restructuring of the database, and end date must also be recorded (**Table 13**). Other details like the measurement of the location will also be taken into account so that Multibright Lighting Innovations can use this in their future forecasts of how long they take in servicing different projects at different locations with different location measurements. To be able to make better use of this data, the difficulty of installing the products is also considered. The product type along with the implementation (indoor or outdoor) will be evaluated along with the difficulty of installing the lighting (**Table 14**). Through this, Multibright would be able to better estimate how long it would take them to install the lighting, who among the employees should they send to the project, and are they working more efficiently on this project than the previous projects.

Staff will also be given unique control numbers which will be attributed to their duration in the company, job title, and contact numbers (**Table 16**). The person who a specific employee reports too is also accounted in one of the entities (**Table 18**). The recordkeeping of accounts receivables is also very important along with the people receiving the money. With this, the employee codes must also be inputted when recording a specific sale of a product or receipt of order (**Table 19**).

Data from new and existing customers of Multibright Lighting Innovations is highly values. For the customer data, information such as the customer's name, telephone number, email address, company, order history, company address, and accounts receivable are gathered. The customers are also given unique customer numbers for easier tracking (**Table 22 and Table 23**). This overall helps Multibright in managing the orders of their customer and knowing when the payments are due along with finding out when the last orders of their customers are which aids them to achieve the goal of customer retention,

VII. Database Design

1. Consistency in appearance and terminology.

Appearance and terminologies would be consistent in the whole system since changing themes would mean more work for the maker and confusing for the user. Consistency makes the actions and operations represented and ensures that both parties would not need to learn new representations for each button or task. **(Image 1)**

2. Availability of shortcuts for frequent users.

Shortcuts are made available especially for frequent users who do not need to go through vigorous steps just to input the information needed. These shortcuts are available for everyone but it is made especially for those who will use the system more compared to the others. **(Image 2)**

3. Availability of help to users.

Just like in Microsoft Applications such as Excel, Word, and Powerpoint, the “Help” button would always be available whenever the user is lost or when the user does not know what to do. When “Help” does not provide the solution to his problem, the user can easily send a report or feedback to the team who made the system. **(Image 3)**

4. Availability of Zoom.

According to Rachel, the Sales Manager, her eyesight has deteriorated over the past few years due to almost 24/7 constant exposure to screens. The zoom function of many programs helped her adjust to her screen fatigue. The owners of the company also have poor eyesight and high astigmatism (genetically inherited). As such, a zoom function should be part of the guidelines on the program for Rachel and her colleagues/owner (mean age = 40) for them to be able to better view the details properly. **(Image 4)**

5. Print Integration

The administration of the company is diverse in terms of age bracket. Allyson Gonzales, one of the managers is a Baby Boomer (69 years old). Christine Yapson and Myra Sangil are around 50 years old (Gen X), while Rachel de Monteverde, Sabrina and Monique Lee (Millennials) are only in their late 20s. The Babyboomer and the Gen X Managers are adamant about the possibility of having a print option because that is their preferred medium. As such, the print option must exist to adjust to the needs of the older managers/employees. **(Image 4)**

6. Availability _____ of _____ Search

During an informal interview with the Accounts Manager, Christine Yapson, mentioned that she has been struggling to find accounts receivable details on the A/R logbook. She also mentioned that Jane Ty, the former general manager, would sometimes get angry because of the inefficiency. As such, the group proposed to have a search button on the program for Christine and other users for them to efficiently find the necessary information immediately, with just a few keywords. Refer to the picture above #5 for this

guideline. As with the previous 2 guidelines, icons shall be used for a more cohesive interface. **(Image 4)**

7. Navigation System

For the UI of the proposed system, It would be easy to move across the different functions of the app because the different functionalities are just a click away
Availability of error prevention. **(Image 5)**

8. Use of lightweight graphics

The proposed interface primarily makes use of black, white, and gray which is not harsh to the eyes. These set of colors are also the least likely to get distorted when it is exported, printed, or displayed through another medium. **(Image 6)**

9. Clear and Separate column labels for each data type

The quantity, type, and notes sections are indicated by separate column levels which avoids confusion and mixing of data. **(Image 7)**

10. Availability of error prevention

Error prevention features such as undo and redo buttons, and edit buttons are important especially for business software. An example where it would be necessary is when an accounts manager incorrectly inputs an amount in a database. Unavailability or difficulty to perform an error prevention feature would lead to serious consequences. **(Image 8)**

11. Aesthetic and Minimalist Design

It does not appeal to customers well if UI has too much going on. It may also lead to confusion while using it. **(Image 9)**

12. Availability of informative feedback

It is important that the user is informed of what is happening during a process. **(Image 10)**

13. Availability of a drop-down menu

Having a drop-down menu makes it convenient for its users to access certain features or commands within the application. When clicked or toggled, the components of the application menu appear and could be easily accessed. **(Image 11)**

14. Utilization of hyperlinks

A hyperlink is a reference to data one can follow by tapping or clicking. Using hyperlinks makes it possible for its user to access certain files or text without exiting the application itself. **(Image 12)**

15. Availability of interactive forms

An Interactive form is a data-gathering window that requires its users to input certain information. To illustrate, considering the current operations of Mutibright, this can

be utilized whenever a new customer orders from the company and requires them to input their full name, company and contact details, and the like. **(Image 13)**

VIII. Design of Forms, Reports, Interfaces, and Dialogues

Collection Reminder Email

The collection reminder is done through the company email. The email would be pre-composed wherein details will only be filled out once Multibright has received the job order. Image 14 shows an example of the email. Information will be provided about their order as well as the guidelines about the different modes of payment. **(Image 14)**

Form for Inputting Orders

There will be separate tabs for New Order for new customers and old customers. In the tab for new customers, blank customer information details are there for new customers to fill up, while the tab for old customers looks just the same but with filled out information. The customer details are situated at the top of the page, separate from the details of the products they will order for easier customer tracking. In the details of the product, one column is for quantity, the next column is for the type of lights product, and the last column is for notes where the customer can input other details and descriptions for their order. **(Image 15 & 16)**

Form for Checking and Updating Order Details in the System

The Order Status tab is for customers to check and keep updated with the status of their orders. At the top right corner of the page is a summary of the customer and order details. At the bottom of it will be for the accounts receivable which tracks how many percent of the total payment are in their balance and the next deadline of their balance. This will be updated by the accounts manager of MBLI every time the customer pays. At the lower right of the page is an icon of a pdf file entitled with the company name. Customer may click this button and download the pdf for a completely detailed update. **(Image 17)**

Customer Retention Tab

The Customer Retention Tab is for the management. This shows the dates of the last time their specific customers ordered from them. All the companies that has become their customers are listed in this tab. The list will be arranged according to the earliest dates. "Email company" buttons are placed beside each company so management has the option to email the company. **(Image 18)**

IX. Conclusion

Customer retention refers to the activities and processes that a company does in order to increase the number of return customers and decrease the number of customer defections. An example of Customer Retention Management (CRM) is customer feedbacks, loyalty cards, and membership cards. The main goal of CRM is achieved through perceived customer loyalty and brand loyalty initiatives. Moreover, it is important for a company to take care of its customers for they will be the ones who will bring the business up and booming in the long run.

In the position of Multibright Lighting Innovations, having a detailed record of the customers in the system of the company will be beneficial for both parties since all information

can now be kept systematically without the fear of losing the information if it is just printed on a sheet of paper and stored inside a cabinet. Tracking the inventory of the company can now be made easy with the proposed systems and the communication process inside the office can also be improved since the system makes the dissemination of information easier than before. With these, the company would be able to keep up with the changing technology especially in the 21st century and upgrade more of its systems in the future.

INDIVIDUAL REFLECTION PAPER

Peavey Ann Lespaul Alemania - 201701112

1. Discuss the activities that you did for it (include details).

Planning	As the group leader, I suggested Customer Retention Management (CRM) considering that it is very important especially in the business setting where customers may go as they please. I realized that CRM is very rampant nowadays in coffee shops and restaurants. In the planning session, I gathered suggestions on what companies can we use so that we can propose systems that would be related to Customer Retention Management. When we have agreed that we will use Oscar's company, I suggested the interview part so that we could gather the needed data and I know that data gathering would be easy considering that Oscar is closely related to the business.
Analysis	In the analysis part, I helped formulate the questions that can be asked to the company in order to determine the specific needs of the company. Moreover, I also helped in the Data Flow Diagrams and the E-R diagrams. I specifically made the Level 1 DFD, the structure used in all of the E-R Diagrams, and the relationship tables. I made sure that the group is on the same page and every person knows what our content should be so that we all can work separately but focusing on the same goal.
Design	I suggested the contents that can be placed in the design phase of the project and how CRM can be placed in the design. Moreover, I helped with the content the more detailed E-R Diagrams as well as the e-mails that should be sent to the customers and the format of the system.

2. Discuss the value that each activity would contribute to this project and other projects at the same time.

Planning	The planning stage is very important because this phase would determine the relationship of the group and the company. Without the planning stage, there would be nothing to work on and communication with the company would be impossible. In order to ensure that the project would be successful, the planning stage should be done carefully and with enough knowledge in terms of systems that could help a company.
Analysis	The analysis part is when you start determining if the data that you have gathered about the company is enough for you to have a good system to propose. Without the analysis part, one won't be able to identify which data should be used as the Primary Key, Entity, or the Relationships that can be formed. It is important to give the Analysis part the correct amount of time so that the information which would be used in the design phase is correct and would not be put to waste.
Design	Creating the actual E-R Diagrams and DFDs made me appreciate the project more since I get to visualize what the project would look like if implemented. This also made me value Systems Analysis and Design since I get to do the diagrams on my own and understand how it would work once

	implemented. Having a detailed design in every project to be done would be very helpful when implementing the project itself for this would guide the IT department about what is happening in the systems.
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3. Reflect on the things that you learned from doing that part of the project and how you may be able to apply the lessons.

Planning	Contributing to the Planning Phase of the project made me reflect about the needs of a certain company. I realized that upgrading from manual operations to technological operations would be really helpful to any company that is present in any industry. Technologies makes our lives easier and at the same time reminds us that there are things that would need a computer or any technology in order for us to make our business operations more efficient. The lessons that I have learned in class will really be helpful to me once I enter the business industry after graduation.
Analysis	Contributing to the Analysis Phase of the project made me raise my confidence in terms of communicating with a company and identifying what can be improved in the its operations or in its data gathering process. The analysis part of this project made me understand the importance of Systems Analysis and Design since I have seen the needs of a certain company, I realized that technologies really do play a big role in our lives.
Design	Contributing to the Design Phase of the project made me appreciate systems analysts more since I realized that what they are doing is not easy and one would need a deeper understanding of all the lessons that was discussed in class when it comes to systems. I have learned that the design phase would encompass almost every information that you have collected in the planning and analysis part of the project since these would be the ones that you will be using in the diagrams needed for the project.

APPENDICES

Exhibit A. Proposed Level 0 Data Flow Diagram for the business processes of Multibright Living Innovations

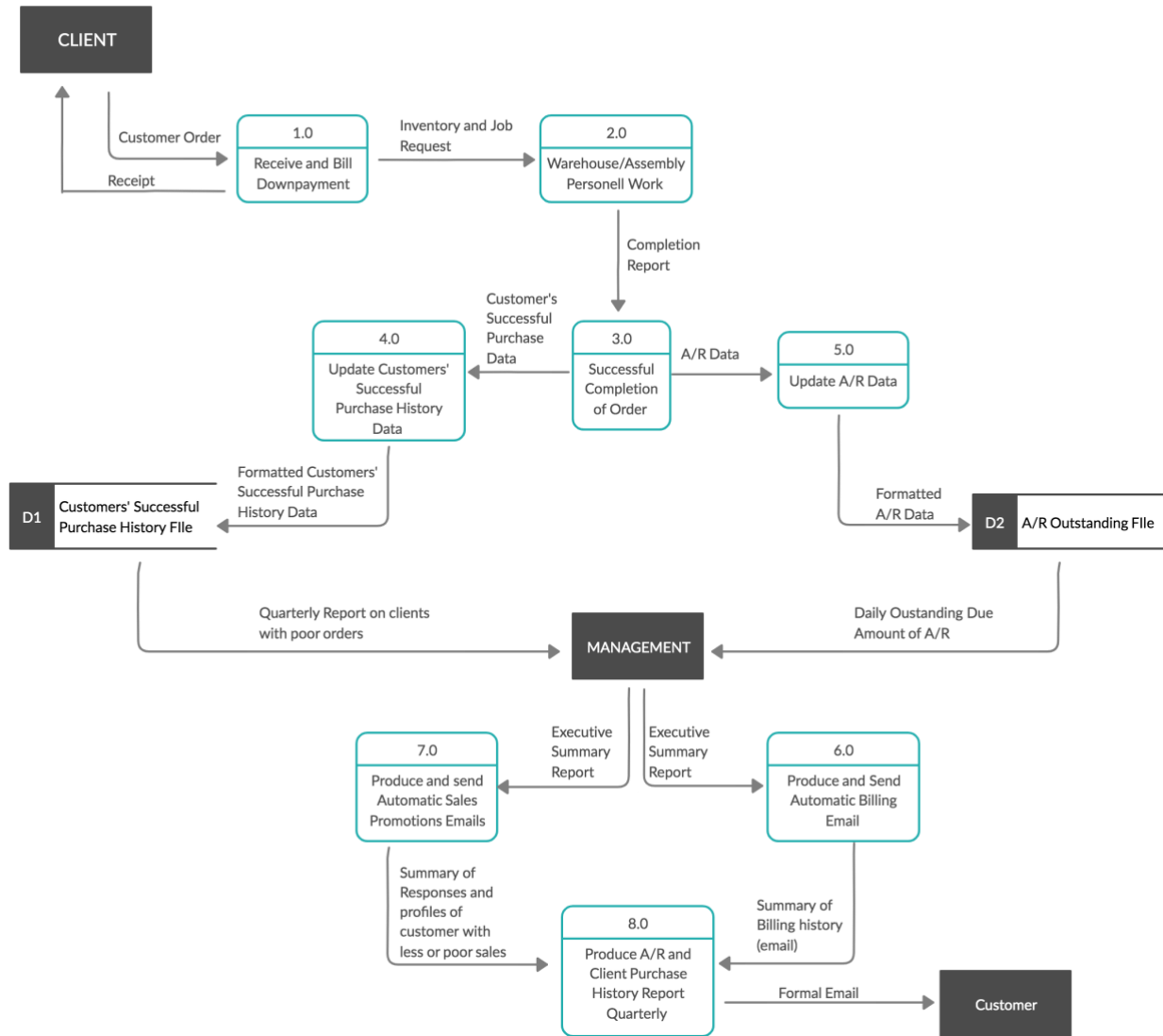


Exhibit B. Proposed Level 1 Data Flow Diagram for the business processes of Multibright Living Innovations

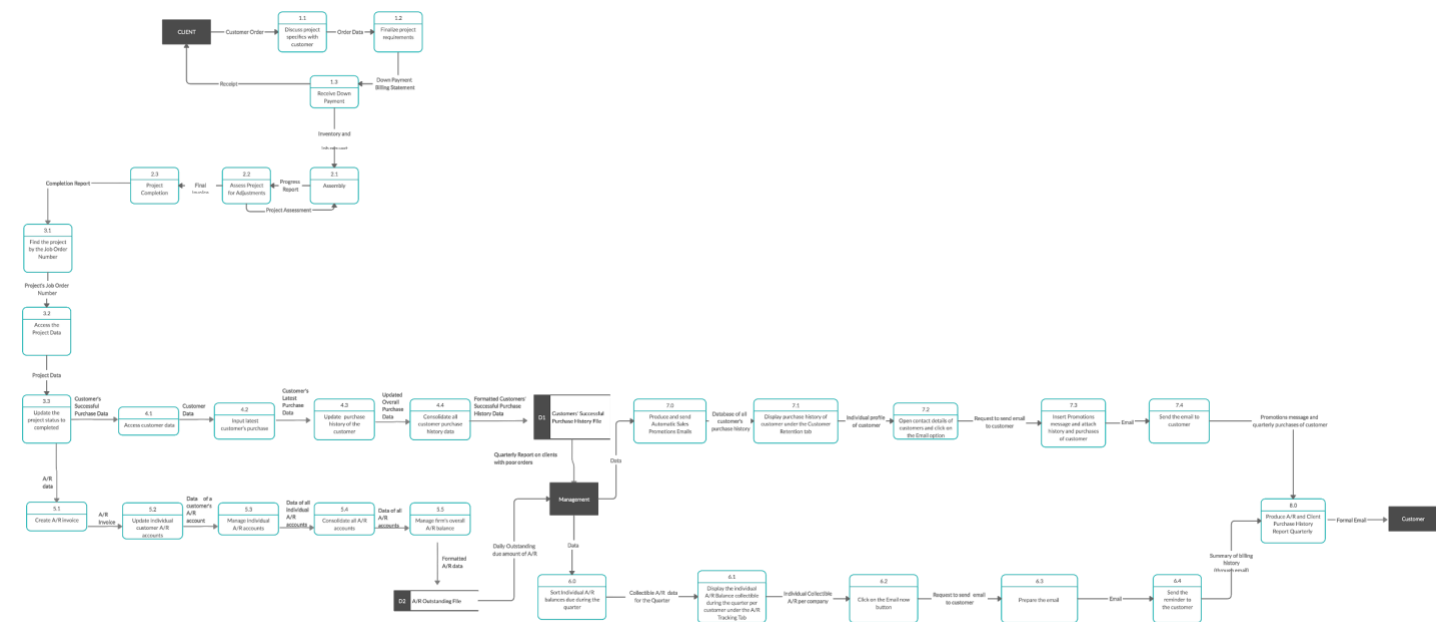


Exhibit C. E-R Diagram for Sales Disbursement Cycle

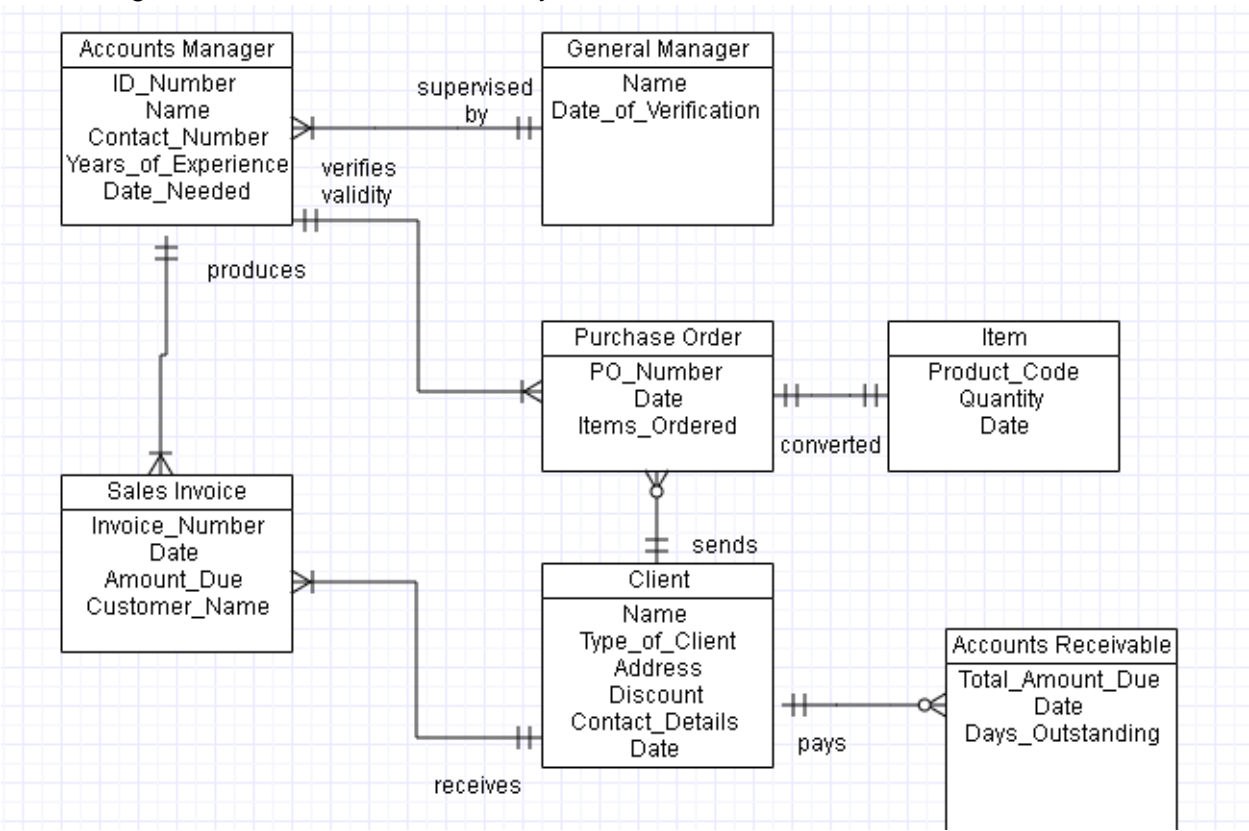


Exhibit D. E-R Diagram for Sales Manager Work Cycle

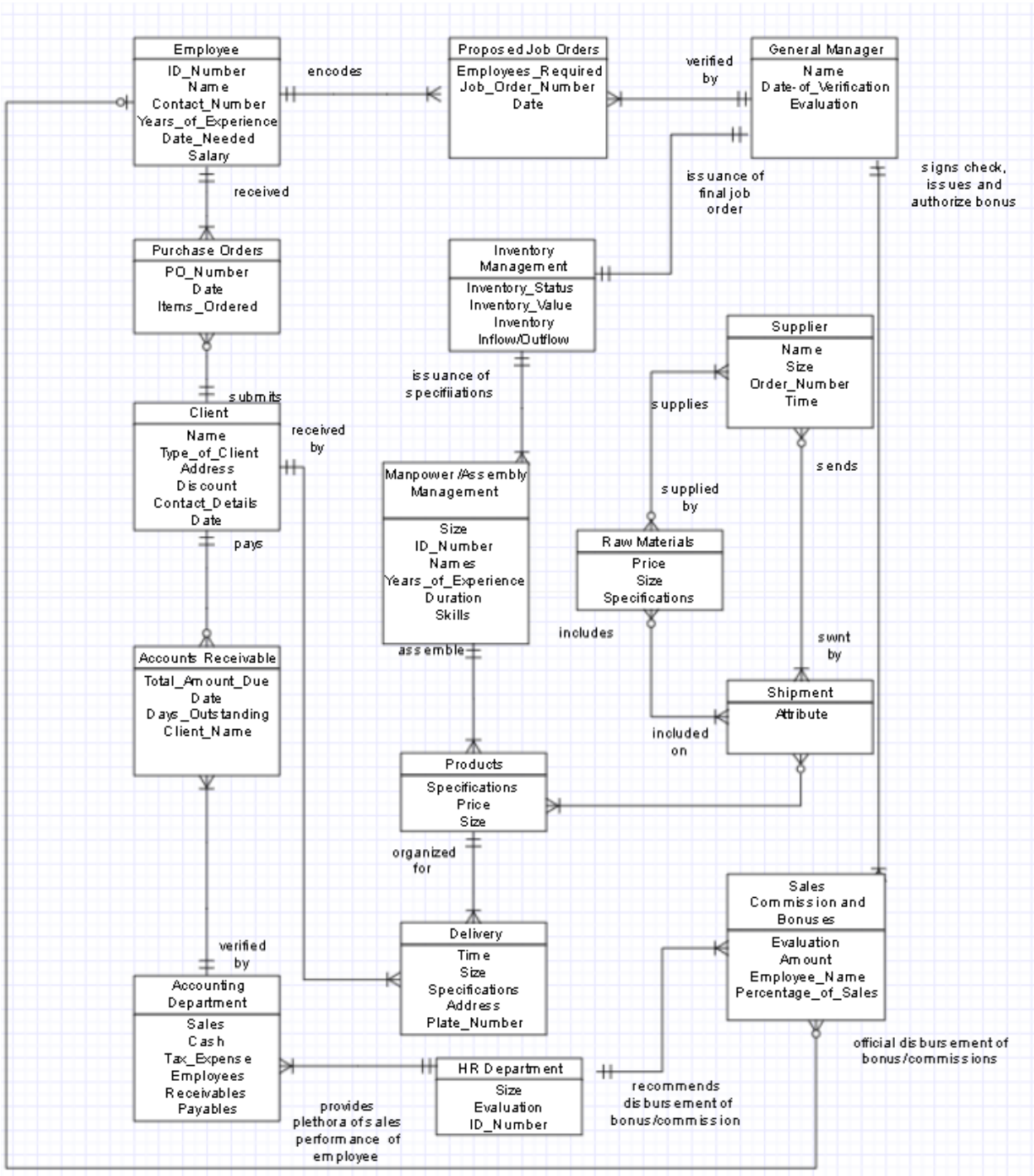


Exhibit E. E-R Diagram for Order Cycle

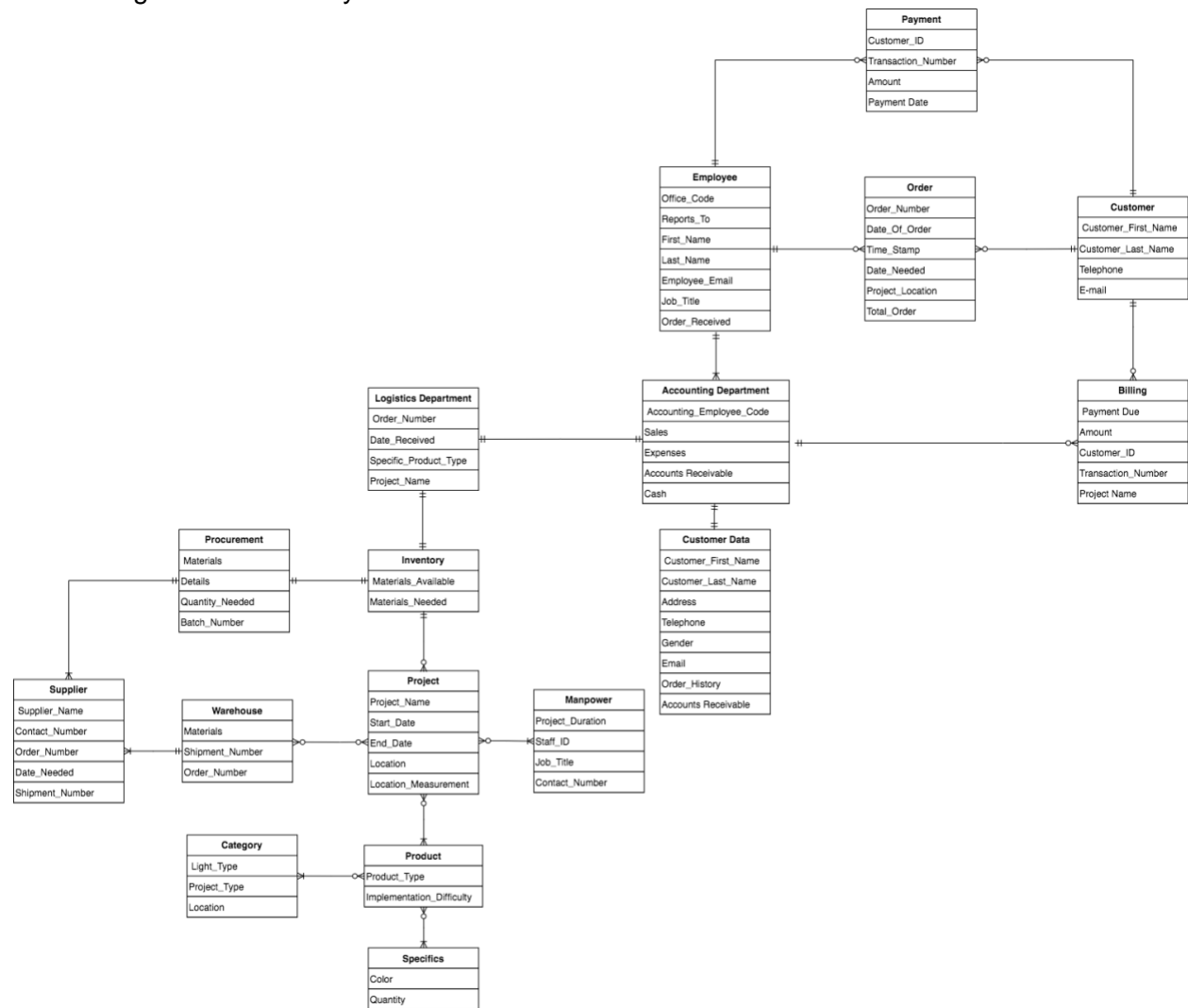


Exhibit F. E-R Diagram with Identifiers

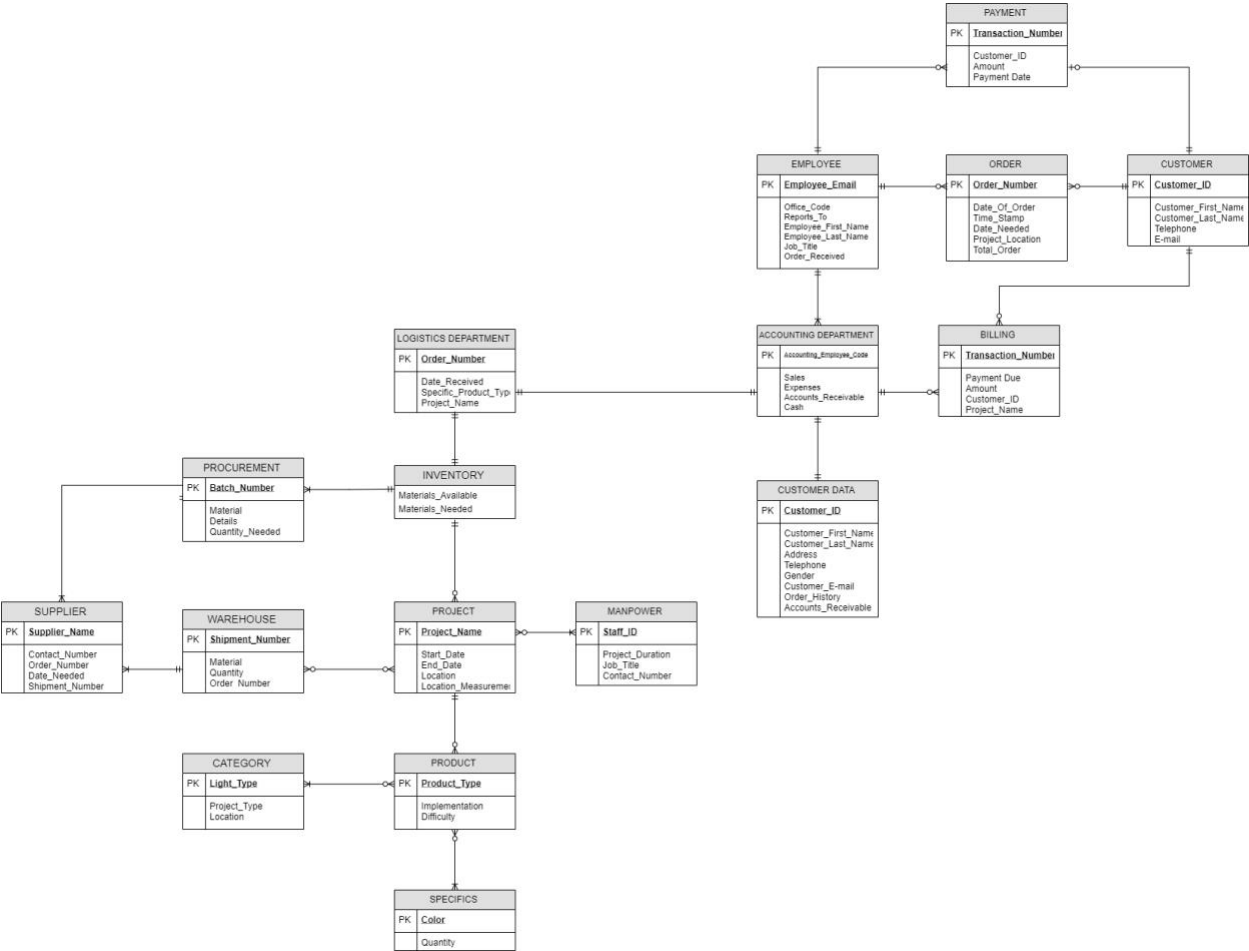


Exhibit G. E-R Diagram for Accounts Receivable Management (One Client)

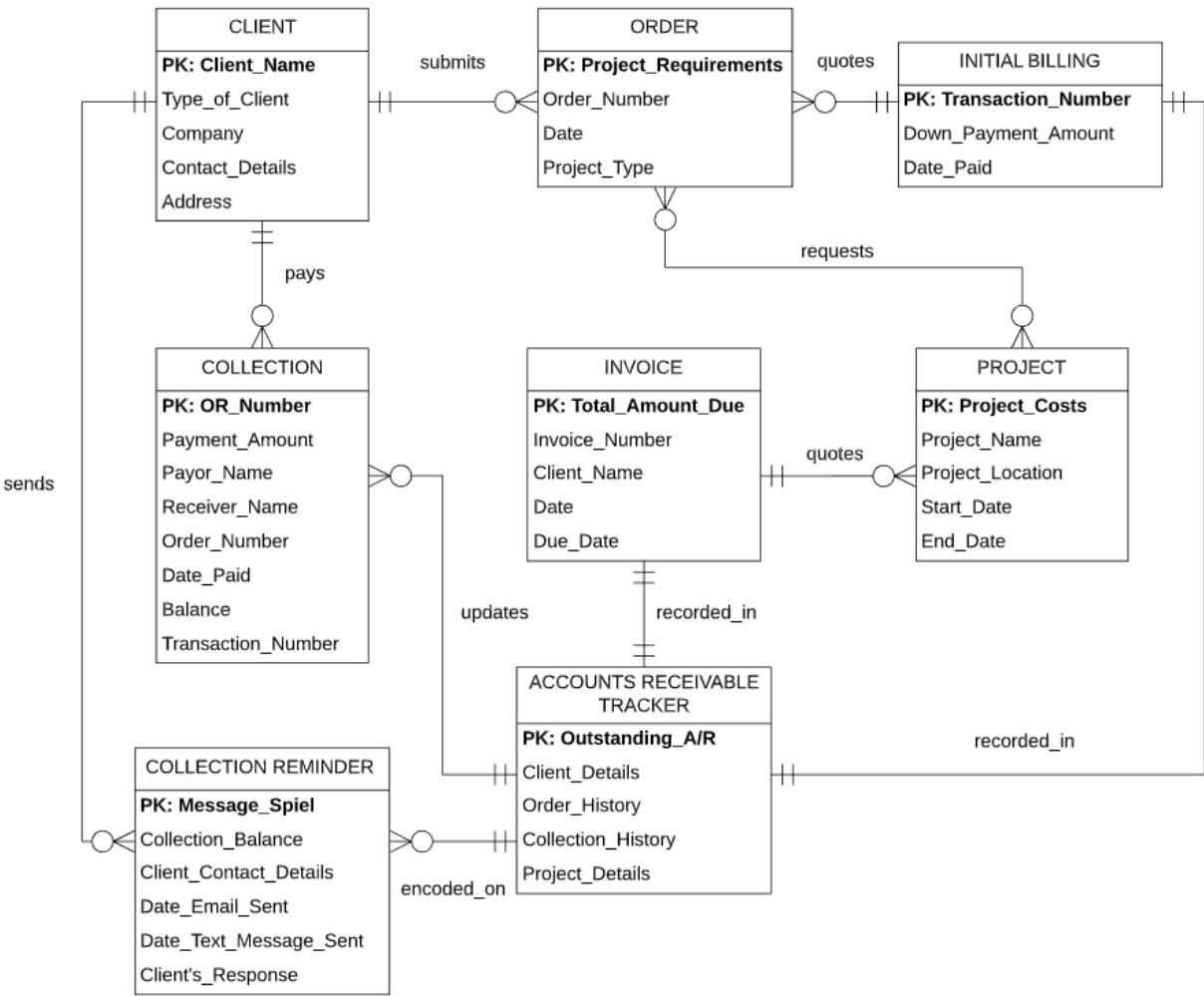


Table 1. List of papers submitted for each chapter

Paper #	Link
1	https://docs.google.com/document/d/1G4ubTQN-gOrngMjkJOERrunRr3GMYtqoOaG3i8aGhWA/edit?usp=sharing
2	https://docs.google.com/document/d/1VX3DeeLZy7hanV7ndE5MqedSDjivcCnLUD8eww387uk/edit?usp=sharing
3	https://docs.google.com/document/d/18UZ3ZUFqIQY5NtDXR7ZW87m8kv7IDVTzj_8k854Deg/edit?usp=sharing
4	https://docs.google.com/document/d/103bKzHQn76SVUgzqLrBytcASsQ4MSunNgW03W_4tM84/edit?usp=sharing
5	https://docs.google.com/document/d/1xGHpVLdSyflngXEnqthOAq9OCyOLpOmAbyy0IKpgBqs/edit?usp=sharing

Table 2. Interview Results with the CEO of Multibright Living Innovations

Interviewer	Oscar Lee
Interviewee	Monique Lee

Location of Interview	MBLI Office
QUESTIONS	ANSWERS
Please state your name, position, and years in service.	I am Monique Lee, 27 years old. I have been working here ever since I was a teenager. Alam mo naman kapag Chinoy, malaki usually ang focus sa negosyo.
What is the average order per client every quarter of the calendar year?	Every year siguro we get around hundreds of order. I don't really know the exact number. Yung accountant namin (outsourced) ang nagaayos usually ng finances namin kasama na ang Sales Mgr and Accounts Mgr.
What is the average days for collecting the Accounts Receivable amount from customers?	30 to 60 days or even more, depending on the needs of the client or relationship.
What specific information does the management need at the end of each day/month/quarter?	As instructed by our outsourced accountant, we need to collate all sales numbers, receipts, A/R outstanding and etc. Kailangan din yung mga inventory numbers. Very very tedious talaga ng inventory. Mas kaya pa namin i-computerize ung A/R namin.
What is the current system used by the company when storing the customer purchase history?	Naku, pinaka-low tech of the low tech, logbook ang para sa AR! The quotations and sales document are computerized naman cuz we had to. Alam mo naman si mommy, di magaling sa computer so we inherited a low tech workplace.
How does the firm keep track of its individual Accounts Receivable accounts as of the moment?	Logbook! Si Ayi (Aunty) Christine nagaayos niyan. Minsan nga nahihigh blood ako at si mommy noon kasi namimiss out niya minsan ang collection! Sabi nya sakin, why dont we computerize na lang daw. Sabi ko, ok lang naman pero walang time.

Table 3. Interview Results with the Sales Manager

Interviewer	Oscar
Interviewee	Rachel de Monteverde
Location of Interview	MBLI Office
QUESTIONS	ANSWERS
Please state your name, position, and years in service.	I am Rachel de Monteverde, the Sales Manager/Secretary for around 6 years.

What are the important business rules that you encounter every day?	"I think yung importanteng business rule na naencounter ko araw araw ay ung mga rules regarding sa pagbenta mismo ng mga products. Yung process ng accept ng PO tapos yung approval ng boss and of course yung evaluation and commision ko from the company."
Gumawa na ba ang HR Department ng ER Diagram for Employee Management?	"Nope, kayo ang first na gagawa."

Table 4. Multibright Living Innovations Staff (Upper Management)

NAME	POSITION
Allyson Gonzales	Sales/Procurement Manager
Sabrina Lee	HR Manager
Myra Sangil	Warehouse/Procurement Manager
Rachel de Monteverde	Sales Manager
Christine Yapson	Accounts Manager

Table 5. Proposed Decision Table Discount System given to customers for Multibright Living Innovations

	RULES										
	1	2	3	4	5	6	7	8	9	10	11
CONDITIONS											
Customer Type	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW
Total Cost of Project (in thousands)	$0 < x \leq 200$	$0 < x \leq 200$	$200 < x < 500$	$200 < x < 500$	$500 \leq x < 1000$	$500 \leq x < 1000$	$1000 \leq x < 2000$	$1000 \leq x < 2000$	$2000 \leq x < 3000$	$x \geq 2000$	$x \geq 3000$
COURSE OF ACTION											
No discount	X										
Offer 1% discount		X	X								
Offer 2% discount				X	X						

Offer 3% discount						X	X				
Offer 4% discount								X	X		
Offer 5% discount										X	X

Table 6. Proposed Decision Table for the Email System to be sent to customers for Multibright Living Innovations

	RULES					
	1	2	3	4	5	6
CONDITIONS						
Customer Type	NEW	OLD	NEW	OLD	NEW	OLD
Weeks Elapsed since Last Purchase	4	4	8	8	12	12
COURSE OF ACTION						
Send monthly newsletter and updates	X	X	X	X	X	X
Send initial follow-up email			X	X		
Send second follow-up email					X	X

Table 7. Normalized E-R Diagram Relation for Supplier

<u>Supplier_Name</u>	Contact_Number	Order_Number	Date_Needed	<u>Shipment_Number</u>
Longsheng Electrics Co., Ltd.	0927 852 3199	MLBI_ON_0001	March 12, 2017	MLBI_SN_0001
Longsheng Electrics Co., Ltd.	0927 852 3199	MLBI_ON_0002	July 5, 2017	MLBI_SN_0002
Longsheng Electrics Co., Ltd.	0927 852 3199	MLBI_ON_0003	January 20, 2018	MLBI_SN_0003

Table 8. Normalized E-R Diagram Relation for Procurement

<u>Batch_Number</u>	Material	Details	Quantity_Needed
MLBI_BN_0001	Filament	For Series G Filament Bulbs, Medium Durability	400 units
MLBI_BN_0002	Nylon Wire	Metallic Double Loop, Nylon Coated	150 units
MLBI_BN_0003	Base	Metallic Halide, Mogul	400 units

Table 9. Normalized E-R Diagram Relation for Warehouse

<u>Shipment_Number</u>	Material	Quantity	<u>Order_Number</u>
MLBI_SN_00001	Filament	400 units	MLBI_ON_00001
MLBI_SN_00002	Nylon Wire	150 units	MLBI_ON_00002
MLBI_SN_00003	Base	400 units	MLBI_ON_00003

Table 10. Normalized E-R Diagram Relation for Category

Light_Type	Project_Type	Location
LED Lights	Tipsy Pig Gastropub	Capitol Commons, Camino Verde Rd, Pasig
Halogen Lamps	The Shang Grand Tower	Perea Street corner Dela Rosa Street, Legaspi Village, Makati City
Incandescent Lights	Jollibee Katipunan	Katipunan Ave, Quezon City, Metro Manila

Table 11. Normalized E-R Diagram Relation for Logistics Department

<u>Order_Number</u>	Date_Received	Specific_Product_Type	Project_Name
MLBI_ON_00001	February 16, 2016	Metal Halide Medium Base	SMDC Blue Residence
MLBI_ON_00002	June 4, 2016	CA11 LED Medium Base	Makati City Hall Building
MLBI_ON_00003	October 19, 2016	T7 Intermediate	Hexagon Group of Companies

Table 12. Normalized E-R Diagram Relation for Inventory

Materials_Available	Materials_Needed
E26/E27 Medium	PAR20
E17 Intermediate	T8 Small
E39/E40 Mogul	S11 Marquee

Table 13. Normalized E-R Diagram Relation for Project

Project_Name	Start_Date	End_Date	Location	Location_Measurement
Ortigas Center Street Lights	January 20, 2009	February 20, 2000	Pasig City	8km
Starbucks 6750	July 1, 2012	August 1, 2012	Makati City	110 square meters
BonChon Regis Center	March 3, 2017	April 3, 2017	Quezon City	70 square meters

Table 14. Normalized E-R Diagram Relation for Produce

Product_Type	Implementation	Difficulty
Street Lights	Outdoor	Difficult
Indoor Lights	Indoor	Moderate
Indoor Lights	Indoor	Moderate

Table 15. Normalized E-R Diagram Relation for Specifics

Color	Quantity
Cool White (2700K - 3000K)	100 Bulbs
Bright White (3500K - 4100K)	100 Bulbs
Daylight (5000K - 6500K)	100 Bulbs

Table 16. Normalized E-R Diagram Relation for Manpower

Staff_ID	Project_Duration	Job_Title	Contact_Number
2006-0201	January 20, 2009 to February 20, 2009	Assemble Assistant	09171234567
2006-0202	January 20, 2009 to February 20, 2009	Assemble Assistant	09171234566
2006-0203	January 20, 2009 to February 20, 2009	Assemble Assistant	09171234562

Table 17. Normalized E-R Diagram Relation for Payment

Transaction_Number	Customer_ID	Amount	Payment_Date
AA0001	000031	Php 1,500,000	April 1, 2009
AA0002	000142	Php 900,000	August 1, 2012
AA0003	000178	Php 700,00	June 1, 2017

Table 18. Normalized E-R Diagram Relation for Employee

Employee_Email	Office_Code	Reports_To	Employee_First_Name	Employee_Last_Name	Job_Title	Order_Received
sabrinalee@gmail.com	1998-0100	Monique Lee	Sabrina	Lee	Human Resource and Inventory Manager	Street Lights for Ortigas Center
nicovaldezco@gmail.com	2005-0120	Monique Lee	Nilo	Valdezco	Messenger	Indoor Lights for Starbucks 6750
allysongonzales@gmail.com	2006-0130	Monique Lee	Allyson	Gonzales	Engineer and Sales Manager	Indoor Lights for BonChon Regis

						Center
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Table 19. Normalized E-R Diagram Relation for Accounting Department

Accounting_Employee_Code	Sales	Cost	Accounts_Receivable	Cash
MBLI_EC_2001-0100	Php 700,000	Php 300,000	Php 560,000	Php 140,000
MBLI_EC_2004-0120	Php 150,000	Php 70,000	Php 40,000	Php 110,000
MBLI_EC_2003-0225	Php 85,000	Php 50,000	Php 60,000	Php 25,000

Table 20. Normalized E-R Diagram Relation for Order

Order_Number	Date_Of_Order	Time_Stamp	Date_Needed	Project_Location	Total_Order
AA0001	December 12, 2008	1:03:54 PM	January 10, 2009	Pasig City	350 Lights
AA0002	February 17, 2012	9:27:04 AM	June 20, 2012	Makati City	100 Lights
AA0003	January 10, 2017	8:48:43 AM	February 25, 2017	Quezon City	80 Lights

Table 21. Normalized E-R Diagram Relation for Billing

Transaction_Number	Payment_Due	Amount	Customer_ID	Project_Name
MBLI_TN_0001	March 24, 2016	Php 1,500,000	000012	SMDC Blue Residences
MBLI_TN_0002	July 14, 2008	Php 125,000	000008	Starbucks Petron, Katipunan
MBLI_TN_0003	January 21, 2016	Php 110,000	000021	BonChon, UpTown Center

Table 22. Normalized E-R Diagram Relation for Customer

Customer_ID	Customer_First_Name	Customer_Last_Name	Telephone	Customer_E-mail	Company
000001	Juan	Dela Cruz	0912 678 8756	juandelacruz@yahoo.com.ph	Starbucks
000002	Maria	Aquino	0916 758 2234	maquino@gmail.com	Unilever
000003	Henry	Sy	0998 546 1124	hsy@gmail.com	SM Supermalls

Table 23. Normalized E-R Diagram Relation for Customer Data

Customer_ID	Customer_First_Name	Customer_Last_Name	Address	Telephone	Gender	Customer_E-mail	Order_History	Accounts_Receivable	Company
000001	Juan	Dela Cruz	Metrowalk	0912 678	M	juandelacruz@	No previous	Php 0	Starbucks

			Mall, Meralco Ave, Pasig,	8756		yahoo.c om.ph	orders		
000002	Maria	Aquino	2nd Ave, Taguig, Metro Manila	0916 758 2234	F	maquin o@gma i.com	May 3, 2016 - Bright White (3500K - 4100K) - 80 units	Php 350 000	Unilever
000003	Henry	Sy	Q1 Multinati onal Ave, Parañaq ue, 1704 Metro Manila	0998 546 1124	M	hsy@g mail.co m	April 10, 2015 - Cool White (2700K - 3000K) - 230 units Novemb er 23, 2015 - Daylight (5000K - 6500K) - 100 units	Php 800 000	SM Supermall s

Image 1. Consistency in appearance and terminology

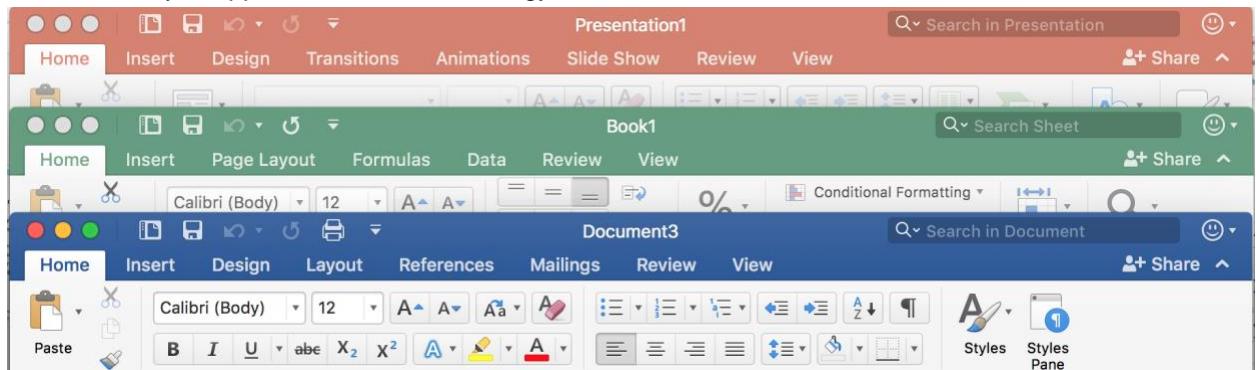


Image 2. Availability of shortcuts for frequent users

Format characters and paragraphs			
Format characters		Change paragraph alignment	
To do this	Press	To do this	Press
Open the Font dialog box to change the formatting of characters.	Ctrl+D	Switch a paragraph between centered and left-aligned.	Ctrl+E
Change the case of letters.	Shift+F3	Switch a paragraph between justified and left-aligned.	Ctrl+J
Format all letters as capitals.	Ctrl+Shift+A	Switch a paragraph between right-aligned and left-aligned.	Ctrl+R
Apply bold formatting.	Ctrl+B	Left align a paragraph.	Ctrl+L
Apply an underline.	Ctrl+U	Indent a paragraph from the left.	Ctrl+M
Underline words but not spaces.	Ctrl+Shift+W	Remove a paragraph indent from the left.	Ctrl+Shift+M

Image 3. Availability of help to users

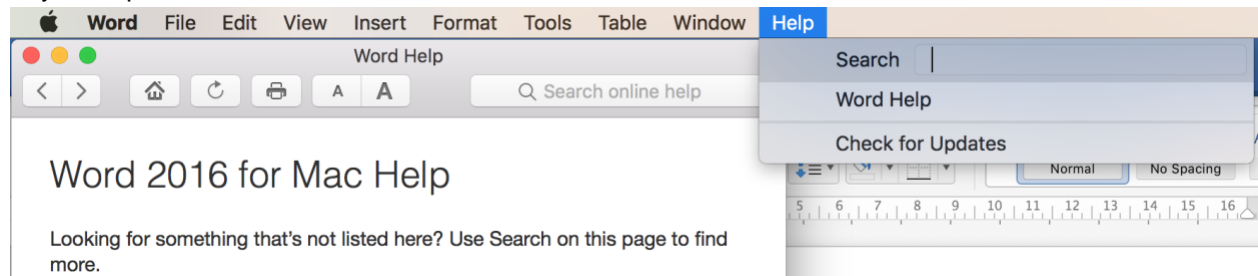


Image 4. Availability of Zoom

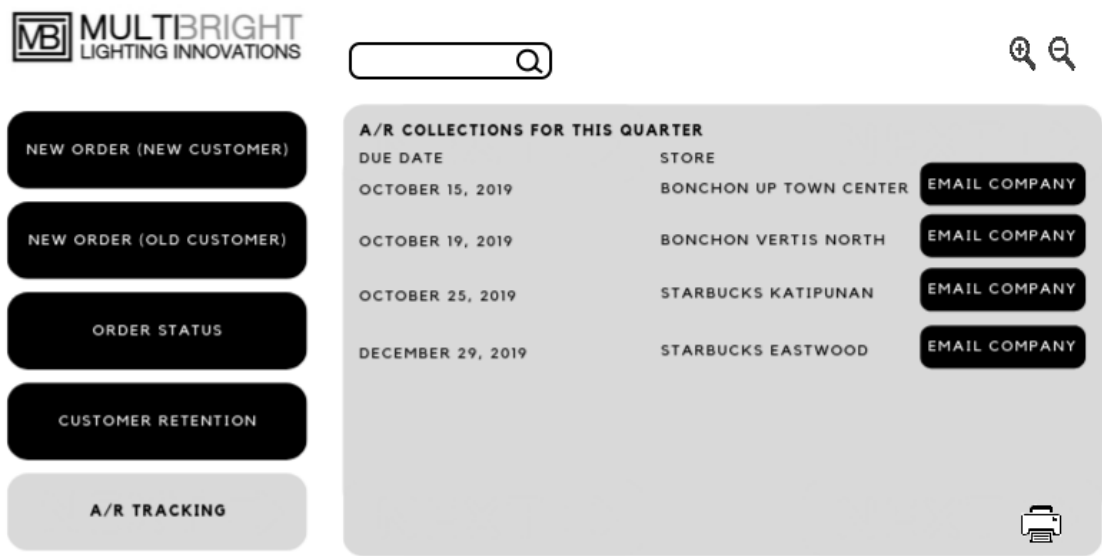


Image 5. Easy Navigation System



Image 6. Use of lightweight graphics

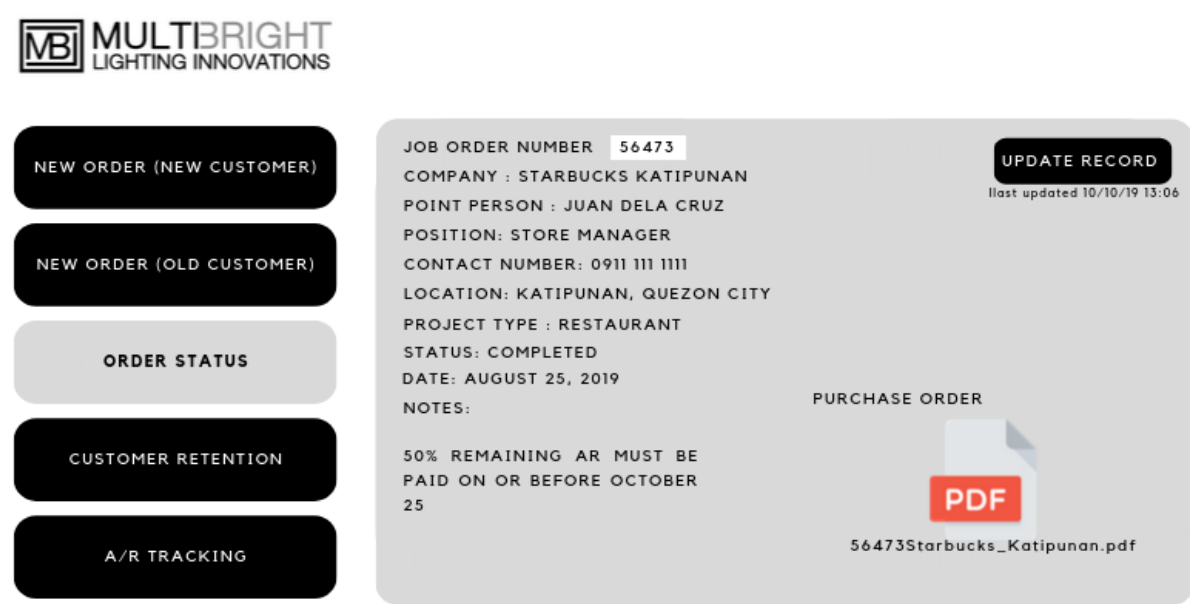


Image 7. Clear and Separate column labels for each data type

NEW ORDER (NEW CUSTOMER)

NEW ORDER (OLD CUSTOMER)

ORDER STATUS

CUSTOMER RETENTION

A/R TRACKING

COMPANY

POINT PERSON

CONTACT NUMBER

LOCATION

DATE

JOB ORDER NUMBER

POSITION

PROJECT TYPE

STATUS

QUANTITY

TYPE OF LIGHT

NOTES

Image 8. Availability of error prevention

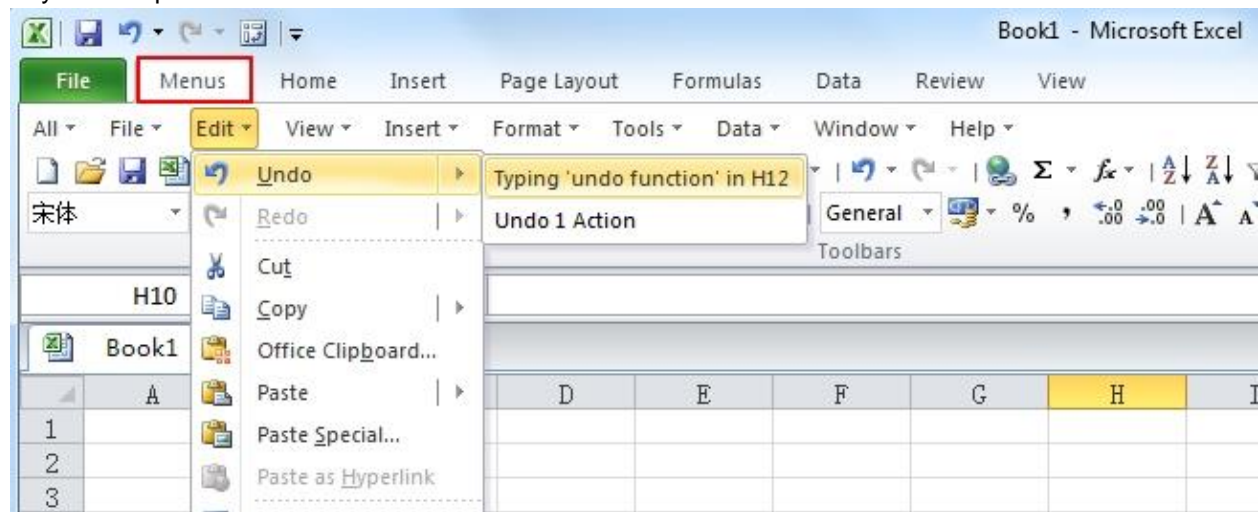


Image 9. Aesthetic and Minimalist Design



Image 10. Availability of informative feedback

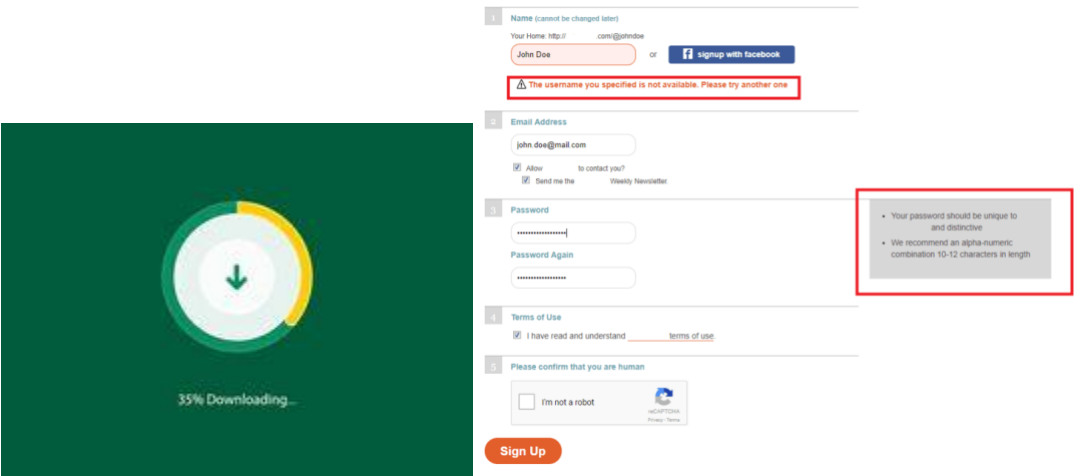


Image 11. Availability of a drop-down menu



Image 12. Utilization of hyperlinks

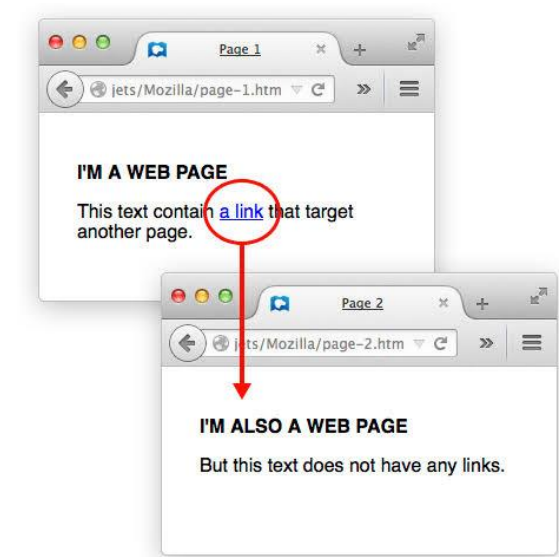


Image 13. Availability of interactive forms

Arrival Card

Last Name	<input type="text" value="Leverling"/>	Passport No.	<input type="text" value="31195855"/>
First Name	<input type="text" value="Janet"/>	Visa No.	<input type="text" value="73203393"/>
Nationality	<div><div>United States</div><div>Switzerland</div><div>Taiwan</div><div>Tajikistan</div><div>Thailand</div><div>Turkey</div><div>United Kingdom</div><div>United States</div></div>	Gender	<input type="checkbox"/> Male <input checked="" type="checkbox"/> Female
Address		Date of Birth	<input type="text" value="30"/> <input type="text" value="06"/> <input type="text" value="1985"/>
Flight No.			

Image 14. Email notification for customer regarding unsettled payment

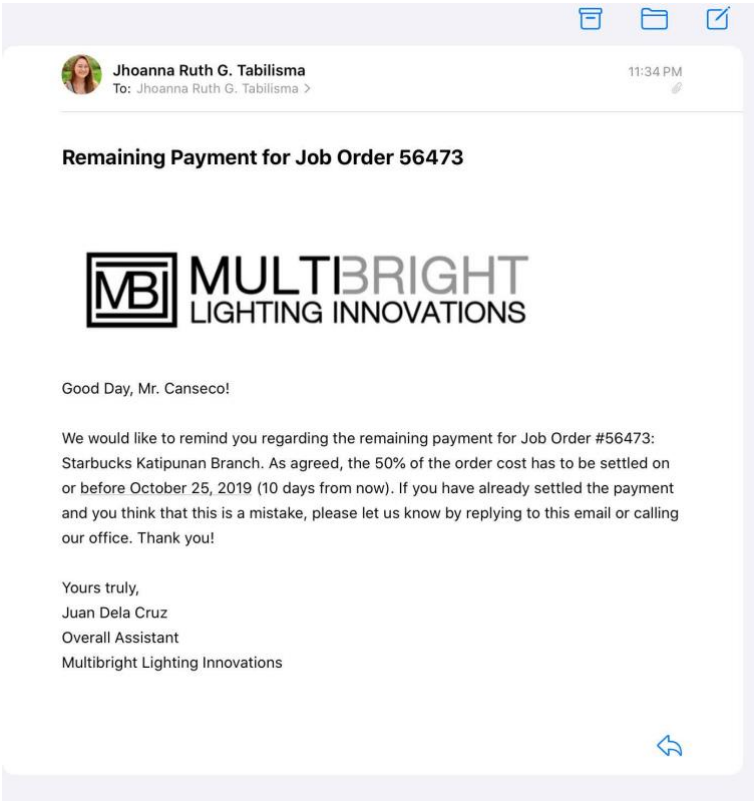



Image 15. Form for inputting the orders from new customers of Multibright Lighting Solutions



NEW ORDER (NEW CUSTOMER)

NEW ORDER (OLD CUSTOMER)

ORDER STATUS

CUSTOMER RETENTION

A/R TRACKING

COMPANY

POINT PERSON

CONTACT NUMBER

LOCATION

DATE

JOB ORDER NUMBER

POSITION

PROJECT TYPE

STATUS

QUANTITY	TYPE OF LIGHT	NOTES

Image 16. Form for inputting the orders from old customers of Multibright Lighting Solutions

MULTIBRIGHT
LIGHTING INNOVATIONS

NEW ORDER (NEW CUSTOMER)

NEW ORDER (OLD CUSTOMER)

ORDER STATUS

CUSTOMER RETENTION

A/R TRACKING

COMPANY

POINT PERSON : JUAN DELA CRUZ

CONTACT NUMBER: 0911 111 1111

LOCATION: KATIPUNAN, QUEZON CITY

DATE: AUGUST 25, 2019

JOB ORDER NUMBER

POSITION: STORE MANAGER

PROJECT TYPE

STATUS

PURCHASE ORDER

[CLICK HERE TO ATTACH PURCHASE ORDER](#)

NOTES

Image 17. Form for checking and updating order details in the System

MULTIBRIGHT
LIGHTING INNOVATIONS

NEW ORDER (NEW CUSTOMER)

NEW ORDER (OLD CUSTOMER)

ORDER STATUS

CUSTOMER RETENTION

A/R TRACKING

JOB ORDER NUMBER

COMPANY : STARBUCKS KATIPUNAN

POINT PERSON : JUAN DELA CRUZ

POSITION: STORE MANAGER

CONTACT NUMBER: 0911 111 1111

LOCATION: KATIPUNAN, QUEZON CITY

PROJECT TYPE : RESTAURANT

STATUS: COMPLETED

DATE: AUGUST 25, 2019

NOTES:

50% REMAINING AR MUST BE PAID ON OR BEFORE OCTOBER 25

PURCHASE ORDER

PDF

56473Starbucks_Katipunan.pdf

UPDATE RECORD

last updated 10/10/19 13:06

Image 18. Customer retention tab of the application which shows the management the last time that the customer ordered from them and gives the option to email the customer

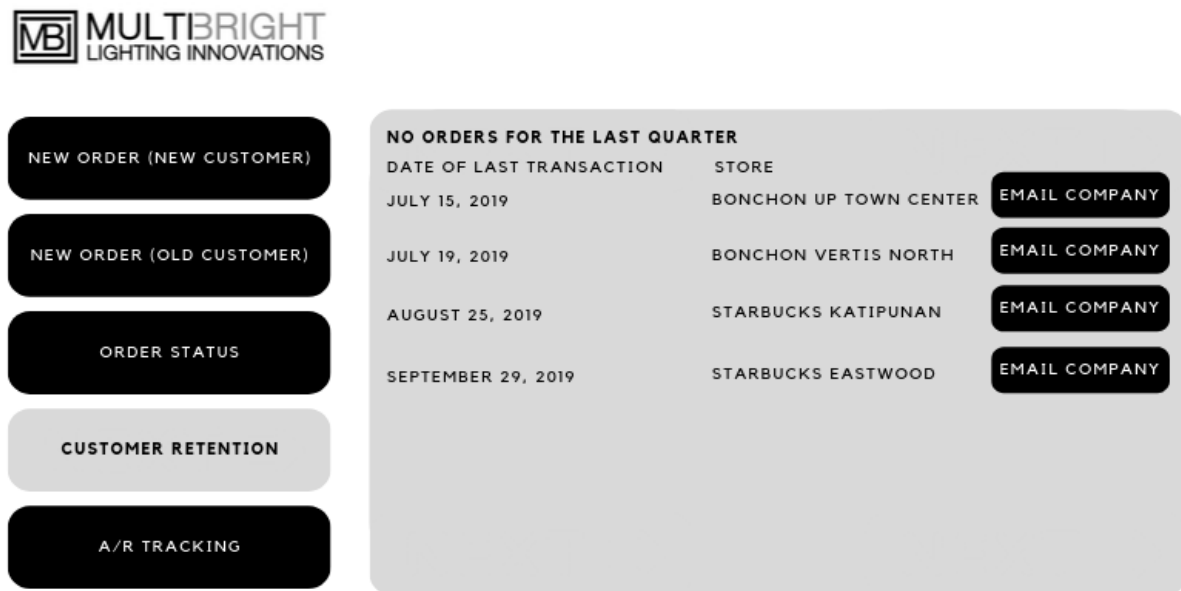


Image 19. Accounts Receivable tracking tab of the application which shows the management when the payments are due and gives the option to email the customer



NOTES

Access the complete Data Flow Diagrams via:

<https://drive.google.com/drive/folders/1IQ7rjQ3NpYAIT1DAbJuQwlbLFhBYaew9?usp=sharing>