

Systems Analysis & Design Deliverables

BA 186

Sir Roy Vincent L. Canseco

Final Paper

**Business Intelligence of the UP Cash Office**

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## **I. Planning**

### **Overview & Rationale of Planning**

The UP Cash Office is in charge of all monetary transactions that happen in UP, may it be for tuition, car stickers and room reservations. The current process of paying includes getting a payment slip from the office in charge of handling payments, and then going to UP Cash Office and tendering the payment slip. After this, the amount needed will be paid and a receipt is given to the payor. The payor then has to show the receipt to the office that gives the payment slip in order to verify the payment. For example, to reserve a room in CBA, one must go to room 107 in order to get a “quotation” in the form of a payment slip. Then, the individual must go to UP Cash Office in order to show the payment slip and then pay for the amount needed. In order to verify the payment made, the person must then show the receipt of payment back to the representative in room 107. Having had first-hand experience with this process, the group believes that the process can be made shorter by having a university wide accounting system that takes not of all payments made to the university. This will make the process of payment shorter as different colleges will have their respective cashiers to collect payments. This will also reduce stress of payors, especially those that do not have the luxury of transportation to keep going from the UP Cash Office to their respective college. It’s important that UP change this system in order to reduce the presence of data silos, and as well as providing more avenues of payment for different transactions needed. Change is needed in UP in order to make systems more efficient, and one way to start is through the UP Cash Office.

### **Executive Summary**

Our project involves seeking ways and proposals to improve the business intelligence of the UP Cash Office. Starting with our foundations in the Planning phase, all the way to our learnings from the Analysis & Design phases, as well as the adjustments made throughout each stage and significant activity in our project, we have ultimately decided to propose a system improvement in their queueing process. Following the planning and research conducted in the first part, our group then determined & structured the current system & data requirements to base our proposed system on. The paper highlights key changes that our proposal aims to make in improving the overall experience of the payor as well as the ease, efficiency, and optimal workflow of the UP Cash Office staff and managers. Following this, the diagrams made from the Analysis stage were then transformed into concrete interfaces, databases, forms, and the like – samples of which were explored in the Design stage of the paper. The group’s overall proposal seeks to improve and modernize the UP Cash Office in an ever-growing, digital, and fast-paced community that is UP Diliman.

## II. ANALYSIS

### Overview & Rationale of Analysis

In order to improve the systems and business intelligence of the UP cash office, the group has decided to thoroughly assess the necessary constituents. Firstly, determining system requirements through interviews, written documents, and computerised sources is obligatory as this is the initial step to meticulously analysing the office's structure and systematic approaches. Moreover, this entails evaluating the nature of their problems and formulating ways to solve them. The concepts of Joint Application Design, Business Process Reengineering, and Disruptive Technologies were applied under the encompassing notion of maximizing the office's efficiency. Secondly, structuring system process and data requirements involves the use of graphical representations and several diagrams. This enables us to have a clearer and more detailed depiction of how the different processes work. Hence, the group has gathered all the information needed to be able to develop new ways to enhance the overall system of the UP cash office.

### Determining System Requirements

#### Requirements Determination Deliverables

Interviews & Observations (*interview transcripts, observation notes, meeting minutes*)

Our group plans to conduct interviews with key people involved in the UP Cash Office in order to obtain essential inside information regarding the organization. Through these insights obtained, we would be able to more closely understand the systemic requirements & circumstances in the Cash Office now, and determine operational recommendations for their benefit.

Existing Written Documents (*missions and strategy statements, business forms, procedure manuals, job descriptions, training manuals, system documentation, flowcharts*)

Written documents will also play a big role in determining the system requirements, and ultimately, in our project. Going to the root of the role of the UP Cash Office and understanding its core purpose through its mission & strategy statements, our group would be able to align our recommendation with their values. Business plans, projected forecasts and strategies, as well as current flowcharts and documentation manuals, will also serve as our guide in gauging the consistency (or disparity) between actual daily activities facilitated by the staff.

Computerized Sources (*CASE repositories, reports from existing systems, displays & reports from system prototype*)

Lastly, computerized sources may also be of benefit to the group, but is subject to availability or agreement of the Cash Office to disclose such information to us. By analyzing a wide variety of reports, prototypes, and programs developed by the organization, the group would hopefully be able to determine the effectivity and efficiency by each of these factors and cite these examples in our recommendations.

### Joint Application Design

Joint Application Design is a method/process used to determine system requirements by bringing together all the prominent members that would be affected by the proposed system and collect

data from all of these members. Furthermore, one key aspect that makes this type of system requirements methodology unique is that the client or end user is part of the design and development of the system. In relation with the UP Cash Office, JAD allows for the faster development of any new systems or applications to be used within the office's operations. This is possible because the nature of JAD is for all "key" people to meet in isolation in a highly focused environment to attain a certain goal (whether that is ideation of an application, development of a new system, etc.). The "key" people would consist of the clients, executive sponsors (managers, CEO, etc.), facilitator or session leader, scribe, systems analyst, and other employees that would use or be directly affected by the new system requirements or application.

### **Business Process Reengineering**

Business Process Reengineering is the act of recreating a core business process with the goal of improving product output, quality, or reducing costs. Moreover, it involves strictly enforcing change within the system— it encompasses the notion of ameliorating inefficiency and figuring out new ways to move forward. Unlike business process management or improvement, both of which focus on working with existing processes, BPR means changing the said processes fundamentally. In relation to the UP Cash Office, BPR makes room for thorough assessment within the system. In addition, this enables the office to identify and communicate the need for change; however, this will require management that conveys the grand vision of change, along with effectively portraying how this may affect even the lowest-ranked employee positively. As with any other project, business process reengineering needs a team of highly-skilled, motivated people who will carry out the needed steps. The UP Cash Office needs to gather a team of experts that specialize in the necessary fields. Afterward, altering inefficient processes and defining key performance indicators would be necessary to proceed. With a competent team and the careful implementation of the procedure, BPR would undoubtedly be upheld. Ultimately, the goal of Business Process Reengineering is to find the optimal solution that will achieve substantial improvements in an institution's performance, productivity, and quality.

### **Disruptive Technologies**

Disruptive technologies play a big role in organizations, because they significantly alter the way that businesses or industries operate. Organizations always strive to look for ways to improve their business processes, and one way is by inventing an entirely new way of getting something done. These disruptive technologies have superior attributes that enable the breaking of long-held business rules. For example, the university has recently embraced the new and improved radio frequency identification (RFID) card which completely changed the way students use their IDs. These IDs are powered by PayMaya, which provides students and UP personnel another avenue to tap a host of electronic payment solutions. Through the "powered up" ID, students can now receive allowances and stipends, and pay for dormitory and school fees. Just like what UP has done with the IDs, it would be beneficial for the UP Cash Office to innovate using disruptive technologies, as it serves as custodian of revenues and all income of the University. These technologies could be an avenue for the office's seamless operations. For example, UP could invest in a cloud-based software that integrates with the university's payroll solution and helps automate core business operations. This could potentially help in making their work more productive.

## Structuring System Process Requirements

### Process Modeling

Business process modeling refers to the graphical representation of a company's business processes, as a method of identifying potential improvements. In other words, it is a critical component for effective business process management. First of all, process modeling gives everyone a clear depiction and understanding of how the process works; moreover, it provides consistency and identifies inefficiencies. Ultimately, the preeminent objective of these representations is to thoroughly analyze the business' current state, and simulate necessary measures to be carried out in order to achieve better results.

Undoubtedly, there's no one-size-fits-all solution for business process modeling— at the end of the day, it is highly dependent on what the company wishes to achieve. In relation to the UP Cash Office, it is essential to make use of BPM as its detailed technical nature and process-emphasis link it closely with quality management and the analytical approaches responsible for the improvement of quality. Business process modeling techniques are concerned with mapping and workflow to enable understanding, analysis, and pragmatic change. Diagrams (essentially “flow diagrams”) are a central feature of the methodology; with that said, the UP Cash Office may utilize the aforementioned representation and use it for their benefit. It relates to several aspects of management (profit, change, processes, projects, et.c) so the office may use it to define a specified flow of activities— one that will positively affect their business. Fundamentally, business process modeling aims to improve business performance by optimizing the efficiency of connecting activities in the provision of a product or service.

### Data Flow Diagramming

#### Symbols

**Process:** (work or actions performed on data/inside the system)

- Receive and transform transaction order: this will include the payment slip and receipt
- Update transaction records of department/college: this is for the records of the department/college that request for payment, and as well as the records of UP Cash Office

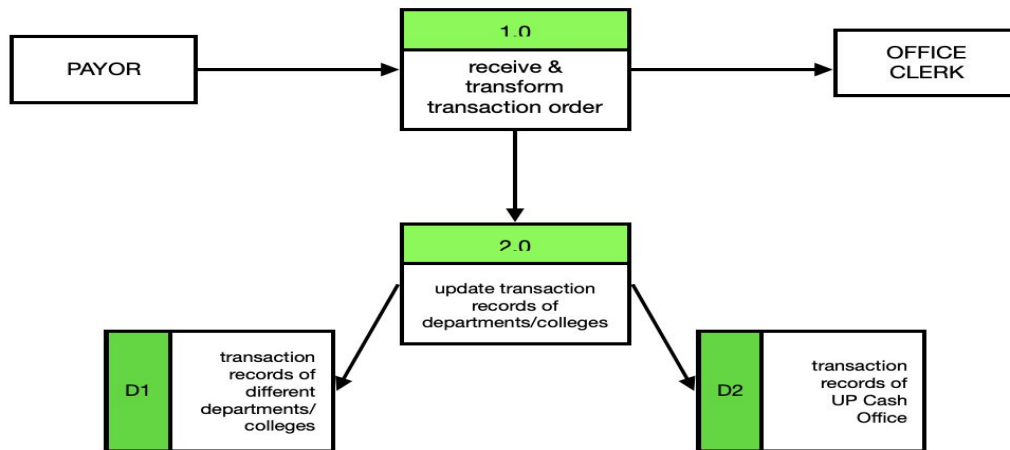
**Data Store:** (data rest/inside the system)

- Transaction records of different departments/colleges: this refers to the transaction records of the departments/colleges that will receive payment
- Transaction records of UP Cash Office: refers to transaction records of UP Cash Office that will be used to cross-check records with departments/colleges for tracking and alignment of records

**Source/sink:** (an external entity that is origin or destination of data/outside the system)

- College: they will be in charge of giving the payor a payment slip
- Payor: hands over the payment slip given by the department/college to UP Cash Office
- Office clerk: in charge of recording all payments made to UP Cash Office

## Level-0 Diagram



## Modeling Logic with Decision Tables

Decision table for tuition payment process

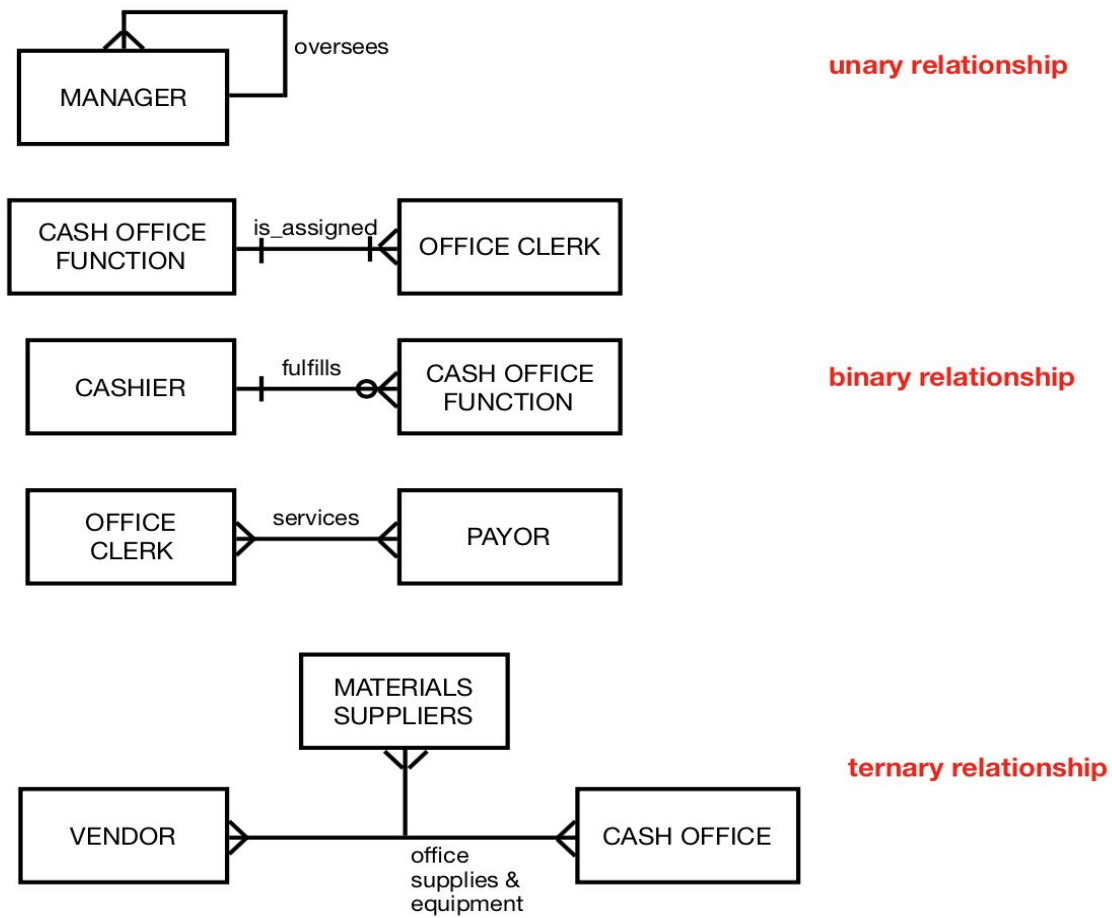
	Conditions	Rules				
		1	2	3	4	5
Condition stubs	Under free tuition	Y				
	Under SFA discount		Y	Y		
	With scholarship				Y	Y
	Late payment		Y	N	Y	N
Action stubs	Process free tuition	X				
	Deduct SFA discount		X	X		
	Process late payment		X		X	
	Process scholarship				X	X

## Questions Needed

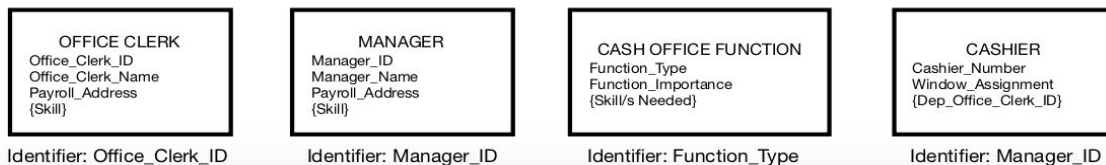
1. Who will be involved in the new proposed system?
2. Will the new system change any already installed functions in the UP Cash Office?
3. Has this system been proposed before?
4. What benefits will the UP Cash Office gain from the new system?
5. What costs will the UP Cash Office incur once the system is installed and maintained?
6. What are the specific components that need to be changed?
7. Will the new system have a positive effect on all employees and end-users?
8. Are there any other businesses using a similar system to the proposed?
9. What are the possible issues that would need to be addressed in case the system fails?
10. Will there be a contingency plan if the implementation of the new system fails?
11. How long will the system be used?
12. Is there a need to hire external support for the said system?
13. Will all parts of the system be developed in-house?
14. To what extent will normal operations be affected once the implementation of the new system begins?
15. Is the proposed system entirely necessary?

## Structuring System Data Requirements

### E-R Diagram (Current)

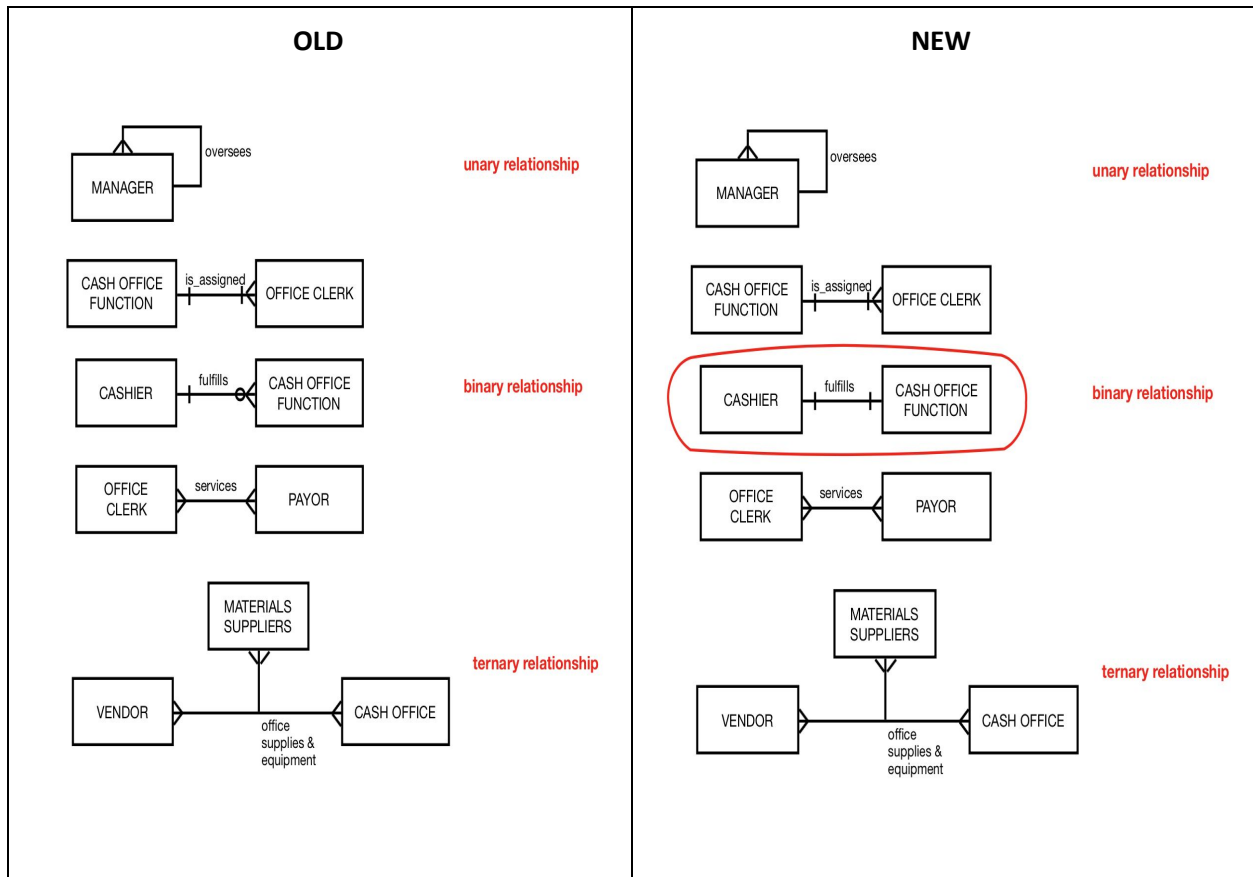


### attributes, candidate keys, identifiers



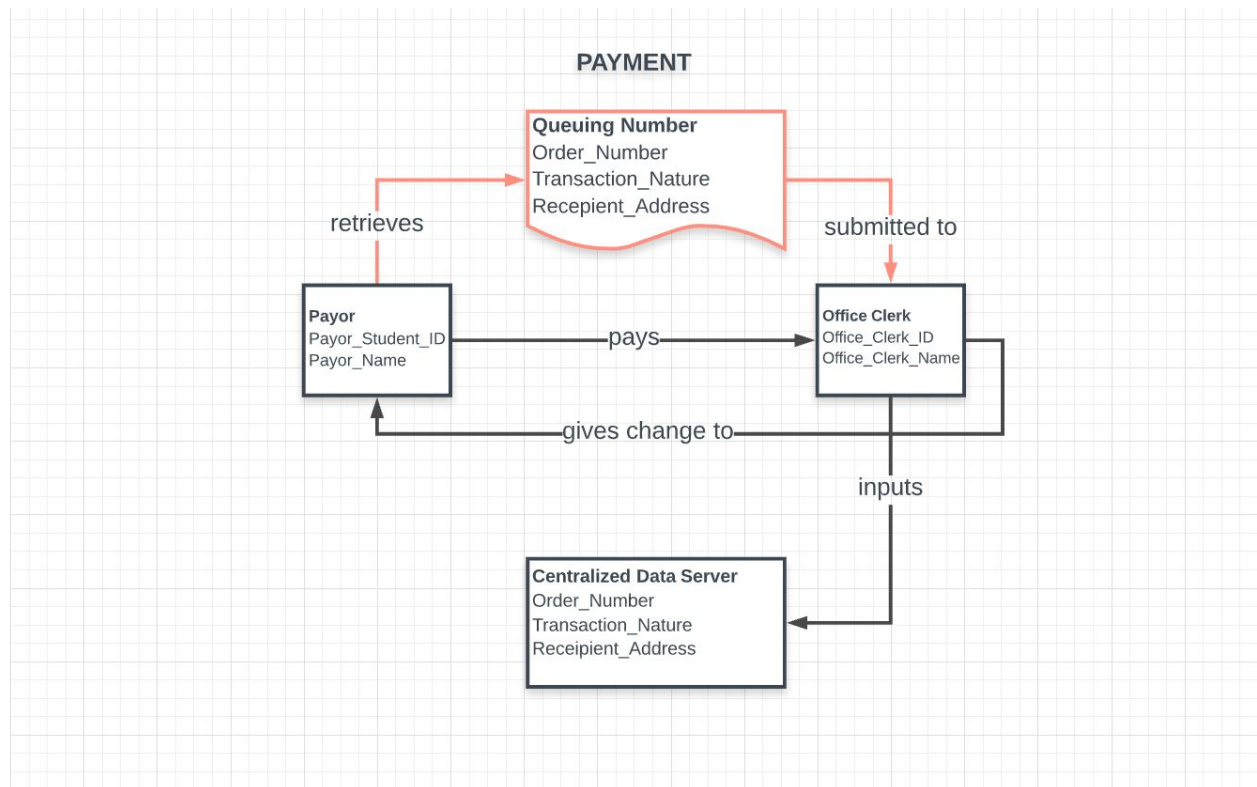


## E-R Diagram (Proposed Improvement)



The main area of focus we wish to improve is that which takes place in the payor's queueing experience, and the process by which payor's are served. In essence, we see this process to be completely automated. Instead of the current system of getting a physical stub with a number on it which hence determines your sequence in the queue to be served, our proposed solution aims to make this more efficient. With an automated queueing & assignment system – similar to that of what large banks use – payor's will firstly input their information in the portal, which would then give out a queue number assignment. The automated process would not only take away the physical confusion of paper stubs, but would also allow the UP Cash Office to more easily store the information of the payor. Instead of filling the paper slip that comes with the usual physical stub, this entire process would be condensed in the portal which would automatically store and categorize the data inputted. Given this improvement, the entity relationship between cashier and cash office function would also become a more efficient one, as the algorithm would automatically assign a payor to a set cashier based on traffic and cashier availability. This is a far improvement from the current system that bases service on which payor arrives first, which officer clerk becomes available for service, and which cashier opens up, assuming it is manned.

## E-R Diagram (Sample Document)



The area highlighted in red is the new process of “automated queuing” that we wanted to introduce as a group. Similar to the systems of various banks in the Philippines (such as BPI), customers will input certain information in the software that would then release a queuing number, to be tracked on a screen in the UP Cash Office. The current system involved the manual calling of payors when a certain office clerk is free, often causing commotion as it’s hard to track who has been in the line before the other therefore by introducing the new system, we remove the potential confusion of queuing, and centralizing the information that is needed by the different colleges for the tracking of their cash collections from payments. Office clerks themselves will also be prepared with the various payment information needed in the transaction that the customer wishes to accomplish.

### III. DESIGN

#### Overview & Rationale of Design

System design is an integral part of the project as this was the phase where the group was able to develop a concrete understanding of how the improved system will operate. We first developed a logical database design that reflects the actual data requirements for the UP Cash Office. Creating a relational database model was also important because users would be able to see data in simple tables with common columns to link related tables. The Cash Office functions were listed down and ranked according to their importance. Apart from that, the group also created a simple table that lists down each student/customer ID, name, and office clerk name and ID for each payment transaction made.

Another step for the new design of the UP Cash Office's system is the representation of E-R diagrams as relations. Creating a table for these relations would make it easier for the users to keep track of each order/transaction they make with their clients. Two goals were also in mind: protection of the system from failures or data loss and security from unauthorized use.

#### Designing Databases

##### Relational Database Model (Sample Data)

##### PAYMENTS

Payor_ID	Payor_Name	Office_Clerk_Name	Office_Clerk_ID
7361	Lance	Jazmine	008
7692	Ryan	Jas	007
8204	Luis	Yu	006

##### CASHIER

Cashier_Number	Window_Assignment
2019	0001
2018	0002
2017	0003

##### CASH OFFICE FUNCTIONS

Function_Type	Function_Importance
Income Collection	High

Disbursements	High
Cash Custodian	Moderate
Short-term Investments	Moderate
Cashiering	High

### Representing E-R Diagram as Relations

#### ORDER

Order Number	Order Date	Promised Date
0059	11/05/2019	11/12/2019
0060	11/02/2019	11/05/2019
0061	11/11/2019	11/18/2019

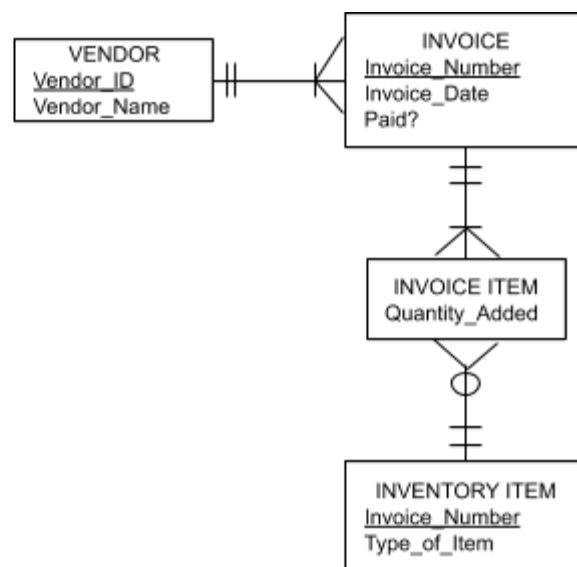
#### ORDER LINE

Order Number	Product_ID	Quantity Ordered
0059	C124	2
0060	D609	3

#### PRODUCT

Product_ID	Description	Room	(Other Attributes)
C124	Projector Equipment	Econ Audi	---
D609	Classroom Venue	BA 107	---

### Relations



VENDOR (Vendor\_ID, Vendor\_Name)  
INVOICE (Invoice\_Number, Invoice\_Date, Paid?)  
INVOICE ITEM (Quantity\_Added)  
INVENTORY ITEM (Invoice\_Number, Type\_of\_Item)

## **Designing Forms, Reports, Interfaces, Dialogues**

### **15 Guidelines**

Our overall goal is to create more efficient forms, reports, interfaces, and dialogues for the UP Cash Office based on the previous system upgrades and database models & relations we have established. Listed below are brief descriptions of how we fulfill the various guidelines for these deliverables, including select exhibits that showcase some of these guidelines in execution.

- 1. Dropdown Menu:** appear on the top of page interface for employees to select what kind of function/transaction they would like to check
- 2. Icons:** icons will be positioned together with the name of the function for the user's quick & easy understanding
- 3. Color:** appropriate colors will be added and categorized by type of function/transaction for easier understanding
- 4. Pop-up Menu:** appears upon selecting a category from the first dropdown menu for more specific activities
- 5. Mixed Upper & Lower Case:** the text is generally composed of lower case letters, except for the first letters of words which are upper case
- 6. Abbreviations:** to be used for readily understood terms (shortened month names, "GWA", etc)
- 7. Highlight:** errors in the system, especially discrepancies or payables in accounts will be highlighted red when appropriate
- 8. Easy Navigation System:** employees can sift through a variety of information collated in the system for whatever needs
- 9. Meaningful Titles:** titles for each exhibits header as well as column and row titles are appropriately, clearly, and uniquely named
- 10. Spacing:** spacing is made between sections, within groups of rows, and the like for readability
- 11. Natural Language Interaction:** results and status of different customer accounts will be reflected in comprehensible English words
- 12. Justification:** textual content is justified left, while numerical values are justified right

**13. Form Interaction:** for new customers, inputting information in creating their profile/account

**14. Balanced Layout:** margins, spacing, font size, and style all follow appropriate hierarchy & highlighting per exhibit

**15. Cookie Crumbs:** trail in tracking different activities of customers and other content in a database

The guidelines detailed above can be used by UP Cash Office to modify their existing system's forms and reports. The Exhibits below are all examples of the different forms and reports UP Cash Office might have if they adopt the system the researchers have proposed in the previous parts of the paper. One can note below the various combinations of guidelines used in order to create ergonomic and easily understandable forms. These guidelines include using Mixed Fonts, Highlighting, Spacing, Meaningful Titles and many more.

**Exhibit A: Data Input Screen (Sample Student Customer Information)**

<b>Customer Information</b>		Nov 11 2019
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<b>CUSTOMER INFORMATION</b>	
Customer Student Number	2014-12345
Name	James White
Course	BS Psychology
Age	20
GWA	1.27

**Exhibit B: Student Customer Form (School Year Annualized)**

UP Cash Office				Page:	2 of 2
Detail Customer Account Information				Date:	12-Nov-19
	Student Number:	2015-24759			
<b>DATE</b>	<b>TRANSACTION</b>	<b>PURCHASE</b>	<b>PAYMENT</b>	<b>BALANCE</b>	
12-Aug-19	Tuition payment		22,500	22,500	
26-Aug-19	Venue reservation		500	23,000	
02-Oct-19	ID payment		175	23,175	
16-Oct-19	Graduation fee		300	23,475	
16-Oct-19	TCG payment		30	23,505	
16-Oct-19	Dormitory fee		3,000	26,505	
	Summary		26,505	26,505	

### Exhibit C: Help Screen (Sample Student Customer Information)

<b>Help Information</b>	- Reviewing Student Account Status
The intent of this screen is to retrieve student account status information. Information related to tuition payments, student fees, and total balances is provided.	
<b>Field Descriptions:</b>	
1. Student Number	UP assigned student number
2. Transaction	shows all transactions made by the student
3. Purchases	shows all purchases made by the student
4. Balance	current account balance
5. Payment	all individual payments of each transaction
6. Summary	ending balance
<b>Description of Account Status:</b>	
1. Active	in good standing
2. Closed	no longer a student, LOA, must re-enroll in the next school year
3. New	in good standing but a freshman student
4. Voided	not in good standing
<b>Special Function Keys:</b>	
F1 = Help (Displays this screen)	
F2 = Account Details	
F9 = Print (Prints Student Customer Form)	
F10 = Return (returns to prior screen)	

### Exhibit D: Form Interaction (For New Non-Student Customers)

USER DATABASE

Full Name	<input type="text"/>		
Address	<input type="text"/>		
Occupation	<input type="text"/>		
Birthdate	<input type="text" value="mm/dd/yyyy"/>	Age	<input type="text"/>
Sex	<input type="text"/>		
Purpose	<input type="text"/>		
Mode of Payment	<div>Cash <input type="checkbox"/> Bank Deposit / Online Transfer <input type="checkbox"/> Cheque <input type="checkbox"/></div>		