Team Members: Mohsin Raheem, Tajbir Singh, Enes Sert, Rana Khizar, Savraj

Dhaliwal

Sponsoring Organization: Off Campus Student Services (OCSS)

System Name: UMBC Gold Card

Group 3

IS 436, 1195

Executive Summary

The following is a proposal for a Senior Analysis and Design Project consisting of the upgrade of the current Commuter Gold Card registration system for data extraction and easy registration. The Off-Campus Student Services currently has no way to look at commuter student demographic data or commuter involvement on campus other than at their own events. Our goal is to allow Off Campus Student Services to view the commuter populations demographic data, have information available at will for better OCSS event planning and allow students to register online for an easier seamless Gold Card Registration process.

The project involves both hardware and software development. In hardware development we will build a new scannable gold card and have on site scanning at each participating business. The software will enable the ability to record gold card usage each time a discount is redeemed. This allows the OCSS to view how often students eat on campus versus going off campus or going home. In addition, there will be a new and improved registration system of the gold card that allows commuters to sign up at the Registrar's office upon registering for UMBC. This will allow data from the Registrar's office to go into user data storage. Upon UMBC registration, students enter all their demographic data, having the gold card linked with that process provides OCSS more accurate information about who exactly the commuters are at UMBC. By knowing who your commuters are and common trends about them we can better program events around that for increased attendance and involvement.

Thorough planning and brainstorming with my team and the Off-Campus Student Services director Dr. Antonio Silas was put into this proposal. Using their expertise and our current knowledge of life as commuters we were able to identify realistic approaches to this problem. Our team consisting of four commuters decided that there needs to be something seamless and enticing offered to increase data availability and student involvement, food discounts and easy access registration. In conclusion, this solution could lead future projects involving more extensive planning, as well an increased budget. This gold card platform will be an excellent testing platform utilizing relevant data to see what the commuter student population mainly consists of then going even further by seeing who the most active commuters are by viewing the gold card usage data.

D1: Systems Request

Commuter Gold Card Implementation and Data Extraction

Team Name: Team 3
Project Sponsor: Off Campus Student Services (OCSS)
Dr. Antonio Silas: Director
Vladimir Rodriguez, OCSS Assistant Director

Problem Statement: The Off Campus Student Services is currently not effective at promoting the services and events they provide for the UMBC students. They do have access to students' information such as race, age, address, and whether they are commuter; however, there is no system for them to track the statistics of this valuable information. This causes the OCSS to experience lack of student participation as well less Gold Card holders for the students to attend their events. Providing advertisement ideas, building a system to combine Gold Card with Red Card details, and organizing events and programs that specific to students' interests would increase the participation and involvement with OCSS.

Business Need: This project has been initiated to extract relevant data and increase commuter participation at on campus restaurants/events and several restaurants in the area with the use of the UMBC gold card for logging the data.

● Commuters have many different options to spend free time, plenty of events on campus to attend, and different places to eat at.
● We need to advertise and upgrade our gold card, so it has more functionality(scanning) and is more popular among students.
● Maximize participation for events and programs
● There are different types of student categories, which the OCSS consider when organizing events such as veteran, adult learner, commuter, first time first term student, and/or transfer student. We need to take these into consideration in the analysis.

Business Requirement:
The business requirement of this task is to determine better activities and opportunities for commuters, transfer students, veteran students, and adult learners while categorizing these students based off the data. Categorizations of race, age, and population of each group.

By using our commuter gold card students will have exclusive discounts to restaurants, free breakfast every Tuesday mornings. OCSS will also gain data that the can analyze every time a student signs up and uses the gold card. The specific functionality the gold card should have are the following:

● Scan at participating restaurants
● Show what category type student is
● Which location and what time it is used
● How often it is used

- Determine favorite places

Business value: We expect that the commuter gold card will increase commuter engagement and allow for students to save money with the restaurants that have partnered with us to increase sales. Overtime this will create a pool of data for us to see where commuters eat the most, what their demographic info is, and allow OCSS to gain credibility in the community for future business partnerships (ex. chick fil a, Starbucks). The data will also provide value to the OCSS department when they start programming to create events by allowing them to see the actual demographic of the commuter population. (Transfers, Veterans, Adult Learners, etc.).

Constraints: The constraints for this task is technical implementation and budget for overall expenses ($3,000). The budget that the OCSS is considering using for the project will come from operating expenses.

Team Members:

Enes Sert
Tel: (202) 550-4280.
E-mail: mser1@umbc.edu
Biography: Enes has been working as an analyst for about a year. He does not have systems analysis experience, but he is involved with data and business analysis.
Role: Enes' role in the team is, data modeling and documenting, and D1

Savraj (Sav) Dhaliwal
Tel: (202) 870-0117
Email: Dh12@umbc.edu
Bio: Sav has experience as a business analyst consulting for biz merlin to provide HR software solutions. I have been a student for 4 years where I have gained experience working in fast pace group settings.
Role: Sav will be working as the team lead and the main communicator for this project.

Tajbir Singh
Tel: 240-755-4994
Email: Tajbir1@umbc.edu
Bio: Tajbir has had some internship experience in working with groups to work on both govt. and private projects with major deadlines.
Role: Taj will be leading D2 in this capstone project.

Mohsin Raheem
Tel: (240)-217-2690
Email: mraheemm1@umbc.edu
Bio: Mohsin has some systems analysis experience while working within a group environment for a year long project (PLTW) in high school.
Role: Mohsin will be the team lead for deliverable 3 in this capstone project.

Rana Khizar
Tel: (240)-837-3155
Email: rkhizar1@umbc.edu
Bio: Rana has some data and system analysis experience while working at TATA consultancy services.
Role: Rana will be a D5 lead in this capstone project. He will be working on User interface, Physical Process & Data Models.

4. Time set aside to meet outside of class.

Team meetings will take place on Thursdays between 3:00 and 4:00pm.

D2: Requirements Definition & Use Cases
Section 1
Project requirements are listed below, this includes the functional and non functional requirements.

Functional Requirements (Use Cases):
1.   The system shall allow students personal data to be collected from UMBC Gold Card users with the use of a bar code.
2. The system shall allow the students personal data to be viewed and analyzed from Off Campus Student Services personnel via their organizations database to understand usage trends of cardholders. (Information Oriented and Process oriented)
3.   The system shall allow managers to view the current gold card population of commuters and their usage. (Process Oriented)
4.   The system shall record the addition of new gold card users to the database as the registrar records the users personal data and usage of the card. (Process Oriented)
5.   The system shall allow UMBC Gold Card users to view their account and the points available to be redeemed. (Process Oriented)
6.   The system shall send UMBC Gold Card users a notification when they have sufficient amount of points to be redeemed for a reward. (Process Oriented)
7.   The system shall record the transaction information when the user swipes the card.

Non-Functional Requirements:
1.   The system shall run on Android and Apple devices. (Operational)
2.   The system shall record a student claiming a discount by using the Gold card. (Performance)
3.   The system shall be compatible with any Web browser. (Operational)
4.   The gold card shall have a barcode for swipe functionality at restaurants. (Operational)
5.   The system shall create a record of where the user used the card and how much discount was applied. (Operational)

Section 1A
Interview information used to gather the requirements are presented below. We conducted an interview in OCSS and provided the details that we gathered in the interview and the transcripts that were recorded.

Interview Notes Approved by: Antonio Silas and Vladimir Rodriguez
Person (s) Interviewed: Dr. Antonio Silas, OCSS Director.
In addition, the first person we previously interviewed, Vladimir Rodriguez, joined the second interview to listen our conversation with Dr. Silas.
Interviewer: Sav Dhaliwal, Enes Sert, Mohsin Raheem, Tajbir Singh, Rana Khizar
Purpose of Interview:
   ● To understand current issues with the existing system

- To figure out methods to improve the commuter gold card system
- Come to a consensus on a final solution

Summary of Interview:

1. The current system does not allow the organization to extract user data (demographics, sex, age, etc) when consumers use the card
2. Brainstorm ideas with the organization to come up with possible solutions. Potential solutions include manual entry of user data by the organization, and a QR code system.
3. The consensus solution was to implement a QR code system on to the gold card and a mobile device. This system will be similar to other systems such as the UMBC red cards and ticketing process.

Open Items:

- Get budget information/ constraints
- Schedule follow up interview with Antonio Silas regarding implementation process

Section 1B

Interview Questions/Transcript:

Includes our observation notes that we took as we studied their requirements and what processes have to be in effect to make the system work. Our observation notes are listed below.

· They already have the data for student statistics provided by red card, but there is no connection/relation between red card and gold card. If the information gold card provides could merge with red card, we could get better results.

· They have no way of tracking the information about what group of students visit which business vendor that is listed on gold card, and the usage statistics of it is missing as well.

· Their objective is to know who they we hitting and who they are not hitting in terms of student groups.

· Can we come up with a process for them to sell gold cards digitally?

o Currently they are offered only at the events that take place

· They also have a new idea of housing for long-distance commuters or freshman students that want to move to a closer place to the campus. How can we go with this?

Section 1C

Includes documents and forms used for document analysis. We had a physical Gold Card to take a look at and performed our analysis to see how we can make it more efficient and convenient for the user. The current gold card looks outdated as it only shows the vendors and the possible discounts. New card will be much more modernized with either a QR code or a barcode similar to the red card. This will allow the organization to extract necessary data.

The current gold card has a layout of all the restaurants on campus and in the local area that offer discounts to gold card users. The redesign of this card will have the layout of all the restaurants that offer discounts, and a QR which will be scanned by each restaurant. The process of scanning each card allows The office of commuter services to track when a user is

using the card, where they are using it, and their personal information. Additionally, it will allow companies to keep track of how often users use the card and when they use it to allow them to forecast their sales.

Fig 1.1 Gold Card

Section 2

We performed three use case analysis and provided them below. Our use cases include: Student data extraction of cardholders, recording new gold card members personal data, and an incentive program to encourage gold card use.

Use Cases:

ID: UC-1 **Priority:** High	
Use Case Name: Extract Data [CC1] student identification and demographic information from UMBC Gold Card User **Actor:** OCSS Management	
Description: This use case describes how OCSS management can view and extract student data (collected from UMBC Gold Card users.	
Trigger: OCSS wants to gain information about student data to help them with their programs and events. **Type:** þExternal oTemporal	
Preconditions: 1. OCSS management user is authenticated. 2. Student Gold Card data store available on-line.	

Information for Steps:
Management ID

Access Granted
Account Details

Management ID

Research

Normal Course:
1. Management user logs into database with their credentials.
2. Management user gets access to database
3. Management user gets to view student data such as point totals, identification, and demographic information.
4. Management user extracts the necessary student specifics such as point totals , identification, and demographic information.
5. Management analyzes what they extracted to further their research on how they can improve their programs.

Post conditions:
1. Management logs out of database

Management IDManagement ID	OCSS ManagementOCSS Management	ResearchStudent personal details and demographic information [CC2] extracted	OCSS Management

Summary:

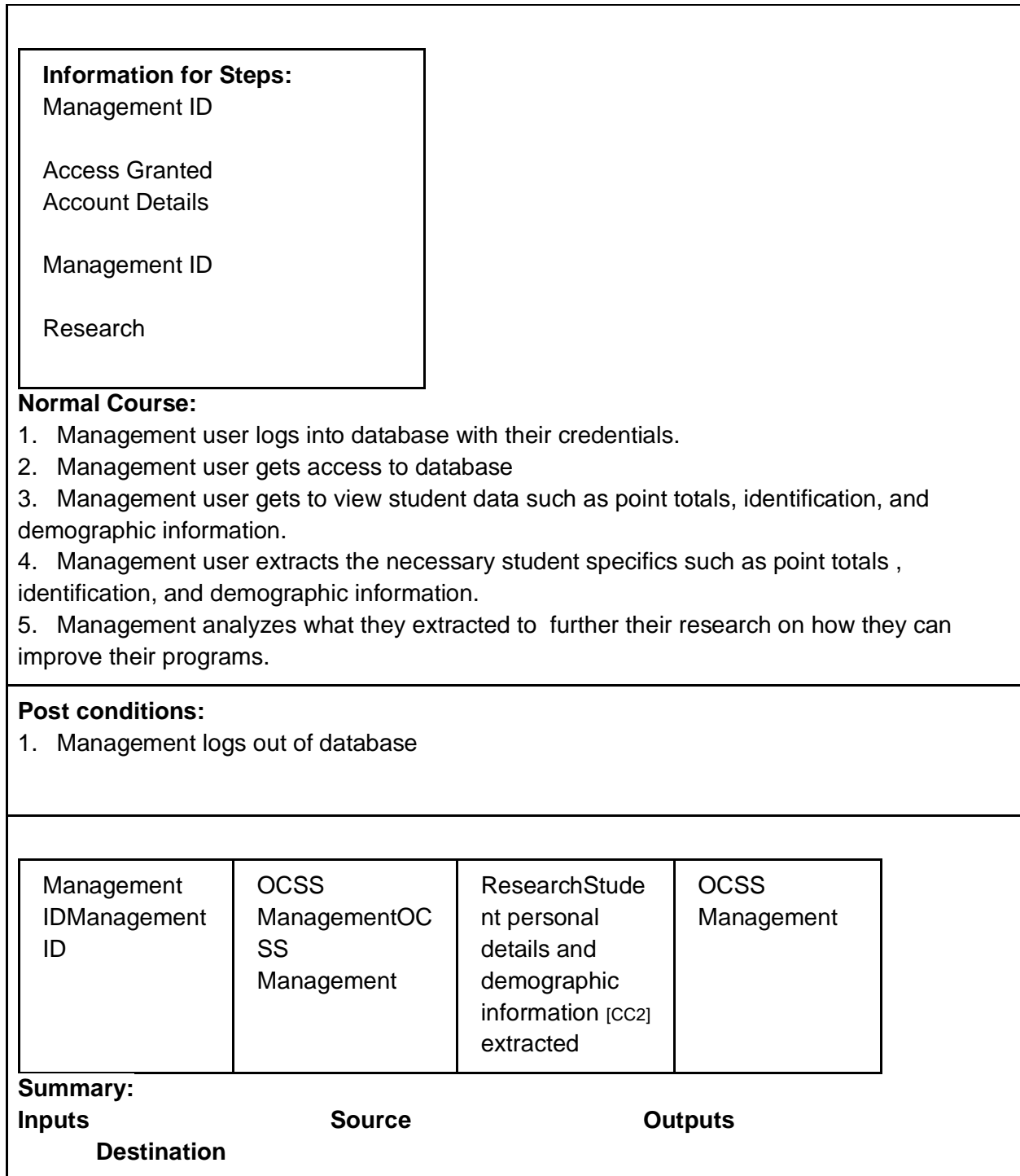| Inputs	Source	Outputs	Destination

Fig 2.1 Use case 1

ID: UC-2
Priority: High

Use Case Name: Record New UMBC Gold Card User
Actor: Registrar office

Description: When a student acquires a UMBC Gold Card, they are added on to a online database.

Trigger: Student wants to purchase a UMBC Gold Card

Type✓External oTemporal

Preconditions:
1. Buyer must be a UMBC student.
2. Student Gold Card data store available online.

Information for Steps:
Registrar ID
Database Updated
 Uploaded to Online Database
Information Stored

Normal Course:
1. Registrar logs into database with ID
2. Registrar uploads Student details in to the database system; including but not limited to: age/race/veteran status/commuter status.
3. Log gets updated on to online database.
4. Information is safely stored online.

Post Condition:
       1.

Registrar ID	Student	Student Row Created	Registrar's office

Summary

Inputs	Source	Outputs	Destination

Fig 2.2 Use case 2

ID: UC-3
Priority: High

Use Case Name: Checking Student Gold Card Usage
Actor: OCSS Management

Description: The usage activity (amount of times the gold card has been used, when it has been used, where it has been used) of a student's gold card can be seen by ocss management.

Trigger: OCSS management user wants to check activity of a Gold Card
Type: þExternal oTemporal

Preconditions:
1. Student Gold Card data store available online.

Information for Steps:
Management ID
Access Granted
Student activity
Log out

Normal Course:
1. OCSS management user logs in to database with credentials
2. Access granted to OCSS Management User
3. OCSS management user can observe student activity by a specific student or by filters (such as by university year, age, race).

Post condition:
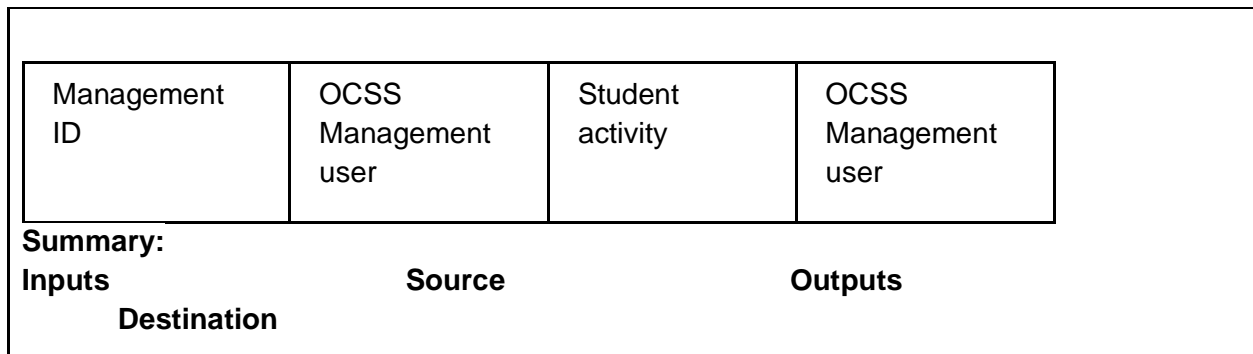1. OCSS Management user logs out of database.

Management ID	OCSS Management user	Student activity	OCSS Management user

Summary:

Inputs	Source	Outputs	Destination

Fig 2.3 Use case 3

D3: Process Modeling Document

Section 1: Diagrams

This section will consist of the various diagrams needed regarding our project. Included in this is the context diagram, Level 0 diagram, and Level 1 child diagrams. These diagrams depict how information and process flows regarding our Gold Card registration system. The context diagram shows a broader view while level 0 gets more specific and ultimately the level 1 child diagram gives a better understanding regarding the processes from the level 0 diagrams.
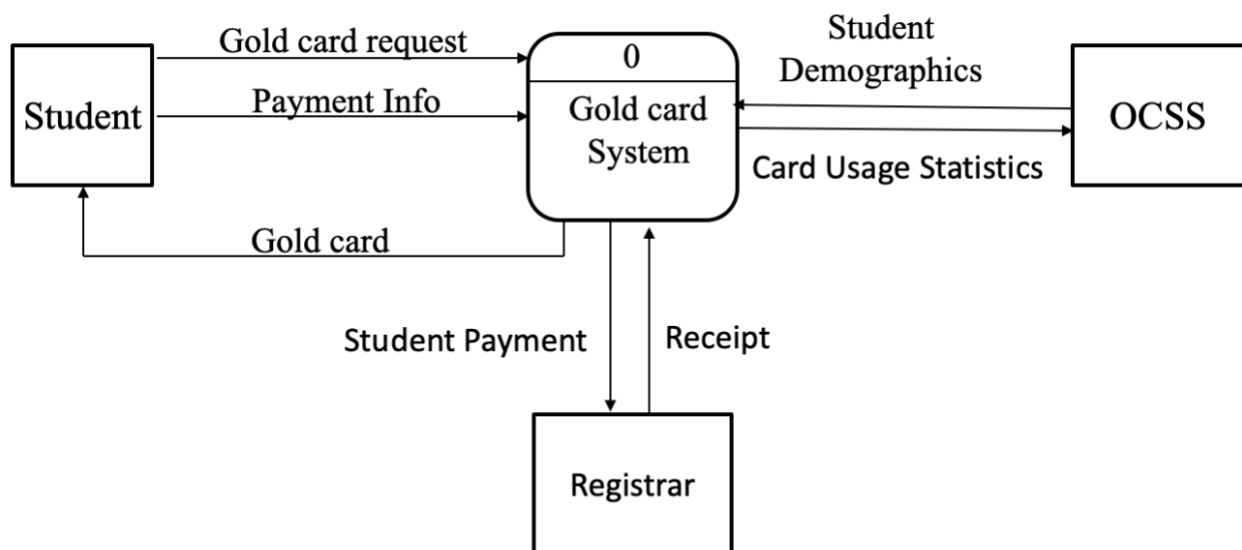
Context Diagram of Gold Card Registration System:

Fig 1.1 Context Diagram

Level 0 Diagram of Gold Card registration System:

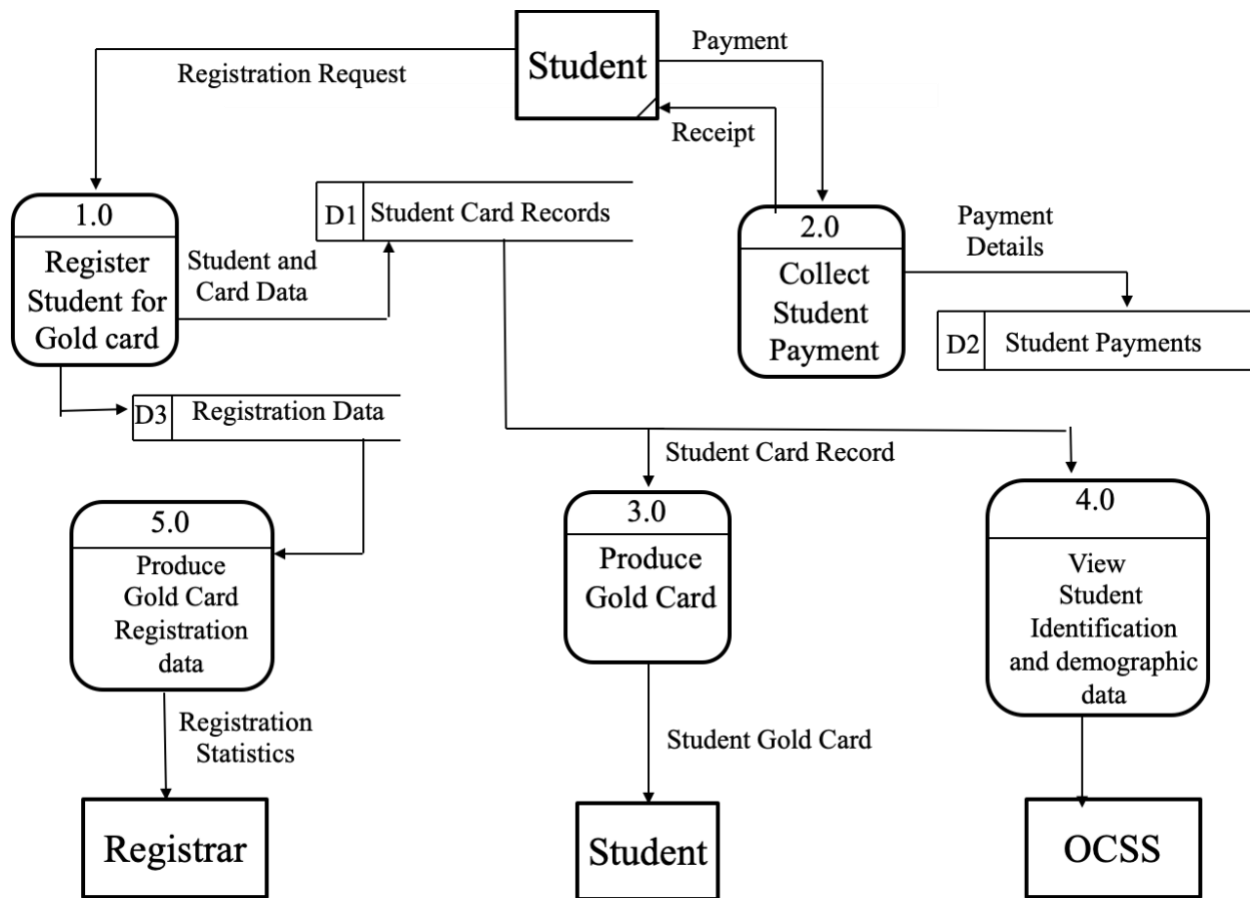Fig 1.2 Level 0 Diagram
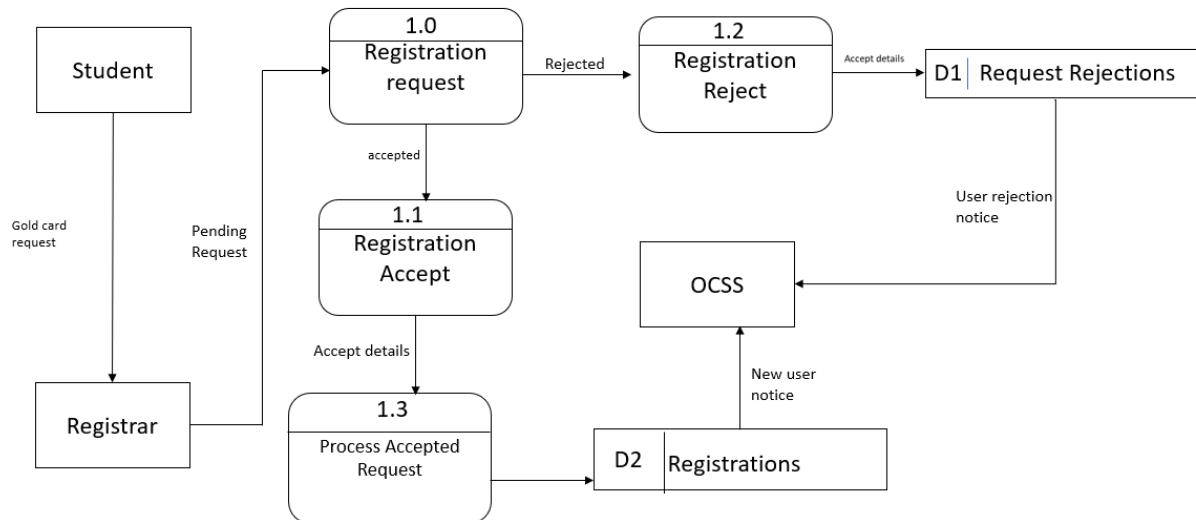
Child Diagrams

1.0: Register student for Gold Card:
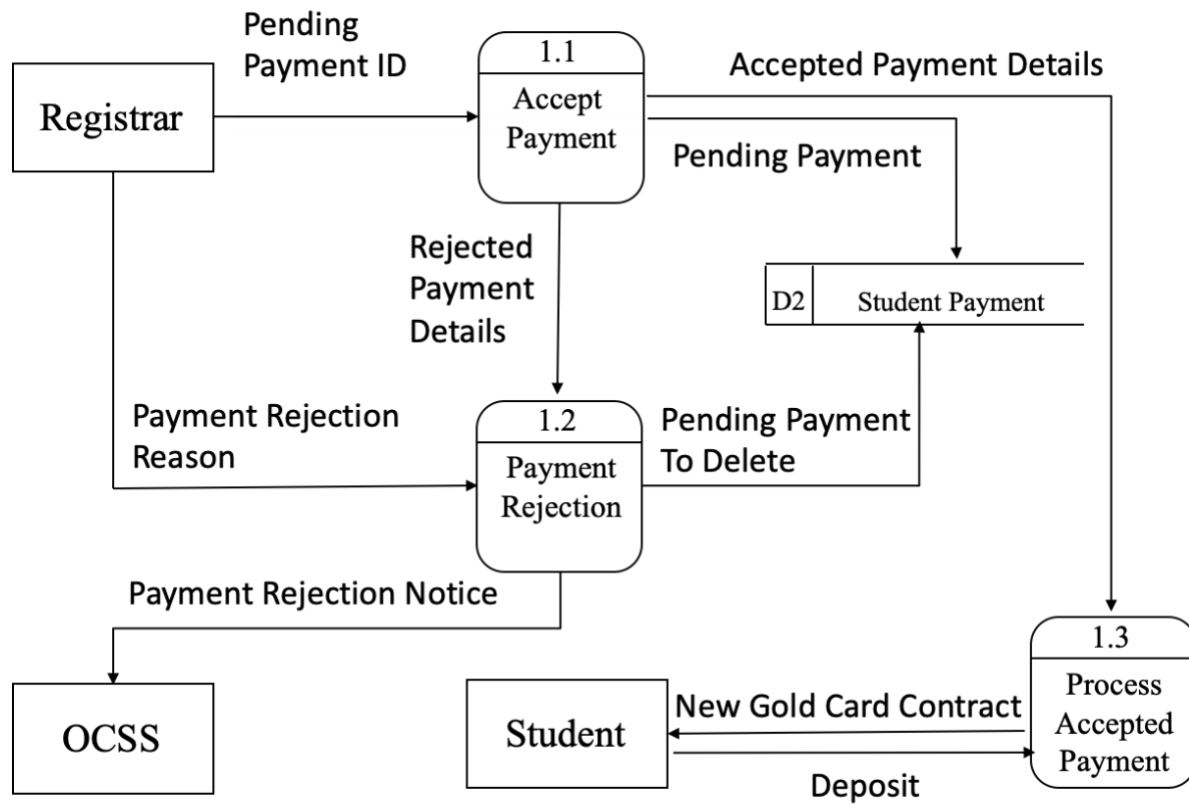

FIG 1.3 Chilid 1 Diagram

Child 2

Fig 1.4 Chilid 2 Diagram
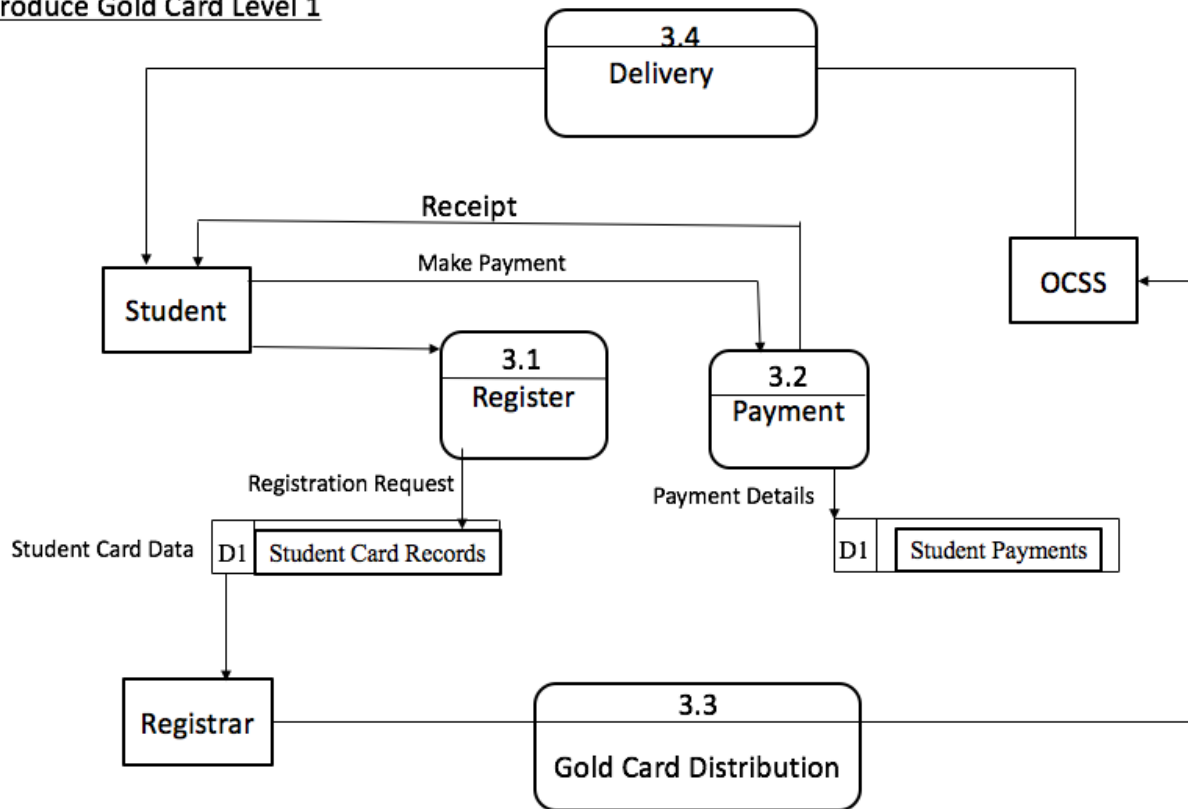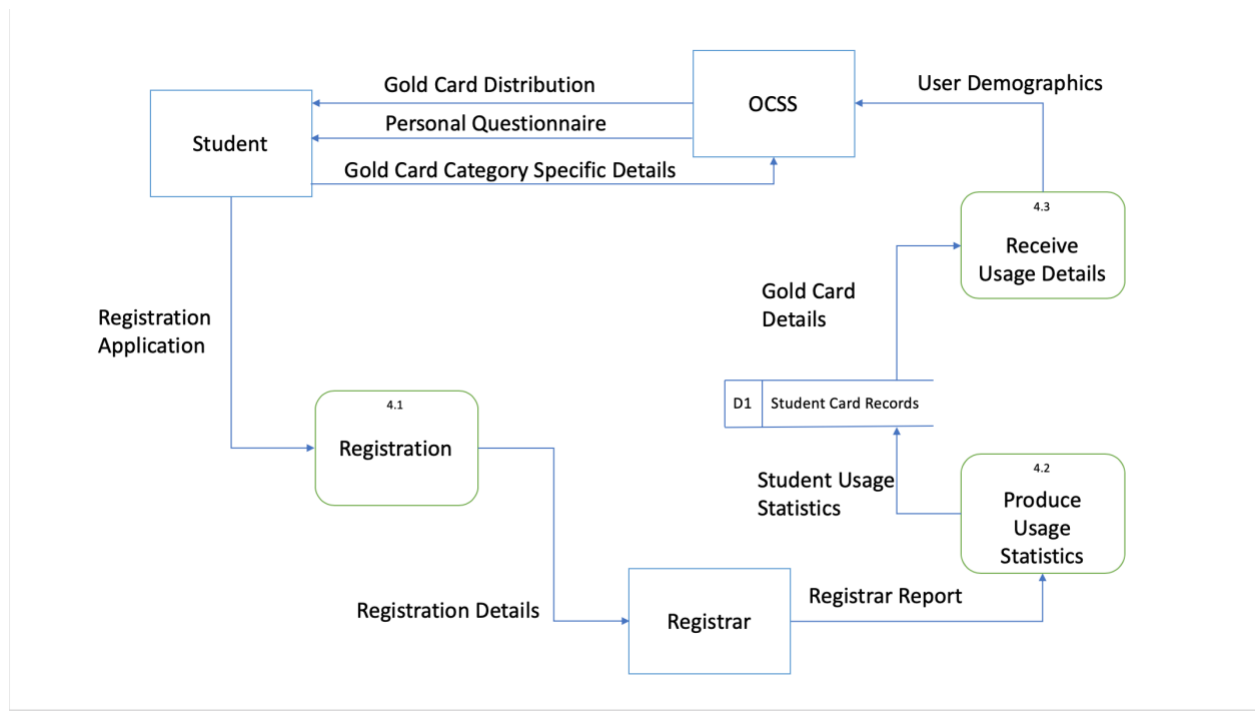
Produce Gold Card Level 1

```
                                    ┌─────────────────┐
                                    │      3.4        │
                                    │   Delivery      │
                                    └─────────────────┘

                              Receipt

                              Make Payment
        ┌──────────┐                           ┌──────────┐
        │          │                           │   OCSS   │
        │ Student  │                           └──────────┘
        └──────────┘
                    ┌──────────┐   ┌──────────┐
                    │   3.1    │   │   3.2    │
                    │ Register │   │ Payment  │
                    └──────────┘   └──────────┘

                  Registration Request        Payment Details

  Student Card Data  │D1│ Student Card Records    │D1│ Student Payments

        ┌──────────┐           ┌─────────────────────┐
        │ Registrar│           │        3.3          │
        └──────────┘           │ Gold Card Distribution │
                               └─────────────────────┘
```

Child Diagram #4

Child Diagram #5

Fig 1.4 Chilid 2 Diagram

Gold Card Distribution

Personal Questionnaire

Gold Card Category Specific Details

Student
6.1

OCSS
6.3

Registration
Application

Student Card Data

Register
6.2

D1 | Student Card Records
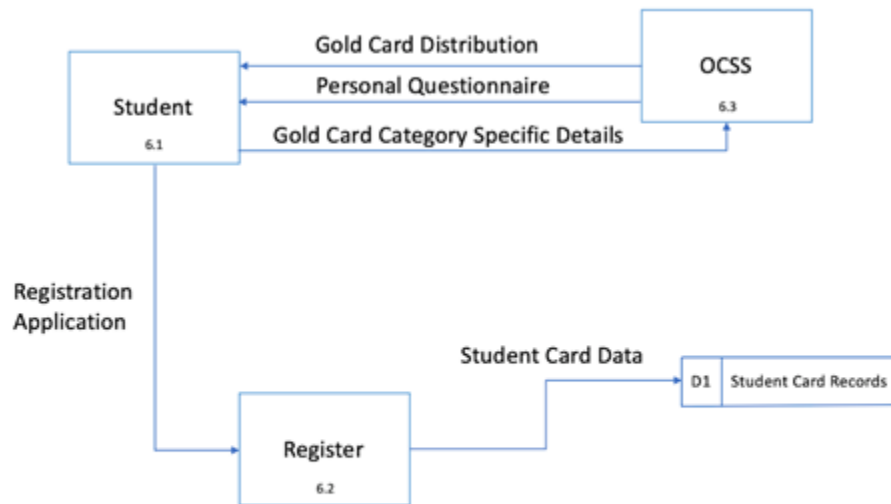
D4 - Data Modeling Document

1: Data Model: Entity-Relationship Diagram:

Payment

PK	p_id
	p_type
FK	s_id
	p_amount
	p_date

Registration Details

PK	rd_id
	s_id
FK	r_type
	s_dob
	s_category

provides

is provided by

registers

is registed by

Student

PK	s_id
	first_name
	last_name
	s_dob
	e_mail
	s_category

makes

is made by

Registrar

PK	r_id
	r_type
	r_date
	r_season
FK	card_id
FK	s_id

OCSS

PK	card_id
	semester
FK	s_id
	event_name
	num_usage
	last_used

registers

is registered by

reports

is reported by

2: Weighted Decision Matrix

Evaluation Criteria	Relative Importance (Weight)	Alternative 1: Scanable Gold Card	Score (1-5)*	Weighted Score	Alternative 2: Digital Gold Card	Score (1-5)*	Weighted Score	Alternative 3: Swipable Gold Card	Score (1-5)*	Weighted Score
Technical Issues:										
Security Risk	15	Involves risk	1	15	Involves risk	3	45	Involves slight risk	2	30
Integration	10	Simple to do	5	50	Requires POS	4	40	Fairly simple	5	50
Product Recovery	15	5-7 business days	3	45	7-10 business days	3	45	3-6 business days	4	60
Economic Issues:										
Cost	15	$2,500	3	45	$3,000	3	45	$2,000	3	45
Labor	5	A few people	1	5	few people	2	10	few people	2	10
New Technology Threat	10	Less likely	1	10	unlikely	2	20	unlikely	1	10
Organizational Issues:										
Process Management	5	Easy to instruct	5	25	Easy	5	25	Simple process	5	25
Communication / Feedback	15	Face to face interaction	3	45	Face to Face	4	60	Face to face	4	60
Customizable	10	Requires replacement	3	30	Requires Upgrades	2	20	Replacement will be needed	4	40
TOTAL	100			270			310			330

Decision:

_____ According to the weighted matrix, the Alternative 3, the swipeable gold card, is the most optimal solution.

3: Alternatives Matrix

Requirements	Server Based	Thin Client Server	Thick Client Server
Operational Requirements			
The System shall run on Android an Apple, Windows and MAC devices	✓	✓	✓
System shall be compatible with any Web browser		✓	✓
Gold card shall have a barcode for swipe functionality			✓

System shall create a record of the customers purchases	✓	✓	✓
Performance Requirement			
System shall record a student claiming a discount for vendor	✓		
System shall be reliable and available all times	✓	✓	✓
Security Requirement			
System shall authenticate user before allowing to enter data		✓	✓

Decision:
We decided to go forth with client based architecture. We need to tailor our program for our clients, which are students. The resources provided will be faster and more reliable. Client computers provide an interface to allow a computer user to request services of the server and to display the results the server returns.

D5: User Interface, Physical Process & Data Models

Section 1:User Interface Design

User Interface Design section includes three commonly used scenarios. It also includes example of interface standard or design principles. Additionally, this section consists of five user interface design prototypes.

1.1 The most commonly occurring 3 use scenarios

Use Scenario: The Deciding Student	Use Scenario: The Quick Student	Use Scenario: The Research Student
User is not sure whether he/she wants to purchase a UMBC Gold Card and looks for guidance.	User knows what he/she wants and prefers to purchase a UMBC Gold Card and leave the place as soon as possible.	User clearly has a decent knowledge of the UMBC Gold Card and still asks many questions to know every detail.
1. User will likely consult with the OCSS advisor about why he/she would want to get a UMBC Gold Card (1.0). 2. After thinking through if the gold card purchase will be beneficial, the user might consider requesting to register (1.0). 3. User will likely discuss the issue with OCSS advisor and the registration will be accepted (1.1). 4. User may change his/her mind and the OCSS might reject the request (1.2).	1. User will likely know what the UMBC Gold Card offers and will want to request to register to move onto next step (1.0). 2. User will explain the reasons he/she wants the gold card for, and OCSS advisor will move forward with acceptation of registration (1.1). 3. Before departing, user may prefer to wait the process to be accepted to be sure he/she is registered successfully (1.3).	1. User might ask about what UMBC Gold Card offers that others do not offer in that time period (1.0). 2. User will have a long conversation with the OCSS advisor about the benefits before proceeding for registration (1.0). 3. User will have his/her registration accepted since there is no more possible question left to address (1.1). 4. User will likely wait for the process to be accepted and leave the OCSS with a confirmation of registration (1.3).

1.2 Interface standards and design principles

The interface standards and design principles that we would take into consideration to increase our user interface consistency include our Template and Icons. These main standards allow us to keep our whole system under the same aesthetic agenda. By having similar icons on every page, the user knows where to click for better system navigation. By using the same template across every page we are able to develop unison with our system interface with a consistent aesthetic.

This also includes our interface elements which are broken up into Input controls, navigational components, and informational components.Input Controls are buttons, text fields, checkfields, radio buttons, dropdown lists, toggles and a date field. Navigational components include breadcrumbs, slider, search field, tags, and icons.Informational Components include tooltips, notifications, message boxes and modal windows.
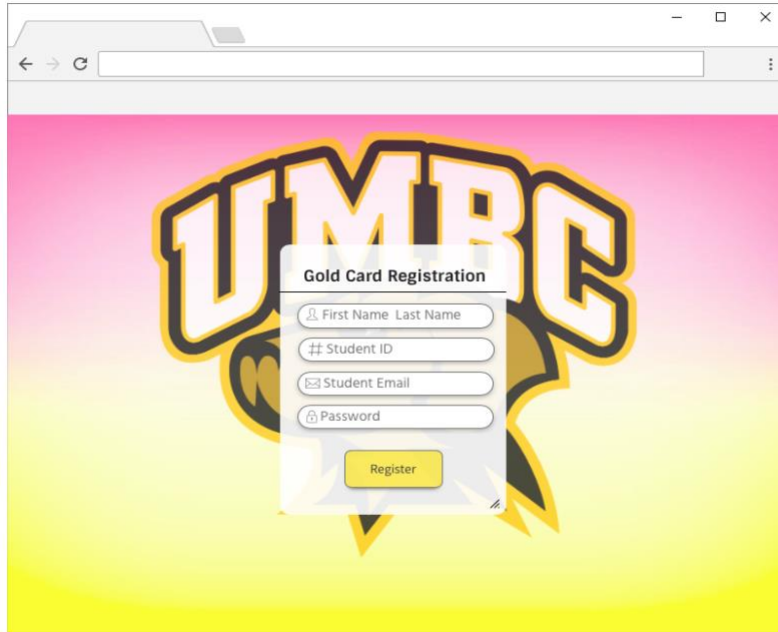
There are basic practices we are following for the interface design.
- Keeping the interface simple
- Creating consistency by using common interface elements.
- Strategically using color
- Using typography to create clarity.
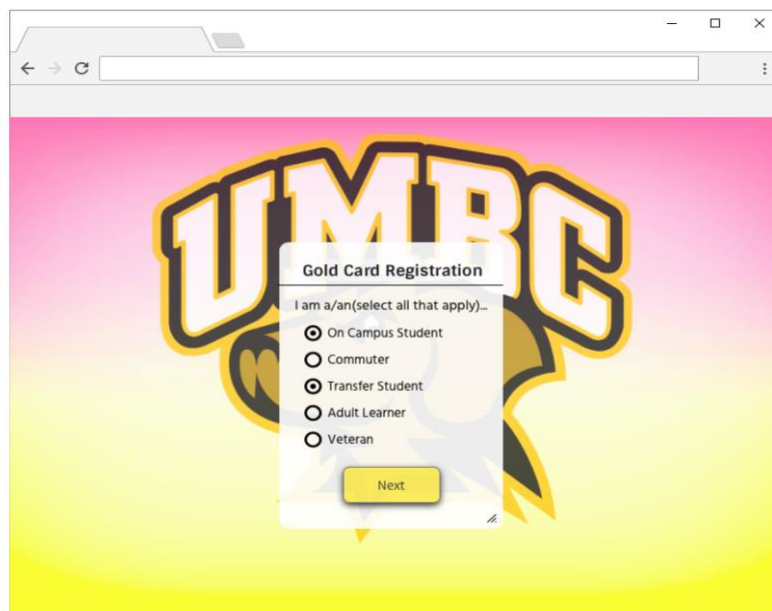- Making sure the system properly communicates with the user.

1.3 Prototypes

Registration form Interface:

In the registration interfaces, the user is prompted to enter his or her information to continue the registration process. Then the user is prompted to select what his/or her status is as a student.

Fig 1.3.1 Registration

Fig 1.3.2 Registration

Cart: The cart page shows the user the price and what they have to pay for.
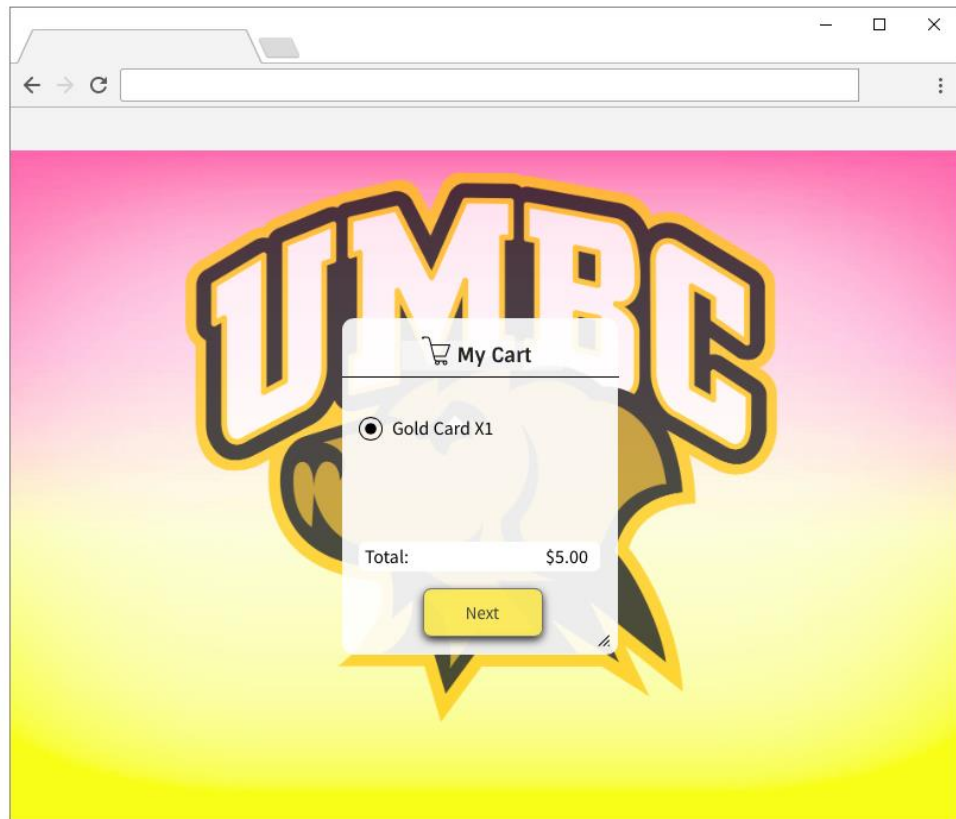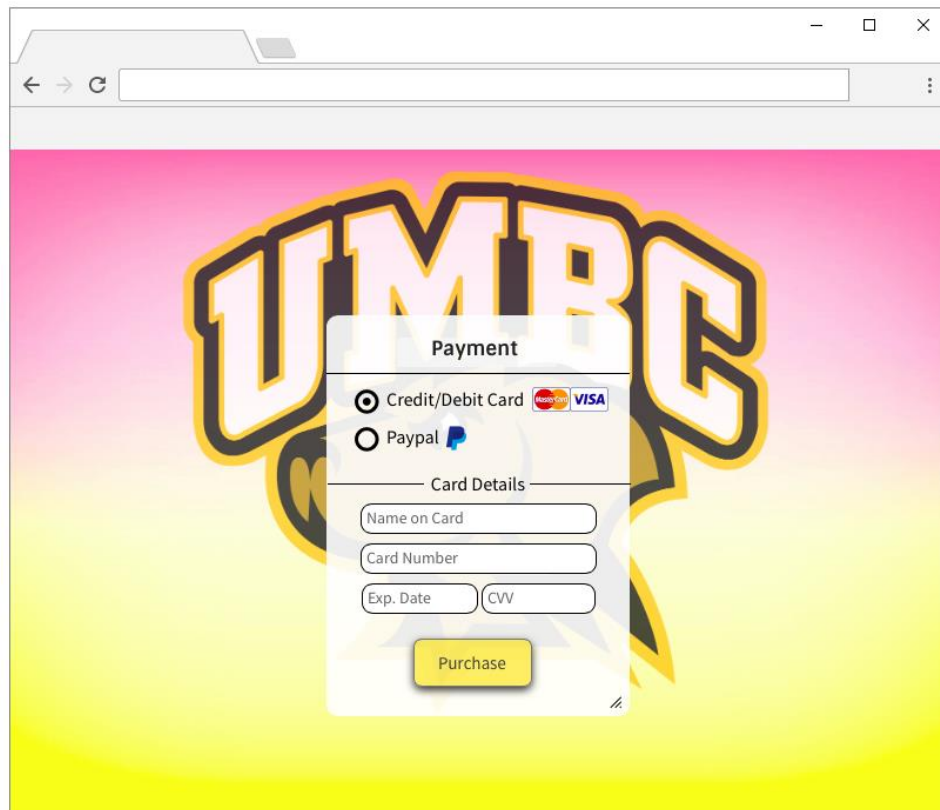
Fig 1.3.3 Cart

Payment : The payment page lets the user enter their payment according to their preference and then the user enters card information to proceed.

Fig 1.3.4

Receipt and Confirmation: User interface page informs the user of confirmation of their purchase, they receive a confirmation number and also get an email sent.
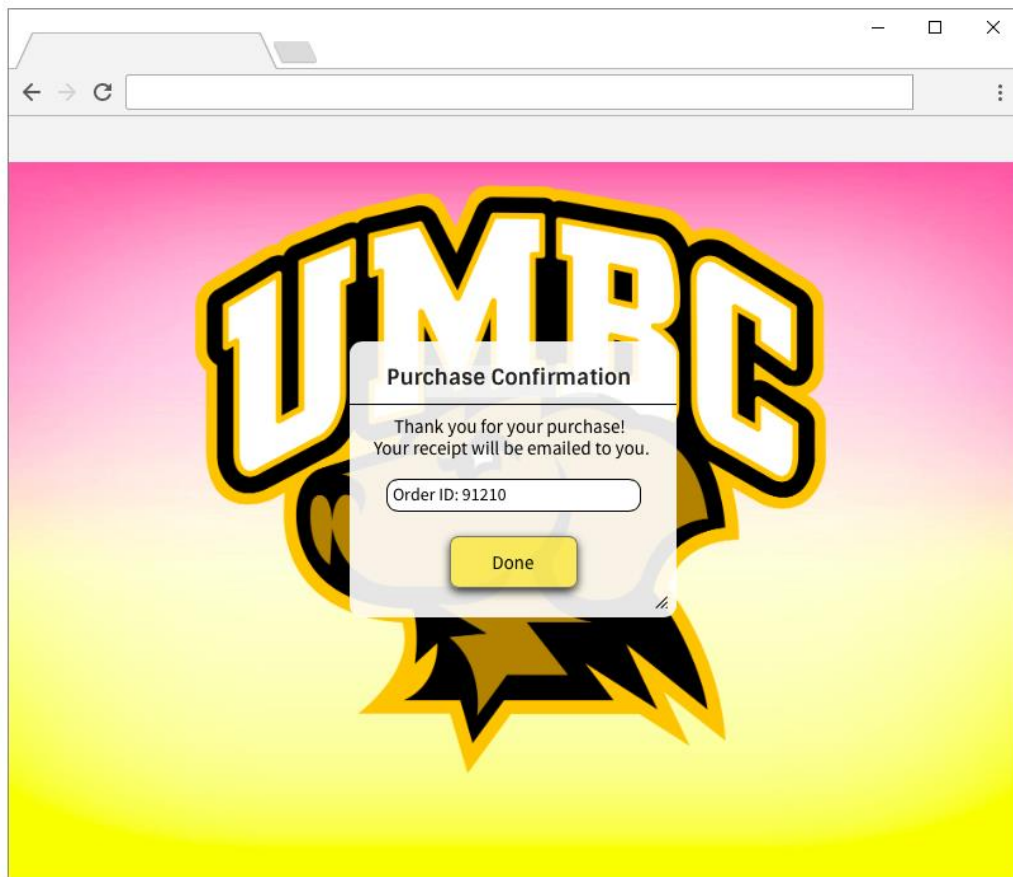

Fig 1.3.5 Confirmation

Section 2: Physical Process Model

This section includes the level 0 diagram and the physical level 0 diagram
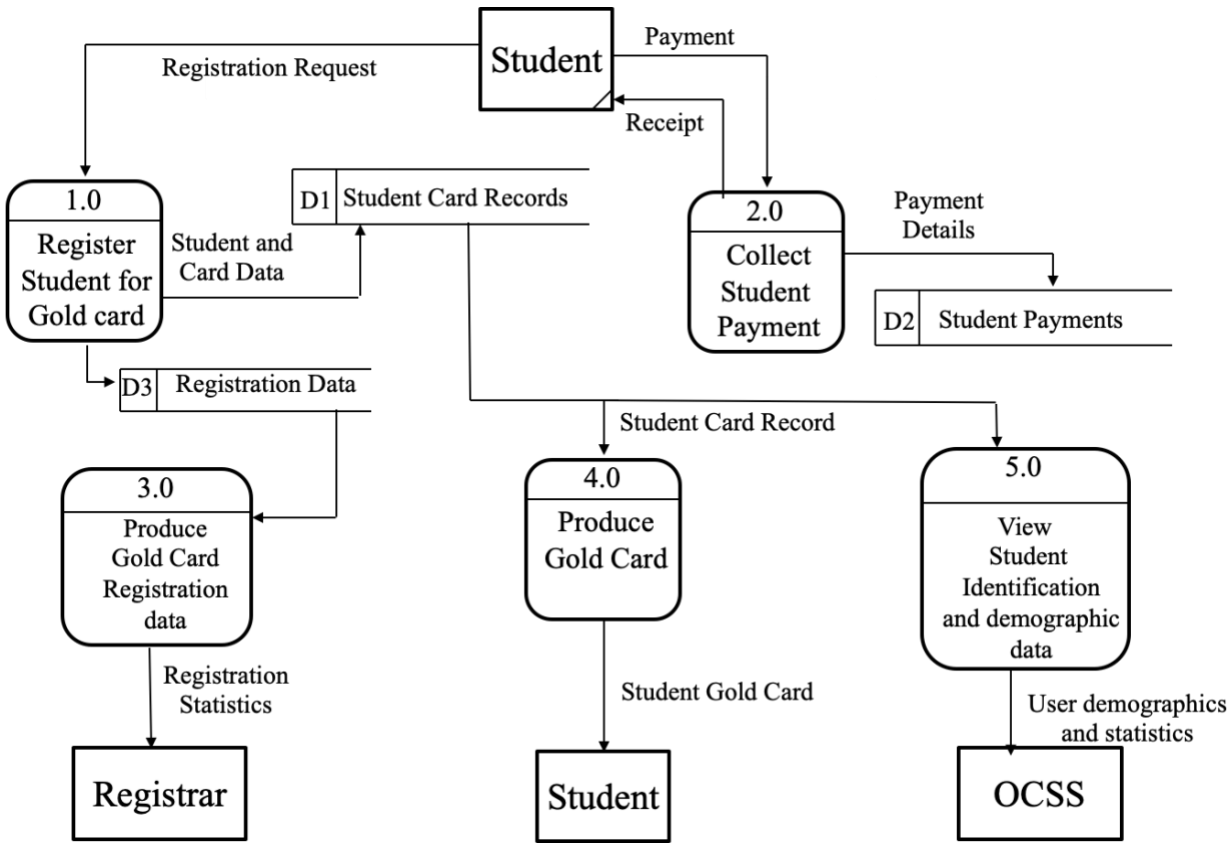
Level 0 Diagram
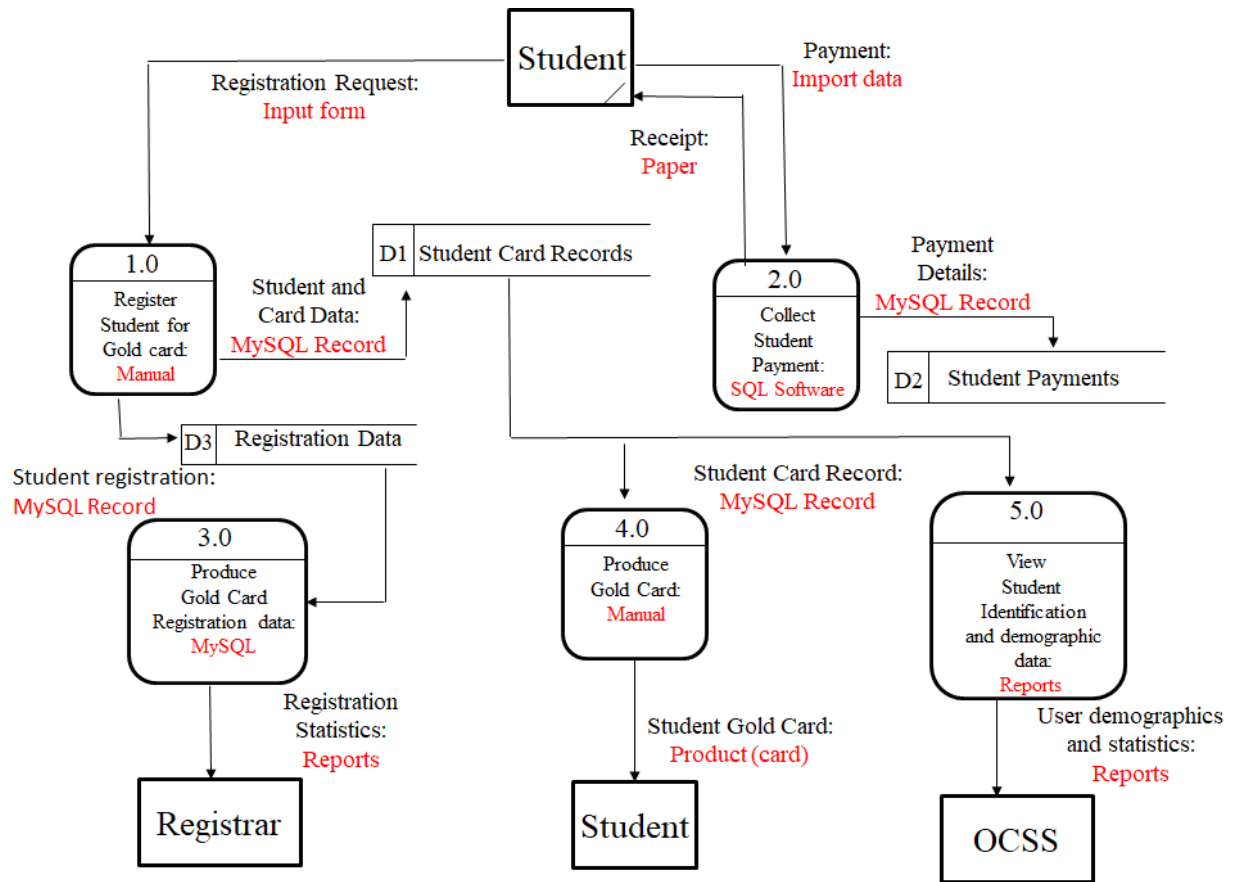

Fig 2.1 Level 0

Level 0 Physical Diagram

Fig 2.2 Physical diagram

Section 3: Physical Data Models

In this section, the ERD is converted to a physical ERD which includes attributes types and length.
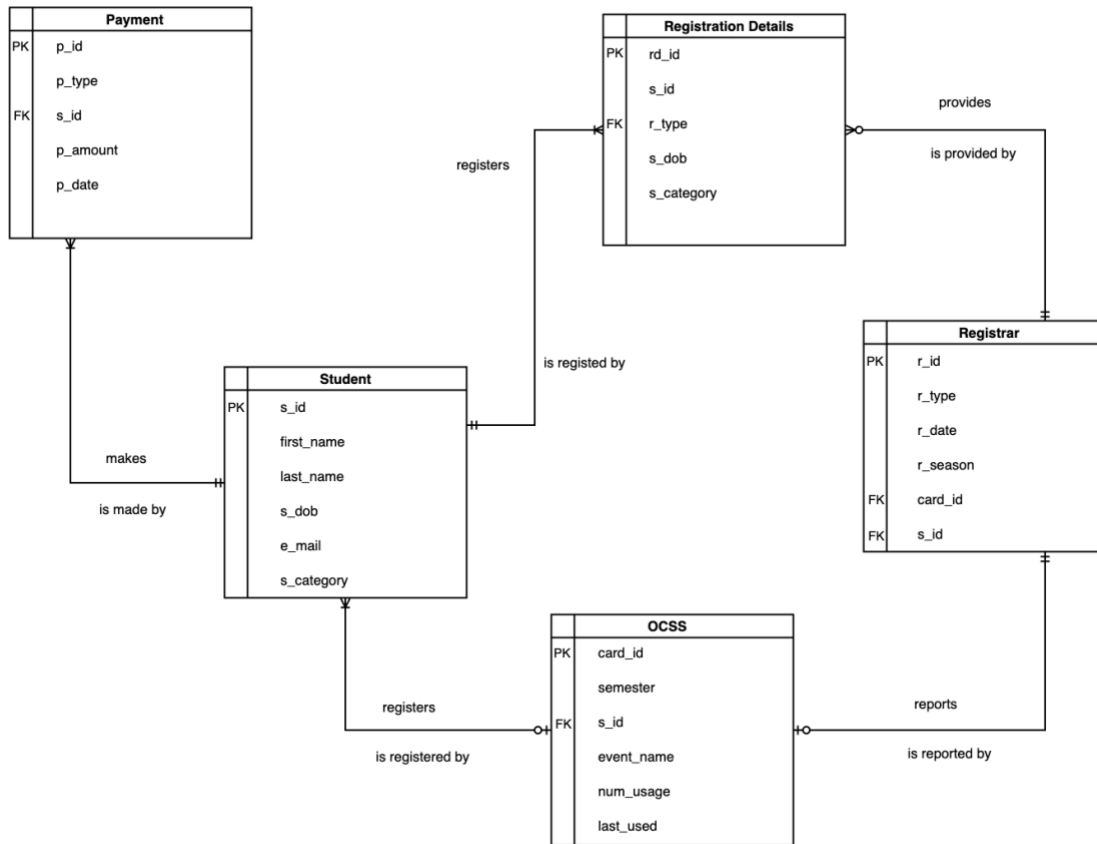
Entity-Relationship Diagram
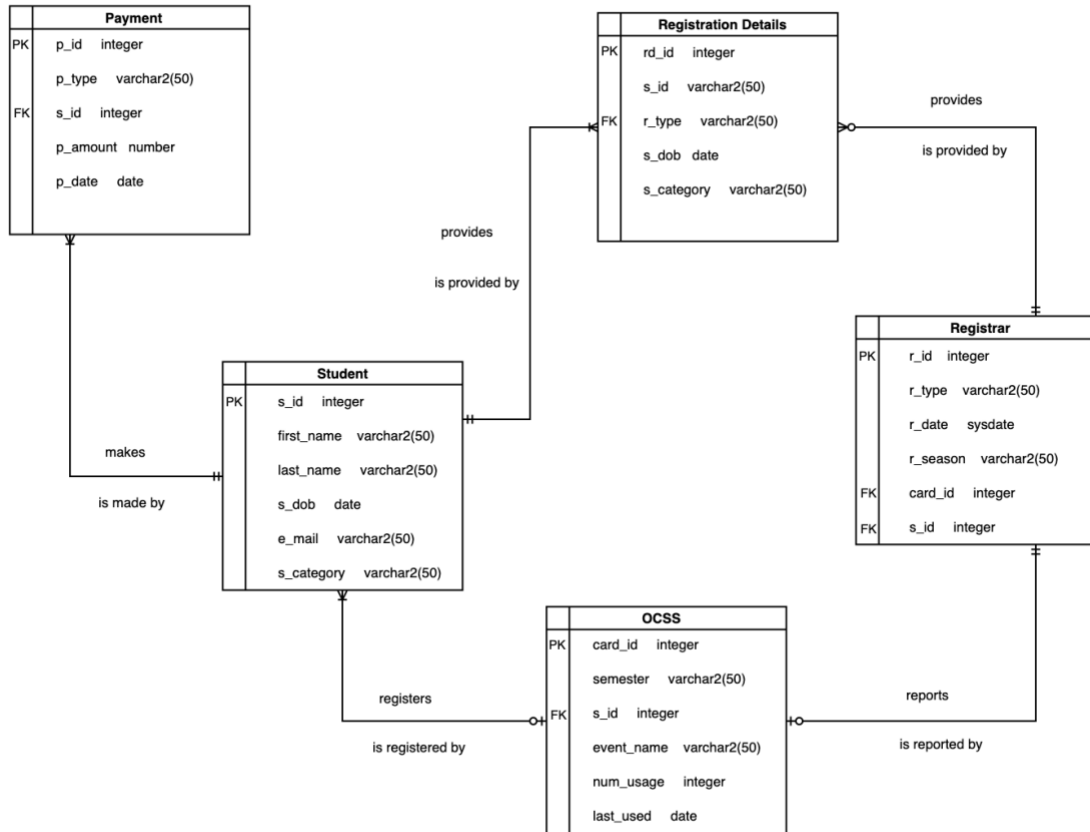

Fig 3.1 ER

Physical Entity-Relationship Diagram

Payment

PK	p_id	integer
	p_type	varchar2(50)
FK	s_id	integer
	p_amount	number
	p_date	date

Registration Details

PK	rd_id	integer
	s_id	varchar2(50)
FK	r_type	varchar2(50)
	s_dob	date
	s_category	varchar2(50)

provides

is provided by

provides

is provided by

Registrar

PK	r_id	integer
	r_type	varchar2(50)
	r_date	sysdate
	r_season	varchar2(50)
FK	card_id	integer
FK	s_id	integer

Student

PK	s_id	integer
	first_name	varchar2(50)
	last_name	varchar2(50)
	s_dob	date
	e_mail	varchar2(50)
	s_category	varchar2(50)

makes

is made by

OCSS

PK	card_id	integer
	semester	varchar2(50)
FK	s_id	integer
	event_name	varchar2(50)
	num_usage	integer
	last_used	date

registers

is registered by

reports

is reported by

Fig 3.2 Physical ER