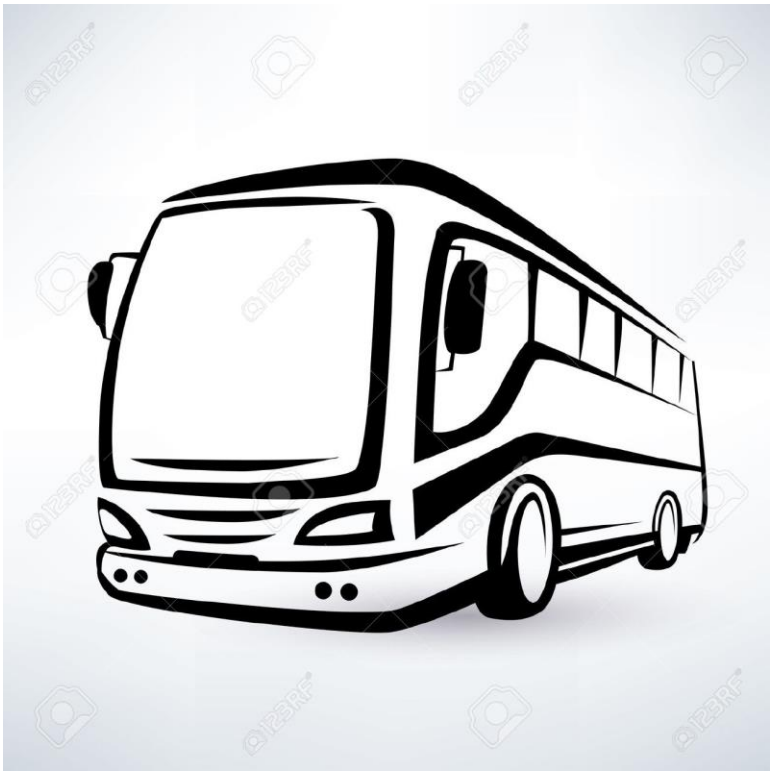
COMET CRUISER



MIS -6308

Professor: - Srinivasan Raghunathan

Group 16

Tulsi Yepuri

Divya Venkatramani

Praveen Muthuvelan

Krishna Priya Rudraraju

Karan Bhardwaj

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Executive Summary:

This project is mainly aimed at designing and developing a scheduling system for the UT Dallas shuttles. This will help to solve the problem currently being faced by many students of the lack of shuttles for transport during the peak hours. The system will be capable of analyzing the number of students that will be using the shuttle at a particular time and will accordingly schedule the shuttles. Implementation of this project will be of great benefit to the students as it will make commuting to and from campus an easy process.

The main objective of this project is to ensure the safety of the students as well as the shuttles. This will also help in improving the overall class attendance and will avoid students being late to the class as the new transport system will be more efficient. The scheduling system will also ensure that the number of shuttles at any given time is proportional to the number of students at that particular time.

The system will be designed and developed in such a way that it maintains a +/-10% student buffer at all times. When students register for their particular classes through the galaxy portal, a checkbox will be available for the students to indicate whether or not they will be making use of the shuttle services. This information will be sent to the transportation team for analysis and proper scheduling.

Problem Statement:

Problem:

The existing transportation system does not properly address the situation during peak college hours, which leads to shuttles being overcrowded. There are certain days generally on the weekends that the shuttles end up running without any passengers on board which is again a wastage of gas. There is a need to schedule the shuttles better so as to overcome the issues that are currently being faced.

Objective:

The project objective is to properly schedule the existing transportation system in order to ensure:

- Improved safety and comfort of the students.
- Improved safety of the shuttles.
- Students reaching to school on time.
- Reduced gas wastage.

Scope:

The project is a multiphase undertaking that will require interaction between different existing systems i.e. the galaxy system and the transportation system. Firstly, at the time the students register for the courses through the galaxy system they will have an option to select a checkbox indicating whether they will be availing the shuttle services or not. If the student selects the check box then this data will go to the transportation system. Once this data is collected, the transportation team will analyze and accordingly schedule the shuttles. A database will be required to be maintained by the transportation department so as to collect all this data. This system takes a buffer of +/- 10% which means that it takes into consideration that at any time

the total number of students in the shuttle could increase or decrease by a 10% margin. This system will also take into account for large crowds during some on campus event. As the registration of courses takes place once a semester therefore students will only get one chance to register for the shuttle service. The ad hoc requests to enroll students for the shuttle service is out of scope for this project.

Assumption:

There is an online registration system for new students at the time they join the institution. The shuttles are in service only during the day. Each shuttle has a maximum capacity which cannot be exceeded.

Deliverables:

The deliverables that will be provided at the end of the project are:

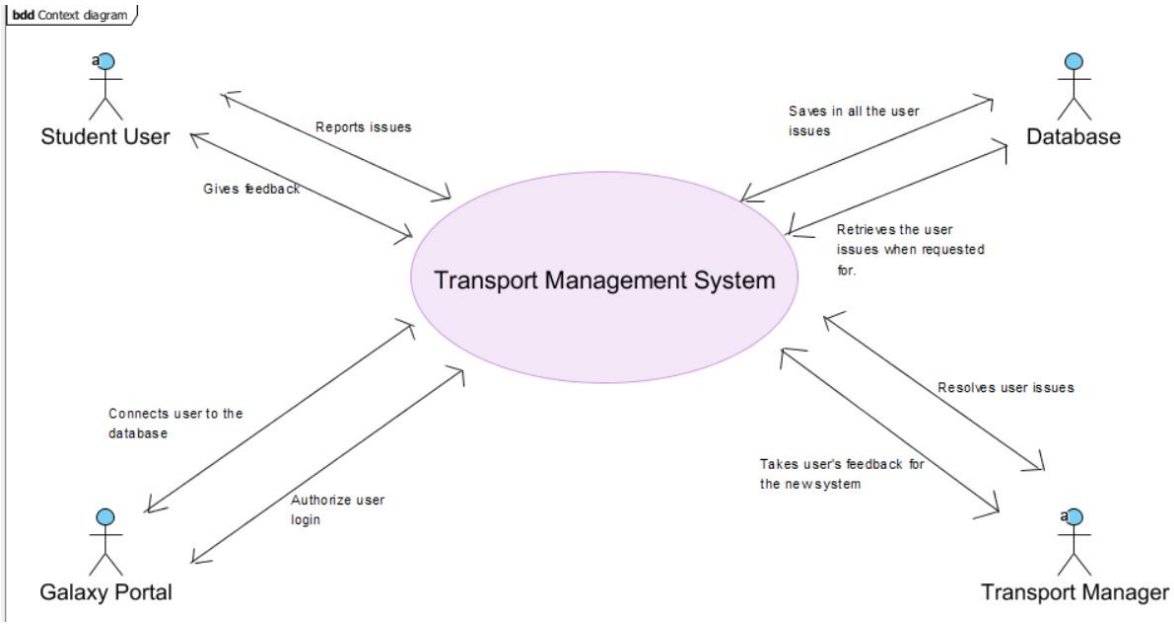
- A highly functional scheduling system.
- Source files for the scheduling system.
- A documented report outlining every detail of the created system.

Project Success Criteria:

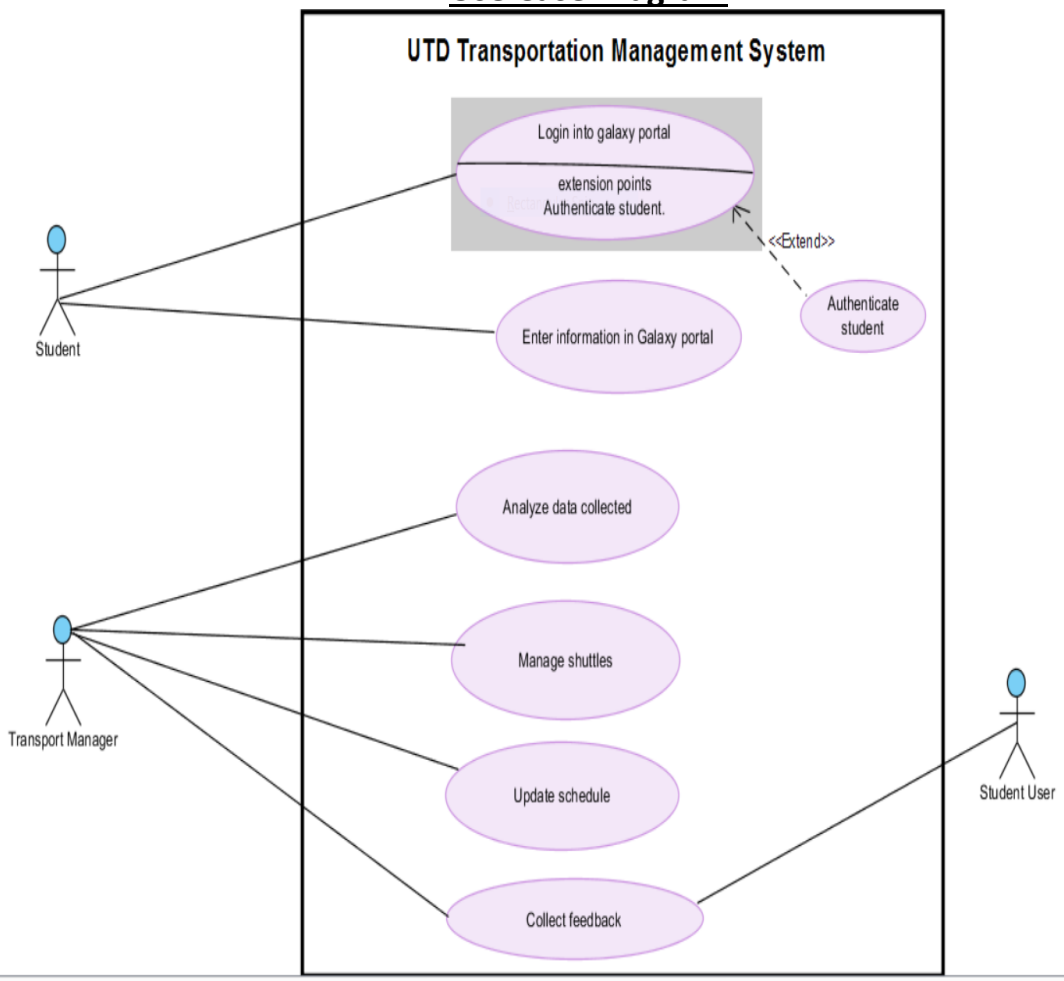
The success of the project will be based on the following criteria:

- The efficiency of the modified transport service.
- The performance of the scheduling system.
- The improvement of students' safety
- The level of improvement in class attendance among the commuting students.
- The level of satisfaction among the commuting students.
- Maintenance cost of the shuttles.

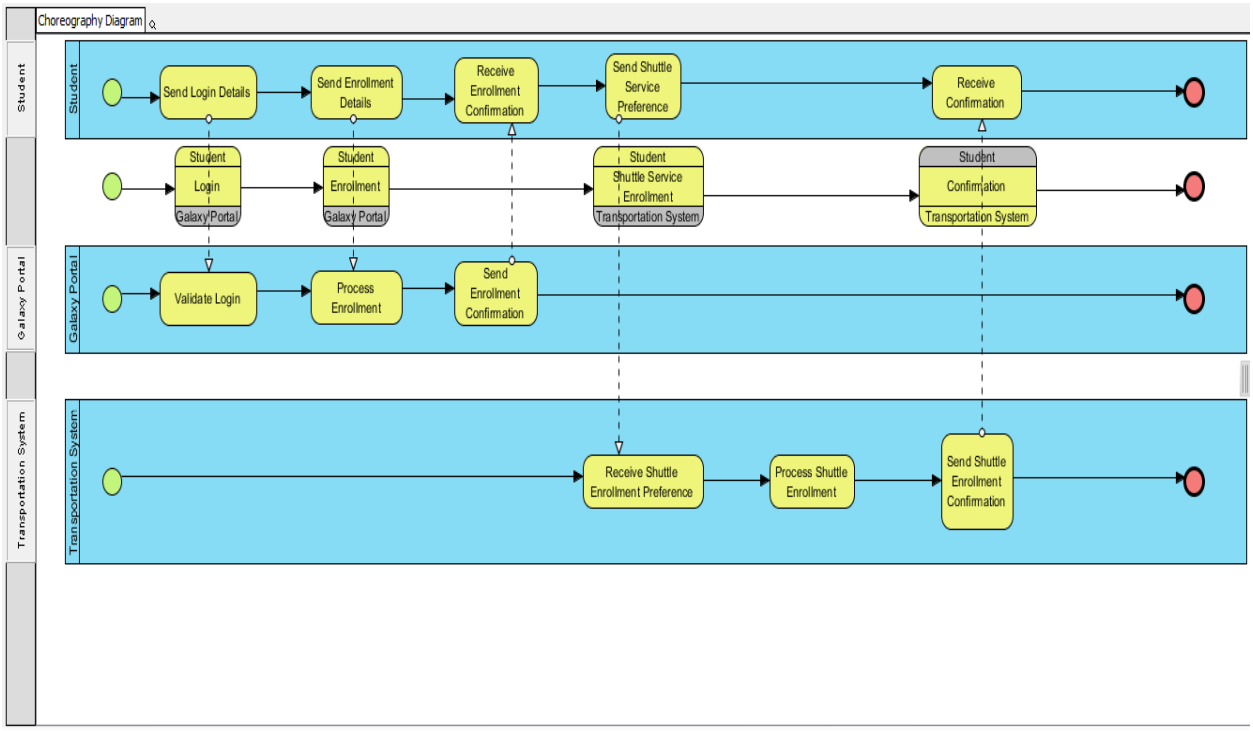
Context Diagram



Use Case Diagram



Choreography Diagram



Use Case Description

Use Case ID	1
Use Case Name	Login into Galaxy Portal
Primary Actor	Student
Brief Description	This use case focusses on the part where the student logins into the Galaxy Portal with their credentials
Stakeholders	UTD Administration, Student
Trigger	When the resident enters the credentials and clicks Login

Normal flow of events	1) The student enters the credentials. 2) The student clicks login. 3) System verifies and allows student the access.
Subflow	1.1) The student enters the Username 1.2) The student enters the Password
Alternate/ Exception Flow	1) The student gets an error message of wrong credentials entered.

Use Case ID	2
Use Case Name	Authenticate Students
Primary Actor	Student
Brief Description	This use case focusses on the part where the student credentials are checked for validity. It is an extension to the Login Use Case.
Stakeholders	UTD Administration, Student
Trigger	When the resident enters the credentials and clicks Login.
Normal flow of events	1) System verifies validity of the credentials. 2) Approves the credentials.
Subflow	None
Alternate/ Exception Flow	1) Sends an error message.

Use Case ID	3
Use Case Name	Enter information in Galaxy Portal
Primary Actor	Student
Brief Description	This use case focusses on the part where the user enters the information about whether he/she will be availing the shuttle services or not. According to the input the course details and timings of

	classes for that particular student would be sent to the Transportation System.
Stakeholders	Students, Transportation Management, UTD administration.
Trigger	When the student selects/not selects the check box indicating they will make use of shuttle service.
Normal flow of events	1) The student registers for courses. 2) The student then checks the check-box indicating that they will make use of shuttle service during that semester. 3) The information of the timings of the classes for the particular student will be sent to the transportation system.
Subflow	None
Alternate/ Exception Flow	1) If the student does not check the check box then 1.1) The details will not be sent to the transportation system.

Use Case ID	4
Use Case Name	Analyze Data Collected
Primary Actor	Transport Manager
Brief Description	This use case focusses on the part where the Transport Manager analyses all the data recorded in the system so that the number of shuttles are in proportion to the number of students availing shuttle services at any particular time
Stakeholders	Students, Transportation Management, UTD administration.

Trigger	When the data has been entered by all the students for the concerned semester
Normal flow of events	1) Transport Manager analyses the data in the system.
Subflow	1.1) Transport Manager analyses the various times against the number of students at that time. 1.2) Transport Manager analyses the number of shuttles available to them at any particular time.
Alternate/ Exception Flow	None

Use Case ID	5
Use Case Name	Manage Shuttles
Primary Actor	Transport Manager
Brief Description	This use case focusses on the part where the Transport Manager manages the shuttles according to the requirement at that particular time.
Stakeholders	Students, Transportation Management, UTD administration.
Trigger	When the Transport Manager has analyzed all the data.
Normal flow of events	1) Transport Manager determines how many shuttles would be required for different class times. 2) He determines the capacity of each shuttle. 3) He then records down that whether there is a need for extra shuttles during a specific time period or not.
Subflow	None

Alternate/ Exception Flow	None

Use Case ID	6
Use Case Name	Update Schedule
Primary Actor	Transport Manager
Brief Description	This use case focusses on the part where the Transport Manager updates the schedule of the shuttles according to the requirement at any given instance of time.
Stakeholders	Students, Transportation Management, UTD administration.
Trigger	At the time of designing a scheduler for the shuttles
Normal flow of events	1)The schedule is planned in accordance with the peak hour traffic and non-peak hour traffic. 2) The schedule is then made available to all the shuttle users.
Subflow	None
Alternate/ Exception Flow	None

Use Case ID	7
Use Case Name	Collect Feedback
Primary Actor	Transport Manager
Secondary Actor	Shuttle User(Only those students who have registered)
Brief Description	This use case focusses on the part where the Transport Manager collects feedback from all the

	shuttle users in order to improve the services for the next semester.
Stakeholders	Students, Transportation Management, UTD administration.
Trigger	This use case is triggered at the end of the semester.
Normal flow of events	1) The Transport Manager sends a feedback form to all shuttle users. 2) The shuttle users fill in the feedback
Subflow	1.1) The feedback form checks on the parameter of safety. 1.2) The feedback form checks on the parameter of comfort.
Alternate/ Exception Flow	None

Data Dictionary

Student = StdNetID +StdFirstName + StdLastName +StdEmailId + StdCommutingStatus + Stdcourse

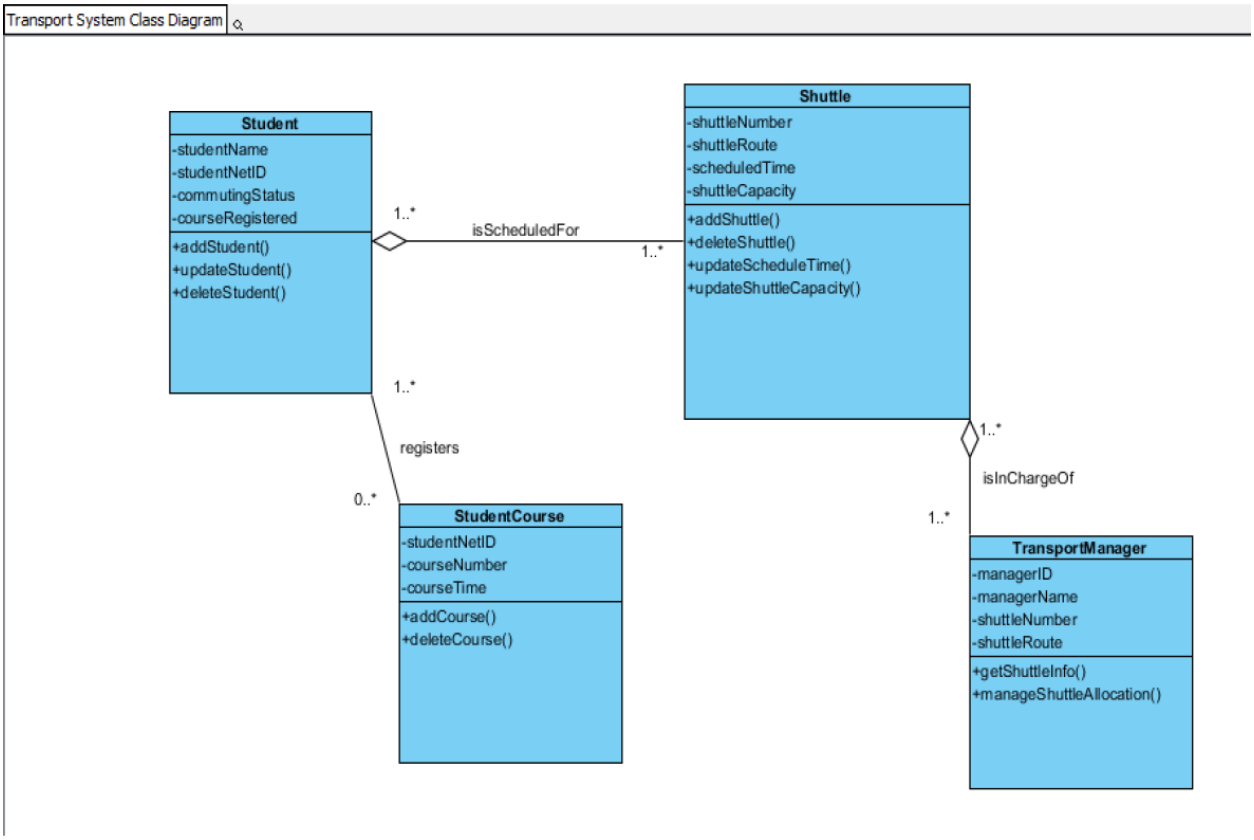
TranportManager = TMID + TMFirstName + TMLastName + TMEmailID+ TMContactNo

Credentials= NetID + Password

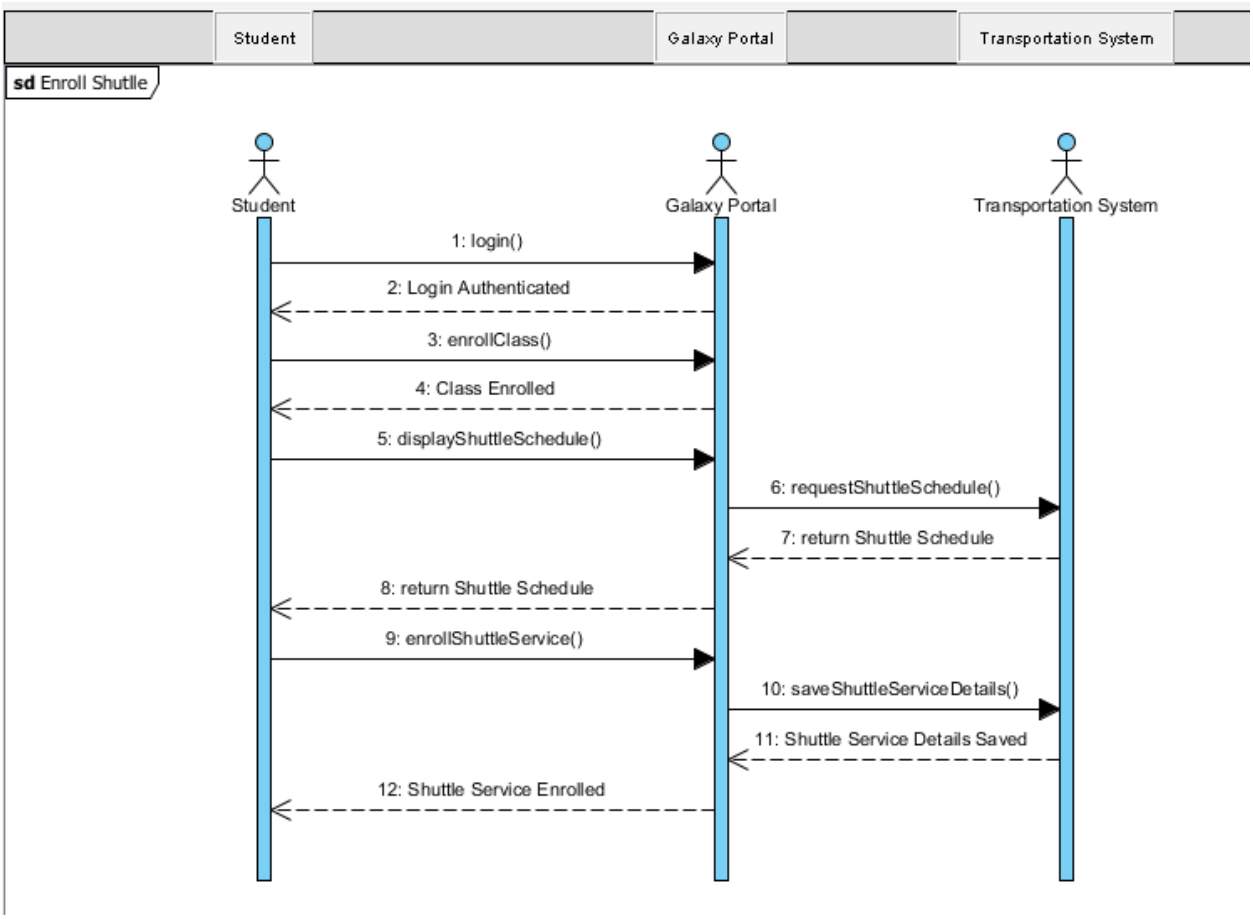
Course= CourseNo+ CourseDescription +CourseTime

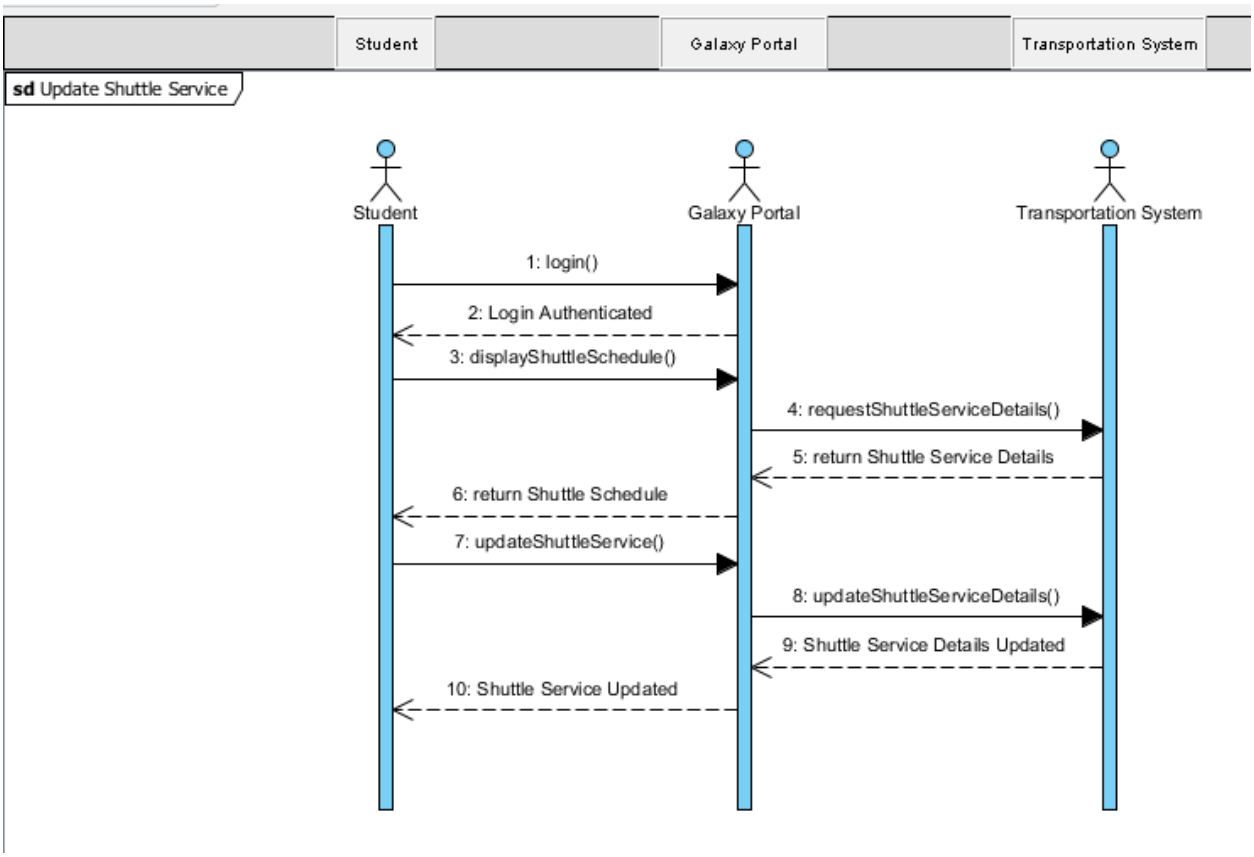
Shuttle= ShuttleNo + ShuttleRoute + ShuttleCapacity + scheduleTime

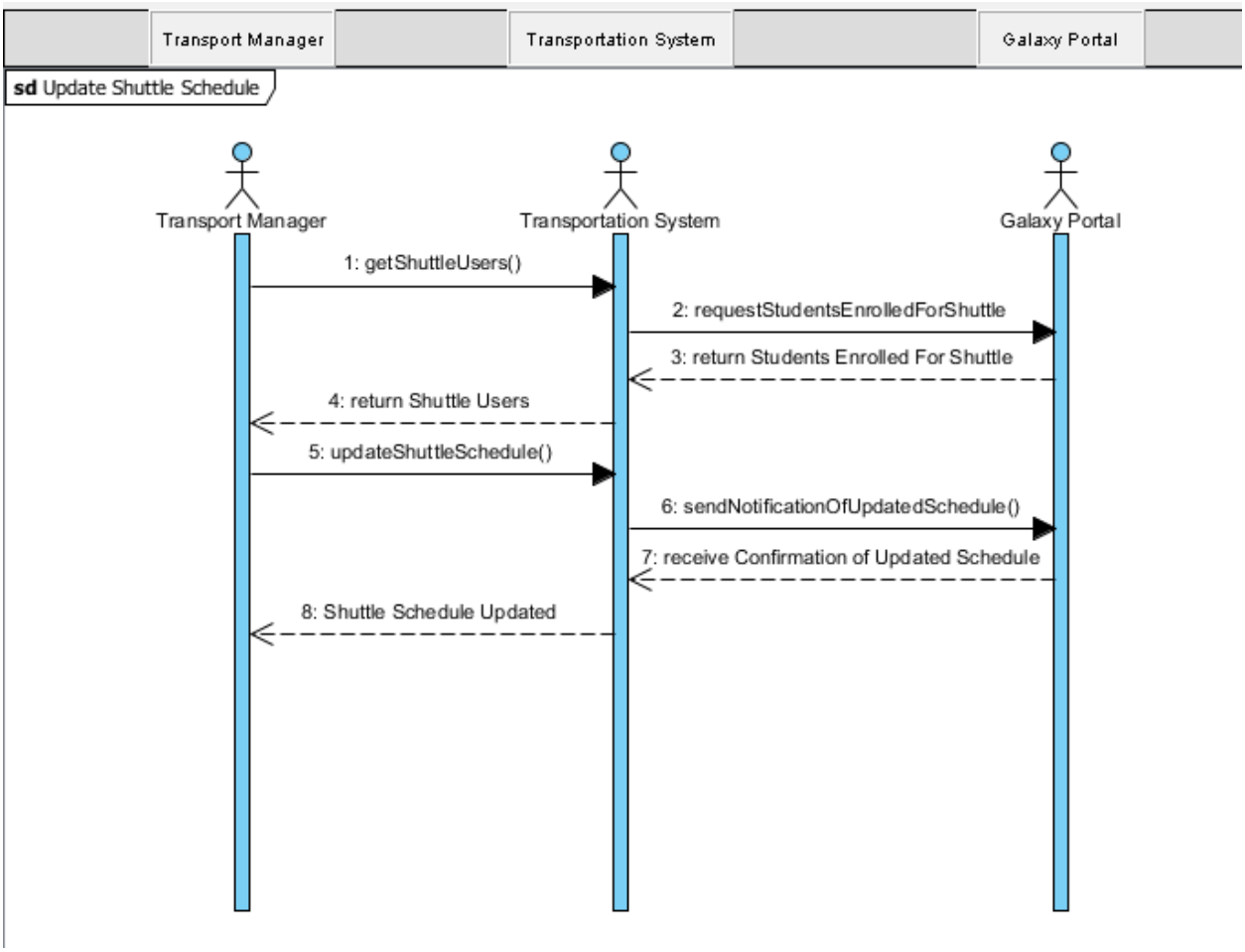
Class Diagram

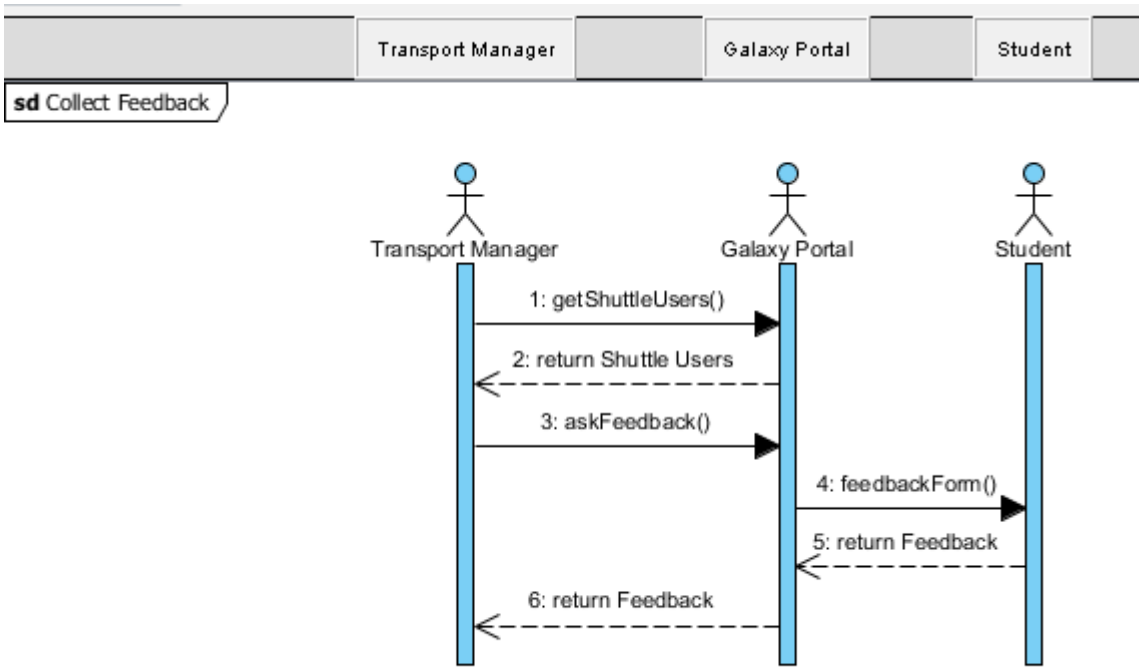


Sequence Diagram




Student
Galaxy Portal
Transportation System
sd Update Shuttle Service
Student
Galaxy Portal
Transportation System
1: login()
2: Login Authenticated
3: displayShuttleSchedule()
4: requestShuttleServiceDetails()
5: return Shuttle Service Details
6: return Shuttle Schedule
7: updateShuttleService()
8: updateShuttleServiceDetails()
9: Shuttle Service Details Updated
10: Shuttle Service Updated


Transport Manager
Transportation System
Galaxy Portal
sd Update Shuttle Schedule
Transport Manager
Transportation System
Galaxy Portal
1: getShuttleUsers()
2: requestStudentsEnrolledForShuttle
3: return Students Enrolled For Shuttle
4: return Shuttle Users
5: updateShuttleSchedule()
6: sendNotificationOfUpdatedSchedule()
7: receive Confirmation of Updated Schedule
8: Shuttle Schedule Updated


Transport Manager
Galaxy Portal
Student
sd Collect Feedback
Transport Manager
Galaxy Portal
Student
1: getShuttleUsers()
2: return Shuttle Users
3: askFeedback()
4: feedbackForm()
5: return Feedback
6: return Feedback

Database Design

-Student(studentNetID, studentFirstName, studentLastName, commutingStatus, courseRegistered, password)

studentNetID should not be null and should be unique

-Service(studentNetID, shuttleNumber)

studentNetID and shuttleNumber should not be null.

-Shuttle(shuttleNumber, shuttleRoute, scheduleTime, shuttleCapacity)

shuttleNumber should not be null and should be unique.

-**TransportSystem**(shuttleNumber,managerID, managerList, shuttleSchedule)

shuttleNumber and managerID should not be null.

-**TranportManager**(managerID, managerFirstName, managerLastName)

managerID should not be null and should be unique.

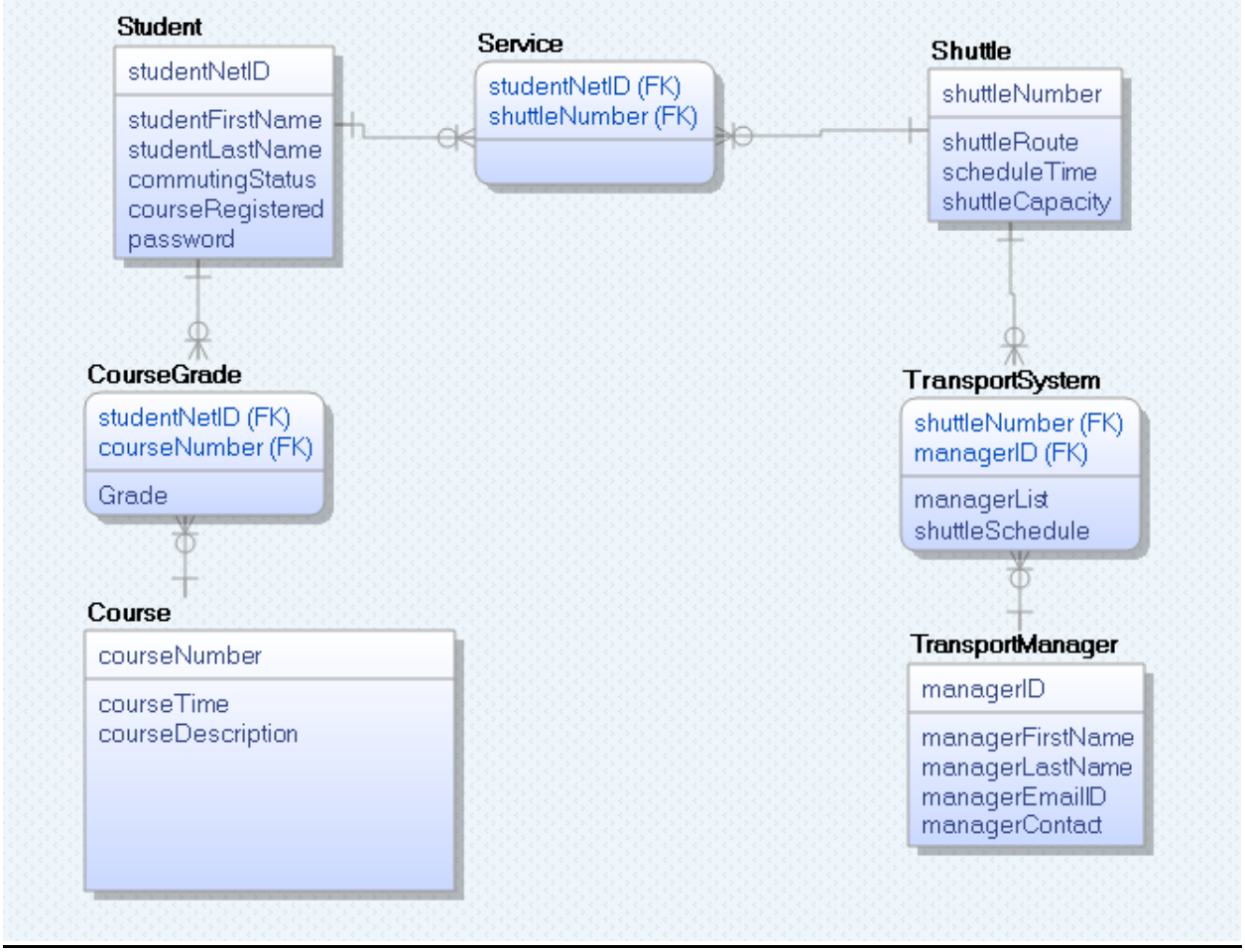
-**Course**(courseNumber, courseTime, courseDescription)

courseNumber should not be null and should be unique.

-**CourseGrade**(studentNetID, courseNumber, Grade)

StudentNetID and courseNumber should not be null.

E-R Diagram


Student
studentNetID
studentFirstName
studentLastName
commutingStatus
courseRegistered
password
Service
studentNetID (FK)
shuttleNumber (FK)
Shuttle
shuttleNumber
shuttleRoute
scheduleTime
shuttleCapacity
CourseGrade
studentNetID (FK)
courseNumber (FK)
Grade
TransportSystem
shuttleNumber (FK)
managerID (FK)
managerList
shuttleSchedule
Course
courseNumber
courseTime
courseDescription
TransportManager
managerID
managerFirstName
managerLastName
managerEmailID
managerContact

Functional Specification Document

- This system will basically help in the proper scheduling of the UT Dallas shuttles by analyzing the number of students that will be availing the bus at a particular time against the capacity of the bus. As of now the problem faced by most of students is the lack of number of shuttles during peak times.
- This system will help in ensuring the safety of the students, as the bus will no longer be overloaded. This will also have positive implications on the overall attendance of students coming to school. It will make sure that the number of shuttles at any time is in proportion to the number of students at that time.
- At the time the student registers for the classes there will be a checkbox to confirm as to whether the student will be making use of the shuttle service. If yes, then the data about the timings of the classes for that student will be sent to the transportation team. After getting the data from all the students, analysis will be done to ensure proper scheduling of shuttles.
- This system is easy to implement and will be beneficial for the students once implemented. It will be built in a manner that it will keep a +/- 10% student buffer.

METHODS

1. Login:

Class name: student

Clients (consumers): users/students

Associated use cases:login

Description of responsibilities: login to the system by giving username and password

Arguments received:user name,password

Type of value returned: login successful

Pre-conditions: user should enter correct email and password

Begin

Input username

Input password

If (Username== entered username && password = entered password)

Then Output “Login successful”

Else

Output “Login failed”

End IF

End

2.Add StdInfo

Class name: student

Clients(consumers): students

Assosiated use cases: settings,manage users

Description of responsibilities: it allows student to add his/her information about availing the shuttle.

Aurguments received: information that needs to be added.

Type of value returned: add StdInfo

Pre conditions: enter valid email id and password

Begin

Input emailId

Input password

Then Click add StdInfo

Output Prompt StdInfo added.

3. Update StdInfo

Class name: student

Clients(consumers): students

Assosiated use cases: settings,manage users

Description of responsibilities: it allows student to update his information

Aurguments received: information that needs to be updated

Type of value returned: updated StdInfo

Pre conditions: enter valid email id and password

Begin

Input emailId

Input password

Then Click update StdInfo

Output Prompt StdInfo updated

4. Manage Shuttle Allocation:

Class name: Shuttle

Clients(consumers): transport manager.

Assosiated use cases:

Description of responsibilities: The Transport Manager manages the shuttles according to the requirement at that particular time.

Aurguments received: number of students availing the shuttle service

Type of value returned: shuttle schedule

Pre conditions: number of students availing the service at a particular time slot

Begin

Input number of students

Input time

If (no. of students >> shuttle capacity)

THEN Change the shuttle schedule

ELSE

Stick to the usual schedule

END IF

END

5. Logout:

Class name: student

Clients(consumers): users/students

Assosiated use cases:

Description of responsibilities: the allows the app to be successfully closed

Aurguments received: logout

Type of value returned: logout successful

Pre conditions: the user should be logged in

Begin

If (login = true && Logout Button == clicked)

Then

Output Logout successful

Go to Log In page

Else

Output You are not logged in

END IF

END

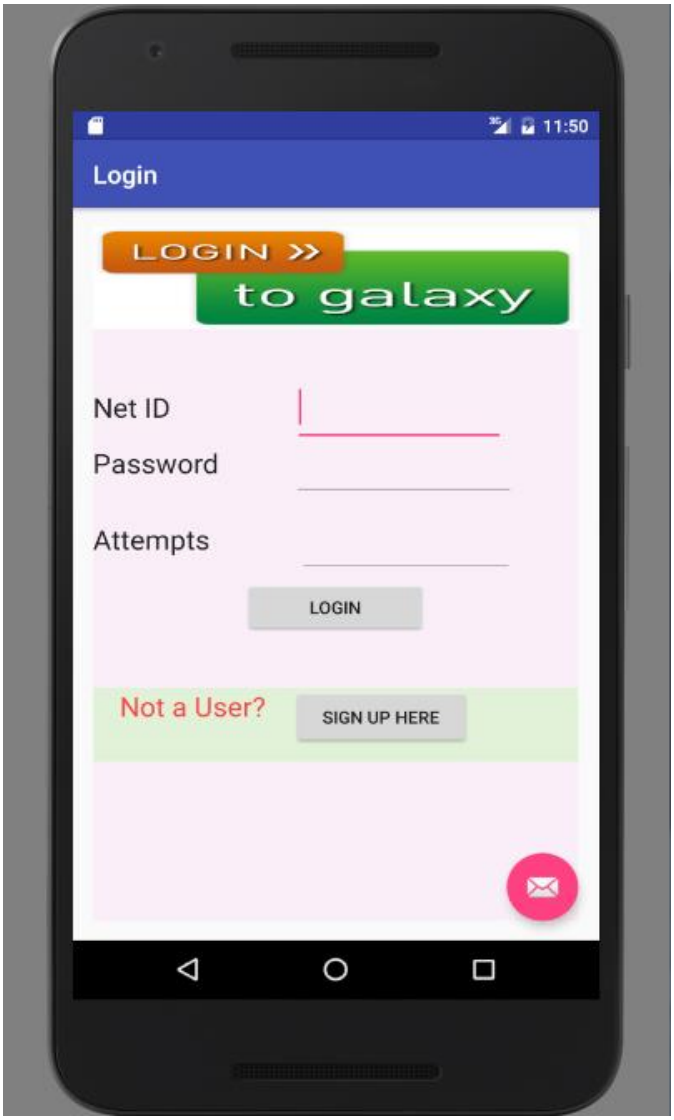
Prototype Screens

Following are a few sample prototype screens of how the app will look like after launching.

Screen 1:- Welcome screen of University of Texas at Dallas Mobile application.

Screen 2:-

Sample Login screen which allows the student to enter the NetId and password to authenticate the student's credentials. If the student hasn't registered in galaxy, they can proceed to sign up page. Also the screen allows the user to try logging in up to 5 times. The attempts will be incremented for every wrong sign-in.The App will be closed automatically if the user crosses the limit.



Screen 3:-

The home screen of this mobile app. Students can select from various given options and will be directed to the appropriate pages. Here, we are selecting "**Register"** to enroll for courses and avail shuttle services.

Screen 4:-

Class registration screen. Student will select the term for which they are enrolling the class.

Other Inputs,

- Subject – Department for which they are registering (eg MIS- Management information systems)
- Course No – Class code (eg 6324 – Object oriented programming)
- Instructor – Name of the Instructor of that class (Mark thouin)

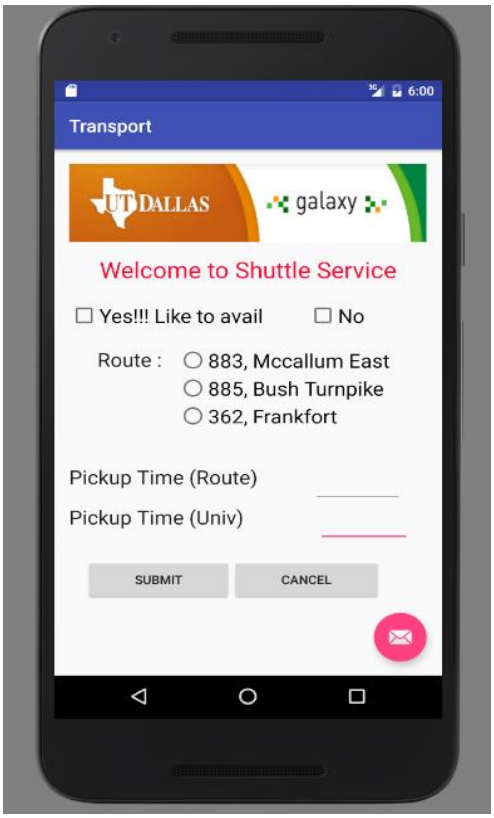
Example


1:50
Register
UTDALLAS
galaxy
Enter Class Details
Summer 2016
Fall 2016
Spring 2017
Subject :
MIS
CourseNo :
6308
Instructor :
Srinivasan Raghunathan
REGISTER

Screen 5:-

Shuttle service screen which allows students to register their desired time to pick/drop them up for the class. This screen will appear once the student finishes his course registration.

- If the user opts for own transportation, he can select the 'No' checkbox by which remaining fields will be disabled automatically.
- If he/she avails the service, then appropriate timings should be entered so that student traffic can be monitored by the Shuttle manager .

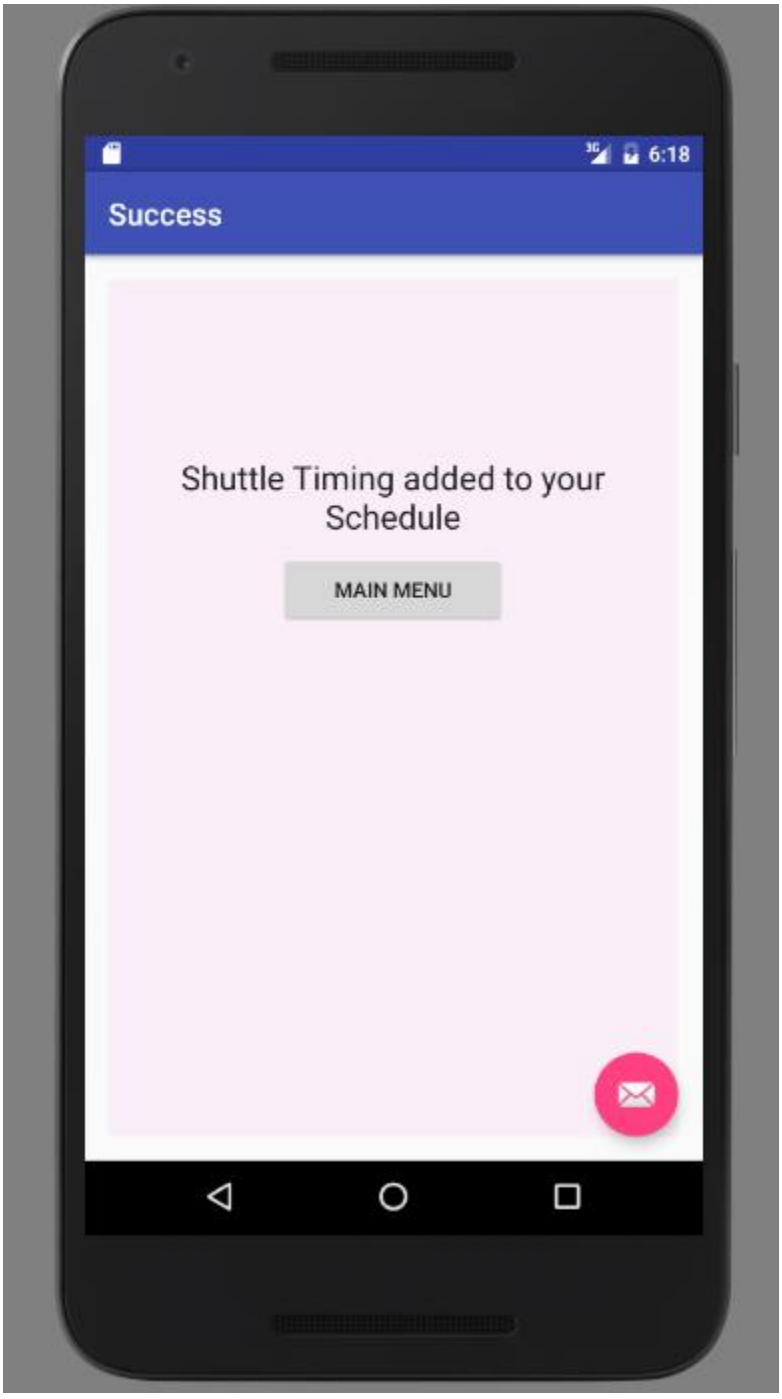


Example:-


6:06
Transport
UT DALLAS
galaxy
Welcome to Shuttle Service
Yes!!! Like to avail
No
Route :
883, Mccallum East
885, Bush Turnpike
362, Frankfort
Pickup Time (Route)
16:20
Pickup Time (Univ)
SUBMIT
CANCEL

Screen 6:-

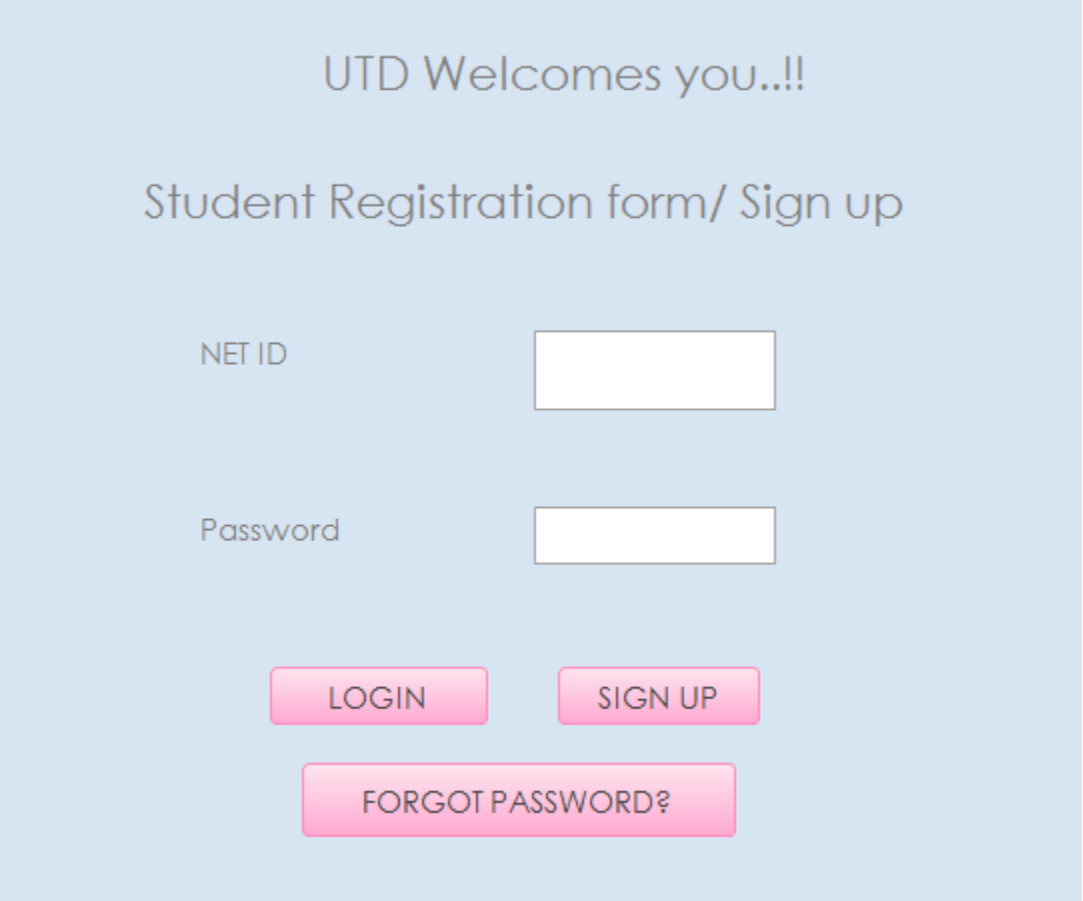
The following screen will appear after the student successfully registered for course and shuttle. The shuttle details will be updated accordingly in the galaxy portal. Students can change the desired shuttle timings at any point of time.



Interface Design

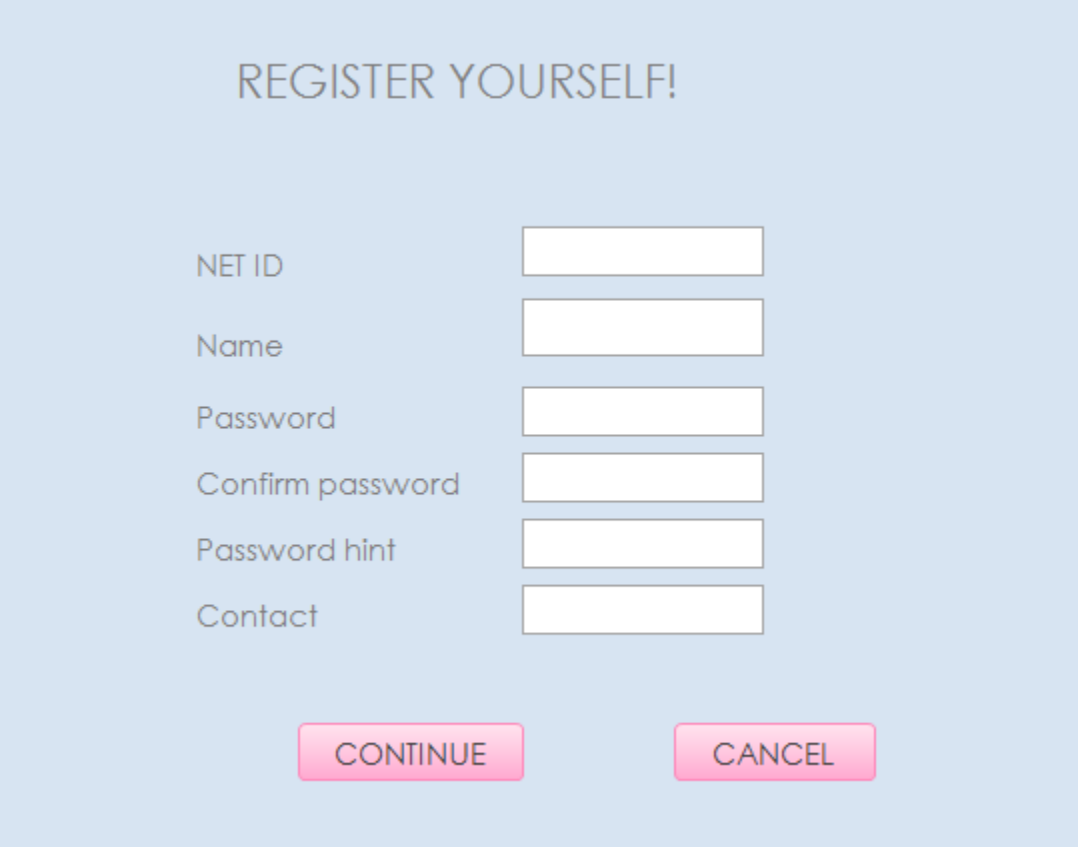
Student Login Page:-

This screen allows the students to login into the UTD Galaxy system with the login credentials.



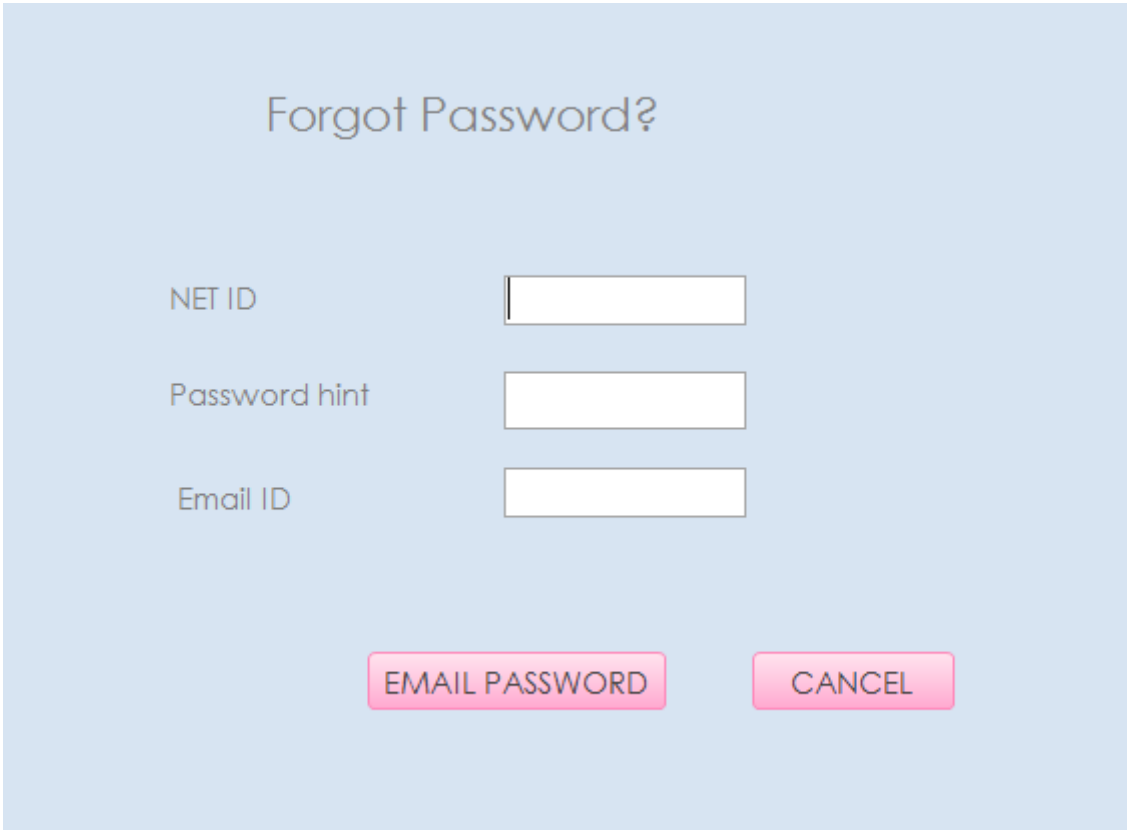
New User Registration Page:-

This screen allows students to register as a new user with basic details like Netid, password and contact details



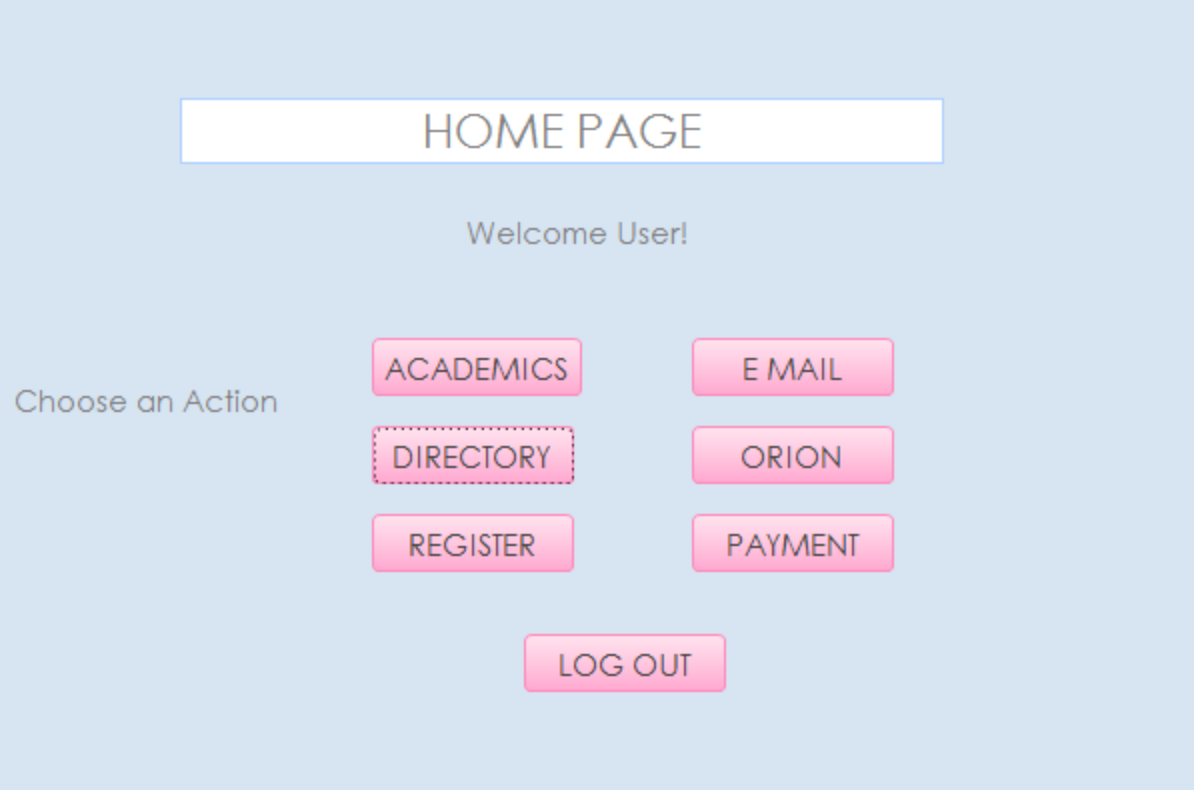
Account Recovery page:-

If the student forgets his password, he can retrieve it using the secret questionnaire and contact details.



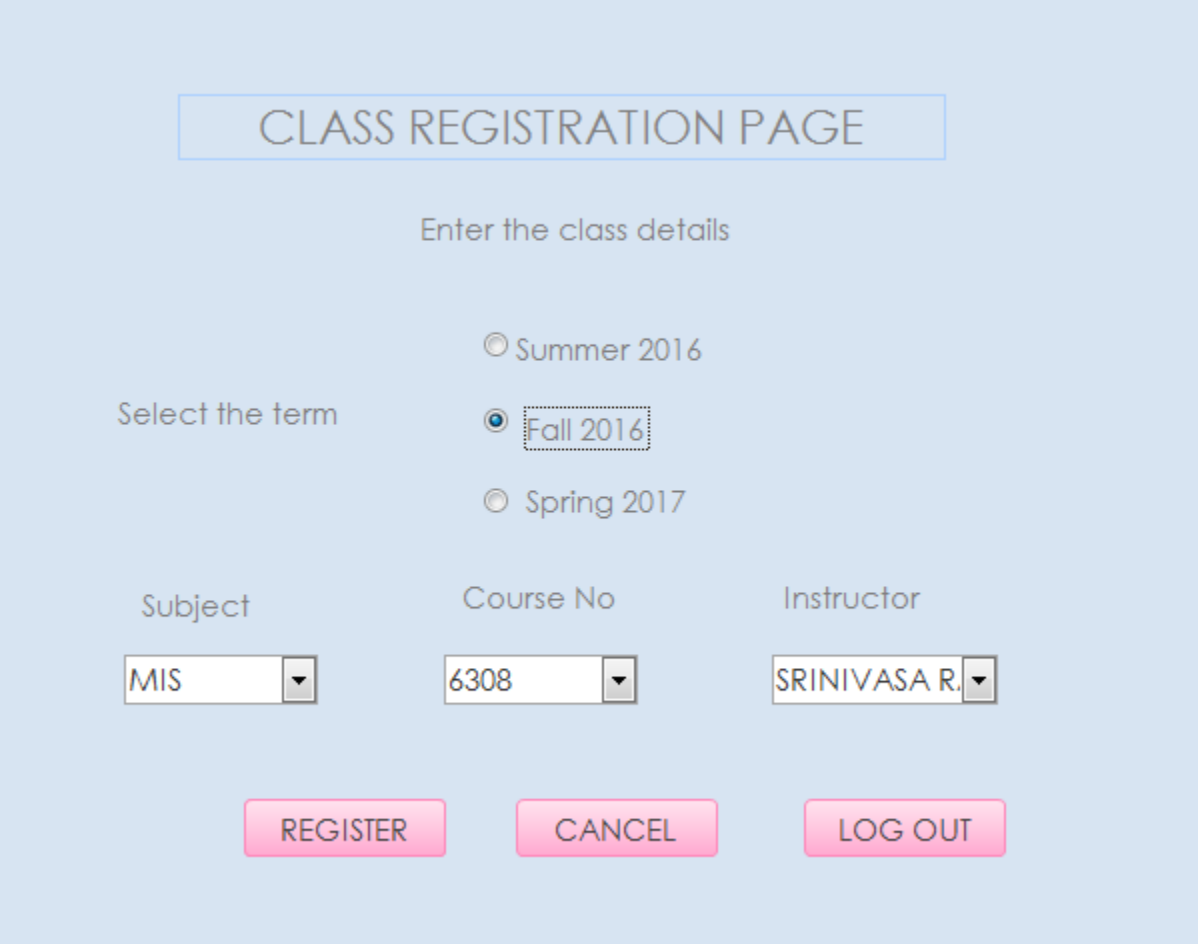
Home page:-

This home screen allows the user to select from various options like payments, course registration etc. In order to register for courses and shuttles, the student should select 'Register' option.



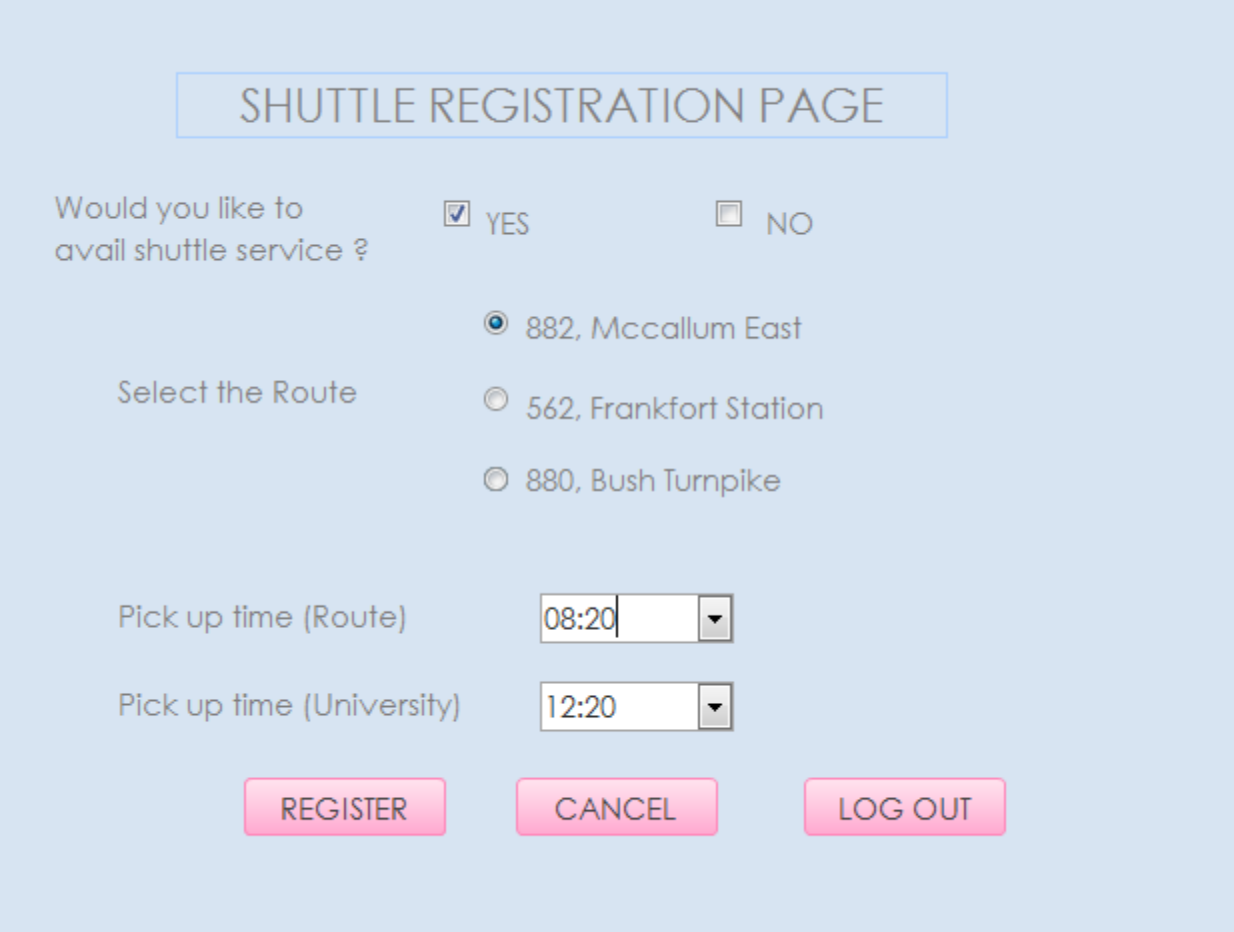
Class Registration page:-

Students are then allowed to register for their desired courses giving the course number and instructor. Appropriate details will be recorded in the database with student details, course details and the class timings.



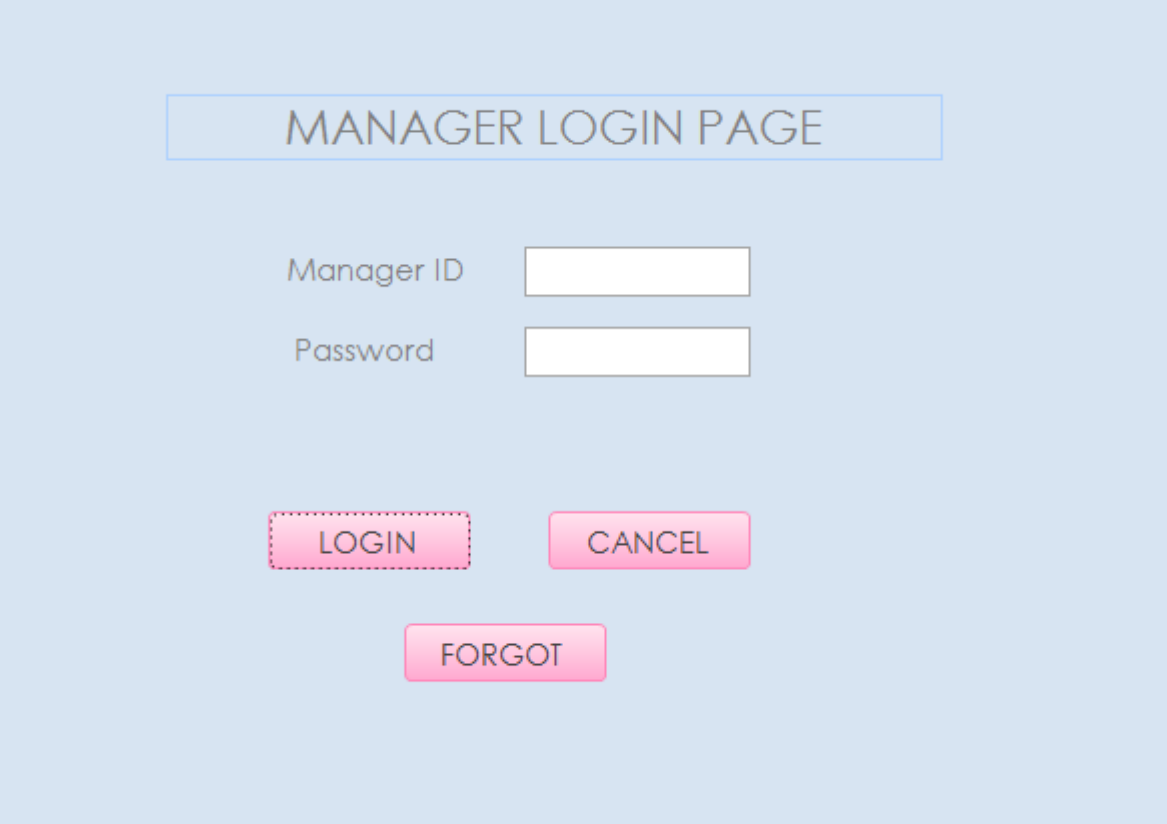
Shuttle Registration Page:-

Following the course registration, the students can avail the shuttle service if they are willing. They can select their pickup time and enter the route details. The details will be reflected on their respective galaxy portal.



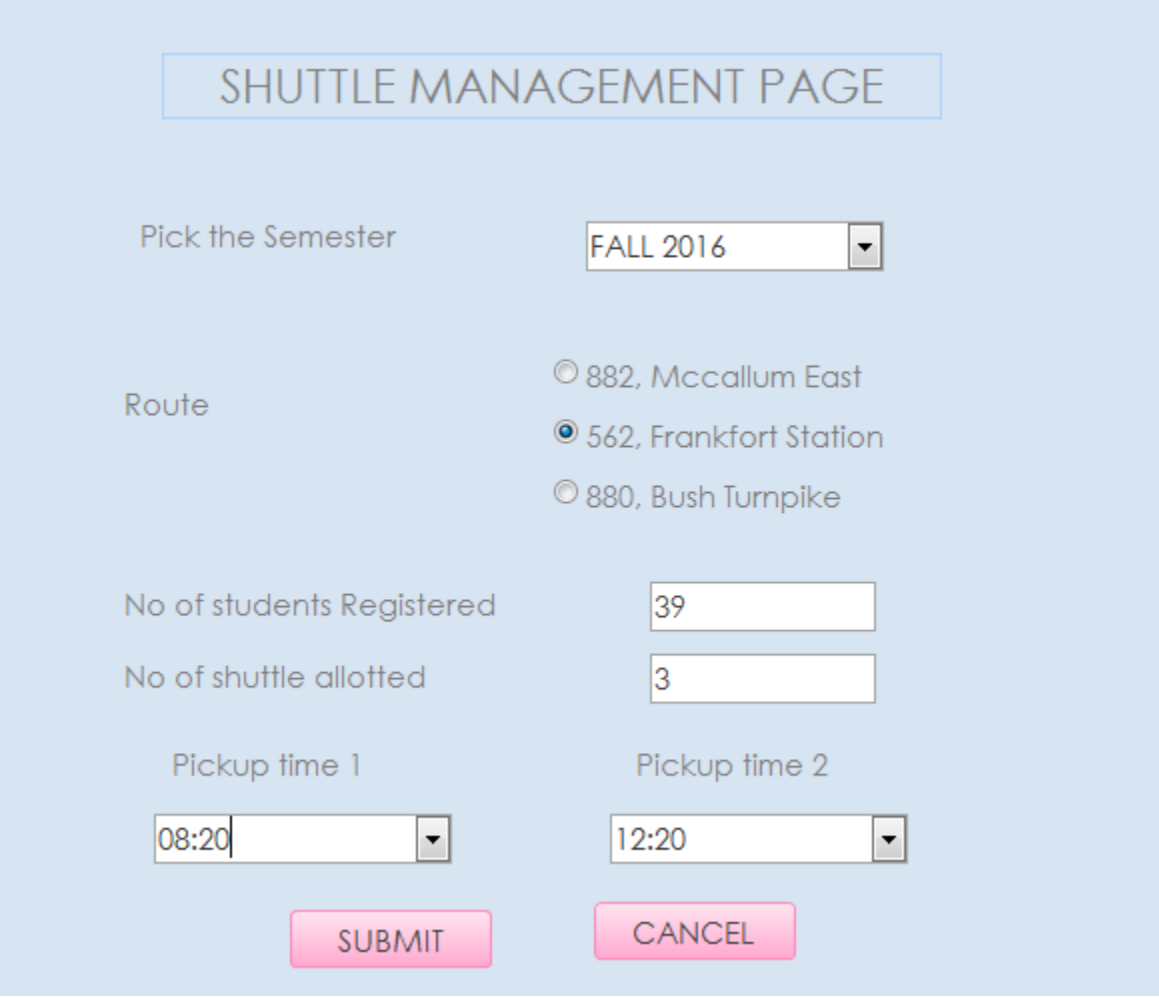
Manager Login Page:-

This screen allows the shuttle manager to sign in and manage the shuttle services.



Shuttle Management Page:-

The Manager will decide the number of shuttles based on the students registered for that particular time. He can assign more shuttles during peak hours.



System Control Design

Preventive Control Mechanism:

1. In the galaxy systemm when a user (Student or System administrator) logs into the application, the data that can be accessed by the user is limited based on his role i.e. a student can access only that part of the system that is related to registration or change settings, he cannot access the entire database. This limited access functionality prevents the issue of data integrity and unauthorized privilege escalation.
2. Also, encryption of confidential data prevents the issue of data integrity.

Detective Control Mechanism:

1. The account of the user(Student or System administrator) gets locked after three wrong attempts suspecting unofficial system login. However, a password hint is entered by the student during the registration process. So password can be retrieved in case the student has forgotten it.

Corrective Control Mechanism:

1. Data corruption and/or loss caused by the entry of invalid data or commands, mistakes in database or system administration processes can be corrected by this mechanism called the rollback where the system administrator will have an option to disregard the changes made to the database and restore the database.

Weekly Timeline

Weeks		Tasks
05//30/2016	06/06/2016	Introduction to the team members
06/07/2016	06/14/2016	Finalized on UT Dallas Comet cruiser
06/15/2016	06/22/2016	Scope and Objective for Comet cruiser
06/23/2016	07/01/2016	Context Diagram and Use case diagram
07/02/2016	07/07/2016	Use case descriptions and Data dictionary
07/08/2016	07/13/2016	Class Diagram along with ERD
07/14/2016	07/21/2016	Sequence Diagram
07/22/2016	07/29/2016	Interface design with prototypes
07/30/2016	07/30/2016	Project report documentation

Meeting Minutes

Meeting Number: SAPM Project Group 16- 1

Location: Graduate Student Lounge, Google Hangouts

Date: May 30th 2016

Time: 6:00 to & 7:30 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- Introduction to the project group members
- Discussed briefly about the project outline
- Suggested multiple ideas for the group project.
- Scheduled meetings to update on the progress of the project.

Meeting Number: SAPM Project Group 16- 2

Location: Graduate Student Lounge, Google Hangouts

Date: June 7th 2016

Time: 4:00 to 6:00 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- The team has brainstormed various ideas for the project and analyzed to see if it meets the guidelines for project selection.
- The team has selected the UT Dallas Comet cruiser as a final choice.
- Decided to research and gather relevant information regarding the chosen project

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Meeting Number: SAPM Project Group 16- 3

Location: Graduate Student Lounge, Google Hangouts

Date: June 15th 2016

Time: 5:00 to & 7:30 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- The team collaborated the information gathered by the team mates.
- We discussed on the scope and objective of the project and created few assumptions relevant
- Created a work break down structure and track on the work done.

Meeting Number: SAPM Project Group 16- 4

Location: Graduate Student Lounge, Google Hangouts

Date: June 23rd 2016

Time: 5:00 to & 7:30 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- The team collaborated the work with Tulsi coming up with the context diagram for the Comet cruiser.
- The use case diagram was designed for the Comet cruiser

Meeting Number: SAPM Project Group 16- 5

Location: Graduate Student Lounge, Google Hangouts

Date: July 2nd 2016

Time: 6:00 to & 7:30 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- Few of the major use cases were tackled and documented
- Completed use case descriptions and data dictionary

Meeting Number: SAPM Project Group 16- 6

Location: Graduate Student Lounge, Google Hangouts

Date: July 8th 2016

Time: 5:00 to & 7:30 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- The class diagram was designed by our team member Divya
- The E r diagram was designed with the analysis of the team members

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Meeting Number: SAPM Project Group 16- 7

Location: Graduate Student Lounge, Google Hangouts

Date: July 14th 2016

Time: 4:00 to & 6:30 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- The team has come up with Sequence diagram with Karan designing it.

Meeting Number: SAPM Project Group 16- 8

Location: Graduate Student Lounge, Google Hangouts

Date: July 22nd 2016

Time: 5:00 to & 7:30 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- Interface Design were created by Praveen along with the Prototype Screens
- The Functional specifications of the project were documented.

Meeting Number: SAPM Project Group 16- 9

Location: Graduate Student Lounge, Google Hangouts

Date: July 30td 2016

Time: 5:00 to & 7:30 PM

Attendees: Karan Bhardwaj

Praveen Muthuvelan

Divya Venkataramani

Tulsi Yepuri

Krishna Priya Rudraraju

Purpose:

- The team has collaborated their respective work and sat down to finish the final documentation of the project.

References

- Mr.Srinivas Raghunathan, Professor, UTD Study Material
- "Object-Oriented Systems Analysis and Design" by Jeff Hoffer , Joey George, and Joe Valacich, Pearson Prentice-Hall, Second Edition, 2006.
- For Different Model Diagrams:
  Visual Paradigm SW Trail Version
- For Interface Design
  http://www.foreui.com/