DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
THE UNIVERSITY OF TEXAS AT ARLINGTON

ARCHITECTURAL DESIGN SPECIFICATION
CSE 4316: SENIOR DESIGN I
FALL 2020

MAV BLAZERS - TEAM 6
ACM WEBSITE

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Revision History

Revision	Date	Author(s)	Description
0.1	11.13.2020	Team	document creation

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1 INTRODUCTION

The UTA ACM website's purpose is to host news and events relating to UTA's ACM Chapter through a blog-like structure. The way users interact with the website will be through their user role, of which there are four of: unpaid member (regular website visitor), paid member (yearly or lifetime), officer, and administrator. The main pages on the website will be the Home page, Login page, News page, an About section, and a User Profile page for each paid member where the user can upload blogs.

The Home page is the main page of the website where all recent UTA ACM events will be posted by the ACM Chapter officers. It will contain a calendar listing the events, posts of dates and information about upcoming events that can be clicked on and scheduled in a user's personal calendar, and other events that officers would like to post.

The Login page will let users login in or sign up for the website with their user role. Users will have settings associated with their account, such as whether or not to sign up for email notifications about upcoming events and calendar updates.

The News page contains all of the information about anything related to the ACM chapter. Officers will also have full control over this section to post about anything relevant that users should know about.

The About section is a separate page listing all information about the chapter. This includes who are the chapter officers and sponsors, ways to sign up for the chapter, and other information relating to the chapter itself.

Each user that has at least a paid membership will also be allowed to post blogs and upload information to the website. These blogs could be about more upcoming events or a person's experience with those events. Other paid members should be able to react to other blog posts by referencing them or by leaving comments and reactions. Paid members can also upload materials to share with other paid members. These could be course resources like notes, lectures, or lecture videos, course information, or their resume which will be automatically shared with any company that requests it. This will be useful to professors to share more information about their course online. It also gives incentive for people to register as ACM members.

The user role will determine how the user interacts with the website. Any unpaid member or visiting user can visit the Home page, News Page, About page, and visit any user's profile to read their blog. They cannot upload their own blogs or download and upload resources to the website.

Paid members have all the benefits of unpaid members and are allowed to post blogs, upload, and download resources from other paid members.

ACM officers have the most privileges as they have all of the benefits of paid members and can update the calendar, send out email notifications, and update the Home, News, and About pages.

Administrators have full access to the website and database. They are also responsible for updating who are the chapter officers.

Some of the other architectural designs will need to include ways to automatically demote paid members to unpaid members when the membership expires. The website will be supported on chromium browsers and a web version will be supported for viewing but not editing.
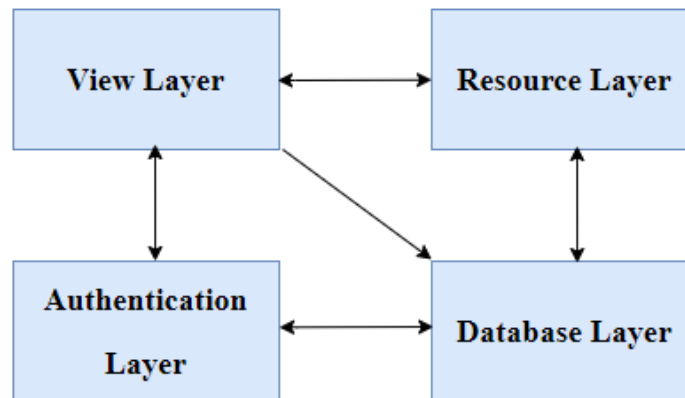
2 SYSTEM OVERVIEW

Figure 1: Architectural Layer Diagram

2.1 VIEW LAYER DESCRIPTION

The View Layer is the main layer the user will be interacting with when using the website. This layer includes everything the user can see when visiting the website, such as the Home page, News page, About page, calendar, and blogs. This layer is responsible for rendering the appropriate page to the user. As shown in the diagram, this layer will access every other layer in the website. When the user is trying to log in through the login page, the Authentication layer is used to verify the login. The default user role is unpaid member. By having a user role with a higher privilege, the View layer will update itself to that role. For example, when going from non-paid to a paid member role, the user will be able to access pages such as the course resources.

Next, the View layer must access the database to retrieve the blog posts from other users. It is expected that the View layer will update itself to show new blogs, comments, reactions, calendar updates, and updates to the Home, News, and About sections automatically without the user needing to refresh the web page.

Lastly is the Resource layer. The View layer will be able to access this layer if the user has the correct role. The Resource layer is accessed when the user wants to upload or download materials from the website.

2.2 AUTHENTICATION LAYER DESCRIPTION

The Authentication layer is responsible for authenticating users that will log in or sign up for the website. It will store information that the other layers in the system will use to verify that user role. The default user role is unpaid membership. The paid membership will be verified through that person being registered for UTA ACM's chapter. There are two types of paid membership. Those are the lifetime and yearly memberships. If the paid member is yearly, the website is responsible for automatically demoting their account to an unpaid member. If the member is lifetime, the chapter officers are responsible for this demotion. The user will retain their membership as long as they are actively using it at UTA, even if they have already graduated. The next type of role is chapter officer. These roles are given by the website administrators. The final role is administrator. Chapter officers and administrators have all levels of each layer available to them.

The Authentication layer has access to the View layer's and Database layer's API and can read and write to those layers.

2.3 RESOURCE LAYER DESCRIPTION

The Resource layer is responsible for the uploading and downloading of resources. These resources are blog posts, course information such as notes, lectures, and lecture videos, along with anything else the account can upload or download. This is the layer where the user communicates directly with the database.

Its API's take write information from the View layer and sends back the updated view. The Resource layer can also read and write to the database. Note that the only way the View layer has access to the Resource layer is if the user has the correct role.

2.4 DATABASE LAYER DESCRIPTION

The Database layer holds all of the website related information such as user accounts, entries, and uploaded resources. The Database layer has APIs that can read and write information to it. This layer gives read and write access to the Resource and Authentication layers, but only provides read access to the View layer.

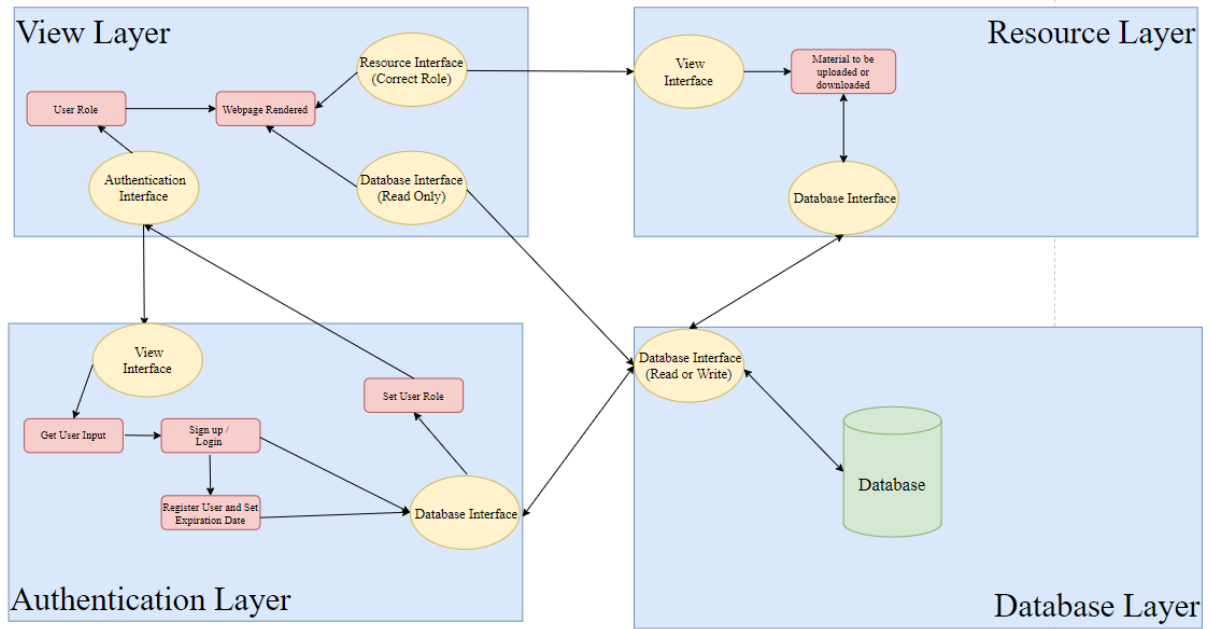# 3   SUBSYSTEM DEFINITIONS & DATA FLOW

Figure 2: Layers and Subsystems

4 VIEW LAYER SUBSYSTEMS

The View layer has 5 subsystems, 2 of which contain the state of the subsystem and 3 of which are interfaces to other layers. The web page rendered is the core responsibility of this layer. The web page's state depends on the User Role, Resources, and Database. The User Role determines whether user have the option to post blogs and can upload or download resources. The Resource interface will provide an API to users to upload or download materials. The web page is constantly monitoring the state of the Database and will do automatic updates to the main web pages and calendar.

4.1 USER ROLE SUBSYSTEM

The User Role subsystem stores the user role and gives that information to the web page subsystem. This information changes the way the web page will be rendered and what web pages the user can access. The User Role is set by the Authentication Layer Interface when the user logs in to the website.
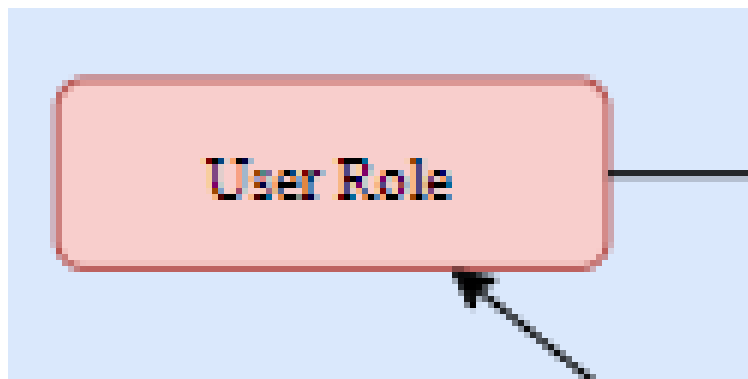
Figure 3: User Role Subsystem subsystem description diagram

4.1.1 ASSUMPTIONS

- The timeout key is determined by the Authentication Layer, not the View Layer.

- All authentication will be done by the Authentication Layer, this subsystem only stores the role.

- This subsystem will not manage the User Role in any way.

- This subsystem will not influence the web page rendered or accessed, that is the responsibility of the Web Page Subsystem

4.1.2 RESPONSIBILITIES

- This subsystem is responsible for storing the User Role.

- This subsystem will give the User Role to the Web Page Subsystem.

- When the timeout key expires, the User Role will update to the appropriate role.

- The default User Role is unpaid member.

4.1.3 Subsystem Interfaces

Table 2: User Role Interfaces

ID	Description	Inputs	Outputs
#01	Obtain User Role from Authentication Layer Interface	Input from Authentication Layer Interface	N/A
#02	Give User Role to Web Page Subsystem	N/A	Output to Web Page Subsystem

4.2 Web Page Subsystem

The Web Page Subsystem is in charge of storing the state of the web page and rendering it to the website. This subsystem takes in information from other subsystems, such as the User Role, the state of the Database, and the Resource Layer Interface. This subsystem, however, does not write to any other part of the system. It can navigate to other layers, such as accessing the Authentication Layer when a user signs up or logs in, or accesses the Resource Layer when a user wants to upload and download material.
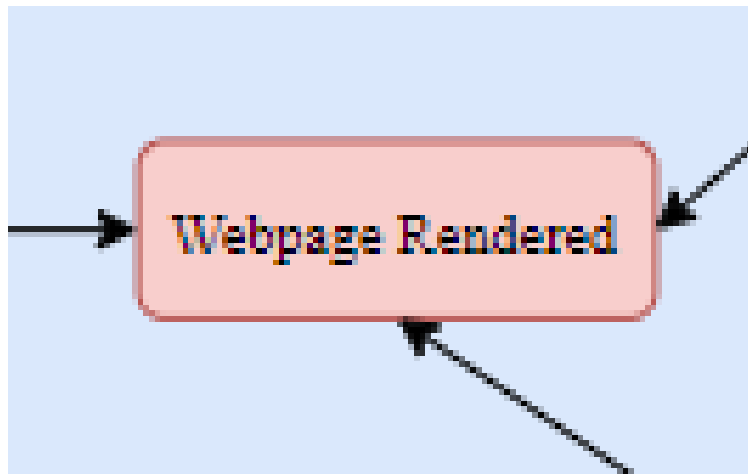
Figure 4: Web Page Subsystem subsystem description diagram

4.2.1 Assumptions

- This subsystem gets information from the User Role, Database, and Resources.
- This subsystem can access all other layers at any time.

4.2.2 Responsibilities

- This subsystem is responsible for rendering the web page based on the current state of the website.
- This subsystem will render the appropriate page based on the user's device.
- This subsystem can navigate and access all of the other layers based on the web page.

- This subsystem does not directly write information to the system.

- The web page rendered will be updated automatically according the changes in the other layers.

4.2.3 SUBSYSTEM INTERFACES

Table 3: Web Page Interfaces

ID	Description	Inputs	Outputs
#01	Obtain user role from User Role Sub-system	Input from User Role Subsystem	N/A
#02	Obtain resources from Resource Layer	Input from Re-source Layer Interface	N/A
#03	Obtain state of the Database	Input from Database Layer Interface	N/A

4.3 RESOURCE LAYER INTERFACE

The Resource Layer Interface retrieves the API from the Resource Layer to the View Layer. It provides access to materials other users uploaded to the Database, such as blog posts, course information like notes and lectures, and other materials. The Web Page Subsystem takes input from this subsystem when it needs to render these blog posts or materials, or it uses this subsystem when a user wants to upload or download materials. This interface acts as a direct connection to the database.
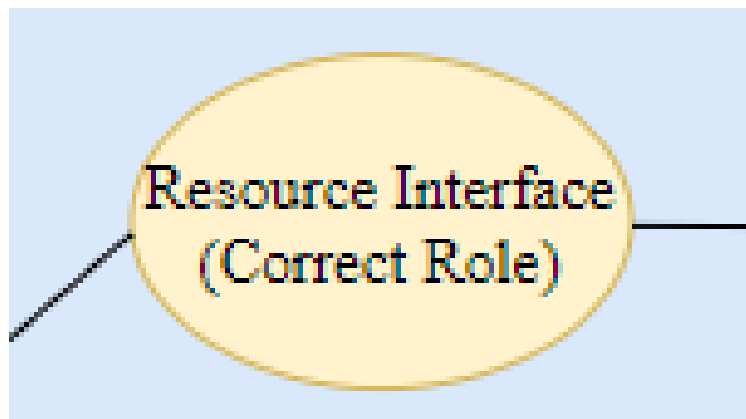

Figure 5: Resource Interface Subsystem subsystem description diagram

4.3.1 ASSUMPTIONS

- This will not check for user role when asked for resources.

- Maintains a connection to the database.

4.3.2 RESPONSIBILITIES

- Will give resources such as blogs and course materials or other uploaded materials.

- Will give an API for downloading resources.

- Will give an API for uploading resources.

4.3.3 SUBSYSTEM INTERFACES

Table 4: Resource Layer Interfaces

ID	Description	Inputs	Outputs
#01	Obtain User Role from Authentication Layer Interface	Input from Resource Layer Interface	N/A
#02	Give User Role to Web Page Subsystem	N/A	Output to Web Page Subsystem

4.4 AUTHENTICATION INTERFACE

The Authentication Layer Interface is responsible for giving an API to the View Interface for user authentication. This subsystem gets accessed when a user logs in or signs up for the website. The Authentication Interface also sets the User Role given from the Authentication Layer.
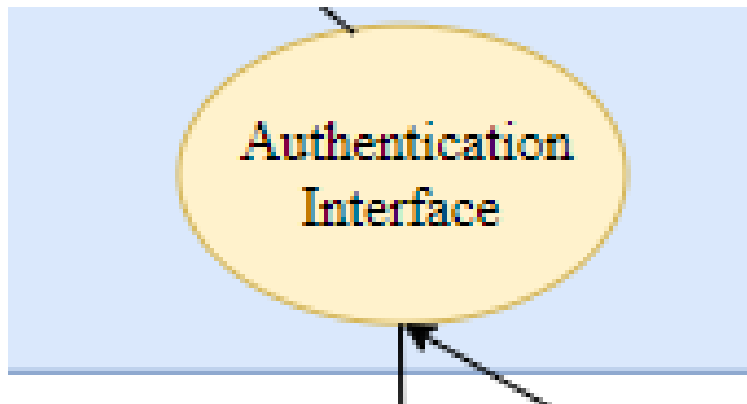

Figure 6: Authentication Interface Subsystem subsystem description diagram

4.4.1 ASSUMPTIONS

- The Authentication Layer is accessible at any point, meaning the user can log in or sign up at any time.

4.4.2 RESPONSIBILITIES

- Return and set the User Role.

- Set the expiration time on the User Role.

4.4.3 SUBSYSTEM INTERFACES

Table 5: Authentication Layer Interfaces

ID	Description	Inputs	Outputs
#01	Obtain User Role from Authentication Layer	Input from Authentication Layer	N/A
#02	Give User Role to User Role Subsystem	N/A	Output to User Role Interface
#03	Go to Login and Sign Up System in Authentication Layer	N/A	Output to Authentication Layer

4.5 DATABASE INTERFACE (READ ONLY)

The Database Interface allows the View Layer to continuously receive information from the Database. The View Layer will also be notified of any updates to the Database and update the rendering of the web page based on that update. For example, if a UTA ACM officer updates an event on the Home page, then the View Layer will be notified of it and update the Home page. The View Layer does not have write access to the database as its purpose is to hold the state of the web page and render it.
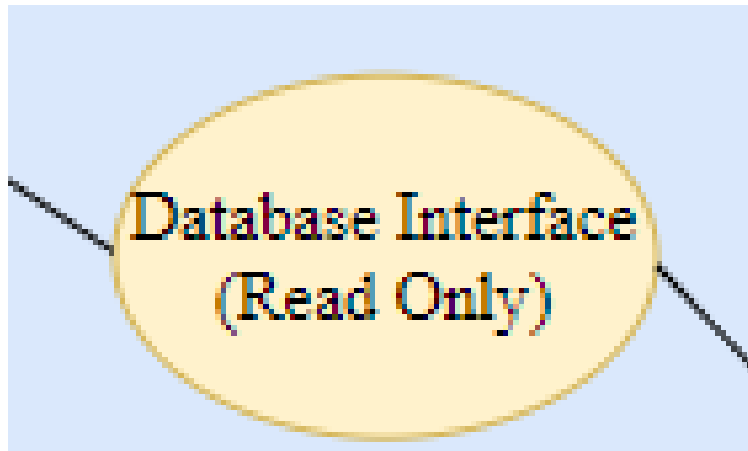

Figure 7: Database Interface Subsystem subsystem description diagram

4.5.1 ASSUMPTIONS

- The View Layer will always have a connection to the Database.

- The View Layer will only read data from the Database.

4.5.2 RESPONSIBILITIES

- The View Layer will continuously update it pages based on information in the Database

4.5.3 SUBSYSTEM INTERFACES

Table 6: Database Interfaces

ID	Description	Inputs	Outputs
#01	Obtain Data from the Database	N/A	Database Layer Interface
#02	Give Data to Web Page Subsystem	N/A	Output to Web Page Subsystem

5 Authentication Layer Subsystems

5.1 View Layer Interface

The view interface subsystem is the basic login/registration view of the website. This subsystem is the part of authentication layer as it is the first step in user authentication/registration.
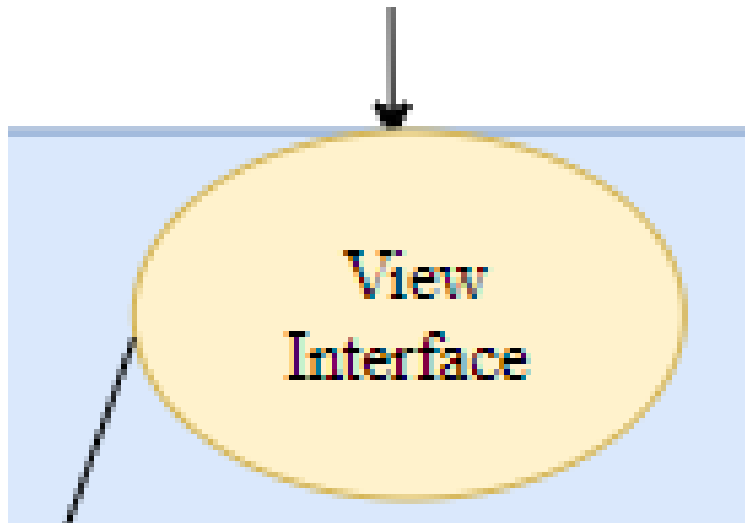

Figure 8: View Layer Interface description diagram

5.1.1 Assumptions

- It is assumed that the login/registration page is always available

- The database and file system is always available and has a steady connection to website

5.1.2 Responsibilities

This subsystem will display the login or registration page stored in the website. The user will give input to the system and will be able to login or register for the website.

5.1.3 Subsystem Interfaces

Table 7: View Layer Interfaces

ID	Description	Inputs	Outputs
#01	Display user login/registration form for the user to provide input		Display input fields for the user

5.2 User Input Subsystem

This subsystem will take input from the user to complete registration/login. The function of this subsystem is based on what user chooses(login or registration).

5.2.1 Assumptions

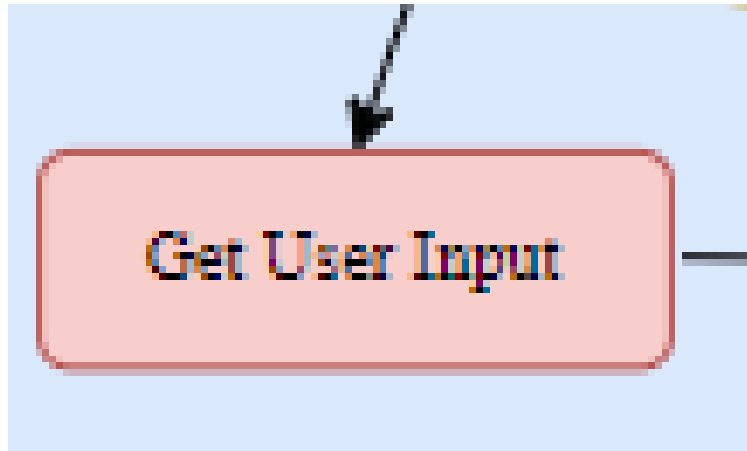- It is assumed that the database is fully functioning and connected

Figure 9: User Input description diagram

5.2.2 RESPONSIBILITIES

This subsystem will take user input(login credentials or user information) and authenticate the inputs.

5.2.3 SUBSYSTEM INTERFACES

Table 8: User Input Interfaces

ID	Description	Inputs	Outputs
#01	Display login page with username and password field	username password	None
#02	Display registration form	User information	none

5.3 SIGN UP OR LOGIN SUBSYSTEM

This subsystem is the main authentication system of the website. When the user inputs is taken, this subsystem authorizes the user with the database system and allow access to the website.
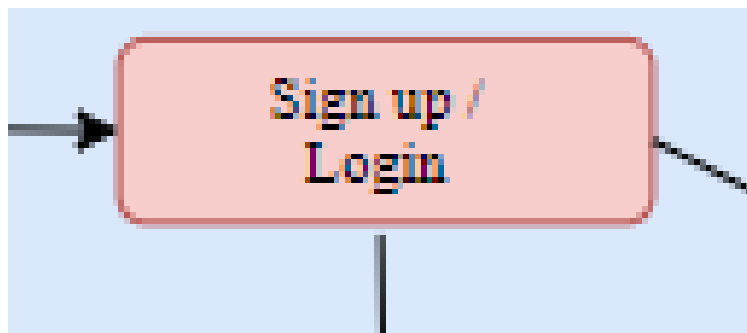

Figure 10: Sign Up Or Login description diagram

5.3.1 ASSUMPTIONS

- It is assumed that the user input subsystem is tested and the user inputs are valid in terms of input types.

- The database is connected and fully functioning.

5.3.2 RESPONSIBILITIES

This subsystem takes the user input data and validates against the website when the user is logging in. If the user is registering to use the website, it creates a new profile in the database with the user data.

5.3.3 SUBSYSTEM INTERFACES

Table 9: Sign Up Or Login interfaces

ID	Description	Inputs	Outputs
#01	The user data is validated against database	User credentials user information	success/failure message

5.4 REGISTER USER SUBSYSTEM

This subsystem registers user and sets expiration date on the user accounts. The users can be a member of ACM at UTA as long as they are a part of UTA.
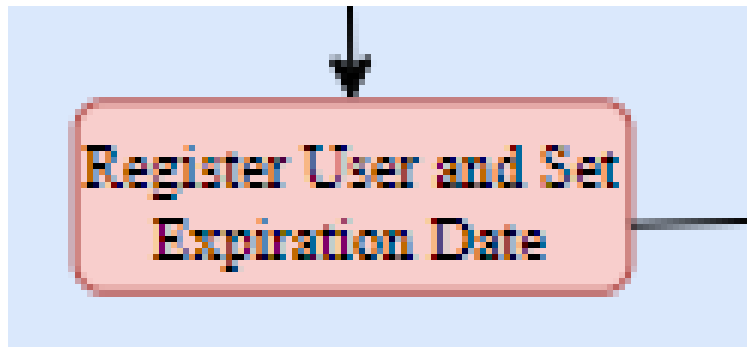

Figure 11: Register User description diagram

5.4.1 ASSUMPTIONS

- It is assumed that the user registering to website is currently a part of UTA.

- The database is connected and fully functioning.

5.4.2 RESPONSIBILITIES

This subsystem registers a user if they are trying to register for an account at this website. When the user is registered, the student accounts will have an expiration date. For regular paid users, the expiration date is every year. The users with lifetime membership will have a validity of four years (the time at UTA before graduating).

5.4.3 SUBSYSTEM INTERFACES

Table 10: Register User Interfaces

ID	Description	Inputs	Outputs
#01	Take user info from subsystem User input and store it in database	user information type of membership	none
#02	Retrieve data from database for member validity	Member type	N/A

5.5 SET USER ROLE SUBSYSTEM

This subsystem sets user roles in the website. There are different user roles as described in the overview of the system. When the user registers for the website, user role is set on the basis of paid/unpaid memberships, ACM officers and administrator.
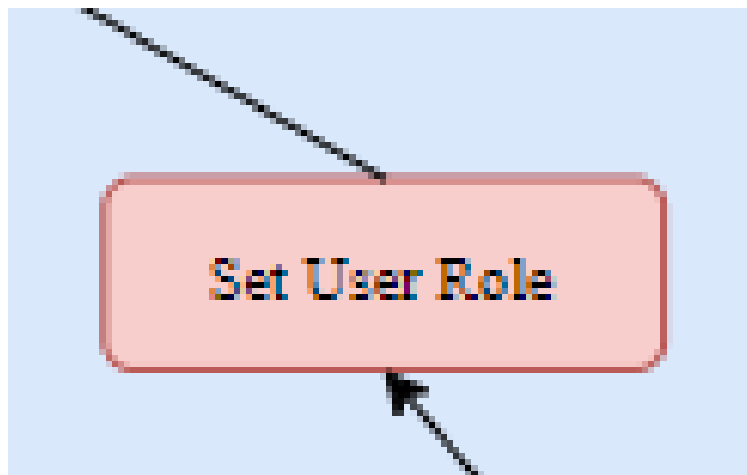

Figure 12: Set User Role description diagram

5.5.1 ASSUMPTIONS

- It is assumed that the database is connected and fully functioning.

- The user is valid and will have some role in the website.

- The user role is unpaid member by default.

5.5.2 RESPONSIBILITIES

This subsystem will create an object with user role and sets it a unique role from the class of user roles. The user role once set can be managed later based on the membership type.

5.5.3 SUBSYSTEM INTERFACES

Table 11: Set User Role Interfaces

ID	Description	Inputs	Outputs
#01	Create a user object and set a user role value	User type and user id	N/A

5.6 DATABASE LAYER INTERFACE

The database interface subsystem is the major point of user verification, and records storage. This subsystem will be able to check the credentials of the user, register a user to the website and provide other subsystems with user attributes.
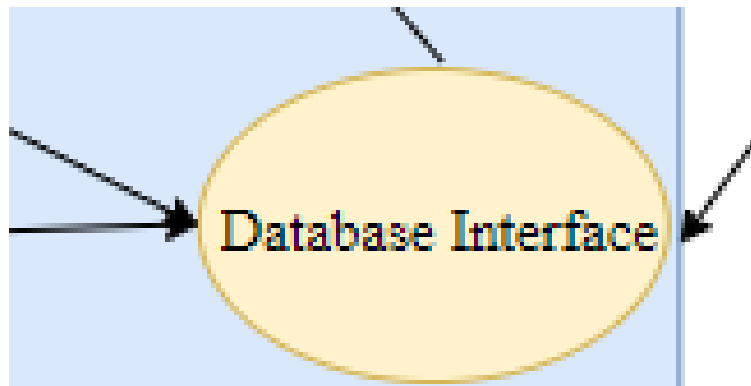

Figure 13: Database Layer Interface description diagram

5.6.1 ASSUMPTIONS

- It is assumed that the database is connected to other requiring subsystems

5.6.2 RESPONSIBILITIES

The database subsystem will act as a verification point for the users. The validity of users is checked against the database records and will grant or deny access for the resources and contents of the website. This subsystem will also provide validation service for other subsystems in other layers of the website.

5.6.3 SUBSYSTEM INTERFACES

Table 12: Database Layer Interfaces

ID	Description	Inputs	Outputs
#01	Validate user login/bus	user credentials	login success/failure
#02	Set user roles in a record	User membership type	N/A

6 RESOURCE LAYER SUBSYSTEMS

The Resource layer has 3 subsystems, 2 of which are interfaces to other layers and 1 that contains the state of the subsystem. The View Interface Subsystem obtains the files from the Materials Subsystem to display to the user for viewing or downloading. The Materials Subsystem obtains files from the user to send to the Database Interface Subsystem. In addition, it retrieves files from the Database Interface Subsystem to provide a download link for the users to access. The Database Interface Subsystem obtains files from the Materials Subsystem to send to the Database layer. Also, it retrieves files from the Database layer to send to the Materials Subsystem.

6.1 VIEW INTERFACE

The View Subsystem will obtain data from the Materials Subsystem for users to view and download files uploaded by other users.
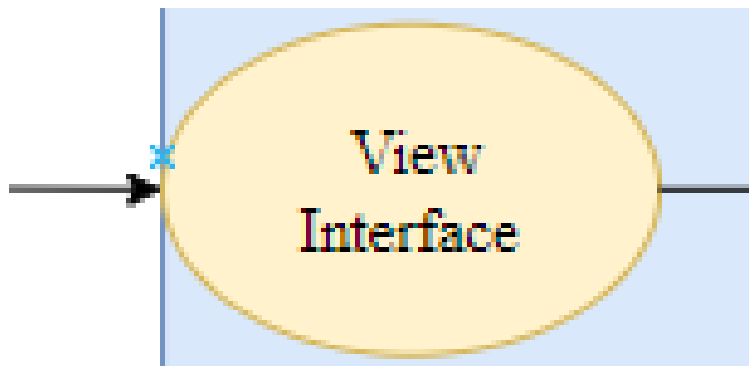

Figure 14: View Interface subsystem description diagram

6.1.1 ASSUMPTIONS

- The view interface will continuously obtain data from Material Subsystem

- Users can view the files uploaded by other users

6.1.2 RESPONSIBILITIES

- Display files to the user

- Obtain files from the Materials Subsystem

6.1.3 SUBSYSTEM INTERFACES

Table 13: View interfaces

ID	Description	Inputs	Outputs
#01	Retrieve files from the Material Sub-system	N/A	Display file to users to view or download

6.2 MATERIALS SUBSYSTEM

The Materials subsystem stores files provided by the user to the Database Interface Subsystem. In addition, the subsystem retrieves files from the Database Interface Subsystem. These files can be accessed or viewed by other members.
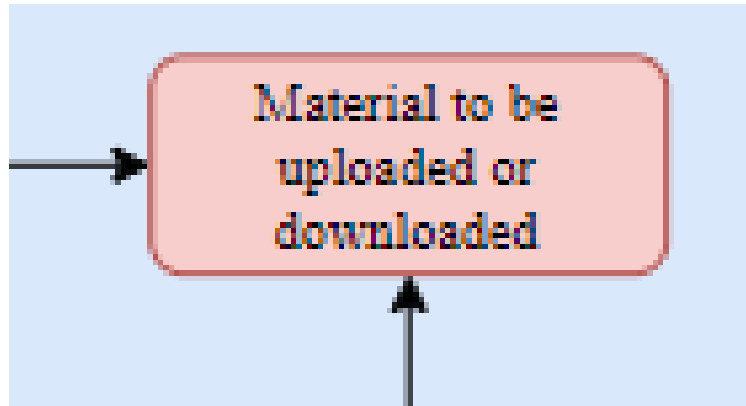

Figure 15: Materials subsystem description diagram

6.2.1 ASSUMPTIONS

- This subsystem will retrieve files from the Database Interface Subsystem.

- This subsystem will send files to the Database Interface Subsystem.

- This subsystem will support all file types uploaded to the Database Interface Subsystem.

6.2.2 RESPONSIBILITIES

- Retrieve files from the user

- Send files to the Database Interface Subsystem

- Retrieve files from the Database Interface Subsystem

- Provide a link to the users to download files from the Database Interface Subsystem

6.2.3 SUBSYSTEM INTERFACES

Table 14: Material interfaces

ID	Description	Inputs	Outputs
#01	Obtain Data from Database Interface	N/A	File to the user
#02	Give Data to the Database	Receive files from user	Output file to the Database Interface Subsystem

6.3 DATABASE INTERFACE

The Database Interface allows the Material Subsystem to send and retrieve files to the Database Interface subsystem in the Database layer.
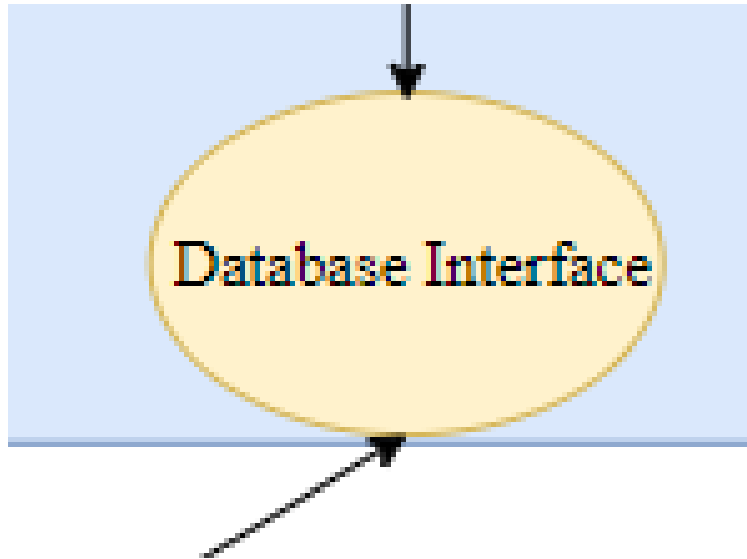
Figure 16: Database Interface subsystem description diagram

6.3.1 ASSUMPTIONS

- The Resource layer will always have a connection to the Database.

- The Resource layer will read and write data from the Database.

6.3.2 RESPONSIBILITIES

- The Resource layer will add files to the Database based on user input.

- The Resource layer will request files to be downloaded from the Database.

6.3.3 SUBSYSTEM INTERFACES

Table 15: Database interfaces

ID	Description	Inputs	Outputs
#01	Obtain Data from Database	N/A	Database Layer Interface
#02	Give Data to the Database	Receiving files from user	Output files to the Database interface in the Database layer

7 DATABASE LAYER SUBSYSTEMS

The Database layer has two subsystems, one being the database interface and the other being the database itself. The database interface (nodeJS server) is is able to read and write to the database. The database is the other subsystem which will hold all of the information for the website using MySQL.

7.1 DATABASE INTERFACE

The Database Interface allows the Database Layer to update information to the Database. Information can come in and out from the database layer to the authentication, resource, and view layer. The view layer can read information from the database layer. While both authentication and resource layer can both pull and write information into the database interface to the database layer.
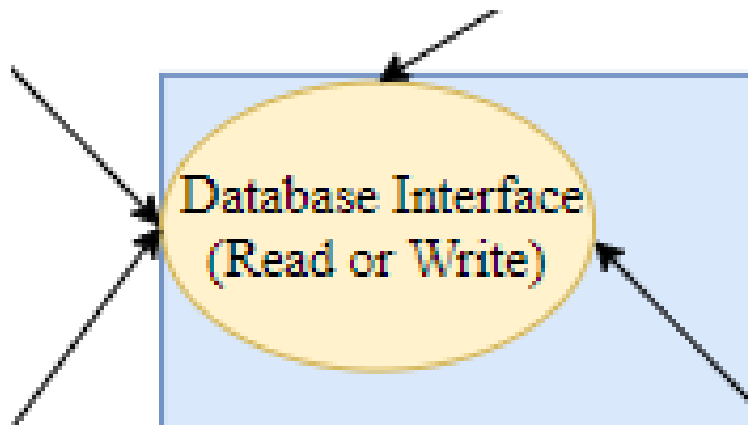

Figure 17: Database Interface description diagram

7.1.1 ASSUMPTIONS

- The Database layer will be connected to the other three layers (View layer, Authentication layer, and Resource layer).

- The Database interface should be able to read and write to the database.

7.1.2 RESPONSIBILITIES

- The Database interface will update it's content based on the information from the other three layers.

- The Database interface will provided information from the database layer to the other three layers based on need.

7.1.3 SUBSYSTEM INTERFACES

Table 16: Database Layer Interfaces

ID	Description	Inputs	Outputs
#01	Obtain data from Resource layer	Data	Add data to the database
#02	Provide data to Resource layer	Data	Provided data
#03	Obtain data from the Authentication Layer	Data	Add data to the database
#04	Provide data to the Authentication layer	Data	Provided data
#05	Provide data from View layer	Data	Provide data to the View Layer

7.2 DATABASE

The Database subsystem will store information from the database interface which is connected to the other three layers.
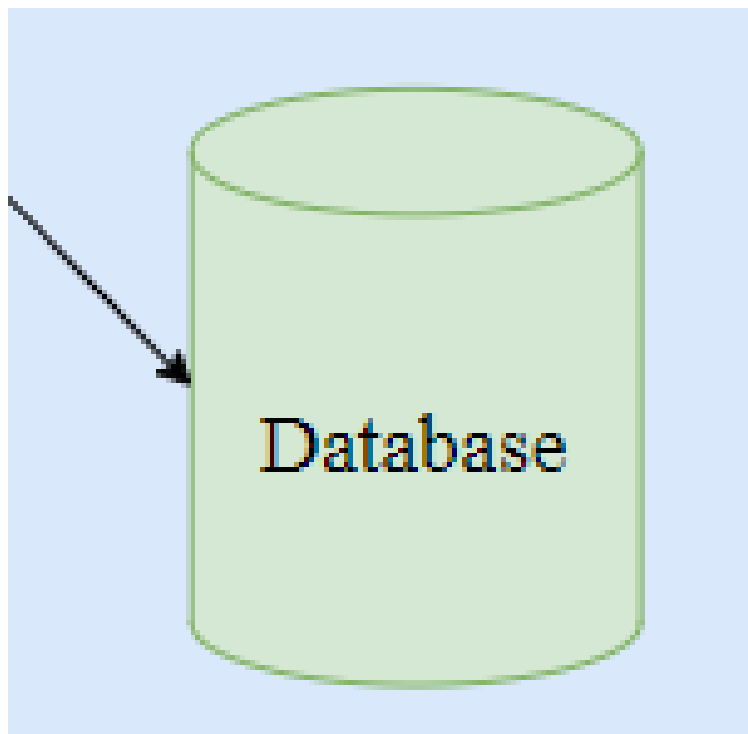

Figure 18: Database description diagram

7.2.1 ASSUMPTIONS

- The Database will store information from the other three layers (View layer, Authentication layer, and Resource layer).

- The Database should be able to provide information.

7.2.2 RESPONSIBILITIES

- The Database will update it's content based on the information from the database interface.

- The Database will provided information to the database interface based on its needs.

7.2.3 SUBSYSTEM INTERFACES

Table 17: Database Interfaces

ID	Description	Inputs	Outputs
#01	Obtain data from database interface	Data	Add data to the database
#02	Provide data to database interface	Data	Provided data from database

REFERENCES