SOFE 3650U Software Design and Architecture

Iteration 2 of Art Gallery Project

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Project Use Cases:

Use Case	***Description***
UC-1: Information Page	A user can access the information about the art gallery website, history of art gallery website, and the events of the upcoming art gallery and its location Administrator can update this information, upload new information, new events description.
UC-2: Buy or Sell Arts	A user can buy art pieces from the sales page and can select the quantity required to buy. Administrator has the access the to update the art pieces for selling. Administrator can also buy the art pieces from the artists.
UC-3: Make Payment	A user can use the different payment methods to buy the desired art pieces. Administrator can buy art from the users that are selling the art pieces by making payment through this method.
UC-4: Contact Art Gallery	A user can provide feedback, express concerns, make a complaint regarding the services provided at art gallery website through Art Gallery contact page. A customer service representative can see the complaints and concerns of the users through art gallery contact page and can access them accordingly.
UC-5: Collection Page	A user can see the different art pieces listed on the collection page. Collection Page is only meant to display the art pieces. Users can access this page free of cost. Administrator can remove, add or modify the art pieces on this page.
UC-6: Manage Users	The administrator removes or adds the users. Administrator can modify the permissions of the users. User can be removed for a limited period or permanently by the administrator .
UC-7: Login and Logout	A user login into the system through a password /login page will be promoted when the user clicks on sign in. Once the user has been authorized the access to the art gallery, user can navigate the art gallery website according to the roles. Administrator have access to the login and passwords of every user of the art gallery website.
UC-8: Manage Art Gallery	Administrator have access to the art gallery and manages the amount of art pieces displayed, any information or issues related to the art gallery. Technician manages the art gallery by fixing the concerns related to the art gallery functioning. Technician is responsible for the overall maintenance of the art gallery website.

Quality Attributes :

Quality Attribute	Description	Associate Use Case(s)
QA-1: Performance	The User should not experience delays of more than 5 seconds in retrieving information from the site.	All UC
QA-2: Usability	The User has many methods of paying for the art they desire. The system should reflect this and offer many payment methods (bank transfer, e-transfer, cash by mail etc…)	UC-3
QA-3: Testability	The system may sometimes receive invalid inputs. The system should be able to process these inputs within 10 seconds per invalid input.	All UC
QA-4: Security	User's will store private financial information on thesite to buy and sell art. Therefore, the system should encrypt the private information of its users like login and financial info.	All UC
QA-5: Modifiability Usability	The system administrator should be able to modify theart gallery.	UC-1, UC- 2, UC-5, UC-8
QA-6: Testability	The system must be able to complete art transactions	All UC
QA-7: Availability	The system must continue to operate and be available all the time. For UC-4 availability must be predefined	All UC
QA-8: Interoperability	The system must exchange data with external systems such as banking services and online payment providers	UC-3
QA-9: Performance	The users can see new art pieces withing thirty minutes from an update by the administrator.	UC-5
QA-10: Security	The management can easily find out the different modes of payments and which users have made the payments	UC-3
QA-11: Security	The administrator can decide which users can be added or removed from the art gallery due to any security concerns which might be temporary or	UC-6

Constraints:

Constraint	Description
CON-1	The system must be accessible and run smoothly by all popular web browsers (mozilla, chrome, edge etc...) and all popular operating systems (Windows, mac os x). Additionally, the system must also support mobile devices.
CON-2	All user data including financial and transactional records must be stored indefinitely.
CON-3	The system must have a mobile-friendly design.
CON-4	The system must work properly when viewed with different resolution monitors. The system must work when the view is stretched or shrunk.
CON-5	All art uploaded to the system must have the authors permission.

Iteration 2: Identifying Structures to Support Primary Functionality

The goal of this iteration is to reason the units of implementation. This will affect the team's formation , interfaces and means by which the development task may be implemented .

Step 2: Establish Iteration Goal by Selecting Drivers

The goal of this iteration is to address the general architectural concern of identifying structures to support primary functionality. Keeping this in mind, the following drivers that we as the architects must account for:

- UC-2: Buy or Sell arts: This directly supports the core of the project through the purchasing of art pieces and the ability to add to the database by the administrator
- UC-5: Collection Page: This directly supports the core of the project through the ability to modify the art piece collections page
- UC-8: Manage Art Gallery: This directly supports the core of the project through the ability to modify the art pieces database. It also supports modifiability of the back end with a technician

Step 3: Choose One or More Elements of the System to Refine

The elements that are to be refined are those that are directly associated with the different layers that were previously defined by the reference architectures. Specifically, the main functional requirements must be refined in reference to the architecture designed in iteration 1.

Step 4: Choose One or More Design Concepts That Satisfy the Selected Drivers

Selected design concepts

Design Decisions and Location	**Rationale and Assumptions**
Create a Domain Model for the application	A Domain Model is useful for the system to identify major entities and their relationships within the domain. The Domain Model always exists within a system, however, the earlier it is designed the easier it becomes to understand. So, an initial Domain Model must be created early in the design process.
Identify Domain Objects that map to the functional requirements	After the initial Domain Model, each Domain Object must then be identified and encapsulated in its own building block.
Decompose Domain Objects into generalized and specialized Components	Once the Domain Objects have been identified and encapsulated, they must be specialized into modules and components that are specific to the layer they are located in.

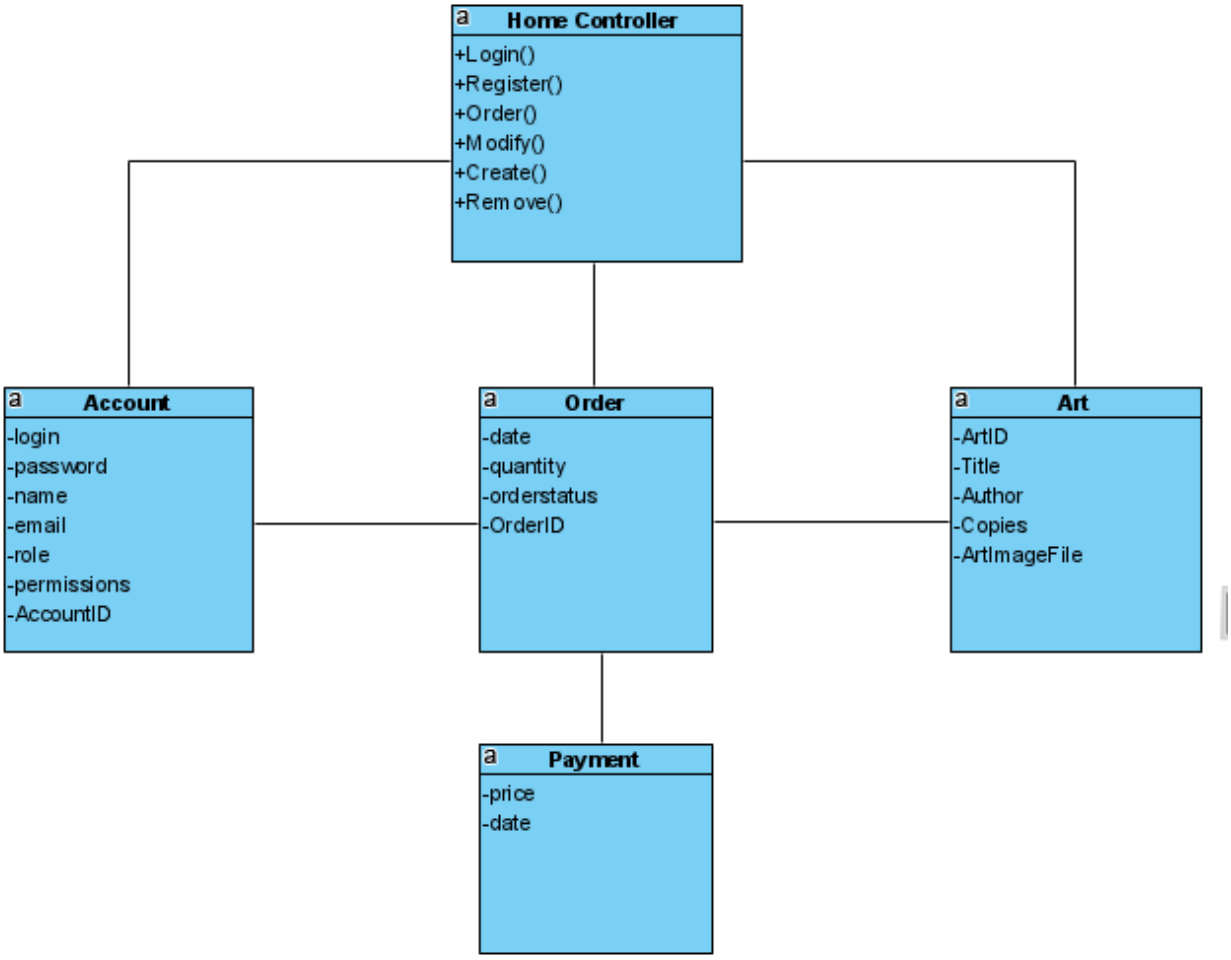
Step 5: Instantiate Architectural Elements, Allocate Responsibilities, and Define Interfaces

Design Decisions and Location	**Rationale**
Create only an initial domain model	An initial domain model is created to accelerate this design phase. In this domain model, the entities of the primary use cases are identified and modeled .
Map the system use cases to domain objects	System's use cases are analyzed to identify domain objects associated with primary use cases.
Decompose the domain objects across the layers to identify layer-specific modules with	This method of working confirms that the module that maintains all of the features are

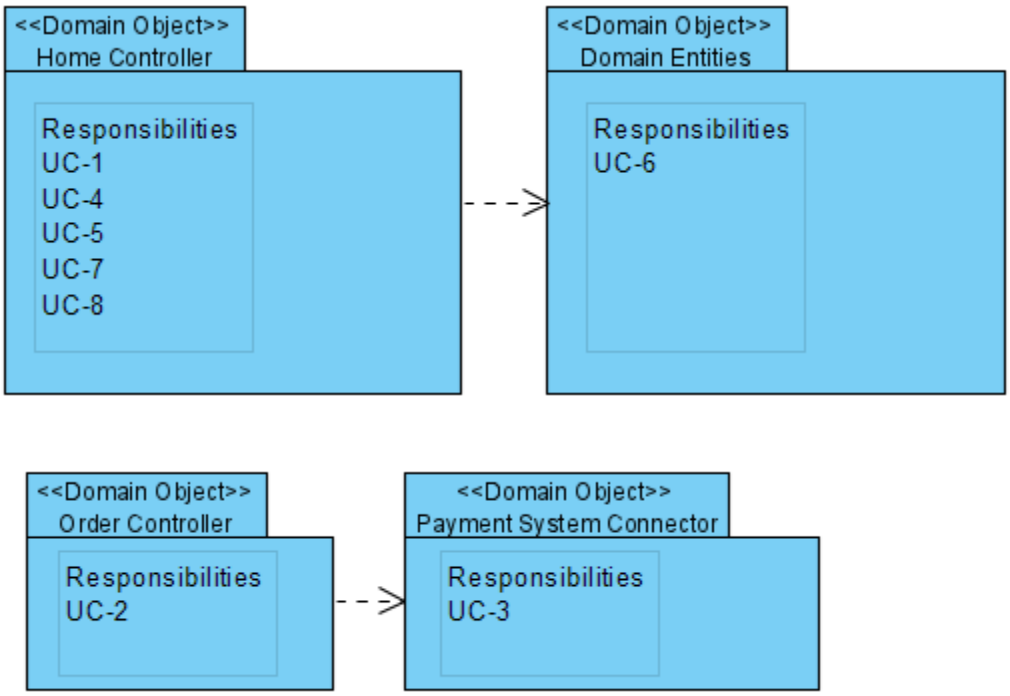
an explicit interface	recognized. The use case will be handled by the architect. This helps the remaining team members to identify the module, which allows the work to be equally distributed.

Step 6: Sketch Views and Record Design Decisions

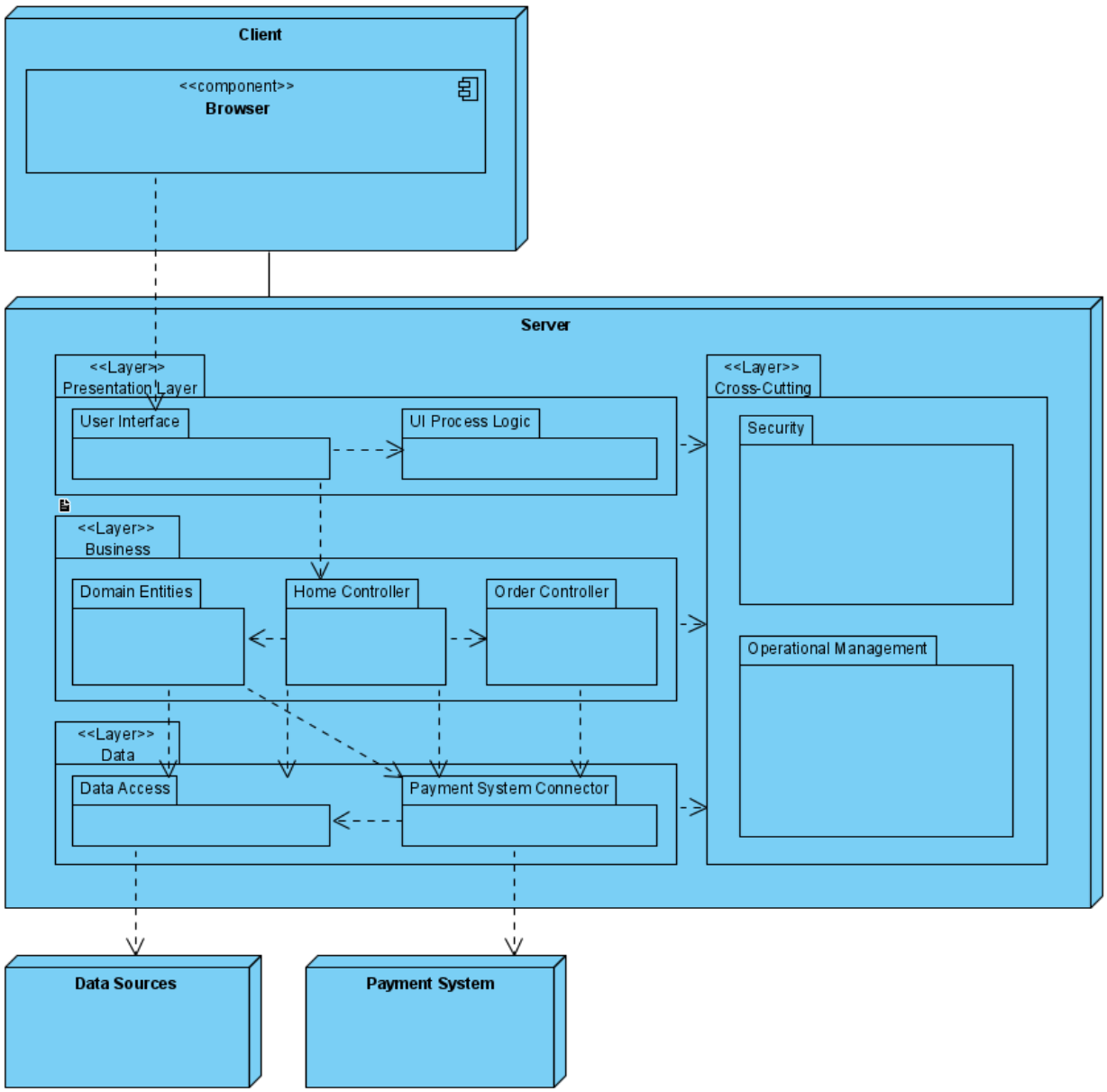
Initial Domain model for the system encapsulating some use cases:



Domain Objects for some use cases.



Module view with modules that support primary use cases:

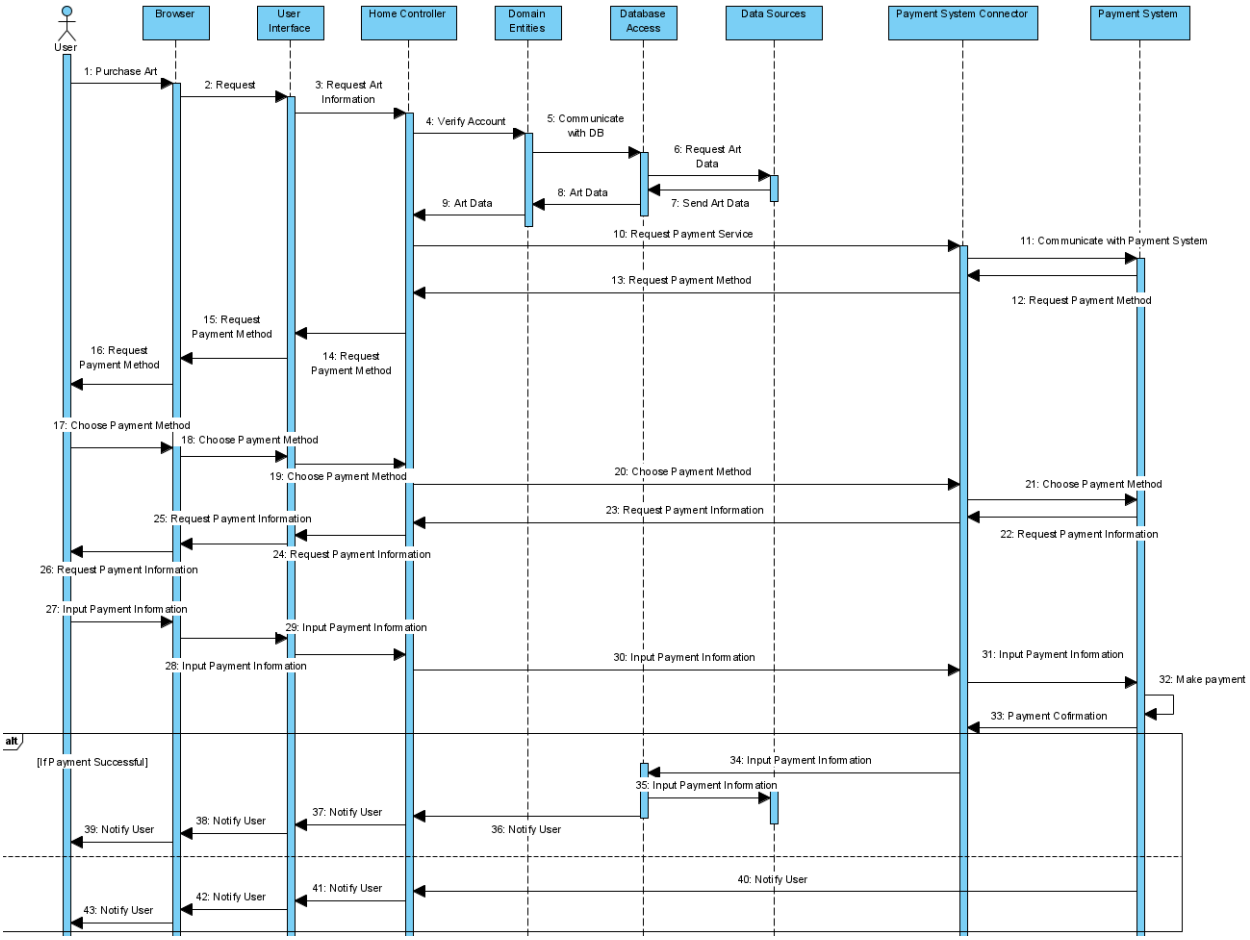


Element	Responsibility
Browser	Application module that is used by the client to interact with the server applications to provide or display information. Runs on the client machine
User Interface	These components are responsible for receiving/sending information to the users through inputs like buttons, text fields, etc...
UI Process Logic	These components are used to direct the flow of the applications use cases. This can include data validation, providing data from business layer to presentation layer, etc...

Domain Entities	Contains the entities from the domain model. These include account processing, registration, etc...
Home Controller	Contains business logic pertaining to most use cases of the system. This includes logging in, registering, modifying the art gallery, etc… (UC-1, UC-4, UC-5, UC-7, UC-8)
Order Controller	This controller processes business logic pertaining to the ordering of artwork (UC-2)
Data Access	This module encapsulates persistence mechanisms to provide basic operations like retrieving and storing data
Payment System Connector	This connector is responsible for communication between the order controller and the external payment system, in other words a service agent
Security	These components include functionality to handle security aspects such as authorization and authentication
Operational Management	These components handle cross-cutting concerns such as exception management, logging, and instrumentation and validation

Sequence Diagrams for primary use cases:

UC-2: ***Buy or Sell Art***

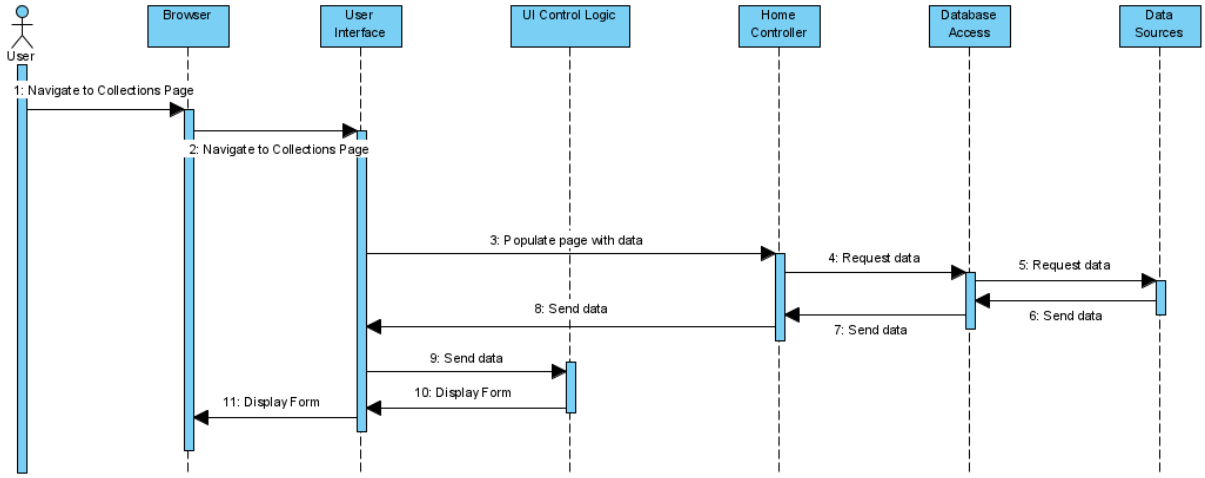


Method	**Description**
Element: Browser	
Request	Browser is requesting the information pertaining to the art requested by the user
Choose Payment Method	Payment System asks user what payment method they would like to use, then user selects from given list and browser is passing along parameters
Input Payment Information	User inputs information for given payment method and browser is passing along parameters
Element: User Interface	

Request Art information	User interface is requesting the information pertaining to the art requested by the user to display to send to the browser
Choose Payment Method	User Interface is passing parameters of payment system chosen to payment system connector
Input Payment Information	User Interface is passing parameters of payment information to payment system connector
Element: Home Controller	
Verify Account (Request Art Information)	This method verifies that the user account is valid with the account management system in Domain Entities and requesting art information through that
Element: Domain Entities	
Communicate with DB	This method requests art information that the user requested to purchase
Element: Database Access	
Request Art Data	This method requests art information that the user requested to purchase
Input Payment Information	Access Database to input payment information (invoice etc)
Element: Payment System Connector	
Communicate with Payment System	Connect to the external Payment system Application
Choose Payment Method	Transfer user inputted information to the Payment System Application
Input Payment Method	Transfer user inputted information to the Payment System Application
Input Payment Information	Transfer information from payment (invoice etc) to the database

Element: Payment System	
Make Payment	Payment System Application uses user inputted information to make a payment

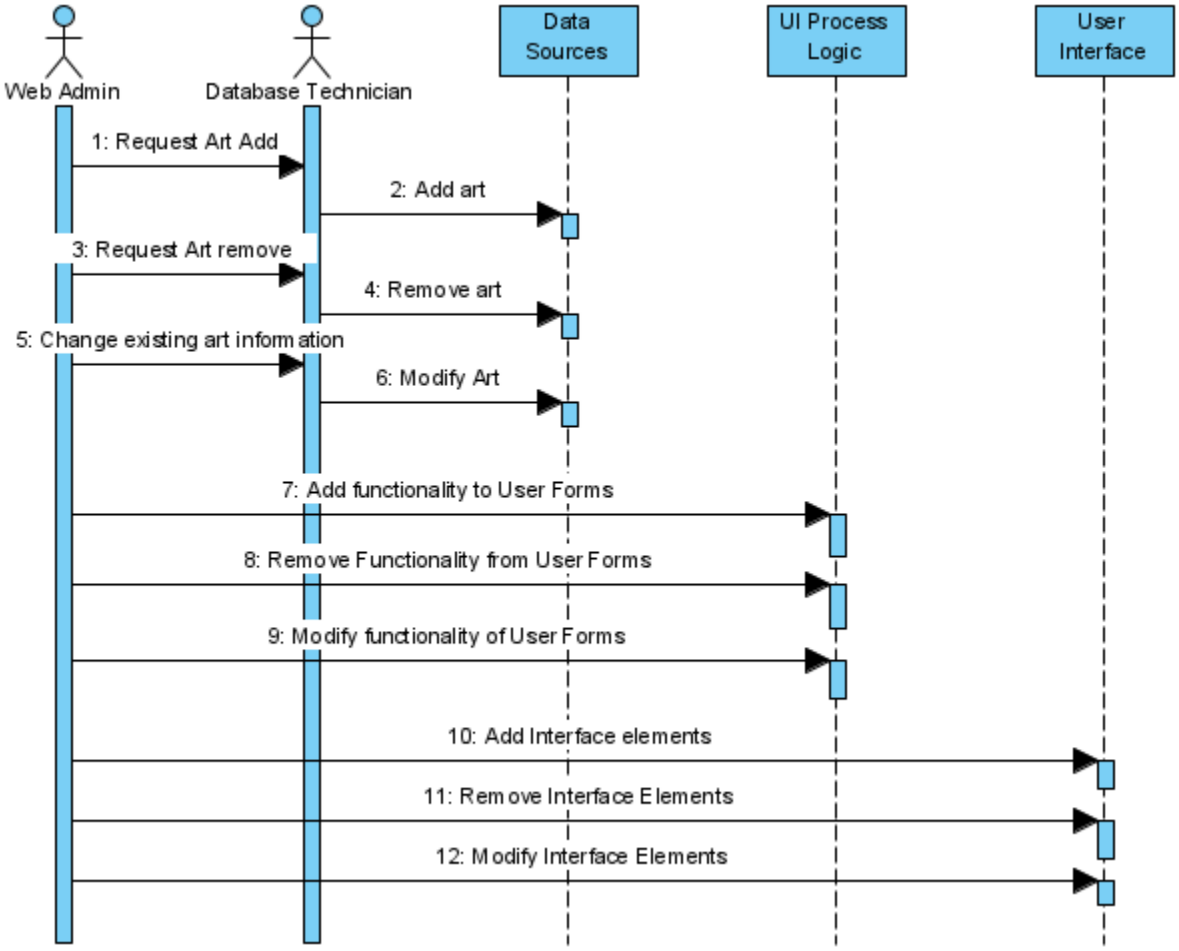
UC-5: ***Collection Page***



Method	**Description**
Element: Browser	
Navigate to Collections Page	This method calls the User Interface to provide a form for the User Interface
Element: User Interface	
Populate page with data	Request information from database to display to the user viewing the collections page
Send data	Send database information to UI Control Logic to receive updated element information
Element: Home Controller	
Request Data	Request information from database
Element: Database Access	

Request Data	Request access to read database information

UC-8: Manage Art Gallery



Method	**Definition**
User: Web Admin	
Request Art Add	Web Admin makes decision about which art to add and then notifies Database Technician
Request Art Remove	Web Admin makes decision about which art to remove and then notifies Database Technician
Change existing art information	Web Admin makes decision about which art to modify and then notifies Database

	Technician
Add functionality to User Forms	Web Admin makes decision about which functionalities should be added to the system and directly accesses the UI Process Logic to add them
Remove functionality to User Forms	Web Admin makes decision about which functionalities should be removed to the system and directly accesses the UI Process Logic to remove them
Modify functionality to User Forms	Web Admin makes decision about which functionalities should be modified to the system and directly accesses the UI Process Logic to modify them
Add Interface Elements	Web Admin makes decision about which interface elements should be added to the system and directly accesses the User Interface to add them
Remove Interface Elements	Web Admin makes decision about which interface elements should be removed to the system and directly accesses the User Interface to remove them
Modify Interface Elements	Web Admin makes decision about which interface elements should be modified to the system and directly accesses the User Interface to modify them
User: Database Technician	
Add art	Database Technician receives information from Web Admin to update database by adding art information
Remove Art	Database Technician receives information from Web Admin to update database by removing art information
Modify Art	Database Technician receives information from Web Admin to update database by modifying existing art information

Step 7: Perform Analysis of Current Design and Review Iteration Goal and Achievement of Design Purpose

The design decisions in this iteration provided an initial understanding of how functionality is supported in the system with regards to the primary functional use cases. Modules associated with the functionality of the system were identified and defined.

Not Addressed	Partially Addressed	Fully Addressed	Rationale
	UC-2		The payment system to pay for art has been implemented, but a system that pays the users selling art on the website must still be implemented to fulfill UC-2.
		UC-5	The collection page is fully implemented as a modifiable page that can be displayed to the user if they wish to browse art on the art gallery
		UC-8	The art gallery is fully modifiable through direct access to the database and the user interface forms are also modifiable directly