Assignment 2: Software Architecture Document

Group 8

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Contents

Documentation Road Map:

This section is a given road map about all the architectural documentation. In this section we provide clear and precise information about the overall sections of the documentation what information they contain and where we can find in the document.

Section Name	Overview
Design Decisions and Rationale	In this section all the decision that are taken for designing and architecture and their rationales are discussed.
Modular View Documentation	This section provides the complete overview of the Module view.
Primary Presentation	In this sectionUML Modular View Diagram is discussed.
Element Catalogue	In this section each element of the system and their properties are discussed.
Element and their properties	In this section, we define all the element in modular view in the system
Relations and their properties	In this section the modules relationship with layers are discussed.
Element interfaces	In this section we discuss all the architectural layers interfaces.
Element Behavior	There are system modules behavior is discussed and how they interact with each other's.
Variability guide	This section discussion the flexibility points in the modular view in the system
Rationale	This section discuss the set of logical decisions in the modular view in the system
Component and Connector Documentation	This section provides the complete overview of theComponent and Connector view.
Primary Presentation	In this sectionUML Component and connector view Diagram is discussed.
Element Catalogue:	In this section each element of the system and their properties are discussed.
Element and their properties	In this section, we define all the element in component and connector view in the system
Relations and their properties	In this section the modules relationship with layers are discussed.
Element interfaces	In this section we discuss all the architectural layers interfaces.
Element Behavior	There are system modules behavior is discussed and how they interact with each other's.
Variability guide	This section discussion the flexibility points in the component and connector view in the system
Rationale	This section discuss the set of logical decisions in the modular view in the system

Views Overview:

Architectural views are the overall representation of a system architecture to the meaning full stakeholders of the system. This is on the architect which view have to be develop and need for the stakeholder to understand and communicate with the system. These views enable stakeholders to verify that system address their concerns.

Architecture of any system can be represented by one or more architectural views. In our system we design two architectural views. Module view and Component-and-Connector (C&C) view.

Module View:

We have selected uses view from the model view because our architecture is layer-based architecture and it will be better to select this architecture because we want to see the interaction of different modules and services and how these layered are interacted. This layer architecture can define by layered architecture.

Component-and-Connector (C&C) Views:

Accordingly, Component &Connector of OTIS, there is an external system having LPROD, LCRM, and DHL Express. External System Connects with OTIS System having a business object Component, Data object component, UI Object component, and reports component. The UI Object connects with the Customer UI to do order tracking, Business object takes all decisions and handles the data from an external system. The data object also connects with the Business object. After a decision, it gives instructions to UI Object and UI Object connects with Reports to generate required report instructions to the system. We also have a web hosting server component and a Database server component they both interact with OTIS System and as well as interact with the Backup server/Log server component.

Design Decisions and Rationale:

When you are going to design the architecture of any system you should take some design decisions. These decisions are taken to achieve the desire goal. Decisions are depending on the design results. we have to make architectural decision on the basis of system primary functionality and some time to achieve the desire quality level of the system. Beyond any software architecture there are several decisions are taken to design the architecture and these decisions are help full to the representations of the elements and this is called rational. Theses decision includes:

- Concept
- Structure
- Relationship
- Resources

Concept:

When you start any design, you have several alternatives for one system. We firstly select the designing concept that states out problem and good for its solution. In our OTIS system

architecture, we select the Module view concept for designing the architecture of the OTIS system.

Structure:

After selecting the desire architectural view for the system next step is to define the structure for the view. We define a complete structure for the OTIS system architectural view as shown below.

Relationship:

When the structure is created then we have to define the retainer ship and different connections of the views in the system. In the OTIS system we show the different kind of relationship of the layers of the views. How there are connected and share data to each other is shown.

Resources:

All the layers in the system require the resources form the system. We allocate the require resources for the applicable layers form the different systems, peoples or any hardware. In the OTIC system we allocate the resources where its need.

Why the selected pattern is appropriate for the problem:

As our prioritized quality attributes are performance, maintainability and availability, our solution would be Layered based system. The layered based architecture system is easy to learn as the time of the developing, testing and deployment time is 6 months. Our developers are already familiar to develop this architecture. This reduces the dependency on the modules/components on each other which increases the cohesion in the system. Cost overhead, testing is low and error handling is relatively easy.

Advantages of your choice:

- This pattern allows for the implementation of any protocol because the protocols are concealed. Thus, I refer it as a generic model. It has the ability to adjust to numerous different regimens.
- Both connection-oriented and connectionless services are supported. So, when reliability is required, we can utilize the connection-oriented paradigm, and when we need faster transfer of data over the internet.
- Following the abstraction principle is this tiered architecture. Other layers are not significantly affected by changes to one layer.
- Compared to bundling all services into a single layer, it is easy to fix and make it available.

Mapping these advantages to your prioritized QAs:

Decisions Benefits	Quality Attributes
System would be available more as error fixing and testing is more easy	Availability
Develop the system in web based (Java) as the developer team is already familiar to the programming paradigm	Performance
Divide the modules into multiple components/modules as the dependency of the modules on each other is relatively low	Maintainability
Develop a database system backup as if database data fails there data restoration	Availability
Develop separate service utility to differentiate the data from multiple components to single database.	Availability
Layered based system provides cohesion in the system as every module/component provides its own functionality	Maintainability

Design Decisions and Rationale:

Design Decisions	Rationale
OTIS system is hosted in a production server and multiple users that are use portal by various departments.	Due to network latency, the overhead brought on by intermediaries who handle communication, anoverall architecture approach in OTIS may have a detrimental effect on the performance of an application. To ensure that the required performance criteria are met, both the user as well as the component provider should indeed carefully develop and assess the architecture.

Divide domain objects into generic and specific components.	Complete functional sets are represented by application components, but these functional sets are maintained by smaller elements that are found inside the layers. In this pattern, the "components" were also what have been referring to it as components. Module specialization is related to the layers in which they are found (e.g., UI modules). There are no great options to breaking down the layers into functional modules.
Information can be attained by using the Mutual Database Integration technique.	The system's interactive component must do database queries. It is possible to think of the system's batch and interactive components as two separate programs (or sub - components) that share data from the same database. In this situation, the common database integration design can be applied to assist the communication between these systems. With this strategy, no modifications to the system's current components are necessary. Discarded alternatives: • Obtaining the data via an API, which calls for changes to the current components and would negatively affect performance.
Create the client application's user interface with the Java Spring boot.	The building project framework. Since the developers were already aware with it, the Java Sprint boot provide maintainability and portability. Discarded alternatives: • Thought was given to using the.Net Core framework, but the programmers lacked sufficient familiarity.

Glossary

[1] H. Cervantes, Designing Software Architectures A practical approch, Addison Wesley, 2016.

[2] L. B. P. Clements, Software Architecture in Practice, 2004.

[3] F. Bachmann, "Managing Variability in Software Architectures".

[4] F. Bachmann, "Documenting Software Architecture: Documenting Behavior," Architecture Tradeoff Analysis Initiative, 2002.

[5] F. Bachmann, "Documenting Software Architecture: Documenting Interfaces," Architecture Tradeoff Analysis Initiative, 2002.

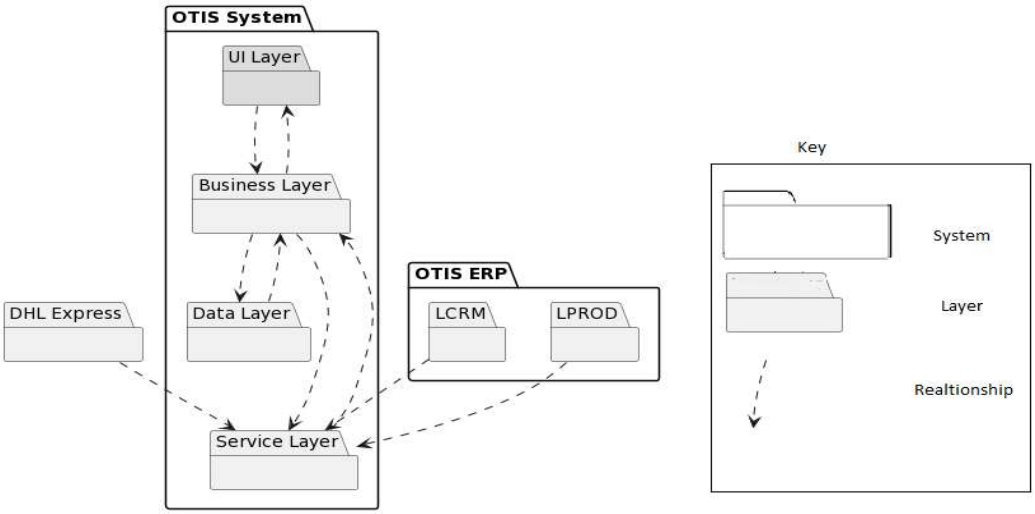
Definitions, acronyms, and abbreviations

Term	Meaning
Lycia	Lycia Company
LRPO	LPROD Lycia Production System
LCRM	Lycia Customer relationship management system
HTTP/HTTPS	Hyper text transfer protocol/ secure hypertext transfer protocol
ORM	Object Relational Mapping
API	Application programming interface
UI	User Interface
QA	Quality Attribute
UC	Use Case

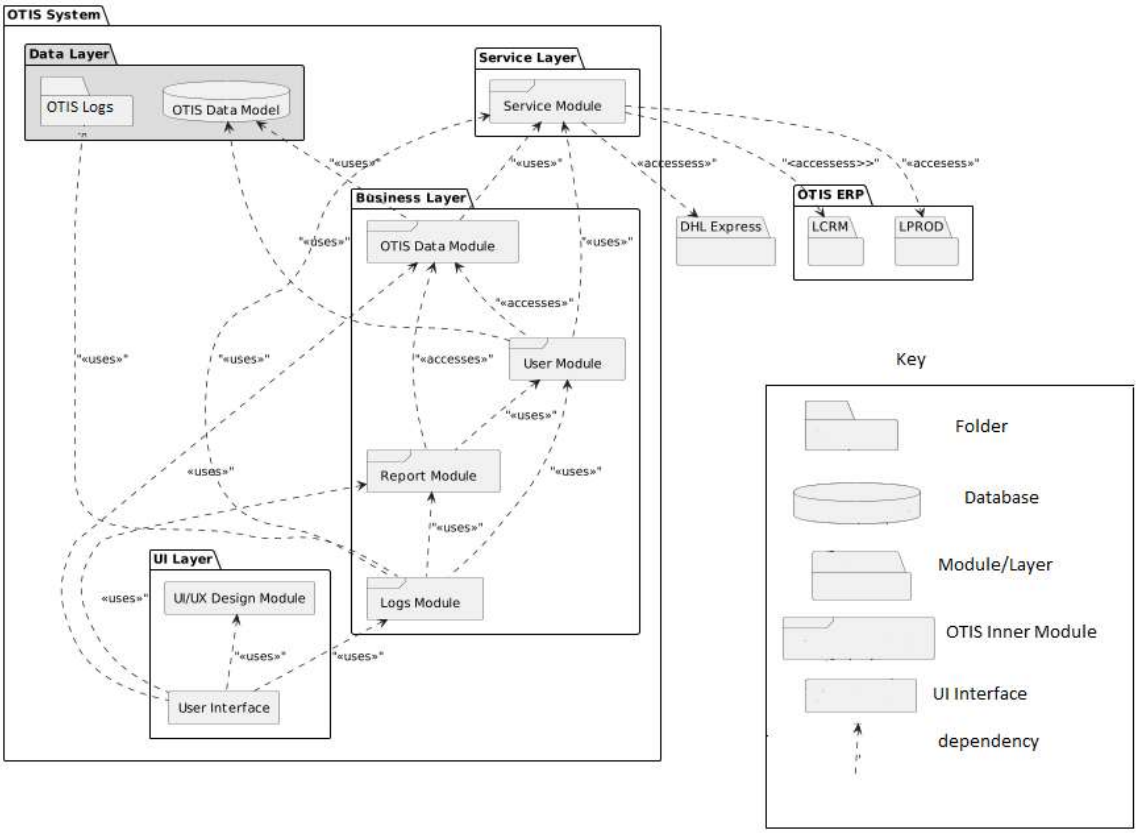
Part B: Modular View Documentation:

Section 1: Primary Presentation:

- **UML Modular View Diagram**



- **Uses view in Modular View**



Section 2: Element Catalogue:

2a): Elements and their properties:

Our system would consist of four layers in which the data is managed. The layers are listed below:

- OTIS Service
- Business Layer
- OTIS Data Model
- UI Layer

OTIS Service:

OTIS service consists of the module which has the responsibility to fetch data from the external system and provide data to the OTIS modules in the business layer. The layer consists of one module listed below:

Element	Responsibility
Service Module	The Module would fetch data from the external system through required requests and provide data to the business layer of our System. When the user logs into the system, the system would authorize the user by getting the user details from the LCRM. The service module consists of triggers that automatically dump new data from the external systems to the OTIS system

Business Layer:

Business layer of our system consist of module which consists OTIS changes in the system. Data storing, Data fetching, Data retrieval, system logs logic is written in the layer. The business layer consists of following modules:

Element	Responsibility
Report Module	Consist of all different types of reports which user could download and view from the system. System can filter through parameters and give different format to the authorize user.
Logs Module	The logs are categorized into system logs, audit logs and event logs. Module get data from service, reports and user module to get all the events with timestamps in log file in the server.
OTIS Module	Get data from service module and store data in the OTIS database. It's also provide the OTIS modules data which is needed by the user.
User Module	Stores data of different users and their authorization level in the system. Stores and retrieves data from the database and matches the authentication system by validating the given data. User access is also managed in the module

OTIS Data Model:

Data Model consist of OTIS relation database and Otis Log files. The data model stores the incoming data from the modules and perform action through trigger, views queries.

Element	Responsibility
OTIS Logs	Consist of folder of different logs of the system. OTIS Logs interact with the logs module and create edit logs files in the system. The logs data is also needed by authorized users to check the activity, error, event in the system
OTIS Database	Consist of Relational Database which stores and saves data. Data views, indexes are created in the database in order to get better performance

UI-Layer:

UI Layer consists an interactive dashboard where users can see all their action they can perform. It consists of 2 elements

Element	Responsibility
UI/UX module	UI/UX module consist of UI elements which is an open-source component used for user interface. It is used by the user interface
User Interface	User Interface is screens where users can interact with the system and perform actions. Each user type have different User interface

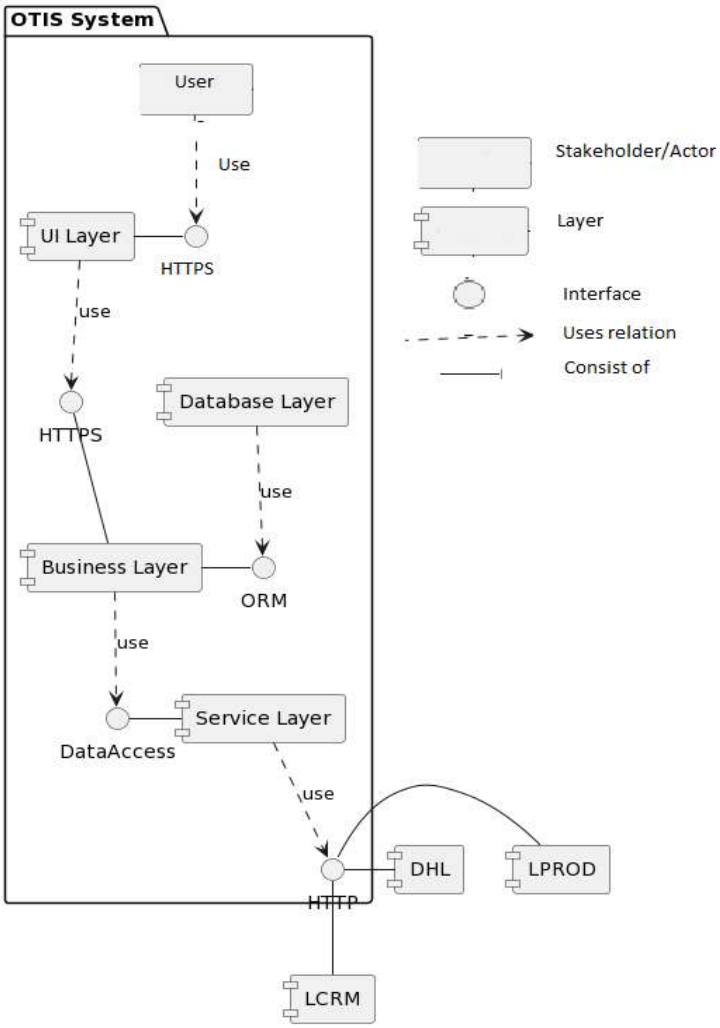
2b): Relations and their properties:

Element	Relationship	Responsibility
Service Module	User Module uses Service Module	User module get data user data from Service Module. A automated call would generate from Service Module which get the data from external system
	Logs Module uses Service Module	Each time Service Module dumps the data into the system, a log is being entered into the system
	OTIS Module uses Service Module	External Systems (LPROD, DHL) is maintained in our system. Service module dumped data every 15 minutes
OTIS Data Model	OTIS Data Module uses OTIS Data Model	OTIS Data Module saves LCRM, LPROD, DHL Express data into OTIS Database through OTIS Data Model. New Data after 15 minute replaces the old data in the database
	User module uses OTIS Data Model	After getting user data from LCRM, User Module authorizes and saves the data through OTIS Data Model. This OTIS User's List is replaced after every week. User module authorizes by giving authority by checking the user data from OTIS Database
OTIS Data Module	Report Module uses OTIS Data Module	Report Module get data from OTIS Module of LCRM, LPROD, DHL and generate a report according to provided Data
	User Module uses OTIS Data Module	User Module get the LCRM, LRPOD and DHL data from OTIS Data Module and provides user with the data.
	UI Dashboard Uses OTIS Data Module	UI checks the list of orders and their progress details through OTIS Data Module
Report Module	UI Dashboard uses Report Module	Authorized users from UI screen can generate report by providing the parameter and order list in the system
	Logs Module uses Report Module	Every Report generate request by the user, log module create a log in the system
User Module	Log Module uses User Module	Every Time User request a login and view Data of their orders and track orders, a log through log module is created
	Report Module uses User Module	User module uses User details from User Module and generates report
OTIS Logs	Logs Module Uses OTIS Logs	All OTIS logs from the modules are saved in OTIS Logs folder in server through Logs Module
UI Module	UI Dashboard uses UI Module	External styling components are used in Dashboard for good user experience.
Logs Module	UI Dashboard uses UI Module	System Admin checks the logs of the system and can check errors with timestamps

2c): Element interfaces:

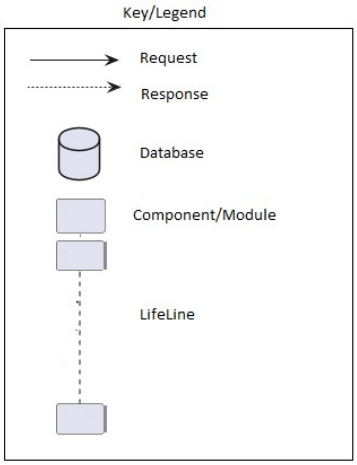
Our system is based on layered architecture and layers can different interfaces which talk with each other. Our system is Web Based and layers interact with each other using the HTTPS web as shown in figure. Service layer uses the HTTPS (JSON, XML) API of external system to fetch data which serves as a utility in our system. Our Business layer takes the data and deliver it into respective database using the ORM (Object Relationship Model). System users can view the data through a web browser by going to the provided route.

- Interface Diagram



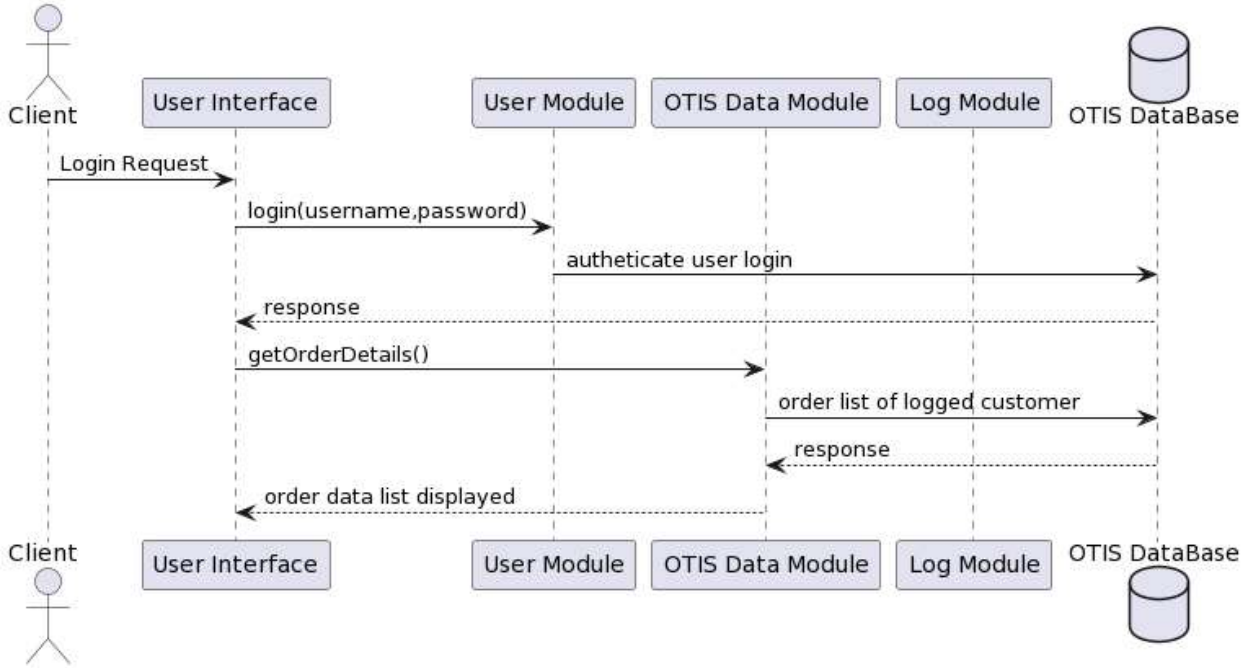
2d): Element Behavior:

Our application interacts with modules and database in order to handle the request from the user of the system. Our system is updated using an automated service through Service module. Service modules fetches data from external system and replaces the existing data from database through respective module functions. The behavior of three primary use cases of our system is shown through sequence diagram below:

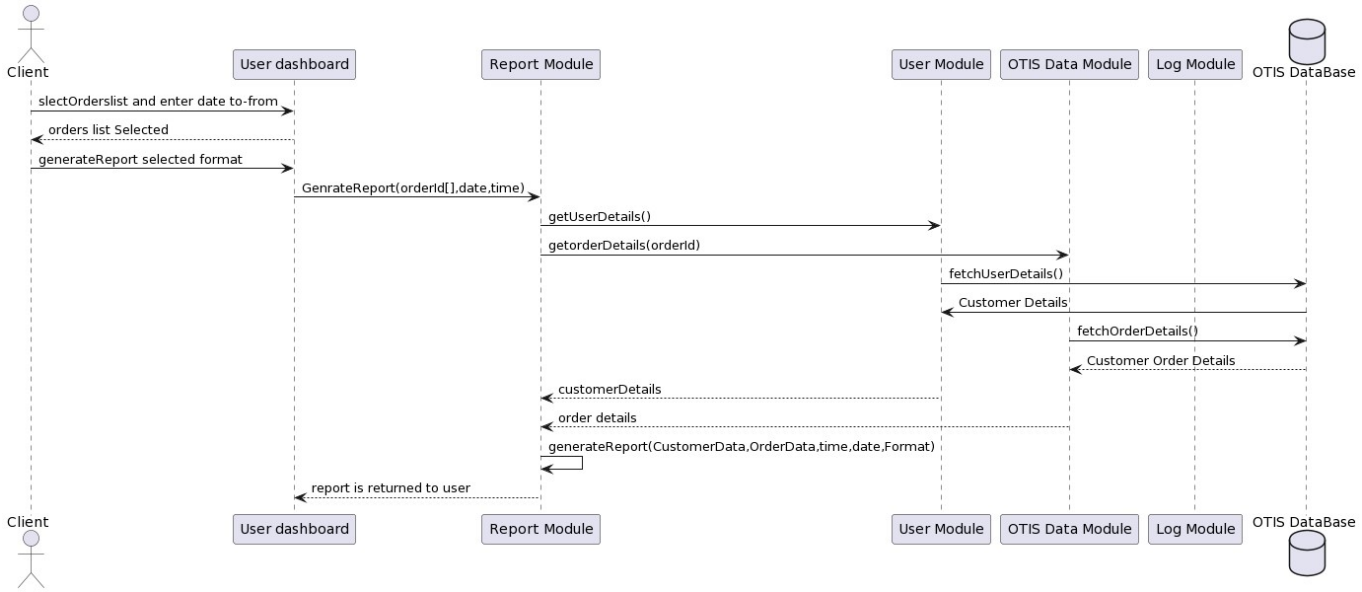


Sequence Diagrams:

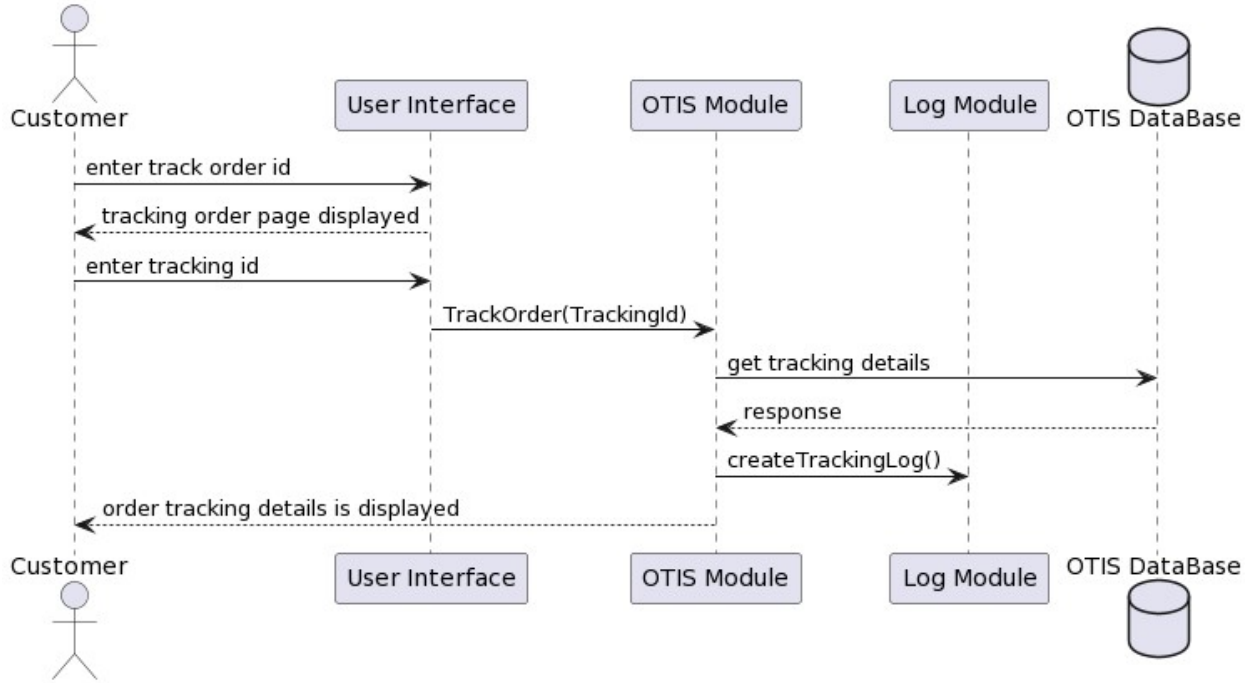
Use Case 1: Manage Customer Order Record



Use Case 2: Generate Order Report



Use Case 3: Track Order Record



Variability guide:

Lycia has more than 400 client spread all across Europe. As our data is extract from external system LCRM, LPROD and DHL express, our service module triggers an API call to the external system and get relative data and saves it into OTIS database.

SR No.	Variability	Module	Rationale
1	An API call is generated to the relevant external system if data isn't present in our data is required by the user	Service Module	If data isn't present in the system, OTIS system needs to validate that the data is in sync with the external system data
2	If the external system data dump fails, the system provides the latest data from database	OTIS Module, User Module	The system needs to displays user with the latest possible data if the external data dump causes an error.
3	If OTIS database fails, backup database is also maintained and used in operation	OTIS Database	If the database crashes/destroys accidently, the user order information must be backed up
4	UI/UX Module can be changed and external UI library can be used. All stakeholders have different UI to interact with the system	UI Layer	Using external UI library will help our developer team to implement as they are familiar with the UI components.
5	If the user order data is not updated latest to 30 min, system also provides user data with label "Legacy data"	OTIS Module	Will let the user know if the data is in-sync with the latest external system data. If the user queries and the system doesn't present the same thing, user needs to get notified

Rationale:

Architectural Drivers:

Design Decision	Addresses	Rationale
Layered-oriented architecture: Separate layers in the system	QA2: Maintainability	As our main three major quality attributes are Performance, Maintainability and Availability. Given the conditions it will be easy to develop and maintain. As dependency is low, it addresses availability. Performance will be good as system would have less than 10000 users.
Using Web Interface	Concerns C5	Delivery time is 6 months. Our team is trained to build Web application
Create Separate Report Module in the system	UC2: Generate Order Report	Report record and report UI is created separately from the system. It increases cohesion and it would be easy to keep

		track of the reports generated and log management
Creation of a separate database	QA3: Availability	If the data is not provided by the external system, our system would fetch the latest data from database
Java Spring boot is used for selected Tech-stack	Constrain C2	Our team had experience in developing the system in Java spring boot. As we need to integrate the OTIS system with the external systems and system needs to be up and running in 6 months.
Logs management is done through a module and saved separately in the server as log files	UC6, UC5	Logs Event, System and audit logs are saved and handled through a separate module and saved in log folder in server
Order detail and order tracking are fetched through the service and saved in the database through OTIS Module	UC3: Track Order Record	As external Systems (DHL, LPROD) provide us the data through JSON, the data is dumped every 30 minutes into the system. A database query would fetch the data to user. If the data is not present in the OTIS database, An API call would check in the external system and display the data if present.
If External system data dumping fails, the error is logged into system logs and the system admin is notified through email	QA1 : Performance	The data dumping fail meaning that our system has the data but the data is not updated with the system. So an Error message and notification needed to be generated in order to alert the system admin to fix the issue
Designed in layered Modular Architecture	QA2: Maintainability	As Performance and maintainability were our main Quality attributes, We decided to opt for an layered architecture
Increase Cohesion by separating modules which have different responsibility	QA2: Maintainability	Separating modules will increase cohesion in the system and it would be easy to test and maintain
Create Separate Module for Logs of all the system	Concern C9	As the system have multiple layers and it would be easy to track the logs. If a system fails, our system logs are not affected

Tactics: (Change tactics with the performance)

We as a team looked into the quality attributes, use cases, constraints and concerns implemented

Tactics	**Tactics QA**	**Module Implemented**
Create a database backup and update it weekly	Performance(Maintain multiple copies of Data)	Data Model(Data Layer)
Trigger data dump of users from LCRM once every 4 weeks	Performance(Manage Event Rate)	Service Module
Expectation handling is done if an error occurs	Maintainability(Fault	Report Module

in the generation of reports and alert is notified to System Admin	Detection)	
If the database doesn't have the required order tracking data, an API call is generated to the external system LPROD,DHL	Availability (State Resynchronization)	OTIS Module
System Administrator can view the error logs along with the timestamps and module	Availability (Expectation Detection)	Logs Module
Service module and Database server will be monitored and how well the system is performing	Availability (Conditional Monitoring)	Service Module, Database Server
Modules is split to increase the cohesion in the system	Maintainability (Split Module)	Business Layer

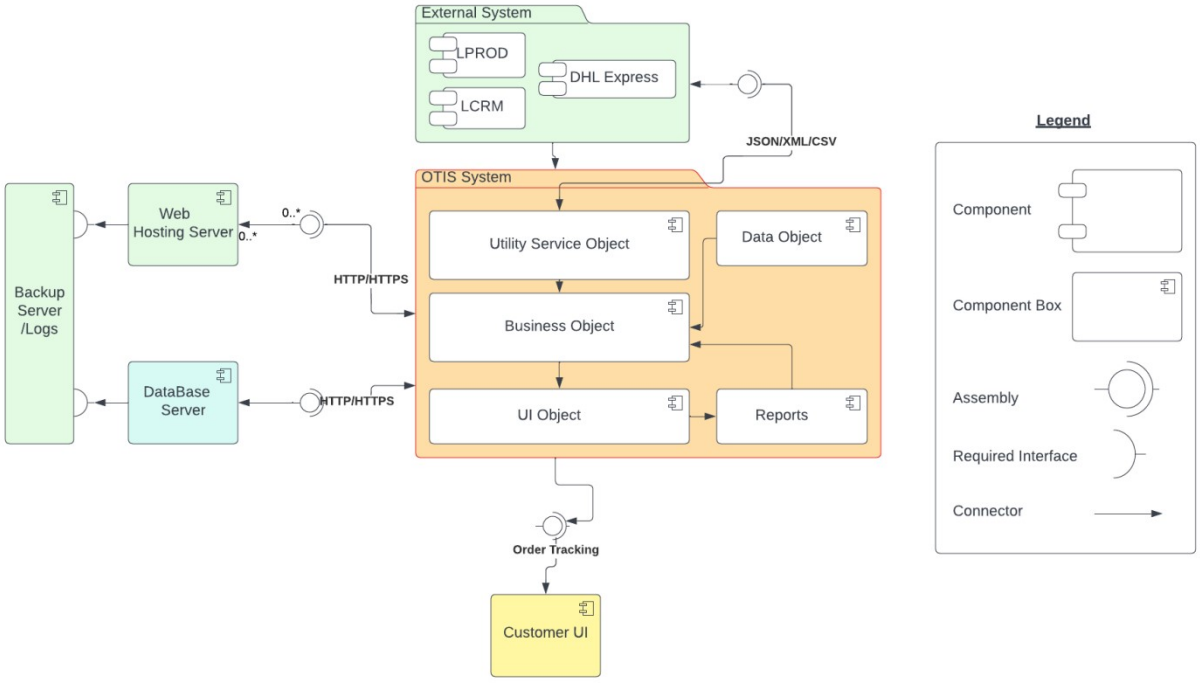
Other Architectural Decisions:

Decisions	Rationale
UI/UX module is used by the user interface in importing UI components	As there are multiple stakeholders in the system, there are multiple dashboard for the system. We use pre-build UI/UX components.

Part B: Component and Connector Documentation:

Section 1: Primary Presentation:

- **UML Component and Connector Diagram**



Section 2: Element Catalogue:

2a): Elements and their properties:

Our OTIS system would consist of multiple components in which the data is interact with each other at run time via component and connector structure. The C&C are listed below:

- OTIS System Component
  - Utility Service Object
  - Business Object
  - UI Object
  - Data Object
  - Reports
- External system Component
  - DHL Express
  - LCRM
  - LPROD

- Web Hosting Component
    - /Tomcat /Apache/IBM Web Sphere
- Database Server Component
    - My SQL
- Backup Server /Log Server component
    - Log Server
- Customer UI Component
    - Customer UI

OTIS System Component:

The main component and connector structure is OTIS System (Component) which consist of five different component interact with each other and depend on every modules in OTIS main component. It's also interacting with external system, databases component and web hosting component. Below are details description/ responsibility of each component.

Component	Responsibility
Utility Service Object	This service utility work continuously extracting the data from external components. The utility service object fetches data from the external system through requests and provides data to the business layer of our System and data stored on database. When the user logs into the system, the system would authorize the user by getting the user details from the database updated user profile via LCRM user lists. The service module consists of service constantly working as background service for extracting data.
Business Object	Business Object (Component) of our system consist of multiple interaction component which consists OTIS all business object / business rule has been written in the system. Data storing, Data fetching, Data retrieval, system logs logic is written in the component. This component has main responsibility to connect all other components like data module, reports, service object and UI objects.
UI Object	UI Objectcomponent consist of UI elements which is an open-source component used for user interface. It is used by the user after login to the system by authentication methods. Its consist of multi level UI/UX with fully responsive web pages. Has main dashboard as landing page where user can view partial views to look many other UI of components.
DataObject	The data object component is consist has many classes for data structure used by ORM (object relational model). Also has many other custom model used by business object component.
Report	The report component consists of all different types of reports. Has separate module for users so user could download and view from the system. System can filter data through parameters and give different format to the authorize user.

External Services Component:

External system componenthandle all component external component to interact and provide ETL (extract, transform, load)/data as (JSON/XML) from the external system (component) to the utility service object in OTIS system where the data has stored in database. The utility component consists of three module listed below:

Component	Responsibility
External Services Component	This external services component work continuously extracting the data from external components like LCRM, DHL Express, and LPROD. The utility service object fetches data from the external system through requests and provides data to the utility service object and the data stored on database. When the user logs into the system, the system would authorize the user by getting the user details from the database updated user profile via LCRM user lists. The external service module consists of scheduler service constantly working as background service for extracting data.

Web Hosting Component:

The web hosting component of OTIS system deployed on web hosting component on server. Used to manage and handling request from OTIS main component. Handle web load balancing, HTTP / HTTPS certifications etc.

Element	Responsibility
Web Hosting Component	The web hosting component responsible for web application web hosting via web hosting services. It can manage http and https certificates and different security certification for web hosting. Its work locally of Lycia environment but also on public access by public IPs.

Database Server Component:

The database server component of OTIS system consists of My SQL. The server has capability to store large amount of data with backup facility to stored data on backup server.

Element	Responsibility
Database Server component	The database server component responsible for storing data in relational database. It can manage and store large amount of external system data, user information, and product tracking information. Also has capability to stored file data on db server. .

Backup Server Component:

The backup server component of OTIS system consists of db server and file server for storing and backup database files in case of failure of system and in any component failure. The server has also stored log of system. The backup server has capability to store large amount of data.

Element	Responsibility
Backup Server Component	The backup server component responsible for backup data via RAID (redundant array of independent disks) used to storing data either in system logs and database backup. It can manage and store large amount of external system data, user information, and product tracking information. The backup server component has log services for store event logs / user exception logs and other logs.

Customer UI Component:

The customer UI component consists of interactive dashboard where users can see all their action they can perform. Handle lots of view for tracking order getting daily reports and extract details of order products.

Element	Responsibility
Customer UI Component	The customer UI component module consists of UI elements which is aweb based interactive UI used for user interaction. It is used after user authenticated by system and user see their screens and performs actions. Different company has various type of screens according to requirement assign by system admin team.

2b): Relations and their properties:

Element	Relationship	Responsibility
Business object Component	External System Component	The business object component get data from external system component .A automated utility service extract data and generate ETL from utility component.
	UI object	Every time when User request from UI object the system would be get data from database and provide data in UI response.
	Reports	The reports module used to generate report. As system extract data from external system and generate reports via different filter applied on system.
Data object component	Data object component uses business object component	The data object component interacts with business objects via ORM for mapping of database tables also support custom classes for mapping multiple tables.
Utility service component	Business object component	The component use to interact with business logic written in Business object to store data on database

		server
	External service component	The external service component used to extract data services from LCRM , DHL Express, LPROD and push to utility service component for data storing on database
Report	UI Object component uses Report Module	After authentication users from customer UI screen/ UI interface can generate report by providing the parameter and track order reports in the system.
	Logs Module uses Report Module	Every Report generate request by the user, log module create a log in the system
UI Object Component	Customer UI Component	From customer UI component user request to login and view Data of their orders and track orders, a log through log module.
	Report component uses User UI component	User module uses User details from User Module and generates report provide reports to other users .download reports in various format like pdf and xls.
Logs component	Logs Module Uses business object component	All OTIS logs from the modules are saved via business logic written in OTIS database and share backup folder on backup server
External system component	External system component uses utility services	External system component has services for fetch data from LCRM, LPROD, and DHL express to push in utility service component from storing data on database.
Web hosting component	Web hosting component uses main OTIS component	The web hosting component has interacted with OTIS main Component hosting via IIS.
Database server component	Database server component uses main OTIS component	The database server component used to save data from business object component (OTIS main component).
Backup server Component	Backup server component uses database / web hosting server component	The backup server component uses database and web hosting server component for backup database and log files.

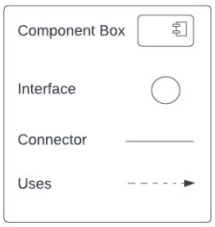
2c): Element interfaces:

OTIS is based on Layered based architecture but has services to interact with each component. The interface is mainly interacting with other components of system. There are five interfaces for the system. The system would develop from local machine of developers to a staging site and finally integrated to production site on production web hosting server. There are below component worked with each other for interaction of system

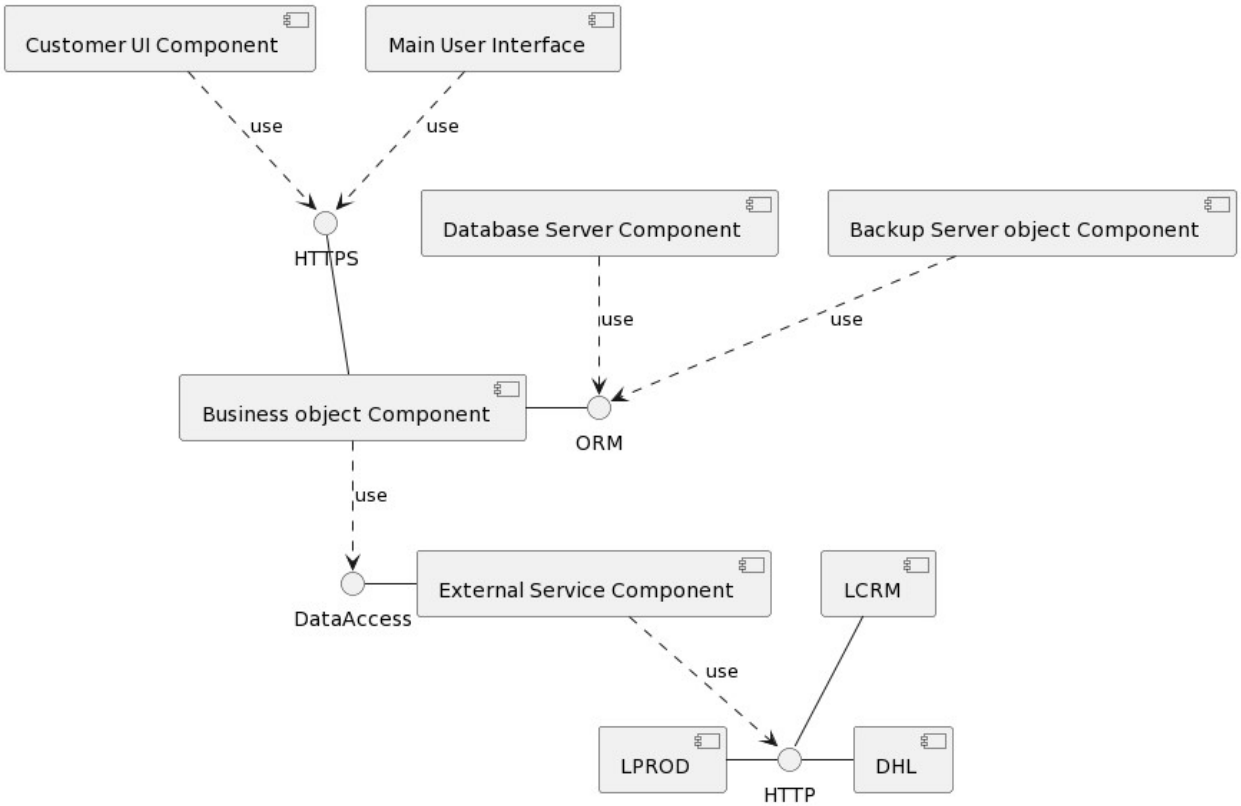
1. External System
2. Main Dashboard User Interface
3. Customer UI
4. Web Server
5. DB Server
6. Backup Server

System has many interfaces depending upon the authorization level given to each module and user respectively. Every interface depending on other required interface. Below diagram showing how interface work on OTIS system.

- **Interface diagram**
  - Key / Legend



  - Diagram

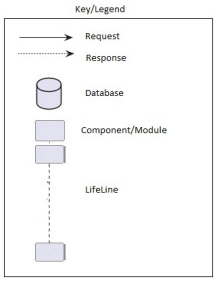


2d): Element Behavior:

The OTIS application interacts with each component via user interface and business object component in order to handle the request from the user of the system. The system shall extract the data from external services component and then stored on database server. The external

system utility, as scheduler services that trigger on every 30 minutes to update the database according to new data available from system. The system shall using web hooks on LCRM and LPROD system to update regularly. The behavior of 3 primary use cases of our system is shown through sequence diagram below:

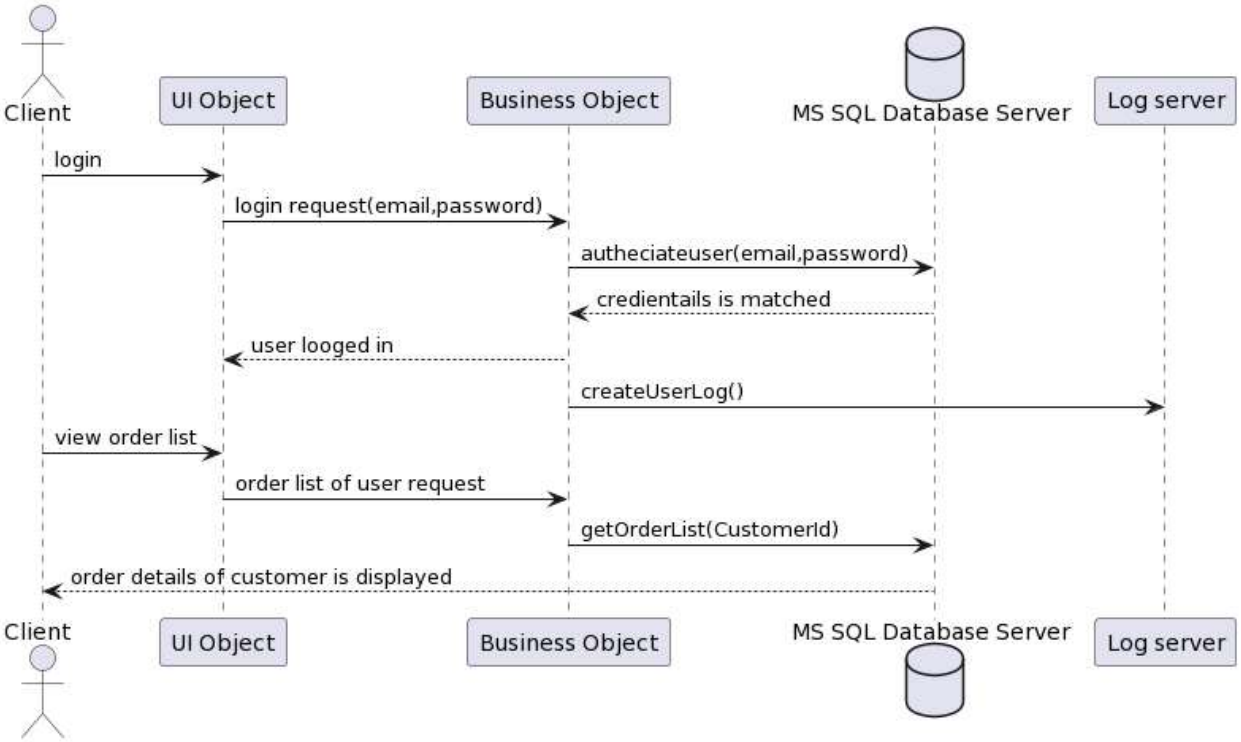
Key/ Legend:



Sequence Diagrams:

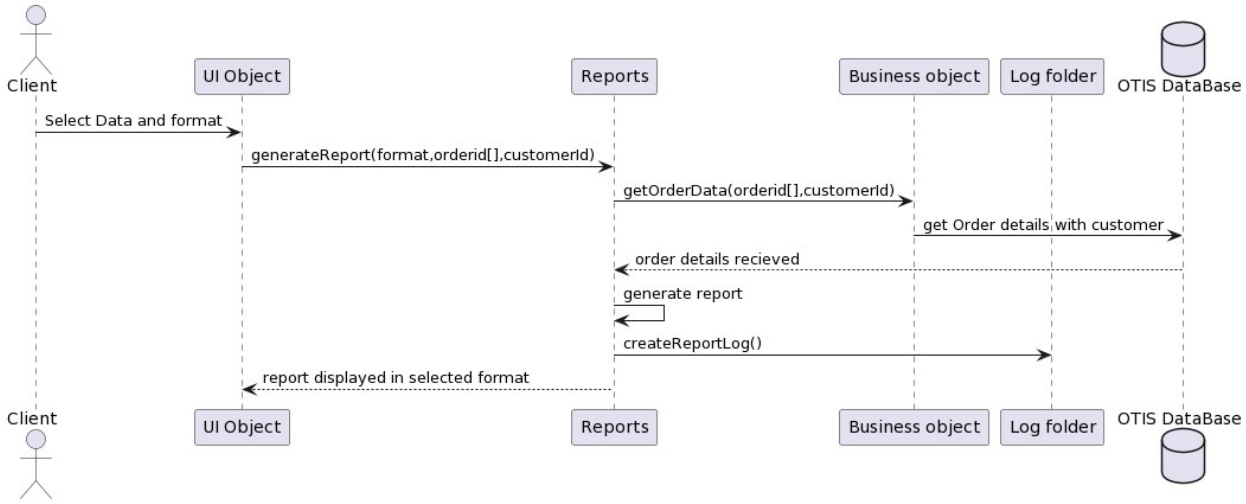
Use Case 1:

- UC1-Manage Customer Order Record



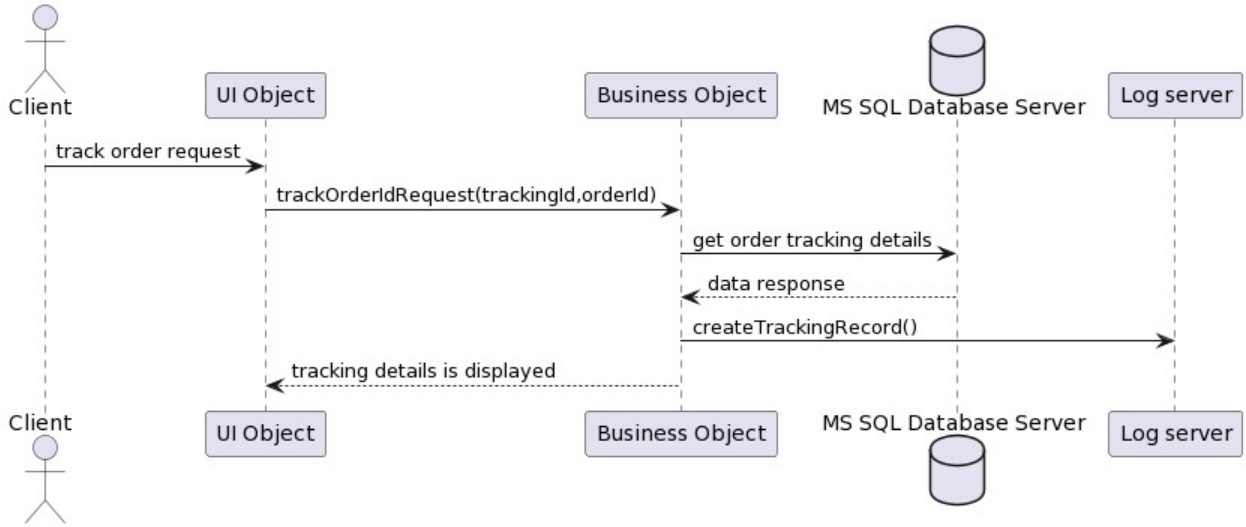
Use Case 2:

- **UC2-Generate Order Report**



Use Case 3:

UC3-Track Order Record



Variability guide:

The system shall design as a large scale system which has component approach so when a component needed we use to connect a component on business object component as the system has been design to extract the data from any external system either new module is coming that directly integrated to external system and create business objects on OTIS system. It is relatively good approach for getting integrated any module to the system in future either its web service or any other data services.

SR No.	Variability	Module	Rationale
1	An Hook call trigger on every 2 hour for getting data from LPROD,DHL Express and LCRM objects	External Service Component	If data call fails to get data or any service failure then data is validate again for another call if error found persistently then system should trigger to write log on log file server. on other case if no new data is not found then system should not trigger to update anything on database
2	If the system data dump failure then the system display previous data only depend upon last update from last database	OTIS main Component Module, Business object Component	The system shall always show the latest updated data whenever new data updated. In case of any backend services failure the system shall display last updated records not affected on system.
3	In case of OTIS database service failure then backup RAID Service provide service with latest database backup.	OTIS Database Component	The system shall working normally incase of production database crash or service abundant. backup service start on immediate basis.
4	The Customer UI component/pages is capable to assign according to roles and rights.	UI Object Component	The admin will changes and assign different pages according to role and rights assign to customer UI.
5	If customer track an order but data is not found or upload on server so default massage has been display on notification menu	OTIS main Component	The system shall let the user about the sync data via default response message via response mapping table

Rationale:

Architectural Drivers:

Design Decision and location	Addresses	Rationale
Select separate service component for external system	Quality Attribute (Maintainability) QA1	The system shall cover maintainability quality attributes so separate external component is easy to build and deploy as service. If any other new service need to attached the only process will be added as factory pattern implemented so it's easy to maintain and component efficiency is very high so not dependence on main OTIS system. The background service constantly run and data extract and upload to system with 10 min time span.
Select Responsive web Interface on OTIS System UI Component	Concerns	The system shall build with responsive design so it's easy to use and response on any web browser and mobile devices. The quality of web responsive interface is light weight and scalable.
Select separate Reports Component	UC2	The system shall build with report component separately because development and maintenance is easy and other 3rd party libraries like DevExpress and Telerik tools charts/ pivot grid easily integrated with the reports component
Select database component with capability on separate backup DB/Log server	Quality Attribute Availability	The system shall use separate database component. We setup separate backup facility so system should be available 24/7 in case of any disaster the system shall available by backup service instance.
Select web hosting component on web server	Quality Attribute Availability	The system shall use separate Webhosting component rather than with database separate hosting facility should be available in case of any failure on system from backup hosting

		server.
Use External system component batches for data receiving.	Constrain	As per our finalize decision we use following format to receive ETL from external system as get from web service (JSON/XML) and file format is (CSV, XML).
Server logs component on backup server	UC6	Each log either system log / application log and event log is stored as text file by time stamp on share log folder. So it's easy to access by developer and support team.
In case of system failure	QA 3 Performance	The system should be capability to switch to backup application server if any failure of component. The automated load balancer used to redirect system to replica backup production web server and db server. So system should be available 24/7.
Each component separately work with their respective sub component	QA 1 Maintainability	OTIS system work with sub component (UI component, Business Object component ,Data Object ,Reports component) and external system and db/web server component work separately so I case of any new module injection the system should be not depended on other system.
Loosely couple system and implementing approach	QA 1 Maintainability	System shall be loosely couple with other component and more generic so integration is easy and implementation approach is quite easy according to SOLID principle.
System upgrade and maintenance downtime	Concern	The system shall take down time every time at night 2 hours for system upgrading and maintenance

Tactics:

In designing for OTIS system components and connectors we deeply look into QA, use cases, constraining and implementation approaches.

Tactics	Tactics QA	Module Implemented
Log management on event of success and failure.	Availability	OTIS Business Object Component
UI assign for managing user and assign screens to customers	Performance	UI Component
Check records to dump data to db server on every 10 min	Performance	Utility Service Component
Local and global exception handling	Maintainability(Fault Detection)	Business Object Component
External API Expose for HTTP/HTTPS web services	Availability	External Service component

Other Architectural Decisions:

Decisions	Rationale
Customer UI via UI Object Component	As we build UI Object component for customer so the admin would be assign the custom UI and roles and rights for customer for view reports and tracking the order.