Group Trip Settlement System

1.1. Aim of the Project

This section presents a short description defining the aim of the project. It should reflect projects' objectives agreed with the teacher.

To introduce the aim of our project, let us first recall that the Project title is

"Group trip settlement system". The aim of our project is to provide a single, simple platform that will allow users to plan, manage group trip in the form of a Web System. The single key word in the aim is to emphasize that the process of coordinating, booking group trips is done in on place in the form of package depending on the group persons number which allows every group member to access quickly and in a centralized manner relevant information.

1.2. General Assumptions

This section describes the idea of the project. It should focus on the vision of artefacts and part of reality being a context for business analysis.

The general assumptions are aimed to isolate some section of reality and analyze how the project reality will be connected to our daily lives one.

When it comes the technical implementation:

Due to the lack of time and sufficient knowledge to carry out the process of building such a complex system, the delivered system will may not cover all the feature that will be included in the requirements specification document. This process will be done using new technologies and tool to provide a scalability at any point in the time.

When it comes to the usage and operational assumptions:

- The system will be hosted on a cloud computing services to ensure better integration
- The system will be using endpoint provided by suppliers and vendors (transportation companies, accommodation companies, …) to gather their data and facilitate the integration process
- The system will be used by travelers, companies or any parties interested in giving the services or accessing the one offered by us
- The system will be targeted for the USA market

When it comes to the economic assumptions:

For the Financing: After getting desired result from software development and marketing team, new investors can be attracted to the project for the funding purposes.

For the Budget:
The project costs will remain the same and some exception could be applied, the budget should not be used for any other purpose than task related to the project.

1.3. Stakeholders Description

Define the stakeholders of the project and put them in the table, along with their roles. The table should also contain assignments to projects' parts that reflect the responsibilities of a given stakeholders group.

Group Name	Name	Responsibilities
Users	Using the system for group trips and participating in the requirement gathering process	
	Travelers	Using the system to for group trips
	Universities	Using the system for group trips
	Lodging companies	Providing support to customer and getting some statistical report
	Tourisms Agencies	Providing support to customer and getting some statistical report
	Translator companies	Providing support to customer and getting some statistical report
	Transportation companies	Providing support to customer and getting some statistical report
Investors	Funding the project	
	Entrepreneurs	Providing funding in exchange not only for interest revenue but also some percentage ownership of the business (interested in the success of the product)
	Venture Capitalists	Providing the capital funding in exchange not only for interest revenue but also for equity or an ownership stake of the business
Suppliers and Vendors	Providing services that will be used in the system	
	Marketing Company	Investigating the market and evaluating marketing strategies to promote the product
	Software development company	Materializing the requirement into an actual software to be introduce in the market
	Transportation companies	Provide the catalog of transportation prices to the system either by endpoints or entering them in the system
	Lodging companies	Provide the catalog of accommodation prices to the system either by endpoints or entering them in the system

	Tourism agencies	Provide the catalog of transportation prices to the system either by endpoints or entering them in the system
	Call center support company	Provide catalog of various support services to the customer
	Legal advice company	Providing legal advice related to local regulations from the law perspective

1.4. Existing/Alternative solutions

List of potential alternative solutions that aim at solving the same or similar stakeholders needs.

The following website that are providing similar solutions to the problem were investigated:

1. Troupe: https://www.troupe.com/

   Troupe is a travel planning website that makes group travel organization in one place.
   Troupe offers following features:

   - Voting system allows all group travel members to vote for travel's plans
   - Adding Deadlines/Reminders: The system will automatically send out reminders or quick nudges to group members.
   - Sharing Information: about flights, accommodations, activities,

   - Useful blogs and guidelines for the travelers

2. Intrepid Travel: https://www.intrepidtravel.com/us

   The platform provides small group tour adventure means you'll travel the local way. The company offers more than 1,000 escorted tours worldwide. The following functionalities are offered:

   - Getting all the detailed information about the trip after specifying the date,
     for instance what specific package may include (meals, accommodation, activities)
   - Giving and reading reviews about the available tours
   - Getting online support on different social media platforms
   - Etc. …

3. Wonder log: https://wanderlog.com/

   A mobile and website app that allow people plan individuals and group trips.
   It offers the following features:
   - Make plans like an agenda

- Make a budget plan for the trip
- Accessing trips information offline
- Adding notes to stops during the journey
- View the trips done on a map
- See flight, hostels, attraction in the selected places and book them

4. Planify: https://planify.io/

   Planify is a website offering that offers the group trip planning capabilities to its users. The following functionalities are offered as a service:
   - Designing the itinerary of the trip
   - Sending the designed itinerary to the group members
   - Global access to the information for all members
   - Statistic review
   - Instant notification

   On the other hand, one can notice that the services offer by the system are subject to a subscription and the does not offer anything else than planning

In term of functionalities the existing systems provide mazing features, our task will be to collect only interesting functionalities from different platforms and merge them under one with some improvements.

1.5. Gantt Chart
Gantt diagram depicting the distribution of planned activities over time, including the allocation of specific resources and stakeholder groups involvement for planned tasks.

The Gantt Chart will be based on the following activities steps:

- Find Partner to discuss and analyze the project idea
- Research on the market for competitive solutions
- Consulting with lawyer about local regulation
- Gathering and analysis of business requirements
- Hiring a consulting software company for projecting the budget estimation
- Find Software development team company for a prototypes
- Finding investor in the process of with prototypes `
- Building partnership with suppliers (Tourism, hostel, transportation, etc...)
- Buying all non-human resources
- Finishing the project implementation development
- Hiring a consulting company for integration and testing purpose
- Buying licensing for the product to be release in the market
- Contacting a Marketing company for product advertisement
- Marketing and releasing the project in production
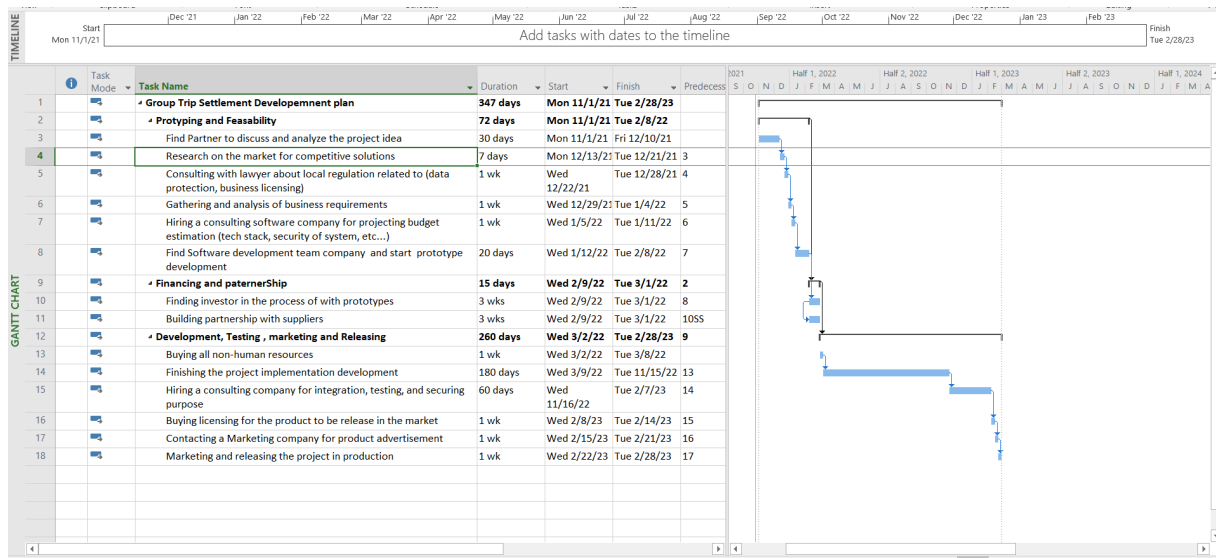
2. Requirements specification **(F2)**

2.1. Functional Requirements Specification

In this section, provide the table for functional requirements, including name, source and significance for the project. Each requirement has to be assigned to a specific group, i.e., interface, conversion, database, data exchange.

The functional requirements are aimed to outline functionalities of the system that are important for the business and the user. After a long discussion about different group of functionalities in this section of our project. The line became blurry while we were trying to include functionalities for group such as interface, conversion, database, data exchange, etc. .... They tend to be somehow closer to non-functional requirements than functional requirements. This led our decision of including only requirements related only to the system's functionalities in the below table.

In this table, the Significance given is based on the user. For other stakeholders, the requirement matrix contains all the details.

Id	Requirement statement	Significance	Group
FR_001	The system should allow the administrator to create package	0	Functionality
FR_002	The system should display group trip packages in the system to the user	5	Functionality
FR_003	The system should allow the user to create group trip	5	Functionality

FR_004	The system should allow the user to add activities to the group trip	5	Functionality
FR_005	The system should allow the user to search and filter group trip packages based on dates, price, duration, and cities	5	Functionality
FR_006	The system should allow the user to buy group trip packages attached to the group trip	5	Functionality
FR_007	The system should allow the user to print invoice of bought trip packages	5	Functionality
FR_008	The system should allow the user to view done trips	4	Functionality
FR_009	The system should allow the user to change the details of a booked group trip for a certain period	5	Functionality
FR_010	The system should allow users to view a map based on the group trip activities and locations to visit	5	Functionality
FR_011	The system should allow the administrator to see the income generated by all users ordered packages	0	Functionality
FR_12	The system should allow users to send and receive support messages to the administrator	5	Functionality
FR_013	The system should allow users to create voting pool for activities in a group trip	5	Functionality
FR_014	The system should allow users to add notes in a group trip	4	Functionality
FR_015	The system should allow users to quit a group trip	5	Functionality

FR_016	The system should allow users to delete their accounts	5	Functionality
FR_017	The system should allow users to change their accounts details	5	Functionality
FR_018	The system should allow users to submit feedback on a done group trip	5	Functionality
FR_019	The system should allow the admin user to ban, block other users account	4	Functionality
FR_020	The system should provide to users the packaged cost based on the person within the group	5	Functionality

2.2. Non-Functional Requirements

In this section provide the table for non-functional requirements that includes name, source, significance for the project and the type of requirement, e.g., efficiency, standards, constraints, etc.

In this table, the Significance given is based on the user. For other type, the requirement matrix contains all the details.

Id	Requirement statement	Significance	Group
NFR_001	The system should support English and French languages	5	Usability
NFR_002	The system should display pages in less than 12 seconds	4	Performance
NFR_003	The system should use the SSL communication layer	4	Security
NFR_004	The system should comply with local and national laws	4	Regulatory
NFR_005	The system should be down after deployment for more than 24 hours	4	Availability
NFR_006	The system should support up to 2000 simultaneous users	5	Performance
NFR__007	The system should be scalable	0	Scalability

	horizontally to support business growth		
NFR__008	*The system should enforce two factor authentication for package purchase*	*5*	*Security*
NFR__09	*The user should verify the account creation within a period of one hour*	*4*	*Security,*
NFR__010	*The group trip package should have a maximum number of persons*	*3*	*Constraint*
NFR__011	*The system should be responsive*	*5*	*Usability*
NFR__012	*The system should support only visa and master card payment method*	*4*	*Supportability*
NFR__013	*The system should support only the following web browsers: Chrome, Firefox, safari*	*3*	*Portability*
NFR__014	*The system should be usable during maintenance*	*4*	*Availability*
NFR__015	*The system supports a light and dark customization mode*	*4*	*Usability*
NFR_016	*The system should backup data every week*	*4*	*Safety, Recoverability*

2.3. Requirement Matrix

The complexity of relationships among requirements and stakeholders should be depicted in the form of significance matrix. The dimensions are respectively, a set of requirements and a set of stakeholders. At the intersection of the dimensions, we place the level of significance (0-5) of the specific requirement for a particular stakeholder.

Functional Requirement Matrix

Functional Requirement Id (Name)	Significance		
	Users	Investors	Suppliers
FR_001	0	2	5
FR_002	5	2	4
FR_003	5	2	4
FR_004	5	1	5
FR_005	5	3	4
FR_006	5	2	4
FR_007	5	2	4
FR_008	4	0	3
FR_009	5	2	4
FR_010	5	1	4
FR_011	0	3	5
FR_012	5	2	5
FR_013	5	0	3
FR_014	4	0	3
FR_015	5	1	4
FR_016	5	2	4

FR_017	*5*	*2*	*4*
FR_018	*5*	*3*	*5*
FR_019	*4*	*0*	*5*
FR_020	*5*	*2*	*4*

Non-Functional Requirement Matrix

Non-Functional Requirement Id (Name)	Significance		
	Users	*Investors*	*Suppliers*
NFR_001	*5*	*3*	*5*
NFR_002	*4*	*2*	*5*
NFR_003	*4*	*3*	*5*
NFR_004	*4*	*5*	*4*
NFR_005	*4*	*2*	*5*
NFR_006	*5*	*3*	*5*
NFR_007	*0*	*5*	*5*
NFR_008	*5*	*2*	*4*
NFR_009	*4*	*1*	*4*
NFR_010	*3*	*1*	*4*

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NFR_011	5	3	5
NFR_012	4	3	4
NFR_013	3	1	5
NFR_014	4	1	5
NFR_015	4	0	4
NFR_016	4	3	5

2.4. Requirements Diagram

You should prepare the diagram in SysML 1.5 presenting the requirements model, including both functional and non-functional requirements. It is defining the elements fulfilled by the requirement (satisfy), elements accepting the requirement (verify), elements specifying the requirements (refine) and elements that track requirements (trace).

The requirement diagram is also attached in the files as it is big to fit in the A4 document.

2.5. Use Case Diagram

You should prepare the use case diagram in UML 2.5 depicting the roles of stakeholders who are users of the project. It should also present the high-level concept of system usage divided into modules. Please describe the critical use cases in the natural language or with the use of behavioural diagrams.

2.6. Dictionary and Business Rules

In this section, you should include the dictionary of business concepts present in the project. You can also define rules in a natural language or with the use of a formalised standard dedicated to business rules in SBVR.

Dictionary

Term	Definition
System	Computer software package that performs a specific function directly for an end user
Group Trip	A trip for a group of people who have agreed on a common schedule, travel date, and mode of transportation.
Invoice	A stamped business document that lists and records the details of a transaction between a buyer and a seller.
Packages	A detailed description of a Group Trip service that is available to be delivered to customers
Group	A collection of two or more users bound by a shared expense
Activities	A record of user information, trips, accommodation, including the amount of payments.
Customer Support Team	The group of people that offers various forms of service to customers (e.g. online live chat, mobile call, etc.)
User	This is a person who has registered in the system and has an account in it.
Data	Information that can be associated with an identified or directly or indirectly identifiable natural person.
User	This is a person who has registered in the system and has an account in it.
Two Factor	A security system that requires two distinct forms of identification to access something.
Communication Layer	A layer which consists of a network of wired/wireless networks, the Internet, and protocols
SSL	A security protocol that creates an encrypted link between a web server and a web browser

Business Rules

	Business Rules
1.	Each group trip package can only be created by one or only one administrator.
2.	Each user can buy one or more group trip packages.
3.	Each group trip package can only be bought by one and only one user.
4.	Each user can make one or more payments.
5.	Each payment can only be made by one and only one user.
6.	Customer Support Team should be available 24 hours.
7.	There is timeout for session after 15 min inactivity.
8.	Each user can request to cancel group trip package for a full refund, up to 72 hours before the date and time of the trip.
9.	The system must ask for two factor authentication due to user's suspicious activity.
10.	The system must block service for user if the user does not comply with Terms of Use

3. Design **(F3)**

3.1. Logical Data Model

3.1.1. Structural Model

Prepare the model as class and component diagrams expressed in UML 2.5. Use natural language to describe the semantics of models' elements. Besides, use the object diagram to present an instance of the model at the time of system execution.

The following small changes were introduced during the creation of the structural model

- *The user will not have the possibility to add wanted activities because the system as stated, will be based on the USA, and the activities could differ based on the states of the group trip package.*

Class Diagram
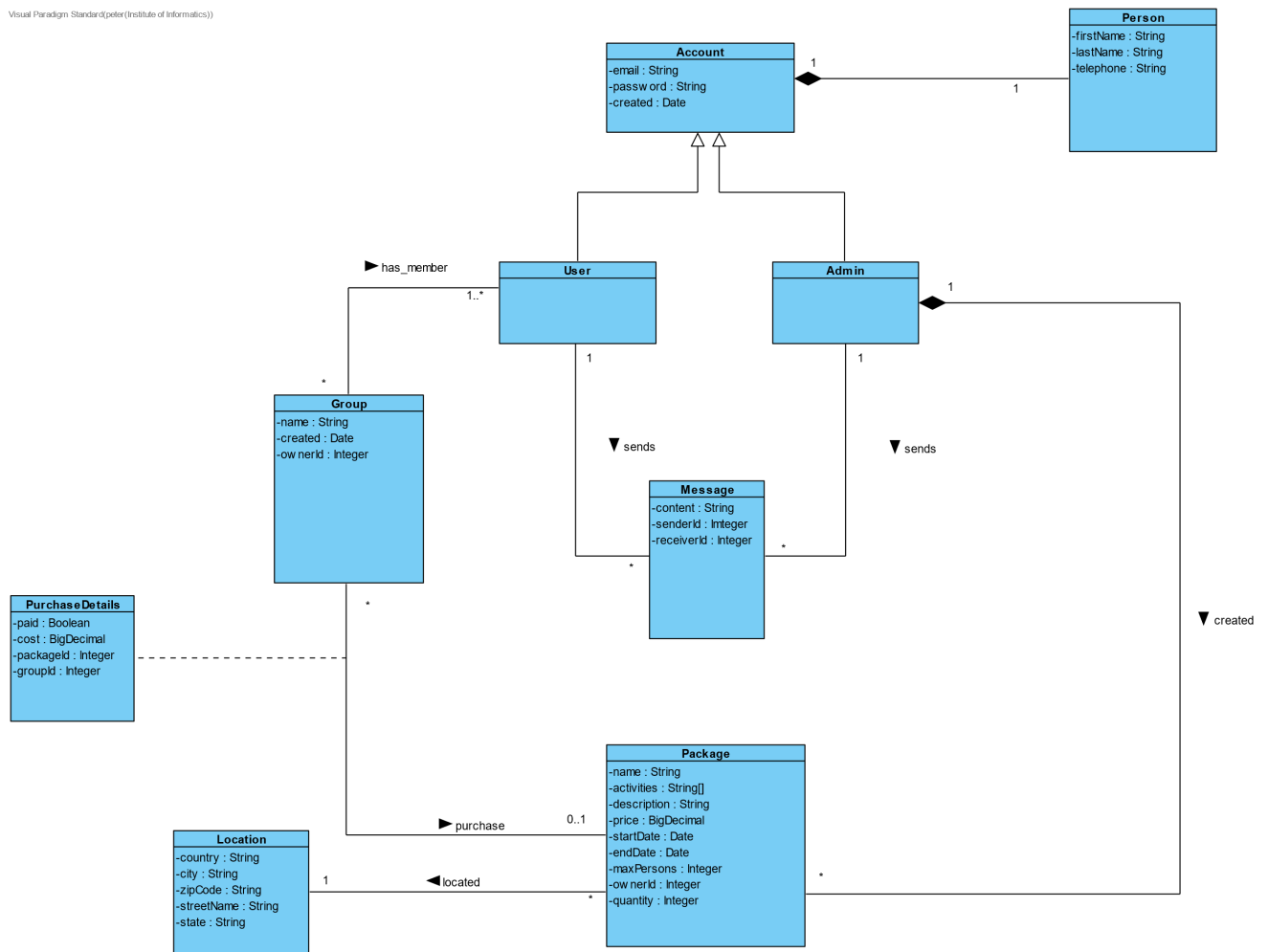
Component Diagram

Create package component diagram
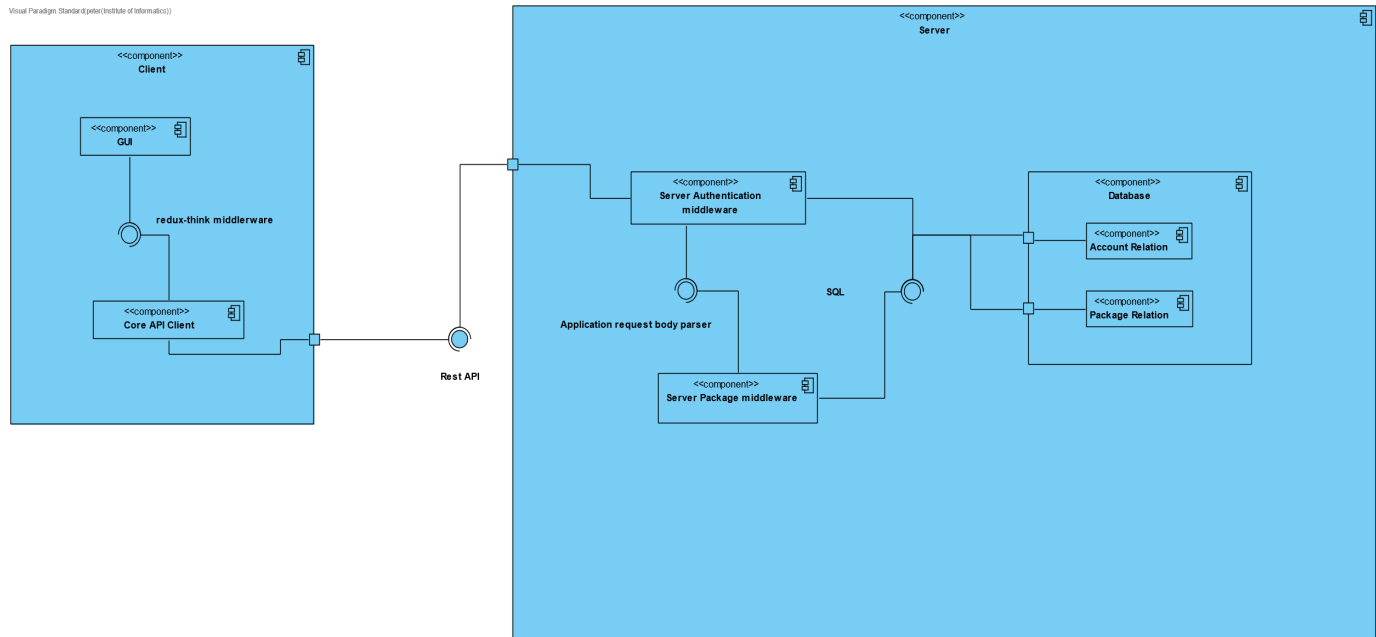
Add group member component diagram

Object diagram

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Visual Paradigm Standard(peter(Institute of Informatics))

User1 : Account

id = 1
email = dummyUser@email.com
passw ord = pDFSKNQANDA!@kjdnfknssdasdsd
created = 20/11/2021

Person1 : Person

accountId = 1
firstName = Dummy
lastName = Dummy last
telephone = 005400548982

Group10 : Group

id = 10
name = Winter time in chicago
ow nerId = 1
created = 25/12/2021

PurchaseDetails10 : PurchaseDetails

cost = 5460,70
groupId = 10
packageId = 50
paid = False

package50 : Package

id = 50
name = Chicago history trip ...
description = Lorem Ipsum is simply dummy text of the printing
activities = [Lorem Ipsum..., Lorem Ipsum..., Lorem Ipsum...]
startDate = 27/12/2021
endDate = 02/01/2022
price = 5460,70
quantity = 4
maxPersons = 5
ow nerId = 20

3.1.2. Behavioural Model

In this section present behaviour of crucial use cases using the UML 2.5 diagrams, namely sequence diagram, state diagram, and activity diagram.

Activity diagram

Create a group trip

Visual Paradigm Standard(Elvin(Institute of Informatics))

User	Gui	Backend
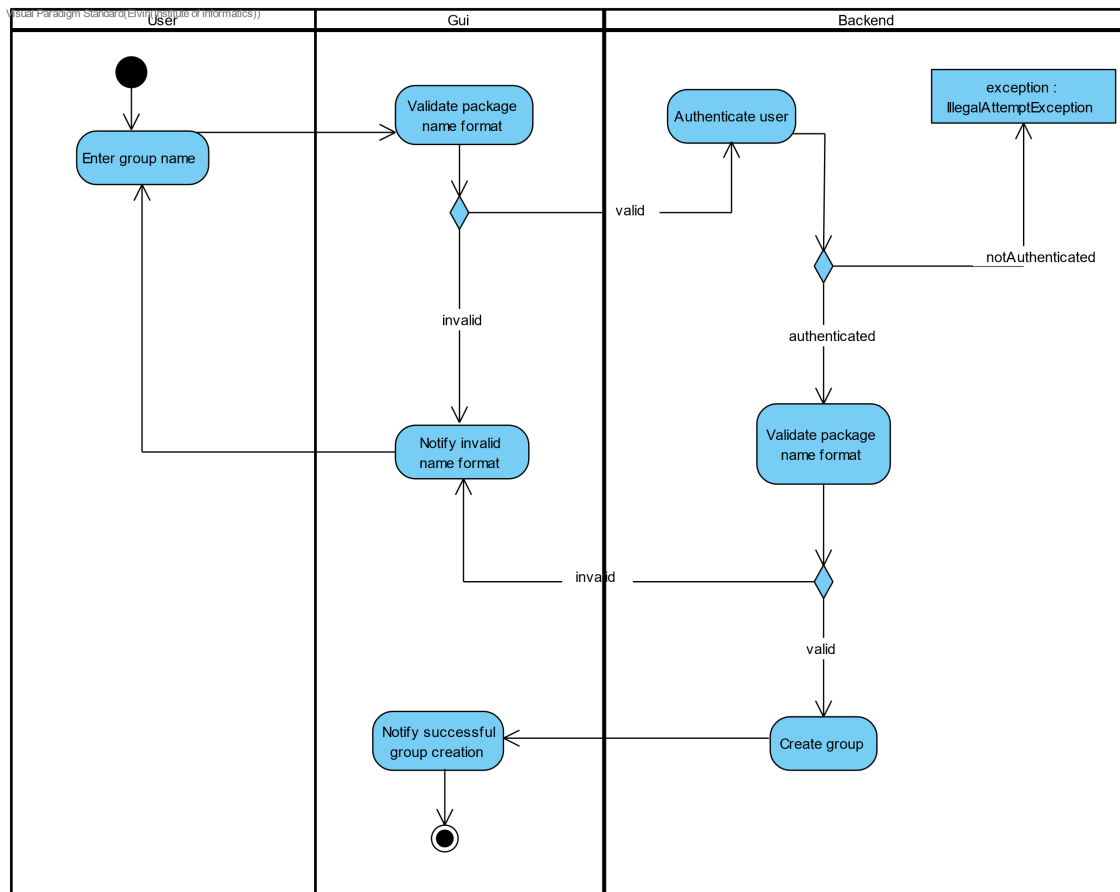
Add a member to a group trip

Create a package

Visual Paradigm Standard(Ewin(Institute of Informatics))

Admin	Gui	Backend
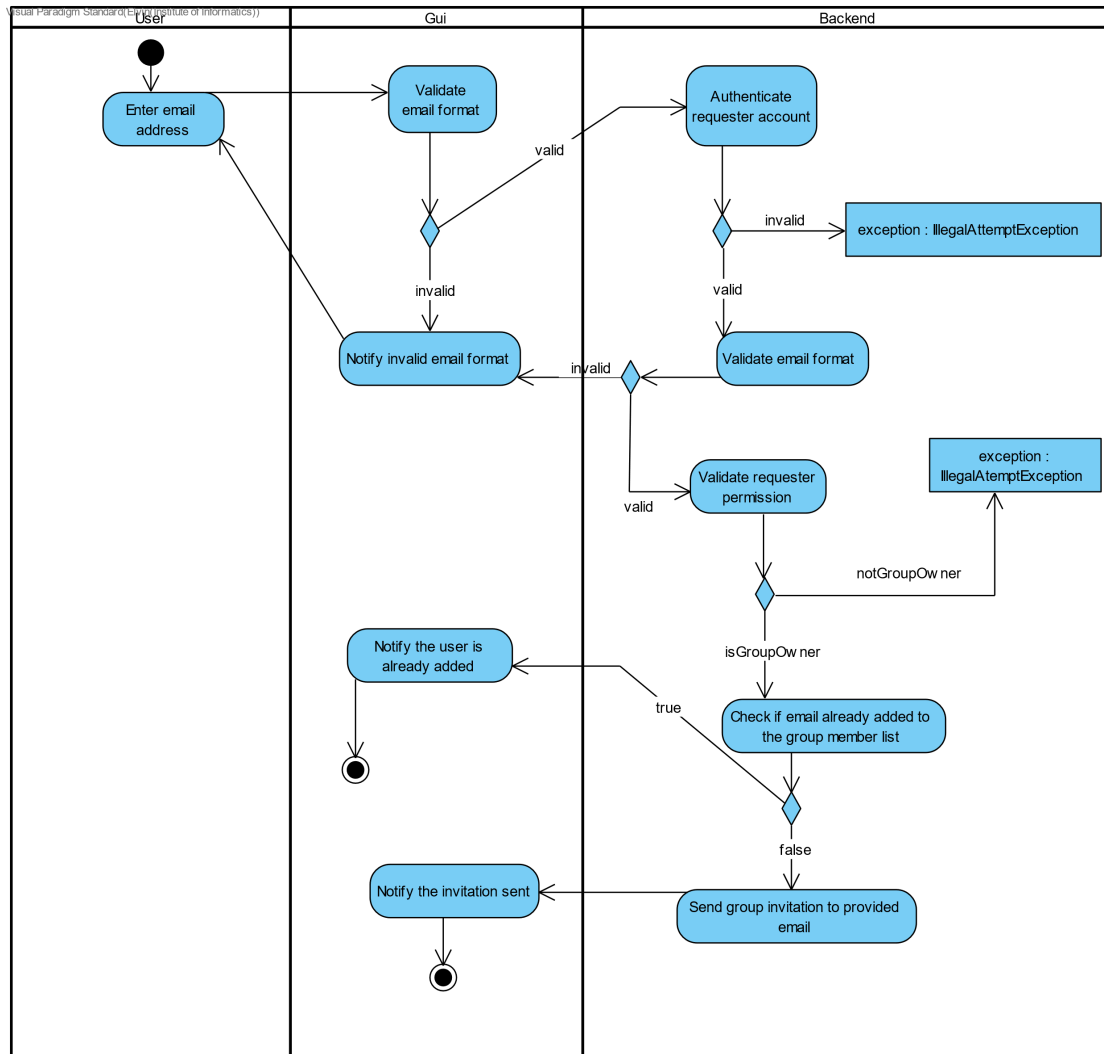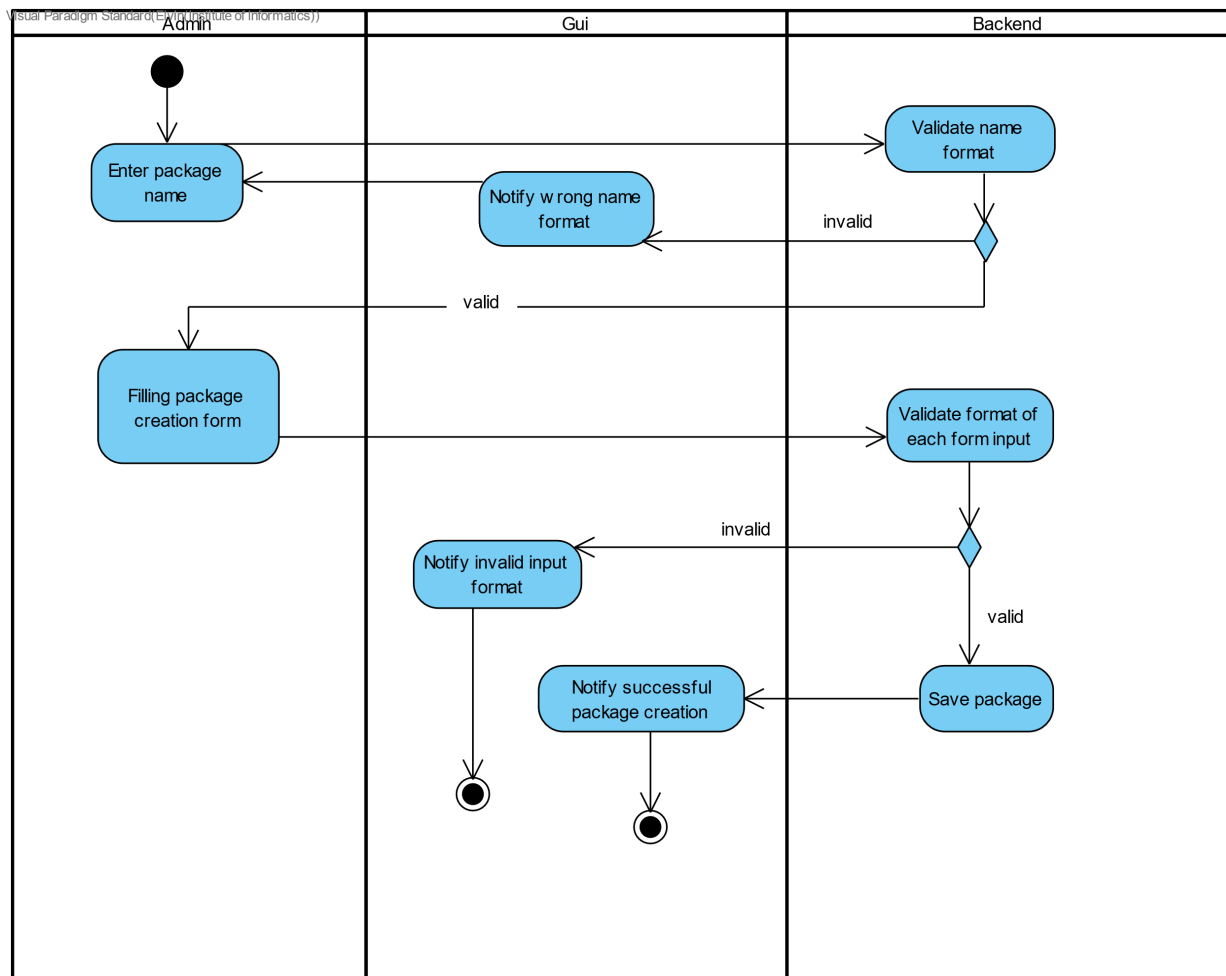
Buy a package for a group trip
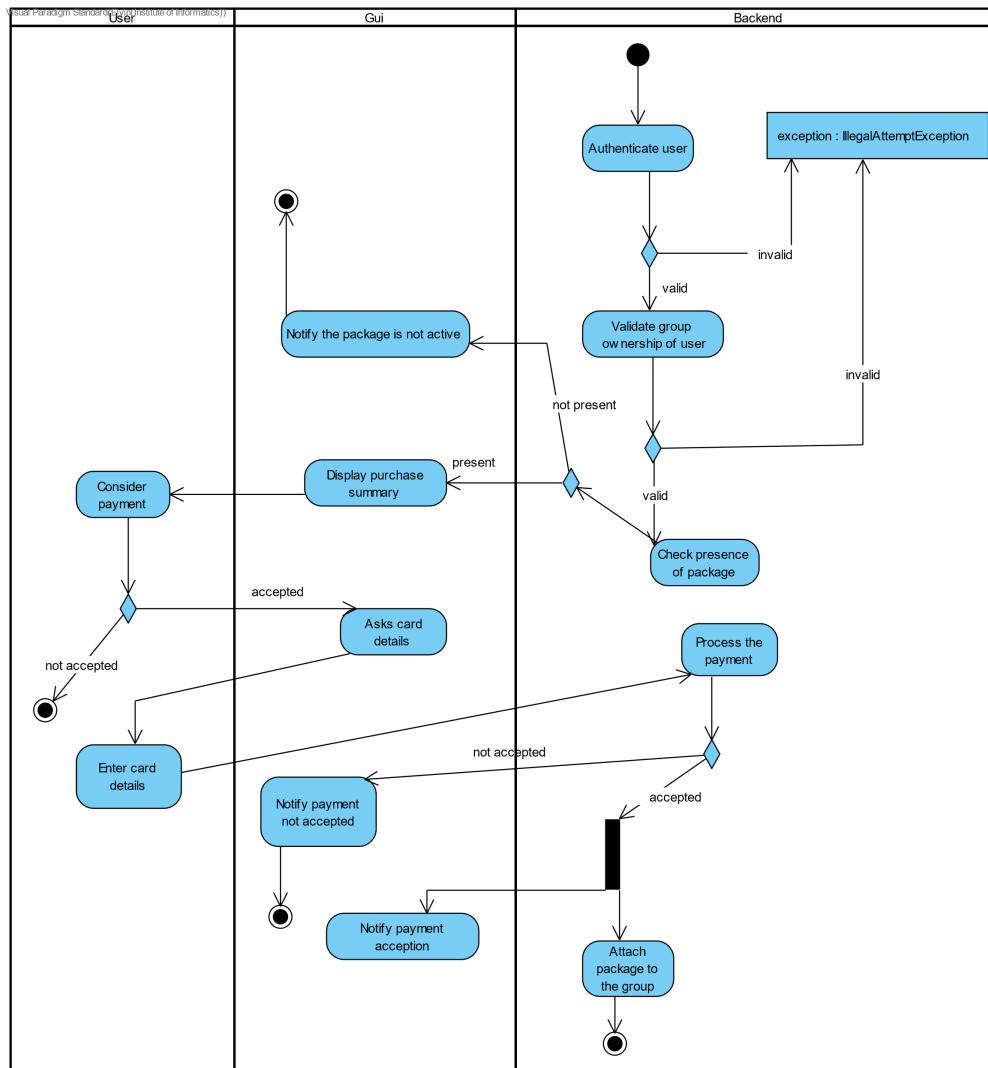
Sequence diagram

Create a group trip
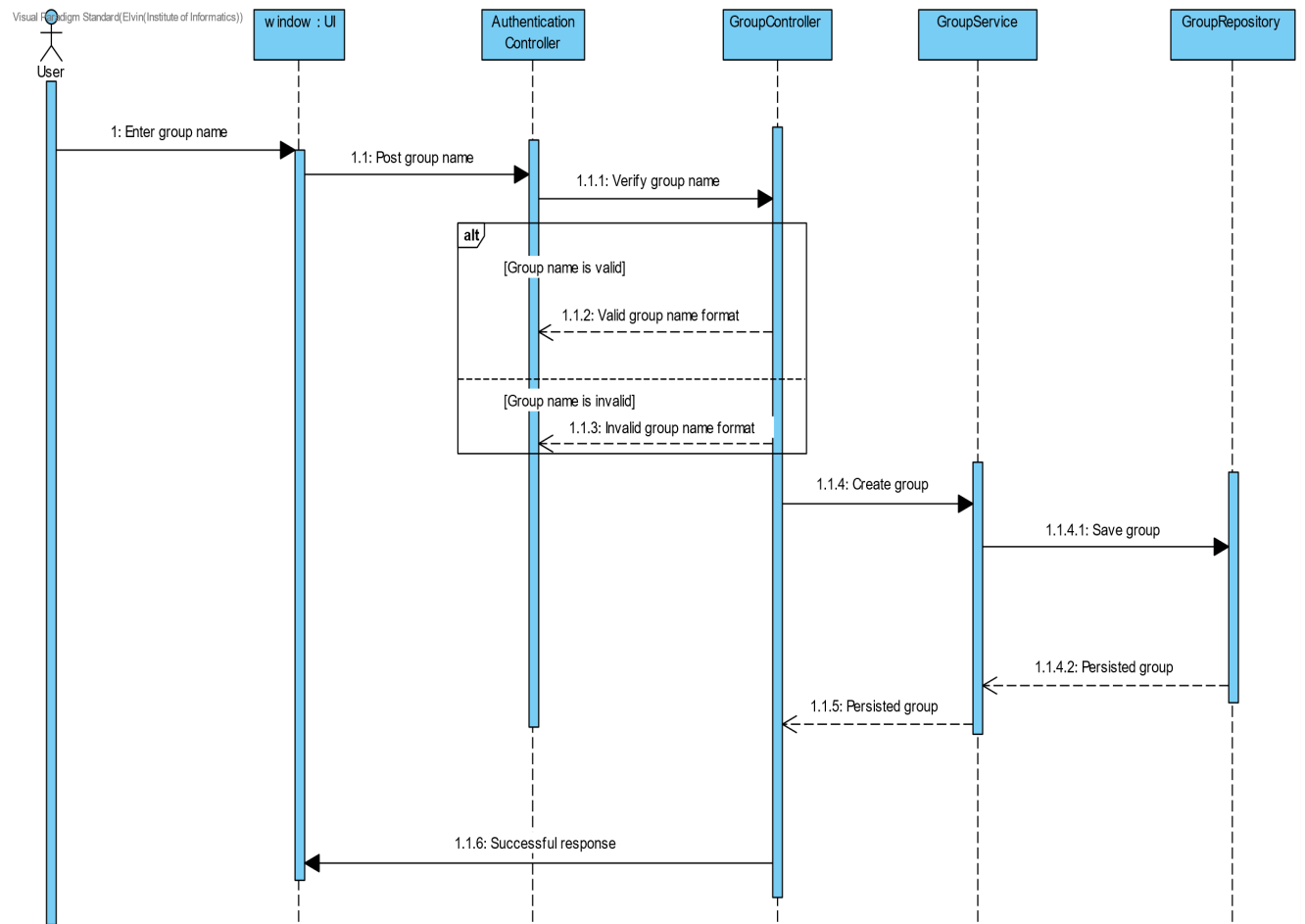
Visual Paradigm Standard(Elvin(Institute of Informatics))

| User | window : UI | Authentication Controller | GroupController | GroupService | GroupRepository |

1: Enter group name

1.1: Post group name

1.1.1: Verify group name

alt

[Group name is valid]

1.1.2: Valid group name format

[Group name is invalid]

1.1.3: Invalid group name format

1.1.4: Create group

1.1.4.1: Save group

1.1.4.2: Persisted group

1.1.5: Persisted group

1.1.6: Successful response

Add a member to a group trip

State Diagram

Create a group trip

Visual Paradigm Standard(Elvin(Institute of Informatics))

Email address
entered

Unvalidated
email address

checking email format

Validated
email address

Unauthenticated requester

authenticating

Email sent

sending email

Permitted
requester

checking permission

Authenticated
requester
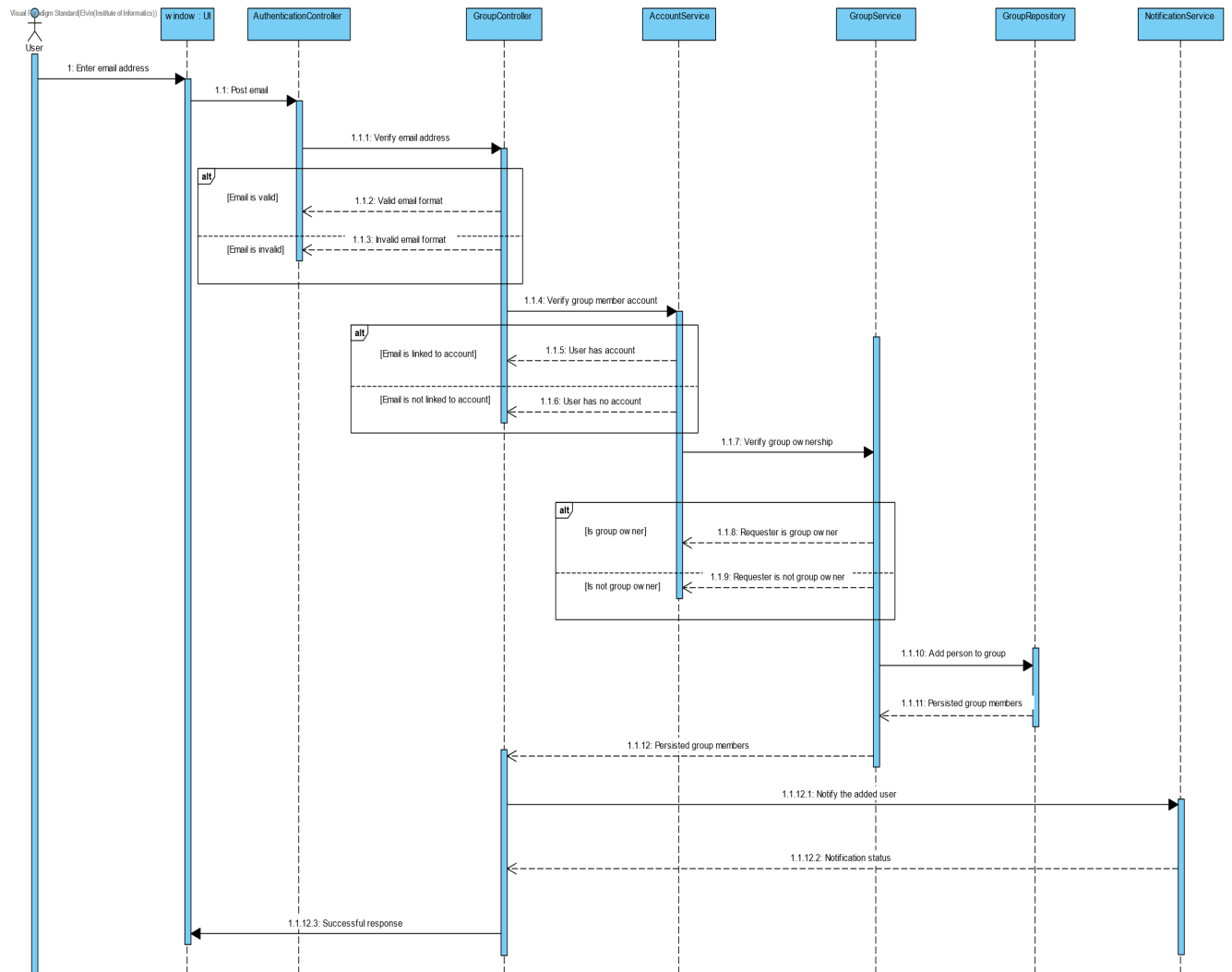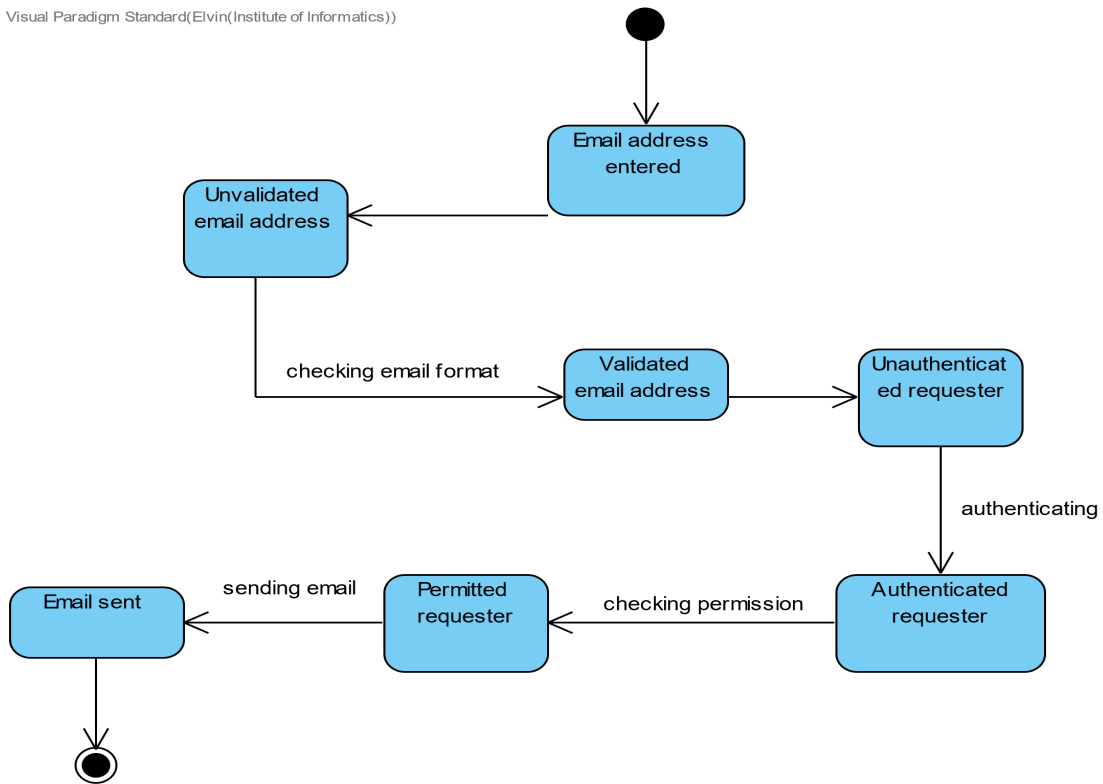
Add a member to a trip group

Visual Paradigm Standard(Elvin(Institute of Informatics))

Cancelled

cancel creation

Group name
entered

Unvalidated name
format

validating

Validated name
format

authenticating requester

Authenticated
requester

creating group

Created
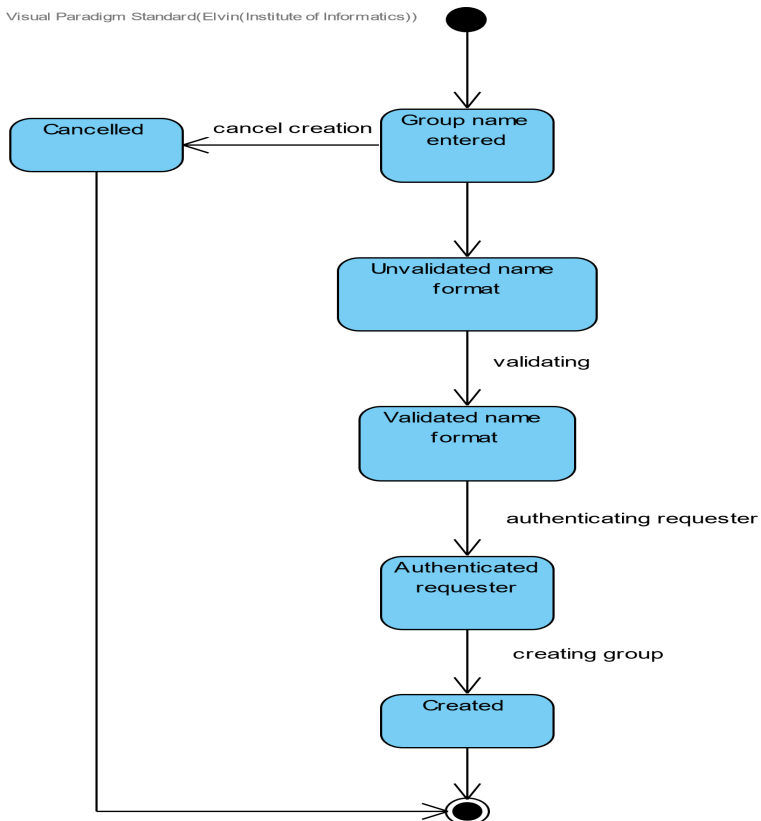
3.2. Database Model

3.2.1. Conceptual Model

The model contains the definition of entities and relationships among them in terms of the database (persistence). You should present it as a diagram and description of key elements in natural language.
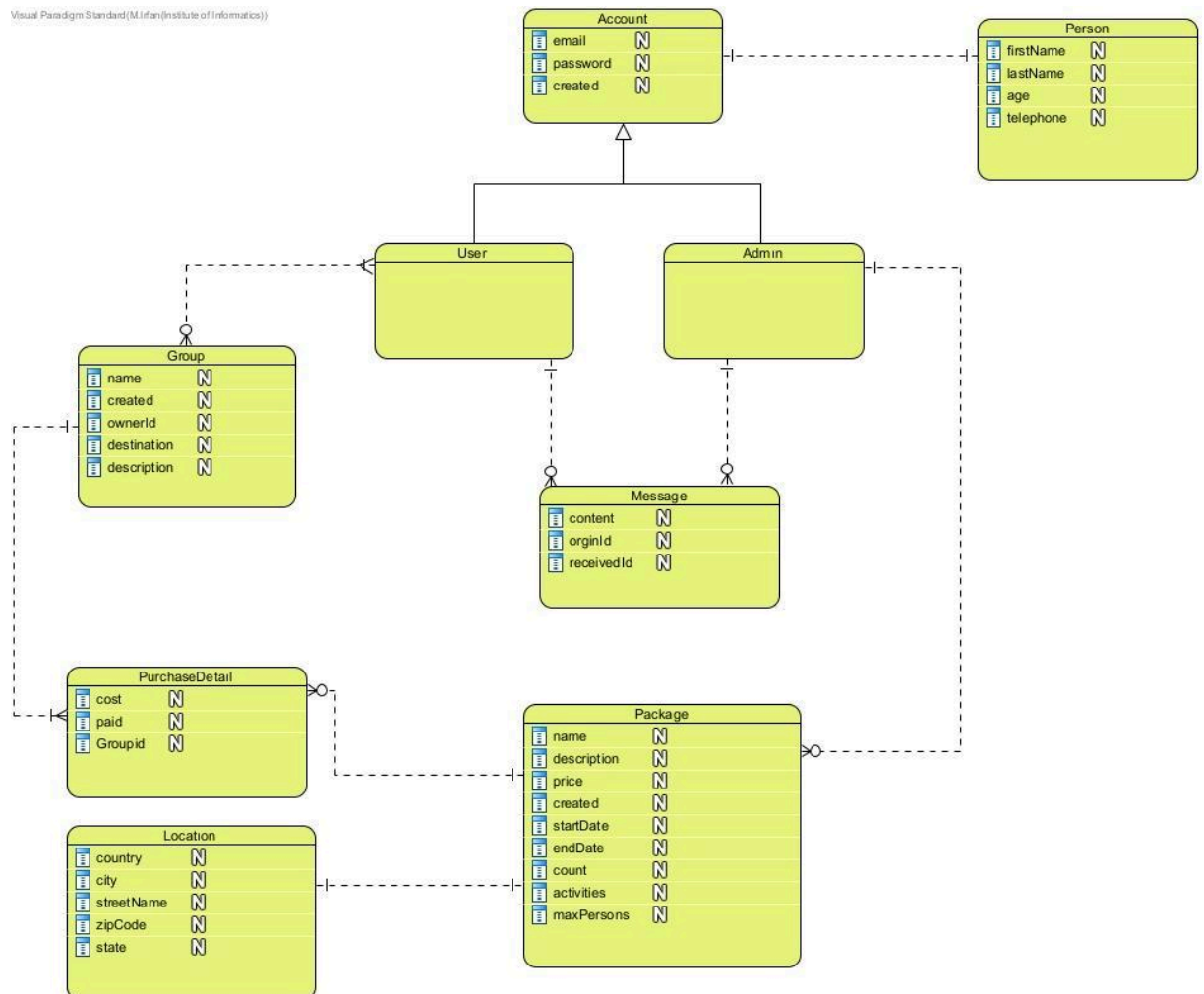
3.2.2. Physical Model

The model presented as a diagram of the database that constitutes the implementation of the conceptual model in the selected database management system.

It is required to include an elaboration on transformations used in the process.

- *The float8 are going to be replaced with double (the used tool had some issues not having them for the trial version)*
- *The int4 are going to be replaced with bigint (the used tool had some issues not having them for the trial version)*
- *The many to many relationships between the user table and group table had to be changed by adding an additional assisting table.*
- *We have decided to use varchar(255) to store all the array of string as csv values*

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Visual Paradigm Standard(M.Irfan(Institute of Informatics))

User

🔑 id	int4	
📇 Accountid	int4	

Account

🔑 id	int4	
📇 email	varchar(255)	
📇 password	varchar(255)	N
📇 created	date	N

Person

🔑 id	int4	
📇 firstName	varchar(255)	N
📇 lastName	varchar(255)	N
📇 age	int4	N
📇 telephone	int4	N
📇 Accountid	int4	

Group

🔑 id	int4	
📇 name	varchar(255)	N
📇 created	date	N
📇 OwnerId	int4	
📇 destination	varchar(255)	N
📇 description	varchar(255)	N

Message

🔑 id	int4	
📇 content	varchar(255)	N
📇 orginId	int4	N
📇 receivedId	int4	N
📇 Userid	int4	
📇 Adminid	int4	

Admin

🔑 id	int4	
📇 Accountid	int4	

Package

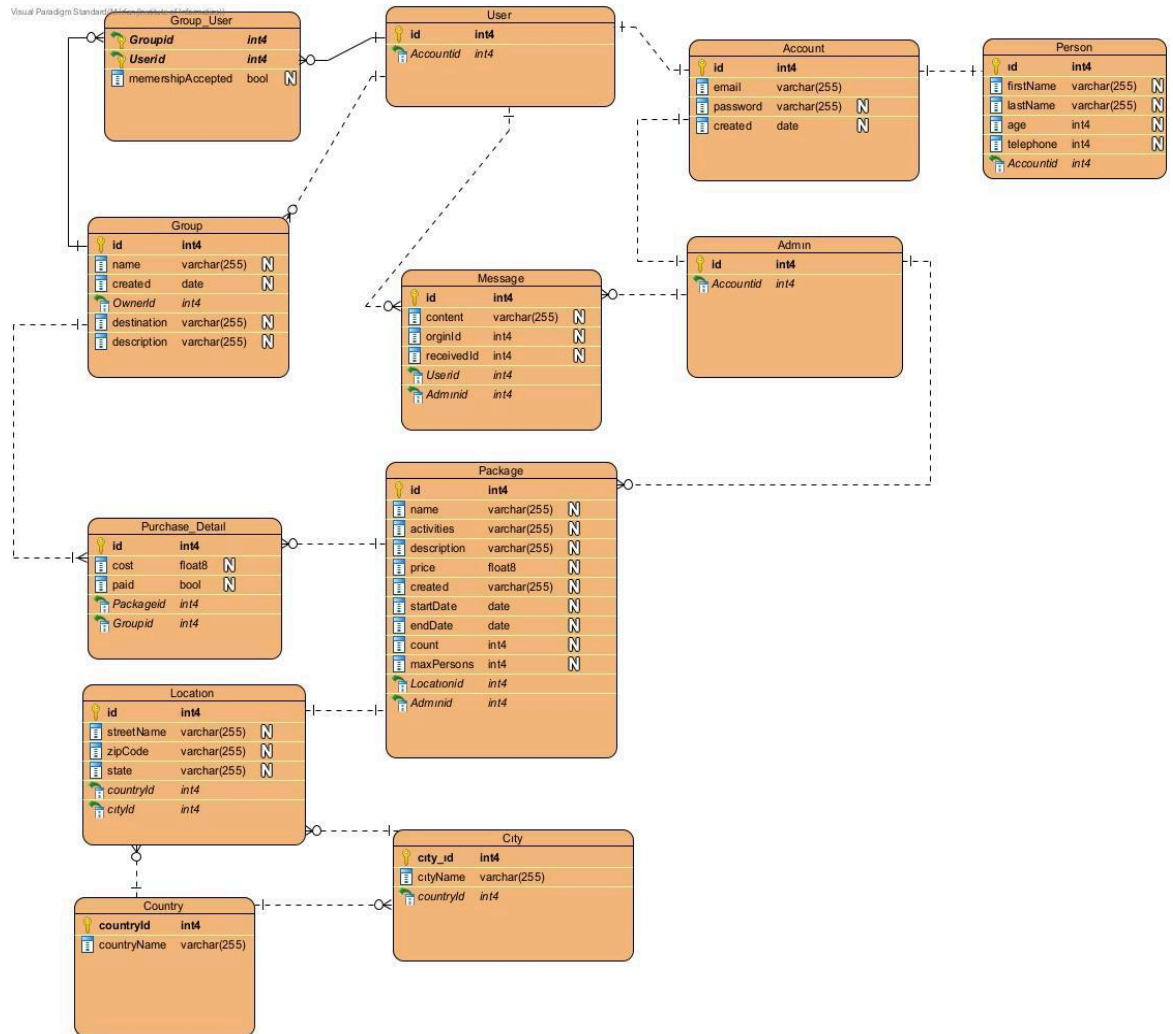|		
🔑 id	int4	
📇 name	varchar(255)	N
📇 activities	varchar(255)	N
📇 description	varchar(255)	N
📇 price	float8	N
📇 created	varchar(255)	N
📇 startDate	date	N
📇 endDate	date	N
📇 count	int4	N
📇 maxPersons	int4	N
📇 Locationid	int4	
📇 Adminid	int4	

Purchase_Detail

🔑 id	int4	
📇 cost	float8	N
📇 paid	bool	N
📇 Packageid	int4	
📇 Groupid	int4	

Location

🔑 id	int4	
📇 streetName	varchar(255)	N
📇 zipCode	varchar(255)	N
📇 state	varchar(255)	N
📇 countryId	int4	
📇 cityId	int4	

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3.3. Software Architecture

The architecture aspect of the system should be present as a Deployment Diagram expressed in UML 2.5. It shows the placement of prepared and implemented software and hardware artefacts on specific devices.

Visual Paradigm Standard(peter(Institute of Informatics))

Group trip system

<<device>>
User devices

<<executionEnvironment>>
Browser

<Protocol>Http

<<device>>
APplicationServer

<<executionEnvironment>>
NodeJs

<<component>>
MiddlewareLayer

<<component>>
Controllers

<<component>>
ServiceLayer

<<component>>
ModeLayer

TypeORM

<<device>>
DBServer

<<component>>
PostgresSQL

REST API

<<device>>
Third party service

<<component>>
PaypalApi

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