

---

# **5430-002: Software Engineering**

---

## **Project Workbook**

**Summer 2023**

CSCE 5430: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: May 27, 2023
Group4_5430_002_Project1_Workbook.docx	

## Revision History

Date	Issue	Description	Author
May 27, 2023	Project Phase 1	Adding Glossary (Question 4)	Group 4
May 27, 2023	Project Phase 1	Adding system actors (Question 6.1)	Group 4
May 27, 2023	Project Phase 1	Adding system use cases (Question 7.1)	Group 4
May 27, 2023	Project Phase 1	Adding use case diagram (Question 8.1)	Group 4
June 11, 2023	Project Phase 2	Produce a list of candidate classes	Group 4
June 11, 2023	Project Phase 2	Filtering the list of candidate classes	Group 4
June 11, 2023	Project Phase 2	Produce a potential class diagram	Group 4
June 11, 2023	Project Phase 2	Identified potential class attributes	Group 4
June 11, 2023	Project Phase 2	Revised the diagrams	Group 4
June 11, 2023	Project Phase 2	Update the glossary	Group 4
June 18, 2023	Project Phase 3	Adding Three Sequence Diagrams	Group 4
June 18, 2023	Project Phase 3	Adding detailed operations for classes	Group 4
June 18, 2023	Project Phase 3	Adding state chart diagram for iPermit system	Group 4
June 18, 2023	Project Phase 3	Update the glossary	Group 4

CSCE 5430: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: May 27, 2023
Group4_5430_002_Project1_Workbook.docx	

## Table of Contents

<b>IPERMIT SYSTEM GLOSSARY</b>	<b>4</b>
<b>1.1 INTRODUCTION</b>	<b>4</b>
<b>1.2 GLOSSARY</b>	<b>4</b>
<b>IPERMIT SYSTEM ACTORS</b>	<b>5</b>
<b>IPERMIT SYSTEM USE CASES</b>	<b>6</b>
<b>IPERMIT SYSTEM USE CASE DIAGRAM</b>	<b>7</b>
<b>LIST OF CANDIDATE CLASSES</b>	<b>8</b>
<b>POTENTIAL IPERMIT CLASSES</b>	<b>9</b>
<b>POTENTIAL IPERMIT CLASS DIAGRAMS (ENTITY CLASSES ONLY)</b>	<b>11</b>
<b>4REVISED IPERMIT CLASS DIAGRAM</b>	<b>114</b>
<b>POTENTIAL IPERMIT SEQUENCE DIAGRAMS</b>	<b>20</b>
<b>DETAILING THE OPERATIONS</b>	<b>23</b>
<b>IPERMIT STATE CHART DIAGRAM</b>	<b>24</b>
<b>IPERMIT STATE CHART DIAGRAM EXPLANATION</b>	<b>25</b>

CSCE 5430: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: May 27, 2023
Group4_5430_002_Project1_Workbook.docx	

## iPermit System Glossary

### 1.1 Introduction

This document is used to define terminology specific to the problem domain, explaining terms, which may be unfamiliar to the reader of the use-case descriptions or other project documents. Often, this document can be used as an informal *data dictionary*, capturing data definitions so that use-case descriptions and other project documents can focus on what the system must do with the information.

### 1.2 Glossary

The glossary contains the working definitions for the key concepts in the iPermit System.

Term	Definition
Regulated Entities (RE)	A business organization that is located within Ontario and is regulated both in its jurisdiction of registration and in all other jurisdictions in which it trades.
Web site	Is a set of related web pages containing content (media) such as text, images, video, and audio. A website is hosted on at least central computer called web server that is accessible via a network such as the Internet.
Mobile web browsers	A Web browser designed for the small screens of mobile device like a smartphone. Smartphones come with a Web browser; however, third-party browsers may be available.
OPS	OPS stand for Ontario Public Services and is used as a common payment portal that offer a public website the RE can access to pay his/her applications fees.
Environmental permits	An environmental permit is the technical and legal document establishing the environmental conditions for the construction and / or function of a project or activity.
RE dashboard	RE dashboard is a defined place in the RE software interface act as a reporting mechanism that aggregate and display the current status of the RE permit application process.
RE user account	An account identified by a user name and password that is created to manage access to resources and services provided by the ministry's web site.
Manage Permit Controller	A controller which is used to permit request for the permit activity.
Review Submitted Application Controller	A controller which is used to review the submitted application.
Permit Issue Controller	A controller which is used to issue permit for submitted application.

CSCE 5430: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: May 27, 2023
Group4_5430_002_Project1_Workbook.docx	

## iPermit System Actors

The first useful step to analyze the system functionality is to look in the problem statement at the things that interact with the system. In UML use case analysis, these external things are called **actors**. Actors are identified based on the following:

- Actors are always external to the system – they are therefore outside our control.
- Actors interact directly with the system.
- Actors represent roles that people and things play in relation to the system, not specific people or specific things.
- Each actor has a unique name and description.

Actor	Description
Regulated Entity (RE)	Regulated Entity (or RE in short) is an Ontario business who is required to have Environmental permits to do certain activities (that may be harmful to environment e.g. paint spray, heating system etc) on their Sites (property on which activity occurs).
OPS common payment portal (CPP)	OPS common payment portal (or CPP in short) is an automated system provided by Ontario public service to securely get the RE's application fees.
Ministry's Environmental Officer's (EO)	The Ministry's Environmental Officer's (or EO in short) is a general user of the Permit Issue System who takes a decision whether to permit or deny the RE's requests.

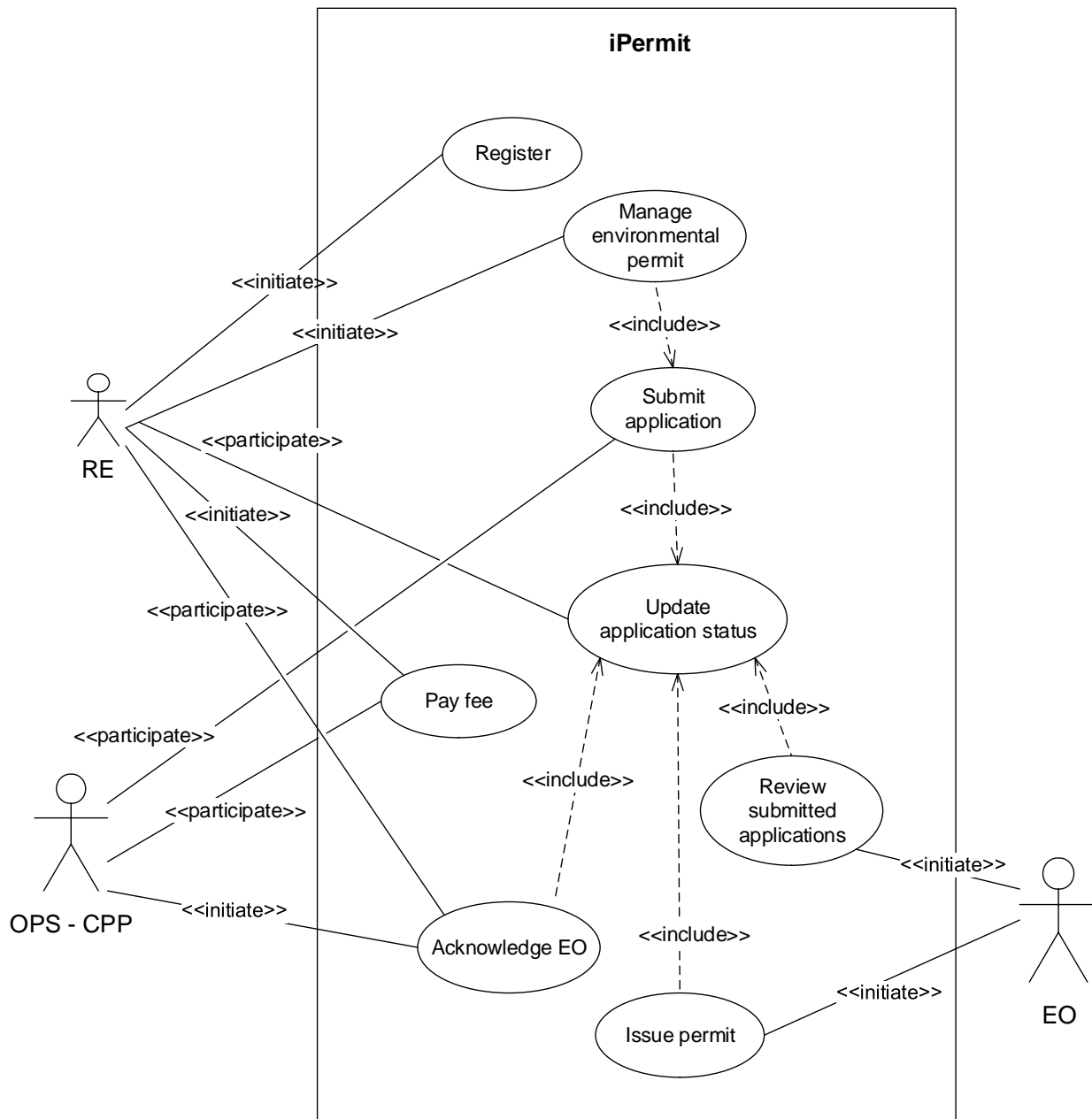
CSCE 5430: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: May 27, 2023
Group4_5430_002_Project1_Workbook.docx	

## iPermit System Use Cases

Use case	Description
Register	Register UC provides the functionality for RE to create an account in the system allowing her/him to register and provides information about their Organization, Contact Person, Address, and Site.
Manage environmental permit	Provides the ability for RE to fill a form in the Ministry's web site in order to apply for required permit, it also provides information (later) on the current status of RE application once submitted.
Submit application	Once RE complete their application form the Submit application UC records this transaction for RE and inform the OPS-CPP the necessary and corresponding information in order to collect the proper fees from RE.
Pay fee	Provides the ability for RE to pay the proper application fee automatically with the help of the external payment model (OPS common payment portal).
Acknowledge EO	With successful possessing of the payment, this UC declares to the EO that the RE application submission form is completed and send email to RE email account confirming their application submission.
Review submitted applications	Provides the ability for the Ministry's Environmental Officer's (EO) to access and review the RE's submitted applications. After reviewing the application form, EO shall be able to either Approve or Reject the application form.
Issue permit	Provides the ability to issue a permit to the RE, if the request is approved by the EO.
Update application status	Provide the ability to maintain and update the RE permit applications after each phase of the permit process life cycle. I.e., Submitted, Paid, Being Reviewed, Approved/Reject, or Issued.

CSCE 5430: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: May 27, 2023
Group4_5430_002_Project1_Workbook.docx	

## iPermit System Use Case Diagram



CSCE 5430: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: May 27, 2023
Group4_5430_002_Project1_Workbook.docx	

## List of Candidate Classes

Regulated Entities

Environmental permits

Activities

Paint spray

Heating system

Activity Sites

Ministry's web site

Account

Organization

Contact Person

Address

Application form

Payment site

Payment

OPS common payment portal

Fee

RE email account

RE dashboard

Application status

Ministry's Environmental  
Officer's (EO)

EO's dashboard

Mobile web browsers



CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

## Potential iPermit Classes

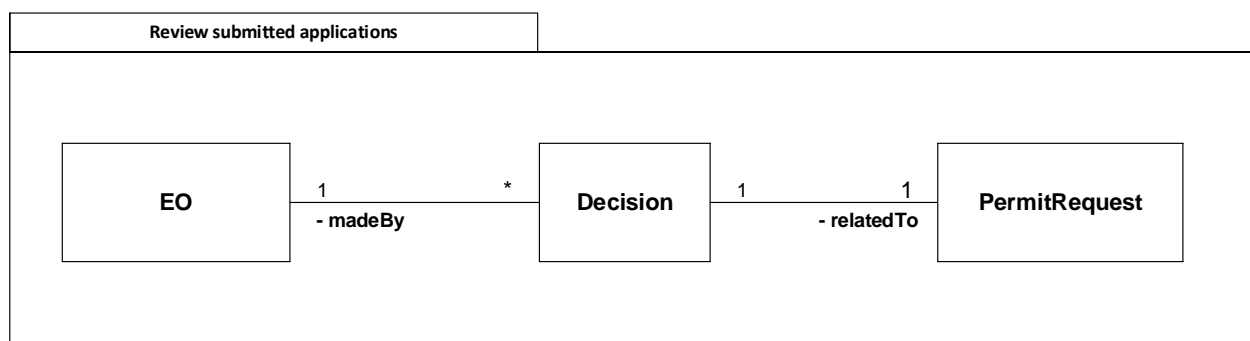
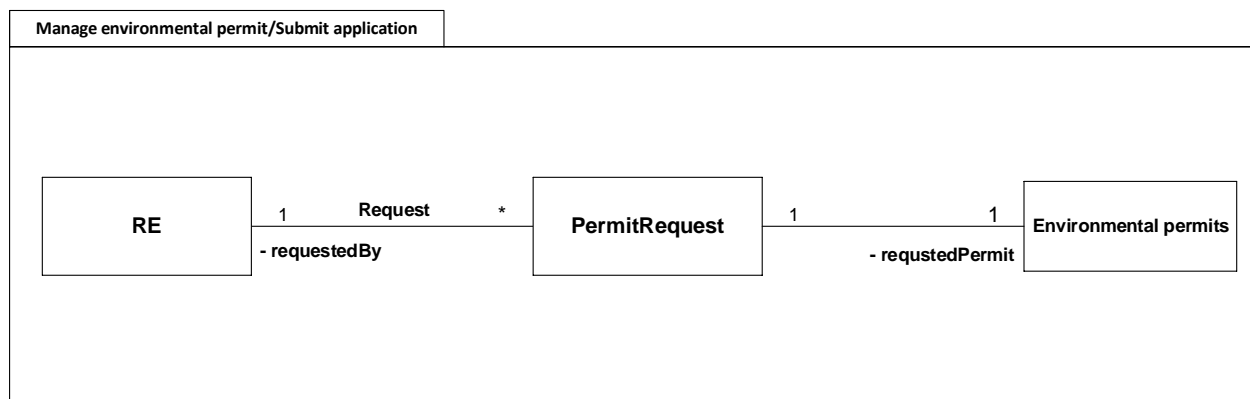
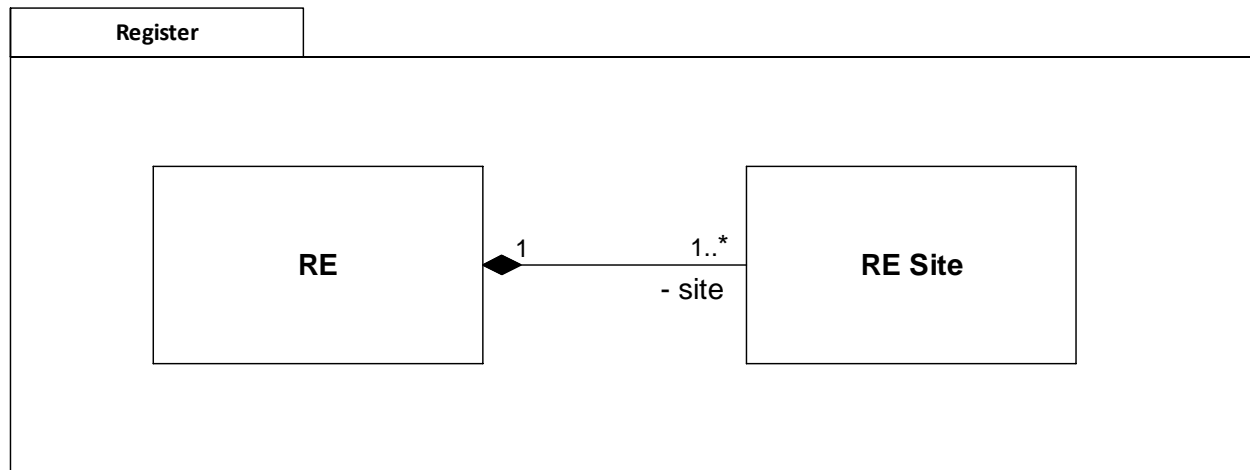
Class name	Type	Brief Description
RE	Entity	Hold all attributes, properties and operations that represent a Regulated Entity (RE).
RE Site	Entity	Each RE's organization has one or more sites to which the permit is requested. This entity class holds the attributes, properties and operations related to these sites.
RegistrationForm (Ministry's web site)	Boundary	The Ministry's Environmental registration form that enable RE to create a new user account.
RegisterController	Control	A control class to manage the user registration process.
PermitRequest	Entity	An entity class that holds the attributes, properties and operations related to the permit requests transactions.
Environmental permits	Entity	Maintain basic information on the available permits and their tariff.
PermitRequestForm	Boundary	The Ministry's Environmental permit request form (Ministry's web site) that enable RE to apply for required permit
ManagePermitsController	Control	A control class to manage the process of requesting permits and follow-up the existing requests.
EO	Entity	A specialization class to represent the specific attributes, properties and operations for The Ministry's Environmental Officer.
Decision	Entity	Each RE completed request will be reviewed by the EO and finally a decision whether to accept or reject the request will be taken. This entity class record these decision and its related information.
ReviewSubmittedApplicationsForm	Boundary	A boundary class to maintain all information related to the website that enable the EO to review and make the request decisions.
ReviewSubmittedApplicationsController	Control	A control class to manage the process of evaluating and taking decision on the requested permits.
OPS-CPP	Entity	A specialization class to represent the specific attributes, properties and operations for OPS common payment portal user
RequestStatus	Entity	This entity class maintain (record) the different status of RE's permit request.
Updater	Entity	An abstract class acts as a superclass (generalization class) that might be EO, OPS-CPP or RE. Note that, it is not supposed from RE to send emails.
emailArchive	Entity	This entity class log (record) all the email sent from the EO and OPS-CPP to the RE for the future references.

CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

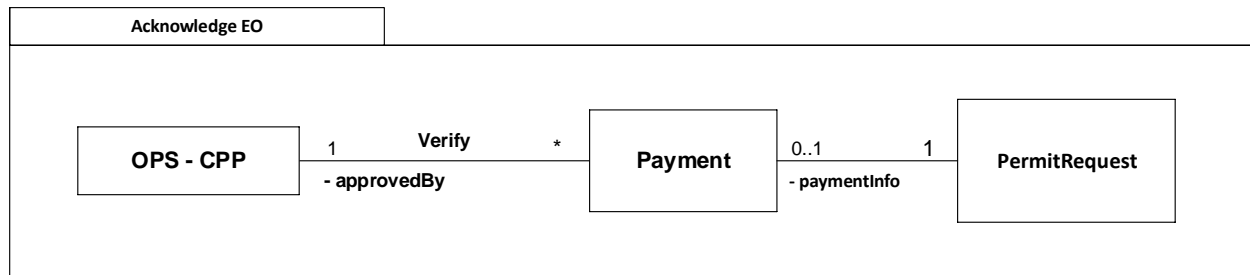
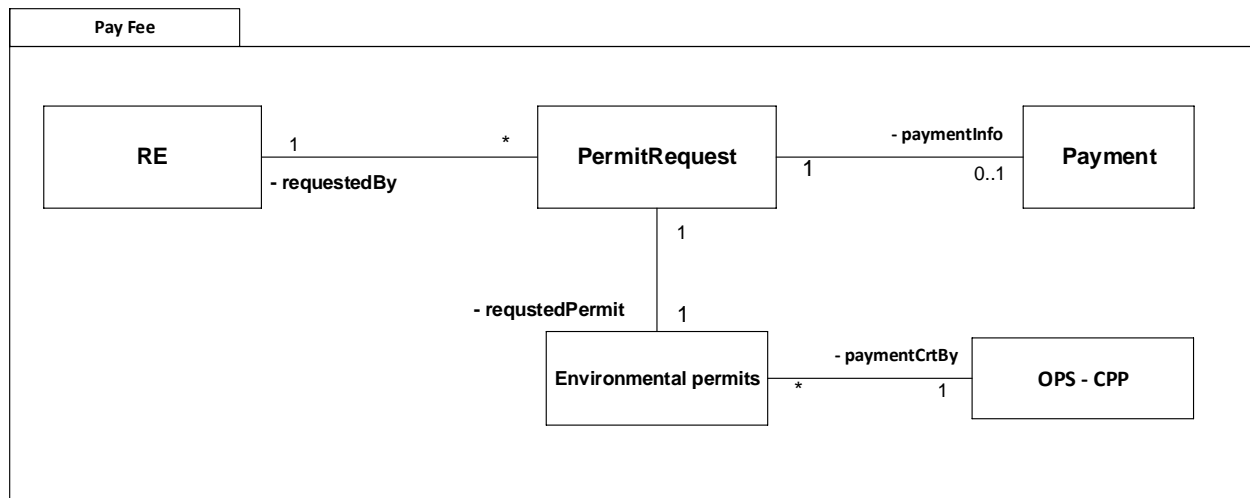
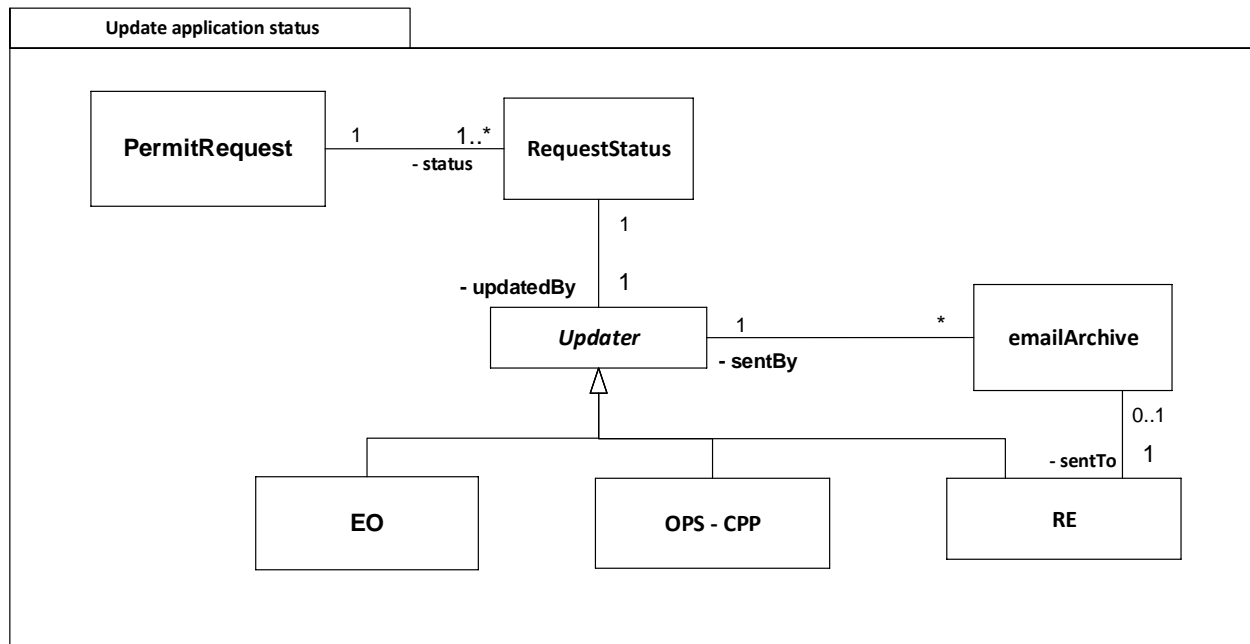
Payment	Entity	Payment is an entity class to maintain (record) the payment transaction that include information on the payment date, method, and whether it is approved nor not.
PayFeeForm	Boundary	This responsibility of this form is to inform the RE that he will be directed to the OPS web form.
PayFeeController	Control	A control class to manage the process of hosting the OPS web form.
SuccessfulPaymentNoticeForm	Boundary	A Popup form to be displayed in order to inform that RE payment was successful, and the control will return back to the Ministry's web site.
AcknowledgeEOController	Control	A control class to inform RE the status of his/her payment and with successful possessing of the payment, it declares to the EO that the RE application submission form is completed and send email to RE email account confirming their application submission.
Permit	Entity	Maintain all information of the approved issued permits.
IssuePermitForm	Boundary	A boundary class to maintain all information related to the website that enable the EO to issue a permit.
PermitIssueController	Control	A control class to manage the process of issuing permits.

CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

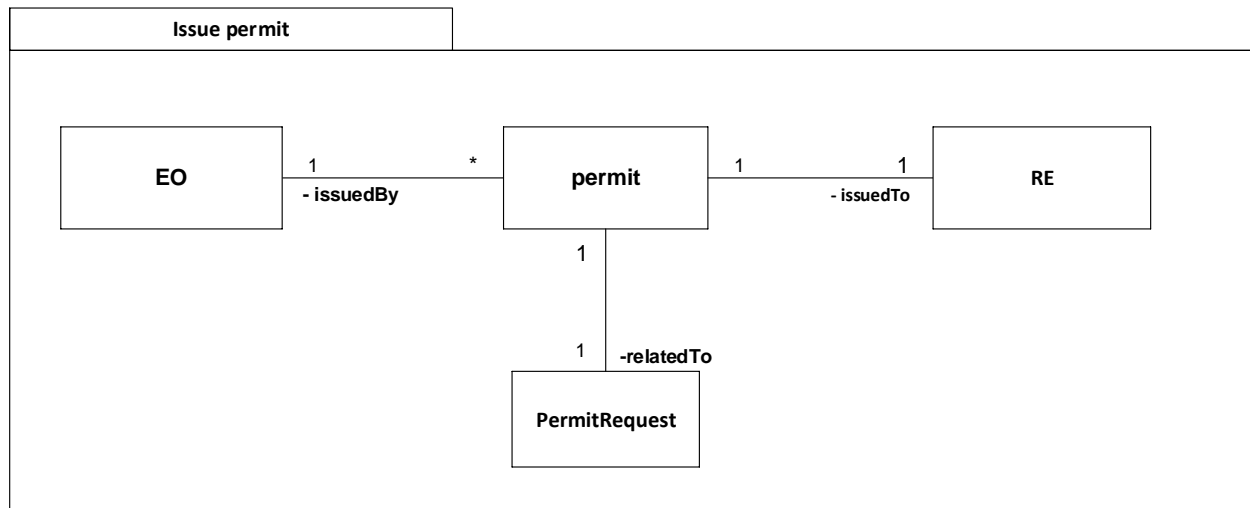
## Potential iPermit class diagrams (entity classes only)



CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	



CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	



CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

## Revised ipermit Class Diagram

### 1. RE Class

Attribute name	Type	Brief Description
ID	String	The Regulated Entity User ID
contactPersonName	String	Organization contact person name
password	String	An encrypted version of RE account password
createdDate	Date	The RE account creation date.
email	String	Organization contact person email address
organizationName	String	Organization Name
organizationAddress	String	Organization Address

### 2. RE Site Class

Attribute name	Type	Brief Description
siteAddress	String	Organization site address.
siteContactPerson	String	Organization site contact person name

### 3. PermitRequest Class

Attribute name	Type	Brief Description
requestNo	String	The request number, a sequence number generated by the system (iPermit).
dateOfRequest	Date	The request creation date
activityDescription	String	The description of the activity that needs a permit
activityStartDate	Date	The activity starting date
activityDuration	Date	The duration of the activity
permitFee	Double	The activity permit fee

### 4. EnvironmentalPermits Class

Attribute name	Type	Brief Description
permitID	String	The permit unique ID number
permitName	String	The permit descriptive name

CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

permitFee	Double	The base permit fee
description	String	A complete permit description

## 5. EO Class

Attribute name	Type	Brief Description
ID	String	The Ministry's Environmental Officer's ID
Name	String	Ministry's Environmental Officer's name

## 6. Decision Class

Attribute name	Type	Brief Description
ID	String	The role identification
dateOfDecision	Date	The decision taken date
finalDecision	String	The final decision {permit, deny}
Description	String	The decision description

## 7. RequestStatus Class

Attribute name	Type	Brief Description
permitRequestStatus	String	Permit request status {submitted, being reviewed, approved, etc}
date	Date	The status update date
description	String	Reasons and comments

## 8. EmailArchive Class

Attribute name	Type	Brief Description
emailID	String	Email number
emailDate	date	Email date
reason	String	The reason for the email

## 9. OPS-CPP Class

Attribute name	Type	Brief Description
ID	String	The OPS common payment portal's ID
Name	String	The OPS common payment portal's name

CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

## 10. Payment Class

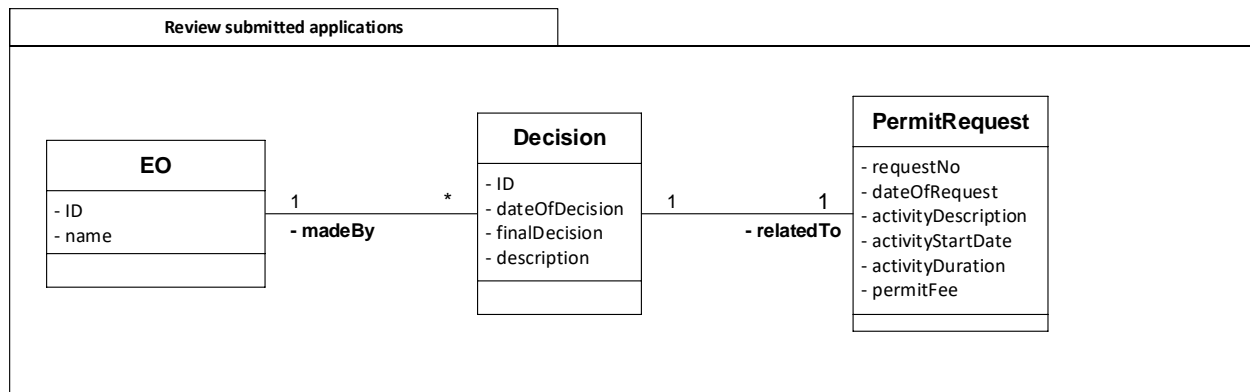
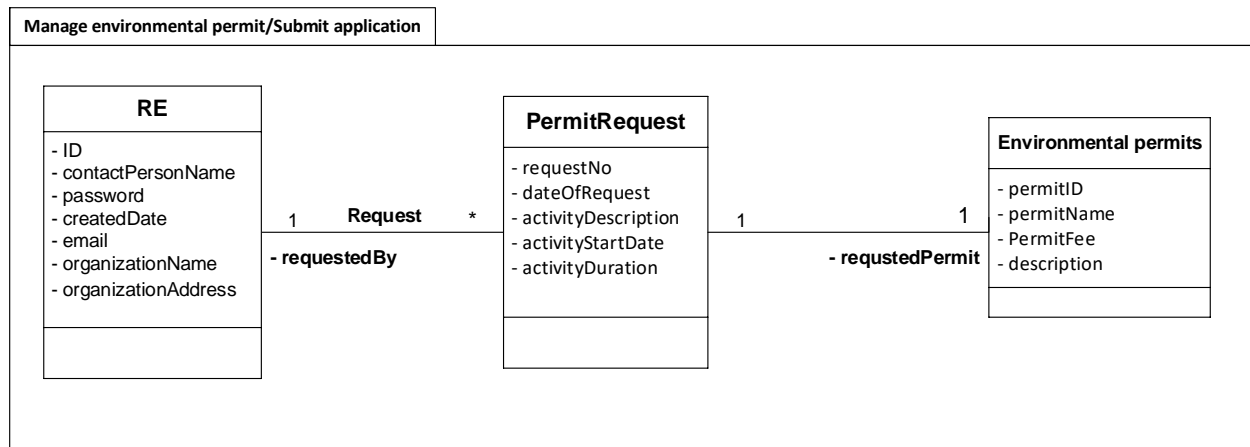
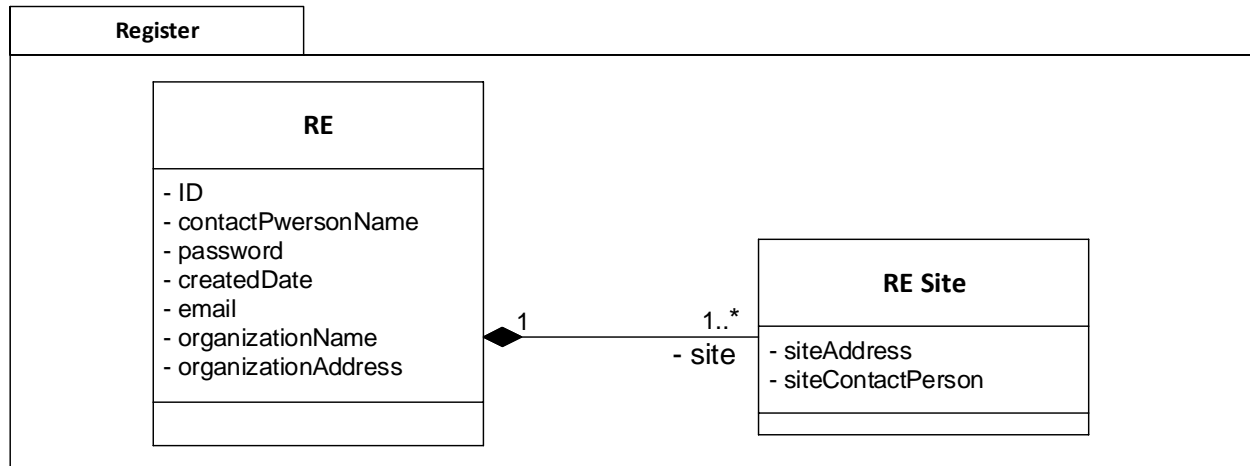
Attribute name	Type	Brief Description
paymentID	String	The payment ID
paymentDate	Date	The payment date
paymentMethod	String	The payment method, e.g., Master card, Visa, PayPal, etc.
Last4DigitofCard	Double	The last digit of the card number (to maintain privacy)
cardHolderName	String	The card owner name
paymentApproved	Boolean	The payment approval decision (yes, no)

## 11. Permit Class

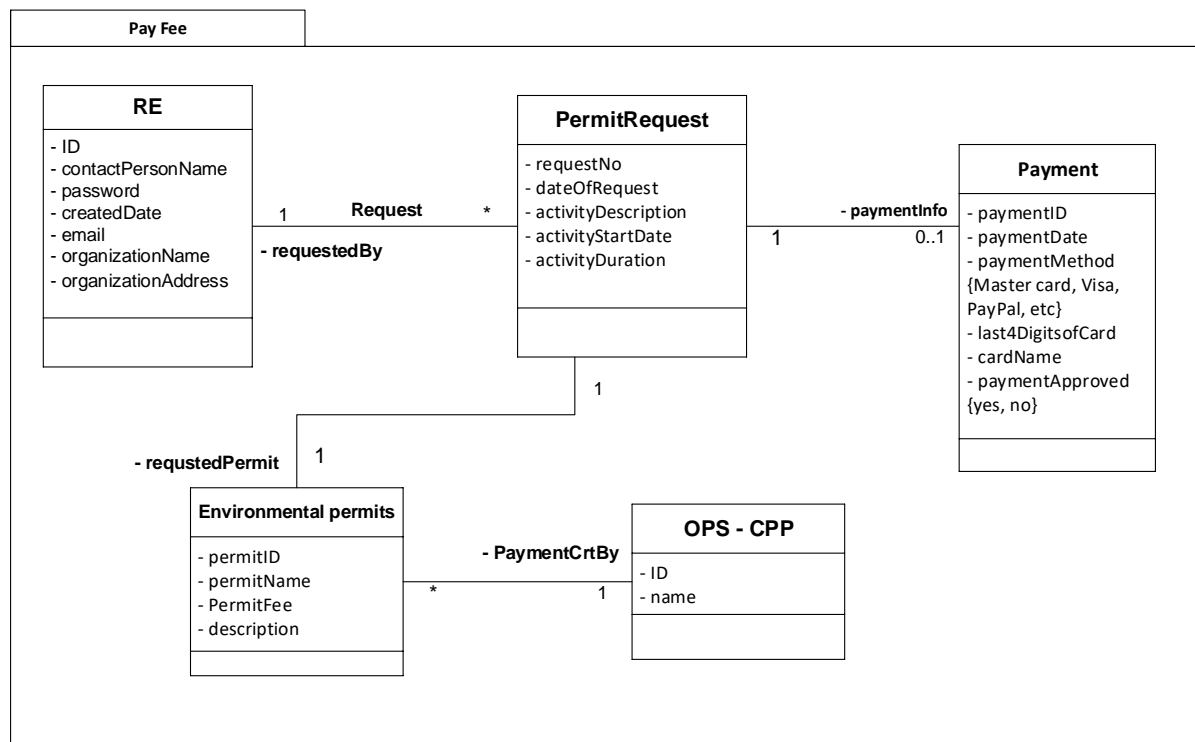
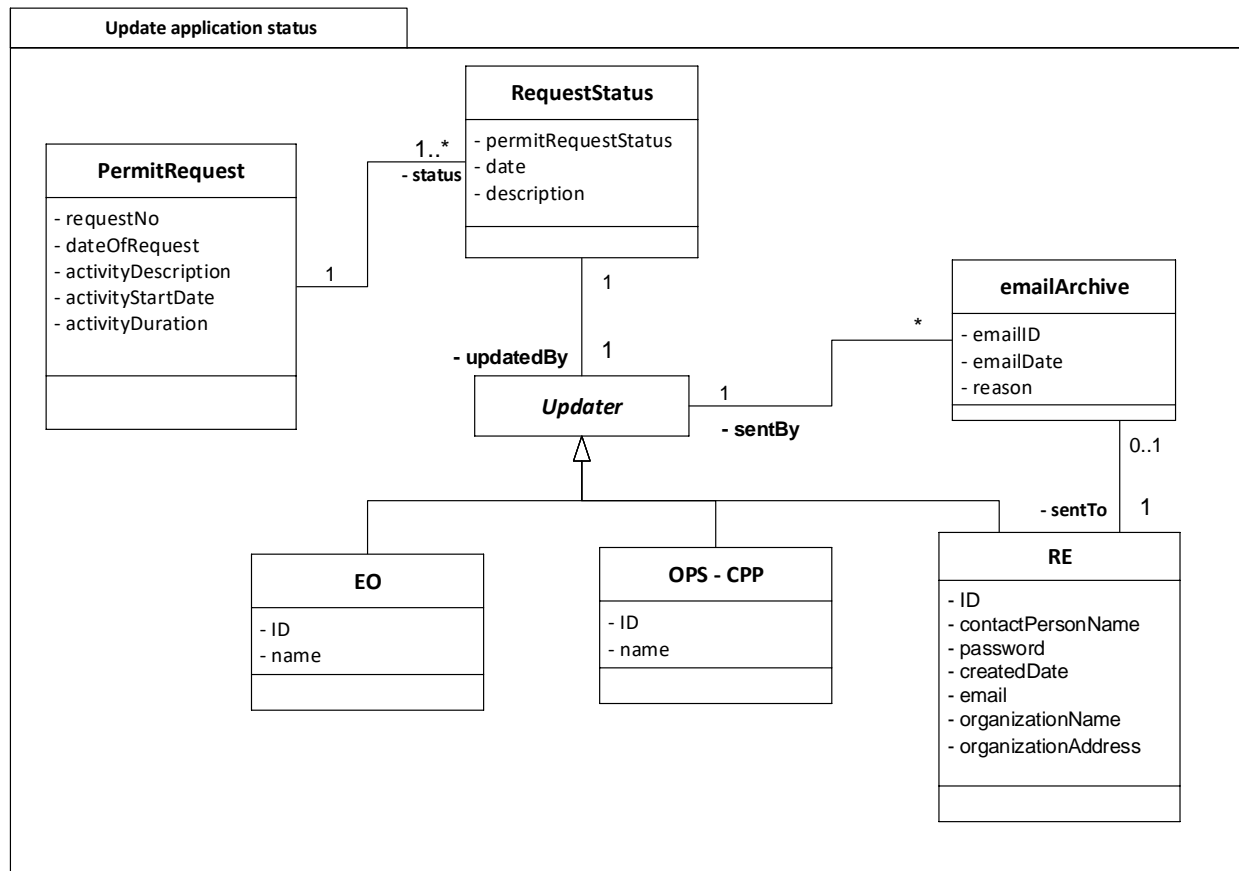
Attribute name	Type	Brief Description
permitID	String	The approved permit unique ID number
dateOfIssue	Date	The date of issue
duration	String	The duration (in time) of the actual permit
description	String	The actual permit description



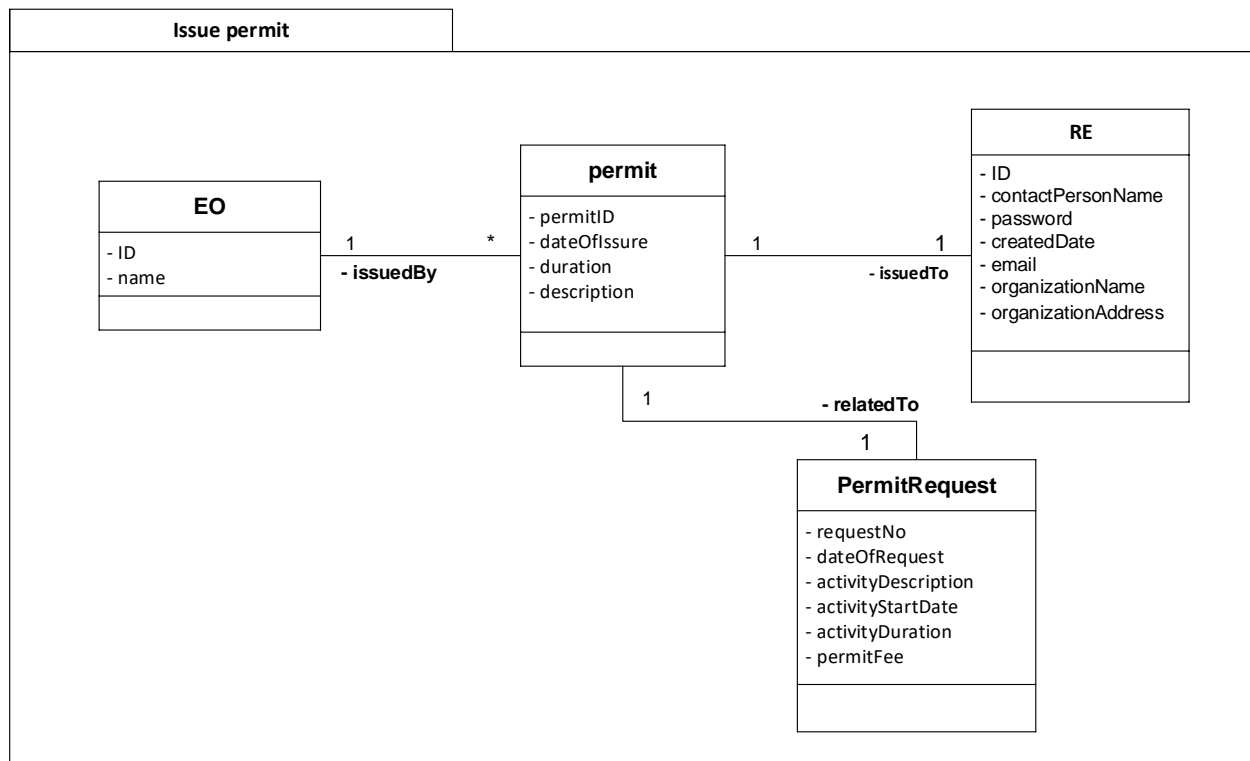
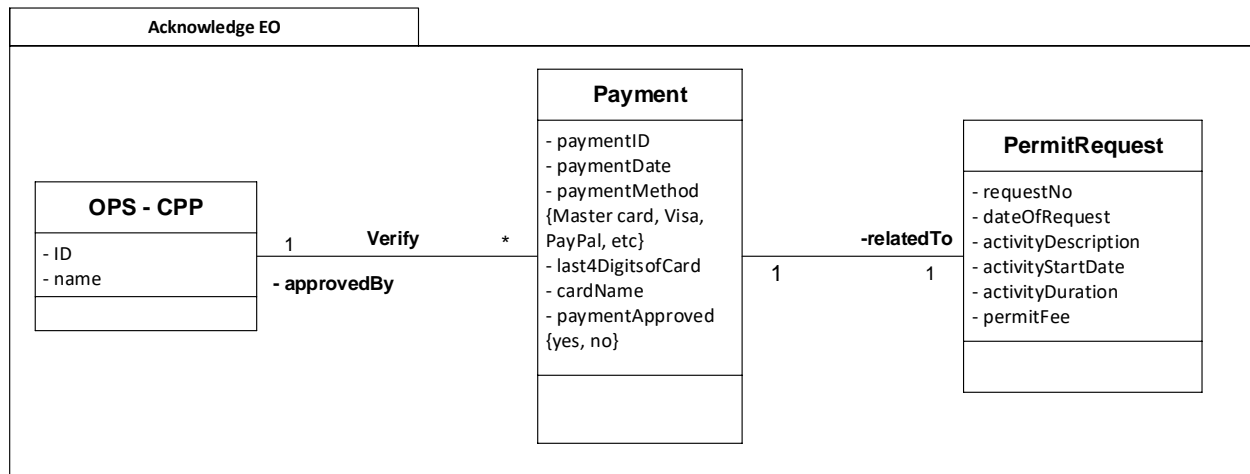
CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	



CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	



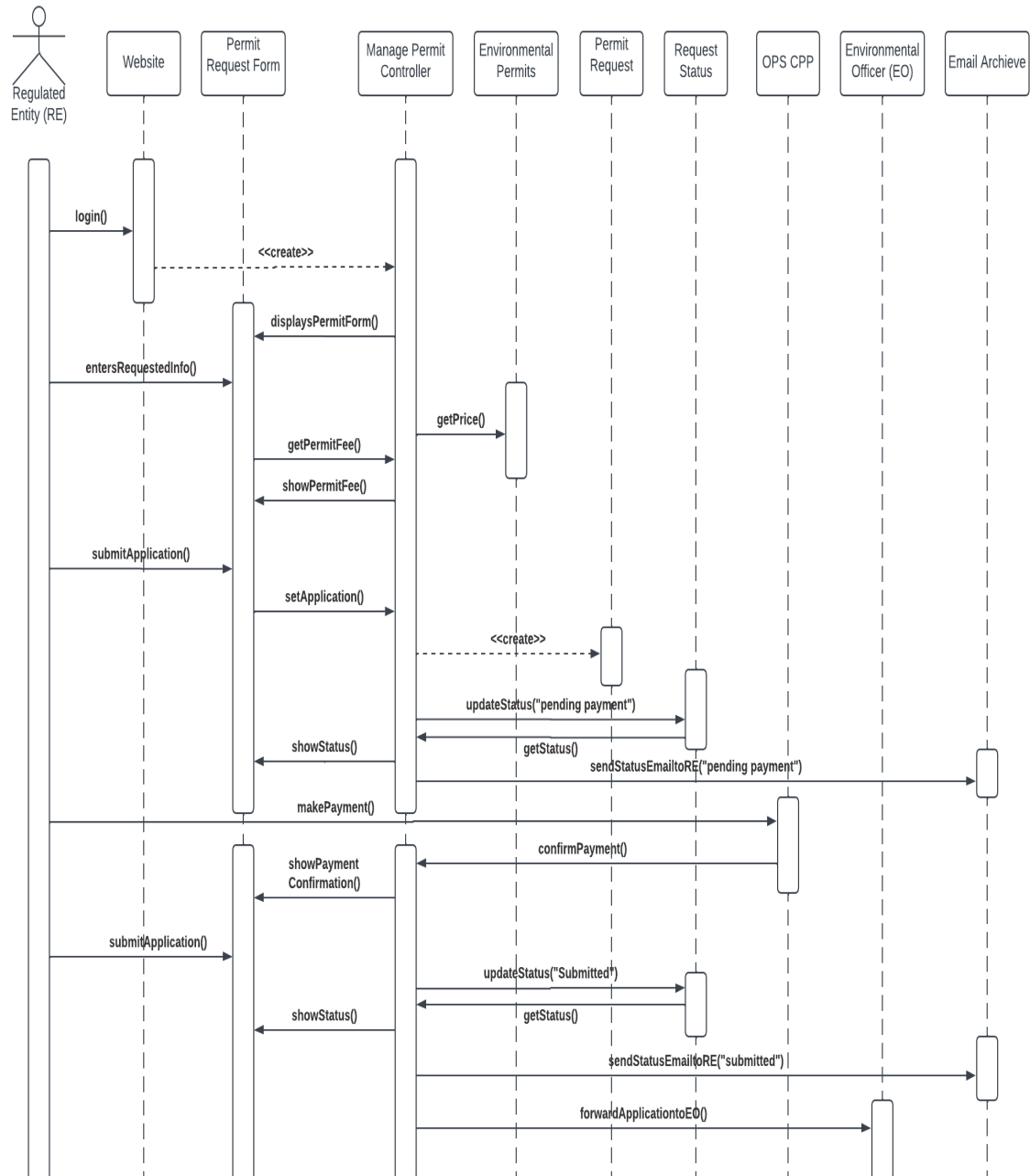
CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	



CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

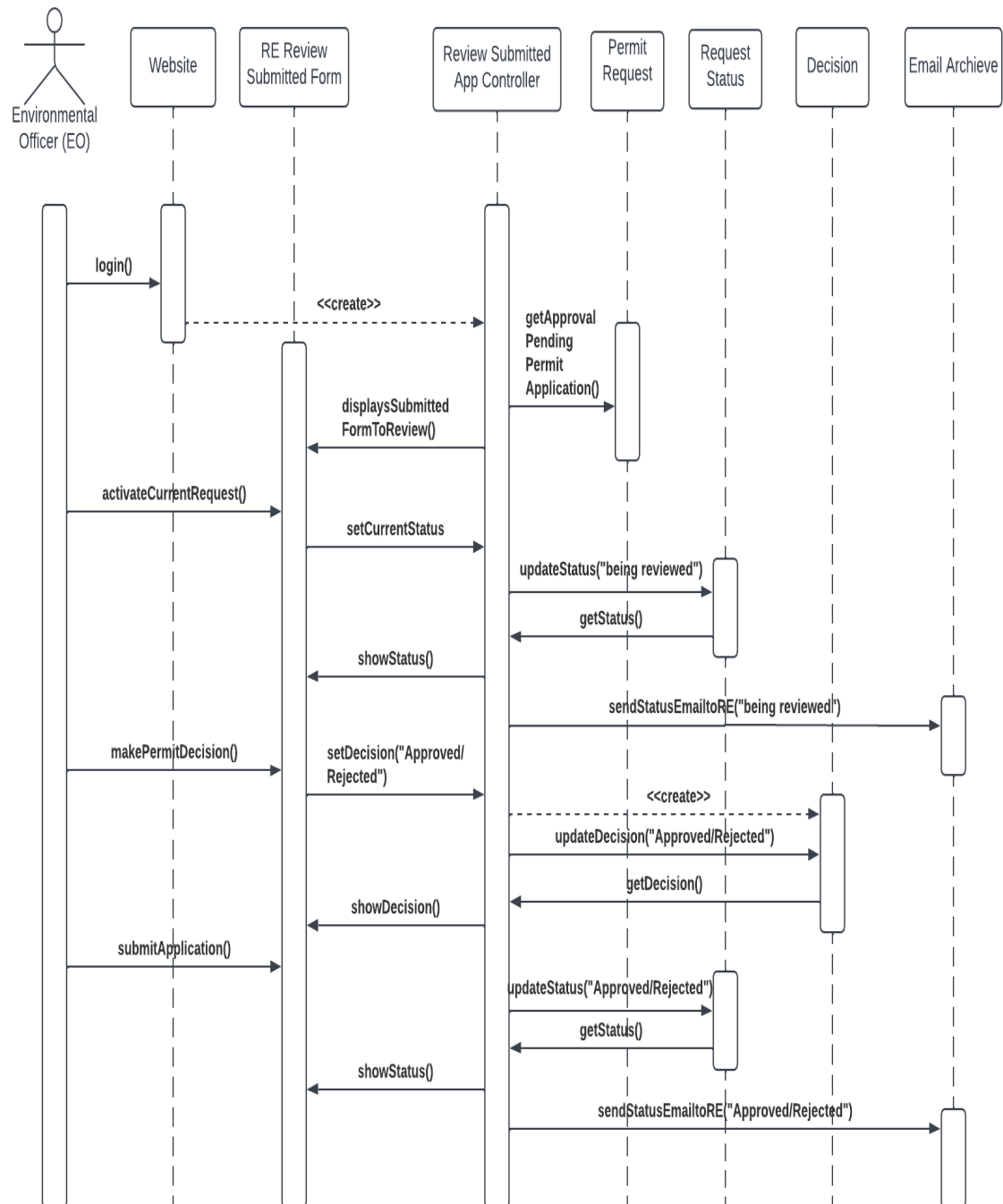
## Potential iPermit Sequence Diagrams

### 1. Manage Environmental Permit



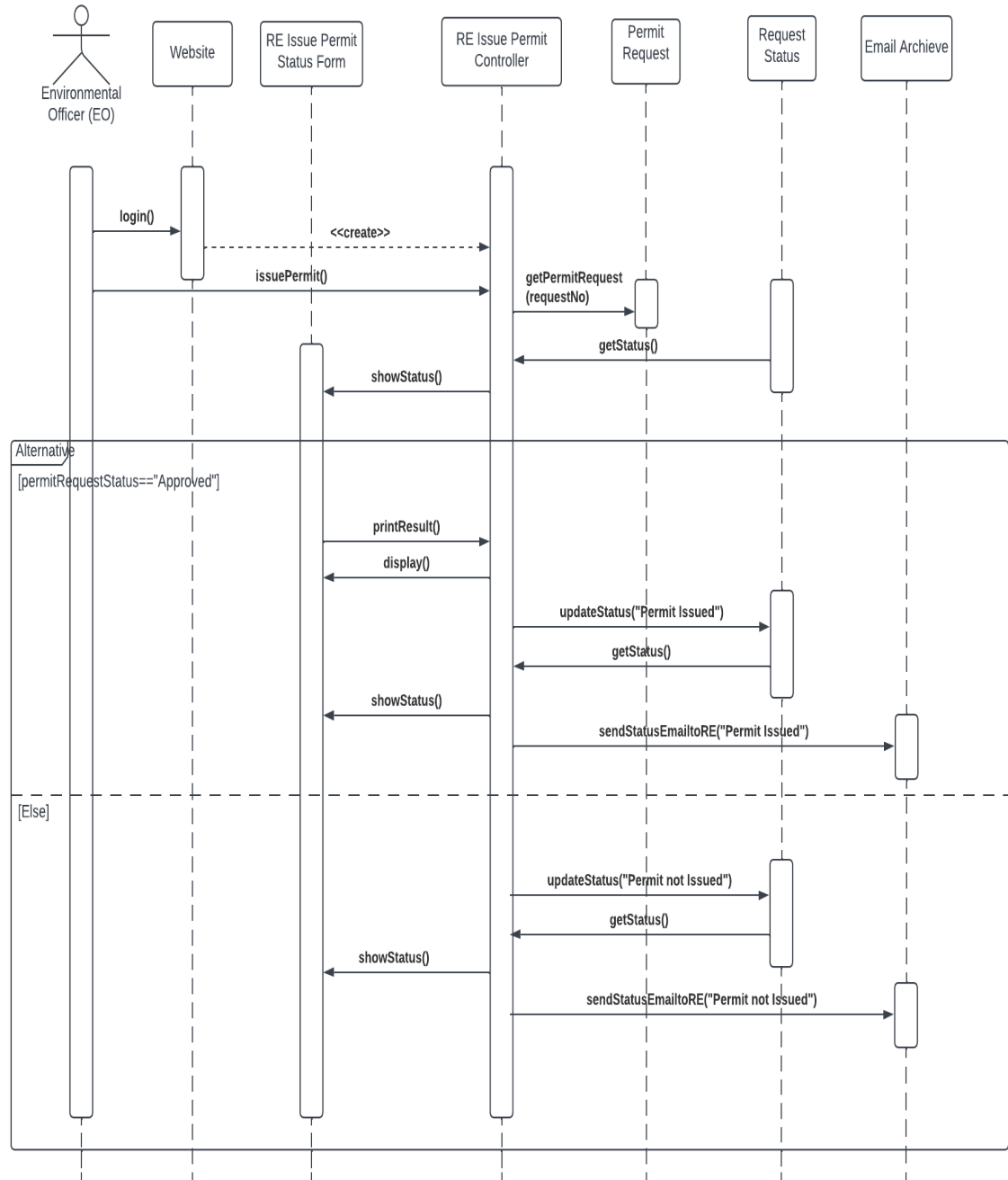
CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

## 2. Review Submitted Applications



CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

### 3. Update Application Status



CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

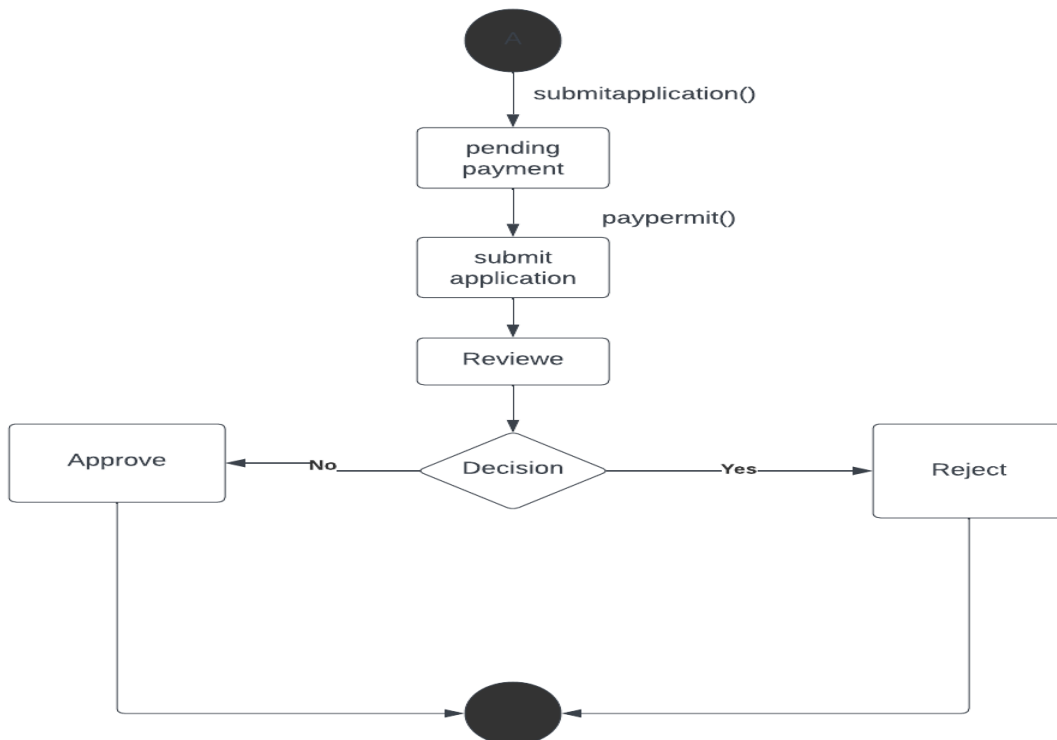
## Detailing the operations

Class Name	Receiving message (Operation)	Brief Description
Website	login()	RE and EO login to the iPermit Website with their credentials.
Permit Request Form	displaysPermitForm()	Manage Permit Controller will display the Permit Request Form Application to RE.
	entersRequestedInfo()	RE enters the related info for Permit Request Application.
	showPermitFee()	Permit fee is displayed on the form.
	submitApplication()	RE Submits the application.
	showStatus()	Displays the Permit Request Status.
	showPaymentConfirmation()	Displays the payment confirmation status after RE makes payment to apply for Permit.
	getPermitFee()	Gets the Permit Fee of the particular Permit applied.
Manage Permit Controller	setApplication()	Permit Request is been created after RE fills in all details and submit the application.
	getStatus()	Gets the Permit Request Status from Request Status class.
	confirmPayment()	Confirms the payment from OPS, which was done by RE for Permit Request.
	getPrice()	Gets the price of the Permit requested, to make payment by RE.
RequestStatus	updateStatus(requestStatus)	Updates the Permit Request Status as pending payment, submitted, approved, rejected, issued, not issued.
OPS CPP	makePayment()	RE makes payment through OPS CPP, for the requested permit application.
Environmental Officer (EO)	forwardApplicationtoEO()	Application/Permit Request is sent to EO, raised by RE.
Email Archieve	sendStatusEmailtoRE(requestStatus)	Permit Request Status is sent to RE Email, on each upadation of status. Permit Request Statuses are pending payment, submitted, approved, rejected, issued, not issued.
RE Review Submitted Form	displaysSubmittedFormToReview()	Displays the RE Submitted Form for review to EO.
	activateCurrentRequest()	Activates the current Permit Request Application.
	showStatus()	Displays the Permit Request Status.
	makePermitDecision()	EO makes the Permit Request Decision for the submitted application.
	showDecision()	Permit Request decision is displayed on the submitted permit request form.
	submitApplication()	EO Submits the application.
Review Submitted App Controller	setCurrentStatus()	Sets the current status of the Permit Request submitted form.

CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

	getStatus()	Gets the Permit Request Status from Request Status class.
	getDecision()	Gets the Decision of the Permit Request Application from Decision Class, made by the EO.
Permit Request	getApprovalPendingApplication()	Gets the Permit Request application, whose approval is pending after submission by RE.
	getPermitRequest(requestNo)	Gets the Permit Request Application of the requested number.
Decision	updateDecision(status)	Updates the Permit Request Status Decision. Statuses are Approved, Rejected.
RE Issue Permit Status Form	showStatus()	Displays the Permit Request Status.
	display()	Displays the results of Permit Issue status.
RE Issue Permit Controller	issuePermit()	EO issues the permit to the requested permit, as per the Request Status of the Permit Request. (Issues Permit, if request status is Approved. Permit is not issued, if request is not approved or rejected.)
	getStatus()	Gets the Permit Request Status from Request Status class.
	printResult()	Prints the result of Permit Request Issue status.

## iPermit State Chart Diagram





CSCE 5430-002: Software Engineering	Issue: Summer 2023
Project Workbook – Phase 1, 2 & 3	Issue Date: June 11, 2023
Group4_5430_002_project1_Phase3	

## **iPermit State Chart Diagram Explanation**

Initially, Regulated Entity (RE) submits an application in a ministry's website for Permit Request. After submitting the application, RE makes the permit request fee pending payment, to get the approval from the Environmental Officer (EO), and then submits the application again. Then EO reviews the submitted permit request application and makes the decision to approve or reject the permit request application. If EO updates the decision as "Approved", then RE is issued with the required permit. If EO updates the decision as "Rejected", then RE is not issued with the required permit.