GCI'16 Documentation

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A.A 2016/2017

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Software requirements document

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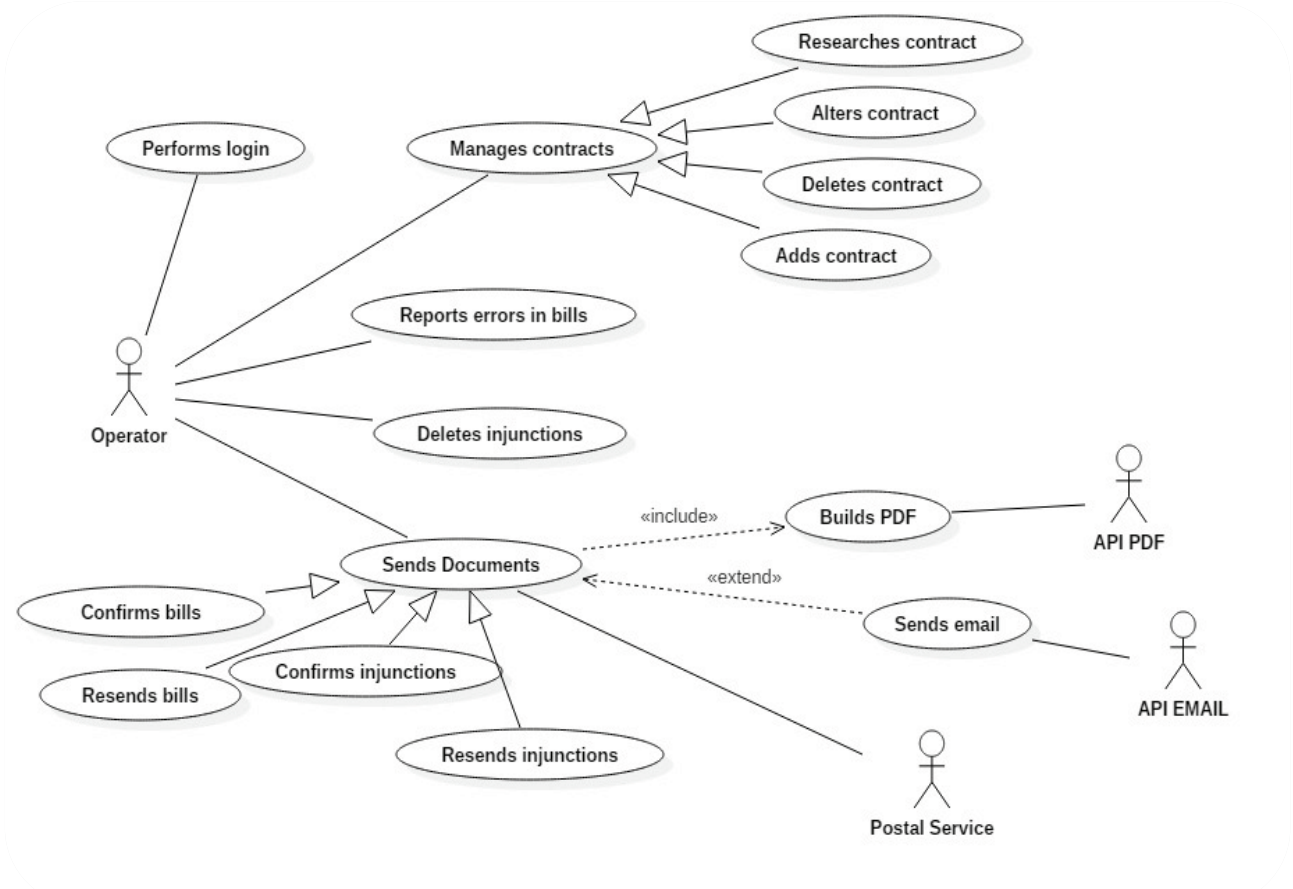
Use case diagram



Cockburn tables

Performs login

Use case	Performs login
Goal in context	The operator wants to authenticate
Preconditions	The goal is to let the operator log into the system inserting the right credentials
Success and condition	The operator gets access to the system
Failed end condition	The operator can't access to the system
Operator	Operator
Trigger	The operator starts the program

MAIN SCENARIO

Step n.	Operator	System
1	The operator starts the program	
2		The system shows the "Login" mockup
3	The operator fills all field in the "Login" mockup	
4		The system enables the "Login" button in the "Login" mockup
5	The operator presses the "Login" button in the "Login" mockup	
6		The system shows the "Home" mockup

EXTENSION n.1

Step n.	Operator	System
6.1		The system shows the "Login – error" mockup
7.1	The operator presses the "ok" button in the "Login – error" mockup	
8.1		Go to step 3

Researches contract

Use case	Researches contract
Goal in context	The operator can be able to read information about the contract researched
Preconditions	The operator must be logged in and he has compiled almost one field in the "Registry management" mockup
Success and condition	The operator reads the informations about the contract researched
Failed end condition	There aren't contracts stored into the system
Operator	Operator
Trigger	The operator clicks on "Search" button in the "Registry management" mockup

MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on "Search" button in the "Registry management" mockup	
2		The system shows the details of the contracts founded into the table

EXTENSION #1

Step n.	Operator	System
2.1		The system shows the "Registry management – error" mockup
3.1	The operator clicks on the "Ok" button in the "Registry management – error" mockup	

SUBVARIATION #1

Step n.	Operator	System
1.2	The operator leaves all fields blank	
2.2		The system shows details of all contracts stored into the system

Alters contract

Use case	Alter contract
Goal in context	Modify a pre-existing contract
Preconditions	The operator must be logged in, he has searched a contract and he has selected it from the table in the "Registry management" mockup
Success and condition	The operator has modified a pre-existing contract
Failed end condition	The operator fills the interested fields with invalid characters. The operator cancels the operation and system shows the "Registry management" mockup
Operator	Operator
Trigger	The operator clicks on the "Alter holder" button in the "Registry management" mockup

MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on "Alter holder" button in the "Registry management" mockup	
2		The system shows the "Alter holder" mockup
3	The operator edits one or more fields	
4		The system enables the "Alter" button associated with the field edited
5	The operator clicks on the "Alter" button	
6		The system shows the "Alter holder – success" mockup
7	The operator clicks on the "Ok" button in the "Alter holder – success" mockup	

EXTENSION #1

Step n.	Operator	System
6.1		The system shows the "Alter holder – error" mockup with a reference to the form that contains the error
7.1	The operator clicks on the "Ok" button in the "Alter holder – error" mockup	
8.1		Go to step 2

Deletes contract

Use case	Deletes contract
Goal in context	The operator wants to delete a contract
Preconditions	The operator must be logged in and he has selected a contract from the table contained in the mockup "Registry management"
Success and condition	The operator deletes the selected contract
Failed end condition	The operator can't delete the selected contract The operator cancels the operation
Operator	Operator
Trigger	The operator clicks on the "Delete" button in the "Registry management" mockup

MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on "Delete" button in the "Registry management" mockup	
2		The system shows the "Delete contract" mockup
3	The operator clicks on the "Yes" button in the "Delete contract" mockup	
4		The system shows the "Delete contract – success" mockup
5	The operator clicks on the "Ok" button in the "Delete contract – success" mockup	
6		The system shows the "Registry management" mockup

EXTENSION #1

Step n.	Operator	System
3.1		The system shows the "Delete contract – error" mockup
4.1	The operator clicks on the "Ok" button in the "Delete contract – error" mockup	
5.1		Go to step 6

EXTENSION #2

Step n.	Operator	System
3.2	The operator clicks on the "No" button in the "Delete contract" mockup	
4.2		Go to step 6

Report errors in bills

Use case	Report errors in bills
Goal in context	The operator wants to report errors in bills
Preconditions	The operator must be logged in and he has selected a bill in the bills' table of the "Bills queue" mockup
Success and condition	The operator reports an error in a bill
Failed end condition	The operator clicks on the "Cancel" button
Operator	Operator
Trigger	The operator clicks on the "Report error" button in the "Bills" mockup

MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on "Report error" button in the "Bills" mockup	
2		The system shows the "Report error" mockup
3	The operator fills the "Report's specifications" field in the "Report error" mockup	
4		The system enables the "Send" button in the "Report error" mockup
5	The operator clicks on the "Send" button in the "Report error" mockup	
6		The system shows the "Send" mockup

EXTENSION #1

Step n.	Operator	System
3.1	The operator clicks on the "Cancel" button in the "Report error" mockup	
4.1		Go to step 8

EXTENSION #2

Step n.	Operator	System
5.2	The operator clicks on the "Cancel" button in the "Report error" mockup	
6.2		Go to step 8

Deletes injunction

Use case	Deletes injunction
Goal in context	The operator wants to delete an injunction that has the "non-issued" state
Preconditions	The operator must be logged in and he has selected an injunction from the injunctions' table in the "Injunctions queue" mockup
Success and condition	The operator deletes one or more injunctions from the injunctions' table in the "Injunctions queue" mockup
Failed end condition	The operator doesn't delete the injunctions from the table
Operator	Operator
Trigger	The operator clicks on the "Delete" button in the "Injunctions queue" mockup

MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on the "Delete" button in the "Injunctions queue" mockup	
2		The system shows the "Delete injunction – success" mockup
3	The operator clicks on the "Ok" button	
4		The system shows the "Injunctions queue" mockup

EXTENSION #1

Step n.	Operator	System
2.1		The system shows the "Delete injunction – error" mockup
3.1	The operator clicks on the "Ok" button in the "Delete injunction – error" mockup	

Confirms bills

Use case	Confirms bills
Goal in context	The operator wants to confirm a single or a group of bills
Preconditions	The operator must be logged in and he has selected a bill (or more than one bill) in the bills' table of the "Bills queue" mockup
Success and condition	The operator confirms a bill
Failed end condition	The operator cancels the operation
Operator	Operator
Trigger	The operator clicks on the "Confirm" button in the "Bills queue" mockup

MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on the "Confirm" button in the "Bills queue" mockup	
2		The system shows the "Build PDF" mockup
3	The operator clicks on the "Send PDF" button in the "Build PDF" mockup	
4		The system shows the "Send PDF" mockup
5	The operator clicks on the "Ok" button	
6		The system shows the "Bills queue" mockup

EXTENSION #1

Step n.	Operator	System
3.1	The operator clicks on the "Cancel" button in the "Build PDF" mockup	
3.1		Go to step 6

EXTENSION #2

Step n.	Operator	System
4.2		The system shows the "Send PDF" mockup in which the field "Log address' error" is visible
5.2	Go to step 5	

SUBVARIATION #1

Step n.	Operator	System
1.3	The operator clicks on the "Confirm" button in the "Bills queue" mockup after he has selected more then one row from the table or he has clicked on the "Select all" button	
2.3		The system shows the "Build PDF – multiple" mockup
3.3	The operator clicks on the "Send PDFs" button in the "Build PDF – multiple" mockup	
4.3		The system shows the "Send PDF – multiple" mockup
5.3	Go to step 5	

Resends bills

Use case	Resends bills
Goal in context	The operator wants to resend a bill that has the "Issued" state

Preconditions	The operator must be logged in and he has selected a bill in the bills' table of the "Bills" mockup
Success and condition	The operator must be logged in and he has selected a bill in the bills' table of the "Bills" mockup
Failed end condition	The operator cancels the operation The PDF interface is not available
Operator	Operator
Trigger	The operator clicks on the "Build PDF" button in the "Bills" mockup

MAIN SCENARIO

Step n.	**Operator**	**System**
1	The operator clicks on the "Build PDF" button in the "Bills" mockup	
2		The system shows the "Build PDF" mockup
3	The operator clicks on the "Send PDF" button in the "Build PDF" mockup	
4		The system shows the "Send PDF" mockup
5	The operator clicks on the "Ok" button	
6		The system shows the "Registry management" mockup

EXTENSION #1

Step n.	**Operator**	**System**
4.1		The system shows the "Send PDF" mockup in which the "Log address' error" form is visible
5.1	Go to step 5	

EXTENSION #2

Step n.	**Operator**	**System**
3.2	The operator clicks on the "Cancel" button in the "Build PDF" mockup	
4.2		The system shows the "Bills" mockup

EXTENSION #2

Step n.	**Operator**	**System**
2.3		The system shows the "Build PDF – error" mockup
3.3	The operator clicks on the "Ok" button in the "Build PDF – error" mockup	
4.3		Go to step 6

Confirms injunctions

Use case	Confirms injunctions
Goal in context	The operator wants to send an injunction to the customer
Preconditions	The operator must be logged in and he has selected an injunction from the table contained in "Injunctions queue" mockup
Success and condition	The system creates and sends the PDF
Failed end condition	The operator cancels the operation The PDF interface is not available

Operator	Operator
Trigger	The operator clicks on the "Confirm" button in the "Injunction queue" mockup

MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on the "Confirm" button in the "Injunction queue" mockup	
2		The system shows the "Build PDF" mockup
3	The operator clicks on the "Send PDF" butto in the "Build PDF" mockup	
4		The system shows the "Send PDF" mockup
5	The operator clicks on the "Ok" button in the "Send PDF" mockup	
6		The system shows the "Registry management"mockup

EXTENSION #1

Step n.	Operator	System
3.1	The operator clicks on the "Cancel" button in the "Build PDF" mockup	
4.1		The system shows the "Injunctions queue" mockup

EXTENSION #2

Step n.	Operator	System
4.2		The system shows the "Send PDF" mockup in which the "Log address' error" form is visible
5.2	Go to step 5	

EXTENSION #3

Step n.	Operator	System
2.3		The system shows the "Build PDF – error" mockup
3.3	The operator clicks on the "Ok" button in the "Build PDF – error" mockup	
4.3		Go to step 6

Resends injunctions

Use case	Resends injunctions
Goal in context	The operator wants to resend an injunction that has the "Issued" state
Preconditions	The operator must be logged in and he has selected an injunction in the injunctions' table of the "Injunction" mockup
Success and condition	The operator resends an injunction that has the "Issued" state
Failed end condition	The operator cancels the operation
Operator	Operator
Trigger	The operator clicks on the "Build PDF" button in the "Injunction" mockup

MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on “Build PDF” button in the “Injunction” mockup	
2		The system shows the “Build PDF” mockup
3	The operator clicks on the “Send PDF” button in the “Build PDF” mockup	
4		The system shows the “Send PDF” mockup
5	The operator clicks on the “Ok” button in the “Send PDF” mockup	
6		The system shows the “Registry management” mockup

EXTENSION #1

Step n.	Operator	System
3.1	The operator clicks on the “Cancel” butto in the “Build PDF” mockup	
4.1		The system shows the “Injunction” mockup

EXTENSION #2

Step n.	Operator	System
4.2		The system shows the “Send PDF” mockup in which the “Log address’ error” form is visible
5.2	Go to step 5	

EXTENSION #3

Step n.	Operator	System
2.3		The system shows the “Build PDF - error” mockup
3.3	The operator clicks on the “Ok” butto in the “Build PDF – error” mockup	
4.3		Go to step 6

Adds contract

Use case	Adds contract
Goal in context	Create a new contract
Preconditions	The operator must be logged in and he clicked the "Registry management" button from the "Home" mockup
Success and condition	The operator adds a new contract
Failed end condition	The operator doesn't fill all fields The operator cancels the operation
Operator	Operator
Trigger	The operator clicks on the "Add" button in the "Registry management" mockup

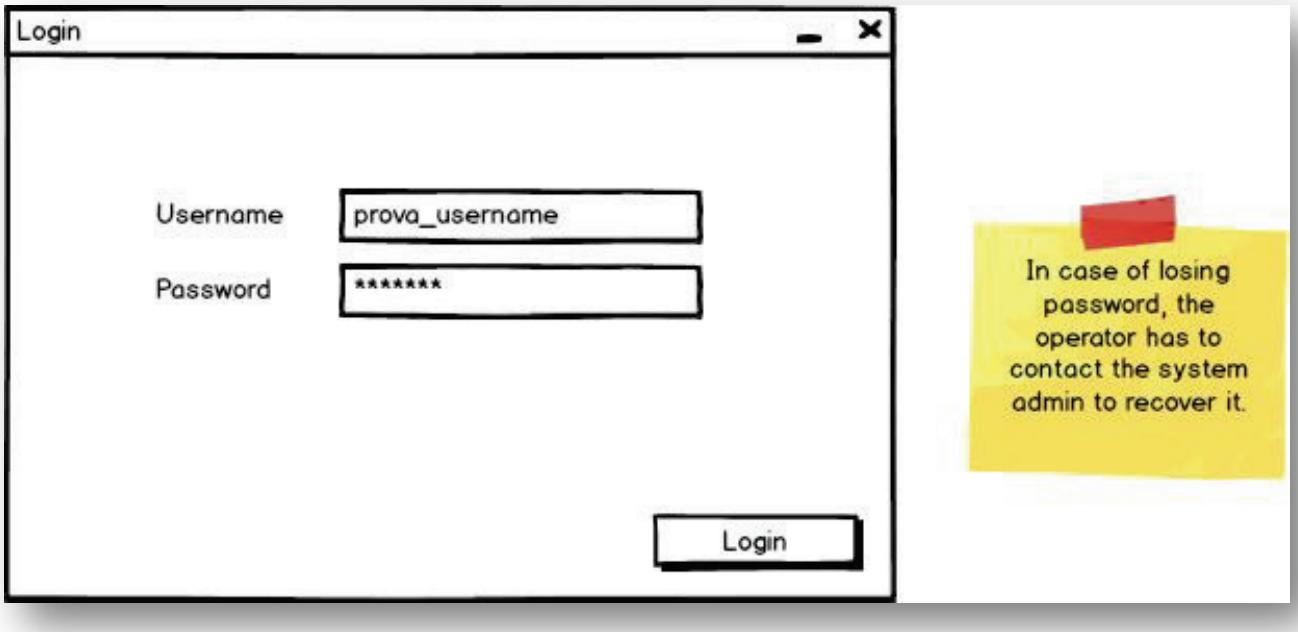
MAIN SCENARIO

Step n.	Operator	System
1	The operator clicks on "Add" button in the "Registry management" mockup	
2		The system shows the "Add holder" mockup
3	The operator fills all fields and clicks the "Add" button in the "Add holder" mockup	
4		The system shows the "Add holder – success" mockup
5	The operator clicks on the "Ok" button in the "Add holder – success" mockup	
6		The system shows the "Add holder" mockup

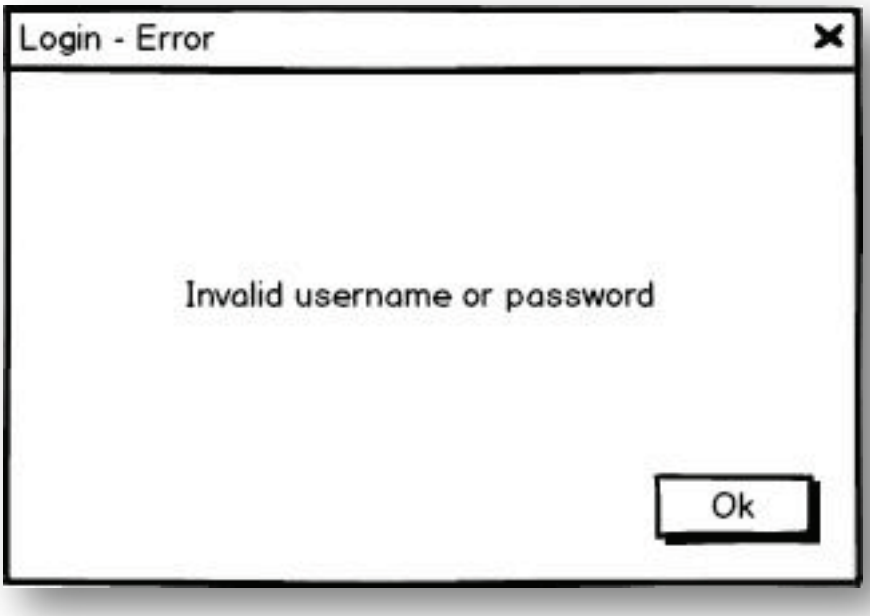
EXTENSION #1

Step n.	Operator	System
4.1		The system shows the "Add holder – error" mockup with reference to the field that contains error
5.1	The operator clicks on the "Ok" button in the "Add holder – error" mockup	
6.1		Go to step 2

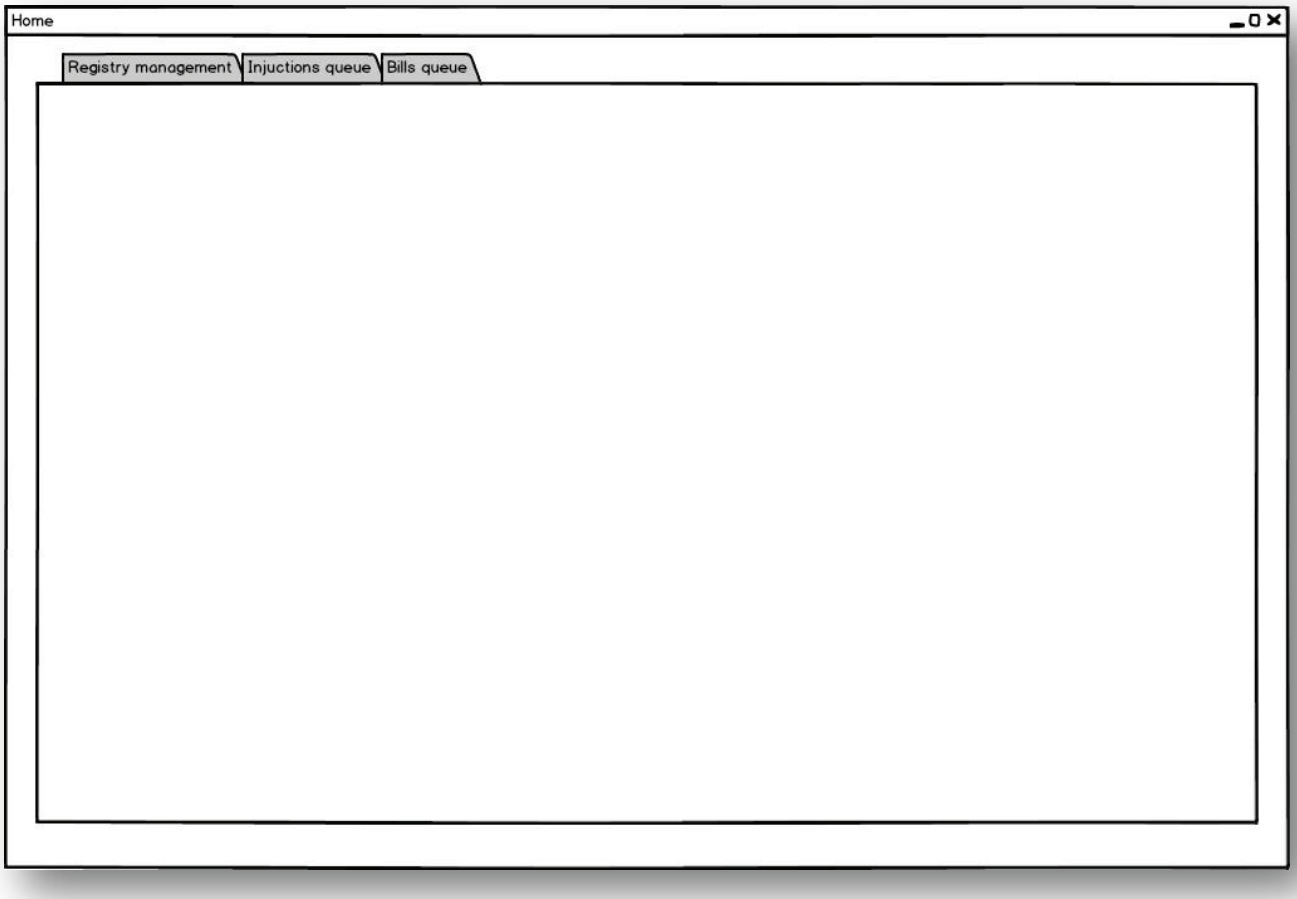
Mockup



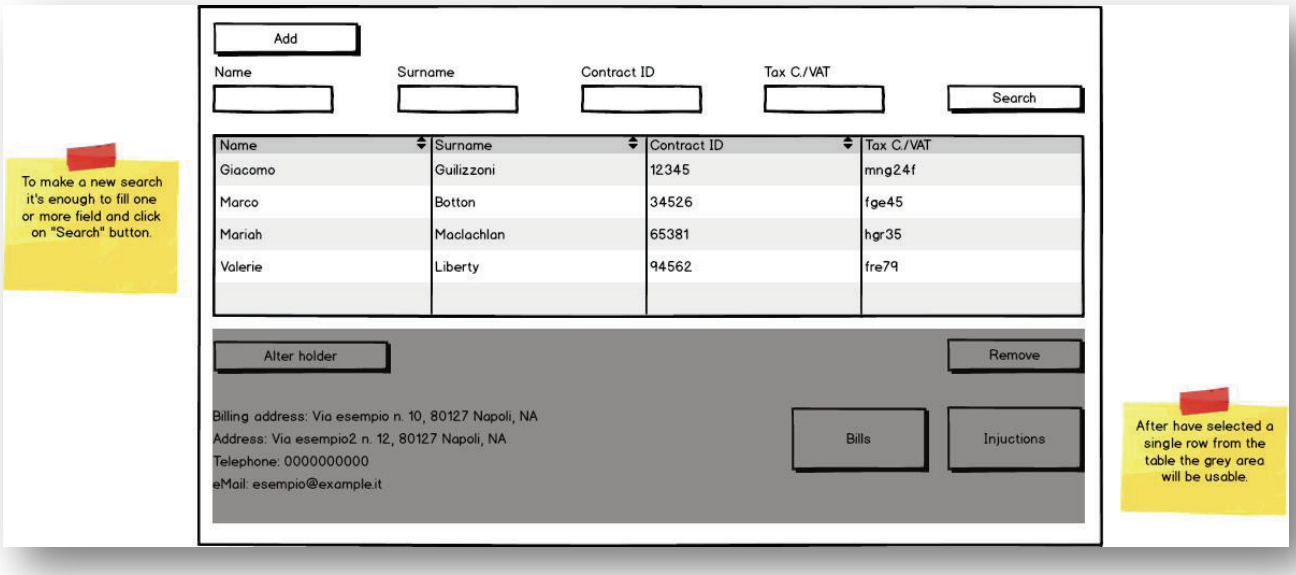
Login



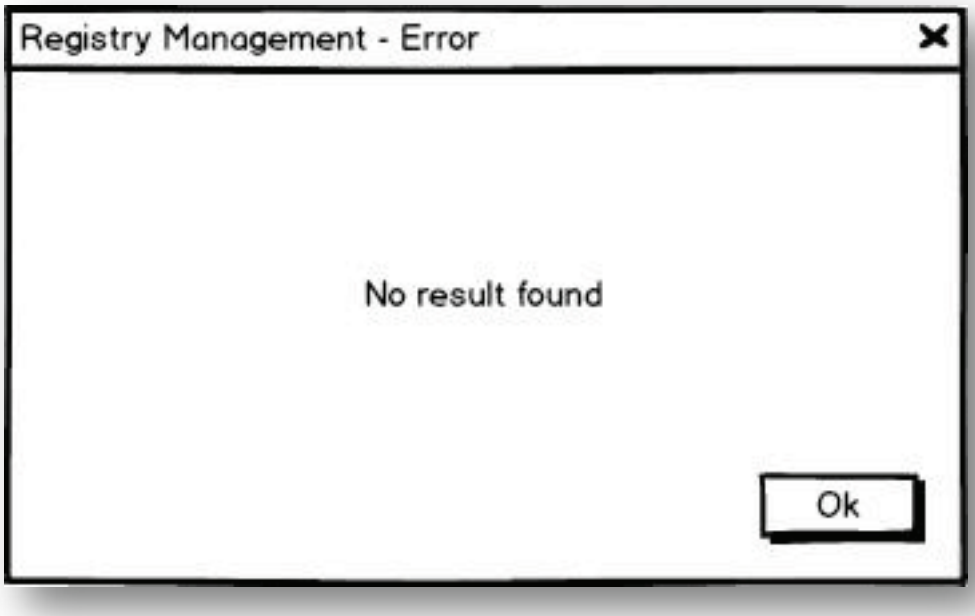
Login - error



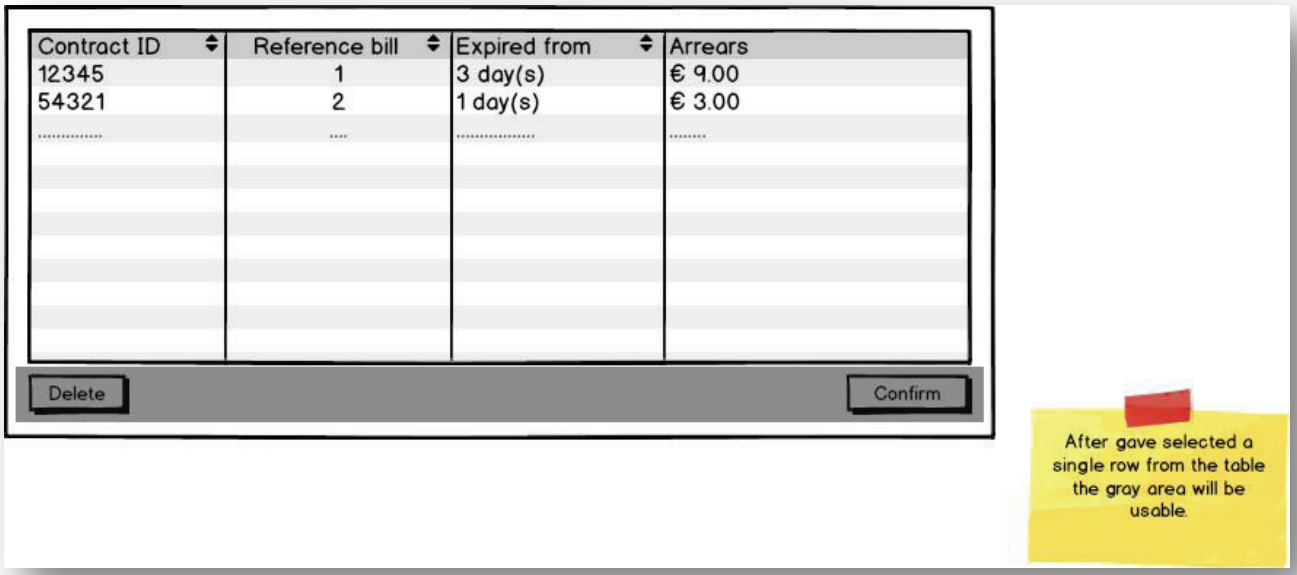
Home



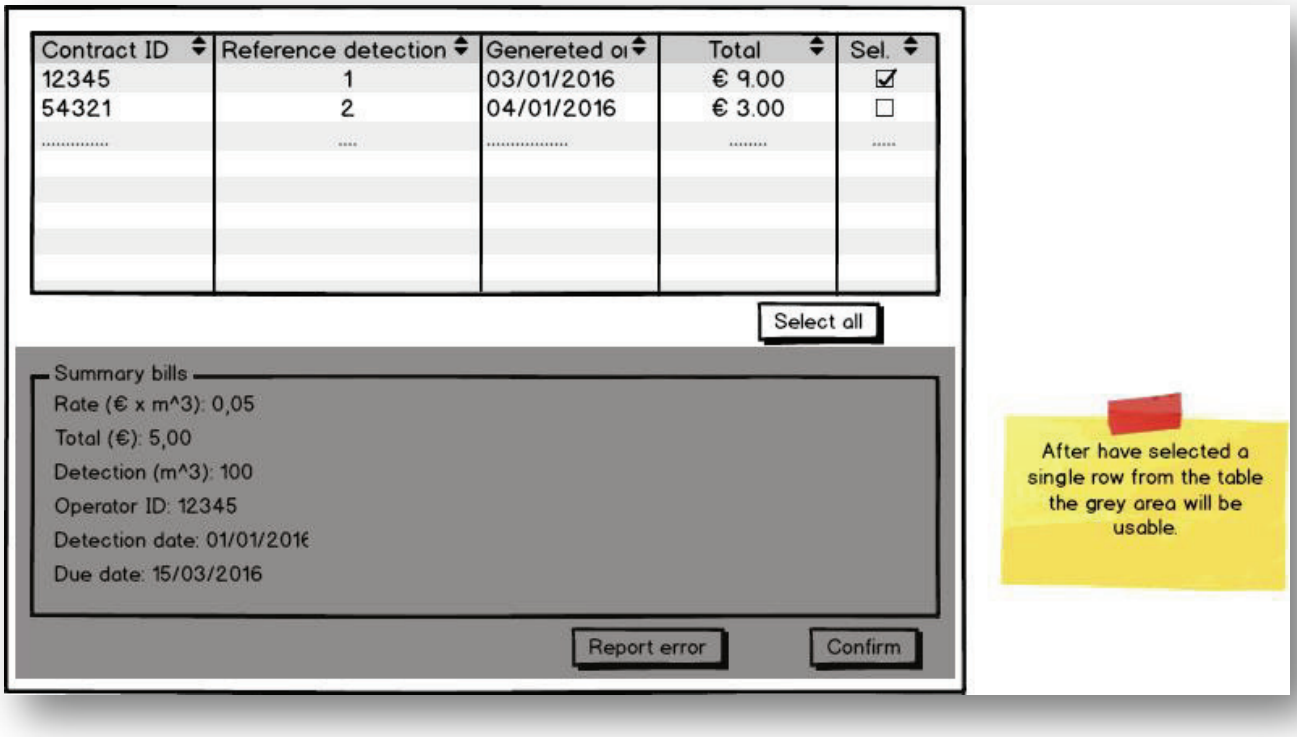
Registry management



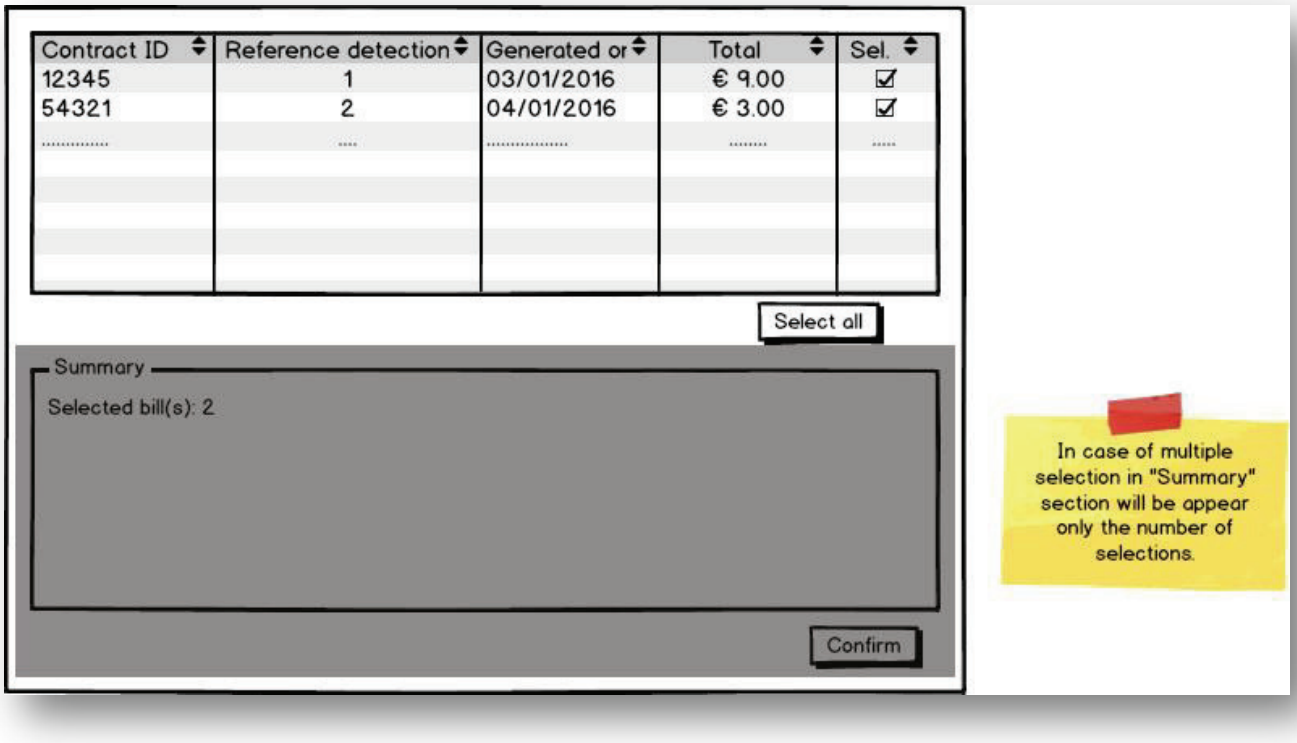
Registry management – error



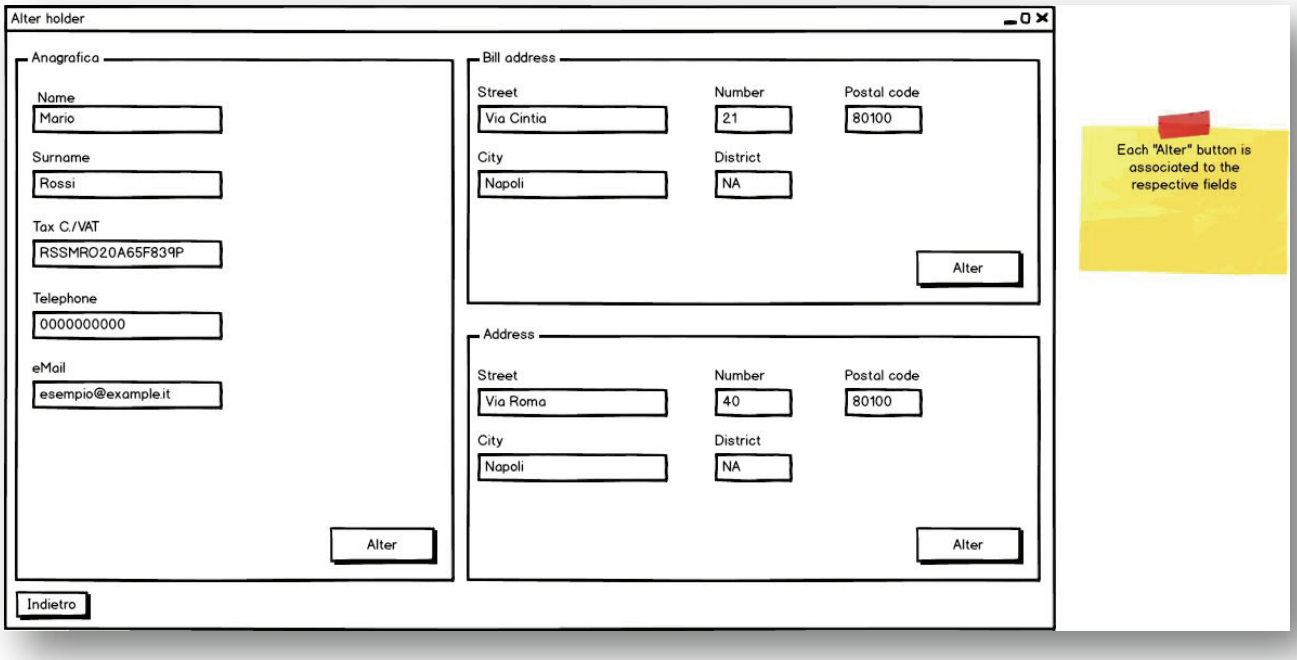
Injunctions queue



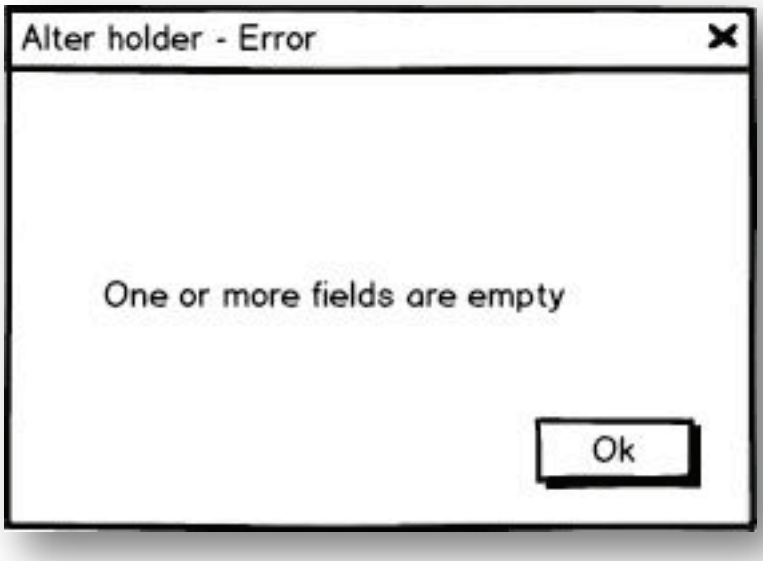
Bills queue - Single



Bills queue - Multiple

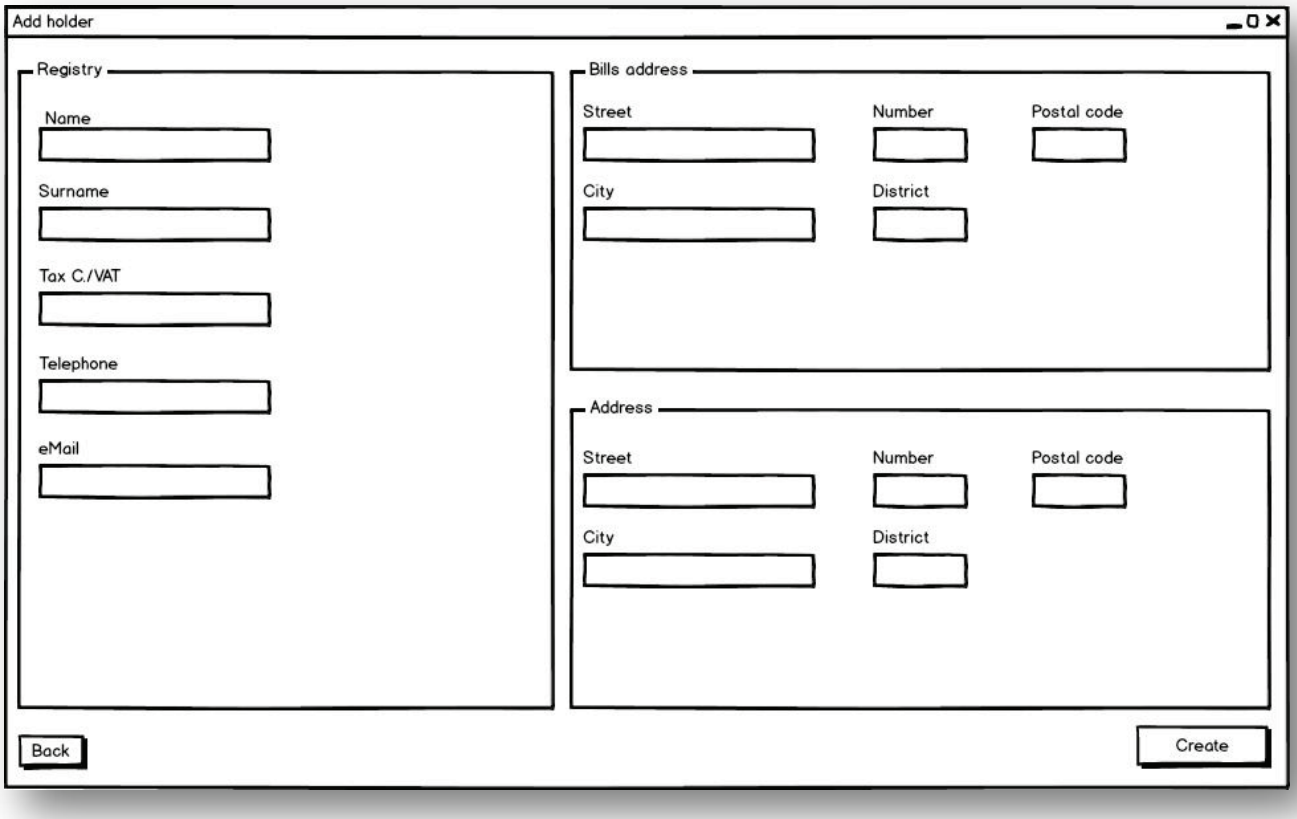


Alter holder

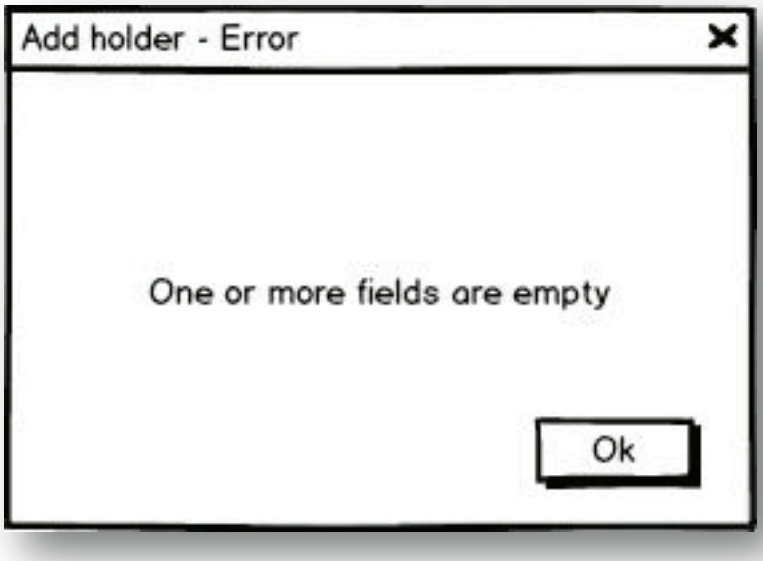


Alter holder - error

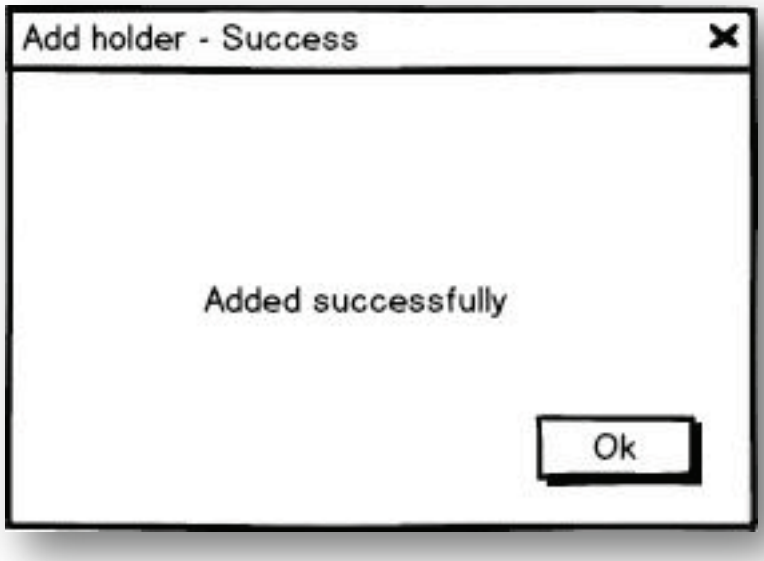
Alter holder - success


Add holder
Registry
Name
Surname
Tax C./VAT
Telephone
eMail
Bills address
Street
Number
Postal code
City
District
Address
Street
Number
Postal code
City
District
Back
Create

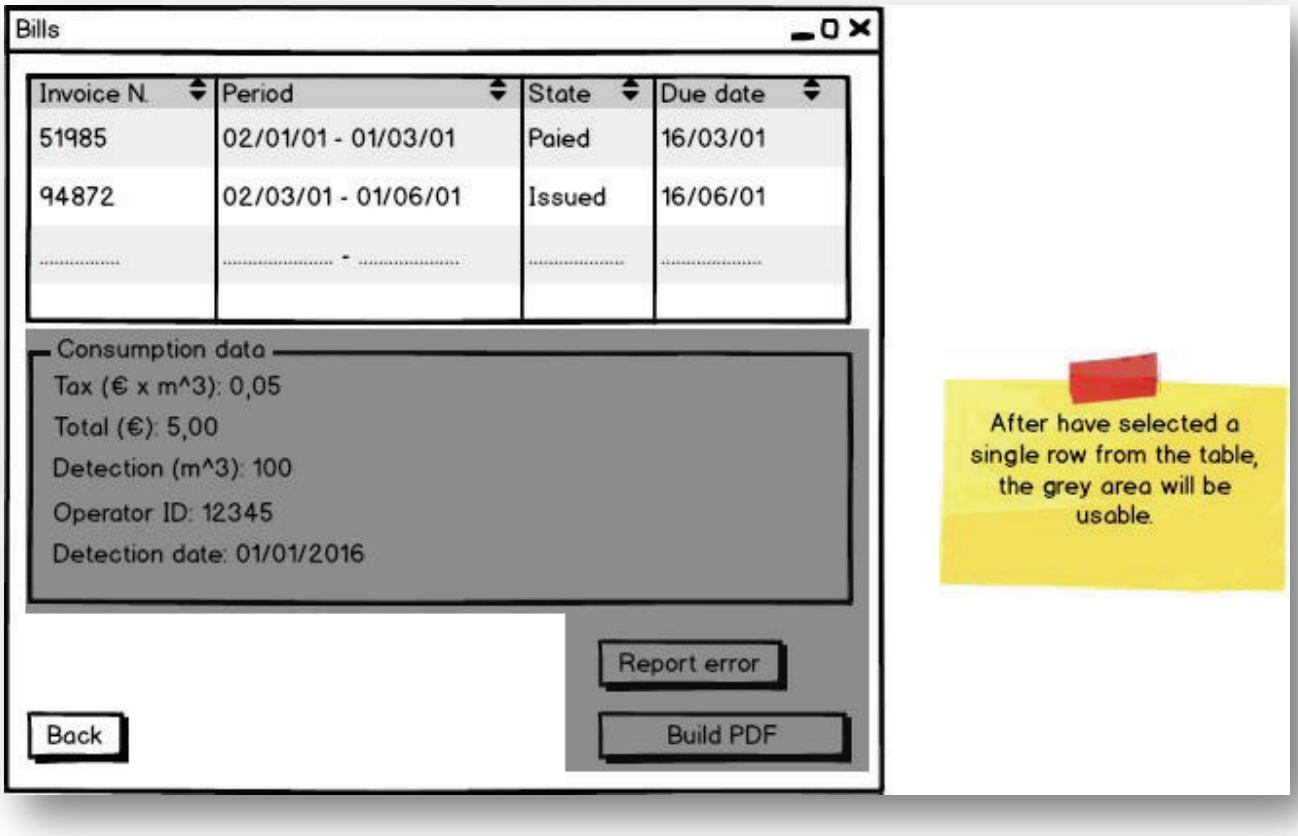
Add holder



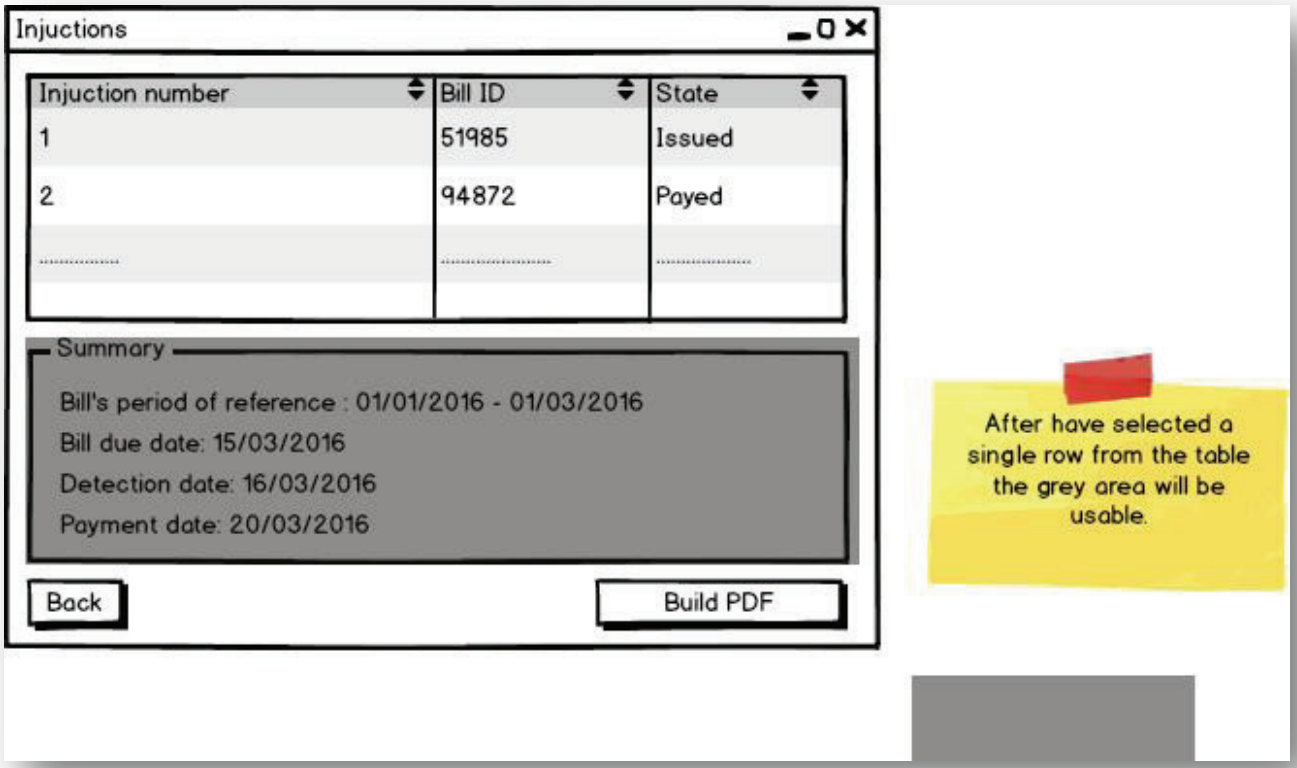
Add holder - error



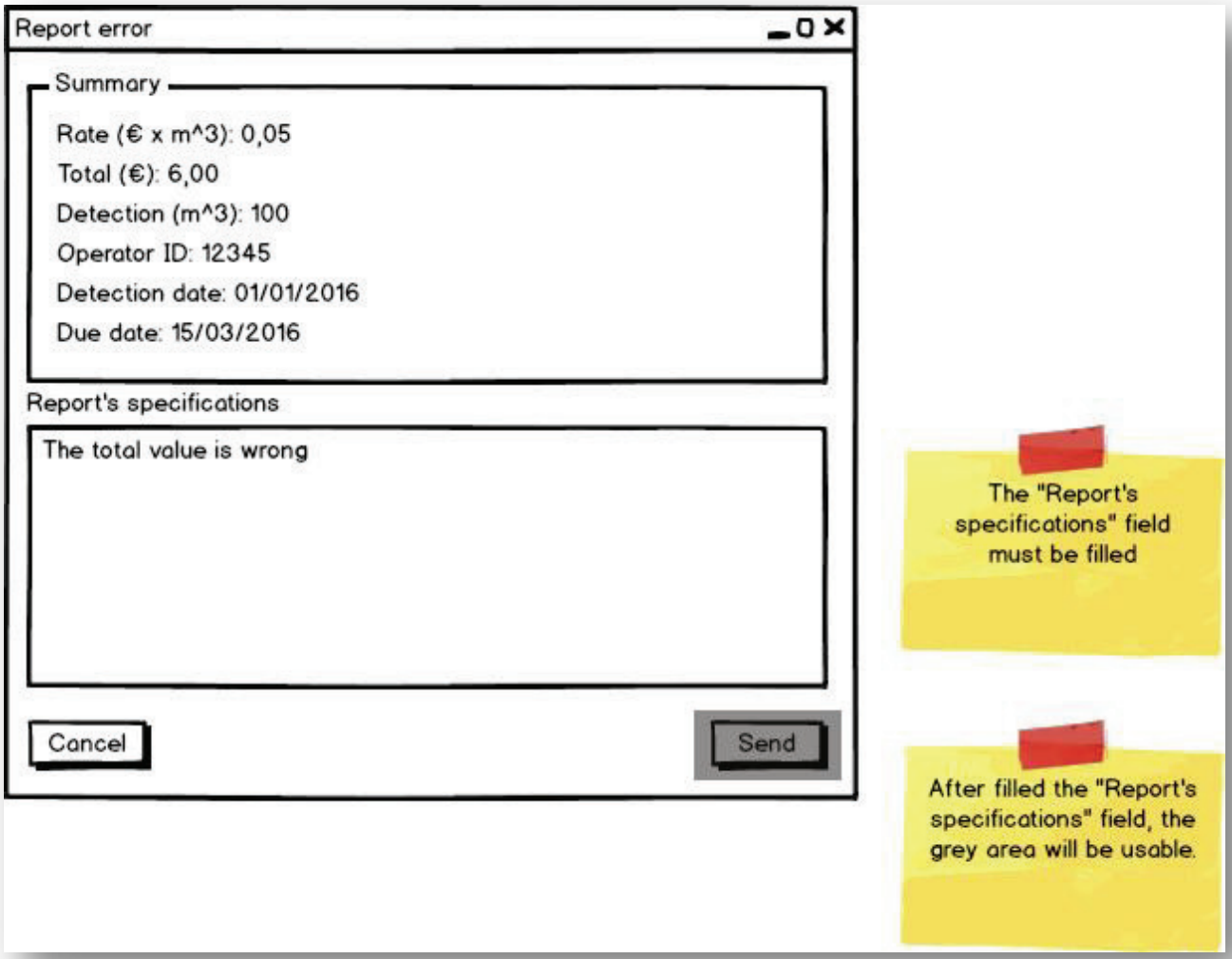
Add holder - success


Bills
Invoice N.
Period
State
Due date
51985
02/01/01 - 01/03/01
Paied
16/03/01
94872
02/03/01 - 01/06/01
Issued
16/06/01
Consumption data
Tax (€ x m^3): 0,05
Total (€): 5,00
Detection (m^3): 100
Operator ID: 12345
Detection date: 01/01/2016
Report error
Back
Build PDF
After have selected a single row from the table, the grey area will be usable.

Bills

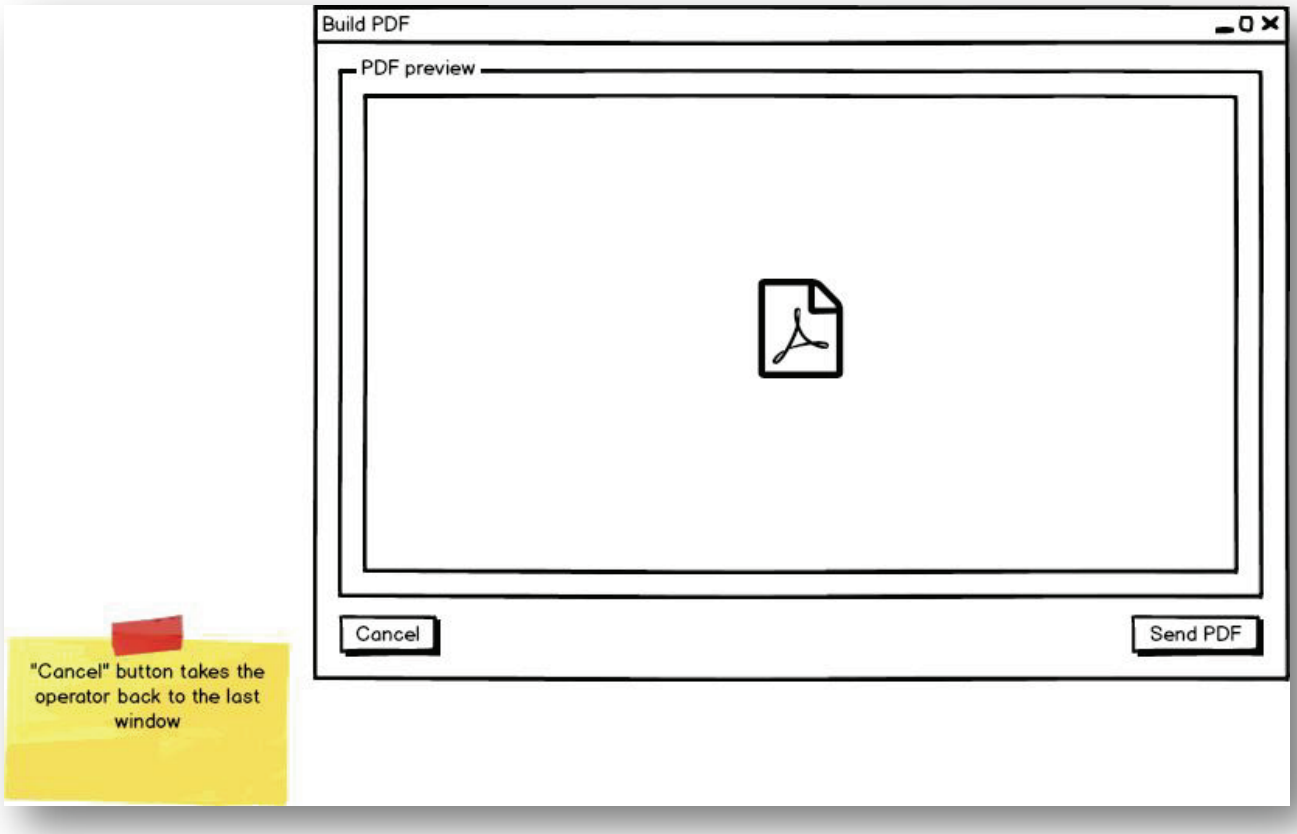


Injunctions

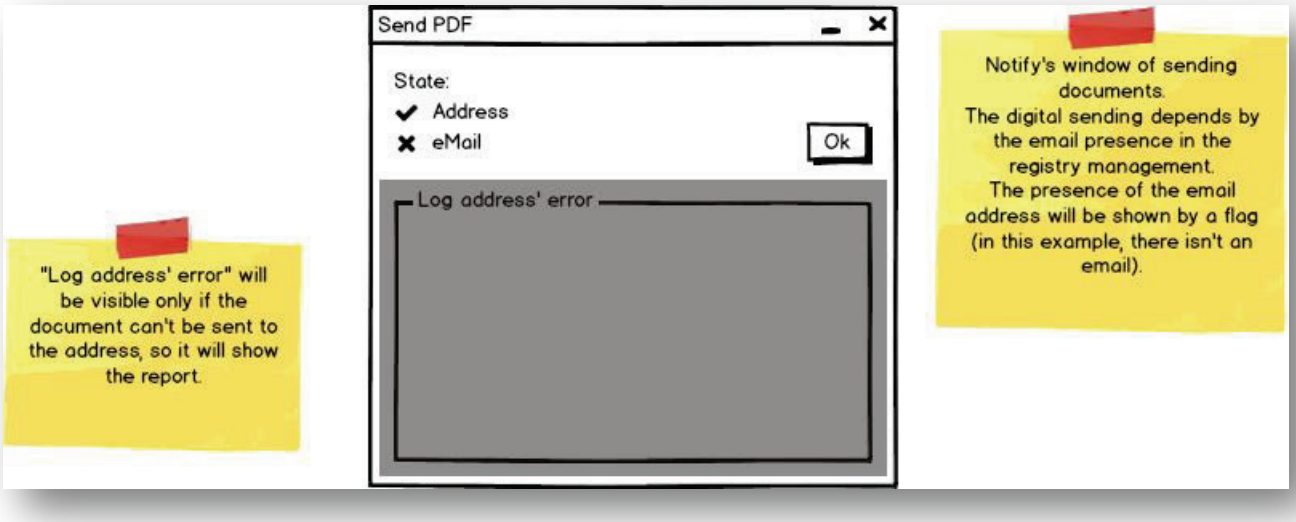


Report error

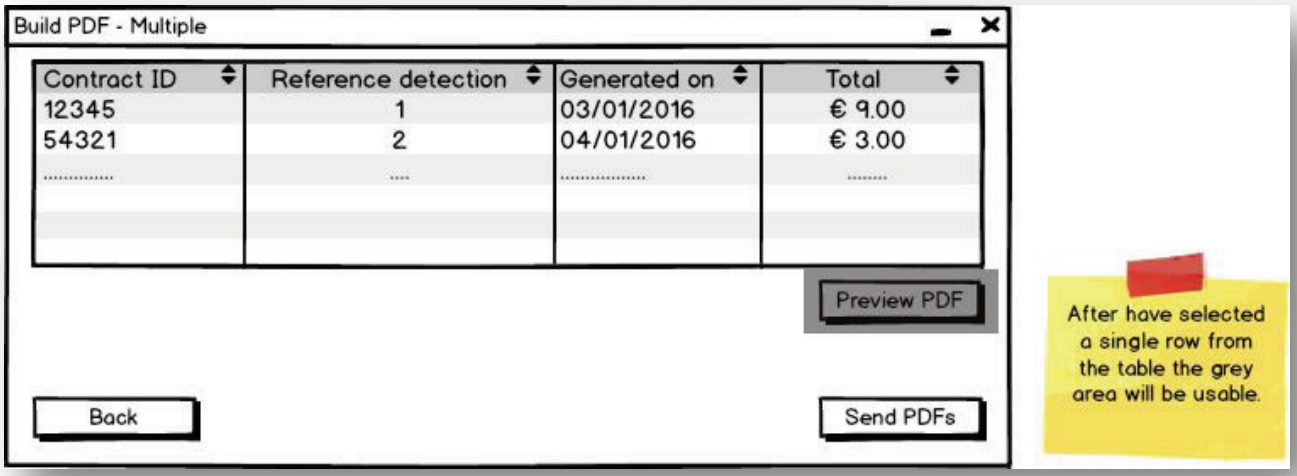
Send


Build PDF
PDF preview
Cancel
Send PDF
"Cancel" button takes the operator back to the last window

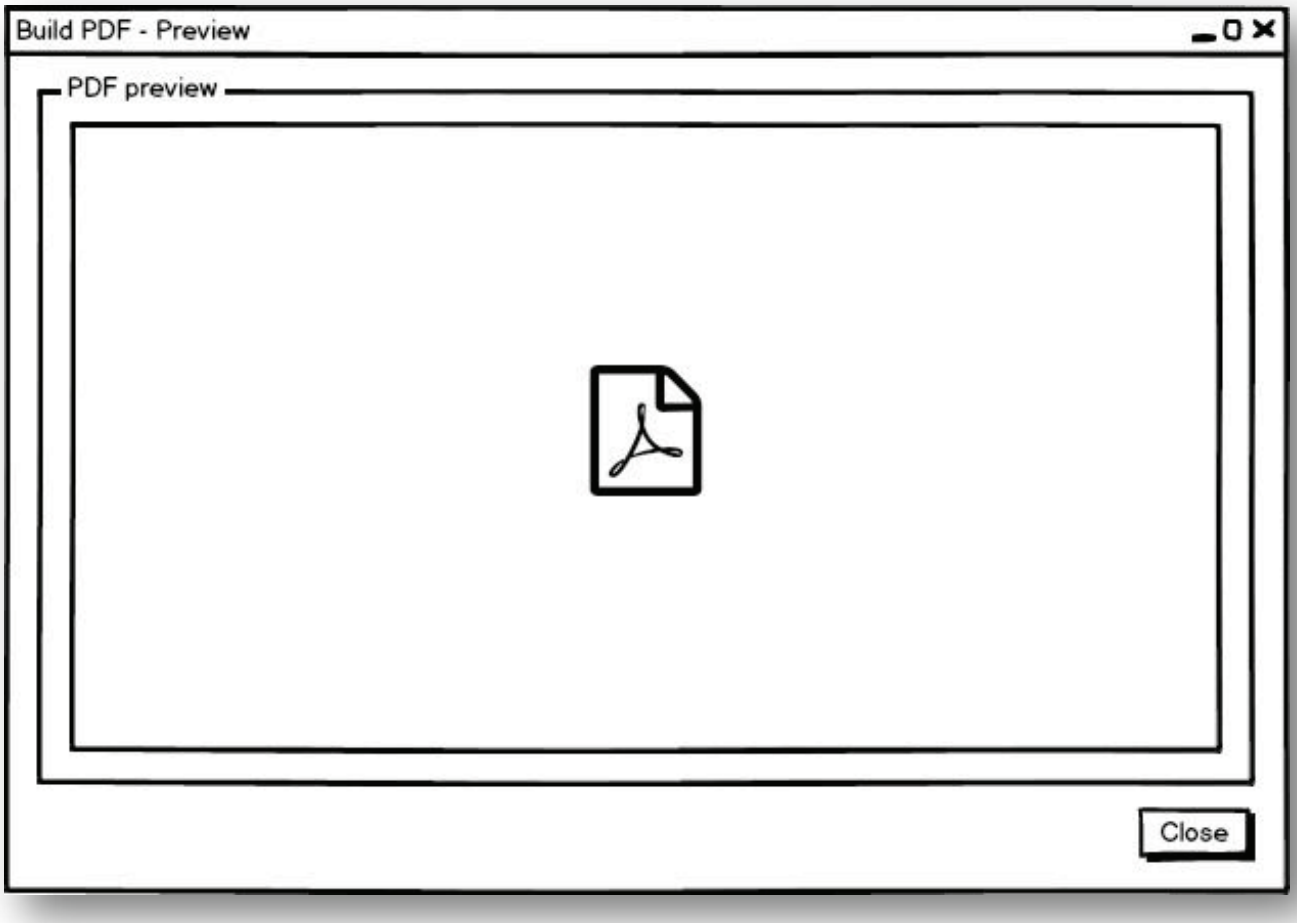
Build PDF


"Log address' error" will be visible only if the document can't be sent to the address, so it will show the report.
Send PDF
State:
Address
eMail
Ok
Log address' error
Notify's window of sending documents.
The digital sending depends by the email presence in the registry management.
The presence of the email address will be shown by a flag (in this example, there isn't an email).

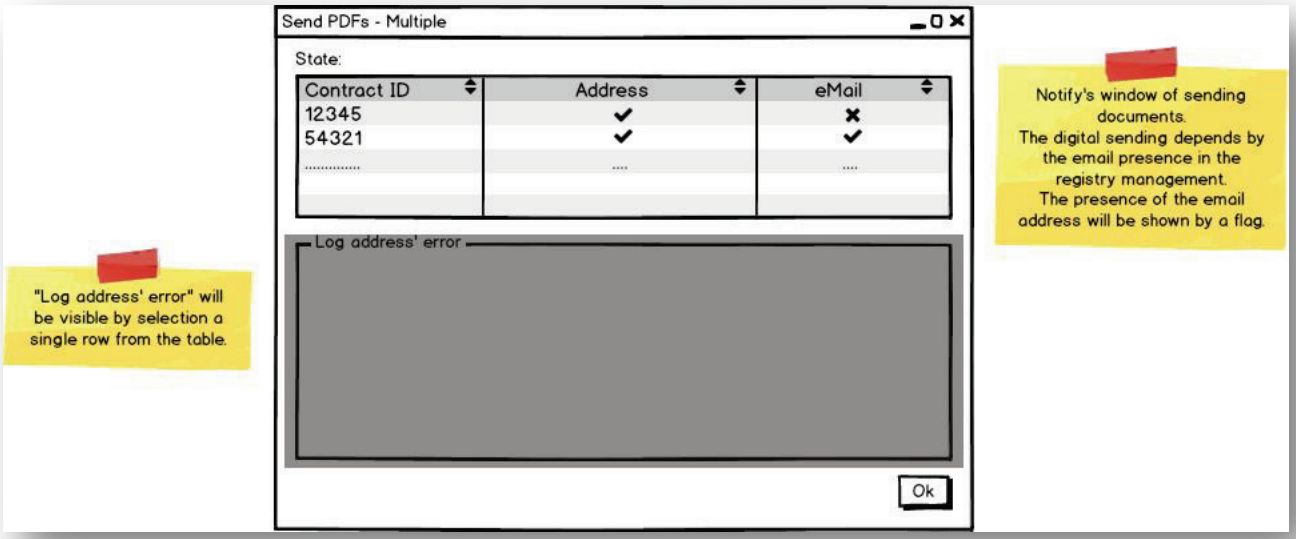
Send PDF



Build PDF - multiple

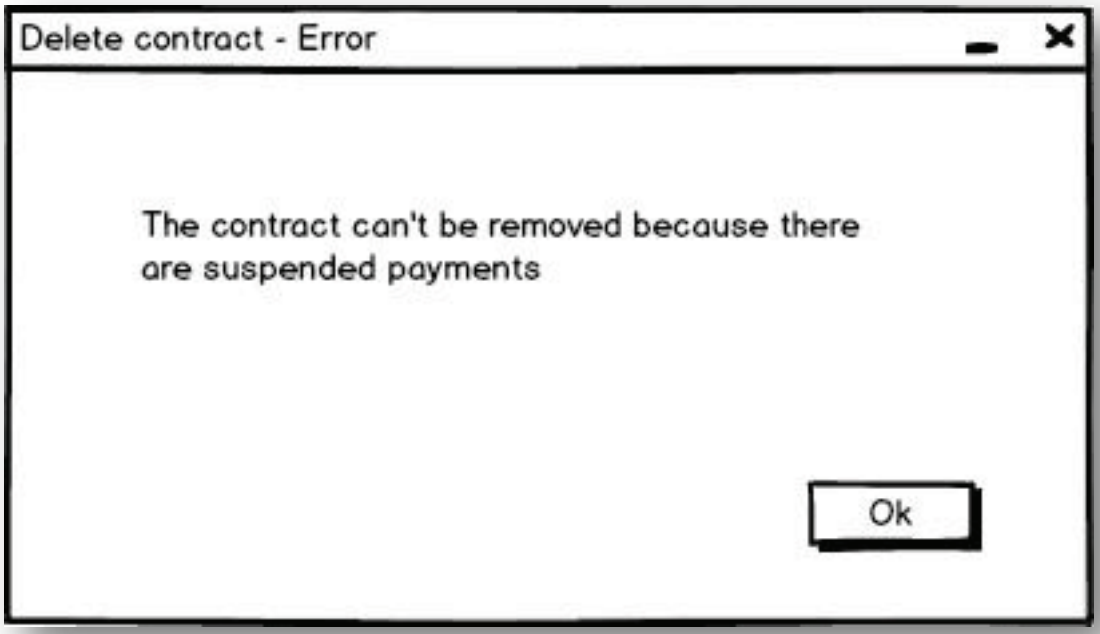


Build PDF - preview

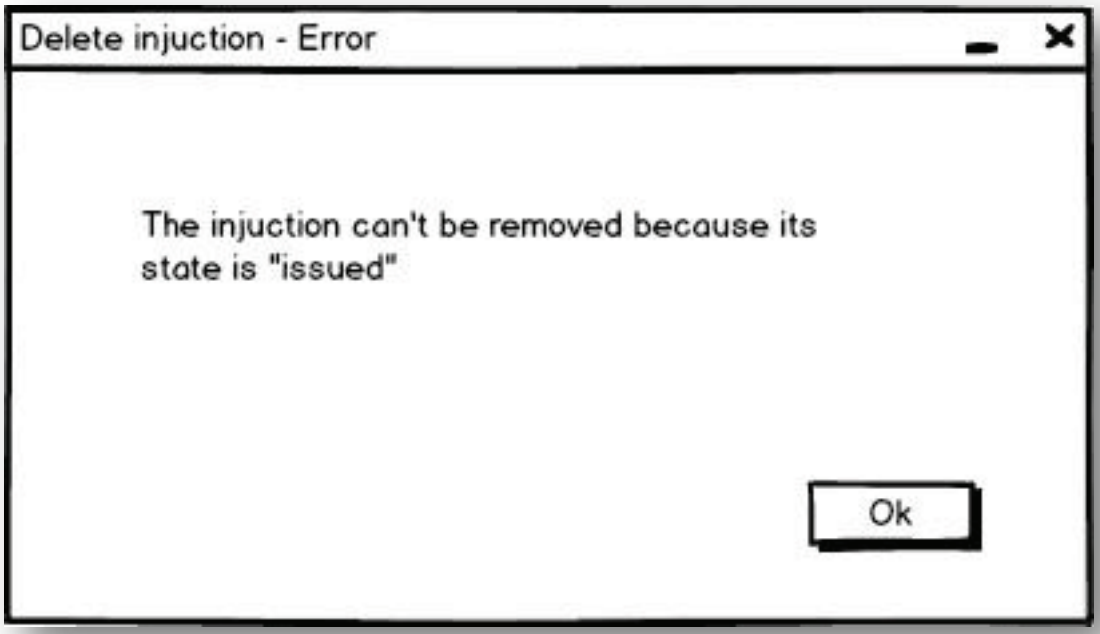


Send PDFs - multiple

Delete contract

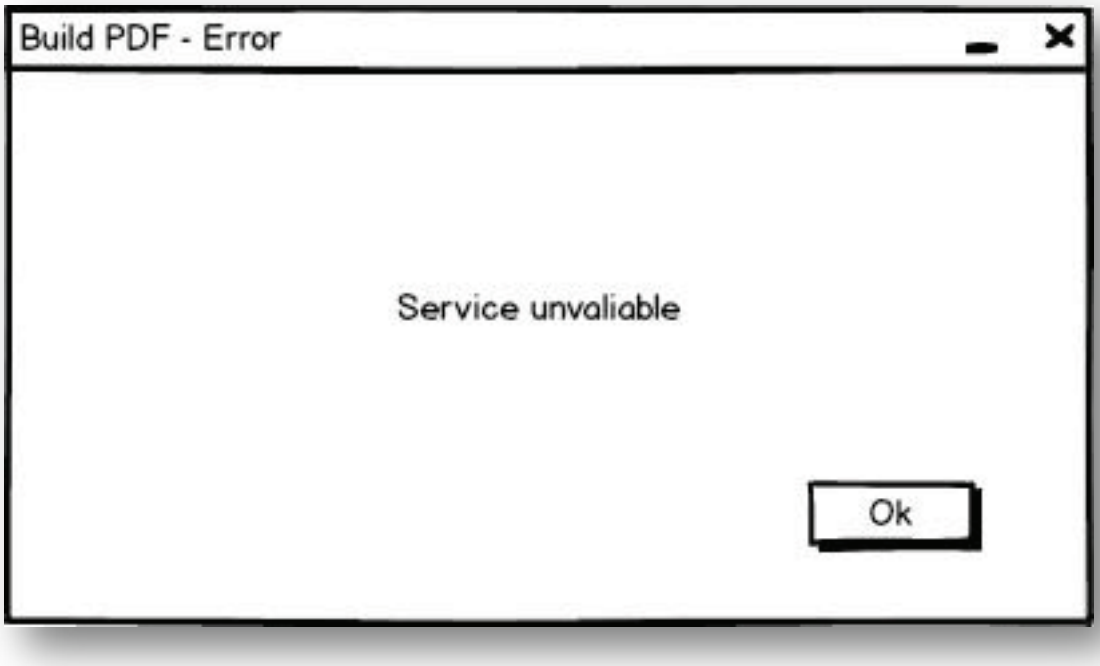


Delete contract - error

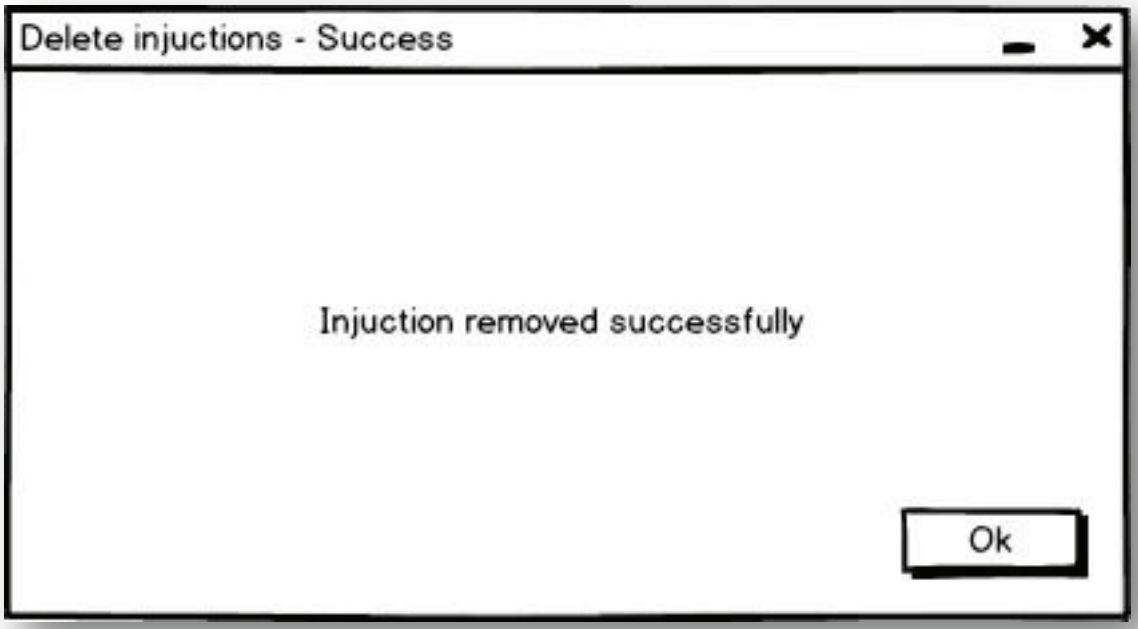


Delete injunction - error

Delete contract - success

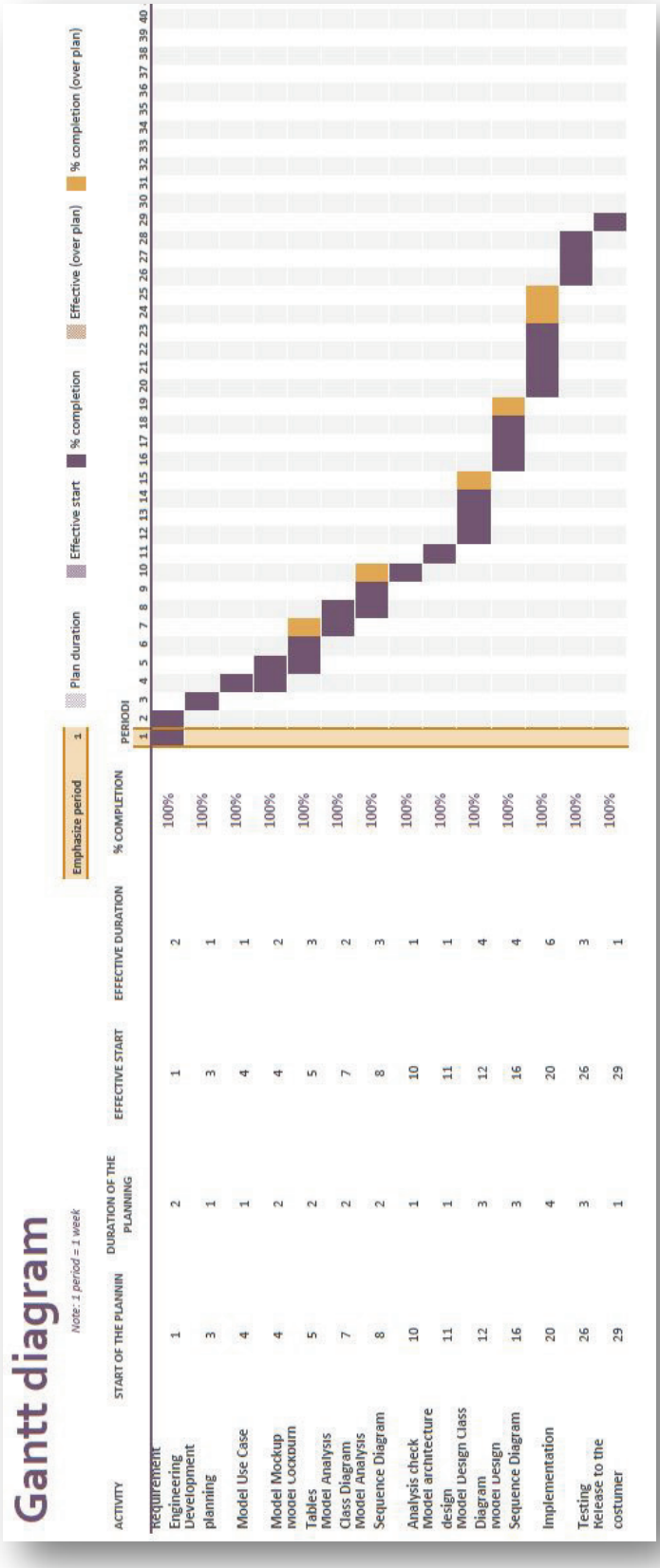


Build PDF - error



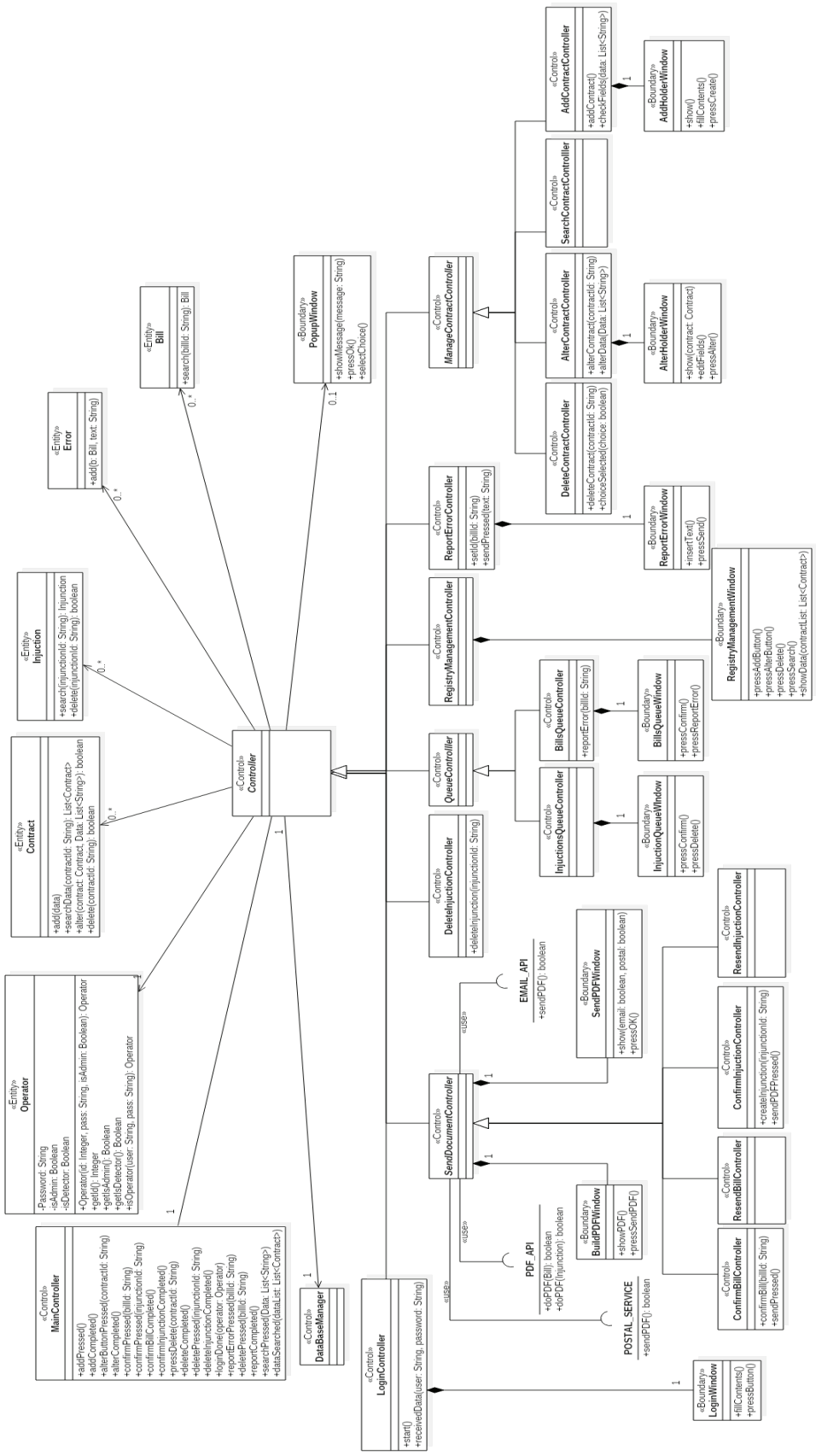
Delete injunctions – success

Gantt diagram



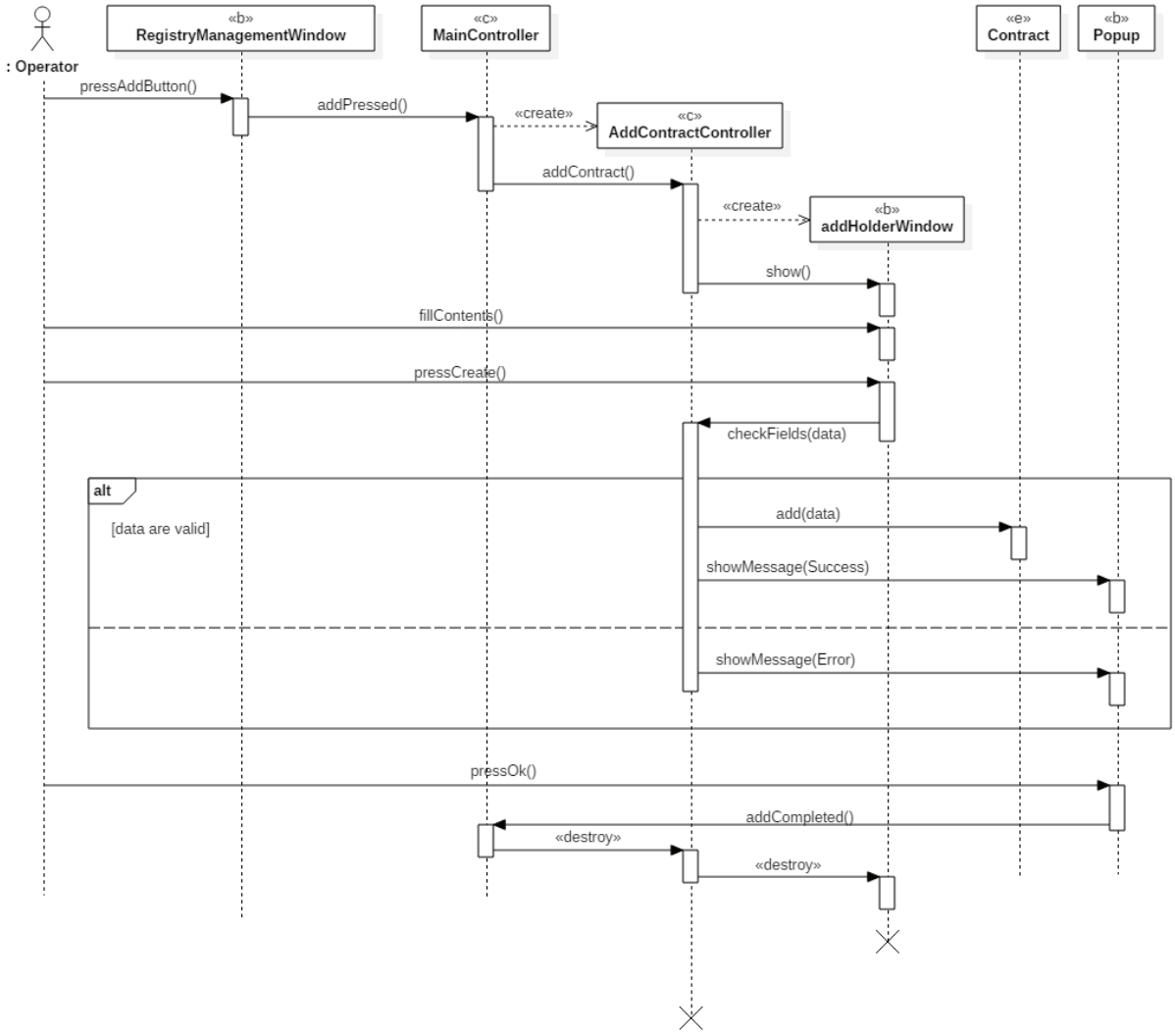
Domain model

Analysis class diagram

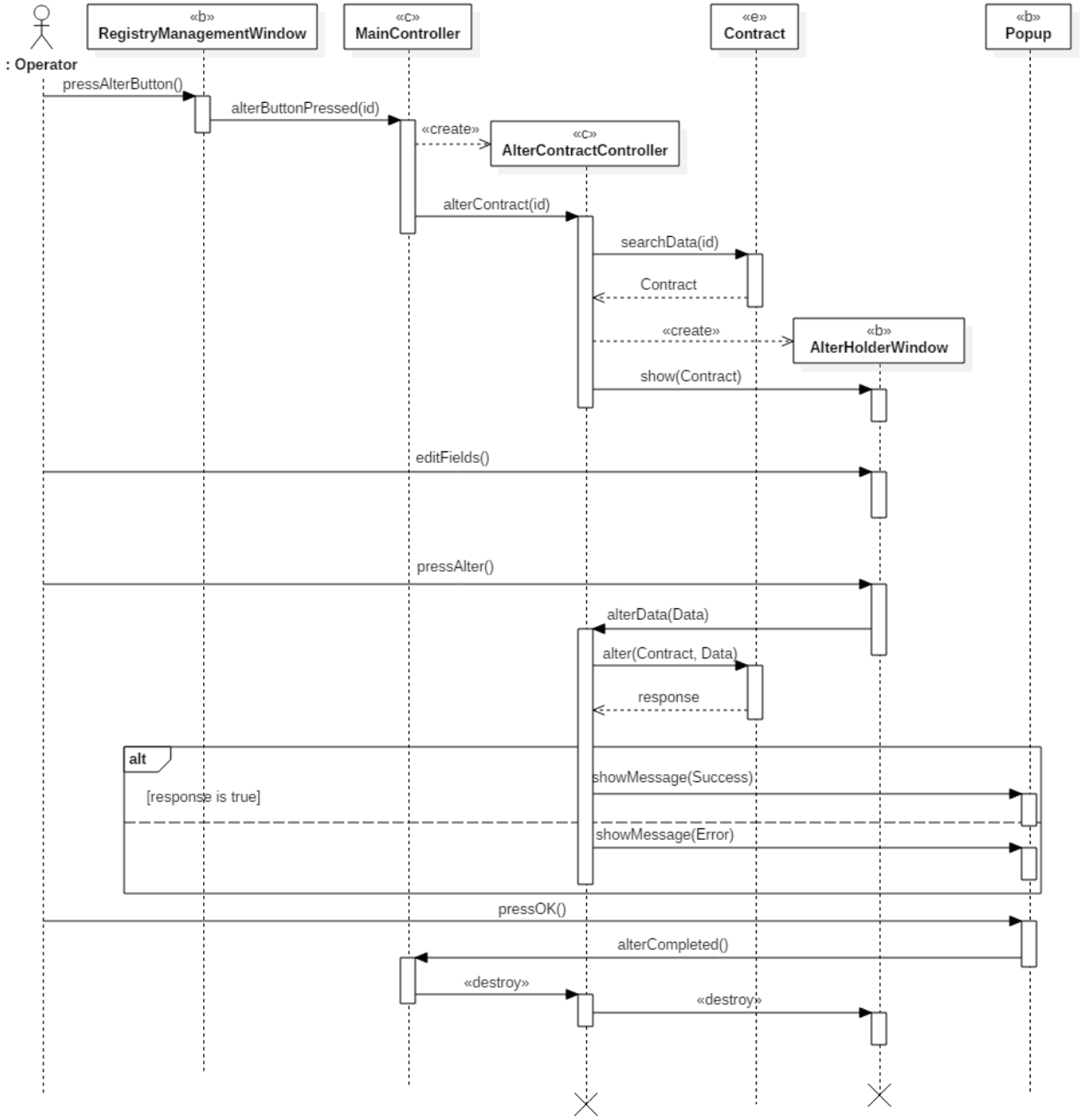


Analysis sequence diagrams

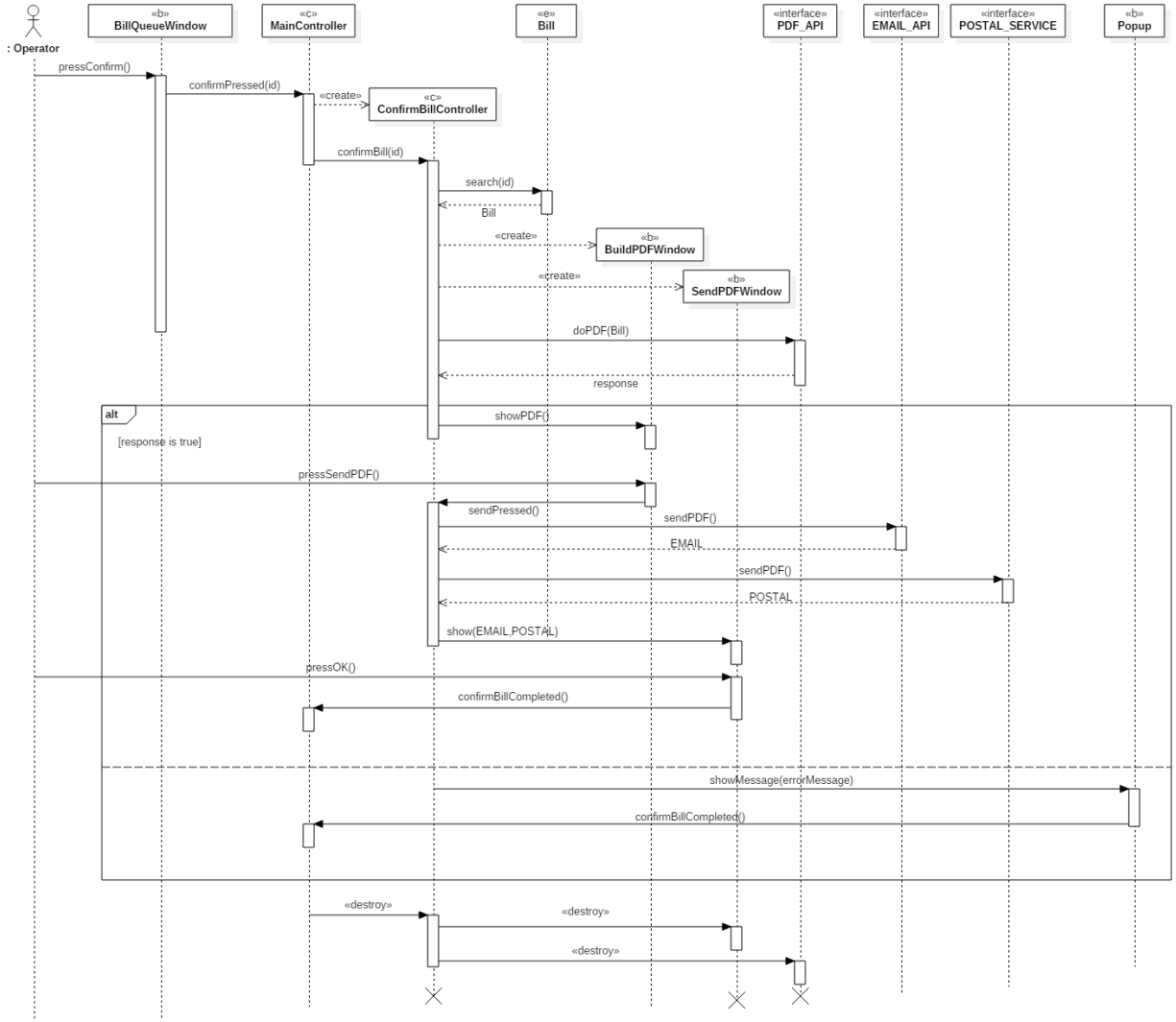
Adds contract



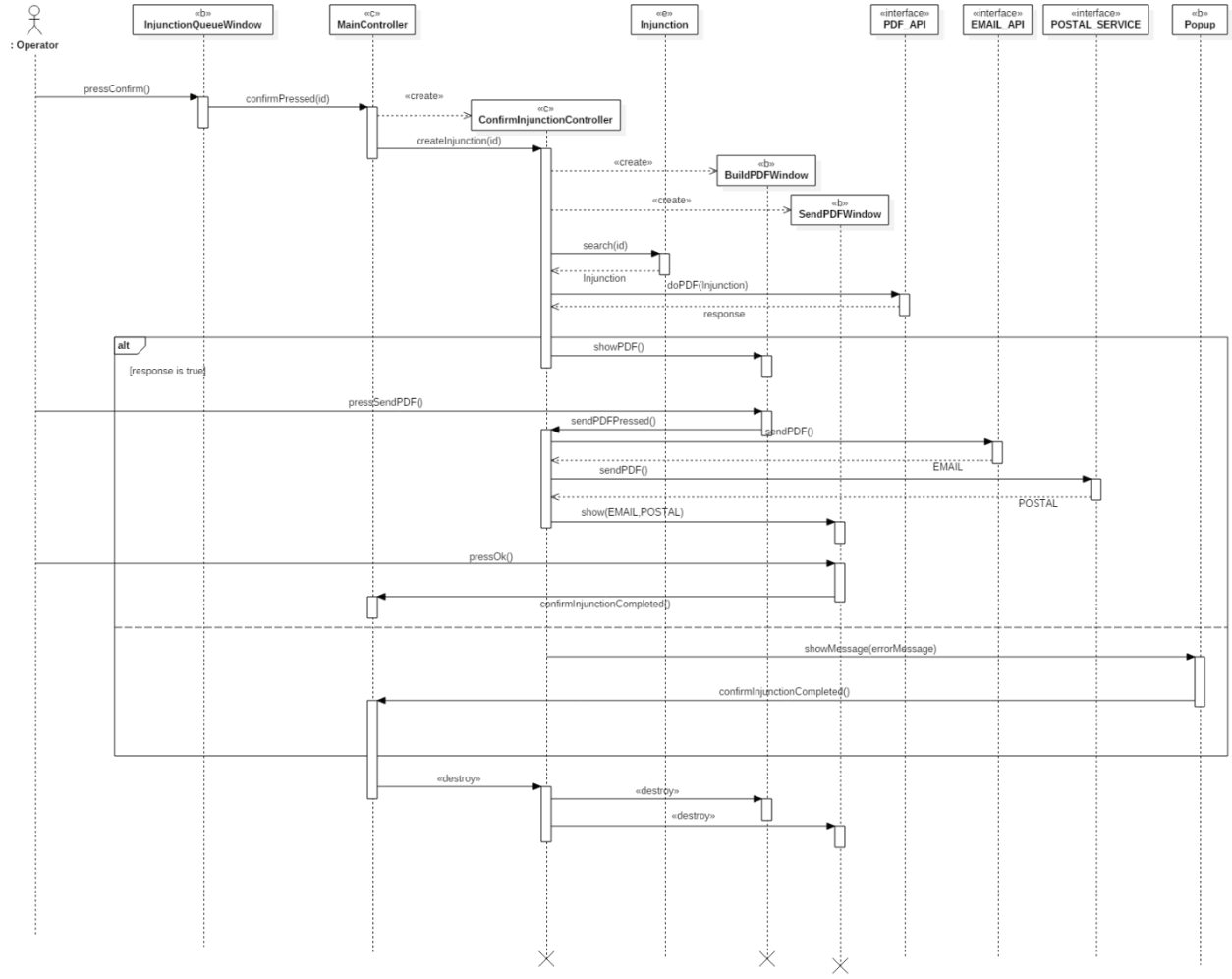
Alters contract



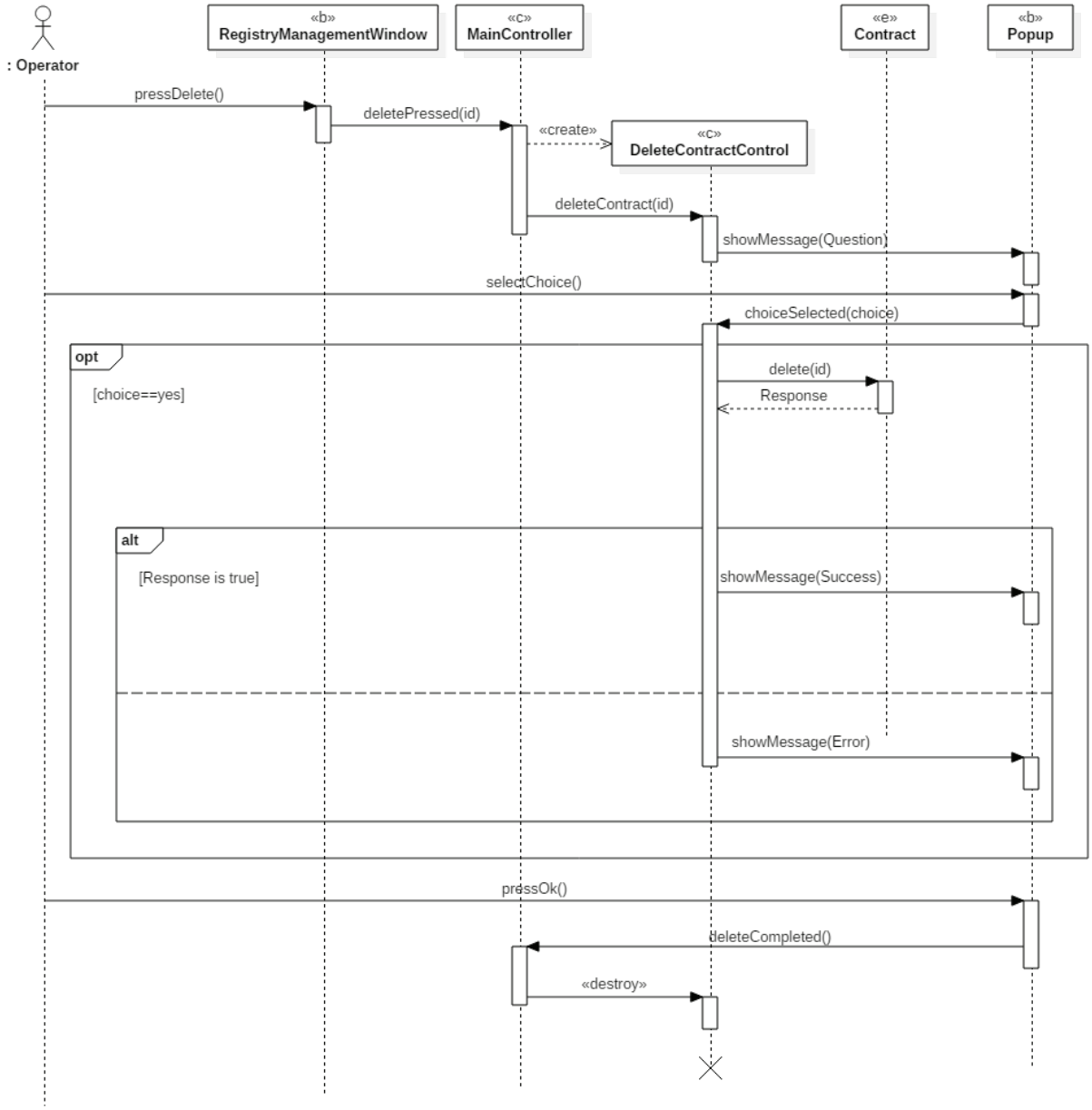
Confirms bill



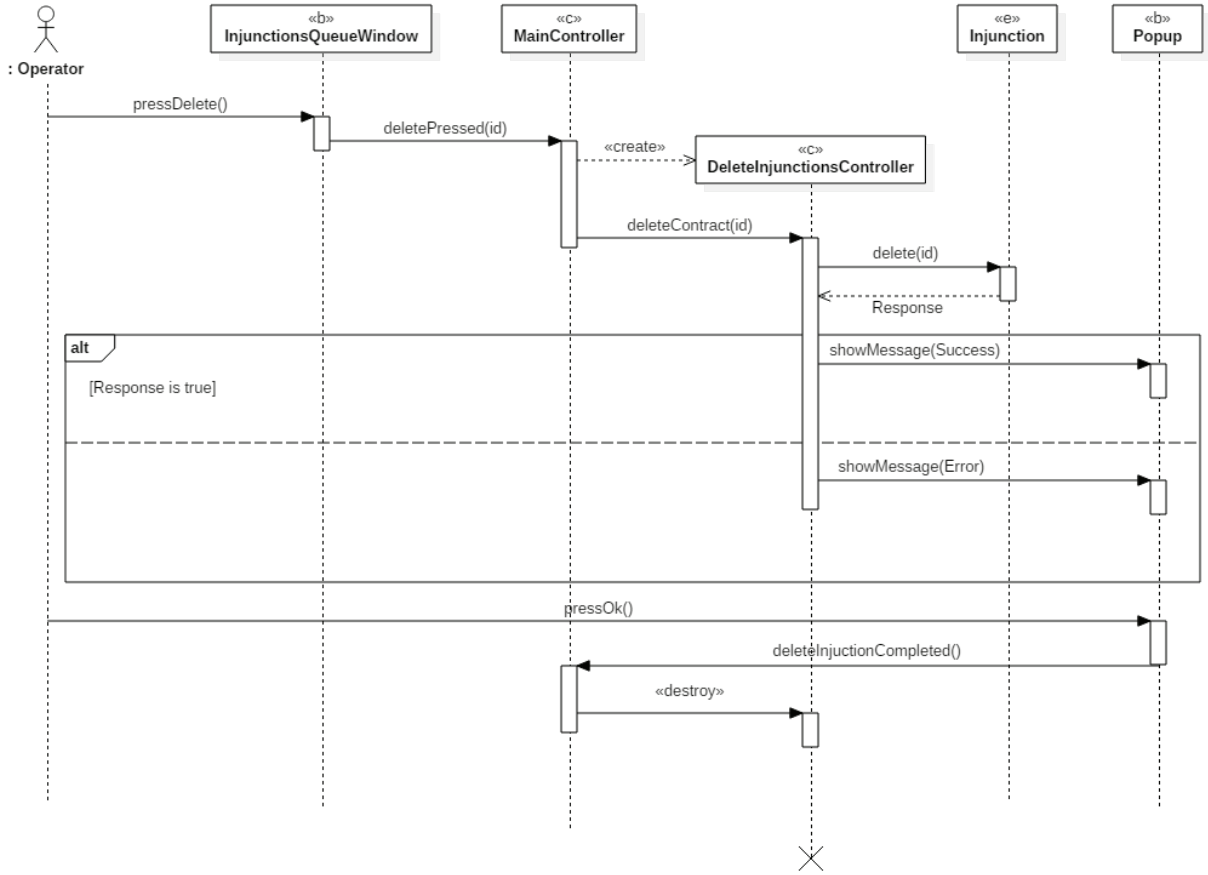
Confirms injunctions



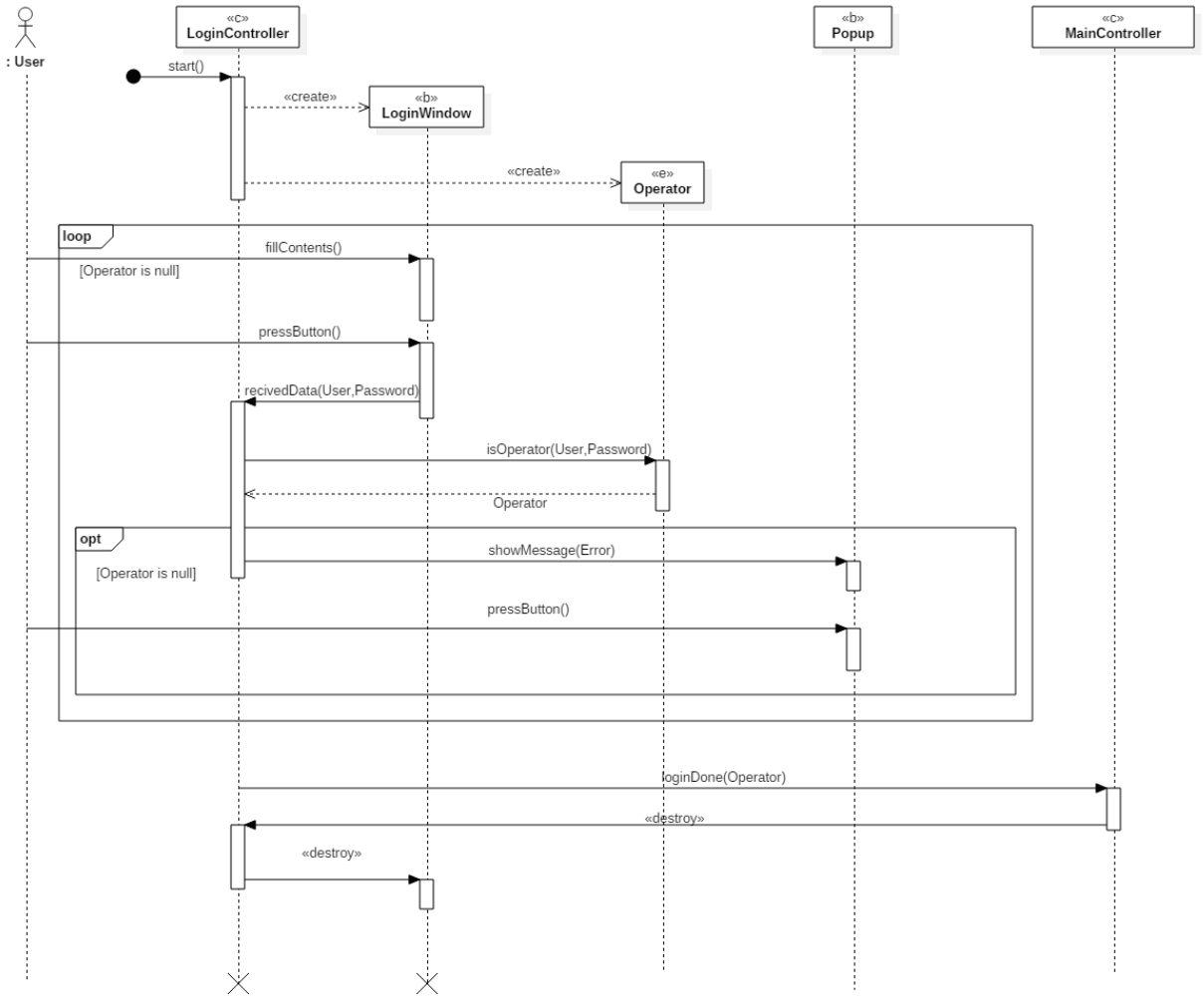
Deletes contract



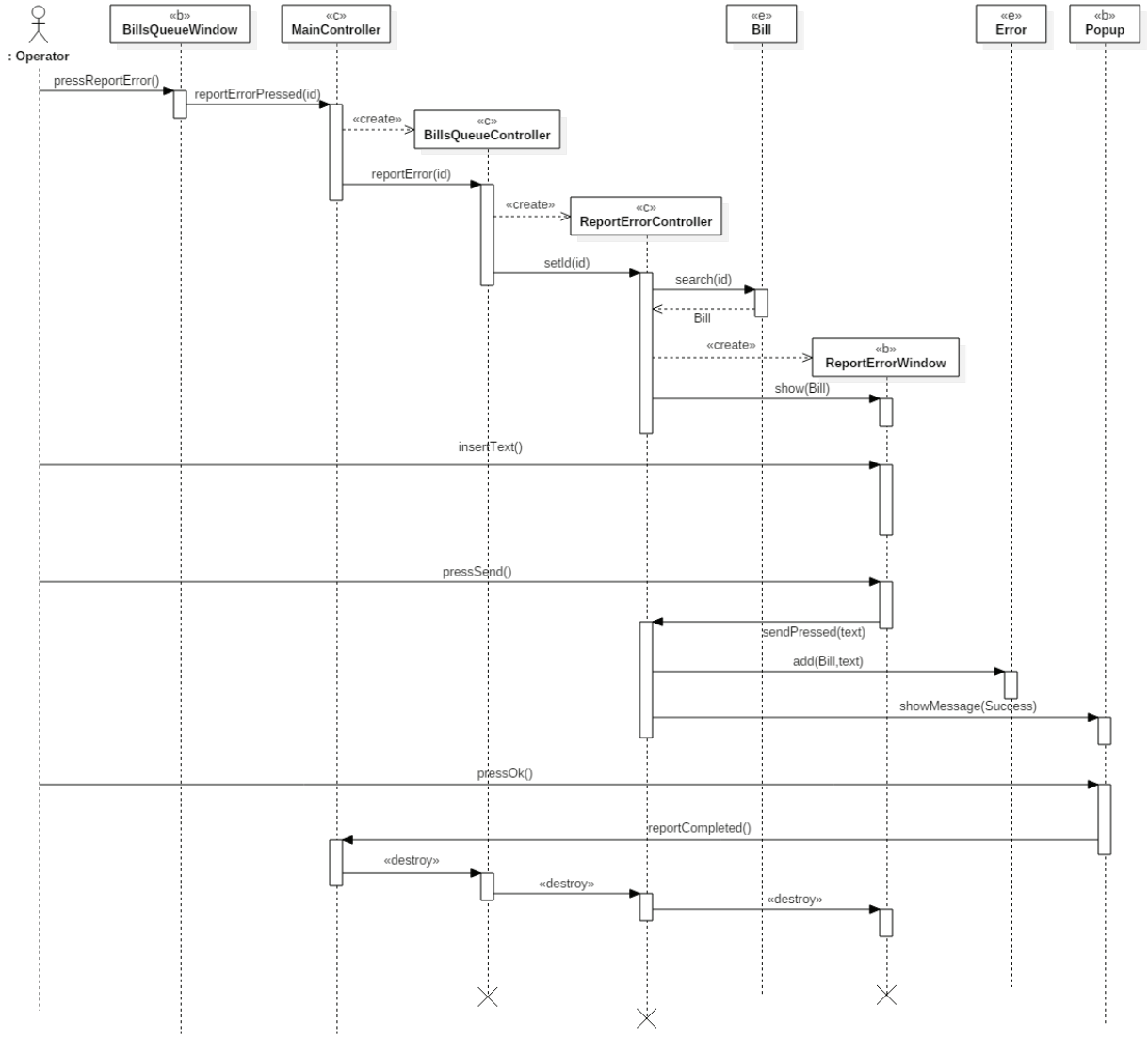
Deletes injunctions



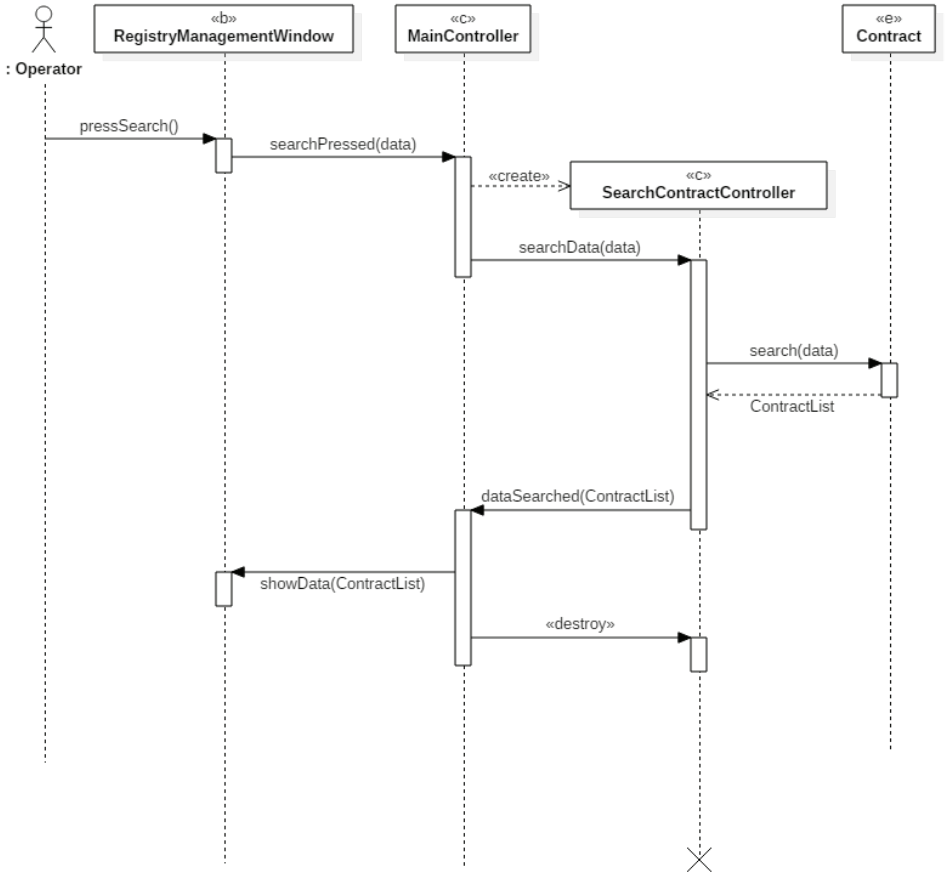
Performs login



Reports errors in bills



Researches contract



System design document

Architecture analysis

The software architecture used in the application is the Model-View-Controller architecture. The system is partitioned into three subsystems:

- The Model subsystem, it maintains the application domain knowledge
- The View subsystem, it allows the user to view the object of the application domain
- The Control subsystem, it deals with the user interactions

A set of data in a relational database, used by the application, and the entity classes are part of the first subsystem (they represent the entities of the problem).

The View subsystem is formed by the boundary classes. They form the user interfaces.

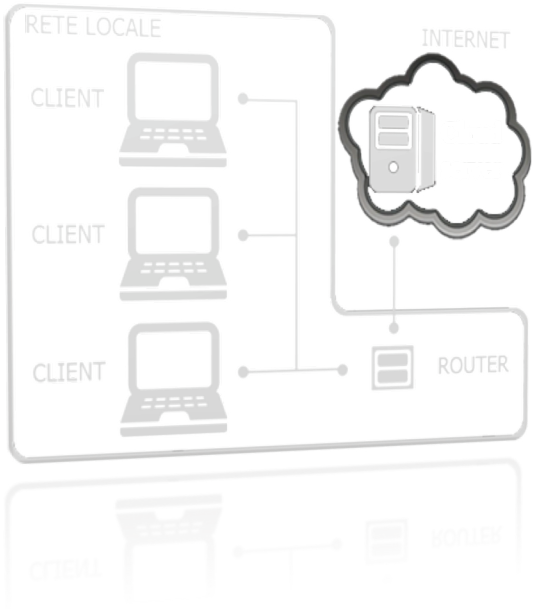
The Control subsystem is formed by the control classes. They manage the control logic and the interaction between entity and user interfaces.

The application manages the asynchronous event by an event-based management. The boundary objects, that form the user interfaces, are associated to listeners that catch an event when it occurs and execute actions depending by event.

The application is developed using centralized control: only one subsystem, the Control subsystem, is responsible for activating and stopping the others.

To have a centralized database the application is based on a cloud solution.
With a database as a service model, application owners do not have to install and maintain the database themselves. Instead, the database service provider takes responsibility for installing and maintaining the database, and application owners are charged according to their usage of the service.

To give access to operators' log file to system administrator, the application uploads all files on a cloud ftp server.



Technologies

- Apache PDFBox: **"***The Apache PDFBox[ff] library is an open source Java tool for working with PDF documents. This project allows creation of new PDF documents, manipulation of existing documents and the ability to extract content from documents. Apache PDFBox also includes several command-line utilities. Apache PDFBox is published under the Apache License v2.0.***"** (https://pdfbox.apache.org/)
- ICEpdf: *"ICEpdf is an open source PDF engine for viewing, printing, and annotating PDF documents. The ICEpdf API is 100% Java, lightweight, fast, efficient, and very easy to use. ICEpdf can be used as standalone open source Java PDF viewer, or can be easily embedded in any Java application to seamlessly load or capture PDF documents."* (http://www.icesoft.org/java/projects/ICEpdf/overview.jsf)
- Apache J4LOG: *"With log4j it is possible to enable logging at runtime without modifying the application binary. The log4j package is designed so that these statements can remain in shipped code without incurring a heavy performance cost. Logging behavior can be controlled by editing a configuration file, without touching the application binary."* (https://logging.apache.org/log4j/1.2/)
- Oracle JavaMail: **"***The JavaMail API provides a platform-independent and protocol-independent framework to build mail and messaging applications. The JavaMail API is available as an optional package for use with theJava SE platform and is also included in the Java EE platform***"**. (http://www.oracle.com/technetwork/java/javamail/index.html)
- Apache Commons-net*: "Apache Commons Net™ library implements the client side of many basic Internet protocols. The purpose of the library is to provide fundamental protocol access, not higher-level abstractions. Therefore, some of the design violates object-oriented design principles. Our philosophy is to make the global functionality of a protocol accessible (e.g., TFTP send file and receive file) when possible, but also provide access to the fundamental protocols where applicable so that the programmer may construct his own custom implementations (e.g, the TFTP packet classes and the TFTP packet send and receive methods are exposed)."* (https://commons.apache.org/proper/commons-net/)
- MySQL Connector: *"MySQL provides standards-based drivers for JDBC, ODBC, and .Net enabling developers to build database applications in their language of choice."* (https://www.mysql.com/it/products/connector/)
- GitHub: **"***GitHub is a web-based Git or version control repository and Internet hosting service. It is mostly used for code. It offers all of the distributed version control and source code management (SCM) functionality of Git as well as adding its own features. It provides access control and several collaboration features such as bug tracking, feature requests, task management, and wikis for every project***"**. (https://github.com)

Design pattern & Implementation choices

The design pattern used are the Observer, Singleton and DAO pattern.

- The **Observer pattern** is used to define the Control - Component relationship. Each class that implements the Control interface has their Component objects; the way by which this classes dialogue is defined by the Observer Pattern. For increase the modularity has been included a class Listener. This last is used by Control classes (and by Main˙Controller class) for catching the event triggered by their Component objects. After we talk about the class Listener.

- The **Singleton pattern** is used to define the classes Main˙Controller and Database˙Controller. The application need just one instance of both these classes. Using the Singleton pattern, we are sure that, in every moment during the computation, we have at most one instance of Main˙Controller and one instance of Database˙Contoller. The reason to have only one Main˙Controller is that this class manage the main control logic of the application: having more than one Main˙Controller would be a disaster. Instead, the reason to have only one Database˙Controller is that this class is the only one that dialogue with the database: it asks the database to do queries and it manages the results. We want the database receives a request at a time.

- The **DAO** (**Data Access Object**) **pattern** is used to provide some specific operation without exposing details of the database technology implemented. In this way the system is independent from the database technology.
  Any DAO class is used to access to a specific object stored into the DBMS (all of these classes are described into the DAO Package).
  In our case we used as technology the mySql DBMS.

During the design, some implementation choices were made:

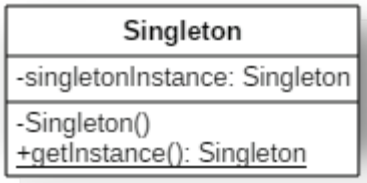
1: Class Listener: it has been introduced to increase the modularity.
This class implements the ActionListener, MouseListener and ChangeListener interfaces, so it implements the methods described into the implemented interfaces.
These methods are invoked by the Component objects and it does something different depending on the object that invoked it.

2: Controller interface: it has been introduced as tag interface.

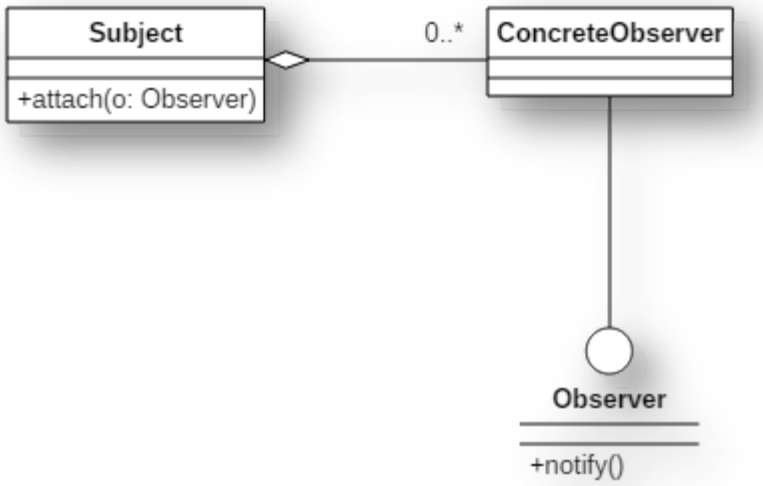
3: Classes Registry˙Controller, BillsQueue˙Controller, InjunctionQueue˙Controller: Main˙Controller's responsabilities (which is present into the Analysis' class diagram) were splitted, during the design phase, into these 3 classes: Registry˙Controller, BillsQueue˙Controller, InjunctionQueue˙Controller. In this way we increased the modularit: each one of these 3 classes manage one of the 3 panels present into the main view (Registry Management, Bills Queue, Injunctions Queue).

4: All log's file generated from the J4LOG API are shown on http://loggci16.altervista.org/ (password "ingsw12a3v").

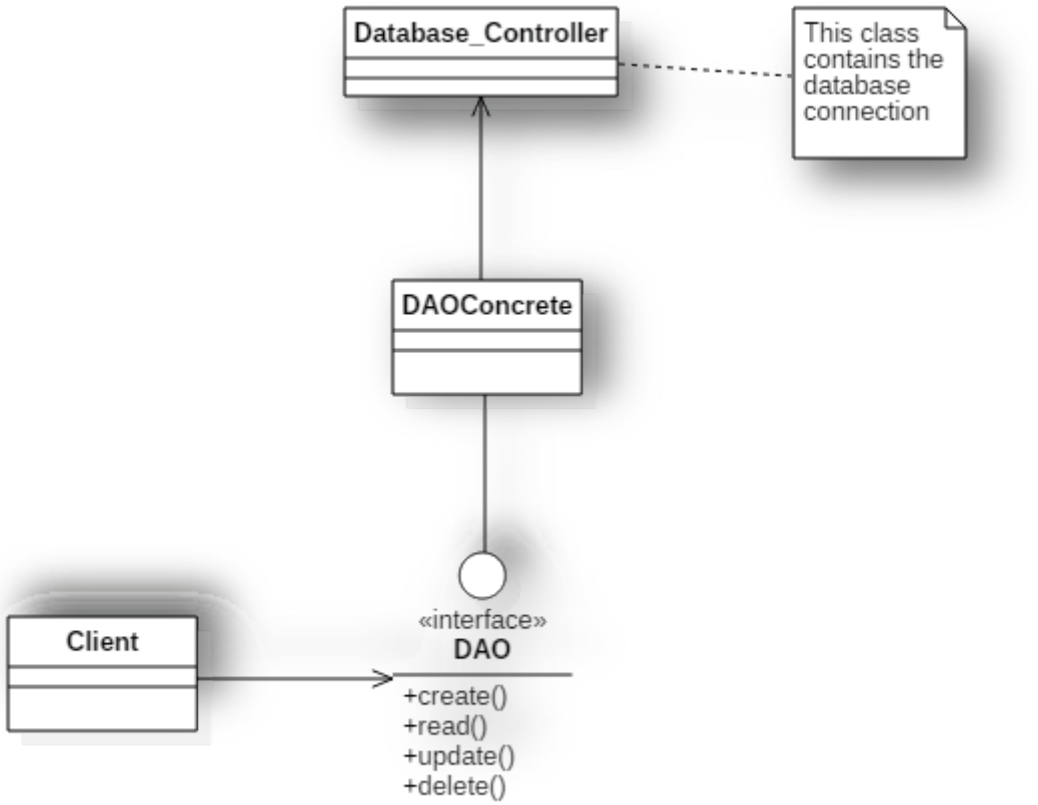
Singleton pattern:



Observer pattern

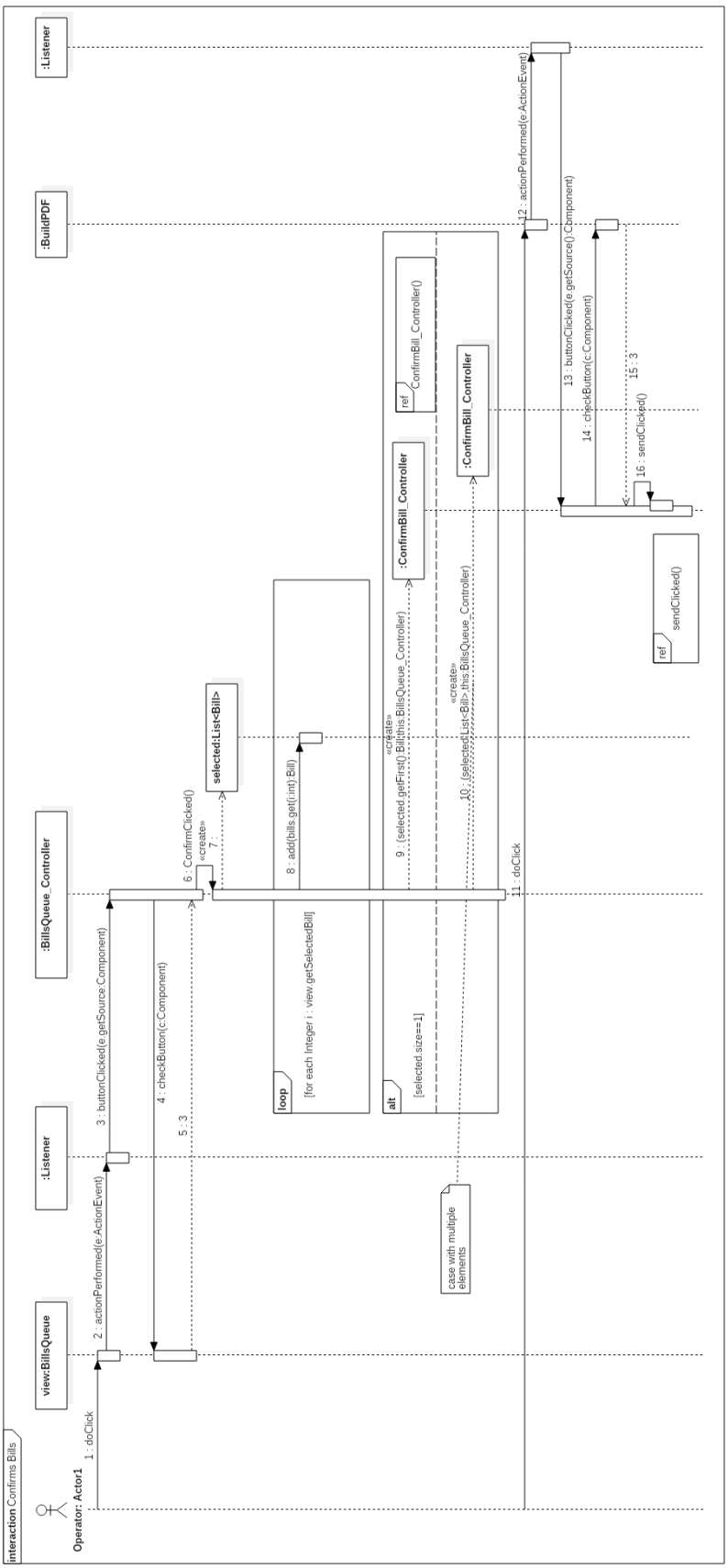


DAO pattern

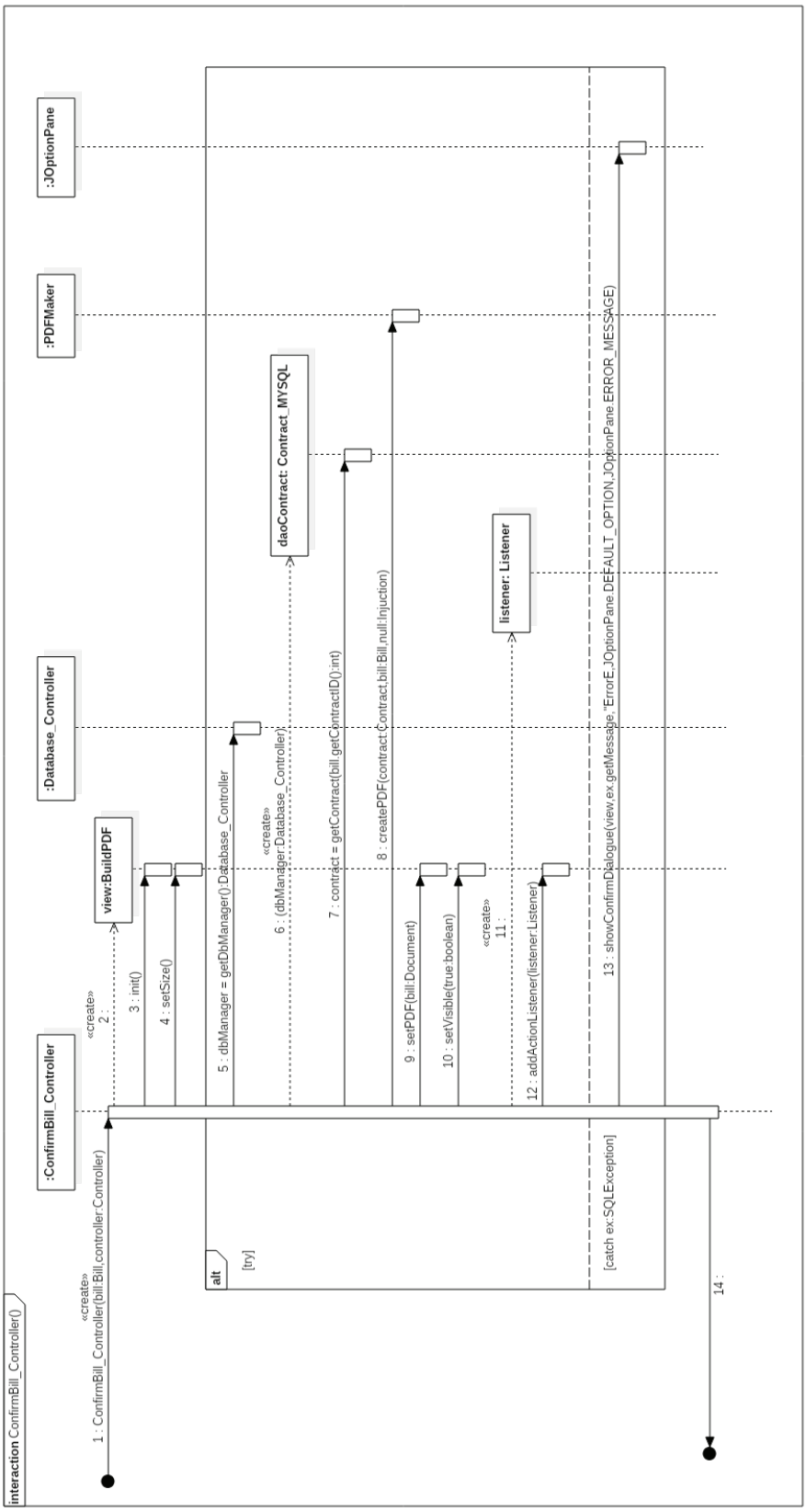

Database_Controller
This class contains the database connection
DAOConcrete
Client
«interface»
DAO
+create()
+read()
+update()
+delete()

Design sequence diagram

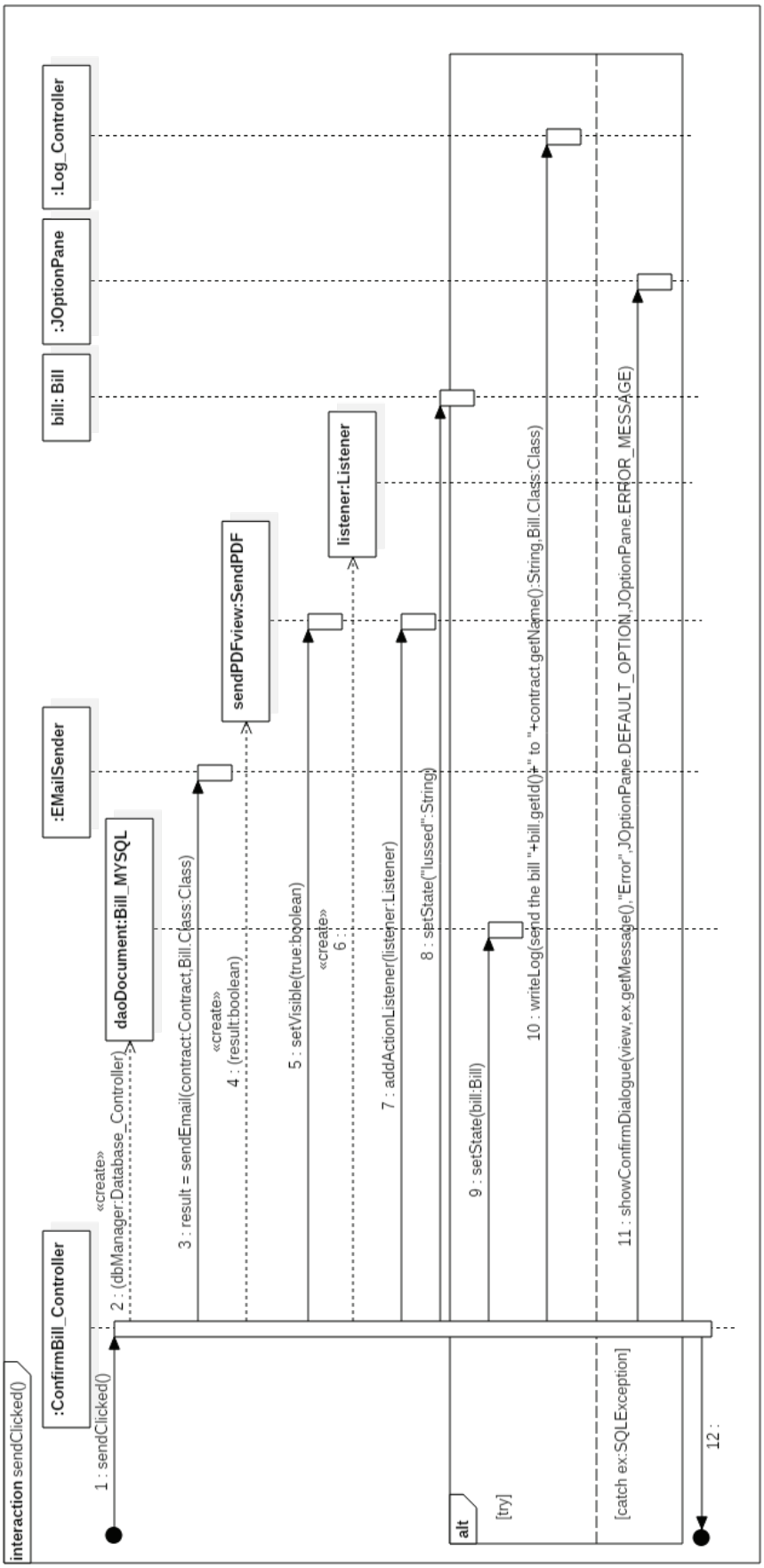
Confirm bill



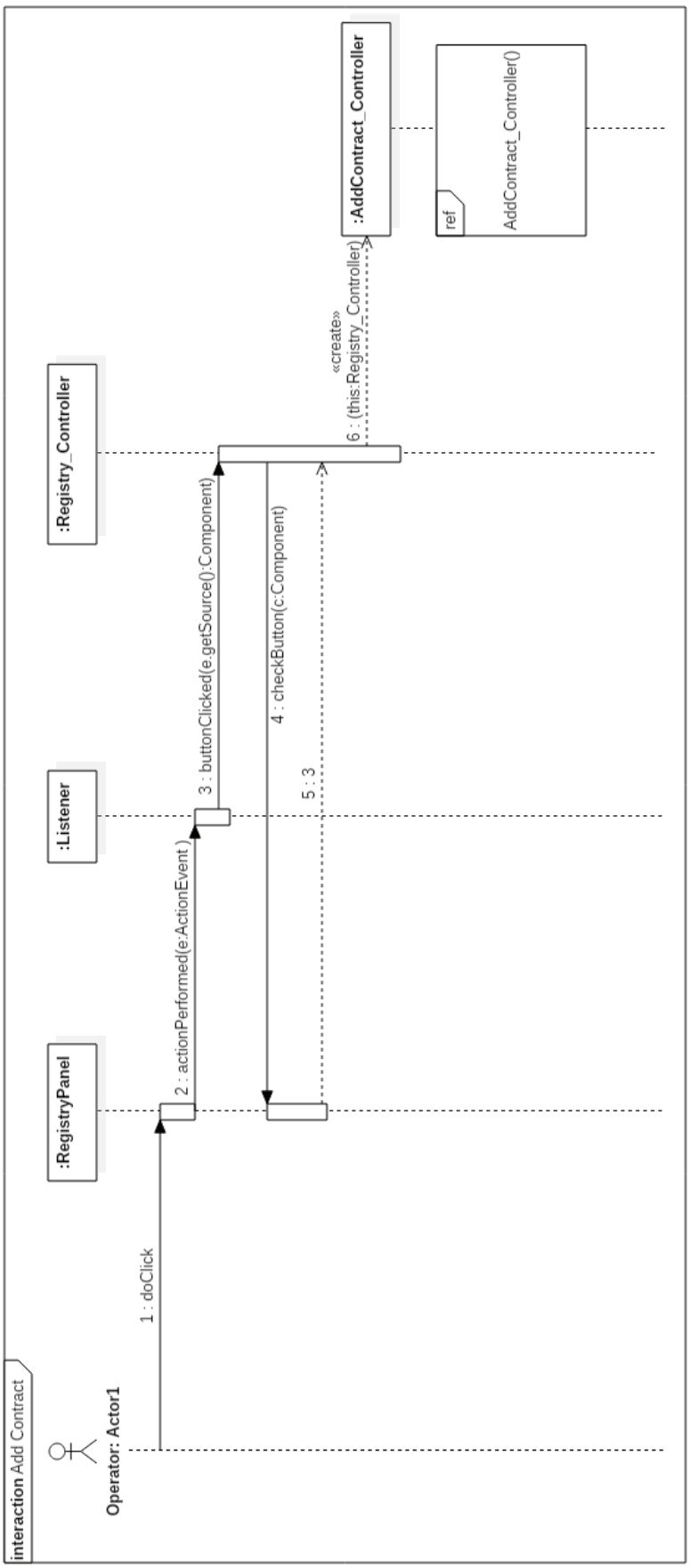
ConfirmBill˙Controller()



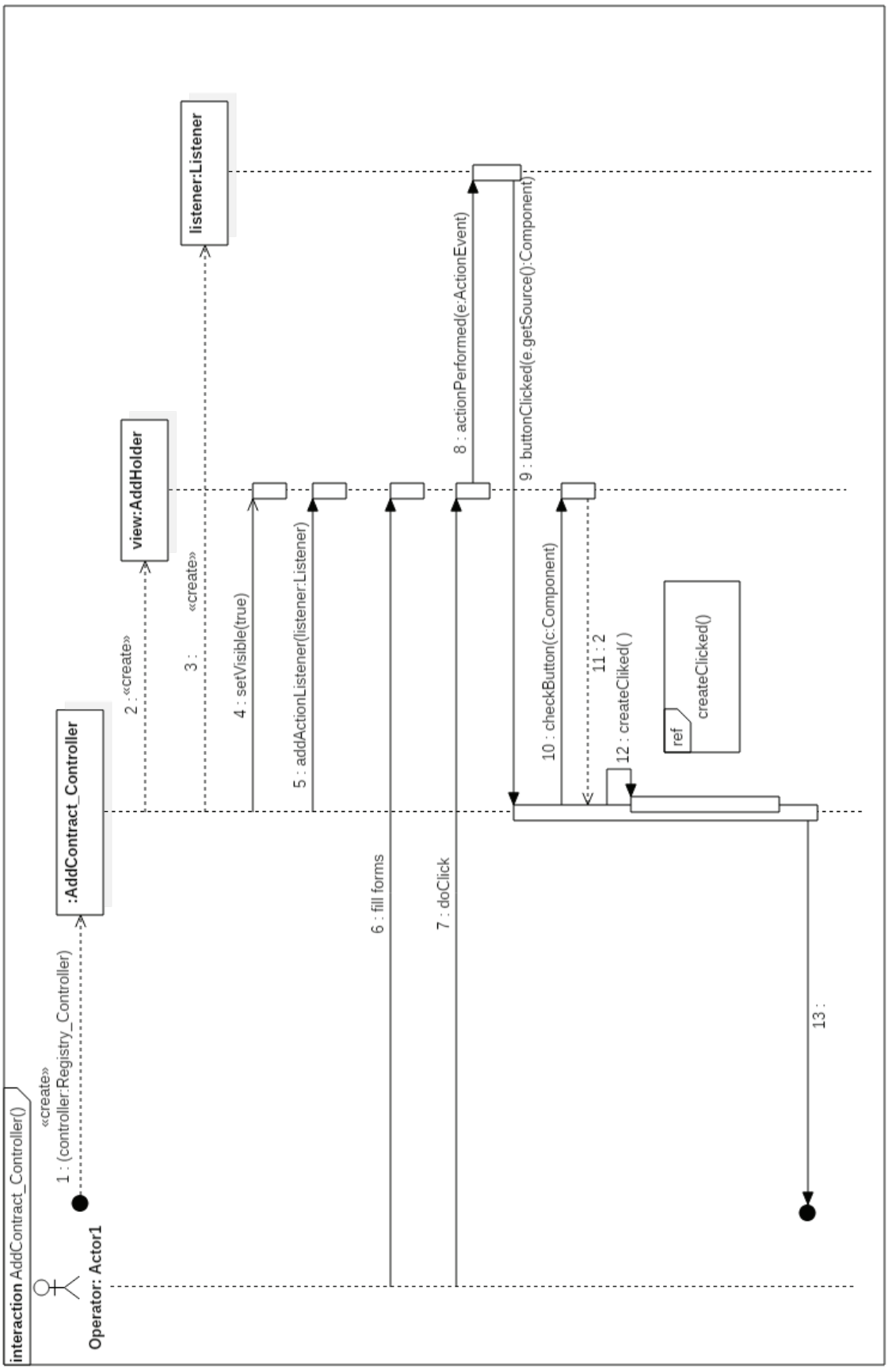
ConfirmsBill˙Controller.sendClicked()



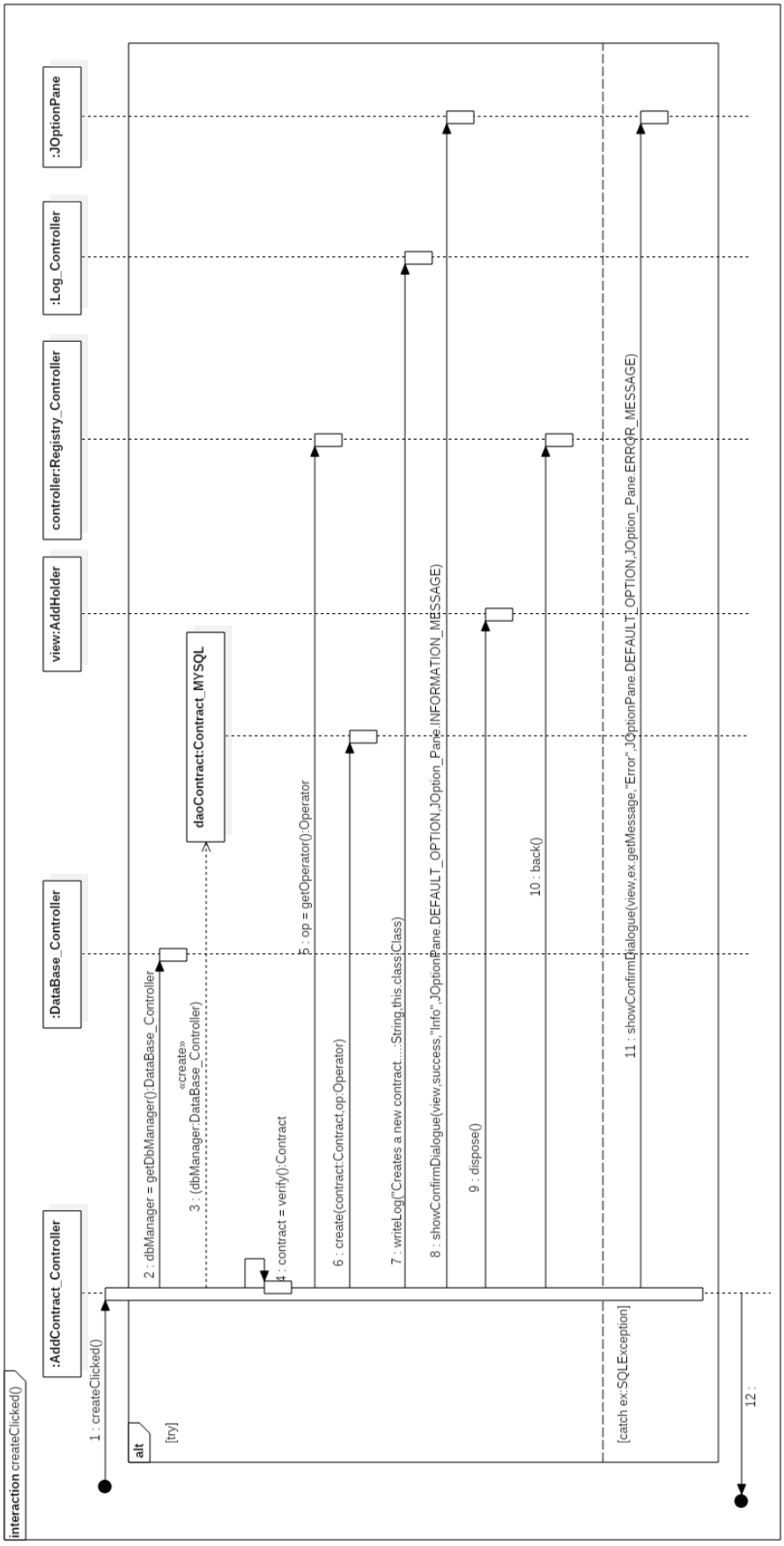
Add contract



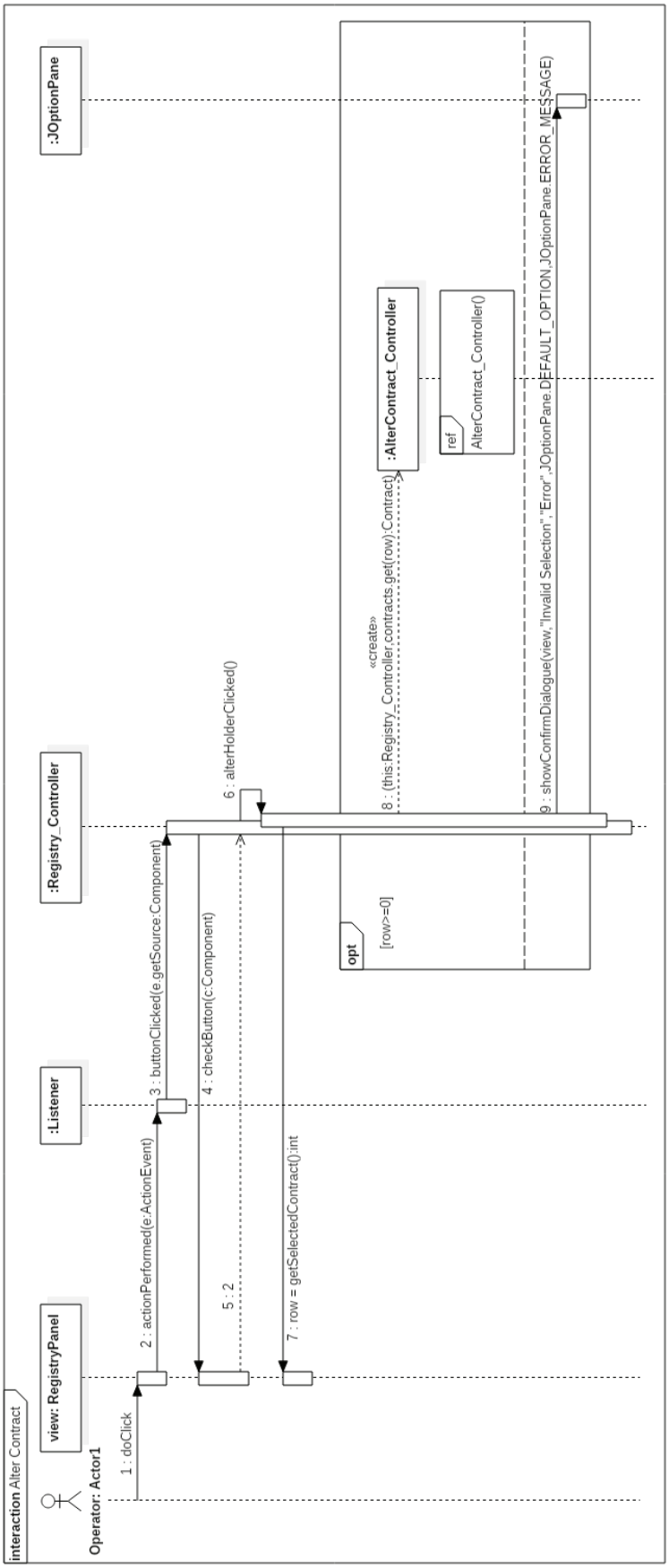
AddContract˙Controller()



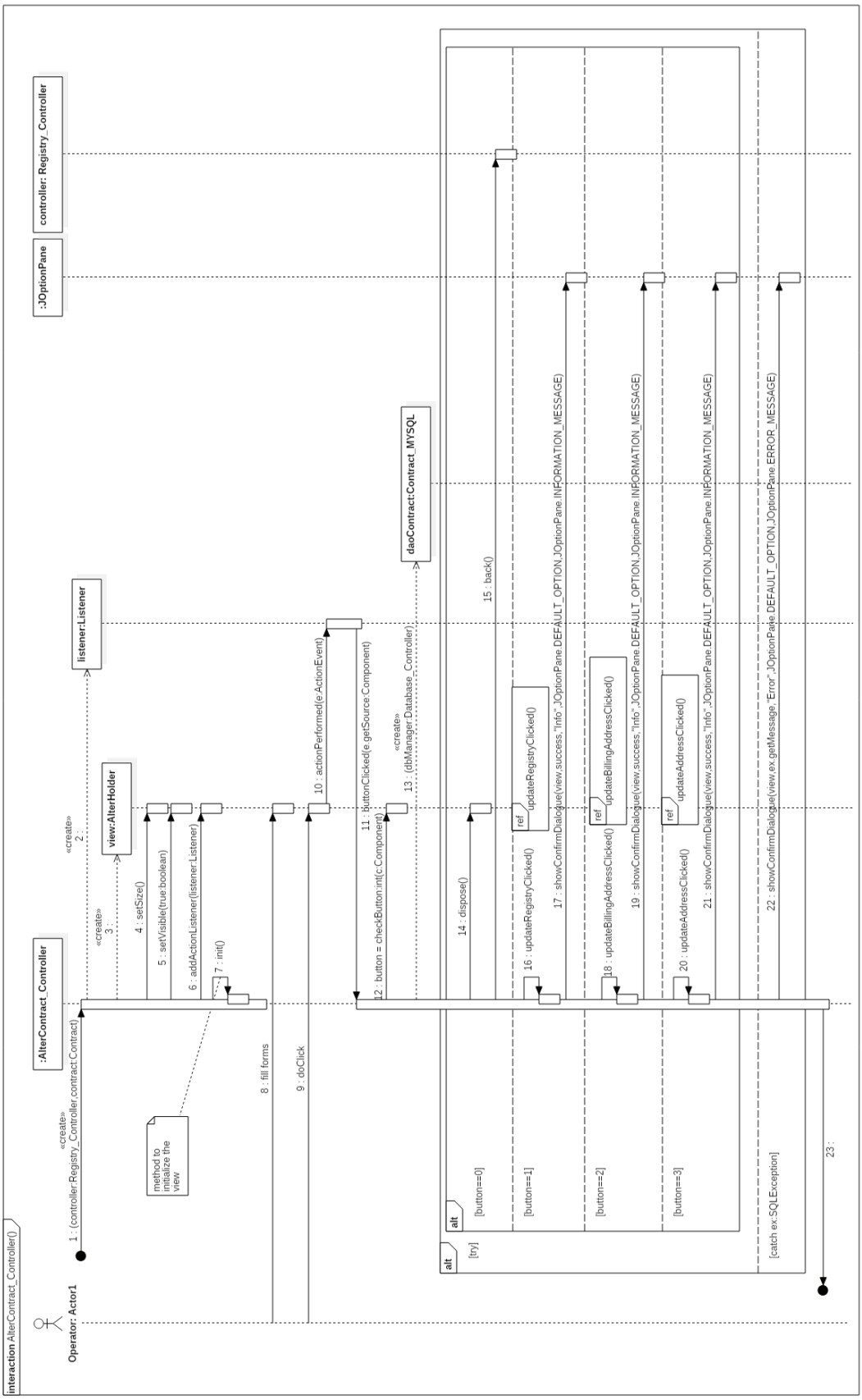
AddContract˙Controller.createClicked()



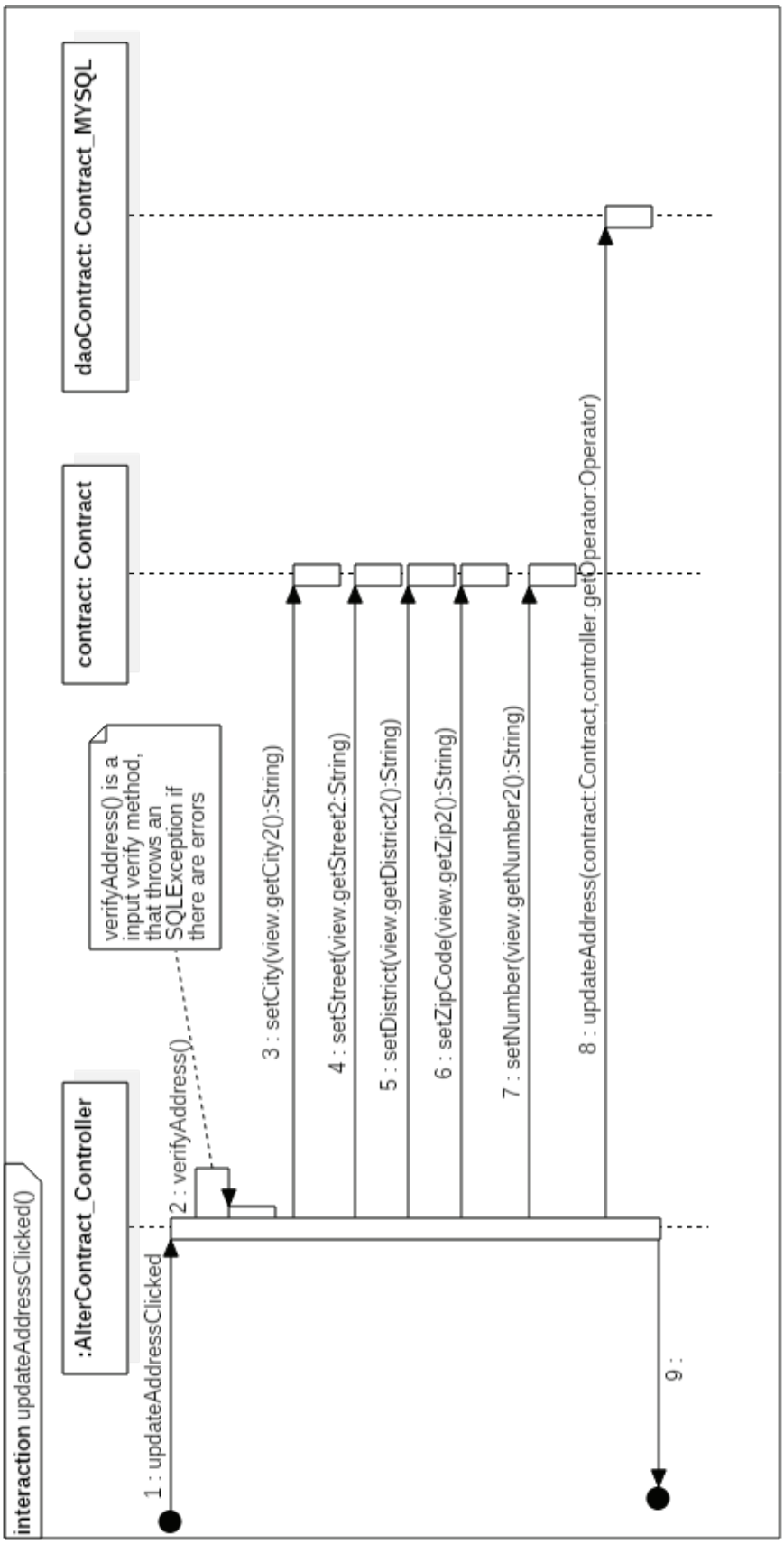
Alter contract



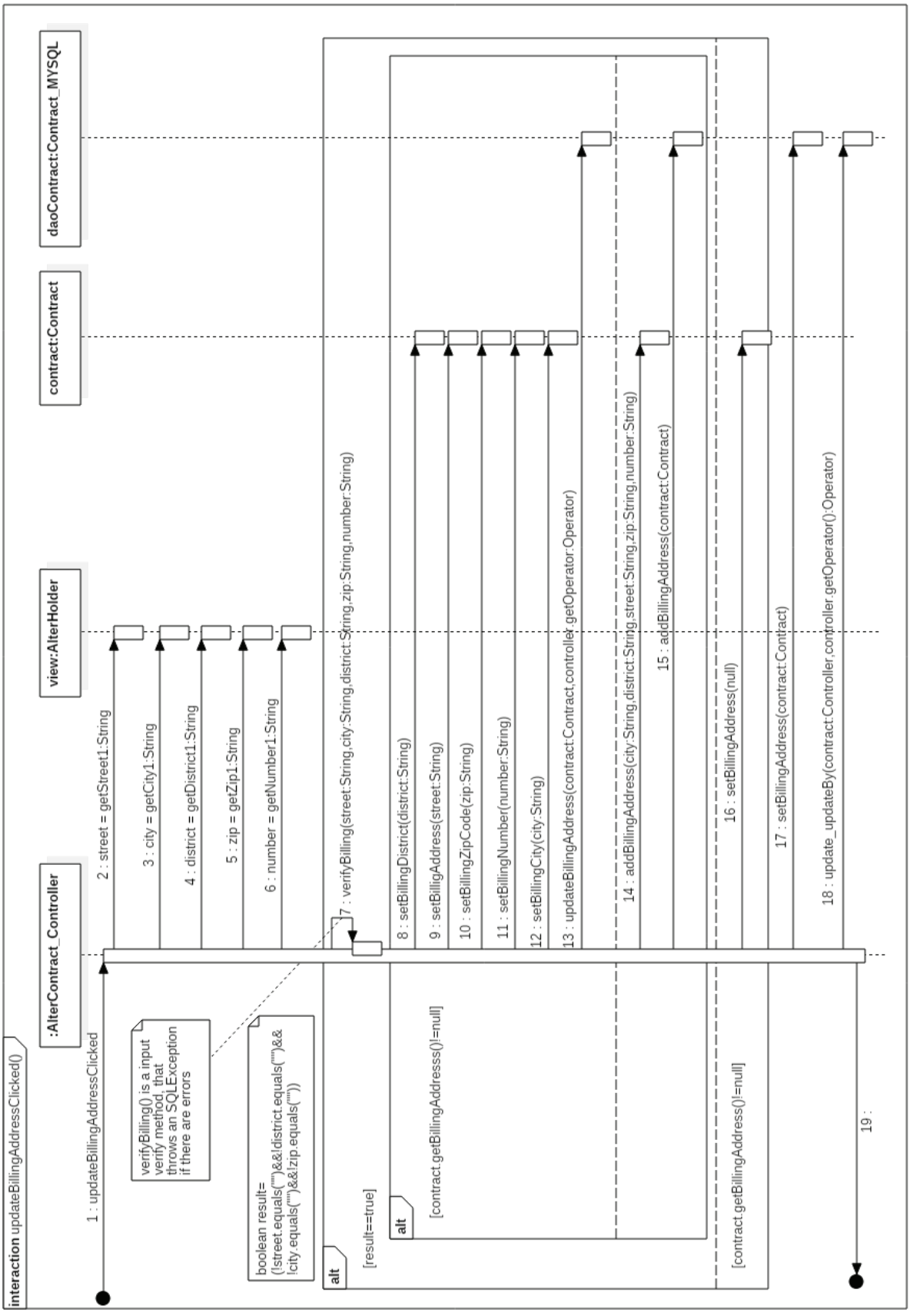
AlterContract˙Controller()



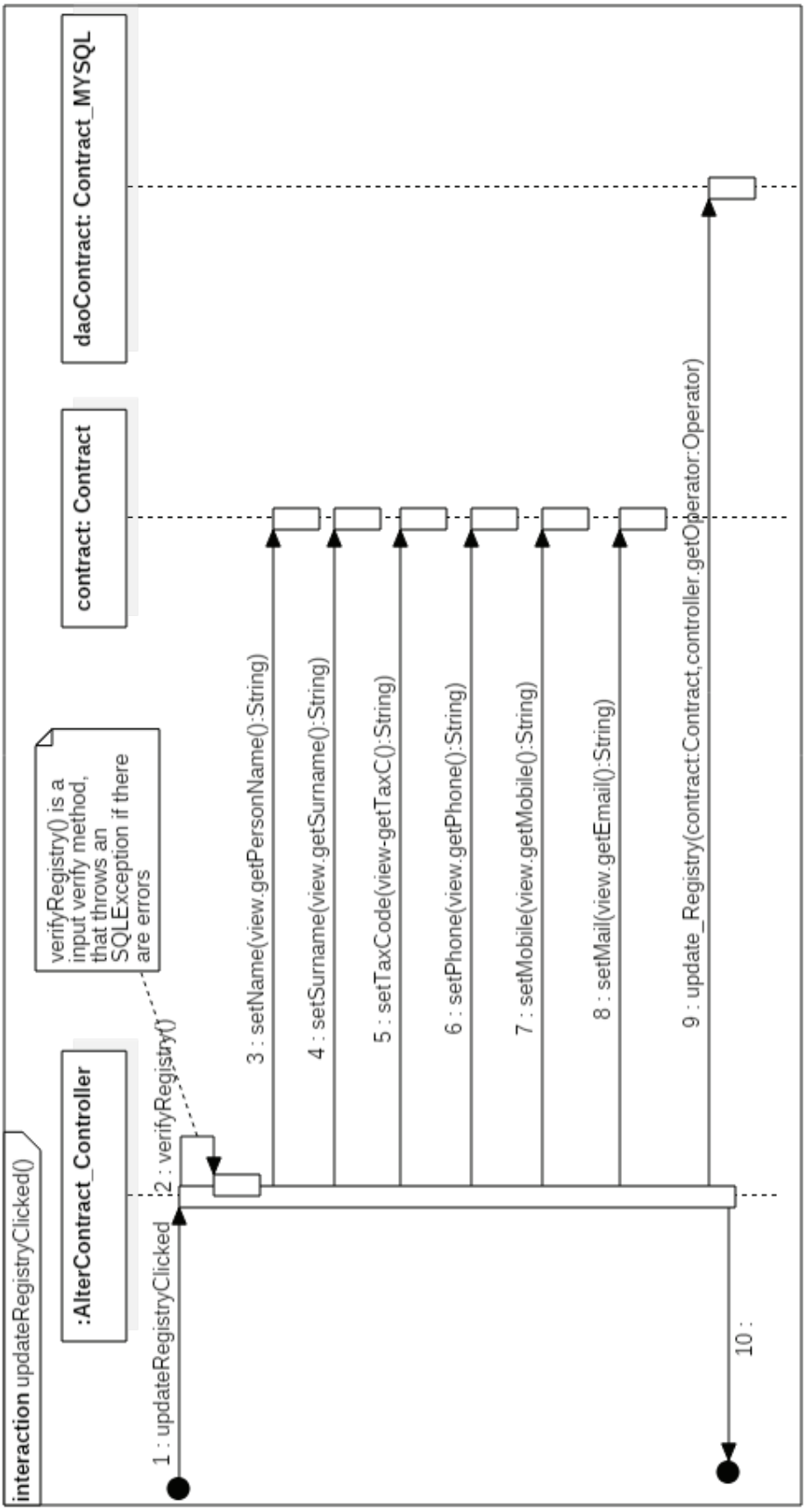
AlterContract˙Controller.addressClicked()



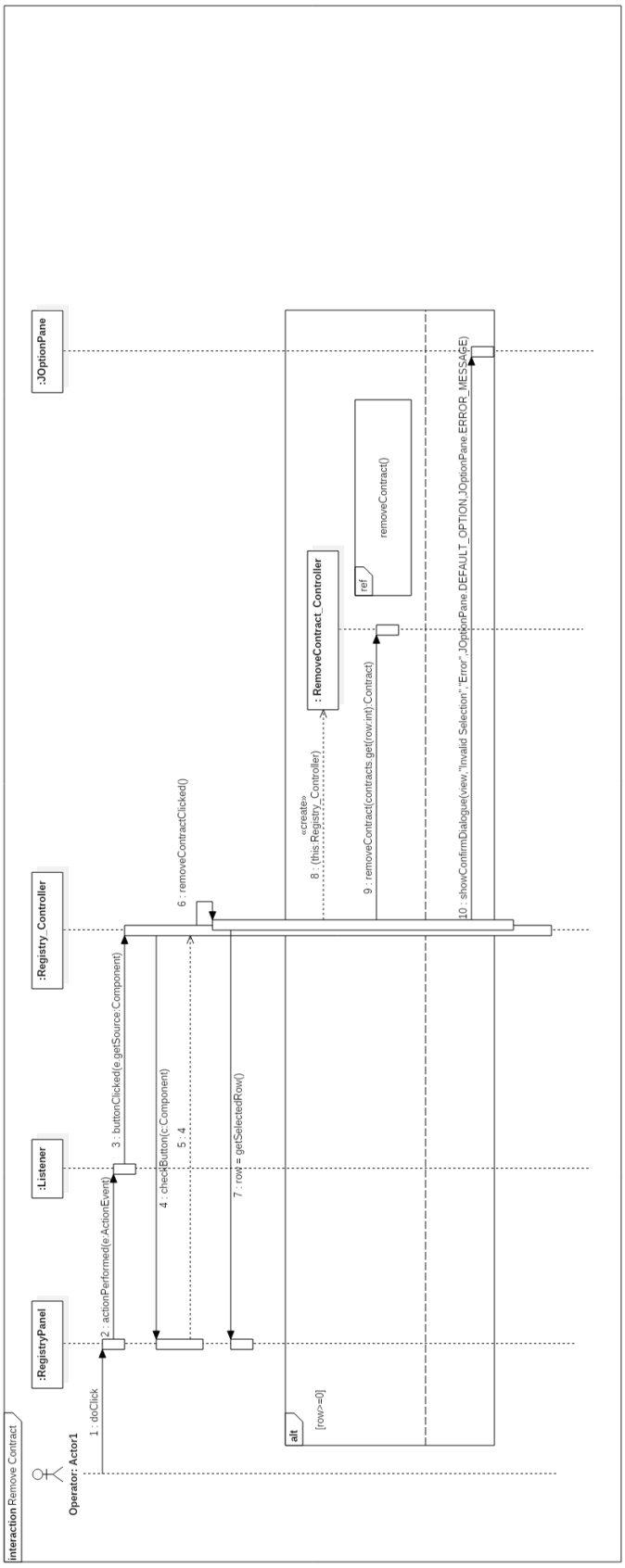
AlterContract`Controller.updateBillingAddressClicked()



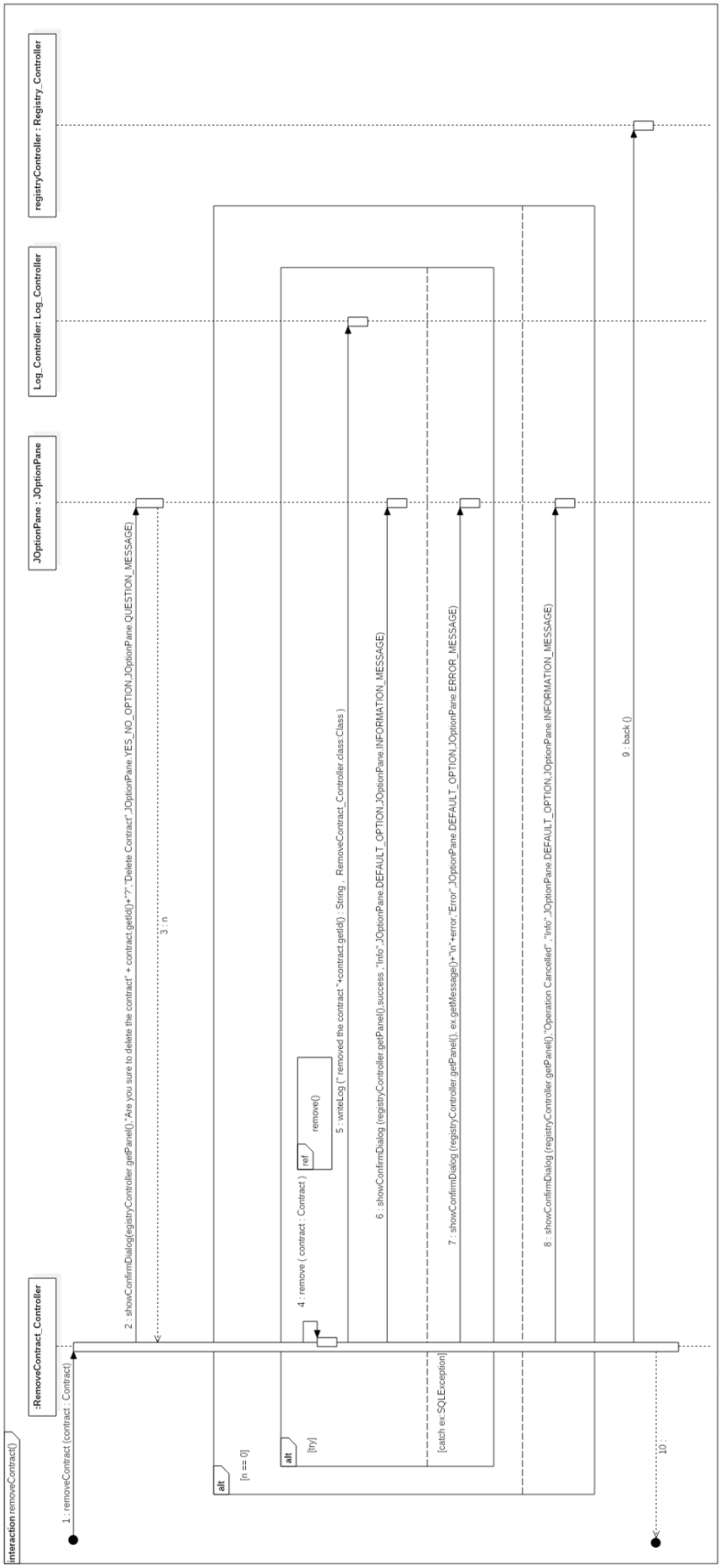
AlterContract˙Controller.updateRegistryClicked()



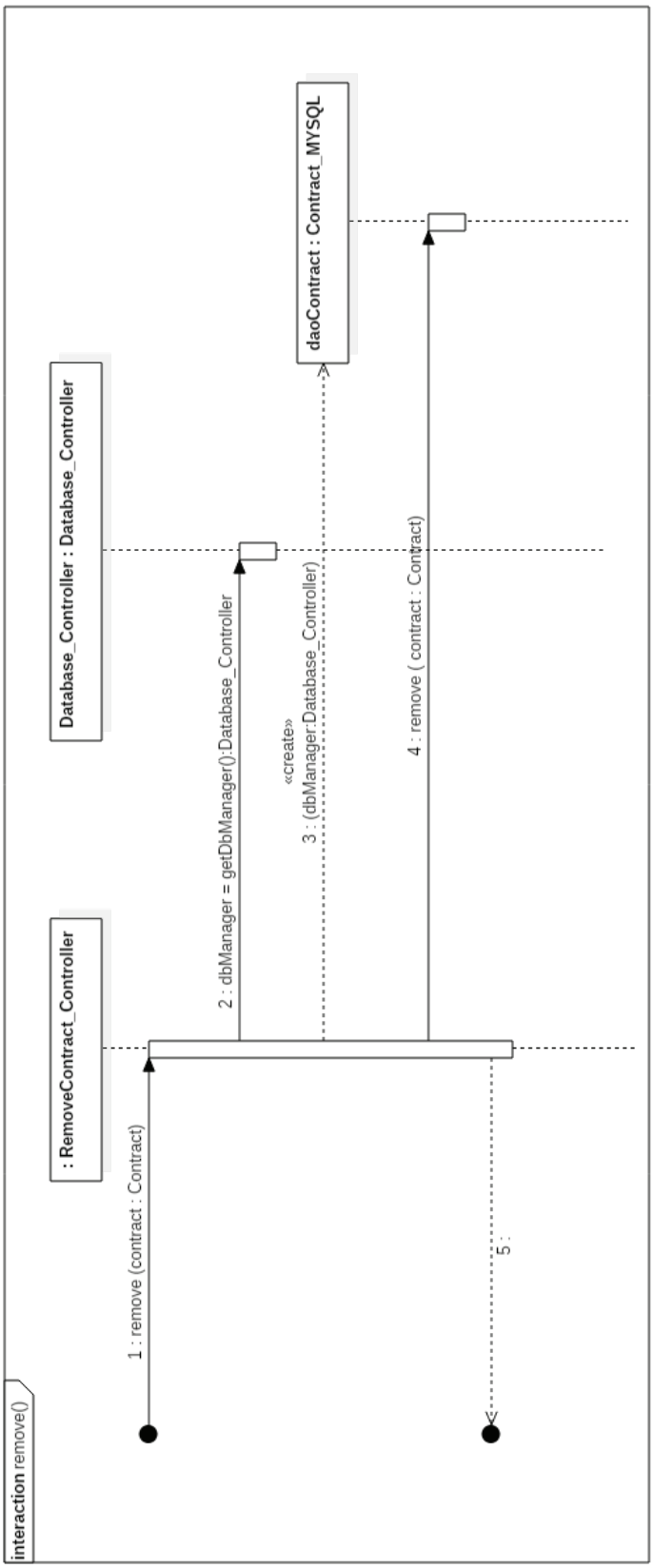
Remove contract



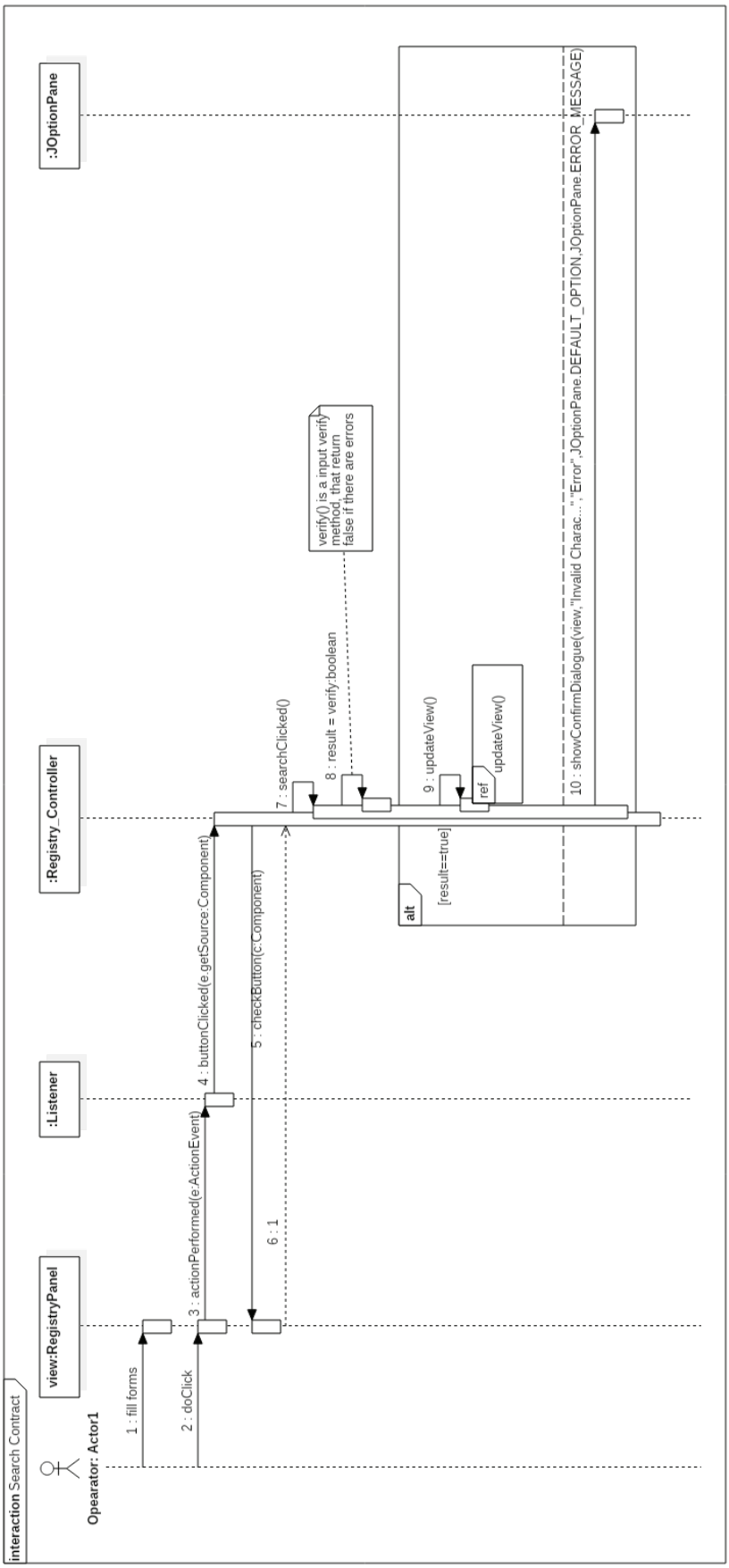
RemoveContract'Controller.removeContract()



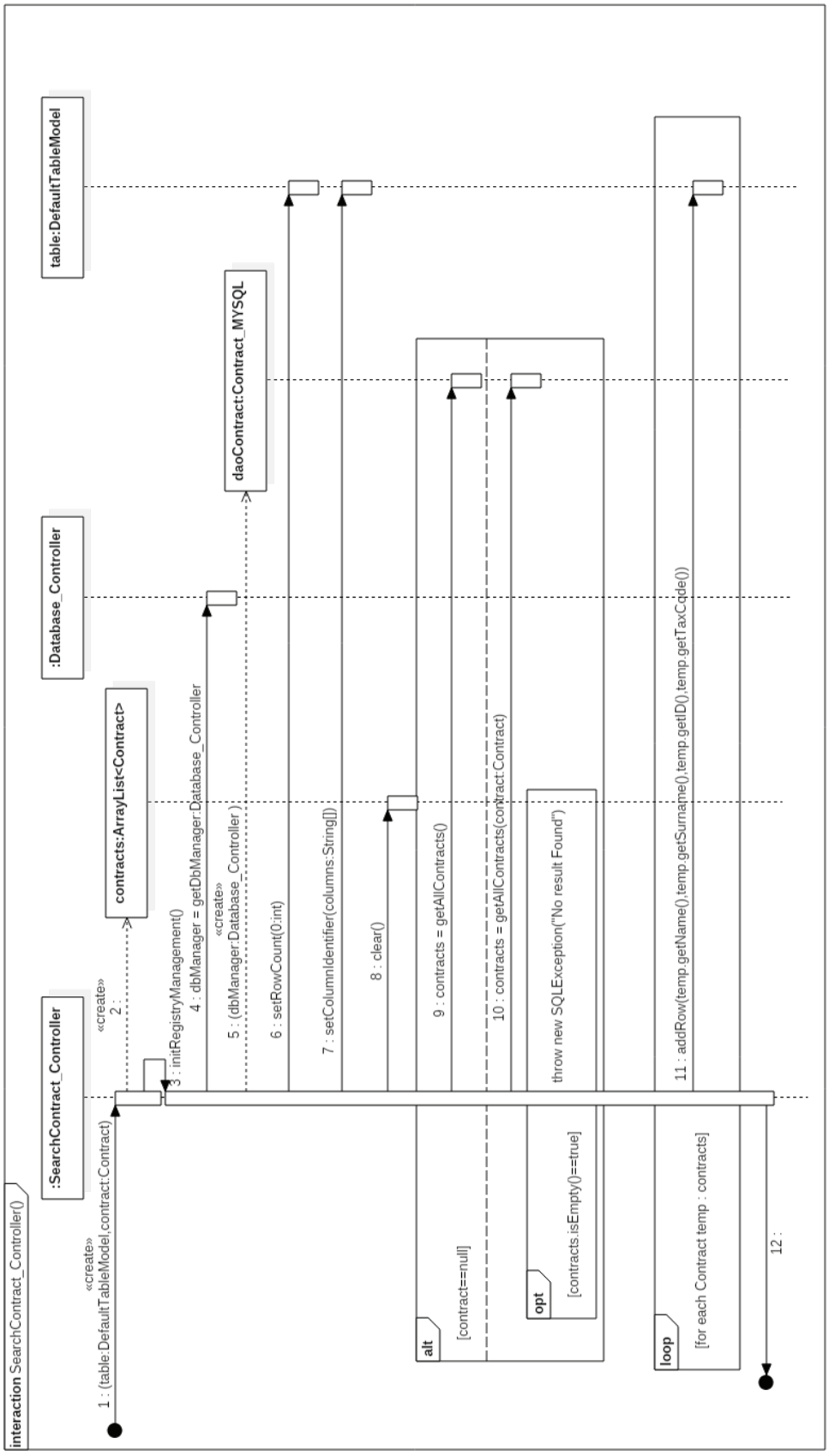
RemoveContract˙Controller().remove()



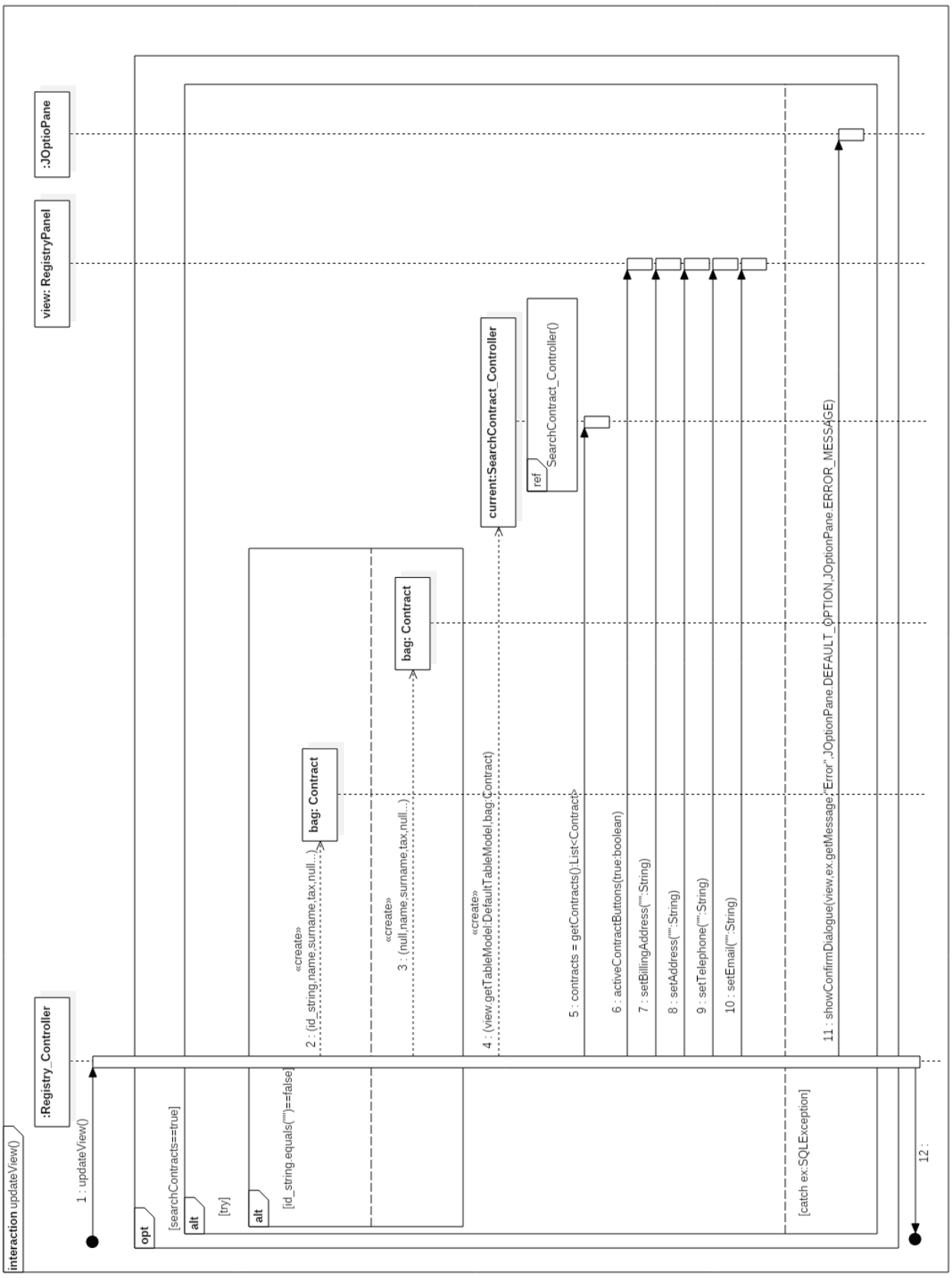
Search contract



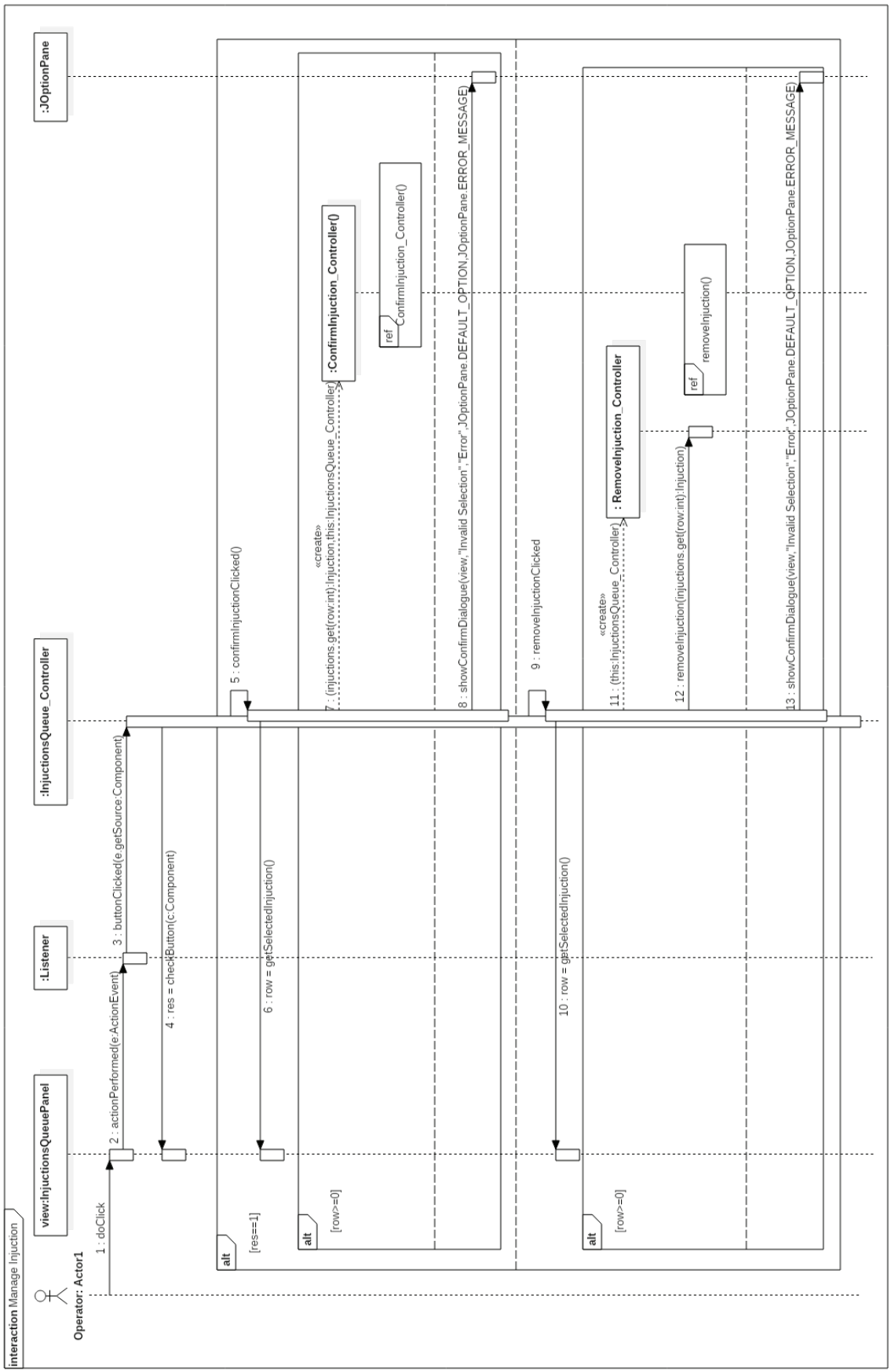
SearchContract˙Controller()



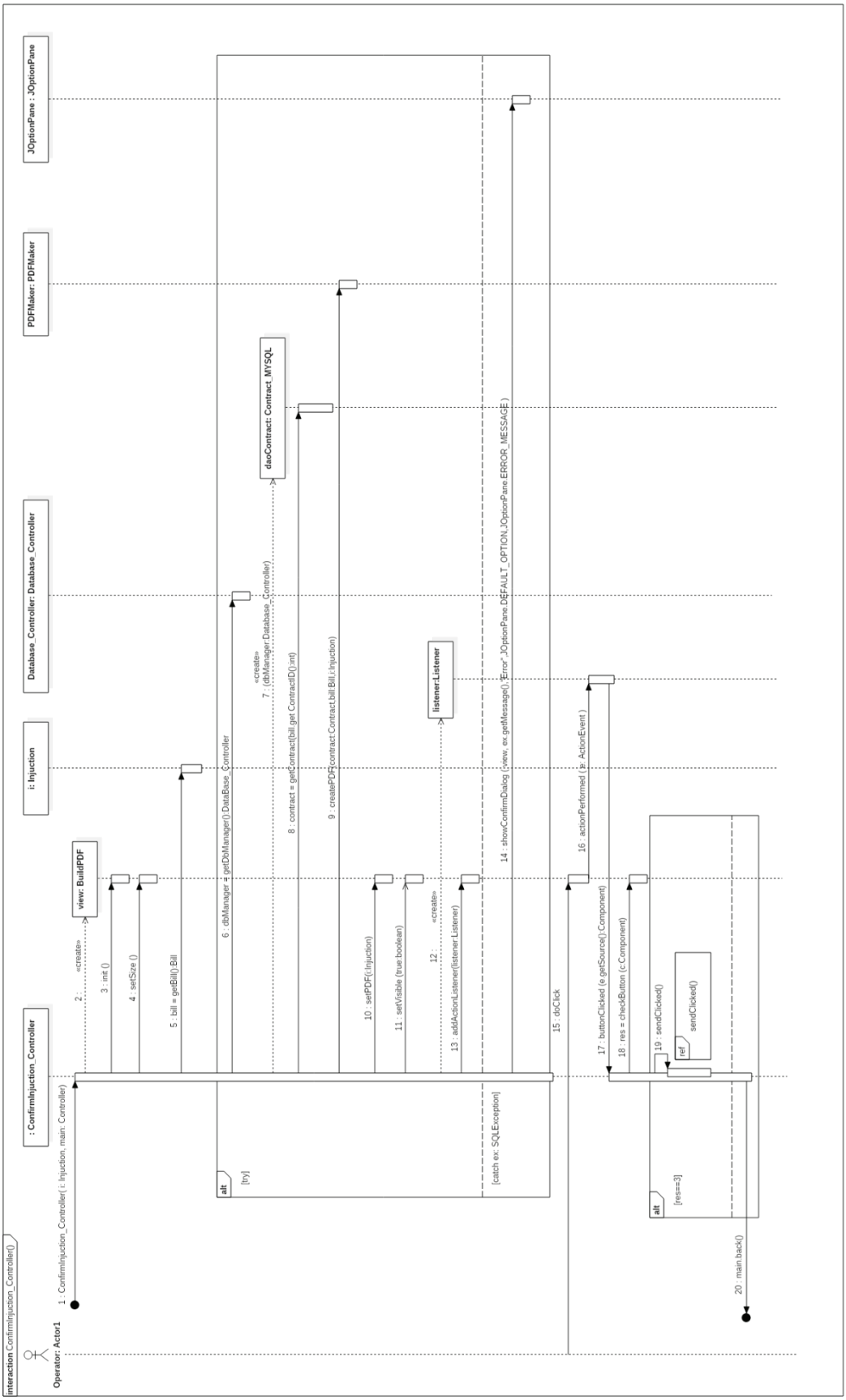
SearchContract˙Controller.updateView()



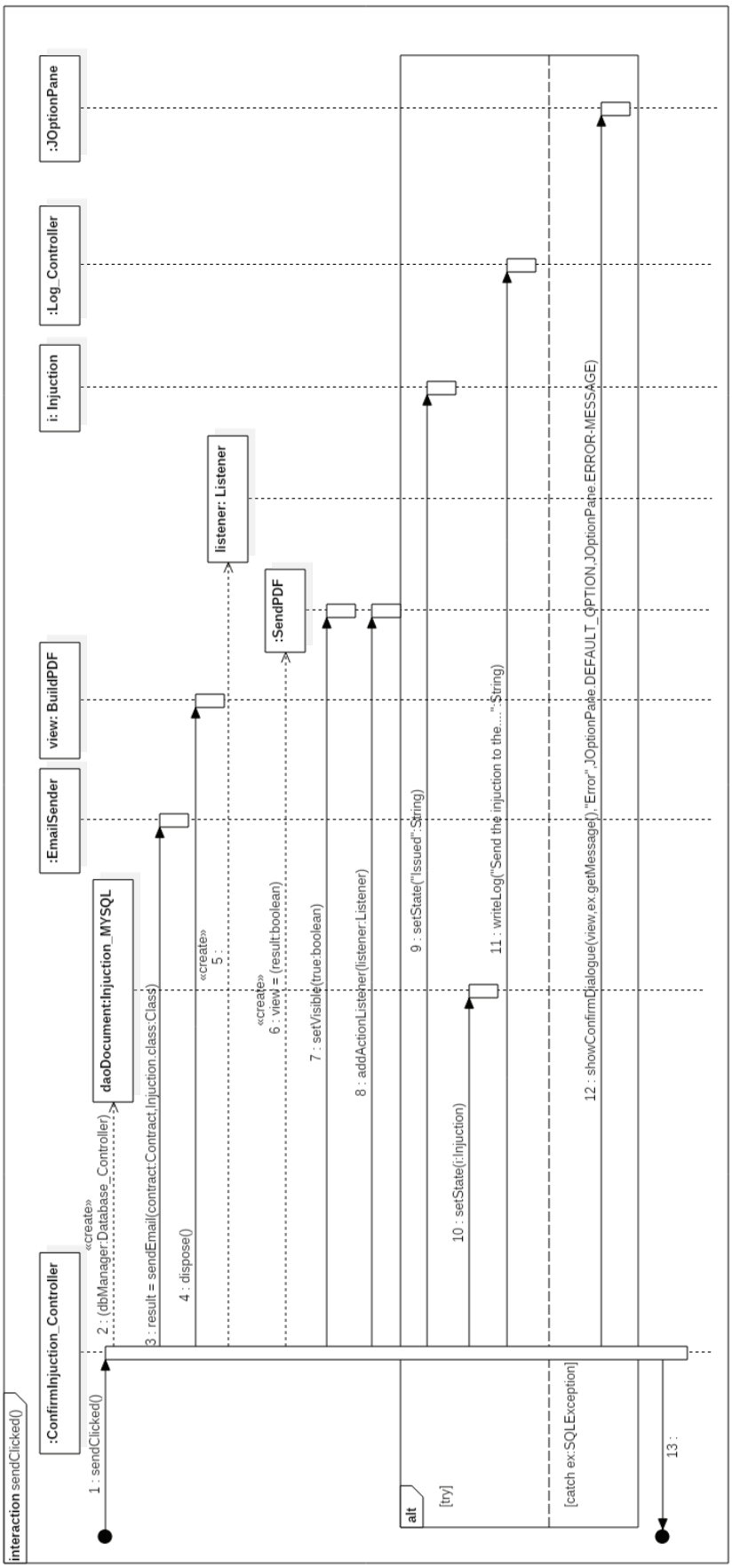
Manage injunction



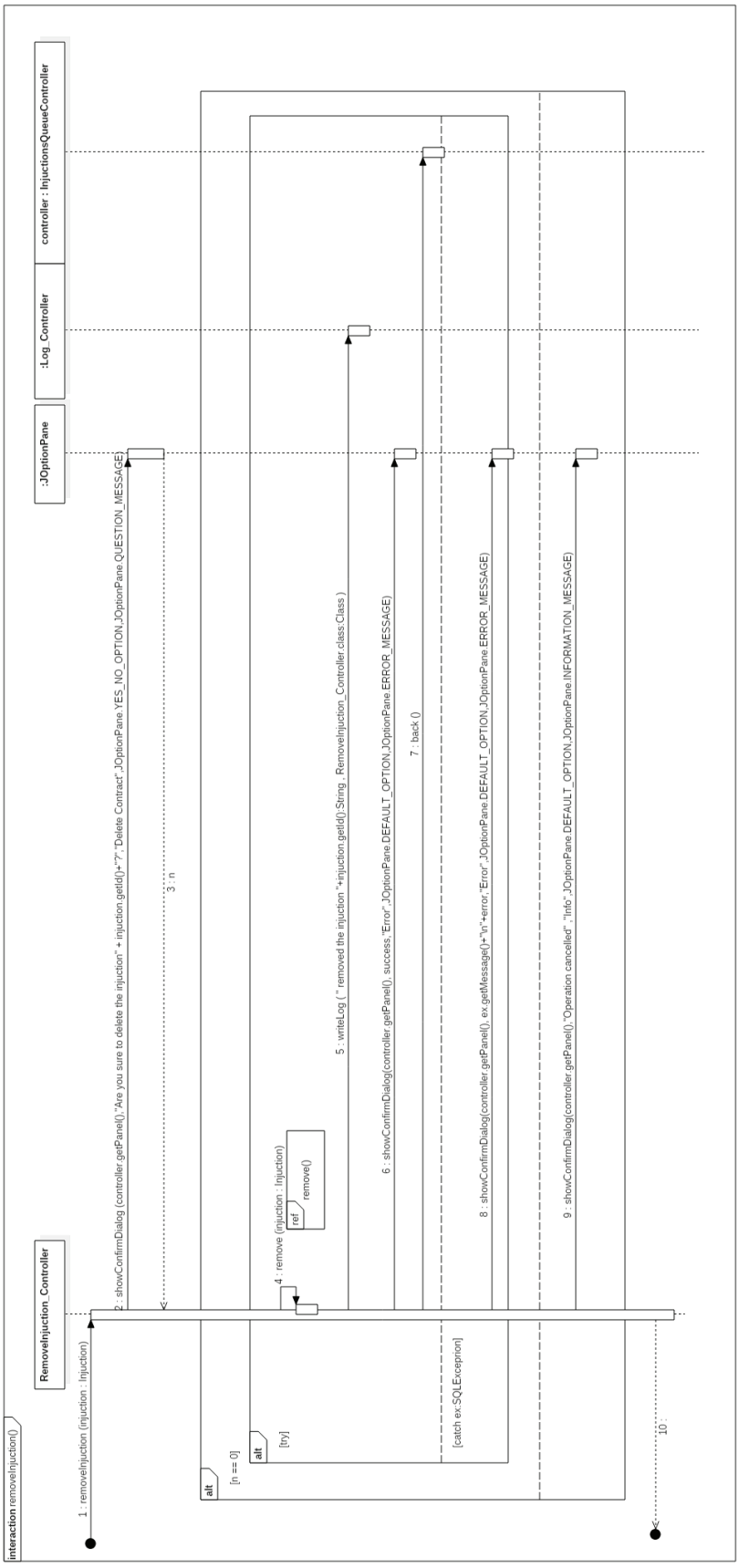
ConfirmInjunction'Controller()



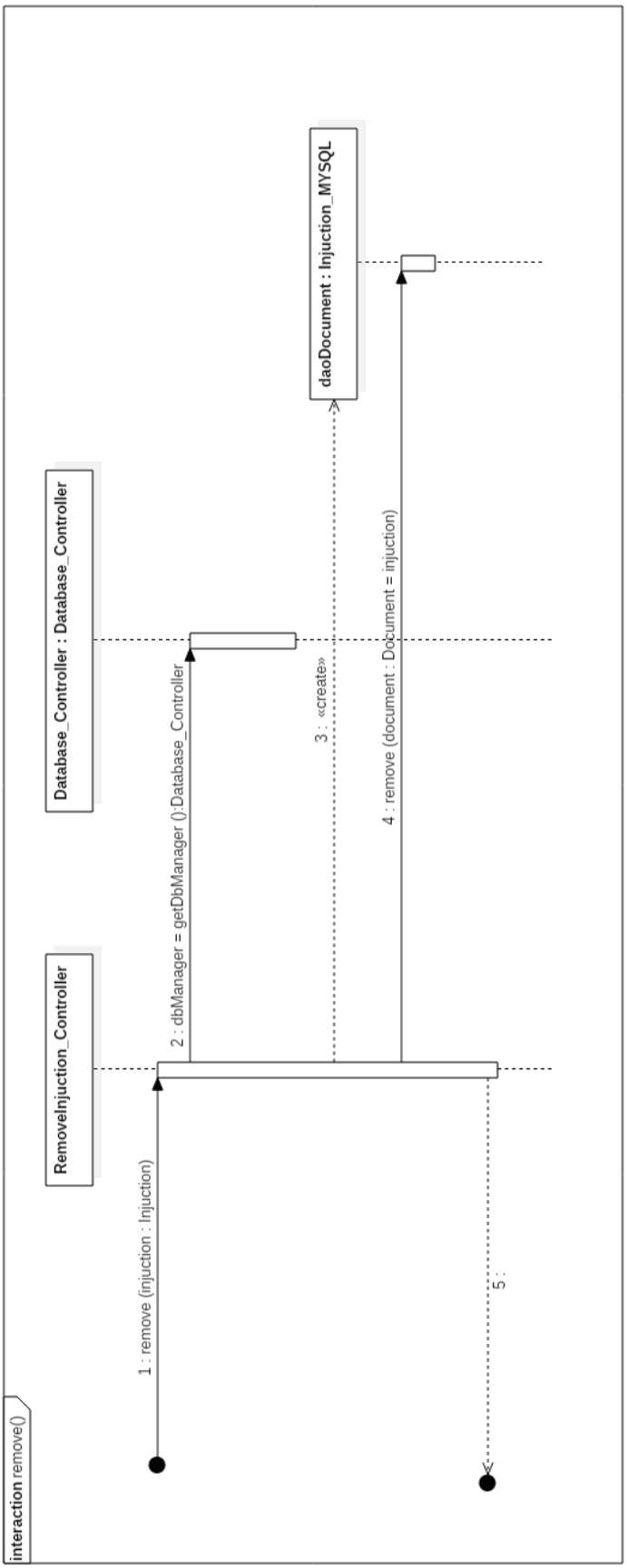
ConfirmInjuntion˙Controller.sendClicked()



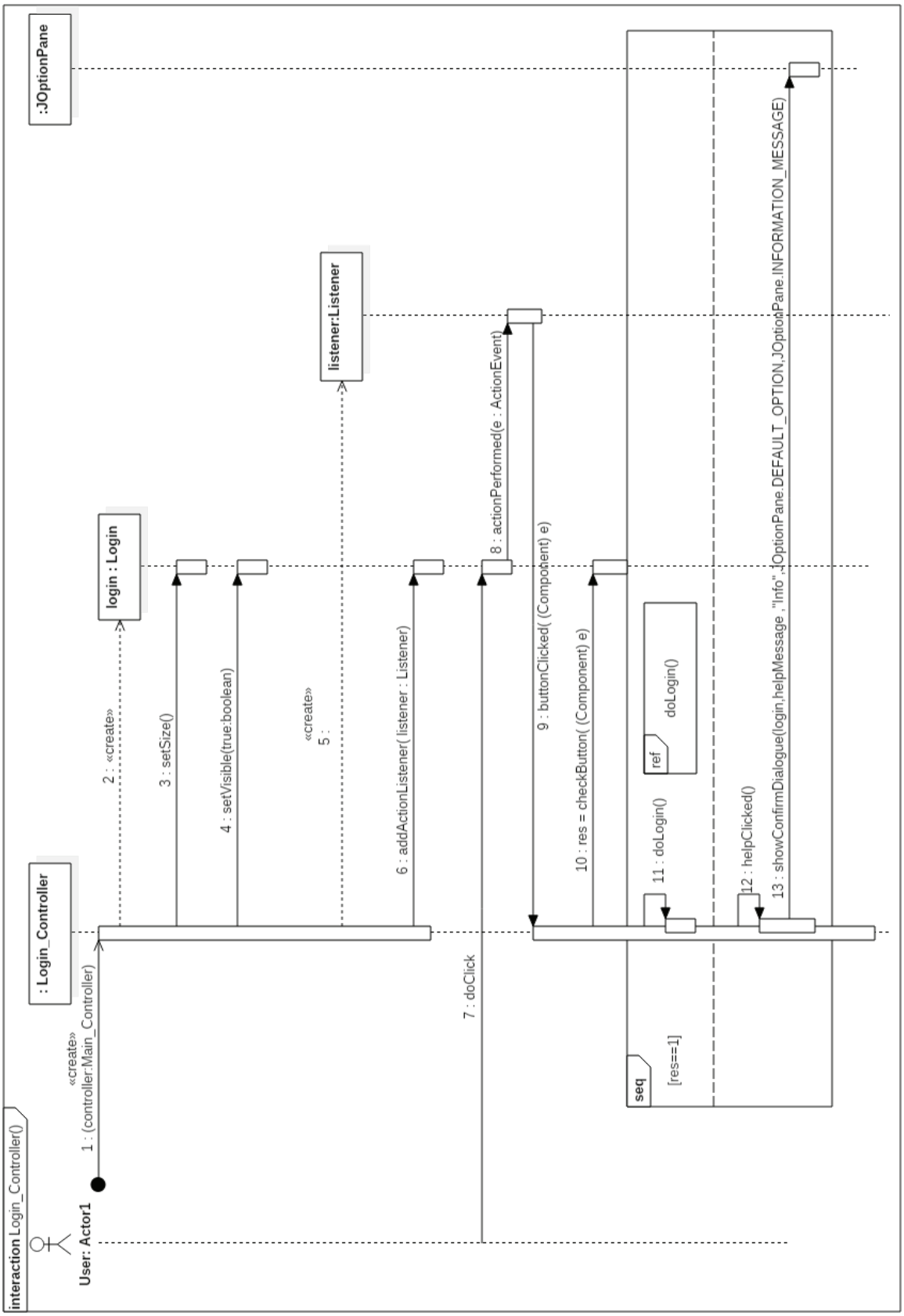
RemoveInjunction'Controller.removeInjunction()



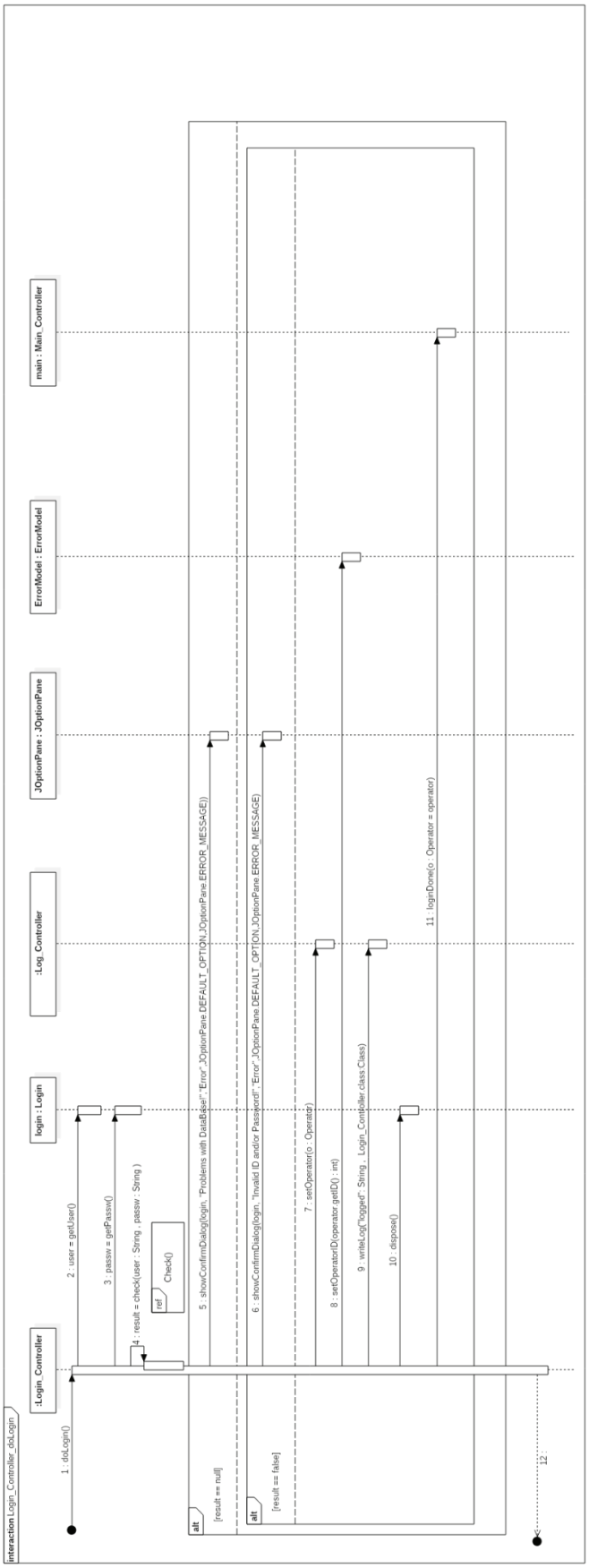
RemoveInjunction'Controller.remove()



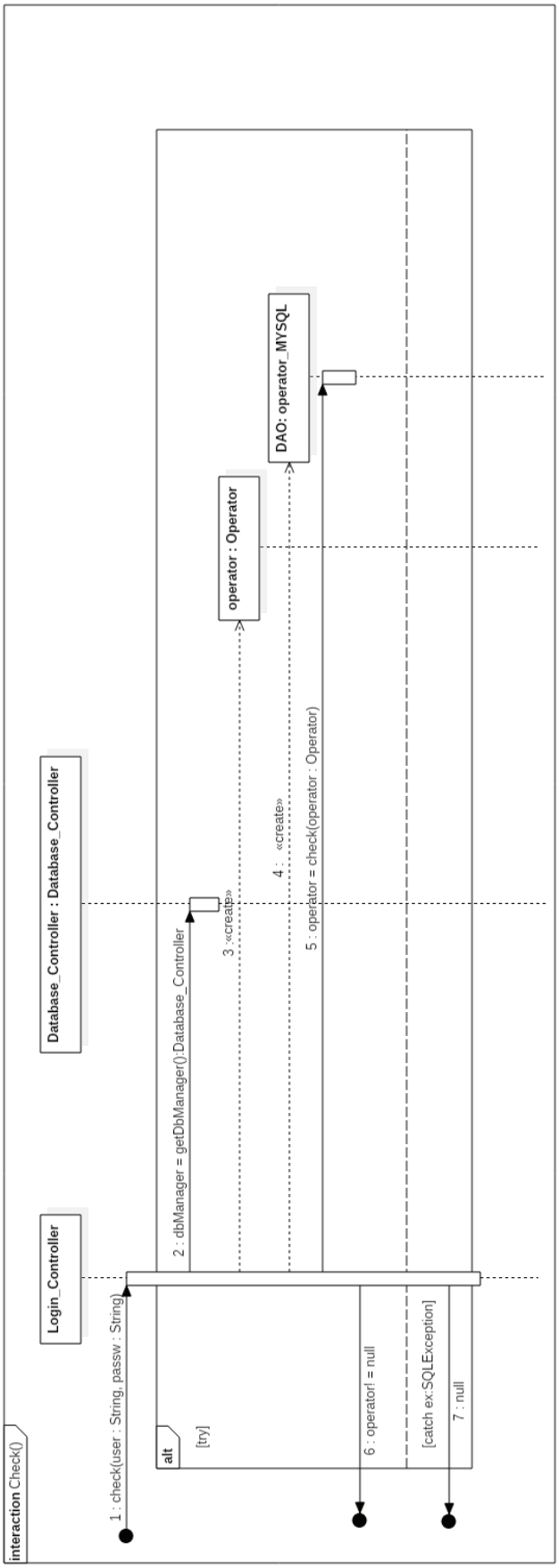
Login Controller()



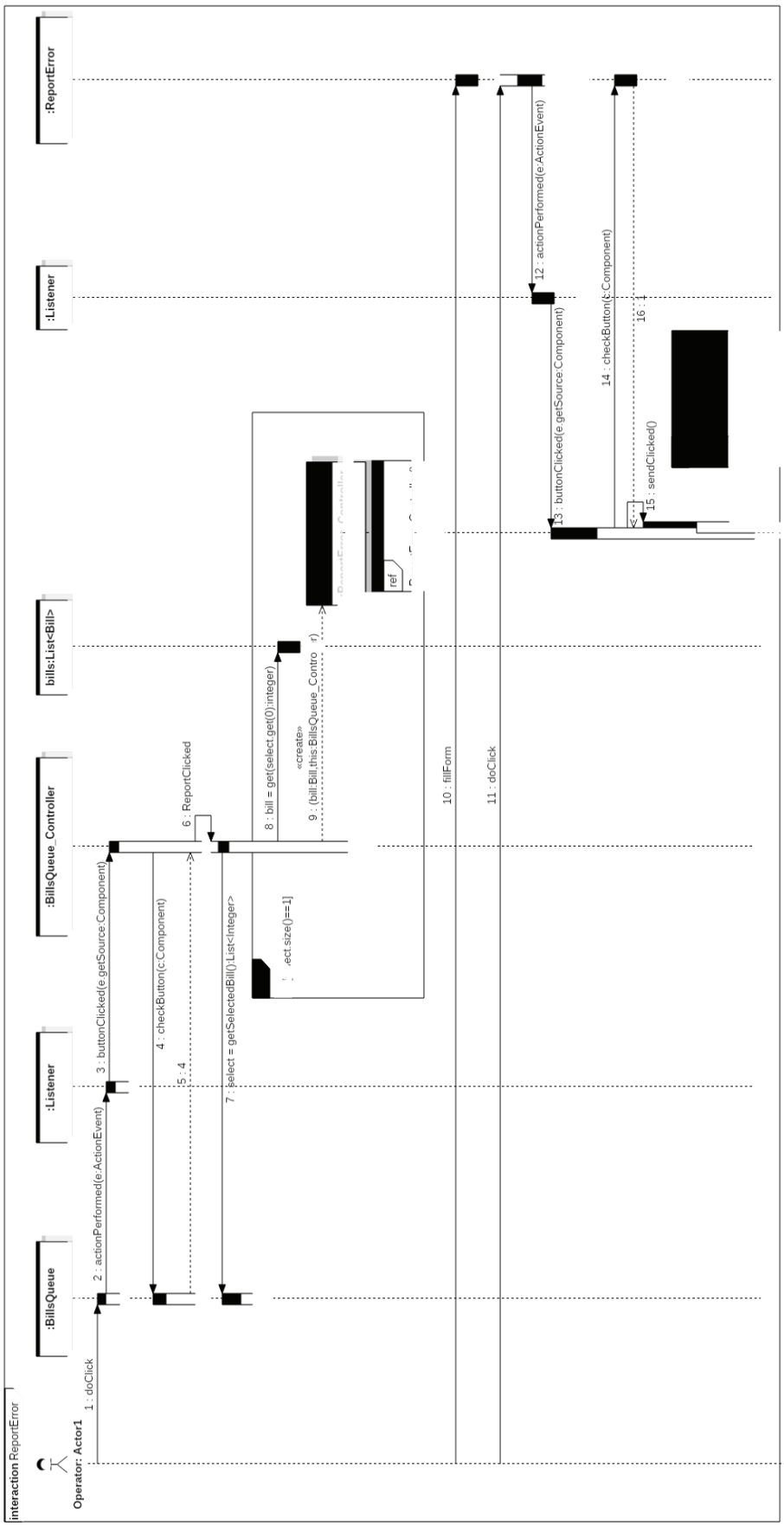
Login˙Controller.doLogin()



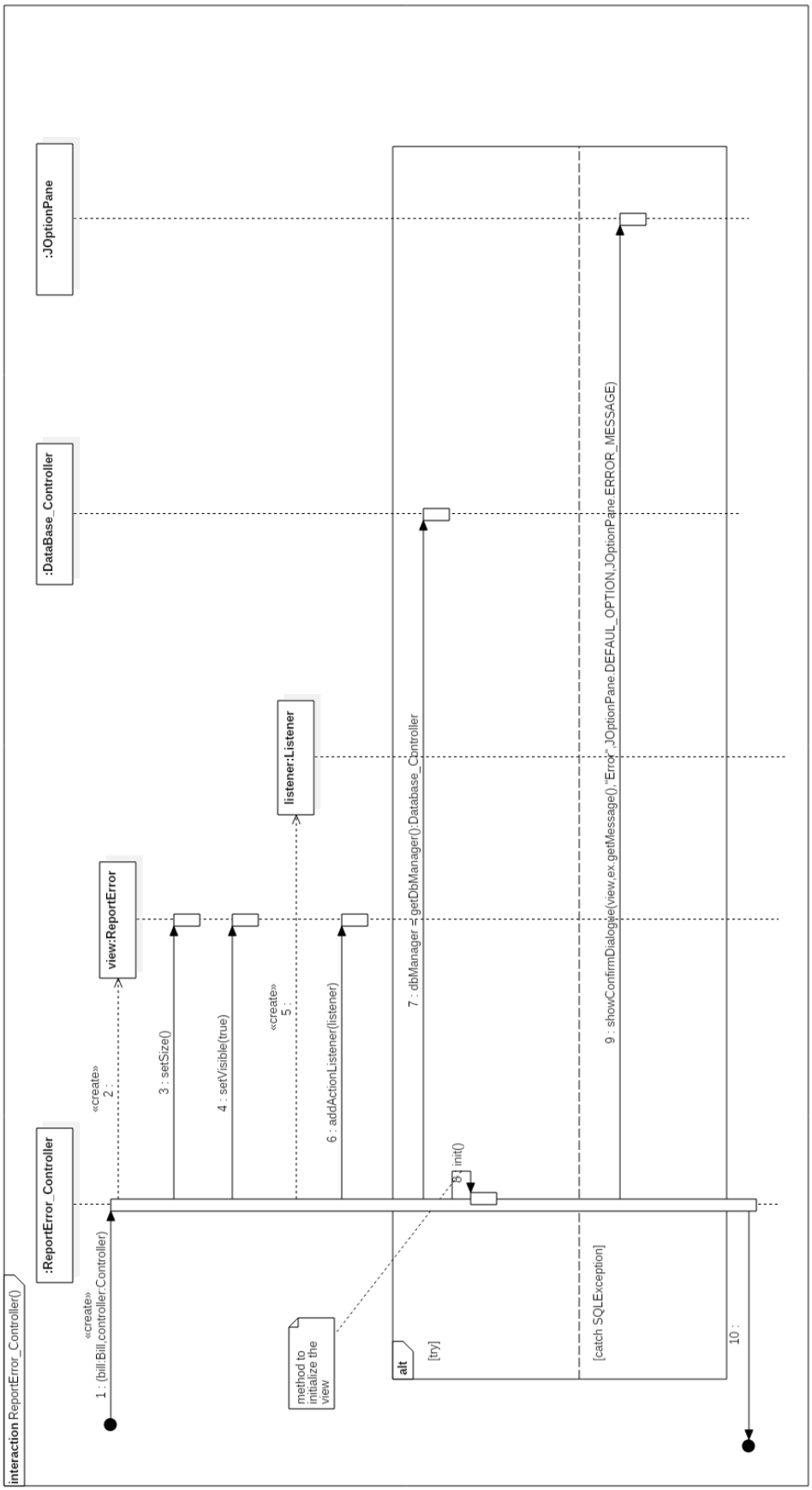
Login˙Controller.check()



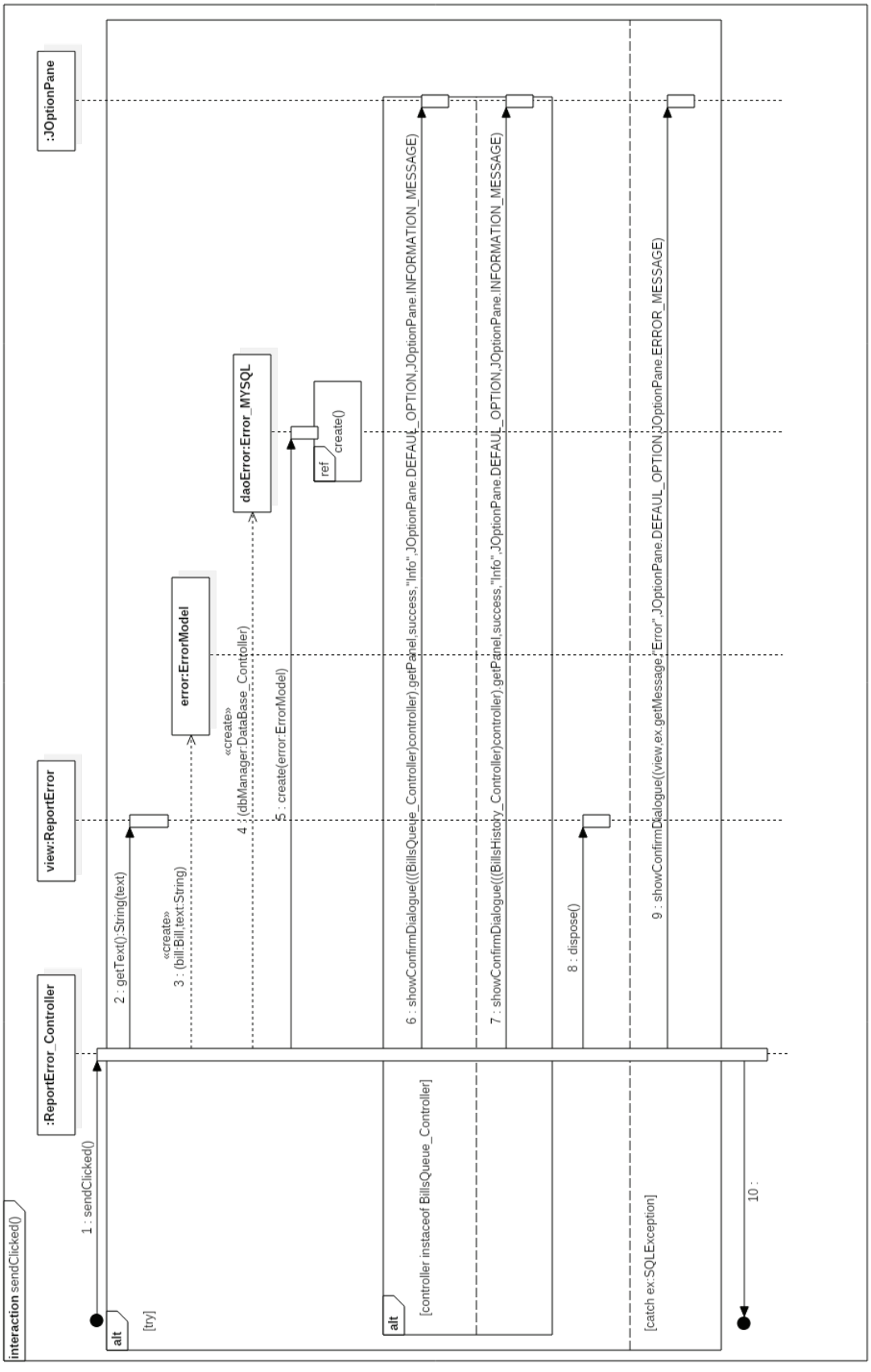
Report error



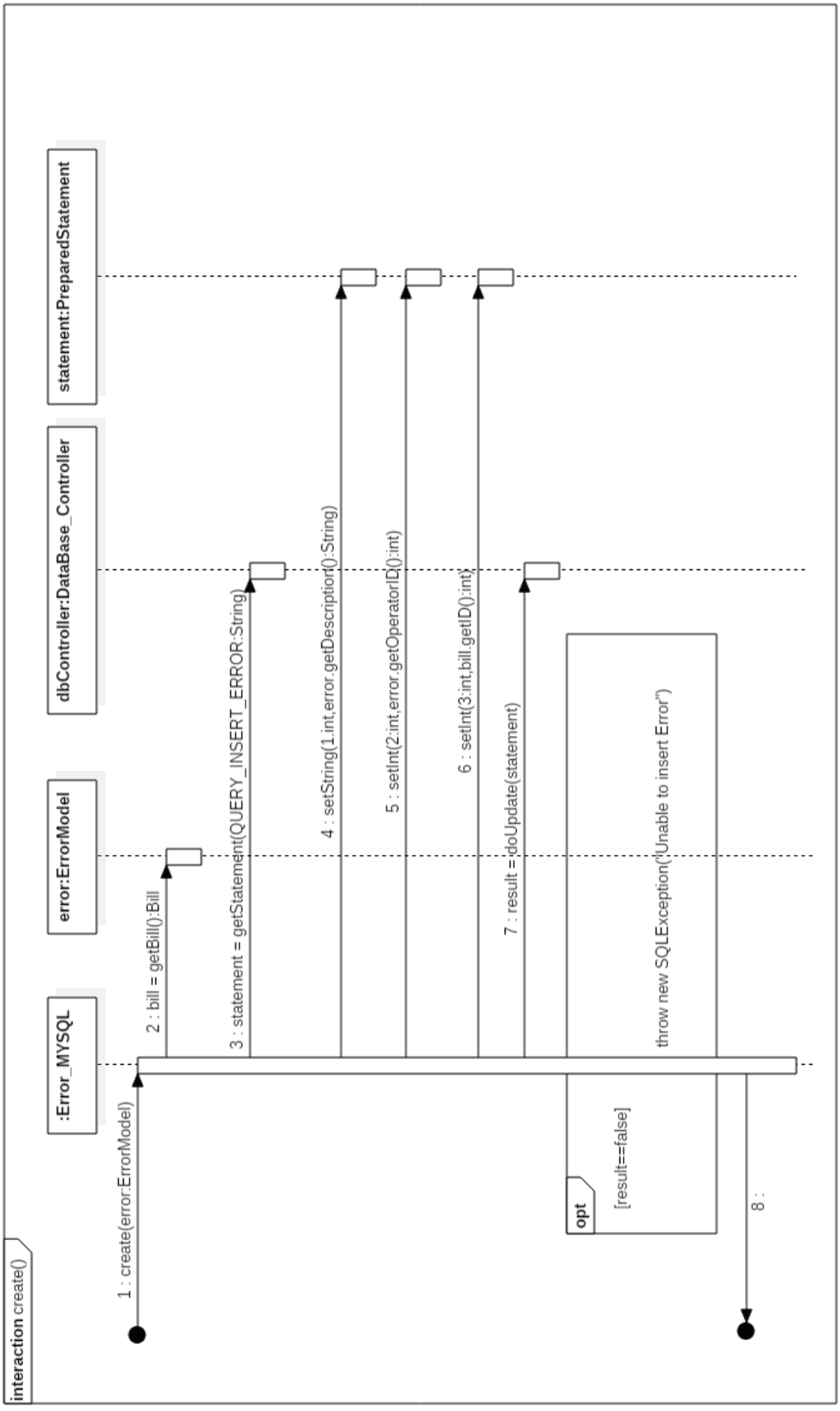
ReportError˙Controller()



ReportError˙Controller.sendClicked()

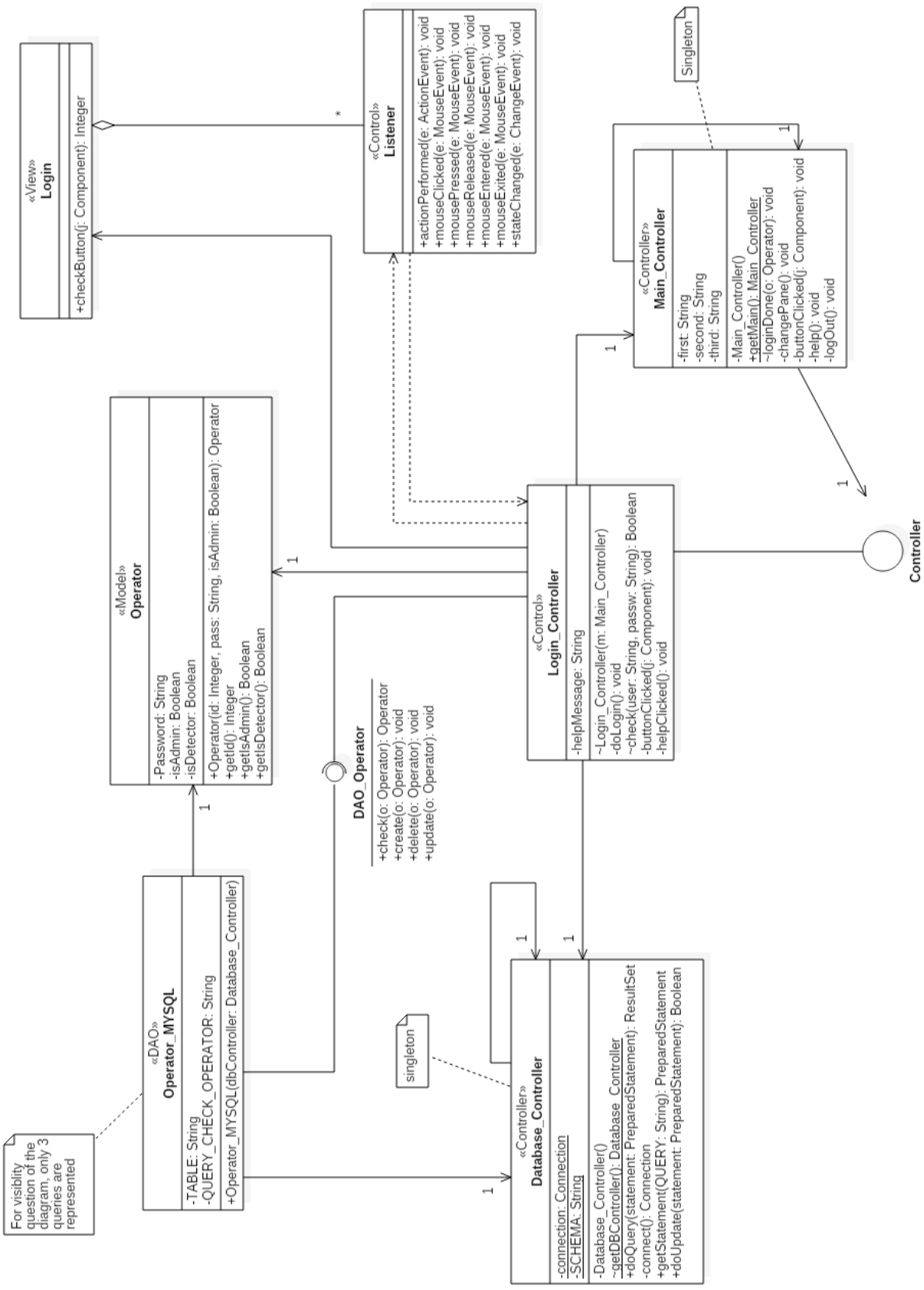


Error˙MYSQL.create()

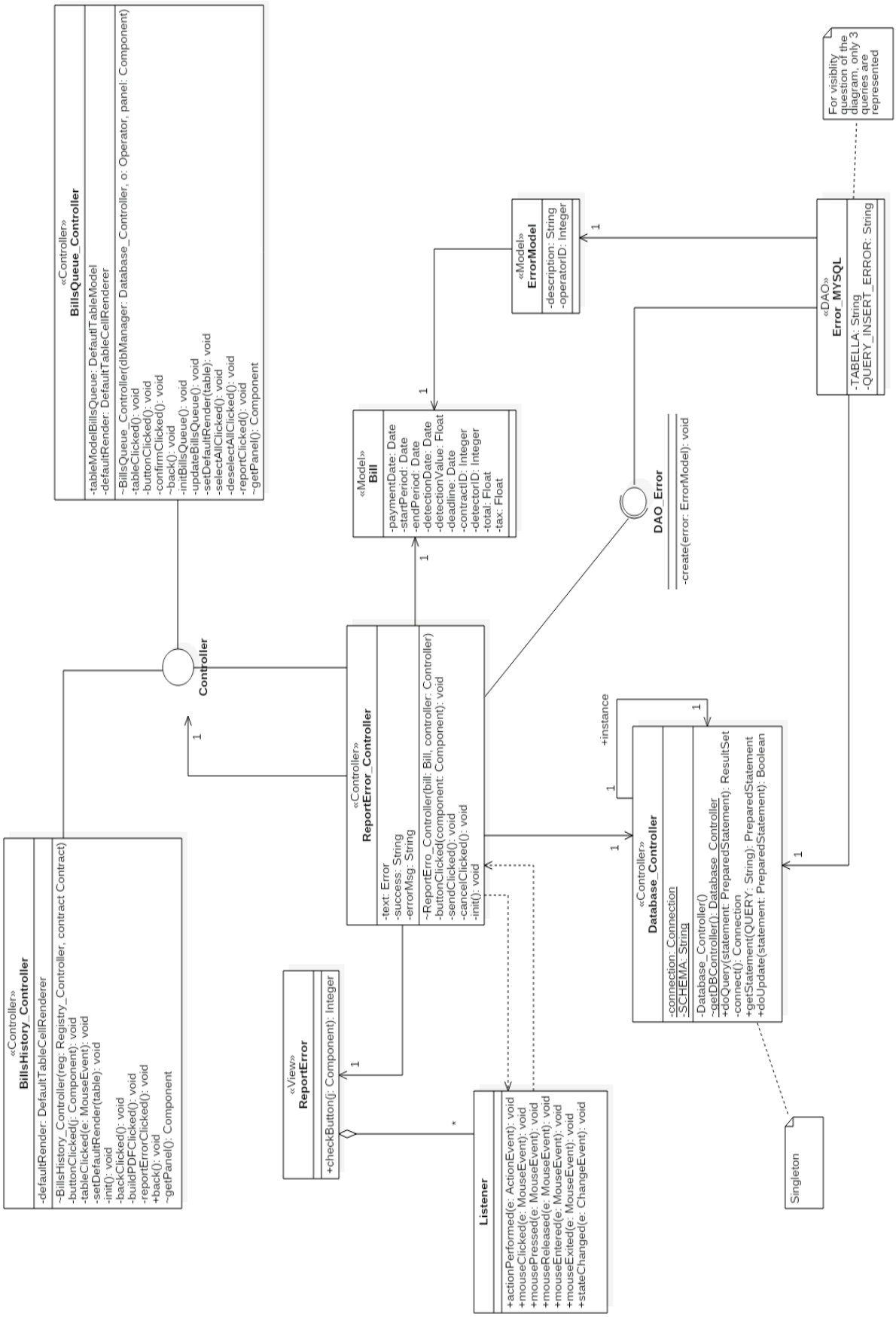


Design class diagram

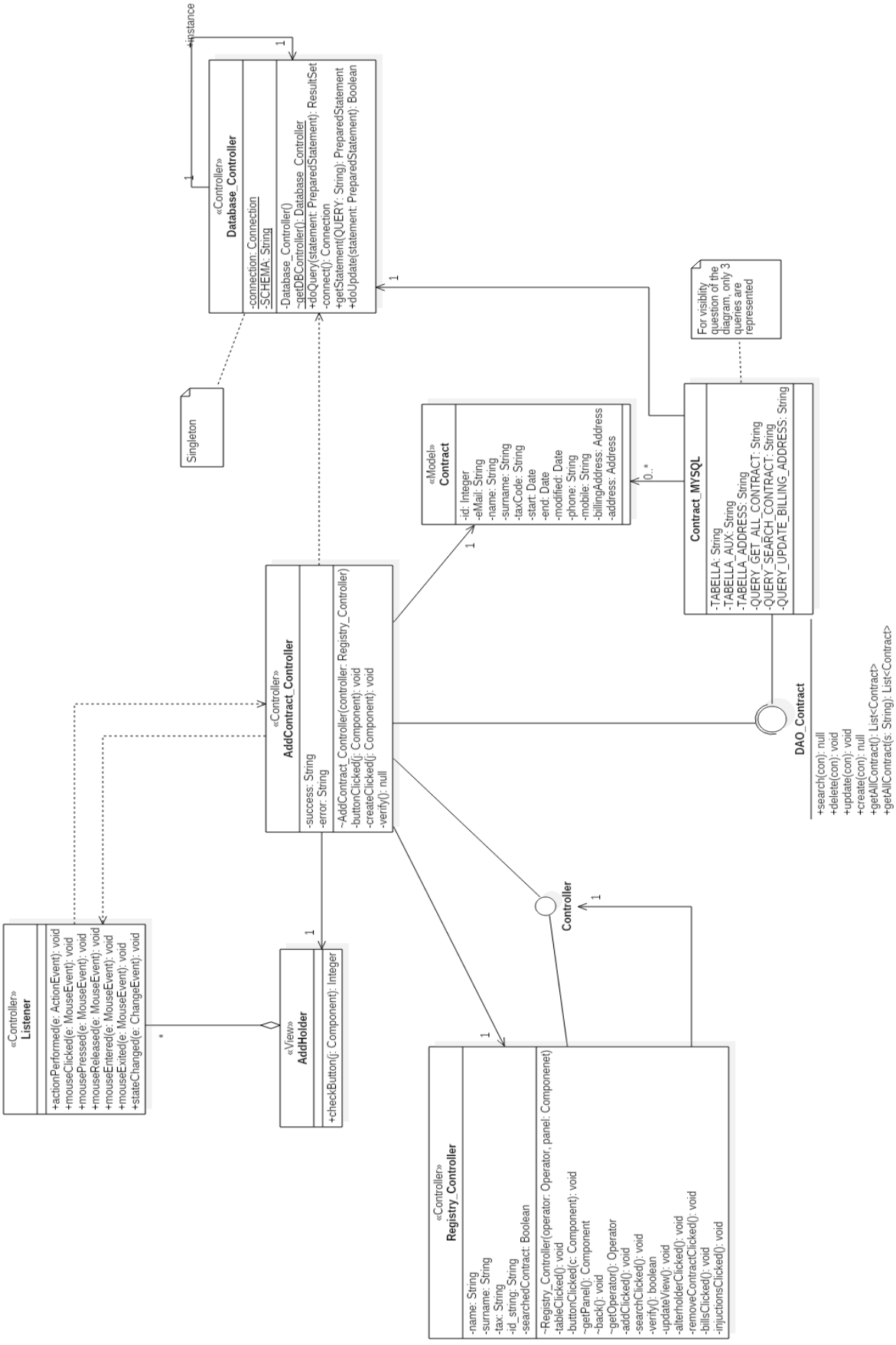
Performs login



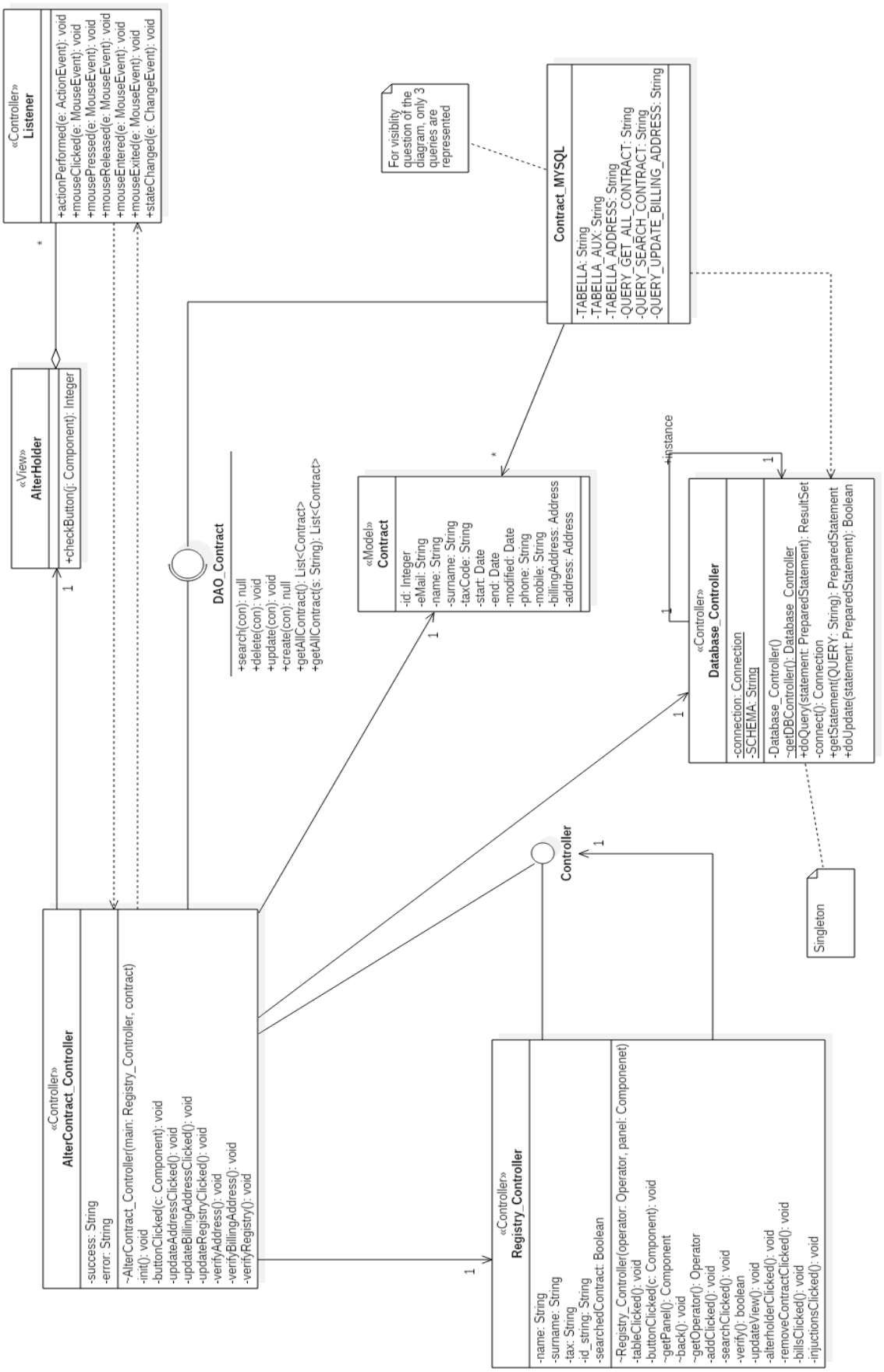
Report error in bill



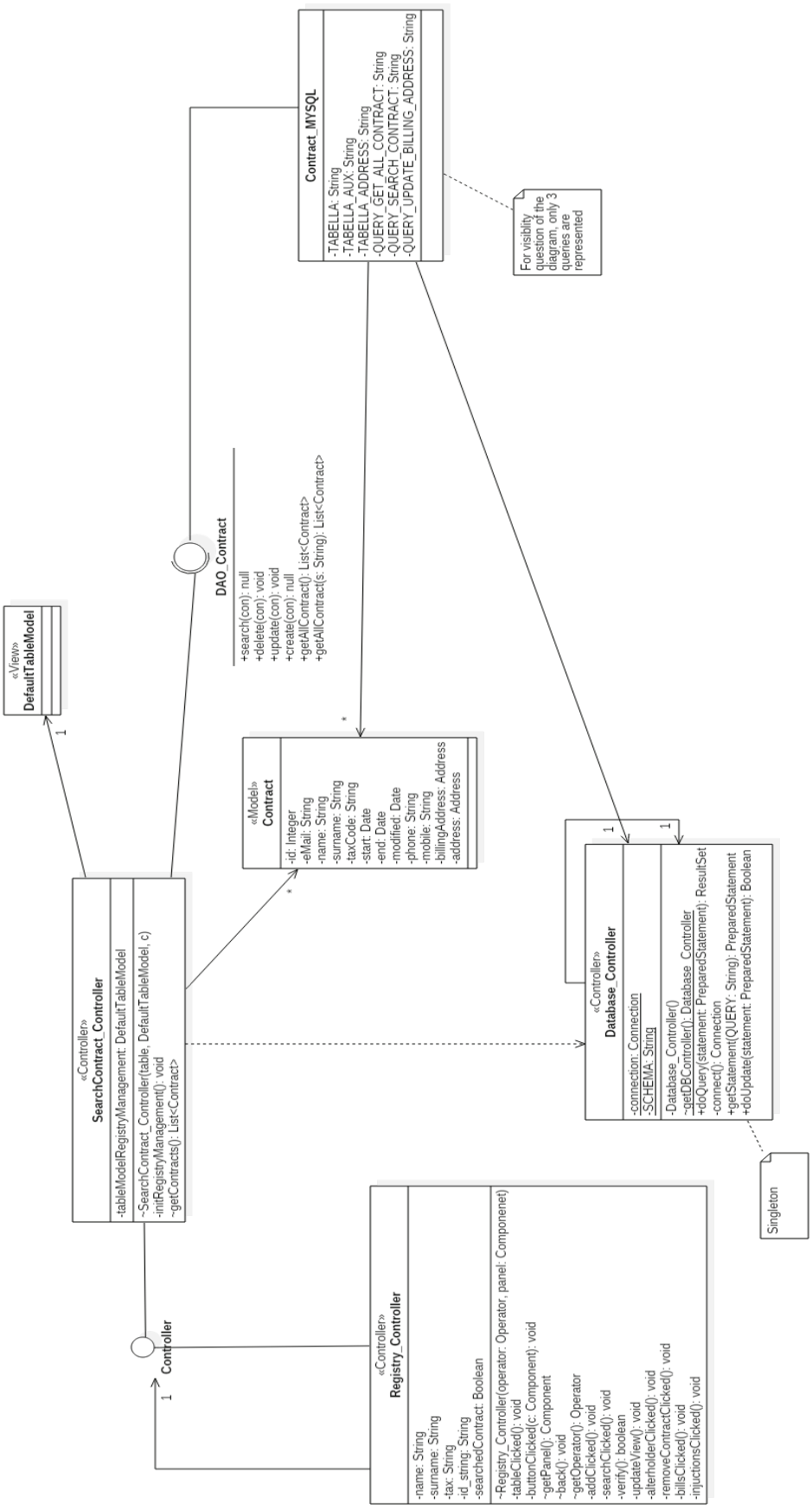
Add contract



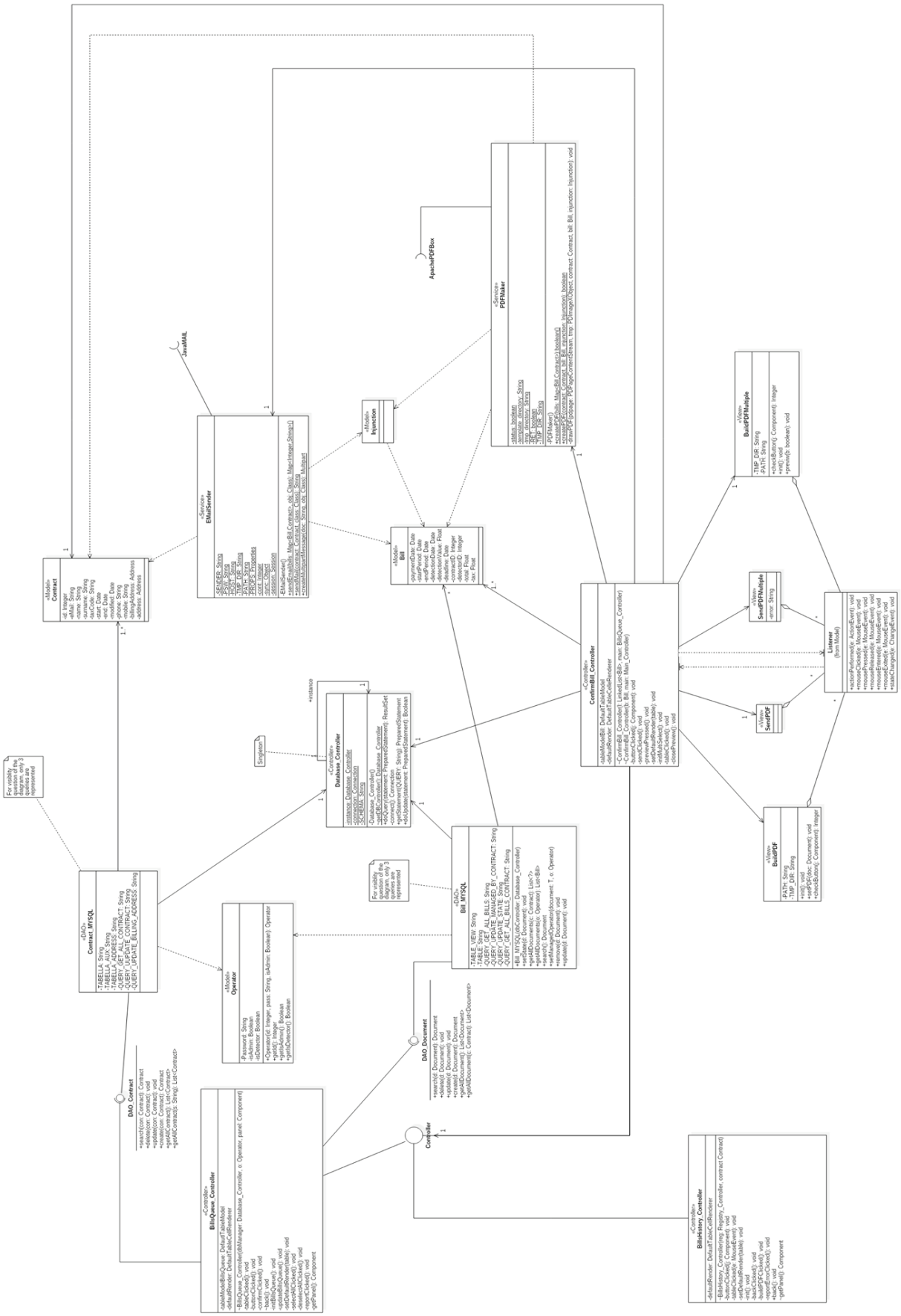
Alter contract



Search contract

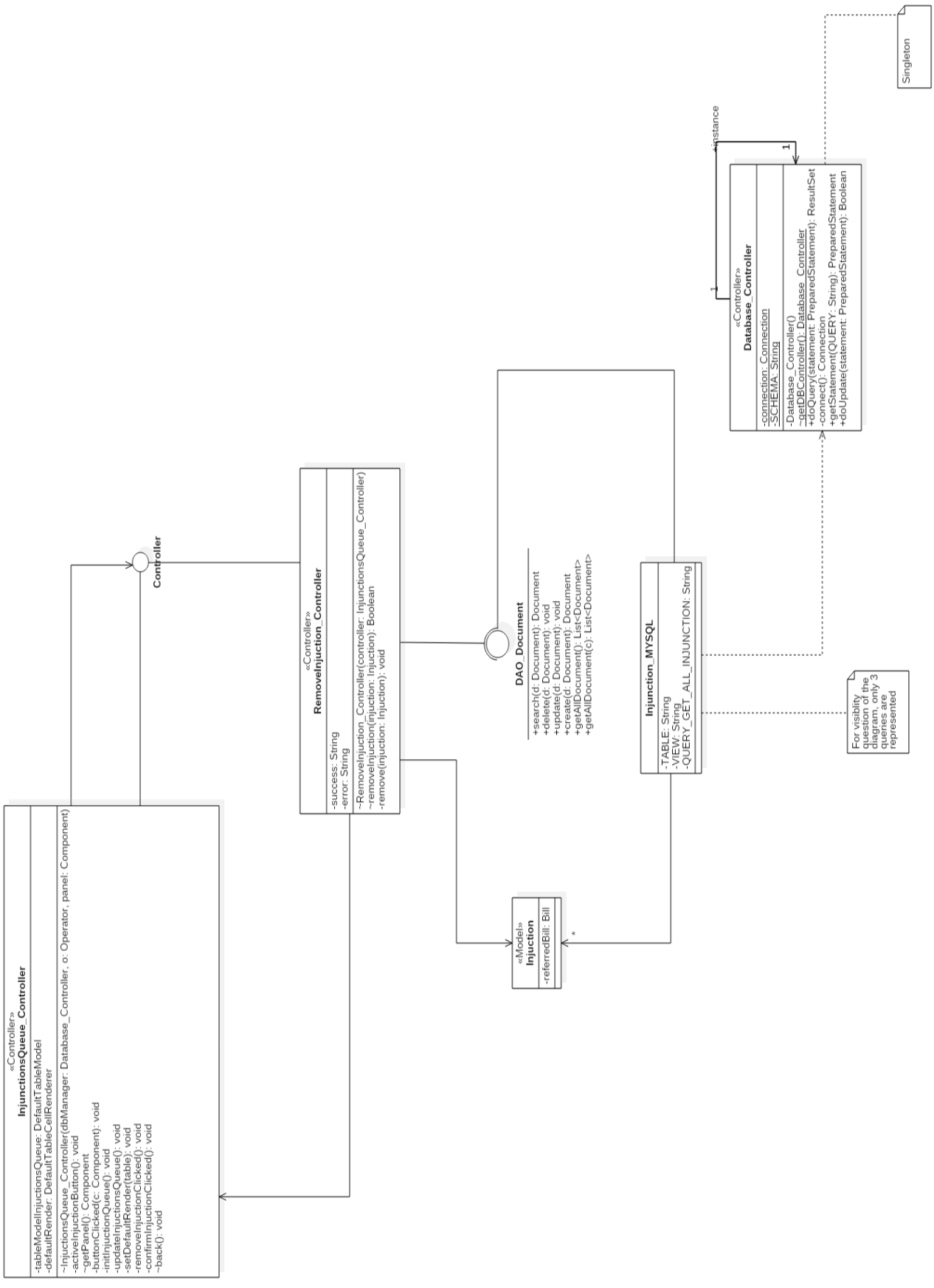


Confirm bill

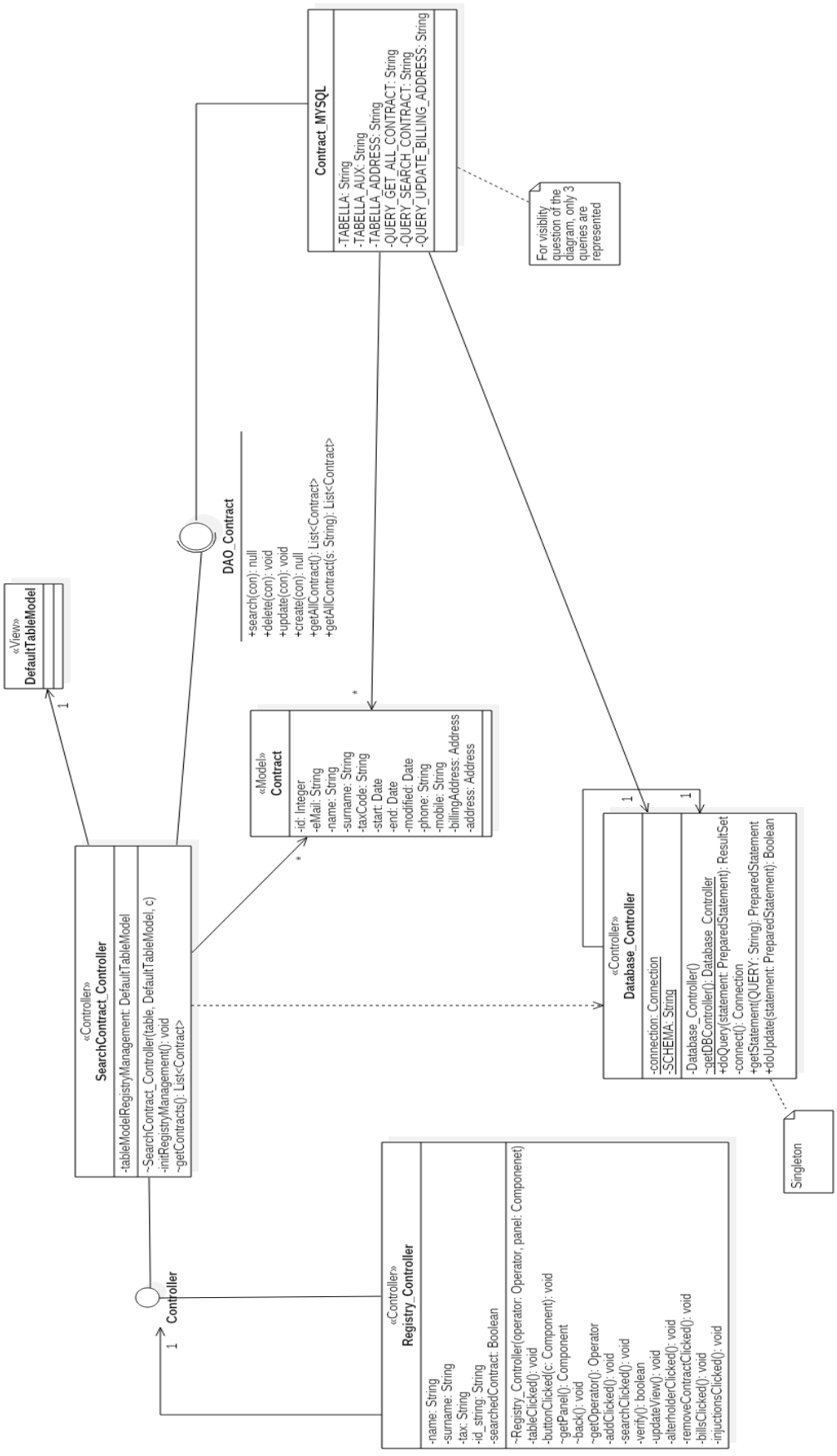


Confirm injunction

Delete injunction



Listener


«View»
DefaultTableModel
Contract_MYSQL
-TABELLA: String
-TABELLA_AUX: String
-TABELLA_ADDRESS: String
-QUERY_GET_ALL_CONTRACT: String
-QUERY_SEARCH_CONTRACT: String
-QUERY_UPDATE_BILLING_ADDRESS: String
For visibility question of the diagram, only 3 queries are represented
DAO_Contract
+search(con): null
+delete(con): void
+update(con): void
+create(con): null
+getAllContract(): List<Contract>
+getAllContract(s: String): List<Contract>
«Model»
Contract
-id: Integer
-eMail: String
-name: String
-surname: String
-taxCode: String
-start: Date
-end: Date
-modified: Date
-phone: String
-mobile: String
-billingAddress: Address
-address: Address
«Controller»
SearchContract_Controller
-tableModelRegistryManagement: DefaultTableModel
-SearchContract_Controller(table, DefaultTableModel, c)
-initRegistryManagement(): void
~getContracts(): List<Contract>
«Controller»
Database_Controller
-connection: Connection
-SCHEMA: String
-Database_Controller()
~getDBController(): Database_Controller
+doQuery(statement: PreparedStatement): ResultSet
-connect(): Connection
+getStatement(QUERY: String): PreparedStatement
+doUpdate(statement: PreparedStatement): Boolean
Singleton
Controller
«Controller»
Registry_Controller
-name: String
-surname: String
-tax: String
-id_string: String
-searchedContract: Boolean
~Registry_Controller(operator: Operator, panel: Componenet)
-tableClicked(): void
-buttonClicked(c: Component): void
~getPanel(): Component
~back(): void
~getOperator(): Operator
-addClicked(): void
-searchClicked(): void
-verify(): boolean
-updateView(): void
-alterholderClicked(): void
-removeContractClicked(): void
-billsClicked(): void
-injuctionsClicked(): void
1
*

CRC Cards

Class Name: AddContract Controller	
Superclasses	
Subclasses	
Responsibilities	**Collaborators**
Allows operation to add a new contract	Contract MYSQL
Shows the "Add Contract" window	Contract
Builds and destroys the boundary objects needed for processing	Database Controller

Class Name: AlterContract Controller	
Superclasses	
Subclasses	
Responsibilities	**Collaborators**
Allows to modify an existing contract	Contract MYSQL
Shows the "Alter Contract" window	Contract
Builds and destroys the boundary objects needed for processing	Database Controller

Class Name: RemoveContract Controller	
Superclasses	
Subclasses	
Responsibilities	**Collaborators**
Allows to delete an existing contract	Contract MYSQL
Shows a popup to confirm the operation	Contract
	Database Controller

Class Name: SearchContract Controller	
Superclasses	
Subclasses	
Responsibilities	**Collaborators**
Allows to search an existing contract	Contract MYSQL
Fills the table with the results	Contract
	Database Controller

Class Name: BillsQueue˙Controller	
Superclasses	
Subclasses	
Responsibilities	Collaborators
Allows the operator to start the process to confirm a bill	Bill˙MYSQL
Fills the table with the bills that should be send	Bill
Shows the “BillsQueue” panel	Database˙Controller

Class Name: BillsHistory˙Controller	
Superclasses	
Subclasses	
Responsibilities	Collaborators
Allows the operator to view the bills history for a contract.	Database˙Controller
Allows the operator to start the process to confirm a bill	Bill˙MYSQL
Shows the “BillsHistory” window	Bill
Builds and destroys the boundary objects needed for processing	

Class Name: ConfirmBill˙Controller	
Superclasses	
Subclasses	
Responsibilities	Collaborators
Allows the operator to confirm a single or a set of bills	Database˙Controller
Shows the “BuildPDF” window	Bill˙MYSQL
Shows the “SendPDF” window	Bill
Builds and destroys the boundary objects needed for processing	PDFMaker
	EMailSender

Class Name: ConfirmInjunction˙Controller	
Superclasses	
Subclasses	
Responsibilities	Collaborators
Allows the operator to confirm an injunction	Database˙Controller
Shows the “BuildPDF” window	Injunction˙MYSQL
Shows the “SendPDF” window	Injunction
Builds and destroys the boundary objects needed for processing	PDFMaker
	EMailSender

Class Name: InjunctionsHistory˙Controller
Superclasses
Subclasses

Responsibilities	Collaborators
Allows the operator to view the injunctions history for a contract.	Database˙Controller
Allows the operator to start the process to confirm an injunction	Bill˙MYSQL
Shows the “InjunctionHistory” window	Injunction
Builds and destroys the boundary objects needed for processing	

Class Name: InjunctionsQueue˙Controller	
Superclasses	
Subclasses	
Responsibilities	Collaborators
Allows the operator to start the process to confirm an injunction	Injunction˙MYSQL
Fills the table with the bills that should be send	Injunction
Shows the “InjunctionsQueue” panel	Database˙Controller

Class Name: RemoveInjunction˙Controller	
Superclasses	
Subclasses	
Responsibilities	Collaborators
Allows to delete an existing contract	Injunction˙MYSQL
Shows a popup to confirm the operation	Injunction
	Database˙Controller

Class Name: Login˙Controller	
Superclasses	
Subclasses	
Responsibilities	Collaborators
It allows the operator to proceed to HomePage.	Operator˙MYSQL
It controls the elaboration during the login.	Operator
Builds and destroys the boundary objects needed for processing	Database˙Controller

Class Name: Database˙Controller	
Superclasses	
Subclasses	
Responsibilities	Collaborators
It allows connection to the Database	
It allows to execute the query on Database	

Class Name: Listener	
Superclasses	
Subclasses	
Responsibilities	Collaborators
It allows to manage and interpret operator’s actions	

Class Name: Log Controller	
Superclasses	
Subclasses	
Responsibilities	**Collaborators**
Writes within a file the registration and the history of the operations performed by an operator or administrator.	Operator
Reports important events	

Class Name: Main Controller	
Superclasses	
Subclasses	
Responsibilities	**Collaborators**
Shows the "Home" window	Operator
It allows the operator to proceed to logout	Database Controller
It allows the operator to consult some help message for proper operation of the system	

Class Name: Registry Controller	
Superclasses	
Subclasses	
Responsibilities	**Collaborators**
It allows to direct the contract's crud operations	Contract
It allows to direct the display of bills history and injunctions history	Operator

Class Name: ReportError Controller	
Superclasses	
Subclasses	
Responsibilities	**Collaborators**
Allows operation to report error	Error MYSQL
Shows the "ReportError" window	Bill
Builds and destroys the boundary objects needed for processing	Database Controller
Class Name: Bill	
Superclasses: Document	
Subclasses	
Responsibilities	**Collaborators**
It represents Bill entity	
It contains and provides bill's datas.	

Class Name: Contract	
Superclasses	
Subclasses	
Responsibilities	Collaborators
It represents Contract entity	
It contains and provides contractr's datas.	

Class Name: Document	
Superclasses	
Subclasses: Bill, Injunction	
Responsibilities	Collaborators
It represents Document entity	
It contains and provides documents's datas.	
Class Name: EMailSender	
Superclasses	
Subclasses	
Responsibilities	Collaborators
It allows to send Email	

Class Name: ErrorModel	
Superclasses: Observable	
Subclasses	
Responsibilities	Collaborators
It represents Error entity	
It contains and provides error's datas.	

Class Name: Injunction	
Superclasses: Document	
Subclasses	
Responsibilities	Collaborators
It represents Injunction entity	
It contains and provides injunction's datas.	

Class Name: Operator	
Superclasses	
Subclasses	
Responsibilities	Collaborators
It represents Operator entity	
It contains and provides operator's datas	

Class Name: PDFMaker
Superclasses
Subclasses

Responsibilities	**Collaborators**
It allows to create a PDF	

Testing document

System testing

Performs login test

Test ID	1
Test name	Performs login
Test goal	The goal is to let the operator log into the system inserting the right credentials
Note	In this case we consider these credentials: "User1", "Psw1": right credentials (stored into the DBMS); "User2", "Psw2": wrong credentials (non-stored into the DBMS)

Input	Desired output	Obtained output
The operator fills the form with credentials: "User1", "Psw1"	System shows the "Registry Management" view	System shows the "Registry Management" view
The operator fills the form with credentials: "User1", "Psw2"	System shows the error's popup with message "Invalid ID and/or Password!"	System shows the error's popup with message "Invalid ID and/or Password!"
The operator fills the form with credentials: "User2", "Psw1"	System shows the error's popup with message "Invalid ID and/or Password!"	System shows the error's popup with message "Invalid ID and/or Password!"
The operator fills the form with credentials: "User2", "Psw2"	System shows the error's popup with message "Invalid ID and/or Password!"	System shows the error's popup with message "Invalid ID and/or Password!"

Researches contact test

Test ID	2
Test name	Researches contract
Test goal	The goal is to let the operator research contracts using forms
Note	In this case we consider these credentials: "Name1", "Surname1", "ContractID1","TaxC/VAT1": right credentials (stored into the DBMS); "Name2", "Surname2", "ContractID2", "TaxC/VAT2": wrong credentials (non-stored into the DBMS);

Input	Desired output	Obtained output
The operator fills the form with credentials: "Name1", "Surname1", "ContractID1", "TaxC/VAT1"	System shows the results into the table	System shows the results into the table
The operator fills the form with credentials: "Name2"	System shows the error's popup with message "No result found"	System shows the error's popup with message "No result found"
The operator fills the form with credentials: "Surname2"	System shows the error's popup with message "No result found"	System shows the error's popup with message "No result found"
The operator fills the form with credentials: "ContractID2"	System shows the error's popup with message "No result found"	System shows the error's popup with message "No result found"
The operator fills the form with credentials: "TaxC/VAT2"	System shows the error's popup with message "No result found"	System shows the error's popup with message "No result found"

Alters contract test

Test ID	3
Test name	Alters contract
Test goal	The goal is to let the operator alter a contract selected from the table
Note	

Input	Desired output	Obtained output
The operator fills the form with new credentials	System shows a popup with message “Contract altered” displayed	System shows a popup with message “Contract altered” displayed
The operator fills the form with invalid characters	System shows a popup with message “Invalid characters”	System shows a popup with message “Invalid characters”

Deletes contract test

Test ID	4
Test name	Deletes contract
Test goal	The goal is to let the operator delete a contract selected from the table
Note	We consider three cases: "Contract1": this contract can be removed; "Contract2": this contract can't be removed because it has some pendant bills; "Contract3": this contract can't be removed because is already closed.

Input	Desired output	Obtained output
The operator selected the "Contract1"	System shows a popup with message "Contract removed"	System shows a popup with message "Contract removed"
The operator selected the "Contract2"	System shows the error's popup with a message that explains the reason why it can't be closed	System shows the error's popup with a message that explains the reason why it can't be closed
The operator selected the "Contract3"	System shows the error's popup with a message that explains the reason why it can't be closed	System shows the error's popup with a message that explains the reason why it can't be closed

Deletes contract test

Test ID	4
Test name	Deletes contract
Test goal	The goal is to let the operator delete a contract selected from the table
Note	We consider three cases: "Contract1": this contract can be removed; "Contract2": this contract can't be removed because it has some pendant bills; "Contract3": this contract can't be removed because is already closed.

Input	Desired output	Obtained output
The operator selected the "Contract1"	System shows a popup with message "Contract removed"	System shows a popup with message "Contract removed"
The operator selected the "Contract2"	System shows the error's popup with a message that explains the reason why it can't be closed	System shows the error's popup with a message that explains the reason why it can't be closed
The operator selected the "Contract3"	System shows the error's popup with a message that explains the reason why it can't be closed	System shows the error's popup with a message that explains the reason why it can't be closed

Adds contract test

Test ID	5
Test name	Adds contract
Test goal	The goal is to let the operator add new contracts
Note	

Input	Desired output	Obtained output
The operator fills all forms interested in the contract's adding	System shows a popup with message "New contract added"	System shows a popup with message "New contract added"
The operator fills a form with invalid characters	System shows the error's popup with a message that explains the reason why it can't continue the operation	System shows the error's popup with a message that explains the reason why it can't continue the operation

Reports errors in bills test

Test ID	6
Test name	Reports errors in bills
Test goal	The goal is to let the operator reports errors in bills
Note	

Input	Desired output	Obtained output
The operator fills the form with the errors	System shows a popup with message "Operation successfully completed"	System shows a popup with message "Operation successfully completed"

Deletes injunctions test

Test ID	7
Test name	Deletes injunctions
Test goal	The goal is to let the operator delete injunctions
Note	

Input	Desired output	Obtained output
The operator clicked the “Remove” button	System shows a popup with message ”Operation successfully completed”	System shows a popup with message ”Operation successfully completed”
The operator clicked the “Remove” button but the injunction can’t be removed because it has pending payment	System shows a popup with an error message	System shows a popup with an error message

Confirms bill test

Test ID	8
Test name	Confirms bill
Test goal	The goal is to let the operator confirm a selected bill
Note	

Input	Desired output	Obtained output
The operator selects a bill from the bill's table and presses "Confirm button"	System shows the bill's preview (PDF)	System shows the bill's preview (PDF)

Resends bill test

Test ID	9
Test name	Resends bill
Test goal	The goal is to let the operator resend a selected bill
Note	

Input	Desired output	Obtained output
The operator selects a bill from the bills' table and presses "Confirm button"	System shows the bill's preview (PDF)	System shows the bill's preview (PDF)
The operator selects a bill from the bills' table that has been payed and presses "Confirm button"	System shows a popup that contains an error message	System shows a popup that contains an error message

Confirms injunctions test

Test ID	10
Test name	Confirms injunctions
Test goal	The goal is to let the operator confirm an injunction
Note	

Input	Desired output	Obtained output
The operator selects an injunction from the injunction's table and presses "Confirm button"	System shows the bill's preview (PDF)	System shows the bill's preview (PDF)

Resends injunctions test

Test ID	11
Test name	Resends injunctions
Test goal	The goal is to let the operator resends an injunction
Note	

Input	Desired output	Obtained output
The operator selects an injunction from the injunction's table and presses "Confirm button"	System shows the bill's preview (PDF)	System shows the bill's preview (PDF)
The operator selects an injunction from the injunctions' table that has been payed and presses "Confirm button"	System shows a popup that contains an error message	System shows a popup that contains an error message
The operator selects an injunction that refers to a payed bill	System shows a popup that contains an error message	System shows a popup that contains an error message

JUnit code

Source

```
1.  package Controller;
2.
3.  import java.sql.SQLException;
4.  import java.util.logging.Level;
5.  import java.util.logging.Logger;
6.  import org.junit.Before;
7.  import org.junit.BeforeClass;
8.  import org.junit.Test;
9.  import static org.junit.Assert.*;
10. /**
11.  *
12.  * @author Andrea
13.  *
14.  * This class tests the "check" method of "Login˙Controller" class.
15.  * This methods takes 2 parameters in input: USER(String) and PSW(String).
16.  *
17.  * Equivalence classes:
18.  * USER:
19.  *  - Numerical value between 0 and 100 (T)
20.  *  - Numerical value lower then 0  (F1)
21.  *  - Numerical value higher then 100   (F2)
22.  *  - NULL  (F3)
23.  *  - Alphanumerical value  (F4)
24.  *
25.  * PSW:
26.  *  - Stored values (T)
27.  *  - Not stored values (F1)
28.  *  - NULL  (F2)
29.  *
30.  * Method applied: SECT
31.  * Number of tests: 15 (5x3)
32.  */
33. public class Login˙ControllerTest –
34.     private static Login˙Controller instance;
35.     private Boolean result;
36.     private String user;
37.     private String psw;
38.     private Boolean expResult;
39.
40.     public Login˙ControllerTest() –
41.     ″
42.
43.     @BeforeClass
44.     public static void setUpClass() –
45.         try –
46.             instance = new Login˙Controller(Main˙Controller.getMain());
47.         ″ catch (SQLException ex) –
48.             Logger.getLogger(Login˙ControllerTest.class.getName()).log(Level.SEVERE, null, ex);
49.             fail("Login˙Controller instantiation failed");
50.         ″
51.     ″
52.
53.     @Before
54.     public void setUp() –
55.         user = null;
56.         psw = null;
57.         result = null;
58.         expResult = null;
59.     ″
60.
61.     /*
62.     *   EQUIVALENCE CLASSES TESTED:
```

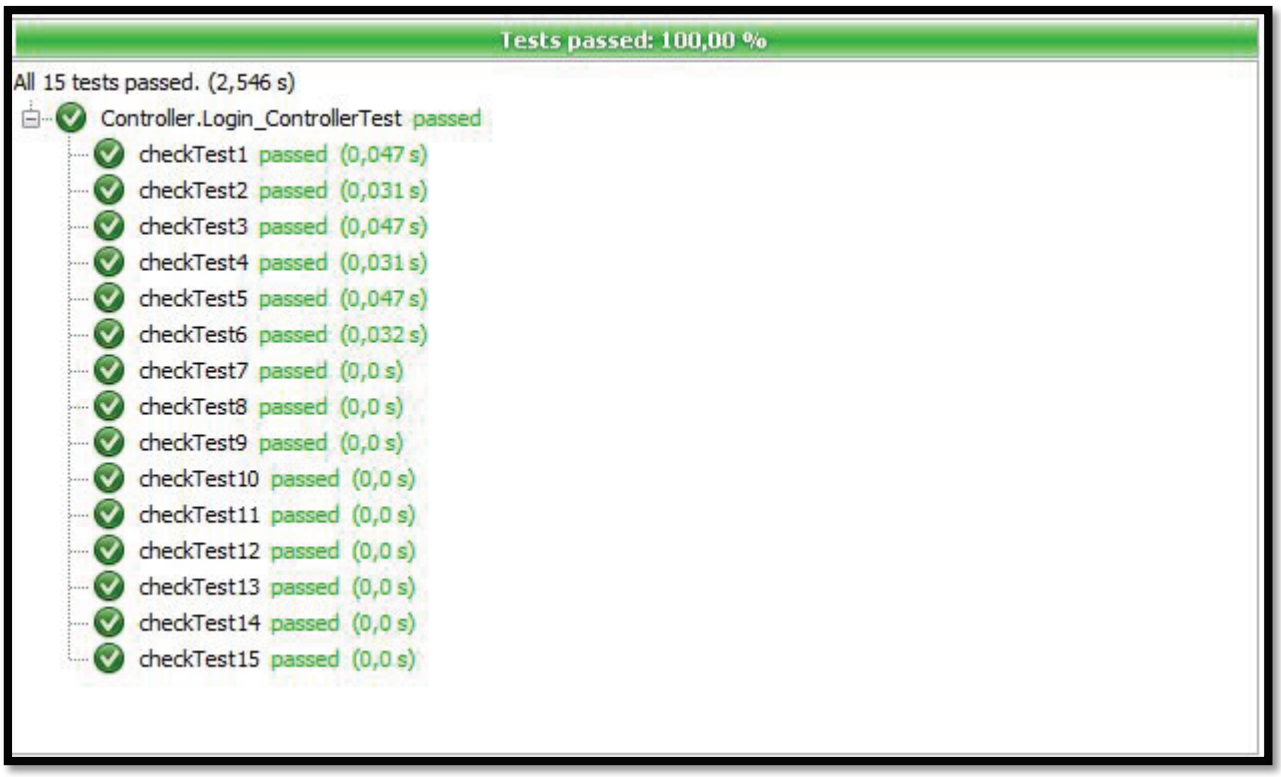
```
63.     *   User:   T
64.     *   Psw:    T
65.     */
66.     @Test
67.     public void checkTest1()–
68.         user = ”2”;
69.         psw = ”ingsw”;
70.         expResult = true;
71.         result = instance.check(user, psw);
72.         assertEquals(result, expResult);
73.     ″
74.
75.     /*
76.     *   EQUIVALENCE CLASSES TESTED:
77.     *   User:   T
78.     *   Psw:    F1
79.     */
80.     @Test
81.     public void checkTest2()–
82.         user = ”2”;
83.         psw = ”ingw”;
84.         expResult = false;
85.         result = instance.check(user, psw);
86.         assertEquals(result, expResult);
87.     ″
88.
89.     /*
90.     *   EQUIVALENCE CLASSES TESTED:
91.     *   User:   T
92.     *   Psw:    F2
93.     */
94.     @Test
95.     public void checkTest3()–
96.         user = ”2”;
97.         expResult = false;
98.         result = instance.check(user, psw);
99.         assertEquals(result, expResult);
100.    ″
101.
102.    /*
103.    *   EQUIVALENCE CLASSES TESTED:
104.    *   User:   F2
105.    *   Psw:    T
106.    */
107.    @Test
108.    public void checkTest4()–
109.        user = ”101”;
110.        psw = ”ingsw”;
111.        expResult = false;
112.        result = instance.check(user, psw);
113.        assertEquals(result, expResult);
114.    ″
115.
116.    /*
117.    *   EQUIVALENCE CLASSES TESTED:
118.    *   User:   F2
119.    *   Psw:    F1
120.    */
121.    @Test
122.    public void checkTest5()–
123.        user = ”101”;
124.        psw = ”ingw”;
125.        expResult = false;
126.        result = instance.check(user, psw);
127.        assertEquals(result, expResult);
128.    ″
```

```
129.
130.    /*
131.    *   EQUIVALENCE CLASSES TESTED:
132.    *   User:   F2
133.    *   Psw:    F2
134.    */
135.    @Test
136.    public void checkTest6()–
137.        user = ”101”;
138.        expResult = false;
139.        result = instance.check(user, psw);
140.        assertEquals(result, expResult);
141.    ″
142.
143.    /*
144.    *   EQUIVALENCE CLASSES TESTED:
145.    *   User:   F3
146.    *   Psw:    T
147.    */
148.    @Test
149.    public void checkTest7()–
150.        user = ”2abc”;
151.        psw = ”ingsw”;
152.        expResult = false;
153.        result = instance.check(user, psw);
154.        assertEquals(result, expResult);
155.    ″
156.
157.    /*
158.    *   EQUIVALENCE CLASSES TESTED:
159.    *   User:   F3
160.    *   Psw:    F1
161.    */
162.    @Test
163.    public void checkTest8()–
164.        user = ”2abc”;
165.        psw = ”ingw”;
166.        expResult = false;
167.        result = instance.check(user, psw);
168.        assertEquals(result, expResult);
169.    ″
170.
171.    /*
172.    *   EQUIVALENCE CLASSES TESTED:
173.    *   User:   F3
174.    *   Psw:    F2
175.    */
176.    @Test
177.    public void checkTest9()–
178.        user = ”2abc”;
179.        expResult = false;
180.        result = instance.check(user, psw);
181.        assertEquals(result, expResult);
182.    ″
183.
184.    /*
185.    *   EQUIVALENCE CLASSES TESTED:
186.    *   User:   F4
187.    *   Psw:    T
188.    */
189.    @Test
190.    public void checkTest10()–
191.        psw = ”ingsw”;
192.        expResult = false;
193.        result = instance.check(user, psw);
194.        assertEquals(result, expResult);
```

```
195.    ″
196.
197.    /*
198.    *   EQUIVALENCE CLASSES TESTED:
199.    *   User:   F4
200.    *   Psw:    F1
201.    */
202.    @Test
203.    public void checkTest11()–
204.        psw = ”ingw”;
205.        expResult = false;
206.        result = instance.check(user, psw);
207.        assertEquals(result, expResult);
208.    ″
209.
210.    /*
211.    *   EQUIVALENCE CLASSES TESTED:
212.    *   User:   F4
213.    *   Psw:    F2
214.    */
215.    @Test
216.    public void checkTest12()–
217.        expResult = false;
218.        result = instance.check(user, psw);
219.        assertEquals(result, expResult);
220.    ″
221.
222.    /*
223.    *   EQUIVALENCE CLASSES TESTED:
224.    *   User:   F1
225.    *   Psw:    T
226.    */
227.    @Test
228.    public void checkTest13()–
229.        user = ”-1”;
230.        psw = ”ingsw”;
231.        expResult = false;
232.        result = instance.check(user, psw);
233.        assertEquals(result, expResult);
234.    ″
235.
236.    /*
237.    *   EQUIVALENCE CLASSES TESTED:
238.    *   User:   F1
239.    *   Psw:    F1
240.    */
241.    @Test
242.    public void checkTest14()–
243.        user = ”-1”;
244.        psw = ”ingw”;
245.        expResult = false;
246.        result = instance.check(user, psw);
247.        assertEquals(result, expResult);
248.    ″
249.
250.    /*
251.    *   EQUIVALENCE CLASSES TESTED:
252.    *   User:   F1
253.    *   Psw:    F2
254.    */
255.    @Test
256.    public void checkTest15()–
257.        user = ”-1”;
258.        expResult = false;
259.        result = instance.check(user, psw);
260.        assertEquals(result, expResult);
```

```
261.     ″
262. ″
263.
```

Results




```
Testsuite: Controller.Login_ControllerTest
Tests run: 15, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 2,546 sec
```