Design

PSE of

PSE Group

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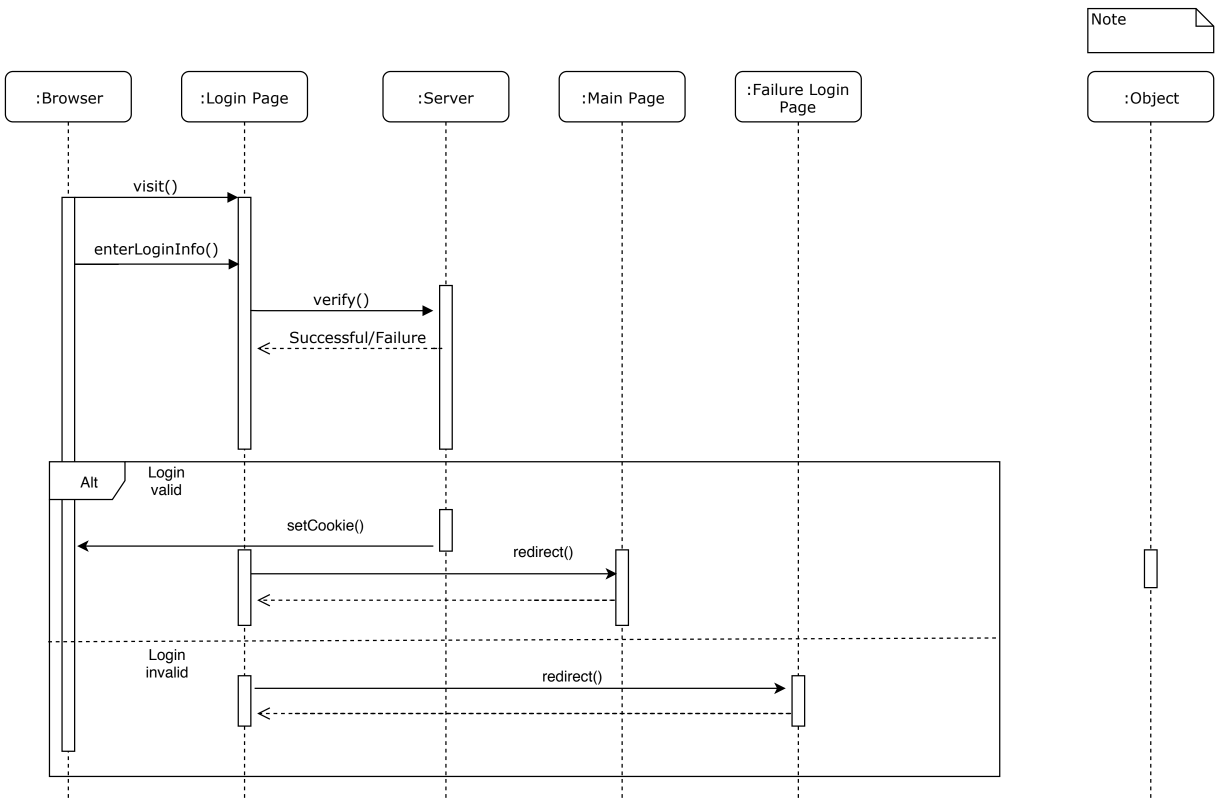
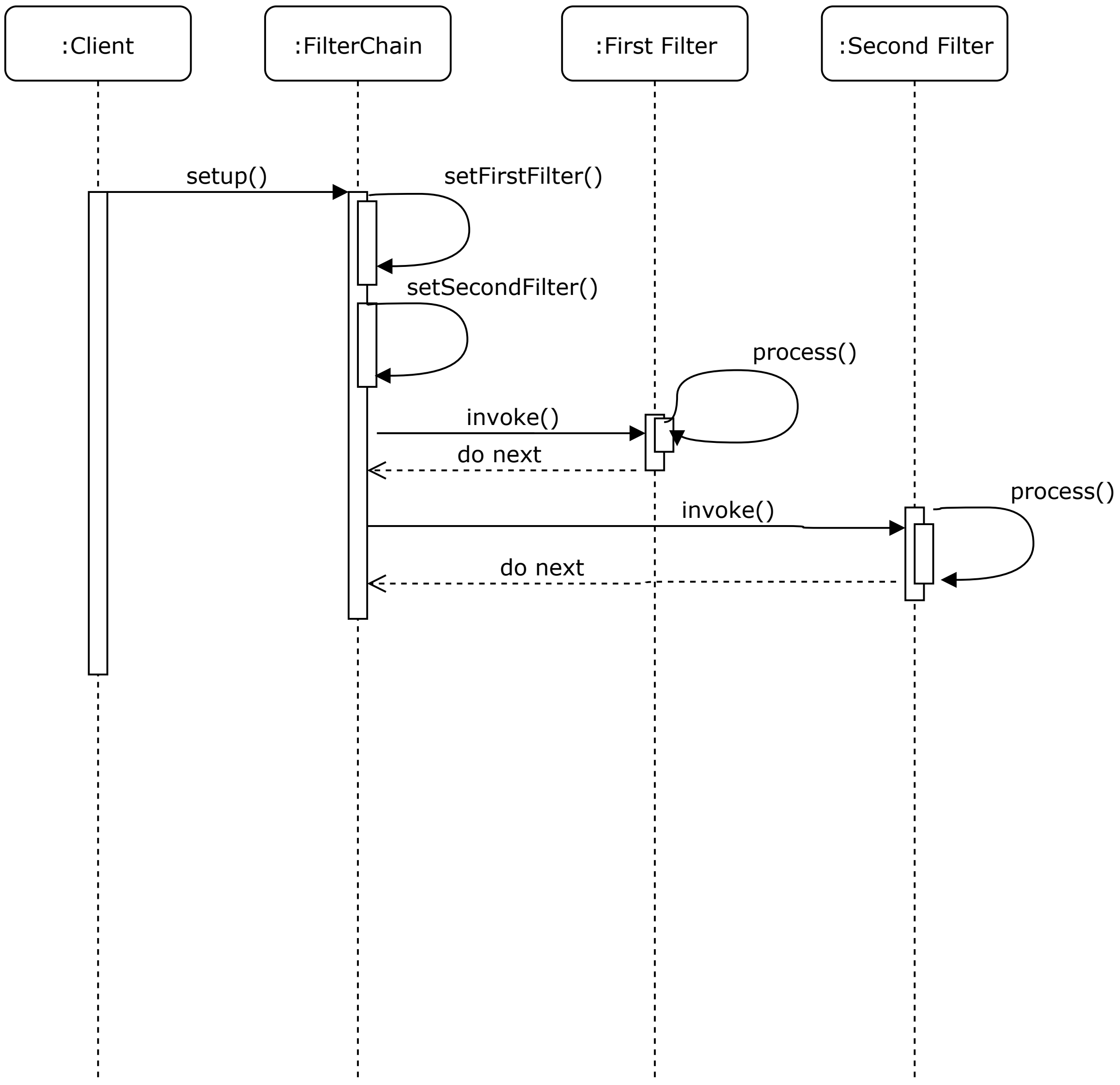
Contents

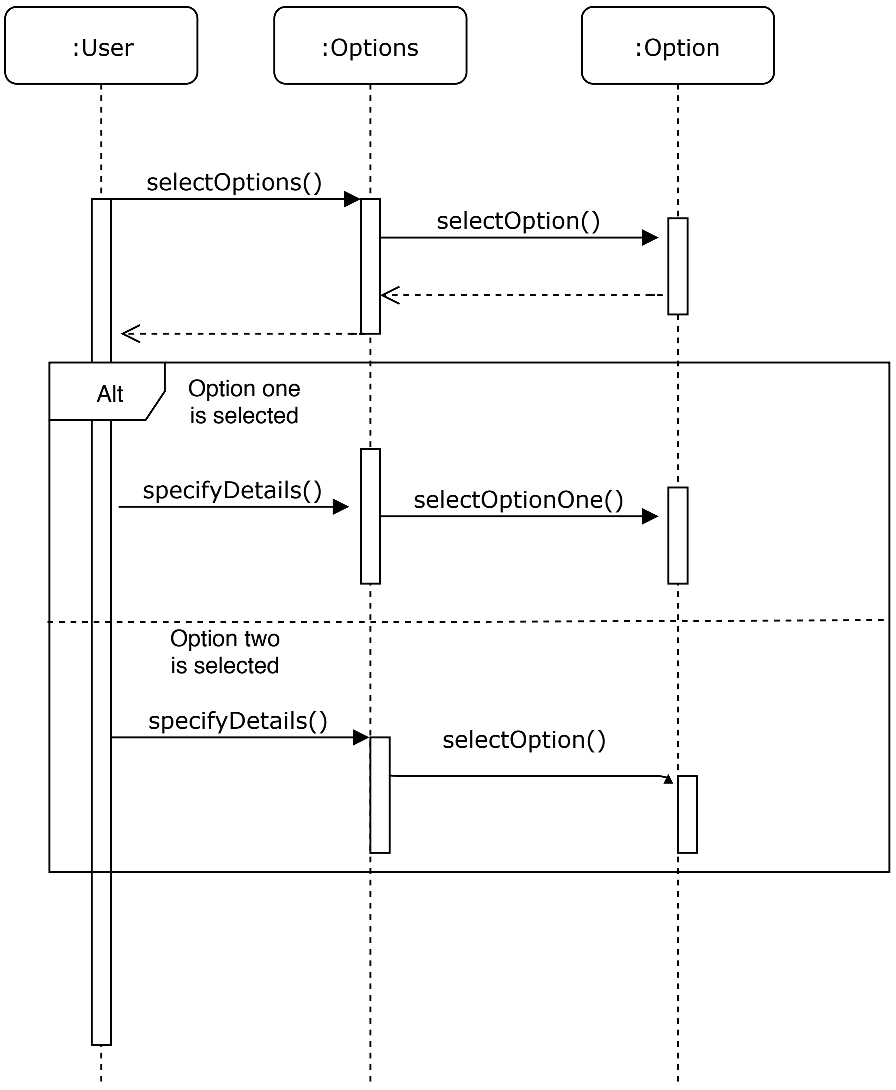
1 Design

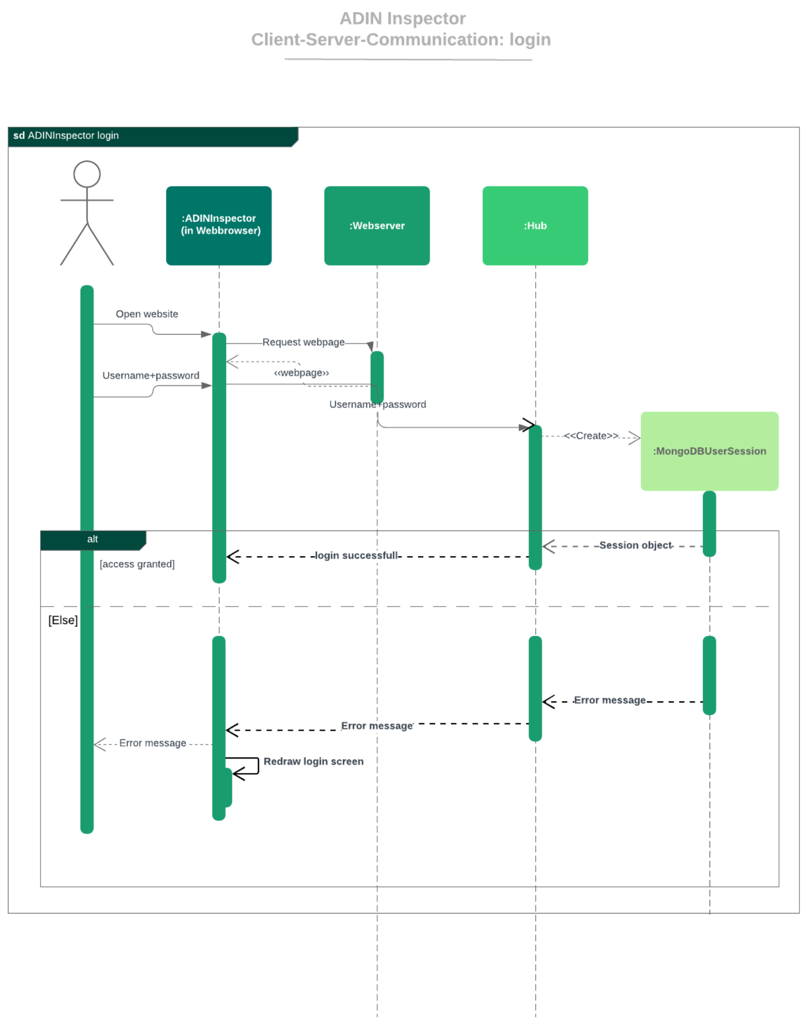
1.1 Front-End

1.1.1 Sequence Diagram




:Client
:FilterChain
:First Filter
:Second Filter
setup()
setFirstFilter()
setSecondFilter()
process()
invoke()
do next
invoke()
process()
do next

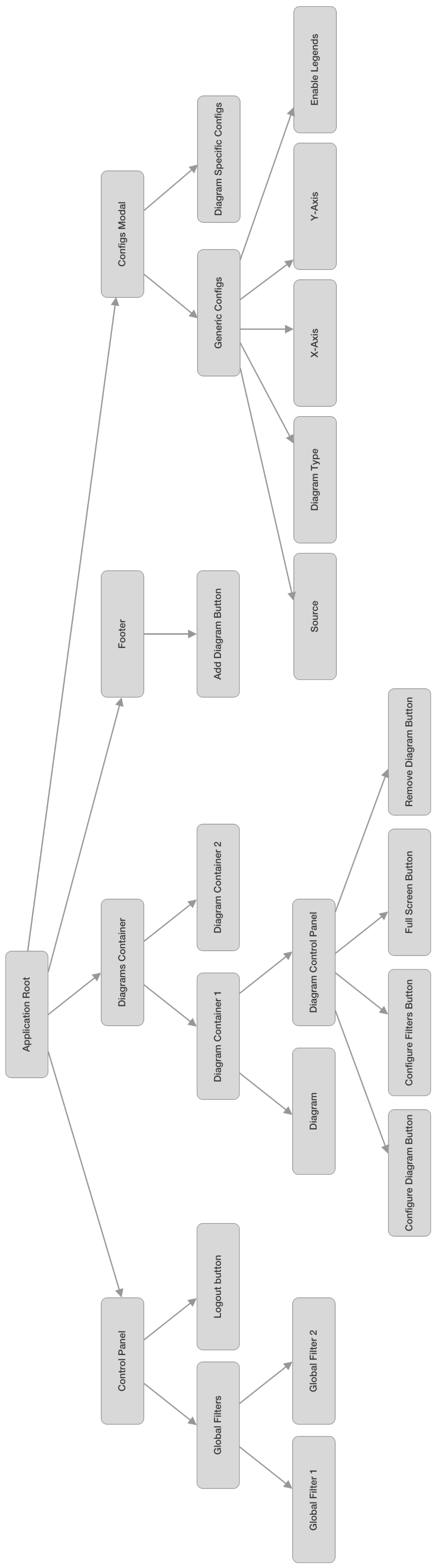

:User
:Options
:Option
selectOptions()
selectOption()
Alt
Option one is selected
specifyDetails()
selectOptionOne()
Option two is selected
specifyDetails()
selectOption()



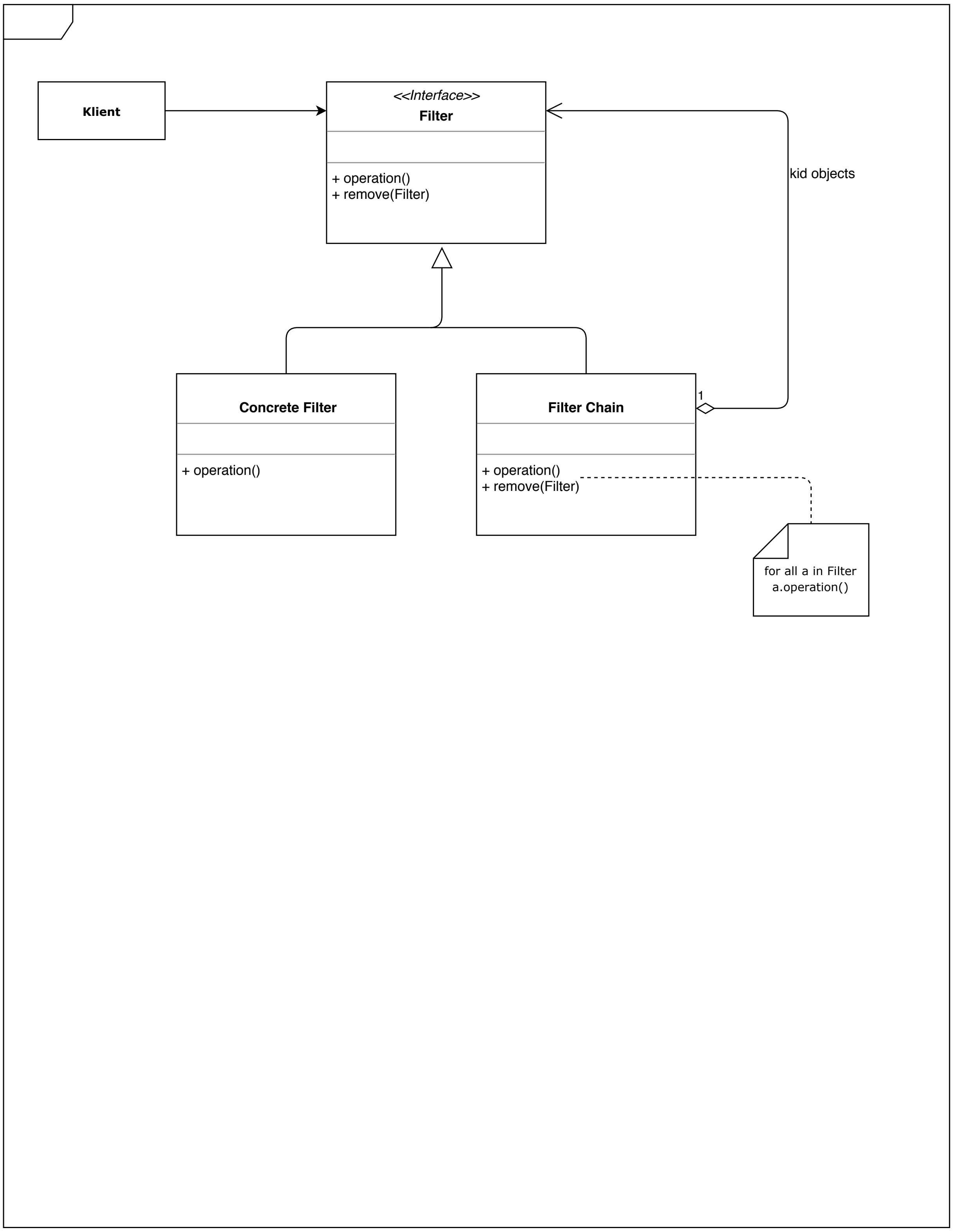
Inspector Client-Server-Communication-login.png

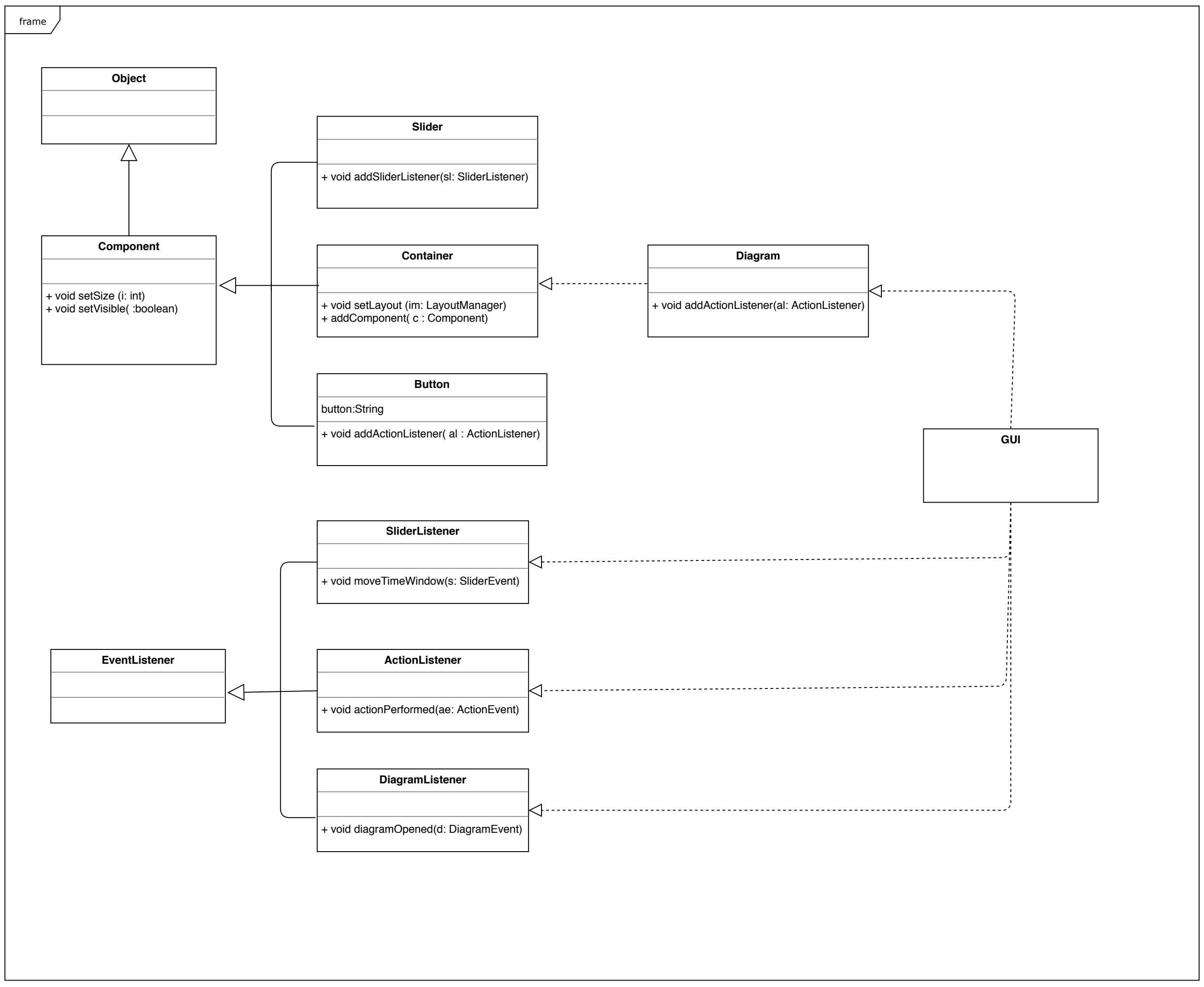
1.1.2 Activity Diagram

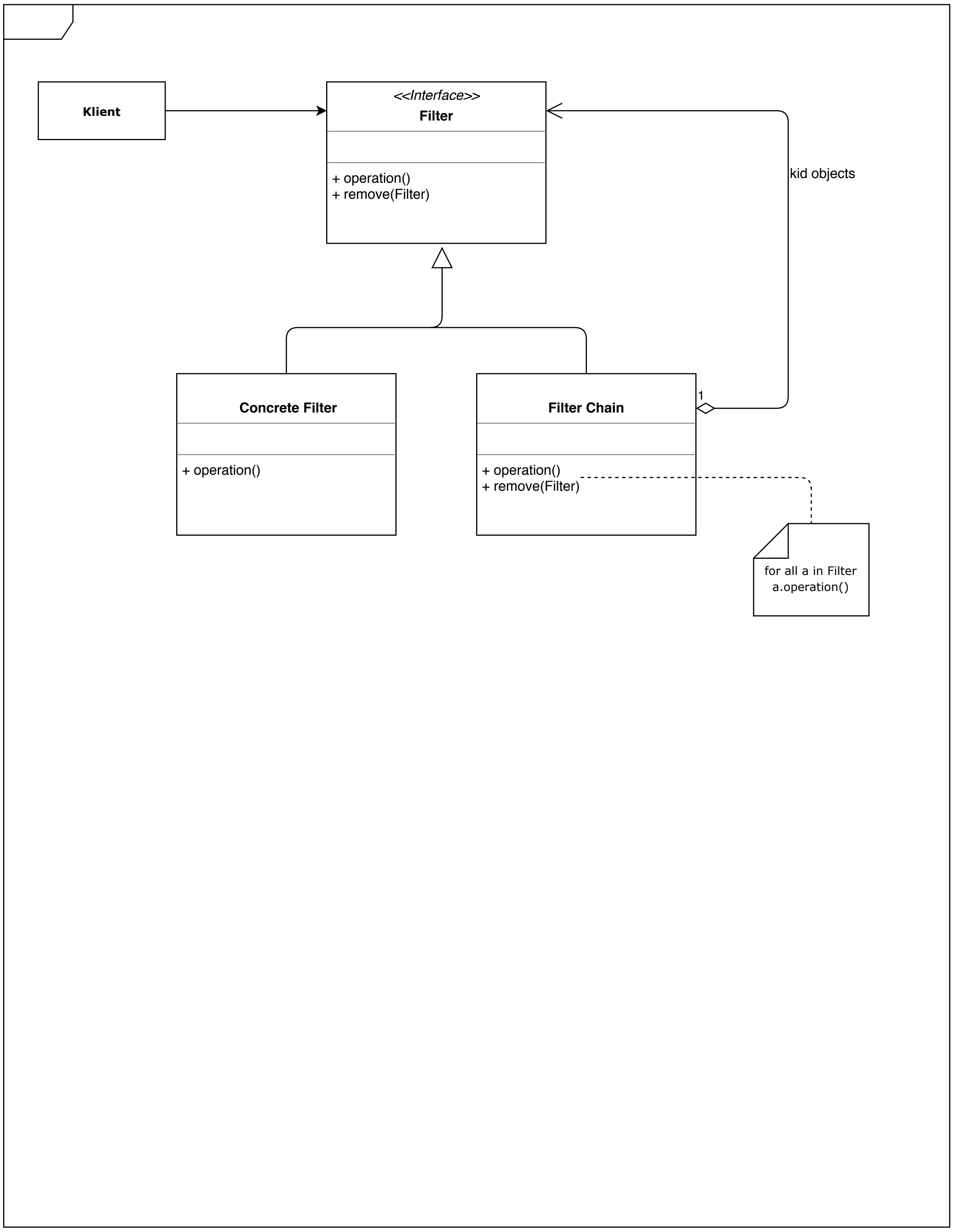
1.1.3 UI Structure Diagram


Application Root
Control Panel
Diagrams Container
Footer
Configs Modal
Logout button
Global Filters
Global Filter 1
Global Filter 2
Diagram Container 1
Diagram Container 2
Diagram
Diagram Control Panel
Configure Diagram Button
Configure Filters Button
Full Screen Button
Remove Diagram Button
Add Diagram Button
Generic Configs
Diagram Specific Configs
Source
Diagram Type
X-Axis
Y-Axis
Enable Legends

1.1.4 Class Diagram




frame
Object
Component
+ void setSize (i: int)
+ void setVisible(:boolean)
Slider
+ void addSliderListener(sl: SliderListener)
Container
+ void setLayout (im: LayoutManager)
+ addComponent(c : Component)
Diagram
+ void addActionListener(al: ActionListener)
Button
button:String
+ void addActionListener(al : ActionListener)
GUI
SliderListener
+ void moveTimeWindow(s: SliderEvent)
EventListener
ActionListener
+ void actionPerformed(ae: ActionEvent)
DiagramListener
+ void diagramOpened(d: DiagramEvent)


Klient
<<Interface>>
Filter
+ operation()
+ remove(Filter)
kid objects
Concrete Filter
+ operation()
Filter Chain
+ operation()
+ remove(Filter)
1
for all a in Filter
a.operation()

1.2 Client-server protocol

Messages between client and server are exchanged as strings in JSON format.
In the following list words in angle brackets ("<>") are placeholders.

1.2.1 Requests from client to server:

- getAvailableCollections
  syntax: {"cmd": "GETAVCOLL"}
  expected reply: list of collections
- getCollectionSize(collection)
  syntax: {"cmd": "GETCOLLSIZE", "par": "<collection>"}
  where <collection> is the name of a collection
  expected reply: collection size
- getCollection(collection)
  syntax: {"cmd": "GETCOLL", "par": "<collection>"}
  expected reply: data set
- getCollectionInRange(collection, key, start, end)
  syntax: {"cmd": "GETCOLLRANGE", "par": "<collection>", "key": "<keyvalue>", "start": "<startvalue>", "end:", "<endvalue>"}
  where <key> is the name of a key in the given collection and <startvalue> and <endvalue> are valid values for this key
  expected reply: data set
- getCollectionInRangeSize(collection, key, start, end)
  syntax: {"cmd": "GETCOLLRANGESIZE", "key": "<keyvalue>", "start": "<startvalue>", "end:", "<endvalue>"}
  expected reply: collection size

1.2.2 Messages from server to client:

- list of collections
  syntax: {"cmd": "LISTCOL", "par": ["<collection>"]}
  where <collection> is the name of a collection
- collection size
  syntax: {"cmd": "COLLSIZE", "par": "<size>"}
  where <size> is the number of records in this collection
- data set
  syntax: {"cmd": "DATA", "par": [<record>]}
  where each record is a JSON object

1.3 Back-End

This subsection deals with the back-end of the ADIN INSPECTOR. How the system deals with client http calls, and how kafka interacts with the system. An overview of the system can be seen in Figure 1

1.3.1 Class Diagram

Next we'll look at each class and method in detail

- Config properties file
  The config file is stored alongside the built application .jar file and contains the path to the Kafka installation folder, the user name and password of a mongoDB account with the highest level of access and the name of the database.

- Initializer
  Methods:

  - main
    parameters: String of arguments from the console
    returns: void
    App entry point.
    We load the config.properties life and use the path provided to start the zookeper, kafka and mongodb services

- MongoConsumer
  The Mongo Consumer, as the name implies, consumes all messages from all topics in the Kafka messaging system. Once a message is found it is passed along to the Mongo Client for further processing.
  Variables

  - clientMediator
    Type : MongoClientMediator
    An instance of the Mongo Client Mediator, created with the credentials from the config file.

  Methods

  - MongoConsumer constructor
    parameters: user name and password of a mongoDB account with the highest level of access.
    returns: void
    Initializes the MongoClient variable and calls listenForRecords();

  - getAllTopics
    parameters: none
    returns: an array of strings containing all the available kafka records
    Asks the kafka server service which topics exists.

  - listenForRecords
    parameters: none
    returns: void
    This Method first calls getAllTopics and uses the array of topics to poll the kafka server for new messages.
    If new messages are found then the messages are passed to the Mongo Mediator for adding them to the Database.
    If no new messages are found for a topic notify the Mongo Mediator that the collection tied to the topic is ready for pre-processing.

- MongoClientMediator This object serves as a nexus between the users who want to get data out of the database and the consumer, and dataProcessor who want to add data into the database.
  Variables
  - client
    type: MongoClient
    An instance of the Mongo Client from the official java API.

  Methods
  - MongoClientMediator constructor
    parameters: Username and password
    returns: void
    Initializes the client variable, throws an error if the user is not found.
  - addRecordToCollection
    parameters: String representation of a record in json format
    String name of the collection it should be added to.
    returns: void
    Converts the json string into a java object, then to a bson document and uses the mongoAPI to insert it into the database.
  - addRecordsToCollection
    parameters: String Array of records to be added to a collection
    String name of the collection it should be added to.
    returns: void
    for each oneof the members of the array call addRecordToCollection
  - ProcessCollection QUESTIONS FOR ANKUSH
    parameters: String, name of a collection
    returns: void
  - getCollection
    parameters: String, name of a collection
    returns: String array containing all entries of the collection
  - getStartRecord
    parameters: String, name of a collection
    returns: the first entry of the collection as a String.

  - getEndRecord
    parameters: String, name of a collection
    returns: the last entry of the collection as a String.
  - getCollectionSize
    parameters: String, name of a collection
    returns: the number of entries in the collectoin as int
  - getCollectionInRange
    parameters: String, key of the parameter used for filtering
    String start and end ranges for the filtering
    returns: String array containing all entries of the collection within that range
    this Method is very general to allow for flexibility.For example by letting the key be, SourceIPaddresses, or a timeStamp.
  - getCollectionInRange
    parameters: String, key of the parameter used for filtering
    String start and end ranges for the filtering
    returns: number of elements matching the range as int
    this Method is very general to allow for flexibility.For example by letting the key be, SourceIPaddresses, or a timeStamp.

- Record
  Every message that comes from kafka and needs to be added to the database has it's own Record class that inherit from this one.
  Every single class that inherits needs to be able to, using reflection, convert itself into a Bson Document where every variable is a key Value pair of the name of the variable and it's associated value.
  Variables
  - id
    type: String

  Methods
  - getAsDocument()
    parameters: none
    returns: A Document, containing every variable of any class inheriting from this one.
    This function checks for every variable, gets it's name and value as a string and adds it to the document that it eventually returns.
- PacketRecord
  Inheriting from Record, this class contains the variables that match the json string obtained from kafka.
  Variables
  - id
    type: String

this id is used for determining the ordering when saving to mongoDB, it's the offset of the message in the kafka messaging queue. inherited from Record

- client
  type: String
- L2Protocol
  type: String
- SourceMACAddress
  type: String
- L4Protocol
  type: String
- SourceIPAddress
  type: String
- PacketSummary
  type: String
- DestinationIPAddress
  type: String
- Timestamp
  type: String
- DestinationPort
  type: String
- SourcePort
  type: String
- DestinationMACAddress
  type: String

Methods

- getters / setters
  parameters: none
  returns: variable type
  Each variable has it's getters and setter methods.

• AlarmRecord
Variables

- method
  An instance of the Mongo Client from the java API

Methods

- getters / setters
  parameters: none
  returns: variable type
  Each variable has it's getters and setter methods.

- AggregatedRecord
  Variables
  - method
    An instance of the Mongo Client from the java API

  Methods
  - getters / setters
    parameters: none
    returns: variable type
    Each variable has it's getters and setter methods.

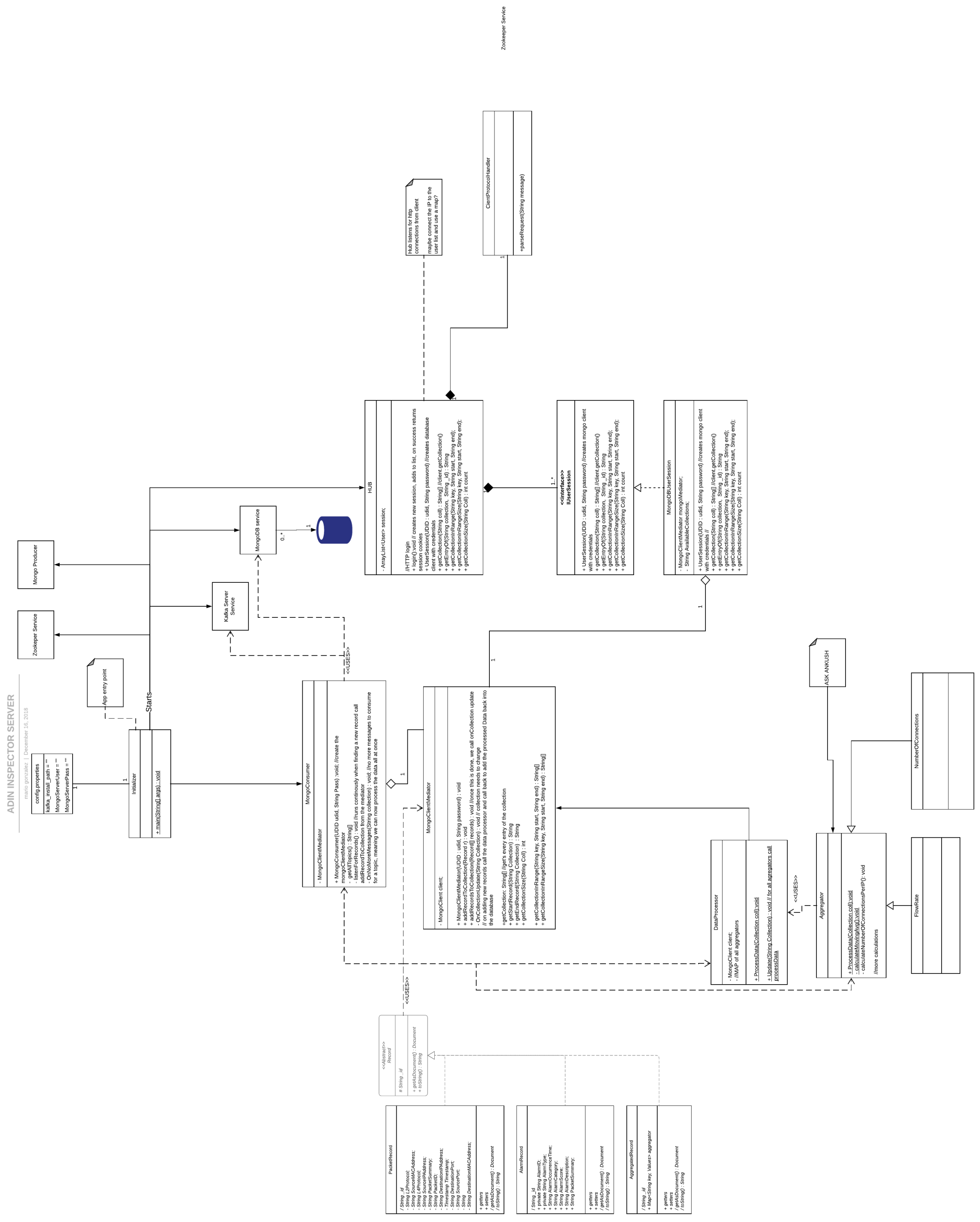
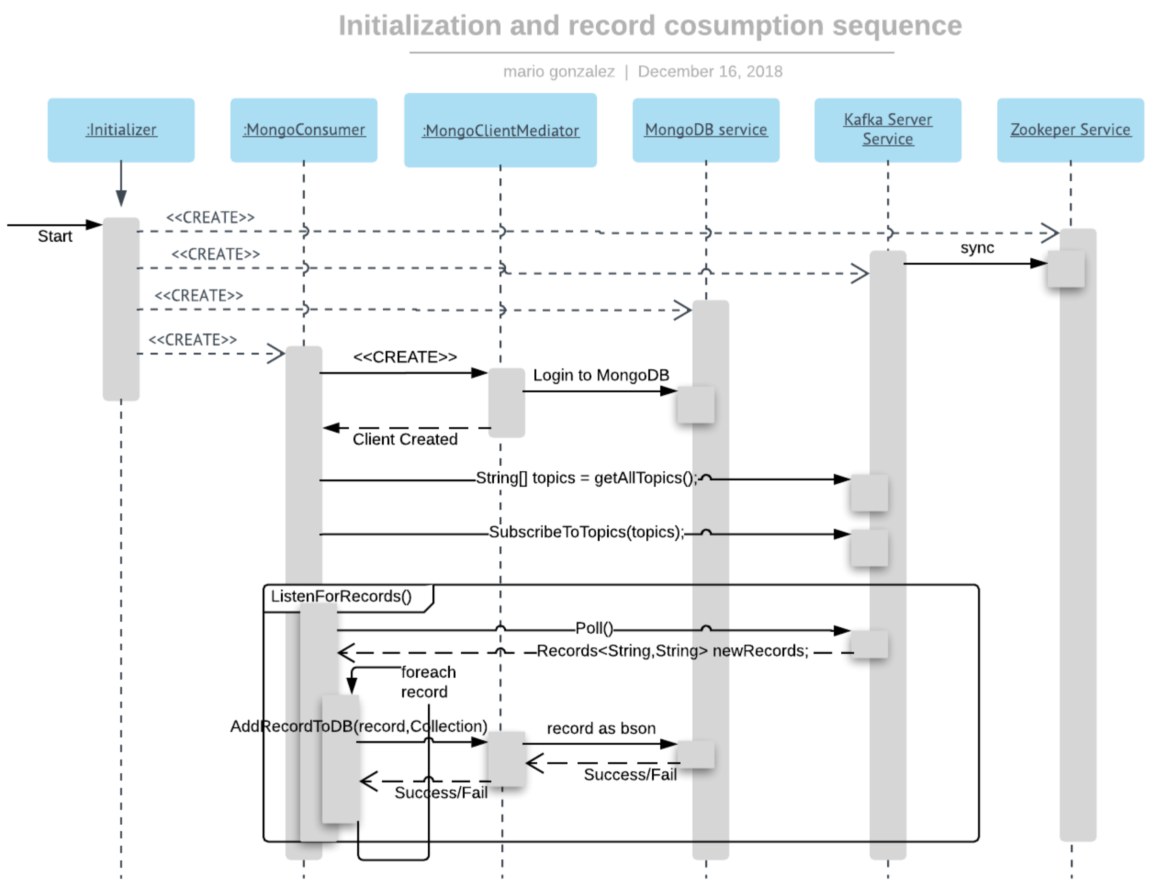


Figure 1: This is the class diagram for the whole back-end system

1.3.2 Sequence Diagram



1.3.3 Activity Diagram