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Faculty of Information &
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FUNDAMENTALS OF SOFTWARE TESTING PART 2

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Link to the video:

https://drive.google.com/file/d/1yF8krdqBC_PQJ05Y_T1E6D3gNi5gGOBv/view?usp=share_link

GITHUB USERNAME: michelepag

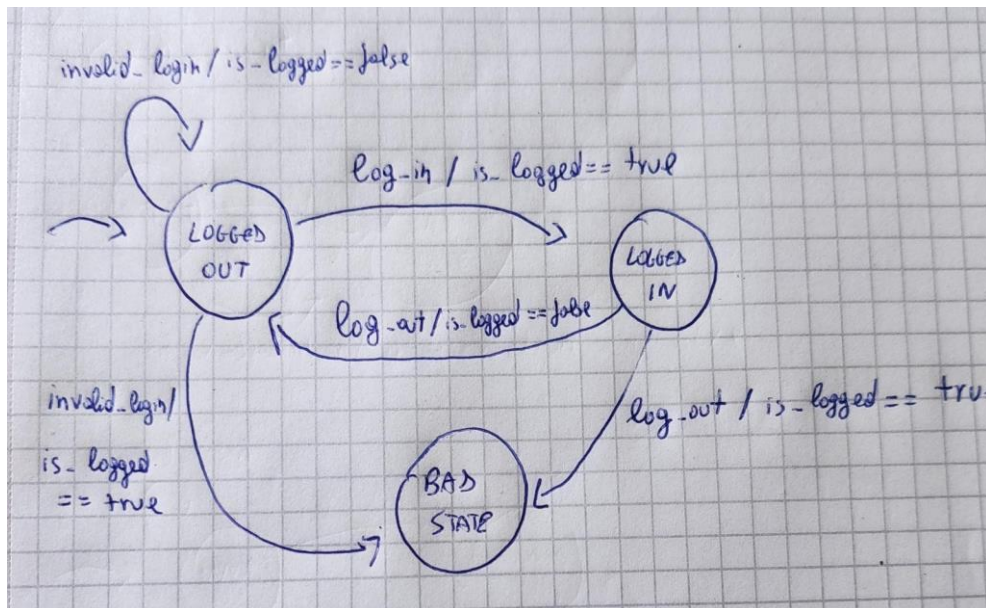
TASK 1

For the first task three automaton have been designed to specify the system taking advantage of the Gherkin specification and the knowledge of the API.

THE LOGIN AUTOMATON

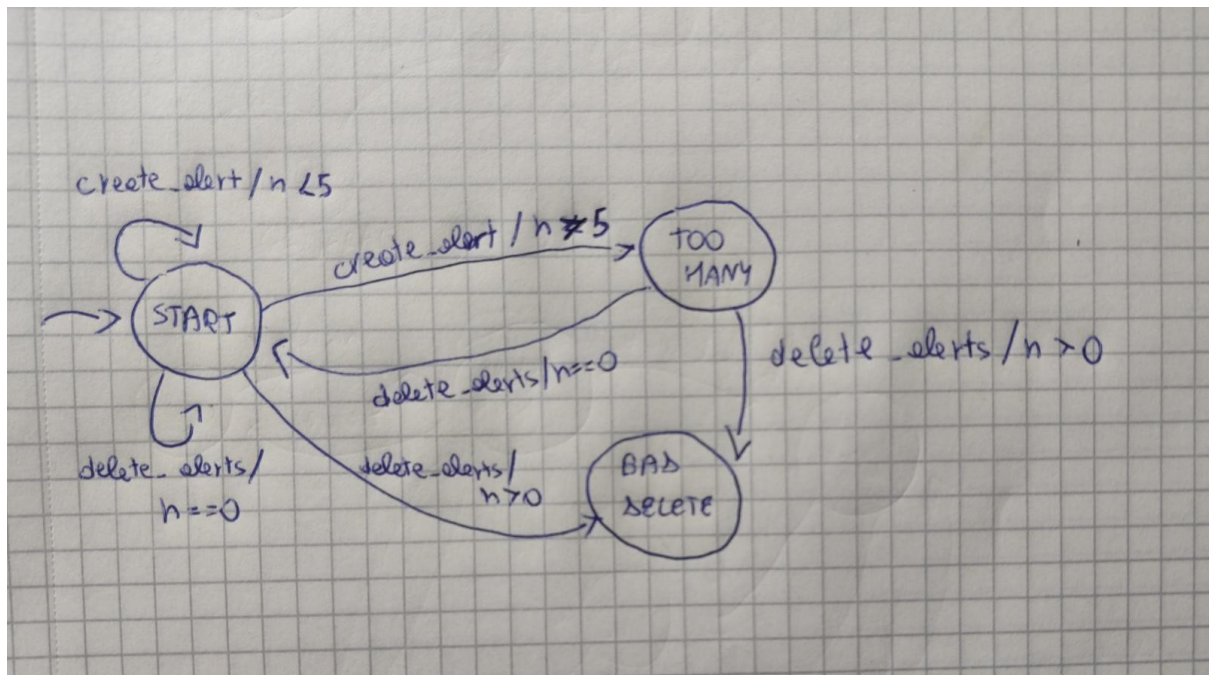
The login automaton specifies the login and logout functionality of the website. Based on the actual status of the user, the automaton can reach a bad state in two occasions:

1. When the user is able to login with an invalid credential.
2. When the user logouts, but the status appears as logged in.



THE ALERT LIMIT AUTOMATON

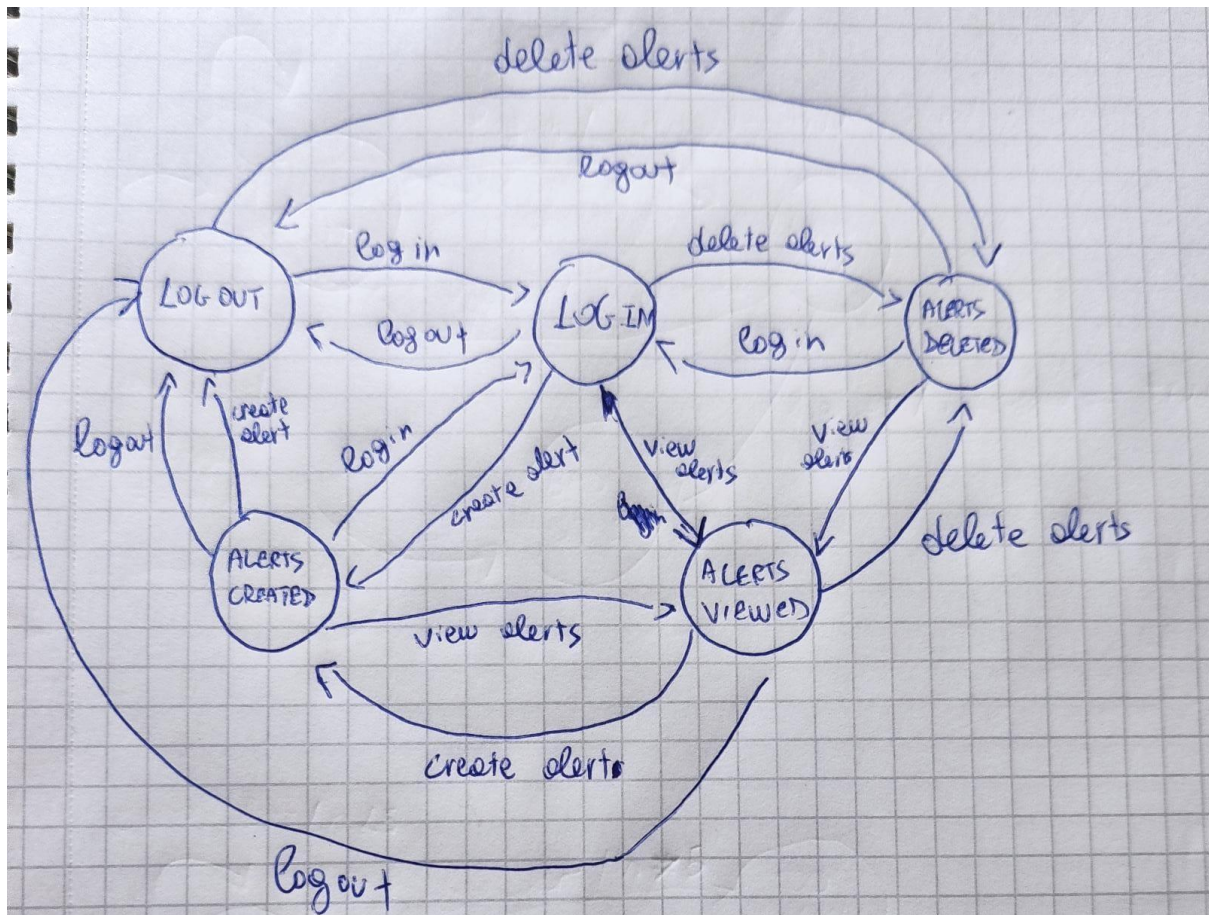
This automaton specifies the functionality of creating and deleting alerts. When more than 5 alerts are generated, the automaton enters the bad state "Too Many". Given that the delete request eliminates all alerts, after that the number of alerts should always be zero. Hence, the "Bad Delete" state is reached whenever after a delete the request the number of alerts is more than zero.



GENERAL MODEL

This automaton specifies all the possible actions a user can take using the API. The assumptions on which this design lies are:

- A user can take all the possible actions if it is logged in .
- A user can only view alerts if it is logged in, therefore there is no transition from “Log Out” to “Alerts Viewed”



TASK 2

Valid login

```

1 [LoginModelProperty]AUTOMATON::> LoginModelProperty() STATE::>loggedout
2 Valid login
3 [LoginModelProperty]MOVED ON METHODCALL: void main.Runner.login(boolean) TO STATE::> loggedin
4 [LoginModelProperty]AUTOMATON::> LoginModelProperty() STATE::>loggedin
5 Successful Logout observed
6 [LoginModelProperty]MOVED ON METHODCALL: void main.Runner.log_out(boolean) TO STATE::> loggedout
7 [LoginModelProperty]AUTOMATON::> LoginModelProperty() STATE::>loggedout
8 Invalid login observed
9 [LoginModelProperty]MOVED ON METHODCALL: void main.Runner.login(boolean) TO STATE::> loggedout
10 [LoginModelProperty]AUTOMATON::> LoginModelProperty() STATE::>loggedout
11 Valid login
12 [LoginModelProperty]MOVED ON METHODCALL: void main.Runner.login(boolean) TO STATE::> loggedin
13

```

To test the login and logout functionality, the monitor makes use of the endpoint to check login status. In fact, the methods that lead to a transition, take a Boolean value which corresponds to the user's status at the point in time. All the transitions can be verified comparing the output of the

program.

```
Executing GET request...
Response: {"userId":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829","isLoggedInOnWebsite":true}
user logged in
Executing GET request...
Response: {"userId":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829","isLoggedInOnWebsite":false}
Successful logout
Executing GET request...
Response: {"userId":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829","isLoggedInOnWebsite":false}
Invalid login
Executing GET request...
Response: {"userId":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829","isLoggedInOnWebsite":true}
user logged in
```

ALERT LIMIT

To monitor this automaton, instead of using and comparing each time an integer value representing the number of alerts, the methods take a Boolean value which is true if the number of alerts is more than five in case of `create_alert()`, on the other hand, for `delete_alerts()`, the value would be true if the number of alerts is zero.

```
1 [AlertLimit]AUTOMATON:> AlertLimit() STATE:>start
2 Alert uploaded
3 [AlertLimit]MOVED ON METHODCALL: void main.Runner.create_alert(boolean) TO STATE:> start
4 [AlertLimit]AUTOMATON:> AlertLimit() STATE:>start
5 Alert uploaded
6 [AlertLimit]MOVED ON METHODCALL: void main.Runner.create_alert(boolean) TO STATE:> start
7 [AlertLimit]AUTOMATON:> AlertLimit() STATE:>start
8 Alert uploaded
9 [AlertLimit]MOVED ON METHODCALL: void main.Runner.create_alert(boolean) TO STATE:> start
10 [AlertLimit]AUTOMATON:> AlertLimit() STATE:>start
11 Alert uploaded
12 [AlertLimit]MOVED ON METHODCALL: void main.Runner.create_alert(boolean) TO STATE:> start
13 [AlertLimit]AUTOMATON:> AlertLimit() STATE:>start
14 Alert uploaded
15 [AlertLimit]MOVED ON METHODCALL: void main.Runner.create_alert(boolean) TO STATE:> start
16 [AlertLimit]AUTOMATON:> AlertLimit() STATE:>start
17 Alert uploaded
18 [AlertLimit]MOVED ON METHODCALL: void main.Runner.create_alert(boolean) TO STATE:> start
19 [AlertLimit]AUTOMATON:> AlertLimit() STATE:>start
20 Too many alerts
21 [AlertLimit]MOVED ON METHODCALL: void main.Runner.create_alert(boolean) TO STATE:> !!!SYSTEM REACHED BAD STATE!!! too_many
22 aspects._asp_AlertsLimit0.ajc$before$aspects__asp_AlertsLimit0$3$fe8a53a6(_asp_AlertsLimit0.aj:32)
23 main.Runner.main(Runner.java:45)
24 [AlertLimit]AUTOMATON:> AlertLimit() STATE:>too_many
25 Delete Alerts
26 [AlertLimit]MOVED ON METHODCALL: void main.Runner.delete_status(boolean) TO STATE:> start
27
```

The runner file creates 7 alerts and then performs a delete request.

```

Send Http POST request
{"id":"62af95e7-5ed7-40ac-8b4f-41269f27274b","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img"}
Uploaded alert correctly
Executing GET request...
Response: [{"id":"c29e19d3-2add-4241-9420-fd0f9fe7dbcf","timestamp":"2023-01-04T07:09:10.4028279Z","eventLogType":1,"userId":"73e"}]
Number of alerts is: 0
Send Http POST request
{"id":"3a718de5-782f-4a60-8985-a000f836c969","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img"}
Uploaded alert correctly
Executing GET request...
Response: [{"id":"c11343b8-a92b-4f8a-95a5-ecba211751e1","timestamp":"2023-01-04T07:09:11.228487Z","eventLogType":0,"userId":"73e"}]
Number of alerts is: 2
Send Http POST request
{"id":"ad544129-d0b7-4c57-b527-bf9a74d4caa0","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img"}
Uploaded alert correctly
Executing GET request...
Response: [{"id":"cad8d3a7-2cf4-4553-89ed-d35a6f1350cd","timestamp":"2023-01-04T07:09:11.7651925Z","eventLogType":0,"userId":"73e"}]
Number of alerts is: 3
Send Http POST request
{"id":"5f5a5e74-f13f-4653-9174-f0a53ce5f24d","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img"}
Uploaded alert correctly
Executing GET request...
Response: [{"id":"cdf0100f-db77-4d57-b308-55ddcf6f069a","timestamp":"2023-01-04T07:09:12.2808657Z","eventLogType":0,"userId":"73e"}]
Number of alerts is: 4
Send Http POST request
{"id":"0f265ce9-0993-492e-882d-7ed1709e6a8a","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img"}
Uploaded alert correctly
Executing GET request...
Response: [{"id":"08b8d67e-9d86-4c15-abbc-58420f064fae","timestamp":"2023-01-04T07:09:12.7921295Z","eventLogType":0,"userId":"73e"}]
Number of alerts is: 5
Send Http POST request
{"id":"033dael0-31e3-4436-9bf8-e496606dalla","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img"}
Uploaded alert correctly
Executing GET request...
Response: [{"id":"b3937b74-e37c-4108-98e9-106a02a967ef","timestamp":"2023-01-04T07:09:13.3296376Z","eventLogType":0,"userId":"73e"}]
Number of alerts is: 6
Send Http POST request
{"id":"6b04f9da-b569-4e7e-9a0b-4c53012fdc2d","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img"}
Too many alerts
Executing GET request...
Response: [{"id":"52dlcb0c-a889-47d9-8418-14b8a47e759c","timestamp":"2023-01-04T07:09:13.860947Z","eventLogType":0,"userId":"73e"}]
Number of alerts is: 7
Executing GET request...
Response: [{"id":"25b7969d-241d-40fe-81a1-5c1ecbf83479","timestamp":"2023-01-04T07:09:14.3661761Z","eventLogType":1,"userId":"73e"}]
Number of alerts is: 0
Good Delete

```

GENERAL MODEL

For the general model the runner file simulates a set of actions a user can take and compare them with the actual events retrieved from the endpoint supplied.

```

SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
Starting ChromeDriver 108.0.5359.71 (1e0e3868ee06e91ad636a874420e3ca3ae3756ac-refs/branch-heads/5359@{#1016}) on port 40789
Only local connections are allowed.
Please see https://chromedriver.chromium.org/security-considerations for suggestions on keeping ChromeDriver safe.
ChromeDriver was started successfully.
Jan 04, 2023 8:17:47 AM org.openqa.selenium.remote.ProtocolHandshake createSession
INFO: Detected dialect: W3C
Send Http POST request
{"id":"f1b53990-ce23-44e5-a16e-ebecbe7959f5","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img","postedBy":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829"}
Send Http POST request
{"id":"36c09dc5-0013-49ee-97ec-a108006c83e7","alertType":5,"heading":"title","description":"descr","url":"link","imageUrl":"img","postedBy":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829"}
[1672816676.942][WARNING]: Timed out connecting to Chrome, retrying...
[1672816685.033][WARNING]: Timed out connecting to Chrome, retrying...
Executing GET request...
Response: [{"id":"4eb4815b-4f7d-45c0-9dd2-a0617697d07c","timestamp":"2023-01-04T07:17:49.4453295Z","eventLogType":5,"userId":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829","systemState":5,7,7,0,0,7,6,1,5,7,7}]

```

```

1 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>login
2 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>login
3 User viewed alerts
4 [GeneralModelProperty]MOVED ON METHODCALL: void main.EventMaker.view_alerts() TO STATE::> alerts_viewed
5 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>alerts_viewed
6 An alert has been uploaded
7 [GeneralModelProperty]MOVED ON METHODCALL: void main.EventMaker.create_alert() TO STATE::> alerts_created
8 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>alerts_created
9 Alerts created
10 [GeneralModelProperty]MOVED ON METHODCALL: void main.EventMaker.create_alert() TO STATE::> alerts_created
11 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>alerts_created
12 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>alerts_created
13 User logged out
14 [GeneralModelProperty]MOVED ON METHODCALL: void main.EventMaker.log_out() TO STATE::> logout
15 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>logout
16 Alerts deleted and user is logged out
17 [GeneralModelProperty]MOVED ON METHODCALL: void main.EventMaker.delete_alerts() TO STATE::> alerts_deleted
18 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>alerts_deleted
19 User logged in
20 [GeneralModelProperty]MOVED ON METHODCALL: void main.EventMaker.log_in() TO STATE::> login
21 [GeneralModelProperty]AUTOMATON::> GeneralModelProperty() STATE::>login
22 User viewed alerts
23 [GeneralModelProperty]MOVED ON METHODCALL: void main.EventMaker.view_alerts() TO STATE::> alerts_viewed
24

```

In this simulation the user logs in, clicks on view alerts, uploads two alerts, clicks on view alerts, logouts, deletes the alerts, logs in and clicks on view alerts.

TASK 3

LOGIN MODEL

```

Response: {"userId":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829","isLoggedInOnWebsite":false}
done (LOGGED_IN, logout, LOGGED_OUT)
Executing GET request...
Response: {"userId":"73ed1cab-f8c2-4ff8-84b6-d7f81d835829","isLoggedInOnWebsite":true}
done (LOGGED_OUT, login, LOGGED_IN)
action coverage: 3/3
state coverage: 3/3
transition-pair coverage: 7/8

Process finished with exit code 0

```

ALERT LIMIT MODEL

The alert limit model sometimes identifies a discrepancy between the actual number of alerts. Sometimes the test passes without issues

```
Response: [{"id":"bf37b3ea-1007-4c91
Number of alerts is: 0
done (START, delete_alerts, START)
Executing GET request...
Response: [{"id":"c833454b-232a-4a3e
Number of alerts is: 0
done (START, delete_alerts, START)
done Random reset(true)
action coverage: 2/2
state coverage: 2/2
transition-pair coverage: 8/13

Process finished with exit code 0
```