# Scriptless test automation through graphical user interface (GUI)

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#### The outrageous promise

## Script less and test more!



- Test steps defined prior to execution
- Each check separately defined
- Maintenance when the GUI changes



#### Captured Selenium script

- Easy to capture
- Readable?
- Maintenance?

http://www.testdag.nl/		
	Command	Target
1	open	http://www.testdag.nl/
2	set window size	738x803
3	select frame	index=0
4	click	css=.material-icons
5	click	linkText=Location
6	click	linkText=Capgemini headquarters in Leidsche Rijn (Utrecht)



#### Scripted test automation through GUI



#### Scripted test automation through GUI





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#### Begin "Search for a Billy bookcase"

StartWeb "http://www.ikea.com/us/en"



#### Write "billy[ENTER]"

End

#### Begin "View the details"



End

#### Begin "Check the price"



End



• Tests are generated during the execution



Scriptless test automation through GUI

- Usually some randomness involved
- Defining test oracles is different





#### **Open source TESTAR tool**



Tool for scriptless GUI test automation

- <u>https://testar.org/</u>
- <u>https://github.com/TESTARtool/TESTAR\_dev</u>

Active research and feature development

- Machine learning and artificial intelligence
- Model inference and automated change detection

#### **Open source TESTAR tool**





## Obtaining the state of the GUI



- Using Windows Accessibility API or Selenium Web Driver
- Obtaining a widget tree

#### Obtaining the state of the GUI





## **Deriving actions**



Configuring the types of actions

- Left click on menus and buttons
- Left click + type text on input fields
- Sliding actions for scrollbars
- Drag and drop?
- Double clicks?
- Right clicks?

## Filtering actions



Configuring the actions NOT to select

- Text based filtering: "Exit", "Close", "Minimize", ...
- Specific widget filtering
- Programmatic filtering

#### Selecting an action



- Using an action selection algorithm
- In a specific state, triggering predefined behaviour

#### Action selection algorithms



- Random
- Random + prioritize new actions
- Learning a model, exploring new actions
- Machine learning
- Artificial intelligence
- Evolutionary algorithms

#### **Test oracles**



- Generic "free" oracles: crash, freeze
- Suspicious titles: "Error", "Expection", ...
- Oracles that trigger with a matching GUI state



#### Output of TESTAR tool



- Executable test sequence that leads to failure
- HTML report with screenshots
- GUI state graph database (if enabled)



#### Scripted:

- Specific paths (user scenarios)
- Precise test oracles
- Manual effort to create and maintain the test scripts

Scripted smoke tests and critical test scenarios

#### Scriptless:

- Test generation
- Low maintenance effort
- More challenging test oracles
- Requires execution time to get good coverage

Scriptless nightly testing for robustness and coverage



## Any questions?

More information:

- <u>https://testar.org/</u>
- Email: <u>pekka.aho@ou.nl</u>
- <u>https://www.testomatproject.eu/</u>







