



Keeping pace with Product Evolution

UI Automation Framework Guidelines

V. Narayan Raman
CEO, Sahi Pro
@narayanraman
@sahipro

Initial Thoughts?

- Automation keeps breaking
- Waits and synchronization problems
- Object identifiers keep changing
- Frameworks need to be created and maintained
- Reports don't always make sense
- Playback is slow
- Version controlling not easy

Problem

- Rapid development is the need of the day
- Automated testing should ideally help. BUT
 - Automation scripts break easily when applications evolve
 - Fixing automation scripts steals time from quality testing
 - Automation effort stagnates and quickly becomes obsolete



Can Automation Help?

- When migrating a jquery application to Angular JS?
- When migrating from Angular 1 to Angular 2?
- When migrating from Salesforce Classic to Salesforce Lightning?
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What should QA Automation solve?

- Software enables a business
- Better quality software means low risk to business
- In dynamic businesses, where software and business change, Software quality systems should ensure continuity of business



Good Automation Effort

- Needs Maximum Utilization of
 - People
 - Dev, QA, BA etc.
 - Processes
 - Version Control
 - Continuous Integration
 - Automation Tools and Frameworks
- Great if
 - Automation tool and framework is easy to use and allows all people to contribute

Types of Changes

- Business case has changed
 - Eg. ST and VAT replaced by GST
- Application flow has changed
 - Eg. “Add Beneficiary” moved from “Transfers” screen to “Requests” screen and has validation step
- Application UI has changed
 - Elements have changed
 - Eg. Textbox name has changed from “login” to “signin”
 - Text for assertions have changed
 - Eg. Message “Invalid Login” has changed to “Invalid Sign in”

Types of Changes - Responsibility

- Business case has changed
 - BA*, QA
- Application flow has changed
 - BA, QA*
- Application UI has changed
 - Dev, QA



What's a Framework?

- Inversion of control
 - Hollywood Principle: "Don't call us, we'll call you"
 - In a framework, unlike in libraries or in standard user applications, the overall program's flow of control is not dictated by the caller, but by the framework
- Extensibility
 - A user can extend the framework - usually by selective overriding; or programmers can add specialized user code to provide specific functionality.
- Non-modifiable framework code:
 - The framework code, in general, is not supposed to be modified, while accepting user-implemented extensions. In other words, users can extend the framework, but should not modify its code

Source: Wikipedia



Framework Expectations

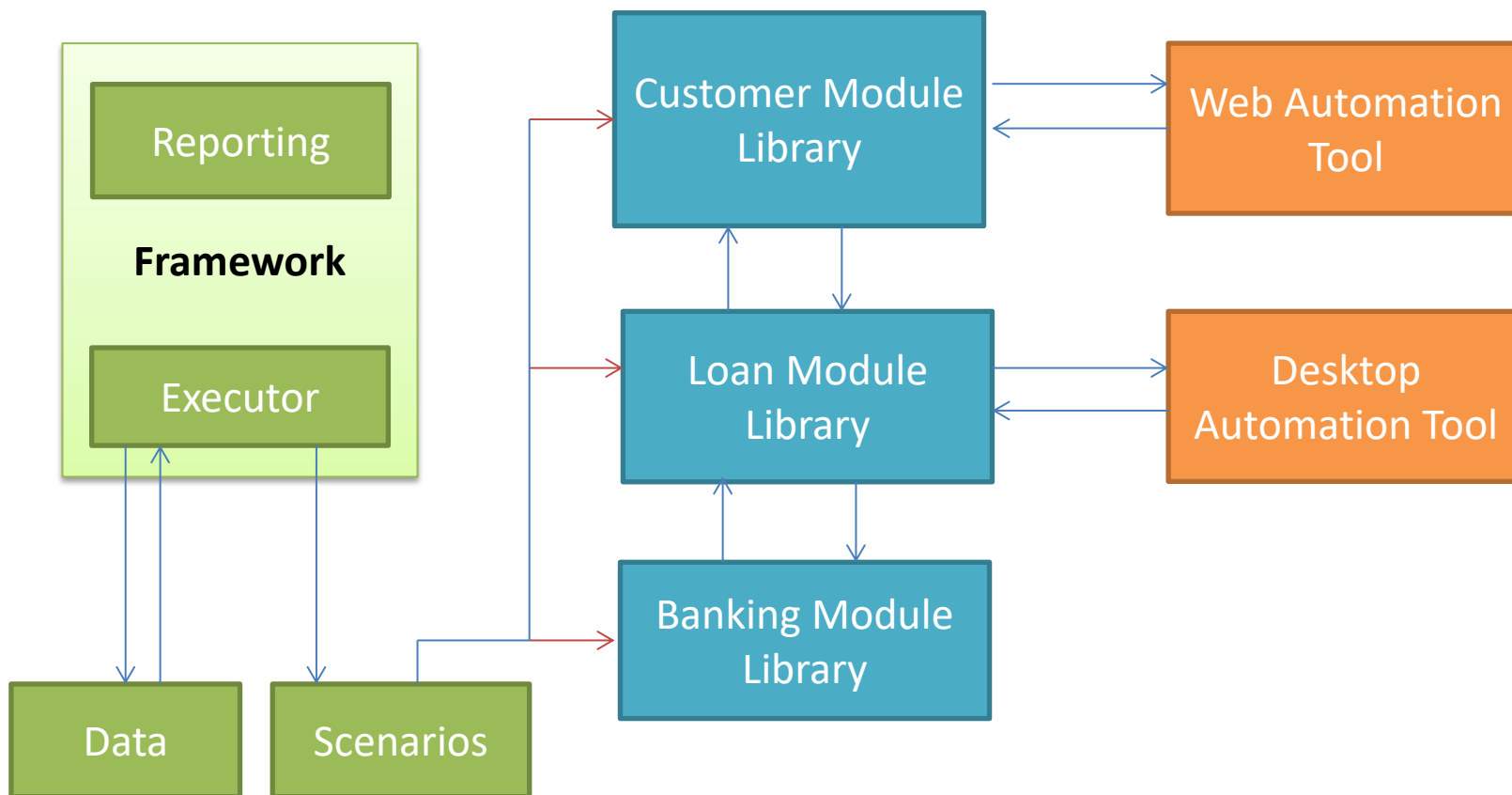
- Execution: Should be able to execute automation code!
 - For speed: parallel, distributed execution
- Maintenance:
 - Allow separation of concerns for easy maintenance
 - Business Layer
 - Implementation Layer
 - Object Repository Layer
 - Audit and Reporting:
 - Error reporting with screenshots etc. for testers to validate
 - Rich reports for various stake holders with traceability



Frameworks, Libraries and Tools

- Frameworks take care of execution, reporting, and give hooks to call user libraries
- Libraries bunch together application specific functionality like User creation, login etc.
- Tools allow interaction with systems eg UI interface, webservices interface etc.

Frameworks, Libraries and Tools



Wrong Implementation

	A	B	C	D
1	TestCase	Locator Type	Locator Value	Test Data
2	open_Browser	null	null	Chrome
3	enter_URL	null	null	http://google.com
4	click_On_Link	linkText	Gmail	
5	enter_Text	id	Email	testuser
6	enter_Text	name	Passwd	passwordtest
7	click_On_Button	name	signIn	
8	close_Browser			

<http://www.seleniumeasy.com/selenium-tutorials/keyword-driven-framework-example>

Wrong Implementation

Feature: Todo item management

Scenario: Adding a todo item

Given: I have a todo list named "Mondays list"

When I go to the home page

And I fill in "username" with "dave"

And I fill in "password" with "secret"

And I press "Log In"

And I go to the todo page

And I click on link "Mondays list"

And I fill in "todo" with "Grab some milk"

And I press "Add todo"

Then I should see "Todo item added successfully"

- <https://www.sitepoint.com/smelly-cucumbers/>



Layers of Automation

Business Layer

- Expresses business intent
- Agnostic of
 - web application itself
 - Testing tool
 - interaction code
- Eg.
 - Create user, Approve user, Login user
- Will change if business logic itself changes
- Survives across UI implementations (web or mobile or desktop), survives architectural changes.

Framework Examples

Check Account Balance is updated after transfer	<i>[Documentation]</i>	Check Account Balance is updated after transfer		
	<i>loginRetailUser</i>	"test"	"secret"	
	<i>verifyBalance</i>	"25000"		
	<i>transferMoney</i>	"Rajesh"	"1000"	"movie tickets"
	<i>verifyBalance</i>	"24000"		
	<i>logout</i>			

Implementation Layer

- Understands interactions between different actions performed on UI

– Eg.

```
function login($username, $password){  
    _setValue(_textbox("user"), $username);  
    _setValue(_password("password"), $password);  
    _click(_submit("Login"));  
}
```

- Library file with implementation of keywords used in Business Layer
- Will change if interaction flow changes

```
function transferMoney($beneficiary, $amount, $description){  
    _click($_DIV_FUNDS_TRANSFER);  
    _setSelected($_SELECT_FTbeneficiary, $beneficiary);  
    _setValue($_TEXTBOX_FTAMOUNT, $amount);  
    _setValue($_TEXTBOX_FTDESCRIPTION, $description);  
    _click($_SUBMIT_CONTINUE);  
    _click($_SUBMIT_CONFIRM);  
}
```



Element Repository Layer

- Central repository of all elements in the automation code
- Changes when a particular element changes due to HTML/Javascript changes in the application UI



Framework Examples

- ROBOT Framework
- Cucumber
- Any Excel keyword framework you may have built
- Sahi Pro Excel Framework



What Should Change?

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Gyan

- Automation code is most useful when there is a lot of change planned in your application
 - Acts as a safety net and guideline
- Automation code should not be thrown away when application technology changes
- Building the right layers and strictly following them helps in minimal maintenance efforts and long lived useful automation scripts
 - QUESTIONS?