

# User Interface Tests (GUI and WUI)

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# Types of Related Tests

- Interface tests / Controller
- Acceptance Tests
- Layout Tests
- Accessibility Tests
- Installation Tests
- Configuration Tests / Portability
- Smoke Tests / Sanity

# Interface Tests

- Systems with bad architecture
  - View code together with model code

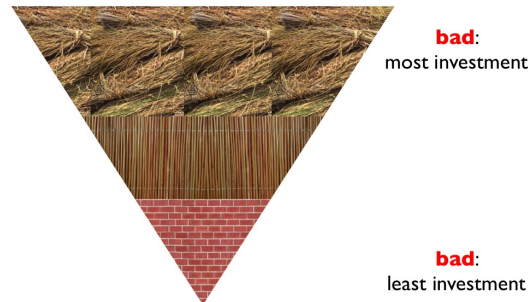
or

- Organization in Layers (ex: MVC)
  - View (Interface)
  - Controller (Adapter Interface => Model)
  - Model

# How to automate

- Record
- Programming
- Abstraction of user events
- Direct use of interface API

- Isolated
- Integrated



# Recording

- Advantages
  - Facility
  - Friendly to client/user/tester
- Disadvantages
  - Tests after implementation
  - Problems of tools:
    - Not modularized code
    - Not friendly code
    - Not all actions are captured

# Programming

- Advantages
  - Modularized
  - May be written before SUT code
- Disadvantages
  - Harder to create compared with recording

# Recording + Programming

- Recording: Capture a lot of actions
- Programming: Organize the generated code and add new actions
  
- Advantages
  - Fast
  - Organized
- Disadvantages
  - Tests written after implementation

# Event Abstraction

- Mouse (click/drag) and Keyboard (type)
- Find an element  $\leq$  **Critical operation**
- Throw event (arguments)
- Example, type:  
    `textbox = findElement("username")`  
    `type(textbox).("admin")`



# Find an Element

- By identifier
- By properties
  - By type
  - By text
  - By localization
- - All: May be fragile to layout changes

# By Identifier

- + Component type abstraction
- + Component unique
- - Requires ids for unimportant components
- `getElementById("id=username")`

# By Properties

- + Documentation of component type
- - May not be unique: Requires more information
  - Location
  - Text (- internationalization (i18n))
- `getElement("//input[@type='submit']")`
- `getElement("//input[@type='submit' and @value='GO']")`
- `getElement("//td[2]/input[@id='Email']")`

# Graphical User Interface (GUI)

- OS portability
- Window manager portability
- **FEST**

# Web User Interface (WUI)

- OS portability
- Browser portability
- Selenium\*

# Tools

- Simple browsers
  - HTMLUnit
  - + Practicality / - Not real browser
- Javascript run internally in browser
  - Selenium
  - + Real browser / - Complications
- Browser API
  - WebDriver (“Selenium 2”)
  - + Real browser / + Faster

# Screenshot

- Layout tests
  - Automated + Manual
- Eases debugging on continuous integration servers

```
@Screenshot(policy = ScreenshotPolicy.ALWAYS)
public class SomeClassAnnotatedAlways implements SeleniumClass {
    private Selenium selenium;
    public Selenium selenium() { return selenium; }
}
```

# Asynchronous Events

- **Anti-Pattern: Pause**
- **Pattern: Wait with timeout**



# Browsers Idiosyncrasies

- HTML
- JavaScript
- XML Path Language (XPath)
- Document Object Model (DOM)
- Cascading Style Sheets (CSS)
  
- <http://www.w3schools.com>

# Care

- Popups
- HTTPS / Certifies
  - Invalid
  - Expired

# Internet - HTTP

- Get, Maximum size of parameters
- Post
- Encoding
- Parameters
- Cookie
- Request / Response
- Render / Redirect / Forward
- Results: 404, 500, 502 ...

# User Actions

- **Mouse**
  - Drag and drop
  - Click, Double click
- **Keyboard**
  - => Keyboard shortcuts, texts
  - Type in sequence
  - Type and hold

# Browser Statistics

## Browser Statistics Month by Month

2009	<u>IE7</u>	<u>IE6</u>	<u>IE8</u>	<u>Fx</u>	<u>Chrome</u>	<u>S</u>	<u>O</u>
January	25.7%	18.5%	0.6%	45.5%	3.9%	3.0%	2.3%
2008	<u>IE7</u>	<u>IE6</u>	<u>IE5</u>	<u>Fx</u>	<u>Chrome</u>	<u>S</u>	<u>O</u>
December	26.1%	19.6%		44.4%	3.6%	2.7%	2.4%
November	26.6%	20.0%		44.2%	3.1%	2.7%	2.3%
October	26.9%	20.2%		44.0%	3.0%	2.8%	2.2%
September	26.3%	22.3%		42.6%	3.1%	2.7%	2.0%
August	26.0%	24.5%		43.7%		2.6%	2.1%
July	26.4%	25.0%		42.6%		2.5%	1.0%

- Source:

[http://www.w3schools.com/browsers/browsers\\_stats.asp](http://www.w3schools.com/browsers/browsers_stats.asp)

# Console, Prompt ...

- Parser and interpreter errors
  - Parameter order
  - String conversion
- Simplicity
- No need for additional tools
  - Ex: `Runtime.getRuntime().exec(command)`

# Tools

- **FEST**
  - <http://code.google.com/p/fest>
- **HTMLUnit**
  - <http://htmlunit.sourceforge.net>
- **Selenium**
  - <http://seleniumhq.org>
- **WebDriver**
  - <http://code.google.com/p/webdriver>

# Contact

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