

# 5th Generation Test Automation Frameworks

Anton Angelov

Co-founder, Chief Development

AUTOMATE THE PLANET

Site: <http://bellatrix.solutions>

Blog: <http://automatetheplanet.com>

@angelovstanton

aangelov@bellatrix.solutions



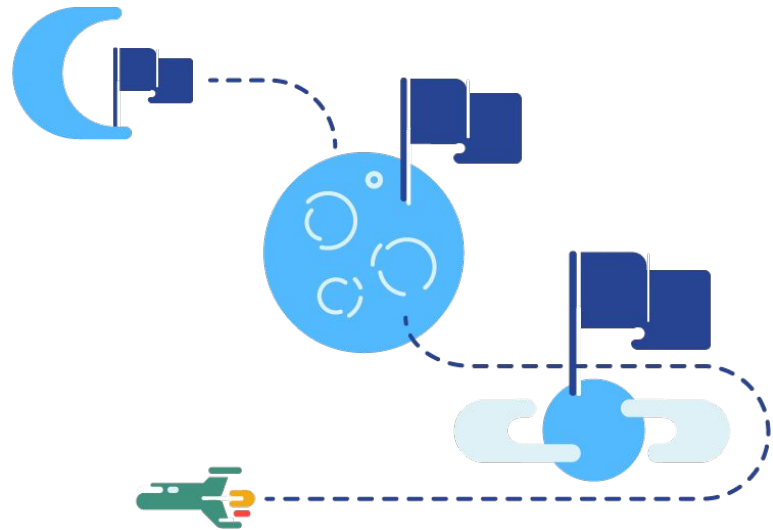
# Agenda

Definitions

Frameworks Generations

5th Generation

Demos



# Software Library

A software library generally consists of pre-written code, classes, procedures, scripts, configuration data and more. All of the available functions within a software library can just be called/used within the program body without defining them explicitly.

```
var currentTime = DateTime.Now.ToUniversalTime();  
var timeTomorrow = DateTime.Now.AddDays(1);
```

# Software Framework

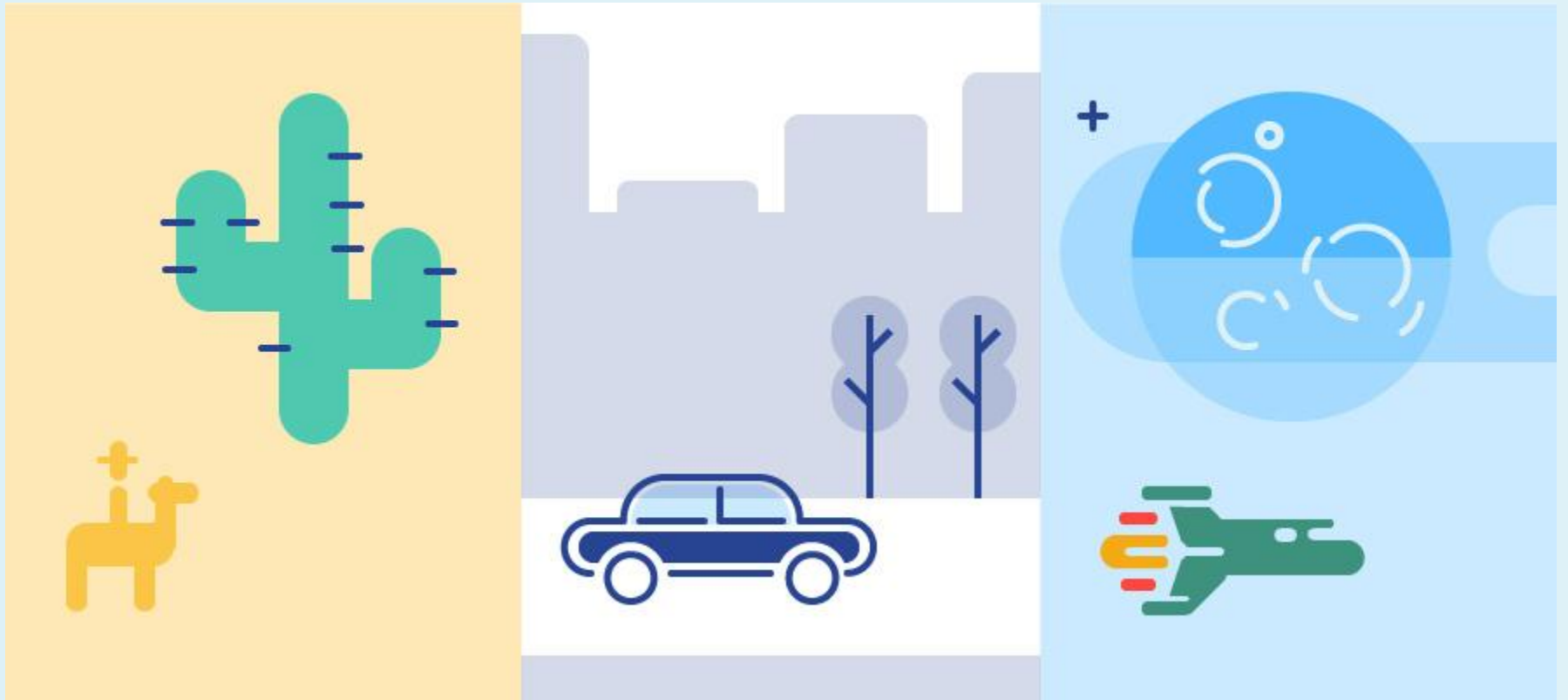
A software framework is an abstraction in which common code providing generic functionality can be selectively overridden or specialized by user code providing specific functionality.

- Inversion of control
- Default behaviour
- Extensibility
- Non-modifiable

# Test Automation Framework

Various guidelines, coding standards, concepts, processes, practices, project hierarchies, modularity, etc. to support automated testing.

# Generations of Test Automation Frameworks



# 1st Generation- Record and Playback

Country\_Cyprus\_VAT (untitled suite) - Selenium IDE 2.9.0

File Edit Actions Options Help

Base URL

Fast Slow

Test Case

Country\_Cyprus\_VAT

Command	Target	Value
click	//*[contains(@id,'rcbPrefillBillingFromClient_rcbFiel...]	
type	//*[contains(@id,'rcbPrefillBillingFromClient_rcbFiel...]	Offline Shopping Cart
click	//*[contains(@id,'rcbPrefillBillingFromClient_rcbFiel...]	
waitForValue	//input[contains(@id,'ciBilling_txtCompanyName_tx...]	Telerik Academy
typeTelerikControls	//input[contains(@id,'ciBilling_txtAddress_txtFieldTe...]	Sofia
typeTelerikControls	//input[contains(@id,'ciBilling_txtCity_txtFieldText']]	Sofia
click	//*[contains(@id,'ciBilling_rcbCountry_rcbField_Arro...]	
click	//*[contains(@id,'ciBilling_rcbCountry_rcbField_Dro...]	
typeTelerikControls	//input[contains(@id,'txtVatId_txtFieldText']]	CY10166278W
click	//*[contains(@id,'cbSameAsBilling']]	
waitForValue	//input[contains(@id,'ciShipping_txtCompanyName...]	Telerik Academy
click	//*[contains(@id,'ciShipping_rcbCountry_rcbField_A...]	
type	//*[contains(@id,'ciShipping_rcbCountry_rcbField_In...]	China
click	//*[contains(@id,'ciShipping_rcbCountry_rcbField_D...]	
clickAndWait	//*[contains(@id,'btnNext']]	
verifyTextNotPresent	18% Value Added Tax Cyprus	
verifyTextNotPresent	Value Added Tax	
clickAndWait	//*[contains(@id,'lbtnPrev']]	
typeTelerikControls	//input[contains(@id,'txtVatId_txtFieldText']]	10166278W

Command

Target

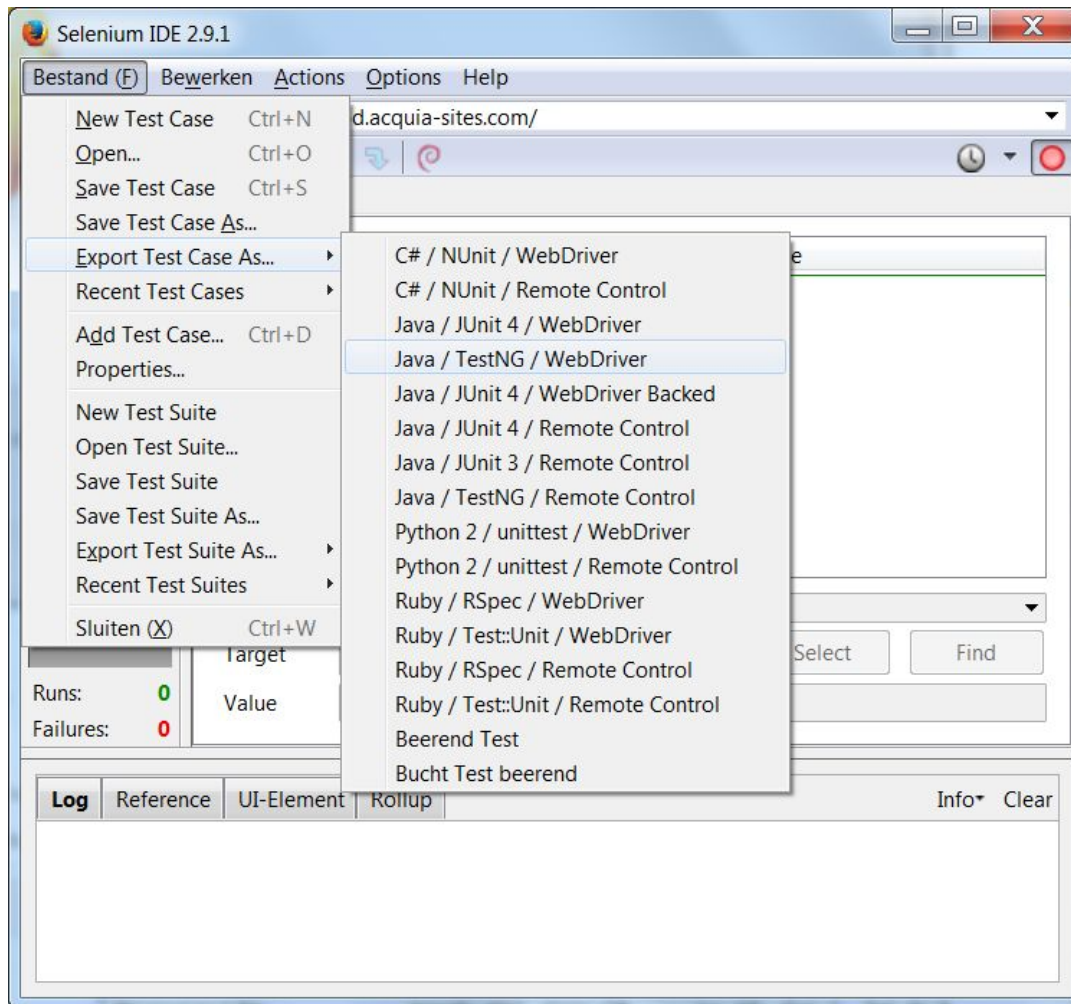
Value

Runs: 0  
Failures: 0

# 1st Generation- Pros and Cons



# 2nd Generation- Modular Frameworks



# 2nd Generation- Data Driven Frameworks

```
[DataSource("Microsoft.VisualStudio.TestTools.DataSource.CSV", "TestsData.csv",  
"TestsData#csv", DataAccessMethod.Sequential)]  
[TestMethod]  
public void DataDrivenTest()  
{  
    int valueA = Convert.ToInt32(this.TestContext.DataRow["valueA"]);  
    int valueB = Convert.ToInt32(this.TestContext.DataRow["valueB"]);  
    int expected = Convert.ToInt32(this.TestContext.DataRow["expectedResult"]);  
}
```

## 2nd Generation- Pros and Cons



# 3rd Generation- Library Architecture



## Have an Account?

If you have an account with us, [please login](#) to reuse an existing payment info.  
If you don't have a Telerik account, fill in the form below and we will create one for you.

### Billing Information (\*Required)

First name\* Anton

Last name\* Angelov

E-mail\* anton.angelov@yahoo.com

Company\* Progress

Phone\* 08894465464

Address\* 33 Alexander Malinov Blvd., 33 Alexa

City\* Sofia

Country\* Bulgaria

Zip/Postal code 1729

European VAT ID

If no VAT ID is provided, Value Added Tax at the rate for the particular country will be charged on any eligible items. **IMPORTANT:** Telerik will NOT issue any tax refunds if a valid VAT number is provided after the purchase has already been processed. Contact an office near you for questions or assistance.

### License Holder Information (Who is the License Holder?)

Same as billing

First name\* Anton

Last name\* Angelov

Email\* anton.angelov@yahoo.com

Company\* Progress

Address\* 33 Alexander Malinov Blvd., 33 Alexa

City\* Sofia

Country\* Bulgaria

Zip/Postal code 1729

# 3rd Generation- Library Architecture

```
public void PurchaseItem(string item, double itemPrice, ClientInfo clientInfo)
{
    this.itemPage.Open(item);
    this.itemPage.AssertPrice(itemPrice);
    this.itemPage.ClickBuyNowButton();
    this.signInPage.ClickContinueAsGuestButton();
    this.shippingAddressPage.FillShippingInfo(clientInfo);
    this.shippingAddressPage.AssertSubtotalAmount(itemPrice);
    this.shippingAddressPage.ClickContinueButton();
    this.checkoutPage.AssertSubtotal(itemPrice);
}
```

# 3rd Generation- Keyword Driven

Number	Description	Keyword	Object
Step 1	Click login link on home page	clicklink	//*[@id="menu-main"]/li[3] /a
Step 2	Enter email	inputdata	id="email"
Step 3	Enter password	inputdata	id="pass"
Step 4	Verify login button enabled	verifybutton	class="loginBtn"
Step 5	Log in to the app	login	anton@gmail.com,12345

# 3rd Generation- Pros and Cons



# 4th Generation- Hybrid Frameworks



# 4th Generation- BDD Based Frameworks

**Scenario:** Successfully Convert Seconds to Minutes

**When** I navigate to Seconds to Minutes Page

**And** type seconds for 1 day, 1 hour, 1 minute, 1 second

**Then** assert that 1501 minutes are displayed as answer

**Scenario:** Successfully Convert Seconds to Minutes No Minutes

**When** I navigate to Seconds to Minutes Page

**And** type seconds for 1 day, 1 hour, 1 second

**Then** assert that 1500 minutes are displayed as answer

# 4th Generation- BDD Based Frameworks

```
[When(@"type (.*) kWh")]
public void WhenTypeKWh(double kWh)
{
    this.kilowattHoursPage.ConvertKilowattHoursToNewtonMeters(kWh);
}

[When(@"type (.*) kWh in (.*) format")]
public void WhenTypeKWhInFormat(double kWh, Format format)
{
    this.kilowattHoursPage.ConvertKilowattHoursToNewtonMeters(kWh, format);
}
```

# 4th Generation- Pros and Cons

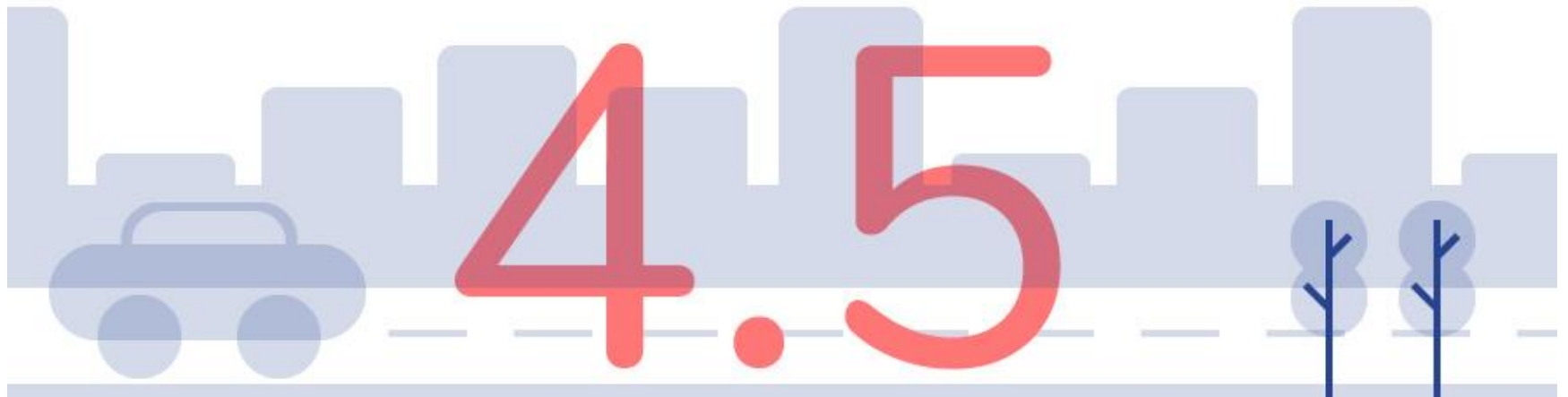


# 4.5th Generation- Selenium Based



```
@Test
public void testLogin() {
    open("/login");
    $(By.name("user.name")).setValue("johny");
    $("#submit").click();
    $("#username").shouldHave(text("Hello, Johny!"));
}
```

# 4.5th Generation- Pros and Cons



# 5th Generation- Full-Stack

- Well Documented
- Fully Covered with Tests
- Entirely Coded
- Cross-technology Support
- Cross-platform
- Parallel and Distributed Testing
- Extendable and Customizable

# The Bellatrix Story

Bellatrix is a cross-platform, an easily customizable and extendable .NET test automation framework that increases tests' reliability.



# Cross-platform Readiness



# Cross-technology Readiness- Web

```
[TestClass]
[Browser(BrowserType.Firefox, BrowserBehavior.ReuseIfStarted)]
[ExecutionTimeUnder(2)]
public class BellatrixBrowserBehaviourTests : WebTest
{
    [TestMethod]
    [Browser(BrowserType.Chrome, BrowserBehavior.RestartOnFail)]
    public void BlogPageOpened_When_PromotionsButtonClicked()
    {
        App.NavigationService.Navigate("http://demos.bellatrix.solutions/");
        var blogLink = App.ElementCreateService.CreateByLinkText<Anchor>("Blog");
        blogLink.EnsureIsVisible();

        blogLink.Click();
    }
}
```

# Cross-technology Readiness- Desktop

```
[TestClass]
[App(Constants.WpfAppPath, AppBehavior.RestartEveryTime)]
[ExecutionTimeUnder(2)]
public class ControlAppTests : DesktopTest
{
    [TestMethod]
    public void MessageChanged_When_ButtonHovered_Wpf()
    {
        var button = App.ElementCreateService.CreateByName<Button>("LoginButton");
        button.Hover();
        var label = App.ElementCreateService.CreateByName<Button>("successLabel");
        label.EnsureInnerTextIs("Sucess");
    }
}
```

# Cross-technology Readiness- Mobile

```
[TestClass]
[Android(Constants.AndroidNativeAppPath,
    Constants.AndroidDefaultAndroidVersion,
    Constants.AndroidDefaultDeviceName,
    Constants.AndroidNativeAppAppAppiumPackage,
    ".view.Controls1",
    AppBehavior.ReuseIfStarted)]
public class ButtonControlTests : AndroidTest
{
    [TestMethod]
    [TestCategory(Categories.CI)]
    [TestCategory(Categories.Mobile)]
    public void ButtonClicked_When_CallClickMethod()
    {
        var button = App.ElementCreateService.CreateByIdContaining<Button>("button");
        button.Click();
    }
}
```

# Cross-technology Readiness- API

```
[TestClass]
[ExecutionTimeUnder(2)]
public class CreateSimpleRequestTests : APITest
{
    [TestMethod]
    public void GetAlbumById()
    {
        var request = new RestRequest("api/Albums/10");
        var client = App.GetApiClientService();

        var response = client.Get<Albums>(request);
        response.AssertContentContains("Audioslave");
    }
}
```

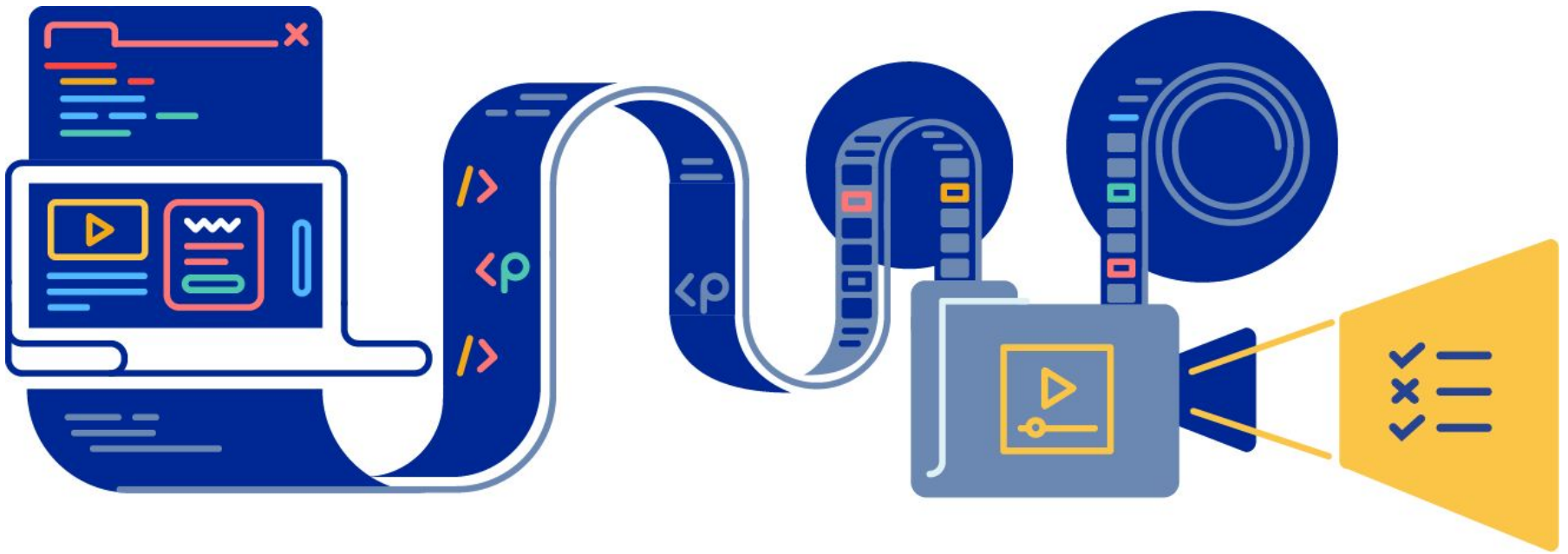
# Easy Knowledge Transfer

The image shows a Visual Studio IDE with a C# code file named `BellatrixBrowserBehaviourTests.cs` open. The code is for a test class `BellatrixBrowserBehaviourTests` that inherits from `WebTest`. It includes several comments and methods:

- Line 22: `// If you place attribute over the class all tests inherit the behaviour. It is possible to place it`
- Line 23: `[Browser(BrowserType.Firefox, BrowserBehavior.ReuseIfStarted)]`
- Line 25: `// 2.2. All web Bellatrix test classes should inherit from the WebTest base class. This way you can`
- Line 26: `public class BellatrixBrowserBehaviourTests : WebTest`
- Line 27: `{`
- Line 28: `// 2.3. All MSTest tests should be marked with the TestMethod attribute.`
- Line 29: `[TestMethod]`
- Line 30: `public void PromotionsPageOpened_When_PromotionsButtonClicked()`
- Line 31: `{`
- Line 32: `// There is more about the App class in the next sections. However, it is the primary point v`
- Line 33: `// It comes from the WebTest class as a property. Here we use the Bellatrix navigation servic`
- Line 34: `App.NavigationService.Navigate("http://demos.bellatrix.solutions/");`
- Line 35:
- Line 36: `// Use the element creation service to create an instance of the anchor. There are much more`
- Line 37: `var promotionsLink = App.ElementCreateService.CreateByLinkText<Anchor>("Promotions");`
- Line 38:
- Line 39: `promotionsLink.Click();`
- Line 40: `}`
- Line 41:
- Line 42: `[TestMethod]`
- Line 43:
- Line 44: `// 2.4. As mentioned above you can override the browser behaviour for a particular test. The glo`
- Line 45: `// Only for this particular test, Bellatrix opens Chrome and restarts it only on fail.`
- Line 46: `[Browser(BrowserType.Chrome, BrowserBehavior.RestartOnFail)]`
- Line 47: `public void BlogPageOpened_When_PromotionsButtonClicked()`
- Line 48: `{`
- Line 49: `App.NavigationService.Navigate("http://demos.bellatrix.solutions/");`

The Solution Explorer on the right shows a project structure with folders for `00. Templates`, `01. Folder and File Structure`, `02. Control Browser`, `03. Navigate To Pages`, `04. Locate Elements`, `05. Locate and Wait Elements`, `06. Wait for Elements`, `07. Common Services`, `08. Common Controls`, `09. Normal Assertions`, `10. Ensure Assertions`, `11. Behaviour Driver Development BDD L`, and `12. Page Objects`. The `BellatrixBrowserBehaviourTests.cs` file is highlighted under the `02. Control Browser` folder.

# Troubleshooting Easiness



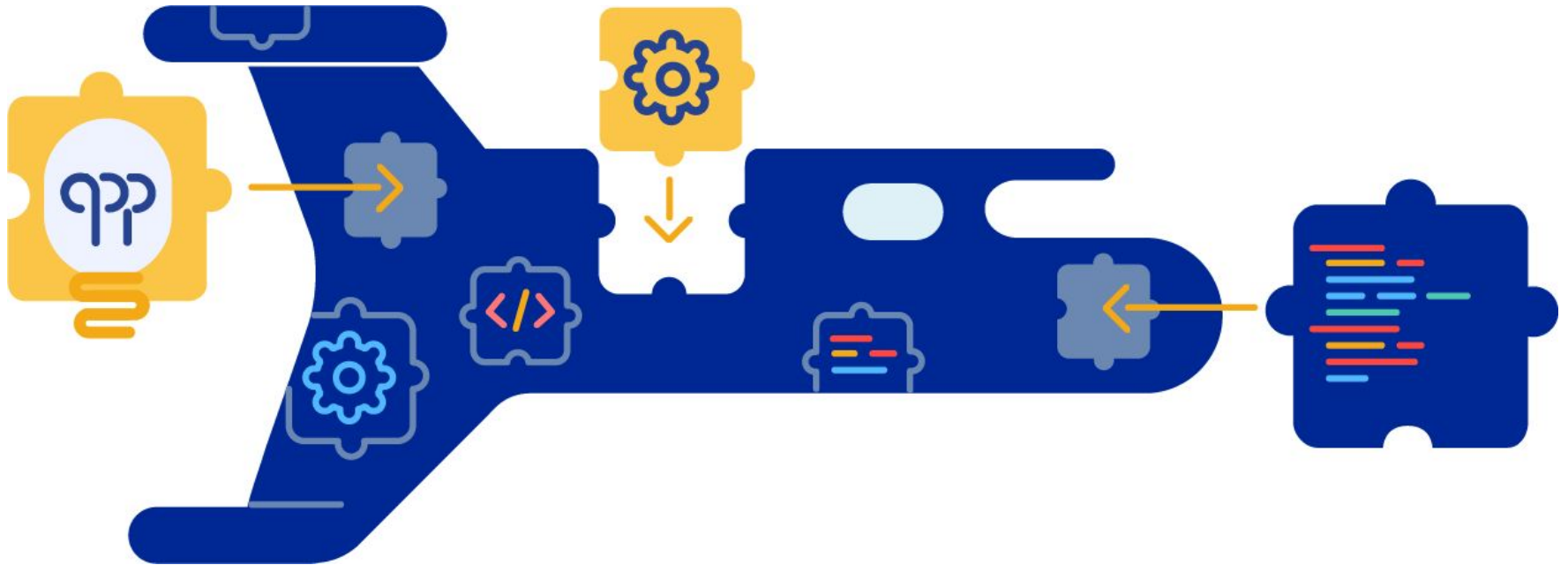
# Full-page Screenshots on Test Failure

```
[TestClass]
[ScreenshotOnFail(true)]
[Browser(BrowserType.Chrome, BrowserBehavior.ReuseIfStarted)]
public class FullPageScreenshotsOnFailTests : WebTest
{
    [TestMethod]
    public void PromotionsPageOpened_When_PromotionsButtonClicked()
    {
        App.NavigationService.Navigate("http://demos.bellatrix.solutions/");
        var promotionsLink = App.ElementCreateService.CreateByLinkText<Anchor>("Promotions");
        promotionsLink.Click();
    }
}
```

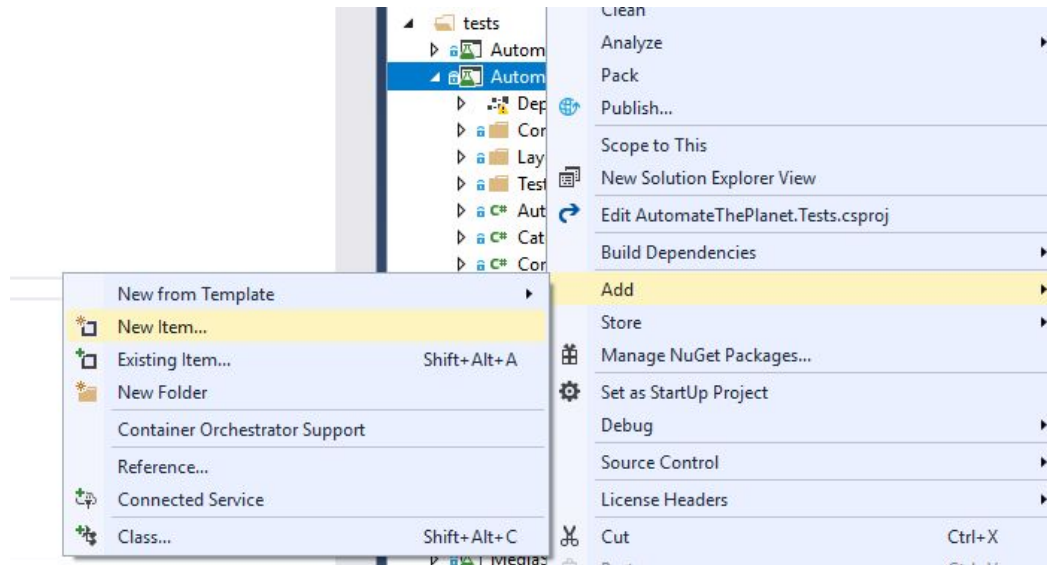
# Video Recording on Test Failure

```
[TestClass]
[VideoRecording(VideoRecordingMode.OnlyFail)]
[Browser(BrowserType.Chrome, BrowserBehavior.ReuseIfStarted)]
public class VideoRecordingTests : WebTest
{
    [TestMethod]
    public void PromotionsPageOpened_When_PromotionsButtonClicked()
    {
        App.NavigationService.Navigate("http://demos.bellatrix.solutions/");
        var promotionsLink = App.ElementCreateService.CreateByLinkText<Anchor>("Promotions");
        promotionsLink.Click();
    }
}
```

# Library Customization



# Accelerate Tests Creation- Templates



```
└─ LoginPage
   ├── + C# LoginPage.Assertions.cs
   ├── + C# LoginPage.Elements.cs
   └── + C# LoginPage.Methods.cs
```

# Accelerate Tests Creation- Code Snippets

```
public TextField CouponCode => Element.CreateById<TextField>("coupon_code");
```



# Summary

- Definitions
- Generations of Test Automation Frameworks
- Define 5th Generation Frameworks
- Demos

# Resources

- <http://docs.bellatrix.solutions>
- <https://www.automatetheplanet.com/>
- MSDN

# Questions

