# Lab Module 2 – Build a Domain Specific Language

## Introduction

Writing Web UI Automation Test is quite intuitive and easy to write once you’ve seen a few examples using Selenium to locate elements, perform action and make some assertions.

However, maintaining these UI Automated test *– which are brittle by nature –* can be harder over time to the point where it becomes impractical to maintain.

In this module we will explore a few patterns to introduce a strong separation of concerns between the scripts *- which are the specifications or scenarios of what the tests should do –* and specialised objects abstracting the detailed interaction with the Pages using Selenium of our Application or System Under Test (SUT).

## Pre-requisites

Docker for Windows/Mac/Ubuntu, Visual Studio 2015, 2017 or 2019 and a GitHub account.

## Objectives

After completing this lab, you will be able to:

* Refactor existing brittle UI Selenium Tests with a lightweight DSL using Page Objects
* Understand how to apply SOLID, DRY and DAMP principle to maximise, optimise maintainability & readability of your test harness
* Although this example focuses on Web UI Automation, these principles apply for any type of interfaces whether Desktop or Mobile.

Scenario

Our new e-commerce website is about to release to production and some UI Selenium tests were written in a rush due to tight deadline by a contractor who left the organisation. You are now in charge on maintain these and extends these as a Automation Quality Engineer.

## Setting up

Cloning out Application Under Test

All the demos use the open source ASP.NET Core 2.2 reference application eShopOnWeb.

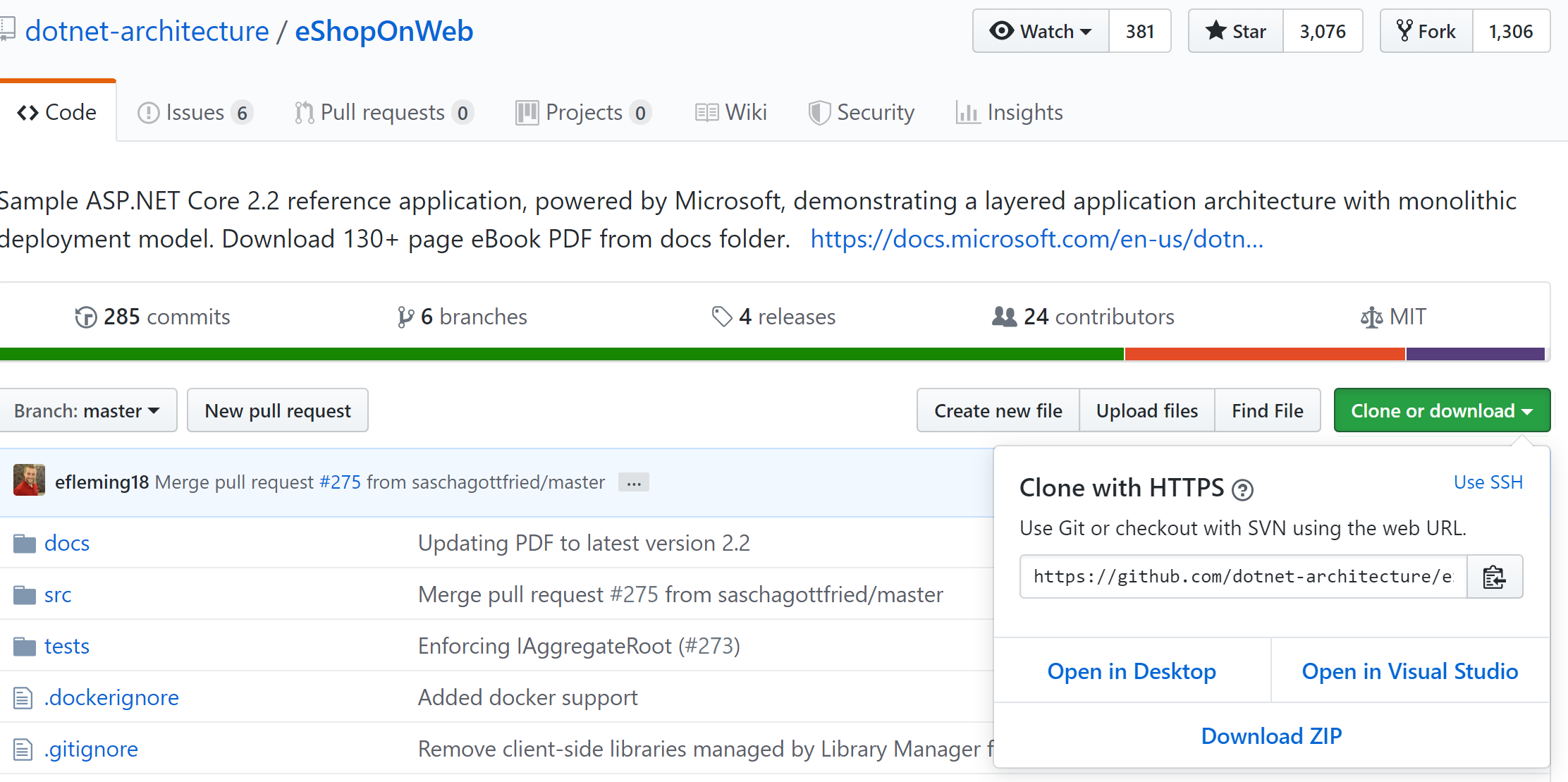
1. To set it up and getting it running, please execute the following commands:

git clone <https://github.com/dotnet-architecture/eShopOnWeb>  
cd eShopOnWeb  
docker-compose build  
docker-compose up

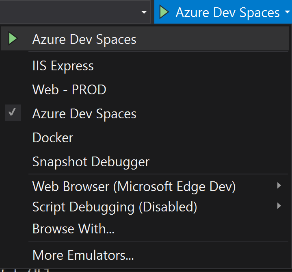
You can now access the application from <http://localhost:5106>

1. Alternatively, if you have an Azure Subscription, the solution can be deployed in Azure DevTest AKS environment. If you don’t have a AKS DevTest Cluster run the following Azure CLI command using [Azure Cloud Shell](https://docs.microsoft.com/en-us/azure/cloud-shell)

az aks create -g <resourceGroupName> -n <AKSClusterName> --location <region> --disable-rbac --generate-ssh-keys

Then clone the repository and open eShopOnWeb.sln with Visual Studio

And finally deploy using Azure DevTest from the list of execution environments as below:

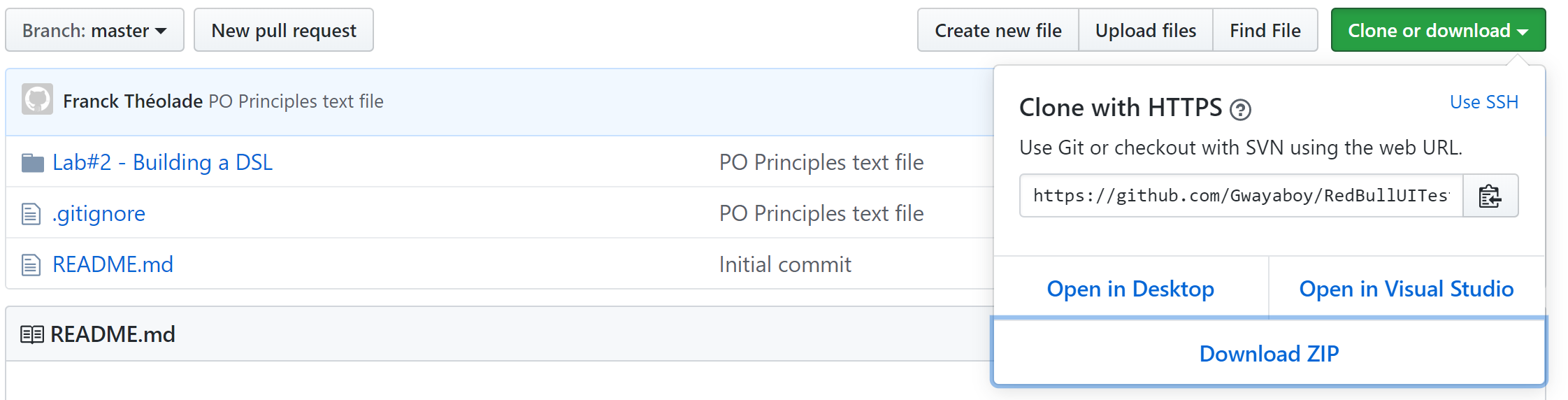


Cloning the Labs Repository

Download and clone the repository

git clone <https://github.com/Gwayaboy/RedBullUITestingWorkshop>

Or clone navigate to the URL above and choose clone with Visual Studio:



### Exercise 1: Refactoring with Page Objects

#### Introduction

1. Refactoring and shuffle code around to encapsulate and facilitate Page Object flows
2. Encapsulate the page interaction into Page Objects
3. Break down long running tests into separate scenarios flow

#### Tasks 1.1: Refactoring Plumbing code to facilitate Page Objects

*The Page Object pattern is as a way of encapsulating the interaction with an individual page in your application in a single object. It makes heavy use of Object-Oriented principles to enable code reuse and improve maintenance. Your test scripts are very procedural, and the details are handled in Page Objects. Scripts are the* ***What*** *and Page Objects are the* ***How****.*

1. Expand the Step 1 folder under the solution and notice there is a *IntroducingPageObjects.txt* file. You can read that file at the end of this exercise to gain more perspective on the purpose and principles of Page Object pattern.
2. First, let’s add an abstract Page class at the root of the solution, this will be our base page object which all our page will inherit from. This page will encapsulate selenium’s IWebDriver instance
3. Let’s add a protected WebDriver Property and a couple of public properties for our pages like Title and Url.

public abstract class Page

{

protected IWebDriver WebDriver { get; private set; }

public string Title => WebDriver.Title;

public string Url => WebDriver.Url;

}

1. In our base Page we will also need a static internal generic method which will be responsible for navigating and creating our initial page object.

We will also guard our method against null WebDriver and empty or null start-up URL

internal static TPage NavigateToInitial<TPage>(IWebDriver driver, string url)

where TPage: Page, new()

{

if (driver == null)

throw new ApplicationException("Please provide web driver to proceed");

if (string.IsNullOrWhiteSpace(url))

throw new ApplicationException("Please provide with a start-up url");

driver.Navigate().GoToUrl(url);

return new TPage { WebDriver = driver };

}

*Notice we have placed some constraints on the generic TPage type to only return concrete children from Page with parameter-less constructors.*

1. Let’s now introduce our first page object which will encapsulate our landing page.

Under Step 1 folder, add a Pages subfolder and add in that folder our HomePage Page class which inherits from our base Page.

1. Then we will need a factory class which will be responsible for creating WebDriver instance and navigating to an initial page.

Add at the root of the solution a BrowserHost class as follow:

public class BrowserHost

{

private IWebDriver \_webdriver;

private BrowserHost(IWebDriver webDriver)

{

\_webdriver = webDriver;

\_webdriver.Manage().Window.Maximize();

}

public TPage NavigateToInitial<TPage>(string url)

where TPage : Page, new()

{

return Page.NavigateToInitial<TPage>(\_webdriver, url);

}

public static BrowserHost Chrome()

{

var options = new ChromeOptions();

options.AddArgument("test-type");

var directory = Directory.GetCurrentDirectory();

return new BrowserHost(new ChromeDriver(directory, options));

}

}

1. Next, Let’s make BrowserHost implement IDisposable and implement the disposable pattern as follow:

#region IDisposable Support

private bool disposedValue = false; // To detect redundant calls

protected virtual void Dispose(bool disposing)

{

if (!disposedValue && disposing && (\_webdriver != null))

{

\_webdriver.Quit();

\_webdriver.Dispose();

\_webdriver = null;

}

disposedValue = true;

}

// This code is added to correctly implement the disposable pattern.

public void Dispose()

{

Dispose(true);

}

#endregion

#### Tasks 1.2: Breaking Down BrittleTest and Plumbing code to facilitate Page Objects

We can now start refactoring our functional test about buying a Mug of T by breaking down BrittleTest which mix a few things functional flows

* Search for a Mug<T>
* Add to Basket and Head to Checkout
* Checkout, Place Order and Verify Order has been placed

Using our Page Objects DSL, we will focus on confirming you can add a Mug<T> to the basket (providing it exists in our product catalogue), and head to checkout. Then we will introduce separate test for searching for an item through the product catalogue and lastly proving there’s many items in the basked we can place an order.

1. Let’s start by adding a new AddingToBasketAndCheckingOutTests Test class file