



How to Automate API Testing

(TDD + BDD) = ATDD

knock, knock .. 😊

Pavan Yadlapalli – Automation Architect

Parallel programming on Super Computers

Telecom Integrations (C, C++, JSP)

Developer, Automation, Cloud Native

Theam

μSvc

Testing & Test Automation

Tests & levels of testing

TDD & BDD

implementation on sample apps

Postman

Automation & Gates

References & Links

Q&A

μ Services

- Why? smaller, more focussed "micro" services.
- Micro
- Independent
- Cooperating
- 12- Factors (<http://12factor.net/>)
- Start with Monolith , Separate them based on demand (<http://www.appcontinuum.io/>)

Testing & Test Automation

Why Testing

- Production-ready software requires testing before it goes into production
- whether the developed **software** met the specified requirements or not and to identify the defects to ensure that the product is defect free

Why Test Automation

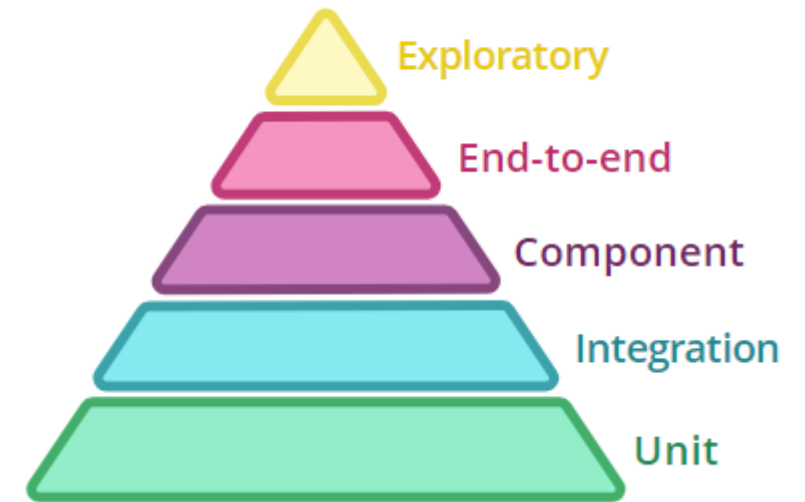
- Continuous delivery
- Building, testing and deploying an ever-increasing amount of software manually soon becomes impossible
- It's obvious that testing all changes manually is time-consuming, repetitive and tedious. Repetitive is boring, boring leads to mistakes

Tests

Present in our Services, we have tried coverage gates at 50%
Sometimes convoluted.
Didn't ensure that the service will even get up.

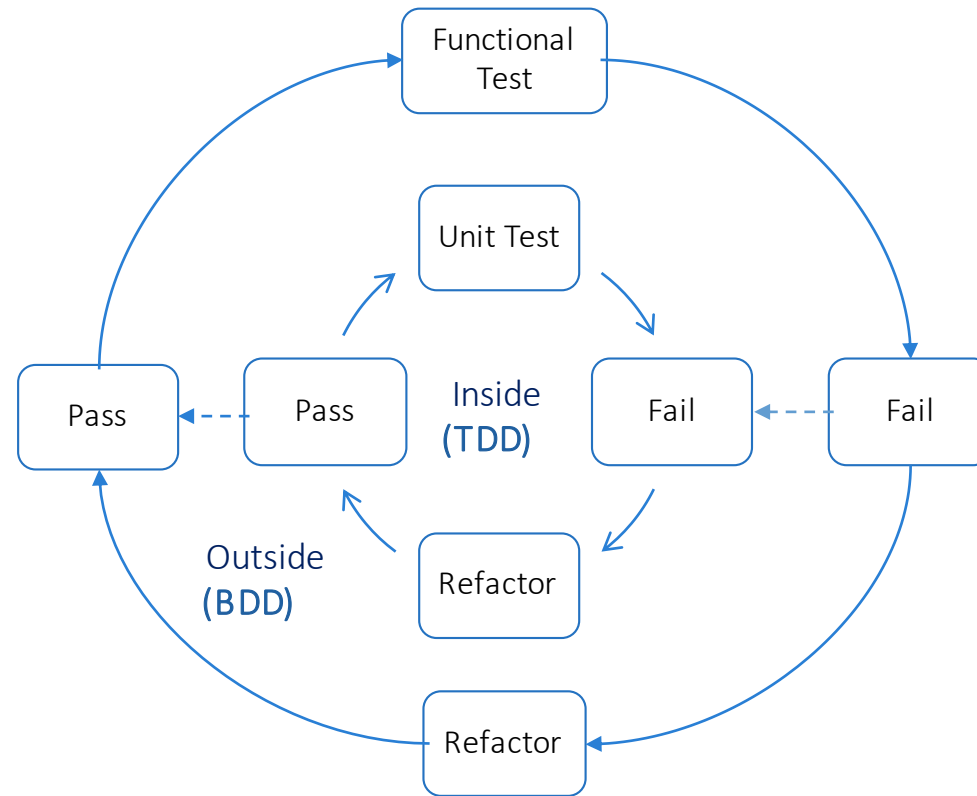
So, Whats the correct way?

- Run the whole app's process.
- App "doesn't know" it's not in production.
- Run locally, before a commit.
- High confidence that the app will get up.
- ...require external services and data bases...



<https://martinfowler.com/articles/microservice-testing/#conclusion-test-pyramid>

TDD (Just what we need) but how?



Pros and Challenges of this Approach

- 1. encourages better design of production code
- 2. increases the testability of the product
- 3. quick feedback to developers
- 4. Automation

Requirements

- 1. Discipline
- 2. Tools

TDD – Just TDD Python..!

- Python
- Pylint
- Bravado (Swagger)
- Mountebank
- Flask

Unit test

```
def test_create_qrcode_isnone(self): @patch('qrrelation.relation.relation.relationdf',r
    with self.assertRaises(TypeError) as exc:
        self.tmp.createQR()
        return_value='5678')
def test_create_qrcode_scale(self):
    self.assertIn(b'PNG',
self.tmp.createQR("test",6))
```

Component test

```
def test_getrelation(self,relationdf_mock):
    self.assertIsNotNone(self.tmp.getRelation(
"tmp"))
```

Integration Test

```
def test_something(our_service, db):
    db.put(TEST_DB_ENTRY)
    response = requests.get(
        our_service.url + '/something',
        headers={'Authorization': TEST_AUTH_HEADER})
    assert response.status_code == 200
```

```
import pytest, redis
@pytest.yield_fixture(scope='function')
def db(db_session):
    yield db_session
    db_session.flushdb()
@pytest.fixture(scope='session')
def db_session(redis_port):
    return redis.Redis(port=redis_port, db=0)
```

Name	Stmts	Miss	Cover	Missing
End2End-test.py	23	0	100%	
__init__.py	0	0	100%	
app.py	14	0	100%	
config.py	15	0	100%	
integration-test.py	9	0	100%	
qrcodegen__init__.py	0	0	100%	
qrcodegen\qrcode.py	8	0	100%	
qrrelation__init__.py	0	0	100%	
qrrelation\relation.py	5	0	100%	
unit_test.py	37	0	100%	
TOTAL	111	0	100%	

ATDD Example –TDD & BDD

Story :

Given the Name
when I send to REST API
Then API should Accept Save to DB and return 200

```
0 references | PXY6797, 1 day ago | 1 author, 2 changes
public class ControllerTest : IDisposable
{
    [Fact]
    0 references | PXY6797, 1 day ago | 1 author, 2 changes | 0 exceptions
    public void Test_GetLastName_Controller()
    {
        var testctrlr = new InfoController();
        Assert.NotNull(testctrlr.GetLastName("Test"));
    }
    - references | PXY6797, 1 day ago | 1 author, 1 change | 0 exceptions
    public void Dispose()
    {
    }
}
```

```
- references | PXY6797, 1 day ago | 1 author, 3 changes
lic class DaoTest : IDisposable

[Fact]
0 references | PXY6797, 1 day ago | 1 author, 2 changes | 0 exceptions
public void Test_GetLastName_dao()
{
    var testctrlr = new LastNameDAO();
    Assert.NotNull(testctrlr);
}
[Fact]
0 references | PXY6797, 1 day ago | 1 author, 2 changes | 0 exceptions
public void Test_GetLastName_method_dao()
{
    var testctrlr = new LastNameDAO();
    Assert.NotNull(testctrlr.GetLastName("test"));
}
[Fact]
0 references | PXY6797, 1 day ago | 1 author, 2 changes | 0 exceptions
public void Test_GetLastName_method_returntype_dao()
{
    var testctrlr = new LastNameDAO();
    Assert.IsType<InfoName>(testctrlr.GetLastName("test"));
}
[Fact]
0 references | PXY6797, 1 day ago | 1 author, 2 changes | 0 exceptions
public void Test_GetLastName_method_returnnotempty_dao()
{
    var testctrlr = new LastNameDAO();
    Assert.IsType<InfoName>(testctrlr.GetLastName("test"));
    Assert.NotNull(testctrlr.GetLastName("test").FirstName);
    Assert.NotNull(testctrlr.GetLastName("test").LastName);
    Assert.Equal("test", testctrlr.GetLastName("test").FirstName);
}
}
```

```
[Scenario]
0 references | PXY6797, 1 day ago | 1 author, 1 change | 0 exceptions
public async Task Behave_API(string First, HttpClient client, HttpStatusCode answer)
{
    HttpResponseMessage httpResponse = null;

    "Given the Name test"
    .x(() => First="test");

    "And Create Client for API"
    .x(() => client = _factory.CreateClient());

    "When I send First name to API"
    .x(async () =>
    {
        httpResponse = await this.client.GetAsync("/api/Info/test");

        // Must be successful.
        httpResponse.EnsureSuccessStatusCode();
        answer = httpResponse.StatusCode;
    });

    "Then the response should be 200"
    .x(() => Xunit.Assert.Equal(HttpStatusCode.OK, answer));
}
```

Unit, Integration, Component & Contract Test

0 references | PXV6797, 1 day ago | 1 author, 3 changes

```
public class DaoTest : IDisposable
{
    [Fact]
    0 references | PXV6797, 1 day ago | 1 author, 2 changes | 0 exceptions
    public void Test_GetLastName_dao()
    {
        var testctrlr = new LastNameDAO();
        Assert.NotNull(testctrlr);
    }
    [Fact]
    0 references | PXV6797, 1 day ago | 1 author, 2 changes | 0 exceptions
    public void Test_GetLastName_method_dao()
    {
        var testctrlr = new LastNameDAO();
        Assert.NotNull(testctrlr.GetLastName("test"));
    }
    [Fact]
    0 references | PXV6797, 1 day ago | 1 author, 2 changes | 0 exceptions
    public void Test_GetLastName_method_returntype_dao()
    {
        var testctrlr = new LastNameDAO();
        Assert.IsType<InfoName>(testctrlr.GetLastName("test"));
    }
    [Fact]
    0 references | PXV6797, 1 day ago | 1 author, 2 changes | 0 exceptions
    public void Test_GetLastName_method_returnnotempty_dao()
    {
        var testctrlr = new LastNameDAO();
        Assert.IsType<InfoName>(testctrlr.GetLastName("test"));
        Assert.NotNull(testctrlr.GetLastName("test").FirstName);
        Assert.NotNull(testctrlr.GetLastName("test").LastName);
        Assert.Equal("test", testctrlr.GetLastName("test").FirstName);
    }
}
```

```
[Fact]
0 references | 0 changes | 0 authors, 0 changes | 0 exceptions
public void SaveLastName_Response_Test()
{
    string storedProcedure = null;
    SqlParameter[] parameters = null;

    var request = new SaveLastNameRequest()
    {
        FirstName = "test",
        LastName = 1
    };

    _mockDbContainer.Setup(dao => dao.ExecuteProcedure(It.IsAny<string>(), It.IsAny<SqlParameter[]>()))
        .Returns(1).Callback<string, SqlParameter[]>((s, sp) =>
        {
            storedProcedure = s;
            parameters = sp;
        });

    var response = dao.SaveNotification(request);

    Assert.Equal("[RWD].[usp_SaveNotification]", storedProcedure);
    Assert.Equal(11, parameters.Length);
}
1 reference | PXV6797, 1 day ago | 1 author, 2 changes | 0 exceptions
public void Dispose()
{
}
```

9

1 reference | PXV6797, 1 day ago | 1 author, 2 changes

```
public class IntegrationTests : IClassFixture<WebApplicationFactory<Startup>>
{
    private readonly HttpClient _client;
    private readonly WebApplicationFactory<Startup> _factory;
    0 references | PXV6797, 1 day ago | 1 author, 1 change | 0 exceptions
    public IntegrationTests(WebApplicationFactory<Startup> factory)
    {
        _factory = factory;
        _client = factory.CreateClient();
    }
    [Fact]
    0 references | 0 changes | 0 authors, 0 changes | 0 exceptions
    public async Task Integration_can_save_lastName()
    {
        // The endpoint or route of the controller action.
        var httpResponse = await _client.GetAsync("/api/Info/test");

        // Must be successful.
        httpResponse.EnsureSuccessStatusCode();
        Assert.Equal(HttpStatusCode.OK, httpResponse.StatusCode);
    }
}
```

[Fact]

0 references | PXV6797, 1 day ago | 1 author, 1 change | 0 exceptions

```
public async Task Contract_Test_Swagger_avilable()
{
    // The endpoint or route of the controller action.
    var httpResponse = await _client.GetAsync("/");

    // Must be successful.
    httpResponse.EnsureSuccessStatusCode();
    Assert.Equal(HttpStatusCode.OK, httpResponse.StatusCode);
    var response = await httpResponse.Content.ReadAsStringAsync();
    Assert.Contains("Swagger", response);
}
```

Coverage and Gates

```
Total tests: 8. Passed: 8. Failed: 0. Skipped: 0.
```

```
Test Run Successful.
```

```
Test execution time: 9.6891 Seconds
```

```
Calculating coverage result...
```

```
Generating report 'C:\CGX_V2\dotnetTDD\dotnetTDDTest\coverage.json'
```

```
+-----+-----+-----+-----+
| Module      | Line   | Branch | Method |
+-----+-----+-----+-----+
| dotnetTDDApi | 90.69% | 83.33% | 87.5%  |
+-----+-----+-----+-----+
```

```
+-----+-----+-----+-----+
|           | Line   | Branch | Method |
+-----+-----+-----+-----+
| Total      | 90.69% | 83.33% | 87.5%  |
+-----+-----+-----+-----+
| Average    | 90.69% | 83.33% | 87.5%  |
+-----+-----+-----+-----+
```

Name	Stmts	Miss	Cover	Missing
End2End-test.py	25	0	100%	
__init__.py	0	0	100%	
app.py	16	1	94%	22
config.py	15	0	100%	
integration-test.py	9	0	100%	
qrcodepkg__init__.py	0	0	100%	
qrcodepkg\qrcode.py	8	0	100%	
qrrelation__init__.py	0	0	100%	
qrrelation\relation.py	5	1	80%	5
unit_test.py	35	0	100%	

```
Microsoft (R) Test Execution Command Line Tool Version 15.9.0
```

```
Copyright (c) Microsoft Corporation. All rights reserved.
```

```
Starting test execution, please wait...
```

```
Total tests: 9. Passed: 9. Failed: 0. Skipped: 0.
```

```
Test Run Successful.
```

```
Test execution time: 8.5345 Seconds
```

Postman/jmeter

```
newman run .\PythonTDD.postman_collection.json -e .\Development.postman_environment.json -d .\Data.json -n 4 --disable-unicode
```

	executed	failed
iterations	4	0
requests	4	0
test-scripts	4	0
prerequisite-scripts	0	0
assertions	8	0
total run duration: 691ms		
total data received: 36B (approx)		
average response time: 55ms		

-Iteration 1/4

```
root@Postman:~# curl http://127.0.0.1:8080/Home
GET http://127.0.0.1:8080/Home [200 OK, 160B, 183ms]
Pass Status code is 200
Pass Body matches string
```

Iteration 2/4

```
root@Postman:~# curl http://127.0.0.1:8080/Xtra [200 OK, 160B, 19ms]
Pass Status code is 200
Pass Body matches string
```

```

"name": "Postman",
"event": [
  {
    "listen": "test",
    "script": {
      "type": "text/javascript",
      "exec": [
        "tests[\"Status code is 200\"] = responseCode.",
        "",
        "tests[\"Body matches string\"] = responseBody",
      ]
    }
  }
],
"request": {
  "url": "http://{{qruri}}/{{value}}",
  "method": "GET",
  "header": {}
}

```

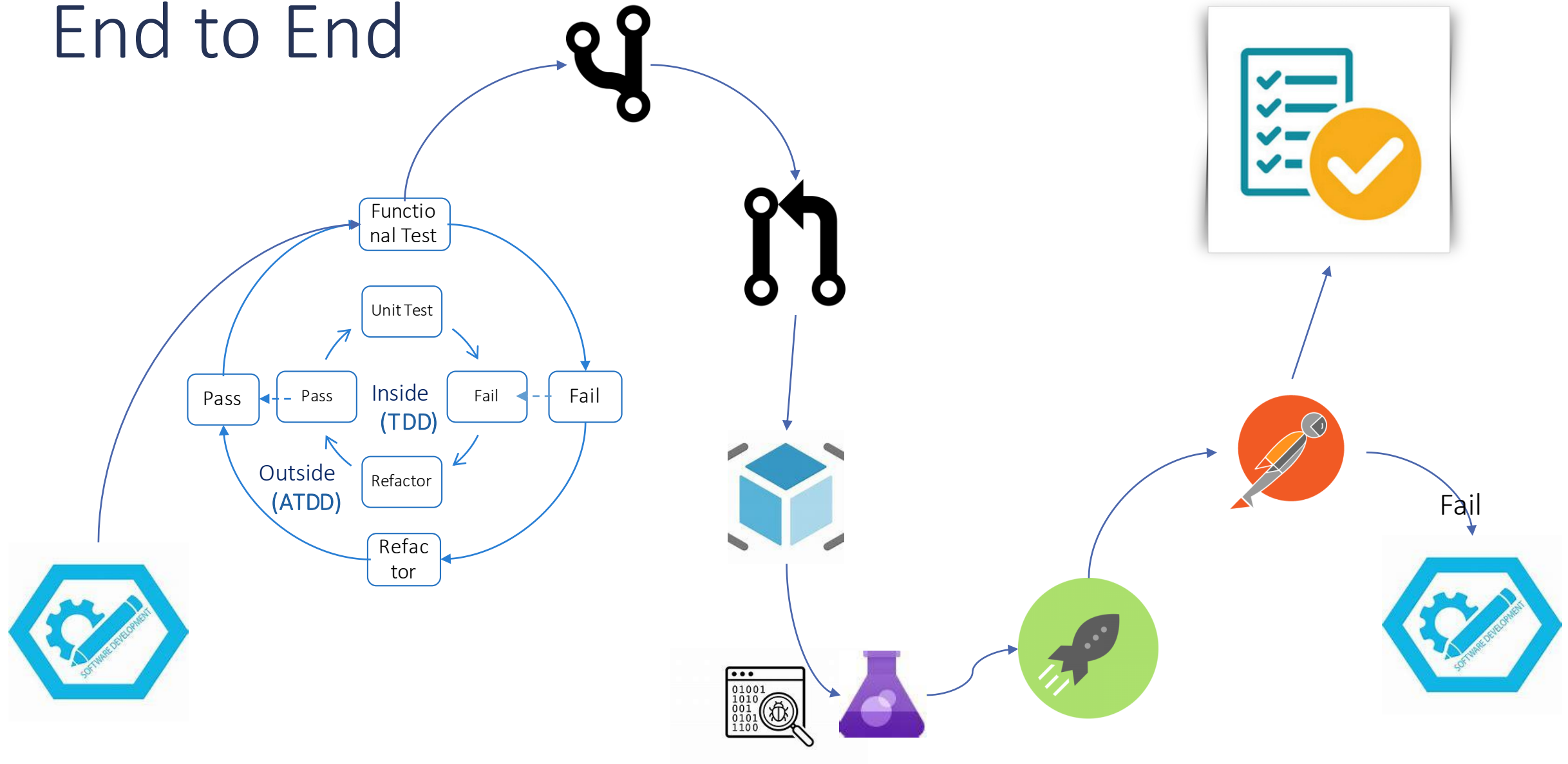
```
parallelCollectionRun = function (done) {
  newman.run(options, done);
};
```

```
// Runs the Postman sample collection through
parallel.
```

[illegible]

Cmd : Node parallelrun.js

End to End



Q & A ?

More about tests / microservices / stuff

<https://martinfowler.com/articles/microservice-testing>

<https://www.hindsightsoftware.com/blog/tdd-vs-bdd>

<http://12factor.net/>

<http://www.appcontinuum.io/>

<https://xbehave.github.io/>

<https://github.com/jkcpavan/TDDPython>

<https://github.com/jkcpavan/dotnetcoreTDD>

Thank You

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