STC 2018

ZERO Touch QA Automation Platform

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Cognizant

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Abstract

With the industry transformation to Digital Trend, there is always a need for an efficient streamlined Continuous Delivery. This Whitepaper would talk about Zero Touch QA Automation Platform. It deals with the Solution on Integrated DevOps & Quality Approach. This would consist of Artificial Intelligence in Reporting and Data Visualization. The Complete QA Cycle is automated from Test Design to Test Closure with Continuous Monitoring, involving no manual intervention. The paper would also give insights on Business benefits/outcome on adopting this approach with streamlined Governance.

ARE YOU READY FOR FULLY AUTOMATED QA SERVICE

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Top 5 Challenges

1. Need simplified automation approach to enable functional testers with test automation
2. Need manual effort reduction in end-to-end test process (test design, test results update, defect creation, end to end traceability, summary report etc.)
3. Need ability to automatically analyze the test failures
4. Need ability to focus on 360 degree Quality Assurance
5. Need solution to measure Code coverage

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(Challenge 1) - Need to simplify Test Automation

Agile Adoption

Expected to have more frequent releases

Go beyond UI test to API and data testing

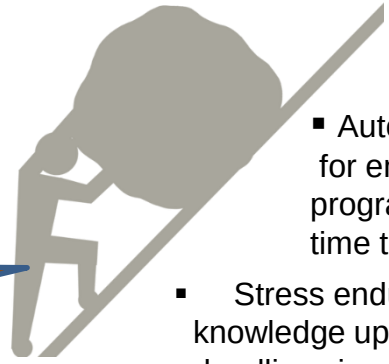
Need to automate regression / progression test cases

Adopting Agile

Current Team have less automation expertise

and no compromise on product quality

Challenges



- Automation Enablement for entire team is a programming language is time tanking process
- Stress endures handling knowledge upskilling and project deadlines in parallel

Agile Transformation demands

Layered | High adoption | Simplified

- By 2021, **50%** of enterprises will leverage **intelligent test automation**[1]
- There is a rising need to adopt script less automation using business friendly navigation flows and keyword abstraction tests to encourage the involvement of business stakeholders in testing[2]

Analysts Commentary

Application leaders who are modernizing application development face an increasing need to **deliver applications faster and of higher quality**

(Challenge 2) - Need to automate the E2E QA Ecosystem

Practically possible to practice every phase of Software Test Life Cycle Process in Agile Test Delivery Model ?

Skip QA Process… ?

Impacts

- No E2E Traceability
- lack of documentation
- loss of knowhow
- Lack of Quality Control
- Low Defect Containment efficiency
- No view on project health

Spend hours on the QA Process… ?

Impacts

- Considerable manual effort
- Prolonged Time to Market
- Not suitable in Agile delivery models

Impacts Outweigh

- Requirement Analysis
- Test Design
- ALM Update
- Test Scripts Development
- Test Execution
- Test Logs
- Test Reporting
- Test Closure

+

Focus not just on Test Execution Automation

Efficient and Continuous Testing Agility possible through Fully automated QA Process

Implement Now ! A Test Process that is hyper-efficient and delivers progressively faster cycles

Analysts Commentary

- **44%** of the Fortune 500 companies benefited from automated test management solutions[3]

"Build a continuous software delivery pipeline** achieving **Continuous Testing Agility"

Challenge 3 - Simplify Test Analysis & Reporting

Challenges encountered without an efficient Failure Analysis & Reporting Mechanism

Huge Effort spent!

Multiple test runs a day & continuous investigation of failures leading to considerable effort spend

Delayed Feedback!

Unproductive days due to bad builds and test failures caused by environmental issues

Costly & Complicated Adoption!

Challenge in adapting to complicated tools amidst project deadlines

No Transparency on Project Health

Cumbersome to monitor and maintain KPIs in multiple forum

Employ Reporting Intelligence platform with advanced analytics – "**We can't control things which we can't measure**"

Analysts Commentary

- **By 2020,** the number of users of modern business intelligence and analytics platforms that are differentiated by augmented data discovery capabilities will grow at twice the rate and deliver twice the business value of those that are not [4]

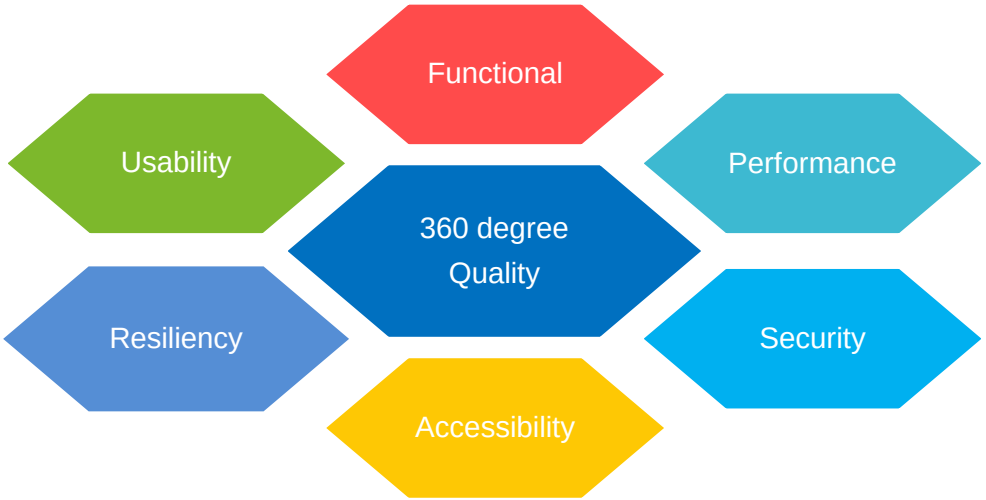
"Organizations step forward towards continuous delivery and faster feedback"

(Challenge 4) – 360 degree Quality Assurance

Do you know?
Epic Software failure that Testing could have prevented - Yahoo! Data heft in Dec'16 :
Affected 1 Billion user accounts. Information of all sorts, including email addresses, usernames, passwords, dates of birth, security questions, and even phone numbers were all reportedly leaked.
(Why? – Insufficient Quality Assurance on Non-Functional aspect | Impact ? – Affected Customer Satisfaction & brand reputation)

Take Away –> Customer Experience is the key to business outcomes viz. increased NPS, product adoption and user advocacy

What it means to QA ? -> GO Above & Beyond Functional Assurance for Better Customer Experience



Challenge

Imperative to assure on all these factors for improved quality and enriched customer experience

Important to have an early feedback and deliver at speed in a digitally assured business

Analysts Commentary

- By 2020 customer experience will overtake price and product as the key brand differentiator [5]
- 72% of businesses say that improving customer experience is their top priority [5]
- More than 50% of organizations will redirect their investments to customer experience innovations [7]

7

Challenge 5 - Need solution to measure Code coverage

Enough testing in place ?

Focusing on high value tests?

Facilitating faster Stabilization of final release ?

*<u>Conventional requirements-based testing</u> of code tends to result in considerable **over-testing** without the guarantee of **complete coverage***

Redundant & non-productive — There are too many test cases which test the same code path

Incomplete & un-tested — A tester is not aware of the areas that have not been tested

<u>Impact</u> - This typically results in additional QA cost and extended testing timelines which in turn impact project success

Analysts Survey Insights

~30%
Of all tests do not touch modified code

Capers Jones, Software Quality A survey of the state of the art

~16%
Of all bugs are found in untested code

Coverity Test Advisor – QA Edition user survey

Software delivery with **~ 2 to 7 defects per thousand lines of code (KLOC)** due to inadequate testing

Casper Jones Survey statistics

Deep Dive

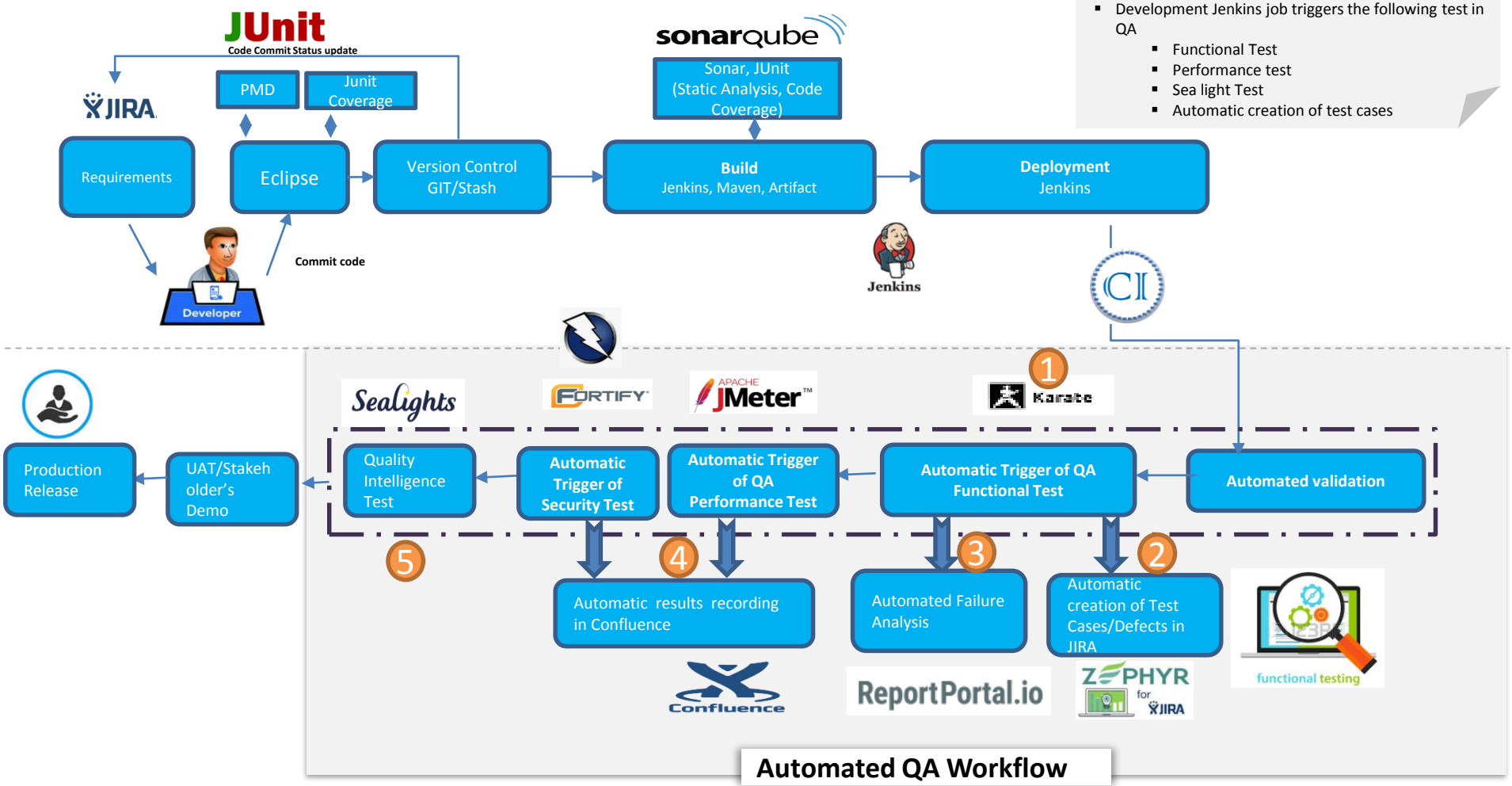
ZERO TOUCH QA – A Vision for Digital IT Industry

Adopt next-generation *testing* practices to test early, often, automatically and continuously

Zero Touch QA Platform

Continuous Testing / Continuous Analysis / Continuous Reporting

- When the code is committed in GIT, the development Jenkins job gets automatically triggered
- Development Jenkins job triggers the following test in QA
  - Functional Test
  - Performance test
  - Sea light Test
  - Automatic creation of test cases



Automated QA Workflow

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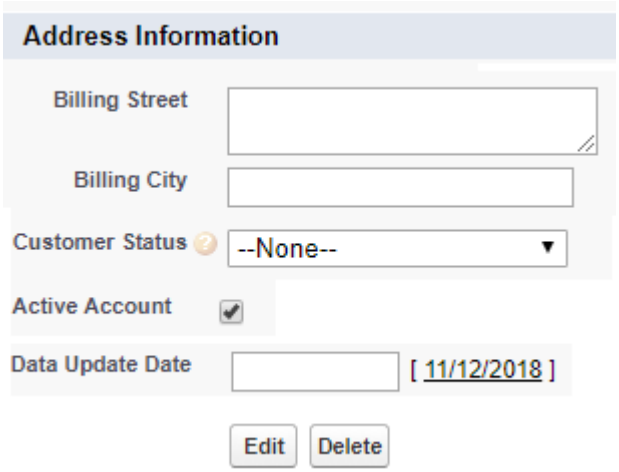
1 Simplification of Automation / Script less Automation

Challenge	Solution	Benefit
▪ Getting the existing team to upskill in programming language to automate ▪ Meeting the current project deliverables and upskilling puts stress on the testers ▪ To retain the domain knowledge that enables quality product delivery	▪ Simplify the various types of automation using a BDD construct Example: Karate for API test	▪ Enabled 90% of existing team for progression and regression automation ▪ Reduced test automation effort by 60%

UI Test Simplification

1. Identify Patterns → 2. Review and Align with UI Developers → 3. Abstract with BDD Construct → 4. Publish Language of Automation



3. Abstract with BDD Construct (Scenario)

Then I enter the text {103 John F Kennedy Pkwy, STE 234} into {Billing Street} Text Area
Then I enter the text {New York} into {Billing City} Text Box
Then I select the drop down value as {Available} in {Customer Status}
Then I select the {Active Account} checkbox
Then I select the {Current Date} date for {Data Update Date} field
Then I click on the {Edit} Button

Control	1. Identify Patten (Generic XPATH)
Text Area	//label[text()='"+ LABEL +"']/following::td[1]/textarea
Text Box	//label[text()='"+ LABEL +"']/following::input[1]
Check Box	//label[text()='"+ LABEL +"']/following::input[1]
Date Field	//label[text()='"+ LABEL +"']/following::td[1]//span[@class='dateFormat']
Button	//input[@value='"+ LABEL +"']
Drop Down	//label[text()='"+ LABEL +"']//following::td[1]//select

API Test Simplification

1. Identify Patterns → 2. Review and Align with Developers (NOT REQUIRED) → 3. Abstract with BDD Construct → 4. Publish Language of Automation

Karate Framework Integration with BDD

```
Scenario: create and retrieve a cat

Given url 'http://myhost.com/v1/cats'
And request { name: 'Billie' }
When method post
Then status 201
And match response == { id: '#notnull', name: 'Billie' }

Given path response.id
When method get
Then status 200
```

JSON is 'native' to the syntax

Intuitive DSL for HTTP

Payload assertion in one line

Second HTTP call using response data

2 Automate E2E QA Ecosystem

2 Automatic creation of Test Cases/Defects

Automatic Workflow with Zero Manual Intervention

Begin

Trigger Job from Jenkins

Step 1

Run the Automation Test Cases in QA Environment

Step 2

Creation of Test Cases in JIRA under the Test Cycle

Step 3

Update the Test Cases as Pass/Fail as per Test Results

ZEPHYR for JIRA

Step 4

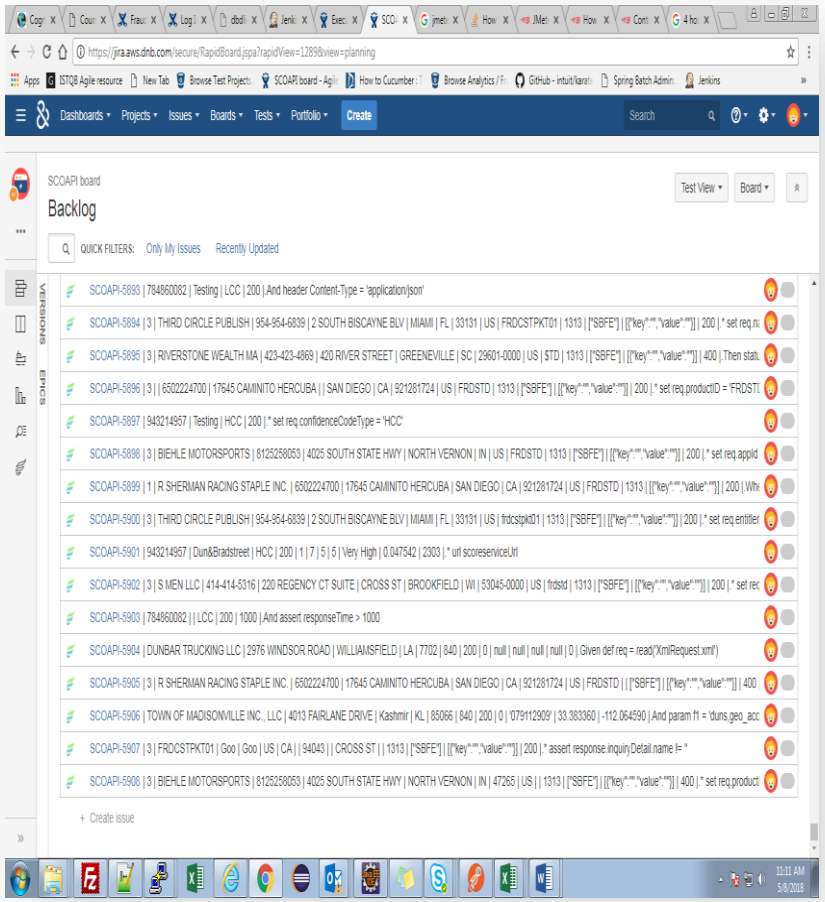
Creation of Bugs in JIRA for failed test cases and Auto Analysis of Failed Bugs

End

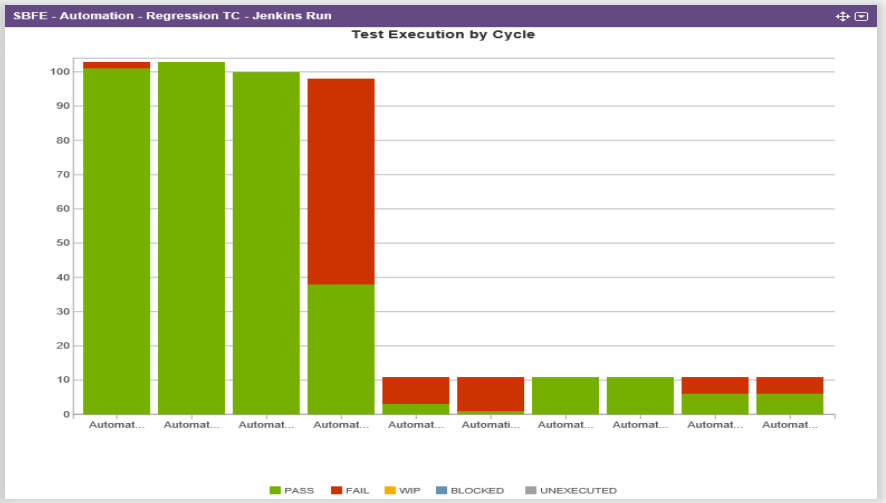
JIRA Dashboard with Test Metrics

Zephyr JIRA Integration

AUTOMATED TEST CASE



AUTOMATED STATUS AND DEFECTS



Filter Results: SBFE - Jenkins Integration Bugs

T	Key	Summary
	SBFES-1453	Regr_179_CR20_FHQ.Perform regression test.13) Null Account Base Number-ACCOUNTBASENBR09 :
	SBFES-1452	Regr_179_CR20_FHQ.Perform regression test.12) Null Account Base Number-ACCOUNTBASENBR08 :
	SBFES-1446	Regr_3run_AH_SBFES943.Perform regression testing 1.Verify AH is loaded to AT and AM TESTING with SBFEOWNER_NOT_IN_ODS and LD_INDC = 1 when AH data doesn't existing in ACCT :

1–3 of 3

Note: Options are available to avoid logging of duplicate defects in JIRA

JIRA Serenity Integration

DAP Business – Match on AWS / DBMOA-2391

Test Automation on Match Response (Online Vs Batch)

Edit | Comment | Assign | More | To Do | In Progress | Workflow

Activity

All | **Comments** | Slack | Work Log | History | Activity | Transitions

Jegatheesan, Manoj [X] (Inactive) added a comment - 01/Jun/18 5:56 PM

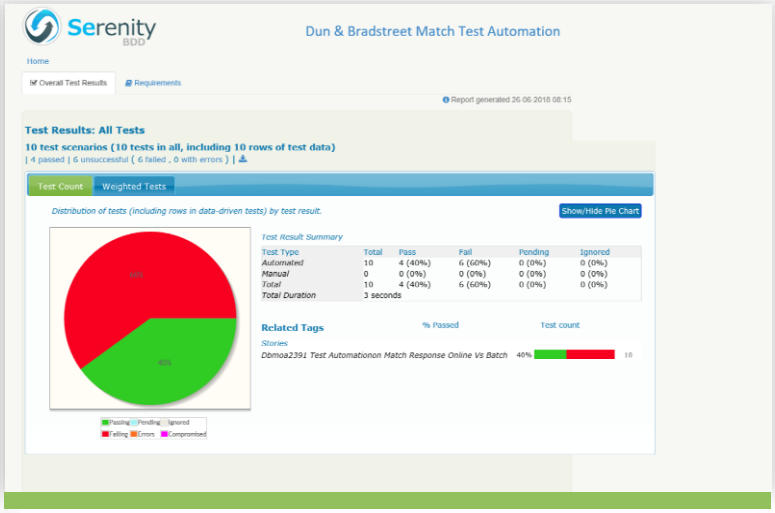
Online Vs Batch Test automation has been added to existing test suite in below GIT repository
https://stash.aws.dnb.com/scm/idres/match_test_automation.git
feature/TestAutomation_MQ

Jegatheesan, Manoj [X] (Inactive) added a comment - 31/May/18 6:13 PM

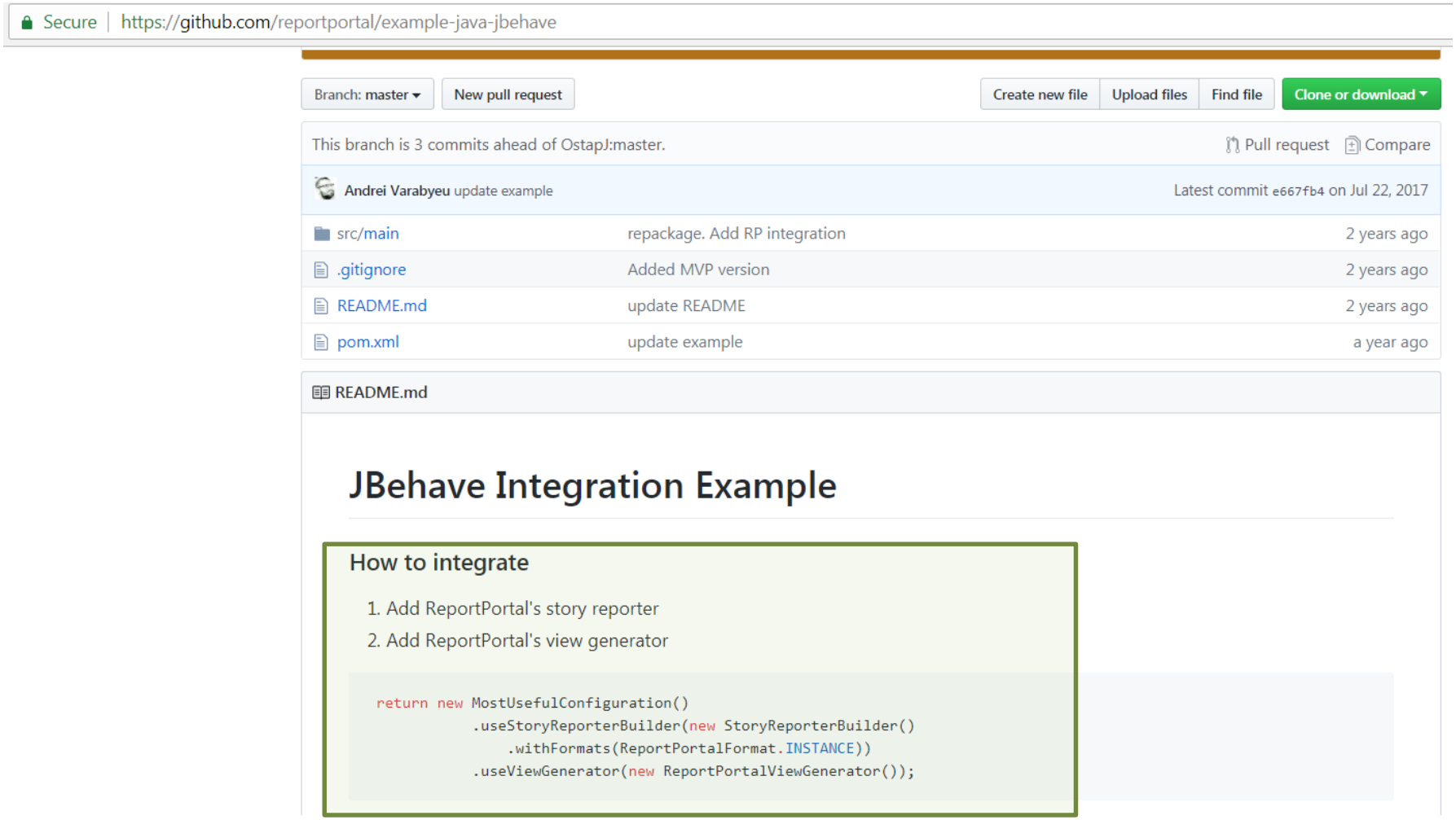
Thucydides Test Results

Test report

- TS_OnlineVsBatch_001 In Match Interface, Ensure that Match application returns same match details while online and batch Name Address Inquiry processed: SUCCESS :
- TS_OnlineVsBatch_002 In Match Interface, Ensure that Match application returns same match details while online and batch NationalID Inquiry processed: SUCCESS :
- TS_OnlineVsBatch_003 In Match Interface, Ensure that Match application returns same match details while online and batch Domain Inquiry processed: SUCCESS :
- TS_OnlineVsBatch_004 In Match Interface, Ensure that Match application returns same match details while online and batch Nationwide Inquiry processed: SUCCESS :
- TS_OnlineVsBatch_005 In Match Interface, Ensure that Match application returns same match details while online and batch Dual Pass Inquiry processed: SUCCESS :
- TS_OnlineVsBatch_006 In Match Interface, Ensure that Match application returns same match details while online and batch Name Address Multi mode Inquiry processed: FAILURE :
- TS_OnlineVsBatch_007 In Match Interface, Ensure that Match application returns same match details while online and batch NationalID Multi mode Inquiry processed: SUCCESS :
- TS_OnlineVsBatch_008 In Match Interface, Ensure that Match application returns same match details while online and batch Domain Multi mode Inquiry processed: FAILURE :
- TS_OnlineVsBatch_009 In Match Interface, Ensure that Match application returns same match details while online and batch Nationwide Multi mode Inquiry processed: FAILURE :
- TS_OnlineVsBatch_010 In Match Interface, Ensure that Match application returns same match details while online and batch Dual Pass Multi mode Inquiry processed: FAILURE :

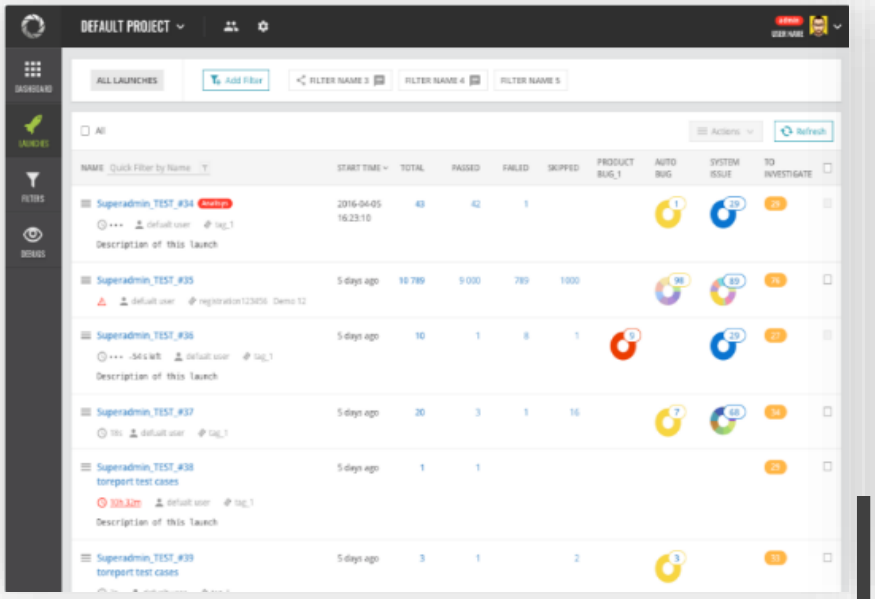


3 AI powered Test Automation Dashboard with Real-Time Analytics



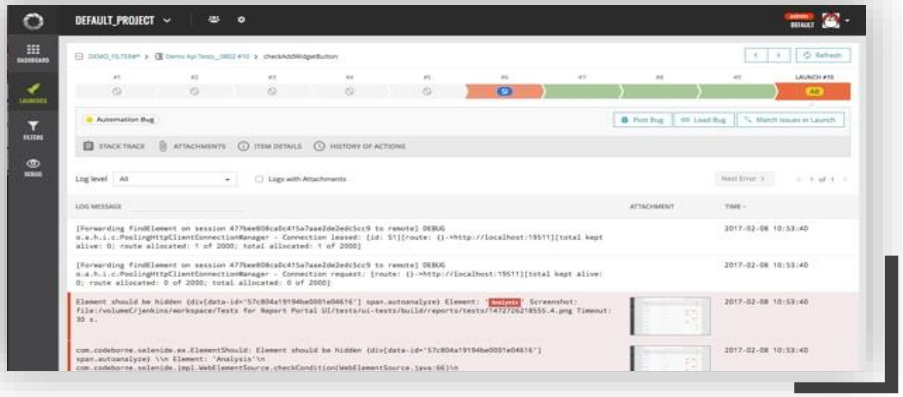
3 AI powered Test Automation Dashboard with Real-Time Analytics

- **AI Based Analysis**



- **Central Repository for Integrated Dashboard and Reports**

- **Failure Tracking / Management**



Benefits:

- 30% - 50% Reduction in Failure Analysis effort
- 20% - 30% Reduction in Script Failure Tracking/Management

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4 Automatic trigger of NFT and auto upload of test results

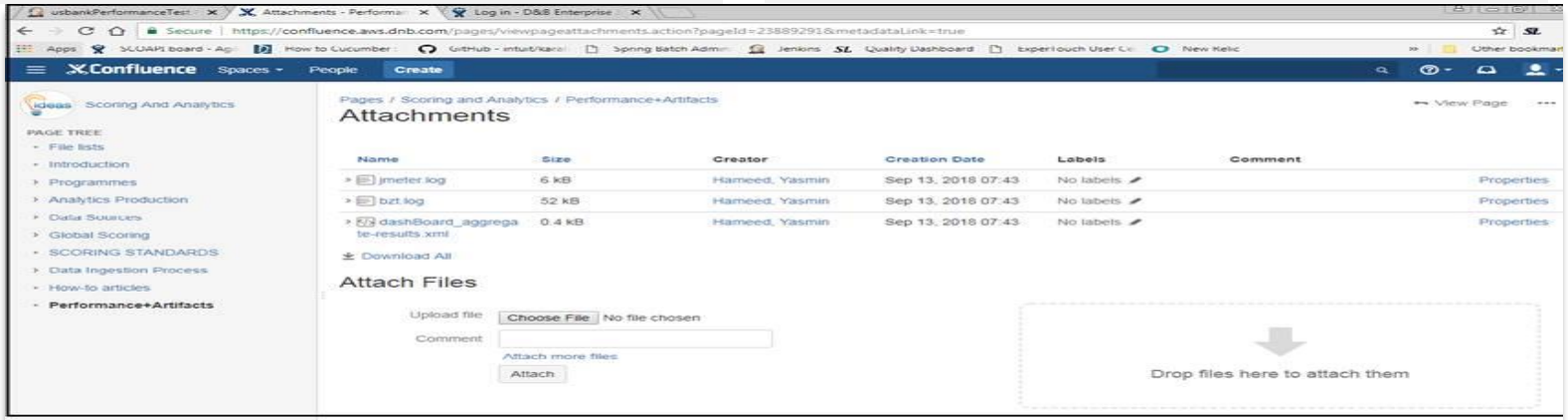
4 360 degree Quality Assurance

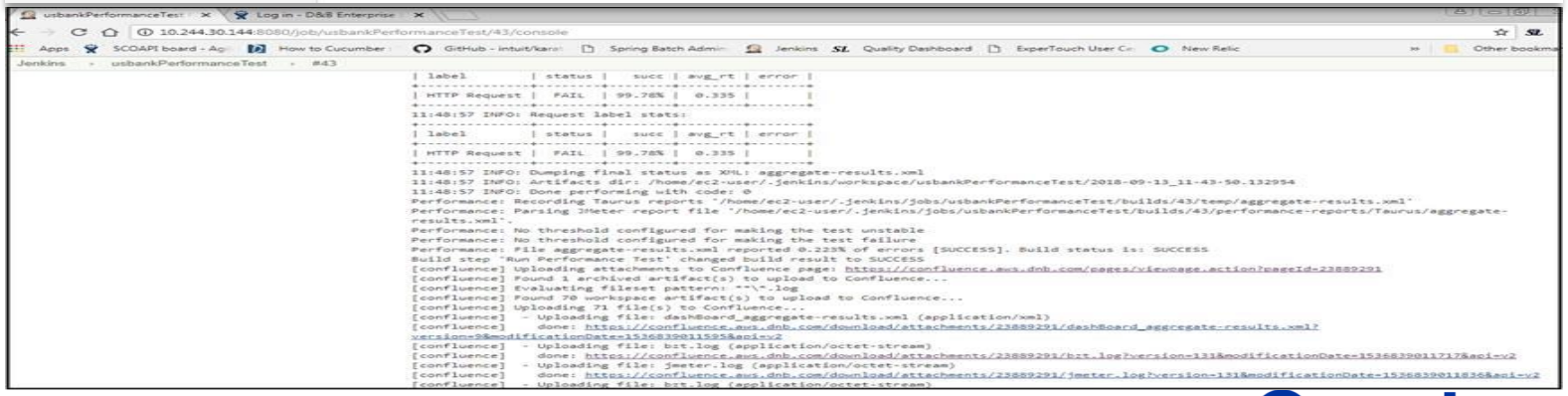
Features:

- Perform Performance Testing using Jmeter, integrated with Jenkins
- Perform Security Testing using Fortify, integrated with Jenkins
- Upload the Results in Confluence automatically

Benefits:

- Transparent visibility of test results
- 70% of effort savings in Test Closure activities





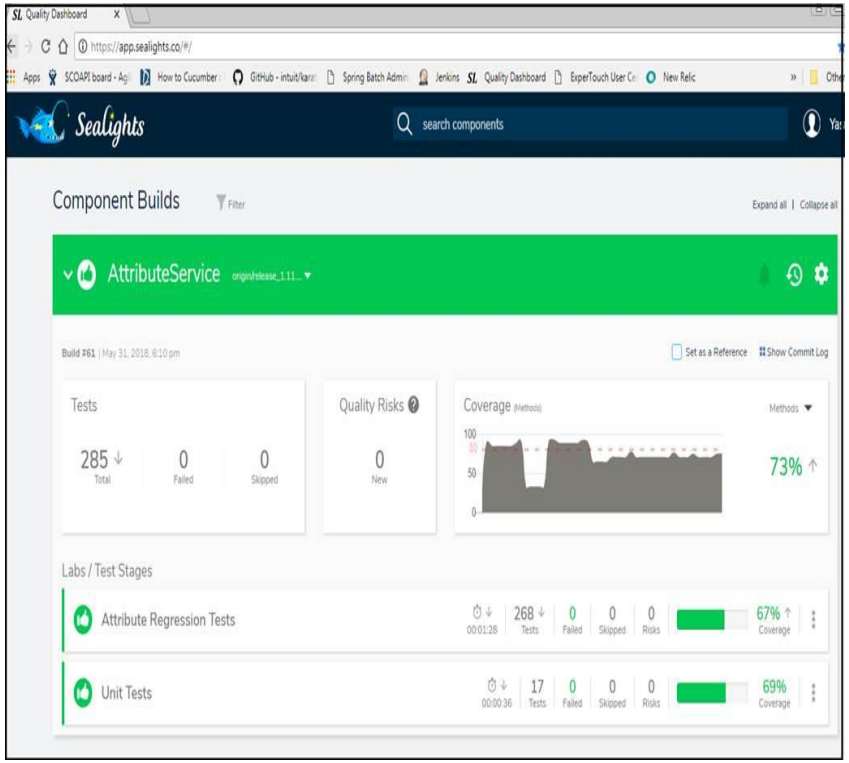
5 Automatic Code Coverage Analysis

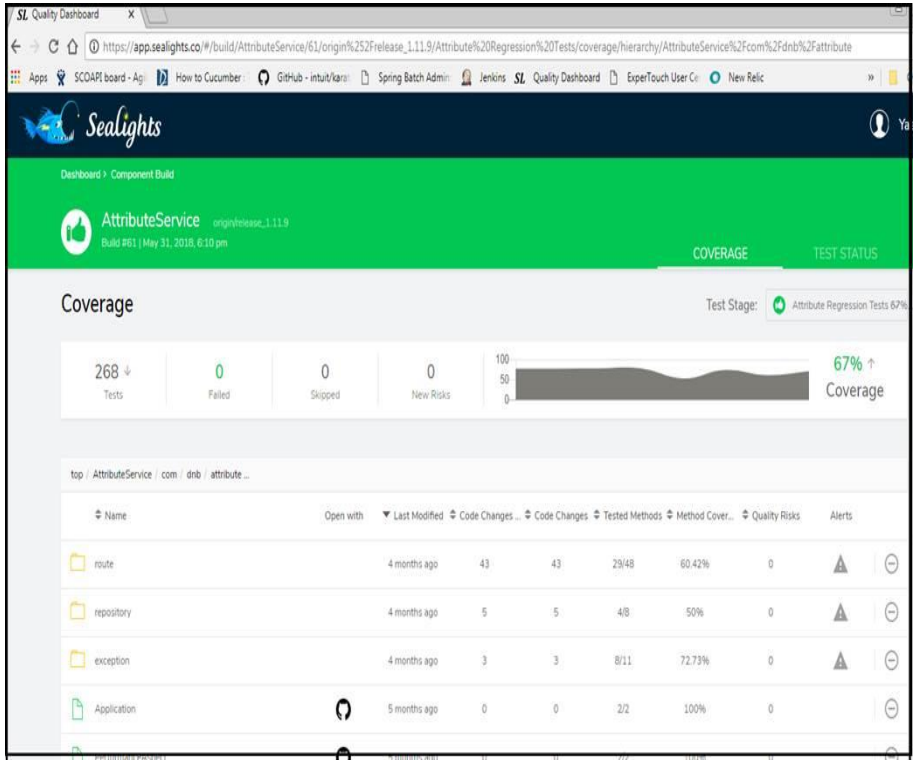
Features:

- Test Gap Analytics
- Release Quality Analytics
- Block Untested Code Changes
- Utilize Test Impact Analytics to Test Smarter

Benefits:

- 100% Improvement in Code Coverage for Test Cases
- Test Quality Analytics to Test More with “Less Tests Approach”





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Success Story

COGNIZANT'S SOLUTION

A B2B Data and Analytics customer has embarked on a journey towards Digital Business. Towards this, for acceleration of application modernization and business value realization, Cognizant implemented **automated continuous testing** and **release integration with analytics in an agile /DevOps environment called "Zero touch QA automation Platform"**

Multilayered Automation

Enterprise multilayered automation assessment (UI/API/Data) | In sprint Automation BDD, TDD Script less approach | 1 | Serenity, Karate, Selenium | Test Data Management | Informatica Test Data Management

Virtualized Digital Ecosystem

Services Virtualization | Cloud Assurance | Microsoft Azure, aws | Containerized Elastic test environment (Selenium Grid) | Amazon Lambda, ZALENIUM, docker

Training & Testing of Autonomous Systems

Assuring AI-ML systems | python | RPA Bots Assurance | UiPath

Non Functional Testing

Performance Testing/Engineering | New Relic, Apache JMeter | 4 | Security Testing | CHECKMARX | Application Monitoring | stelligent papertrail, New Relic

SMART Tools Orchestration

Continuous Integration | Jenkins, git | Automated Analysis | 3 | ReportPortal.io | Code Coverage Analysis | Sealights | 5

QI Bots

ML driven test optimization | ReportPortal.io | Jira / Zepher / Jenkins Integration | TestRail, ZEPHYR | 2 | DevOps Analytics | ZABBIX, kibana

BENEFITS DELIVERED

- **300%** improvement in cycle time (12 weeks to 3 weeks)
- **>80%** Code coverage from automated tests
- **>95%** reduction in test execution time
- **95%** effort reduction in test result analysis, Centralized dashboard
- **83%** reduction in defect leakage to production
- **100%** Automated Non functional assurance
- **100%** ISO Compliance

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Bibliography

- [1]https://www.businesswire.com/news/home/20171205005805/en/Testplant-Recognized-Visionary-Gartner%E2%80%99s-2017-Magic-Quadrant
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- [7] https://www.gartner.com/newsroom/id/3072017

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Author Biography

- Around 12+ years of experience in Software Testing
- Passionate on Quality Assurance
- Worked on Information Media & Entertainment, Technology & Healthcare Domains

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&

- Around 16+ years of experience in software development
- Passionate in solving customer problems
- Excited to work in the world of lean and agile development

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Thank You!!!

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Appendix

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Automation Learning Plan

Name						
Team						
Over All %	0					
Over All Status	Not Complete					
Level 1	Installation & System Setup	Time Required to Achieve [Hrs]	Total Score	Achieved	Your Current Level Score	Your Current Level Status
S.No.	Requirements					
1	Software Installations - Maven, Java, Eclipse, Source Tree,	8	5	Yes	0	Not Complete
2	Add Ons - Jbhave, Maven	2		Yes		
3	Configurations - Java Path & Maven Path Update in System properties, Link Java Version in Eclipse	2		Yes		
4	Install Drivers - IE, Chrome, Firefox	2		Yes		
Level 2	Start a Workflow		Total Score	Achieved	Your Current Level Score	Your Current Level Status
S.No.	Requirements					
1	Develop automation workflow without using any framework 1. Trigger using Eclipse, Selenium, Any Driver, Jars	40	20	Yes	0	Not Complete
Level 3	Framework		Total Score	Achieved	Your Current Level Score	Your Current Level Status
S.No.	Requirements					
1	Understand BDD Framework	16	40	Yes	0	Not Complete
2	Annotations in Jbhave	12		Yes		
3	Understand Maven Project	24		No		
4	Understand Project Object Model	24		No		
5	Generate Test Report	8		No		
Level 4	Java to Coding		Total Score	Achieved	Your Current Level Score	Your Current Level Status
S.No.	Requirements					
1	Understand Java - Collections & OOPS	80	25	No	0	Not Complete
2	Integration of REST API/Data Base Connectivity Vs UI Comparision	24		No		
3	Coding & Development	32		No		
4	Analyse Report	8		No		
Level 5	Jenkins		Total Score	Achieved	Your Current Level Score	Your Current Level Status
S.No.	Requirements					
1	Configurations in Jenkins	4	10	No	0	Not Complete
2	Install Plugins in Jenkins - JDK, GIT, Maven, Folder, Publish HTML, Dashboard view, Junit, Job Pipeline	2		No		
3	Create Job in Jenkins	2		No		

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Data Test Simplification

Scenario: *To compare Actual and Expected Source*

DELIMITED

```
S.No||name|age
1|"James Kirk"|40
2|"Jean-Luc Picard"|45
3|"Wesley Crusher"|27
```

XML

```
<empinfo>
    <employees>
        <employee>
            <S.No>1</S.No>
            <name>James Kirk</name>
            <age>40</age>
        </employee>
        <employee>
            <S.No>2</S.No>
            <name>Jean-Luc Picard</name>
            <age>45</age>
        </employee>
        <employee>
            <S.No>3</S.No>
            <name>Wesley Crusher</name>
            <age>27</age>
        </employee>
    </employees>
</empinfo>
```

JSON

```
{  "empinfo" :
    {
        "employees" : [
        {
                " S.No " : 1
                "name" : "James Kirk",
                "age" : 40,
        },
        {
                " S.No " : 2
                "name" : "Jean-Luc Picard",
                "age" : 50,
        },
        {
                " S.No " : 3
                "name" : "Wesley Crusher",
                "age" : 27,
        },
                 ]
    }
}
```

S.NO	Record Status	Name	Age
		Status|Expected Data |Actual Data	Status|Expected Data |Actual Data
1	PASS	PASS | James Kirk | James Kirk |	PASS | 40|40 |
2	FAIL	PASS | Jean-Luc Picard | Jean-Luc Picard |	FAIL | 45 | 50 |
3	PASS	PASS | Wesley Crusher | Wesley Crusher |	PASS | 27|27 |

RECORD LEVEL SUMMARY				
TOTAL RECORDS PROCESSED	3			
TOTAL RECORDS PASSED	2			
TOTAL RECORDS FAILED	1			
ELEMENT LEVEL SUMMARY				
ELEMENT NAME	TOTAL	PASS	FAIL	NO DATA
Employee Name	3	3	0	0
Employee Age	3	2	1	0