Quality Engineering in DevOps world – a Strategic Enabler
» Analyst Speak
» DevOps in a nutshell
» DevOps vs DevTestOps
» Continuous Testing & Delivery leveraging QE
» Unit Testing & SAST
» Automation, Performance & Security
» Service Virtualization
» Continuous Integration, Deployments & Delivery
» Operations Stabilization in Devops
» Continuous Automation & Delivery Pipeline
» Collaborative Platform & How does it help?
To date, Gartner has had more than 3,500 client interactions (inquiries, best-practice calls and conference one-on-one meetings) discussing DevOps awareness, initiatives, successes and failures.

Forrester - Development and operations (DevOps), the purview of unicorns, is now transitioning to the mainstream. Business technology (BT) leaders are realizing that Agile is no longer enough; they need to involve the full technology management organization to drive competitiveness in an era when customer centricity is pivotal to success.
Key Challenges

DevOps toolchains are often built from discrete and sometimes disconnected tools, making it difficult to understand where bottlenecks are in the application delivery pipeline.

Orchestrating the DevOps toolchain can be compelling, but it can introduce another set of challenges.

DevOps initiatives continue to grow in complexity, driving many IT organizations to seek tools that provide greater control and visibility over the entire DevOps process.

Toolchain orchestration promises to simplify the DevOps toolchain; however, one tool is not able to support the entire toolchain resulting in additional integration, ownership and handoff challenges when using multiple orchestration tools.
DevOps adoption Is no longer Just For unicorns

Culture and people come First; process follows

Release velocity is pivotal

There’s no “easy” button

Culture and people come First; process follows

Source: Forrester’s Q1 2017 Global DevOps Benchmark Online Survey

DevOps Adoption

Enterprise vs. SMB DevOps Adoption

- Enterprise:
  - 81% Adopting DevOps
  - 12% Not adopting
  - 7% Don’t Know

- SMB:
  - 70% Adopting DevOps
  - 19% Not adopting
  - 11% Don’t Know

Source: RightScale 2016 State of the Cloud Report

DevOps Adoption Up in 2016

- 2016:
  - 74% Adopting DevOps
  - 16% Not adopting
  - 6% Don’t Know

- 2015:
  - 66% Adopting DevOps
  - 19% Not adopting
  - 15% Don’t Know

Source: RightScale 2016 State of the Cloud Report

Use Docker + Config Tools

- Docker: 20% + 80% Config Tools

Source: RightScale 2016 State of the Cloud Report

Many Companies Using Chef + Puppet

- Chef: 33% + 67% Overlap + 33% Puppet

Source: RightScale 2016 State of the Cloud Report
DevOps Adoption

Respondents Using DevOps Tools

- Puppet: 32% (2016), 24% (2015)
- Docker: 27% (2016), 13% (2015)
- Ansible: 20% (2016), 10% (2015)
- Salt: 9% (2016), 6% (2015)
- Rocket: 3% (2016), 3% (2015)

Source: RightScale 2016 State of the Cloud Report

Enterprise Adoption of DevOps

Don’t know: 7%
Not adopting DevOps: 12%
Adopting DevOps company-wide: 21%
Adopting DevOps for projects or teams: 29%
Adopting DevOps for BUs or divisions: 31%

Container Challenges by Maturity

- Lack of experience using containers: 39% using containers, 25% not using
- Security: 29% using containers, 27% not using
- Monitoring & managing containers: 26% using containers, 22% not using
- Governance: 25% using containers, 19% not using
- Technology not mature: 24% using containers, 29% not using
- Resistance from ops: 18% using containers, 14% not using
- Resistance from dev: 14% using containers, 11% not using

Source: RightScale 2016 State of the Cloud Report

Respondents Adopting Docker

- All: 35% using, 27% plan to use
- Enterprise: 38% using, 29% plan to use
- SMB: 33% using, 26% plan to use
- Tech: 36% using, 32% plan to use
- Non-tech: 36% using, 19% plan to use
- Dev: 36% using, 28% plan to use
- IT: 28% using, 25% plan to use
- N. America: 28% using, 23% plan to use
- Europe: 29% using, 34% plan to use
- Asia: 42% using, 25% plan to use

Source: RightScale 2016 State of the Cloud Report
Adoption and Strategies vary across Vertical Segments

Financial Services Accelerate To compete With Fintechs
DevOps offers key benefits in fraud detection, time-to-market, and scalability.

Media, entertainment, & Leisure embark On The Journey To Differentiate With DevOps
DevOps drives to improve customer experience.

Manufacturing Transitions Beyond Automation To Show DevOps Momentum
Manufacturers improve efficiency and insight by expanding the role of technology.

Utilities And Telecommunications Lead The Pack To Drive Business Transformation
Data must drive strategy, with services that emphasize connectivity.

Public Sector And Healthcare cling To Manual Audit And compliance Procedures
Compliance-wary companies need not fear automation.

Business Services And construction Ponder The Leap Into Automation
Technology is becoming part of the business.

Retail And Wholesale DevOps Adoption Drive Differentiated Interactions With clients
Get ready for the next generation of digital stores.
DevOps vs. DevTestOps

**DevOps**

- All actions – Development --> Operations
- Emphasis on Automation & Analytics
- Continuous Integration + Continuous Deployment (CI/CD)
- Dev --> Ops Process Reduced from Months to Days/Hours
- Continuous Feedback & Improvement Supported
- Maturing Processes and Organizations Focus

**DevTestOps**

- Equal Importance for Dev, Operations and Testing
- Continuous Testing
- End to End Automation
- Overall Cost Reduction – Automation, Reduce Cost of Quality
- Fail – First, Fail - Fast, Fail- Often – Early Defects Detection
- Collaborative Communication utilizing Dashboard

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Devops in a nutshell

Automated Unit Testing & SAST

Build Packing & Automated Deployments

Continuous Testing
  - Functional Automation
  - Non Functional Automation

Production Deployments

Post Production Monitoring & Feedback Amplification

Build Dev

Infrastructure Automation & operations

Virtual Server(s)

CI Server

Hosted Tools

Physical server(s)
Continuous Testing & Delivery Leveraging QE elements

Efficient Tools

Centralised data management through automated TDM tools & other mechanisms for on demand testing

Data Engineering

Enabling continuous testing by overcoming the dependency factors involved

Service Virtualization

Leveraging a collaborative dashboard to monitor application release activities & health

Third party system

Application Under Test

Client Layer

Web Server

App Server

Component 1

Component 2

Component 3

Target System

Dashboard

Application Under Test

Continuous Monitoring

Health Check

Application {Through scripts}

Infrastructure {Through metrics configuration}

CI Platform

Continuous Testing

Functional Automation

Non - Functional Automation

Adopting Quality Engineering approach to provide end to end automated functional and non-functional test coverage for each release

Ensuring quality during rapid and frequent build deployments by leveraging robust CI tools integrated with test automation frameworks

Ensuring faster feedback for issues remediation through continuous infrastructure & application monitoring in production & test environments

Leverage

Efficient Tools

Leverage

Data Engineering

Enabling continuous testing by overcoming the dependency factors involved

Third party system

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Leverage

Efficient Tools

Leverage

Data Engineering

Enabling continuous testing by overcoming the dependency factors involved

Third party system
DevOps Journey

Cost Elements

» Cost of Maintenance
» Technology Adoption

» DevOps Process
» Org. Change Mgmt. (People, Process and Systems)

» Tools and process for CI and CD
» Infra Maintenance

» On Demand Test Envs.
» End-to-End Automation and Test Coverage

» Tools for Automation and Non Functional Tests
» Process Standardization

ROI Factors

» Build Reliability
» Uninterrupted Service Delivery

Quality Engineering approach for early testing (Functional and Non Functional)

» Automation Stabilization
» Continuous Testing – Continuous Feedback

» Tool optimization and consolidation
» Quality Check gates

» Unified Automation Framework
» Best suited tools

DevOps Journey

Automation Maturity

Build - Deployment – Release Automation

Transformed to TDD / ATDD / BDD

Matured Collaborative Agile (Dev, QA and Ops)

Adopted CI and CD tools

Functional and Non Functional Automation

Matured Agile Organization

Partial Agile

No Automation in place

Build Reliability

Uninterrupted Service Delivery

Quality Engineering approach for early testing (Functional and Non Functional)

Automation Stabilization

Continuous Testing – Continuous Feedback

Tool optimization and consolidation

Quality Check gates

Unified Automation Framework

Best suited tools

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Key QE elements — In Detail
Unit Testing & SAST

1. **IDE** (Technology Agnostic)
   - Code Repository

2. **Unit Testing**
   - JUNIT/NUNIT
   - Build Server

3. **CI Server**
   - Static Code Analysis
   - Open Source/Commercial Tools
   - Results Analysis & Vulnerable identification
   - Manual Analysis for false positive removal

4. **Final Summary**

- Unit testing is performed using respective open source tools that integrated with the IDE used for code development
- CI Server picks the build from the code repository/version controlling tool once the developer commits the build
- CI Server initiates the static code analysis by triggering a request to the configured open source / commercial tools

**Secure Coding Guidelines & Standards**

- Input Validation
- Output Encoding
- Secure handling of credentials
- Session Management
- Cryptographic practices
- Error handling / Logging
- Data Protection
- Communication Security
- Memory management
TDD blended with DevOps

- Feature Spec file
- DevOps Specific input to feature requirements
- Automated Configuration Management frameworks (Ansible/Chef/Puppet)
- Feature broken into functions
- CI/CD framework (Continuous Integration/Continuous Delivery)

**Development Ends**
- Function 1 - Unit Test case
- Function 2 - Unit Test case
- Function 3 - Unit Test case

**Finalized Feature**
- Unit Testing, Integration Tests and Performance Tests in reference to development under DevOps practices.

**DevOps Analytics Platform**
- Add a Developer test
- Run Developer tests at the unit level
- Make code changes

- Pass, Functionality complete
- Fail, Functionality Incomplete

- Continuous Feedback
- Continuous Deployment
Service Virtualization in AWS Cloud

Advantages

✓ Accessible from Multiple Geographies (Cloud & On-premise)
✓ Deploy & Bring Up/down to Optimize Resources & Cloud Spend
✓ Easily Customized as the UI or Business Needs Change
✓ Leverage Docker Containers, enabling Continuous Integration of Code Changes and Parallel Test Instances
✓ Reduce CapEx (Capital Expenditure) by Hosting in AWS (Amazon Web Services) Cloud
✓ Dynamically Support Infrastructure & Policy as Code, with Fugue...

Typical DevTest SV Usage Scenario

» Automatically Capture realistic behavior
» Build VS Image, collection services requests and Service responses
» Optimize models as desired

DevTest

Deploy SV tool on cloud

Create Virtual Services

Legacy

ERP

Databases

Mainframe

DevTest

Test (Manual, Automated)

Exercise SUT

System Under Test (SUT)

Virtual Service

DevTest

Target Service

Typical DevTest SV Usage Scenario

SOAP Request

SOAP Response

JMS Publish

Playback against Virtual Service
Continuous-Integration vs. Delivery vs. Deployment

Source Control
Commit Changes

Build
Run Build And Unit Tests

Staging
Deploy to test Environment Run Integration Tests, Load Test, & Other Tests

Production
Deploy to Production Environment

Continuous Integration

Automated

Approve Deploy

Automatic Deploy

Continuous Delivery

Continuous Deployment
What tools/technologies should QE team get trained

Though Selenium continue to dominate, the following tools have been adopted faster

Web Driver IO  Protractor  Concourse

REPL is used to build web driver component

With DevOps, The need for Microservices testing with spring server technologies will take higher precedence

By 2019, Spring Server will dominate the server market space (https://github.com/bartobri/spring_server)

GitHub will become the global platform and open source will be the future.

Brief list of various Test Automation tools that have been in faster adoption

Concourse
https://concourse.ci/ - This is better than Jenkins - Shell script - runs on a FLOW.

Gradle
https://gradle.org/ - Alternate to Maven

Gulp
http://gulpjs.com/ - Supports Jasmine, Mocha - BDD tools - This is better than Cucumber

GRUNT
automate just about anything with a minimum of effort

WEBDRIVER

Webdriver CS
Visual Regression

Concourse as a server. Enables multiple deployment for seamless test execution
Operations Stabilization & Alignment with DevOps

DevOps Enabled Test Lab

1. Release Automation
   - Automated Deployments
     - Staging QA
     - Dev Deployments
     - Smoke Tests

2. Configuration Management
   - Rapid Configuration Management
     - Multiple Nodes across technologies

3. Environment Management
   - Build Environments
     - Manage Virtualized & Non-Virtualized
     - Staging QA
     - Dev
   - Maintain Monitor

4. Continuous Monitoring
   - Health Check
     - Infrastructure
       - Threshold evaluation
     - Application
Collaborative DevTest Platform & How does it help?

- Build
- Integrate
- Deploy
- Operate

Live Dashboard

- Release Progression
- Build Status
- Test Status
- Predict Analysis
- Application Health
- Release Readiness
- Quality Metrics
- Go – No Go Decision Enabler

Monitoring Tools
DAST Tools
Test Automation Tools
Test Management Tools
Performance Testing Tools