

# Approaches and Tools for Testing Web Services



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*PRESENTED BY*

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# Agenda

- ❖ Who Are We?
- ❖ Problems from Inadequate Testing
- ❖ Web Service vs Traditional Software
- ❖ Automated Regression Testing
- ❖ Automated Load Testing
- ❖ Automated Security Testing
- ❖ Resources
- ❖ Q&A: Closing Discussion

# Who are we?

## Lucille Forster & Roy Life

- ❖ Role
- ❖ Background
- ❖ Experience



# Problems from Inadequate Testing

- ❖ \$59.5 **billion** lost per year due to software defects. Source: 2002 federal study.
- ❖ \$100 **billion** lost annually in U.S. due to cybercrime, global total is \$575 billion. Source: 2014 McAfee report.
- ❖ \$2 **trillion** estimated cyber crime costs by 2019. Source: 2016 Forbes article.
- ❖ 43% of software projects cost more, take longer, or do less; 18% of software projects fail. Source: 2013 Chaos Manifesto

## Links to Sources:

1. <https://www.nist.gov/sites/default/files/documents/director/planning/report02-3.pdf>
2. <https://www.csis.org/events/2014-mcafee-report-global-cost-cybercrime>
3. <https://www.forbes.com/sites/stevemorgan/2016/01/17/cyber-crime-costs-projected-to-reach-2-trillion-by-2019/#353335993a91>
4. <https://larlet.fr/static/david/stream/ChaosManifesto2013.pdf>

# Benefits of Web Services vs Traditional Software Development

## Large Traditional Programs

- ❖ Slow Paced Development
- ❖ Difficult to Build
- ❖ Prone to Increasing Size & Complexity
- ❖ Maintenance Nightmare
- ❖ Challenging to Test & Deploy

## Web Services

- ❖ Faster to Develop
- ❖ Easier to Build
- ❖ Scalable
- ❖ Flexible
- ❖ Re-usable
- ❖ Easier to Maintain
- ❖ Easier to Test

# Automated Regression Testing

## ❖ Purpose

### ▪ Advantages of web service testing

- Isolation of the services removes dependencies on front end system being fully developed before testing
- Allows services to be tested once regardless of how the system consumes the service
- Black box testing allows testing in isolation for boundary values, mandatory and optional fields, data format verification and data field validation

## ❖ Regression Testing Procedures

- Functional testing done each time change is introduced.
  - **Tool:** Ready!API SoapUI NG Pro (Example tool) Techniques follow.
  - **Parameter File:** Use for any values that vary among environments, re-usable across projects.
  - **Data Driven Testing:** Use to vary data during loops of test.
  - **Organization into Testing Hierarchy:** Project-> Test Suite -> Test Case -> Test Steps (re-usable).
  - **Assertions:** Use to determine whether test passes or fails.
  - **Custom Reports:** Tailor for security & usability.
    - Remove any default display of password.
    - Reduce details for test cases that pass.
    - Increase details for test cases that fail.

*Disclosure: Sandia National Labs uses a variety of different tools for testing web services and the tools listed are just some examples of some of those tools*

# Automated Performance Testing

## ❖ Purpose

- Web Services unique characteristics are large amounts of XML/JSON transactions on server side, which require processing of payloads
- Complexity of processing payloads means need to focus on performance testing
  - Determine if API can handle expected load since they may service multiple clients concurrently
  - Determine behavior and scalability issues under high traffic loads

## ❖ Performance Testing Assessments

- **Tool:** LoadRunner, formerly HP, now Microfocus (Example tool used)
  - Use HTTP/HTML or Webservice Protocol
- **Parameters:** Use for any values that vary among testing iterations
  - REST web service usually require parameterization within the URL, Header or Body
- **Service Level Agreement (SLA):** Provided by customer and used to determine whether test passes or fails.
- **Custom Reports:** Word document based on boilerplate with links to automated report generated by LoadRunner.

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# Automated Security Testing

## ❖ Purpose

- Web services are usually open on the network
  - This element opens them up to host of vulnerabilities like Denial-of-Service (DOS) attack, penetration attacks
- Proper handling of client-side authentications, and authorization is critical
- Mitigate any Open Web Application Security Project (OWASP) Top 10 vulnerabilities before allowing services to be deployed in production. For example:
  - SQL Injection (SQLi)
  - Cross-site scripting (XSS)
  - Cross-site request forgery (XSRF)

## ❖ Security assessments

- **Tool:** Ready!API SecurePro (SmartBear). An Example tool used.
- **Parameter File:** Use for any values that vary among environments, re-usable across projects.
- **Data Driven Testing:** Use to vary data during loops of test.
- **Organization into Testing Hierarchy:** Project-> Test Suite -> Test Case -> Test Steps -> Security Test
- **Assertions:** Use to determine whether test passes or fails.
- **Custom Reports:** Tailor for security & usability.
  - Remove any default display of password.
  - Reduce details for test cases that pass.
  - Increase details for test cases that fail.

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## Testing Processes

- Elfriede Dustin et al, Automated Software Testing: Introduction, Management, and Performance. Addison-Wesley, 1999.
- Mark Fewster & Dorothy Graham, Software Test Automation, Addison-Wesley, 1999.

## Security Testing

- Open Web Application Security Project (OWASP)  
[https://www.owasp.org/index.php/Category:OWASP\\_Top\\_Ten\\_Project](https://www.owasp.org/index.php/Category:OWASP_Top_Ten_Project)

## Conferences & Training

- <http://testingconferences.org/>
- US based: Stareast, Starwest, STP Con, SANS
- <https://techbeacon.com/best-software-testing-conferences-2018>
- Automation Guild (Online Training) <https://automationguild.com/show>

# Closing Discussion, Q&A

## Discussion

- ❖ What lessons can you share?
- ❖ What tools and practices work for you?
- ❖ What are your issues?

## Questions?

### Contact Us

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