



So You Want to Start API Testing Now What?

CQAA

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Your Presenter



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He has worked on projects including cybersecurity, database development, the software development lifecycle, web publishing and monitoring, and integration with legacy systems and maintains the IoT Hall-of-Shame <http://bit.ly/iotshame> and SQLi Hall-of-Shame <http://bit.ly/sqlishame>

Follow him [@codecurmudgeon](https://twitter.com/codecurmudgeon)

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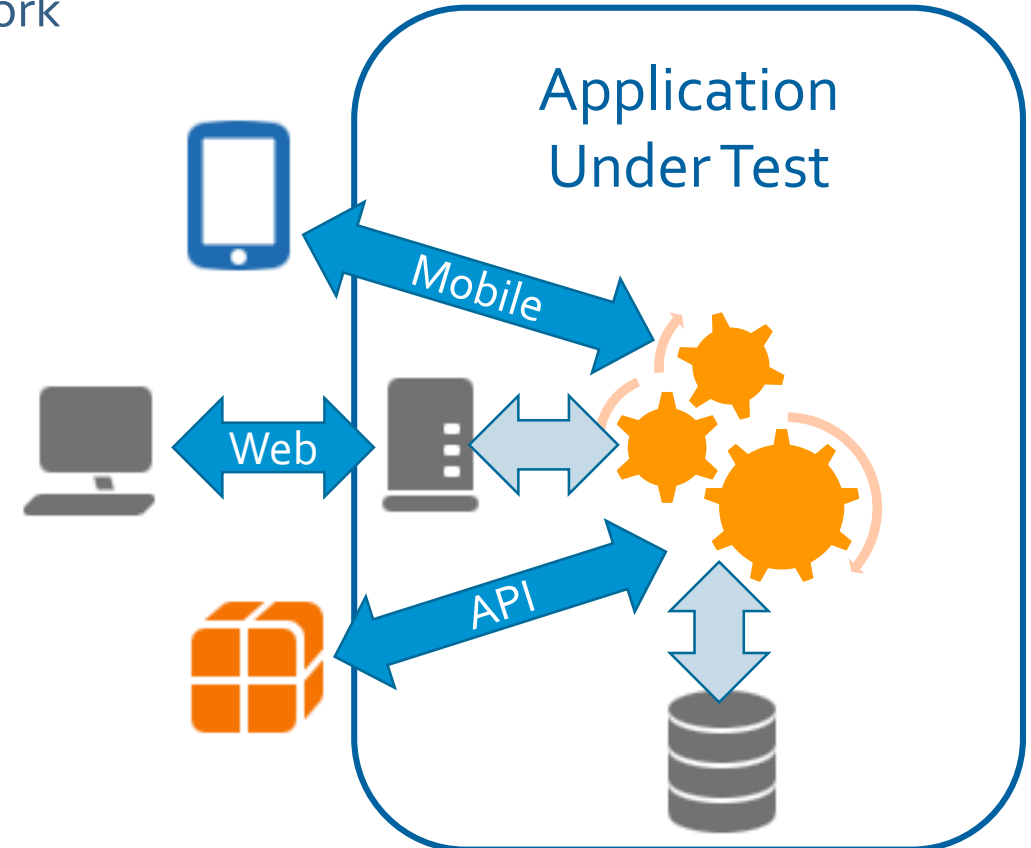
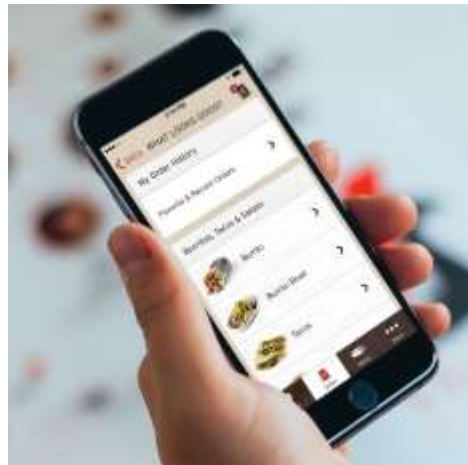
Web: <http://parasoft.com>



What are APIs?



- A web API is a programmatic interface consisting of one or more public endpoints to an application that has been deployed on a network
- Common Practice:
 - Communicate using REST and SOAP over HTTP
 - Most commonly in JSON and XML format



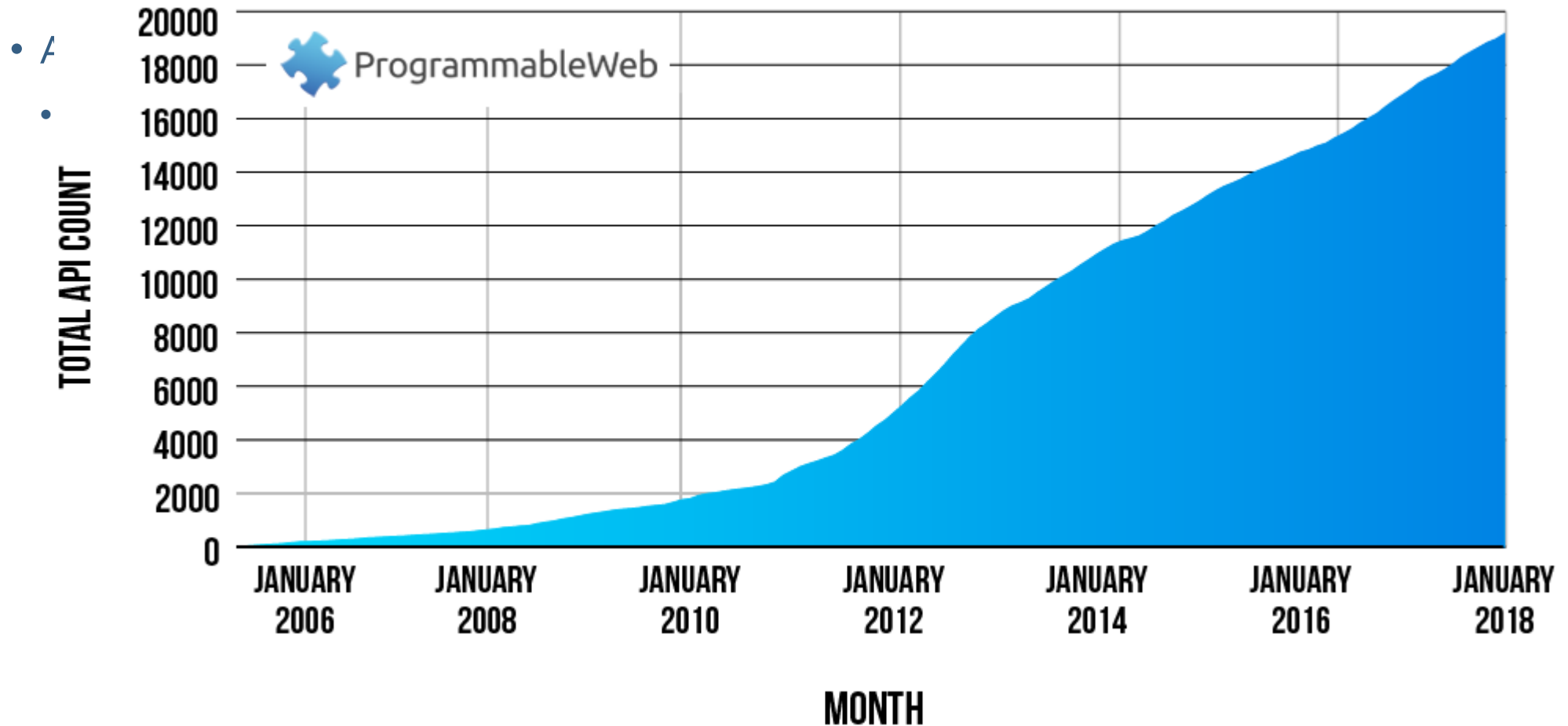
What are APIs?

- Let me



What are APIs, and why do they matter?

GROWTH IN WEB APIS SINCE 2005



What are APIs, and why do they matter?



What are APIs, and why do they matter?



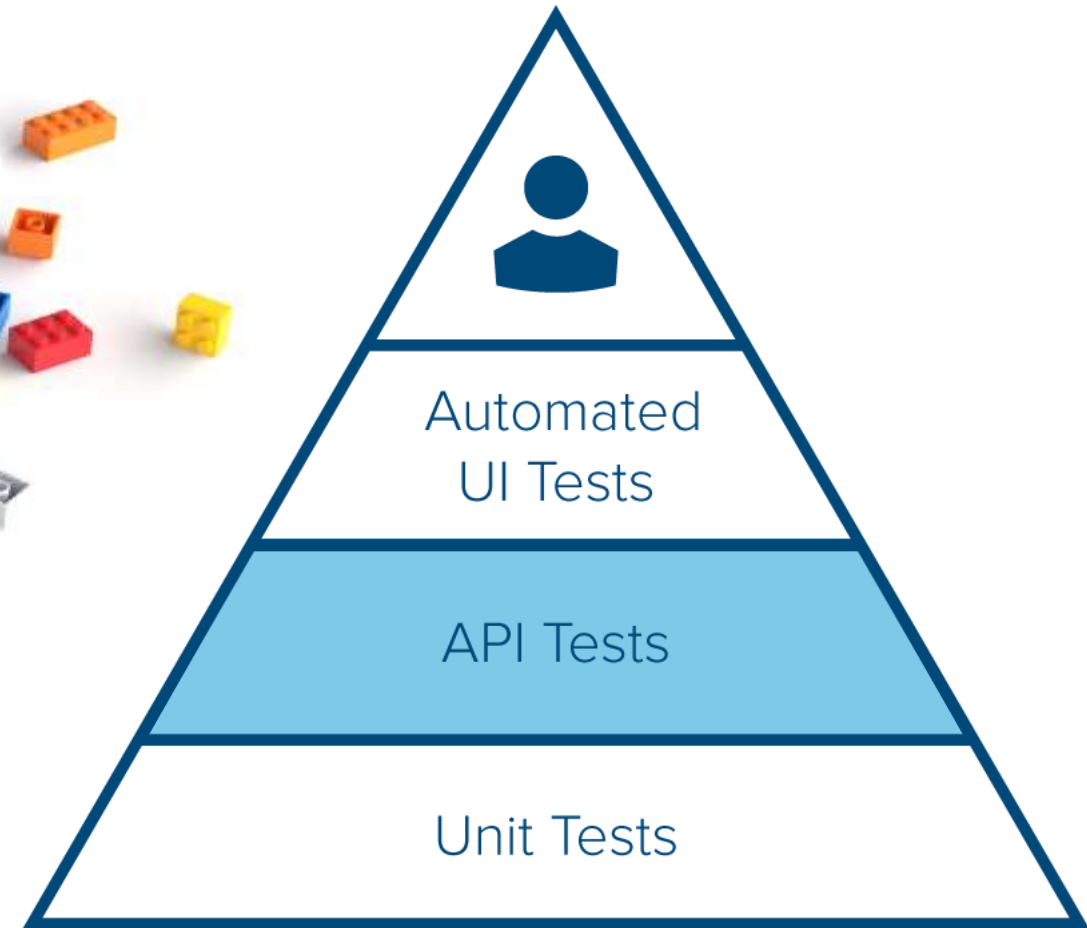
What are APIs, and why do they matter?



Significant Impact on the Business



Automated API Testing



Why is API testing so difficult?



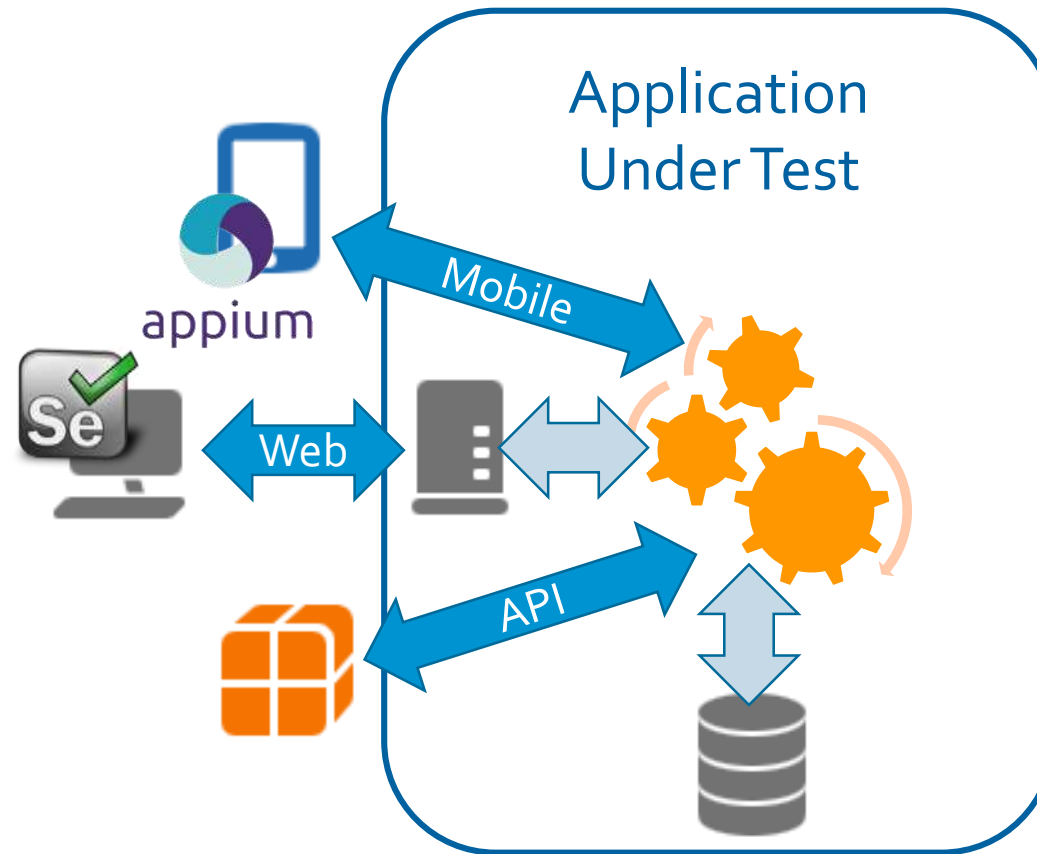
Why is API Testing So Difficult?



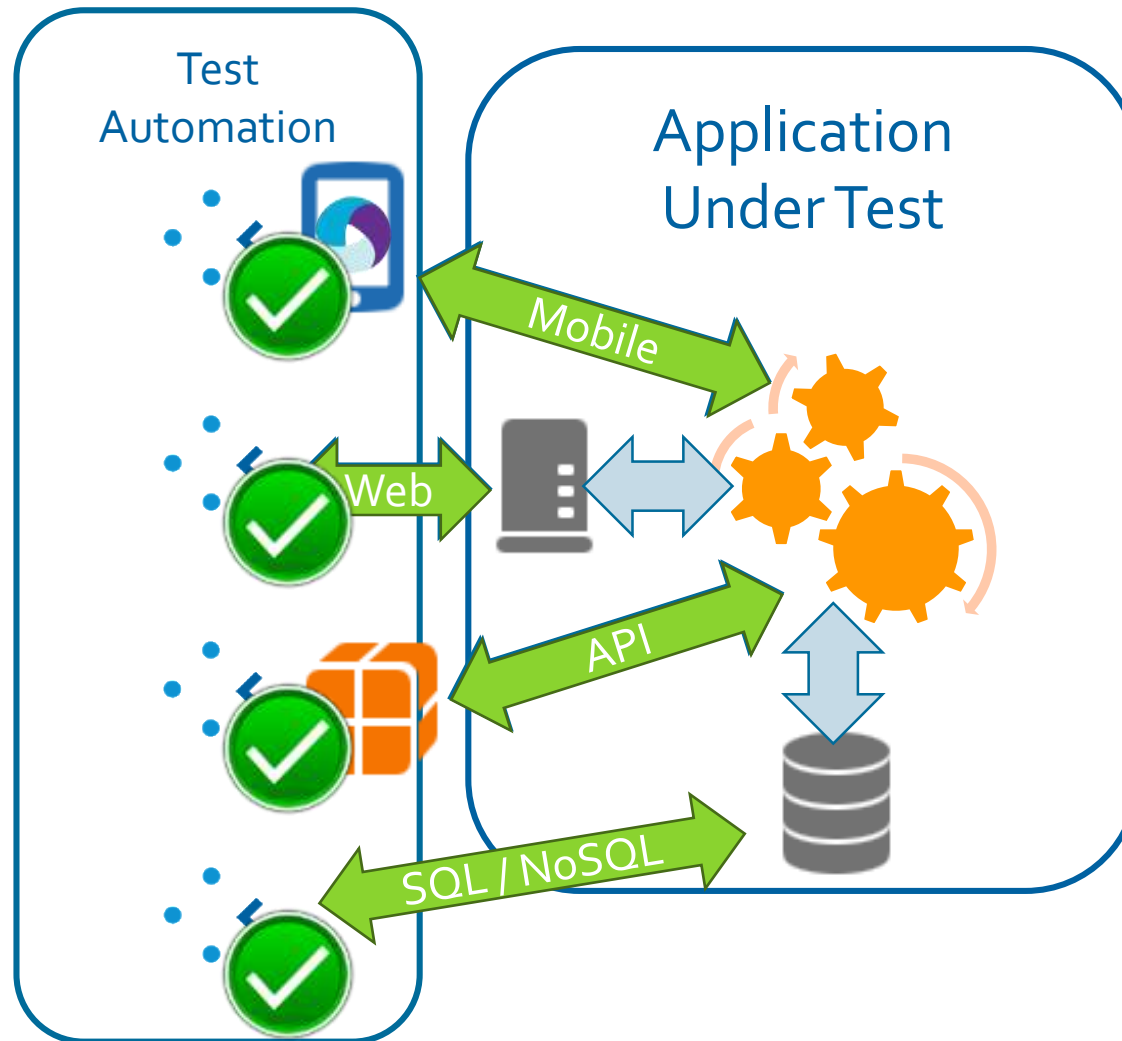
Why is API Testing So Difficult?



A Typical Testing Strategy



Automated API testing



How do you test an API?

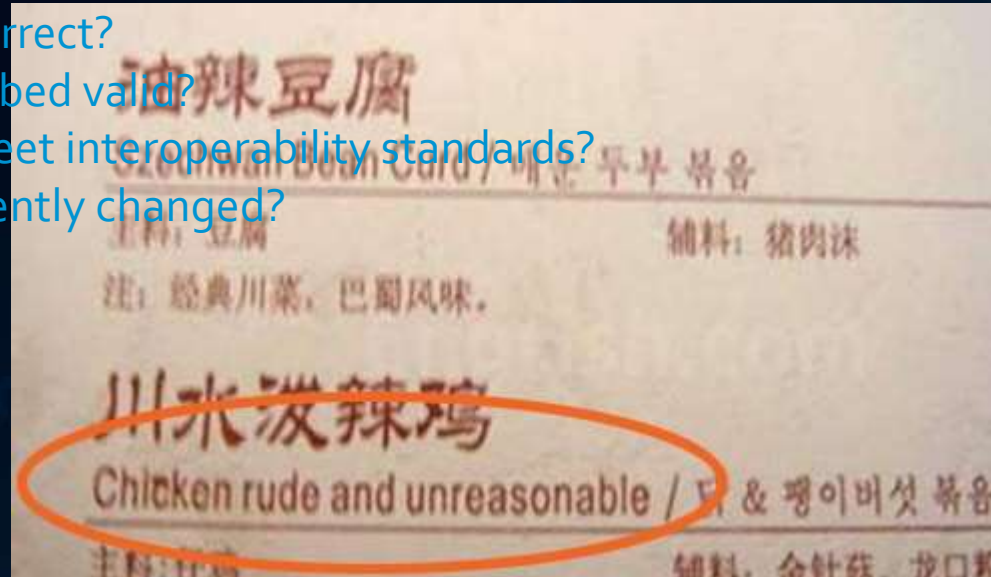
A strategy for testing APIs



What kinds of API Tests are there?

Service Definition Tests

- Test the service definition itself to find:
 - Is it semantically correct?
 - Is the service described valid?
 - Does the service meet interoperability standards?
 - Has the service recently changed?



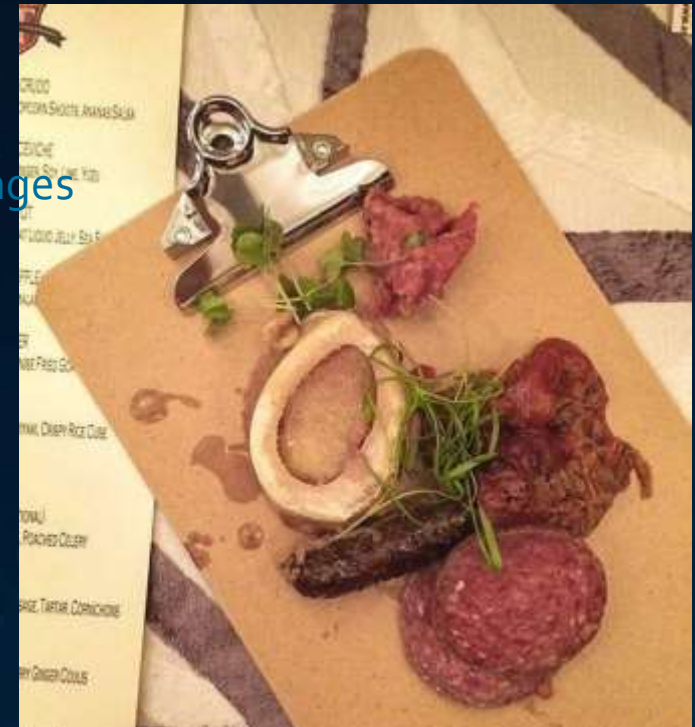
Service Definition Tests provide a solid foundation for your test's resilience



What kinds of API Tests are there?

Component Tests

- Test the individual components of a service looking for:
 - 500 errors
 - Error messages
 - Response code
 - Response time
 - Response headers
 - Response body
 - Response status
 - Response type
 - Response version
 - Response charset
 - Response encoding
 - Response language
 - Response location
 - Response redirect
 - Response refresh
 - Response script
 - Response stylesheet
 - Response title
 - Response type
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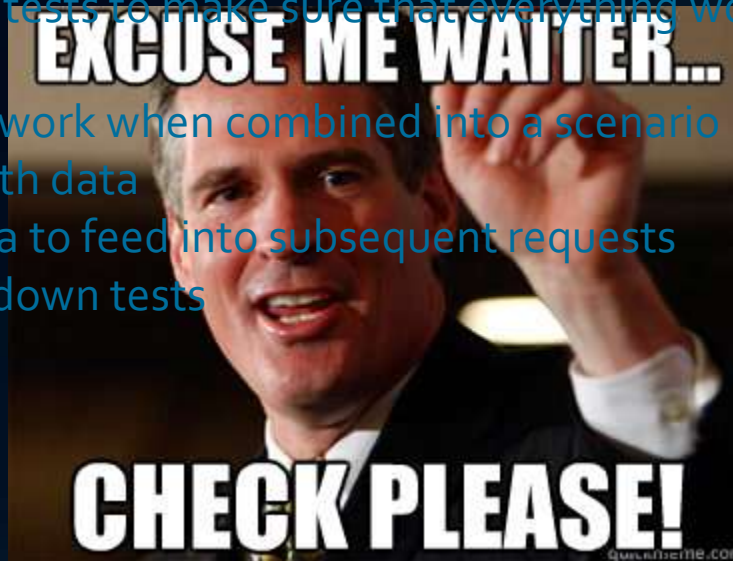
Component tests validate that individual resources work as expected. (Unit tests for QA)



What kinds of API Tests are there?

Scenario Tests

- Reuse the component tests to make sure that everything works in a specified scenario
 - Ensure your APIs work when combined into a scenario
 - Drive the tests with data
 - Use response data to feed into subsequent requests
 - Startup and tear down tests



Scenario Tests allow you to understand defects that are introduced by combining different data points together.



What kinds of API Tests are there?

Performance Tests

- Utilize a combination of component and scenario tests to validate the SLAs and timely performance of our application.



Performance tests validate that your application can behave under various types of stress



What kinds of API Tests are there?

Security Tests

- Use your existing component and scenario tests to kick off different kinds of penetration and security testing.



"Hi, I'd like a burger");
SELECT * FROM
Customers;"

Security Tests safeguard your application against malicious behavior



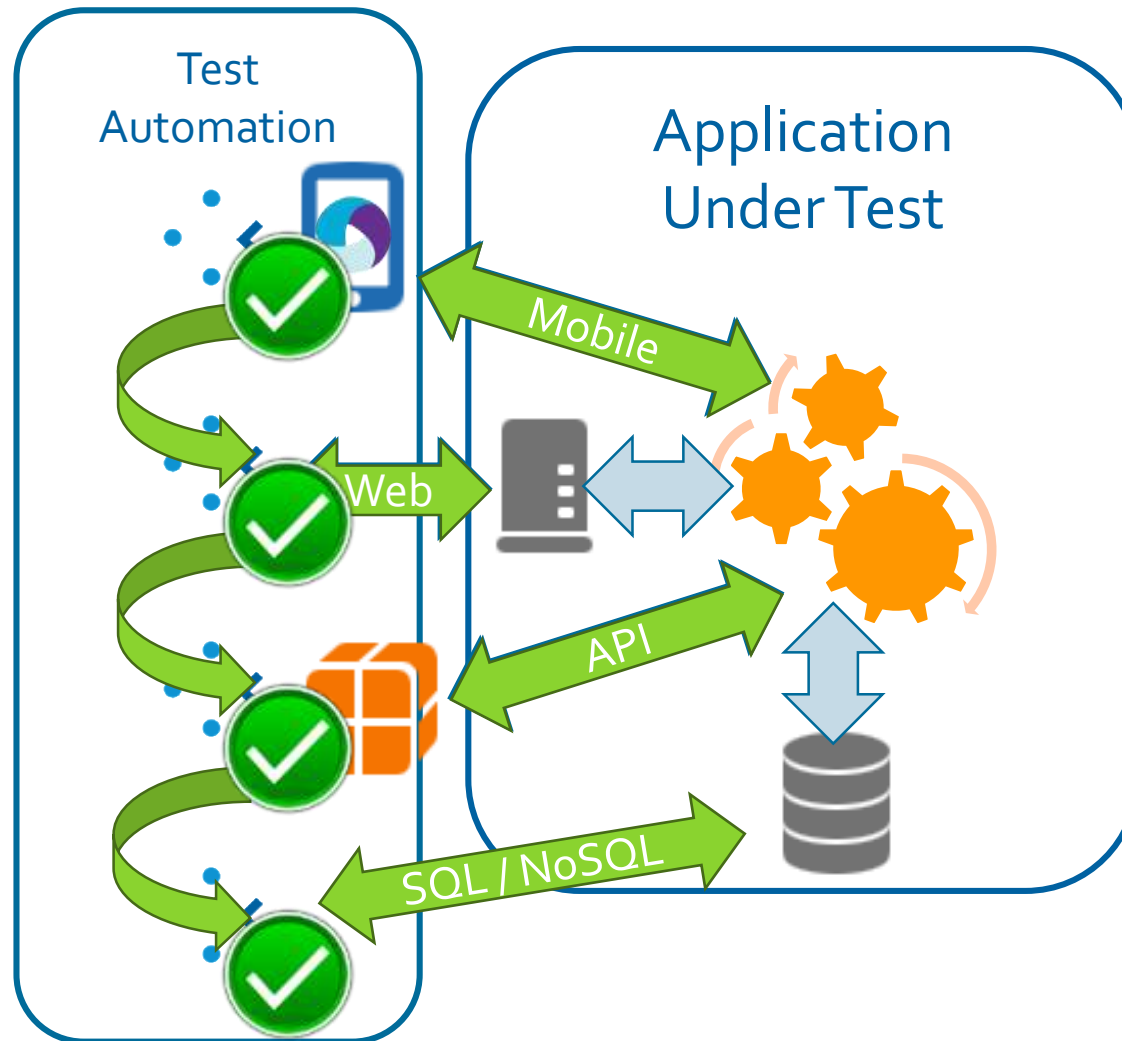
What kinds of API Tests are there?

Omni-Channel Tests

- Test every external entry point into your application to ensure appropriate behavior from each angle.



Omni Channel Testing



What kinds of API Tests are there?

Omni-Channel Tests

- Test every external entry point into your application to ensure appropriate behavior from each angle.



Omni-Channel Tests comprehensively test your application across multiple interfaces.



What kinds of API Tests are there?

- Service Definition Tests — Test the service definition itself
- Component Tests — Test the operations of the service definition
- Scenario Tests — Test the components with respect to each other
- Performance Tests — Test the application for compliance to SLA's
- Security Tests — Test the application for vulnerabilities
- Omni-Channel Tests — Test every entry into the application from end to end



Managing and mitigating change

- Bulletproof your application by ensuring that your tests adapt to change quickly
- Change can take many forms:
 - Protocol message format change
 - Elements added/removed from API
 - Code change affecting the data format
 - Service broken down as part of a shift towards microservices



API Testing, are you doing it right?

Best Practices

- Technology that simplifies the process of API Testing
 - The ability to execute various testing techniques within one consolidated ecosystem
- What environment is our application deployed in, and do we have access?
 - Environment template to allow seamless execution of test artifacts
- Which of our application's services are we testing?
 - Execution of test artifacts in the context of an environment
- What do we want to achieve with this test?
 - Requirements traceability
- What is our expected outcome?
 - Continual validation of our expectations



PARASOFT



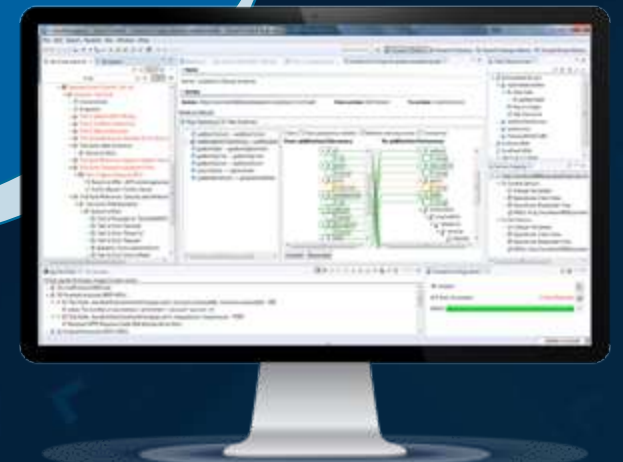


Choosing the Right API Testing Solution

Two Types of API Testing Solutions

API Testing Tool

Lightweight browser-based interface
+ Rich Desktop IDE based interface



Required Features and Capabilities

All API testing tools must have

Ease of Usage and capability



- ☐ Visual and Script less
- ☐ Custom Extensibility Framework
- ☐ Apply assertions and validations
- ☐ Data Driven Testing
- ☐ Test reusability
- ☐ Rapidly create tests before the service is available
- ☐ Authentication (SSL, Oauth, etc)

Optimized Workflows



- ☐ Test Flow Logic
- ☐ AI Powered Test Creation
- ☐ Test Data Management/ Generation
- ☐ BDD/ Cucumber support

Supported Technologies



- ☐ REST API Testing (GET, POST, Headers JSON)
- ☐ SOAP API Testing
- ☐ MQ/JMS Testing
- ☐ IoT and Microservice Testing
- ☐ Database Testing
- ☐ Web Based Testing
- ☐ Performance Testing
- ☐ Mainframe, Fixedlength, EDI, FIX, etc

Automation



- ☐ CI Integration
- ☐ Build system plugins
- ☐ Command line execution
- ☐ Open APIs for DevOps integration

Management/ Maintenance



- ☐ Integration with Requirements management systems (e.g. ALM/ Jira)
- ☐ Basic/ Advanced Reporting
- ☐ Test orchestration
- ☐ On Premise and Browser based access to solution
- ☐ Change Management process



Choosing the right API testing tool

A successful API rollout must have



Rapid Test Creation

Optimal way for test to keep pace with Agile development



Breath of technology

Comprehensive testing tailored to key industry initiatives



Broadly accessible architecture

Team access, collaboration, and scaling



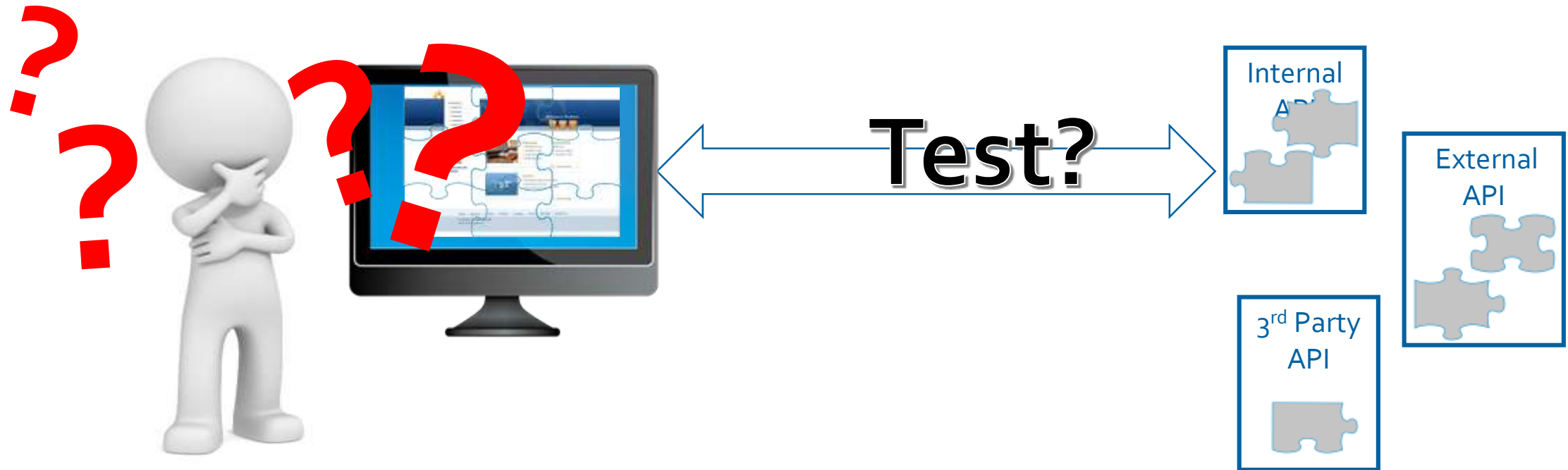
Change Management

Maintenance of your test library



Rapid Test Creation

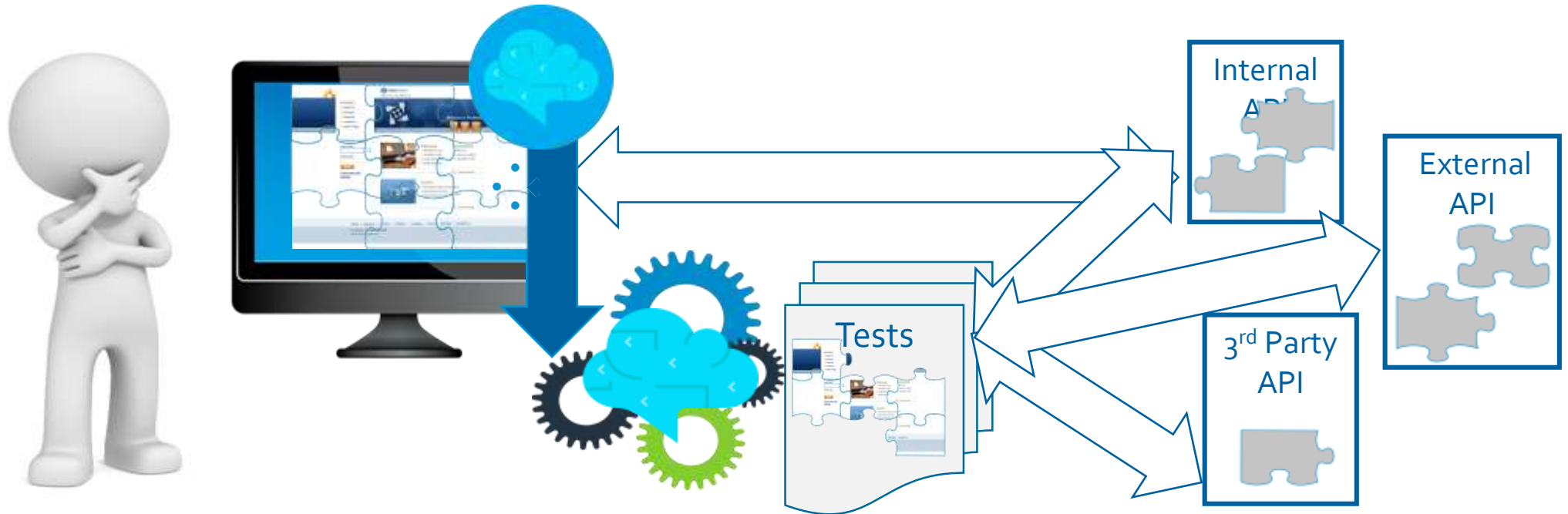
- **The Challenge: Time lost creating comprehensive API Tests**
 - Multiple APIs used by the application
 - Difficult to understand usage for documented and undocumented APIs
 - Time spent going back and forth with development for knowledge



Rapid Test Creation

Reduce the time it takes to create API tests

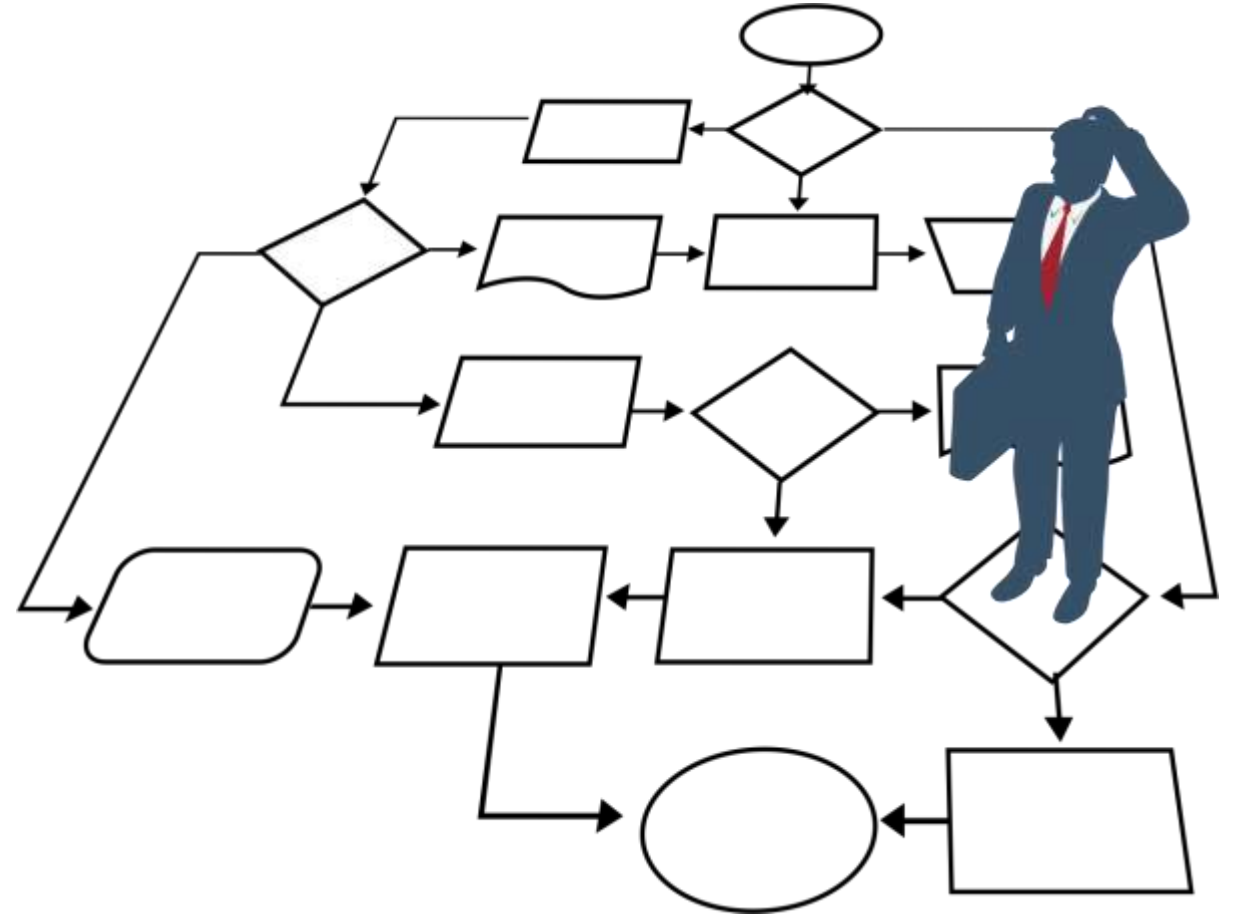
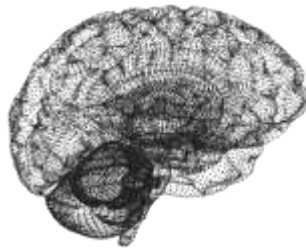
- **The Solution:** AI Powered test creation (Its 2019)
 - Exercise existing Manual tests to extract, filter and create API test scenarios by simply using the UI
 - Leverage AI to identify patterns and establish data relationships to create the API template
 - Automatically generate an API test scenario that can be run repeatedly



Putting the AI into API

Make the problem smaller

- More functional testing
 - Smaller tests, more specific
- AI
 - Turn big nasty tests into smaller specific



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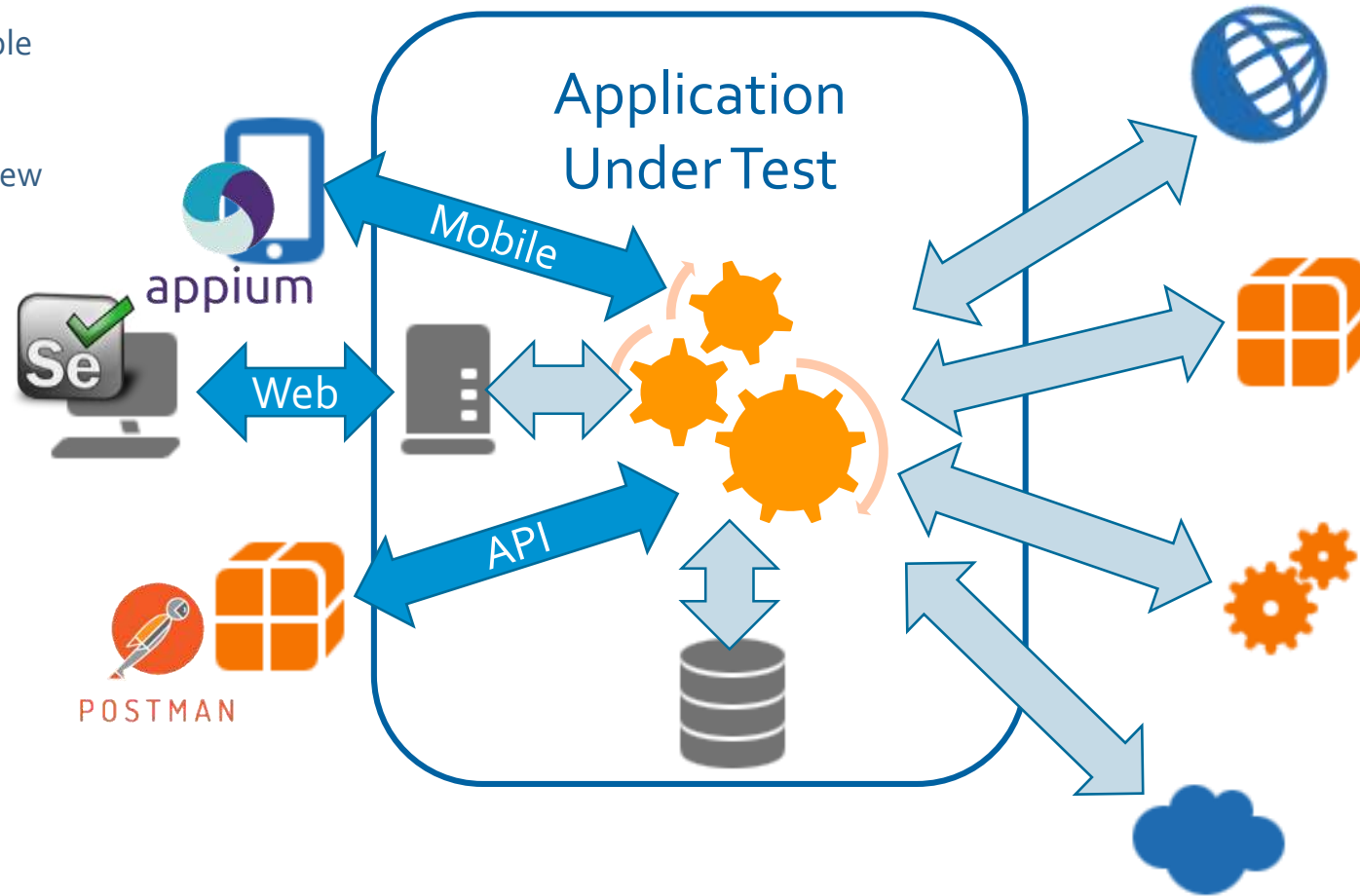
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Breath of Technology

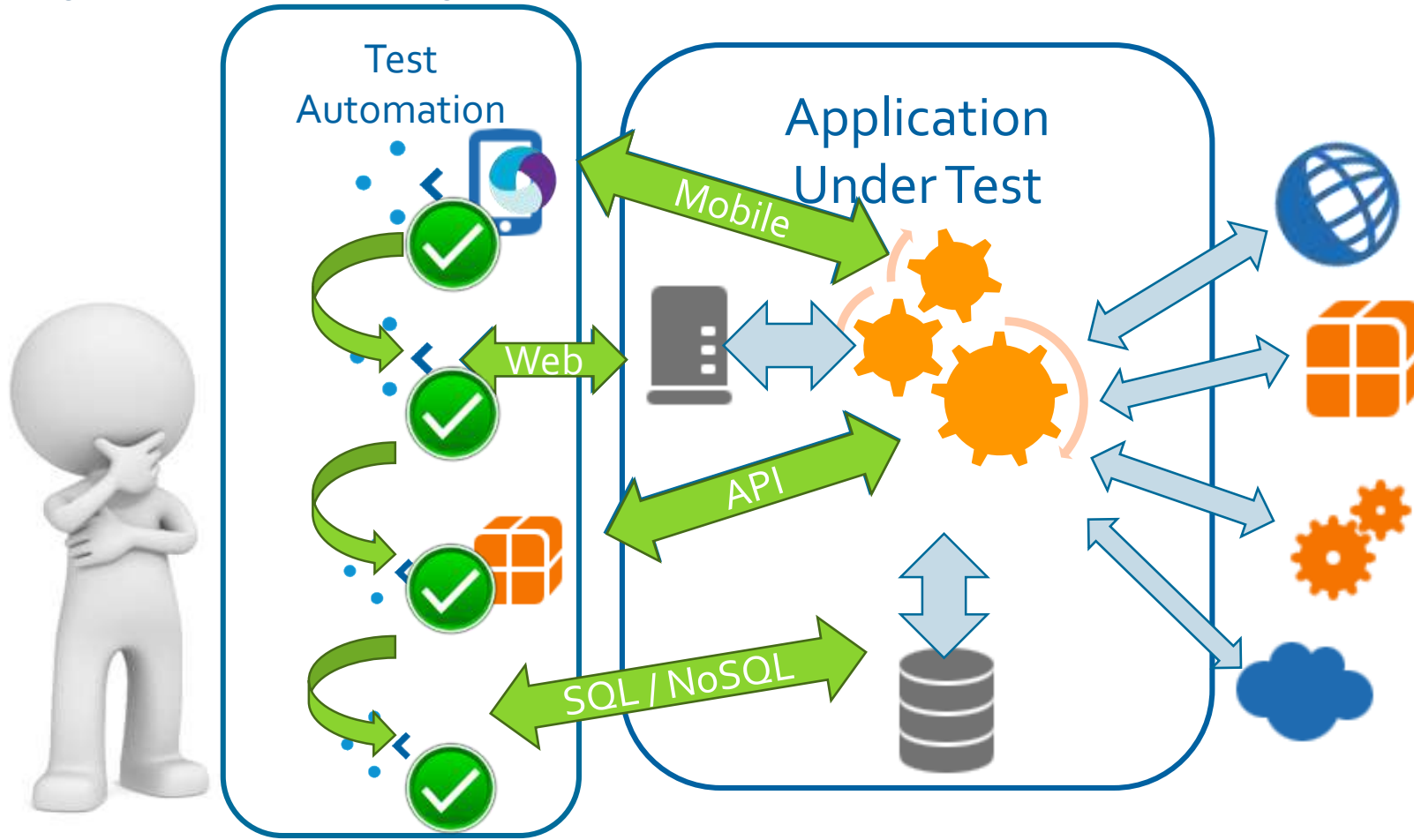
- **The Challenge: Adopting multiple tools to test different interfaces introduced significant overhead to QA department**
 - Very high cost of creating tests that validate multiple interfaces
 - Existing tool set doesn't support emerging use of new technology (i.e Microservices and IoT)
 - High cost of training
 - Difficulty interpreting and correlating output from multiple tools



Breath of Technology

Increase QA productivity by being able to test all requirements regardless of technology

- **The Solution:** Extensibility frameworks
 - Omnichannel testing of web, web service, and mobile interfaces easily achieved from one tool
 - High level of supported message formats and protocols with new additions to support you current and future initiatives



What do you need to test?

SOA / Web Services WADL MTOM(XOP) / MIME / DIME
Sonic MQ WSDL Web Applications UDDI HTML
XML HL7 Copybook BPEL JSON PoX (Plain XML)
Extendable Formats AJAX SAP RFC/IDoc
Mobile Interfaces JMS Java JVM Calls
Mainframe CICS/IMS HTTP/HTTPS SQL / Stored Procedures
webMethods IS SMTP Extendable Protocols
EDI JDBC/ODBC REST WS-* Standards
CSS WSIL SOAP JavaScript FTP JSP
OAuth RMI Tibco Rendezvous TCP/IP .NET WCF
IBM WebSphere MQ ISO 8583, FIX, SWIFT
EJB webMethods Broker



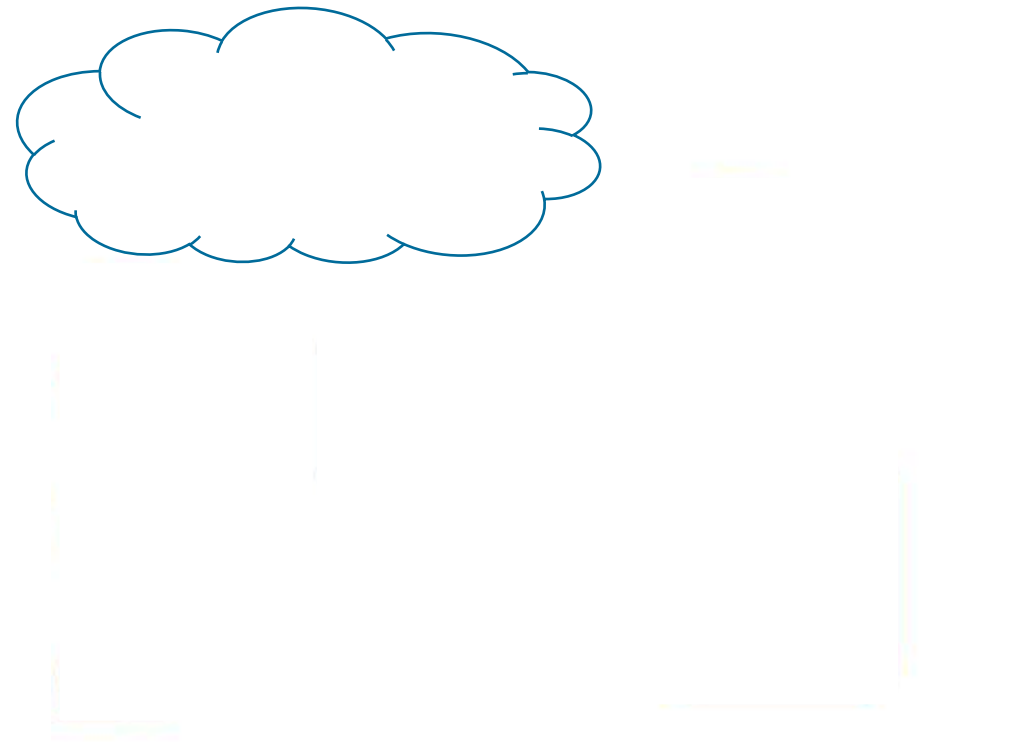
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Broadly accessible architecture

- **The Challenge: Growing pains of a scaling organization**
 - Test automation works best when an organization is “All In”
 - Community of practice requires simple browser based access for ad-hoc usage
 - Center of excellence requires a powerful desktop for daily usage
 - Redundancy in artifact creation and research due to lack of collaboration between teams
 - Need a centralized authority that manages and deploys test artifacts
 - Prevent lost knowledge due to employee attrition



Highly accessible and collaborative architecture

Increase in autonomy and productivity attributed to QA self-sufficiency

- **The Solution: A Continuous Testing Platform + Source Control**
 - Browser based thin client available for all infrequent users of test automation
 - Powerful desktops backed with source control for daily users
 - Centralized repository of test environments, virtual services, test cases and, test data available to all teams



Self-service accelerates testing

- Self-service
- Searchable
- Usable
- Deployable
- Destroyable
- Reusable



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Change = Risk ... understand the impact?

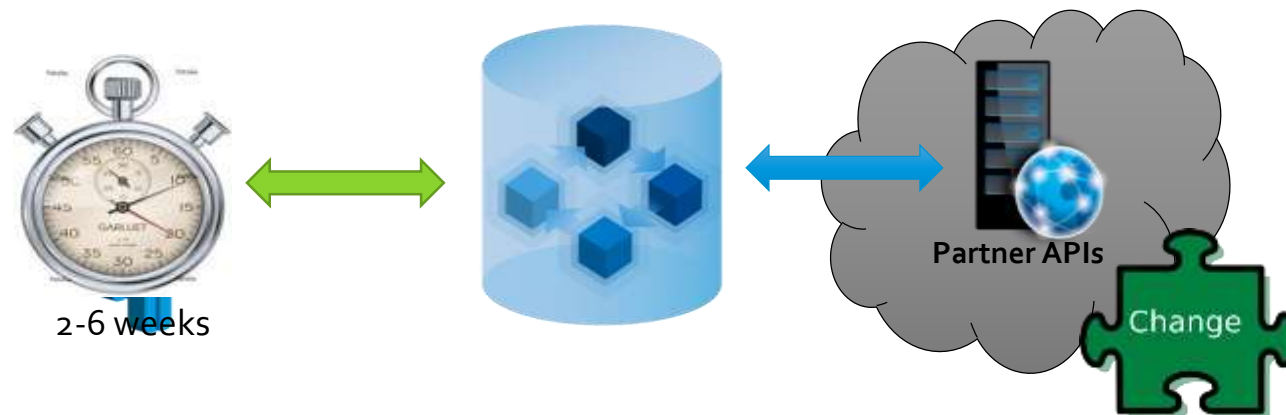
Increased functionality = Increased risk

- Increased functionality results in **more complex** code
- Interdependencies grow as enhancements are introduced
- **Knowledge** of the code base **becomes more fragmented** as the team grows
- **A small change has an unknown impact ...**
 - "It worked yesterday!?!"
 - "I didn't change that functionality!"
 - "We discovered a regression"



Change Management

- **The Challenge:** API change disrupts testing deliverables
 - Business leverages internal and partner APIs heavily in applications
 - Each time a new version is announced results in 2-6 weeks of test refactoring
 - Slows down application testing cycles that result in delayed releases



Change management

▼ Name

Name: Bookstore Change Template

▼ Service

Service: <http://parabank.parasoft.com/parabank/services/store-01V2?wsdl>

From version: Old Version

To version: Current Version

[Reset to Defaults](#)

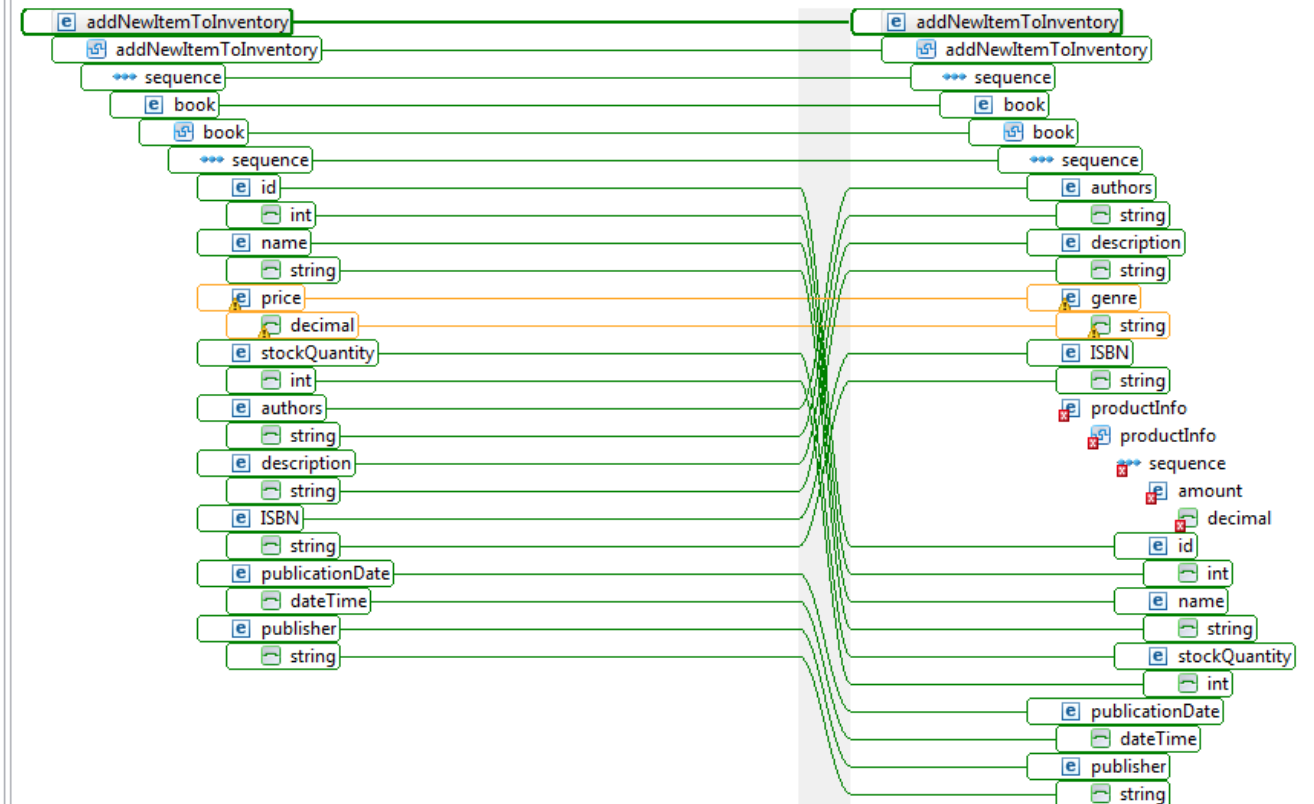
[Map Operations](#) [Map Schemas](#)

- addItemToCart → addItemToCart
- addNewItemToInventory → addNewItemToInventory
- getItemById → getItemByIdentifier
- getItemByTitle → getItemByTitle
- getItemsInCart → getItemsInCart
- submitOrder → submitOrder
- updateItemInCart → updateItemInCart

Filters: ☐ High probability matches ☐ Matches needing review ☐ Unmatched

From: addNewItemToInventory

To: addNewItemToInventory



TL;DR

Every API testing tool must have

- Ease of Usage and capability
- Optimized Workflows
- Supported Technologies
- Automation
- Management/ Maintenance

To maximize efficiency and ROI you must have

- Rapid Test Creation
- Breath of technology
- Broadly accessible architecture
- Change Management



Make sure your testing tool checks all the boxes

Ease of Usage and capability



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THANK YOU

Q&A

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