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Web Service的自动化测试 -soapUI的介绍

黄勇

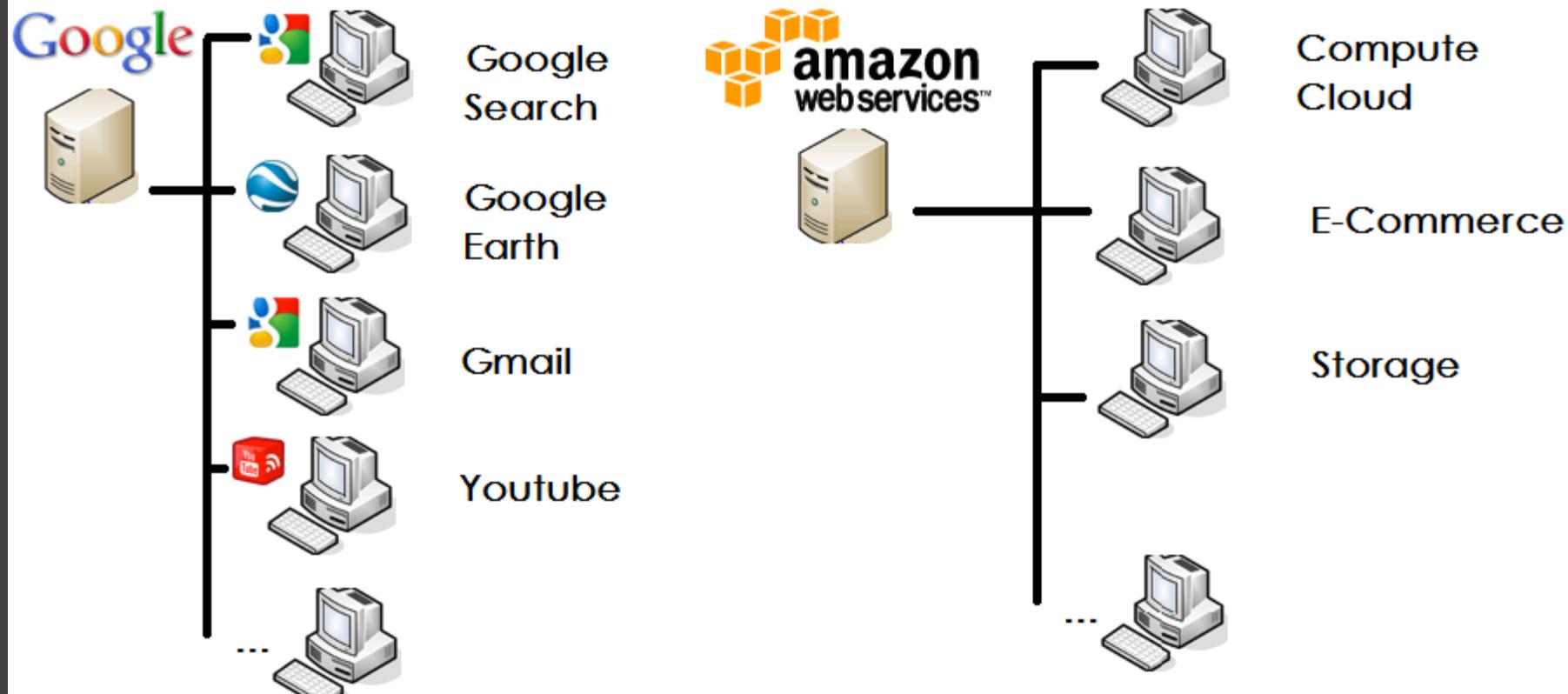
ThoughtWorks

什么是Web Service?

- 提供功能
- 被其他程序使用
- 基础平台是XML+HTTP



Web Service实例



Web Service Description Language

- 描述Web Service
- xml文档



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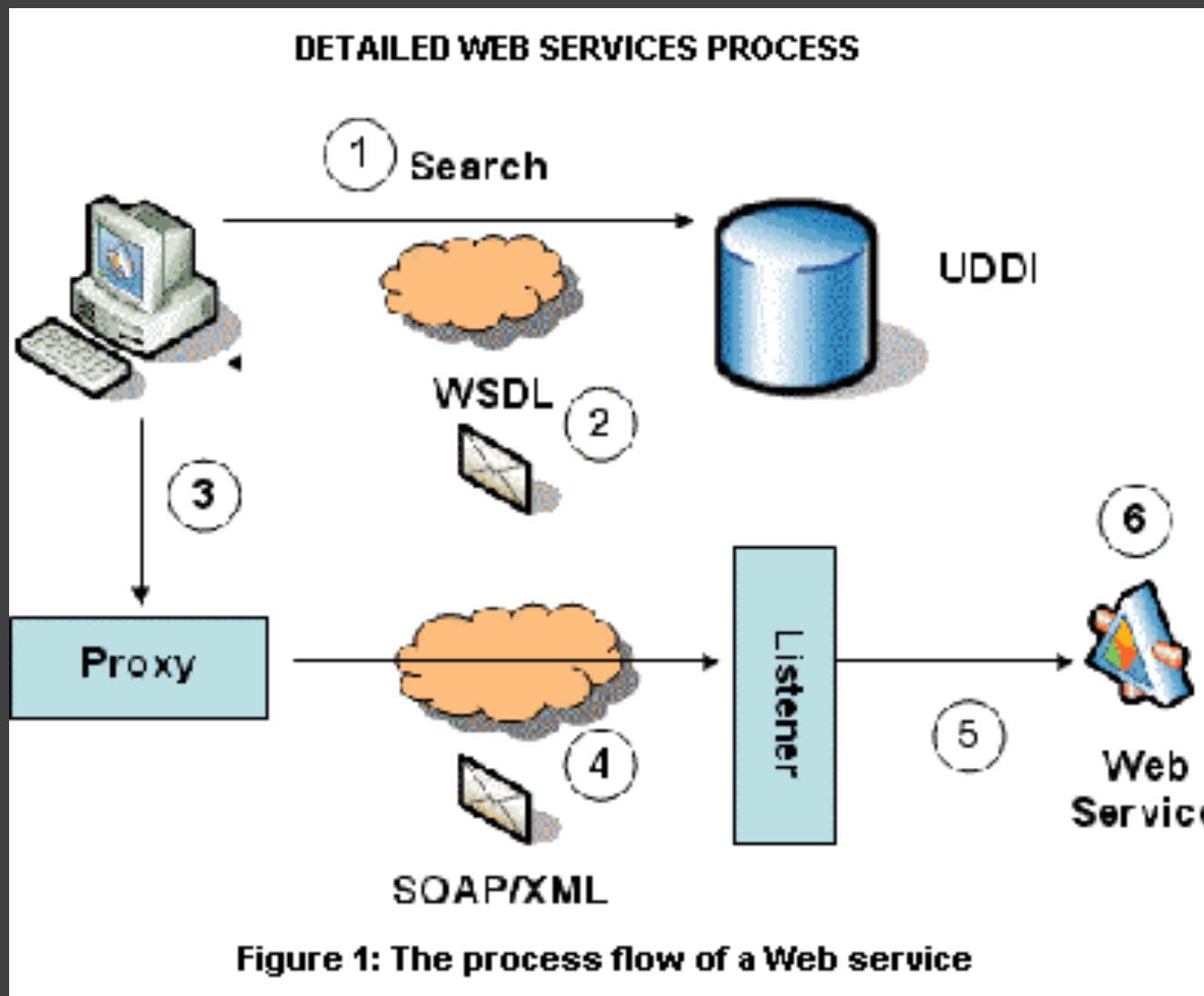
Simple Object Access Protocol

- 基于XML
- 使用HTTP交换信息



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Web Service, WSDL和SOAP



Web Service测试的特点

- 多数service没有界面
- service之间的交互和依赖
- 需要更多的回归测试



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Web Service测试与传统测试的不同

- 除去功能测试和性能测试之外:
- Governance Testing
- Service-level Testing
- Integration Testing
- Security Testing



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一个SOAP请求实例

```
POST /InStock HTTP/1.1
Host: www.example.org
Content-Type: application/SOAP+xml; charset=utf-8
Content-Length: nnn

<?xml version="1.0"?>
<SOAP:Envelope
  xmlns:SOAP="http://www.w3.org/2001/12/SOAP-envelope"
  SOAP:encodingStyle="http://www.w3.org/2001/12/SOAP-encoding">

  <SOAP:Body
    xmlns:m="http://www.example.org/stock">
    <m:GetStockPrice>
      <m:StockName>NewStock</m:StockName>
    </m:GetStockPrice>
  </SOAP:Body>

</SOAP:Envelope>
```

一个SOAP响应实例

HTTP/1.1 200 OK

Content-Type: application/SOAP+xml; charset=utf-8

Content-Length: nnn

```
<?xml version="1.0"?>
<SOAP:Envelope
  xmlns:SOAP="http://www.w3.org/2001/12/SOAP-envelope"
  SOAP:encodingStyle="http://www.w3.org/2001/12/SOAP-
  encoding">

  <SOAP:Body  xmlns:m="http://www.example.org/stock">
    <m:GetStockPriceResponse>
      <m:Price>34.5</m:Price>
    </m:GetStockPriceResponse>
  </SOAP:Body>

</SOAP:Envelope>
```

soapUI

The screenshot shows the soapUI Pro 3.6 - TRIAL application window. The left sidebar displays a project tree under 'Creates a new soapUI Project'. A test case named 'TC-Simple_Keyword_Search' is selected, indicated by a green checkmark icon. The main workspace shows a 'TestSteps' tab where a step named 'Populate_Headers' has failed, as indicated by a red 'FAILED' status bar. Below the steps, the 'Search - Suite' section is expanded, showing various search-related test cases like 'IC-Simple_Keyword_Search', 'IC-Complex_Keyword_Search', etc. At the bottom, the 'Properties' panel shows 'Name' as 'TC-Simple_Keywo...'. The status bar at the bottom indicates 'TestCase failed [Cancelling due to failed test step: groovy.lang.MissingMethodException: No signature of method: com.eviware.soapui.impl.wsdl.teststeps.RestTestRequest.setRequestHeaders() is applicable for parameters]'.

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soapUI是什么？

- 基于SOAP或REST
- 把功能测试转化成性能测试
- 支持Windows, Mac和Linux



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soapUI特性

- 针对Web Service设计
- Mock Service
- 多协议支持: SOAP, REST, HTTP, JDBC



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soapUI实例

- 天气预报的Web Service

Weather Forecast

Select your City ...

Select country : UK Select city : London Download Weather Forecast Now!

Updated on 4/3/06 7:20 AM Local Time

London, United Kingdom Latitude: 51.51 Longitude: -0.08 Sun Rise: 6:31 AM Sun Set: 7:37 PM	
Temperature: 8°C Visibility: 10.0 km Feels Like: 5°C UV Index: 0 (Low) Dew Point: 5°C Humidity: 81	
Wind conditions - Speed: 16 km/h Degree: 270 GUST: N/A Direction: W	Day conditions:
Pressure information - Bar Pressure: 1015.9 mb Bar Direction: rising	Night conditions:
Moon Phase - 	Wind Speed: 18 Wind GUST: N/A Wind Degree: 287 Wind Direction: WNW Humidity: 56 Precipitation: 40
	Wind Speed: 16 Wind GUST: N/A Wind Degree: 305 Wind Direction: NW Humidity: 65 Precipitation: 10

Updated at : 4/3/06 6:14 AM Local Time

High Temperature: 11°C Low Temperature: 1°C	Sun Rise: 6:31 AM Sun Set: 7:37 PM
Day conditions: 	Night conditions:
Wind Speed: 18 Wind GUST: N/A Wind Degree: 287 Wind Direction: WNW Humidity: 56 Precipitation: 40	Wind Speed: 16 Wind GUST: N/A Wind Degree: 305 Wind Direction: NW Humidity: 65 Precipitation: 10

Sun Rise: 6:27 AM
Sun Set: 7:40 PM

Highest Temperature : 7°C
Lowest Temperature : 0°C

Thursday, Apr 6

Sun Rise: 6:25 AM
Sun Set: 7:42 PM

Highest Temperature : 12°C
Lowest Temperature : 0°C

Friday, Apr 7

Sun Rise: 6:22 AM
Sun Set: 7:44 PM

Highest Temperature : 10°C
Lowest Temperature : 5°C

Saturday, Apr 8



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soapUI Pro 3.6 - TRIAL

File Tools Desktop Help

Search Forum

Projects

WeatherForecast

- WeatherForecastSoap
- WeatherForecastSoap12
 - GetWeatherByPlaceName
 - Request 1
 - GetWeatherByZipCode
- TestSuite 1
 - TestCase 1
 - Test Steps (3)
 - DataSource
 - GetWeatherByPlaceName
 - DataSource Loop
 - Load Tests (1)
 - LoadTest 1
- MockService 1
 - GetWeatherByPlaceName
 - Response 1

soapUI Starter Page WeatherForeca... ▾ X

[Overview](#) [TestSuites](#) [Security Configurations](#) [Requirements](#) [JDBC Connections](#) [Reporting](#) [Events](#)

Project Summary

File Path

<C:\Documents and Settings\ww\Desktop\WeatherForecast-soapui-project.xml>

Interface Summary

WeatherForecastSoap

<http://www.webservicex.net/WeatherForecast.asmx?wsdl>

WeatherForecastSoap12

<http://www.webservicex.net/WeatherForecast.asmx?wsdl>

Test Summary

TestSuites	1
TestCases	1
TestSteps	3
Assertions	5
LoadTests	1

Mock Summary

MockServices	1
MockOperations	1
MockResponses	1

soapUI Starter Page Request 1 http://www.webservicex.net/WeatherForecast.asmx

View Type: All

GetWeatherByPlaceName

PlaceName: MADRID (xsd:string)

GetWeatherByPlaceName

Latitude: 44.76898 (xsd:float)

Longitude: 75.14134 (xsd:float)

AllocationFactor: 0.000102 (xsd:float)

FipsCode: 36 (xsd:string)

PlaceName: MADRID (xsd:string)

StateCode: NY (xsd:string)

Details

WeatherData

Day: Monday, November 08, 2010 (xsd:string)

Weather: http://forecast.weather.gov/im... (xsd:string)

MaxTemp: 45 (xsd:string)

MinTemp: 34 (xsd:string)

MaxTemp: 7 (xsd:string)

MinTemp: 1 (xsd:string)

WeatherData

Day: Tuesday, November 09, 2010 (xsd:string)

soapUI Starter Page WeatherForecast WeatherForecastSoap12 GetWeatherByPlaceName

http://www.webservicex.net/WeatherForecast.asmx

View Type: All

GetWeatherByPlaceName

PlaceName: new york

soap:Envelope

soap:Body

GetWeatherByPlaceName...

GetWeatherByPlaceName...

Latitude 40.74838

Longitude 73.9967041

AllocationFactor 0.001051

FipsCode 36

PlaceName NEW YORK

StateCode NY

Details

WeatherData

Day Monday, November 20, 2017

Aut Headers (0) Attachments (0) WS-...

Headers (8) Attachments (0) SSL Info WSS (0) J...

+ X SOAP Response - VALID

Match content of [Latitude] - FAILED
-> XPathContains comparison failed, expecting [44.76898], actual was [40.74838]

Match content of [Longitude] - FAILED
-> XPathContains comparison failed, expecting [75.14134], actual was [73.9967041]

Match content of [PlaceName] - FAILED
-> XPathContains comparison failed, expecting [MADRID], actual was [NEW YORK]

Match content of [StateCode] - VALID

Assertions (5) Request Log (4)

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projects

- WeatherForecast
 - WeatherForecastSoap
 - GetWeatherByPlaceName
 - Request 1
 - GetWeatherByZipCode
 - WeatherForecastSoap12
 - GetWeatherByPlaceName
 - Request 1
 - GetWeatherByZipCode
- TestSuite 1
 - TestCase 1
 - Test Steps (2)
 - DataSource
 - GetWeatherByPlaceName
 - Load Tests (1)
 - LoadTest 1
- MockService 1
 - GetWeatherByPlaceName
 - Response 1

Response 1

MockService 1 GetWeatherByPlaceName GetWe...

so AP

Outline Raw XML

```
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/...
<soap:Header/>
<soap:Body>
  <web:GetWeatherByPlaceName>
    <!--Optional:-->
    <web:PlaceName>MA</web:PlaceName>
  </soap:Body>
</soap:Envelope>
```

Form Outline Raw XML

```
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/...
<soap:Header/>
<soap:Body>
  <web:GetWeatherByPlaceNameResponse>
    <web:GetWeatherByPlaceNameResult>
      <web:Latitude?></web:Latitude>
      <web:Longitude?></web:Longitude>
      <web:AllocationFactor?></web:AllocationFactor>
      <!--Optional:-->
      <web:FipsCode?></web:FipsCode>
      <!--Optional:-->
      <web:PlaceName>NEW YORK</web:PlaceName>
      <!--Optional:-->
      <web:StateCode>NY</web:StateCode>
      <!--Optional:-->
      <web>Status?></web>Status>
      <!--Optional:-->
      <web:Details>
        <!--Zero or more repetitions:-->
        <web:WeatherData>
          <!--Optional:-->
```

MockService 1 GetWeatherByPlaceName GetWeatherByPlaceName - Request 1 Request 1

http://HuangTongMac:8080/

View Type: All

GetWeatherByPlaceName

PlaceName: MADRID (xsd:string)

soap:Envelope

soap:Header

soap:Body

web:GetWeatherByP...

web:GetWeather...

web:Latitude ?

web:Longitude ?

web:Alloca... ?

web:FipsCode ?

web:PlaceName NEW YORK

web:StateCode NY

web>Status ?

web:Details

web:Wea...

web:Day ?

web:... ?

web:... ?

web:... ?

web:... ?

web:... ?

Form Outline Raw Overview

projects

WeatherForecast

WeatherForecastSoap

GetWeatherByPlaceName

so AP Request 1

GetWeatherByZipCode

WeatherForecastSoap12

GetWeatherByPlaceName

so AP Request 1

GetWeatherByZipCode

TestSuite 1

TestCase 1

Test Steps (2)

DataSource

GetWeatherByPlaceName

Load Tests (1)

LoadTest 1

MockService 1

GetWeatherByPlaceName

so Response 1

GetWeatherByPlaceName GetWeatherByPlaceName - Request 1 TestCase 1

FAILED

TestSteps	TestCase Coverage	TestCase Requirements
so AP Request 1	RE ST TP AP MF	BC

DataSource
GetWeatherByPlaceName - Request 1
DataSource Loop

Description Properties Setup Script TearDown Script Report Script Report Parameters

Test started at 2010-11-09 17:06:21.074

- Step 1 [DataSource] OK: took 0 ms
- Step 2 [GetWeatherByPlaceName - Request 1] FAILED: took 87 ms
 - > [Match content of [web:Latitude]] XPathContains comparison failed, expecting [40.74838], actual was [?]
 - > [Match content of [web:Longitude]] XPathContains comparison failed, expecting [73.996704], actual was [?]
- Step 3 [DataSource Loop] OK: took 0 ms
- Step 4 [GetWeatherByPlaceName - Request 1] FAILED: took 29 ms
 - > [Match content of [web:Latitude]] XPathContains comparison failed, expecting [44.7689], actual was [?]
 - > [Match content of [web:Longitude]] XPathContains comparison failed, expecting [75.14134], actual was [?]
 - > [Match content of [web:PlaceName]] XPathContains comparison failed, expecting [MADRID], actual was [NEW YORK]
- Step 5 [DataSource Loop] OK: took 0 ms

> Current row = 1

> Current row = 2

TestCase failed [Failing due to failed test step], time taken = 116

TestCase Log

GetWeatherByPlaceName - Request 1 TestCase 1 LoadTest 1 Request 1

URL

FAILED

TestSteps TestCase Coverage TestCase Requirements

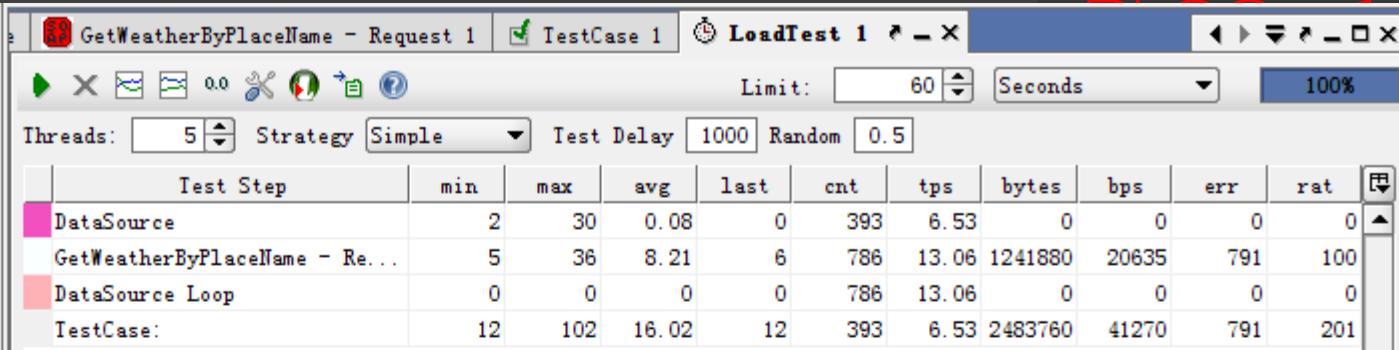
Enable Coverage

Element	Contract Coverage
WeatherForecastSoap12	26% (11%) 10/38
TestSuite 1	11% (5%)
TestCase 1	11% (5%)
GetWeatherByPlaceName - Request 1	42% (21%)
Message	42% (21%)
Request	100% (0%)
Response	35% (24%)
Match content of [web:Latitude]	0% (6%)
Match content of [web:Longitude]	0% (6%)
Match content of [web:PlaceName]	0% (6%)
Match content of [web:StateCode]	0% (6%)
Message	42% (21%)
Request	100% (0%)
Response	35% (24%)
Match content of [web:Latitude]	0% (6%)
Match content of [web:Longitude]	0% (6%)
Match content of [web:PlaceName]	0% (6%)
Match content of [web:StateCode]	0% (6%)

Assertion Results

Projects

- WeatherForecast
 - WeatherForecastSoap
 - WeatherForecastSoap12
 - GetWeatherByPlaceName
 - Request 1
 - GetWeatherByZipCode
- TestSuite 1
 - TestCase 1
 - Test Steps (3)
 - DataSource
 - GetWeatherByPlaceName
 - DataSource Loop
 - Load Tests (1)
 - LoadTest 1
- MockService 1
 - GetWeatherByPlaceName
 - Response 1



LoadTestPro Properties

Property	Value
Name	LoadTest 1
Description	

Show Types: - All - Show Steps: - All -

time	type	step	message
2010-11-09 17:13:20...	Message		LoadTest started at Tue Nov 09 17:13:20 C...
2010-11-09 17:13:21...	Step Status	GetWeatherByPlace...	TestStep [GetWeatherByPlaceName - Request...
2010-11-09 17:13:21...	Step Status	GetWeatherByPlace...	TestStep [GetWeatherByPlaceName - Request...
2010-11-09 17:13:21...	Step Status	GetWeatherByPlace...	TestStep [GetWeatherByPlaceName - Request...
2010-11-09 17:13:21	Step Status	GetWeatherByPlace...	TestStep [GetWeatherByPlaceName - Request...

796 entries

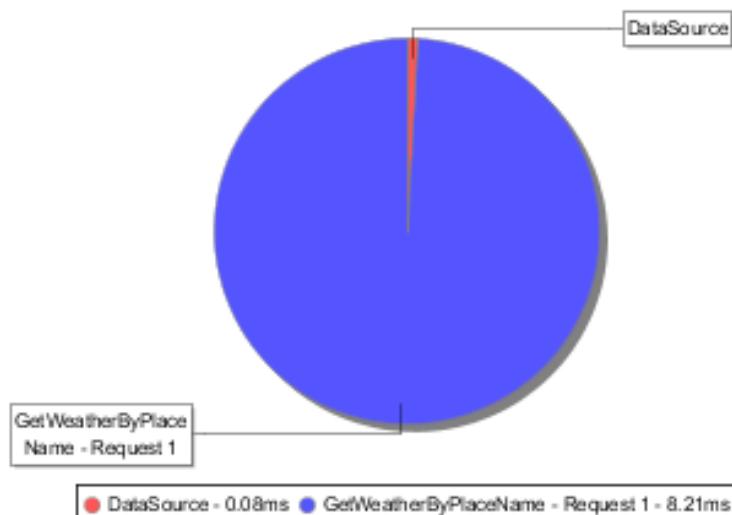
LoadTest Log LoadTest Assertions Setup Script TearDown Script Report Script Report Parameters

LoadTest Results for LoadTest 1

Result Statistics

TestStep Name	min	max	avg	last	cnt	tps	bytes	bps	err	rat
DataSource	2	30	0.08	0	393	6.53	0	0	0	0
GetWeatherByPlace	5	36	8.21	6	786	13.06	124188	20635	794	101
DataSource Loop	0	0	0.0	0	786	13.06	0	0	0	0
TestCase:	12	102	16.02	12	393	6.53	248376	41270	794	202

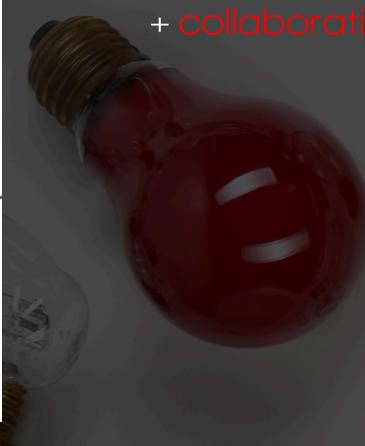
Average Step Time Distribution



LoadTest Log

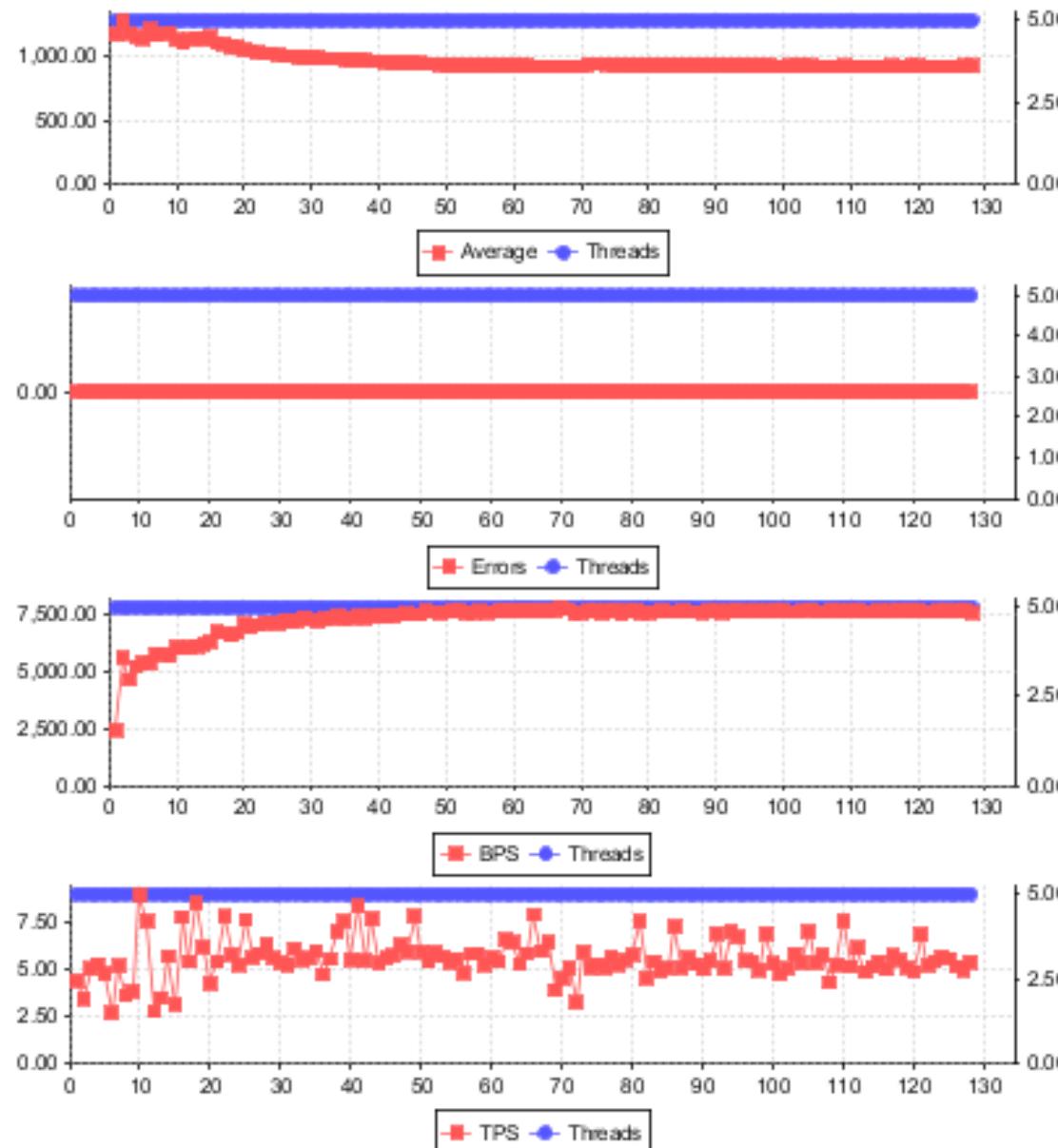
Time	Type	Step	Message
2010.11.09 17:13:20	Message		LoadTest started at Tue Nov 09 17:13:20 CST 2010
2010.11.09 17:13:21	Step	GetWeatherBy	TestStep [GetWeatherByPlaceName - Request 1] result status is FAILED; [[Match content of [web: Latitude]] XPathContains comparison failed, expecting [40.74838], actual was [?], [Match content of [web:Longitude]] XPathContains comparison failed, expecting [73.996704], actual was [?]] [discarded]

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GetWeatherByPlaceName - Request 1LoadTest Statistics History

B' QConf

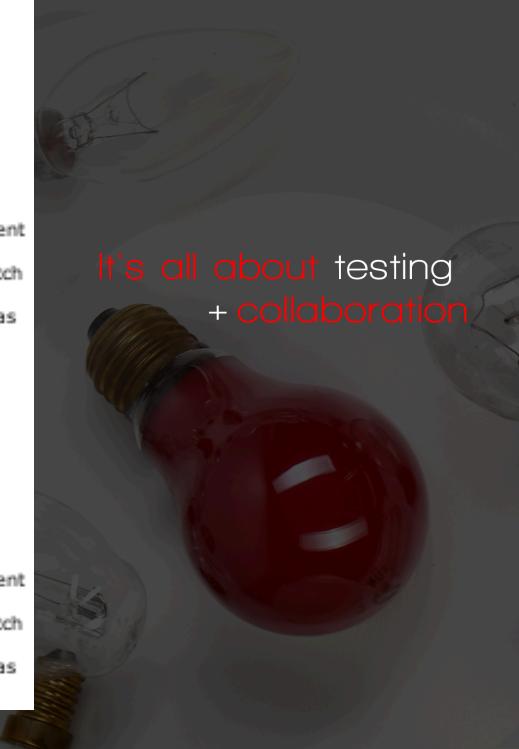


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LoadTest Log

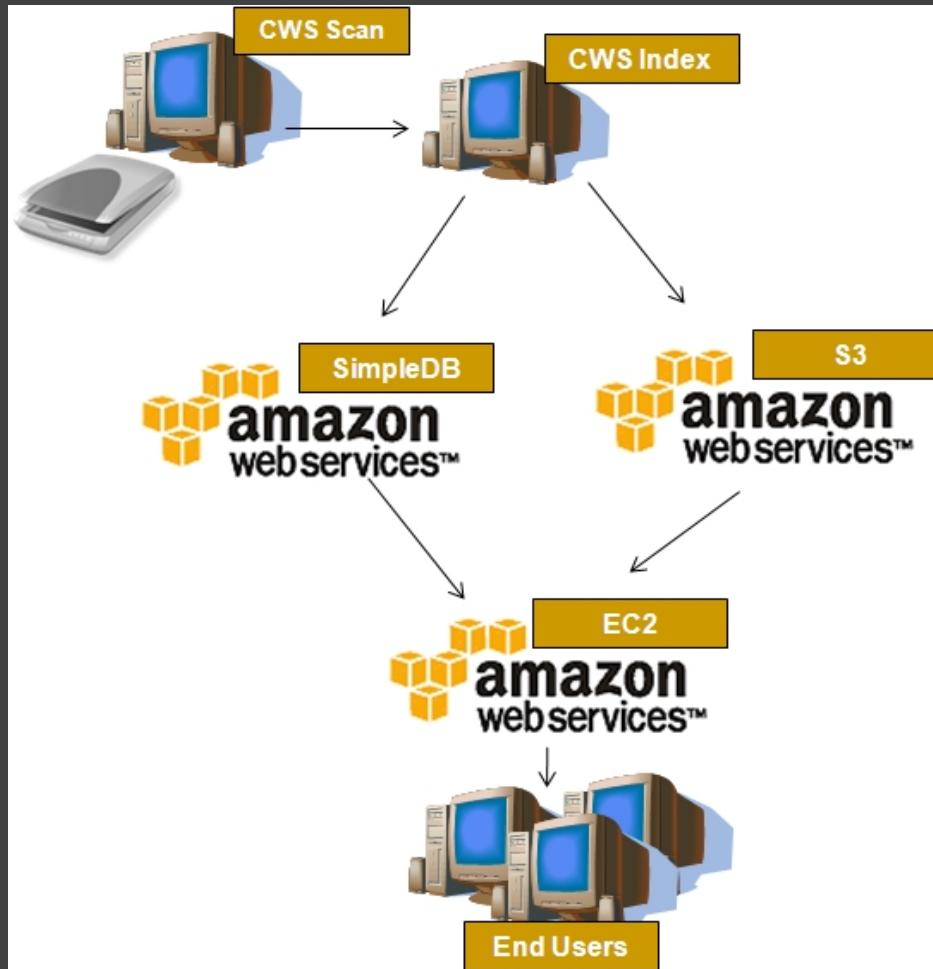
Time	Type	Step	Message
2010.11.09 17:13:21	Step	GetWeatherBy	TestStep [GetWeatherByPlaceName - Request 1] result status is FAILED; [[Match content of [web:Latitude]] XPathContains comparison failed, expecting [44.7689], actual was [?], [Match content of [web:Longitude]] XPathContains comparison failed, expecting [75.14134], actual was [?], [Match content of [web:PlaceName]] XPathContains comparison failed, expecting [MADRID], actual was [NEW YORK]] [discarded]
2010.11.09 17:13:21	Step	GetWeatherBy	TestStep [GetWeatherByPlaceName - Request 1] result status is FAILED; [[Match content of [web:Latitude]] XPathContains comparison failed, expecting [40.74838], actual was [?], [Match content of [web:Longitude]] XPathContains comparison failed, expecting [73.996704], actual was [?]] [discarded]
2010.11.09 17:13:21	Step	GetWeatherBy	TestStep [GetWeatherByPlaceName - Request 1] result status is FAILED; [[Match content of [web:Latitude]] XPathContains comparison failed, expecting [44.7689], actual was [?], [Match content of [web:Longitude]] XPathContains comparison failed, expecting [75.14134], actual was [?], [Match content of [web:PlaceName]] XPathContains comparison failed, expecting [MADRID], actual was [NEW YORK]] [discarded]
2010.11.09 17:13:21	Step	GetWeatherBy	TestStep [GetWeatherByPlaceName - Request 1] result status is FAILED; [[Match content of [web:Latitude]] XPathContains comparison failed, expecting [40.74838], actual was [?], [Match content of [web:Longitude]] XPathContains comparison failed, expecting [73.996704], actual was [?]] [discarded]
2010.11.09 17:13:21	Step	GetWeatherBy	TestStep [GetWeatherByPlaceName - Request 1] result status is FAILED; [[Match content of [web:Latitude]] XPathContains comparison failed, expecting [44.7689], actual was [?], [Match content of [web:Longitude]] XPathContains comparison failed, expecting [75.14134], actual was [?], [Match content of [web:PlaceName]] XPathContains comparison failed, expecting [MADRID], actual was [NEW YORK]] [discarded]
2010.11.09 17:13:21	Step	GetWeatherBy	TestStep [GetWeatherByPlaceName - Request 1] result status is FAILED; [[Match content of [web:Latitude]] XPathContains comparison failed, expecting [40.74838], actual was [?], [Match content of [web:Longitude]] XPathContains comparison failed, expecting [73.996704], actual was [?]] [discarded]
2010.11.09 17:13:21	Step	GetWeatherBy	TestStep [GetWeatherByPlaceName - Request 1] result status is FAILED; [[Match content of [web:Latitude]] XPathContains comparison failed, expecting [44.7689], actual was [?], [Match content of [web:Longitude]] XPathContains comparison failed, expecting [75.14134], actual was [?], [Match content of [web:PlaceName]] XPathContains comparison failed, expecting [MADRID], actual was [NEW YORK]] [discarded]

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soapUI能显著提高测试效率

- 亚马逊电子商务服务(Amazon E-Commerce Service)



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soapUI Starter Page AmazonWebService_ECommerceService Request 1 https://ecs.amazonaws.com/onca/soap?Service=AWSECommerceService

Projects

AmazonWebService_ECommerceService

- AWSECommerceServiceBinding
 - BrowseNodeLookup
 - Request 1
 - CartAdd
 - CartClear
 - CartCreate
 - CartGet
 - CartModify
 - CustomerContentLookup
 - CustomerContentSearch
 - Help
 - ItemLookup
 - ItemSearch
 - ListLookup
 - ListSearch
 - MultiOperation
 - SellerListingLookup
 - SellerListingSearch
 - SellerLookup
 - SimilarityLookup
 - TagLookup
 - TransactionLookup
 - VehiclePartLookup
 - VehiclePartSearch
 - VehideSearch
- AWSECommerceServiceBinding Test
- AWSECommerceServiceBinding Mock

View Type: All

BrowseNodeLookup

MarketplaceDomain: ? (xsd:string)

AWSAccessKeyId: ? (xsd:string)

SubscriptionId: ? (xsd:string)

AssociateTag: ? (xsd:string)

Validate: ? (xsd:string)

XMLEscaping: ? (xsd:string)

Shared BrowseNodeLookupRequest [0..1] Add Delete..

BrowseNodeId: Add Edit Delete
?

ResponseGroup: Add Edit Delete
?

Request BrowseNodeLookupRequest [0..*] Add Clear

Request BrowseNodeLookupRequest [0] Delete..

BrowseNodeId: Add Edit Delete
?

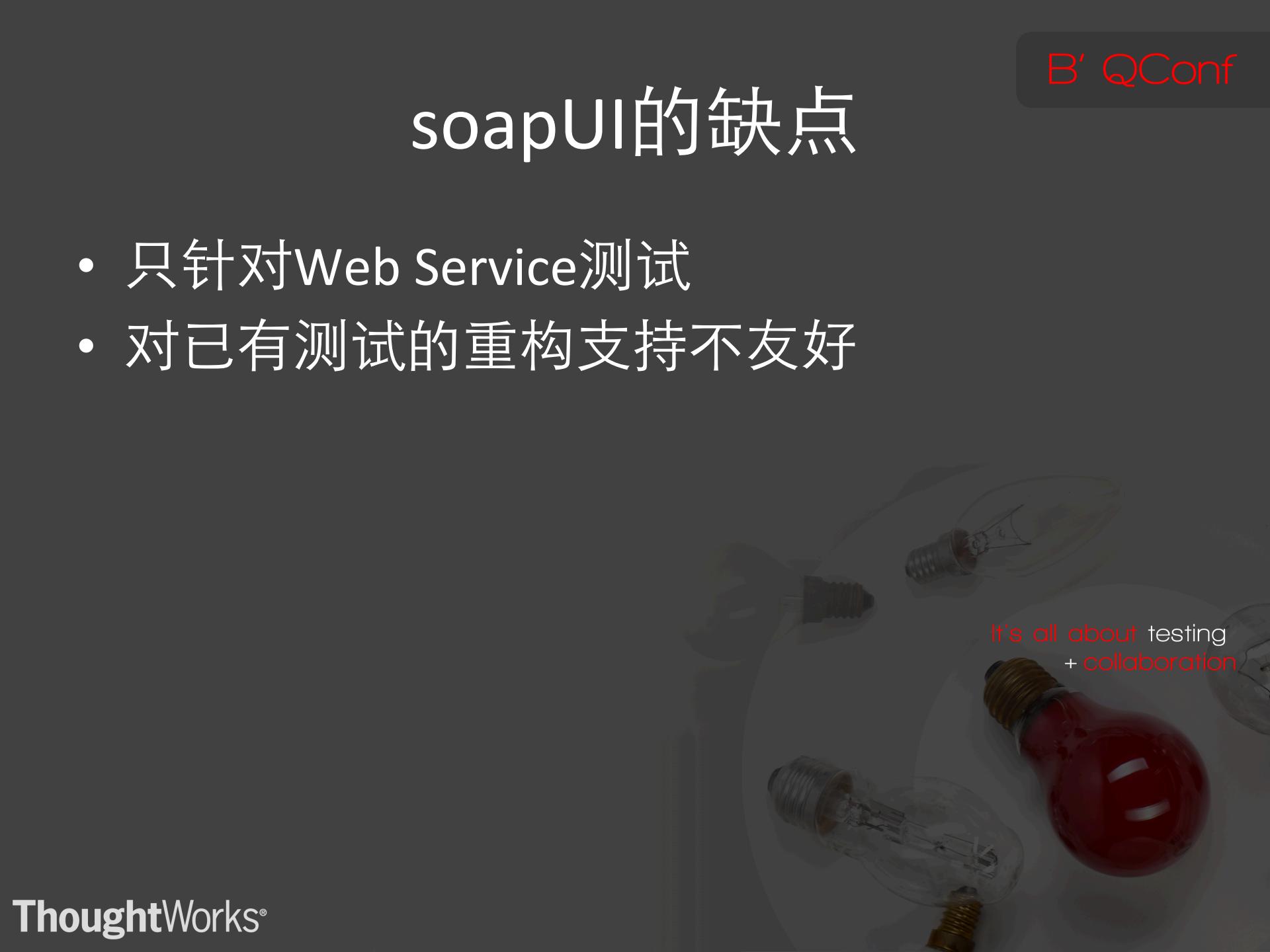
Form Outline Raw XML

Overview Outline Raw XML

Request Properties

soapUI的缺点

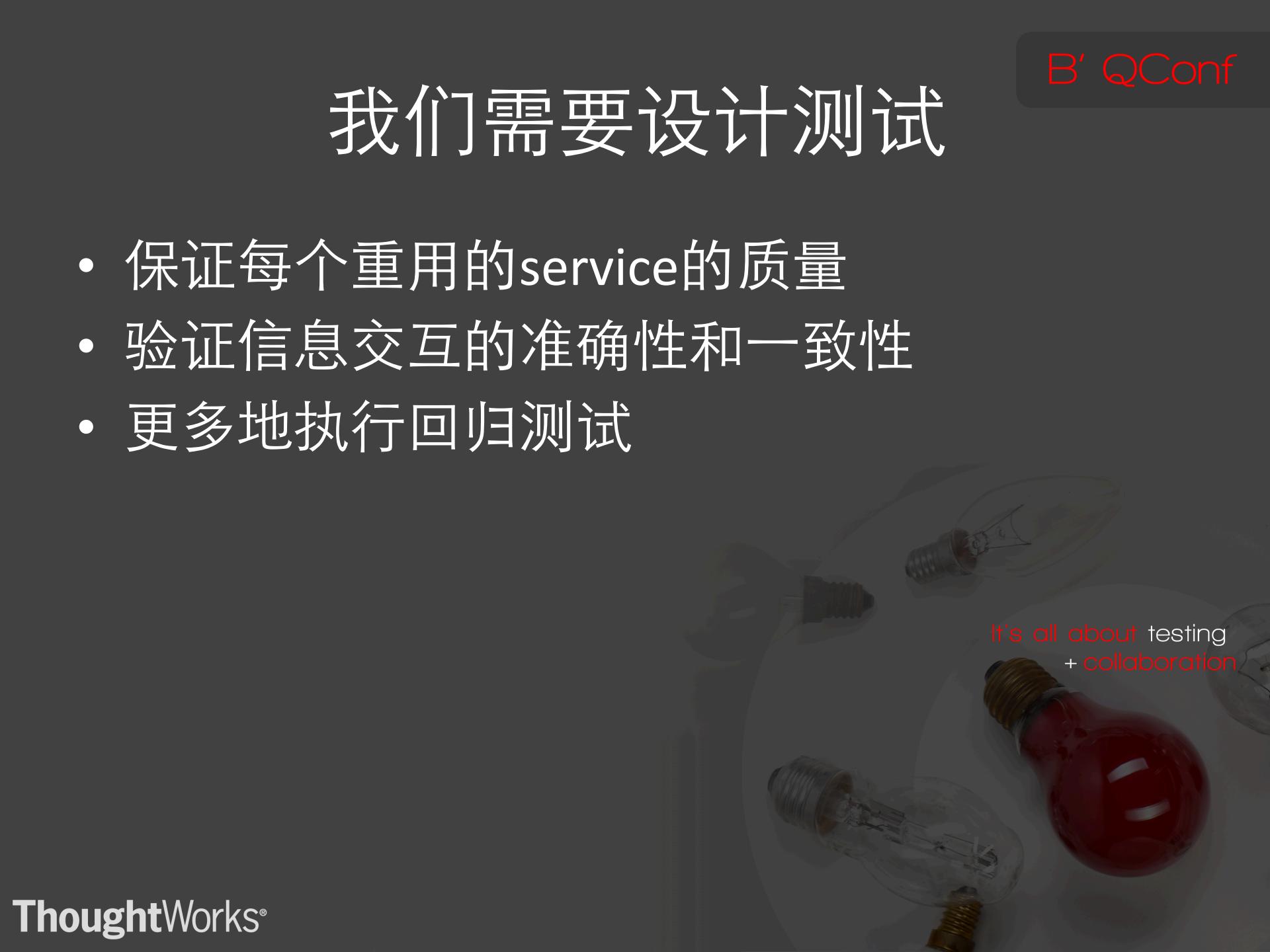
- 只针对Web Service测试
- 对已有测试的重构支持不友好



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我们需要设计测试

- 保证每个重用的service的质量
- 验证信息交互的准确性和一致性
- 更多地执行回归测试



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我们需要更关注：

- Governance Testing
- Service-level Testing
- Integration Testing
- Security Testing



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参考文献

- www.soapUI.org
- www.w3schools.com
- www.wikipedia.org
- <http://www.webservicex.net/>
`WeatherForecast.asmx?wsdl`
- <http://webservices.amazon.com/>
`AWSECommerceService/`
`AWSECommerceService.wsdl`



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谢谢



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Q&A



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