

测试基础架构 演进之路

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StubHub



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主要工作经历：

- ebay 中国研发中心 -- 测试基础架构技术主管
- Hewlett-Packard 惠普软件(中国)研发中心 -- 测试架构师、资深测试专家
- Alcatel-Lucent阿尔卡特朗讯(上海)研发中心 -- 测试技术主管
- Cisco 思科(中国)研发中心 -- 资深测试开发工程师

兴趣爱好：

- 户外运动爱好者
- 高级开放水域潜水员 + 高氧空气潜水员

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- dhrbc@126.com or 微信



测试架构的演变

- ❑ GUI Automation Test Framework的演变
- ❑ Test Data Platform的演变
- ❑ API Automation Test Framework的演变
- ❑ Test Execution Environment的演变
- ❑ Test Execution and Management Platform的演变
- ❑ Test Report Platform的演变

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测试架构的演变

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GUI Automation Test Framework

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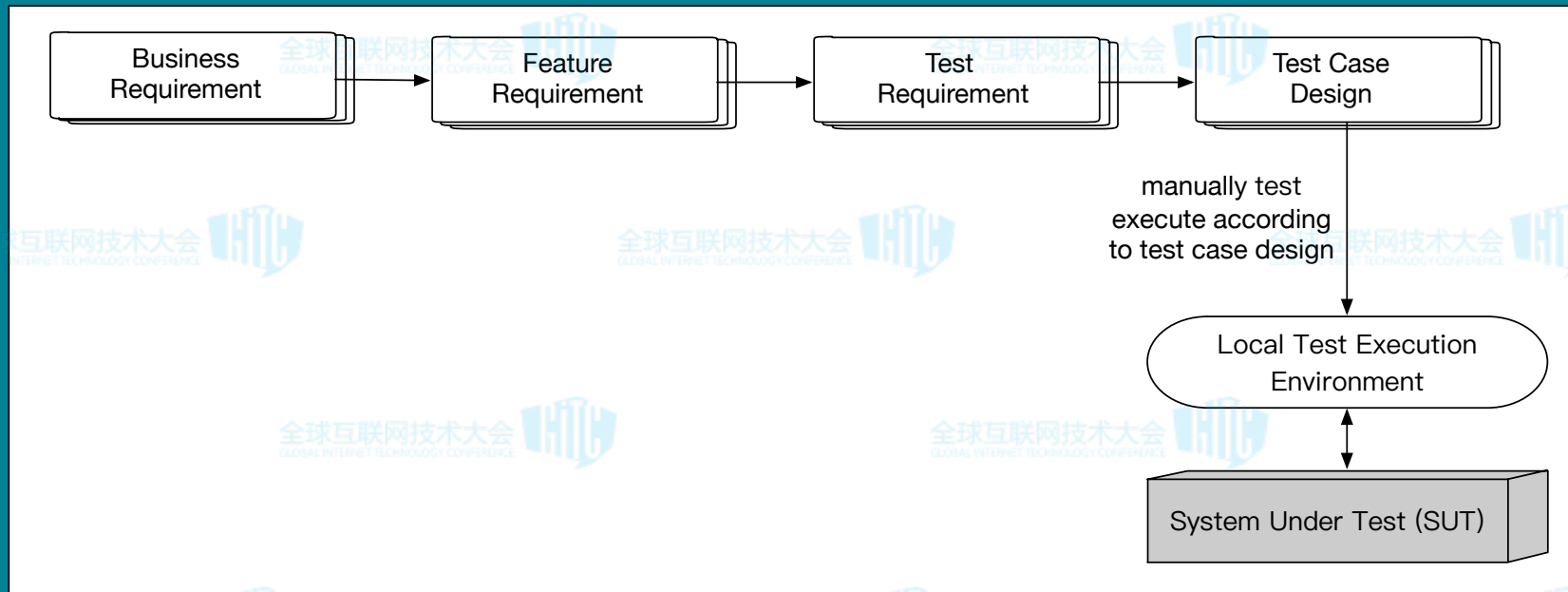


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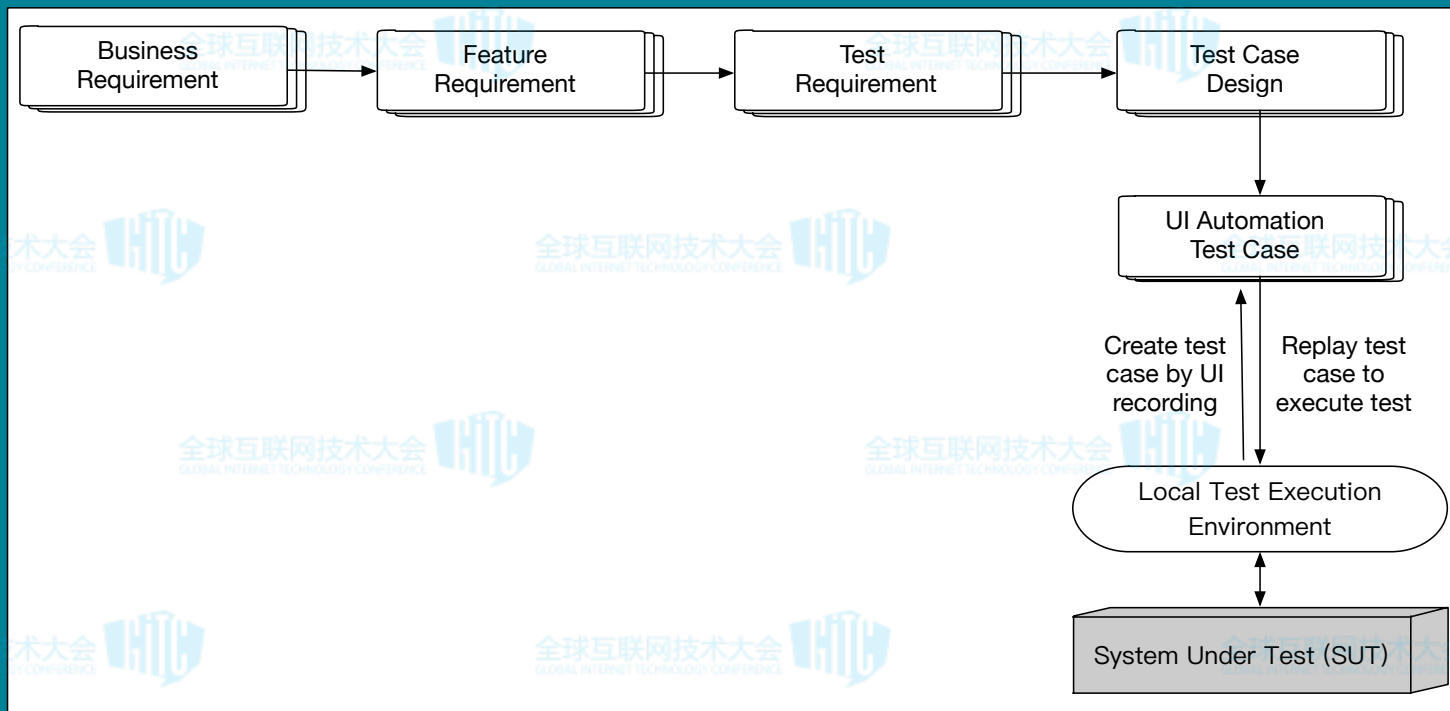
测试架构的演变 - GUI Automation Test Framework

最原始的GUI测试



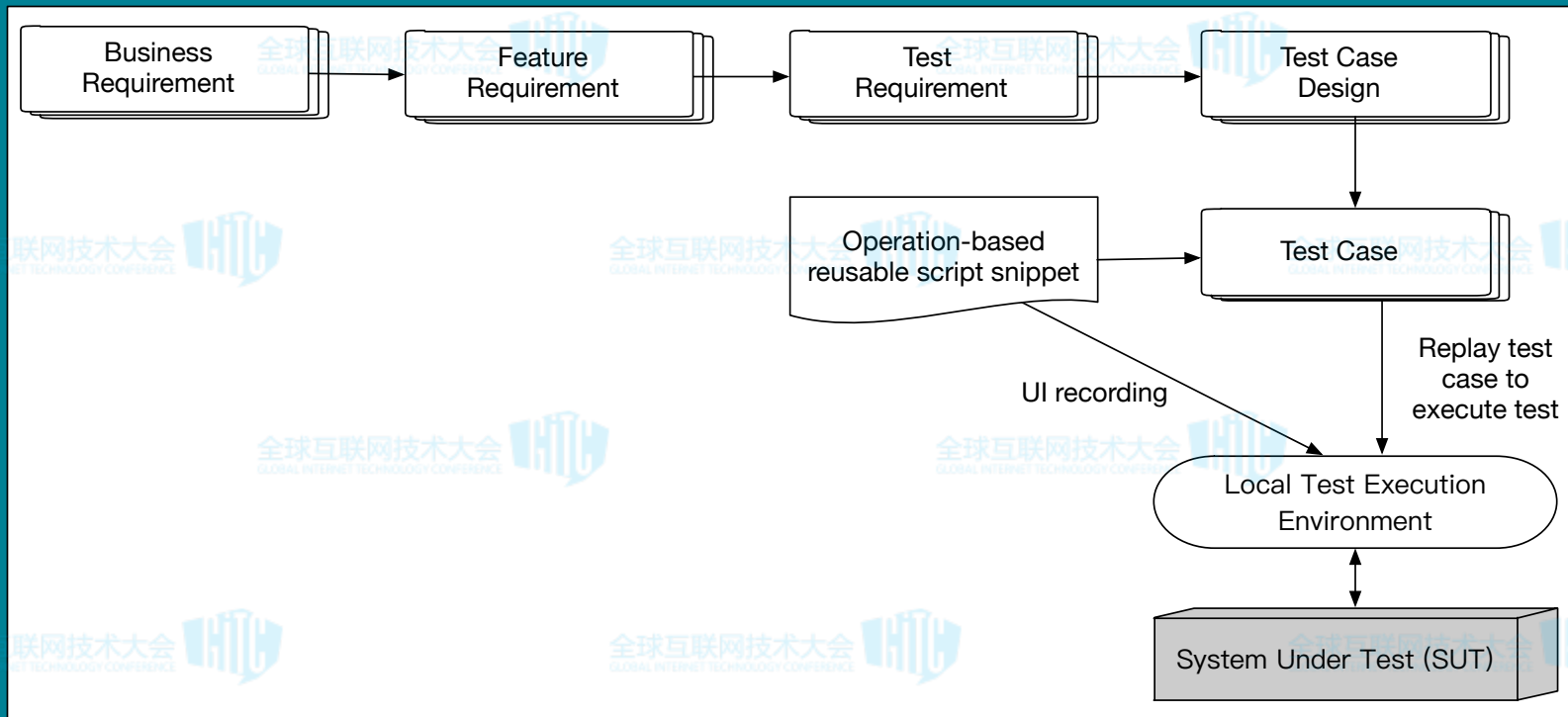
测试架构的演变 - GUI Automation Test Framework

基于录制回放的GUI自动化测试



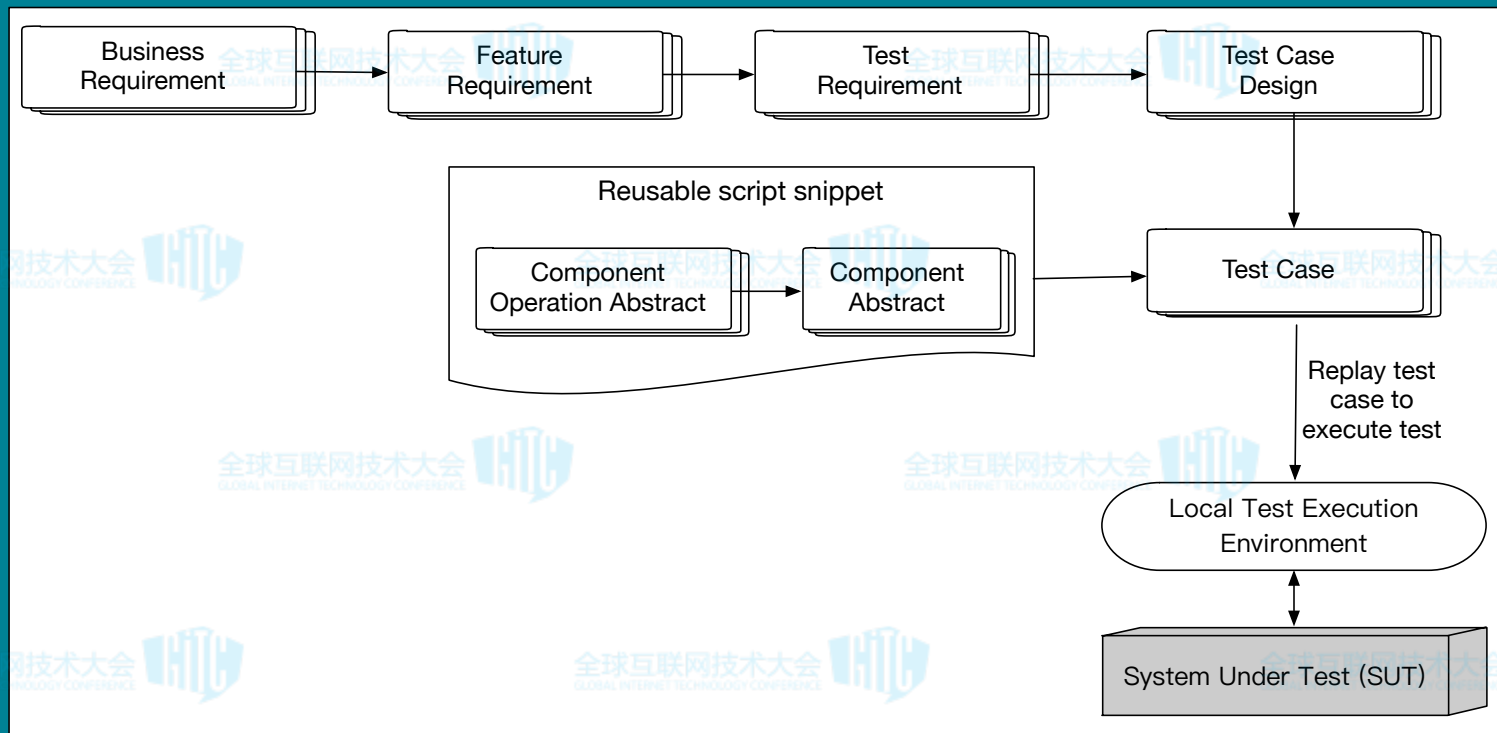
测试架构的演变 - GUI Automation Test Framework

基于可重用测试代码片段构成**GUI**测试用例



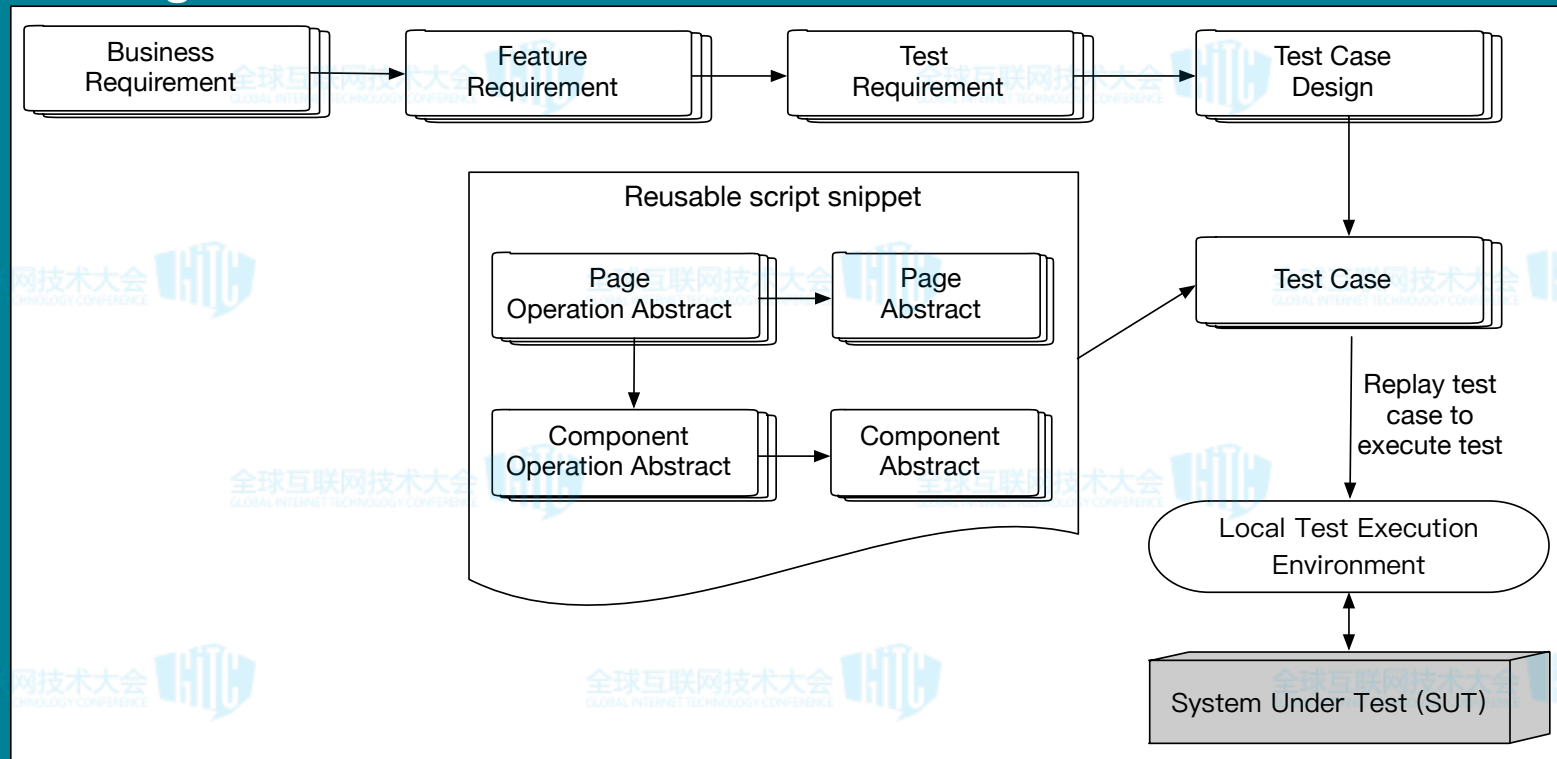
测试架构的演变 - GUI Automation Test Framework

基于Component Abstract构成GUI测试用例



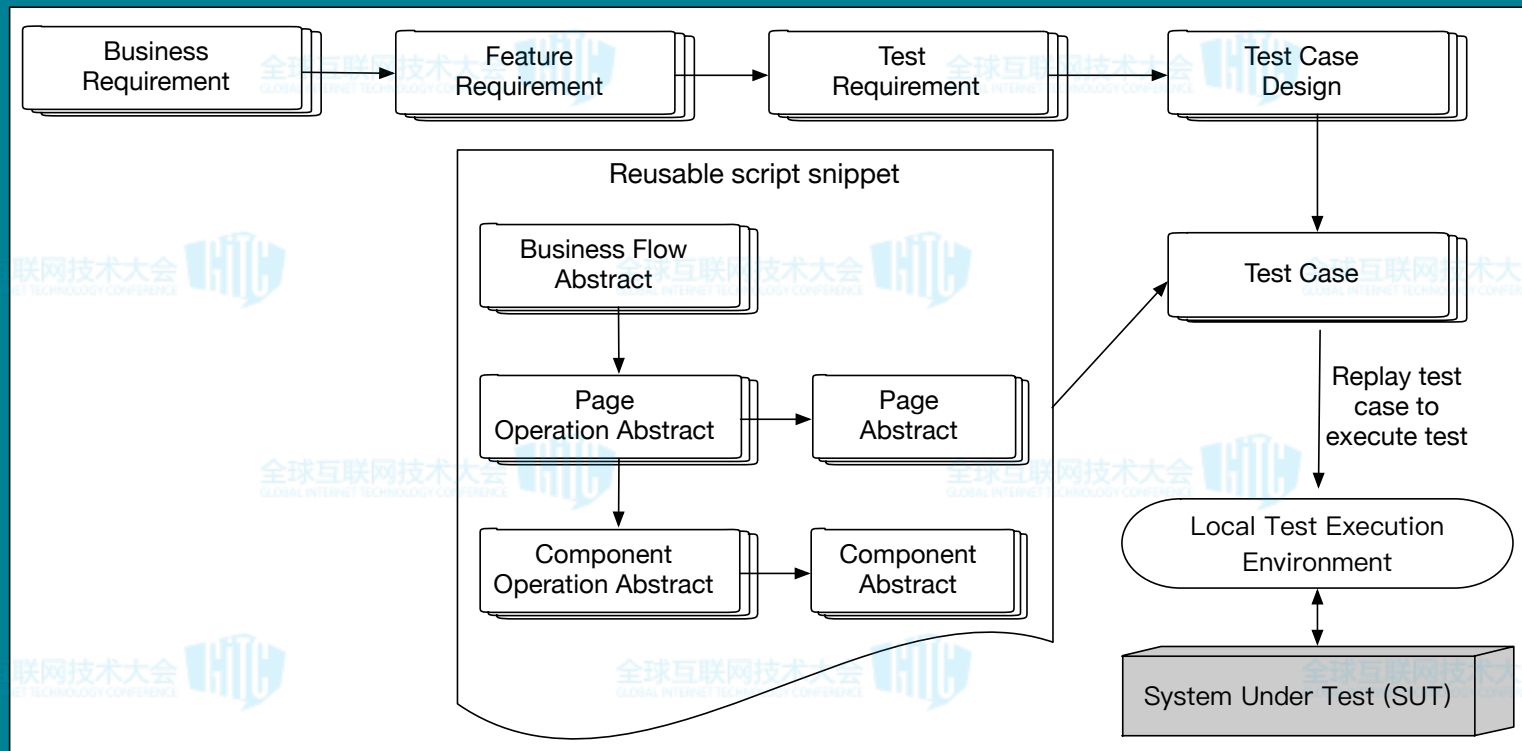
测试架构的演变 - GUI Automation Test Framework

基于Page Abstract构成GUI测试用例



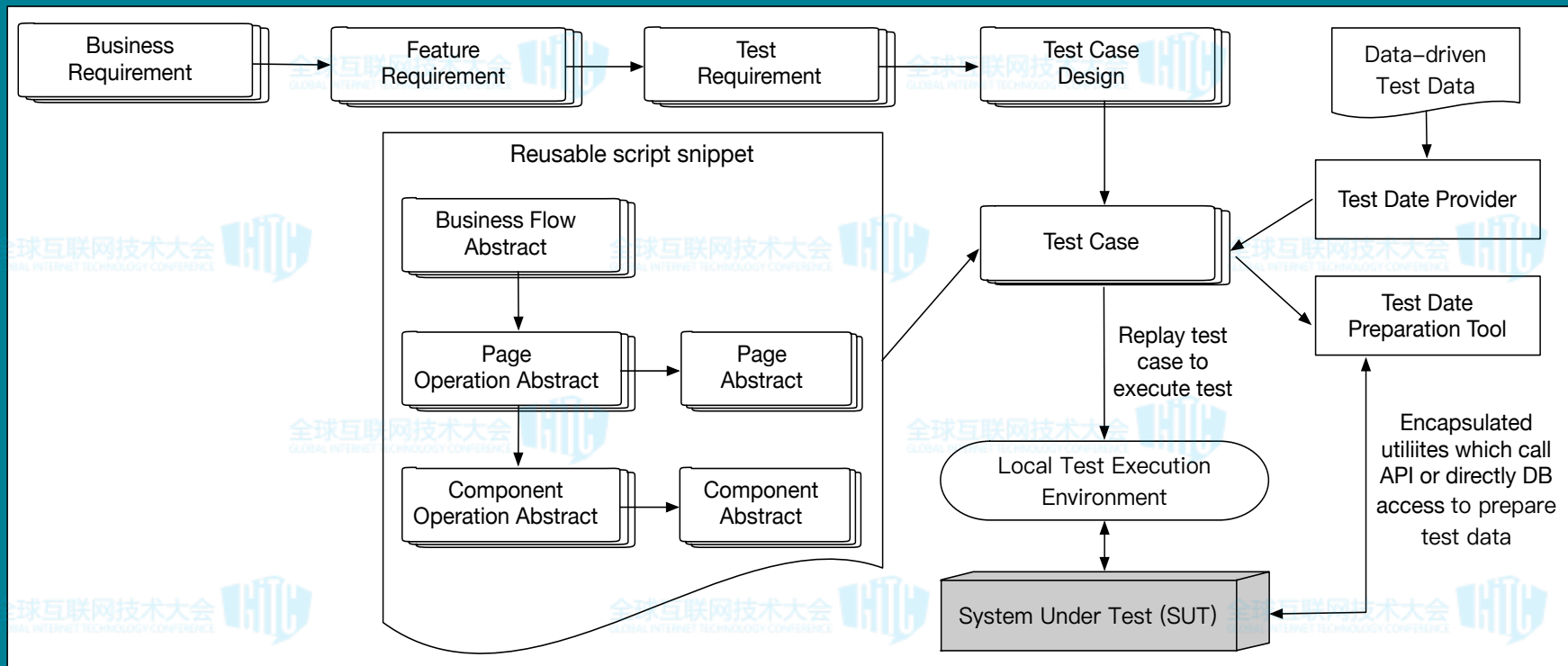
测试架构的演变 - GUI Automation Test Framework

基于Business Flow Abstract构成GUI测试用例



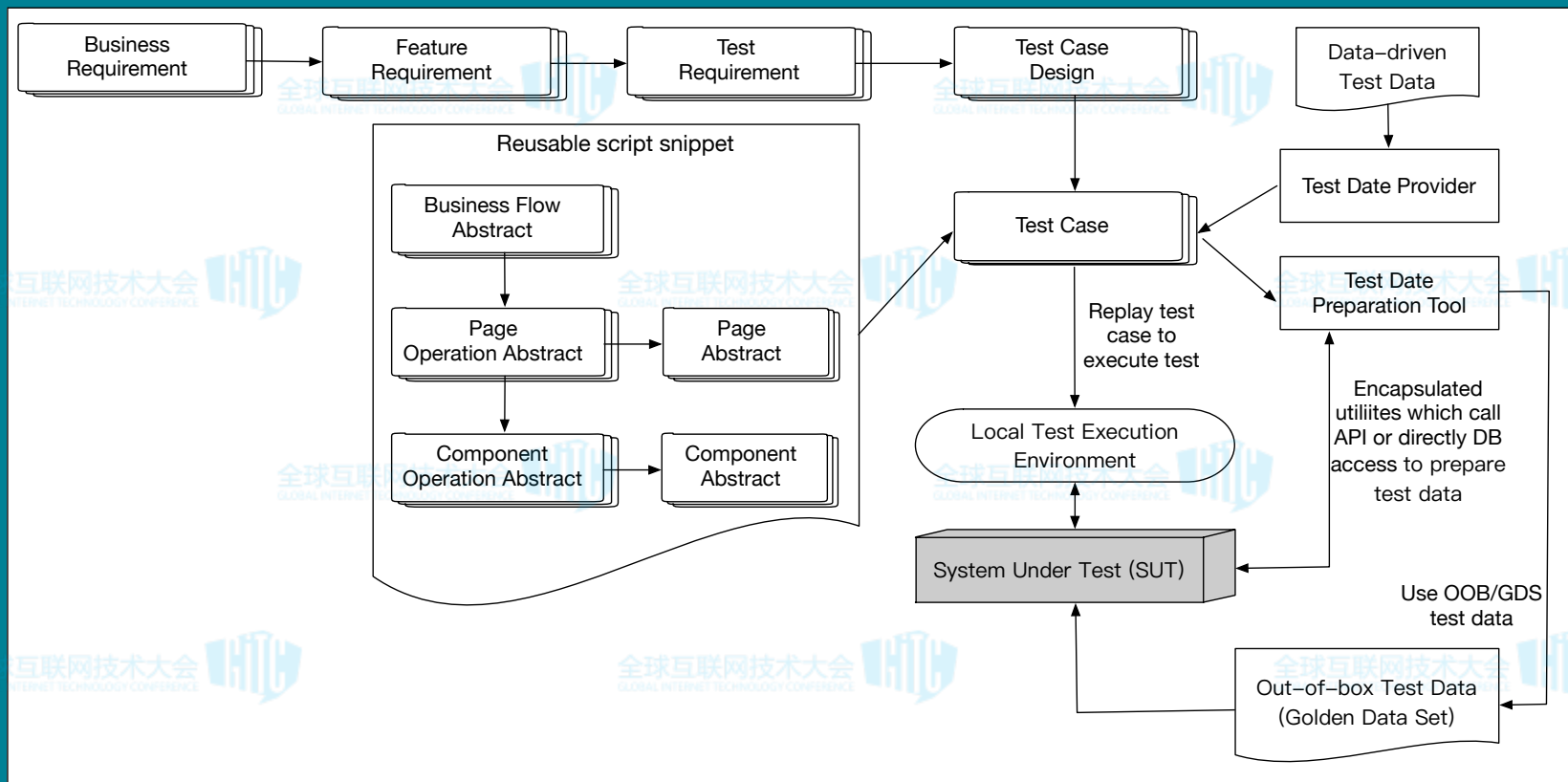
测试架构的演变 - GUI Automation Test Framework

测试数据 – 数据驱动测试 + 测试数据准备



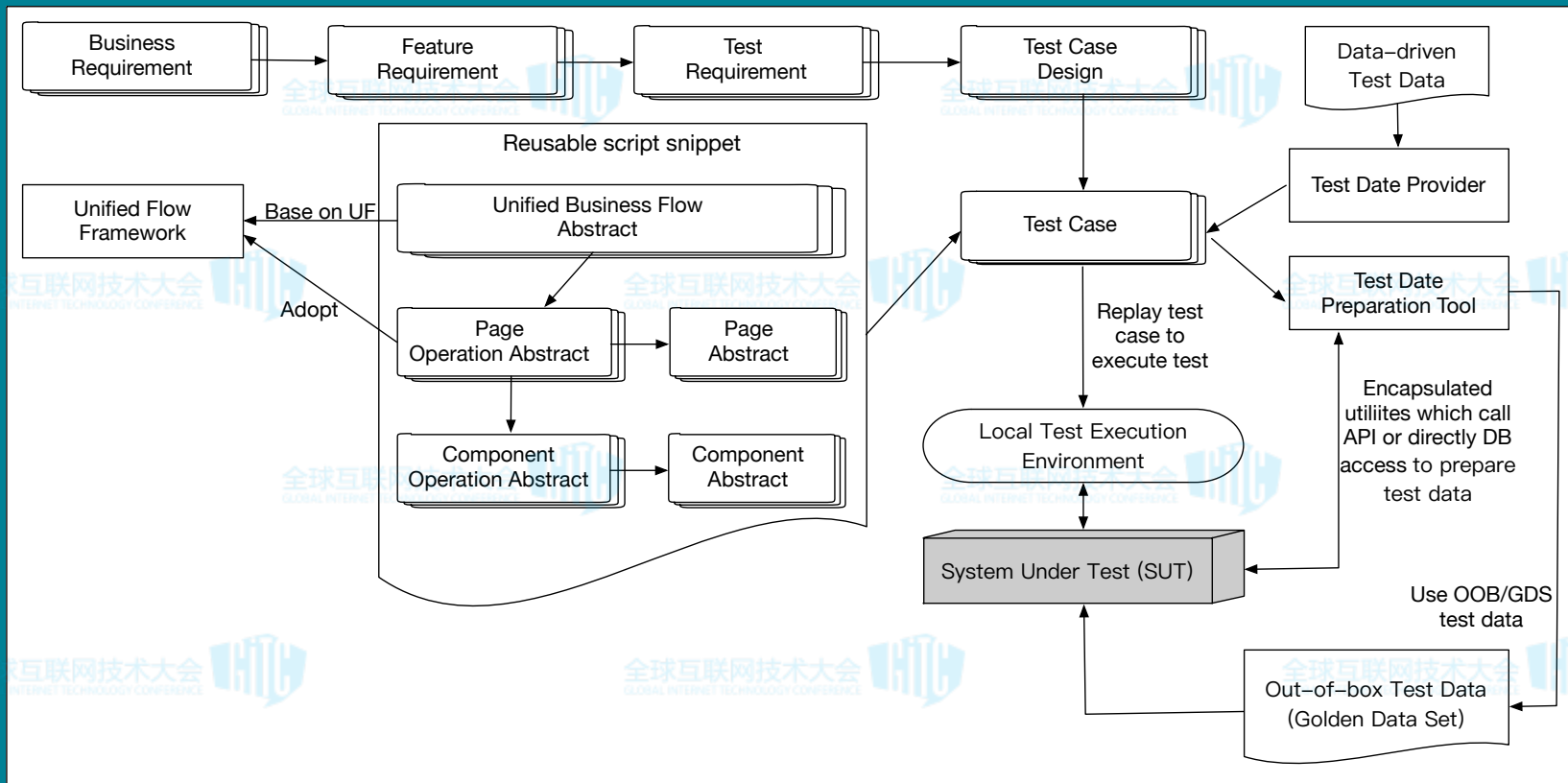
测试架构的演变 - GUI Automation Test Framework

测试数据 – 使用Out-of-box Test Data / Golden Data Set



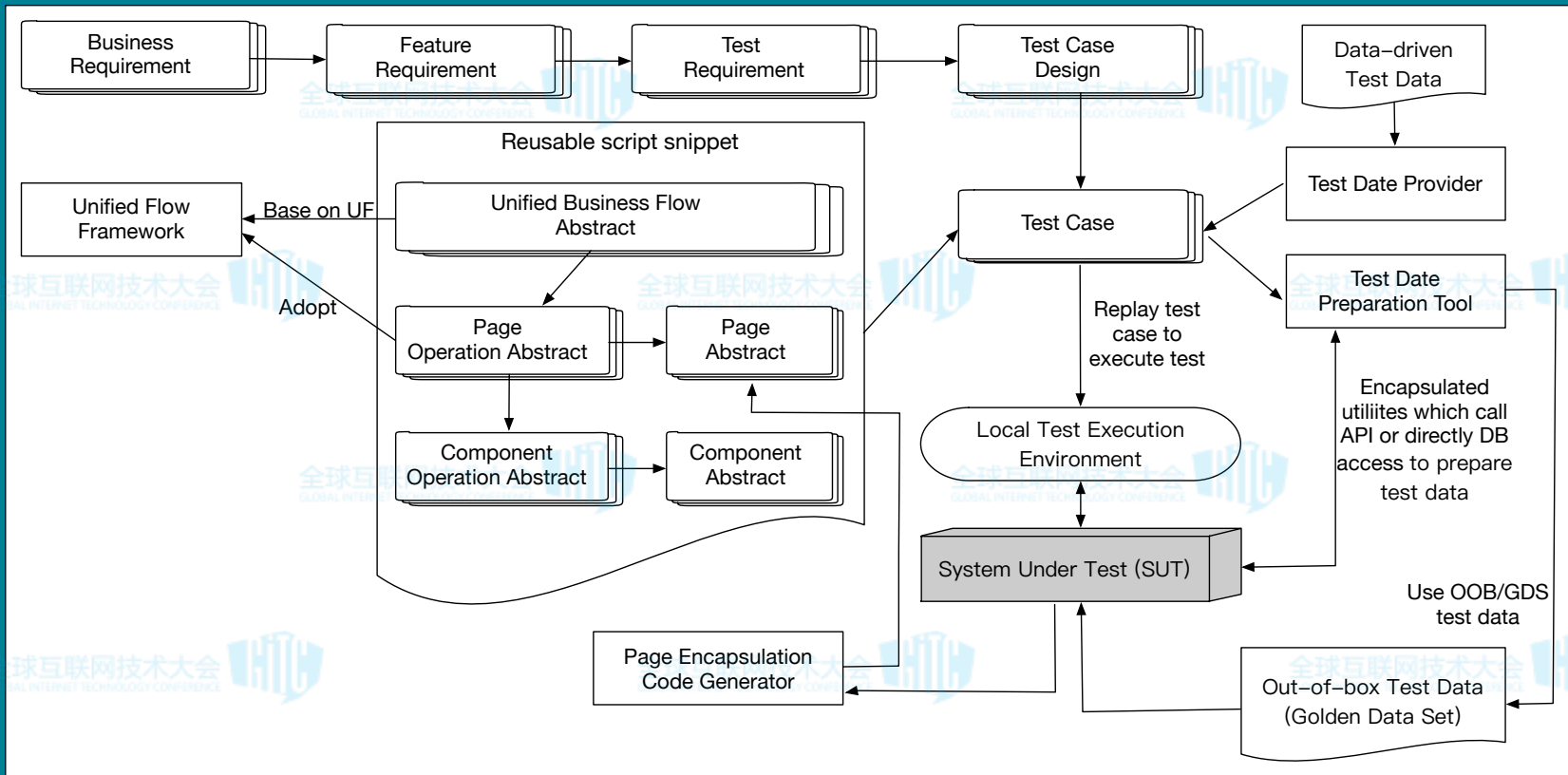
测试架构的演变 - GUI Automation Test Framework

基于Unified Flow Framework实现Flow Branch控制



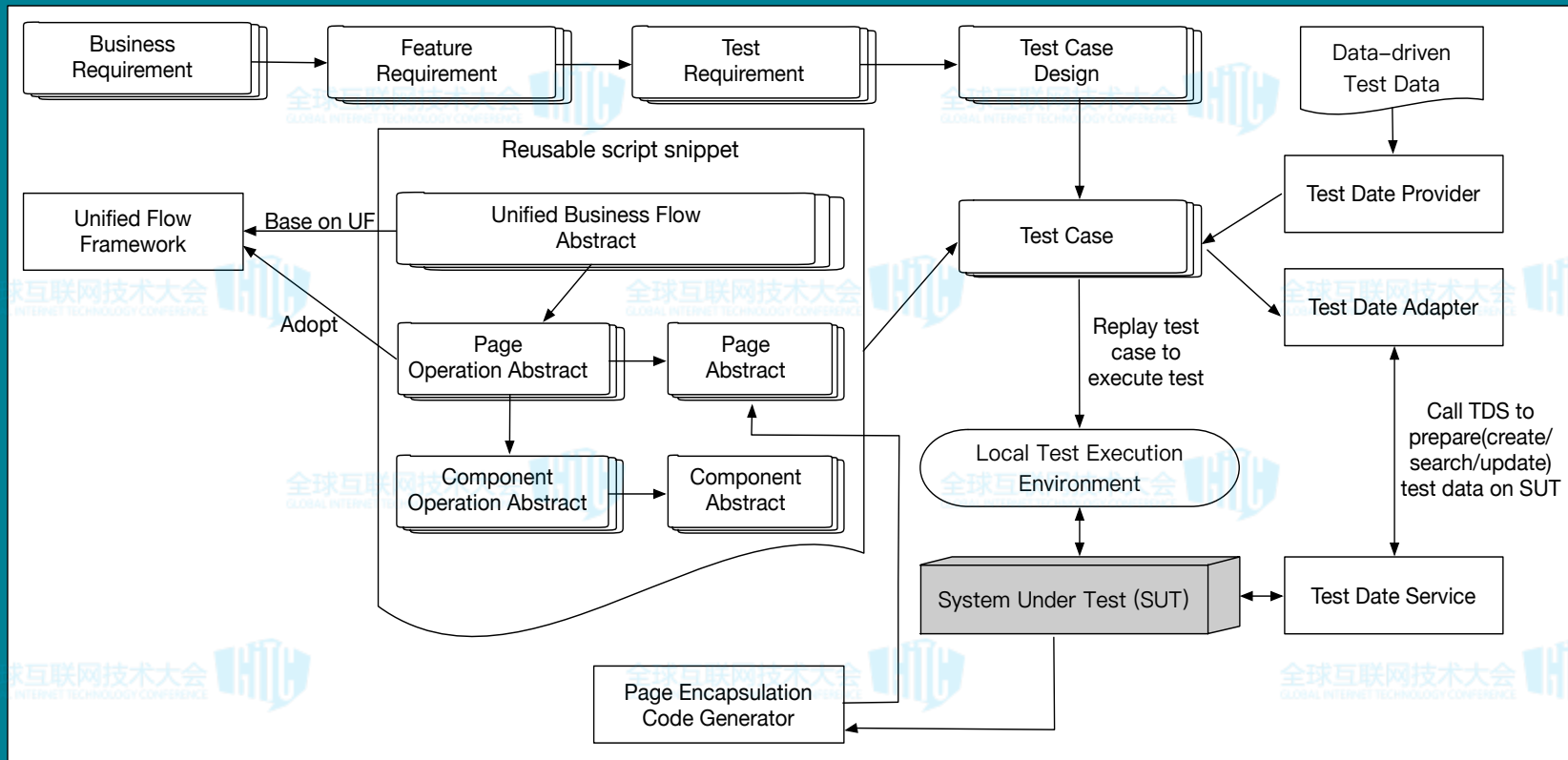
测试架构的演变 - GUI Automation Test Framework

基于Page Encapsulation Code Generator提高Page Abstract的效率



测试架构的演变 - GUI Automation Test Framework

引入Test Data Service, 提供统一的测试数据准备服务



测试架构的演变

Test Data Platform

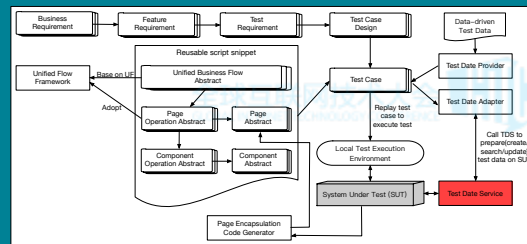
[illegible]

The diagram illustrates the architecture of a Test Data Management (TDM) solution. It features the following components and interactions:

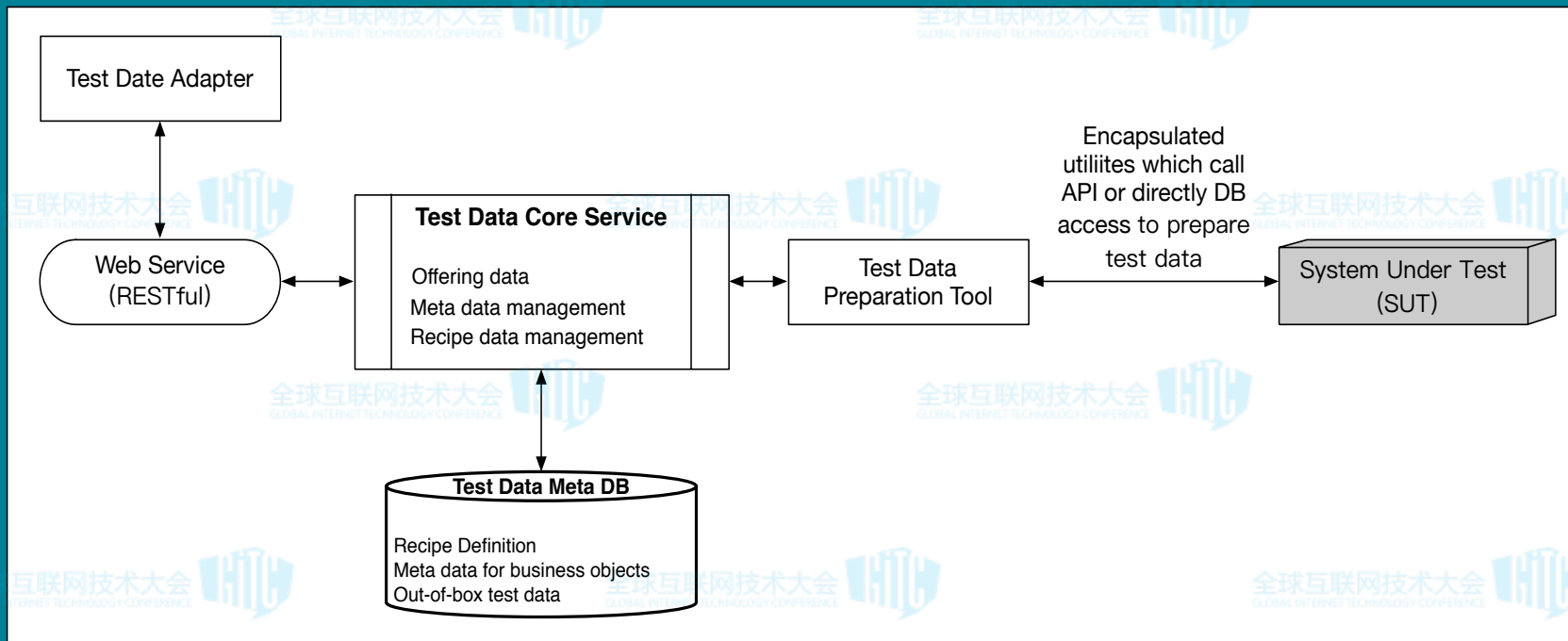
- Test Data Adapter**: A rectangular box at the top left that interacts with the **Web Service (RESTful)** via a bidirectional vertical arrow.
- Web Service (RESTful)**: An oval-shaped component that interacts with the **Test Data Preparation Tool** via a horizontal double-headed arrow.
- Test Data Preparation Tool**: A central rectangular box that acts as the core of the TDM solution. It has three main interactions:
 - It interacts with the **System Under Test (SUT)** via a horizontal double-headed arrow. A label "Encapsulated utilities which call API or directly DB access to prepare test data" is placed above this arrow.
 - It sends data to the **Out-of-box Test Data (Golden Data Set)** via a downward arrow, labeled "Use OOB/GDS test data".
- System Under Test (SUT)**: A 3D rectangular box on the right that receives data from the **Out-of-box Test Data (Golden Data Set)** via an upward arrow.
- Out-of-box Test Data (Golden Data Set)**: A rectangular box at the bottom that stores test data and provides it to the **SUT**.

```
graph TD; TDA[Test Data Adapter] <--> WS([Web Service RESTful]); WS <--> TDP[Test Data Preparation Tool]; TDP <--> SUT[System Under Test SUT]; TDP -- "Use OOB/GDS test data" --> OOB[Out-of-box Test Data Golden Data Set]; OOB --> SUT; TDP -- "Encapsulated utilities which call API or directly DB access to prepare test data" --> SUT;
```

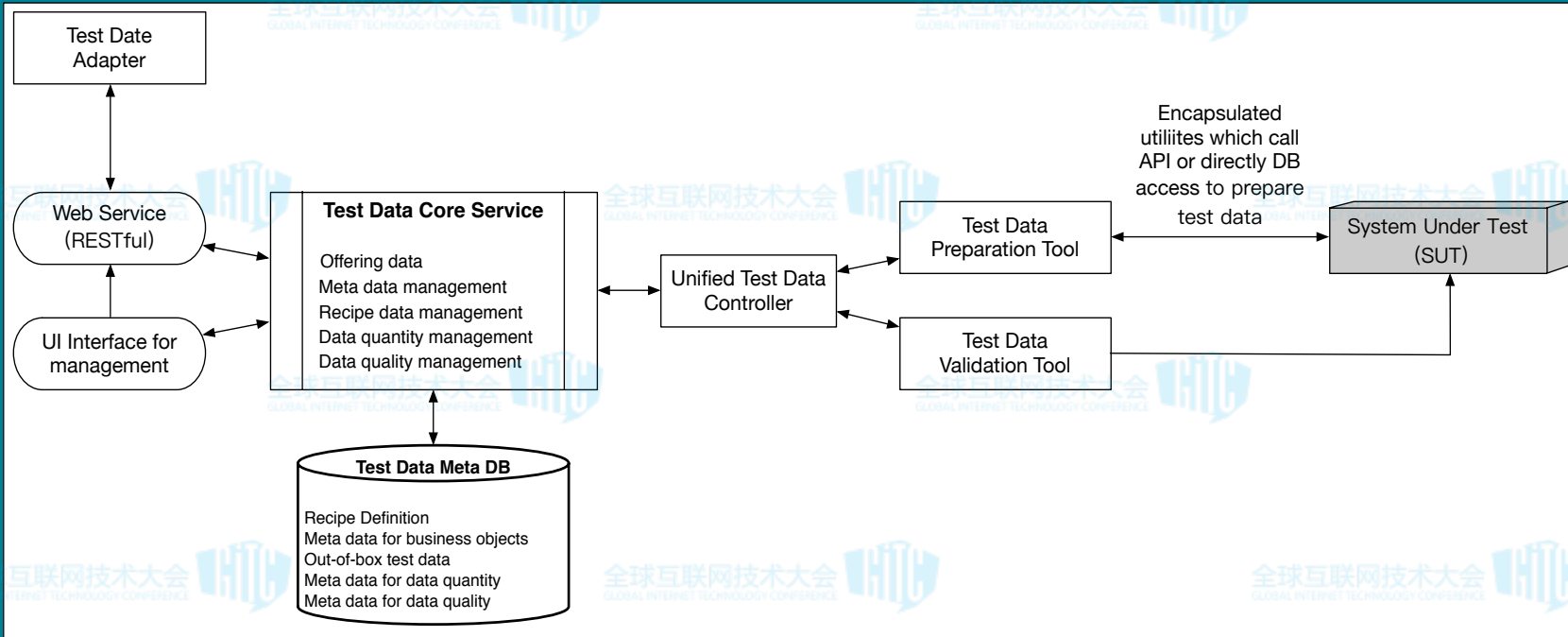
测试架构的演变 – Test Data Platform



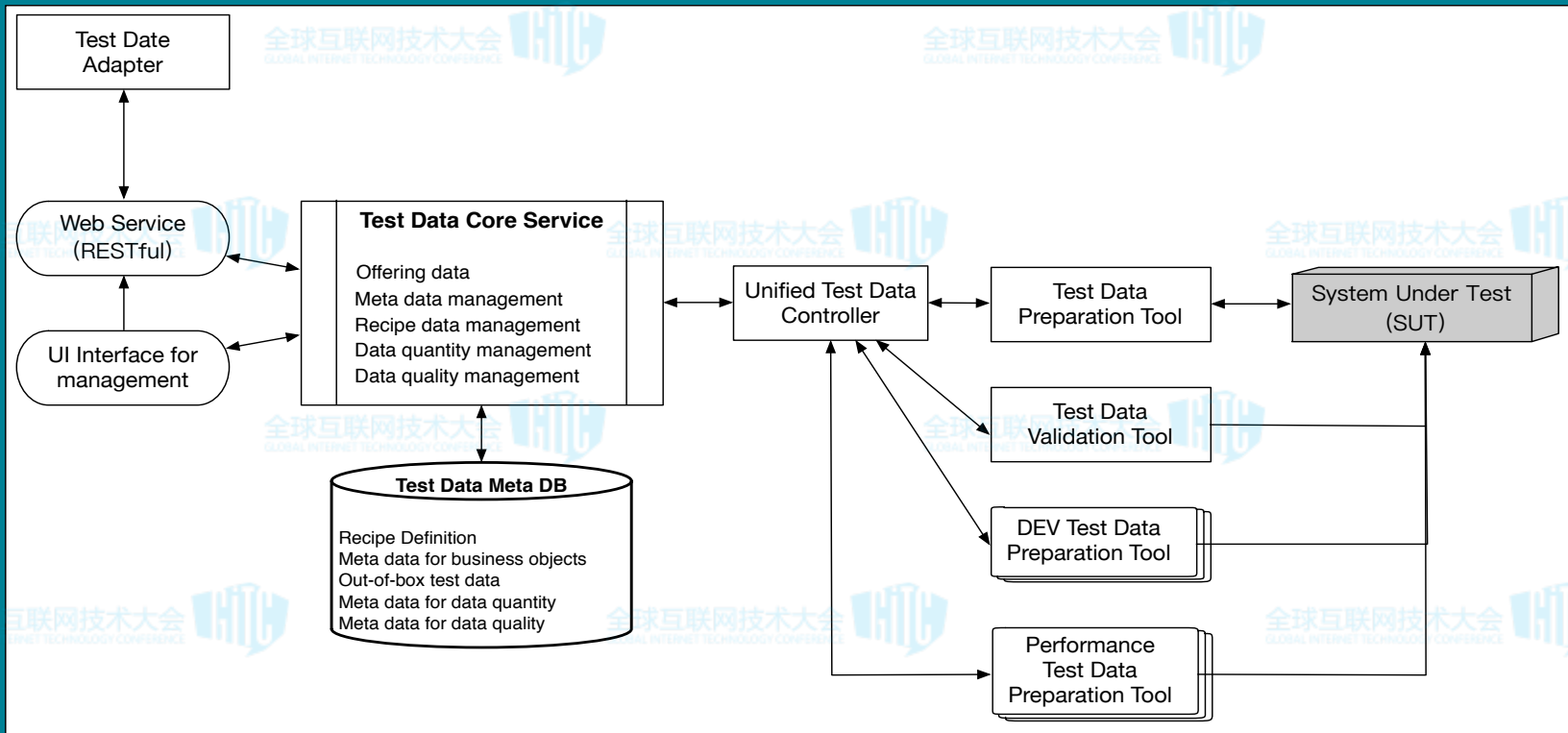
引入Test Data Core Service和Recipe



引入Data Quantity / Quality管理



引入Unified Controller接入不同Test Data Tools

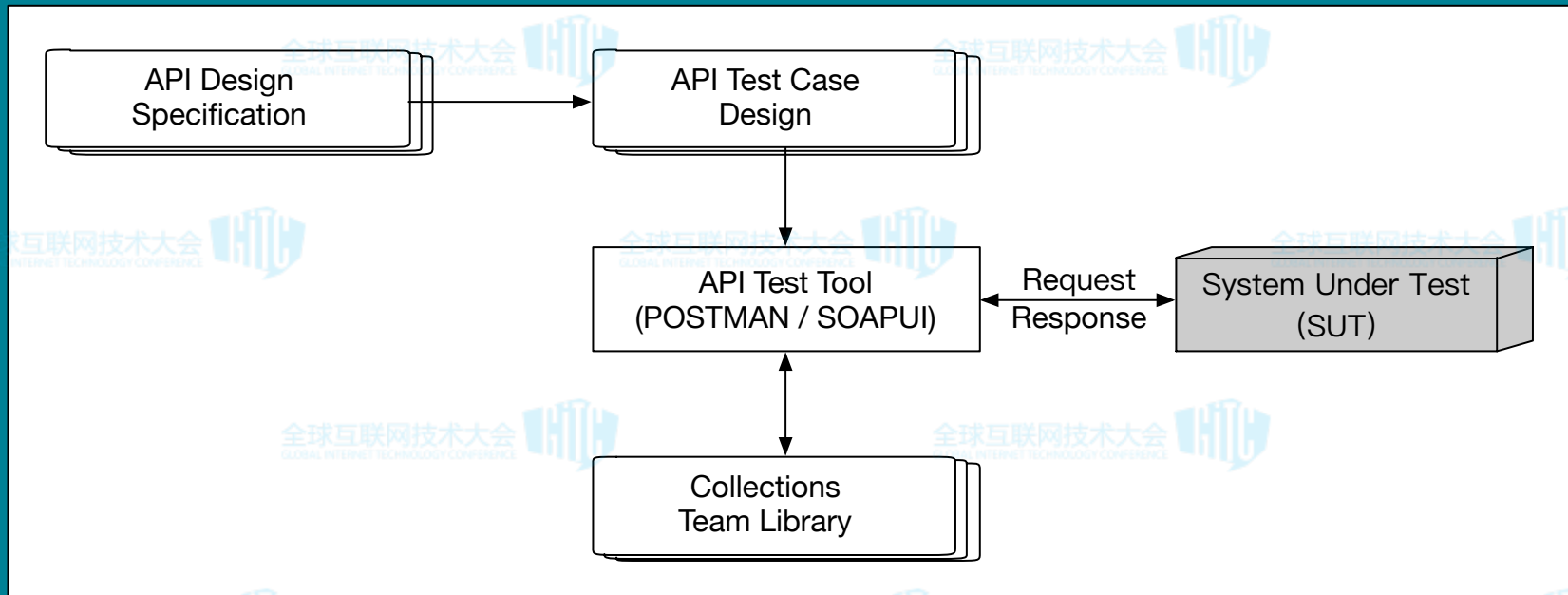


测试架构的演变

API Automation Test Framework

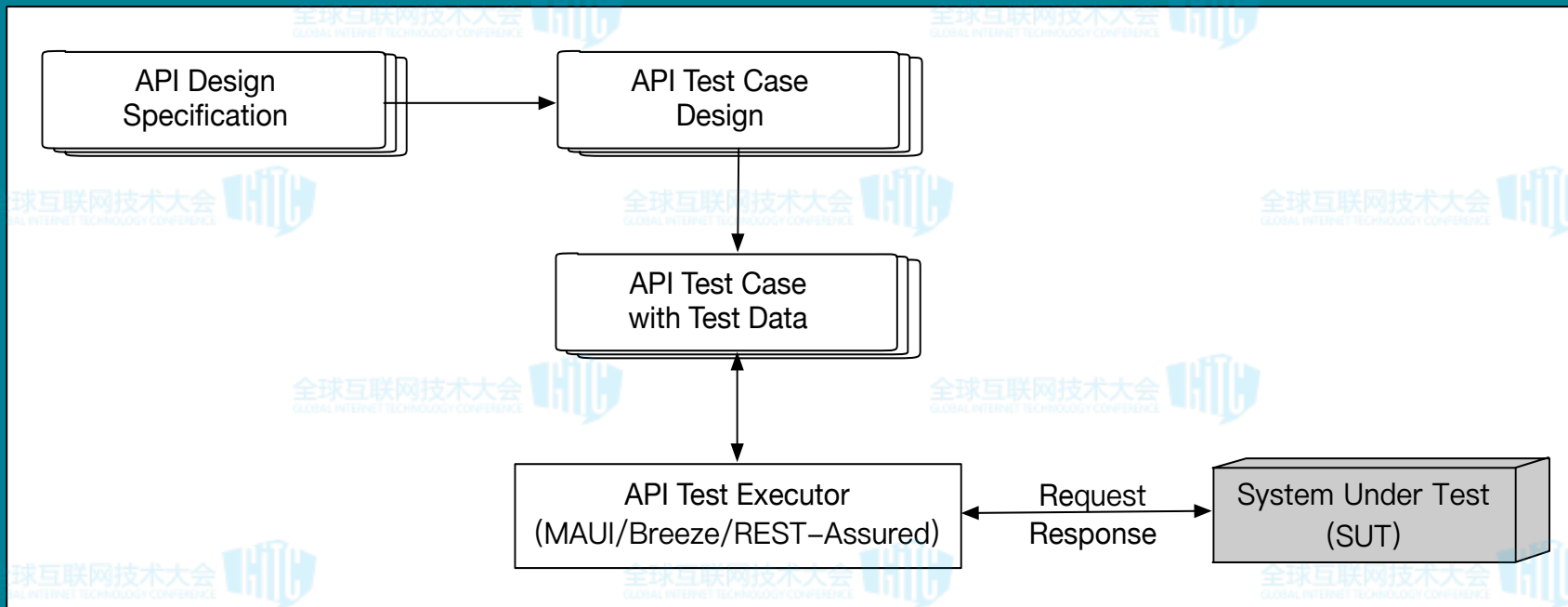
测试架构的演变 – API Automation Test Framework

最原始的API测试



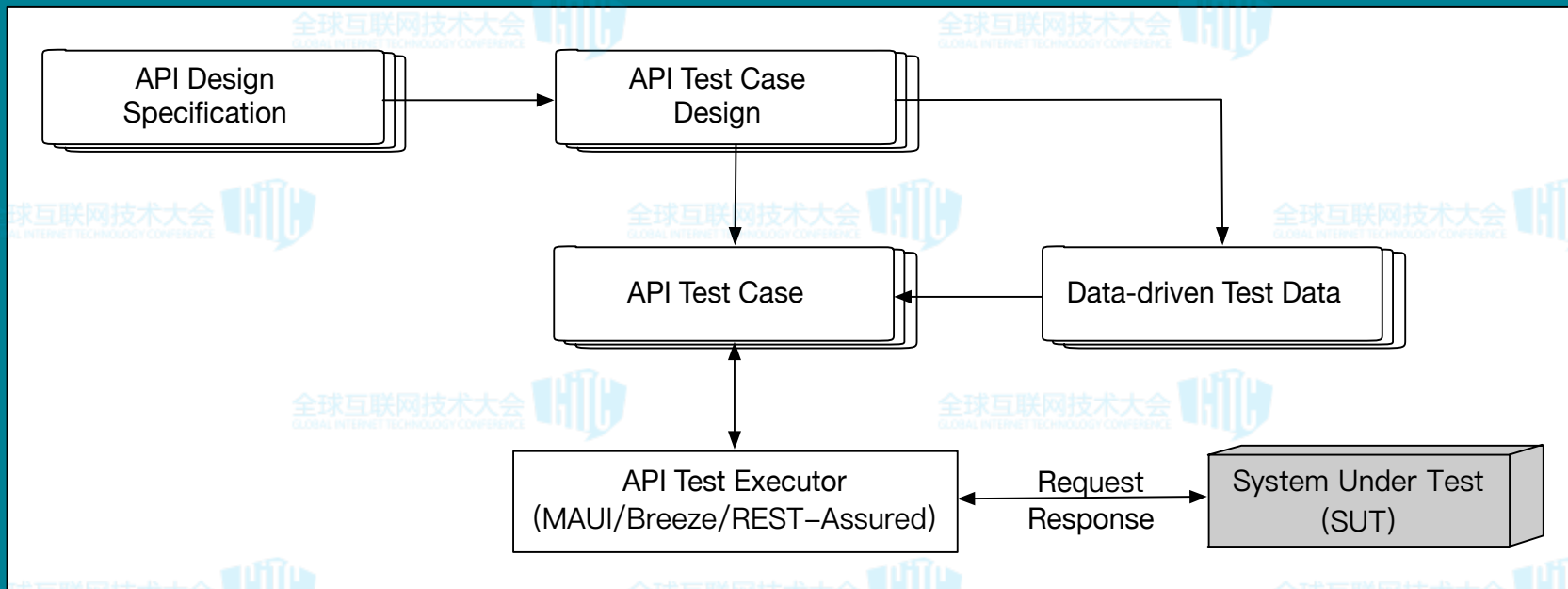
测试架构的演变 – API Automation Test Framework

引入API Test Executor实现Code-based API自动化测试



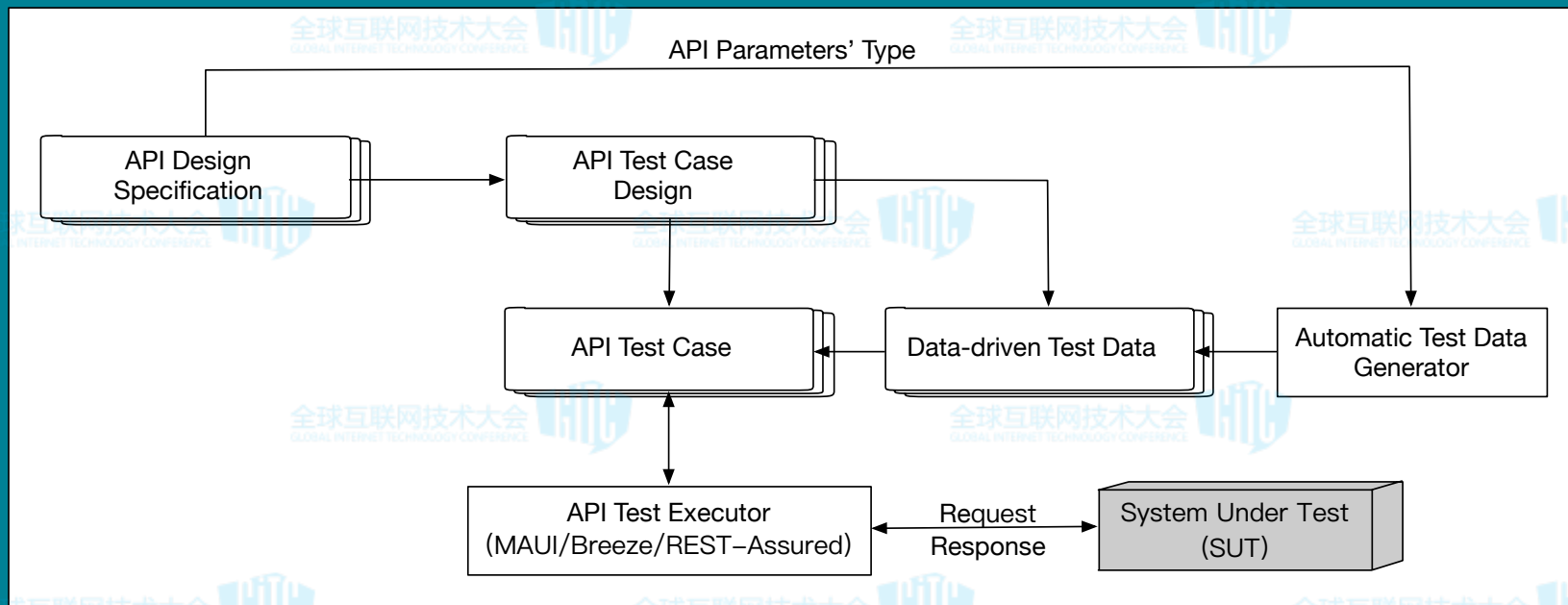
测试架构的演变 – API Automation Test Framework

Test Case和Test Data分离实现Data-Driven Test



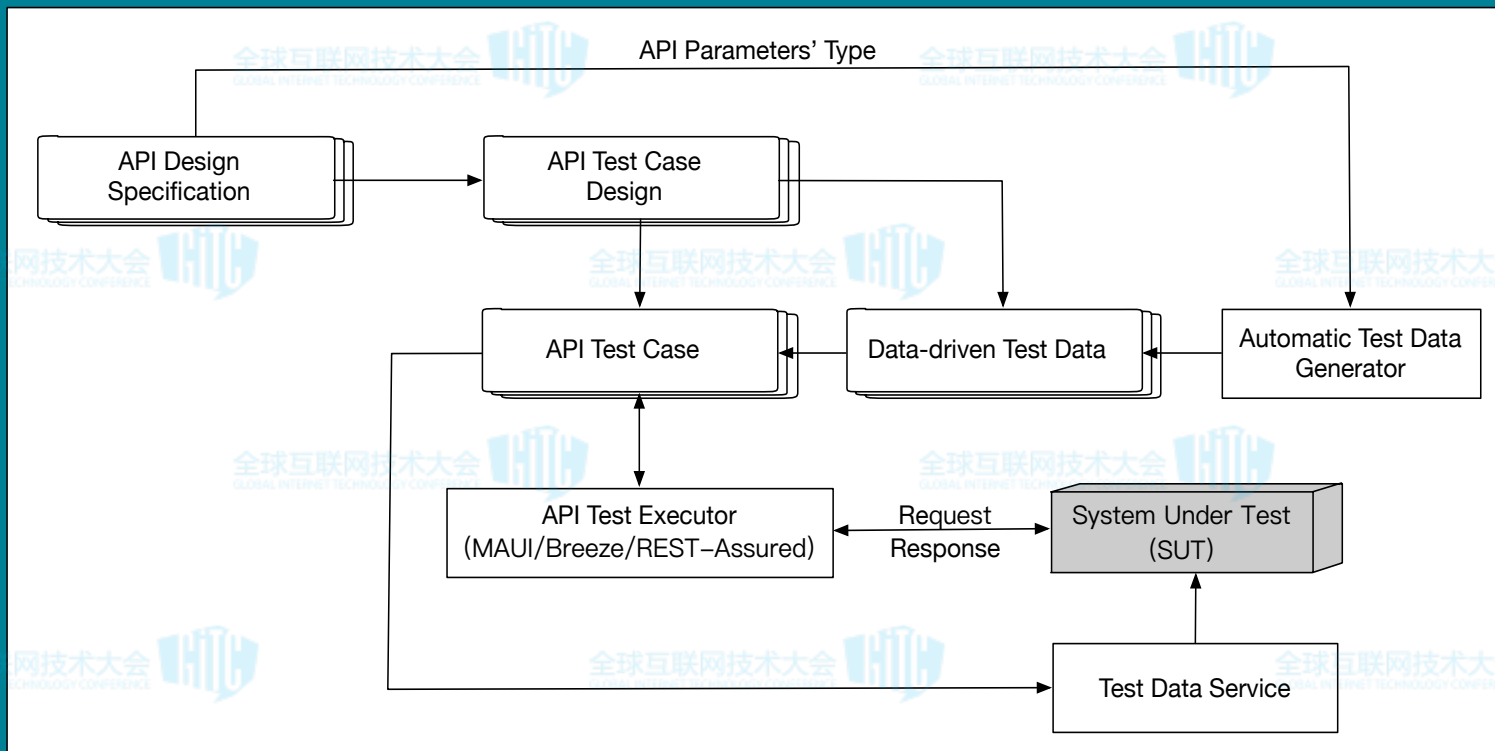
测试架构的演变 – API Automation Test Framework

引入Data-Driven Test Data的自动生成



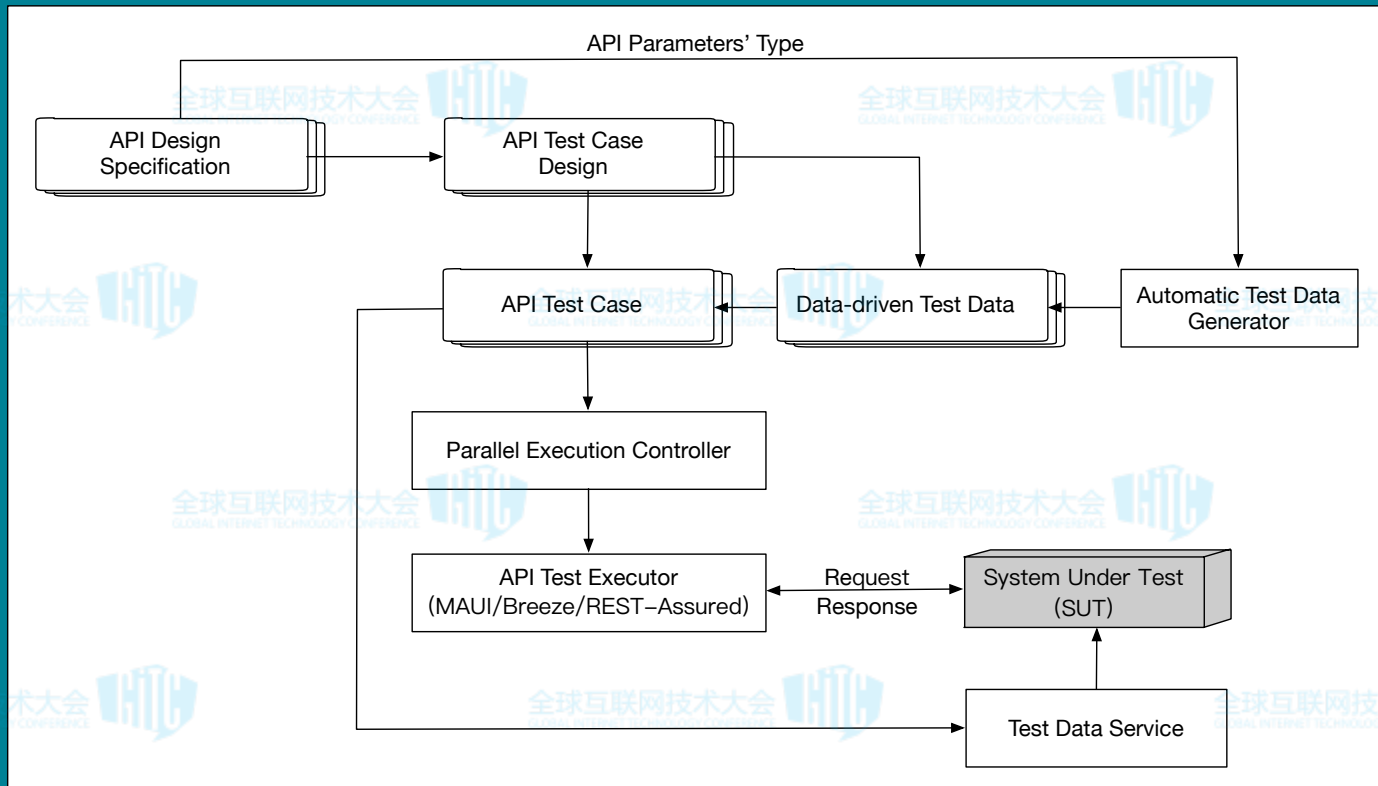
测试架构的演变 – API Automation Test Framework

引入Test Data Service生成测试数据



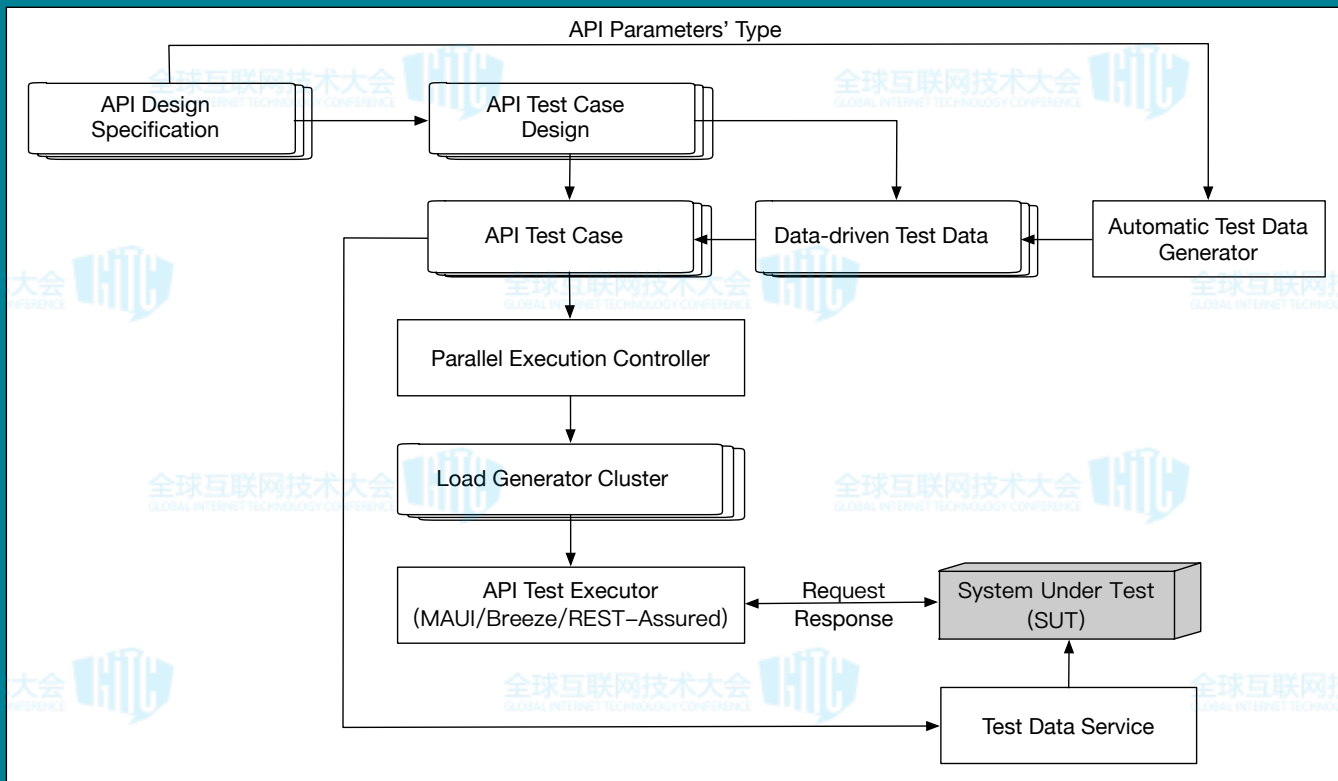
测试架构的演变 – API Automation Test Framework

引入Parallel Execution Controller实现API并发测试



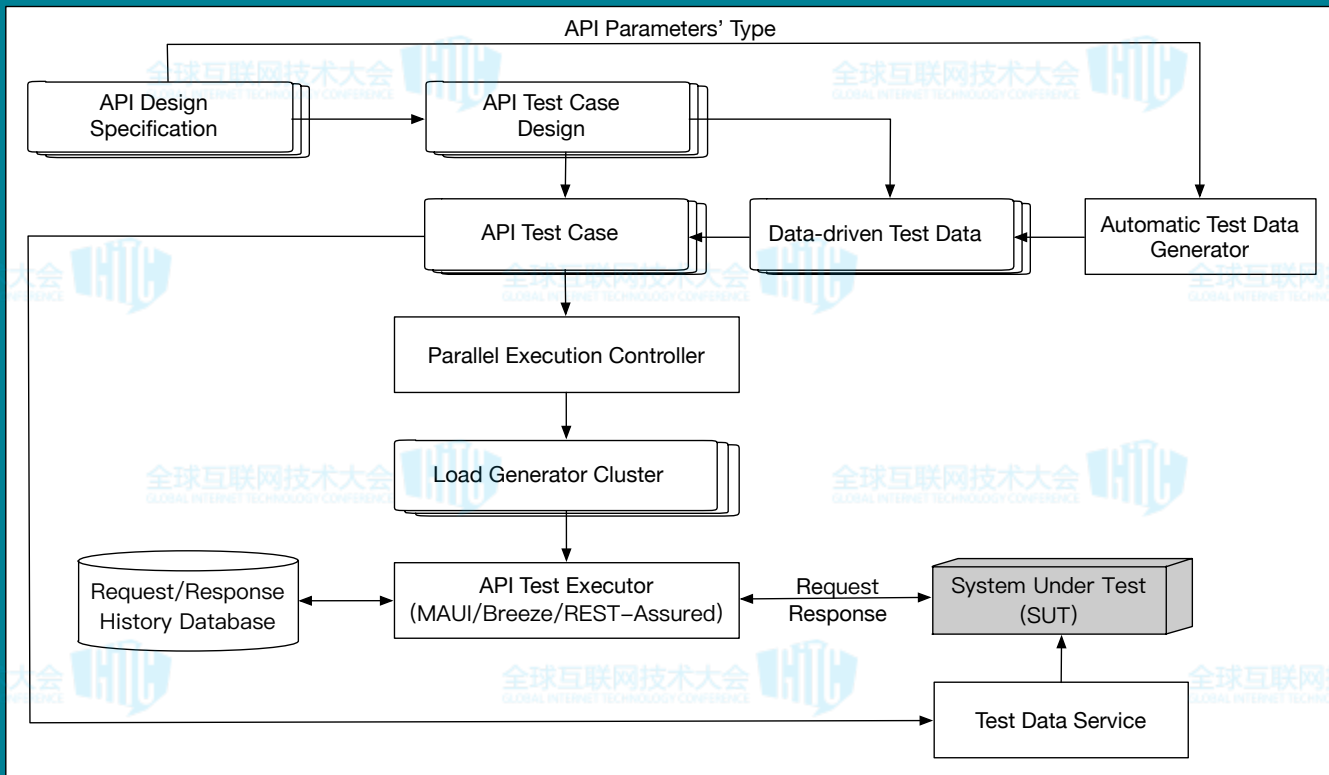
测试架构的演变 – API Automation Test Framework

引入Load Generator Cluster实现API高并发和压力测试



测试架构的演变 – API Automation Test Framework

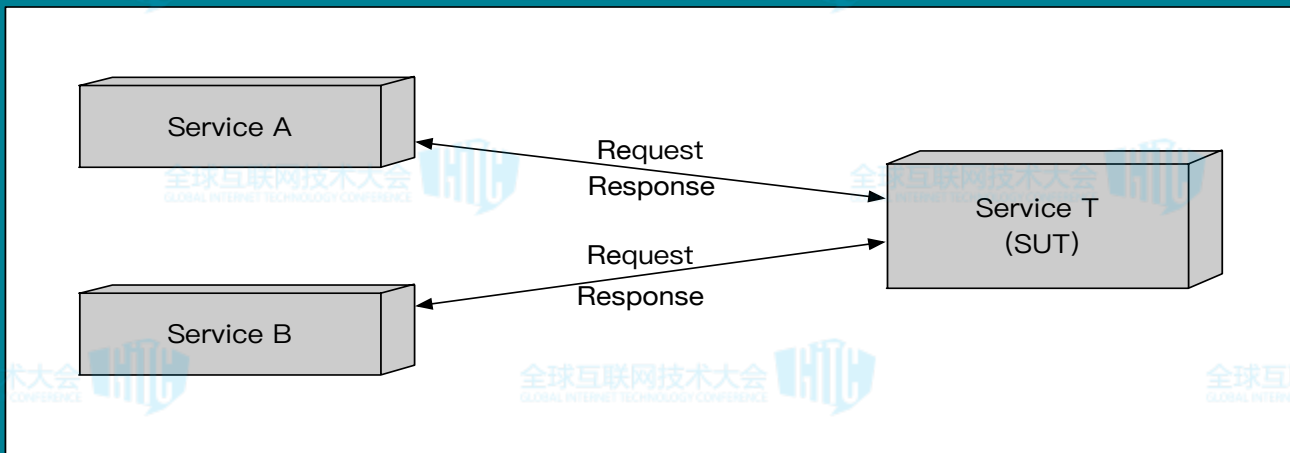
引入2R History Database实现API Diff Identification



测试架构的演变 – API Automation Test Framework

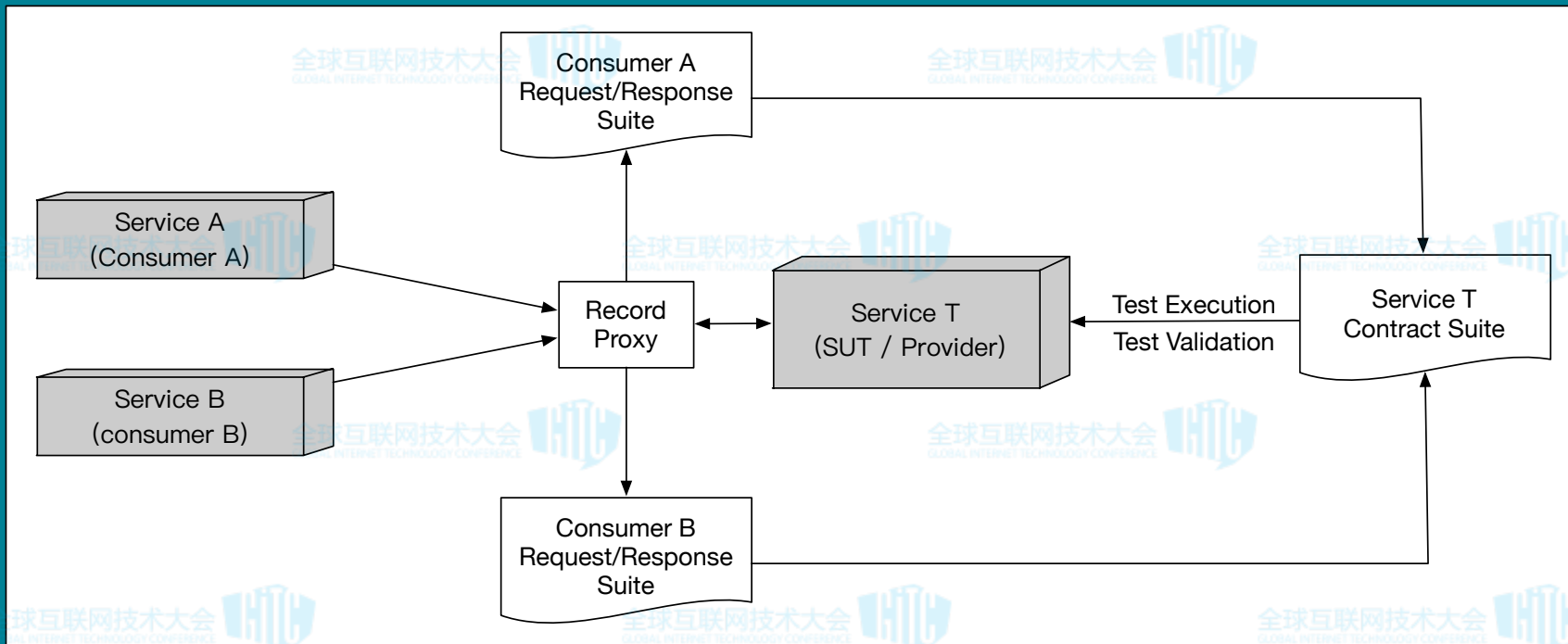
微服务架构下的API测试挑战

- ❑ API的种类数量多
- ❑ API测试高覆盖率的代价大
- ❑ 微服务架构之间的耦合
- ❑ 第三方服务的耦合



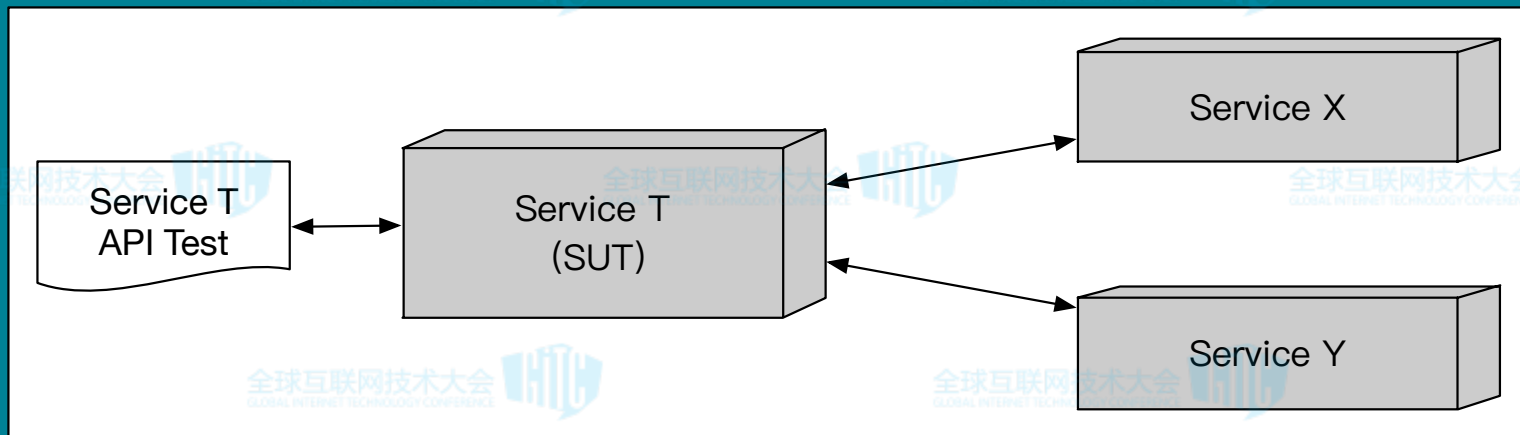
测试架构的演变 – API Automation Test Framework

基于消费者契约的API测试 – 基于契约的测试与验证



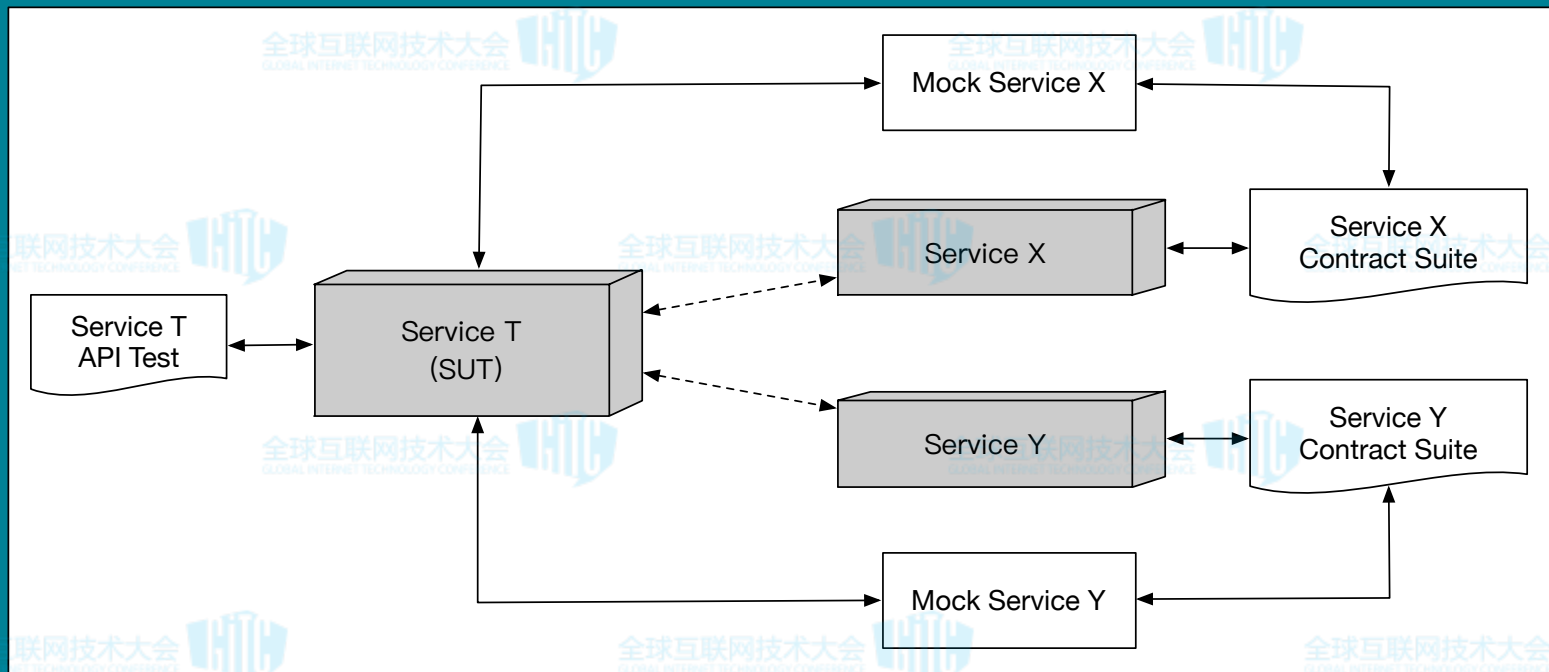
测试架构的演变 – API Automation Test Framework

基于消费者契约的API测试 – 基于契约的Mock Service实现API依赖解耦



测试架构的演变 – API Automation Test Framework

基于消费者契约的API测试 – 基于契约的Mock Service实现API依赖解耦

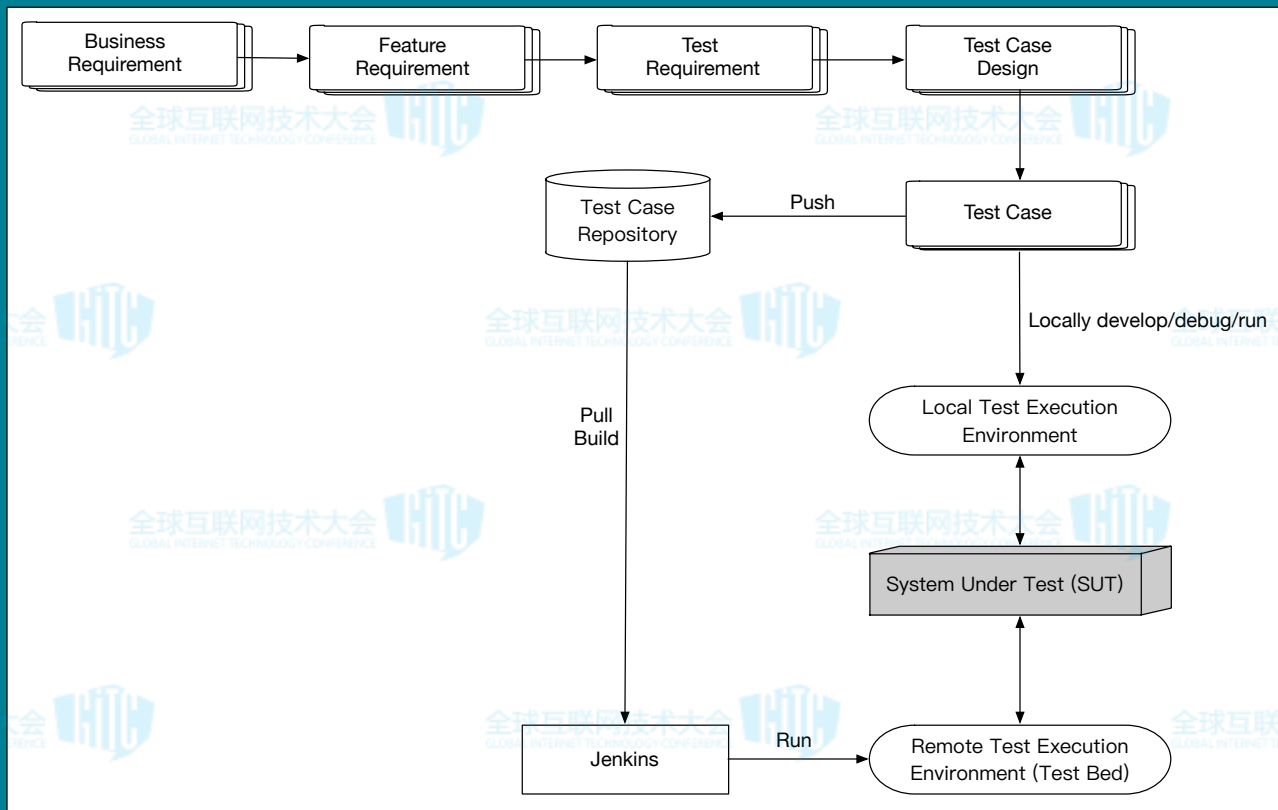


测试架构的演变

Test Execution Environment

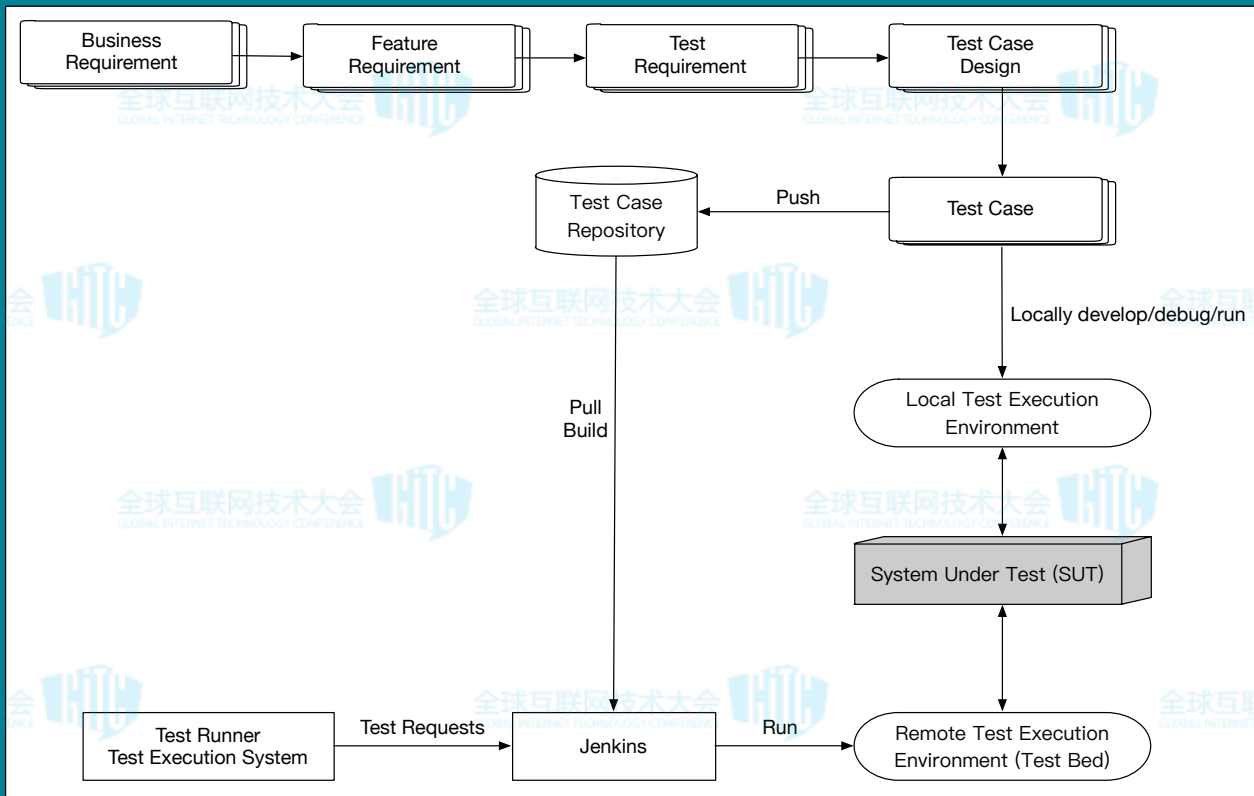
测试架构的演变 - Test Execution Environment

基于Jenkins触发测试执行



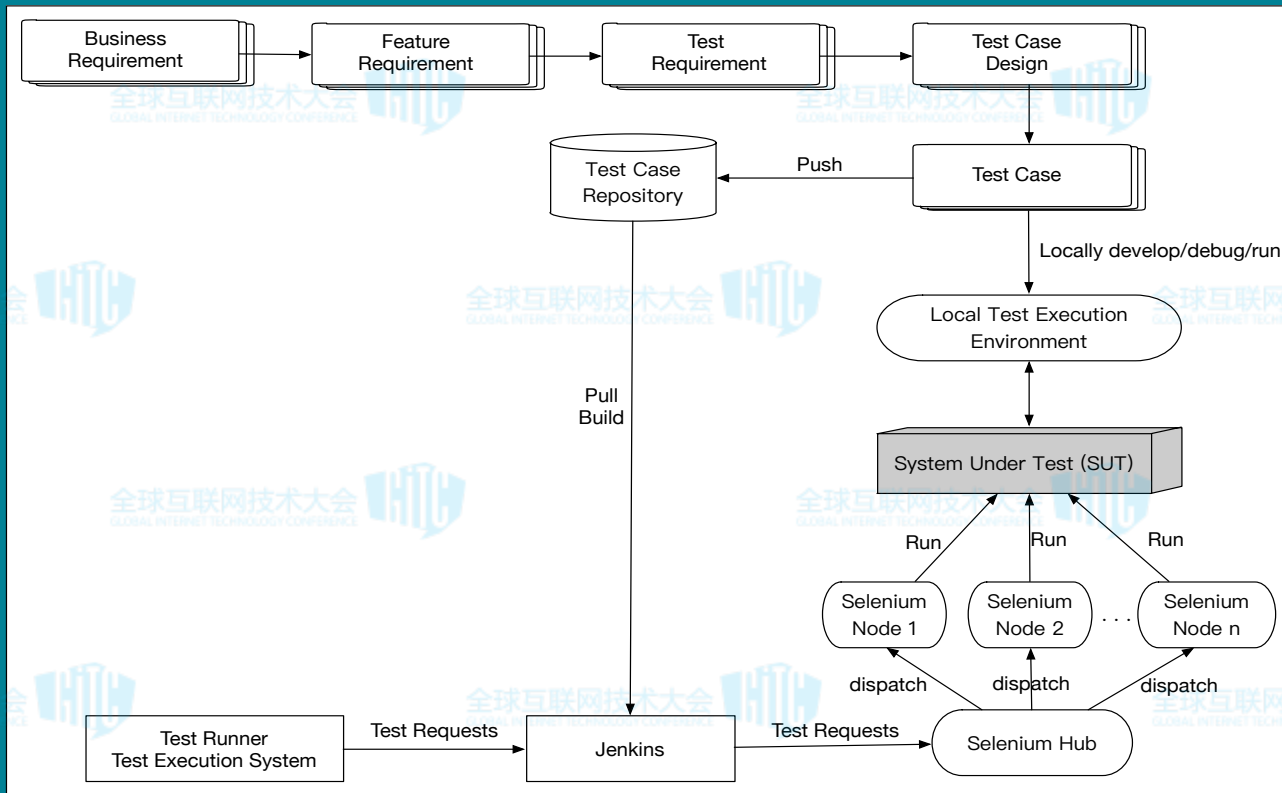
测试架构的演变 - Test Execution Environment

基于Test Runner / Test Execution System



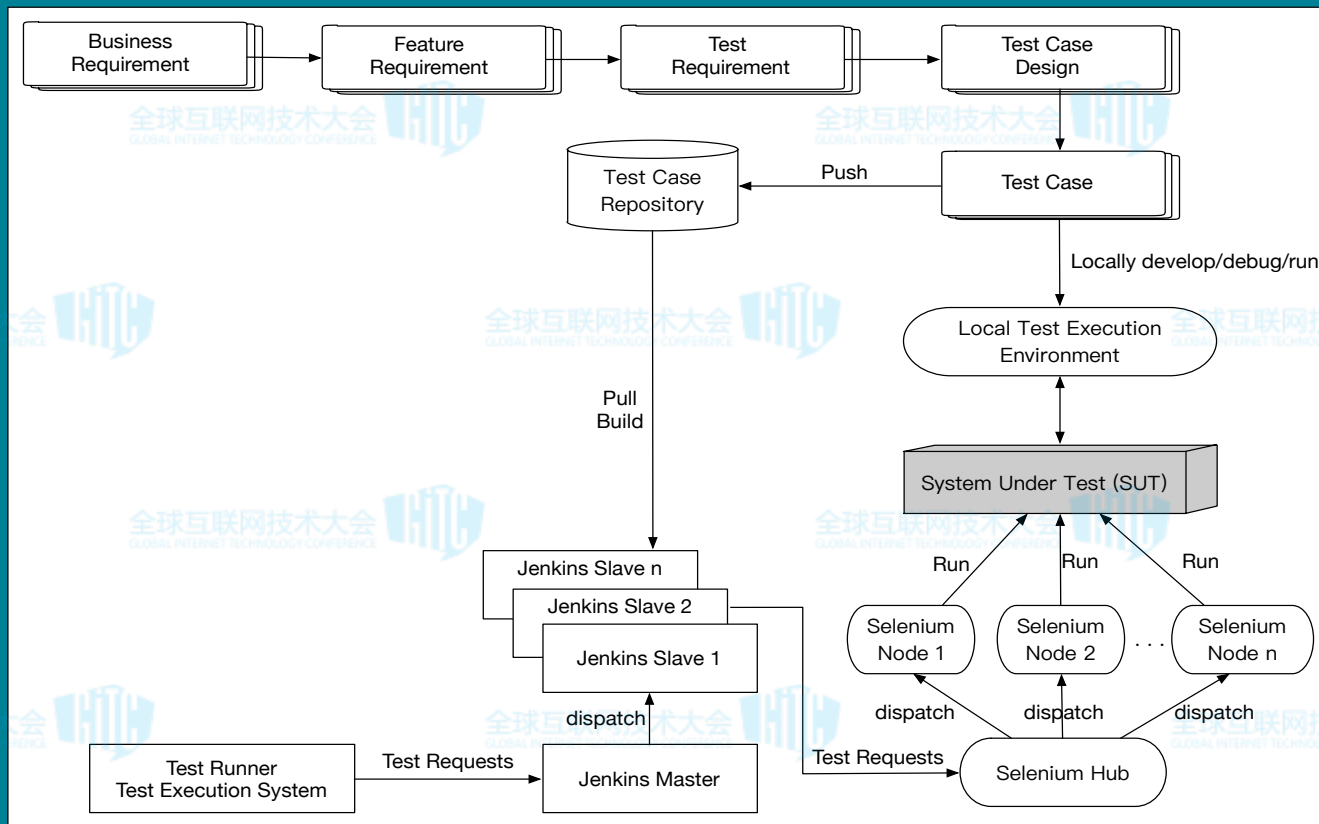
测试架构的演变 - Test Execution Environment

基于Selenium Grid提高测试并行执行能力



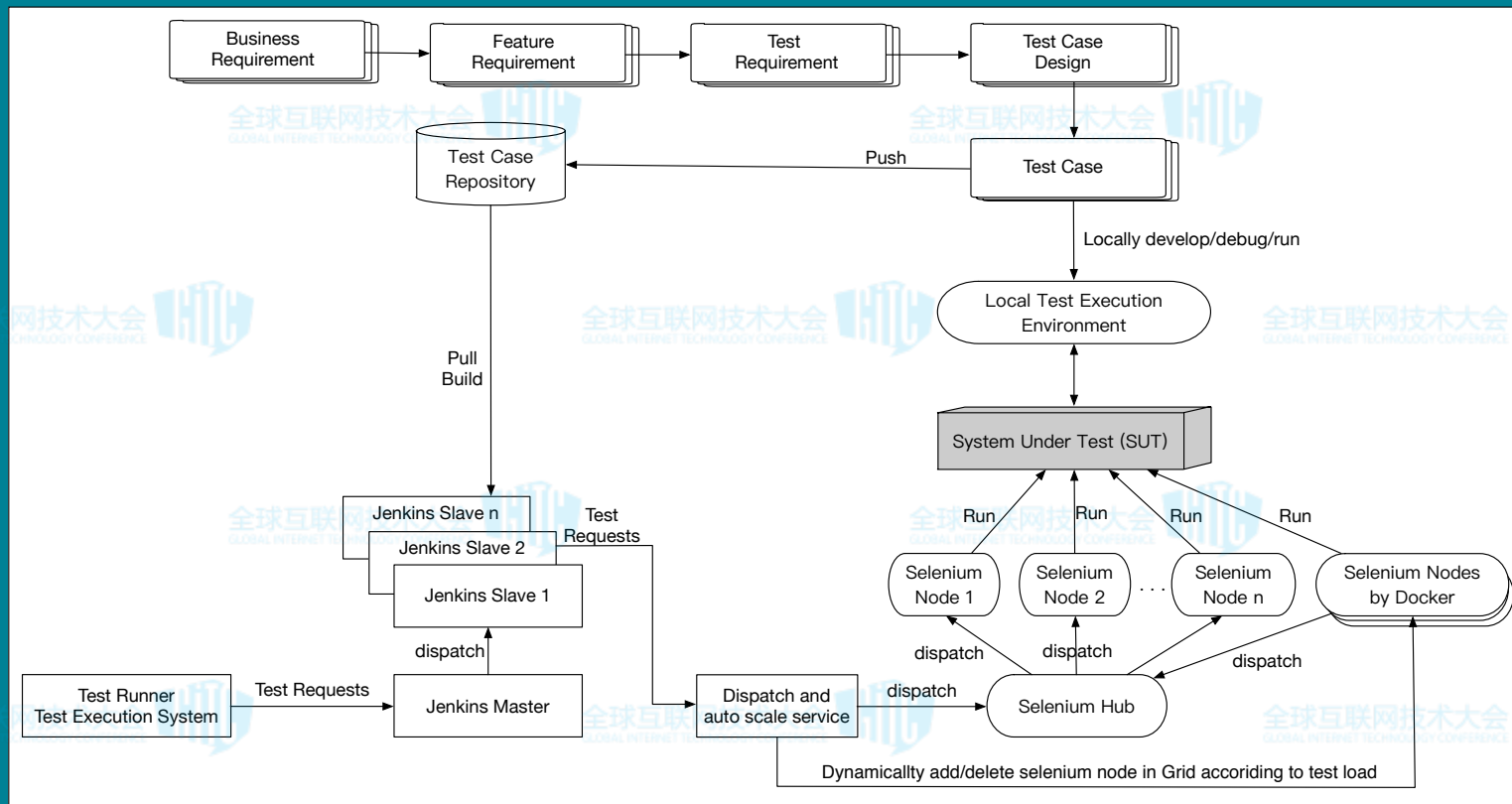
测试架构的演变 - Test Execution Environment

基于Jenkins Cluster提高测试并行执行能力



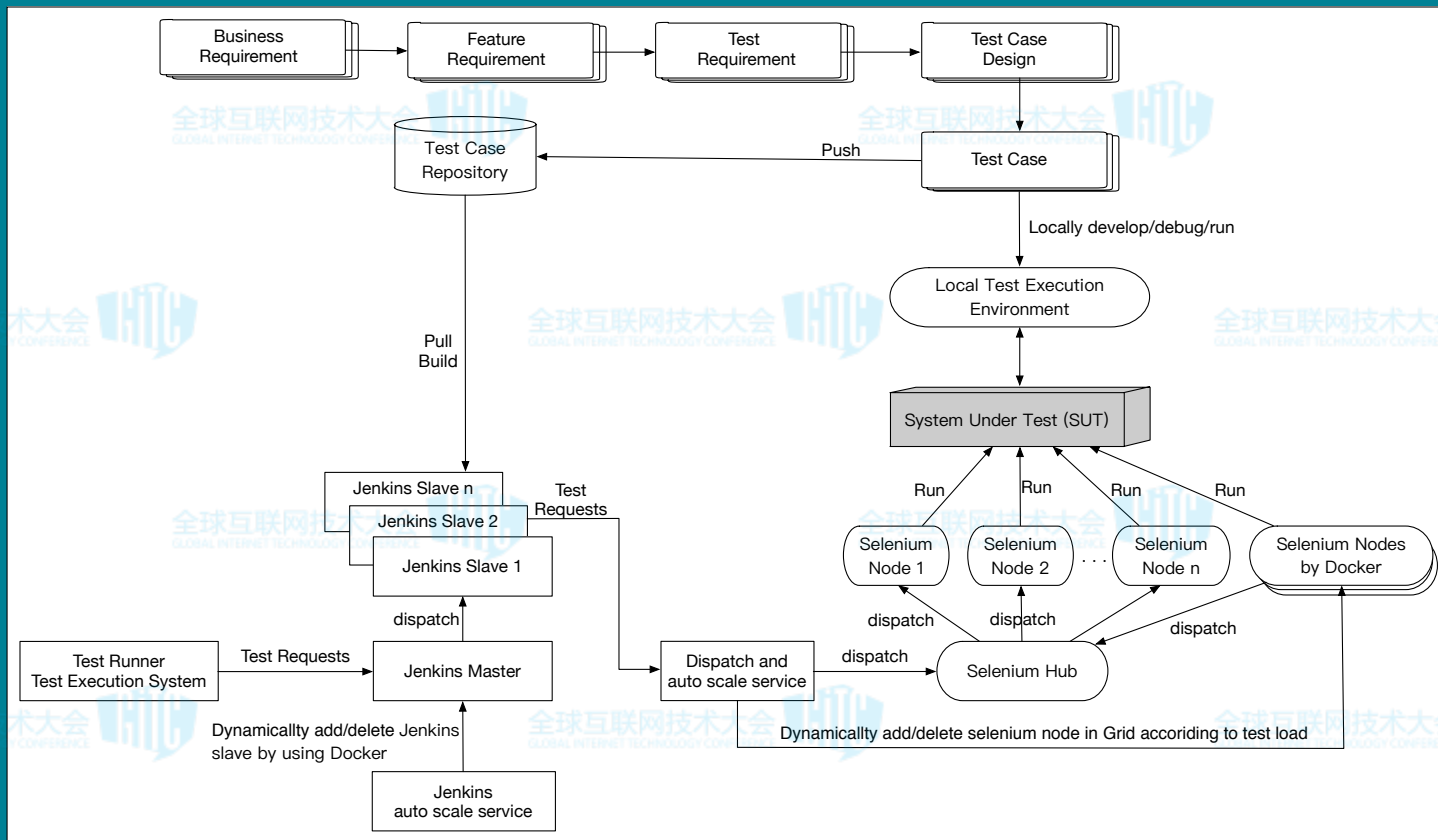
测试架构的演变 - Test Execution Environment

基于测试负载，用**Docker**实现**Selenium Grid**的动态扩展与收缩



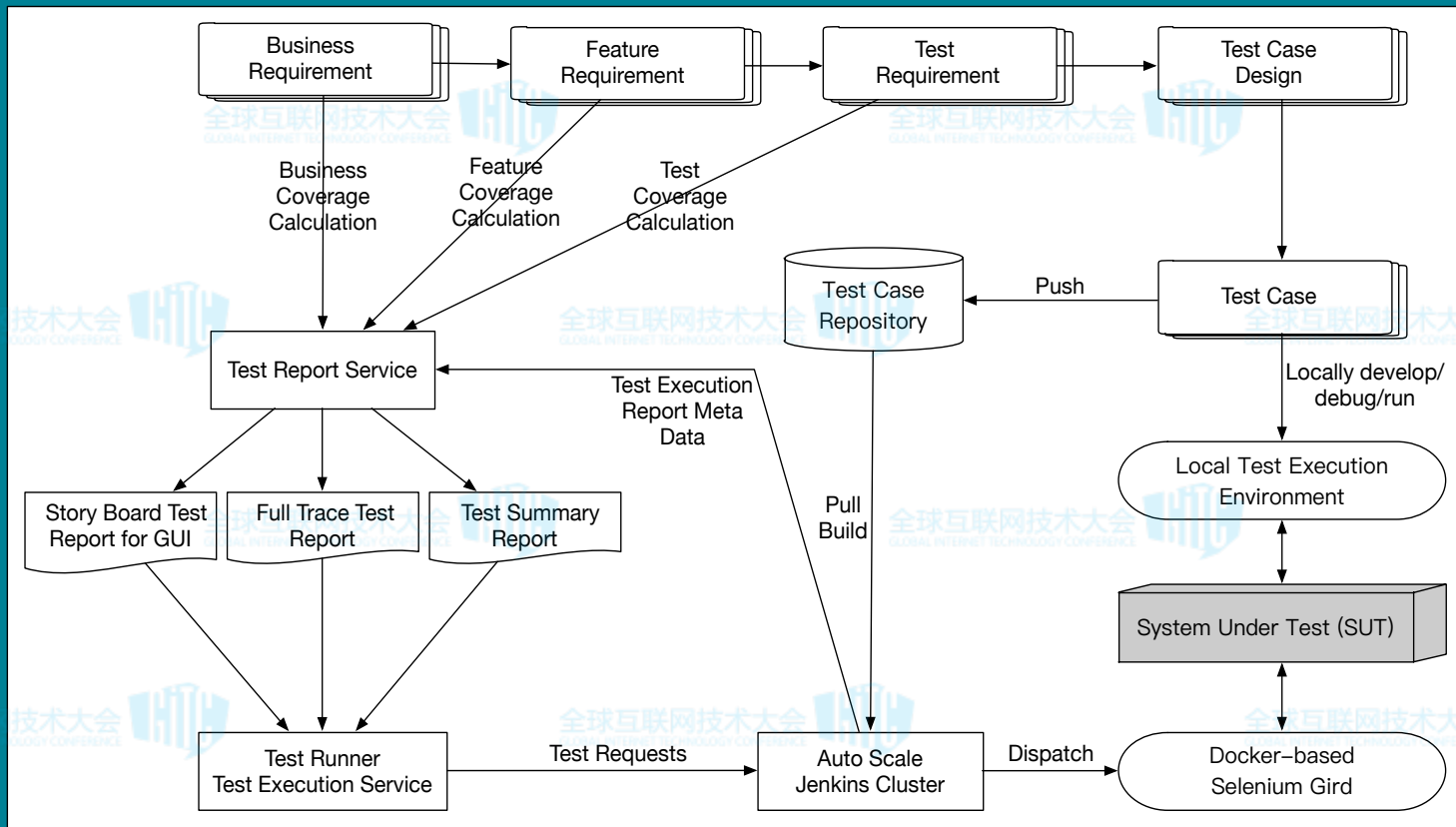
测试架构的演变 - Test Execution Environment

基于Docker实现Jenkins Cluster的动态扩展与收缩



测试架构的演变 - Test Execution Environment

引入Test Report Service生成各种测试报告



测试架构的演变

Test Report Service

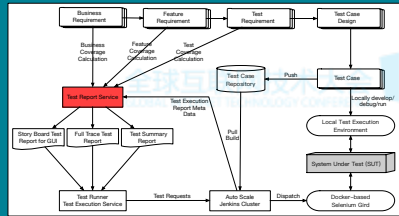
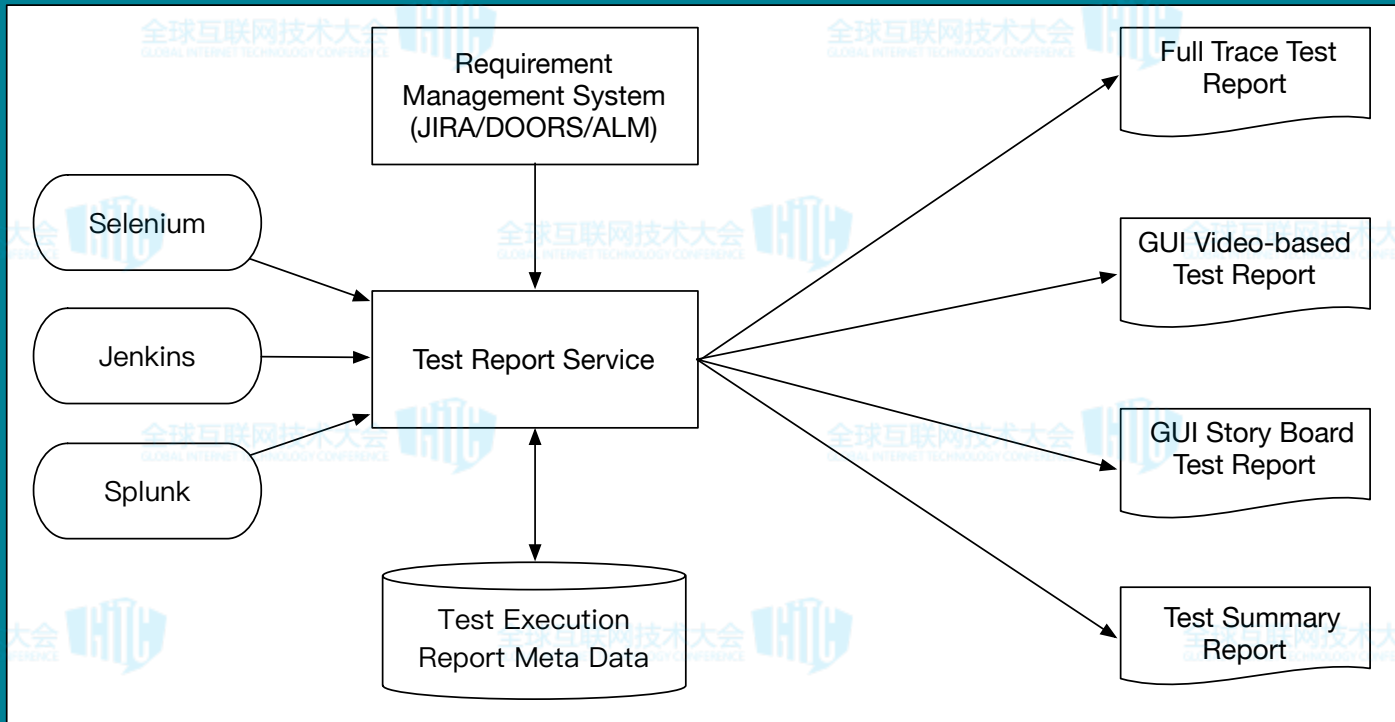
测试架构的演变 - Test Report Service

Test Report Service生成的各种测试报告

- ❑ Full Trace Test Report for DEV/QE
- ❑ GUI Video-based Test Report for PM/PO
- ❑ Story Board Test Report for PM/PO
- ❑ Multi-Site Story Board Comparison Test Report for LQA
- ❑ Test Summary Report for management team
- ❑ Test Trend Report for management team

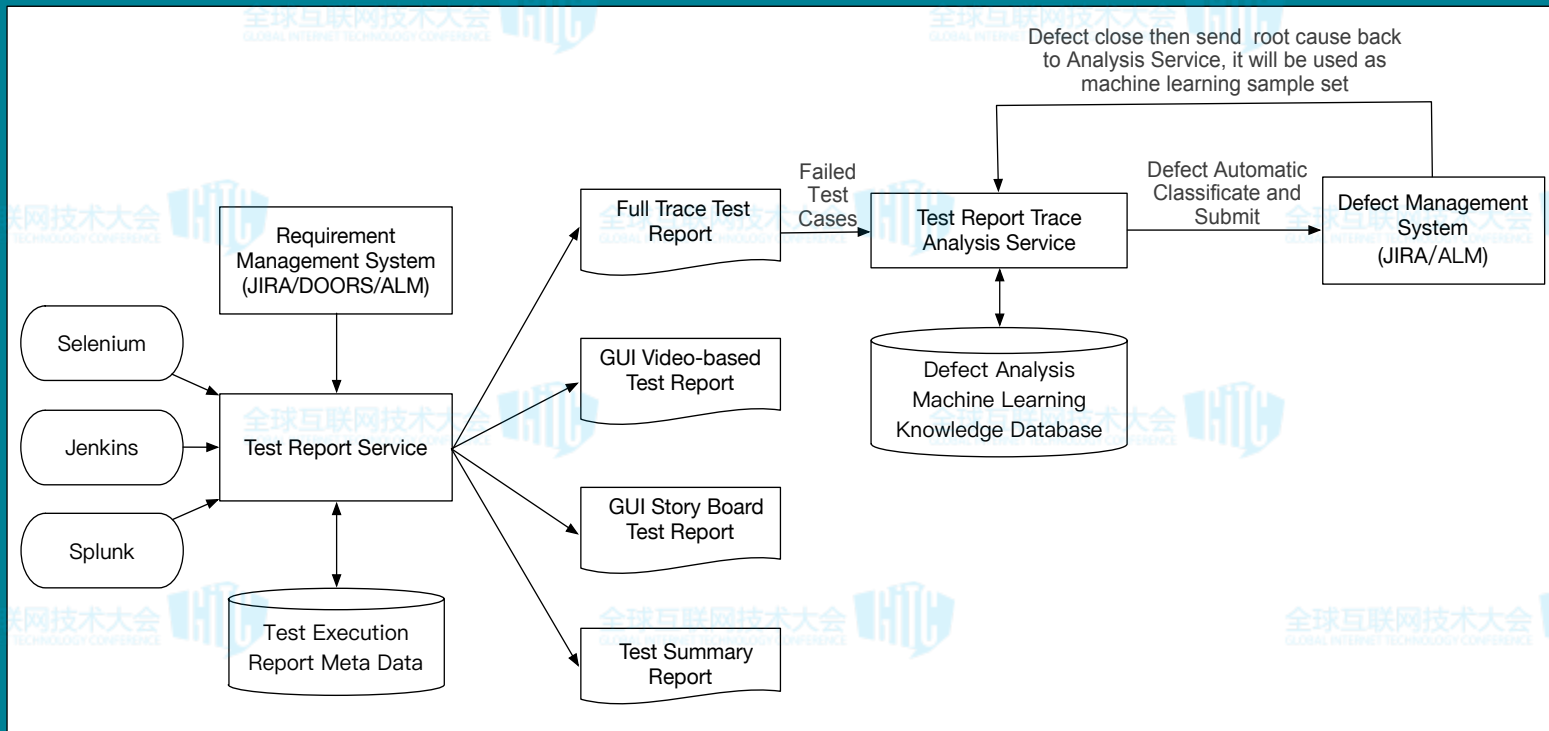
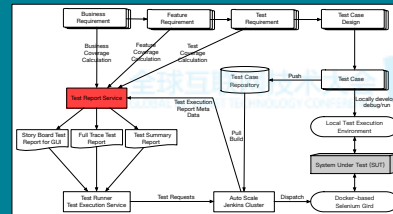
测试架构的演变 - Test Report Service

典型的Test Report Platform架构



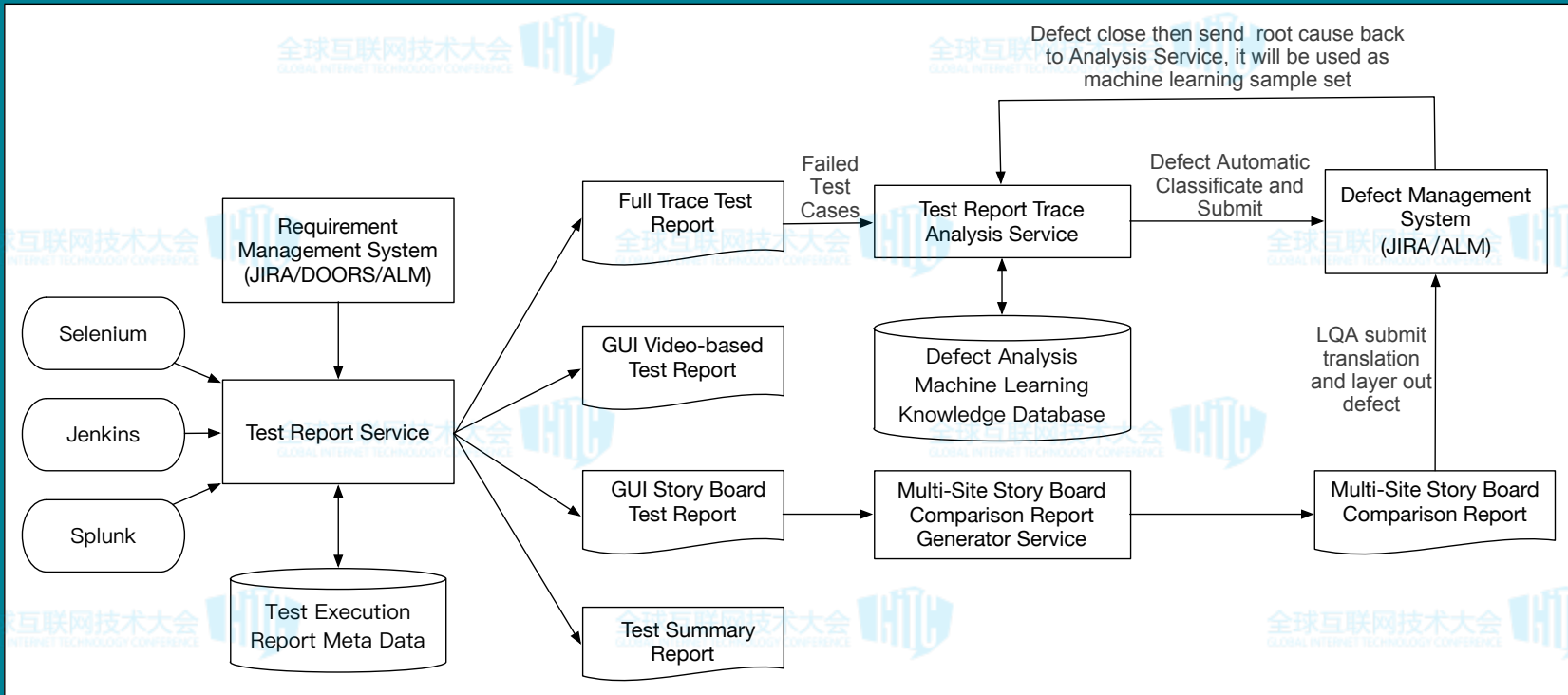
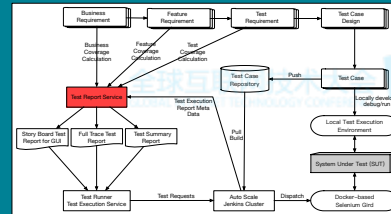
测试架构的演变 - Test Report Service

引入Test Analysis Service提高Defect分类效率



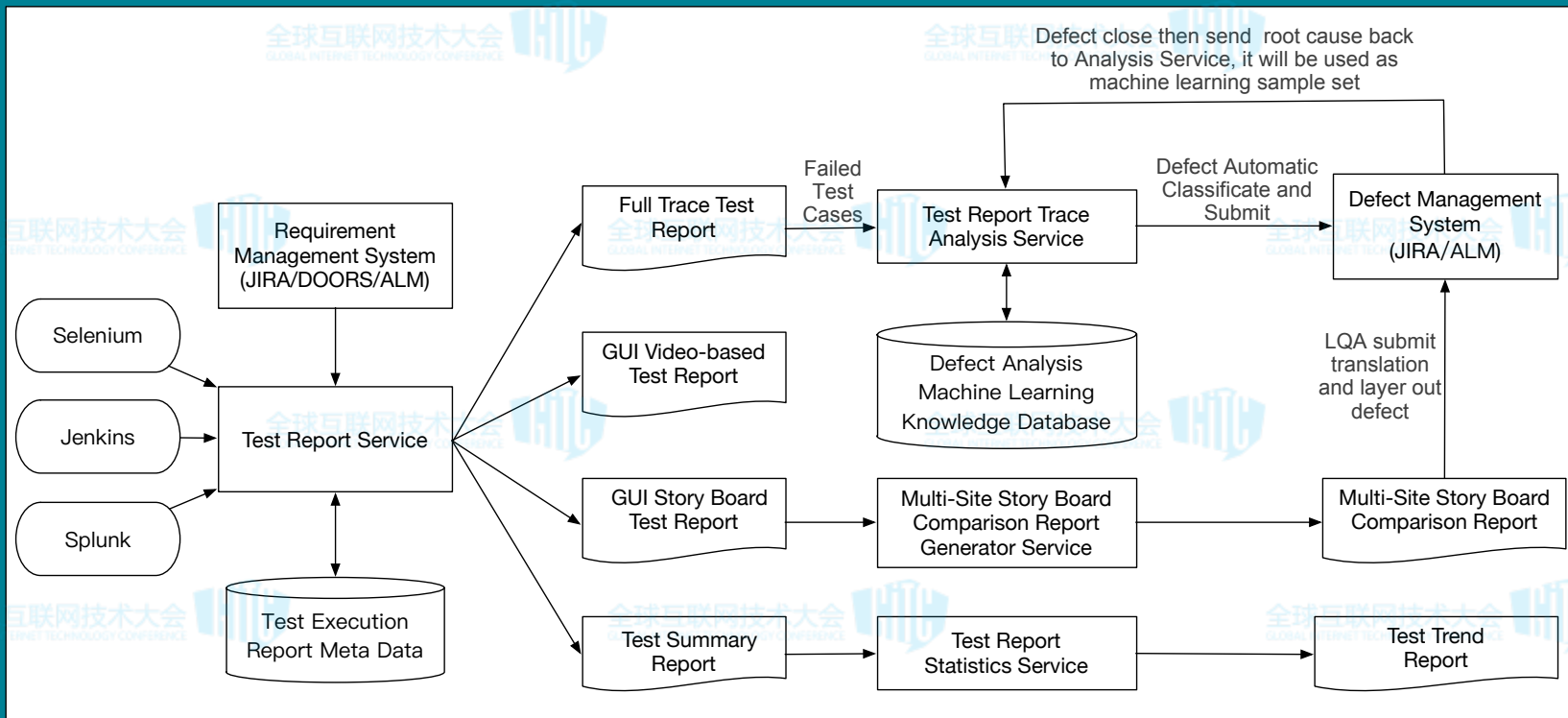
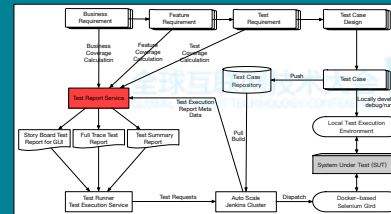
测试架构的演变 - Test Report Service

引入Multi-Site Comparison Report提高LQA 测试效率



测试架构的演变 - Test Report Service

引入Test Statistics Service



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