



移动互联网时代的 软件测试技术新动态

欧阳磊

资深技术顾问
惠普软件集团



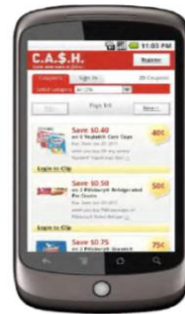
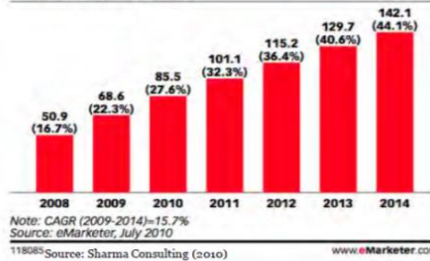
- 为什么需要移动应用质量管理
- 惠普移动应用自动化功能测试
- 惠普移动应用自动化性能测试
- 惠普移动应用自动化安全测试
- 小结

移动应用爆炸式增长



Mobile Web On the Rise

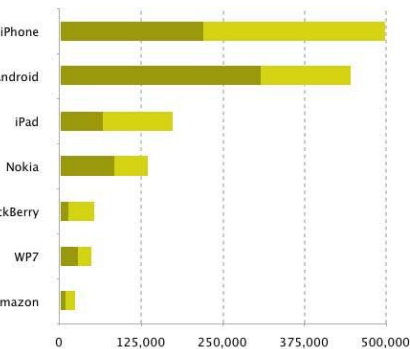
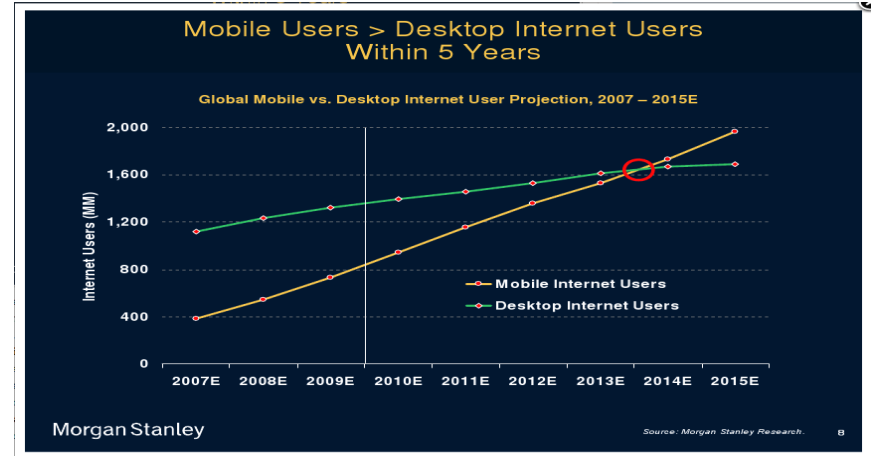
US Mobile Internet Users and Penetration, 2008-2014
millions and % of population



Android OS



Apple OS



Free Paid-for association <http://mmaglobal.com> Source: Sharma Consulting (2010)

US mobile web query growth in 2010-2011

4X

source: Google Mobile 2011

Mobile YouTube Playbacks

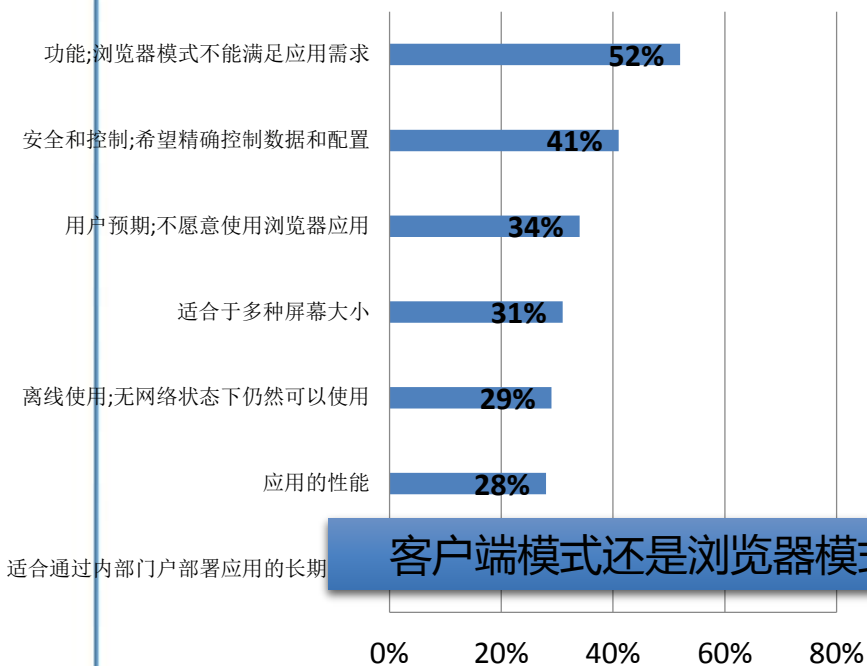
200 M per DAY!

source: Google Mobile 2011

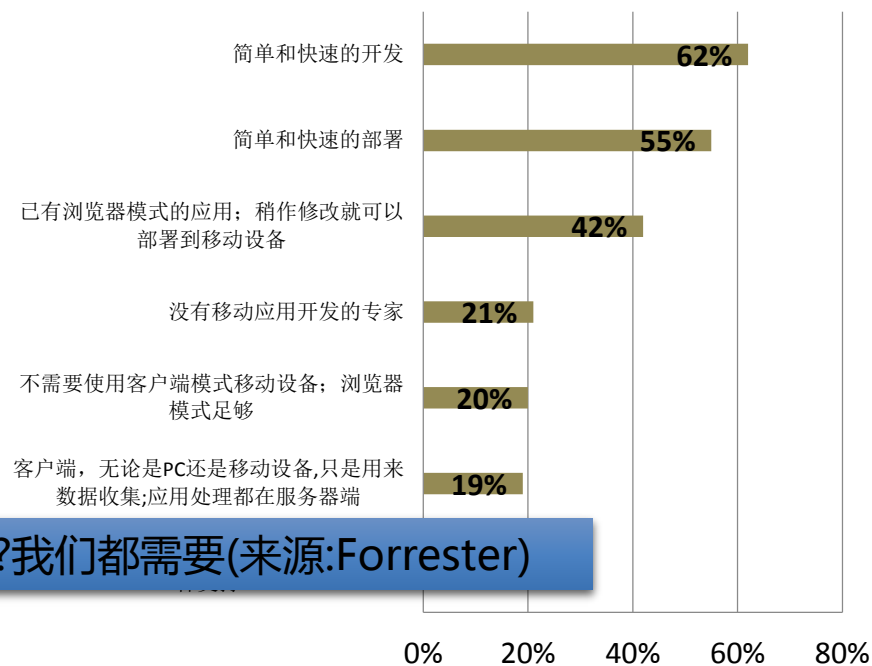
移动应用的两种架构



选择客户端模式的理由



选择浏览器模式的理由



客户端模式还是浏览器模式?我们都需要(来源:Forrester)

来源: 信息周刊2012 移动应用开发调查, July 2012 n=350

移动应用测试的挑战



- **移动终端设备厂商众多**
- **移动设备平台更新速度快**
- **需要支持真实的设备测试**
- **测试平台的运营管理(设备管理,复杂度,成本,风险)**
- **同现有的质量管理体系的整合(工具,流程,策略,人员)**



移动应用测试需要考虑的问题



真实设备

真实的智能手机

真实的手持终端

真实的移动网络

模拟

与设备无关

灵活性和健壮性

测试设备管理

集中化

共享

应用生命周期集成

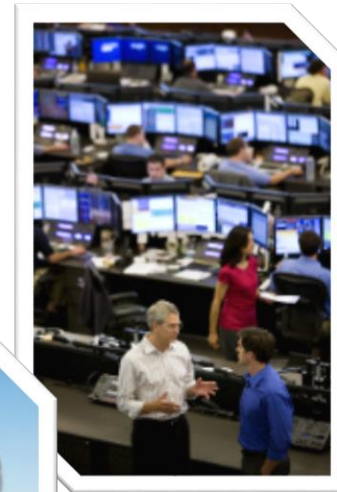
企业范围内可见性

学习周期短

惠普移动应用测试

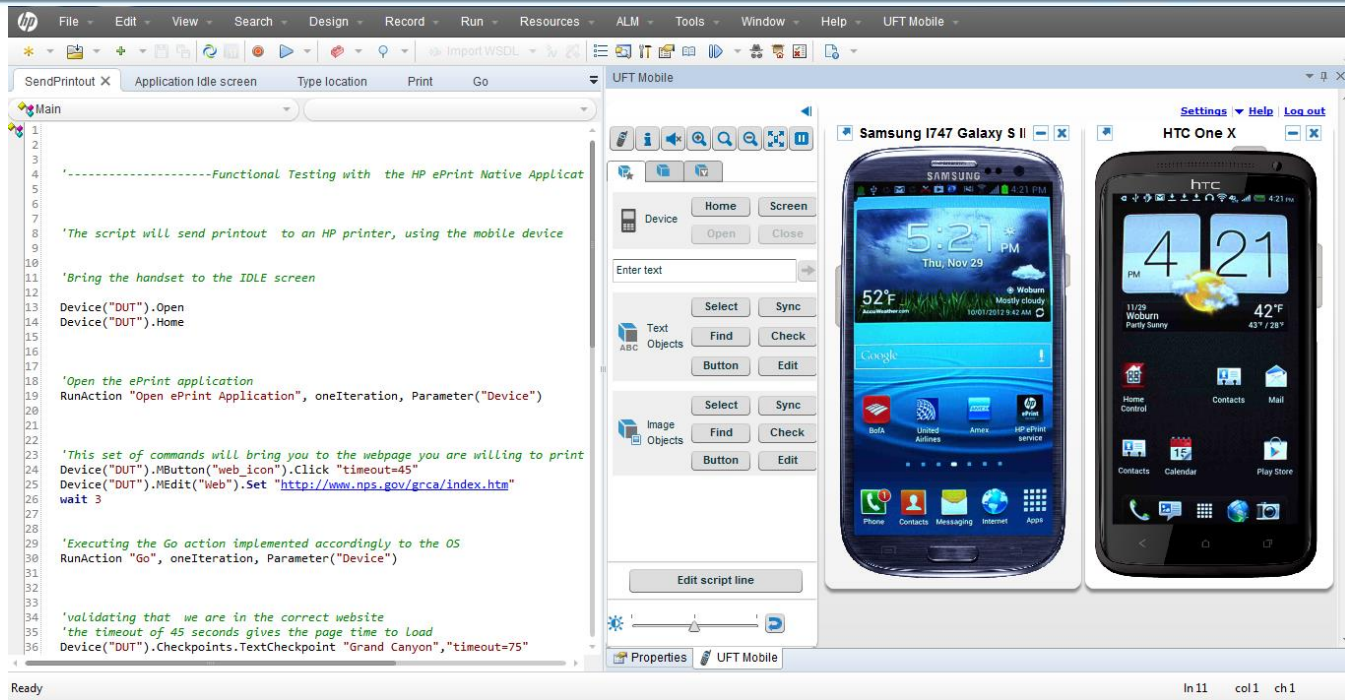


- 移动应用自动化功能测试
- 移动应用自动化性能测试
- 移动应用自动化安全测试



- 为什么需要移动应用质量管理
- 惠普移动应用自动化功能测试
- 惠普移动应用自动化性能测试
- 惠普移动应用自动化安全测试
- 小结

移动应用功能测试 – HP UFT



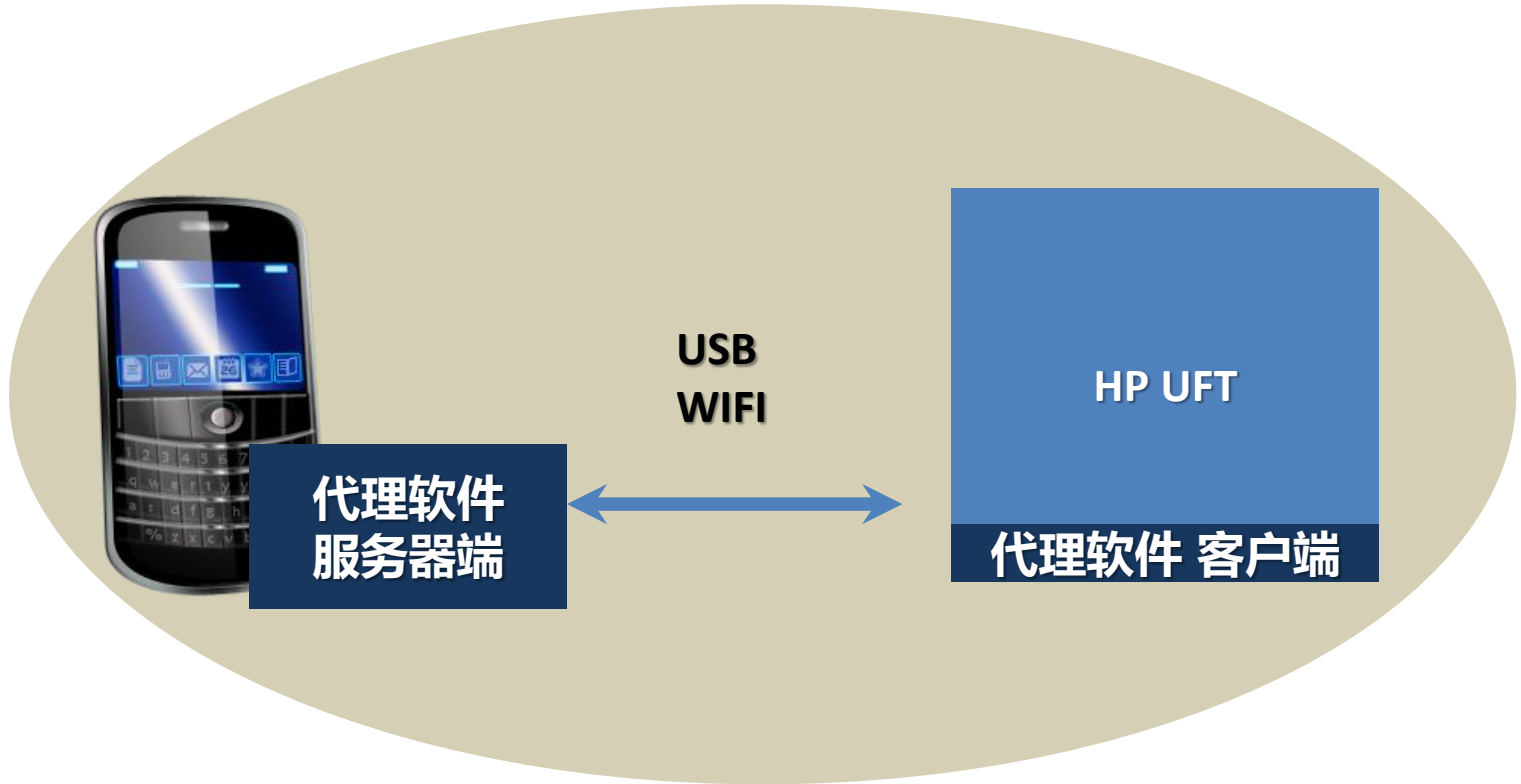
基于真实设备的测试

图形化界面

一个测试，多个平台

©2014 CSTQB www.cstqb.cn

方案1 – 轻量级功能测试



核心技术 – Insight Object

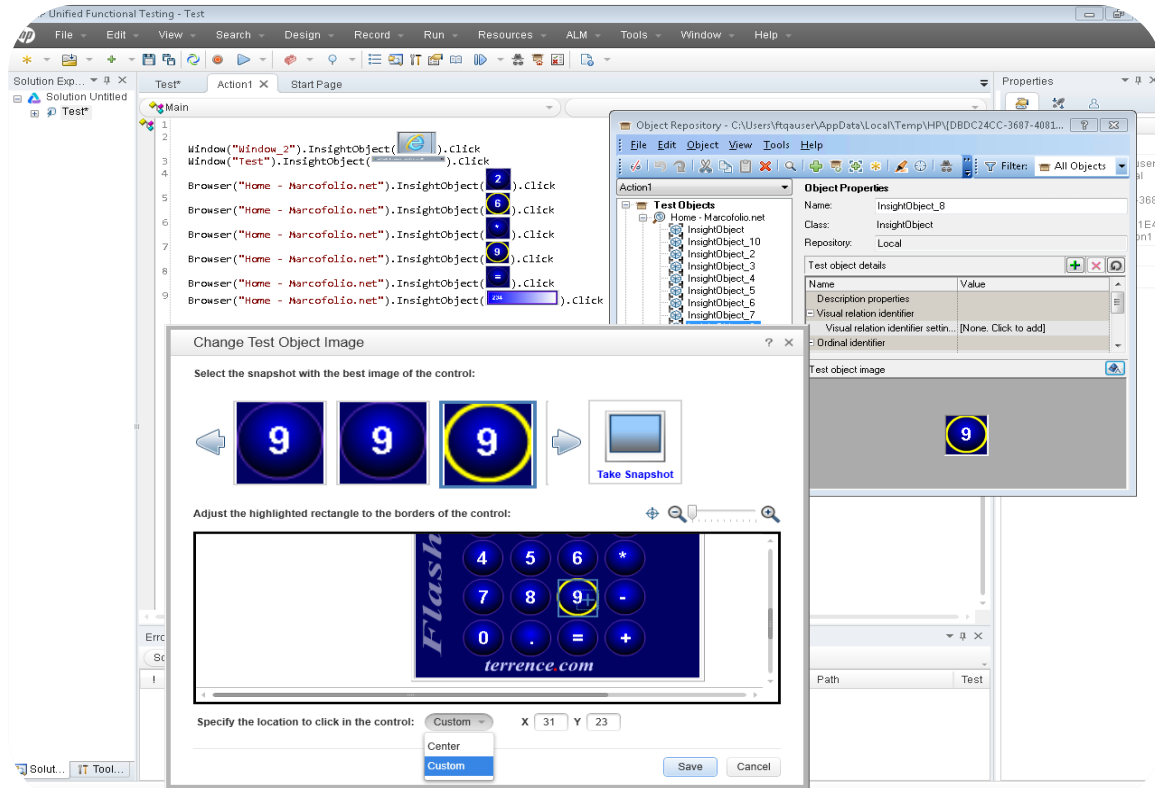


特点:

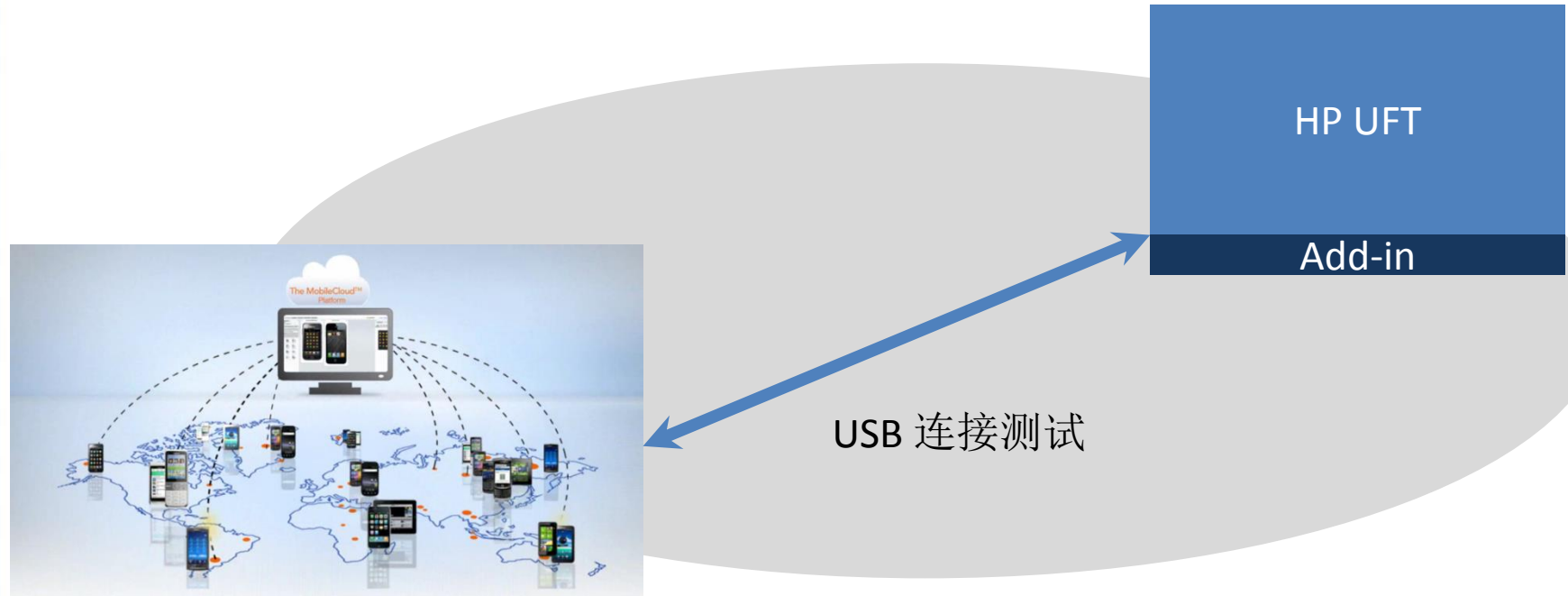
- 通过图像特征获得控制对象
- 用户可用录制和回放屏幕上的任何图像，而无需考虑应用是采用何种技术实现的

收益:

- 自动化测试的技术无关性
- 后台技术发生变化时无需更改脚本



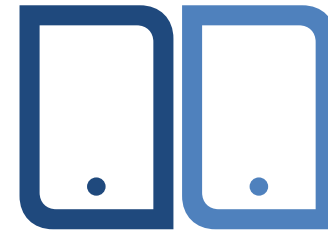
方案2 – 重量级功能测试



安全使用基于私有环境中的真实设备

- 测试人员可以从UFT中选择和快速使用各种移动设备。

核心技术 - MCE



**Your own
devices**

设置

真实移动设备

The screenshot displays the QuickTest Professional (QTP) interface. On the left, the 'Action1' script is visible with the following code:

```
1: DeviceID = Device("DUT").SetTOProperty("device_id", DataTable("A", dtGlobalSheet))
2: Device("DUT").Home
3: model = Device("DUT").GetROProperty("model")
4:
5: Device("DUT").MObject("AppIcon").
6: Device("DUT").MButton("location").Click(20)
7:
8: wait 3
9: If Device("DUT").MButton("Zip Code").Exist Then
10: Device("DUT").MButton("Zip Code").Click(10)
11: End If
12:
13: wait 3
14: Device("DUT").MButton("Zip Code").Click(10)
15:
16: Device("DUT").Type "02420"
17: Device("DUT").MButton("Done").
18:
19: Device("DUT").MObject("Go").C
20:
21: Device("DUT").Checkpoints.Text
22: Device("DUT").Checkpoints.Text
23:
24: Device("DUT").MButton("ATM").
25: Device("DUT").Checkpoints.Text
26:
27: Trans_time = Device("DUT").Get
28: MsgBox Trans_time/1000
29:
30:
31:
32:
```

In the center, the 'Object Repository' window shows a tree view with 'DUT' selected. The 'Object Properties' window for 'DUT' is open, showing details such as Name, Class, Repository, and Test object details.

On the right, a virtual mobile device is shown with an iOS-style home screen. The screen displays various app icons including Messages, Calendar, Photos, Camera, Videos, Maps, Weather, Notes, iTunes, Reminders, Clock, App Store, BofA, Facebook, HBO GO, Phone, Mail, Safari, and Music. The time is 1:42 PM and the carrier is AT&T.

At the bottom left, a 'Data Table' is visible with the following content:

ID	DeviceID
1	C38GNABBDT9V
2	6231EFD1304AT

对象管理

任意设备，一个脚本

惠普移动应用功能测试特点



灵活性和可扩展性

- 基于真实设备
- 基于代理机制
- 基于私有环境

敏捷性和快速

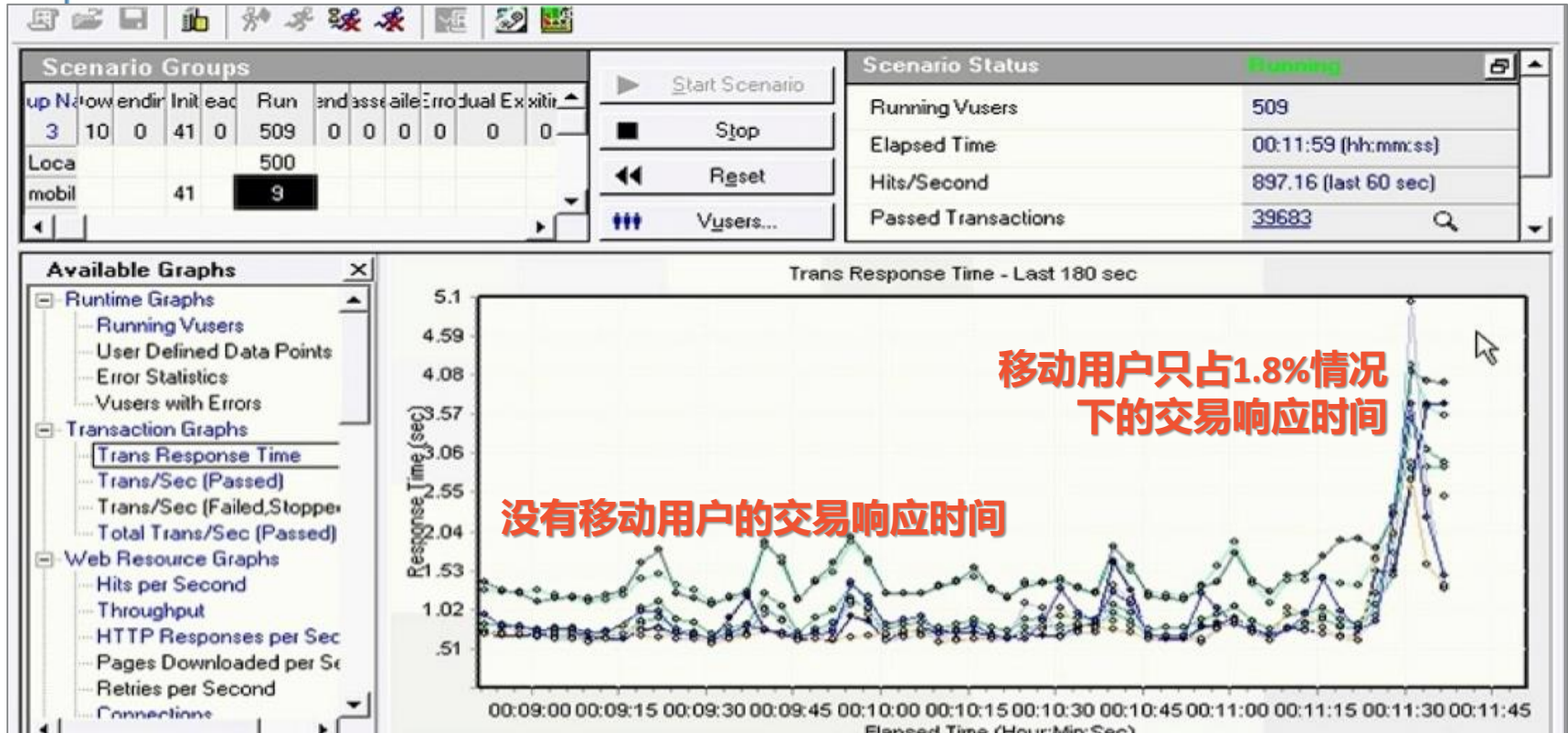
- 自动化保证测试覆盖率
- 与设备无关的脚本。编写一次，可以在多种设备上使用
- 快速重新测试应用

同HP ALM集成

- 需求
- 测试计划
- 缺陷管理

- 为什么需要移动应用质量管理
- 惠普移动应用自动化功能测试
- 惠普移动应用自动化性能测试
- 惠普移动应用自动化安全测试
- 小结

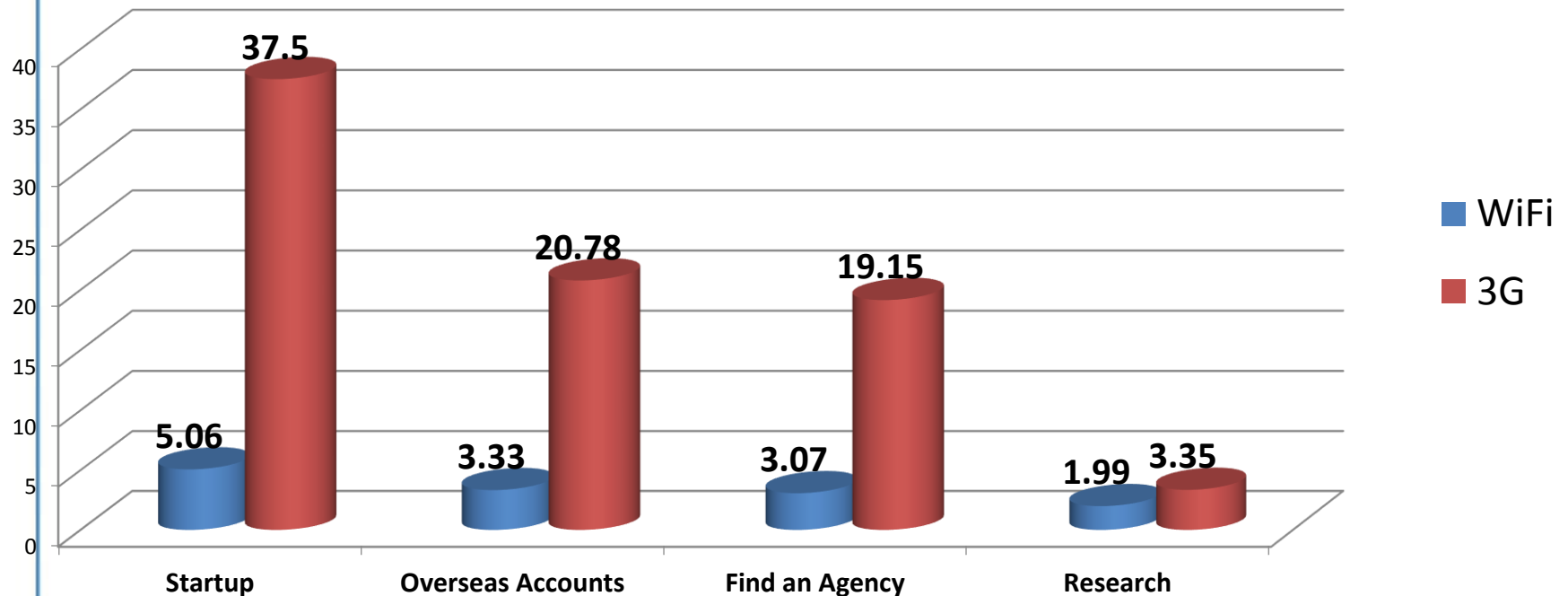
移动用户对应用性能的影响



不同网络下应用性能的对比



手机银行应用的响应时间 WiFi Vs. 3G [Sec]



移动应用性能测试考虑的问题

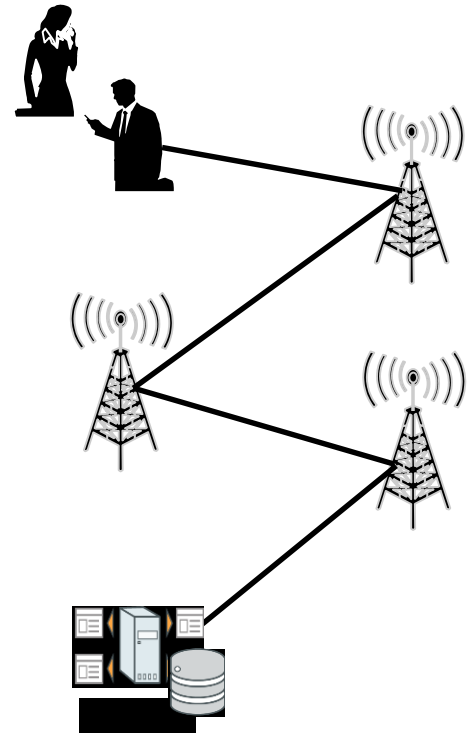


服务器能同时支持的用户数?

不同的网络状况(网络速度,延迟等)?

不同的网络设备?

端对端的性能?



Web Applications

Mobile TruClient

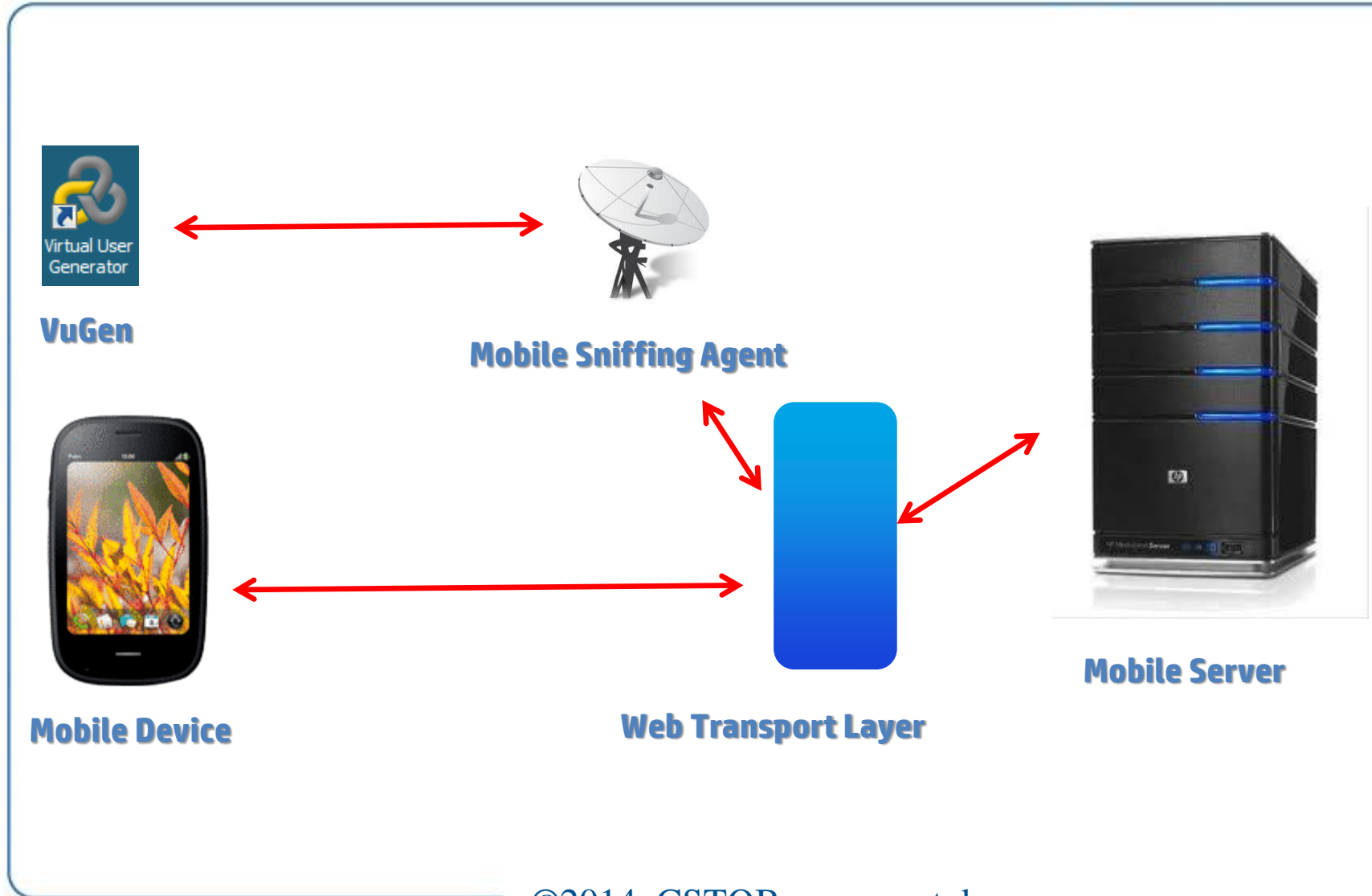
- 针对基于浏览器的应用
- 基于惠普TruClient 技术
- 基于浏览器录制
- 在业务交流流程层面捕获通讯包

Native Applications

Mobile Applications

- 基于native 和浏览器的应用
- 基于Web (http/html) 脚本
- 基于模拟器和移动设备录制
- 分析网络通讯包

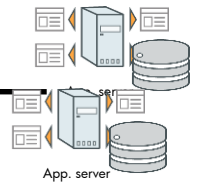
核心技术



移动设备终端



网络状况



移动应用
服务器

- 可以模拟各类网络状况:
 - 延迟
 - 丢包
 - 错包
 - 链路故障
 - 拥塞

HP LoadRunner Controller - Scenario1.lrs - [Design(2)]

File View Scenario Results Diagnostics Tools Help

Scenario Scripts

Load Generators

Name	Status	Platform	Details
almmobileuft	Down	Windows 7	
localhost	Down	Windows 2008	

Load Generator Information

Name: almmobileuft

Platform: Windows

Temporary directory:

Enable load generator to take part in the scenario

Status | Run-Time File Storage | **WAN Emulation** | Run-Time Quota

User Limits | Security | Terminal Services

Enable WAN Emulation on Load Generator

Emulated Location: HeadQuarter

Auto Monitoring User Details

User Name

Password

WAN Emulation settings...

Connect

Add...

Delete...

Reset

Details...

Disable

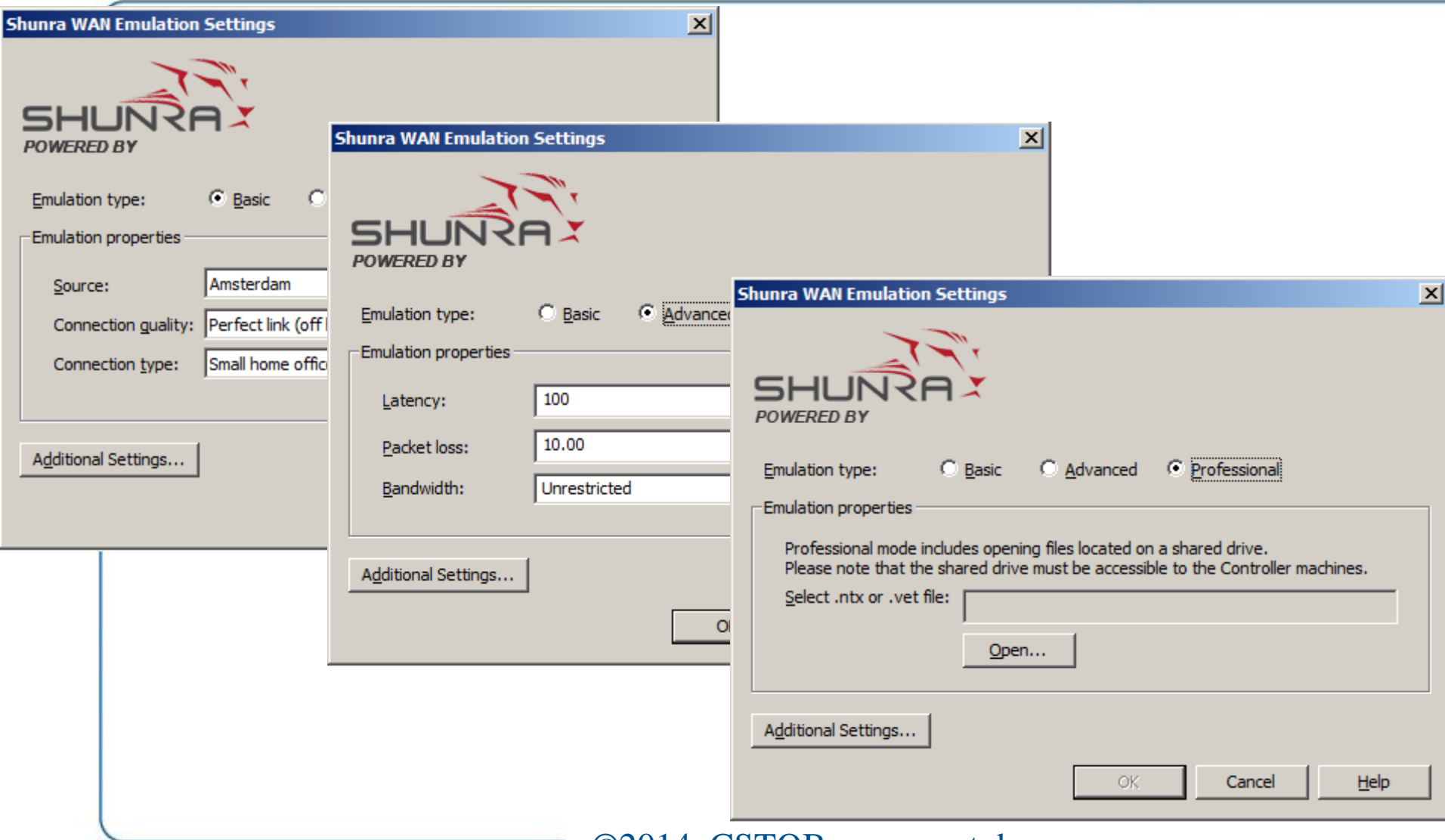
Help

Close

3

2

Users


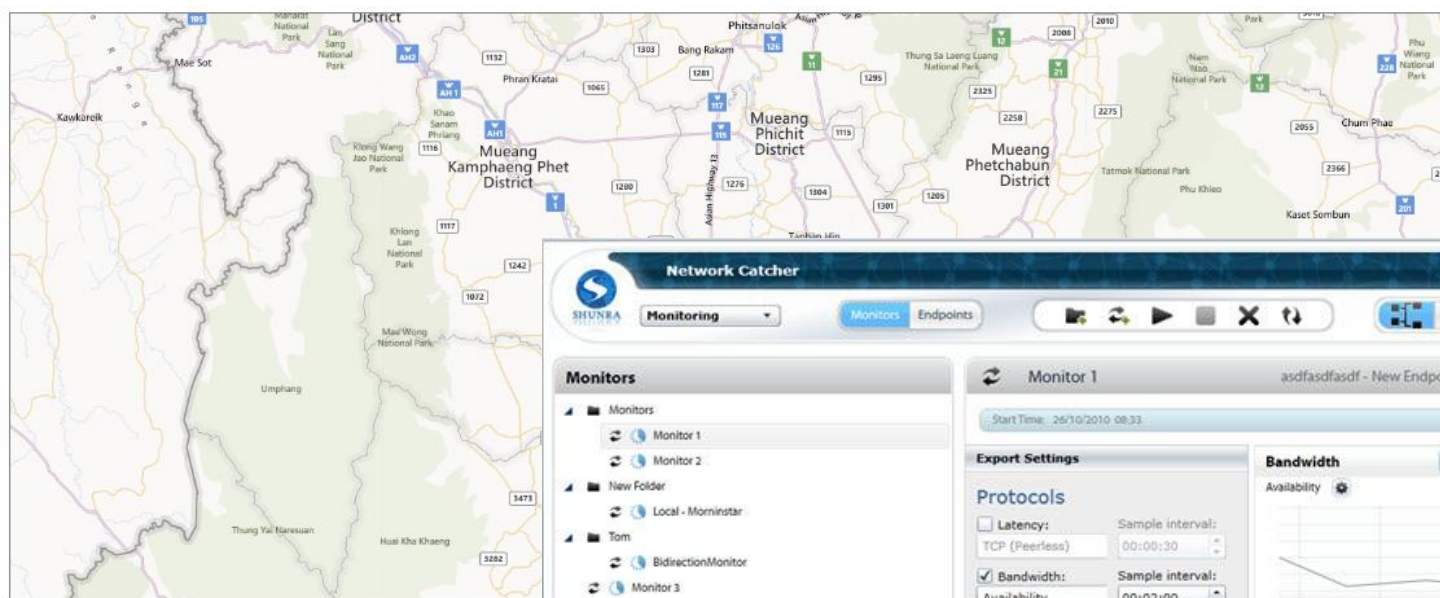


The image displays three overlapping windows of the 'Shunra WAN Emulation Settings' dialog box. Each window features the 'SHUNRA POWERED BY' logo and a title bar with a close button. The windows show different configuration options:

- Leftmost window (Basic mode):** Emulation type: Basic. Emulation properties: Source: Amsterdam, Connection quality: Perfect link (off), Connection type: Small home office. Includes an 'Additional Settings...' button.
- Middle window (Advanced mode):** Emulation type: Basic, Advanced. Emulation properties: Latency: 100, Packet loss: 10.00, Bandwidth: Unrestricted. Includes an 'Additional Settings...' button.
- Rightmost window (Professional mode):** Emulation type: Basic, Advanced, Professional. Emulation properties: Professional mode includes opening files located on a shared drive. Please note that the shared drive must be accessible to the Controller machines. Select .ntx or .vet file: [text box]. Includes an 'Open...' button, an 'Additional Settings...' button, and 'OK', 'Cancel', and 'Help' buttons.

Location

 Close Map



Network Catcher - Monitoring

Monitors: Monitor 1, Monitor 2, Local - Mornistar, BidirectionMonitor, Monitor 3

Monitor 1 - asdfasdfsdf - New Endpoint

Start Time: 26/10/2010 08:33 | End Time: 26/10/2010 09:33

Export Settings

- Protocols: Latency, Bandwidth, Availability
- Sample interval: 00:00:30

Data

Start sampling at: 26/10/2010 08:55:28 | End sampling at: 26/10/2010 09:10:28

Bandwidth - Upstream / Downstream Est. (Mb/s)

Latency - HTTP, ICMP, TCP (Peerless) (MS)

Zoom: 15 Min | 1 Hour | 4 Hours | 12 Hours | 1 Day | 3 Days | 1 Week | Maximum

New Mobile Profile

Mobile Profile
Stationary Profile
Monitor Based Profile

From: Abakan,Russian Federation

To: Abakan,Russian Federation
Abakan,Russian Federation
Aberdeen,United Kingdom
Abu Dhabi,United Arab Emirates
Adana,Turkey
Adelaide,Australia
Aguascalientes,Mexico
Ahmadabad,India
Akron,United States
Albany,United States

Accessing internet via: Wi-Fi, cellular

Device: Any Mobile, iPhone, Android

Latency Conditions: Best, Typical, Worst (On)

Bandwidth Conditions: Best, Typical, Worst (On)

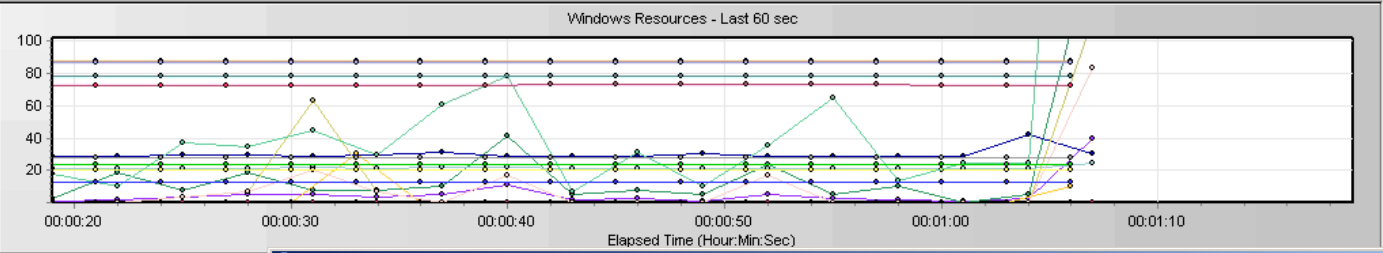
Emulation Time: 1 M

Name: Profile 3

Save & Add Another OK Cancel

Available Graphs

- Runtime Graphs
 - Running Users
 - User Defined Data Points
 - Error Statistics
 - Users with Errors
- Transaction Graphs
 - Trans Response Time
 - Trans/Sec (Passed)
 - Trans/Sec (Failed, Stopped)
 - Total Trans/Sec (Passed)



Color	Scale	Measurement
Hidden	1	...
Hidden	1	Latency (msec) (Shunra VE Cloud)
Hidden	1	Packet Loss % (Shunra VE Cloud)
Hidden	1	Packet Loss Count (Shunra VE Cloud)
Hidden	1	Packet Loss Total (Shunra VE Cloud)
Hidden	1	Bandwidth Util % (Shunra VE Client)
Hidden	1	Bandwidth Util Out % (Shunra VE Client)
Hidden	1	Current bps In (Shunra VE Client)
Hidden	1	Current bps Out (Shunra VE Client)
Hidden	1	Total Throughput In (bytes) (Shunra VE Client)
Hidden	1	Total Throughput Out (bytes) (Shunra VE Client)


HP LoadRunner Analysis - LR Results - Multi User WAN 100ms 1 Loss.lra

Summary Report | Running Users | Hits per Second | Throughput | Transaction Summary | **Average Transa... Response Time**

Properties

Description: Displays the average time taken
 Filter: Transaction End Status = (Pass)
 Group By: Emulated Location

Col	Scale	Measurement	Graph's Mini	Graph's Ave	Graph's Max	Graph's Mec	Graph's
1	1	Brokerage:No WAN Emulation	0.176	0.468	6.671	0.211	1.10
1	1	go to URL:No WAN Emulation	0.025	0.155	3.351	0.038	0.55
1	1	go to URL:WAN (100ms 1% Loss)	0.066	9.952	17.078	9.757	2.64
1	1	logon:WAN (100ms 1% Loss)	2.469	3.862	25.708	3.059	4.15




Mobile Site Home

HTTP Optimization

Recommend for: Desktop Mobile Sort by: Priority A-Z Name

- F** Reduce the size of your images (iPhone)
 - ▶ Images whose width is bigger than the iPhone's screen size
 - ▶ PNG images which are small enough to be converted to PNG8
 - ▶ PNG images which have a small number of colors and should be converted to PNG8

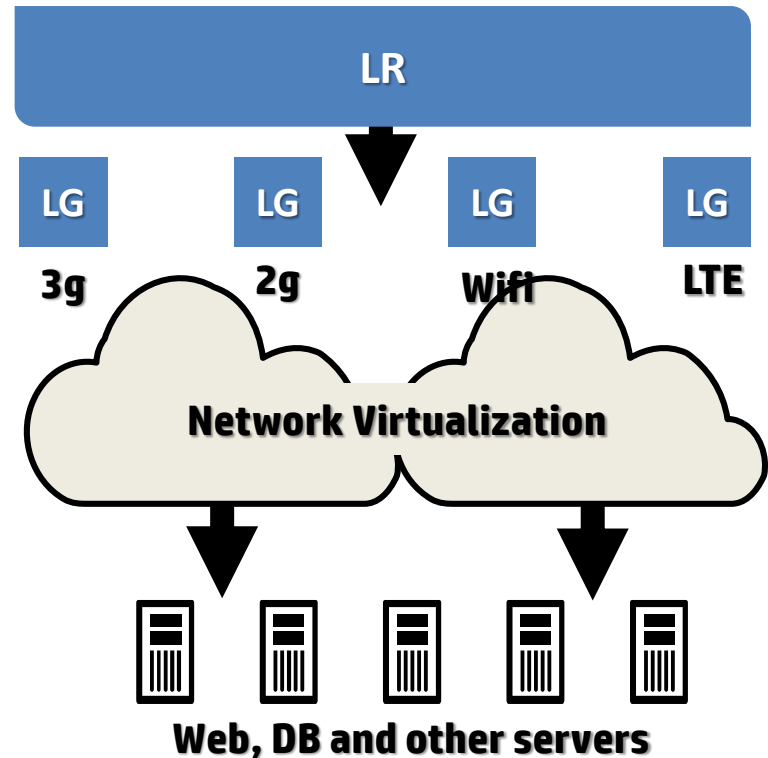
Description: Converting gif to png, and converting all pngs to png8 will reduce image size significantly and most likely will ha
- B** Add long term headers expiration dates
- B** Use fewer domains
- E** Avoid referencing images in stylesheets
- A** Compress Components
- B** Avoid URL redirects
- A** Make fewer HTTP requests (iPhone)
- B** Avoid 404 error code (Not Found) errors
- E** Use domain sharding (iPhone)
- B** Leverage proxy caching
- A** Try to reduce the size of the cookies
- A** Avoid loading javascripts in the head section
- A** Place reference to external CSS resources at the bottom of the HTML document
- A** Increase the Server's keep alive timeouts
- A** Avoid image scaling in HTML

TRT  19.8 sec

惠普移动应用性能测试+网络模拟



- 压力测试，监控和分析
- 模拟真实网络状况
- 动态变化的网络，创建真实有效的移动性能测试结果



- 为什么需要移动应用质量管理
- 惠普移动应用自动化功能测试
- 惠普移动应用自动化性能测试
- 惠普移动应用自动化安全测试
- 小结

HP Fortify SCA



分级报告漏洞的信息

项目的源代码

漏洞推荐修复的方法

漏洞产生的全路径的跟踪信息

漏洞的详细说明

```
try
{
Statement statement = connection.createStatement
ResultSet.TYPE_SCROLL_INSENSITIVE,
ResultSet.CONCUR_READ_ONLY);
ResultSet results = statement.executeQuery(query);

if ((results != null) && (results.first() == true)
{
ResultSetMetaData resultsMetaData = results.get
ec.addElement(DatabaseUtilities.writeTable(re
resultsMetaData));
results.last();

// If they get back more than one row they s
if (results.getRow() > 1)
{
mal
ge
Stage(2);
s
```

Recommendations:
造成 SQL injection 攻击的根本原因
在于攻击者可以改变 SQL 查询的
上下文,使程序员原本要作为数据解
析的数值,被更改为命令了。当构造
一个 SQL 查询时,程序员应当清
楚,哪些输入的数据将会成为命令的
一部分,而哪些仅仅是作为数据。参
数化 SQL 指令可以防止直接更改上
下文,避免几乎所有的 SQL
injection 攻击。参数化 SQL 指令
是用常规的 SQL 字符串构造的,但
是当需要加入用户输入的数据时,它
们就需要使用捆绑参数,这些捆绑参
数是一些占位符,用来存放随后插入
的数据。换言之,捆绑参数可以使程
序员清楚地分辨数据库中的数据,即
其中有哪些输入可以看作命令的一
部分,哪些输入可以看作数据。这
样,当程序准备执行某个指令时,它
可以详细地告知数据库,每一个捆绑
参数所使用的运行时的值,而不会被
解析成对该命令的修改。

前面的例子可以改成使用参数化 SQL
指令的攻击方式(替代用户输入连续
的字符串),如下所示:

Abstract:
在 `SqlNumericInjection.java` 的第 124 行, `injectableQuery()` 方法调用 SQL 查询,该 SQL 查询是由未经验证的输入创建的。通过
这种调用,攻击者能够修改指令的含义或执行任意的 SQL 命令。

Explanation:
SQL injection 错误在以下情况下出现:
1. 数据从一个不可信赖的数据源进入程序。

在这种情况下,数据经由 `ParameterParser.java` 的第 632 行进入 `getParameterValues()`。

RuleID:
9B5F0161-88EC-4104-B70B-0182FEB53BF2
Taint Flags: HTTPRS, WEB, XSS
Direct Function Call:
java.sql.Statement.executeQuery()

- 为什么需要移动应用质量管理
 - 惠普移动应用自动化功能测试
 - 惠普移动应用自动化性能测试
 - 惠普移动应用自动化安全测试
- 小结

惠普移动测试解决方案

- 战略角度高端
- 覆盖范围广泛
- 涉及功能领先

•新挑战, 我们准备好了!



新浪微博:惠普软件

中国测试平台网: www.chinatesting.cn

惠普软件官方网站: www.hp.com.cn/software

支持电话: 4006706101

电子邮箱: info.hpsoftware.cn@hp.com





Thank you
ISTQB®让测试更专业