Mobile load

Performance testing for mobile applications

**"73 percent of developers
plan to extend enterprise
applications to mobile devices
in the next year."**

—Evans Data Corporation

[1]An ABI study, ABI Research, February 2013
http://venturebeat.com/2013/02/06/800-million
-android-smartphones-300-million-iphones
-in-active-use-by-december-2013-study-says/

[2]A Gartner report, April 2013
http://finance.yahoo.com/news/gartner-says
-worldwide-pc-tablet-123000783.html

[3]Evans Data Corporation, Mobile Development
Survey, Volume I, July 2011

Introduction

Using mobile applications is much more than a trend these days—it's a way of life. Whether you want to map directions, find a restaurant, look up your flight details, see where your next meeting is, or just check your email, chances are you do it on your smartphone. Consumer applications and games were the first to hit the market on mobile phones, and soon after enterprise applications followed suit. Banking is going mobile, retail is going mobile, and even HP Application Lifecycle Management (HP ALM) software has a mobile version—HP ALM Mobile—leveraging the HP Anywhere platform.

While the platform to access these applications has changed from the computer to a smartphone, the age-old questions still remain. How do you test your application to ensure that it will perform as expected? How do you account for the difference in how your system behaves responding to mobile traffic rather than to Web traffic? What about the various bandwidth conditions? And the hops across the sky? How do you ensure that the application will not fail your users?

This white paper explores these questions and more. It reviews key mobile trends and analyzes how performance testers must change their testing methodologies to ensure they are accounting for the changes caused by mobile usage.

The mobile application wave

In today's world, it's not hard to spot a person using a mobile application. Just about anywhere you go—from coffee shops to office buildings, from family rooms to city parks—people are accessing mobile applications on smartphones, tablets, and other handheld devices.

In this application-hungry world, it's no surprise that smartphones have become the dominant phone platforms. According to a research firm, by the end of 2013, 1.4 billion smartphones will be in use. The study factors in an annual smartphone growth rate of 44 percent for 2013, which is just ever-so-slightly down from 2012's 45 percent but is still a torrid pace.[1] These smartphone users are ready, willing, and able to connect online to consume a company's goods, services, or internal assets. And with the growing popularity of tablets, users want to be able to access their applications and information from anywhere, at any time, and on any device they have.

Analysts also say that the worldwide tablet shipments are forecast to total 197 million units in 2013, a 69.8 percent increase from 2012 shipments of 116 million units. Analysts say that growth in the tablet segment will not be limited to mature markets alone. Users in emerging markets who are looking for a companion to their mobile phone will increasingly choose a tablet as their first computing device and not a PC.[2] We already see many more people walking around in conferences and meetings with tablets and smartphones instead of laptops, and this trend will increase in the months and years to come. This implies that the way for organizations to reach out to their customers is through their mobile devices. In order for an organization to have maximum reach, it must provide access to its customers in the form of mobile applications.

Today, millions of users around the globe are able to perform electronic transactions via mobile or Internet technology. Advances in mobile payment, commerce, and banking are making it easier to make these transactions via mobile devices.

And while consumer applications are undoubtedly at the peak of the mobile trend, enterprises, in turn, are racing to catch the mobile wave. A new mobile development survey by Evans Data Corporation finds that 73 percent of developers plan to extend enterprise applications to mobile devices in the next year.[3] There are lots of good reasons for this trend. Among them: Mobile applications can increase employee productivity, help distributed teams stay connected, and allow customers to access essential services when they are on the go.

For the growing numbers of businesses that want to stay connected with their customers and employees via mobile applications, these macro trends are good news. It's now easier than ever to keep the lines of communication and commerce open. But this trend also brings a new set of usability challenges. Mobile Web users typically expect to make fewer clicks on a website

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than users accessing sites from a PC. Although a growing number of websites and Web-based applications offer support for small-form-factor mobile devices, many still do not. Websites not optimized for the smaller-screen formats will become a market barrier for their owners—much content and many sites will need to be reformatted or even rebuilt.

Organizations are trying to solve this usability issue by developing more native applications—applications that you download on your mobile device. Native applications are more user-friendly since they can mimic a client application behavior, and also offer a lot of flexibility to developers in terms of design. However, people don't want to download an application for processes that they may not perform very frequently. Infrequent users continue to use their mobile browser to access infrequent information, and hence, the browser-based applications themselves must also be optimized for mobile usage.

The applications versus mobile Internet debate will continue—and remain irrelevant. This isn't a question of either/or—but both.

A new set of challenges

How do you meet mobile users' expectations for a high quality application experience? There's no single answer to that question. That's because mobile applications bring a wide and diverse set of performance validation challenges that go beyond those of performance testing in a hard-wired world. A key point here is that mobile devices don't simply imitate the desktop environment—they have their own set of requirements.

Let's walk through the testing challenges that arise with mobile applications.

A plethora of devices

Compared with desktop PCs, mobile devices come with many more variables and many more moving parts that can influence the end-to-end experience for users.

For starters, connections can come from cell phones, tablets, and various other devices with widely different capabilities. Then there is the diverse and growing range of platforms used in the mobile world, including Android, BlackBerry, iPhone, and Microsoft® Windows® Phone. To complicate matters further, there are many existing versions of platforms in use today.

In many cases, companies need to transform or create from scratch new applications that can offer their goods and services via one if not all of the most common mobile platforms. And correspondingly, testing organizations need to account for multiple types of devices when they build their test cases. They need to ensure that their testing solutions will support testing for various device types.

Mobile-specific sites (m.sitename.com)

Despite users' expectations for a desktop-like experience, mobile devices typically have slower CPUs, smaller screens, and less memory than the typical desktop PC. To provide a good experience to their users, most companies need to modify their applications and rework their interfaces to tailor them to the limitations of mobile devices.

In addition, some companies change their current architectures to support mobile as well as Internet users. Many companies find they need to create a mobile site that serves Web pages appropriate for the small display areas of mobile devices. The mobile site also helps ensure that responses encapsulate only the essential information to reduce the application's bandwidth consumption.

Because of the variations in delivery of the application between desktop applications and applications for the various mobile devices, testing organizations need to consider these factors during the performance-testing process. They need to take into account various display sizes, and hence browser sizes, and more to validate how content will get displayed on the browser.

Mobile meets agile

As companies embrace the mobile platform, they are pushing out updated application versions at an alarmingly fast rate. If this is the case in your organization, this rapid pace of development can overwhelm your QA department and threaten application quality. So how do you ensure a quality release while not slowing down the fast pace of development?

One way to meet this challenge is to use tools that limit the need for script recreation. These tools give you the ability to capture traffic from either the developer's emulator or the actual traffic sent to the application Web server.

Native application versus browser-based application

To add further complexity, there are the variables that come with a mix of native and browser-based applications. Native applications are applications that reside on the user's device and communicate over HTTP(s). The browser-based approach uses a modified version of a browser to access applications online. Many companies use both approaches and offer both solutions to their customers. Testing organizations need to ensure that they have appropriate solutions to support testing of all types of mobile applications, regardless of whether they are native applications or browser-based applications.

Hops across the sky

Another key issue revolves around various network bandwidths. You need to be able to effectively emulate various bandwidth rates, since your end users may come from a variety of networks with various bandwidths, such as 3G, 4G, and LTE connections.

Similarly, what about other network conditions such as network latencies, packet loss, and connections getting dropped? You need to be able to test for a mix of common network conditions since you can't predict where your customers will be coming from. You need to be able to account for the various hops in the sky in order to determine how these may impact your systems.

To comprehensively test your mobile applications, you need solutions that will simulate various bandwidths, latency and other real-life network conditions. You also need to be able to test geographically dispersed loads to accurately represent real-world traffic.

So is mobile performance testing really different?

Right now there's often a misconception that mobile performance testing, though important, is nothing more than following the current testing strategies and practices that have been used for testing load under Internet usage. This couldn't be further from the truth.

Many of the skill sets developed for regular Web testing are applicable to performance testing for mobile applications. But many new and innovative approaches are also required to accurately record the mobile traffic replay and to accurately represent the user experience. As we noted earlier, mobile applications bring their own set of testing requirements.

Differing system behavior

A common perception is that the system load mobile users create is the same as the system behavior regular Internet users create. Hence, if you've tested for an additional 10 percent load, you'll be okay if you get that additional 10 percent through mobile users. But from experience, we know this isn't necessarily the case.

Watch the video to learn more about how
performance testing is impacted by mobile
devices, apps and the mobile network.

When users come to the system through mobile devices, they create a different behavior on the
system. Since connections stay open for longer, more concurrent connections are consumed.
This may mean that in the worst-case scenario, 10 percent of mobile users may exhaust all
the connections available, and regular Internet users may not be able to access the system.
You need to be able to test for situations like this.

Similarly, this may also have an unintended impact on the backend servers, which may behave
differently due to the slow rate of data consumption from mobile users.

The fact that users frequently experience bandwidth changes or complete drop offs from their
mobile connections, especially when they are traveling between locations and crossing various
cell areas, can also impact the performance of the system.

All of the above are the "unpredictable" effects of mobile usage, and the only way to be able
to confidently say that your system can actually handle the mobile usage is by testing it under
various mobile and network conditions.

Different performance-testing solution requirements

In order to adequately test mobile applications, given the varying system behavior as well as
the new challenges, you need to ensure that your testing solutions meet the following criteria:

• Ability to support multiple devices

• Ability to support native applications as well as browser-based applications

• Ability to record through the device using agents, or through emulators, as well as directly
  from a browser to reduce complexity

• Ease of use and fast turnaround time

• Ability to dynamically emulate various network conditions

• Ability to generate and or emulate load from various locations, leveraging the cloud

• Ability to test mobile usage as well as traditional enterprise usage, regardless of the protocol
  the application uses

The HP solution

HP solves the mobile testing problem with a comprehensive, out-of-the-box solution for
testing the performance of mobile applications. The solution is built on the tried and tested
capabilities of HP LoadRunner software and HP Performance Center software, including
HP TruClient technology.

The HP mobile performance testing solution includes two new protocols:

• **HP Mobile TruClient**—Built on top of the innovative new HP TruClient technology, HP Mobile
  TruClient helps you record your browser-based applications directly through the browser. It
  makes scripting and testing of browser-based applications very fast, easy, and robust.

• **HP Mobile Applications**—For native mobile applications, or for any other application that
  can't be recorded using HP Mobile TruClient, the HP Mobile Application protocol lets you build
 Web scripts using agents on the device or through emulators.

In addition, HP also supports comprehensive network emulation through integrations with
Shunra Network Virtualization.

HP LoadRunner

HP LoadRunner is one of the industry's most popular performance validation solutions. It helps you prevent performance problems by detecting bottlenecks before a system deployment or upgrade.

HP LoadRunner allows you to test a broad range of applications, including Web 2.0, Enterprise Resource Planning or Customer Relationship Management (ERP or CRM), and legacy applications—on traditional platforms as well as new platforms such as cloud and mobile. It also helps you identify and reduce performance bottlenecks and obtain an accurate picture of end-to-end system performance before going live, so you can verify that applications meet specified performance requirements and avoid issues in production.

Download the new HP LoadRunner mobile recorder app from the Android Google Play™ Store.
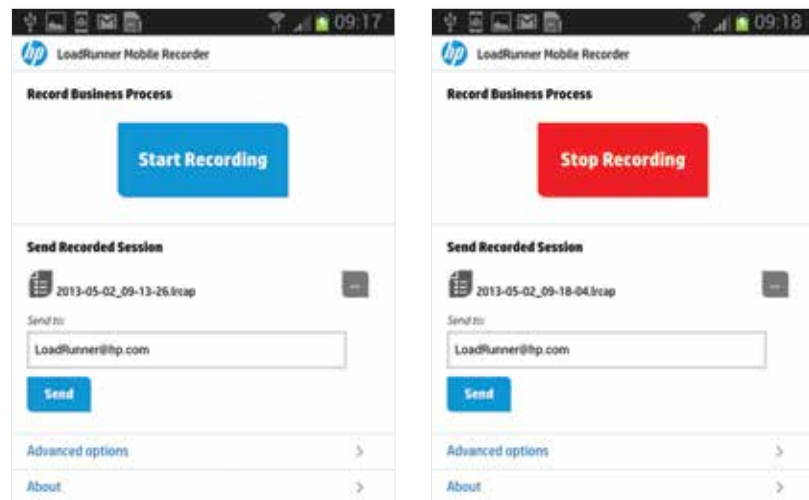
HP TruClient

HP TruClient technology, available in HP LoadRunner and HP Performance Center, is a new, browser-based Virtual User Generator that supports next-generation applications. It's embedded in the browser, and provides interactive recording and scripting, which removes the need for programming during scripting.

HP TruClient gives you the ability to record and replay at various levels, from the GUI level down to the transport and socket level, depending on the skill set available and the level of customization required. This makes scripting easier, faster, and more robust. It supports all Ajax applications, regardless of the framework or toolkit with which it was built. It also extends as HP Mobile TruClient to support testing for browser-based mobile applications.

HP TruClient makes the testing of Web, Web 2.0, and browser-based mobile applications faster, easier, and more comprehensive.

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HP Performance Center

HP Performance Center is enterprise-class performance testing software designed to facilitate standardization, centralization, global collaboration, and the formation of a performance-testing center of excellence (CoE). HP Performance Center is built on HP LoadRunner and includes a management framework that provides a Web-based, globally accessible platform to facilitate enterprise-wide testing and collaboration.

HP Performance Center enables you to input your performance requirements and defects and achieves complete traceability between requirements, tests, and defects. It also integrates with HP ALM to provide you with complete visibility into application quality.

Whether you want to standardize on a specific testing platform or develop a performance-testing CoE, you can base your quality initiative on HP Performance Center.

Network emulation

Since network conditions are such a key element in mobile applications, HP LoadRunner and HP Performance Center now include speed simulation to simulate various types of upstream and downstream bandwidth. For a solution that includes other characteristics such as latencies, packet loss, and jitter, we add network emulation to the HP mobile performance testing solution through our partner integrations.

Mobile performance testing
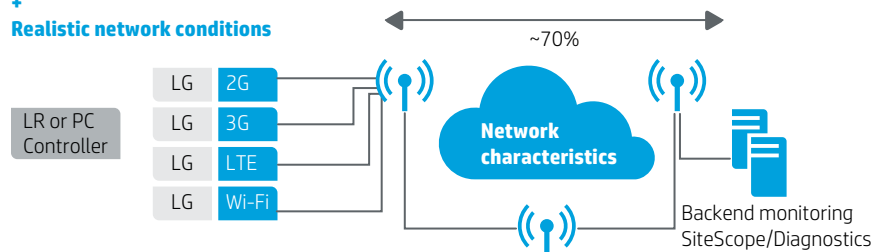
Shunra Network Virtualization helps transform your test environment by bringing real-world network conditions like dynamic bandwidth, latency, packet loss, and jitter into the lab. As a result, performance test results more reliably predict how an a mobile app will perform once deployed to your users. With HP LoadRunner and HP Performance Center, Shunra Network Virtualization provides a complete, end-to-end performance testing solution for mobile applications.

Conclusion

With a mix of users accessing your applications from a variety of mobile and PC devices, from a variety of interfaces, and across a variety of networks, how do you validate the performance of your applications? Are you sure your customers can reach you? What's the end-to-end user experience? How does the new mix of mobile users impact your existing Internet users? Questions like these can be hard to answer.

Mobile users have high expectations. Even though they are connecting via a diverse range of devices that typically have less bandwidth and computing power than most low-end PCs, mobile users still expect fast response times, secure connections, and consistently good service quality. And if those expectations aren't met, users are likely to vote with their feet and walk away from the use of the application.

This reality makes performance testing for mobile applications not just a nice thing to have, but an essential activity for success in the age of the always-on enterprise—a time when people expect instantaneous access to your organization and the services you provide.

SHUNRA

HP Services

Get the most from your software investment. We know that your support challenges may vary according to the size and business-critical needs of your organization.

HP provides technical software support services that address all aspects of your software lifecycle. This gives you the flexibility of choosing the appropriate support level to meet your specific IT and business needs. Use HP cost-effective software support to free up IT resources, so you can focus on other business priorities and innovation.

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• Fast answers giving you technical expertise and remote tools to access fast answers, reactive problem resolution, and proactive problem prevention

• Global Reach Consistent Service Experience giving global technical expertise locally

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