SKIPJAQ

Why fast matters: a SKIPJAQ whitepaper

The essential primer on the link between web-app performance and business performance

Application performance is business performance

While that may sound like a sweeping and somewhat grandiose claim, there is now a small mountain of research and case study material that proves it beyond reasonable doubt.

But what does it mean?

For businesses that transact online, it means that faster page load times and faster application response times translate to a rich array of benefits: they get more organic search traffic, their users browse more, add more to their shopping baskets, are more satisfied, visit them more often, view their brand more positively and, crucially, *spend* more. A lot more.

Trainline picks up speed

Rail ticketing platform trainline.com reaped the dividends when it shaved only 300ms off the latency experienced by its users - that's slightly less than the time it takes you to blink.

Outside of the eCommerce arena, where businesses rely on applications to deliver work, the diverse and compelling benefits of boosting application performance are only limited by the nature of the sped-up applications - if an application dedicated to resolving customer problems is optimised, the business will solve more problems, more quickly and have happier support staff and customers, if it improves the performance of a collaboration application, its staff will collaborate more often and more effectively - and so on.

Tammy Everts, author of Time is Money: The Business Value of Web Performance, notes that research conducted by IBM as far back as the early 1980s revealed the nature of the relationship between application latency and employee performance. Researchers at the computing giant found that as an "application becomes more responsive, the employee becomes exponentially more productive".

Revenue maximisation: how fast is fast enough?

'How fast do my web applications need to be?' sounds like a tough question to answer - and it is - but we can answer the question for eCommerce businesses - using some very fresh data released in April 2017 by SOASTA (since acquired by Akamai).

SOASTA crunched the numbers on 10 billion user visits to eCommerce websites for its State of Online Retail Performance report, and the results emphasize the scale of the challenge still facing the majority of businesses that transact online.

SOASTA found that conversions (i.e. users following through on a call-to-action) peaked when pages loaded in no more than 1.8s on desktops, and in no more than 2.7s on mobile devices. Desktop pages which loaded in 1.9s (i.e. 100ms slower than the time required to maximise conversions) converted 2.4% fewer browsers into buyers, while mobile pages which loaded in 2.8s (again, 100ms slower than the speed needed to maximise conversions), converted 7.1% fewer users.

The report also found that relatively short page load delays caused bounce rates to spike dramatically. On desktops a page load delay of 1s was found to increase the bounce rate by 18.4%, while on mobiles a 1s page load delay correlated with a 49.8% increase in bounce rate. When page load delays hit 2s, the bounce rate for desktop users increased by 62.1% - and the bounce rate for mobile users increased by 102.9%.

Maximum load times for peak conversion:

1.8s
for desktop websites

2.7s
for mobile websites

Finally, the same insignificant-sounding delays had a major impact on another metric crucial to eCommerce success - 'session length' (i.e. the average amount of time users spend on a business's website). 1s of extra latency meant both desktop and mobile users spent 25% less time browsing (and potentially buying), while 2s of extra latency reduced session length by ca. 50% (again, where both desktop and mobile users were concerned).

Most businesses aren't maximising the value of their web traffic - especially on mobile

Clearly, the businesses maximising the value of their traffic have web applications capable of delivering content extremely quickly: in 1.8s or less on desktops, and in 2.7s or less on mobile devices. But what proportion of the businesses that transact online in 2017 are this fast?

To get an idea, we used webpagetest.org (an institution in the world of website performance testing) to measure the performance of 450,000 websites from amongst the web's top one million domains. We found that 72% of desktop websites have page load times worse than 1.8s, while 93% of mobile websites have page load times worse than 2.7s.

> For many businesses the difference between surviving and thriving is likely to be 100ms. And the majority of businesses that transact online have the potential to shave much more than 100ms off their page load times.

Mobile website performance is clearly a major pain point for businesses that transact online: in its *Need for mobile speed* report, which also used data from webpagetest.org, Google revealed that even on 4G networks the average page load time was 14 seconds - this was in 2016 and our own data suggests things have barely improved since then. No doubt this is the reason for the huge disparity between the number of consumers browsing eCommerce stores on mobile devices (47.4%), and the number of consumers who actually 'convert' on mobile devices (21.8%).

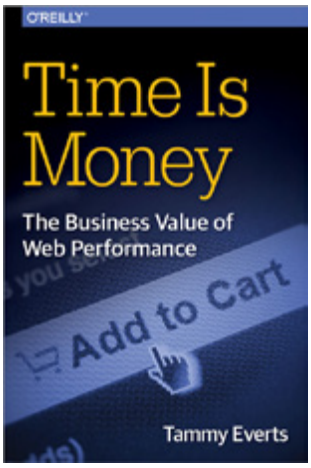
Slow web-applications: direct and indirect damage

So far, we've focused on the harm that slow web-applications can do to a business's bottom line - but we haven't looked at the indirect damage high latency can inflict in the form of creating negative perceptions about a brand.

Tammy Everts, author of *Time is Money: The Business Value of Web Performance*, cites a study which shows just how intimately latency and brand perception are linked. For this study (conducted by Radware), participants were tasked with shopping on a website - the twist being that half of the participants were unknowingly using a version of the website which was 500ms slower. Crucially, notes Everts, "those who used the slower site also developed negative perceptions of areas unrelated to speed. They reported that the site also seemed 'boring', 'inelegant', 'clunky', 'tacky', and 'hard to navigate'".

And a further study suggests that users aren't just sensitive to performance, they have a tendency to misremember it in a manner that disadvantages brands. According to Stoyan Stefanov, the average web user perceives load times as being 15% slower than they actually are; recalling the experience later they remember load times as being 35% slower!

Overall, then, it's certainly fair to say that when it comes to performance, businesses are playing for very high stakes with the odds stacked firmly against them.



Time Is Money - The Business Value of Web Performance
By Tammy Everts

FROM THE ARCHIVES:

A short history of website performance through the eyes of consumers

Since the early days of the web companies have been polling consumers on their expectations regarding website performance. In most cases these companies have been motivated by a desire to generate demand for their products; these surveys should be viewed critically, and are just one piece of the puzzle when it comes to reconstructing how consumers behaved on the web in the past. Nevertheless, certain findings from the reports mentioned below have become 'received wisdom' in the IT community.

1999 — Jupiter Research reveal that the "average online shopper" expects page load times of 4 seconds or less

2006 — Zona Research tells online retailers that their websites need to load in 8 seconds if they want to optimise conversions

2008 — 40% of respondents to a Forrester survey tell pollsters they would abandon a website if it took more than 3s to load

2009 — Aberdeen Group research suggests that a 1s delay in load time corresponds with a 16% decrease in customer satisfaction

2011 — 71% of respondents polled by 1&1 say they are regularly inconvenienced by slow running websites; 31% say that stress/anger caused by poorly performing websites has increased over a 5 year period

2012 — 74% of respondents to an Equation Research survey say they'd wait a maximum of 5 seconds before abandoning a mobile page

2014 — Almost 1 in 2 of those polled for Google's #MobileMadness campaign say that waiting for pages to load is what they dislike the most when browsing the mobile web

2015 — Akamai survey reveals that 49% of consumers expect load times of 2 seconds or less, and 18% expect pages to load "instantly"

Some famous performance improvement case studies - and their limitations

In the world of IT (and in certain business segments) awareness of the link between web application performance and business performance is fairly widespread.

Certain powerful case studies are also well known:

STAPLES

reduced load times by **1s** and improved its conversion rate by approximately **10%**

mozilla

cut load times by **2.2s** and increased downloads of its browser by **15.4%**, well over 10 million downloads per year

intuit

reduced average load times to between **2 and 3 seconds** and saw conversions increase by up to **14%**

Interestingly, all of these case studies share multiple common elements: they were produced by large enterprises, based on results delivered by specially assigned teams, and on work that took many months to complete. More importantly, the tactics used were quite similar in each case: reducing the size of on-page images, reducing third-party 'calls', and improving the configuration of content delivery networks (CDNs). These tactics delivered valuable performance improvements - however, it is almost certain that the improvements were limited because the companies listed above were focused solely on a small part of the whole mass of code actually responsible for the performance of their web-applications...

Performance and the application stack 'iceberg of code'

Website performance is actually a function of web-application code and the performance of all the code underlying the application (often referred to as 'the application stack').

In fact, most of the code online businesses rely on to run their websites was not written by them, and is not in their control. For example, the overall performance of a ticket-booking business will depend on the performance of the web-app it has built, but it will also depend on the performance of the runtime, webserver and operating system code underlying the web-app. The code written by the online business itself is the tip of the iceberg; the real mass of code, and the part that matters most when it comes to performance, is below the water.

Happily, the configuration of this 'underwater' code can be optimised. Unhappily, it can't be done by hand. Tunable parameters in the stack interact in weird and wonderful ways and using brute force testing to find the optimum parameters for just four interdependent settings would take hundreds of thousands of years! It hardly needs be said that this manual approach is unfeasible given the speed at which code changes today (not to mention the money and manpower businesses have at their disposal).

Machine learning goes where engineers fear to tread

However, machine learning can be geared to accomplish what whole teams of capable engineers could not - i.e. make it possible to tune 50-60 settings in the stack of an application simultaneously - delivering dramatic performance gains in the process.

SKIPJAQ has built a self-service platform that businesses can use to optimise the performance of their applications at speed, at scale, and without expert knowledge. At the heart of this platform is an engine that uses cutting edge machine learning techniques developed by—and unique to—SKIPJAQ.

Our approach - optimising application stacks rather than application code - and using machine learning to do it - has already generated impressive results. Here are some of the reductions in 95th %-ile latencies our customers have recently secured using our platform:

-27.02 sec BAKING iT

-3.9 sec SHOPBACK

-467 ms INK GLOBAL

With SKIPJAQ, you can get fast and, more importantly, you can stay fast by making optimisation part of your continuous delivery culture. This really is crucial because, as Tammy Everts says, "Your site is an organic entity that needs constant care and feeding to stay performant."

If you want more visitors, who shop more, spend more, return more and have more respect for your brand - or would like to make your colleagues happier, more productive, and more effective, you can get what you want by turbocharging the performance of your applications - because application performance truly is business performance.

For the first time you can automatically tune the majority of the software that determines how fast you go every day. Give SKIPJAQ a try by signing up on our website or getting in touch directly by writing to sales@skipjaq.com.

Sign up for a free trial of SKIPJAQ at **skipjaq.com** and become the performance hero your business deserves