# Dynatrace Industry Benchmarks Methodology

## US Retail Performance Summary

**Month Ending: January 01, 2015**

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BENCHMARKS OVERVIEW

The mission to provide a great digital experience has quickly transformed from a focus on desktop browsers and websites to one where visitors have the ability to move between channels, without noticing a major shift in the user experience.

One of the cornerstones of a great user experience, the performance of an application, is also undergoing changes as visitor expectations for mobile and web site performance are continually increasing, thanks to faster and more highly available sites. At the same time, mobile and web applications are becoming increasingly complex and more reliant on third-party content, placing the delivery of a great digital experience at risk.

Mobile and web sites have evolved using the latest technology to engage users and drive sales, but the fundamentals of providing fast and reliable performance are becoming increasingly more difficult to manage. It is critical to monitor how your applications perform against industry leaders and your competitors to determine if your performance is supporting your business goals.

A critical tool in this process is Benchmarking - a comparative measurement approach that can help you identify opportunities to improve your business. Benchmarking also provides a framework for prioritizing performance optimization investments so you can direct resources where they’re needed most.

BENCHMARKS ROLE IN PERFORMANCE

There are a formidable number of factors influencing performance over time: infrastructure changes, site architecture, third party integration strategies, web browser advances, ISP stability and growth, as well as increases/decreases in site visitor volume are just a few examples. In addition, strong competitors are engaged in their own performance optimization process; a process that can directly impact end user interpretation of site satisfaction in the marketplace.

Benchmarks support evaluation of optimization strategies, and help companies establish a performance baseline in context with the competition, offer insights into optimization opportunities and evaluation of the impact of optimization initiatives in a dynamic environment.

BENCHMARK BASELINES

Establishing Benchmark baselines is a fundamental first step in developing and executing a performance optimization strategy. Without analytical clarity regarding current conditions it is very difficult to accurately evaluate performance positioning in the marketplace and to set an effective optimization path.

BENCHMARK EVENT BASED ASSESSMENT

Analytical assessment of performance results can, and should, be undertaken on a scheduled basis: weekly, monthly, by quarter and by year. Without a proactive and pervasive approach to performance the level of effort to optimize a site is instead focused strictly on maintaining the status quo.

BENCHMARK OPTIMIZATION MILESTONE ASSESSMENT

The most prevalent form of benchmark assessment is a before and after assessment surrounding an optimization event. A site might perform less efficiently using Firefox, while Business and IT might target Firefox optimization as a key initiative. Initial measurement would focus on the relative ranking of the site in comparison with its competition before optimization, as well as comparison of deeper technical metrics to support targets for optimization.

This assessment would support setting an optimization baseline. A final phase of the optimization exercise would be to again measure results under the same criteria. Improvements in response time, availability and/or consistency would offer validation that the optimization event had a positive impact. Competitive ranking may or may not be influenced by this optimization effort as focused competitors are undertaking many of the same initiatives.

BENCHMARK THE CONTINUAL IMPROVEMENT LOOP

Benchmark analysis is a continuous process that occurs on a consistent timeline and can also be event-based [a site redesign for example]. As informed organizations advance along the performance journey they are continually assessing current state and comparing it against both previous conditions and future expectations. Benchmarking is a key foundation from which a performance excellence is executed.

BENCHMARK MEASUREMENTS

Dynatrace Benchmarks use the following tests to measure performance:

HOME PAGE MONITORING AND MEASUREMENT
Home page Benchmarks measure the single page performance of selected companies in each industry.

TRANSACTIONAL MONITORING AND MEASUREMENT
Transaction Benchmarks measure a multi-step business processes using clearly defined methodologies — such as purchasing a product or performing a stock trade — across major brands in the same industry to provide an unbiased view of the relative performance of the sites.
MONITORING PLATFORMS

The Dynatrace platform is the industry's leading solution for optimizing the performance of mobile, web, cloud and enterprise, applications. Driven by end-user experience, Dynatrace provides a unified view across the entire application delivery chain, by capturing timing and code level information for all transactions, end to end from user click across all tiers, to the database and back.

Benchmark metrics are based on Dynatrace Synthetic Monitoring which measures critical applications for response time and availability. Leveraging the largest and most comprehensive performance-testing network in the world, our integrated platform makes it easy to monitor the mobile or web user experience from major backbone sites and real consumer PC's around the globe.

MOBILE MONITORING

Dynatrace Synthetic Monitoring is an on-demand mobile monitoring solution that accelerates identification, diagnosis and resolution of mobile Website, SMS, and native application performance and availability problems. Mobile Benchmarks consist of measurements taken from major carrier/s in each country including AT&T, Sprint and Verizon in the U.S. to rank performance.

WEB BACKBONE MONITORING

Dynatrace Synthetic Monitoring measures websites with synthetic tests running on enterprise-grade servers in 150+ high-bandwidth data centers around the globe on the Internet Backbone. They offer the most reliable way to regularly synthetically monitor your mobile and web applications they are running at top speed and availability while also providing instant notification when there are issues. Web and Transaction Benchmarks run on a set group of backbone nodes per country to measure and rank performance.

WEB LAST MILE MONITORING

Dynatrace offers the only global network of tens of thousands of testing locations that provide synthetic performance measurements from the edge of the Internet, on consumer-grade computers over local ISPs to provide consumer level Web monitoring. Dynatrace Benchmarks are the only in the industry to measure the real-world performance impact of bandwidth, CDNs, cloud providers, local ISPs and wireless carriers.

Click here to learn more about Dynatrace Synthetic Monitoring

METRICS SCORING

Benchmarks measure mobile and web performance using three clearly defined metrics: Response Time, Availability, and Consistency. This measurement approach is the same for Mobile, Backbone and Last Mile Platforms. The following details how the base metrics for the Dynatrace Benchmarks are calculated.

RESPONSE TIME CALCULATIONS

Response time measures the end-to-end time elapsed while downloading each web page or the entire multistep transaction process. This includes the base HTML page and any referenced objects, third-party content, JavaScript and Cascading Style Sheets and other web content. The reported metric represents the average time required to download the homepage or execute the multistep transaction.

AVAILABILITY CALCULATIONS

Availability measures the percentage of successfully completed tests out of total test attempts for the period. Availability rates are dependent upon a number of variables including the ability of our testing agent to access the website, its ability to process a transaction without error, and its ability to download each step of the transaction within a 2-minute time frame. Reported availability rates do not include errors related to the Dynatrace measurement system or scripting problems.

CONSISTENCY CALCULATIONS

Consistency measures the standard deviation of the response time of successful tests. The goal is to have a low number (in seconds) that would indicate how consistent the response time is each time a user visits a web site. Highly variable response times (again, in seconds) indicate inconsistent performance that may be caused by poor website performance (measured across geographies); or issues with Internet peering or an under-powered technical architecture (which can lead to slowdowns during peak periods). This includes the base HTML page and any referenced objects, third-party content, JavaScript and Cascading Style Sheets and other web content. The reported metric represents the average time required to download the homepage or execute the multi-step transaction.
KEY DRIVERS FOR BENCHMARK METHODOLOGY CHANGES

With the rapid emergence of new digital touch points that includes mobile, the challenge of delivering a great user experience has become much more complex. Organizations need to have the proper systems and processes in place to manage the user experience across mobile web and traditional web touch points. The following are four key drivers for changing Dynatrace Benchmark methodology for 2014:

1) The Importance of Mobile — Mobile interactions will soon race past traditional desktop web interactions putting the mobile experience on the forefront of managing today’s user experience. Dynatrace’s industry leading Performance Network provides the mobile platform to measure and compare the mobile experience of all benchmark participants.

2) Ranking the Entire Digital Experience — It’s critical to compare participants based on their entire digital experience and include Mobile as an equal partner.

3) Measure Today’s Browser User Experience — Response times can vary significantly across different browsers. By testing sites with Chrome, IE and Firefox, Benchmarks accurately measure the user experience across more than 85 percent of the current global browser market.

4) Recognize Industry Changes — Leaders and top companies periodically change across industries and regions. In response to these changes, Dynatrace regularly reviews and updates Benchmark participants to reflect and keep pace with changes in the industry.

2014 BENCHMARKS RANKINGS CALCULATIONS

In 2014 Dynatrace Benchmarks use a three-tier ranking system that creates 4 categories and a single, overall ranking to compare participating companies.

Lower Tier — The lower tier consists of 4 categories (Mobile, Last Mile, Transaction and Web Backbone) across 3 metrics (response time, availability and consistency) for each participant. Transaction and Web may have multiple sets of scores, one for each browser (see example below). Participants are ranked for each category. Please see the section entitled “Metrics Scoring” for more information on how response time, availability and consistency are measured.

The following describes how the scores are calculated for each category:

- Mobile: Mobile scores are based on mobile home page measurements made from a global network of Mobile locations that access web sites using 3G and 4G connections over a variety of carriers.

- Last Mile: Last Mile scores are based on the set of home page measurements that are run from our Last Mile peer populations which are collections of real user PC’s. Dynatrace performance network contains tens of thousands of Last Mile peers with peer sub populations matched to each Benchmark’s region.

- Transaction: Transaction scores are based on the set of industry specific business process performance measurements such as ordering a product for a retail Benchmark or viewing account activity for a credit card benchmark. Transactions can have measurements from several types of browsers including Chrome, Internet Explorer and Firefox. Some Benchmarks may not include Transaction measurements for each type of browser. See the list of Transactions included in this document for each benchmark that includes a transaction test.

- Web Backbone: Web scores are based on home page measurements from different types of browsers including Chrome, Internet Explorer and Firefox. Please note that not all benchmarks include web home page measurements for each type of browser.

- Is your website providing a good digital experience for mobile and web users? Try our Free Performance Test HERE
In this example, the lower tier consists of 7 categories of scores:

1. for Mobile
2. for Last Mile
3. for Transactions
4. for Web

= 7 Each group has 3 metrics for a total of 21 separate scores for each participant.
**Middle Tier** — Based on the Lower Tier rankings, a set of four Middle Tier scores are created for each category (Mobile, Last Mile, Transaction and Web). The scores are calculated by adding together all of the lower level rankings for the group. Here is how the Middle Tier ranking score is calculated:

- **Mobile Score** = Mobile Response Time Rank + Mobile Availability Rank + Mobile Consistency Rank
- **Last Mile Score** = Last Mile Response Time Rank + Last Mile Availability Rank + Last Mile Consistency Rank
- **Transaction Score** = the sum of the scores for all the browsers testing the transaction. Each browser score is calculated with formula: Browser score = Transaction Response Time Rank + Transaction Availability Rank + Transaction Consistency Rank
- **Web Score** = the sum of the scores for all the browsers testing the Web home page. Each browser score is calculated with following formula: Browser score = Transaction Response Time Rank + Transaction Availability Rank + Transaction Consistency Rank

<table>
<thead>
<tr>
<th>Middle Tier</th>
<th>Benchmark Participant</th>
<th>Middle Tier Ranking</th>
<th>Middle Tier Ranking Score</th>
<th>Response Time Rank</th>
<th>Availability Rank</th>
<th>Consistency Rank</th>
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<td>5+3+5</td>
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<td>5+4+4</td>
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</table>

**Middle Tier Example** — Continuing with our toy retailer example here is how the Middle Tier rankings would be calculated. Each Benchmark participant receives a score (Middle Tier Ranking Score) across all four categories - Mobile, Last Mile, Transaction and Web. Note that the Transaction and Web rankings are created by adding multiple scores from the Lower Tier for each browser.

**Top Tier** — There is a single Top Tier industry score by summing all of the Middle Tier scores. Here is how the overall score is calculated:

\[
\text{Overall Ranking Score} = \text{Mobile Score} + \text{Last Mile Score} + \text{Transaction Score} + \text{Web Score}
\]

<table>
<thead>
<tr>
<th>Benchmark Participant</th>
<th>Overall Ranking</th>
<th>Overall Score</th>
<th>Mobile</th>
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</tr>
<tr>
<td>Hobby Hut</td>
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<td>56.0</td>
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**Top Tier Example** — Continuing again with our Toy Retailer example an overall score is calculated by adding together the Middle Tier scores. Those overall scores are then used to rank the participants.
HYBRID AND CUSTOM BENCHMARKS
Dynatrace offers Hybrid Benchmarks which use the Public Benchmarks but also insert additional participants, strictly in a customer portal account, so the customer can compare these additional participants against the public data. Custom Benchmarks are built and managed within a Dynatrace portal account.

BENCHMARK POLICY OVERVIEW
Dynatrace Benchmarks follow well defined selection and measurement methodology policies. These policies assure all benchmarks are designed equitably for all participants. For a full description of policies for specific benchmarks please contact the Dynatrace Benchmark team at BenchmarkTeam@dynatrace.com

PARTICIPANT SELECTION
Benchmark participants are selected via third-party ranking of the top participants in a region and industry. For example, the US Retail benchmark participants are based on the Internet Retailer Top 500 eCommerce sites per online revenue. Other benchmarks are determined by descending order of traffic, assets held or another similar ranking methodology.

BACKBONE LOCATIONS
Unless otherwise noted, Benchmark metrics are collected from the standard Benchmark node(s) in each region. For a listing of standard Benchmark node locations by region, please contact your Dynatrace Account Manager.

FREQUENCY OF MEASUREMENT
Benchmark backbone and mobile metrics are collected from each measurement location a minimum of once per hour. The majority of Benchmarks collect data 24 hours a day. Last Mile metrics are collected based on available end user locations [known as peers]. Typically, between 5 – 10 requests for test are made per Last Mile participant per hour.

MAINTENANCE WINDOWS
All home page benchmarks, Backbone, Last Mile and Mobile, use measurements from tests that are running 24/7. Certain transactional benchmarks include scheduled maintenance windows. In these cases either measurements are not taken at all or reporting is done strictly on specific hours. Maintenance windows assure the most common maintenance periods, typically between midnight and 3am, are excluded from reporting for all participants. For a description of maintenance windows for specific transactional benchmarks please contact your Dynatrace Account Manager.

TIME ZONE SELECTED
The time zones for reporting publicly and in the Dynatrace portal use the capital city location for benchmark’s region. This guarantees consistency in reporting for a given Benchmark or set of benchmarks in a region.

NAVIGATION BEHAVIOR
All of our home page benchmarks including Backbone, Last Mile and Mobile navigate to the participant site home page and require a content match consistent with site availability. Transaction Benchmarks require a set navigation criteria based on a specific end goal; for example, reaching the order confirmation page on a retail site or navigating to an account summary page in a banking site. For a description of navigation behavior for specific benchmarks please contact your Dynatrace Account Manager.

BENCHMARKS BROWSER MONITORING APPROACH
Benchmarks test the most popular browsers used around the world: Chrome, Internet Explorer and Firefox. All U.S. Web home page and transactional benchmarks are measured using both Internet Explorer and Firefox while Benchmarks outside the U.S. are tested using the top browser in that particular region.

BENCHMARK DEMOGRAPHICS
Benchmarks are broken down into geographic regions and specific industries. The list of Benchmarks includes all the major regions and industry sectors world-wide.

BENCHMARK COUNTRIES
Currently there are Dynatrace Benchmarks in the following countries: Australia, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Hong Kong, India, Italy, Japan, Malaysia, Mexico, New Zealand, Norway, Poland, Singapore, South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom, United States.

BENCHMARK INDUSTRIES
**BUSINESS PROCESS (TRANSACTION) METHODOLOGY**

**US RETAIL PRODUCT ORDER BUSINESS PROCESS**
The US Retail Product Order Transaction includes accessing the home page, conducting a search, viewing the search results page, selecting a specific item, viewing the item description, adding the item to the shopping cart, logging in and reviewing the order.

**Testing Maintenance Window**
The US Retail Product Order Business Process Benchmark excludes measurements taken from 3 a.m. to 6 a.m. ET daily, Sunday through Saturday.

**US BANKING ACCOUNT DETAILS BUSINESS PROCESS**
The US Banking Account Details Transaction includes accessing a lightweight user logon page (if available) or the home page, logging in, viewing account summary activity and logging out.

**Testing Maintenance Window**
The US Banking Account Details Benchmark excludes measurements taken from midnight to 6 a.m. ET daily, Sunday through Saturday.

**US CREDIT CARD ACCOUNT DETAILS BUSINESS PROCESS**
The US Credit Card Details Transaction includes accessing a lightweight user logon page (if available) or the home page, logging in, viewing account summary activity and logging out.

**Testing Maintenance Window**
The US Credit Card Account Details Benchmark does not exclude any measurements.

**US BROKERAGE GENERATE ORDER BUSINESS PROCESS**
The US Brokerage Generate Order Transaction includes accessing a lightweight user logon page (if available) or the home page, logging in, navigating to the trade page, selecting a stock, previewing the order, cancelling the order and returning to the trade page and logging out.

**Testing Maintenance Window**
The US Brokerage Generate Order Business Process Benchmark excludes collection and reporting of measurements taken from 4 p.m. to 9 a.m. ET daily, Monday through Friday and all day Saturday and Sunday.

**CANADA BROKERAGE GENERATE ORDER BUSINESS PROCESS**
The Canada Brokerage Generate Order Transaction includes accessing the home page, logging in, navigating to the trade page, selecting a stock, previewing the order, cancelling the order and returning to the trade page and logging out.

**Testing Maintenance Window**
The Canada Brokerage Generate Order Benchmark excludes measurements taken from 4 p.m. to 9 a.m. ET daily, Monday through Friday and all day Saturday and Sunday.

**UK BANKING ACCOUNT DETAILS BUSINESS PROCESS**
The UK Banking Account Details Transaction includes accessing a lightweight user logon page (if available) or the home page, logging in, viewing account summary activity and logging out.

**Testing Maintenance Window**
The UK Banking Account Details Business Process Benchmark excludes collection and reporting of measurements from midnight to 6 a.m. GMT every Sunday.

**AUSTRALIA RETAIL PRODUCT ORDER BUSINESS PROCESS**
The Australia Retail Product Order Transaction includes accessing the home page, conducting a search, viewing the search results page, selecting a specific item, viewing the item description, adding the item to the shopping cart, logging in and reviewing the order.

**Testing Maintenance Window**
The Australia Retail Product Order Business Process Benchmark excludes measurements taken from 3 a.m. to 6 a.m. AET daily, Sunday through Saturday.

**To learn more about Dynatrace, please visit:**
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