# Load testing

Improve the productivity of your critical applications



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by ip-label

# Contents

# Load testing: a key to good application performance

**Load testing** is a prerequisite for **establishing, ensuring, and optimizing the performance of websites (internet and intranet) and applications (mobile, business, etc.).** Software vendors and integrators need it as much as any company that has a website or provides digital services for its colleagues and customers.

Any enterprise which develops or uses business applications and online services, or for which a web presence is essential, stands to benefit from testing the performance of those services under load. Whether an SME or a world-class enterprise, a business needs to know whether its digital services are running smoothly for its employees as much as for its customers.

Load testing is an integral part of application performance management.

This white paper explains the **usefulness of load testing for companies that are vigilant about the performance of their digital services.** We describe what to expect from load testing, from a purposely general point of view, on the basis of lessons learned from load testing specialists' experience in the field.

But how do you know if a load test provider is a good one? To help you make your way through the maze of offerings, this white paper reviews the main points to consider when selecting a load testing provider.
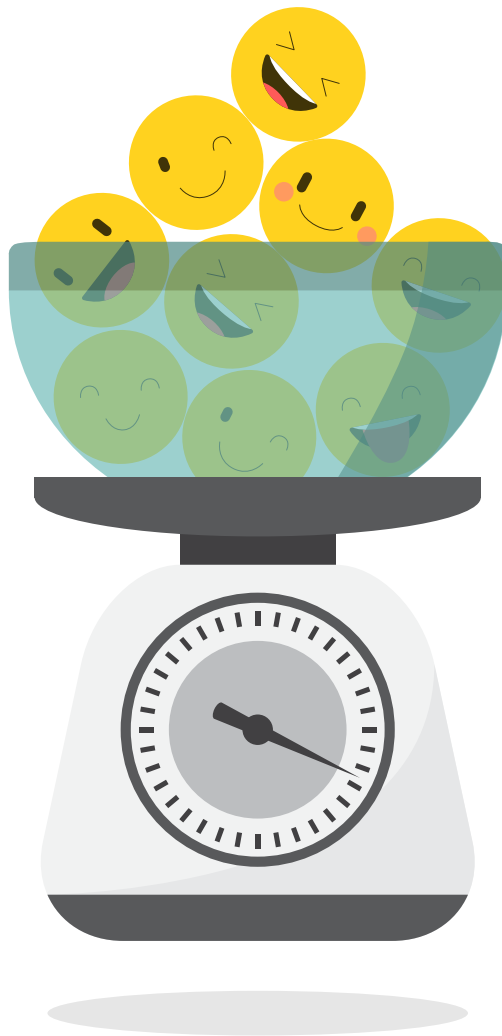
# What is a load test?

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Load testing is a way of understanding **how an application or website reacts** – within the context of its specific configuration and infrastructure – **to the demands that a given number of users is putting on it.**

Load tests may target any specific aspect of an application's ability to respond in a satisfactory way to the demands of a more or less sizeable audience.

The purpose of load testing is to provide answers to such questions as:

- Will my application support the target load (number of users) and still offer a favorable context for use (short response times, good availability)?

- Is the application reacting correctly throughout a sustained period of high traffic?

- Is it able to smoothly complete a transaction for a large number of simultaneous users?

- At what point(s) does performance become unsatisfactory, and above all, why?

- Which optimization should be given priority to boost performance the most cost-efficiently?

- In what context would the cloud's autoscaling capability be the best solution for handling load increases?

- Where is the platform's breakpoint?

- Why is service slower in one place than in another?

- Where are the bottlenecks situated?

# The terminology of tests: load and performance

A whole range of terms are used to designate the various types of tests which come under the category of "load testing". For example, there's robustness testing, soak testing, and so forth. People also talk about capacity testing, stress testing, scalability testing, and other types of tests.

For simplicity's sake, this white paper groups together all of these different types of tests under the term "load testing". This is because they all have in common the notion of "load".

And since the whole point of testing is to determine how well the service performs under load, "performance testing" is a term that is often used interchangeably with load testing.

# Essential notions of load testing

In general, a load testing campaign is carried out in several steps (project definition, specifications, first tests, replication tests, etc.) in which the following notions are fundamental. Let's take a look at these key notions.

## Load

'Load' means all of the users who connect to and interact with the application or website at the same time. Load tests are performed to find the maximum number of simultaneous user that the application can sustain while offering acceptable performance (what is meant by 'acceptable' is to be defined very precisely before the test phase starts).

In load testing, the users are virtual. This way, any number of concurrent users can be added to increase the load. Since the customer knows the scope of his or her website or application, the customer is the one who defines the load to apply, in consultation with the load test provider.

**By increasing the load, testers can visualize the limits, in other words, the moment and the place where the application   or website or its infrastructure becomes saturated.** A site may function very well for hundreds of users at a time, for instance, but collapse if thousands of concurrent users are connected.

# Virtual user

The load to inject to test an application or site is expressed in **VC for virtual clients, in VU for virtual users, or in UV for unique visitors.** In the context of a load test, these virtual users must behave in a way similar to that of a real user (cf. Scenario or automated transaction).

The virtual user is a 'unique' visitor (i.e. connecting for the first time) in the interest of simulating real conditions. If the visitor is not 'unique', data remain in the cache upon each connection (cookies), thus affecting the response times measured by the injector (see Injector below). A good load testing provider therefore takes this into account and makes sure that no remaining data influence test execution.

# Injector

**'Injectors' are tools installed on servers to generate load to stress the platform.** The servers may be connected to the public internet or to a corporate intranet.

During the load test, the number of virtual users is increased by injection, using different methods (ramp up in short or long steps, sudden or gradual load increase, etc.) in accordance with the customer's objectives. They type of injection model is defined by the provider in consultation with the customer.

# Scenario or automated transaction

In the context of load testing, **a scenario is a series of actions simulated by the virtual user of the application to accomplish a task.** The actions performed by the user, and the application's responses to those actions, are a 'transaction'.

In other words, the behavior of a real user of an application is automated – in the form of a scripted scenario – to test the application's ability to respond. The scenario may be more or less complex, depending on the technology (business application, e-commerce site, etc.) and functionalities (commands, video, etc.) that the automated transaction is testing.

The performances measured while scenarios are running are centralized by the load testing provider. These metrics are representative of the performance experienced by the end user.

Scenario scripting can be effective only if there is close cooperation between the customer, who knows the usage patterns of the application, and the provider, whose technical skills in scripting ensure that load testing is on target.

## Service levels and SLAs

**The purpose of load testing is not just to identify the breakpoint under load. Testing is also a way of determining the limits beyond which the users' quality of experience becomes unsatisfactory.** It pinpoints the moment when service becomes unacceptable, in accordance with the thresholds for acceptable and unacceptable service that can be configured in the characteristics of each scenario.

These service levels can be **built into an 'SLA' (service level agreement) which can be set up between an enterprise and its internal or external** users, or implemented in response to other imperatives, depending on the circumstances.

## Analysis

The measurements made as scenarios run are presented in data tables and/ or charts. To make the most of these indicators, full analysis is needed. This is the role of the load testing professional, who has the technical know-how to determine and recommend the most cost-effective optimizations.

Load tests establish the ability of the website or application to provide acceptable quality of service under load. Once the results have been returned, **it is important to understand which approach would be the most efficient to remedy performance flaws.**

- Would investing in a CDN yield better results?
- Or is it more advantageous to optimize certain aspects of the website?
- Or change the database configuration to help the application run faster?

- Or increase capacity in the cloud?
- Is my application performing better than my competitors' apps, or worse, in comparison?

These are the kinds of questions load testing specialists can answer from experience and by analyzing and correlating the data returned from test campaigns. A good provider adds this kind of value to the raw data that comes from load testing.

# What kinds of application can be load tested?

# What kinds of application can be load tested?

The technology implemented to conduct load tests ranges from the simplest (for example, free tools for testing websites) to the most sophisticated (dedicated tools used by load testing professionals).

An application's eligibility for load testing depends on the testing tools used, as well as on the type of service that the provider offers. If you entrust your project to a load testing specialist, there is no limitation on the kinds of application whose performance can be tested.

## From web apps to thick-client applications...

Load testing professionals are able to **test the performance of websites and any application made available over the public internet or on corporate intranets,** from thin-client (Citrix) or mobile applications (downloadable from AppStore or Play Store) all the way to thick-client business applications.

Dedicated specialists can provide testing of the performance of all kinds of application, from HTTP web to VDI (virtual desktop infrastructure) and legacy applications. **Web apps, business applications and their architectures (middleware, databases, virtualization layers and so forth) can all be candidates for load testing.**

# View the entire application delivery chain under load

Any application that is available over the internet or intranet, whether it is based on a thin-client or thick-client architecture, can therefore benefit from load testing.

In fact, it is as much about the application as about its architecture, the infrastructure, and the network. Load testing aims to determine the load that all of the elements in the application delivery chain can withstand, not just the application in isolation. **For instance, tests can be conducted on a business application (CRM, ERP, etc.) running on a virtualized architecture and delivered to users on a corporate network.**

This is why **one criterion to apply when selecting load testing providers is their ability to produce end-to-end insights; in other words, their ability to test and analyze every level of the application delivery chain** (cf. § Range of load testing tools).

Load testing professionals offer a variety of services, in accordance with the application to be tested, as well as its architecture, operating system, network, etc. These services may encompass different types of tests, targeting certain aspects of the performance of the application in question.
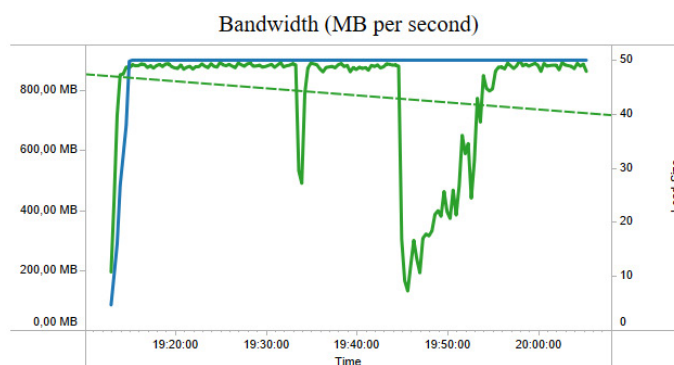


Hits per second

**Load Size** is the number of Virtual Clients running during the last reporting interval.
**Hits Per Second** is the number of times the Virtual Clients made an HTTP request, divided by the elapsed time, in seconds. Each request for a gif, jpeg, html file, etc. is a single hit.

Metrics
- Hits per second(avg)
- Load Size



Virtual Users / Unique Visitors by the Hour
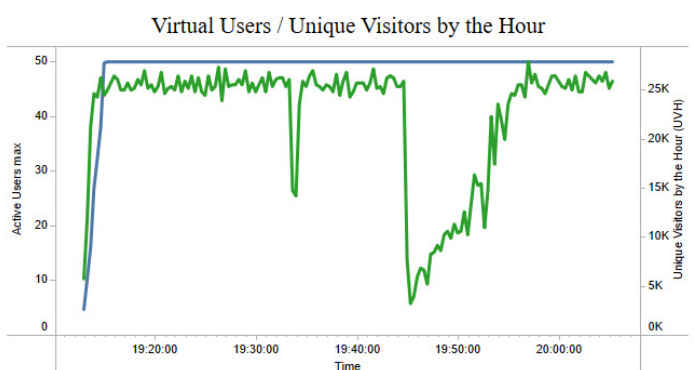
**Load Size** is the number of Virtual Clients running during the last reporting interval.
**A visitor** is a **complete round** with the **complete steps of a scenario**. Every time a virtual user does a round, it is **a visit**. With the **number of visits during a period**, we have **the extrapolation of the number of unique visits by the hour.**

Metrics
- Load Size
- Unique Visitors by the Hour (UVH)



Bandwidth (MB per second)

**Bandwidth** is the amount of data that can be transferred from one point to another within a network in a specific amount of time. It is measured in bits per second.

Metrics
- Bandwidth
- Load Size



Virtual users / Response Time
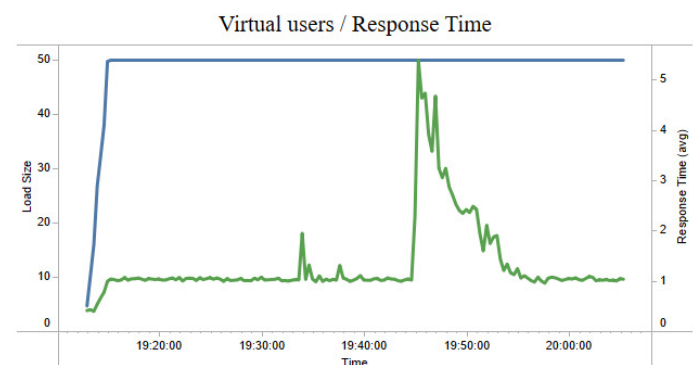
**Response Time** is the time from the end of the HTTP request until the Virtual Client has received the complete item it requested.

Metrics
- Avg. Reponse time
- Load Size

What kinds of application can be load tested?

# When to load test

# When to load test

The classic example of the need for load testing comes from the **world of e-commerce, with its seasonal sales events.** Load testing is quasi-obligatory for e-retailers, well in advance of **Black Friday** and **Mother's Day**.

**But such cases are far from being the only use of load testing.**

What is at stake for enterprises is their ability to **ensure good performance of their digital services for internal and external users.** This is why they resort to load testing during certain "events" in the life of a website or a business application deployed within the company.

Load testing is carried out to prepare for such events and to test the ensuing results in real operating conditions. Apart from the expected intensification of use at certain periods, these events include any replacement, change, removal or upgrade of hardware or software in the system.

Moreover, **load testing plays a part throughout an application's own life cycle.** In the case of companies which develop applications, **load testing is an integral part of agile development.** In these cases, the performance of deployed applications is tested in the **interest of continuous improvement.**

In summary, performance is tested under load in order to better manage:

- rollout to production of applications or websites, and subsequent updates

- changes in platform, architecture, or in the infrastructure

- quality processes, by measuring, validating, and documenting performance

- critical periods when a significant rise in the number of users is expected

- performance problems and/or the needs of agile development

# To prepare deployments and upgrades

Enterprises that use business applications (CRM, ERP, etc.), whether running on thick-client ("standalone") or thin-client ("diskless") workstations, **must test these applications before rolling them out to production to make sure they operate well.**

Furthermore, the application must be up to date at all times. To support and enhance productivity in the enterprise, operations staff must undertake load testing prior to delivering each new version of the business application.

The same is true, of course, of websites: e-commerce, public services, or any other. When optimizations have been made involving web compression, for example, load testing before going live is simply good practice.

## Case study

Load testing was considered a must by a world-class industrial enterprise when it made changes to its website. The group felt that its brand image was promoted as much by the visual aspect of the website as by the site's technical ability to provide visitors with a fast, glitch-free experience.

The need was straightforward: when the group updated the logo on its website, load testing was undertaken to check that the logo was loading properly on the homepage.

The results from load testing gave a detailed view of page display speed with a large number of simultaneous virtual users. This way the enterprise was able to validate the essential page before it went live.

# To manage changes in hardware/software

The application's platform and the infrastructure on which the application is delivered to end users are obviously not unalterable. Changes may be made to them with a view to saving money, to optimize them in response to the findings of load tests, or for other reasons related to corporate policy.

**Any migration of the platform, virtualization of all or part of the architecture, or implementation of SSL/SSO should undergo performance testing before rollout to production.**

Likewise, after implementing changes to the configurations of parts of the architecture like the databases or servers, or deploying any patches, load testing should be carried out before going live.

## Case study

An e-retailer of home furnishings called on a load testing provider when migrating its infrastructure to the public cloud. Test results made it possible to validate website performance on the cloud and confirm that the objectives set for the migration were achieved.

This type of test of website performance is applicable in the context of any infrastructure migration, whether the move is to or from a physical infrastructure, private virtual infrastructure or cloud (private, hybrid, or public). By load testing, the e-retailer was able to confirm that the new platform could handle the load of visitors smoothly.

# To ensure quality: SLA, benchmarks, etc.

Enterprises have every reason to measure the quality of their application services. One of the uses of load testing **within quality assurance processes is to validate performance against a service level agreement (SLA)**. In this context it is important **to establish realistic service levels which will serve as a basis for SLAs.**

**The purpose is to ensure that service level commitments are complied with**, both within the enterprise for internal users as much as for external end users. Indicators from load testing also make it possible to track the service delivered by external providers (ISP, CDN, data center, and others).

## Case study

A French international transport company decided to rationalize IT for all of its locations in France. Its technology partner set up a Citrix/VDI infrastructure to provide all employees with a virtual desktop delivering applications such as Lotus, Office, IE, and so forth.

They selected a provider to handle load testing of the system. During the tests, a load representing the company's 300 users was injected to validate the infrastructure. Load testing was also used to define KPIs and SLA thresholds.

Testing under load set the groundwork for defining the three most meaningful KPIs for monitoring the service delivered to users. The measurements from the load tests enabled the customer to set realistic SLA thresholds.

Load testing has multiple uses in quality-related efforts. Upgrades, migrations, and other changes to the application delivery chain are prime opportunities for checking performance before and after. **With the information provided by load testing, you can prevent regression and factualize any improvements that have been put into place.**

# To avoid downtime in critical business periods

Everyone has heard about the memorable failings of certain big brand websites during end-of-the-year sales. Thus, in recent years, load testing has become a good practice to implement proactively, before disaster strikes.

And yet, many brands that sell online still do not apply this good business practice.

## Case study

During a recent Black Friday, a major sporting goods brand found itself in deep water. Its website was apparently functioning erratically, and sales were significantly short of forecasts. Following this setback, the company reacted by calling on a load testing specialist.

Once the user journeys had been scripted in scenarios, testing got underway. Anomalies were found that blocked specific steps in certain transactions. Using the metrics resulting from the load tests, the specialist was able to determine that the problem was located at the level of the search engine. The problem was an element which had not been tested prior to the onset of the sales season.
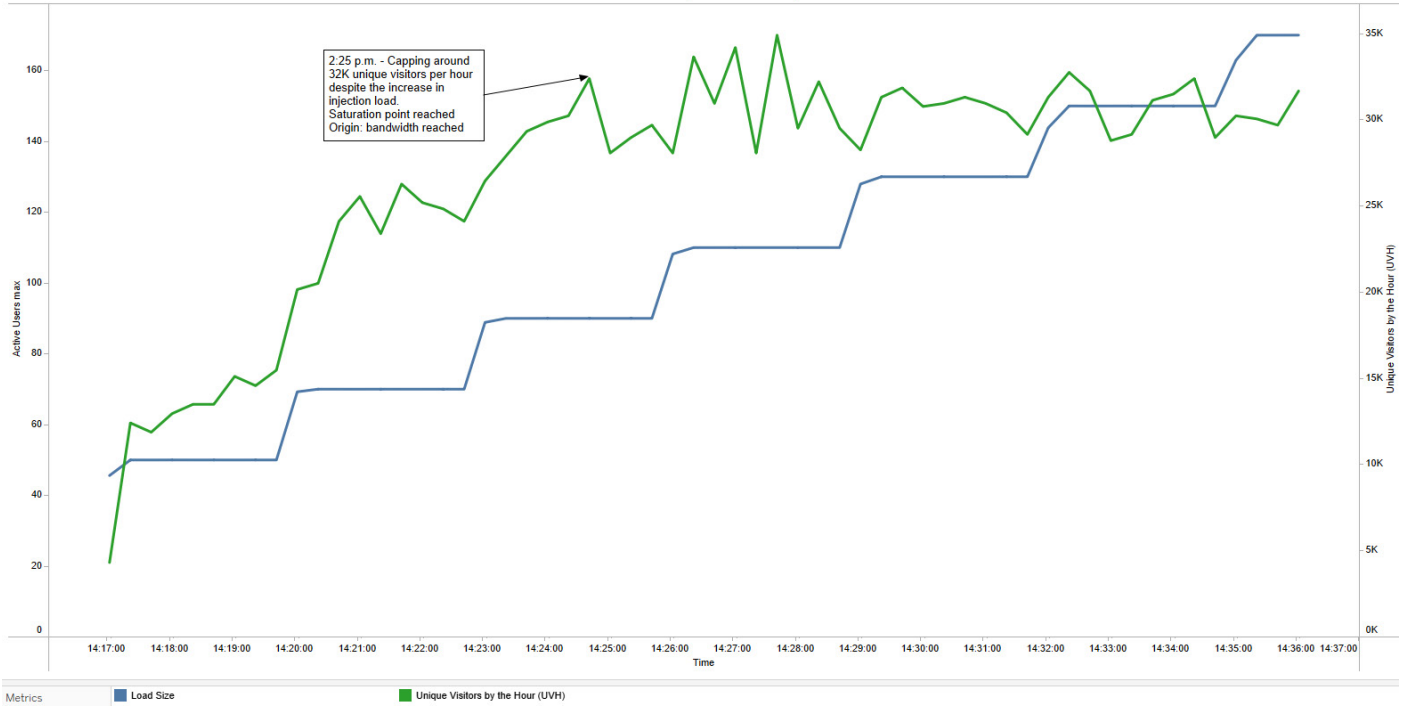
**Load testing should be set up at least three months before a peak sales period,** to make sure there is enough time to run the first test campaign, make the necessary optimizations, and then proceed with replication tests to validate the improvements made.

This use is very widespread among e-commerce website owners. But online sales is not the only kind of business that must be able to withstand surges in user traffic.

**Significant rises in audience levels may also be expected on other types of websites: during a telethon, for instance, or a major sporting event**, concert, historical commemoration, or other occasional event which would result in sudden popularity of the services provided online (news stations, platforms for downloading documents or music, audiovisual/video streaming, payment platforms, etc.).

In these cases, too, load testing can **identify the weak points of a website under load to help to correctly size the infrastructure and determine priority targets for IT investments.**

Virtual Users / Unique Visitors by the Hour

2:25 p.m. - Capping around 32K unique visitors per hour despite the increase in injection load.
Saturation point reached
Origin: bandwidth reached

Metrics    ■ Load Size      ■ Unique Visitors by the Hour (UVH)

# To identify problems and/or in agile development

It is not always possible for enterprises to be proactive about managing their applications' and websites' response to load. In such cases, load testing can be used in reaction to sluggish performance in production.

Load testing is a very effective way of **identifying contention points and detecting weaknesses attributable to the configuration of the platform.** Depending on the load testing specialist, advice about platform tuning may be one of the services provided.

**Another kind of use puts high demands on the technical know-how of load testing professionals: agile development.** Load testing is part and parcel of agile development processes, in dialogue with integrators and companies which develop web applications, mobile apps, and APIs in sectors as varied as retail, health, and energy.

**Agile development can require a great deal of responsiveness on the part of the load testing professional** because the application changes so frequently. The impact on performance of each release must be measured in order to fix any regression as quickly as possible. The load testing specialist must be able to collaborate in real time with the people in the customer's development team.

## Case study

A leading group in the oil and gas industry decided to involve a load testing provider in the development process of an API that it was building in-house. The API was designed to enable diverse terminals to collect information from the group's service stations.

The specialist selected by the enterprise adjusted his load testing methods to the needs of the teams on the customer's side. By working together with the load testing specialist, the customer's technical teams were able to continuously improve the API in question during its actual use in production.

## Software vendors

Software vendors submit their applications to numerous tests, including load testing, throughout the application life cycle.
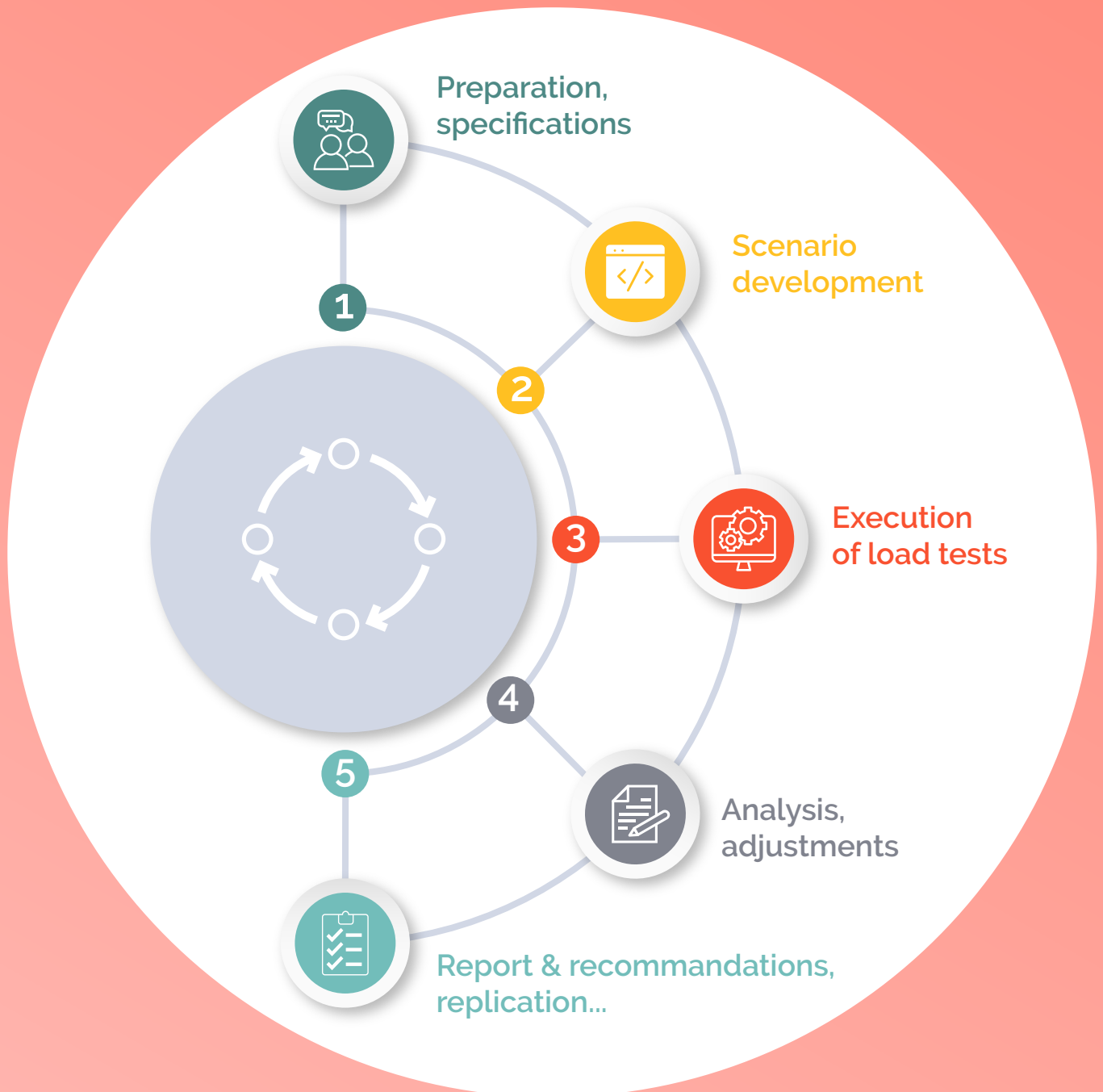
Load tests are conducted first in the development environment. At this stage, a limited load is applied, but enough to find concurrence errors and composition errors. The purpose is to correct the code from each development team before bringing it all together for the next step: the testing environment.

Here, again, load is applied to find the faults that may appear when sections of code run together. Optimizations are integrated, and then the application is again submitted to testing (including load testing). It must pass different stages of validation all the way through to integration and market release.

After go-live, load testing provides developers with insights into how the application is doing in real conditions. Testing is performed to bring improvements in 'agile' fashion to applications in production and check the results of the changes made.

In a nutshell, that is, in the simplest terms, the part load testing plays in agile application development processes.

# What to expect from a load testing project

Preparation, specifications

Scenario development

**1**

**2**

**3** Execution of load tests

**4**

**5** Analysis, adjustments

Report & recommandations, replication...

# What to expect from a load testing project

This section describes how load testing specialists conduct tests to check the performance of their customers' applications under stress in precise circumstances which are defined in consultation with the customer. The needs of the customer and the kinds of testing tools implemented determine how performance is tested in a specific context.

In this section you will also find a summary of the types of results that can be obtained from load testing. These include various kinds of objective measurements for diagnosis. These results must be interpreted meaningfully by an experienced load testing provider with a view to fixing the system's performance shortcomings.

## The steps of a load testing project

Because load testing campaigns are always adapted to the specific needs of the customer, the steps of a project are described here by way of illustration only.

### Determine the objectives

To start with, the load testing provider and the customer determine which people and teams will be involved in the project. The customer's objectives are defined in terms of the load to generate. The volume of the expected audience per hour must be determined in order to estimate the number of virtual clients and the infrastructure to set up by the provider.

## Develop scenarios

The next phase consists of developing scenarios that match the customer's needs. The scenarios must be representative of the user's journey on the application or website. The customer and the provider must determine the number of scenarios required to represent typical user activity, and fully understand how the application service is used in order to set up the corresponding steps within each scenario.

## Run load test

When the scenarios are ready, the load test can begin. It may take more or less time, as determined by the need. Depending on the provider's offer, testing can be carried out on location or remotely. Various load injection models are available; these correspond to the types of information that are being sought (breakpoint, robustness, response to simultaneous connections). The provider may combine different injection models to obtain comprehensive insights.

## Analyze results

In general, the tool used by the load testing professional displays the results in real time. Depending on the services included in the offer, the specialist may analyze the data on the fly and/or at the end of the tests, and draw up a report for the customer based on the metrics that were measured during testing. The specialist might propose other solutions: for instance, to focus on the mobile context, or set up proactive monitoring of the application, or dive deeper into analysis with troubleshooting.

## Report and recommandations

The customer is informed of the specialist's recommendations and makes any necessary changes to improve the quality of service of the application or website in question. A replication test may then be requested to check that the problems have been resolved by the optimizations that were implemented.

# Load test outcomes

Load testing makes it possible to identify any element that limits or degrades the performance of digital services (applications, websites) under load. Problems may originate in the hardware (network component, machines, etc.), in the logical infrastructure (virtualization layer, for instance), or in the application itself.

**Adding load sheds light on contention points or bottlenecks that prevent traffic from flowing smoothly** and slow down response times for the end user. The load testing provider may, on occasion, propose to set up other kinds of testing (for example, network analysis, application troubleshooting, etc.) or monitoring campaigns (synthetic or passive monitoring) to better understand and solve the problem.

**Analysis of the results helps to pinpoint the causes of sluggish performance. On this basis the specialist can recommend fixes to resolve configuration errors, optimize platform tuning, and make the right technical choices.**

## Metrics

Load testing should provide metrics about a variety of aspects of the operation of the applications under test and their environments. Depending on the tool(s) or provider selected, a test campaign can provide data that corresponds to the following categories, representing the client side, the server side, technical aspects, and components of the logical architecture.

## Business indicators

By way of example, these may include the number of visits per hour, the number of orders placed per hour, the number of operators, and much more. The provider may propose more advanced indicators such as 'active users', in other words, the number of simultaneous active sessions, and many others.

## Performance metrics

These important end-user measurements cover such aspects as availability, response times, bandwidth consumption, and so forth.

## System metrics

Depending on the provider selected, a load test may also supply information about the performance of physical components. In this category are indicators such as CPU usage, RAM, disk I/O, as well as network interface data.

## Information about software components

Among the components which may be measured are, for example, databases (SQL Server, Oracle, etc.), as well as application servers (WebLogic, WebSphere).

The exact indicators supplied vary in accordance with the type of load testing carried out, the tools used for the tests, and the services offered by the load testing provider.

## Analysis/diagnostics

The data resulting from load testing are a gauge of application performance and a way of identifying any element that tends to inhibit the performance of the application or website.

But once the breakpoint has been identified, what can be done to make the architecture more robust? When we know there is a problem at application level, how can we find it and fix it?

However detailed load testing results may be, their full diagnostic potential emerges only through analysis by experienced load testing specialists. The value added of a load test lies in clear identification of the root causes of problems with a view to resolving them. **For this, expert advice is a precious advantage.**

In short, while a load test detects weak points under load, **it is up to load testing specialists to propose solutions.** Their experience enables them to offer advice which results in a rationalization of spending, because they take various technical options into consideration and prioritize them to ensure the best return on investment.

# How to choose
# a load testing provider
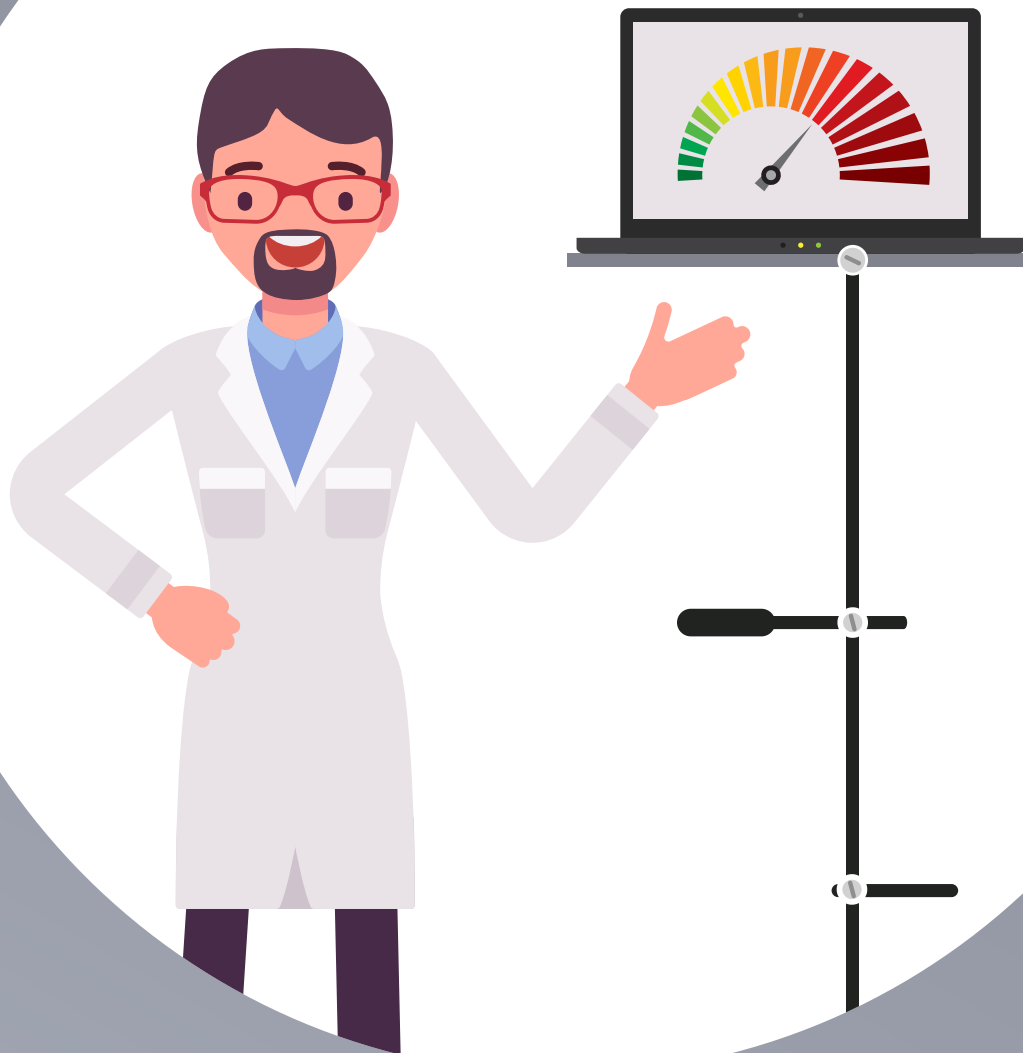
# How to choose a load testing provider

The role of the load testing provider was mentioned above in relation to the types of metrics and indicators supplied as well as for the value that can be added to them through analysis.

But the conduct of load tests (methodology and execution) and the tools used to run them (the breadth of the provider's offering and technical capacities) are likewise criteria of primary importance, as is discussed below.

## Range of load testing tools

The load testing service should, at the very least, indicate to customers whether their objectives are met, and in what configuration. It should also allow them to visualize the sensitivity to load of all user behaviors.

### Tools for testing... and monitoring, and troubleshooting...

Ideally, a good load testing specialist has the tools and know-how required to enable the customer to benefit from insights covering the full breadth and depth of the situation.

**They should be experienced in the use of real-user monitoring (RUM) tools, in addition to tools that look into analytics and traffic statistics, in order to offer the customer an all-encompassing view.**

On the basis of this overall view, a good load testing professional should be able, for example, to calculate the exact number of active users, correlate RUM metrics with the results of load testing, and even offer application troubleshooting services.

Thus a good load testing provider does much more than stress the platform and collect resulting data. The service should ideally include an offer for additional testing when that proves necessary in order to obtain in-depth diagnostics.
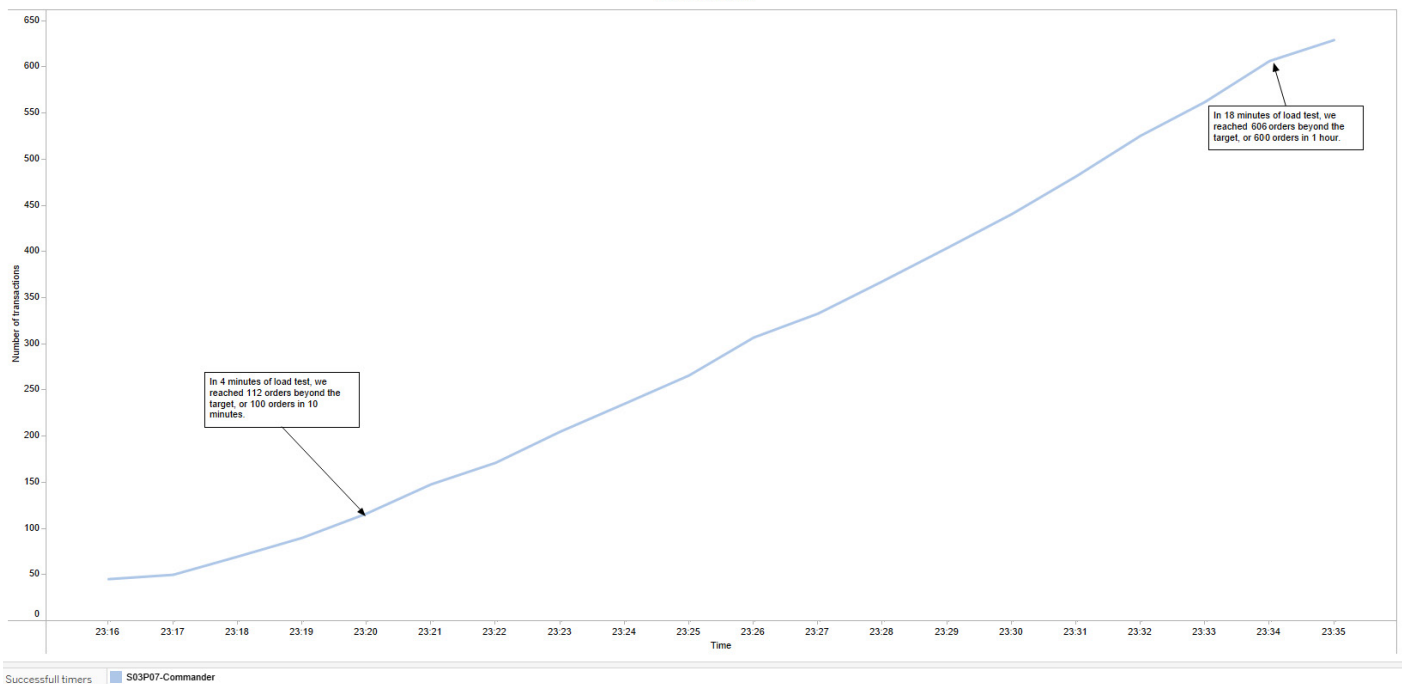
# Case study

A leading enterprise in construction and energy selected an independent software vendor to provide two solutions: a thick-client application to weigh truck freight prior to delivery, and a web application to administer sales for its quarrying business.

To ensure the quality of the solutions it chose, the enterprise needed to know whether those applications were performing up to the standards set for them. If they did not conform to the level of service agreed on, the enterprises wanted to be able to determine the cause of (and therefore the responsibility for) any degraded performance.

The enterprise entrusted its needs to an impartial third-party, a provider of DEM (Digital Experience Management) services. The provider undertook a load testing campaign on the thick client and on the web application, setting up 4 scenarios with a load of 400 virtual users.

**Transactions**

In 4 minutes of load test, we reached 112 orders beyond the target, or 100 orders in 10 minutes.

In 18 minutes of load test, we reached 606 orders beyond the target, or 600 orders in 1 hour.

Number of transactions

Time

Successfull timers   S03P07-Commander

## Load generation characteristics

The specialist's technical capacity to generate load is obviously a factor of primary importance. The provider must be able to inject as much load as necessary to stress even a robust system. Bandwidth must be sufficient to allow the necessary tests.

The ability to run tests in a specific geographical area or at different points around the world is another advantage.

## Results display and reporting

Visualization of the metrics returned matters because the legibility of data facilitates not only diagnostics (the specialist's console) but also communication (the reports provided to the customer).

The way the results are displayed and reported, with views (charts, tables, etc.) presented clearly and meaningfully to the user, serves, for instance, to:

- measure and substantiate improvements

- track SLA compliance

- justify investments to the management

- objectively demonstrate to providers the causes of service deteriorations

# Methodology and project management

## Experience in load testing

One skill that is indispensable for a good load testing specialist is **his/her experience with scripting scenarios**, a task that is carried out in collaboration with the customer. In general, the description of the scenarios to script is supplied on the customer's side by a participant from the relevant business department or by the application owner or website owner.

The load testing specialist advises the customer so as to avoid the pitfall of scenarios that are neither relevant nor realistic (it's hard to resist the temptation to test absolutely everything and deviate from what is really essential). Experience keeps load testing on track, efficiently and without wasting time.

**The ability to handle diverse technical situations (security system, dynamic elements, etc.) is another important criterion to apply** when selecting a load testing provider.

The specialist's experience makes him/her able to adjust the load testing service to the customers' needs. This way he or she can help in a context of agile development, in addition to performing more conventional load testing. Furthermore, the provider should be able to adapt to the customer's existing DEM tools in order to maximize the value of the load testing service.

Lastly, **knowledge of performance by business sector (benchmarks) and a judicious view of established SLA thresholds are appreciable qualities to seek in a load testing provider.**

## Analysis of test results

The service should include deliverables. These may take a variety of forms, in which an analysis of the data from the test is presented. For example, the provider may propose a customer report at the end of the testing project, explaining the type of problems encountered, with an analysis of their causes, and possibly recommendations for optimizations.

If the load test results show poor response times, the specialist uses the results to understand the problem and recommend targeted fixes, configuration optimizations, advice on cloud autoscaling capacities, or other improvements. He or she may also, on the basis of replication tests and the load tester's 'toolbox' (cf. § Range of load testing tools), check whether the changes made yield the expected results on performance and validate them.

To sum up, **a good load testing specialist provides advice to enable the customer to achieve the best application performance possible at the lowest cost.**

## Clarity and rigor of methodology

A good provider works closely with the customer to draw up specifications that match the customer's actual needs, taking into account the customer's wishes, specificities, and constraints.

Being clear about "who does what" is essential to the success of a load testing project and to keeping it on schedule.

The people to involve in the project are defined carefully by both parties. In consultation with the customer, the provider checks the availability of everyone involved and draws up a schedule that allows for replication tests, when needed, in the presence of the designated staff if necessary.

To establish the specifications, the provider goes over every aspect related to the load test with the customer. These include:

- **the type of application** (web, video, audio, legacy, business) and its platform (thin client, thick client)

- **the audience**, meaning the maximum number of users per hour and whether this number is expected to change

- **the scenarios** or user journeys: what is a typical transaction? how many different transactions are there to script? how are they distributed by location?

- **the infrastructure/architecture**: the architecture of the application slated for testing must be described (servers, networks, components, databases), along with their characteristics (security, production or pre-production platform, etc.)

## A trustworthy third-party: impartiality and objectivity

The application delivery chain involves a number of internal and outside players. Different teams within the enterprise, in addition to external providers (ISP, web hosting company, data center, etc.), are involved in the quality of the application service delivered to the end user.

A load testing specialist must know how to deal with the various people involved. This is because load testing can determine very precisely the causes of slow performance and other deficiencies, whether it is a problem of sizing, an overdue reconfiguration at database level, or other performance obstacle. When responsibility is assigned on an objective, factual basis, communication between participants becomes more fluid.

It is the load testing specialist's job to demonstrate the causes of problems impartially, basing the analysis on metrics. In this way, the specialist helps the different teams on the customer's side **to decide calmly where to direct improvement efforts and prioritize investments to achieve maximum results.**

# Toward improving the productivity of your critical applications

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While the primary purpose of load testing is to measure performance and solve problems at the technical level, results from load testing can be helpful at the management level, as well.

Load testing can **smooth the decision-making process by presenting specific technical shortcomings factually and precisely, along with ways to remedy them.** This can help managers understand more confidently what they can reasonably expect from investments in application performance to improve productivity and help them to secure a budget to address specific performance issues.

Because load testing can be done **preventively or correctively**, it is a way to **factualize existing flaws as well as to plan for flawless performance in the future.**

Taking the first step toward load testing can be daunting. Yet application owners and website owners have a lot to gain from load testing, in terms of performance and even in terms of recognition for successful improvement efforts. Enterprises, their workforce and their customers all stand to benefit from consistent load testing of digital services.

We hope this white paper helps to facilitate or improve your approach to load testing.

# About
# the ip-label group

Since 2001, ip-label has been helping enterprises in more than 25 countries to manage and optimize the performance of their critical applications (website, business apps, mobile apps, voice apps, etc.), using software solutions for synthetic monitoring (robots) and real-user monitoring (RUM). Its user-centric DEM (Digital Experience Management) products and services empower organizations to improve the availability and response times of their applications, motors of business success, with a view to growing their audience, revenues, and productivity.

Want to know more about application performance management?

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