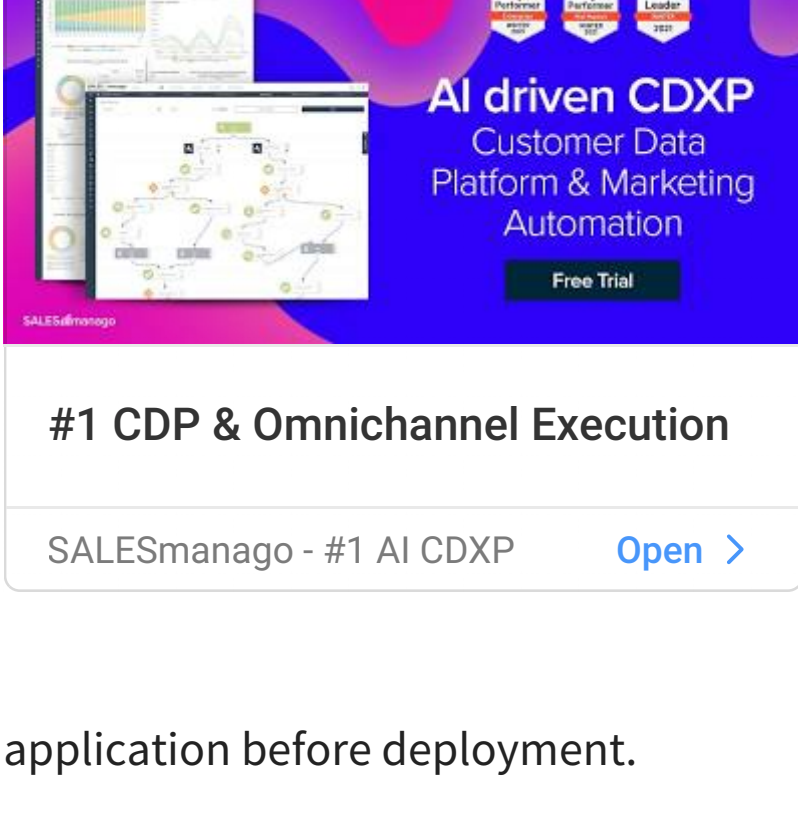


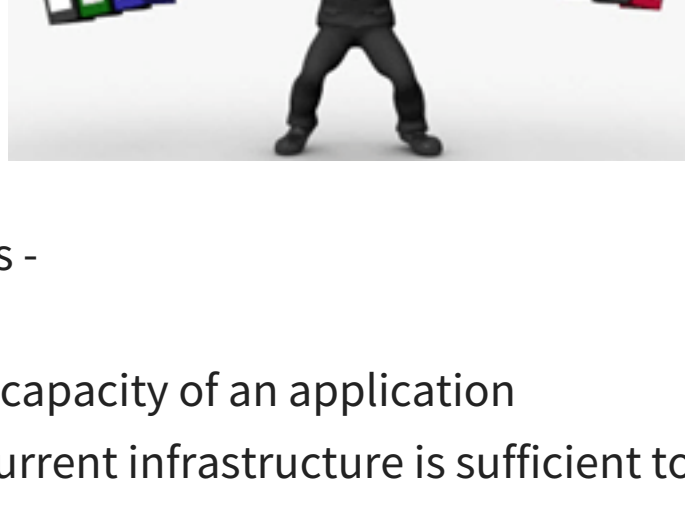
# Load Testing Tutorial: What is? How to? (with Examples)



## Load Testing

**Load Testing** is a non-functional software testing process in which the performance of software application is tested under a specific expected load. It determines how the software application behaves while being accessed by multiple users simultaneously. The goal of Load Testing is to improve performance bottlenecks and to ensure stability and smooth functioning of software

application before deployment.

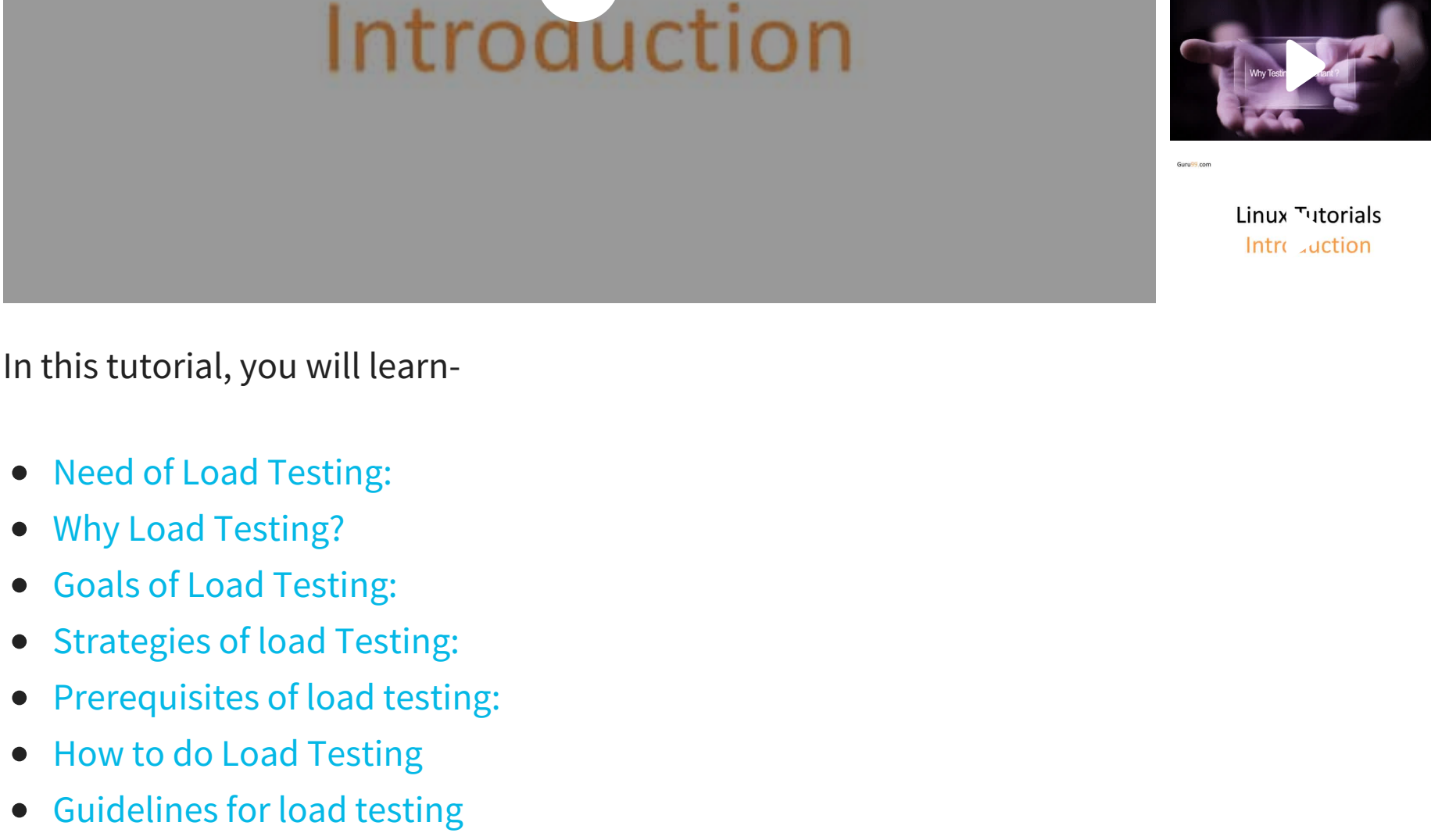


This testing usually identifies -

- The maximum operating capacity of an application
- Determine whether the current infrastructure is sufficient to run the application
- Sustainability of application with respect to peak user load
- Number of concurrent users that an application can support, and scalability to allow more users to access it.

It is a type of non-functional testing. In Software Engineering, Load testing is commonly used for the Client/Server, Web-based applications - both Intranet and Internet.

### FEATURED VIDEOS



In this tutorial, you will learn-

- [Need of Load Testing:](#)
- [Why Load Testing?](#)
- [Goals of Load Testing:](#)
- [Strategies of load Testing:](#)
- [Prerequisites of load testing:](#)
- [How to do Load Testing](#)
- [Guidelines for load testing](#)
- [Load Testing Tools:](#)
- [Advantages and disadvantages of Load testing:](#)

## Need of Load Testing:

Some extremely popular sites have suffered serious downtimes when they get massive traffic volumes. E-commerce websites invest heavily in advertising campaigns, but not in Load Testing to ensure optimal system performance, when that marketing brings in traffic.

Consider the following examples

- Popular toy store Toysrus.com, could not handle the increased traffic generated by their advertising campaign resulting in loss of both marketing dollars, and potential toy sales.
- An Airline website was not able to handle 10000+ users during a festival offer.
- Encyclopedia Britannica declared free access to their online database as a promotional offer. They were not able to keep up with the onslaught of traffic for weeks.

Many sites suffer delayed load times when they encounter heavy traffic. Few Facts -

- Most users click away after 8 seconds' delay in loading a page
- \$ 4.4 Billion Lost annually due to poor performance

## Why Load Testing?

- Load testing gives confidence in the system & its reliability and performance.
- Load Testing helps identify the bottlenecks in the system under heavy user stress scenarios before they happen in a production environment.
- Load testing gives excellent protection against poor performance and accommodates complementary strategies for performance management and monitoring of a production environment.

## Goals of Load Testing:

Loading testing identifies the following problems before moving the application to market or Production:

- Response time for each transaction
- Performance of System components under various loads
- Performance of Database components under different loads
- Network delay between the client and the server
- Software design issues
- Server configuration issues like a Web server, application server, database server etc.
- Hardware limitation issues like CPU maximization, memory limitations, network bottleneck, etc.

Load testing will determine whether the system needs to be fine-tuned or modification of hardware and software is required to improve performance.

## Prerequisites of load testing:

The chief metric for load testing is response time. Before you begin load testing, you must determine -

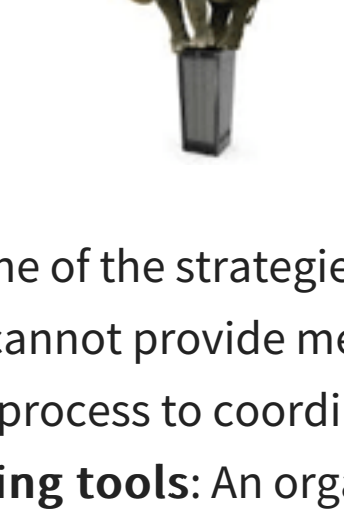
- Whether the response time is already measured and compared - Quantitative
- Whether the response time is applicable to the business process - Relevant
- Whether the response time is justifiable - Realistic
- Whether the response time is achievable - Achievable
- Whether the response time is measurable using a tool or stopwatch - Measurable

## An environment needs to be set up before starting the load testing:

Hardware Platform	Software Configuration
<ul style="list-style-type: none"><li>• Server Machines</li><li>• Processors</li><li>• Memory</li><li>• Disk Storage</li><li>• Load Machines configuration</li><li>• Network configuration</li></ul>	<ul style="list-style-type: none"><li>• Operating System</li><li>• Server Software</li></ul>

## Strategies of load Testing:

There are many numbers of ways to perform load testing. Following are a few load testing strategies-



- **Manual Load Testing:** This is one of the strategies to execute load testing, but it does not produce repeatable results, cannot provide measurable levels of stress on an application and is an impossible process to coordinate.
- **In house developed load testing tools:** An organization, which realizes the importance of load testing, may build their own tools to execute load tests.
- **Open source load testing tools:** There are several load testing tools available as open source that are free of charge. They may not be as sophisticated as their paid counterparts, but if you are on a budget, they are the best choice.
- **Enterprise-class load testing tools:** They usually come with capture/playback facility. They support a large number of protocols. They can simulate an exceptionally large number of users.

## How to do Load Testing

The load testing process can be briefly described as below -

1. Create a dedicated [Test Environment](#) for load testing
2. Determine the following
3. Load Test Scenarios
4. Determine load testing transactions for an application
  - Prepare Data for each transaction
  - Number of Users accessing the system need to be predicted
  - Determine connection speeds. Some users may be connected via leased lines while others may use dial-up
  - Determine different browsers and operating systems used by the users
  - A configuration of all the servers like web, application and DB Servers
5. Test Scenario execution and monitoring. Collecting various metrics
6. Analyze the results. Make recommendations
7. Fine-tune the System
8. Re-test

## Guidelines for load testing



1. Load testing should be planned once the application becomes functionally stable.
2. A large number of unique data should be ready in the data pool
3. Number of users should be decided for each scenario or scripts
4. Avoid creation of detailed logs to conserve the disk IO space
5. Try to avoid downloading of images in the site
6. The consistency of response time over the elapsed period should be logged & the same should be compared with various test runs

## Difference between Load and Stress testing:

Load Testing	Stress Testing
Load testing identifies the bottlenecks in the system under various workloads and checks how the system reacts when the load is gradually increased	<a href="#">Stress Testing</a> determines the breaking point of the system to reveal the maximum point after which it breaks.

## Difference between Functional and Load Testing:

Functional Testing	Load Testing
Results of functional tests are easily predictable as we have proper steps and preconditions defined	Results of load tests are unpredictable
Results of functional tests vary slightly	Load test results vary drastically
Frequency of executing <a href="#">Functional Testing</a> will be high	A frequency of executing load testing will be low
Results of functional tests are dependent on the test data	Load testing depends on the number of users.

## Load Testing Tools:

### LoadNinja

[LoadNinja](#) - is revolutionizing the way we load test. This cloud-based load testing tool empowers teams to record & instantly playback comprehensive load tests, without complex dynamic correlation & run these load tests in real browsers at scale. Teams are able to increase test coverage, & cut load testing time by over 60%.

### NeoLoad:

[NeoLoad](#) is the enterprise-grade load testing platform designed for Agile and DevOps. NeoLoad integrates with your continuous delivery pipeline to support performance testing across the complete software lifecycle - from component to full system-wide load tests.

### Load Runner:

Load runner is HP tool used to test the applications under normal and peak load conditions. Load runner generates load by creating virtual users that emulate network traffic. It simulates real time usage like a production environment and gives graphical results.

Read more about Loadrunner [here](#).



## Advantages and disadvantages of Load testing:

Following are the advantages of Load testing:

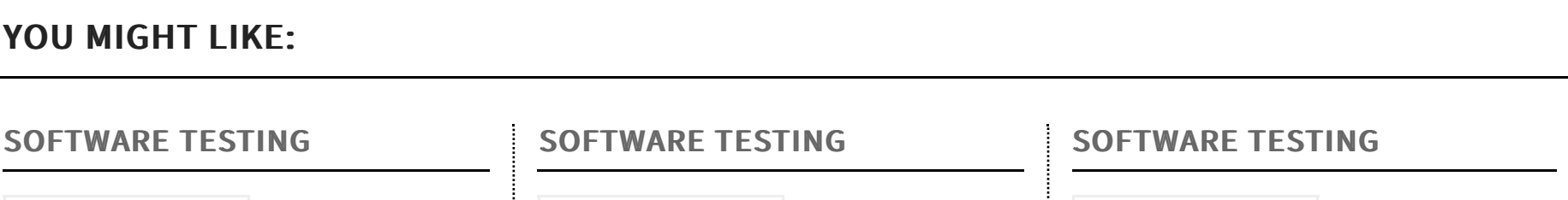
- Performance bottlenecks identification before production
- Improves the scalability of the system
- Minimize risk related to system downtime
- Reduced costs of failure
- Increase customer satisfaction

Disadvantages of Load testing:

- Need programming knowledge to use load testing tools.
- Tools can be expensive as pricing depends on the number of virtual users supported.

## Summary:

- Load testing is defined as a type of software testing that determines a system's performance under real-life load conditions.
- Load testing typically improves performance bottlenecks, scalability and stability of the application before it is available for production.
- This testing helps to identify the maximum operating capacity of applications as well as system bottlenecks.
- Loading testing is important because if ignored, it causes financial losses.



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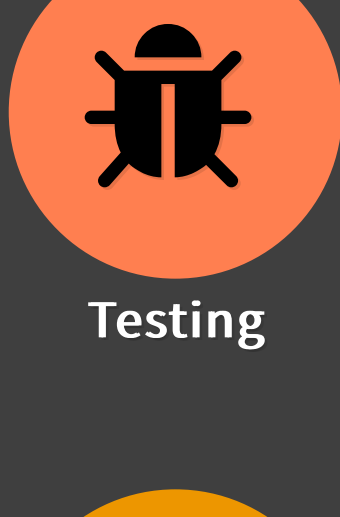
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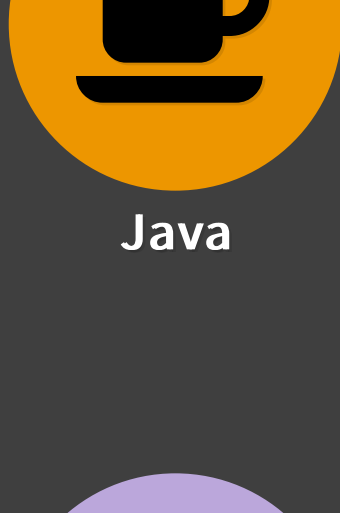
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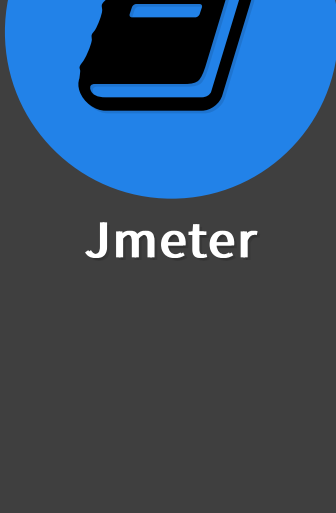
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