Performance Testing

Gabi Kis – UBB - March 2024

Here are the main topics:

- Intro
  - What is performance testing
  - Performance testing types
- Web page performance analysis
  - Good practices
  - Tools & Demo
- Load testing
  - Requirements gathering
  - What and how to script
  - Configure for execution
  - Load testing demo
  - Interpret and report results
- Q&A anytime

WHAT is it**?**

*"**Performance testing** is a testing practice performed to determine **how a system performs** in terms of responsiveness and stability **under a particular workload**."*
– Wikipedia.

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NFR - Performance Testing

- **Functional** vs. **Non Functional** Requirements
  - **Functional** requirements describe **what** the system should do
  - **Non-functional** requirements describe **how** the system should behave

- **Why?**
  - Demonstrate that system meets performance criteria
  - Find which parts perform badly – find bottlenecks
  - Improve overall performance of the system

- **What?**
  - Performance specifications
  - Concurrency/throughput
  - Server response time
  - Other …

Performance Testing Types

Load
- under expected specific load
- find bottlenecks

Stress
- above expected load
- upper limits of capacity
- determine the breaking point

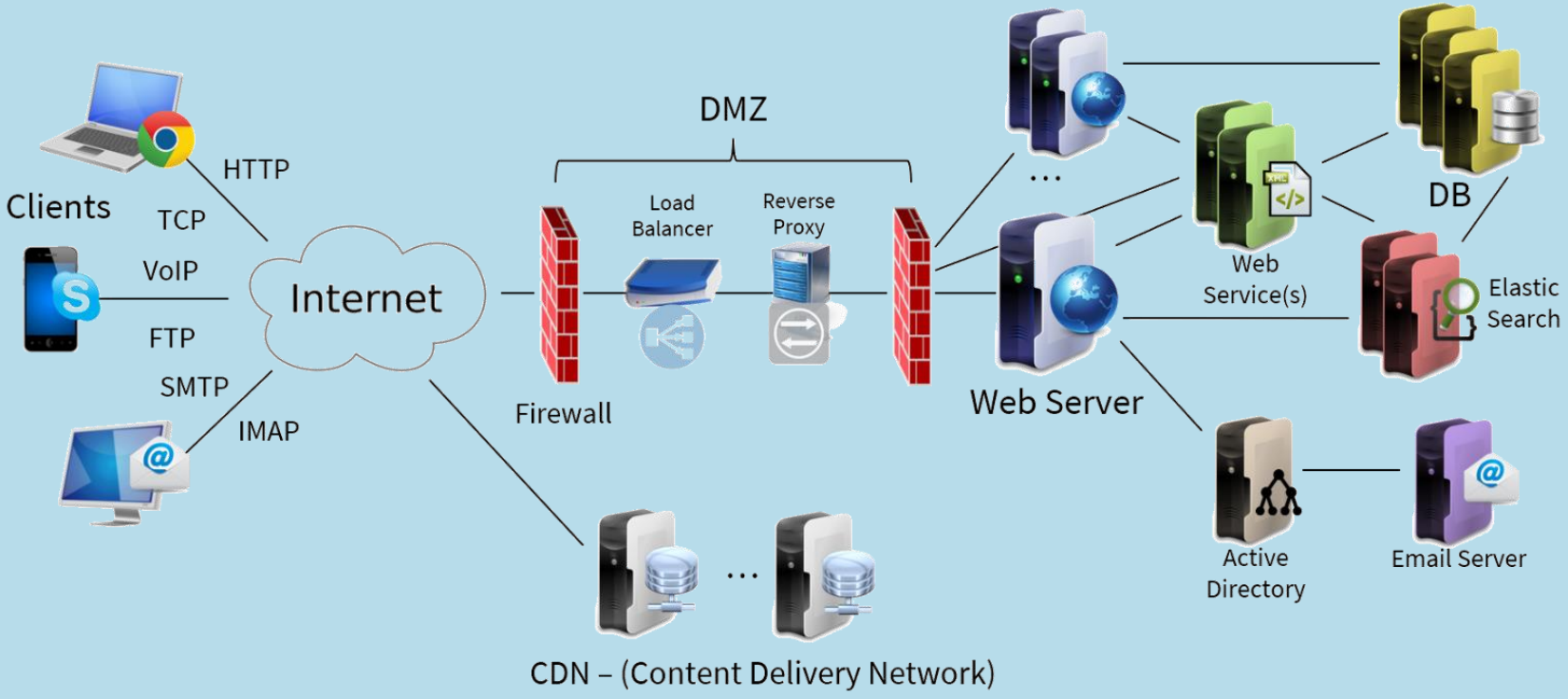
Spike
- short period of time
- extreme load
- recovery of the system

Volume
- large volume/amount of data
- check performance with large data

Endurance/Soak
- long periods of time
- memory leaks
- performance degradation
- reliability of the system

Scalability
- ability to handle a growing amount
- scale up, scale out

Application Network Architecture



Web Page Performance Analysis

Analyze the content of a web page

Generate suggestions to make that page faster

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Web Page Performance Analysis

Good practices

- Minify HTML / CSS / JavaScript
- Prioritize visible content
- Avoid landing page redirects
- Leverage browser caching
- Optimize images
- Enable compression
- Remove Render-Blocking JavaScript

Google

PageSpeed Insights

https://pagespeed.web.dev/

DEMO

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Load Testing

To understand the behavior of the system under a **specific expected load** (e.g. multiple users).

Load Testing – Tools

Open source Java application

Designed to load test functional behavior and measure performance

Open-source load and performance testing framework

Based on Scala, Akka and Netty

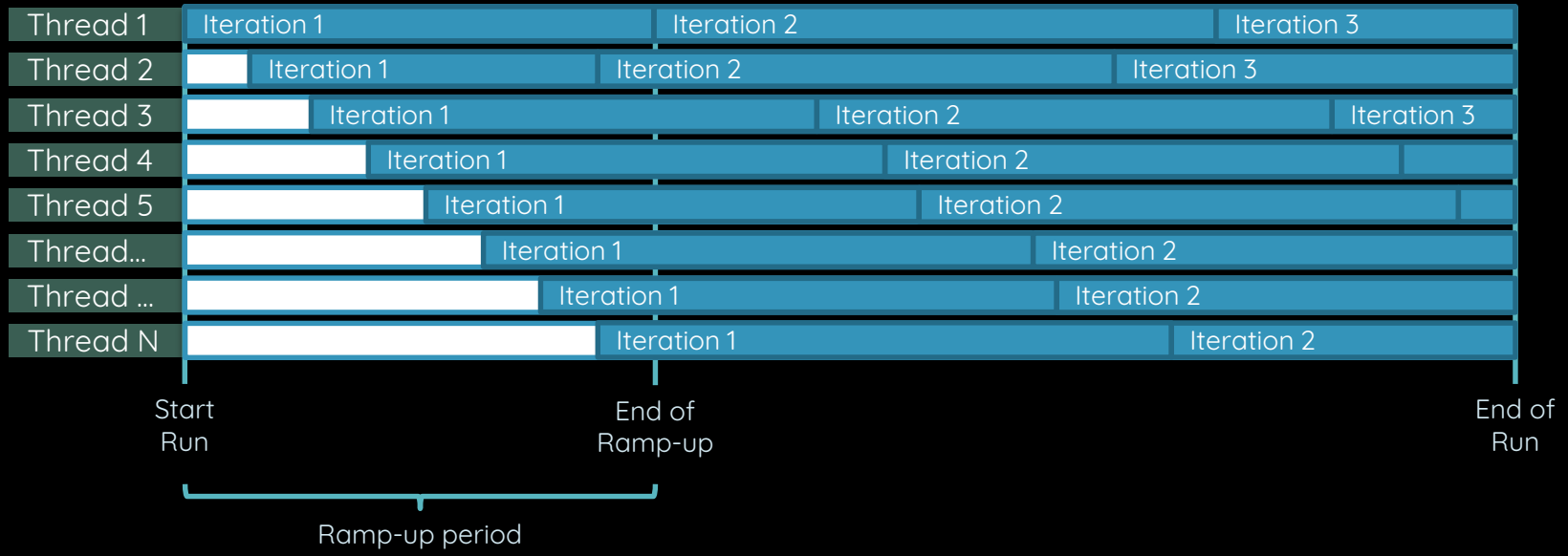
Open source load testing tool

Uses Python to define user behavior

Steps for performance (load) testing

- Gather requirements
- Define scenario(s) – user journey
- Implement scenario – write JMeter script
- Configure script for execution
- Configure environment
- Run (on different configurations – if needed)
- Interpret and analyze results
- Report findings and possible improvements

Threads, Iterations, Users & Ramp-up



N – Number of Threads (users)

Load Testing

DEMO

https://jmeter.apache.org/download_jmeter.cgi

https://jmeter-plugins.org/wiki/PluginsManager/

https://blazedemo.com/

Load testing – RESULTS

- Gather results and monitoring data
- Track script and execution notes (environment, configuration info)
- Interpret results, suggest improvements
- Plot results (e.g. average response time / # of threads)
- Historical comparison (previous builds)
- Summarize findings on each result type (load times, bottlenecks, errors, improvements, performance degradation)
- Include an executive summary

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WHY?

According to amazon if the loading time goes down even by a second, it costs the company $ 16 BN SALE every year.

As per Google if they slow down the search results by just four tenths of a second, they'd lose out on 8 BN SEARCH QUERIES per day!

40% mobile users quit the page if it takes more than 3 seconds to load.

Increase in site speed from 8 to 2 seconds can boost your conversion by 74%

It means 7% drop in the conversion rate.

HOW WEBSITE PERFORMANCE AFFECTS SHOPPING BEHAVIOR

47% of consumers expect a web page to load in 2 seconds or less.

40% abandon a website that takes more than 3 seconds to load.

A 1 second delay (or 3 seconds of waiting) decreases customer satisfaction by about 16%.

Sources: ImpulseDigital, TechReport

Takeaways

Cannot cover everything, therefore, a subset of journeys/pages can be used and balanced based on the real/estimated usage.

Configure and adjust the testing based on the real usage of the application and the behavior of the end-users.

Ask us anything!

- Thank you!