fit@hcmus

Software Testing

CSC13003

Performance Testing

Content

- What is Performance Testing?
- Why to do Performance Testing?
- Types of Performance Testing
- How to do Performance Testing?

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What is Performance Testing?

Performance testing is a type of non-functional testing that ensures software applications to perform properly under their expected workload.

What is Performance Testing?

- The main goal is
  - not to find bugs
  - to eliminate performance bottlenecks
- The focus is on
  - **speed** – whether the application responds quickly
  - **scalability** – the maximum user load the application can handle
  - **stability** – if the application is stable under varying loads

What is Performance Testing?

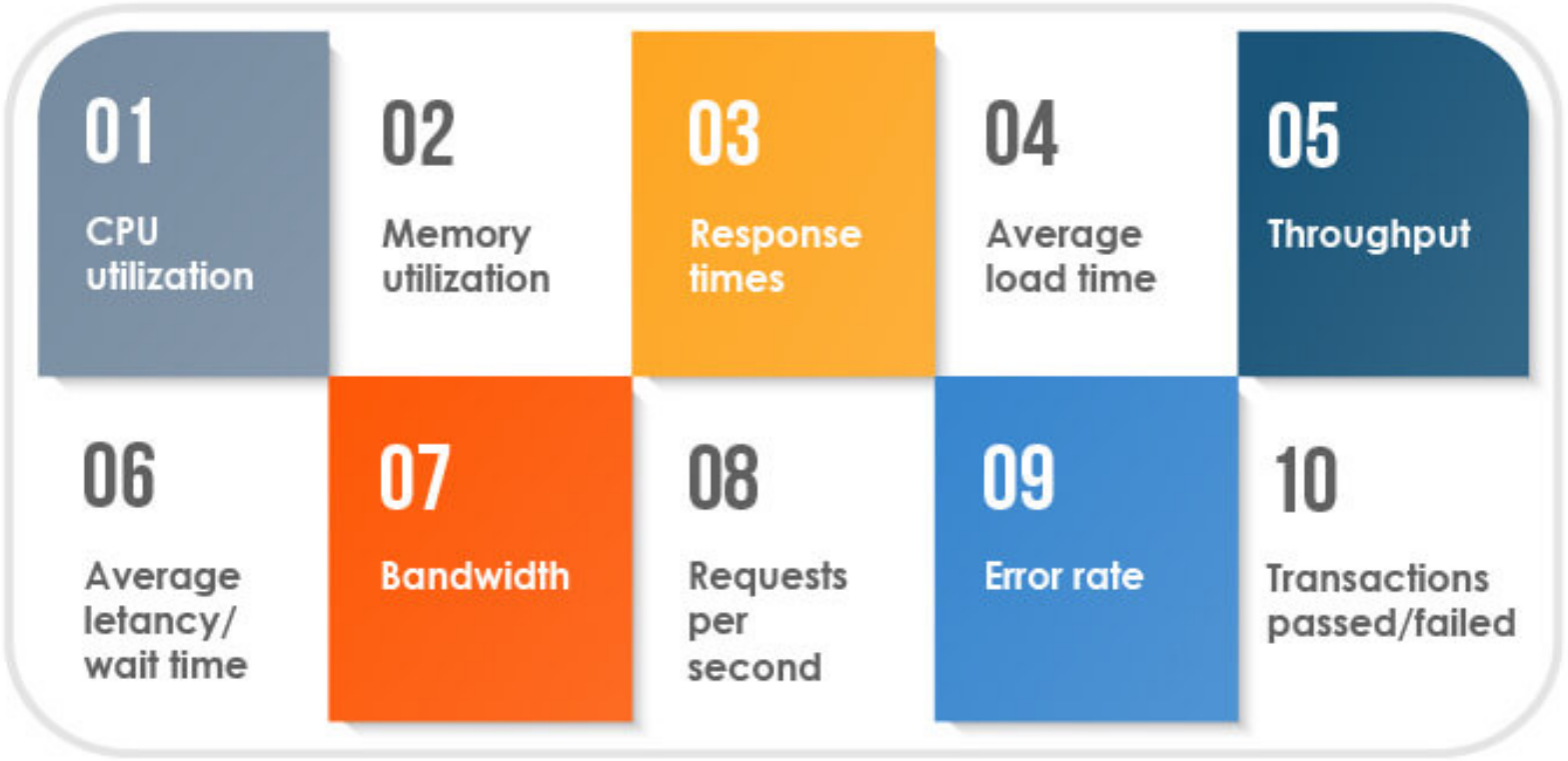
- Common Performance Problems
  - Long load time – long initial time to start an application
  - Poor response time – delayed output response to an input
  - Poor scalability – does not support a large enough number of users
  - Bottlenecks – obstacles that degrade overall system performance

What is Performance Testing?

- Example Performance Test Cases
  - Verify response time is not more than 4 secs when 1000 users access the website simultaneously
  - Verify response time of the Application Under Load is within an acceptable range when the network connectivity is slow
  - Check the maximum number of users that the application can handle before it crashes
  - Check database execution time when 500 records are read/written simultaneously
  - Check CPU and memory usage of the application and the database server under peak load conditions
  - Verify the response time of the application under low, normal, moderate, and heavy load conditions

What is Performance Testing?

- Performance Testing Metrics



What is Performance Testing?

- Performance Testing Metrics
  - CPU utilization – percentage of CPU capacity utilized
  - Memory utilization – utilization of the primary memory
  - Response times – time between sending request and receiving response
  - Average load time – time to complete the loading process
  - Throughput – the number of transactions can be handled in a second

What is Performance Testing?

- Performance Testing Metrics
  - Average latency/Wait time – the time spent by a request in a queue before getting processed
  - Bandwidth – the volume of data transferred per second
  - Requests per second – the number of requests handled per second
  - Error rate – the percentage of requests resulting in errors
  - Transactions Passed/Failed – the percentage of passed/failed transactions

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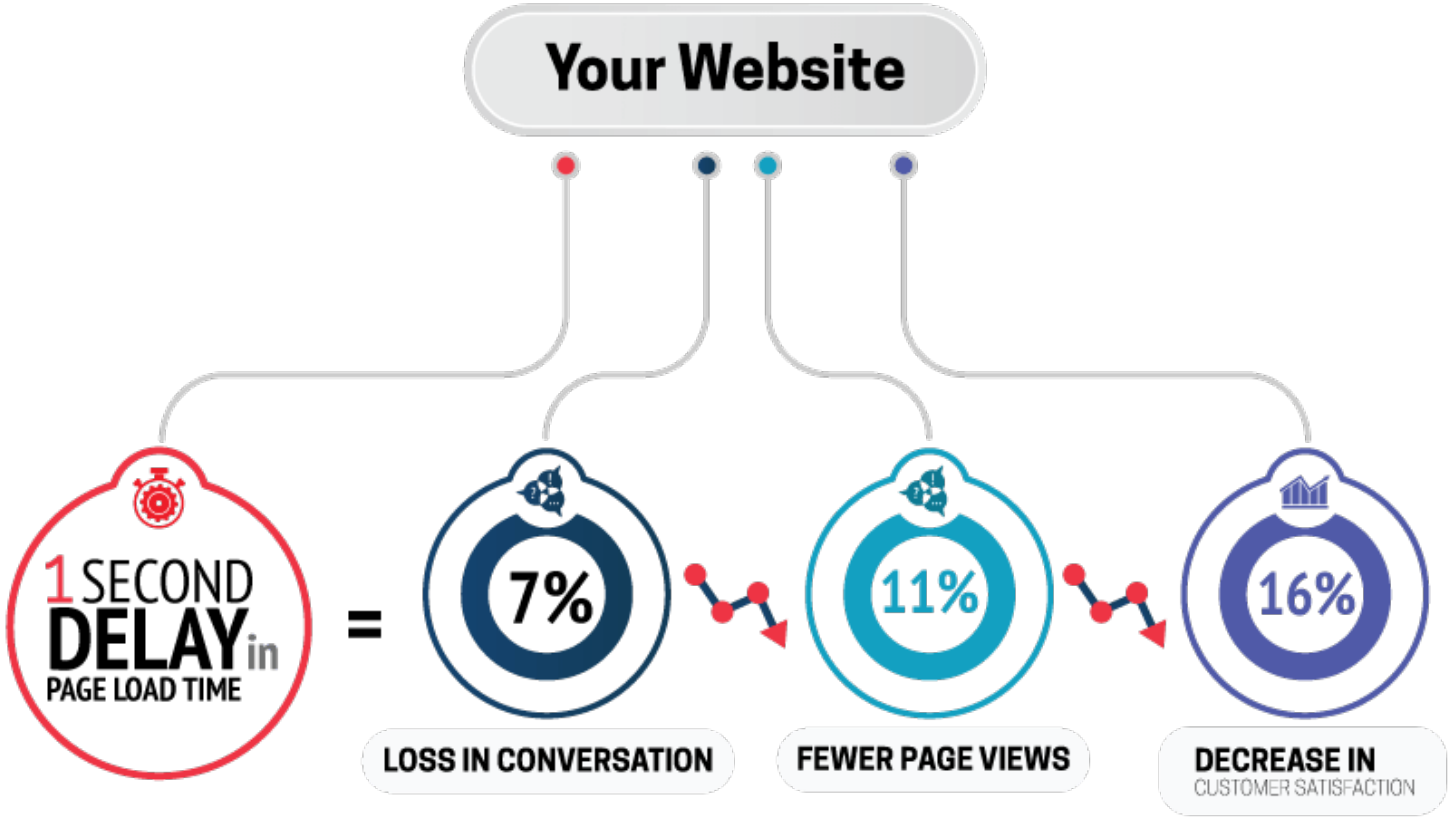
Why to do Performance Testing?

- Most users click away after 8 seconds of delay
- $4.4 billion business revenue loss due to poor web applications performance
- Aberdeen found that inadequate performance could impact revenue by up to 9%
- Business performance begins to suffer at 5.1 seconds of delay in response times of web applications and 3.9 for critical applications

Why to do Performance Testing?

Only a **5-minute downtime** of Google.com (19-Aug-13) is estimated to cost the search giant as much as **$545,000.**

It’s estimated that companies lost sales worth **$1100 per second** due to a recent Amazon Web Service Outage.



IN DOLLAR TERMS,
this means that if your site typically earns $100,000 a day,
this year you could lose **$2.5 MILLIONS** in sales.

Why to do Performance Testing?

- Help ensure the software
  - meet the expected levels of service
  - provide a positive user experience
- Highlight improvements relative to speed, stability, and scalability
- Absence of testing might suffer from different types of problems that lead to a damaged brand reputation

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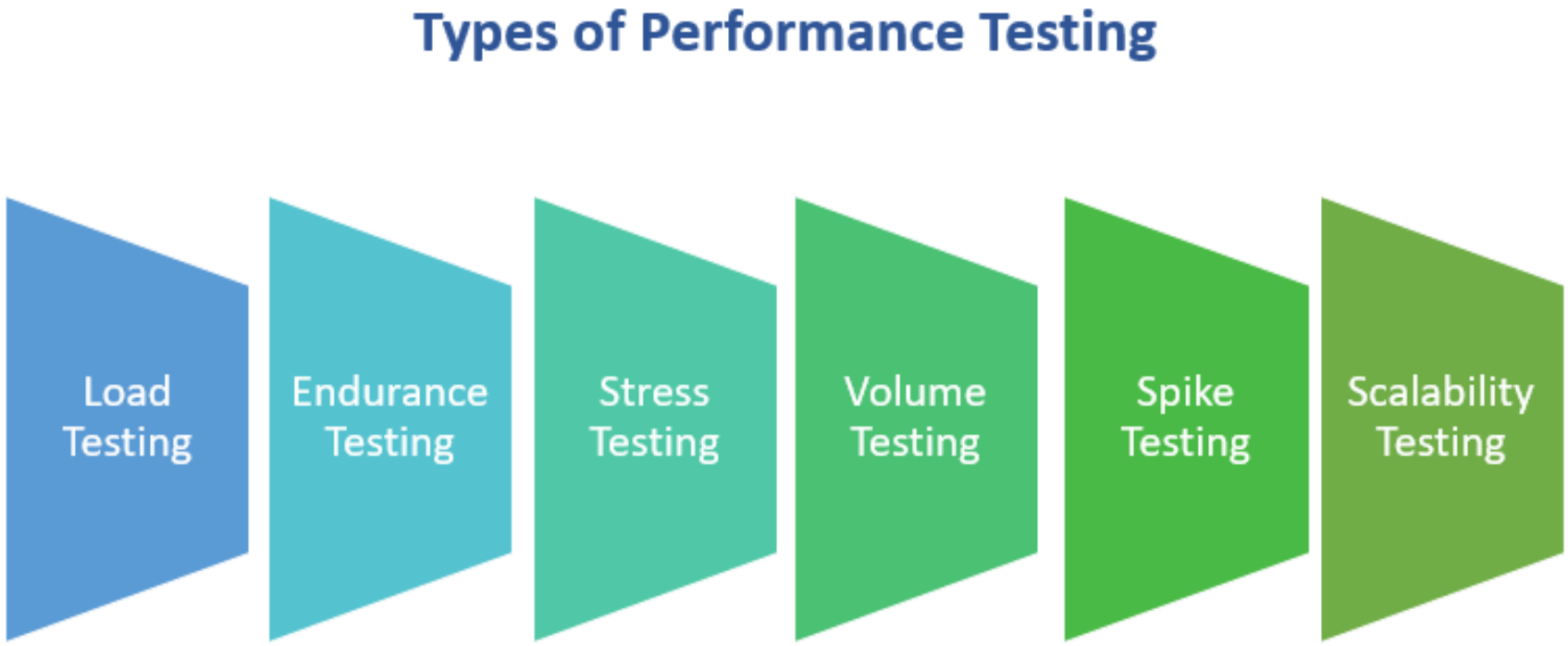
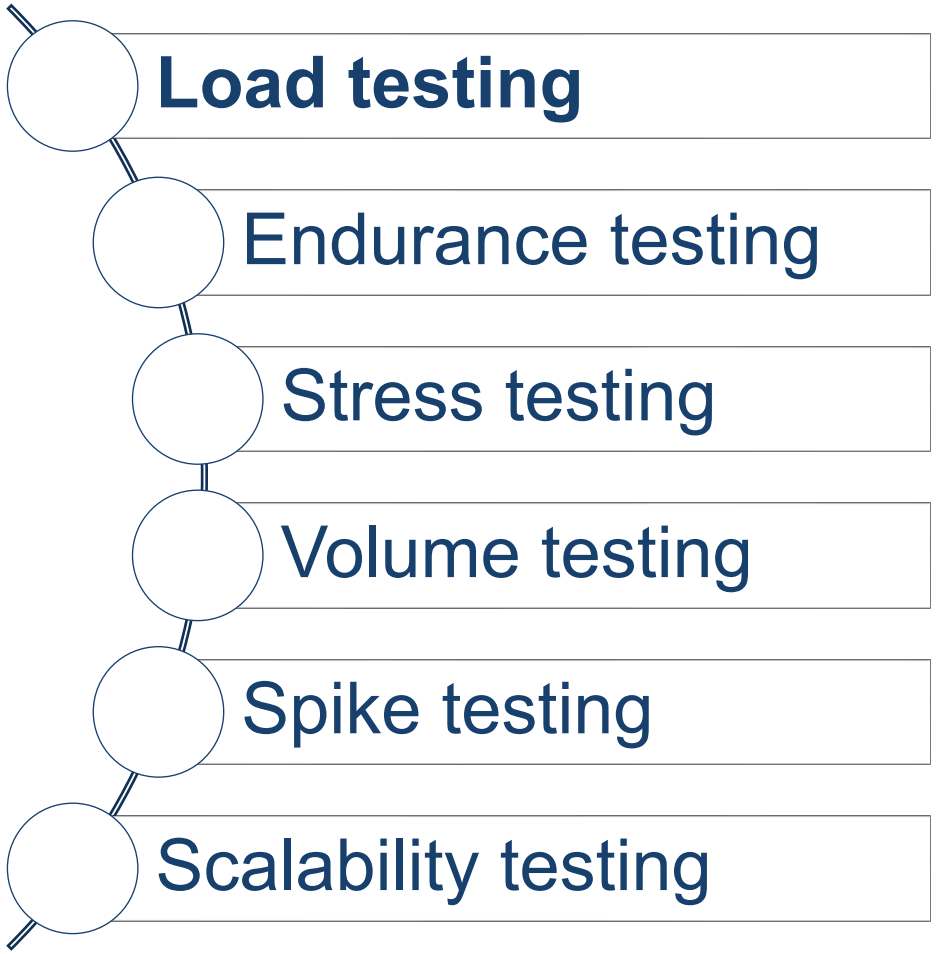
Types of Performance Testing

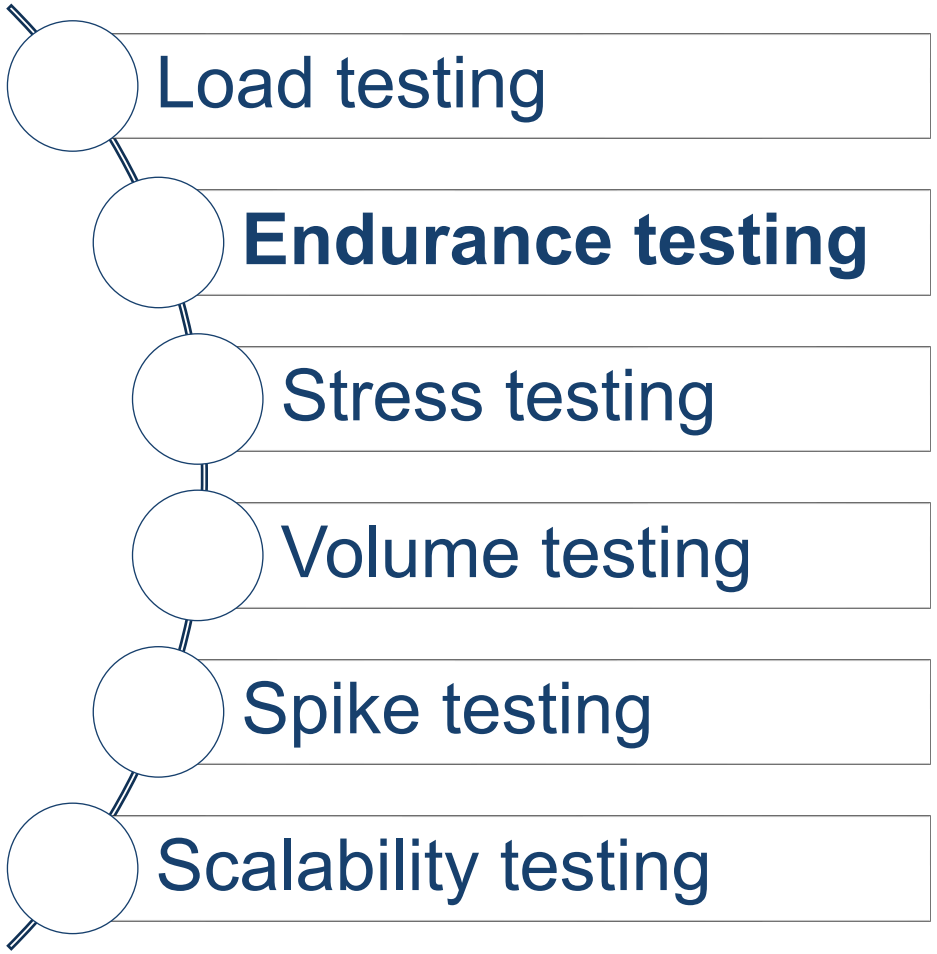


Types of Performance Testing



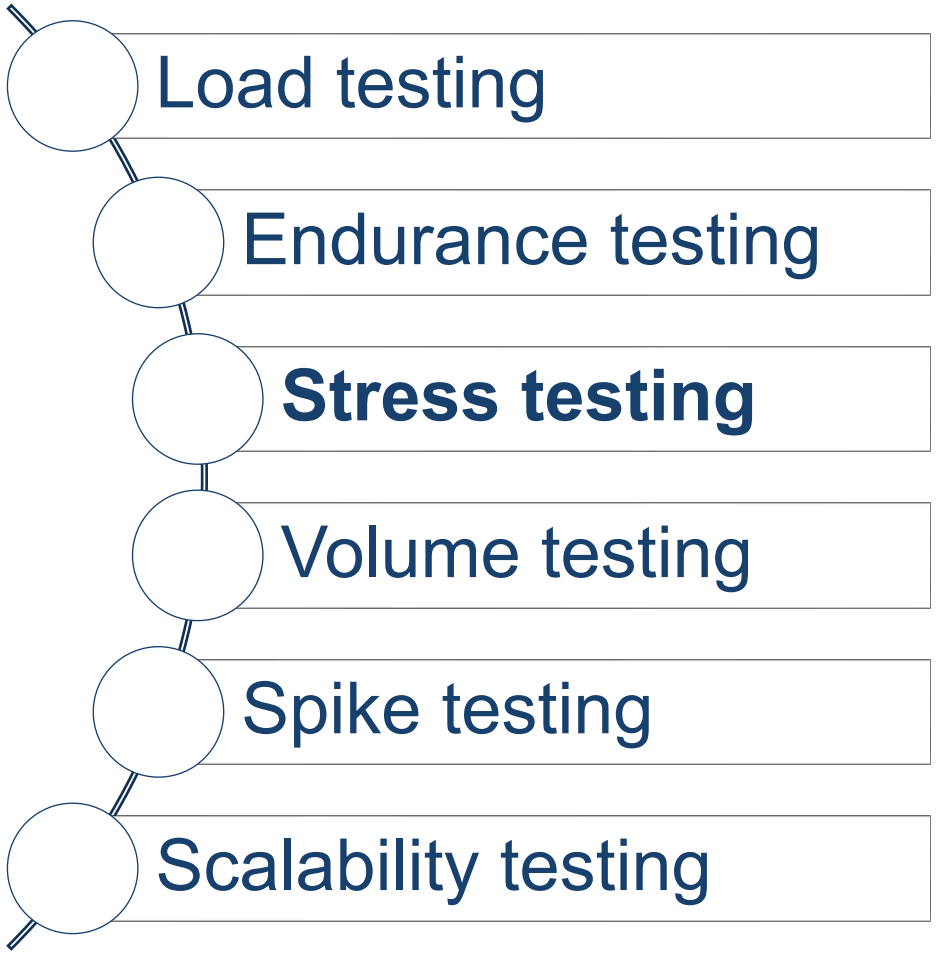
- It checks the product's ability to perform under anticipated user loads
- The objective is to identify performance congestion before the software product is launched in market

Types of Performance Testing



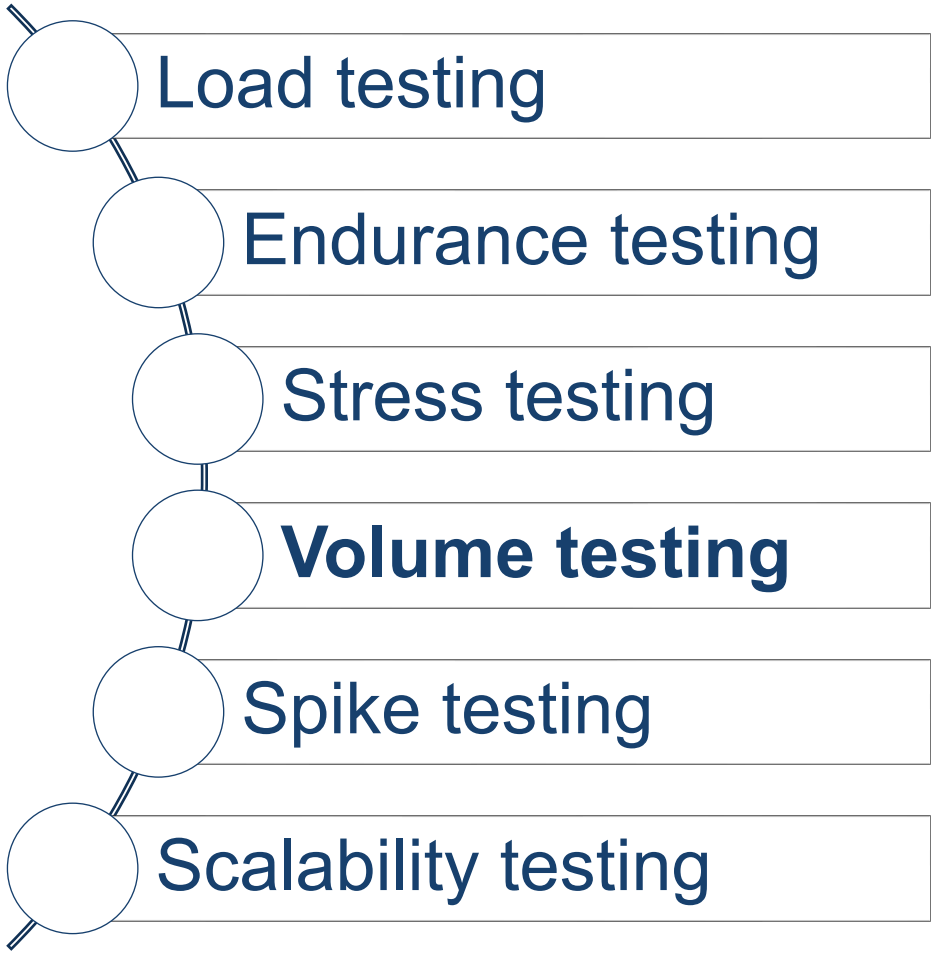
- It is performed to ensure the software can handle the expected load over a long period of time

Types of Performance Testing



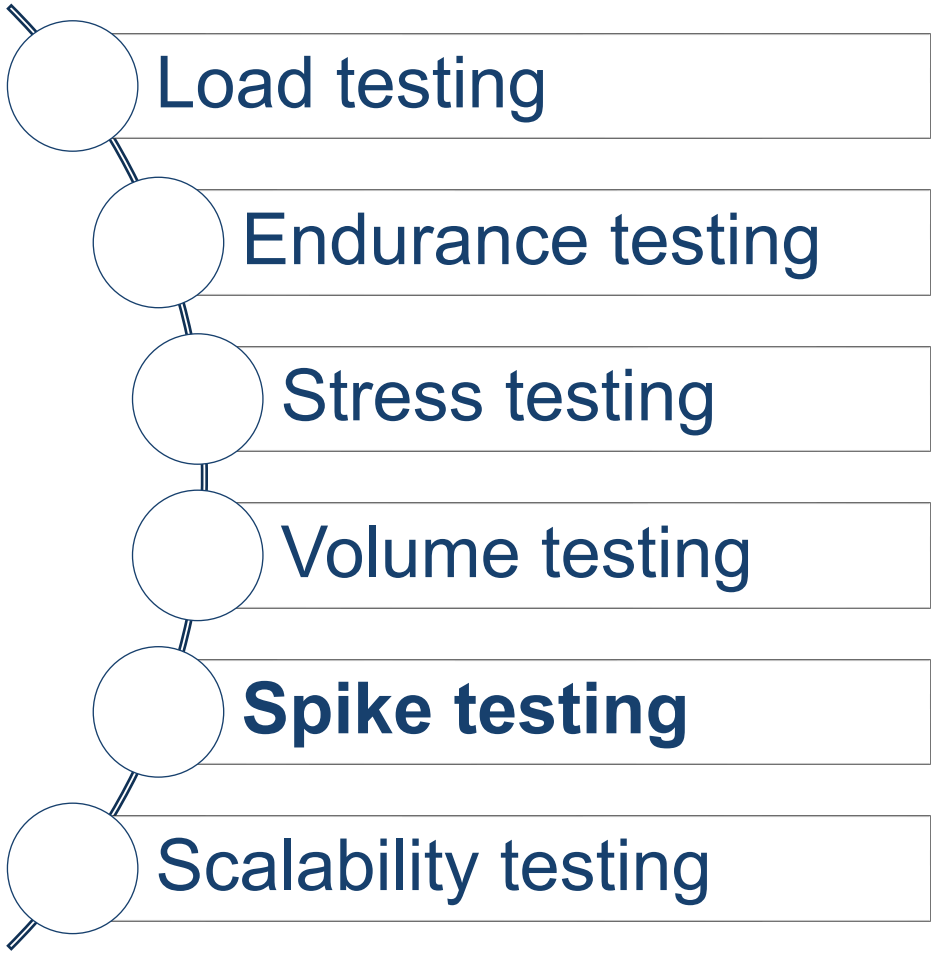
- It involves testing a product under extreme workloads to see whether it handles high traffic or not
- The objective is to identify the breaking point of a software product

Types of Performance Testing



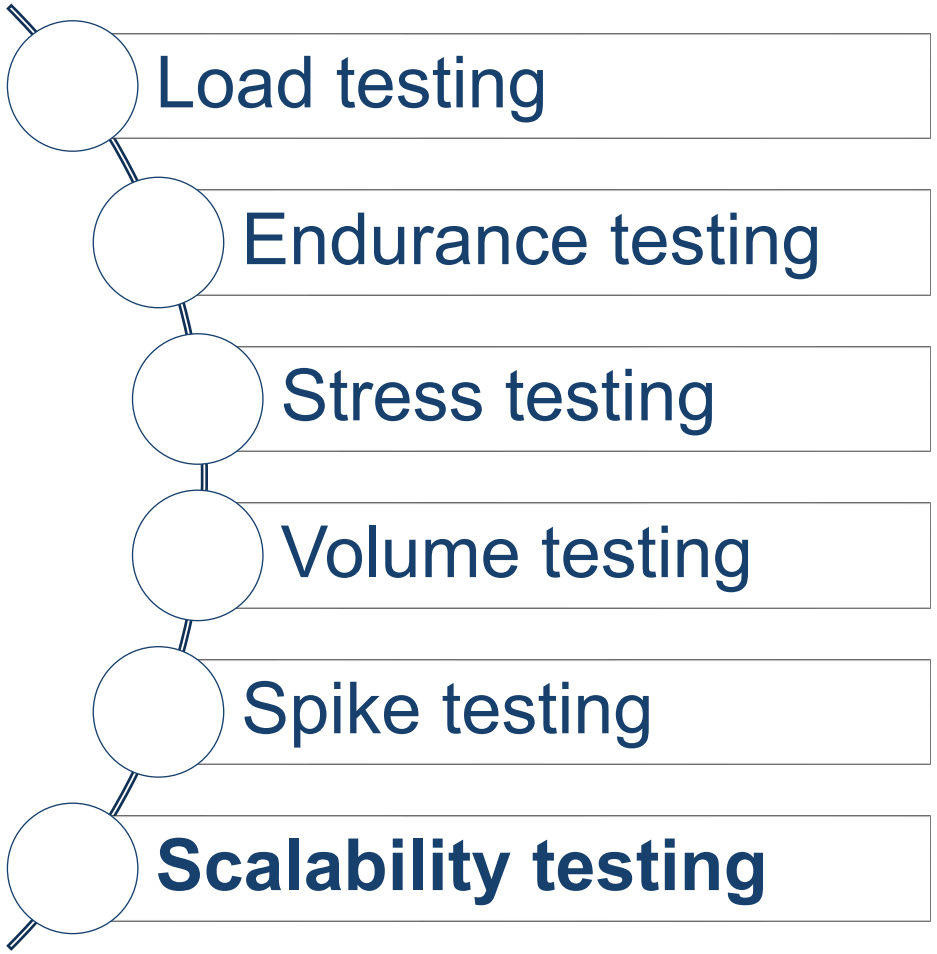
- In volume testing large number of data is saved in a database and the overall software system's behavior is observed
- The objective is to check product's performance under varying database volumes

Types of Performance Testing



- It tests the product's reaction to sudden large spikes in the load generated by users

Types of Performance Testing



- In scalability testing, software application's effectiveness is determined in scaling up to support an increase in user load
- It helps in planning capacity addition to your software system

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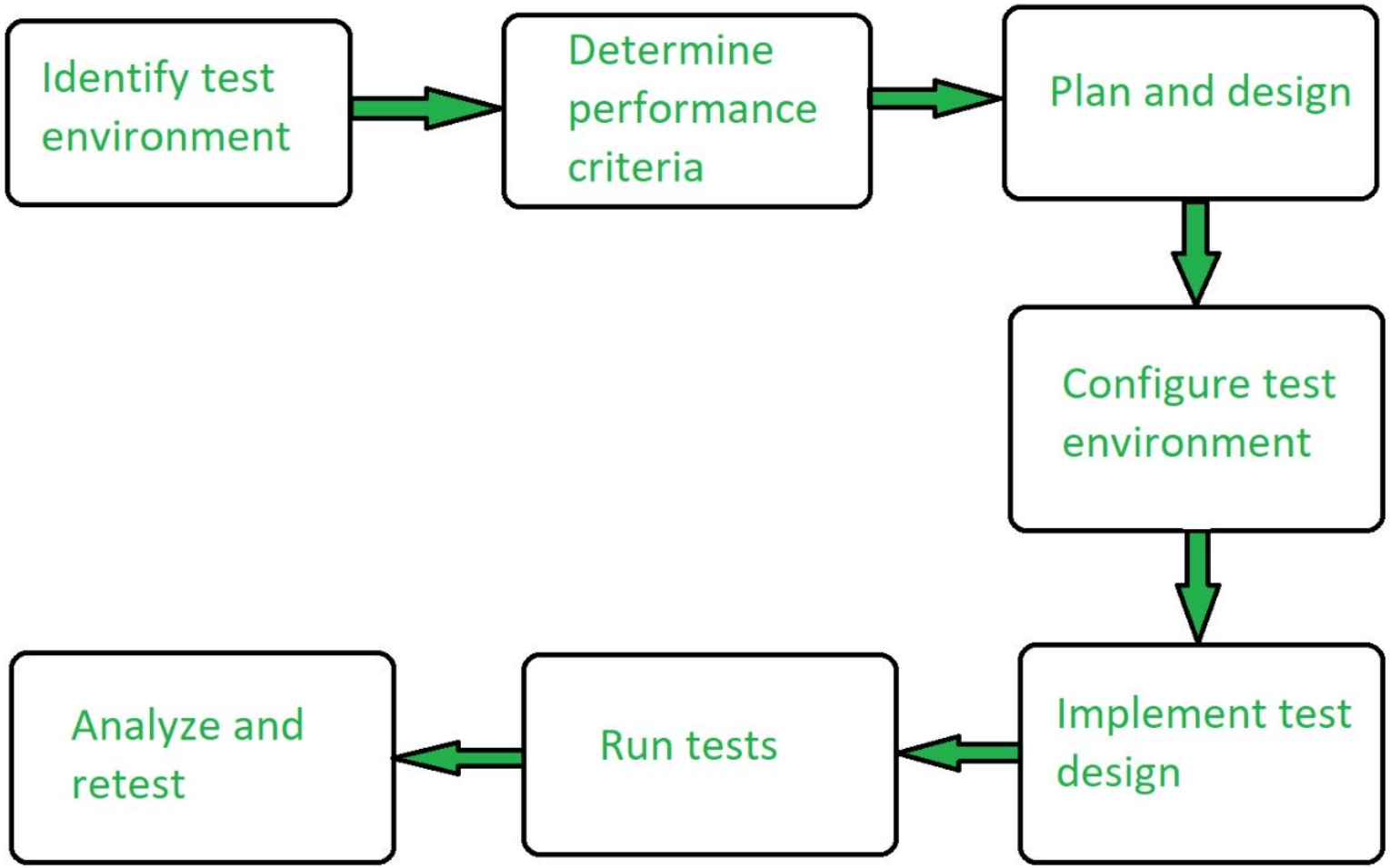
How to do Performance Testing?



How to do Performance Testing?

Step 1 – Identify test environment

- Identify the testing environment and know what testing tools are available at your disposal
- Understand the details of all the hardware, software and different network configurations ahead of time

How to do Performance Testing?

Step 2 – Determine performance criteria

- Identify the general performance metrics
- Identify the performance success criteria

How to do Performance Testing?

Step 3 – Plan and design

- Identify key scenarios by considering
  - user variability
  - test data
  - plan performance
- Simulate a variety of use cases
- Outline what metrics will be gathered

How to do Performance Testing?

Step 4 – Configure test environment

- Arrange all the necessary testing tools and monitoring resources

Step 5 – Implement test design

- Design performance tests according to performance criteria and metrics

How to do Performance Testing?

Step 6 – Run tests

- Execute and monitor the performance tests

Step 7- Analyze and retest

- Analyze the finding and fine tune the test again to see an increase or decrease in performance
- Run the tests again using the same or different parameters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