S.W.A.P Exercises in Tema 1 and Tema 2

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Exercise 1(Tema 1)

**Apache:** The Apache HTTP Server is the world’s most used web server software. Its development started on 1995 under Apache Software Foundation but is continuously developed and maintained by an open community. Apache quickly became the dominant HTTP server and as of 2009, it is the first web software to have served more than 100 million websites. It is free, easy to learn, reliable and flexible, has widespread support and can work well with both Windows and UNIX. As of July 2016 it is estimated to serve about 46% of all active websites.

**Nginx:** Nginx is a free, open-source HTTP web server that its initial purpose was to solve the C10K problem, which means for the web servers to handle ten thousand concurrent connections. Nginx development started on 2002 and was released on 2004 meeting its goal by relying on an asynchronous, events-driven architecture. Nginx is also an IMAP/POP3 proxy server and benefits from high performance at a low memory cost. Apache is preferred over Nginx because of its increased support and more widely used for some lanuages such as Python, Perl or Ruby but Nginx is known to run better under a heavy load.

**Thttpd:** Thttpd is an HTTP web server developed by Acme Laboratories and is known as a “simple,small,portable,fast and secure HTTP server”. It is designed for simplicity, speed and small size. It is single threaded and is used mostly on Unix-like operating systems. Exchanging the richer features of other servers for simplicity, thttpd is suited to service high volume requests for static data and has a bandwidth throttling feature which enables the web administrator to limit the maximum bitrate so the server can still be very responsive under heavy load.

**Cherokee:** Cherokee is an open-source, lightweight web server that runs both on UNIX and Windows. Its stable release was on April 2013 and it is maintained by the community. Its major feature is its graphical administration interface (Cherokee-admin) that has a light design. Some tests have shown Cherokee to be performing better than Apache when serving both static and dynamic content.

**Node.js:** Node.js is an open-source, cross-platform JavaScript runtime environment used for developing a variety of server tools. Many of its basic modules are written in JavaScript and has an event-driven architecture, capable of asynchronous I/O. Node.js allows the creation of web servers and networking tools using JavaScript.

Exercise T2.1(Tema 2)

So if we have 3 replicas for each system, based on the formula on the slides we will have the following result (we consider the availability for each system with 2 replicas known):

**Web:** As = 97.75% + (1-97,75%) \* 85% = 99,6625% (already seen as an example)

**Application:** As = 99% + (1-99%)\* 90% = 99,9%

**Database:** As = 99,9999% + (1-99,9999%)\*99,9% = 99.9999999%

**DNS:** As = 99,96% + (1-99,96%)\*98% = 99,992%

**Firewall:** As = 97,75% + (1-97,75%) \*85% = 99,6625%

**Switch:** As = 99,99% + (1-99,99%) \* 99% = 99,9999%

**Data Center:** As = 99,99% + (1-99,99%)\*99,99% = 99,999999%

**ISP:** As= 99,75% + (1-99,75%)\*95%= 99,9875%

The total system availability is:

As = Web\* Application\* Database\*Dns\*Firewall\*Switch\*Data center \* Isp = 99,6625% \*99,9%\*99.9999999%\*99,992%\*99,6625%\*99,9999%\*99,999999%\*99,9875% = 99,206372121313801144191224854784%

Exercise T2.2

After some research, these frameworks were found that help increase the availability and performance of applications:

**Django:** Django is a high-level Python Web framework that encourages rapid development and clean design. Django's primary goal is to ease the creation of complex, database-driven websites. Django also provides an optional administrative create, read, update and delete interface that is generated dynamically through introspection and configured via admin models. Django can be run in conjunction with Apache, NGINX  or Cherokee using flup (a Python module).

**Ruby on Rails:** Ruby on Rails is a server-side web application framework written in Ruby under the MIT License. Rails is a model–view–controller (MVC) framework, providing default structures for a database, a web service, and web pages. Model–View–Controller is an architectural pattern for implementing user interfaces on computers. It divides a given application into three interconnected parts in order to separate internal representations of information from the ways that information is presented to and accepted from the user. It includes tools that make common development tasks easier "out-of-the-box", such as scaffolding that can automatically construct some of the models and views needed for a basic website.

**CakePHP:** CakePHP is an open-source web framework. It started in 2005 by a Polish programmer, Michal Tatarynowicz. It follows the model–view–controller (MVC) approach and is written in PHP, modeled after the concepts of Ruby on Rails, and distributed under the MIT License**.**

There are other countless frameworks for many languages such as CppCMS, Tntnet (C++), AgularJS, React.js (JavaScript), CodeIgniter, Jamroom, Laravel, PRADO (PHP), CherryPy, Pyjs, CubicWeb (Python) and many more.

Exercise T2.3

We can analyze the stress of each subsystem of a web server using different tools that “stress-test” the system. Some tools analyze the load of the CPU, others the RAM and others the bandwidth. Most of these achieve by stressing each sub-system to its limits. Some of these tools are:

**Memtest86+(RAM):** Memtest86+is a memory test software program designed to test and stress test an x86 architecture computer's random access memory (RAM) for errors, by writing a series of test patterns to most memory addresses, then reading back the data written, and comparing for errors.

**Teleprocessing Network Simulator (TPNS):** An IBM licensed program, first released in 1976 as a test automation tool to simulate one or many network terminal(s) to a mainframe computer system, for functional testing, regression testing, system testing, capacity management, benchmarking and stress testing.

**Microsoft Network Monitor:** Itenables capturing, viewing, and analyzing network data and deciphering network protocols and can be used to troubleshoot network problems and applications on the network.

**IntelBurnTest(CPU):** A program that is used to stress test the CPU of the system. It provides real-time output of results to the screen and has real-time error checking.

Exercise T2.4

Hardware balancers:

Cisco

Barracuda Load Balancer ADC

Resonate

NGINX Plus