You have a captain's log due before 2024-04-21 (in 1 day)! Log it now!
(/captain_logs/5596018/edit)

0x09. Web infrastructure design

DevOps **SysAdmin** **web infrastructure**

Weight: 1

Project to be done in teams of 3 people (your team: Mohamed Madian, Deiaa Elzyat)

Project over - took place from Dec 21, 2023 6:00 AM to Jan 2, 2024 6:00 AM

Manual QA review was done on Jan 14, 2024 11:15 AM

In a nutshell…

- **Manual QA review:** 0.0/42 mandatory & 0.0/5 optional
- **Altogether: 0.0%**
  - Mandatory: 0.0%
  - Optional: 0.0%
  - Calculation: 0.0% + (0.0% * 0.0%) == **0.0%**

Overall comment:

Resources

Read or watch:

- **Network basics** concept page
- **Server** concept page
- **Web server** concept page
- **DNS** concept page
- **Load balancer** concept page
- **Monitoring** concept page
- What is a database (/rltoken/n3CdS3EA5l5psDDKbEhApA)
- What's the difference between a web server and an app server? (/rltoken/0as4wDlFqyhLhf0f_gedcw)
- DNS record types (/rltoken/Pl3UoEfAO7K_jUKRLMmnAQ)
- Single point of failure (/rltoken/uxpx2YhXs10TFLlDg78chA)
- How to avoid downtime when deploying new code (/rltoken/4ansLu2gtHnoFrNThqyObA)
- High availability cluster (active-active/active-passive) (/rltoken/TAJeVYy9U9iLaEDd6XkbRA)
- What is HTTPS (/rltoken/c0zs2MxrmxFLsCPOizxq6g)
- What is a firewall (/rltoken/j6idMcUTyNEDj1oYDQFmUw)

Learning Objectives

At the end of this project, you are expected to be able to explain to anyone (/rltoken/FPJvEE-DRJDvmVTNWeFR8A), **without the help of Google**:

General

- You must be able to draw a diagram covering the web stack you built with the sysadmin/devops track projects
- You must be able to explain what each component is doing
- You must be able to explain system redundancy
- Know all the mentioned acronyms: LAMP, SPOF, QPS

Copyright - Plagiarism

- You are tasked to come up with solutions for the tasks below yourself to meet with the above learning objectives.
- You will not be able to meet the objectives of this or any following project by copying and pasting someone else's work.
- You are not allowed to publish any content of this project.
- Any form of plagiarism is strictly forbidden and will result in removal from the program.

Requirements

General

- A `README.md` file, at the root of the folder of the project, is mandatory
- For each task, once you are done whiteboarding (on a whiteboard, piece of paper or software or your choice), take a picture/screenshot of your diagram
- This project will be manually reviewed:
- As each task is completed, the name of that task will turn green
- Upload a screenshot, showing that you completed the required levels, to any image hosting service (I personally use imgur (/rltoken/m_O2HLsKrO1zg31LMcLOGQ) but feel free to use anything you want).
- For the following tasks, insert the link from of your screenshot into the answer file
- After pushing your answer file to GitHub, insert the GitHub file link into the URL box
- You will also have to whiteboard each task in front of a mentor, staff or student - no computer or notes will be allowed during the whiteboarding session
- Focus on what you are being asked:
- Cover what the requirements mention, we will explore details in a later project
- Keep in mind that you will have 30 minutes to perform the exercise, you will get points for what is asked in requirements
- Similarly in a job interview, you should answer what the interviewer asked for, be careful about being too verbose - always ask the interviewer if going into details is necessary - speaking too much can play against you
- In this project, again, avoid going in details if not asked

Quiz questions

Great! You've completed the quiz successfully! Keep going! (Show quiz)

Tasks

0. Simple web stack

mandatory

Score: 0.0% (*Checks completed: 0.0%*)

(/)

A lot of websites are powered by simple web infrastructure, a lot of time it is composed of a single server with a LAMP stack (/rltoken/YVDX0XsC6XHp0nmezvT9vQ).

On a whiteboard, design a one server web infrastructure that hosts the website that is reachable via `www.foobar.com`. Start your explanation by having a user wanting to access your website.

Requirements:

- You must use:
  - 1 server
  - 1 web server (Nginx)
  - 1 application server
  - 1 application files (your code base)
  - 1 database (MySQL)
  - 1 domain name `foobar.com` configured with a `www` record that points to your server IP `8.8.8.8`
- You must be able to explain some specifics about this infrastructure:
  - What is a server
  - What is the role of the domain name
  - What type of DNS record `www` is in `www.foobar.com`
  - What is the role of the web server
  - What is the role of the application server
  - What is the role of the database
  - What is the server using to communicate with the computer of the user requesting the website
- You must be able to explain what the issues are with this infrastructure:
  - SPOF
  - Downtime when maintenance needed (like deploying new code web server needs to be restarted)
  - Cannot scale if too much incoming traffic

Please, remember that everything must be written in English to further your technical ability in a variety of settings.

Add URLs here:

Save

Repo:

- GitHub repository: `alx-system_engineering-devops`
- Directory: `0x09-web_infrastructure_design`
- File: `0-simple_web_stack`

Done? | QA Review

1. Distributed web infrastructure

mandatory

Score: 0.0% (*Checks completed: 0.0%*)

On a whiteboard, design a three server web infrastructure that hosts the website `www.foobar.com`.

Requirements:

- You must add:
  - 2 servers
  - 1 web server (Nginx)
  - 1 application server
  - 1 load-balancer (HAproxy)
  - 1 set of application files (your code base)
  - 1 database (MySQL)
- You must be able to explain some specifics about this infrastructure:
  - For every additional element, why you are adding it
  - What distribution algorithm your load balancer is configured with and how it works
  - Is your load-balancer enabling an Active-Active or Active-Passive setup, explain the difference between both
  - How a database Primary-Replica (Master-Slave) cluster works
  - What is the difference between the Primary node and the Replica node in regard to the application
- You must be able to explain what the issues are with this infrastructure:
  - Where are SPOF
  - Security issues (no firewall, no HTTPS)
  - No monitoring

Please, remember that everything must be written in English to further your technical ability in a variety of settings.

Add URLs here:

Save

Repo:

- GitHub repository: `alx-system_engineering-devops`
- Directory: `0x09-web_infrastructure_design`
- File: `1-distributed_web_infrastructure`

Done? QA Review

2. Secured and monitored web infrastructure

mandatory

Score: 0.0% (*Checks completed: 0.0%*)

On a whiteboard, design a three server web infrastructure that hosts the website `www.foobar.com`, it must be secured, serve encrypted traffic, and be monitored.

Requirements:

- You must add:
  - 3 firewalls
  - 1 SSL certificate to serve `www.foobar.com` over HTTPS
  - 3 monitoring clients (data collector for Sumologic or other monitoring services)
- You must be able to explain some specifics about this infrastructure:
  - For every additional element, why you are adding it
  - What are firewalls for
  - Why is the traffic served over HTTPS
  - What monitoring is used for
  - How the monitoring tool is collecting data
  - Explain what to do if you want to monitor your web server QPS
- You must be able to explain what the issues are with this infrastructure:
  - Why terminating SSL at the load balancer level is an issue
  - Why having only one MySQL server capable of accepting writes is an issue
  - Why having servers with all the same components (database, web server and application server) might be a problem

Please, remember that everything must be written in English to further your technical ability in a variety of settings.

Add URLs here:

Save

Repo:

- GitHub repository: `alx-system_engineering-devops`
- Directory: `0x09-web_infrastructure_design`
- File: `2-secured_and_monitored_web_infrastructure`

Done? QA Review

(/) Done with the mandatory tasks? Unlock 1 advanced task now!

Ready for a new peer review