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Curriculum

Foundations v2 - Part 3
Average: **87.08%**

100%

Web infrastructure design

Novice

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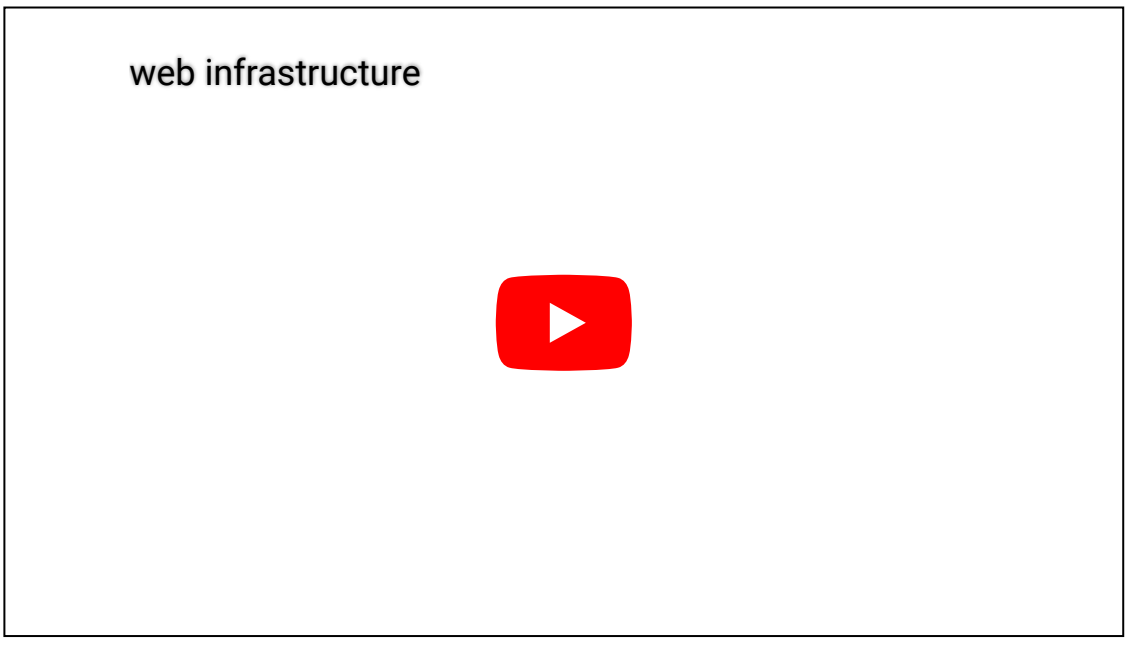
Weight: 1

Concepts

For this project, we expect you to look at these concepts:

- Network basics (/concepts/791)
- Server (/concepts/799)
- Web Server (/concepts/800)
- DNS (/concepts/803)
- Load balancer (/concepts/804)
- Monitoring (/concepts/805)



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/7Pp0_Mdit6r_ZdRGKAwcqw)
- What's the difference between a web server and an app server? (/rltoken/YqKvabbDDtSjnHMV9g1gHw)
- DNS record types (/rltoken/kZXE57FUOK-cqmLfN3CWfg)
- Single point of failure (/rltoken/56OIJ23o5mqSaSeLEwxzJg)
- How to avoid downtime when deploying new code (/rltoken/lxwkY5pRIVzatMPXwx6yew)
- High availability cluster (active-active/active-passive) (/rltoken/rITwKN4AKP1hXZl2FKcAcw)
- What is HTTPS (/rltoken/iEaO7X54UemiSN9z8TtFVA)
- What is a firewall (/rltoken/P2A36USOkcekiqHsCzTefQ)

Learning Objectives

At the end of this project, you are expected to be able to explain to anyone (/rltoken/RrkQ3Y4e2NeMFLApRBf8Zg), **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

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/16_BGzDlaeQepe6t265Xag) 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

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- 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

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/OtZFy7tXzJmziqfiXKT5lA).

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.

Repo:

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

Please review your task manually with the following checklist

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The student drew an application server on the diagram

Help | QA Review

20/20 pts

1. Distributed web infrastructure

mandatory

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.

Repo:

- GitHub repository: `holbertonschool-system_engineering-devops`

- Directory: `web_infrastructure_design`
- File: `1-distributed_web_infrastructure`

Please review your task manually with the following checklist

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The student's repository contains a link to a diagram about this task (do not check the accuracy of it)

Help | QA Review

10/10 pts

2. Secured and monitored web infrastructure

mandatory

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.

Repo:

- GitHub repository: `holbertonschool-system_engineering-devops`
- Directory: `web_infrastructure_design`
- File: `2-secured_and_monitored_web_infrastructure`

Please review your task manually with the following checklist

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Load-balancer is a SPOF

Help QA Review **12/12** pts

3. Scale up

mandatory

Readme

- Application server vs web server (/rltoken/QHWrcB0kVYwbgWCsL57mkQ)

Requirements:

- You must add:
  - 1 server
  - 1 load-balancer (HAproxy) configured as cluster with the other one
  - Split components (web server, application server, database) with their own server
- You must be able to explain some specifics about this infrastructure:
  - For every additional element, why you are adding it

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

Repo:

- GitHub repository: `holbertonschool-system_engineering-devops`
- Directory: `web_infrastructure_design`
- File: `3-scale_up`

Please review your task manually with the following checklist

The student adds servers containing a single component inside them (such as a web server, application server or database)

Help QA Review **5/5** pts

Score

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100%

Congratulations! You made it!

Please review **all the tasks** before you start the peer review.

Ready for my review

Skip this project

Previous project (/projects/2017)