LS Lab 4 - CI/CD or NoSQL

> You are able to work in the same teams as for one of the previous labs or individually

CI/CD is DevOps practice that automates integration and delivery processes and allows you to regularly release high-quality software. CI will automatically build the software, test it and notify you if something goes wrong. CD will automatically install the code changes on the company's servers and perform additional tests. Along with this, NoSQL database technology stores information in JSON documents instead of columns and rows used by relational databases. NoSQL uses a set of BASE properties: basic availability, soft state, eventual consistency in order to solve the problems of scaling and high availability for highly loaded distributed systems.

Choice 1 - CI/CD Pipeline

Task 1 - CI/CD Theory

Answer to the questions:

1. What is the pipeline method of software development?
2. What tasks and problems does the CI/CD process solve?
3. What kind of general stages are there in the CI/CD pipeline? List them in the correct sequence and then describe them.
4. What are unit tests?
5. What are Job Artifacts and Artifacts Storage?

Task 2 - Select a CI/CD solution/platform

Some popular choices:

1. Jenkins
2. Github Actions
3. GitLab
4. CircleCI
5. Travis CI
6. Azure pipeline
7. TeamCity
8. ...

Task 3 - Project preparation

Prepare a project (create a new one or find or choose from previous labs); define the set of tests that will be used in your CI/CD. Describe it briefly. (What language, which test, ...). Create and prepare a repository where you will deploy your CI/CD.

Task 4 - CI/CD Pipeline implementation

Automate the building and deployment of your project using the CI/CD pipeline. You are free to choose any pipeline steps, but, as a rule, the following steps are basic and core:

- checkout SCM
- init
- build

- test
- deploy

You also might add some external steps (*they will be considerer as bonus*):

- push to artifact repository
- wipe environment
- ...

It will be good for you to play with CI cases, e.g. set up to trigger job for Pull Request, for specific branch, to tag/release, for commit to certain branch...

Bonus 1: create multi branch pipeline.

Bonus 2: play with different CI/CD solution plugins.

Some CI best practices

Choice 2 - NoSQL Cluster

Task 1 - Take NoSQL solution

Some examples:

- MongoDB (**default choice**)
- Redis
- CasandraDB
- ScyllaDB
- ...

Task 2 - NoSQL cluster theory

Give the answers for the following questions what is and for what, will be better to provide explanatory pictures/graphs:

1. Redundancy
2. HA
3. Fault Tolerance

Task 3 - NoSQL cluster deployment & validation & Fault Tolerance

1. Deploy your NoSQL cluster (e.g. with *master, primary, slave, replica...*) and investigate/describe its features.
2. Validate all the features by operating with some dataset. Create new nodes/ destroy one...
3. Describe and validate the election process of the primary.
4. Destroy the nodes and describe what will happened?
5. Try to add new nodes after cluster is created, show them. How hard is it?

Bonus: deploy your NoSQL Cluster as Ansible roles.