

Bachelor's Thesis

**Applying GitOps principles to a cloud-native application**

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Start date: March 2023

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Dynatrace developed an intentionally insecure internal microservices application that is used to research Kubernetes security and demonstrate the security scanning capability of their platform. Currently, this application is deployed manually using the Skaffold tool to create and deploy multiple microservices in Kubernetes.

GitOps is an alternative method of implementing continuous deployment for cloud-native applications.

In a GitOps approach, each software or infrastructure component is treated as one or more files in a version control system (VCS). In addition, an automated process is in place for state synchronization between the VCS and the runtime environment.

With GitOps, changes to infrastructure code are now traceable and require review and approval by other developers before being merged into the main branch, resulting in less error-prone code. Another benefit is that a continuous integration (CI) pipeline can now automatically test this modified code, further preventing defects. After merging, a continuous delivery (CD) tool can now pull the new configuration and automatically apply it to the cluster.

Goals of this thesis:

- Research a realistic and up-to-date DevOps workflow that makes life easier for developers who simply want to push code and see automated deployments.
- Apply these findings to Dynatrace's internal microservices application and set up a DevOps workflow.
- Research and develop tests for the new CI/CD pipeline.
- Since GitOps operators need many (elevated) privileges to do their jobs, explore and document potential new security risks.

Modalities:

The progress of the project should be discussed at least every four weeks with the advisor. A time schedule and a milestone plan must be set up within the first four weeks and discussed with the advisor. It should be continuously refined and monitored to make sure that the thesis will be completed in time. The final version of the thesis must be submitted not later than 31.08.2023.