

IT Capstone Topic Approval Form

The purpose of this document is to help you clearly explain your capstone topic, project scope, and timeline and to ensure that they align with your degree emphasis. Without clearly addressing each of these areas, you will not have a complete and realistic overview of your project, and your course instructor cannot accurately assess whether your project will be doable for the purposes of these courses.

Of course, if this a project that you have already completed at work or elsewhere, this should be easy to fill in! Most students use a project that they have already completed in the past year or two. In that case, you will write the proposals (Tasks 1 and 2) as if the project has not been done yet, and Task 3 as the complete post-implementation report.

Complete this form and send it (via UGCapstoneIT@WGU.edu) to your course instructor for approval. Once approved, you will receive a signed document in PDF format that you can upload as part of Task 1.

DEGREE EMPHASIS: Bachelor of Science, Cloud Computing

ANALYSIS:

Project Topic – Installing and configuring Prometheus and Grafana to monitor a Kubernetes-based Machine Learning pipeline for AstroMined Labs.

Problem Statement or Project Purpose – AstroMined Labs is a stealth startup that is developing machine learning models to analyze satellite data about asteroids to determine the feasibility and viability of mining these asteroids for natural resources. They are ready to operationalize their models, and they plan to use Kubeflow to manage their Machine Learning pipelines. Kubeflow is based around a highly scalable and elastic framework using Kubernetes to orchestrate Docker containers. AstroMined Labs has limited experience operating a large Kubernetes deployment, so they have contracted with our organization, KubeOps, to provide observability regarding the performance of their deployments with Prometheus and Grafana.

DESIGN and DEVELOPMENT:

Project Scope

- a. Project Goal(s) and Supporting Objectives –
 - i. Work with the ML Ops team to determine the architecture for their planned ML Pipeline
 - ii. Inventory all current servers, network gear, and cloud accounts.
 - iii. Install and configure the Prometheus Server and supporting architecture.
 - iv. Install and configure the Grafana Server and supporting architecture.
 - v. Install and configure Prometheus alerting with Alertmanager.
 - vi. Automate the creation of sidecar container agents so that every server, node, pod, and container in the environment is monitored.
 - vii. Configure alerts, reports, and dashboards for the ML Ops team.
 - viii. Fully document the Prometheus and Grafana system and train the ML Ops team on its use.

- b. Project Outcomes and Deliverables –
 - i. Automated monitoring of the ML Pipeline architecture
 - ii. Dashboards for real-time observability and reporting for analyzing historical data
 - iii. Alerting to keep the ML Ops team aware of potential hazards that could lead to downtime
 - iv. Full documentation and training
- c. Projected Project End Date – Full implementation of all of the project goals will take 6 weeks after project kick-off. Our target date for completion is April 30, 2022.

IMPLEMENTATION and EVALUATION:

Describe how you will approach the execution of your project – First, KubeOps will collaborate with the ML Ops team to determine the ML Pipeline architecture used. We will then inventory all current servers, network equipment, and cloud accounts. Following that, we will install and configure the Prometheus, Alertmanager, and Grafana servers and the supporting infrastructure. The following step is to automate the creation of sidecar container agents that will monitor every server, node, pod, and container in the environment. After the system ingests metrics, we will configure alerts, reports, and dashboards for the ML Ops team. Finally, we will document the Prometheus and Grafana systems in detail and train the ML Ops team on how to use them.

☒ **This project does not involve human subjects research and is exempt from WGU IRB review.**

COURSE INSTRUCTOR SIGNATURE:

COURSE INSTRUCTOR APPROVAL DATE: April 12, 2022

