Individual Contribution to Kubernetes Capstone Project

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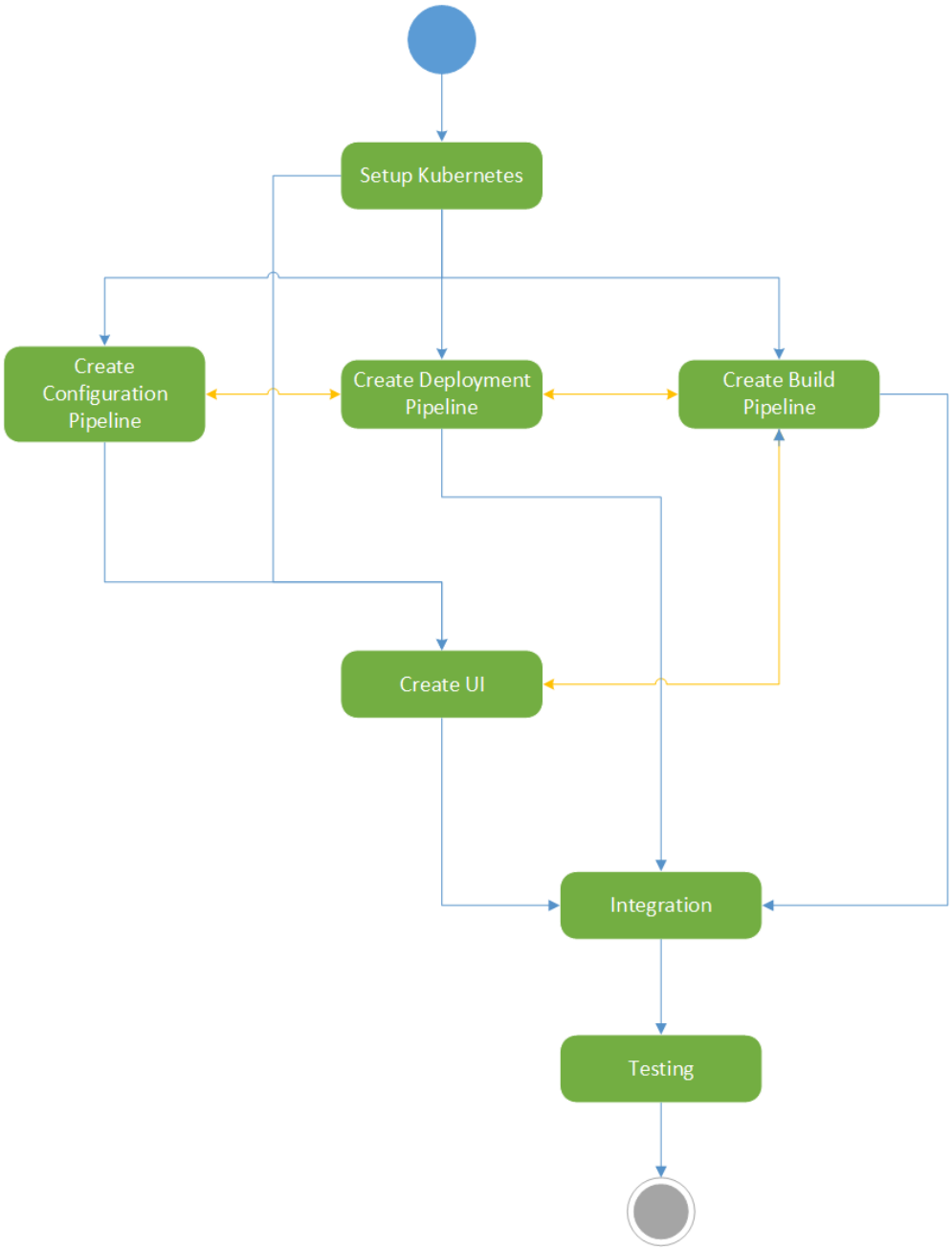
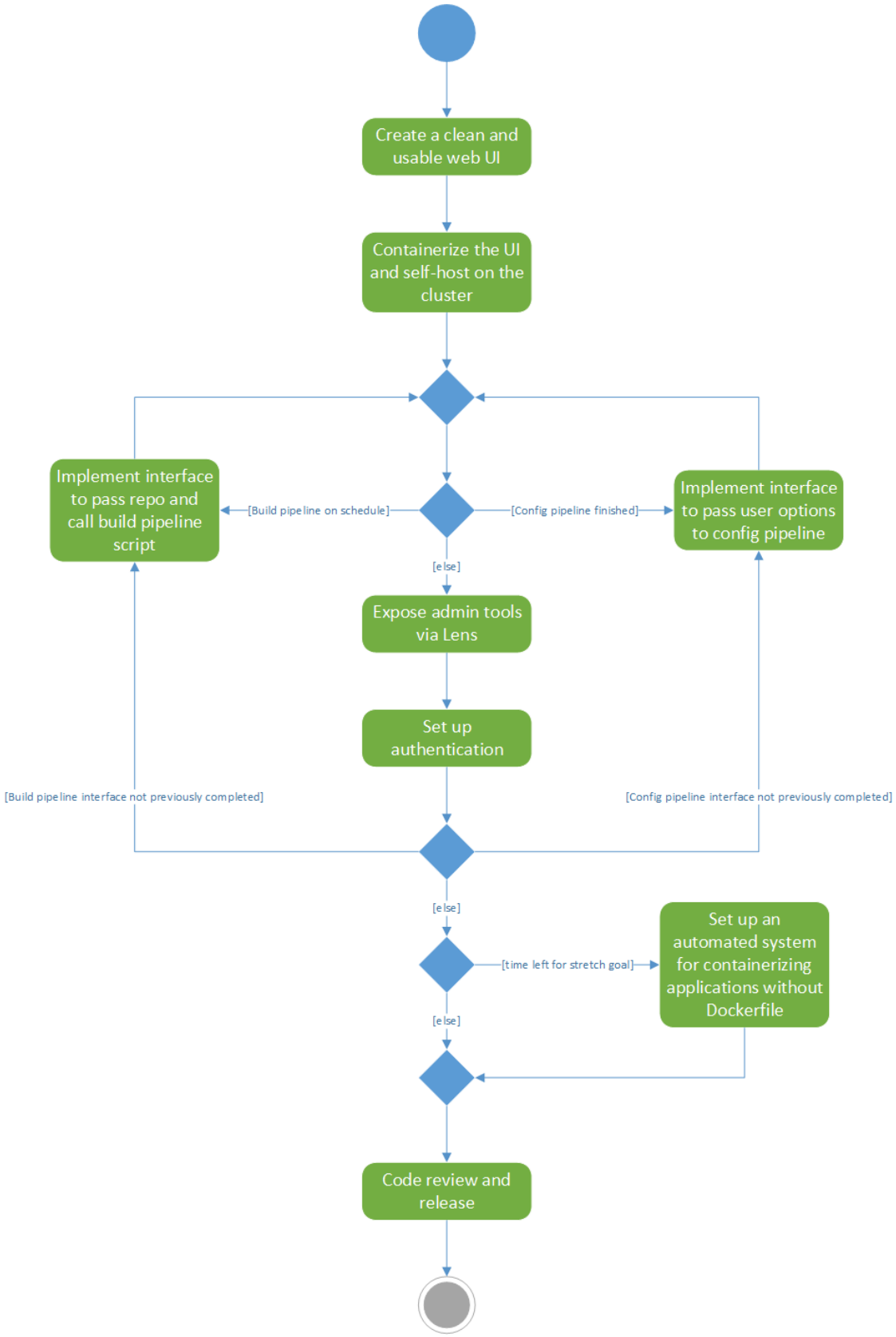
Section 1: Process Flows

Overall System: (Yellow lines indicate flexible integration rather than strict dependency)



Pipeline UI:


Create a clean and usable web UI
Containerize the UI and self-host on the cluster
Implement interface to pass repo and call build pipeline script
[Build pipeline on schedule]
[Config pipeline finished]
Implement interface to pass user options to config pipeline
[else]
Expose admin tools via Lens
Set up authentication
[Build pipeline interface not previously completed]
[Config pipeline interface not previously completed]
[else]
[time left for stretch goal]
Set up an automated system for containerizing applications without Dockerfile
[else]
Code review and release

Section 2: User Stories

User Story #1:

As a user,
I need to pass an application to the pipeline through the UI
So that I don't have to spend time containerizing or setting up deployment to Kubernetes.

User Story #2:

As a user,
I need to access data and interact with the deployed applications in an intuitive way through the UI
So that I can more efficiently work with my applications without needing to interact directly with Kubernetes.

User Story #3:

As a user
I need security protecting the pipeline UI
So that only authorized individuals may modify or add services to the Kubernetes cluster.

User Story #4:

As a developer
I need certain settings from the user when passing an application
So that it can be deployed to Kubernetes properly.

User Story #5:

As a sponsor
I need a clean and usable UI for accessing the pipeline
So that it is easy to use and understand for users who may not have in-depth knowledge of Kubernetes or Docker.

Section 3: Personal Iteration Plan

I have decided to begin this section of the project at the start of winter term and I estimate it to require all of sprint 4 and 5 (1/3 to 2/13). My current estimates for the different sections of the project are as follows:

- Create a clean and usable web UI **(3-6 days)**
- Containerize the web UI and self-host on the cluster **(1 day)**
- Create an interface to pass applications as well as necessary configuration settings to the pipeline for deployment **(3-6 days)**
- Expose admin tools, such as Lens IDE **(2-7 days)**
- Set up authentication **(3-5 days)**

- Set up an automated system for containerizing an application to be passed to the pipeline that is not yet containerized **(2-4 days) [stretch]**
- Code reviews and release **(4-5 days)**

As with every section of this project, my team and I will break these tasks down into smaller chunks as the need arises to split up work.

A few parts of this section are interconnected with other parts of the project. While most can be integrated while being developed in parallel, there are three aspects of the project that need to be completed before I can begin development.

The first requirement is that Kubernetes and Docker need to be installed and set up on the devices, as I will be containerizing the UI and hosting it on the cluster. This should be completed well before I begin work on the UI as all other sections of the project depend on this being complete.

The second requirement is that the config pipeline section of the project must at least have the required user inputs defined, so that I can create the form to input the user's options. Ideally, the config pipeline should be completed so that I can quickly begin work on passing the user options to it, but this is more flexible and can be moved around if the config section of the project is delayed for some reason.

The third requirement is that Kubernetes Lens must be installed and connected to the cluster. Right now, the details of this are currently uncertain, as we are researching how exactly we intend to connect it and expose it via the UI. This research needs to be completed and Lens set up before sprint 5, when I begin working on that portion of the project.

Additionally, there is some research that I must do prior to beginning this section of the project. This research includes deciding on a web framework for the UI, how to connect and expose information about Kubernetes and its services as well as admin tools through Lens, and how security and authentication should be implemented. I plan on working on this research during sprint 3 and winter break. During this time, I will also help my team members with setting up Lens and working on the Kubernetes configuration pipeline, as both are involved with my section of the project. However, it is unlikely I will be able to help the other sections of the project much, as I have the longest section of the project, and will therefore be relying on the help of others who finish their parts first instead. After my section is done, we will all be working together on finishing the integration and testing the entire pipeline, as well as making any changes necessary to improve and refine the product.

Section 4: Solution Architecture

It was decided to deploy the UI as a Docker container like any of the other services that run on Kubernetes so it can take advantage of the pre-existing infrastructure to deliver the service.

The Lens IDE was suggested as a way to display a dashboard for controlling the cluster by the project partner. However, if a better solution is found during research, it is possible that it may be replaced.

The method of authentication has not yet been decided, and will have to be researched, however simply opening up the pipeline UI to any connection is a security risk, and thus some sort of login is necessary.