3000 – INFT Capstone

Kubernetes Server Project – Updated Milestone Report



Date: 2025-02-27

Name: Pod 5 AKS Avenger

Section: 700

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# Summary

The project has been moving forward, and while we successfully hit key milestones, several impediments were faced by the team. Early on, we faced Azure permission problems and disruptions caused by 2FA, which delayed certain tasks and created access issues within our Kubernetes cluster. VM corruption has been a recurring issue, forcing us to rebuild the Kubernetes server multiple times. These setbacks were kind of frustrating as they consumed valuable time and delayed our migration plans (V2P).

Communication challenges arose, especially for the hardware setup for the physical server. Coordination was needed to ensure all team members are aligned on tasks requiring extra effort and planning. Regardless we are moving forward with planning by early March. Stabilizing the Kubernetes cluster has been another ongoing struggle, with periods of instability that required troubleshooting to prevent freezing and crashes.

Even with these impediments, we’ve made good progress. The team’s efforts have kept the project on track, and we’re now ready for official implementation, including testing the Kubernetes cluster on the physical server and completing the documentation by early April. These challenges have certainly tested us, but they’ve also strengthened our knowledge of Kubernetes as a service.

Throughout our milestones we have achieved, each member has contributed in their own way, Franklin was primarily responsible for creation of Kubernetes VM and the configuration of the VM server settings and worked alongside Evan to create the user accounts with permissions and azure arc environment. Kyle has been very resourceful in coordinating how the physical server will be setup, as well as helping with research for hardware requirements and has worked with Jack to ensure proper monitoring and logging along with documentation.

# Things That Went Well

The team successfully set up Kubernetes on the virtual machine (VM), installed and ensured the Kubernetes service ran smoothly, providing a foundation for key milestones such as network configuration, user configuration, and workload deployments. We confirmed the system's functionality by deploying test workloads on the Kubernetes cluster. We have been preparing to migrate our VM server to a physical server, the team has been collectively making sure that all important steps to follow are considered for backup and migration to ensure that the server will be ready for physical implementation.

# Things That Could Have Gone Better

Challenges like Azure permissions issues and 2FA disruptions caused delays in accessing the Kubernetes cluster. VM instability, including corruption, required rebuilding the server multiple times, affecting timelines. Troubleshooting Entra ID access and team inexperience with the tools added confusion. Attendance issues and hardware delays during the physical server setup also slowed progress. Addressing the Azure issues earlier would have improved efficiency.

# Updated Milestone Report

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| --- | --- | --- | --- | --- | --- |
| **Milestone No.** | **Milestone** | **Mandatory/Optional** | **Requirement** | **Completion Date** | **Verification** |
| 001 | Research Kubernetes Server requirements | Mandatory | Study Kubernetes and AKS documentation online | Jan 14th, 2025 | Confirm with team documentation |
| 002 | Set up development environment | Mandatory | Install necessary tools like linux VM and Minikube/ microk8s | Jan 21st, 2025 | installations are functioning and running |
| 003 | Install Kubernetes on VM | Mandatory | Install and configure Kubernetes on the VM | Jan 28th, 2025 | Verify Kubernetes service is running and actively connected to Azure Arc cluster |
| 004 | Configure Kubernetes network | Mandatory | Set up basic network addressing for pod communication | Feb 4th, 2025 | Verify network addressing with test workloads |
| 005 | Configure Kubernetes cluster users | Mandatory | Create and assign roles and permissions | Feb 11th, 2025 | Confirm using Kubernetes dashboard |
| 006 | Test Kubernetes workload deployment | Mandatory | Run and verify a test workload with deployment | Feb 18th, 2025 | Validate workload deployment functionality |
| 007 | Set up persistent storage for Kubernetes | Mandatory | Configure and test persistent storage volumes | Feb 25th, 2025 | Validate storage with a persistent test pod |
| 008 | Prepare for VM to physical server migration | Mandatory | Back up Kubernetes server and prepare migration | Mar 3rd, 2025 | Backup and migration tools and settings are ready |
| 009 | Perform VM to physical server migration | Mandatory | Migrate VM state to physical server | Mar 10th, 2025 | Confirm physical server running Kubernetes |
| 010 | Test physical server Kubernetes cluster | Mandatory | Run test workloads on physical server | Mar 17th, 2025 | Workloads running on physical server |
| 011 | Optimize Kubernetes cluster performance | Mandatory | Adjust resource allocation for efficiency | Mar 24th, 2025 | Compare performance metrics to previous VM state as well as hardware limitations |
| 012 | Manage Kubernetes pods and workloads | Mandatory | Utilize Kubernetes tools to manage pods, workloads, and services | Mar 31st, 2025 | Performing management using built-in tools |
| 013 | Conduct final review and documentation | Mandatory | Compile project documentation and conduct review | Apr 2nd, 2025 | Review completed documentation with the team |