

Case - Maersk, Designing for Reliability

Congratulations! You have been tasked with a big SRE assignment at Maersk!

Key learning objectives:

- Architect for reliability in the cloud
- Define reliability and how to measure it / its properties
- Set reliability objectives and ensure they are monitored and traceable
- Keep things simple when a lot is changing at the same time

Context assignment

Maersk has its ambitions to make teams end-to-end responsible in developing, delivering, and operating their application and services, and embed a culture that puts reliability at the centre of its thinking. The realization of these ambitions has already started by transforming selected department. These departments have changed their way of working and adopted DevOps teams and Agile/Scrum. Next to the organisational changes a big IT transformation has started which has selected Azure Cloud as the migration target on the technology side.

Management has asked you to help the team who is responsible for setting up the new cloud environment and to ensure its reliability. From the past issues, with the current system Management is worried the same (anti-)patterns will emerge during the cloud migration. Their concern is not only purely technical in nature, as they have observed lengthy and fragmented processes in operations – causing friction within and between teams, as well as measurable business impact due to the length of the outages. On the other hand, there's no insight into the costs of migrating to the cloud, as there's no architectural overview available that defines the setup and services to be used – therefore no financial estimates can be made at this point.

Together with the teams, you are tasked to draw up an architectural design and a proposal to improve the reliability of the system using the benefits of cloud computing. The management team would like to see what tools you would like to use and what stability patterns they provide.

Current objectives

You are asked by the management team to present your roadmap for the migration in a short pitch during their quarterly planning session. You need to be able to present an architectural overview to management and elaborate on the design decisions you've made and how they improve reliability. Since one of the concerns of management is related to business continuity, you also need to elaborate on how the teams will be able to on-board to the new environment and run their production systems

The Teams

The Azure Cloud team – is responsible for setting up the new environments in Azure Cloud. The team consists of 6 engineers with various technical backgrounds, a Product Owner and a business analyst allocated by finance to help figure out the migration costs based on the setup, services, and the availability requirements. Since the name-of-the-game is Kubernetes these days the team is exploring its options to run cluster in Azure, figuring out the provisioning and configuration of the resources. Most engineers of the team have worked with Docker before but are new to using Kubernetes. A Proof of Concept is running for the new set up in the cloud and has shown several results already: 1. The current setup for monitoring via Datadog can work for the cloud monitoring, 2. Azure DevOps is used as deployment pipeline but not a lot of reliability measures are set, 3. Most teams are migrating via a lift and shift, 4. The cloud team is doing a lot of manual onboarding.

The CI/CD team – is responsible for the setup and configuration of the pipelines, including the setup of required service connections to deploy to Azure and interact with other applications and/or services that are part of the landscape. The team already decided they would like to move their CI/CD pipelines to Azure DevOps.

The Database team – is responsible for the migration of the Oracle DB & MySQL databases to Azure SQL Databases. They are doing a lift-and-shift migration as there are tools and processes available from Azure to help client move their database workloads to the cloud. They have run in to several problems due to the complexity and size of their landscape in the first face of the migration. The Product Owner of the team has therefor requested to have a clear indication on how the platform can services their needs. Also, the team has run in to some platform limitations during their first face migrations. The team expected the response time of the Azure DBs to be 10ms but they saw theirs were over 200ms. The advisor of the Azure cloud team suggested more capacity, but the budget doesn't allow this upgrade. The team needs your help on deciding what they can do to reduce the response time without receiving more capacity.

The Application teams – are responsible for the migration of their applications/services to the new target environment and technology: Azure Cloud and Kubernetes. They have the domain expertise to re-architect the application, but they are not used to running their own applications in any environment, let it be on-premises or cloud. Applications are deployed and run by the Operations team.

The Operations team – have a Datadog set-up and have already concluded a Proof of Concept (POC) with as their tool of choice for monitoring the Azure environment. They have proven that the teams are able use the current set up and solution in the cloud and are working with the CI/CD team on how to migrate the current production systems in an efficient way for the application teams.

Challenges

Your pre-investigation has discovered several challenges in the organisation:

- You discovered that the Azure Cloud team engineers have none to limited Kubernetes experience in production.
- The application teams have no clear roadmap on when they need to move their applications. The Azure cloud team therefore is worried that they will all request assistance at the same time which causes a lot of manual work.
- Not all application teams are able to access the monitoring data of their applications. They are highly dependent on the availability of the Operational team during incidents.
- Financial picture is very important for to control the costs of the new cloud environment. Management want to know how you are going to monitor and register these costs.
- Management doesn't allow any applications/services to migrate without the reliability measures defined and monitoring in place to track the objectives
- Management doesn't allow any applications/services to migrate without proper overview, monitoring and forecasting of associated costs

Assignment Limitations

- No hiring, no firing
- No manual tasks
- Datadog is chosen as the monitoring solution
- Kubernetes is the platform of choice in Azure
- Azure SQL DB is chosen as DB solution
- Budget limitations can not be resolved by getting more budget

During the process of resolving this case, you may use your personal experience and references to make assumptions about Maersk set-ups, tooling and processes.

In case you have any questions or need additional information please email to: bnagy@xebia.com