

# Refuelling Gas Company establishes Microservices architecture - Case Study



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## Introduction

Last minute fuel emergencies are a common hiccup. Our client, an online gas refuelling service provider, is a pioneer in pacifying this very glitch in planning. Provider of an online gas delivery application that allows users to get their vehicles fuelled without having to stop at the next gas station. The company's application allows users to schedule a gas truck to fill their car's tank ahead of time, avoiding last-minute chaos and allowing users to fill their car's tank at competitive, comparable, or lower rates than other gas stations. It is an app that operates through mobile and delivers fuels straight to its users anytime & anywhere.

Given company's highly technical and ambitious mission, the start-up needed to leverage the cloud to achieve maximum chances of success in today's competitive landscape.

Fortunately, AWS and Applied Cloud Computing had the cloud solutions and implementation experience to help the start-up realise its vision.

## How Does the Fuel Delivery Industry Work?

Because it is a new business, this is the most common question.

Customers will have your fuel-delivery app; they will use it to order fuel when they run out or to pre-schedule it.

Your verified vendors will be notified, and the fuel-delivery truck will navigate to the users' location using the app.

When users are in a hurry to get somewhere, having fuel delivered to their location saves them a lot of time because they don't have to wait in long lines at gas stations.

Furthermore, it ensures that users will not get stuck while driving.



## The Challenge

Since the Start up's business model is based on cutting-edge technology, the start-up's leaders recognised that the quickest path to market involved using the cloud. Fortunately, the leaders were already familiar with Amazon Web Services (AWS) and recognised that the provider provided the most comprehensive suite of cloud and edge infrastructure solutions available today.

The only remaining question was whether an AWS Premier Consulting partner could assist in implementing the architecture that the start-up's small development team had already designed internally. Applied Cloud Computing integrated seamlessly into the project, allowing the start-up to embark on exciting development journey.

## The ACC Solution

Our team meticulously collaborated with the start-up to develop a comprehensive understanding of their business objectives, functional requirements, and systems.

ACC brought to the project a well-balanced, technically savvy team that fit right into the start-up's strategic roadmap.

For the start-up's modernization project, ACC used a variety of AWS services and cloud technologies. At the most basic level, the start-up's solution must include –

1. Robust security features & WAF implementation
2. DevOps & Cloud Native
3. Efficient CI/CD process
4. AWS Elastic container Service for Kubernetes
5. Microservices Architecture
6. Disaster Recovery

## Robust Security features

ACC's team of architects started by creating a landing zone based on AWS best practises.

The landing zone would be used to lay the groundwork for networking, security, management, and governance.

It had to include security controls such as identity and access management (IAM). AWS Key Management Service (AWS KMS) enables you to easily create and manage cryptographic keys, as well as control their use across a variety of AWS services and in your applications. Hence, KMS was used to perform encryption for Data at rest and data in transit



## DevOps & Cloud Native

DevOps is a set of cultural philosophies, practises, and tools that improves an organization's ability to deliver applications and services at a high rate. DevOps automation principals for agility, speed, control, and compliance were used.

ACC used AWS Control Tower to manage multiple AWS accounts and enable single sign-on (SSO) using a cloud-native directory.

Control Tower enables users to define organisation and account hierarchies in order to separate applications and environments in use, which was critical for the client.

## Efficient CI/CD Process

### What is Continuous integration/continuous delivery (CI/CD) Pipeline?

A CI/CD pipeline is a set of steps that must be completed before delivering a new version of software. Continuous integration/continuous delivery (CI/CD) pipelines are a practise aimed at improving software delivery through the use of either a DevOps or a site reliability engineering (SRE) approach.

A CI/CD pipeline adds monitoring and automation to the application development process, particularly during the integration and testing phases, as well as during delivery and deployment.

Although each step of a CI/CD pipeline can be performed manually, the true value of CI/CD pipelines is realised through automation.

For each and every service that will be implemented in their infrastructure, ACC built Proof of Concept (POC) with some pre-defined CI/CD use cases in mind.

The possible steps involved in a CI/CD pipeline are as follows:

**Build:** This phase is considered continuous integration and involves the creation and compiling of code. Teams build off source code collaboratively and integrate new code while quickly determining any issues or conflicts.

**Test:** At this stage, teams test the code. Automated tests happen in both continuous delivery and deployment.

**Deliver:** Here, an approved codebase is sent to a production environment. This stage is automated in continuous deployment and is only automated in continuous delivery after developer approval.

**Deploy:** Lastly, the deployment of the final product into production takes place. This stage is automated and occurs in continuous deployment. In continuous delivery, products or code are sent to repositories and then moved into production or deployment by human approval

## Microservices Architecture

The current architecture of the app is monolithic, and is proposed to change it to Microservices architecture. The old monolithic architecture, made it difficult to scale and manage the users, hence, the architecture will be upgraded to Microservices architecture. All the infrastructure will be provisioned through **Infrastructure as codes**;

### What is Infrastructure as codes? (IaC)

**Infrastructure as code (IaC)** is a method of managing and supplying computer data centres using machine-readable definition files rather than physical hardware or interactive configuration tools.

### What is a Monolithic architecture?

All processes in monolithic systems are tightly connected and run as a single service. This means that if demand spikes in one of the application's processes, the entire architecture must be scaled. Adding or adding features to a monolithic programme becomes increasingly difficult as the code base grows. This intricacy restricts experimentation and makes implementing new ideas difficult. Because there are so many reliant and tightly coupled processes in monolithic designs, a single process failure has a greater impact.

### What is a Microservice architecture?

An application created with a microservices architecture is made up of independent components that operate each application process as a service. These services communicate via lightweight APIs and a well-defined interface. Services are designed to support business capabilities, and each one serves a single purpose.

### Benefits of microservices over Monolithic architecture

- It is simple to manage because it is tiny in size.
- If one of the microservices has to be updated, we must just redeploy that microservice.
- Microservices are self-contained and so deployable on their own. Their start-up and deployment times are significantly shorter.
- It is very simple for a new developer to join the project because he only needs to grasp one microservice that provides the functionality he will be working on, rather than the entire system.
- If a given microservice is experiencing high traffic as a result of users abusing its capability, we must scale out that microservice alone. Microservices design thus allows for horizontal scaling.
- Depending on the business requirements, each microservice can employ a different technology.

## AWS Elastic container Service for Kubernetes

The orchestration of microservices would be handled by **k8s/Eks**

**Kubernetes**, often known as **K8s**, is an open-source system for automating containerized application deployment, scaling, and management.

**The Amazon Elastic Kubernetes Service (Amazon EKS)** is a managed Kubernetes service that makes running Kubernetes on AWS and on-premises a breeze. Kubernetes is an open-source framework for automating containerized application deployment, scaling, and administration. Because Amazon EKS is certified Kubernetes-compliant, current Kubernetes-based apps will work with Amazon EKS.

## Disaster Recovery

A complete shutdown, loss of access to critical systems and important data, and a delay in responding to customers and vendors can all have a negative impact on an organization's revenue, productivity, and reputation. IT is an essential component of business resilience and continuity, and it is critical that you develop and implement IT disaster recovery plans to protect your operations from downtime and data loss.

That's when the disaster recovery module will help us.

AWS Elastic Disaster Recovery (AWS DRS) reduces downtime and data loss by providing fast, dependable recovery of on-premises and cloud-based applications through the use of inexpensive storage, minimal compute, and point-in-time recovery.



## How ACC helped the company?

The organisation transforms its monolithic design with an agile, cloud-based microservices architecture with the help of ACC. Thanks to the sophisticated AWS platform and its numerous advanced cloud computing capabilities, the app can now scale to meet its ambitious growth goals.

The new IT environment adheres to AWS best practises, allowing the development team to quickly design, deploy, and scale mission-critical apps.

The company's new CI/CD pipeline is extremely efficient, which is critical for making rapid upgrades to its users' services. The customer now has all of the cloud infrastructure and tools necessary to provide outstanding services to its users and stay ahead of the competition.

The engineers at ACC first examined and evaluated the current architecture and validated that with the current Monolithic architecture, the start up will not be able to scale once its user base increases.



Applied Cloud Computing (ACC) is an advanced AWS consulting partner. ACC accelerates end-to-end cloud adoption with the best implementation services, software and processes available.

To learn more, go to : [www.appliedcloudcomputing.com](http://www.appliedcloudcomputing.com)

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