

# Serverless DevOps

AWS DevOps Serverless Application  
Automotive Customer

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## CUSTOMER — International automotive OEM

The customer is an international OEM with a global customer-focused web presence. The website addresses all kinds of offers, including those from the after-sales department. Our solution seamlessly integrates a valuable offer for all customers who want to calculate upcoming service scopes for their car and get a quote from their dealer. In addition, a non-binding appointment request can be sent to the desired workshop.

## CHALLENGE — It's all about adaptability

With a limited budget and the prospect of global expansion once the idea proved viable, the client faced numerous obstacles. How could they develop a cost-effective minimum viable product (MVP) that would work efficiently with a smaller user base after launch? Moreover, how could the application be easily scaled to accommodate a growing user base or easily deployed in new markets? On top of that, the solution must collect data from a variety of legacy on-premises systems, utilize multiple API technologies, and have increased response times. Taking all of these requirements into account, it became clear that a highly adaptable solution was critical to the product's success.

Understanding the requirements, MHP was tasked with delivering a customized solution and operational model to meet these needs. Leveraging MHP's extensive cloud experience, the stated requirements, and additional insight into the client's strategic direction and security needs, MHP was able to propose an initial solution that led the client to select MHP as their implementation partner. Given the familiarity with AWS' flexible architectural methodologies and the client's strategic decision to run workloads on AWS, the decision to move forward with AWS was finalized.

## SOLUTION — Fast and automated deployment with modern methods

MHP assembled a group of developers and an architect to design, implement, and manage the solution in close partnership with the client's business team. To meet the client's needs, MHP recommended a serverless approach, which provided a lightweight start with minimal cost and increased adaptability. The solution also leveraged AWS services for monitoring and logging, enabling rapid response to unforeseen events in the environment. To accelerate time to market for new features after the MVP launch, continuous integration and continuous deployment (CI/CD) was used. CI/CD facilitated the complete automation of testing and building the customer's front-end application.

Using the AWS Cloud Development Kit (CDK) and Lambdas written in a scripting language, the backend deployment is also fully automated. To maximize the potential of this foundation, MHP and the client established weekly meetings with all stakeholders involved in the development and release of new features for the application, including developers, architects, and the client's IT and business departments. This arrangement allows the customer to release non-critical features on a weekly basis, while critical features, such as those related to security, are deployed immediately after development.

The web application follows AWS serverless best practices and takes full advantage of serverless services. The front-end is hosted on S3 with a CloudFront distribution in front of it. This arrangement has the advantage of not requiring a running service, keeping costs low. CloudFront allows the application to be deployed to new markets without additional configuration. Communication between the front-end and back-end follows loose coupling best practices using HTTPS and connects to an API Gateway that provides the essential endpoints for the front-end.

The API Gateway integrates with an Express StepFunctions that orchestrate multiple Lambdas. Additionally, it integrates with several Lambdas, that act as proxy to on-premise systems where the required vehicle data is stored. One challenge with this communication is the high and unpredictable response times of some of the legacy systems. To address this issue, DynamoDB is used to cache the vehicle data of those endpoints. All services are configured according to AWS best practices, including operations and monitoring.

The final product is using the following services:

- **GitHub + GitHub Actions** as VCS and CI/CD pipeline for automatic deployments
- **Amazon S3** for storing the frontend

- **AWS CloudFront** for delivering the frontend to end-users
- **AWS API Gateway** that acts as Backend API and enabled logging and monitoring for user specific data
- **AWS Lambda** for business logic and interaction with the on-premises systems
- **AWS StepFunctions** that implement business logic and allow performance and error monitoring
- **AWS X-Ray** integrated into StepFunctions to allow detailed monitoring
- **AWS DynamoDB** to cache data and do further analysis on the consumed data
- **AWS CloudWatch** for logging, monitoring metrics and alarms

A key customer requirement is the flexibility of the solution to quickly adapt to new requirements. This aligns seamlessly with MHP's DevOps methodology, ensuring close collaboration between all stakeholders and the establishment of operations and monitoring for rapid feedback. The organization of weekly meetings is essential to promote active stakeholder engagement and provide timely feedback. This arrangement also ensures rapid adaptation to changing requirements. To deploy such changes, CI/CD automation is essential.

Using GitHub together with GitHub Actions allows you to take full advantage of version control systems and ensure seamless collaboration between multiple developers. It also transforms the testing and deployment of the application from a manual step for developers to a fully automated process. A key benefit is the ability to demonstrate new features to customers as soon as they are developed. Deploying the Cloud Development Kit (CDK) as Infrastructure as Code (IaC) helps ensure a secure and consistent infrastructure deployment.

Once new features are approved by clients during synchronization meetings, they go live within minutes. If they fail, a rollback to the previous release or, depending on the complexity of the problem, a fix is available within minutes. Following the release, monitoring is performed to evaluate new features and potentially modify them for the next sprint. This cycle of requirements, development, release, and operations enables the customer to quickly release new features and adapt the existing application to new environments. It also allows the customer to go live in new markets without changing the cloud infrastructure.

## OUTCOMES – A Viable Living Product

By constructing a serverless architecture employing a DevOps approach, MHP successfully developed a cost-effective, highly adaptable web application. This ensures that new features requested by clients, as well as essential fixes to the application, can be deployed within minutes as needed. Furthermore, the application can be launched in new markets or regions within the same brief timeframe. With monitoring in place and an established communication chain, all vital information is promptly distributed among relevant stakeholders.

A weekly meeting involving business, IT, architects, and developers guarantees a rapid development cycle for new features. Additionally, the integration of monitoring, Infrastructure as Code (IaC), and Continuous Integration and Continuous Deployment (CI/CD) provides all stakeholders with immediate feedback on the environment's activities.

## ABOUT THE PARTNER - "ENABLING YOU TO SHAPE A BETTER TOMORROW"

Functioning as a technology and business partner, MHP digitalizes its customers' processes and products, and guides them through IT transformations along their entire value-creation chain. MHP is a digitalization pioneer for the mobility and manufacturing sectors with expertise that can be transferred to a wide range of industries. MHP is a distinguished AWS partner, currently holding the Advanced tier status and offering Consulting as well as Software services to its customers. Additionally, MHP is a member of the APN Immersion Day program as well as AWS Well-Architected Partner and to date obtained 10 AWS Service Delivery Program Validations (SDPs), two of which MHP achieved as a launch partner.

MHP serves over 300 customers worldwide, including large corporations and innovative SMEs. MHP advises on both operational and strategic issues, offering proven IT and technology expertise as well as specific industry know-how. MHP operates internationally as OneTeam with headquarters in Germany and subsidiaries in the USA (since 2011), UK (since 2016), Romania (since 2014), and China (since 2013).

The MHP Group has been shaping the future alongside its customers for over 25 years. The MHP team of over 3,300 employees is united by the company's promise of excellence and sustainable success. This promise continues to drive MHP – today, tomorrow, and in the future.

"MHP: DRIVEN BY EXCELLENCE."