MHP
A PORSCHE COMPANY

Serverless DevOps

AWS DevOps Serverless Application

Automotive Customer

AWS Serverless DevOps

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 offering for all customers who want to sell or buy their cars into our customer's existing web presence. It allows customers to get verified and detailed information about their cars that was previously only partially available on unverified third-party sites. It also allows our clients to offer automotive services, accessories and financing options for their customers' current or future used cars. The customer who owns a used car also has the option to create a listing page for their car to share with potential buyers. In addition, the site provides additional existing similar car listings with dedicated car resellers.

CHALLENGE — It's all about flexibility

With a limited budget and a potentially global rollout once the concept has proven itself, the customer faced several challenges. How do you build a MVP that runs cost-efficient after go-live with a lower user number? And how can you scale this application without much effort to serve higher user number or roll out easily in new markets? In addition, the solution must collect data from different legacy on-prem systems, using different API technologies and higher response times. With all these requiremens, it came clear that a highly flexible solution is the key for a successful product.

Knowing the requirements, MHP was consulted to provide a solution and operation model that fit these requirements. Based on MHPs cloud experience, the provided requirements and MHPs additional knowledge about the customers strategic alingnment and security requirements, MHP was able to provide a first solution proposal, that convinced our customer to proceed with MHP as implementation partner. Knowing the capabilities of AWS in regards to flexible architecture approaches, and the strategic decision of our customer to run workloads on AWS, the desicion to move forward with AWS was finalized.

SOLUTION — Fast and automated deployment with modern methods

MHP provided a team of developers and an architect to design, implement and operate the solution in close collaboration with our customer's business team. To meet our customer's requirements, MHP proposed a serverless approach. This allows us to start light, with low cost and high flexibility. The solution also used AWS services for monitoring and logging to quickly respond to unexpected events in our environment. To further reduce the time-to-market for new features after the initial MVP is released, CI/CD is used. CI/CD allowed us to fully automate the process of testing and building our customer's front-end application. Coupled with the AWS Cloud Development Kit (CDK) and lambdas written in a scripting language, the backend deployment is also fully automated. To fully leverage this foundation, MHP and the customer set up weekly meetings with all stakeholders relevant to the development and release of new features for the application. This includes developers, architects, and our customer's IT and business departments. With this setup, our customer is able to release non-critical features on a weekly basis, while critical features such as security related features are deployed immediately after development. In the following, we take a closer look at the architecture of the application.

The web application follows AWS serverless best practices, taking full advantage of serverless services. The front-end is hosted on S3 with a CloudFront distribution in front of it. This has the advantage that there is no service running, so the cost of storing the application is low. CloudFront gives us the ability to roll out the application to new markets without further configuration. Communication between frontend and backend follows loose coupling best practices using HTTPS. It connects to an API Gateway that provides all the necessary endpoints for the front-end. The API Gateway integrates with Express StepFunctions that orchestrate multiple Lambdas. Each StepFunction has its own purpose and provides different enriched data to the frontend. This requires each StepFunction to include a Lambda that communicates with our customers' on-premises systems where the required vehicle data resides. One challenge with this communication is the high and unpredictable response times of the legacy systems. To address this issue, DynamoDB is used to cache the enriched vehicle data. One of our customer's requirements is to implement an advanced authentication process for car owners to prove that they are the owner of the car and that no PII data is exposed to users who are not allowed to see it. For unauthorized users, only a small portion of the data is displayed in the frontend. For more data, a two-step authentication is required. First, the customer's public IDP is integrated into our backend to authenticate users. In a second (optional) step, MHP implemented a custom authorization solution using StepFunctions that allows users to authorize themselves to view more details about their car. This approach allows us to reuse the authorization StepFunction for all

endpoints. All services are set up according to AWS best practices. This includes 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 product to end-users
- **AWS API Gateway** that acts as Backend API and enabled logging and monitoring for users
- **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 requirement of our customer is the flexibility of our solution to quickly adapt to new upcoming requirements. This fits perfectly with MHP's DevOps methodology, which ensures that all stakeholders work closely together and that operations and monitoring are set up to provide quick feedback to everyone. Setting up a weekly meeting is crucial to ensure a lively exchange between all stakeholders and to provide feedback quickly. It also ensures rapid adaptation to upcoming changes in requirements. To deploy such changes, CI/CD automation is critical. Using GitHub in combination with GitHub Actions allows you to take full advantage of VCS, ensuring that multiple developers can work seamlessly on the project. In addition, testing and deploying the application is no longer a manual step for the developers, but is fully automated. A big advantage is the ability to showcase new features directly to the customer as soon as they are developed. Using CDK as an IaC helps to deploy the infrastructure in a secure and consistent manner. Once new features are approved by our customers in our synchronization meetings, they are deployed live within minutes, and in the event of a failure, a rollback to the previous version or, depending on the complexity, a fix for the failure is also available within minutes. Once the new release is live, monitoring is in place to evaluate the new features and potentially adapt new features for the next sprint. This cycle of requirements, development, release, and operations gives our customer the ability to release new features and adapt the existing application to new environments quickly. It also allows our customer to go live in new markets without changing the cloud infrastructure.

OUTCOMES –

By building a serverless architecture with a DevOps approach, MHP was able to create a low-cost, highly flexible web application. It ensures that new features requested by our customers, as well as critical fixes to our application, can be deployed within minutes when needed. In addition, the application can be released to new markets or regions in the same short time frame. With monitoring in place and a well established messaging chain, all necessary information is quickly shared with all relevant stakeholders. A weekly meeting between business, IT, architects and developers ensures a fast development cycle for new features. In addition, the combination of monitoring, IaC and CI/CD gives all stakeholders quick feedback on what is happening in our environment.

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."