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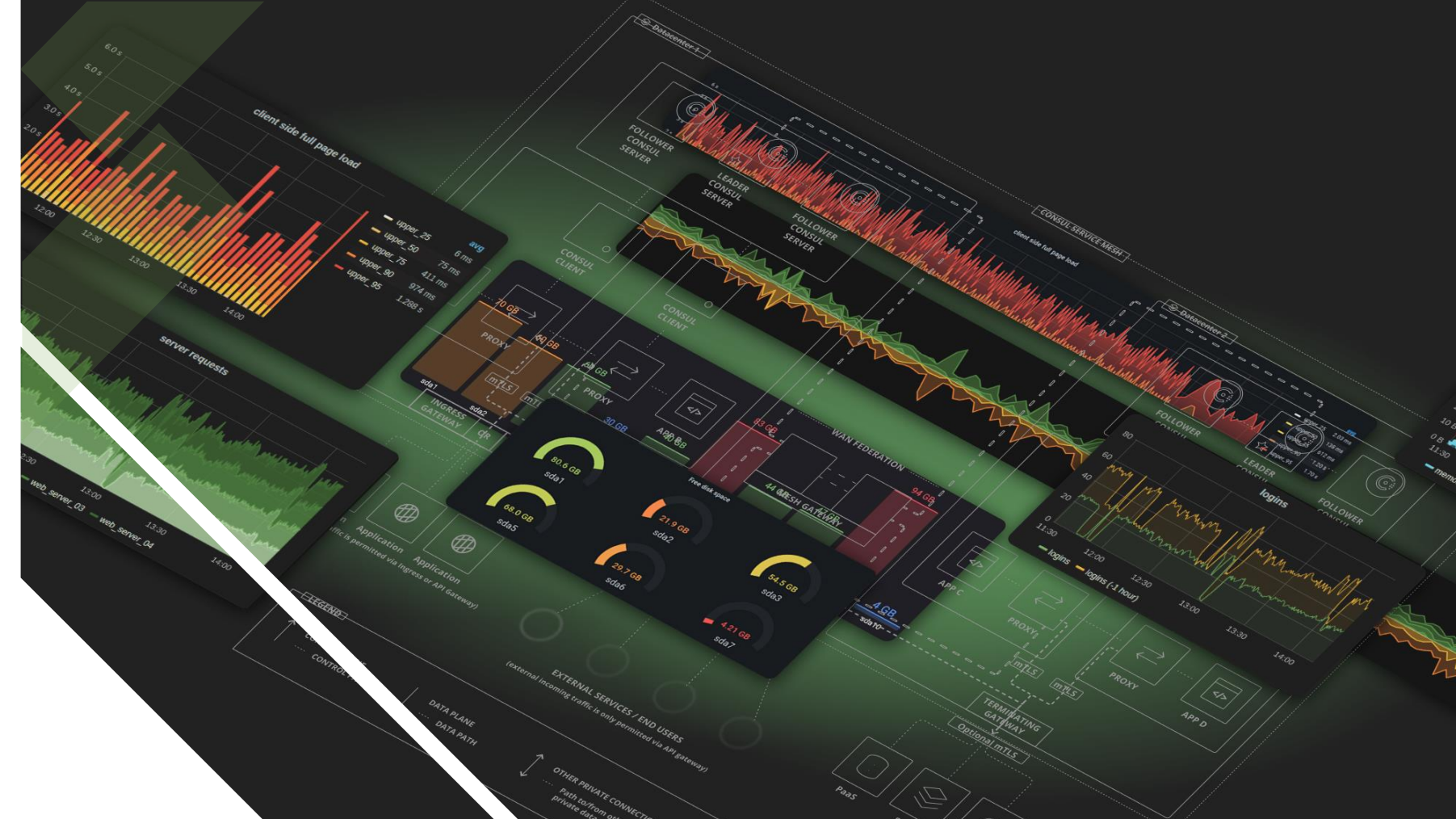
Ephemeral Kubernetes Environments at MBRDNA

iTrellis, Platform Team Case Study



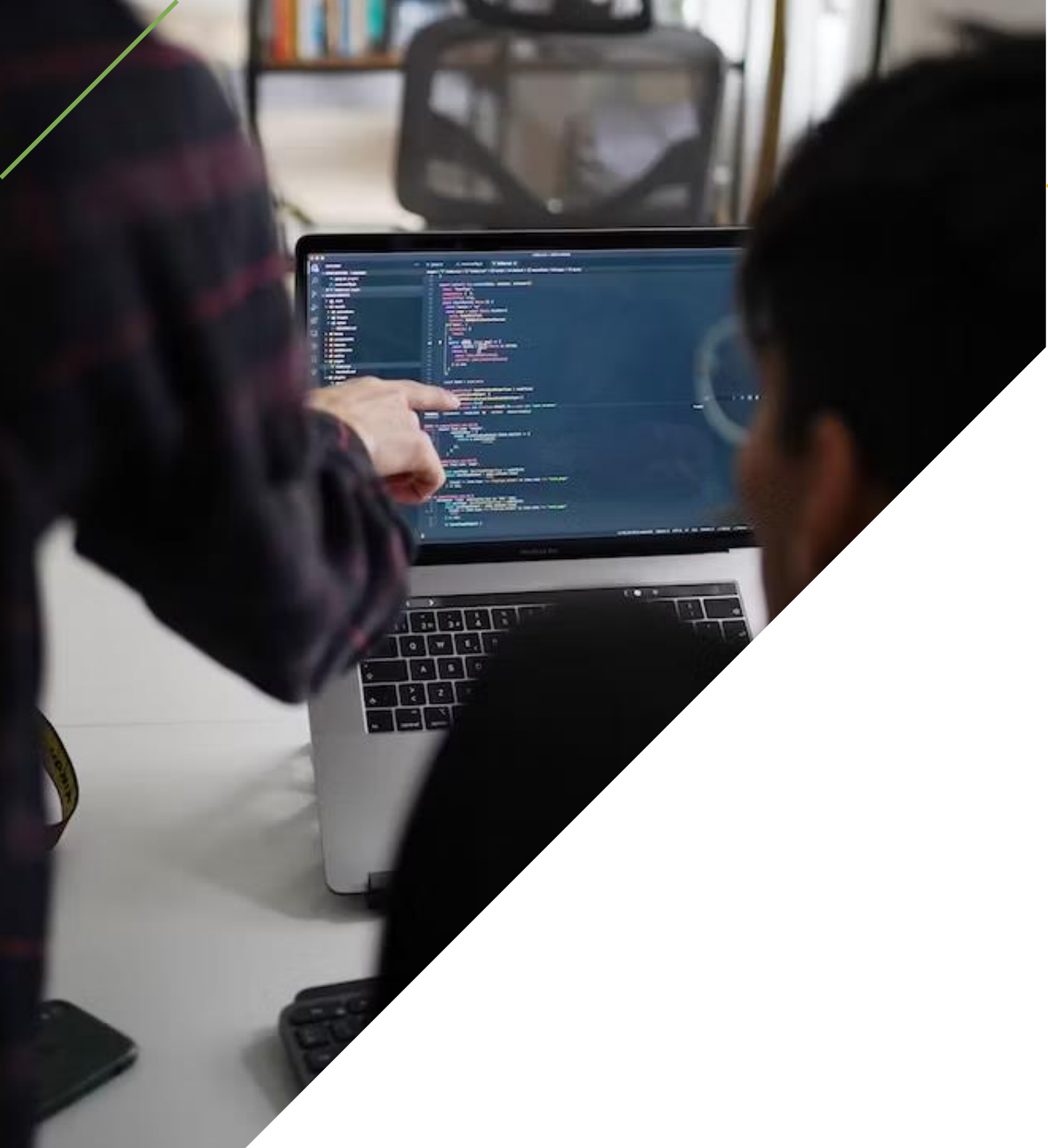
Challenge

Mercedes Benz Research & Development North America (MBRDNA) faces a challenge in balancing flexibility, on-demand availability, cost, and stability in their testing environments. They have a need for temporary, Kubernetes environments for testing purposes, ranging from new feature evaluation to system updates, and the CI/CD pipelines. The complexity comes from the need for distinctive configuration files that detail the Kubernetes version, IP range, and the environment's name in each case. Due to the length of time to construct new environments; sandbox Kubernetes environments were often kept operational to speed up the testing process. Unfortunately, this practice inadvertently leads to tests being carried out in less stable environments, consequently increasing the likelihood of encountering unpredicted bugs in more critical environments.



"To avoid the penalty time of spinning up new test environments, teams leave them up. Long standing environments lag platform updates or might even have been initially spun up with test-specific configurations. Tests are then run against unknown or forgotten circumstances—not matching production environments, eroding the efficacy of tests."

~ **Andrew Huddleston**
Practice Manager, Platform Engineering, iTrellis

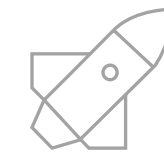


Methodology



Assessment

iTrellis assessed the existing pipelines, scripts, code, and configurations of the current environment. MBRDNA operates an extensive Kubernetes infrastructure consisting of thousands of namespaces distributed across 16 clusters hosted around the globe. Working closely with their platform engineering team, we determined the requirements and advantages of an optimal sandbox environment and gained a deeper understanding of how the existing Kubernetes environments were being deployed and managed.



Innovation

Based on this assessment, iTrellis developed Azure pipelines that are designed to generate ephemeral Kubernetes clusters, an innovation that effectively rendered the static configuration files obsolete. This approach allowed resources like IP address spaces to be generated dynamically, tailoring them to the specific needs of the environment. This also meant that a new environment could be set up quickly and efficiently.



Technologies

The successful implementation of this strategy was made possible with the following technologies:

Azure Pipelines

A robust CI/CD platform that allows for automatic deployments and updates and offers advanced workflows.

Terraform

A versatile tool that makes it possible to define and provide data center infrastructure using a declarative configuration language.

Python

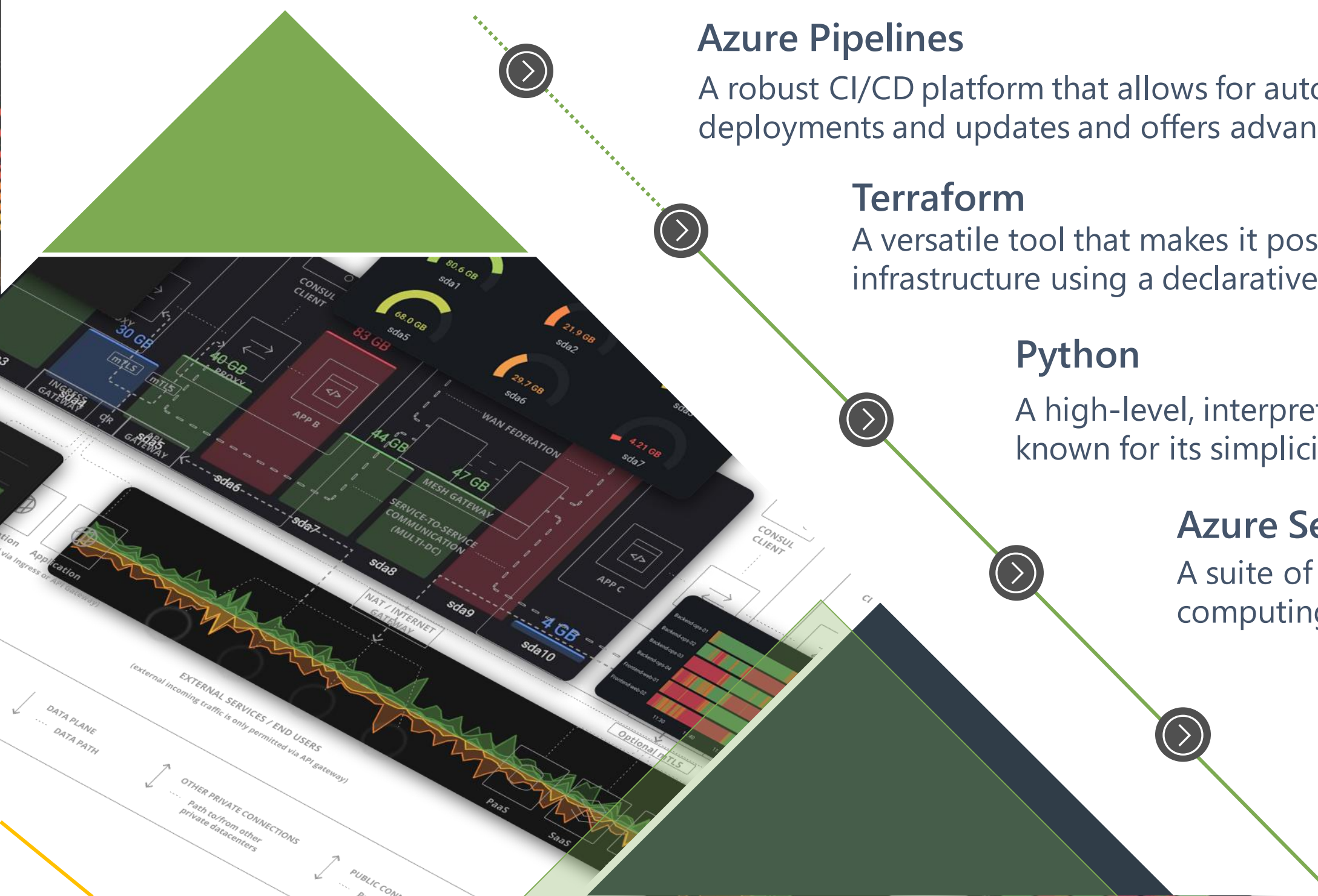
A high-level, interpreted programming language known for its simplicity and power.

Azure Services

A suite of cloud services from Microsoft, offering everything from computing power to storage and networking capabilities.

Helm Charts

packages of pre-configured Kubernetes resources, simplifying the deployment and management of applications on Kubernetes clusters.



Project Outcomes

Isolated Testing: Ephemeral environments facilitated separate testing spaces, averting potential cross-contamination across different tests if multiple engineers were working on various features concurrently.

Infrastructure as Code: Utilizing Terraform and Azure pipelines facilitated infrastructure management through version-controlled and reusable code, enhancing efficiency.

Cost-Effectiveness: The on-demand nature of ephemeral environments allowed Mercedes Benz Research & Development to use resources only, when necessary, thereby lowering cloud costs.

Automation and Consistency: Azure pipelines streamlined the provisioning and decommissioning processes, ensuring uniform and reproducible deployments.

Dynamic Environments: The integration of Azure pipelines transformed the sandbox Kubernetes environments into flexible entities, enabling the reuse of resources such as IP ranges, instead of dedicating them to single environments.



Stability: By creating on-demand environments, engineers could conduct tests on stable platforms, facilitating the early detection of bugs in the development cycle.

Comprehensive Testing: The new ephemeral Kubernetes environments enabled end-to-end testing of the entire build process for fresh environments. This approach ensured that potential issues in the pipeline, which might be overlooked in additive testing, could be identified, and addressed promptly.



Conclusion

The innovative implementation of ephemeral Kubernetes environments significantly enhanced the quality, efficiency, and cost-effectiveness of MBRDNA's testing procedures. This demonstrates the immense value of adaptive, on-demand test environments in contemporary software development practices.



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