Google Cloud

DORA
DEVOPS RESEARCH & ASSESSMENT

kakaomobility

Winner

Mastering effective disaster recovery

Recognizes design of a robust, well-tested disaster recovery plan to protect business operations

About

Kakao Mobility, a subsidiary of South Korea's Kakao Corp, operates Kakao T, the country's most popular taxi-hailing service with more than 30 million users. It has pioneered mobility as a service (MaaS) in the country, offering turn-by-turn navigation and moving into autonomous driving services and indoor mapping technology among other applications.

Challenges

Kakao relied on an on-premises cloud system to process its computing workload. The majority of South Korea's population of 50 million uses Kakao T and other Kakao applications to get where they are going, so service reliability is critical.

Organic growth and usage patterns regularly result in traffic spikes such as at rush hour or around holidays. The company's APIs also experience unpredictable bursts of calls.

When this happened, Kakao's engineers struggled to acquire additional computing resources quickly from the on-premises cloud. They needed to acquire more physical or virtual machines to expand infrastructure capacity. These efforts were unsuccessful sometimes. The team then had to manipulate the system to try and reduce the computing workload, seeking to avoid negative impact on users.

When outages did occur, recovery was slower than Kakao wanted, including on weekends when the IT department was not staffed. Kakao also recognized that reduced service availability and responsiveness disappointed customers and resulted in lost revenue opportunities. Moreover, these issues highlighted that Kakao Mobility needed additional infrastructure to prepare for disaster recovery.

Objectives

Kakao targeted 100 percent SLA (service level agreement) compliance for service delivery to consumers and for response to API requests from internal and external customers. This required building a fault-tolerant and resilient system.

The company also set out to increase its computing capacity in an elastic and cost-efficient way, so that it could easily scale to meet demand surges. At the same time, it wanted to put a disaster recovery plan in place.

These goals were closely intertwined. Kakao wanted to build a system that could autoscale to match traffic. This would also provide redundancy and system resilience, so it could recover automatically from any failure.

Lastly, Kakao sought to have the capability to customize service quality by product and customer since their SLAs varied.

Solution

In a six-month project, Kakao built a multi-cloud environment comprising Google Cloud and its on-premises cloud. Google Kubernetes Engine (GKE), a managed environment for deploying and scaling containerized applications, automates response to traffic bursts in Google Cloud.

More capacity is in place, and the new architecture runs the two cloud resources simultaneously. The solutions both handle incoming requests, making data sharing and orchestrating CI/CD (continuous integration/continuous deployment) complex.

The API gateway splits the workload between Kakao's on-premises cloud and Google Cloud and balances it. Infrastructure as code tools manage deployment and infrastructure configuration.

Provisioning of computing resources is faster with the addition of Google Cloud. Nodes are ready, within 10 to 30 seconds, which enables seamless response to traffic bursts. "This ensures our business agility as well as scalability without critical issues," notes Chief Technology Officer Sean You.

Redundancy between on-premises data centers and Google Cloud clusters underlies a more resilient system. Kakao built the Google Cloud environment so that it can handle all traffic even if its on-premises cloud is down, offering disaster-recovery capability.

"Our services are so critical to our users, we put relentless effort to achieve zero downtime. Therefore our DevOps team mainly focuses on improving the detectability of the system failures and designing resilient systems that can recover automatically," You explains.

Results

Adoption of Google Cloud has dramatically improved Kakao's service scalability and stability. Traffic increases and spikes no longer require securing additional resources because Google Cloud is available on demand. The routing API service is crucial to the delivery of all services, and the system has handled a sharp increase in workload.

In one traffic spike after the move to the new system, incoming demand increased to about four times the previous peak. Additional resources were needed. The Kakao team re-balanced traffic so Google Cloud processed a large portion of the on-premises traffic. GKE orchestrated the increase in computing resources, and the only intervention required was to adjust a setting. The move has also reduced the burden of deployment and operation on the development team.

"We were able to handle those requests by expanding the workload within minutes. Without Google Cloud, we may not have been able to handle those requests in time. This was a real use case that proved our multi-cloud strategy can provide a more reliable and fault-tolerant system," You says.

Kakao is considering an auto scaling configuration that can guarantee service quality for each application that uses its routing API. The company expects that would enable it to customize SLA performance by service.

> ❝
>
> ## Our services are so critical to our users, we put relentless effort to achieve zero downtime.”

-Sean You, Kakao Mobility's Chief Technology Officer

Working with Google

Kakao initiated the project with a small team and drew on additional support from the Google Cloud team including technical account managers. Participants met weekly and achieved strong collaboration. Kakao migrated to its new architecture with zero service downtime.

To learn more about Kakao Mobility's successful project, check out this video.