SAMSUNG CLOUD OPERATION TEAM AUTHENTICATES 10 BILLION+ REQUESTS DAILY WITH MARIADB XPAND; CUTS COSTS BY 50%

Samsung is one of the world's largest consumer electronics and smartphone brands, having sold more than 2 billion Galaxy phones. Every Galaxy user relies on Samsung Cloud for managing their devices and user profiles – which all adds up to 16 billion database table rows, hundreds of petabytes of data, and billions of database transactions every day. That database, of course, must be highly available and extraordinarily scalable. That's why, when the operations and development overhead for their MySQL database sharding became too cumbersome, the Samsung Cloud Operation Team began pursuing a better solution for extreme scalability – and moved to MariaDB's distributed SQL database, Xpand.

Limitless Scalability, Strong Consistency

"Having dealt with the many downsides of sharding – lack of consistency in our backups, the need for additional developer code, and the high infrastructure demands to perform online backups – our #1 requirement, hands-down, was to eliminate sharding," says the Samsung Cloud Operation Team. With that goal as its North Star, Samsung investigated various options before conducting an Xpand proof of concept in 2016. They went live in production the following year, and have been expanding ever since.

A Single Command to Add or Remove Nodes

With Xpand, Samsung can scale out by adding a new node with a single command; data is automatically moved to the new node. Each node adds more compute, memory, and storage to the distributed database, allowing for more (and faster) transactions. The Samsung Cloud Operation Team now has **over 50 Xpand nodes that operate as a single database**, sustaining tens of billions of transactions per day.

Built-in ACID Transactions

Before moving to Xpand, Samsung's DBAs conducted a full online backup per shard, so they never got a single consistent backup. That's a thing of the past. Because Xpand writes to multiple database instances with each distributed transaction, atomicity, consistency, isolation and durability (ACID) are guaranteed.

Low DevOps Overhead

"Discovering that no application changes would be necessary to migrate from MySQL to Xpand was huge for us. It was a simple drop-in replacement," the Samsung Cloud Development Team says. That's because Xpand supports standard SQL and the MySQL protocol. Applications query data the same way they would with a traditional relational database – using all types of joins, filtering, aggregates, common table expressions, stored procedures/functions and more. Xpand also simplified Samsung's app architecture: With sharding code no longer needed, the Samsung Cloud Development Team can now focus on the service logic instead of on the database.

Xpand's self-optimization features save operational resources, as well. Xpand continuously evaluates data distribution and each instance's health and resource utilization relative to the current workload. If database instances are added or removed, or if hotspots are detected, Xpand moves data automatically to maintain an even distribution of storage and query processing – and peak performance.

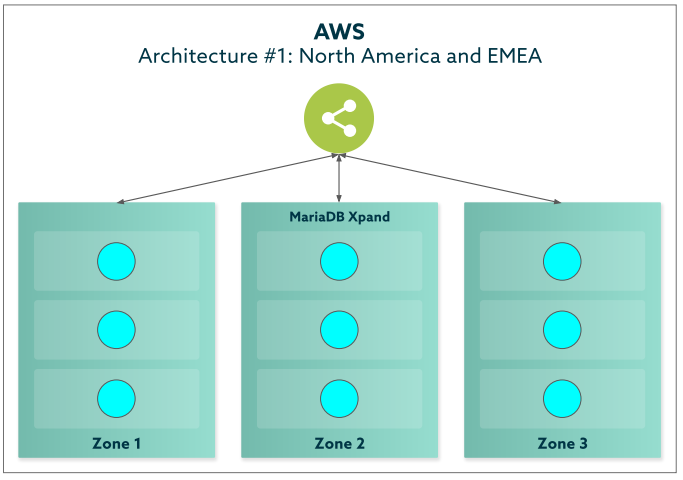
Fault Tolerance and Continuous Availability

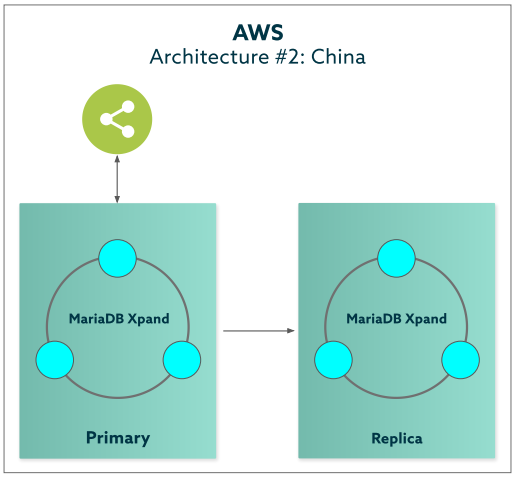
Given Samsung Cloud's hundreds of millions of customers, delivering a reliable user experience is crucial. Having uninterrupted availability and no single point of failure rounded out the list of must-haves in Samsung's database search.

Unlike their sharding solution, Xpand empowers Samsung to scale at will with no concerns about downtime. Adding and removing nodes is non-blocking, so all transactions continue seamlessly. Further, Xpand is fault tolerant by design, another element that made a big impression on Samsung. Should a node (or even an entire cloud availability zone) fail, the system leverages replicas of the data slices on other Xpand nodes or zones. The rebalancer then auto-heals, creating additional replicas of the data originally stored on the failed node. Xpand does all of this automatically and transparently – zero manual intervention or recovery required.

Unexpected Savings

Thanks to Xpand's features, Samsung no longer needs the infrastructure for standby replicas for high availability and backups. Even more notably, Xpand's efficiencies enabled Samsung to downsize from Amazon EC2's i3.16xlarge instance type to the i3.4xlarge – that's 1/4 the instance size – while growing its footprint to two services (one for user profiles and the other for user logs) in three availability zones. "We didn't embark on the Xpand migration to cut costs, but we have seen a substantial financial benefit," says the Samsung Cloud Operation Team. "We're now running at **50% lower cost**, despite having added regions."





What's Next for Samsung on MariaDB

The Samsung Cloud Operation Team has long run an ETL process on their production system, which puts excess stress on their high-TPS, write-intensive production workload. To build on the success they've seen with MariaDB, Samsung is now evaluating Xpand parallel replication, which will give them the ability to distribute the work of writing and consuming binlogs across the cluster – and to configure read replicas and offload the ETL process to a non-production system. With this optimization, Samsung will have a scalable and performant replication solution that positions them well for continued growth.

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