

The background features a vibrant blue gradient with thin, white, wavy lines that create a sense of motion. In the bottom right corner, there are abstract, flowing shapes in shades of purple, pink, and orange.

aws SUMMIT

INDIA | MAY 25, 2023

SDB004

How Paytm leveraged Amazon Aurora to achieve high TPS for their payment gateway workload

Punit Jain

Senior Solutions Architect
AWS India

Vinay Singhal

VP of Engineering
Paytm



Agenda

- Amazon Aurora overview
- About Paytm : India's most loved payment app
- Paytm: Infinity payments application overview
- Learnings and other design use cases

Amazon Aurora

AUTOMATE UNDIFFERENTIATED HEAVY LIFTING

Schema design
Query construction
Query optimization

YOU

Takes care of your time-consuming
database management tasks, freeing you
to focus on your applications and business

AWS

Automatic fail-over
Backup & recovery
Isolation & security
Industry compliance
Push-button scaling
Automated patching
Advanced monitoring
Routine maintenance

Amazon Aurora

Amazon Aurora is a Relational database management system (RDBMS) built for the cloud with full **MySQL** and **PostgreSQL** compatibility



Performance of high-end commercial databases at 1/10th the cost

Simplicity and **cost-effectiveness** of open source databases

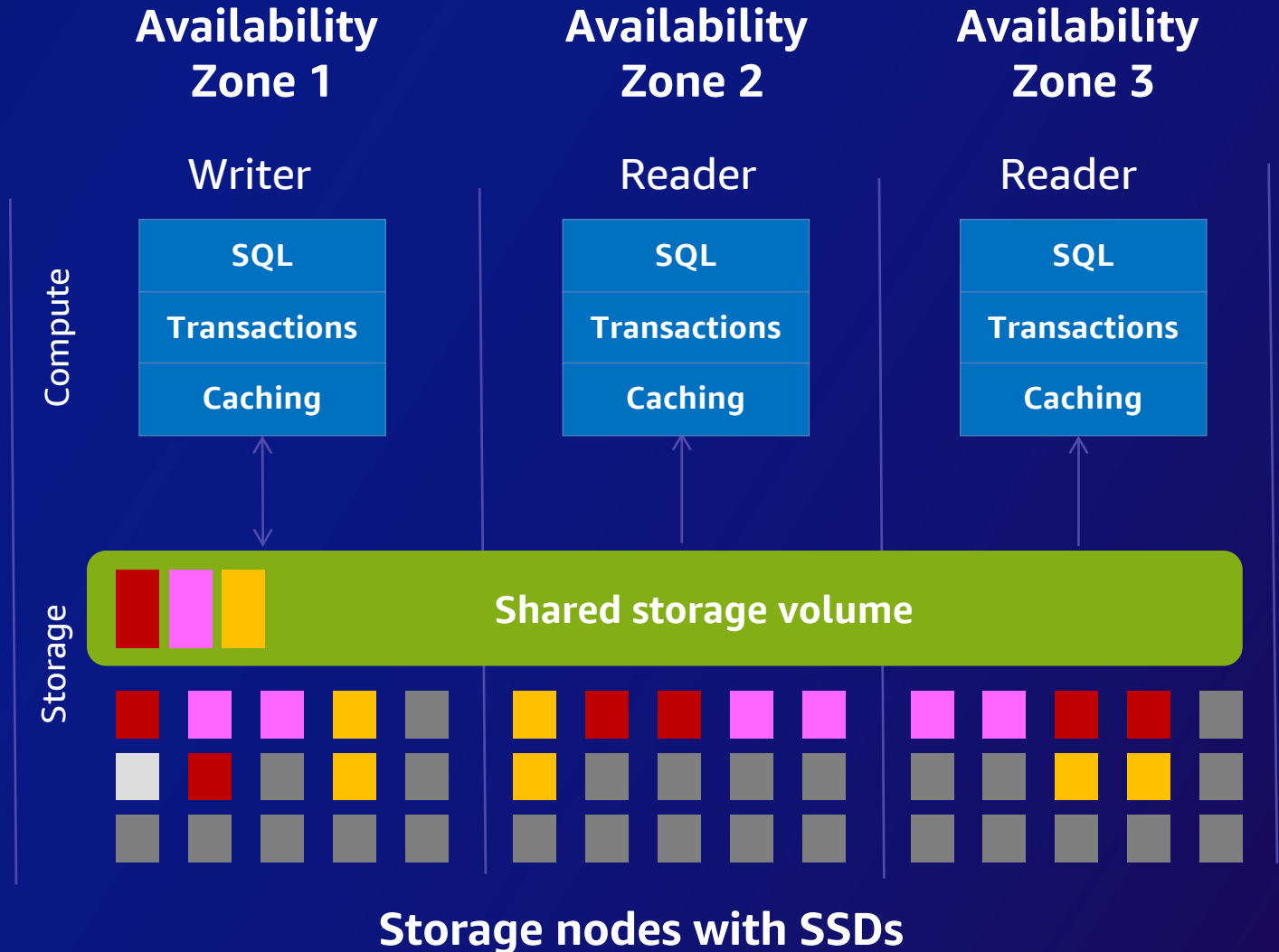
Built-in **secure, Fault-Tolerant** and **Self-Healing Storage**

Simple **pay as you go** pricing

The fastest growing service in the history of AWS

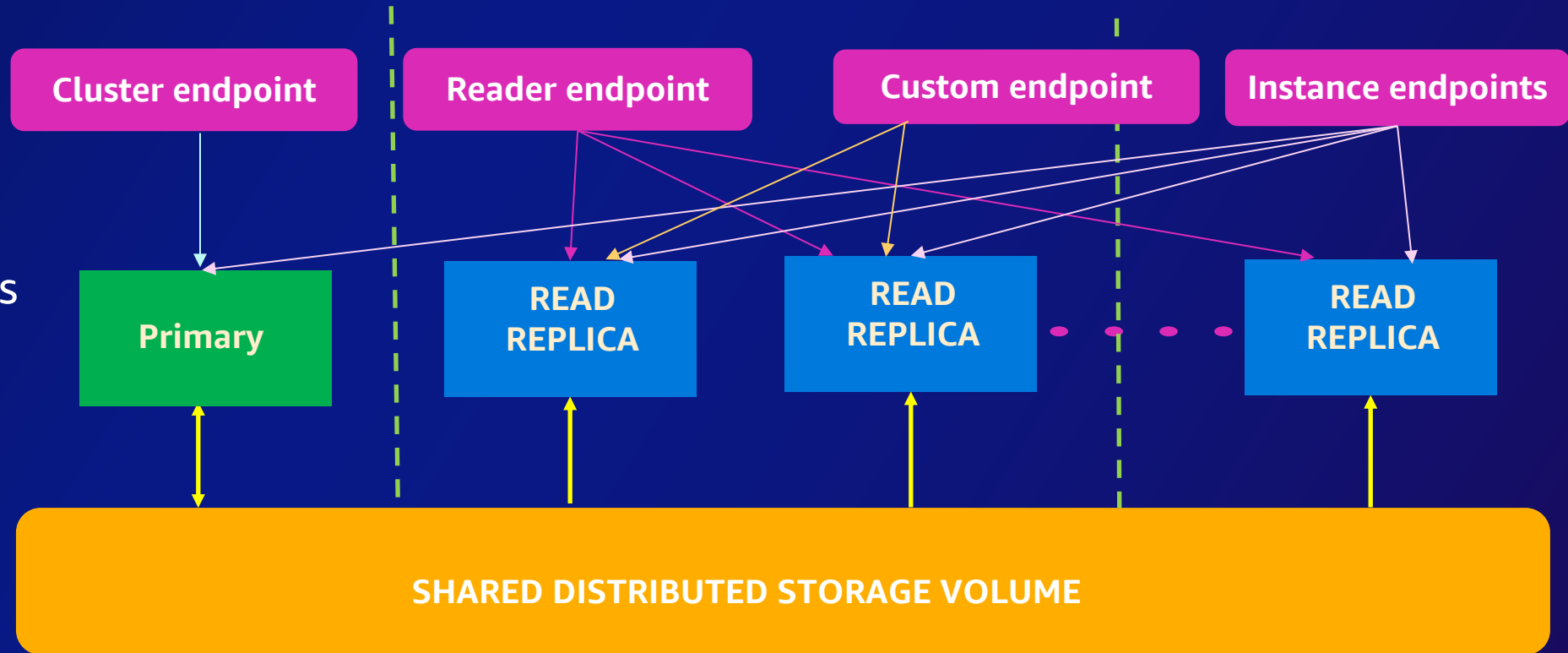
Amazon Aurora : Distributed architecture

- Purpose-built log-structured distributed storage system designed for databases
- Storage volume is striped across potentially hundreds of storage nodes distributed over **3 different AZ**
- **Six copies** of data, two copies in AZ
- Storage volume grows automatically, **up to 128TB**
- Automated Backup in Amazon S3 having **99.999999999 Durability**



Amazon Aurora cluster topology

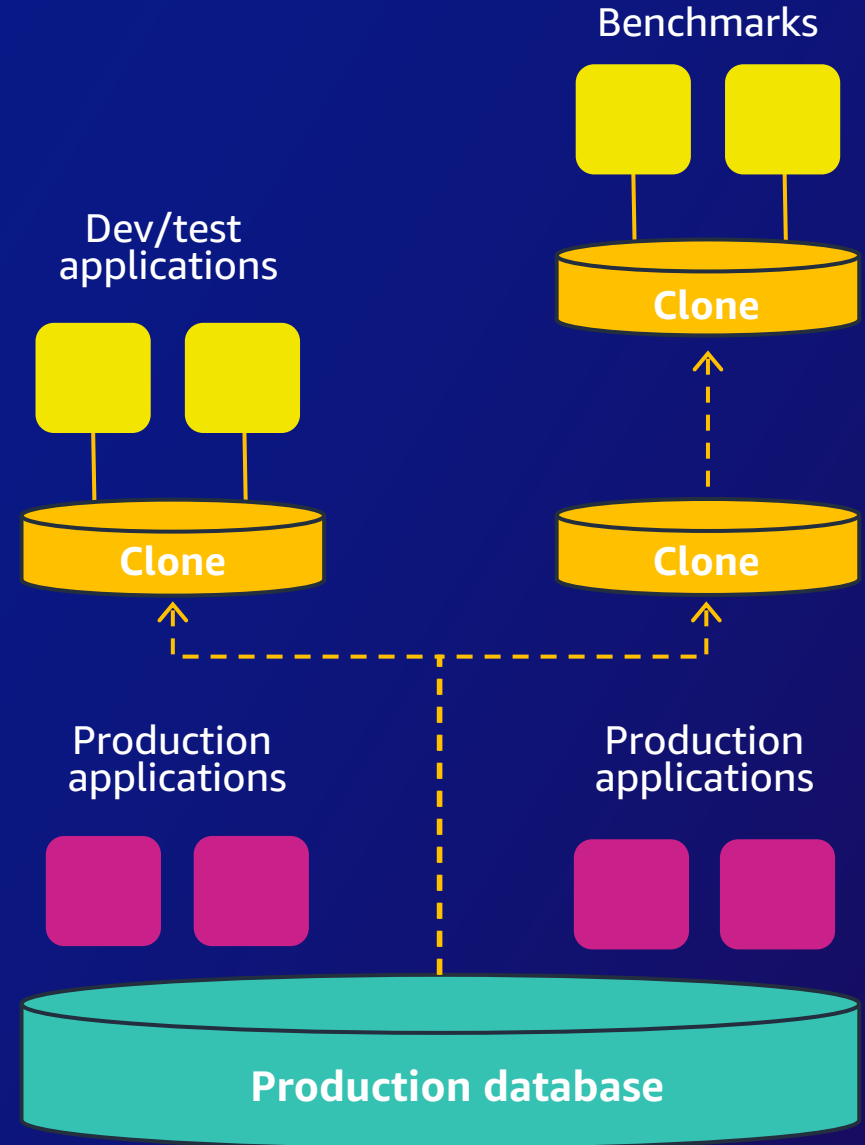
- SLA: 99.99%
- Up to 15 read replicas



Fast database clones

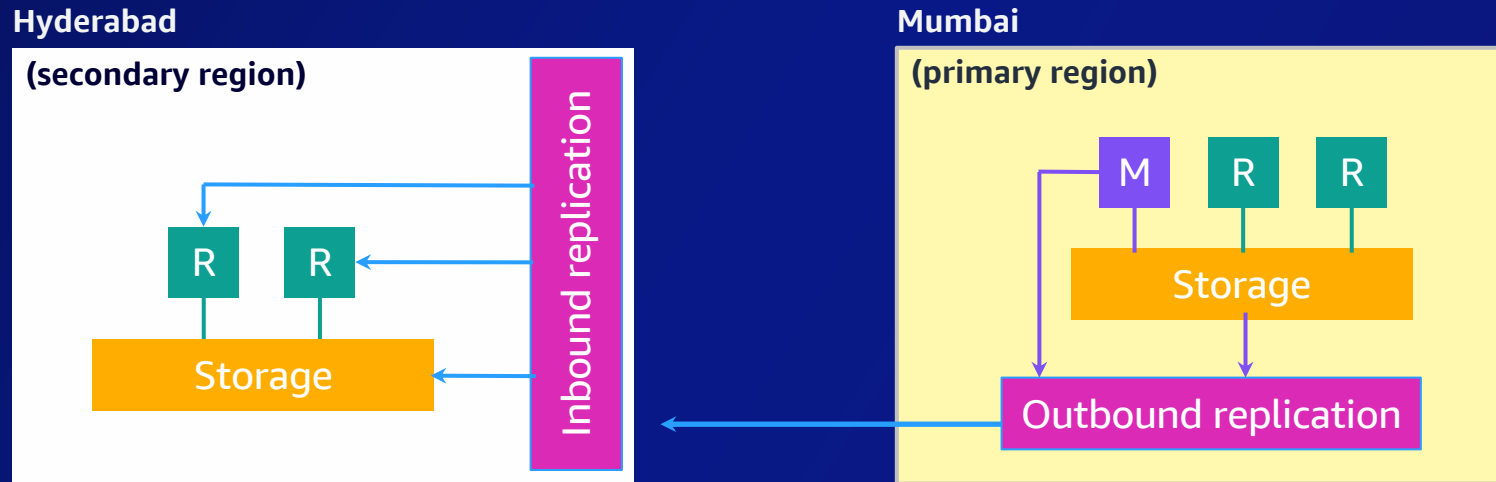
COPY OF A DB CLUSTER (STORAGE VOLUME) WITHOUT DUPLICATE STORAGE COST

- Up to 15 clones from same source
- 2 step process: clone cluster + add instances (optional)
- Clone starts with same DB engine version as source
- Clone across AWS accounts with resource sharing



Amazon Aurora: Global database

FASTER DISASTER RECOVERY AND ENHANCED DATA LOCALITY



High throughput: Up to 200K writes/sec

Low replica lag: < 5 sec cross-region lag

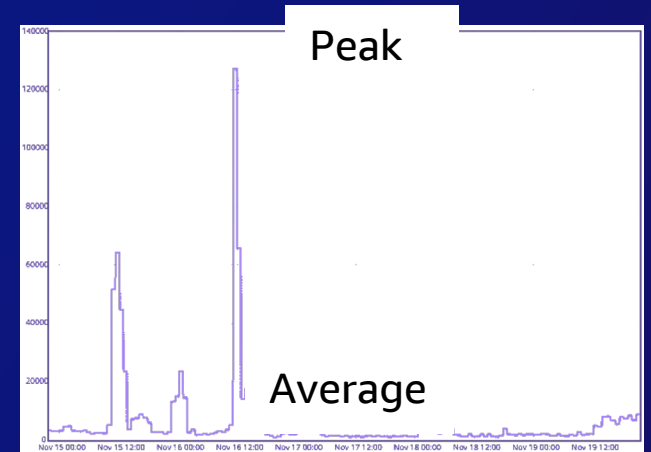
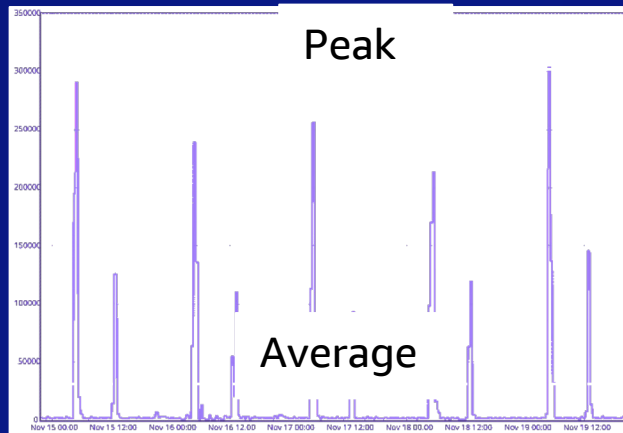
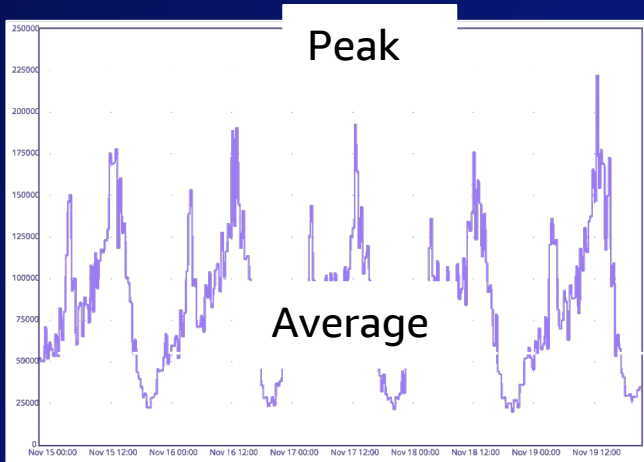
Fast recovery: < 1 min downtime after region unavailability

Support for **in-place conversion** to Global Database

Support for **write forwarding** from secondary regions (Aurora MySQL only)

Database capacity: Cost vs. management

Variable and unpredictable workloads



Insufficient capacity ➡ Experience degradation

Provision for peak ➡ Expensive

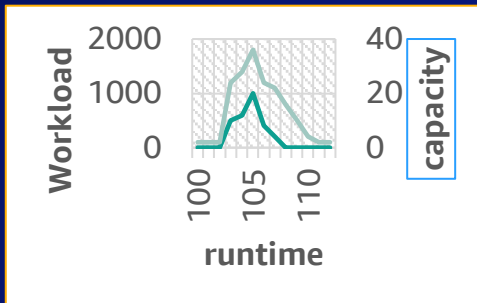
OR

Continuously monitor and scale ➡ Difficult, requires experts, involves downtime

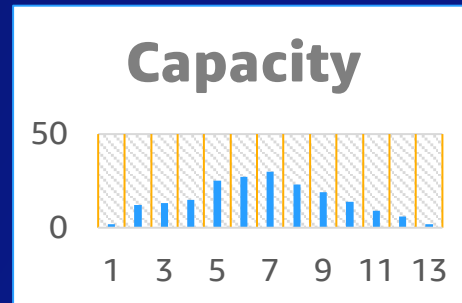
Amazon Aurora Serverless v2



An auto-scaling configuration for Amazon Aurora that now supports even the most demanding applications and database workloads



Scales instantly to **hundreds-of-thousands of transactions** in a fraction of a second



Scale in **fine-grained increments** to provide just the right amount of database capacity



Full breadth of Aurora capabilities including Multi-AZ, Global Database

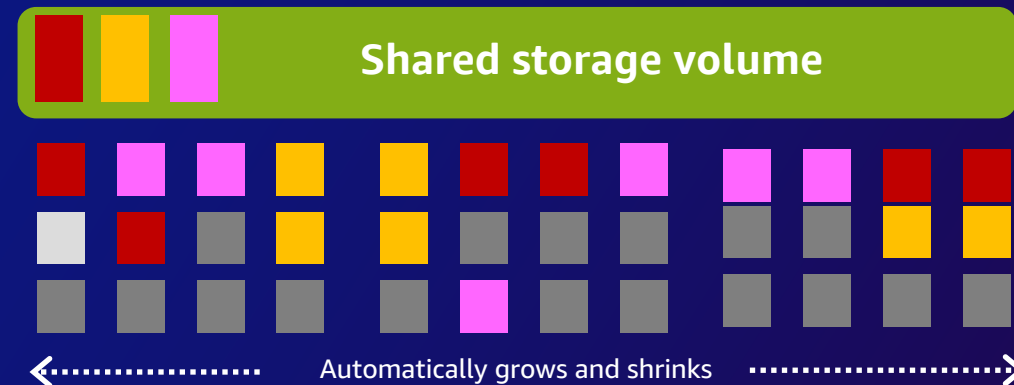
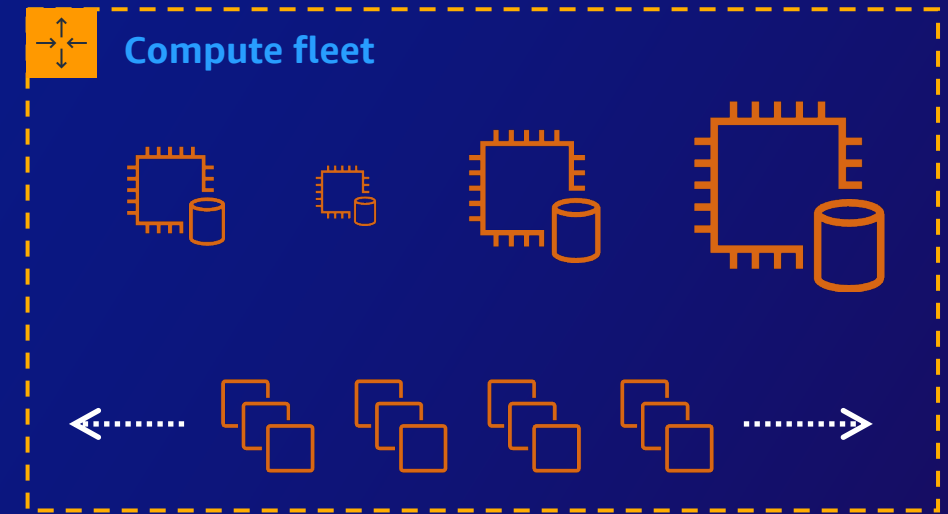
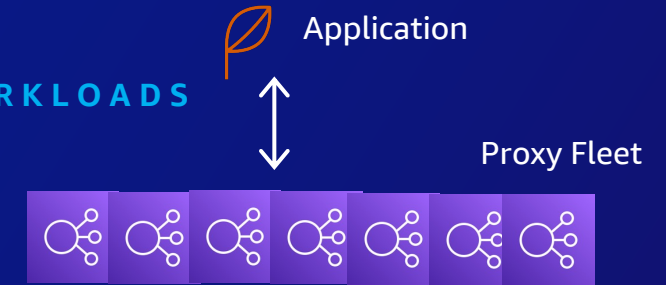


Up to **90% cost savings** when compared to provisioning for peak load

Aurora Serverless V2

WORRY-FREE DATABASE CAPACITY MANAGEMENT FOR UNPREDICTABLE WORKLOADS

- **Proxy fleet** holds the connections from application
- Amazon Aurora Serverless capacity is measured in **Amazon Aurora Capacity Unit (ACU)**
- **1 ACU** comes with **2 GiB** of memory with corresponding CPU and networking
- Scaled up from zero to **0.5 (ACU)** or upto **128 ACUs**
- Cost-effective during periods of low activity



SDB004

How Paytm leveraged Amazon Aurora to achieve high TPS for their payment gateway workload

Vinay Singhal
VP of Engineering
Paytm



© 2023, Amazon Web Services, Inc. or its affiliates. All rights reserved.



Paytm : Who we are

- Paytm is India's payment Super App offering consumers and merchants most comprehensive payment services.
- Pioneer of mobile QR payments revolution in India, Paytm's mission is to bring half a billion Indians into the mainstream economy through technology-led financial Services.
- Paytm enables commerce for small merchants and distributes various financial services offerings to its consumers and merchants in partnership with financial institutions.



Paytm – Redefining scale?

Key Business KPIs - Quarter ended March 2023

Avg Monthly Transacting Users

(avg for three months ended Mar'23)

90 Mn

▲ **27% YoY**

Merchant Subscriptions

(cumulative payment devices as of Mar'23)

6.8 Mn

▲ **1 Mn**
New subscriptions since Dec'22

Total Merchant Payments Volume (GMV)

(for three months ended Mar'23)

₹3.62 Lakh Cr

▲ **40% YoY**

Total Value of loans disbursed through Paytm

(for three months ended Mar'23)

₹12,554 Cr

▲ **253% YoY**

Total Number of loans disbursed through Paytm

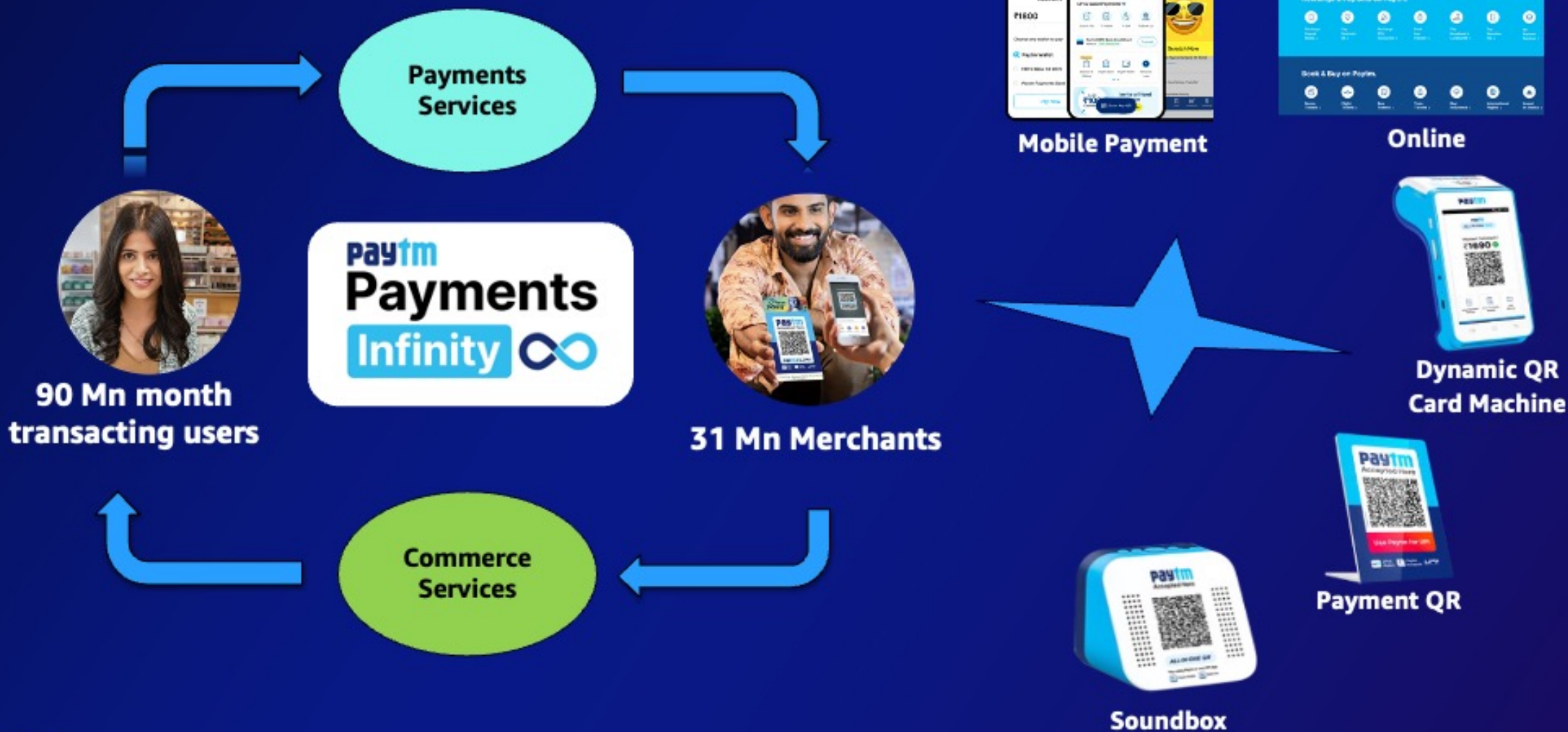
(for three months ended Mar'23)

11.9 Mn

▲ **82% YoY**

Infinity payment application

POWERS ALL OF THE PAYTM BUSINESSES



How we designed this payment application?

Selecting the database: Key asks



High Availability : Up all the time

Resiliency : Auto recovery in case of failures

Reliability : zero data loss tolerance

High Scalability : millions of transaction/day

Compliance and Regulations : Security, Frauds, Risks etc

Cost effectiveness : low operating cost

Amazon Aurora is a great choice



AWS
Managed
Databases

Manageability: Automated Patching, Backup, Failover etc.

Reliability : 6 copy of data across 3 AZ, low replica lag

High Scalability : 15 Replica, Global DB, Decoupled Storage

High Availability and Durability

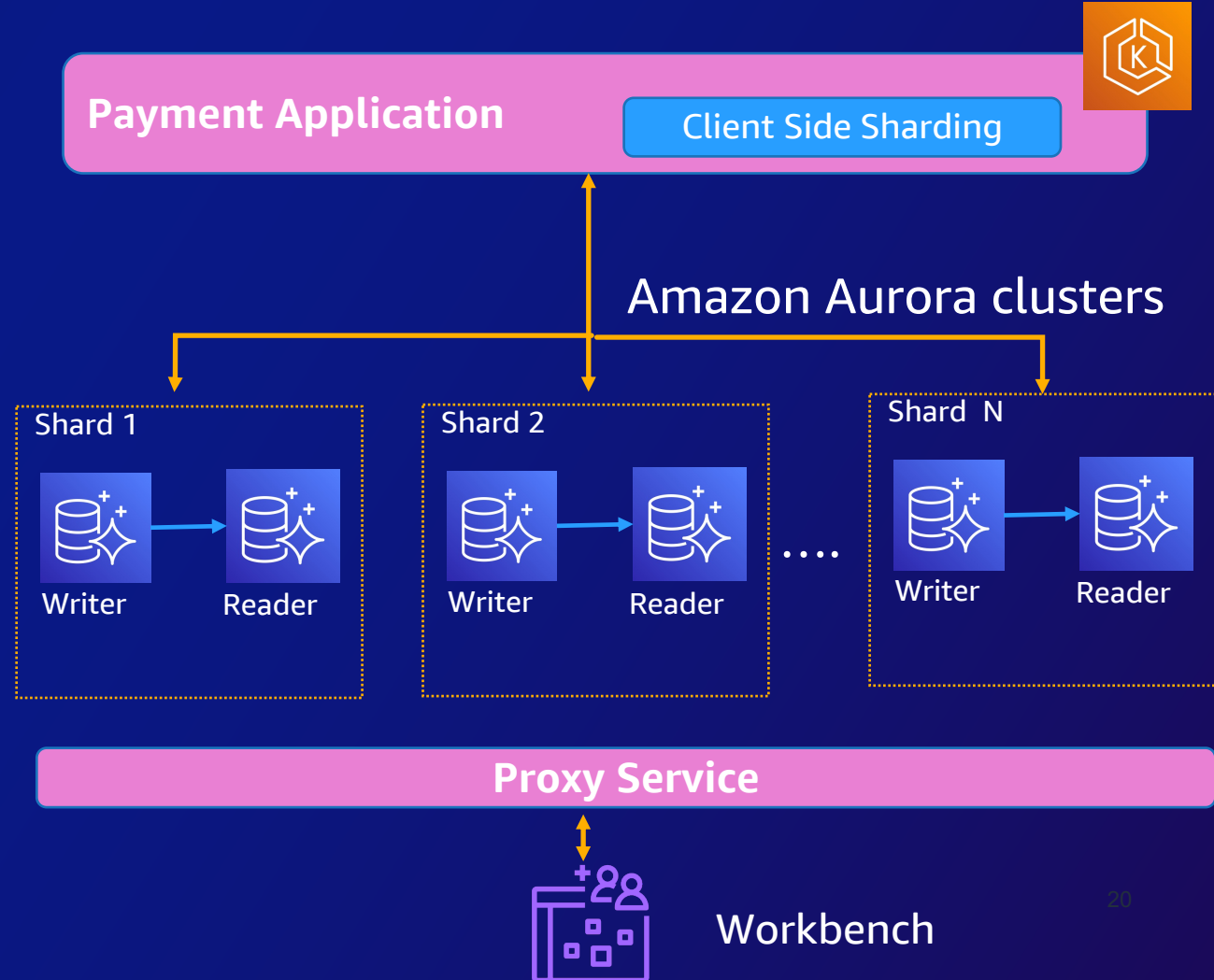
Resiliency: Automated backup and restore

Security and Regulations : SOC, PCI, FedRAMP, HIPAA compliant

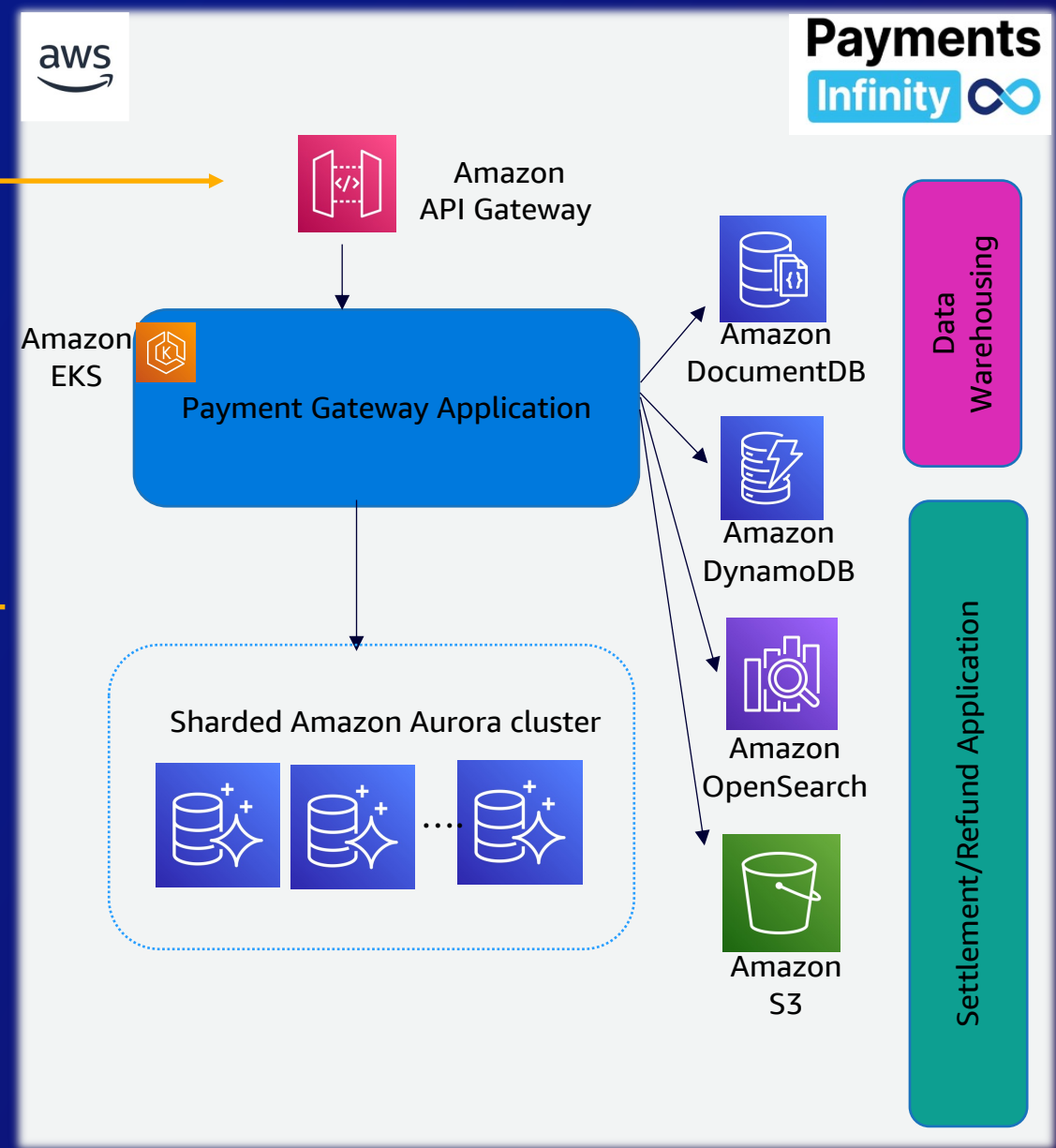
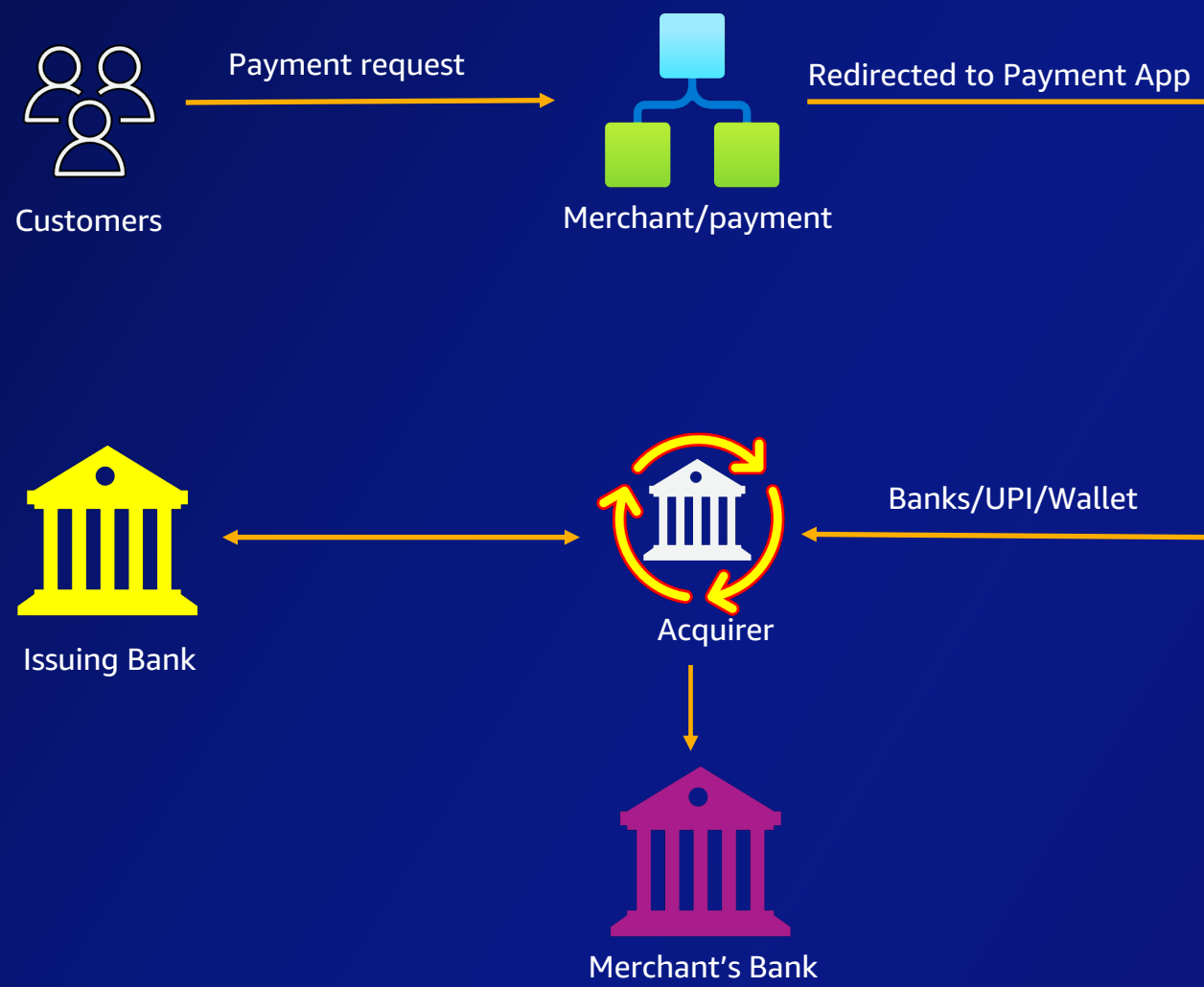
Cost effectiveness : 1/10th compared to commercial DBs

Horizontal scaling with Amazon Aurora

- Selecting the correct shard key is crucial
- Defined number of shards based on requirement for next 2 years.
- Each shard node is an individual Aurora Cluster
- Designed Unique time based sharding function
- No impact to users while sharding.
- No re-distribution of keys required



Infinity payment architecture



Other design use cases

- CDC streams to Apache Kafka for real time time reports and analytics
- Multi tenant Architecture with Aurora
- Transaction flow: Divided into various sub Flows for independent execution and scaling.
- Circuit breaker: to control service failure from cascading to other services
- Rate Limiting: based on merchant, Location etc.
- Database Activity Monitoring: to react quickly on failures

Paytm infra on Amazon Aurora

- More than **500 cluster** of Aurora across various applications (Increasing day by day)
- Amazon Aurora **MySQL 3.x** (MySQL 8.x) Version, latest version in use.
- Currently serving **greater than 4K transactions per seconds(peak)** leveraging Aurora
- Leveraging **AWS Graviton** processors, getting better price performance
- With small **replica lag (~in ms)**, we are able to use Reader instance much more efficiently
 - Current Configuration: 30% -> Writer ; 70% -> Reader
 - Serverless replica

skillbuilder.aws 

Your time is now

Build in-demand cloud skills your way

Thank you!

Punit Jain
Senior Solutions Architect
AWS India

Vinay Singhal
VP of Engineering
Paytm



Please complete the
session survey