Designing for Cost and Scalability: Deploying & Managing Insight Technology's RDS MySQL Database

Introduction

This case study describes the deployment and ongoing management of Insight Technology's MySQL database on Amazon Web Services (AWS) using Amazon RDS for MySQL. Managed by TrueMark, the initiative delivered a secure, cost-optimized, and highly available database platform to support Insight Technology's transportation industry applications. Beyond the initial greenfield implementation, TrueMark continues to provide database management services that ensure the environment remains reliable, scalable, and compliant while enabling faster provisioning of non-production environments.

About The Customer

Insight Technology provides advanced technology solutions to the freight and transportation industry, helping carriers, logistics providers, and related businesses operate more efficiently. Known for delivering high-quality software and infrastructure services, Insight Technology focuses on building scalable, reliable platforms that allow customers to adapt quickly to market demands while maintaining strict security and compliance standards.

Customer Challenge

Insight Technology required a robust and scalable database backend for a new transportation industry application. The environment needed to be designed from the ground up with AWS best practices while minimizing ongoing operational overhead. It needed to handle moderate but consistent traffic patterns with occasional spikes in user activity, and the solution had to be cost-effective to operate. Specific key challenges included:

- **High availability** to balance cost optimization with resiliency by selecting a Single-AZ design that meets the agreed RTO/RPO targets while still achieving ≥99.5% availability.

- **Performance optimization** to maintain consistent response times under peak loads of ~50 concurrent connections and ~200 IOPS, as determined through load testing and observed production benchmarks.

- **Security compliance** for handling sensitive operational data.

- **Operational efficiency** in provisioning and managing non-production environments for development and testing.

Partner Solution

TrueMark architected and deployed a greenfield MySQL environment on Amazon RDS for MySQL, designed to deliver high availability, performance efficiency, and simplified operations. The solution included automated scaling capabilities, secure data handling, and an approach that optimized cost while meeting performance goals.

Key Services Utilized

- **Amazon RDS for MySQL**: Managed MySQL database platform with automated backups, storage auto-scaling, and durable storage.

- **Amazon CloudWatch & Performance Insights**: Monitored database performance, including CPU, memory, storage utilization, and query execution patterns.

- **AWS Key Management Service (KMS)**: Provided encryption at rest for sensitive data.

- **AWS Secrets Manager:** The master password and separate application passwords were generated and safely stored within the Secrets Manager

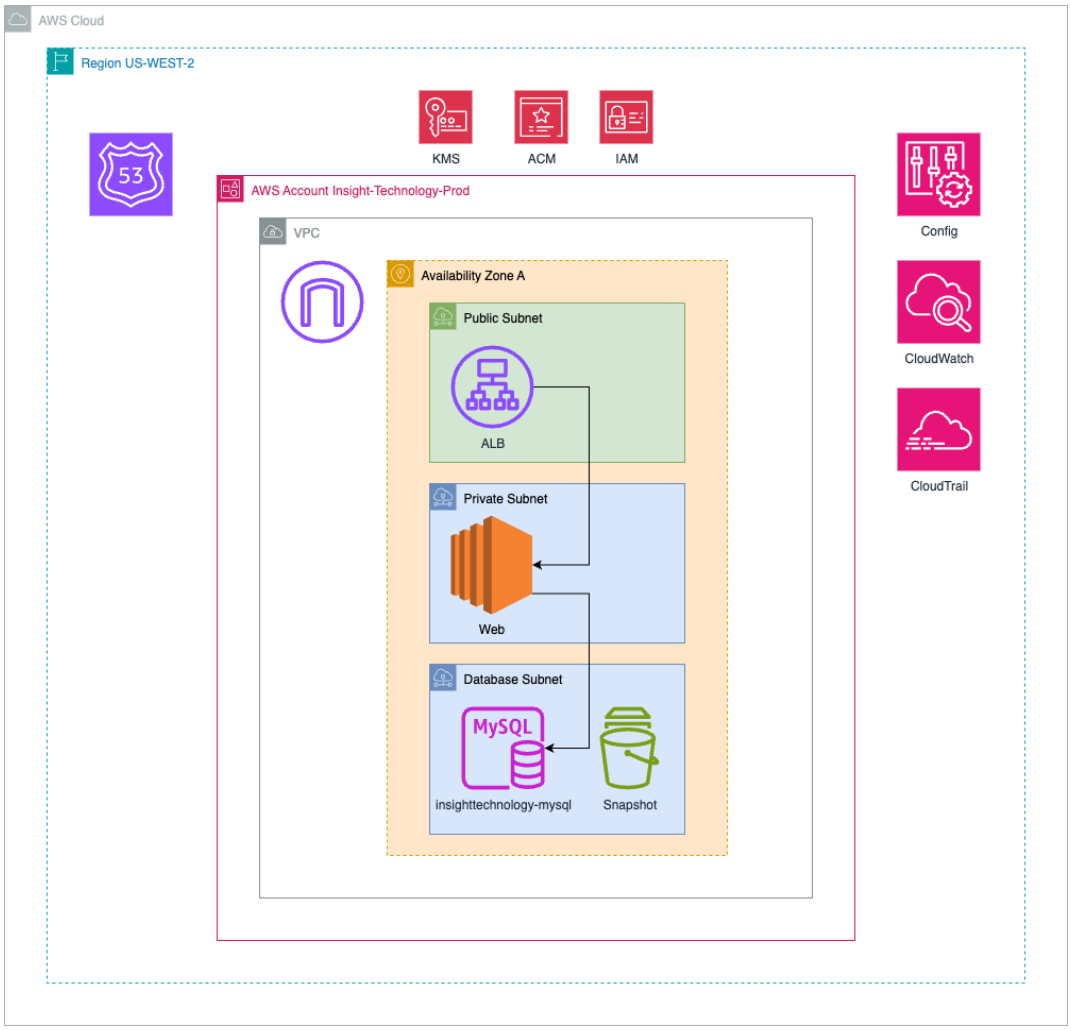
- **Amazon Simple Storage Service (Amazon S3)**: Used for secure staging and long-term retention of database snapshots via AWS Backup.

- **Infrastructure as Code (IaC)**: Terraform was used to provision the RDS instance and supporting infrastructure, enabling consistent, repeatable deployments across environments.

Implementation Process

- **Requirements Analysis**: Evaluated application performance needs, security requirements, and growth expectations (initial size ~2.2 GB, 1% annual growth).

- **Architecture Design**: A Single-AZ RDS for MySQL 8.0 instance was selected to meet ≥99.5% SLA availability, minimizing costs compared to Multi-AZ (≈50% savings), and satisfying RTO (60 minutes) and RPO (24 hours).
- **Security Hardening**: Implemented encryption at rest and in transit (SSL/TLS), IAM-based access controls, and secure credential management via AWS Secrets Manager.
- **Environment Provisioning**: Leveraged Terraform to provision the RDS instance and supporting infrastructure. Both production and test schemas reside within the same instance, isolated via database-level permissions to reduce costs.
- **Performance Optimization**: Right-sized the instance based on observed workloads, ensuring 20–25% headroom above peak demand. Storage was configured using gp3 volumes optimized for typical I/O patterns.
- **Operational Configuration**: Configured automated daily snapshots with incremental backups via RDS (7-day retention) and extended long-term retention (35 days) using AWS Backup. This aligns with the stated RPO of 24 hours.
- **HA and DR Setup**: Storage auto-scaling was enabled to accommodate projected growth seamlessly. In the event of an AZ failure, recovery leverages automated snapshots and point-in-time restore capabilities, meeting agreed-upon RTO and RPO objectives.



Business Impact and Benefits

The deployment of Amazon RDS for MySQL established a reliable, high-performance, and maintainable database foundation for Insight Technology's transportation application. By adopting a cost-optimized Single-AZ architecture, TrueMark delivered a solution that met all functional and operational requirements while achieving significant cost savings compared to a Multi-AZ setup (estimated at ~50% based on AWS pricing at the time of deployment).

Infrastructure as Code (Terraform) enabled consistent and repeatable deployments across environments. Non-production schemas are managed within the same instance using strict permission controls, reducing infrastructure costs compared to separate instances (estimated savings of ~50% based on internal cost modeling). This approach is appropriate for workloads where data sensitivity is low and cost efficiency is prioritized.

Security and compliance were strengthened through KMS-based encryption at rest, TLS

encryption in transit (via ACM), and centralized credential management using AWS Secrets Manager. Access to production and test schemas is strictly segregated at the database level, preventing cross-environment data access.

Monitoring via Amazon CloudWatch and Performance Insights gives Insight Technology's team proactive visibility into performance trends and potential bottlenecks. TrueMark provides regular Site Reliability Reports (SRRs) detailing optimization opportunities, ensuring continuous improvement in database health and efficiency.

Finally, the solution is designed for future growth. Should workload demands increase, the database can be scaled vertically during maintenance windows or upgraded to a Multi-AZ configuration with minimal re-architecture. Storage auto-scaling supports data growth up to 100 GB without requiring manual intervention.

System Stability and Efficiency Summary

- **Database Availability**: The RDS environment has consistently met or exceeded 99.5% availability, with no sustained outages observed during monitoring periods.
- **Performance Stability**: CPU utilization, database load, and I/O activity have remained well below capacity thresholds during typical operations, with only brief, isolated spikes during peak demand periods.
- **Operational Efficiency**: Low queue depths, minimal read/write latency, and stable connection counts have significantly reduced the need for manual performance tuning or emergency interventions.
- **Infrastructure Right-Sizing**: Historical patterns confirm that post-migration instance sizing supports day-to-day workloads efficiently, avoiding overprovisioning while retaining headroom for peak events.

Ongoing Database Management

Beyond the initial migration, TrueMark continues to manage the insighttechnology-mysql database to ensure the environment remains secure, performant, and aligned with AWS best practices well beyond deployment.

General Database Management

- RDS configurations are maintained via infrastructure as code, using Terraform and Bitbucket pipelines.

Maintenance and Upgrades

- TrueMark coordinates and executes both major and minor version upgrades for RDS MySQL, including patching and certificate renewals.

- Upgrades are tested and validated collaboratively with Insight Technology in non-production environments, and then applied during the monthly scheduled maintenance windows to ensure minimal disruption to business operations.

Database Troubleshooting & Incident Response

- TrueMark's Enterprise Operations Center (EOC) monitors the insighttechnology-mysql database and responds to incidents impacting performance or availability.
- Corrective actions such as log analysis, index creation, query optimization, and resizing are executed through change management, minimizing downtime and maintaining database integrity.

Query Optimization and Instance Management

- We continuously identify and resolve bottlenecks through schema consulting, query tuning, and right-sizing of instance types and storage configurations.
- Findings and recommendations are documented in Site Reliability Reports (SRRs) delivered to Insight Technology.

Alarms, Metrics, and Observability

- Amazon CloudWatch dashboards, Performance Insights, and tailored alarms are configured to track CPU, RAM, storage thresholds, and query performance.
- TrueMark investigates triggered alarms and provides remediation to prevent service degradation.

Security Management

- IAM role enforcement, security group governance, and database role/user management are implemented through infrastructure as code.
- Continuous auditing and logging safeguard compliance with Insight Technology's regulatory requirements.

On-Demand Services

- TrueMark allocates additional hours for specialized database requests, ensuring Insight Technology has flexibility to adapt as business and compliance needs evolve.

About TrueMark

TrueMark, an IT Solutions provider and AWS Advanced Tier Partner, holds the AWS Migration Competency and the Amazon RDS Database Migration Service Delivery designation, demonstrating proven expertise in guiding customers through complex cloud adoption and database modernization journeys. We excel in helping companies migrate, modernize, manage,

and support their infrastructure on AWS. Our work consistently delivers improvements in efficiency, consistency, cost optimization, scalability, and security.

Our competitive advantage stems from our ability to attract and retain a team of highly skilled professionals and equip them with the tools, frameworks, and reusable automation patterns needed to tackle challenging projects successfully. At TrueMark, our commitment is to consistently deliver substantial value to our customers and to always act in their best interest, ensuring that our solutions not only meet but surpass expectations.