TrueMark

Powering Scalability and Efficiency: Migration, Modernization, and Ongoing Management of Insight Technology's RDS SQL Server Database

Introduction

Insight Technology partnered with TrueMark to migrate and modernize the Factorloads SQL Server database from their EC2 instance to RDS. The migration improved performance, availability, and scalability while reducing downtime and operational overhead. Since the cutover, TrueMark has continued to manage and optimize the database, handling upgrades, monitoring, incident response, and performance tuning to keep the environment secure and aligned with AWS best practices.

About The Customer

Factorloads, powered by Insight Technology, focuses on helping freight transportation companies thrive. Their aim is to continually enhance the operations of these companies by offering innovative and high-quality products and services at reasonable prices. In the freight transportation industry, Insight Technology strives to be a leader, always exploring new possibilities and untapped opportunities. Their commitment to progress and innovation drives them to serve the transportation sector effectively. Insight Technology places a strong emphasis on quality and encourages its employees to strive for excellence in all their endeavors, ensuring that every task is completed with utmost precision and efficiency.

Customer Challenge

The Factorloads application was running into significant challenges related to recent growth. The application infrastructure, recently migrated to AWS through a rapid lift and shift from a datacenter, was in need of modernization to accommodate additional freight transportation companies. Frequent slowness had been occurring randomly before and after the AWS migration which was identified to be caused by database performance.

The primary challenges presented by Insight Technology for TrueMark to solve were:

- How do we increase database performance to accommodate additional customer load?

- How do we increase database availability and reliability from the current single AZ EC2 instance migrated from the data center?

- How do we allow our developers to move from SQL Server 2016 to the SQL Server 2022 version allowing them to leverage new features and performance opportunities?

- How do we accomplish all of the above quickly and safely without no data loss and limited maintenance windows?

Without these changes, the existing application infrastructure was ill-equipped to handle peak-time demands, leading to frequent slowness, outages and operational inefficiencies. These issues not only incurred financial losses but also restricted user access to vital systems. The urgency for an overhaul was further intensified by growing business needs around technological advancement. Insight Technology required a solution that would not only address the immediate performance deficits but also modernize their database infrastructure for the future. This modernization was crucial to allow Insight Technology to meet evolving customer requirements allowing them to maintain a competitive edge.

Journey to Our Solution

TrueMark aimed to meet the challenge head on, by proposing a solution that leveraged the AWS Database Migration (DMS) service to execute a low downtime migration from the existing EC2 based SQL Server 2016 instance to a scaled-up RDS for SQL Server instance running SQL Server version 2022. This strategic move was designed to enhance system performance and agility, directly targeting the inefficiencies of the old system.

The proposed solution not only would resolve the existing challenges faced by Insight Technology surrounding growth, but it brings greater availability, scalability and upgradeability in the future allowing Insight Technology to stay up on the latest and greatest database technology more readily setting the stage for an increased competitive advantage.
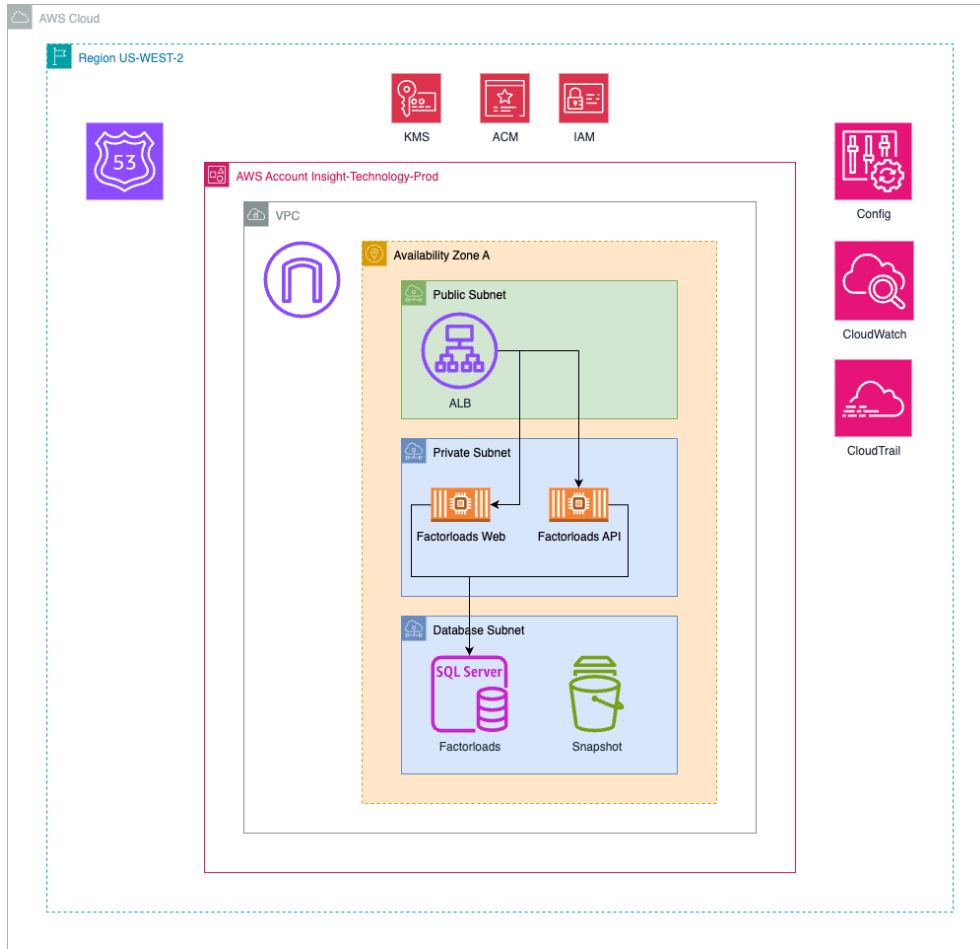
AWS Services

The core of our solution revolves around two primary AWS services: Amazon Relational Database Service (RDS) and AWS Database Migration Service (DMS). Amazon RDS was employed to establish a robust, high-performance database environment, which significantly streamlined the process of database setup, operation, availability and scalability. While the use of AWS DMS, facilitated a seamless migration from the older SQL server instance to the newer RDS for SQL Server 2022 instance. The migration process was executed using a combination of full-load and CDC (Change Data Capture) tasks, ensuring minimal downtime and maximum data integrity.

The Migration Process

The migration process was meticulous and comprehensive. After evaluation and analysis, the TrueMark team stood up an RDS for SQL Server Standard Edition 2022 instance using existing infrastructure automation that used HashiCorp Terraform. Next, a DMS replication instance (dms.c5.2xlarge) with replication engine (version 3.5.2) was configured to handle the migration based on size and previous tests conducted by the team. The target database was sized to handle

the databases being migrated with the largest consisting of 597 tables along with a projected annual load increase of 20%. This setup was specifically designed to accommodate the future expansion and increasing data demands of Insight Technology.

Prior to the migration, we provided extensive support to ensure a smooth transition. This involved conducting an in-depth analysis of the existing infrastructure, identifying potential optimization opportunities, and developing contingency plans for various failure scenarios. A comprehensive migration plan was crafted, focusing on readiness, robust fallback strategies, and stringent security requirements. User acceptance testing protocols were also established to guarantee the new system met all functional and performance requirements.

Following the migration, TrueMark provided continuous monitoring using Amazon CloudWatch for performance metrics and system health, adjusting configurations as needed, and providing detailed documentation and training for Insight Technology's staff. Furthermore, we established robust disaster recovery plans and conducted total cost of ownership analyses, ensuring that the client was well-equipped to leverage their new AWS environment effectively.

Ongoing Database Management

Beyond the initial migration, TrueMark continues to manage the Factorloads 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 SQL Server, 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 Factorloads 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.

Long-term Business Benefits

The implementation of the AWS-based solution led to a notable enhancement in Insight Technology's operational efficiency and system performance. The migration to the AWS RDS SQL Server Standard Edition 2022 brought significant improvements in the reliability and speed of the overall Factorloads application. This strategic upgrade streamlined their IT processes and provided a more scalable, robust infrastructure.

The following response times were gathered from the 5 business days prior to and following the migration measured by AWS CloudWatch metrics gathered on the application load balancer servicing the Factorloads environment.

	Average	Max
Before Migration	1.75 s	81.6 s
After Migration	1.22 s	8.02 s
Improvement	30.3%	90.2%

Table 1: Response Time (99th percentile)

Following the migration, Insight Technology observed tangible benefits in various aspects of their IT operations. System downtime was noticeably reduced, contributing to increased productivity and user satisfaction. Operational costs saw a decline due to the more efficient management and maintenance capabilities offered by the AWS environment. The company also experienced an improvement in data processing and application performance, reflecting the optimized capabilities of the new database system. Additionally, the enhanced backup and recovery features of Amazon RDS bolstered data security and streamlined recovery processes.

Insight Technology now enjoys an upgraded IT infrastructure that is not only aligned with their current requirements but also equipped to handle future technological advancements and data demands. The modernized system has enhanced the company's operational agility and better aligned IT services with their overarching business objectives. Feedback from the client indicates a high level of satisfaction with the solutions and support, reflecting the positive impact of the migration.

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.