R SYSTEMS

AWS MIGRATION

CASE STUDY:

Digital Transformation
On-Premise App to AWS Cloud

A US-Based Client Improved its End-User Experience & Reduced Operational Complexity with AWS Services, Delivered by **R Systems**

Client Overview

The US-based client delivers cost sustainability to employers. They provide affordable & high-quality healthcare to the people who struggle to pay their bills. The client serves as an administrator of health plans for employers and works closely with local health plans and third-party administrators (TPAs) to enhance their offerings.

R Systems developed a highly available, adaptable, stable, and secure solution for the client as they had unpredictable traffic surge during weekdays which required to create more instances to server traffic. They had few legacy applications and needed to identify incompatibilities & re-architect those apps to run on Windows-based EC2 workloads in AWS. As belonging to the healthcare domain, security of the solution was vital. We considered all these requirements while designing the solution.

Problem Statement

Client had an on premise customer portal with multiple user login interfaces like member, employer, provider and others as a legacy system. This system was facilitating partnerships between individuals and their Primary Care Team as mediators. Due to legacy system, there was limited end-user handling with minimum hardware and software support and costly maintenance of the application.

Client wanted to rapidly scale up their digital efforts, information flow, data markets and transform business for the new digital realities with modern technologies. They needed a highly available and cost-effective solution that enables optimal care and an exceptional experience for end-users.

R Systems was engaged to migrate the on-prem applications to AWS which specifically required identifying incompatibilities and re-architecting apps.

Why AWS?

Amazon Web Services is a pioneer in providing leading technology services. Various AWS capabilities were utilized to achieve desired outcomes:

- Used AWS managed directory service for directory aware workloads & its integration with RDS-MSSQL

- Configured Microsoft Windows OS editions for running .NET applications

- Employed Systems Manager to regularly patch the Windows EC2 Workloads

- Ensured near Disaster Recovery (DR) deployment with multiple availability zones

- Implemented logging services like CloudTrail for audit purposes

- Enhanced security with IAM, Cognito, Encryption and Web Application Firewall (WAF)

- Developed a well-architected framework for resilient architecture

R Systems' Solution

Delivered cloud-based solution using various AWS services e.g. EC2, ELB, RDS, etc. to connect every family with dedicated primary care.

Deployment Highlights:

- Re-architected legacy applications to run on AWS

- Configured .NET applications on MS Windows EC2 instances in Multi-AZ environment

- Used Relational Database Service (RDS) MS-SQL server in Multi-AZ config for scalable DB operations

- Leveraged Autoscaling groups to reduce operational complexity of running and managing apps

- Configured required services, such as Elastic Load Balancer, IAM, Directory Services, Route 53, SNS, etc.

- Implemented native authentication service (Cognito)

- Enabled Interactive Voice Response (IVR) system using Amazon pin-point, SES and SNS

Third Party Tools Used:

- Trend Micro endpoint protection

- Zabbix monitoring tool

OS & Database:

S. No.	Operating System	Database
1	Windows 2019 Datacenter Edition	RDS MSSQL 2017 Enterprise Edition

AWS Technologies Deployed:

- **RDS MS-SQL:** To manage SQL Database

- **EC2:** To create virtual server in the cloud

- **Systems Manager:** To manage operating system patching of Windows based EC2 instances

- **Directory Service:** To manage directory aware workloads in the AWS cloud

- **S3:** To store flat files like images, videos, etc. on scalable storage in the cloud

- **Route 53:** To register scalable DNS & domain name

- **ACM (Certificate Manager):** To easily provision, manage and deploy SSL certificates

- **CloudWatch:** To monitor resources & applications

- **SNS:** To manage message topics for pub/sub

- **SES:** To send and receive emails

- **Cognito:** To enable user identity and sync app data

- **Pinpoint:** To engage users via email, SMS, push notifications and analytics

- **ELB:** To distribute load to servers in multiple AZs

- **AutoScaling:** To increase or decrease server count as per incoming traffic

- **IAM:** To manage user access and encryption keys

- **CloudTrail:** To deliver log files to an S3 bucket

- **Web Application Firewall:** To prevent cyber attacks

Architectural Diagram
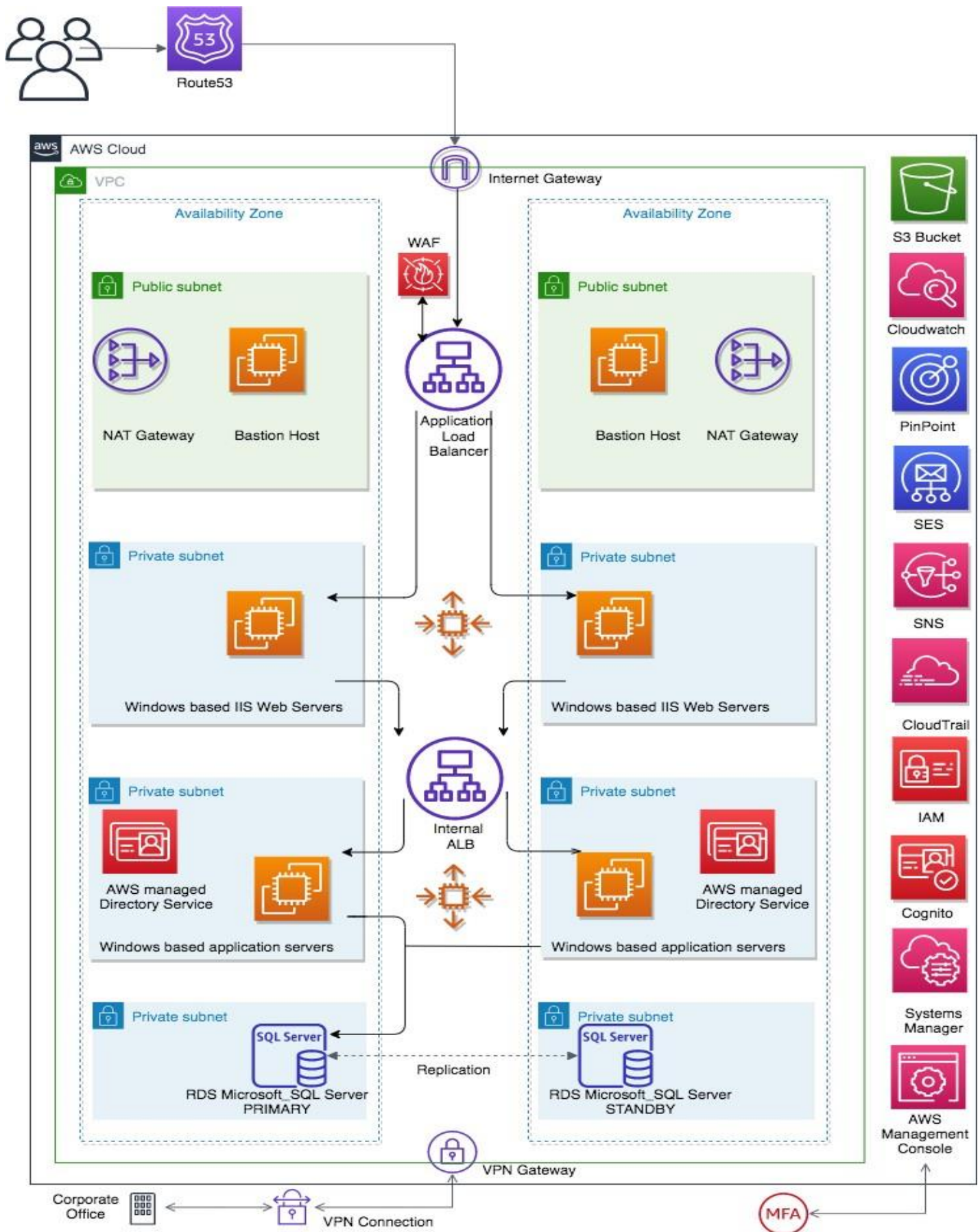
Operational Excellence

Monitoring tools, like AWS CloudWatch & Zabbix were used to generate actionable alerts that were responded by IT team. CloudWatch dashboard was created for IT team to monitor the real-time status of AWS resources. AWS Systems Manager ensured that all Windows based workloads were regularly patched in the defined maintenance window.

Security

- Ensured complete security inside/outside the AWS perimeter & at multiple layers

- Enabled SSO to allow users to access AWS console and resources through their AD credentials. Multi-factor authentication (MFA) was made compulsory

- Enabled MFA and disabled programmatic access for root account

- Configured separate subnets for each layer (Web, Application, Database) for network-level isolation

- Configured apps on EC2 instances to use IAM roles

- Employed security groups & NACLs with least permissive rules

- Used Application Load Balancer to route the traffic to private subnet's servers over multi-availability zones of AWS for higher availability, and achieve near DR deployment

- Configured VPC flow logs to monitor the incoming/outgoing traffic at ENI level. Logs were stored in S3 bucket for 90 days and then archived to Glacier using life cycle policies

- Enabled CloudTrail to record the API activity of AWS services & logs stored in S3 bucket for audit purpose

- Enabled Amazon S3 server-side encryption (AES-256) to encrypt data at rest

- Encrypted EBS volumes using KMS to safeguard the data in transit

- Configured hardened bastion hosts to access EC2 servers in private subnets

- Maximized security with antivirus protection using Trend Micro endpoint protection

- Deployed WAF to prevent cyber-attacks

- Configured VPN to secure the traffic coming from Corporate Datacenter to AWS

- Used hardened OS AMIs as per CIS standards

Reliability

R Systems deployed its solution in a single AWS region leveraging AWS Well-Architected Framework which includes using two availability zones (AZs) to ensure all applications are always available.

AWS Life Cycle was configured to take periodic backups of the tagged EBS volumes. Thus, ensuring the availability of snapshots of EBS volumes for recovery.

AWS managed database service was used to deploy MS-SQL 2017 server in Multi-AZ architecture to ensure high availability of database. Both primary & standby database remained in sync & automated backups were configured to minimize RPO & RTO.

Cost Optimization

- Configured Autoscaling to automatically reduce the server count across all layers (Web, Application) based on incoming traffic

- Reduced operational costs by using managed services, such as RDS, AWS directory service

- Selected C5 family instances and purchased 1-year (Reserved Instance) RI to reduce bills

Project Outcomes & Success Metrics

- Migrated on-prem legacy system to Amazon cloud

- Provided high availability system with negligible downtimes

- Utilized Autoscaling to handle a sudden rise in traffic

- Used Multi-AZ architecture, automated backups for disaster recovery

- Leveraged CloudTrail to simplify audit process

- Secured the solution using IAM, Cognito, EBS volume encryption, etc.

- Provided dynamic benefit design that rewards individuals for high-value care and adherence

- Enhanced accountability of providers and individuals

- Reduced complexity of business processes

- Delivered Optimal care and an exceptional experience

About R Systems

R Systems is an AWS Advanced Consulting partner & Microsoft Gold partner. We are a global digital transformation leader that provides AI-driven solutions to clients across industries, through a broad range of technology & AI/analytics services. We continue to empower organizations for over 26+ years, with 16 delivery centers, 25+ offices worldwide and a workforce of 2750+ professionals.