

Cloud Migration and Operations Support for US Aviation Major in SAP Environment



Overview

Customer needed to transform their IT infrastructure solution to address:

- High Total Cost of Ownership (TCO)
- Need to migrate servers and applications to AWS cloud to increase Low efficiency and agility, resiliency, and cost optimization.
- Increase resiliency of SAP Systems with High Availability and Disaster Recovery. Improve RPO and RTO
- Reactive maintenance and Low productivity
- Requirement for enhanced security posture, integrity of data and access control
- Need to have higher Visibility, Accuracy, and mapping of assets.
- Enhanced environment stability and increased operational excellency.

Scope of the Work

- ▶ Run assessment of pre-existing SAP environment to understand system landscapes and customer's business and operational requirements.
- ▶ Migration of SAP instances and the associated systems from current provider (Virtustream Dell Cloud) to AWS.
- ▶ A subset of systems based on system type and migration methods were migrated (ECC 6.0 are lift and shift) whereas the rest of systems were built as new system followed by restore from the existing system.
- ▶ Tech Mahindra to bring their expertise to execute complex SAP migration best practices on cloud. The customer's large data in files should be migrated to cloud as well.
- ▶ Provide managed services of both infrastructure for the services in scope and application post go-live.

Client Background and Challenge

The customer is a world-leading provider of jet and turboprop engines, as well as integrated systems for commercial, military, business, and general aviation aircraft. The customer also has a global service network to support these offerings.

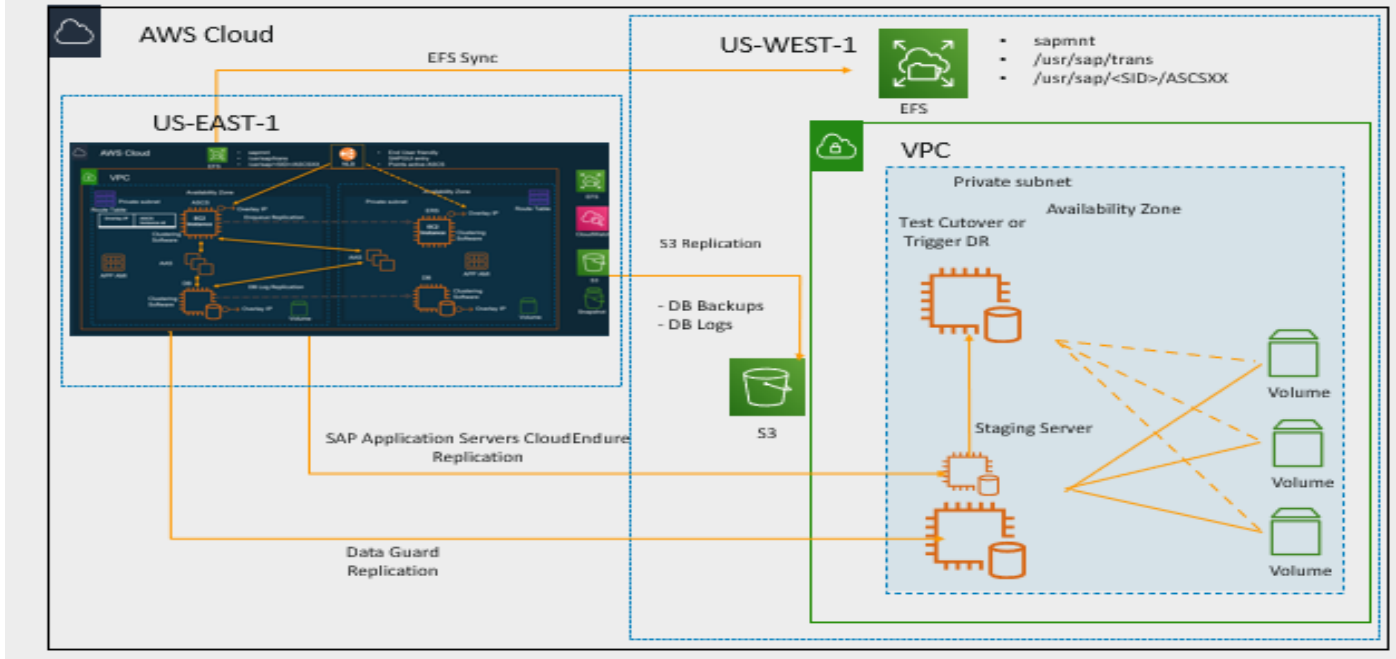
- ▶ High turnaround and less agility with the existing datacenter provider (high turnaround time for request processing for metrics submission and DB refresh activities).
- ▶ Lack of control and visibility to the hardware resources.
- ▶ Data refresh tasks were expensive, manual, error prone and tedious.
- ▶ Resource scalability is limited to the infrastructure in place.
- ▶ HA and DR strategy of current design is not aligned with the business and functional requirements.
- ▶ Lack of day-to-day infrastructure operation (monthly OS patching etc.) and management process.

Our Approach and Solution

AWS Architecture

- ▶ The architecture meets the customer requirements of high availability and disaster recovery solution.
- ▶ Primary region with two AZs were built in US-EAST-1 and DR is in US-WEST-1
- ▶ CloudFormation templates were used to auto provision AWS Infra with SAP installation.
- ▶ Pacemaker with overlay IP across different AZs has been configured as HA solution for SAP systems.
- ▶ AWS disaster recovery solution (DRS)/CloudEndure which performs storage replication has been configured for disaster recovery solution. This solution is able to meet the RPO of 15min and RTO of 2hrs as required by the customer while keeping the cost minimal.
- ▶ Oracle data guard has been used at database level for HA and DR. For HA the replication mode is synchronous and for DR asynchronous replication has been used.
- ▶ Oracle OSB was used for DB backups which sends the DB backups directly from Oracle to S3. This backup is replicated to the DR region using the S3 cross region replication (CRR).
- ▶ Shared EFS mounts were configured per SID. EFS sync is being used to replicate data across region for DR.

SAP DR Architecture – Using DB Replication and CloudEndure



Cloud Operations Governance:

- ▶ Cost optimization activities are covered as part of governance. The support team recommended reserved instance capacity to the customer governance team.
- ▶ Runbooks were created as part of operations to perform regular activities.
- ▶ CloudTrail has been enabled in all AWS accounts and all the regions.
- ▶ All the logs are being configured to store in restricted S3 bucket in Security Account

Security and Access Management:

- ▶ AWS Console access is restricted only via ADFS with MFA, Least Privileged Access, Permissions are enabled using IAM Roles with least required access.
- ▶ **AWS NLB** network load balancers configured to connect SAP GUI logins.
- ▶ NACLs and Security groups ports implemented to secure SAP apps and DB.

Operations Management:

- ▶ AWS instances bootstrapping with **Chef for configuration management**.
- ▶ **GE Hardened / Customized** images of RHEL and OEL images used to build instances using AMI.
- ▶ **AWS SSM** implemented for monthly patching operating Systems.
- ▶ **Qualys, Splunk, CrowdStrike** installed for security, logs, and endpoint protection.
- ▶ **New relic** is used to monitor AWS resources.

Monitoring and Observability:

- ▶ New Relic is setup to monitor the CPU, memory, Load Average etc.
- ▶ SOLMAN - Monitoring has been enabled by the Solution Manager for all the satellite systems. SOLMAN triggers the alert notification to BASIS team upon the breach of the thresholds configured.
- ▶ The OASIS AWS Platform captures AWS API calls, VPC Flow Logs
- ▶ The Amazon CloudWatch Logs Agent is used for capturing Operating System Event logs.
- ▶ Amazon SNS is used for alerting the respective teams.

Managed Service:

- ▶ Tech Mahindra's scope of work includes 24* 7 support of the infrastructure for the services in scope and SAP application.
- ▶ Tech Mahindra provides scalable operational capacity and skills across monitoring, incident management, security, patch, backup, and cost optimization.
- ▶ Integrated with ServiceNow for incident management enabling faster business turnaround for critical issues.
- ▶ SAP Application support team and AWS operations team available around the clock for timely response, proactive troubleshooting of SAP and infrastructure related issues for uninterrupted operations.
- ▶ Service levels are defined based on criticality with response and resolution times.
- ▶ Operational tasks include server patching, health and utilization monitoring, upgradation - OS, DB and service versions.
- ▶ As part of operations excellence AWS resources are continuously optimized.
- ▶ Escalation matrix is in place and process is defined to handle major issues.
- ▶ Root cause analysis process and template is documented in confluence page.
- ▶ Chef is used for configuration management to maintain the infra and application related agents update to date. This has helped in improving risk management, streamlining IT operations and Increasing Service resiliency.

Business and Community Impact



Reduced the TCO for the customer while improving the RPO and RTO objective by migrating from Virtustream Dell cloud to AWS cloud. The migration was performed in a much shorter time and hence reduced downtime and cost to the customer.



Achieved near zero downtime for monthly operational maintenance activities.



Automated OS patch process using AWS SSM.



Continuous Optimization of AWS resources as part of operations excellence.



Increased the security positioning of the customer SAP workload by segregating their workload and following the industry standards on securing SAP.



Aligned customer practice to DevOps by leveraging AWS CloudFormation stacks for provisioning and scale the workloads.



Increased operational resilience by implementing New Relic monitoring tool.



Increased the availability of workloads with clustering for HA and Cloud Endure (AWS DRS) for DR.



Operational efficiency increased with the automation of alerts, backup process and nimble business recovery/restore process in case of disaster.



Increased system availability with patching maintenance windows for each environment according to the customer's standards

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