MIGRATING SAP WORKLOADS TO AWS CLOUD

Cloud is an increasingly credible and powerful infrastructure alternative for critical business applications. It's a great way to avoid capital expenses and maintenance costs while gaining scalability on demand. Deploying SAP on the cloud can transform SAP landscape into an agile, cost-efficient and scalable system, enabling an organization to run better and respond faster to changing market conditions and take advantage of new technologies and business models.

The world of data centers and hardware is also undergoing significant changes. According to a Cisco research, 83% of all data center traffic will be cloud based by 2018

Key points to be followed before migrating:

- **Sensibly Plan for the migration and budget**: SAP migrations are strategic decisions that require assessing the entire SAP landscape and deciding what to be migrated to cloud, including a move onto HANA or a transformation to SAP S/4HANA, BW/4HANA or BW4HANA

- **Launch and touchdown testing** – Many SAP solutions are running on legacy operating system and database combinations that are unavailable on public cloud. In other words, there's no opportunity to "lift and shift." Instead, enterprises must change the operating system and/or database of the SAP solution, which impacts how it runs and requires additional testing. This can contribute significantly to the migration timeline and costs of the overall effort.

- **With Migration process comes Great Responsibility**: It's important to establish production-like reference systems, making full copies of the SAP production environments using production-sized legacy systems plus production-sized cloud systems. Completing a mock migration run using production-like source systems will make it possible to accurately predict the necessary outage window for the business and target actions to condense it with appropriate lesson learned while switching to cloud platform. Migrating environments will invariably require greater processing power and throughput than running those same environments later in production. This makes environment sizing an important consideration and can mandate using the largest available virtual machines for migration. Afterwards, these machines can be downsized.

- **Even man of steel can fail**: With strong skills in infrastructure and SAP, many enterprise IT departments will still need guidance or outside expertise to execute the SAP migration to the public cloud. Navigating and troubleshooting the requisite database migrations across multi-layered, parallel work streams is inherently difficult, so do not undervalue the experience of having 'been there and solved for that.' The ideal migration team will combine IT specialists with deep experience in SAP operating system/database upgrades, and cloud infrastructure specialists who can design the cloud landscape and build-up virtual machines to run SAP optimally in the cloud. Given the high-paced learning curve, consider doing things differently and augmenting our core IT team with experienced resources for the migration.

- **Important to wash and Rinse our system before migration**: Many enterprises have accrued massive amounts of SAP data, some of which they seldom use. Inconsistent source data, corrupted or missing data, and unreadable data formats can bog down the SAP migration to the public cloud. A better

answer is to proactively cleanse, archive and purge to reduce data anomalies and more importantly, minimize the time and labor costs to move, maintain and support data that does not add value.

Benefits in moving to AWS:

For many enterprises running SAP, migrating to AWS is a smart move. Not only does AWS offer a wide variety of public cloud services—such as software, infrastructure and platform as a service but AWS also has a long history of SAP experience and a broad collective knowledge about SAP technologies and tools. Dating back to 2008, AWS relationship with SAP has been marked by successful deployments in a wide range of industries, including retail, consumer packaged goods, manufacturing, media, energy and many more.

AWS also has established a well-resourced SAP HANA competency center, ensuring that SAP customers are fully supported on the strategic HANA platform and on HANA centric applications such as S/4. A key benefit in working with AWS for SAP is its large number of certified SAP HANA instances, far outdistancing other public cloud platforms. In fact, AWS offers a 4-terabyte HANA in-memory instance.

AWS provides a broad range of tools for SAP, including Auto Scaling. These and other tools enable IT organizations to focus more of their time and energy on using SAP for digital transformation goals, while relying on AWS for such requirements as application security, disaster recovery, compliance, governance and other forms of risk mitigation.

AWS most attractive capabilities for SAP-based organizations is the low total cost of ownership, especially in hyperscale environments that would otherwise require big Capex investments to keep up with infrastructure demands as SAP instances expand.

Migrating SAP Workloads to the AWS Cloud with AWS SMS

AWS Server Migration Service (AWS SMS) is an agentless service that migrates our on-premises VMware vSphere or Microsoft Hyper-V virtual machines to the AWS Cloud.

This whitepaper will explain how we can use this service to migrate our virtualized, on-premises (or private cloud) SAP workloads to Amazon Elastic Compute Cloud (Amazon EC2) instances on the AWS Cloud.

Here are some of the key benefits of using AWS SMS:

Simplified migration: After configuring the source environment, we can migrate the virtual machines easily by scheduling replication jobs in the AWS Management Console. Replication to Amazon Machine Image (AMI) creation is a four-stage process that's handled automatically when the replication job is executed.

Incremental migration: AWS SMS can replicate a live environment incrementally, which can speed up the migration process significantly. We can continue to run the production environment while it's being replicated to the AWS Cloud.

Minimized downtime: There is no impact on production operations during incremental replication. However, final replication (cutover) does require downtime.

Parallel migration: With AWS SMS, we can migrate multiple virtual machines in parallel. With this capability, we can migrate the complete landscape (for example, migrate all the development systems at one time, and then quality assurance systems, and so on).

AWS SMS is free to use but during replication, it creates Amazon Elastic Block Store (Amazon EBS) snapshots and uses Amazon Simple Storage Service (Amazon S3) to store those snapshots, and there's a cost associated with those resources. We can refer the Amazon website for the pricing information.

Replication process

To set up our on-premises virtualized environment and AWS account for AWS SMS, we must refer the detailed instructions for VMware and Hyper-V from the AWS website. As part of the setup, we deploy the AWS Server Migration Connector in our virtualized environment. When the setup is complete, we can configure the replication job by setting its schedule and frequency. After you set up the job, the replication of the virtual machine with AWS SMS starts automatically and follows a four-step process. These four steps - scheduled, uploading, converting, and AMI creation are executed sequentially for each replication job run.

Figure 1: Stages in AWS SMS replication process

Schedule

In this step, the migration job(s) configured are scheduled to run either at a specific time or immediately.

Figure 2: Replication job in Scheduled status

Upload

This is a multi-step process:

The VMware or Hyper-V snapshot of the virtual machine is triggered. The snapshot creates a VMDK file (for VMware) or an AVHD file (for Hyper-V).

The Open Virtualization Format (OVF) file is created for the virtual machine. This is an XML file that contains metadata about the virtual machine.

The VMDK or AVHD file created by the snapshot are uploaded to an S3 bucket. The S3 bucket is created automatically in the AWS Region where we have set up the AWS Server Migration Connector. After the snapshot files are uploaded to S3, they are deleted from the source environment.
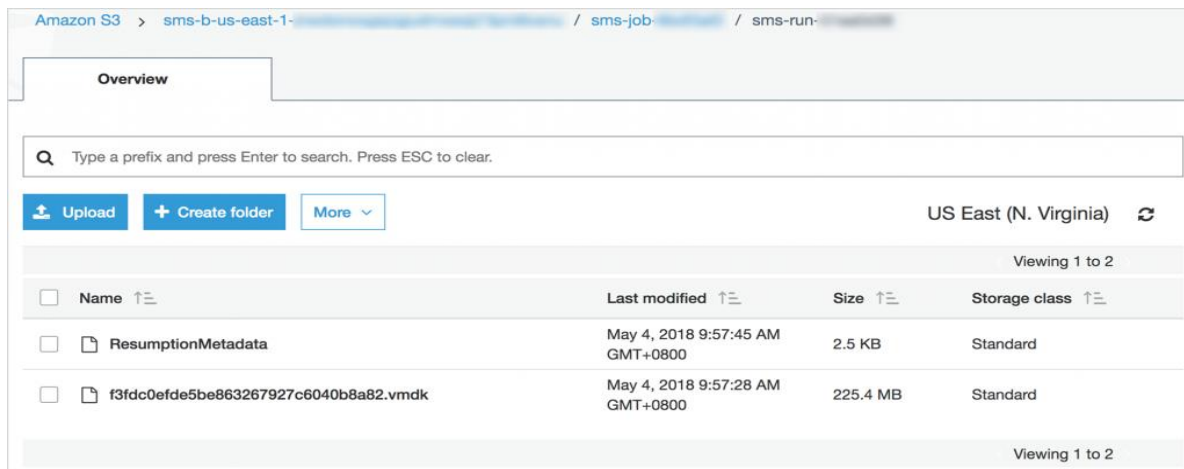

Figure 3: S3 bucket with uploaded VMDK file

Convert

This step handles two tasks:

- AWS SMS creates an EBS snapshot from the uploaded VMDK or AVHD file.
- AWS SMS deletes the VMDK or AVHD file from the S3 bucket.

Create AMI

This step creates an Amazon Machine Image (AMI) from the EBS snapshot produced during the Converting step. After this step is complete, we can launch an Amazon EC2 instance from the created AMI.

The replication job continues to run at the scheduled frequency, with each execution repeating these steps. Each execution of the replication job brings only incremental changes to the AWS Cloud. When the replication is complete, and the servers are ready to go live, we can stop the production servers (on premises) to prevent

further changes and execute the job one last time to bring in the delta from the last execution. After the final changes have been replicated to the AWS Cloud, you can create an EC2 instance from the AMI.

SAP workload migration with AWS SMS

Let's discuss about how we can use AWS SMS to migrate our virtualized SAP environment to the AWS Cloud.

There are two migration options: lift-and-shift, or migration to SAP HANA.

Lift-and-shift migration

In this scenario, we can migrate our virtualized SAP environment running on Windows, Red Hat Linux, SUSE Linux, or Oracle Linux to the AWS Cloud as is, without any changes in the operating system or database. The process consists of these steps:
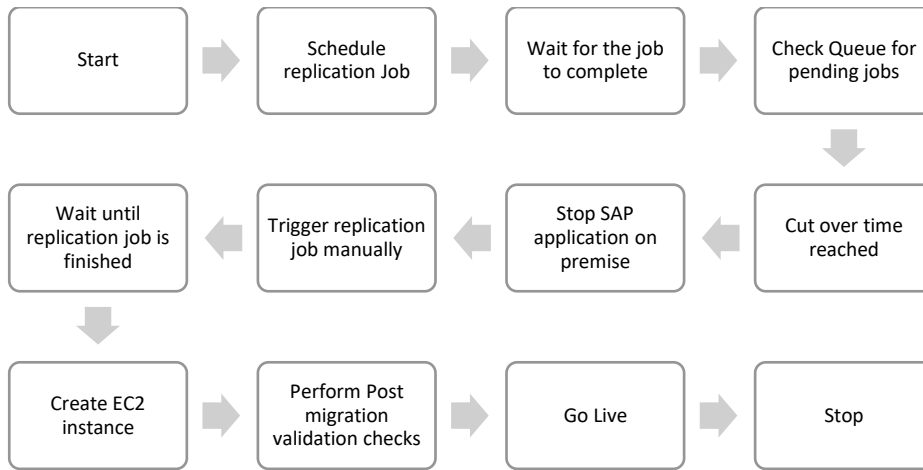
Schedule the replication job at regular intervals for the virtual machines containing the database and non-database applications (ASCS/SCS, PAS, and AAS), or non-SAP NetWeaver-based applications (like BusinessObjects BI). We recommend intervals of 12 hours for the database and 24 to 48 hours for non-database virtual machines.

Complete the first execution of the replication job. we should schedule this job in advance because it's an initial and full replication and will take some time to complete. The execution time will depend on the size of our virtual machines.

Monitor the replication job for successful completion of incremental runs (we recommend at least two runs) and take note of the time it takes to complete each successive replication job. This will give us an estimate of the downtime required for final cutover. We recommend completing at least two incremental runs because it takes much less time to complete subsequent jobs after the initial, full replication, since subsequent runs involve only delta changes. For example, in the replication shown in the following illustration, full replication took around 8 hours, and then delta runs completed in around 1.5 hours.

**Figure 4: Reduced execution time after initial replication**

Figure 5: Architecture to replicate SAP workloads to AWS Cloud

- Plan for the final cutover. For the cutover, we can stop production operations on premises and execute the replication job one last time to migrate delta changes to the AWS Cloud. We also recommend staging a mock cutover before the final cutover.
- Build an EC2 instance from the AMI created by the last replication job.
- Complete post-migration steps such as updating the DNS (or hosts file), validation, and integration.
- Go live.

Migration to SAP HANA

If we aren't running SAP HANA on premises and would like to migrate to AWS Cloud with SAP HANA, we can reduce our downtime significantly with AWS SMS by two ways:

- Lift-and-shift migration
- SAP HANA DMO Process
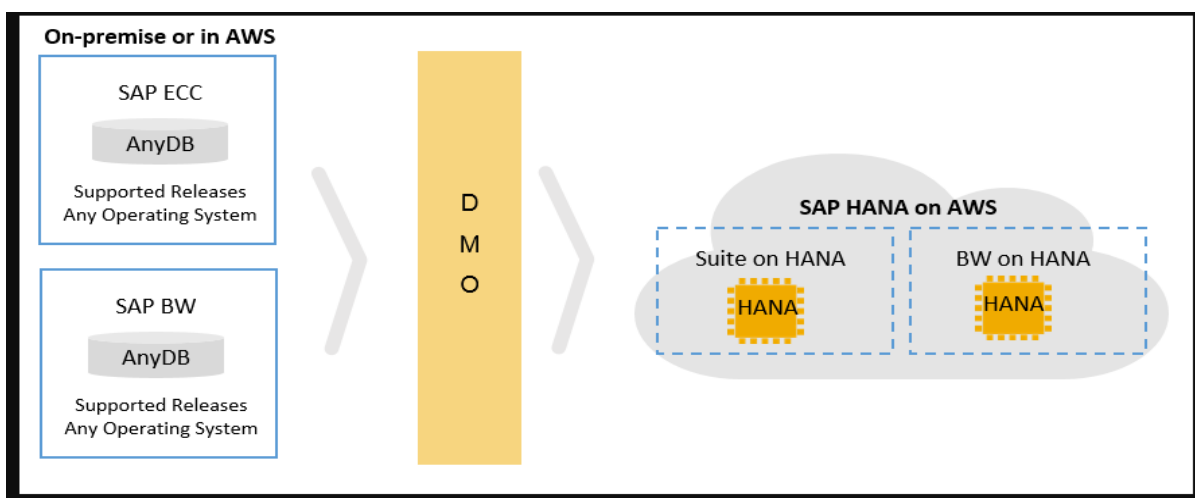
Figure 6: SAP HANA DMO process

Migrating the virtual machines running on Windows, Red Hat Linux, SUSE Linux, or Oracle Linux to AWS by following the process outlined for Lift-and-shift. We are no longer constrained about the availability of resources to optimize the export and import process.

Migrating to SAP HANA will be significantly faster for SAP applications running on AWS. This applies to even large databases as both the source and target SAP instances will be on AWS.

We can use the SAP database migration option (DMO) to perform Unicode conversion, upgrade, and migration in a single step.