Accelerating Customer Adoption of End-User Compute Services with AWS

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Table of Contents

1. Executive Summary

AWS end-user compute solutions have continued to evolve with AmazonWorkSpaces and AppStream 2.0. Both solutions provide cloud-native capability for a full persistent Desktop-as-a-Service using Amazon WorkSpaces or a non-persistent desktop application streaming service using AppStream 2.0. For context on this whitepaper, we will focus on the following technical services from AWS:

> Amazon WorkSpaces: Amazon WorkSpaces is a fully managed, secure Desktop-as-a-Service (DaaS) solution which runs on AWS. With Amazon WorkSpaces, you can easily provision virtual, cloud-based Microsoft Windows desktops for your users, providing them access to the documents, applications, and resources they need, anywhere, anytime, from any supported device.

> Amazon Appstream 2.0: Amazon AppStream 2.0 is a fully managed, secure application streaming service that allows the streaming of desktop applications (or full desktop) to the end-user, presenting them via an HTML 5 compatible web browser, without requiring the applications to be rewritten. Amazon AppStream 2.0 manages the AWS resources required to host and run the applications, scales automatically, and provides access to users on demand.

GlassHouse is an Advanced Consulting partner with AWS, with deep expertise in end user computing. We deliver AWS and Modern Workspace transformations for traditional IT environments and provide integrated support services to ensure stable run-time operations for cloud environments. A summary of our capabilities is provided here.

Key Tenants of the GlassHouse/AWS Capability:

- GlassHouse provides vendor independent consulting and support services, specialising in Modern Workspace transition to cloud

- CloudAccelerate is a delivery framework to provide rapid deployments for cloud solutions using automation for deployments

- GlassHouse designs, deploys, and supports cloud native end-user compute services. Our SME experience in EUC solutions allows for rapid design and deployment outcomes for customers.

- Post deployment, CloudControl is an support services framework to allow flexible technical support and monitoring, often blended with customer operations support.

This whitepaper aims to provide a set of guiding principles and considerations that should be used for migrating existing legacy virtual desktop infrastructure (VDI) and published / hosted applications across to a pay as you go model incorporating Amazon WorkSpaces or Amazon AppStream 2.0.

The target audience includes IT Infrastructure Managers, Architects, Directors, and those who are planning updates to, or considering migration of their desktop services from traditional on-premises environments to Cloud, hybrid-Cloud based, or fully managed virtual workspace solutions.

This document discusses a practical approach including various uses cases, benefits of using one technology over the other, and pricing estimates. We will also discuss the most common challenges and frequently asked questions when planning a migration to Amazon WorkSpaces or Amazon AppStream 2.0.

This document is broken into four categories:

- Environment Discovery and Assessment

- Design (Use cases considerations)

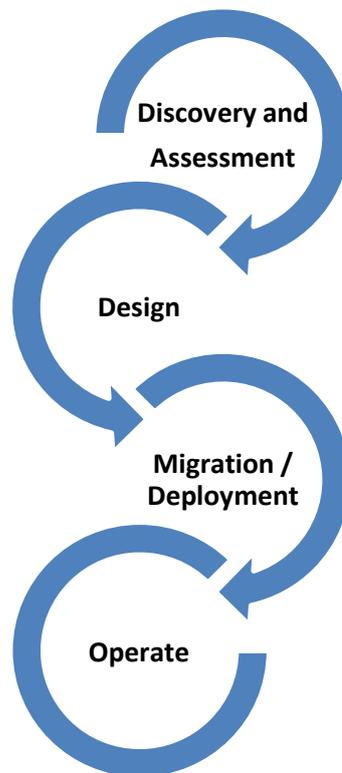- Migration / Deployment

- Operations

Figure 1: Migration Path

2. Environment Discovery and Assessment

2.1 Current VDI Infrastructure

Traditional VDI environments typically provide access to applications or desktop environments using both Server and / or Desktop operating systems, providing a high degree of flexibility in terms of what can be hosted by the VDI environment. This distinction between providing access to a number of applications or access to a complete desktop environment is key to the overall design of a hosted environment.

The Hosted Application model is frequently used by Task Workers, who only require access to a limited number of applications, or where these may be unsuitable for deployment to the desktop environment. In these environments, multiple user sessions are typically hosted together on a Server based operating system, with the system resources being shared amongst the users logged in.

Within the Hosted Desktop model, two main variants are used - Server based operating systems accessed by multiple users, sharing the server's resources, or individually accessed Desktop based operating systems for each user.

2.2 Current AWS Infrastructure

If the customers already have a tenancy in AWS, a detailed understanding of the current AWS infrastructure is essential during the assessment phase to determine the feasibility and impact of migrating the current VDI workloads to Amazon WorkSpaces or Amazon AppStream 2.0.

As Amazon WorkSpaces and Amazon AppStream 2.0 heavily rely on backbone infrastructure services such as Directory Services, it is critical that this is taken into consideration during the initial assessment and planning phase. The location of the shared infrastructure such as domain controllers, file servers, proxy servers etc. will determine the disaster recovery solution, and in some cases, will also affect the end user experience.

As per best practices, it is also advised that all the essential services be migrated to AWS within a shared services VPC in order to specify the necessary governance and security controls for your environment.

It is also recommended that an appropriately sized and redundant AWS Direct Connect service is configured to ensure that applications which need to traverse over the WAN to connect to on premise services will not be affected due to network congestion or network failure.

The following diagrams depicts a full Amazon WorkSpaces and AppStream 2.0 architecture with connectivity to an on-premises data centre.
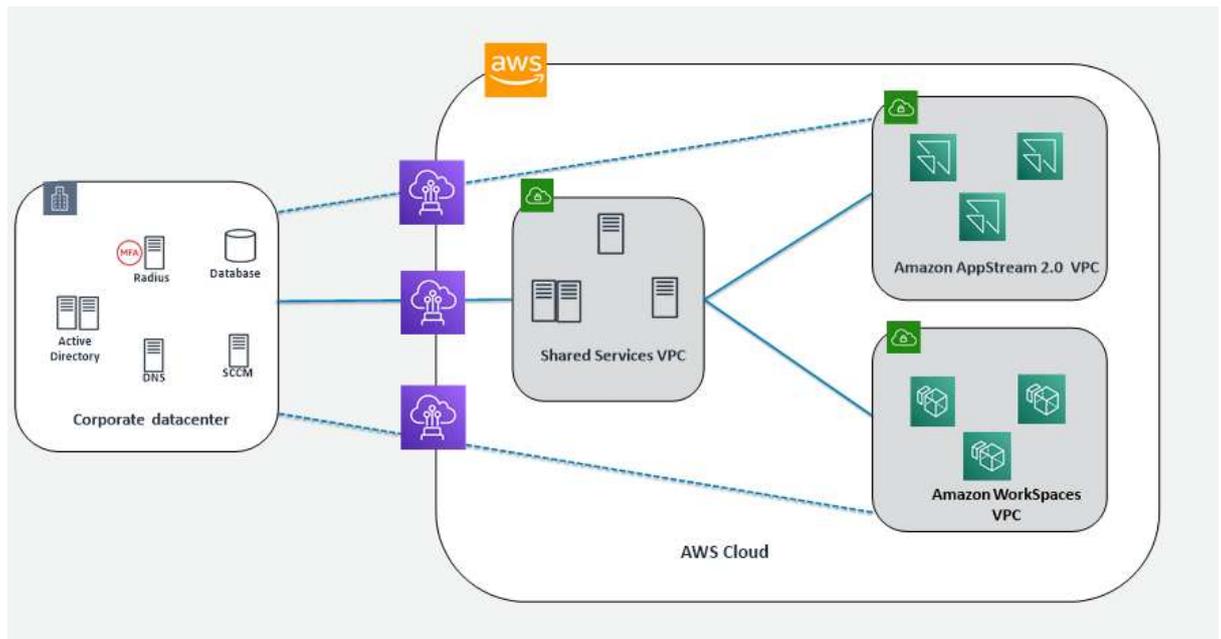
Figure 2**: Standard AWS Deployment Model using Shared Services VPC**

2.3   Usage Patterns and Cost Modelling

The usage patterns of the existing desktops should be assessed to help determine the cost model for the Amazon WorkSpaces or Amazon AppStream 2.0 implementations.

In some traditional VDI environments, licensing for the environment may either be based on a concurrent user model or a named user / device model, with a concurrent use license approximately twice the cost of a named user / device license.

It is crucial that the questions below are taken into consideration to identify the usage pattern and in turn licensing requirements.

- Does the existing environment provide shared resources for multiple users per desktop? This is a common scenario for task-based workers, particularly when the customer runs a 24x7 operation, and where the compute resources are used by multiple shifts of staff.

- What are the compute and storage requirements for the users? Determination of the compute / storage requirements can be used to provision the appropriate resources to the users.

- What type of licenses are currently held and when is their renewal date? Knowing where the customer is within their technology refresh cycle / annual maintenance for existing licenses can help with the construction of the business case for the deployment.

- How many hours a day (on average) do the users access their desktops? This has a direct bearing on the cost model for Amazon WorkSpaces, whether this is ad-hoc hourly billing or a monthly billing option. Amazon AppStream 2.0 only has an hourly billing option, but the type of provisioned resource (Always-On or On-Demand) will determine the cost.

- Is Microsoft Office required? If so, which version (Office 2013, Office 2016, or Office 365)? Office 2013 and Office 2016 can be obtained via the "Plus" application bundles; Office 365 will require BYO licensing, which in turn will require the use of a dedicated tenancy and minimum volumes.

2.4 Sizing and Cost Estimation

The following tables provide sizing and cost estimations for the deployment of Amazon WorkSpaces and AppStream 2.0 within the Sydney region. Common use case parameters have been used as the basis for the estimates, with both AWS and BYO licensing options costed. Cost estimations for all Amazon workspaces instances are available on Amazon workspaces pricing website which may differ based on the region. Cost estimations for all AppStream 2.0 is again available on AppStream2.0 pricing website from AWS.

2.4.1 Amazon Workspaces (Sydney Region)

Note: Prices mentioned herein are in USD and are valid as of 12th February 2021. AWS prices are subject to frequent change and regional effective pricing may vary. Consult with GlassHouse and AWS for current pricing.

License	Hardware Option	Resources	Storage	Monthly Pricing	Hourly Pricing
AWS Supplied Licensing	Standard	2 vCPU 4 GiB RAM	80 GiB Root Volume 50 GiB User Volume	$45	$14 plus $0.39/hour
AWS Supplied Licensing	Performance	2 vCPU 8 GiB RAM	80 GiB Root Volume 50 GiB User Volume	$59	$14 plus $0.58/hour
BYO Licensing	Standard	2 vCPU 4 GiB RAM	80 GiB Root Volume 50 GiB User Volume	$41	$14 plus $0.33/hour
BYO Licensing	Performance	2 vCPU 8 GiB RAM	80 GiB Root Volume 50 GiB User Volume	$55	$14 plus $0.53/hour
Plus Application Bundle	Microsoft Office Professional, Trend Micro Worry-Free Business Security Services, Utilities (Internet Explorer 11, Firefox, WinZip)			$15	N/A

Table 1: Amazon WorkSpaces Cost Estimates

Notes:

- To comply with Microsoft licensing requirements for running Windows10 in cloud environments, Dedicated Hardware must be used. Amazon WorkSpaces gives you the freedom to Bring Your Own Win10 License (BYOL) and to enable this, AWS allocates Dedicated Hardware to your AWS Account. This has a requirement for customers to deploy 200 WorkSpaces, and customers need to provide a ramp plan showing how they are intending to reach 200 WorkSpaces over a period of time. Customers who intend to BYOL should reach out to their AWS representative or AWS Premium Support who will be able to help facilitate the process. The model also includes the costs elements for the dedicated instances and tenancy required to use BYOL – this requirement is driven by Microsoft licensing requirements More details on this is available on BYOL website.

- AWS provides several options to support Bring Your Own Licensing (BYOL) as well as License Included models for non-BYOL workloads. Most Enterprise customers have EA's with Microsoft which can skew their licensing strategy when considering Azure, On-premises and other Cloud Service Providers such as AWS.
- Pricing is shown in USD.
- When used for approximately 80 hours or more per month, specifically around the standard and performance WorkSpaces tier, the Monthly pricing model becomes more cost efficient.

2.4.2   Amazon AppStream 2.0

Note: Prices mentioned herein are in USD and are valid as of 12th February 2021. AWS prices are subject to frequent change and regional effective pricing may vary. Consult with GlassHouse and AWS for current pricing.

Instance Category	Instance Type	Resources	Hourly Pricing
General Purpose	stream.standard.medium	2 vCPU 4 GiB RAM	$0.136
Compute Optimised	stream.compute.xlarge	4 vCPU 7.5 GiB RAM	$0.70
Memory Optimised	stream.memory.large	2 vCPU 15.3 GiB RAM	$0.35
Graphics Design	stream.graphics-design.xlarge	4 vCPU 15.3 GiB RAM 2 GiB GPU	$0.77
Graphics Pro	stream.graphics-pro.4xlarge	2 vCPU 7.5 GiB RAM 8 GiB GPU	$3.04
On Demand stopped instance fee	All instance types		$0.025

Table 2: Amazon AppStream 2.0 Cost Estimates

Costs for the use of Amazon AppStream 2.0 will depend on the type of fleet deployed (Always-On or On-Demand), costs for the Image Builders, and the Microsoft RDS licensing components:

- **Always-On fleet instances** – The instance charge includes compute, storage, and bandwidth that is consumed by the streaming protocol. With Always-On fleets, all instances that are running are charged the running instance fees based on the instance type and size, even if no users are connected.

- **On-Demand fleet instances** - The instance charge includes compute, storage, and bandwidth that is consumed by the streaming protocol. With On-Demand fleets, instances that are being used for streaming are charged the running instance fees based on the instance type and size. Instances in an On-Demand fleet that are stopped and don't have an active streaming connection are charged a small hourly fee that is the same for all instance types and sizes.

- **Image builder instances** - The image builder instance charge includes compute, storage, and bandwidth that is consumed by the streaming protocol. All image

builder instances that are running are charged the running instance fees even if no administrators are connected.

- **User fees** - For each authorized end user in an AWS Region accessing applications on your fleet instances, you will be charged a Microsoft RDS SAL fee of $4.19 / user / month. Schools, universities, and public institutions may qualify for a reduced Microsoft RDS SAL user fee of $0.44 / user / month. Alternatively, customers can choose to bring their own RDS licenses as per the [AppStream 2.0 FAQs website](https://aws.amazon.com/appstream2/faqs/).

With the exception of User fees which are charged monthly, the AppStream 2.0 instances are charged on an hourly basis.

Note: Hourly pricing fee charged for running instances only. For Image Builder and Always-On fleets, instances may be considered running if they are available for use, even if no user is connected. For On-Demand fleets, instances are considered running only if users are connected with an active streaming session.

3. Design

Post the assessment phase, a clear understanding of what type of environment is required for the users is therefore a fundamental requirement to design for the migration of these workloads to Amazon WorkSpaces or Amazon AppStream 2.0 depending upon the use case.

Workloads typically fall into one of the two models:

- Access to a desktop environment

- Access to a limited number of specific applications

Where access to a full desktop is required, Amazon WorkSpaces can be used to provide the resources for the hosted desktop. In the standard deployment model, a Server 2016 operating system is used, with each named user being provisioned a desktop. Amazon Linux WorkSpace (Amazon Linux 2) is also available as a choice in WorkSpaces which is very popular with the developers.

Where access to specific applications or a non-persistent full desktop experience is required, Amazon AppStream 2.0 can be utilised.

3.1 Amazon WorkSpaces

Amazon WorkSpaces is a fully managed, secure Desktop-as-a-Service (DaaS) solution which runs on AWS. With Amazon WorkSpaces, you can easily provision virtual, cloud-based Microsoft Windows desktops for your users, providing them access to the documents, applications, and resources they need, anywhere, anytime, from any supported device.

Amazon WorkSpaces leverages Teradici's PCoIP protocol or the new cloud native WorkSpaces streaming protocol (WSP) to deliver virtual desktops to remote users. PCoIP performs well over medium to high bandwidth and low to medium latency network connections, however, the performance is significantly affected over low bandwidth and high latency connections.

WorkSpaces Streaming Protocol (WSP) is new cloud-native streaming protocol that enables a consistent user experience when accessing your end user's WorkSpaces across global distances and unreliable networks. WSP also enables additional features such as the beta feature of bi-directional video. As a cloud-native protocol, WSP delivers feature and performance enhancements without manual updates on your WorkSpaces.

Today, streaming protocols run as applications on users' hosted desktops. These protocols analyse the hosted desktop, network, and user's device to select compression and decompression algorithms (codecs) that encode a rendering of the user's desktop and transmit it as a pixel stream to the user's device. Streaming protocols use many different codecs to deliver an interactive experience, because codecs are optimized for different scenarios. For example, some codecs are better at showing motion than displaying text, and others are better over low-bandwidth networks.

WSP decouples the streaming protocol from the WorkSpace by offloading metric analysis, codec selection, and encoding to microservices that run natively on AWS. This lets WSP apply a better understanding of each user's session that adapts its industry-standard and

purpose-built codecs in real-time to provide a consistent user experience across challenging network conditions.

Using the Windows Desktop Experience feature, users are presented with a Windows 10-like desktop respectively. For most desktop use cases, this can be appropriate, although in rare instances a full Windows Desktop operating system may be required when the applications to be used within the environment are either not installable or supported on a Server based operating system. In these instances, Amazon WorkSpaces can still be used to provision Windows 10, using the customer's BYO licensing, and using a dedicated Amazon WorkSpaces tenancy.

The BYO licensing model is also applicable where the customer has a specific Windows desktop image that they wish to use within AWS. As per Microsoft licensing requirements, the Windows Desktop license is not eligible for Windows License Mobility, necessitating the need for dedicated hosts and / or instances when the BYOL model is used. Software Assurance or Virtual Desktop Access (VDA) rights may also be required for the Desktop OS.

The other primary consideration for the use of the BYOL model is where there is a specific requirement to use Microsoft Office 365. License Mobility is not provided for Office 365 or the other Office applications. We suggest speaking with your Specialist License Provider (LSP) for specific guidance as applicable to your existing agreements. Also note, Customers can now use AWS SPLA licensing (WinSrv or BYOL Win10 OS) for MS Office Pro Plus.

AWS also launched Amazon Linux workspace desktop that runs on Amazon Linux 2 in mid-2018 which is based upon MATE. MATE is under active development to add support for new technologies while preserving a traditional desktop experience. Amazon Linux workspace in combination with Amazon Linux 2 makes for a great development environment with all the AWS SDKs, tools and developer clients such gcc, Mono and Java. Linux workloads are great for running data science, machine learning, engineering and other Linux friendly workloads taking advantage of AWS storage, analytics and machine learning services. More details around the available Linux workspace bundle options and estimates can be found from the Amazon workspace pricing website.

3.1.1 High Level Design Overview
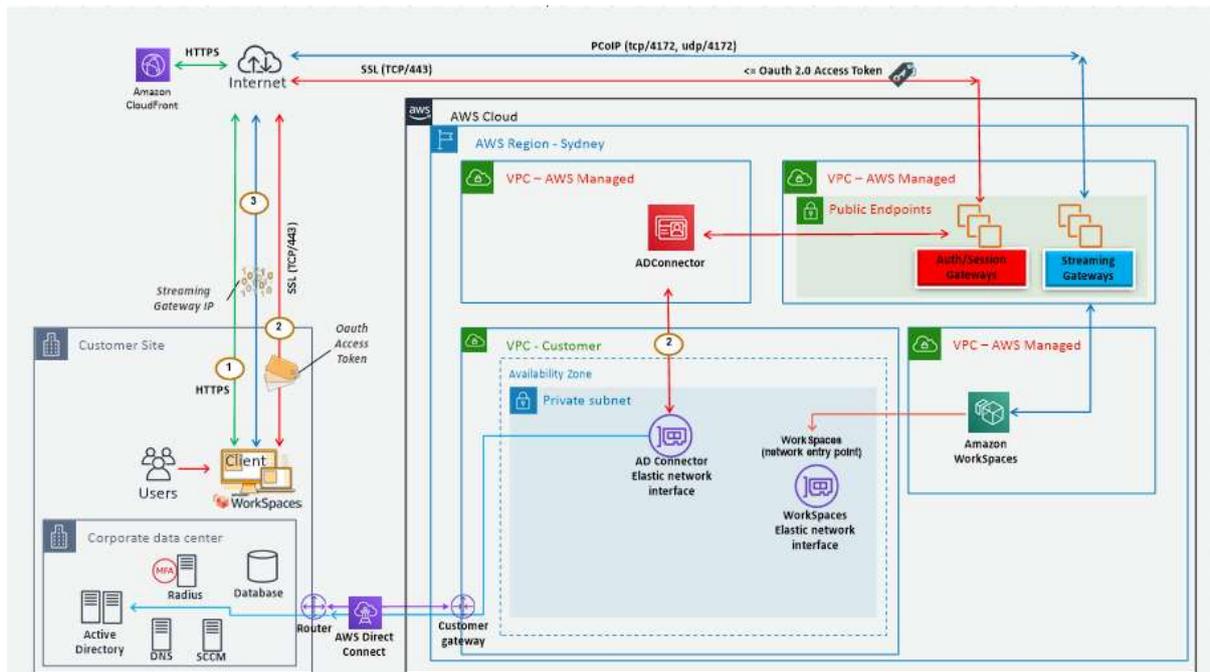
3.1.2 When to use Amazon WorkSpaces

- Where this is a requirement to provide a full persistent desktop solution to the end users

- When serving reliable applications and services to remote office workers

- When migrating from an existing on-premises VDI solution such as Citrix XenDesktop or VMware View and a pay-as-you-go Cloud model is desired

- When users connecting to the Amazon WorkSpaces environment will have a medium to high bandwidth connection with low to medium latency

- When user data persistence is desired

- When rapid scaling of VDI infrastructure is required

- When automated provisioning of desktops and workflows is desired

3.1.3 When not to use Amazon WorkSpaces

- When non-persistent desktops and applications are required where AppStream 2.0 can be utilised.

3.2 Amazon AppStream 2.0

Amazon AppStream 2.0 is a fully managed, secure application streaming service that allows the streaming of desktop applications from AWS to the end-user, presenting them via an HTML 5 compatible web browser, without requiring the applications to be rewritten.

Amazon AppStream 2.0 manages the AWS resources required to host and run the applications, scales automatically, and provides access to users on demand.

You can now enable the native desktop experience for your Amazon AppStream 2.0 fleets. Previously, AppStream 2.0 streaming sessions only showed the windows of the applications that were launched. With this launch, you can enable Desktop View on your fleet, which provides the same desktop experience your users are used to with the existing non-persistent capabilities AppStream 2.0 provides. You can enable the Desktop View when you create a new fleet, or update a stopped fleet. Desktop view is a great solution for delivering complex and GPU intensive applications providing a desktop like experience through AppStream2.0 and gives a lower price point as compared to Amazon WorkSpaces.

Amazon AppStream 2.0 leverages the NICE DCV protocol to deliver hosted applications to remote users. This was designed to work across low bandwidth and high latency network connections and provides a reasonable experience to the end users with poor network connectivity.

Using Amazon AppStream 2.0, users can stream their desktop applications hosted on Windows Server 2012 R2, 2016 or 2019 via an HTML5 enabled browser. Unlike other RDS based streaming technologies, Amazon AppStream 2.0 leverages a 1:1 relationship between the user and server. As the server resources are not shared between users, use cases requiring access to resource intensive applications including high end graphic or 3D applications can be addressed with suitably provisioned AppStream instances.

The BYO licensing model is also applicable where the customers wish to use their own Microsoft RDS CALs as long as they are eligible for Windows License Mobility. The other primary consideration for the use of the BYOL model is where there is a specific requirement to use Microsoft Office 365. License Mobility is not provided for Office 365 or the other Office applications. As per the Microsoft Product Terms, BYO licensing cannot be used for Office on Amazon AppStream as it does not provide dedicated instances and / or hosts.

Figure 4: High Level AWS AppStream 2.0 Design Overview

3.2.1 When to use Amazon AppStream 2.0

- Where access to hosted applications by end-users should be a standards-compatible HTML5 browser

- When migrating from an existing application streaming solution such as Citrix XenApp or Microsoft RemoteApp

- When delivering applications with high-computational or graphical requirements

- When user data persistence is not desired or required

- Where rapid scaling of application streaming infrastructure is required

3.2.2 When not to use Amazon AppStream 2.0

- When a full persistent desktop solution is required.

- When a high user-density or session sharing is required. Amazon AppStream leverages 1:1 mapping between users and servers

4. Migration/Deployment

4.1 Amazon WorkSpaces

This section discusses the best practices and considerations for migration or deployment to Amazon WorkSpaces.

4.1.1 Authentication

Amazon WorkSpaces has a requirement for integration with Directory services to provide authentication for the users using one of the following options:

- **Microsoft AD** - Microsoft AD provides many Microsoft Active Directory features including adding trust relationships with on-premises domains. It is based on Microsoft Active Directory in Windows Server 2012 R2.

- **Simple AD** - Microsoft Active-Directory compatible directory powered by Samba 4 that provides a subset of Microsoft Active Directory features.

- **AD Connector** - AD Connector is a gateway that sends authentication request to an existing on-premises Microsoft Active Directory. No directory information is replicated into or cached in AWS.

Administrators can also configure RADIUS based multi-factor authentication for additional security.

Note: At this time, SAML or OAuth authentication methods are not supported for Amazon WorkSpaces authentication.

4.1.2 Images and Bundles

Amazon Workspaces Bundles are essentially a combination of the instance type (hardware) and the image which contains operating system and applications. Depending on the outcome from the design phase, suitable bundles need to be selected for users based on their hardware and software requirements.

Administrators can also provision custom bundles based on existing Workspace bundles or by importing their own custom desktop image or previous VDI image and combining it with the suitable instance type, provided that licensing agreement with Microsoft allows it. The default service limits apply for the number or images but can be increased if required.

4.1.3 Application Management

As Amazon WorkSpaces utilises persistent desktops model, all changes made to the workspace are retained until the instance is terminated. As such, a centralised application technology will help streamline the application delivery to end users.

Amazon WorkSpaces allows administrators to leverage multiple application deployment technologies including Microsoft SCCM and Intune. For more cloud friendly options, ManageEngine and LiquidWare's FlexApp can be leveraged. For developer style deployments, Chocolatey is becoming more prevalent.

4.1.4   Migration Methodology

The following migration options can be utilised depending on the type of workload being migrated.

- **Migrate base images to Amazon WorkSpaces -** Where non-persistent VDIs are being used within the existing environment, or where the migration of user data along with the VDI is not essential, administrators can import the base images/golden images into Amazon WorkSpaces and create appropriate bundles.

  This is a practical approach where applications are installed directly into the image or are being deployed by use of Microsoft SCCM or similar technology.

  This migration model requires the use of a dedicated tenancy for Amazon WorkSpaces, which requires a minimum of 200 instances within a single region.

- **Create image directly on Amazon Workspaces -** Where migration of existing images is not required, administrators can create an image and bundle directly on Amazon Workspaces.

  This would be an ideal approach when upgrading to Windows 10 or re-skinned Windows Server 2016. Administrators can use third-party technology like Microsoft SCCM, Intune, ManageEngine, LiquidWare FlexApp etc to streamline application delivery to the end users.

  This approach would minimise the risk of carrying over issues from the legacy environment.

  Where a full 10 desktop is required in place of a Windows 10 Experience, this migration model will require the use of a dedicated tenancy for Amazon WorkSpaces.

4.2   Amazon AppStream 2.0

This section discusses the best practices and considerations for migration or deployment to Amazon AppStream 2.0.

4.2.1   Authentication

Amazon AppStream 2.0 currently provides three methods for user authentication.

- **User Pool -** The Amazon AppStream 2.0 user pool offers a simplified way to manage access to applications for end users through a persistent portal for each region. This feature is offered as a built-in alternative to user management through Active Directory and SAML 2.0 federation, with users defined natively within the AWS environment.

- **SAML 2.0 -** Amazon AppStream 2.0 o provides SAML Identity Provider (SAML IdP) based authentication, meaning that users need to login to their SAML provider website in order to access the assigned stacks (e.g. Microsoft ADFSv3, Okta, etc.)

- **Streaming URL -** StreamingURL can also be used, which is especially helpful if you want to automate and orchestrate short lived URL's without prompting the user to login manually. It provides programmatically provide access to AppStream 2.0 by using temporary URLs.

4.2.2 Stacks and Fleets

Amazon AppStream 2.0 Stacks are used to stream applications to users' browsers. A Stack consists of a Fleet of streaming instances coupled with user access policies and configurations. The Fleet type determines when the instances run and how you pay for them. You can specify a Fleet type when you create a Fleet.

The default service limits currently apply to fleets and stacks but can be increased if required.

4.2.3 Image Builders

Amazon AppStream 2.0 provides virtual machines or instances that are used to create the initial images or to install and add applications into the image. These instances are called "image builders", and they can be launched from a base image provided by AWS, or from an existing custom image. Once image builder instance is available, administrators can connect to the image builder to start a desktop session, install applications, add applications to an image, and create an image.

At the time of writing, it is not possible to import your existing Microsoft Windows Server images directly into Amazon AppStream 2.0.

4.2.4 Application Management

Unlike Amazon WorkSpaces, Amazon AppStream 2.0 does not provide any built-in tools to manage application deployments. Administrators can leverage their existing third-party application deployment including Microsoft SCCM to streamline application deployment. Also note, that you are now able to programmatically create an AppStream 2.0 image from start to finish using the image assistant command line interface(CLI) operations. Full details can be found in this [AppStream 2.0 article](#).

4.2.5 Migration Methodology

As Amazon AppStream 2.0 does not allow existing images to be imported, it is essential for administrators to create new images within Amazon AppStream 2.0. User data migration can be performed and presented to the users via Amazon S3 (Home Folders) or by use of roaming profiles and redirected folders.

5. Operations

This section discusses the best practices for ongoing maintenance and automation for Amazon WorkSpaces and Amazon AppStream 2.0.

5.1 Amazon WorkSpaces

5.1.1 Workspace Self-Service Portal

The Amazon WorkSpaces self-service portal allows the end users to provision new WorkSpaces or rebuild existing WorkSpaces in case of failure without contacting the IT Service Desk.

The workflow can be automated to submit provisioning or re-provisioning approvals to the end users' manager which in turn reduces the administrative overhead for IT administrators.

5.1.2 User Assignment

Each WorkSpace is assigned to a single user and cannot be shared by multiple users. Whenever administrators launch a WorkSpace, they must assign it to a user that does not already have a WorkSpace. Should a user require an additional WorkSpace, they would need to access this via a second user account or via an additional Amazon WorkSpaces environment.

5.1.3 WorkSpaces Bulk Provisioning

Bulk provisioning of Amazon Workspaces can be performed to decreases the administrative burden and save time. GlassHouse can work through with customers for large scale deployments of Workspaces using scripting and automation to minimise the engineering time and administrative overheads. Both AWS provided bundles or Custom bundles can be deployed for large fleet of users through a automated and managed process.

5.1.4 Operating Systems updates and Application Updates

Administrators can automate operating system updates by utilising Microsoft WSUS or other patch management technologies.

Depending on the application deployment technology used, administrators can make application updates available to the users or push the updates to the user's WorkSpaces.

5.1.5 Cost Optimisation

As Amazon WorkSpaces provides monthly as well as hourly billing options, it might be difficult to predict the costs during the initial months if the usage patterns are not intimately known.

Administrators can choose to analyse the usage patterns and adjust the billing options accordingly or use the Amazon WorkSpaces Cost Optimizer to analyse and convert the billing to monthly/hourly based on the usage – when used for 80 hours or more, the monthly fee is more cost efficient than the hourly charged rate.

5.2 Amazon AppStream 2.0

5.2.1 User Assignment

Users can be assigned to multiple stacks depending on the applications that they require. Where AppStream 2.0 is AD integrated, the easiest way to control access is via Active Directory Security groups which are associated with the stacks. If using user pools, users can be assigned directly to stacks.

5.2.2 Operating Systems updates and Application updates

Due to the non-persistent nature of the AppStream 2.0 servers, both operating system updates and application updates need to be rolled out on the image builder and a new image needs to be created in order for them to be distributed to the end users.

Blue/Green type deployments can be catered for, allowing seamless migration of users to the updated image and rollback should this be required.

5.2.3 Cost optimizations

Amazon AppStream 2.0 allows administrators to deploy either an Always-On or On-Demand fleet. Depending on which fleet type is chosen will greatly impact the cost. Hence it is vital that administrators configure time based or usage-based auto-scaling policies.

Note: The RDS licensing cost is charged on a non-prorated monthly basis and should be considered in overall cost models.

5.3 Smart Operations

GlassHouse provides CloudControl for operations and control of Amazon Workspaces and AppStream 2.0 deployments. This service framework includes integrated monitoring and alerting, to provide 24x7 operational management of the customer production environment.

Given AWS manages the underlying platforms as a service, the added service layer controls from GlassHouse provide customers a streamlined and cost-efficient support model, which can be coupled with automation features for ticketing, management, provisioning, and support operations.

Since both Amazon Workspaces and AppStream 2.0 are built with fully featured APIs, a wide range of opportunities for innovation exist around these platforms. Use cases may include the following:

- Help-desk integrations with ticketing systems

- Integration with monitoring tools and portals

- Integration with Jira ticketing and workflow management systems

- Provisioning portals for administrators and managers

- Image Automation (AppStream 2.0) and Application deployments

- Self-Service portals (e.g. user driven provisioning with underlying automation and workflows)

- ChatOps (end-user facing experiences to support basic L1 issues, FAQ, route to agent, user sentiment analysis, etc)

With these examples, we see a bright future for customer innovation based on the combination of Amazon Workspaces and AppStream, plus core AWS services for chat, workflow, automation, and call centre automation.

6. Summary

Cloud native VDI and Hosted Application services have matured significantly and can be a suitable replacement for legacy systems that are nearing end of life or where a change in operational cost model is desired.

Both Amazon WorkSpaces and AppStream 2.0 represent different approaches to the presentation of legacy world applications to end-users, addressing persistent desktop or specific application use-cases.

As these services continue to evolve and mature, largely based on customer uptake and feedback, we foresee these services playing a larger role in addressing specific use cases where SaaS type applications are either not yet available or where legacy world applications are required.

With any migration activity where the technology stack is different to the existing environment, GlassHouse recommend that organisations wishing to adopt Amazon WorkSpaces and/or AppStream 2.0 engage a suitable partner for the programme, ensuring that the business' use-cases and specific requirements are appropriately captured, and translated to a successful outcome.

We simplify and accelerate your migration into AWS. GlassHouse specializes in Modern Workspace deployments with AWS and provides continued support options for customers embarking on cloud native end user computing solutions.

For questions or a technical requirements discussion, please contact us at: info@glasshouse.io