12/11/2023

Mo Vid's Proposed Cloud Architecture

Submission by Cloud Consultant Andrew L. Hanrahan

Andrew L. Hanrahan
SYRACUSE UNIVERSITY; IST 615

Table of Contents

Company Background

Mo Vid Inc. is a company that is focused on developing video technologies that enable efficient, coordinated, and collaborative video capture, management and delivery in any organization. The Mo Vid suite of products is flexible, easy to use, and integrates easily with a wide range of complementary video and web technologies.

Problem

Mo Vid is at a crossroads with its software-as-a-service solution and can no longer sustain the physical infrastructure needed for their continued growth. The company is at a point where it needs to create a new version of its SaaS solution that it sells to its customers as a "Cloud-Hosted" Mo Vid deployment.

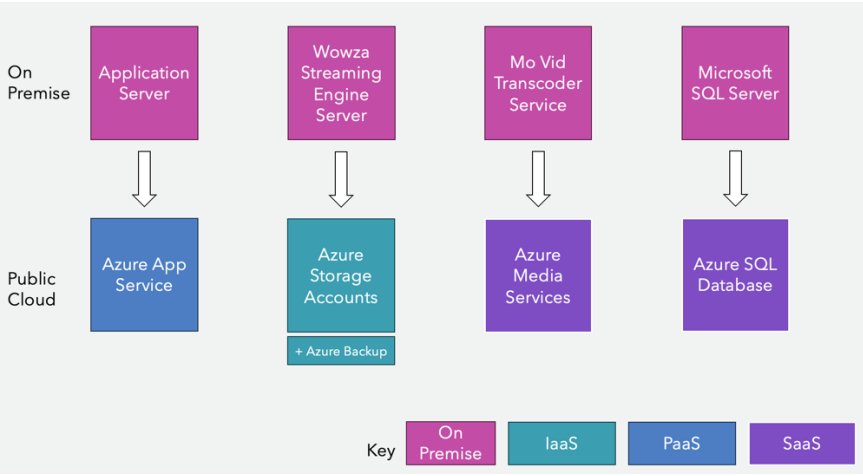
Transition from On-Premise to Cloud Architecture

For Mo Vid, I recommend they use Microsoft Azure to integrate seamlessly with other Microsoft offerings they use. Since they already use a Microsoft SQL server, staying within the Microsoft ecosystem will be rather seamless for the organization. Another benefit to using Azure is that it is up to 5 times cheaper than AWS for Windows SQL Server.[1]

The 4 on-premises servers that Mo Vid operates will be moved to 4 solutions that correspond with the following Microsoft Azure resources:

- Application Server – Azure App Service (PaaS)
- Wowza Streaming Engine Server – Azure Storage Accounts
- Mo Vid Transcoder Server – Azure Media Services (SaaS)
- Microsoft SQL Server – Azure SQL Database (SaaS)

The architecture will include solely virtual machines and PaaS/SaaS solutions and does not use containers. This architecture has been chosen to allow the smoothest transition from on-premise servers to cloud servers.



[1] https://azure.microsoft.com/en-us/pricing/azure-vs-aws/

Costs

In the cloud, the application server will use the **Azure App Service**, a PaaS solution, for the easiest administration. This allows for flexibility to add additional hardware resources like storage, RAM, and CPU without worrying about hardware resources. The table below uses Microsoft's Azure pricing menu to give price estimates for the App Service that meets or exceeds your current on-premise server specifications with 4 cores and at least 8 GiB of RAM.[2]

Premium v2 Service Plan	Cores	RAM	Storage	Pay as you go
P3v2	4	14 GB	250 GB	**$584**/month

The Wowza Streaming Engine Server will become **Azure Storage Accounts** in the cloud. Azure Storage Accounts allows for durable, highly available, and massively scalable cloud storage. The table below uses Microsoft's Azure pricing menu to give price estimates for storage solutions at various sizes and "temperature": premium through archive options represent the availability and ease of retrieval with premium being most available and archive being the least. For Mo Vid's purposes, I recommend, at the very least, "hot" storage as these videos will need to be promptly accessed by your customers.

Data storage prices pay-as-you-go	Premium	Hot	Cool	Cold	Archive
First 50 terabyte (TB) / month	$0.15 per GB	$0.021 per GB	$0.015 per GB	$0.0036 per GB	$0.00099 per GB
Next 450 TB / month	$0.15 per GB	$0.02 per GB	$0.015 per GB	$0.0036 per GB	$0.00099 per GB
Over 500 TB / month	$0.15 per GB	$0.0191 per GB	$0.015 per GB	$0.0036 per GB	$0.00099 per GB

The Mo Vid Transcoder Server will be powered by **Azure Media Services** in the cloud. Azure Media Services is a one-stop shop that lets businesses deliver any media anywhere in the world through on-demand encoding, streaming, and even offers analytics. The table below uses Microsoft's Azure pricing menu to give price estimates for this SaaS solution, trifurcating the service's core functions across three pricing tables.

[2] https://azure.microsoft.com/en-us/pricing/details/app-service/windows/

	Video Analysis	Audio Analysis	Basic Audio Analysis
Price per input minute	**$0.15**	**$0.04**	**$0.02003**

Standard Encoder	**$0.015** per output minute

Standard Streaming Endpoint	Premium Streaming Units
Price (preview)[2]	**$2.0807**/day (**$64.50**/month[1])

The Microsoft SQL will become an **Azure SQL Database** in the cloud. The table below uses Microsoft's Azure pricing menu to give price estimates for this SaaS solution with the Business Critical service tier whose system requirements meet or exceed Mo Vid's current on-premise architecture.

vCORE	Memory (GB)	Pay as you go	1 year reserved capacity
4	20.4	**$2.718**/hour	**$2.292**/hour ~16% savings

Backup Methodology

As your cloud consultant, we understand the need to ensure your data is protected and able to be recovered by you and your customers regardless of accidental deletion or natural disaster. To enable your backup needs, we recommend the use of **Azure Backup**. Azure Backup supports Azure Virtual Machines and SQL workloads which are the services we recommend above.

For your backup needs, we recommend the Standard tier of Azure Backup as the company will need to be able to restore data for 60 days for video files and 30 days for the SQL Server (the Standard tier exceeds your requirement and allows for retention policies up to 6 months).[3]

For the most durable data backup solution, we recommend the read-access geo-redundant storage (RA-GRS) which replicates your data to a secondary region that is hundreds of miles away from the primary region, but also then provides read-only access to the data in the secondary location. This allows for a total of 6 copies of the data maintained on separate nodes for highest storage availability.[4]

If Mo Vid uses our recommendations, we will build an Azure Well-Architected Framework with geo-redundant storage and regional redundancies. A geo-redundant storage solution (GRS) maintains six copies of data hundreds of miles apart so that in the result of the most destructive

[3] https://azure.microsoft.com/en-us/pricing/details/backup/
[4] https://learn.microsoft.com/en-us/azure/virtual-machines/regions

disasters, the data will be secure in this highly durable architecture.[5] In the event of a failover, resources will automatically be acquired from another region where the data was stored, ensuring 99.99999999999% (16 9s) uptime and availability.[6]

One of the benefits of Microsoft Azure is their guarantee of zero trust. With a "just-in-time" and "just enough" access approach (JIT/JE), Azure limits user access by default.[7] Microsoft Azure's built-in Zero Trust policies teach "never trust, always verify," meaning by default users do not gain access to any resources unless specifically granted.

For the reasons stated above, I, as your cloud consultant, recommend a migration from on-premise resources to these 5 products (inclusive of Azure Backup) on Microsoft Azure's public cloud.

Example Backup Cost

Here is an example total cost of ownership (TCO) for one year of backup costs with 10 customers hosting 250 GB of videos a piece and 256 GB of SQL data companywide.[8]

VMs holding videos storage

Instance holding 2.5 TB for 10 customers—250 GB of video per customer with RA-GRS redundancy
$0.059/GB/month "hot" storage (up to 50 TB/month) * 2,500 GB = $147.50/month * 12 months/year = *$1,770.00/year*.

Azure SQL Database

Instance holding 256 GB of data companywide pay as you go, business critical service tier, 4 vCore, RA-GRS redundancy
Point-in-time restore:
256 GB x $0.200/GB/month = $51.20/month * 12 months/year = $614.40/year
Monthly backup retention:
256 GB * 1 monthly backup * $0.050/GB/month = $12.80/month * 12 months/year = $153.60/year
Backup storage point-in-time restore plus monthly backup retention TCO is $64.00/month, *$768/year*.

Total cost of ownership for 2.5 TB of video data and 256 of data on SQL server for 10 customers in a 1-year period is *$2,538.00.*

---

[5] https://learn.microsoft.com/en-us/azure/security/fundamentals/protection-customer-data
[6] PDF: https://azure.microsoft.com/files/Features/Reliability/AzureResiliencyInfographic.pdf?v=95f7f9240e31cb9d723ea0cfdea7864bef338788e9324919e9a93635fb8f64c5
[7] https://www.microsoft.com/en-us/security/business/zero-trust
[8] https://azure.microsoft.com/en-us/pricing/details/storage/blobs/

Mass One-Time Offline Data Upload to the Cloud for Migration

An advanced cloud feature we are recommending is the use of Azure Data Box for the migration of your on-premise storage to the cloud for your customers.

With the information provided by your organization, it has estimated that your company has 1.3 PB (1,300 TB) of storage to move to the cloud:
25 small customers * 10 TB of on-premise data = 250 TB
10 medium customers * 60 TB of on-premise data = 600 TB
3 large customers * 150 TB of on-premise data = 450 TB

It is not feasible to move this data through the internet: if Mo Vid had a dedicated, perfectly running (24/7) 1 Gigabit Ethernet line, it would still take over 4 months to transfer all the data this way. That said, we recommend moving it to the cloud through offline means. We recommend the use of one (1) Azure Data Box Heavy (which will hold 1 PB of data) and three (3) Azure Data Boxes (which will hold 100 TB each).

The one-time cost of moving data using Azure Data Box Heavy (up to 1 PB of data) is $4,000 per unit and a $1,500 shipping fee for 20 days. The one-time cost of moving data through the Azure Data Box (up to 100 TB of data each) is $250 per unit and a $95 per unit shipping fee for 10 days. To streamline the upload process and to return the data boxes to Microsoft at the same time, we recommend renting the data boxes for an additional 10 days for a total of $450. This makes the total cost of your offline data upload to the cloud $6,985.00.

Total Cost of Ownership

Since Mo Vid has agreed to a one-year contract to move all their new and existing customers to the cloud, we recommend one-year reserved instances for the Azure SQL Database to create cost savings. Mo Vid is aware of the maximum amount of capacity, but not standard operating capacity, for its storage accounts, so we recommend a pay as you go model for this service. All services recommended are infinitely scalable.

Small Customers Estimate

The average small customer has 250 hours of video transcoding a month, a 3 GB web application database size, and 10 TB of video storage.

Service	**Cost (monthly)**
Azure SQL Database	$1,675.54
Azure Media Services	$506.25
Azure App Service	$219.00
Azure Storage Accounts (“hot” access)	$710.87
Azure Backup	$299.40
Upfront cost	$0
Estimated monthly cost	$3,411.06
Estimated annual cost	$40,932.72

Medium Customers Estimate

The average medium customer has 1,536 hours of video transcoding a month, an 8 GB web application database size, and between 10 and 60 TB of video storage. (For the purposes of this TCO model, I have put the maximum size of 60 TB in the storage and backup cost.)

Service	**Cost (monthly)**
Azure SQL Database	$1,676.29
Azure Media Services	$3,110.40
Azure App Service	$219.00
Azure Storage Accounts (“hot” access)	$3,706.07
Azure Backup	$1,771.40
Upfront cost	$0
Estimated monthly cost	$10,483.16
Estimated annual cost	$125,797.92

Large Customers Estimate

The average large customer has 3,072 hours of video transcoding a month, a 16 GB web application database size, and between 60 and 150 TB of video storage. (For the purposes of this TCO model, I have put the maximum size of 150 TB in the storage and backup cost.)

Service	**Cost (monthly)**
Azure SQL Database	$1,678.29
Azure Media Services	$6,220.80
Azure App Service	$219.00
Azure Storage Accounts (“hot” access)	$8,913.11
Azure Backup	$4,4421.00
Upfront cost	$0
Estimated monthly cost	$21,452.20
Estimated annual cost	$257,426.40

3 large customers * $257,426.40 estimated annual cost = $772,279.20
10 medium customers * $125,797.92 estimated annual cost = $1,257,979.20
25 small customers * $40,932.72 estimated annual cost = $1,023,318.00

The total cost of ownership for all customers annually, plus the one-time cost of offline data migration through Azure Data Boxes is **$3,060,561.40.**

Conclusion

The transition to cloud infrastructure presents a transformative opportunity for Mo Vid, Inc. The migration promises increased scalability, flexibility, and efficiency, and allows for the highest standards of data integrity and availability. I am confident that this comprehensive migration plan not only addresses your current needs but allows for the company’s continued growth in the ever-evolving technology landscape.