

MoVid SaaS Application

**IST 615 – Cloud Management
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Submitted By:
Pranav Raju Addipalli
482561915

Problem Case:

Mo Vid, a video services company is looking to migrate their video streaming software from an Infrastructure as a Service (IaaS) based application to a Software as a Service (SaaS) based application. The company wants to use a 4-server deployment to handle this problem.

Objective:

Develop a plan to implement a SaaS solution with public cloud access. The architecture must include 4 servers: Application Server, Wowza Streaming Engine, Transcoder Server, and Microsoft SQL Server. Each of these servers must be designed in a way which can handle the data and computing required by a video streaming service.

Why Azure?

To implement the MoVid streaming application, we need a number of resources. Microsoft Azure provides numerous resources and services which can be easily integrated and implemented using virtual machines.

The 4 servers will all be hosted on a Virtual Machine hosted on Windows 2022 Azure VM. This is the most ideal way to ensure the application runs optimally when different resources are required simultaneously.

Proposed Architecture:

The 4-server configuration with the proposed specifications are:

➤ Application Server

- **Platform:** Virtual or Physical
- **CPU:** 4 Cores (Minimum)
- **RAM:** 8 GB (Minimum)
- **OS:** Windows 2012 R2 / Windows 2016 / Windows 2019
- **Storage** (recommended 10K or 15K hard drives for optimum IO):
 - 100 GB (Minimum) System Partition
 - 50 GB MPlayer Data Partition
 - 250 GB (Minimum) WebApp Partition
 - Ports: 80 (HTTP) 443 (HTTPS)

Hosts the web site that the customer uses to manage and offer its video content on a virtual machine. All aspects of the customers instance of Mo Vid are managed through this virtual machine.

➤ **Wowza Streaming Engine**

- **Platform:** Virtual or Physical
- **CPU:** 8 Cores (Minimum)
- **RAM:** 12 GB (Minimum)
- **OS:** Windows 2012 R2 / Windows 2016 / Windows 2019
- **Storage** (7500 RMP Drives or higher):
 - 60-100GB System Partition
 - 500GB or Greater Video Storage
 - External Ports: 443 (HTTPS) 1935 (RTMP) 554 (RTSP Android Streaming)
 - Internal Ports (Wowza to Application): 8088,8086,8087 (Admin/API Ports)

Hosts the streaming video content and is where the video content is downloaded from when a video is played by a user of the Mo Vid web application. All video content is stored in storage accessible to Wowza application.

➤ **Video Transcoder**

- **Platform:** Virtual or Physical
- **CPU:** 8 Cores (Minimum)
- **Operating System:** Windows 2012 R2 / Windows 2016 / Windows 2019
- **Processor:** 1.4GHz minimum (2GHz or faster recommended)
- **Memory:** 16 GB RAM minimum (16GB RAM or 2GB per processor core)
- **Available Disk Space:** 150GB minimum (250 GB or greater recommended for large files, and more powerful servers)

Used to encode the uploaded videos and make them available for playback when copied to the Wowza server.

➤ **Microsoft SQL Server**

- **Platform:** Physical or Virtual
- **CPU:** 4 Cores (Minimum)
- **RAM:** 8 GB (Minimum)
- **SQL:** MS SQL 2012 / MS SQL 2014 / MS SQL 2016 / MS SQL 2019
- **OS:** Windows 2012 R2 / Windows 2016 / Windows 2019
- **Storage** (recommended 10K or 15K hard drives for optimum IO):
 - 60-100GB System Partition
 - 250GB Data Partition
- CLR Enabled SQL Server
- SQL Mixed Mode Security

All the data about that is used to create the content on the Mo Vid web application except for the video files themselves are stored in a database.

Implementation of Architecture:

Application Server

To build an application server with the specified requirements, we need to create a VM with the following specification on Azure:

CPU:

- Size: Standard DS3 v2
- vCPUs: 4
- RAM: 14 GiB

DISKS:

- System Partition: Standard SSD LRS; 128 GiB; Max IOPS: 500
- MPlayerDataPartition: Standard SSD LRS; 64 GiB; Max IOPS: 500
- WebAppPartition: Premium SSD LRS; 8192 GiB; Max IOPS: 16000

NETWORK:

- RDP: 3389
- HTTPS: 443
- HTTP: 80

Wowza Streaming Engine

To build a streaming engine server with the specified requirements, we need to create a VM with the following specification on Azure:

CPU:

- Size: Standard D8s v3
- vCPUs: 8
- RAM: 32 GiB

DISKS:

- OS Disk: Standard SSD LRS; 128 GiB; Max IOPS: 500
- VideoStorageMoVid: Premium SSD LRS; 512 GiB; Max IOPS: 7500

NETWORK:

- Internal: 8088, 8086, 8087
- External: 443, 1935, 554

Video Transcoder

To build a video transcoder server with the specified requirements, we need to create a VM with the following specification on Azure:

CPU:

- Size: Standard D8s v2
- vCPUs: 8
- RAM: 32 GiB

DISKS:

- OS Disk: Standard SSD LRS; 128 GiB; Max IOPS: 500
- VideoStorageMoVid: Premium SSD LRS; 512 GiB; Max IOPS: 7500

SQL Server

To build an SQL server with the specified requirements, we need to create a VM with the following specification on Azure:

CPU:

- Size: Standard DS3 v2
- vCPUs: 4
- RAM: 14 GiB

DISKS:

- SQL Data: 256 GiB, 1100 IOPS, 125 MB/s
- SQL Log: 1024 GiB, 5000 IOPS, 200 MB/s
- SQL TempDb: Use local SSD drive

.NET Integration

For the application to run on .NET with the specified requirements, we need to create an app service which can handle the application in .NET

We must create a runtime stack with .NET 6 for the app to run on .NET framework.

Estimated Costs:

The costs for 4 different servers and to integrate .NET framework year is as follows

- **Application Server –**
- **Wowza Streaming Engine –**
- **Video Transcoder -**
- **SQL Server -**
- **.NET Integration -**

Backup Methodology:

To enable admins to recover data (videos) for up to 60 days, we have set the following condition:
Enable Soft Delete for Blobs: 60 days

For the SQL data to be recoverable for up to 30 days, we have used the enhanced backup policy which backups data every 4 hours for up to 30 days.

Future Scope:

If MoVid would like to move their existing customers to cloud infrastructure, we need to increase the infrastructure as follows:

- **Small**
The implementation above can handle a small customer cluster with 1 TB of outbound streaming video
- **Medium**
To handle a medium customer base we need to upgrade the services as shown below:
 - 10TB of Outbound Streaming video – Increase Disk Storage of App Server
 - 3TB of Inbound traffic to the video transcoder – Upgrade Transcoder VM to more powerful SSD disks with higher throughput
 - DB Size increase to 8GB – Increase the storage of SQL Database VM by 3 times
 - Total video storage is greater than 10TB less than 60TB – Increase Disk Sizes of Streaming Engine
- **Large**
To handle a large customer base, we need to upgrade the services as shown below:
 - 25TB of Outbound Streaming video – Double Transcoder and App Server disk size
 - 6TB of Inbound traffic to the video transcoder – Upgrade Transcoder VM to more powerful SSD disks with higher throughput (twice that of medium)
 - DB Size increase to 16GB – Increase the storage of SQL Database VM by 6 times

Advanced Cloud Features:

MoVid is a streaming application which needs an infrastructure capable of handling huge amounts of data with very less latency to ensure video streaming is hassle-free.

The **Azure SCUTIO** cloud feature would be the best fit for this project as SCUTIO has:

- Extremely Fast storage capabilities
- With up to 1,000 times lower latency and exponentially greater endurance with 3D XPoint technology which can deliver game-changing performance for big data applications and transactional workloads.