Video surveillance and analytics software performance on OCI

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We're heading to a future where virtually everything is under the constant surveillance of a digital eye. The information that we get from instruments, such as video cameras and surveillance cameras, isn't limited by human analysis. Choosing security cameras isn't the only important step in implementing video surveillance. It's crucial to understand the value of having GPU infrastructure and integrated solution with separated cameras and video management software, building a modern video security infrastructure requires the right mixture of infrastructure approaches, including not only the right hardware but also capable networking, well-designed data centers and the appropriate software to manage these tools. A video management system (VMS) orchestrates a surveillance workflow by integrating with cameras, encoders, recording systems, underlying storage infrastructure, client workstations, gateway systems and analytics software, mainly by providing a single interface for video surveillance infrastructure management.

This blog post takes VMS deployments and performance into consideration and showing the Oracle Cloud Infrastructure (OCI) NVIDIA GPU infrastructure is fully suited with the VMS kind of software's, and any customer can take benefits to deploy VMS with full functionality on OCI. In our example use case, we deploy VMS for a customer to cover thousands of kilometers with surveillance cameras and analytics and created a giant impact on real-time

video analytics performance. The VMS functionality recognized the A10 NVIDIA GPU. All VMS functionalities were working perfectly on OCI, which including the ability to run appearance search, face recognition, camera control features, notifications, and alerts.

The solution

The architecture uses a simplified scenario that comprises the following components:

- 1 VMS server node: VM.GPU.A10.1 with 15 cores, 240 GB of RAM, and 24GB GPU memory

- 1 block volume (500 GB): Used to store data, such as applications, logs, output and input files, and models

- 1 VMS client node: VM.GPU.A10.1 with 15 cores, 240 GB of RAM, and 24 GB GPU memory

- 1 Block Volume (500 GB): Used to store data, such as applications, logs, output and input files, and models

- 3 surveillance cameras
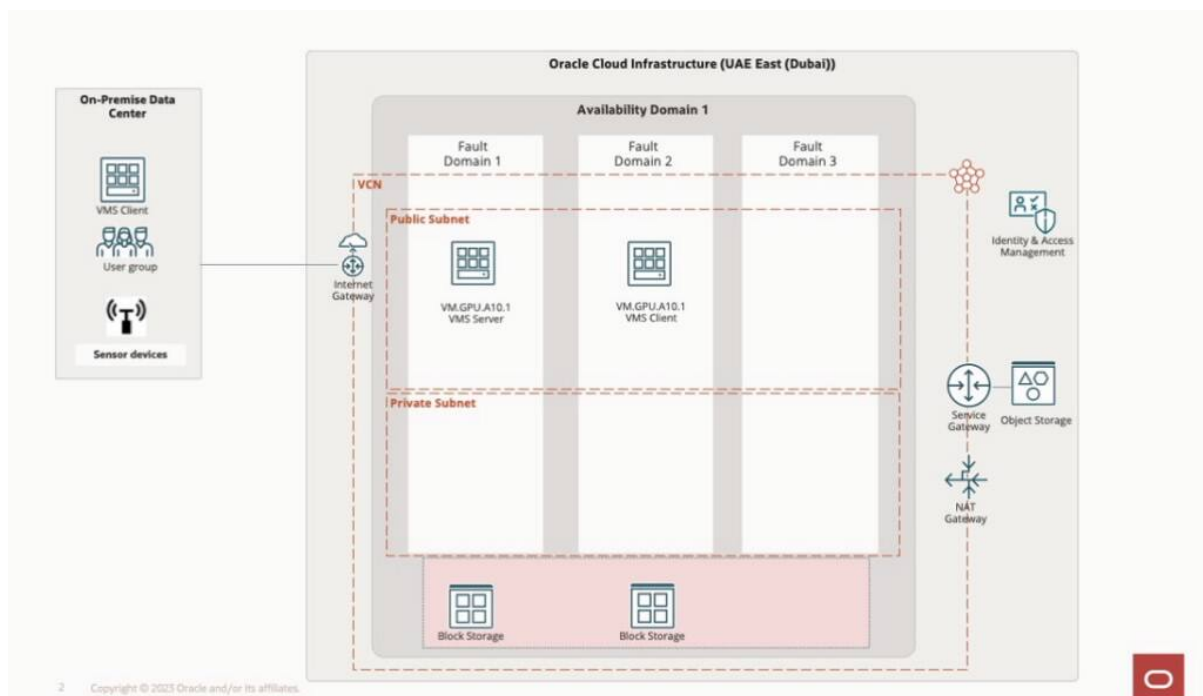
The VMS also has the following general information:

- Server version: 7.14.24.8

- Server IP: x.x.x.x

- Model name: OracleCloud.com

- System name: VMSHOST

- OS: Windows server 2016

- GPU type: Ampere

- System available memory: 246396.5 MB

- Site license usage: Camera Channels: 4/64 POS Sources:0/4LPR6 Channels:0/4 Face Channels:2/10

- LPR service: Available

- LPR Version: 7.14.24.8

- Analytics service: Available

- Analytics service version: 7.14.24.8

Table 1: Cloud services

Representing site	Web endpoint status	Internet status
Active	Up	Connected

Table 2: Network adapters

Adapter name	Status	Link speed
P1-Client Network	Up	50 Gbps
P2-Camera Network	Up	50 Gbps

Challenges faced

During the benchmark, time synchronization was a main roadblock. Because of the limited network control at the edge and being a test environment, the synchronization of the cameras with remote VMS instance was unstable. As result, network ports were getting blocked. A workaround we applied was the cameras syncing locally with the same network time protocol (NTP) service as VMS used on its end.

Despite these challenges, the VMS software vendor strongly believes that a controlled environment with dedicated links or VPN and access to edge devices, such as routers and firewalls, should be enough to have all the necessary ports for connectivity and time synchronization properly opened.

Testing and results

Initially, VMhost had 500 GB of local storage. However, VMS Solutions requested another 10 TB for performance testing purposes. Tier 1 storage provided an estimated 300 MB/s unbuffered throughput and 2400 MB/s buffered throughput. The following tables show the detailed benchmark results:

C-Drive 500 GB buffered test

Total IO

thread | bytes | I/Os | MB/s | I/O per s | AvgLat | LatStdDev | file

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0 | 26360152064 | 25139 | 2513.68 | 2513.68 | 12.332 | 0.493 | C:\Buffered.txt (4096MB)

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total: 26360152064 | 25139 | 2513.68 | 2513.68 | 12.332 | 0.493

b. C-Drive 500GB UnBuffered Test

Total IO

thread | bytes | I/Os | MB/s | I/O per s | AvgLat | LatStdDev | file

----

0 | 3071279104 | 2929 | 292.87 | 292.87 | 109.244 | 0.708 | C:\Unbuffered.txt (4096MB)

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total: 3071279104 | 2929 | 292.87 | 292.87 | 109.244 | 0.708

c. D-Drive 10TB Buffered Test

Total IO

thread | bytes | I/Os | MB/s | I/O per s | AvgLat | LatStdDev | file

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0 | 24164433920 | 23045 | 2304.29 | 2304.29 | 13.452 | 2.657 | D:\Buffered.txt (4096MB)

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total: 24164433920 | 23045 | 2304.29 | 2304.29 | 13.452 | 2.657

d. D-Drive 10TB UnBuffered Test

Total IO

thread | bytes | I/Os | MB/s | I/O per s | AvgLat | LatStdDev | file

----

0 | 6536822784 | 6234 | 623.34 | 623.34 | 51.367 | 14.592 | D:\Unbuffered.txt (4096MB)

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total: 6536822784 | 6234 | 623.34 | 623.34 | 51.367 | 14.592

These benchmarks show that OCI Block Storage's high performance option is excellent to record surveillance cameras videos through streaming. OCI Compute provides bare metal and virtual machine (VM)instances powered by NVIDIA GPUs for various use cases, including mainstream graphics and videos, and offers ultra-low latency and bare line-rate network performance.

Conclusion

The benefits of real-time video analytics are vast and can help make your business safer. With object recognition, motion detection, and other features, you can always keep a close eye on what's happening in your vicinity. The VMS deployment and benchmarking results show that OCI is best in ease-of-use, time-to-deploy, and latency of the streaming.

Based on that experience, we believe that space for improvement on end-user site should include lower latency, lower jitter, stable connectivity, and proper sizing by number of cameras. The alerts and notifications generated can also help speed up the response time to security threats. Finally, the deployment of VMS in Oracle Cloud Infrastructure is simple and cost-effective. With these benefits, it's hard to deny the value of real-time video analytics and how it's changing the security landscape.

For more information, see the following resources:

- Oracle Cloud Console

- OCI Block Storage

- OCI Compute

- Motorola Solutions

About Cloudsway

Cloudsway is a subsidiary of Wangsu Science and Technology (stock code: 300017), established in March 2023. Wangsu Science and Technology is a global leading provider of information infrastructure platform services, with business spread across more than 70 countries and regions worldwide.

Cloudsway is one of the three innovation engines in Wangsu's "2+3" strategy, providing enterprises with integrated products and solutions, such as cloud strategy consulting, modernized application construction, generative AI, and enterprise-grade cloud hosting services. solutions based on AWS.

Cloudsway is committed to become a leading provider of hybrid cloud solutions,offering secure, efficient, and convenient cloud services to enterprises, helping them with digital and intelligent transformation, and boosting their operational efficiency.