VMware-Based Solution Performance for Live Face Matching

Lab Validation Report

By Mahmoud Ouazine

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VMware-Based Solution Performance for Live Face Matching

Lab Validation Report

This report documents the lab validation results achieved during Live Face Matching Software (LFM) virtual machine (VM), and Ganz ZNS VM tests on a Rack Optimized Server for Solutions, 2U Single Node running VMware ESXi 6.0. The results ascertain the integration between LFM, and a 2U Single Node Server running VMware ESXi 6.0. The results demonstrated that both functional and performance tests met the defined goals satisfactorily and successfully. The solution stack included Rack Optimized Server for Solutions, 2U Single Node Server, VMware, LFM, ZNS along with Surveillance Cameras.
**Product Features**

Live Face Matching provides real-time facial image matching for video surveillance systems deployed in public and commercial buildings, hospitals, banks, railways, cruise lines, airports, and many other places where continuous proactive threat detection is essential.

LFM client sequentially reports subjects registered in the image database:

- Large images of matching faces.
- Stored subject images.
- Alarm notification.
- Date and time of match, LFM threshold, confidence rating, camera of match.

Live Face matching system includes many phases: face detection; capturing video stream (ZNS Software); feature extraction, and face matching.

**ZNS software** captures video streams and takes images/video sequences as an input and locates face areas within these images. This is done by separating face areas from non-face background regions.

**Facial feature extraction** locates important features, including eye, mouth, nose and eyebrow positions, within a detected face.

**Face matching and identification** is done by LFM software that matches a facial image that is extracted from the live video of surveillance cameras.

The following products are a part of the tested configuration.

**Live Face Matching Software**

Live Face Matching software (LFM) is a product that can match a facial image that is extracted from the live video of surveillance cameras immediately to the facial image of the target person’s database that has been previously registered. In case the facial similarity rate is greater than or equal to the fixed value, LFM can report an alert to the operator (that is, security personnel monitoring the system). LFM consists of the identify server software running on a identify server with Linux, and the client operation software running on a client PC with Microsoft® Windows®.

Identify server software can input live video of a maximum of 4 cameras, and it can match at a high-speed maximum of 60 faces per second. LFM also provides a movie file identify function, that can match any of the uploaded video files to the server.
Real Time Architecture

Figure 1

Main Features

- **High-Identify Accuracy**
  Up to 6 different images and/or photos (patterns) of the face images can be registered per person. Identify accuracy can be improved when using multiple directions and shadows of the facial images, rather than using only a single pattern.

- **High-Speed Identify**
  LFM can extract multiple faces (live video identify a maximum of 3 faces/image) from a single image in parallel, and can also identify in real-time 5 faces per second (fps). Live video identify technology is used to identify or verify a person’s facial patterns from a video frame on a specific video source in real time. A single server can input a maximum of 4 cameras in parallel and identify can be processed at a maximum speed of 60 faces per second.

- **High-robustness**
  LFM can achieve high-robustness against a shifting direction of the targeted face. It can also be achieved using normal surveillance camera video.

- **Movie file identify**
  In addition to the live video identify, LFM enables the operator to use the movie file identify function, which can be identified by using uploaded movie files.

- **Auto-Alert Report**
  LFM allows the operator to switch on/off of the identify function and to set thresholds for facial similarity rate arbitrarily in each monitoring situation. It can also report an alert to other external devices.
- Providing software developer kit (SDK) function through Web API command

  SDK function (Web API command) is provided in order to support software development with user commands and to make the identify function available.

- Flexible Camera Selection

  Other manufacturer’s IP cameras can be adaptable by combining with the optional interface module.

### Ganz ZNS NVR

The Ganz ZNS NVR (ZNS-NVR) is a digital video recording and remote surveillance software package for Windows. This solution with LFM is only used for capturing video streams from cameras. The ZNS-NVR accepts video streams from all major network IP cameras and servers, frame grabbers, and any direct show compatible devices, including webcams and USB cameras. This along with the ZNS-NVR client-server architecture allows you to build fully scalable solutions ranging from a single camera up to thousands of cameras. ZNS-NVR is primarily designed to:

- View live video streams from multiple sources locally and remotely, over the Internet.
- Record video from multiple sources and play them back later locally or remotely.
- Export previously recorded video to preserve and present it as evidence.

**Main Features**

- The ZNS-NVR software can be either integrated with supported hardware or acquired from ZNS-NVR resellers as a part of a complete digital video recording and remote surveillance solution.
- ZNS-NVR consists of two major components: NVR Server, and the ZNS Broadcast and NVR Client. The NVR Server is a behind-the-scenes application that captures live streaming from non-Hitachi cameras. There is no need to use a ZNS server when using Hitachi cameras.

### IP Cameras

IP camera, an IP addressable camera, is a digital camera that can be directly connected to the Internet or network through a CAT5 or Wi-Fi connection. Network cameras send already digitized and compressed video streams such as codec.

**Main Features**

- Existing local network infrastructure can be used for the installation.
- Some network cameras have built-in motion detectors and compression engines, which enable the DVR Server to use a minimum of its computer resources; therefore, the same computer can also be used for other tasks.
- There are no requirements for CPU or chipset manufacturers, since network cameras do not require any additional hardware to be installed on the computer.

**Note** - When using Hitachi cameras, the need for a ZNS server is eliminated as the cameras are independent from the host configuration.

- Network IP camera installations are highly scalable and upgradeable.
KiwiVision Camera Simulator
KiwiVision Camera Simulator software is used in this test. The KiwiVision Camera Simulator is a tool that simulates an IP network surveillance camera and it supports Motion JPEG. KiwiVision software is used to scale the number of cameras used in this test.

VMware vSphere 6
VMware vSphere 6 is a virtualization platform that provides a datacenter infrastructure. It features vSphere Distributed Resource Scheduler (DRS), high availability, and fault tolerance. VMware vSphere 6 has the following components:

- **ESXi 6** – A hypervisor that loads directly on a physical server. It partitions one physical machine into many virtual machines that share hardware resources.

- **VMware vCenter Server** – Management of the vSphere environment through a single-user interface. With vCenter, there are features available such as vMotion, Storage vMotion, Storage Distributed Resource Scheduler, High Availability, and Fault Tolerance.
Test Environment Configuration

The test bed consists of one Rack Optimized Server for Solutions, 2U Single Node system running ESXi 6.0 equipped with 2 × 4TB SAS drives configured in RAID-1, 3 Hitachi CR210 servers and 2 Brocade FCX 624 Ethernet Switches.

Figure 2 shows the high level solution architecture. The devices can be connected freely as long as the specifications of each device are complied with. Details are presented in Table 3, “Test Environment Components Main Function Configuration,” on page 9.

Figure 2

Figure 3
Figure 4

Hardware Components

The following table lists the details of the hardware used.

Table 1. Hardware Components

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Model</th>
<th>Description</th>
<th>Quantity</th>
<th>Use/Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hitachi</td>
<td>Rack Optimized Server for Solutions, 2U Single Node</td>
<td>2 × Intel Xeon E5-2680 12 Cores, <a href="mailto:v3@2.50GHz">v3@2.50GHz</a> 128 GB RAM, 2 × 4 TB (RAID-1) 2 × 10 GbE ports</td>
<td>1</td>
<td>ESXi 6.0, LFM Server VM, ZNS Server VM</td>
</tr>
<tr>
<td>Hitachi</td>
<td>Generic Compute System Server</td>
<td>Dual Intel Xeon CPU E5-2620 0@ 2.0 GHz 2 CPU 6 Cores, 16 GB RAM, 838.62 GB LSI MR9267-8i SCSI Disk Device (4 × 300 GB SATA), 4 × 1 GbE, Windows 8.1 Professional</td>
<td>1</td>
<td>Camera Simulator Server (KIWI Solution Software)</td>
</tr>
<tr>
<td>Hitachi</td>
<td>Generic Compute System Server</td>
<td>Dual Intel Xeon CPU E5-2620 0@ 2.0 GHz 2 CPU 4 Cores, 12 GB RAM, 600 GB LSI MR9267-8i SCSI Disk Device, (2 × 300 GB SATA), 4 × 1GbE, Windows 2012 R2</td>
<td>1</td>
<td>LFM Client</td>
</tr>
</tbody>
</table>
Table 1. Hardware Components (Continued)

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Model</th>
<th>Description</th>
<th>Quantity</th>
<th>Use/Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hitachi</td>
<td>Generic Compute System Server</td>
<td>Dual Intel Xeon CPU E5-2620 0@ 2.0 GHz 2 CPU 4 Cores, 12 GB RAM, 600 GB LSI MR9267-8i 8SCSI Disk Device, (2 × 300 GB SATA), 4 × 1 GbE, Windows 2012 R2</td>
<td>1</td>
<td>LFM Client</td>
</tr>
<tr>
<td>Brocade</td>
<td>Brocade FCX 624</td>
<td>Brocade FCX 624 8554E@800MHz Ethernet Switch - 24 ports 10/100/1000 Mb/sec Ethernet</td>
<td>2</td>
<td>LAN Switches</td>
</tr>
</tbody>
</table>

Software Components

The following table lists the details of the software used.

Table 2. Software Components

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Software</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware</td>
<td>ESXi 6.0</td>
<td>VMware vSphere 6 Enterprise Plus - Licensed for 2 Physical CPUs</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Windows 2012 R2</td>
<td>64-bit Operating System, x64-based processor</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Windows 8.1 Pro</td>
<td>64-bit Operating System, x64-based processor</td>
</tr>
<tr>
<td>Red Hat</td>
<td>6.3 (64-bit)</td>
<td>Red Hat Enterprise Linux (64-bit)</td>
</tr>
<tr>
<td>Hitachi Kokusai</td>
<td>LFM Server</td>
<td>LFM Server Live Face Matching software version S150707 with License</td>
</tr>
<tr>
<td>CBC (AMERICA), Inc.</td>
<td>ZNS Server</td>
<td>ZNS version 2.5.4 with License Digital video recording and remote surveillance software package for Windows</td>
</tr>
<tr>
<td>KiwiSecurity</td>
<td>KiwiVision Configuration Camera Simulator</td>
<td>KiWI Camera Simulator software with License</td>
</tr>
</tbody>
</table>
### Test Environment Components Main Function Configuration

The following table lists the details of the environment components main function.

**Table 3. Test Environment Components Main Function Configuration**

<table>
<thead>
<tr>
<th>Component</th>
<th>Main Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rack Optimized Server for Solutions, 2U Single Node</td>
<td>Hosts ESXi 6.0, LFM Server, ZNS Server, ZNS Broadcast</td>
</tr>
<tr>
<td>LFM Server</td>
<td>Performs identification using live images from cameras, and if a registered person is alerted, send the alert to the operation client PC. The device performs registration, deletion, etc. on to the person's database according to the requests from the operation client PC.</td>
</tr>
<tr>
<td>LFM Client (Operation client PC)</td>
<td>Displays the alert from the identify server on a screen. In addition, operates registration, deletion and search. The operation client is grouped into the management client and identifies clients by function.</td>
</tr>
<tr>
<td>ZNS Server</td>
<td>This server is where CBC VMS “ZNS-NVR” software is installed. ZNS-NVR consists of two major components: NVR Server and the ZNS Broadcast and NVR Client. The main function of the ZNS Server is to capture video streams, and then ZNS Broadcast transcodes and distributes video streams.</td>
</tr>
<tr>
<td>ZNS Broadcast</td>
<td>The main function of the ZNS Server is capturing Video streams, and then ZNS Broadcast transcodes and distributes Video streams.</td>
</tr>
<tr>
<td>Camera Simulator Server</td>
<td>Supports video motion JPEG. It simulates real time images in the surveillance area and distributes data to the ZNS Server.</td>
</tr>
</tbody>
</table>
Test Methodology

The objective of testing this environment is to measure the baseline for LFM virtual machines (VMs) and ZNS VMs on VMware by exercising general use cases to show that there are acceptable levels of performance and end user experience when scaling the number of cameras, number of clients, and the number of face data in the LFM server.

The information collected during testing determined the overall qualification of all involved parts.

Used Media Type Information

The following is a list of media details used in this test when using KiwiVision camera simulator with (640 × 480).

Video Type Codec Motion JPEG.
- Frame rate 10.
- Resolution 640 × 480.
- Decoded format: Planar 4:2:0 YUV.

The following is a list of media details used in this test when using KiwiVision camera simulator with (1920 × 1080):

- Video Type Codec Motion JPEG.
- Frame rate 30.
- Resolution 1920 × 1080.
- Decoded format: Planar 4:2:0 YUV.

Real time Media Type Information

These are the media details observed while running the above tests when using KiwiVision camera simulator with M-JPEG (640 × 480).

- Average Frame Size or bandwidth = 87.4 KB/Frame
- Average Receive Frame rate = 9.0 fps
- Average Display Frame rate = 9.0 fps

These are the media details observed while running the above tests when using KiwiVision camera simulator with M-GPEG (1920 × 1080).

- Average Frame Size or bandwidth = 414kB/Frame
- Average Receive Frame rate = 9.4 fps

Test Cases

These are the test cases.

Baseline Test

The baseline is tested with the configuration described in the following table. Based on these results the number of face data, the number of virtual cameras, and the threshold were scaled. Alert threshold is a field in which you can enter the threshold for generating an alert. You can enter a numeric value from 0.0 to 100.0. Where 0.0 means the facial similarity is not a match and 100.0 means the facial recognition is a complete similarity match.
The tests were performed using one client and 2 clients. Both Codec Motion JPEG (640 × 480) and Codec Motion JPEG (1920 × 1080) have been tested to evaluate ZNS Server performance.

The performance results were collected when using 1-Channel, 4-Channel, and 16-Channel cameras with 100 000, 200 000, and 300 000 face data in the LFM database, while varying the threshold values to generate the alerts. The tests were performed with thresholds of 0, 50, and 100.

Table 4. Baseline Configuration

<table>
<thead>
<tr>
<th>Server/Software</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM Host</td>
<td>ESX 6.0 with Hyper-threading enabled</td>
</tr>
<tr>
<td>LFM VM</td>
<td>38 × vCPU</td>
</tr>
<tr>
<td></td>
<td>96 GB memory</td>
</tr>
<tr>
<td></td>
<td>3 TB virtual disk using thin provisioning</td>
</tr>
<tr>
<td>ZNS VM</td>
<td>9 × vCPU</td>
</tr>
<tr>
<td></td>
<td>32 GB of vRAM</td>
</tr>
<tr>
<td></td>
<td>500 GB virtual disk using thin provisioning</td>
</tr>
<tr>
<td>LFM Software</td>
<td>100,000 faces</td>
</tr>
<tr>
<td></td>
<td>16 cameras (virtual)</td>
</tr>
</tbody>
</table>
Performance Test
These were the steps taken for the performance test.

1. Prepare the configuration accordingly by setting the number of channels, number of face data, and the threshold value.

2. The number of camera channels is configured from the KiwiVision server.

3. The number of face data is configured from the LFM client.

4. The number of clients is set from the LFM client.

5. The alert threshold value is set from the LFM client.

6. Start KiwiVision instances from KiwiVision Windows server clients according to the number of camera channels that need to be tested.

7. From ZNS server start the following:

8. ZNS NVR Server service.

9. ZNS NVR Server watchdog service.

10. ZNS NVR Broadcast Server service.

11. From LFM Client connect to the cameras defined in the LFM Server
    
    After performing step 4 the testing starts.

12. Connect to the LFM VM and ZNS VM and monitor CPU performance, memory performance and disk usage.

13. From the ESX host, monitor performance using the ESXTOP command.

14. From the beginning of the test, collect the results after 10 minutes, and then after 20 minutes.

15. Collect the frame rate process from the LFM server using the command line interface. The frame rate process is located in "FaceIdentifyLive_00.SnapLog" file in the "/home/hike/SFS/bin/tmp/states" directory.

16. When step 9 is done, stop the services. Reconfigure with new test parameters and then run the next test.
Analysis

Used Media Type Information
These are the media details used in this test when using KiwiVision camera simulator with M-JPEG (640 × 480).

- Type Codec: Motion JPEG.
- Frame rate: 10 fps.
- Resolution: 640 × 480.
- Decoded format: Planar 4:2:0 YUV.

These are the media details used in this test when using KiwiVision camera simulator with M-GPEG (1920 × 1080).

- Type Codec: Motion JPEG.
- Frame rate: 30 fps.
- Resolution: 1920 × 1080.
- Decoded format: Planar 4:2:0 YUV.

Real time Media Type Information
These are the media details observed while running the above tests using KiwiVision camera simulator with M-JPEG (640 × 480).

- Average Frame Size or bandwidth = 87.4 KB/Frame
- Average Receive Frame rate = 9.0 fps
- Average Display Frame rate = 9.0 fps

These are the media details observed while running the above tests when using KiwiVision camera simulator with M-GPEG (1920 × 1080).

- Average Frame Size or bandwidth = 414kB/Frame
- Average Receive Frame rate = 9.4 fps
- Average Display Frame rate = 9.3 fps
Test Results
This test was conducted for a combination of number of face data, alert threshold, camera channels and LFM clients. The following table shows the results for this test.

Table 5. LFM VM and ZNS VM Performance Results

<table>
<thead>
<tr>
<th>Amount of Face Data</th>
<th>Alert Threshold</th>
<th>Number of Camera Channels</th>
<th>Number of Clients</th>
<th>LFM VM CPU Usage (%)</th>
<th>LFM VM Memory Usage (%)</th>
<th>LFM VM Disk Usage (KB/sec)</th>
<th>LFM Frame Rate Process</th>
<th>ZNS VM CPU Usage (%)</th>
<th>ZNS VM Memory Usage (%)</th>
<th>ZNS VM Disk Usage (KB/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 000</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3.5</td>
<td>1856</td>
<td>4.9995</td>
<td>3</td>
<td>0.655</td>
<td>10.5</td>
</tr>
<tr>
<td>100 000</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>5877.5</td>
<td>5.0015</td>
<td>9</td>
<td>0.675</td>
<td>10</td>
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<tr>
<td>100 000</td>
<td>0</td>
<td>16</td>
<td>1</td>
<td>17</td>
<td>4.5</td>
<td>15219</td>
<td>3.241</td>
<td>45</td>
<td>0.995</td>
<td>5</td>
</tr>
<tr>
<td>100 000</td>
<td>50</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>93.5</td>
<td>5.002</td>
<td>3</td>
<td>0.61</td>
<td>13</td>
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<tr>
<td>100 000</td>
<td>50</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>2.5</td>
<td>384.5</td>
<td>4.85</td>
<td>5</td>
<td>0.495</td>
<td>8.5</td>
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<td>100 000</td>
<td>50</td>
<td>16</td>
<td>1</td>
<td>26.5</td>
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<td>4.901</td>
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<td>1</td>
<td>2</td>
<td>0.87</td>
<td>22.5</td>
<td>5.001</td>
<td>3</td>
<td>0.29</td>
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<td>644.5</td>
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<td>0.265</td>
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<td>5</td>
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<td>5.0025</td>
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<td>4.9995</td>
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<td>26</td>
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Table 5. LFM VM and ZNS VM Performance Results (Continued)

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LFM VM, 100 000 Face Data, and Codec MPEG-4 Video Performance Results Summary

The Performance Results Summary for LFM VM when using a value of 100 000 for face data in the LFM face matching database is shown in the chart below.

These are the observations made for LFM VM when using 100 000 face data in performance tests:

- The highest CPU usage for LFM VM server configured with 38 vCPU and 96 GB of memory when using 100 000 face data, was up to 26.5 % when using a 16 channel camera and a facial similarity rate threshold set to 50 and to 100.

- The highest memory usage for LFM VM server configured with 38 vCPU and 96 GB of memory when using 100 000 face data, was up to 4.5 % when using a 16 channel camera and a facial similarity rate threshold set to 0.

- Using 2 LFM clients has no noticeable impact on CPU or memory usage compared to having one LFM client.

- The optimum frame rate process achieved for an LFM VM server configured with 38 vCPU and 96 GB of memory when using 100 000 face data, was 5 fps.
LFM VM, 200 000 Face Data, and Codec MPEG-4 Video Performance Results Summary

The Performance Results Summary for LFM VM when using 200 000 face data in the LFM face matching database is shown in the chart below.

These are the observations made for LFM VM when using 200 000 face data in performance tests:

- The highest CPU usage for LFM VM server configured with 38 vCPU and 96GB of memory when using 200 000 face data was up to 45.5 % when using a 16 channel camera and a facial similarity rate threshold set to 100.
- The highest memory usage for LFM VM server configured with 38 vCPU and 96GB of memory when using 200 000 face data, was up to 14 % when using a 16 channel camera and a facial similarity rate threshold set to 50.
- Using 2 LFM clients has no noticeable impact on CPU or memory usage compared to having one LFM client.
- The optimum frame rate process achieved for LFM VM server configured with 38 vCPU and 96GB of memory when using 200 000 face data, was 5 fps.
LFM VM, 300 000 Face Data, and Codec MPEG-4 Video Performance Results Summary

The Performance Results Summary for LFM VM when using 300 000 face data in the LFM face matching database is shown in the chart below.

These are the observations made for LFM VM when using 300 000 face data in performance tests:

- The highest CPU usage for LFM VM server configured with 38 vCPU and 96GB of memory when using 300 000 face data, was up to 58 % when using a 16 channel camera and a facial similarity rate threshold set to 100.
- The highest memory usage for LFM VM server configured with 38 vCPU and 96GB of memory when using 300 000 face data, was up to 15 % when using a 16 channel camera and a facial similarity rate threshold set to 50.
- Using 2 LFM clients has no noticeable impact on CPU or memory usage compared to having one LFM client.
- The optimum frame rate process achieved for LFM VM server configured with 38 vCPU and 96GB of memory when using 300 000 face data, was 5 fps.
LFM VM, 16 Camera Channels, and Codec MPEG-4 Video Face Data Scalability
Performance Results Summary

The chart below shows the performance results summary when using 16 camera channels and scaling the number of face data.

These are the observations made for LFM VM when scaling the number of face data:

- The CPU usage for LFM VM server configured with 38 vCPU and 96GB of memory increased by 58% when scaling the number of face data from 100,000 to 300,000 and a facial similarity rate threshold set to 0.
- The CPU usage for LFM VM server configured with 38 vCPU and 96GB of memory increased by 70% when scaling the number of face data from 100,000 to 300,000 and a facial similarity rate threshold set to 50.
- The CPU usage for LFM VM server configured with 38 vCPU and 96GB of memory increased by 123% when scaling the number of face data from 100,000 to 300,000 and a facial similarity rate threshold set to 100.
- The memory usage for LFM VM server configured with 38 vCPU and 96GB of memory increased by 125% when scaling the number of face data from 100,000 to 300,000 and a facial similarity rate threshold set to 0.
- The memory usage for LFM VM server configured with 38 vCPU and 96GB of memory increased by 225% when scaling the number of face data from 100,000 to 300,000 and a facial similarity rate threshold set to 50.
- The memory usage for LFM VM server configured with 38 vCPU and 96GB of memory increased by 162% when scaling the number of face data from 100,000 to 300,000 and a facial similarity rate threshold set to 100.
ZNS VM and 16 Camera Channels (Codec Motion JPEG) Face Data Scalability
Performance Results Summary

The chart below depicts the ZNS Server Performance Results Summary when using 16 camera channels (Codec Motion JPEG 1920 × 1080).

These are the observations made for ZNS VM when using 16 camera channels (Codec Motion JPEG 1920 × 1080):

- The highest CPU usage for ZNS VM server configured with 9 vCPU and 32GB of memory was up to 116 % when using a 16 channel camera and ZNS server running VMS client.
- The highest memory usage for ZNS VM server configured with 9 vCPU and 32GB was up to 9% when using a 16 channel camera and ZNS server running VMS client.
- The lowest CPU usage for ZNS VM server configured with 9 vCPU and 32GB of memory was 1% when using a 1 Channel camera and ZNS server not running VMS client.
- The lowest memory usage for ZNS VM server configured with 9 vCPU and 32 GB was 1% when using a 1 channel camera and ZNS server not running VMS client.
- Running VMS client on ZNS server has a significant impact on CPU and memory performance results. Not using VMS client improved CPU performance by up to 36%.
ZNS VM, CPU Performance Comparison Without ZNS VMS Client
(Video Type Codec Motion JPEG 1920 × 1080)

The chart below shows ZNS Server performance when ZNS server is running with and without VMS client, and using 16 camera channels (Codec Motion JPEG 1920 × 1080).

This is the observation made for ZNS server when having running with and without VMS client, and using 16 camera channels (video type Motion JPEG 1920 × 1080):

- Running VMS client on ZNS server has a significant impact on CPU and memory performance results. Not using VMS client improved CPU performance by up to 36%. Due to that, the use of both VMS client and ZNS server in the same VM is not recommended.

Real time Media Type Information

These are the media details observed while running the above tests using KiwiVision camera simulator with M-JPEG (640 × 480).

- Average Frame Size or bandwidth = 87.4 KB/Frame
- Average Receive Frame rate = 9.0 fps
- Average Display Frame rate = 9.0 fps

These are the media details observed while running the above tests when using KiwiVision camera simulator with M-GPEG (1920 × 1080).

- Average Frame Size or bandwidth = 414kB/Frame
- Average Receive Frame rate = 9.4 fps
- Average Display Frame rate = 9.3 fps
Conclusion and Guidelines

Live Face Matching (LFM) provides real-time facial image matching for video surveillance systems deployed in public and commercial buildings such as banks, airports, and many other places where continuous pro-active threat detection is essential. LFM client sequentially reports subjects registered in the image database.

The results described in this paper demonstrated that both functional and performance tests met the defined goals satisfactorily and successfully while using up to 16 camera channels.

The highest CPU usage for LFM VM server configured with 38 vCPU and 96GB of memory was up to 58%, and the highest memory usage was up to 15% when using a 16 channel camera. Running VMS client on ZNS server has a significant impact on ZNS CPU performance.

Hitachi best practices recommend that customers can use LFM VM server on a Rack Optimized Server for Solutions, 2U Single Node hardware configured with 30 vCPU and 96GB of memory and ZNS server configured with 16 vCPU and 32GB of memory.

Having LFM server and ZNS server as virtual machines running on VMware ESXi on a Rack Optimized Server for Solutions, 2U Single Node hardware offers customers affordable LFM features with high performance, large face matching database, and an optimum frame rate process of 5 fps.
For More Information

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