Understanding Augmented Reality Monitoring in OpenManage Mobile

This technical whitepaper provides information on how to leverage OpenManage Mobile with Augmented Reality in the datacenter to enhance monitoring and troubleshooting of MX7000 chassis.

Abstract

Augmented Reality Monitoring is a new feature of OpenManage Mobile that adds efficiency and intuition to systems management solutions. It pushes the boundaries in the growing technology of Augmented Reality and employs Quick Sync 2 to quickly report potential problems in the system.

April 2019

Revisions

Date	Description
April 2019	Initial release

Acknowledgements

This paper was produced by the following:

Authors

Alex Rote – Software Senior Engineer

Manoj Malhotra – Consultant Product Management

Saurabh Kishore – Software Senior Principal Engineer

Table of contents

Executive summary

Dell EMC utilizes the latest technology to enhance systems management, from creating a fully-modular chassis management ecosystem such as the PowerEdge MX7000 to inventing the state-of-the-art, short-range wireless management interface that powers Quick Sync technology. Augmented reality is the latest advancement in machine learning that unlocks the ability to interact with the datacenter in new ways, and Dell continues to lead this technology with the release of OpenManage Mobile with Augmented Reality Monitoring.

With OpenManage Mobile, a datacenter administrator can use Augmented Reality Monitoring to quickly visualize the components in an MX7000 chassis and can get immediate feedback on possible faults in the system. As soon as an administrator points the camera, the Augment Reality Monitoring employs Quick Sync 2 to fetch management information without the need of a backend database or repository. This results in providing the exact information required by administrators at their convenient time.

Augmented Reality Monitoring is available in OpenManage Mobile version 3.2 for iOS 12 and above and Android OS 8.0 and above on mobile devices (phones). It is currently compatible with MX7000 chassis system.

1 Introduction

Augmented Reality Monitoring is a new feature in OpenManage Mobile 3.2 that creates an augmented reality environment in the datacenter, highlighting key components in the MX7000 chassis. The administrators are required to be in front of chassis and can point camera to it, they can then easily view all the required details, and response to any faults in the system. Using OpenManage Mobile with Augmented Reality Monitoring, administrator can do the following:

- Identify the front of the MX7000 chassis
- Guide the administrator through setting up the Quick Sync 2 connection
- Show the health status of the sleds, fans, and power supplies in the chassis
- Highlight critical fault logs in the case of a problem with a component

To troubleshoot more than what is accomplished with Augmented Reality Monitoring, the administrator can then follow links to the chassis details and hardware logs pages of OpenManage Mobile.

1.1 Hardware and system requirements

Augmented Reality Monitoring in OpenManage Mobile 3.2 currently supports the MX7000 chassis system.

Below are the system requirements to leverage Augmented Reality Monitoring:

Augmented Reality Monitoring System Requirements

Table 1

User Operating System	Requirements
Android	OS Version: Android 8 and above Hardware: all phones supported
iOS	OS Version: iOS 12 and above Hardware: phones starting with iPhone 6S

2 Augmented reality technology

Augmented Reality Monitoring leverages the latest advancements in augmented reality to create its datacenter environment. It uses Quick Sync 2 to quickly and securely fetch information about its environment to enhance the camera feed with overlays that show the most relevant details. This section describes some of the details regarding each technology and how to best utilize them.

2.1 Understanding augmented reality

Augmented reality is a technology that uses a camera, embedded motion sensors, and machine learning to create a simulated, three-dimensional environment that appears alongside the camera feed. Augmented Reality Monitoring utilizes ARCore and ARKit 2, in Android and iOS mobile devices respectively. At a high level, augmented reality runs in a feedback loop that performs the following:

1. Reads the visual information from the camera feed and identifies some trackable details, which could be certain lights or patterns.
2. A short time later, again reads from the camera feed and attempts to locate the same trackable details.
3. Uses information captured from the embedded motion sensors and physical motion interpretations of the hardware to determine the approximate distance, rotations, motions, and light level of each trackable detail.
4. From the tracking interpretations, updates the three-dimensional environment with new estimates about surfaces and objects that were detected.

When the augmented reality sensors detect enough information to accurately understand a surface or an object, the environment creates an anchor to match that surface or object. The anchor is created with details of where it exists in the three-dimensional environment and its size and facing. By knowing where these anchors are and by reading the motion sensors, an augmented reality system can accurately detect when the camera points towards or away from the anchors and can update the positions of its three-dimensional environment to map alongside the camera feed. Augmented Reality Monitoring uses these anchors to find the location of the hardware and to draw overlays that are fixed to the anchors. This creates a realistic impression that these overlays are actually fixed to the hardware within the camera feed.

There are important considerations when using any augmented reality-based technology, regarding the accuracy of the camera feed and the motion sensors. Because the camera needs to be able to accurately identify and detect unique details, the user should keep the following guidelines in mind:

- The room should be well lit to make sure that there is enough contrast to determine unique patterns in the camera feed.
- The room should not contain any moving objects, which would give conflicting information when compared with the motion sensors.
- The augmented reality device must move around slightly to obtain enough information to accurately predict an anchor. It is recommended to point the camera at different angles to try and capture additional positioning information.
- However, the device must not move too quickly, or the motion sensors may exceed their accuracy thresholds and fail to predict the physical motion correctly. This could cause anchors to drift away from their expected locations in the camera feed.

Note: The health and age of the mobile device can also have a detrimental effect on the tracking performance, which can also cause inaccurate detections or drift.

Augmented Reality Monitoring attempts to visually identify the shape and patterns of the front of the chassis from the camera feed. In addition to the general augmented reality guidelines, there are a few additional considerations to ensure an accurate detection:

- The chassis should not be obstructed by loose or hanging wires.
- The camera should be pointed toward the chassis with which the user intends to work.
  Note: It is recommended that only one chassis should be in the camera view at a time.
- The chassis should not move, and components should not be changed while using Augmented Reality Monitoring.

By following these guidelines, Augmented Reality Monitoring should detect the chassis within a few seconds and provide a realistic overlay that appears fixed to the front of the chassis.

2.2   Connecting with Quick Sync 2

Quick Sync 2 is a state-of-the-art, short-range wireless management interface that uses Bluetooth Low Energy (BLE) and Wi-Fi to securely connect to a system and quickly fetch information. Because of its security, speed, and appropriate range, it is the ideal interface for Augmented Reality Monitoring to connect to a chassis and read health and fault information.

The module is activated and deactivated on the Liquid Crystal Display (LCD) of the chassis. When activated, the Quick Sync 2 BLE component begins to broadcast a beacon advertisement which can be detected by Augmented Reality Monitoring. The broadcast signal is attenuated to a range of about 1m for security and is extended when a distinct and exclusive connection is established. The BLE communication is layered underneath additional technology to transfer larger data elements and provides a version of the Transport Layer Security (TLS) used by web servers adopted for the block-based BLE protocol. Each chassis is validated by a certificate with a 2048-bit or larger public key. The Diffie-Hellman key exchange protocol is used to establish a 128-bit or larger AES-GCM session key.

Although Augmented Reality Monitoring does not typically need it, Quick Sync 2 technology also contains a Wi-Fi component for higher-bandwidth data transfer. Quick Sync 2 Wi-Fi is based on 802.11b/g/n and uses the 2.4 GHz spectrum. Link-layer security is provided by using WPA2-PSK, with a random key generated each time Quick Sync 2 Wi-Fi is activated and exchanged over the BLE connection. The link layer security is complemented by TLS or SSH transport layer security used by each feature. The compute sleds in an MX7000 chassis system are authenticated by OAuth token, with the chassis facilitating the authentication of the iDRACs in each sled.

Note: More details about Quick Sync 2 are available in the Related Resources section of Appendix A.

3 Getting started

Augmented Reality Monitoring works most effectively when used as a tool to quickly investigate a problem with a chassis. This section describes some recommendations to setup an environment to use Augmented Reality Monitoring in this manner.

3.1 Downloading OpenManage Mobile

OpenManage Mobile is available as a free download through the Google Play Store and Apple App Store. Search for OpenManage Mobile or use these links:

- https://play.google.com/store/apps/details?id=com.dell.omm&hl=en (Android)
- https://itunes.apple.com/us/app/openmanage-mobile/id949941153 (iOS)

3.2 Hardware configuration

Augmented Reality Monitoring is currently compatible with the PowerEdge MX7000 chassis system. The chassis must be enabled with Quick Sync 2. Quick Sync 2 access is enabled by default. In case it may have been disabled, it can be enabled again in the OpenManage Enterprise Modular console settings:

1. Open the console and log in using an account with chassis-administrator access
2. Navigate to **Devices → Chassis**, then select the chassis you want to configure
3. Navigate to **Settings → Local Access Configuration**
4. Under the **Quick Sync** settings, make sure **Quick Sync Access** property is set to "Read Write".

Note: More information about the Quick Sync 2 module, including how to configure it or how to purchase and install it, are available in the Related Resources section of Appendix A.

Additional configuration of the chassis is optional but should be considered to enhance the use of Augmented Reality Monitoring. It is recommended to use OpenManage Mobile to perform initial deployment of the chassis. This is to ensure that during use there is full compatibility and, uninterrupted connection.

For security, the root user's password of the chassis should be configured. For best security practices, it is recommended to use a strong password other than the system default, which is available on the LCD of the chassis. The root credentials can be configured by OpenManage Mobile during initial deployment. Alternatively, they can be configured using the OpenManage Enterprise Modular console.

For additional convenience, the location settings of the chassis should be configured. This enables an administrator to help find a chassis in case a fault has been remotely detected. These settings can also be configured both by OpenManage Mobile during initial deployment or by the OpenManage Enterprise Modular console.

3.3 Using Augmented Reality Monitoring

The most efficient way to use Augmented Reality Monitoring is to perform on-the-spot diagnosis of an unexpected problem. For example, datacenter administrator may notice an unexpected warning light flashing on a chassis while walking through the datacenter. In this scenario, Augmented Reality Monitoring provides the fastest means to access the chassis and bring the details of the fault to the center of the screen.

You must activate Quick Sync 2 on the chassis first, and then Augmented Reality Monitoring must be launched. This gives Augmented Reality Monitoring a brief time to load data in the background while the rest of the manual steps are finished.

Launching and Using Augmented Reality Monitoring:

1. Launch the OpenManage Mobile application on the mobile device.
2. Go to the navigation menu and select the Augmented Reality Monitoring link.

3. After launching the Augmented Reality Monitoring, to detect the chassis, point the camera to the chassis.
4. You must stand three feet away from the chassis and hold the camera perpendicular to the chassis. For more information, see Understanding Augmented Reality. You can try moving the camera to capture different angles of the chassis.

If the Quick Sync 2 of the chassis has already been activated and the chassis was initially configured by OpenManage Mobile, then at this stage the health data of the chassis should be displayed on the camera feed. If either of these steps had not been completed yet, instructions in Augmented Reality Monitoring will help connect the device to the chassis.

The health data will overlay on top of the chassis front face, highlighting the components that are healthy as green, components that have a warning fault as yellow, and components that have a critical fault as red. Simply tap any component to view a detailed report of that component. The center of the report will list any faults that are associated with that component. If the fault list does not have enough details, or if the problem is unknown, the report will have a navigation link to the Hardware Logs page of OpenManage Mobile to find additional information.

Note: When Augmented Reality Monitoring navigates to the regular monitoring pages in OpenManage Mobile, the augmented reality detection of the chassis is lost and must be identified again. All other data and connection information is saved.

A   Technical support and resources

Dell.com/support is focused on meeting customer needs with proven services and support.

A.1   Related resources

- **OMM WIKI – Dell Tech Center**
  http://www.Delltechcenter.com/OMM
- **OMM overview on Dell.com**
  www.Dell.com/OMM
- **OMM Download (Android)**
  https://play.google.com/store/apps/details?id=com.dell.omm
- **OMM Download (iOS)**
  https://itunes.apple.com/us/app/openmanage-mobile/id949941153
- **OMM Users Guide 3.2 (Android / iOS)**
  https://www.dell.com/support/home/us/en/04/product-support/product/openmanage-mobile-v3.2/manuals
- **White Paper: "Understanding OpenManage Mobile (OMM) and Quick Sync Security (PowerEdge 14th Gen servers and MX Chassis)"**
  https://downloads.dell.com/manuals/all-products/esuprt_software/esuprt_ent_sys_mgmt/openmanage-mobile-v31_white-papers2_en-us.pdf
- **White Paper: "Understanding Quick Sync 2 for Dell EMC PowerEdge 14th Gen Servers and MX7000 Chassis"**
  https://downloads.dell.com/manuals/all-products/esuprt_software/esuprt_ent_sys_mgmt/openmanage-mobile-v31_white-papers3_en-us.pdf
- **White Paper "Accessing Remote Desktop using VNC on Dell PowerEdge Servers and MX7000 Modular Infrastructure"**
  https://downloads.dell.com/manuals/all-products/esuprt_software/esuprt_ent_sys_mgmt/openmanage-mobile-v31_white-papers1_en-us.pdf
- **"Save Server Management Time and Effort for IT Staff" – A paper by Principled Technologies, and sponsored by Dell EMC**
  http://www.principledtechnologies.com/Dell/Quick_Sync_2_OpenManage_Mobile_0717.pdf and
  http://www.principledtechnologies.com/Dell/Quick_Sync_2_OpenManage_Mobile_infographic_0717.pdf