Executive Summary

iDRAC9 Telemetry Streaming, available with the Datacenter license, is architected to provide highly granular, high-value data using resource-efficient data streaming of server performance data. The true value of that data, however, can only be realized when it is collected and analyzed for multiple servers where trends and anomalies are more easily discerned. iDRAC9 data can deliver fact-based answers for important questions, such as: “Is my power usage linear or bursty?” Or “Do I have ‘zombie’ servers in my datacenter?”

Dell Technologies commissioned Tolly to demonstrate the end product use of iDRAC9 Telemetry Streaming data when used in conjunction with the Splunk “big data” analysis solution. Given that delivering superior user experience is a universal goal of IT, this report will focus on examining several key system elements and performance indicators provided by iDRAC9 streaming data that can be used to assure the quality of user experience.

Tolly found that iDRAC9 Telemetry Streaming provides essential information for analyzing large scale performance of enterprise datacenters. See Figure 1 for a logical diagram of the performance areas examined in this example use case.

The Bottom Line

iDRAC9 v4.x Telemetry Streaming provides:

1. Wide-range of high-value data including Power, Thermal, GPU monitoring, Advanced CPU metrics, Storage SMART Logs with agent-free collection
2. Simple integration into Splunk platform to provide analysis and visualization
3. Ability to spot high level trends along with “drill down” capability into low-level detail data
4. Time series data that assures no missed data points which can occur in large polled environments
5. Greater insights into the IT environment to drive business outcomes

Delivering Superior User Experience: Key System Elements

Logical Diagram of Some System Aspects Impacting User Experience

Notes: Subset of iDRAC9 Telemetry Streaming data that can be analyzed to detect situations that could degrade user experience. iDRAC9 4.x or later with Datacenter license required.

Source: Tolly, October 2020
Background

iDRAC9 4.x represents a significant step forward that will aid customers in advancing the strategic understanding of the operational characteristics of their datacenters.

This report will demonstrate how that data can be used in conjunction with the popular Splunk platform to provide deeper insights into your compute environment and deliver optimum user experience.

This discussion assumes that the underlying iDRAC9 and Splunk infrastructure has been built and is operational.¹

For details of iDRAC9’s array of data and streaming efficiency and an overview of the collection and analysis architecture, see Tolly Report #220101.²

Case Study: User Experience

iDRAC9 data can be used in myriad ways, this report will show one way that is universally important: assuring superior user experience. To that end, this report will explore Splunk visualizations of server performance data key to user experience: 1) Power, 2) CPU utilization, 3) Memory Utilization, 4) Thermal, and 5) Storage SMART logs (disk).

Within each area, example topics for more detailed investigation will be discussed for situations where anomalies impacting user performance might be uncovered. Along with this discussion, example visualizations generated by the Splunk analysis platform are shown.

Power

Power is arguably the most important element of any datacenter because without it you have no datacenter. Understanding power consumption at present as well as visualizing longer term trends can help you assure that your datacenter will have sufficient power as usage grows. See Figure 2 for an example Splunk visualization.

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Figures 2

1 For setup details, see “How To Integrate iDRAC9 Telemetry Data Into The Splunk Platform” at the “Telemetry” tab under the Resources/White Papers section at www.dell.com/support/idrac.

2 See the “Telemetry” tab under the Resources/White Papers section at www.dell.com/support/idrac.
Furthermore, you can cross reference power consumption with your power circuity diagrams to confirm that circuit loading matches planned consumption.

Drill-down at the server level can help assure that there is adequate power available to specific servers. This is particularly important with chassis-based servers as requirements will vary by the needs of the specific components installed in the chassis.

## CPU Utilization

The CPU is the heart of the server. Thus, it stands to reason that CPU performance data reveals a great deal about server performance - and optimal CPU performance helps assure optimal user experience. See Figure 3 for an example Splunk visualization.

While there are many subtle gradations of CPU performance that can impact the datacenter, two of the most obvious that iDRAC9 data can help you uncover are extreme examples: CPU utilization that is too high, and CPU utilization that is too low.

CPUs that are overtaxed generally indicate systems that cannot currently handle the workload that they have been assigned. For example, a virtualization host designed to handle test or development loads may have inadvertently been assigned to handling large-scale production virtual machines. No matter the cause, such systems are unlikely to deliver a good user experience.

At the other end of the spectrum are servers that are drastically underutilized, known colloquially as “zombies.” These can be wasted resources. iDRAC9 data can help you ferret out such systems so that you can either remove them or reassign them to productive work.

CPU data can be used to investigate more subtle CPU-related issues, too. These included throttling situations, CPU errors related to hardware, identification of power profile/c-states and more.

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**Figure 3**

iDRAC9 Telemetry Streaming - CPU Data:
Visual Analysis via Splunk

Source: Tolly, October 2020

Top image displays individual server trends. Bottom image displays averages.
Memory Utilization

Next to the CPU, memory is a high-priority resource. See Figure 4 for an example Splunk visualization.

At the most basic level, assuring that memory is not over-subscribed is essential to assuring that application performance meets service-level agreements.

Less obvious, but also important, is the capability of using iDRAC9 memory data to allow a more rapid identification of potential issues with server memory modules (i.e. DIMMs).

In the example, temperature levels are being monitored for each of the DIMM sockets in the server which can help identify DIMMs with unusually high temperature readings.

What Can Telemetry Tell Me?

iDRAC9 telemetry delivers high-value data that is 100% complete. No buffer overruns or lost data points to worry about.

“Big data” collected via iDRAC9 Telemetry Streaming can answer big questions along with very focused and precision questions.

Here are just a few examples of questions that can be answered with iDRAC9 data visualized over time:

“Is my power usage linear or bursty?”

“Do I have any thermal ‘hot spots’ in my datacenter?”

“Are any of my network interfaces operating near capacity?”

“Do I have any ‘zombie’ (i.e. unused) servers in my datacenter?”

Ongoing collection of iDRAC9 data allows ongoing monitoring of these types of questions and countless other datacenter scenarios.

Source: Tolly, October 2020

iDRAC9 Telemetry Streaming - Memory Utilization Data: Visual Analysis via Splunk

Source: Tolly, October 2020

Red callout box (left) shows integration of Dell OpenManage Enterprise (OME) alerts with iDRAC9 data.
Thermal

While perhaps not as obvious an influence on performance as power and CPU, thermal can be a silent killer of servers and server components. See Figure 5 for an example Splunk visualization.

HVAC design and implementation for datacenter is complex and critically important. As new systems are brought online or existing systems migrated to different locations in the datacenter, the thermal characteristics of individual servers and cabinets can change dramatically.

Invisible to the human eye, these types of changes can only be tracked by evaluating detailed thermal data and analyzing that data over time.

Every datacenter component has thermal design limits which must be understood and monitored to assure ongoing operation and avoid disruption.

Many server components will continue to run as they approach, or even exceed, design limitations. Eventually, though, problems will manifest themselves.

iDRAC9 can be used to monitor components and racks so that one can assure that they are within thermal limits.

Additionally, iDRAC9 data is essential in recognizing whether thermal conditions are trending higher - perhaps dangerously high - in your datacenter.

Rising temperatures in systems can result in rising errors in server memory (i.e. DIMM) cards and ultimately DIMM failure.

Server temperature/voltage fluctuations can also signal issues that must be managed before failures occur.

iDRAC9 data can provide for visualizations where rack thermals can be analyzed to see if a condition affects an entire rack.

Similarly, the data can be used to detect anomalous “hot spots” in the datacenter so that such situations can be mitigated prior to any failure and a subsequent negative impact on user experience.
Storage SMART Log Data

SMART is an acronym for Self-Monitoring, Analysis and Reporting Technology. SMART data is primarily used to monitor disk errors.

DRAC9 collects that data and makes it available for user analysis. See Figure 6 for an example Splunk visualization.

This data is highly granular and provides insights down to the sector level.

Most importantly, SMART data can help provide advance warning of disks that are accumulating excessive errors and, thus, could be on the verge of failure.

iDRAC9 SMART data enables datacenter operations staff to be proactive and address potential disk failures before there is any data loss or inconvenience to users.

Furthermore, large-scale collection and analysis of SMART data can help identify potential problems with a particular brand or model of disk drive that might be deployed across a given datacenter.

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# See Backblaze blog on the topic at: [https://www.backblaze.com/blog/what-smart-stats-indicate-hard-drive-failure](https://www.backblaze.com/blog/what-smart-stats-indicate-hard-drive-failure)
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