

# VirtualWisdom FAQ

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## General

### Q: How is VirtualWisdom different from legacy monitoring solutions?

A: Application-centric Infrastructure Performance Management is a new market space, as defined by VI and a number of market analysts. Being able to optimize the performance, availability and utilization of infrastructure across servers, network and storage is a critical ingredient to successfully running business-critical applications.

The VirtualWisdom app-centric IPM platform is comprised of three key capabilities: Application Service Assurance; Workload and Capacity Optimization; and Problem Resolution and Avoidance. These are enabled by Virtual Instruments' highly scalable wire and machine data instrumentation and app-centric analytics. These integrated capabilities provide deep infrastructure insights to every team relying upon the performance and availability of business-critical applications. As a result, VirtualWisdom enables proactive performance management and signals the beginning of the app-centric IPM era by establishing it as the best approach to managing the next generation data center. Specifically, VirtualWisdom:

- Offers a full stack, application-centric view of your infrastructure. We help you to understand physical & virtual infrastructure interrelationships, to map applications to the underlying shared infrastructure across servers/VMs, networks and storage.
- Implements highly granular, heterogenous, agentless monitoring. You can non-intrusively track every transaction and I/O request to see how application behavior and infrastructure changes affect response times.
- Includes a massive ingest capability of both machine and wire data. We uniquely capture continuous, real-time wire and machine data metrics via comprehensive instrumentation across all infrastructure elements with unsurpassed data ingest capabilities.
- Implements cross-silo correlation and machine-learning-based analytics. VirtualWisdom App-centric Analytics correlate and analyze wire and machine data in the context of the application to help you proactively find and resolve performance problems and optimize utilization without your users even knowing.

### Q. What does VI mean by Application-centric IPM?

A. App-centric IPM is about managing the end-to-end infrastructure for the express purpose of delivering application performance and availability. There are several principles of App-centric IPM, but the central requirement is that the IPM solution must understand the application. There are three core requirements:

1. Knowing where the applications live: Understand which application services are deployed on which infrastructure services - essentially, having a map of the data center infrastructure in relation to each application.
2. Understanding Business Context of the Applications: Knowing which applications are more valuable than others to the business and what relative service levels (or tiers) are expected. This is particularly important because applications of varying business criticality are often sharing common infrastructure services.
3. Knowing how the Applications behave, and understanding how their behavior stresses the infrastructure. Most application performance issues start with a change at the application or database layer that the infrastructure is unable to adapt to. Understanding the application behavior and the way it stresses or is about to stress the infrastructure is critical to proactive performance management.

With the three core requirements satisfied, IT management has the context necessary to make proactive decisions on how to preserve and guarantee the performance and availability of the applications, by acting on the Infrastructure that supports them.

### Q: What is wire data? Why does Gartner consider it a key to modern infrastructure monitoring?

A: Most IT admins are virtually blind to I/O performance. VirtualWisdom adds the missing leg of the stool to infrastructure optimization, I/O data. Today, virtualized servers are consolidated, optimized and load balanced based on CPU and memory utilization data. VMware, for instance, has a limited view of I/O performance or SAN/NAS I/O utilization, which comprise the missing 3rd leg of the "systems" stool (CPU, Memory, I/O). VirtualWisdom is a comprehensive, cross-domain SAN/NAS I/O and virtual infrastructure monitoring, measurement and analysis solution. VirtualWisdom is the 1st and only solution that directly measures, in real-time, actual I/O traffic across all components in a SAN/NAS (HBAs, NICs, network switches, cables, and storage arrays). VirtualWisdom measures this data, analyzes it, and correlates the I/O information with the virtual server information provided via VMware's vCenter, and other hypervisors.

With this correlated, real-time utilization and performance data, server consolidation ratios and the overall ROI of consolidation projects can be dramatically increased as load balancing and vMotion transfers can now be initiated and optimized based on actual I/O data, not just CPU and memory data. VirtualWisdom provides the required visibility into the I/O subsystem that is essential for virtualizing business-critical applications, like those based on Oracle or SAP, which tend to be very I/O intensive.

### Q: What are App-centric Analytics?

A: With VirtualWisdom Analytics, we've taken the expertise gained from working with hundreds of enterprise clients and built that wisdom right into the platform. We incorporate our trouble-shooting and diagnostics with suggested analytics. Specifically, each investigation workflow provides guidance to the analytics that apply to that investigation. The analysis that used to take experts hours or even days is now executed in seconds. More details are found in the [analytics question](#) of this FAQ, and on the [analytics datasheet](#).

### Q: What is performance testing? How is it different than performance monitoring?

A: Storage performance validation and testing products, such as Load DynamiX Enterprise from Virtual Instruments, are used in a pre-production environment, by generating a load on the storage network and measuring performance, to optimize the performance, reliability, and cost-effectiveness of storage systems. Storage performance validation and testing replaces the guesswork in purchasing, deploying and configuring storage systems. The goal of storage performance validation products is to proactively avoid performance problems and optimize the cost/performance tradeoff.

Storage or infrastructure performance monitoring tools, such as VirtualWisdom, which can be software or hardware based, are used to monitor the performance and availability of production infrastructures. They are usually deployed in a persistent fashion and alert admins to failures or other potential performance issues after a problem has occurred. They are solutions that can help storage managers discover performance bottlenecks in the production environment. The best monitoring tools, like VirtualWisdom, can discover problems before users do and help avoid a great number of severe problems. The best tools include a full view of the I/O path from the POV of the application running on the virtual machine, all the way to the storage LUN or filesystem. The best tools include intelligent analytics which, in addition to helping to avoid problems, help admins find the "needle in the haystack" when problems do occur.

### Q: How does VirtualWisdom work?

A: VirtualWisdom directly measures and monitors both the virtual and physical I/O infrastructure to provide an unprecedented view into what is happening to the IT infrastructure in real-time. With the VirtualWisdom real-time dashboards and historical trending information, IT Operations can immediately identify and resolve configuration or performance issues. This substantially improves the productivity of the IT team and can save enterprise organizations millions of dollars per year. VirtualWisdom is unique in that it uses several sources for data, including third-party integrations and VirtualWisdom probes to provide a full cross-domain view of the infrastructure.

The Virtual Server Probe software probe collects data from VMWare's vCenter, Hyper-V or ProbeVM. The SAN Network Switch software probe collects SNMP/SMI-S performance, error, and utilization data from network switches, and the SAN and NAS Performance Probe hardware devices analyze the Fibre Channel frames or IP packets for detailed transaction and latency data. ProbeNetflow captures flow records from NetFlow, sFlow, Jflow, and IPFIX and sends them to the VirtualWisdom appliance. ProbeSDS captures data from VMware VSAN or Dell EMC ScaleIO software-defined storage systems.

Once a problem is found, as defined by an exceeded performance, error, or utilization threshold, an alert is automatically sent to the customer's management system or directly to the vendor of the failing or failed device. Following that, it goes way beyond a simple correlation view; advanced analytics guide the admin to the source of the problem.

### Q: We are already using a monitoring tool; why would I need VirtualWisdom?

A: For your mission-critical applications. The ones which cannot slow down or go down. Virtualization mgmt tools are very good at optimizing servers for VM deployments. SRM tools are designed to provide capacity related assistance for large SANs. Switch managers are very good at provisioning and configuration tasks. APMs can help solve problems that are native to the application. None are very good at optimizing application response time or finding network related bottlenecks, and you often are forced to use several tools for a complete end to end view. VirtualWisdom is an "expert" virtual administrator that works 24x7. It only alerts you if there is a problem or pending problem in the infrastructure, and if there is, behind that dashboard is a complete set of tools to zero in on the problem.

Do you ever get blamed for problems with no way to immediately prove innocence, and do you and your vendors still have trouble quickly finding and fixing problems? Are you spending too much time fire-

fighting problems?

At the end of the day, one thing is true. When VirtualWisdom is installed, no customer around the world has EVER had to bring in another company to find problems we can't find. On the contrary, at EVERY customer who brings us in to help optimize their storage and virtual server infrastructure, ControlCenter, Tuning Manager, TPC, DCFM, CFM, BNA, or other SAN management products are already in use, and Virtual Instruments has been brought in to find problems that proved too difficult to find with these other tools. Large enterprises around the world like AT&T and T-Mobile, plus many financial institutions such as PayPal, e-Trade, Lloyds, MetLife, Fidelity and others continue to use VirtualWisdom and expand its use every year. Yet all of these enterprises already have a full complement of fine, general purpose IT management and monitoring tools. Only VirtualWisdom collects both wire and machine data, correlate that data and then analyzes the data across all infrastructure components.

### Q: How are Virtual Instruments and Load DynamiX related?

A: In early 2016, the two companies merged and took the name of the larger company. Virtual Instruments and Load DynamiX customers have continually asked for tighter integration between the two companies' monitoring and testing products, and the merger responded to that demand. While the Virtual Instruments' VirtualWisdom platform analyzes the performance of the production infrastructure for IT operations, Load DynamiX (now called WorkloadWisdom) delivers the storage workload acquisition, analysis and modeling capabilities IT engineering and architecture teams need. Together, the technologies offer the most advanced infrastructure instrumentation and performance analytics in the data center.

### Q: Who typically uses VirtualWisdom?

A: First are the infrastructure owners, responsible for deliver and demonstrating business value of the data center infrastructure. These people are looking to provide a single "truth" across the IT silos, and often try to consolidate tools. VirtualWisdom is uniquely positioned, by not only providing the granular analytics required by Operations team, but also by providing the app-centric view to the business owners, the constituents of the infrastructure owners.

Second, there are the server platform or infrastructure/operations administrators/managers. These people are focused on server consolidation for cost-cutting; they're the traditional constituency of the hypervisor vendors. As virtualization has become more prevalent, however, the administrators of enterprise applications are finding themselves adopting the technology to improve the availability and flexibility of application platforms.

The third group, application owners, is very much a non-traditional constituency for hypervisor vendors, yet they're being drawn into the virtual world as virtual machines (VMs) proliferate out of development and test and into heavy-load and complex n-tier Web and hybrid applications. How exactly are application owners different from server administrators? To start with, what application owners most want is application visibility – insight into the topology of the application's infrastructure components and real-time data on performance and availability. They don't care whether those applications are running in virtual or physical machines. They just need the data and mostly care about response time and data availability. If the app slows down, they want to know what is the cause of the problem. They also need to be able to communicate with the traditional VM management team.

The fourth group is the storage engineer, administrators and managers, the traditional team charged with deploying switches and storage, and who worry most about availability, utilization, and performance of their storage and storage network components. They quickly realize that VirtualWisdom is the only solution for proactively optimizing their production storage infrastructure.

Fifth are Dev Ops. These pros team with Apps QA and Infrastructure teams to deliver and ensure ongoing performance on new applications.

### Q: Can you list some companies which use your products?

A: VirtualWisdom is used by nearly half of the Fortune 100, government agencies, and over 400 additional Global 2000 companies, including E\*Trade, GE, Unilever, AT&T, Lloyd's Banking Group, Us Patent & Trade Office, Amadeus, MetLife, and Morrisons. For further information on reference customers, contact your Virtual Instruments sales representative or authorized reseller.

### Q: Why do customers use VirtualWisdom?

A: VirtualWisdom is the industry's leading platform for App-centric Infrastructure Performance Management. It empowers data center operations professionals to deliver on the complex requirements of their application infrastructure. The platform provides insights into the performance, availability and utilization of the end-to-end server to storage infrastructure—across physical, virtual and cloud environments. It intelligently correlates and analyzes an unmatched breadth and depth of data, transforming it into answers and actionable insights. This enables IT teams to assure data availability,

increase infrastructure utilization, and guarantee performance- based service level agreements (SLAs), increasing the value of the infrastructure.

#### Q: How and where are Virtual Instruments products sold?

A: Our products are sold and supported around the world by combination of direct and indirect sales channels, including large OEMs like EMC and HPE, and regional and national VARs. For the name of a representative or reseller nearest you, please email [info@virtualinstruments.com](mailto:info@virtualinstruments.com)

#### Q: How is VirtualWisdom licensed?

A: VirtualWisdom is licensed at the platform level with either an Enterprise (unlimited) or Virtual Edition (limited) option. Machine data sources are then licensed by the number of active monitored units. For Cisco and Brocade Fabric integration, this is per active switch port; for vSphere and Hyper-V this is per physical host; for IBM PowerVM this is per physical active core; for NetFlow this is per network endpoint; for SDS (ScaleIO and vSAN) this is per physical host contributing storage to the cluster; for NetApp this is by physical storage node. Wire data sources are sold in two parts: the physical chassis comes in 12-, 16-, 24- and 48-link varieties for either FC or Ethernet; and software licenses that activate those links. Finally, the platform analytics are enabled via an annual subscription.

#### Q: Do you offer professional services options?

A: Yes. Virtual Instruments offers a variety of services that help customers augment their existing IT staff with highly trained infrastructure performance management specialists. Your organization can experience the complete functionality and benefits of VirtualWisdom by utilizing Virtual Instruments Professional and Managed Services. We offer several deployment options:

- Our Silver option provides VI experts to configure your solution, verify data collection, and train your staff in basic product use. Our Gold deployment includes all of the services provided in our Silver deployment, plus help to set up your solution to proactively manage your infrastructure. Our Platinum deployment includes our most comprehensive installation, configuration, and training package. We install and configure your solution, then perform a baseline assessment and provide 3 months of follow up assistance.
- Infrastructure Performance Assessment (IPA). The IPA service includes delivery of best practices, baseline reporting, advanced analysis and alert investigation. In many cases, this service is delivered in direct support of large scale migration and consolidation projects. This service can be delivered as a stand-alone solution that is inclusive of a dedicated, targeted deployment of the VirtualWisdom Platform, or as auxiliary services in a currently installed account.
- Virtual Instruments Managed Service (VIMS). Managed Services deliver monthly health, utilization and performance reports, track progress against KPIs and help customers proactively manage their VirtualWisdom environments. They are focused on improving the performance and availability of customers' mission-critical applications by augmenting their existing staff.

#### Q: How can I see a demonstration of VirtualWisdom?

A: Go to <http://www.virtualinstruments.com/request-demo/> and request a live demo either over the Internet or in person. Or visit us at a local IT event, or trade show, and stop by our exhibit booth.

#### Q: How do customers cost-justify VirtualWisdom?

A: When deploying VirtualWisdom, payback is typically within a year. Typical benefits include:

- Reduced CAPEX by deploying fewer switch links and storage ports
- Reduced CAPEX by optimizing storage tiering
- Reduced CAPEX by improving VM density
- Reduced OPEX through improved collaboration and productivity of your IT team
- Improved OPEX via higher application service levels by avoiding problems or fixing existing problems up to 90% faster.

With VirtualWisdom, problem resolution times and trouble tickets are dramatically reduced and unnecessary SAN/NAS/Host purchases are eliminated. If the business impact of or revenue loss from of an outage can be quantified and is significant, then payback can be almost immediate as a single avoided outage will more than pay for the cost of a full VirtualWisdom deployment. We also offer a pay as you go model, so you can deploy VirtualWisdom for your most critical applications first and easily grow over time. Contact your VI representative or reseller and we can generate a specific benefits analysis to fit your needs. More information can be found at our [on-line calculator](#), or this [ROI whitepaper](#)



**Q: Are there industry analysts who follow Virtual Instruments?**

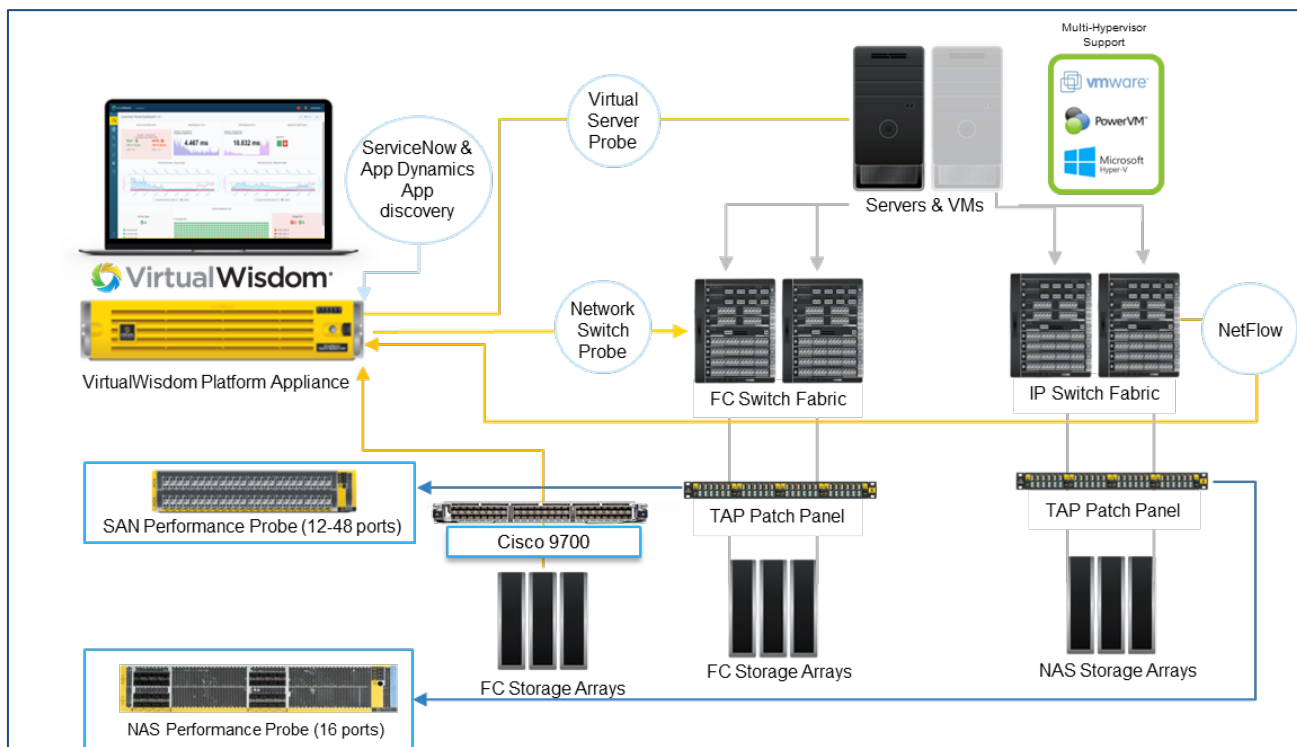
A: Yes, Virtual Instruments is well-known by nearly every storage and IT infrastructure monitoring industry analyst. Analysts at Gartner, 451 Research, IDC, Enterprise Management Associates, Storage Switzerland, Demartek, Taneja Group and others know our products and the unique value that our products bring to our customers.

**Q: What is your relationship with other infrastructure technology vendors?**

A: Virtual Instruments solutions are available from, or used worldwide through Virtual Instruments OEM partners, which include leading storage, server and data center providers including Dell EMC, HPE and HDS. By leveraging Virtual Instruments solutions these partners deliver best in class infrastructure solutions to a wide range of customers. Additionally, we have technology alliances with vendors like Cisco, Gigamon, and ServiceNow to deliver integrated solutions to help you solve the toughest IT problems. For a list, see our [Partners page](#).

**Q: Is VirtualWisdom a software or a hardware solution?**

A: It is both. The VirtualWisdom platform is composed of a fully integrated combination of software and hardware probes, Traffic Access Points (TAPs), and the VirtualWisdom Platform Appliance. The hardware component is unique in the industry and allows you to see things that literally no other product or service can help to you see. And the software analytics component goes far beyond the monitoring correlation engines you're used to seeing. In the Products section of this FAQ, we'll dive deeper.



*VirtualWisdom architecture diagram*

## VirtualWisdom Use Cases

**Q: Can I use VirtualWisdom to ensure SLA compliance with my customers / constituents?**

A: VirtualWisdom can be used to take back control of your IT infrastructure. VirtualWisdom provides historical and real-time performance dashboards, helping to focus problem identification and resolution in heterogeneous environments to maintain SLA compliance. VirtualWisdom is unique in its ability to not only capture metrics that show adherence to service level agreements and internal policies, but also record them and keep them in an easily searchable format.

**Q: Can I assure that my infrastructure is supporting my application performance requirements?**

A: VirtualWisdom Application Service Assurance analytics align infrastructure performance with

application requirements by providing executive and LOB visibility through easy-to-use executive and application-level dashboards, enabling Tiered Service Level policies to assure the performance of business-critical applications running on shared infrastructure, and discovering and mapping application usage of dynamic and virtualized infrastructure.

#### Q: Can I use VirtualWisdom to optimize my infrastructure investments?

A: Workload and Capacity Optimization analytics enable you to proactively assess workload behavior and capacity from the VM to the storage array by optimizing end-to-end workload placement across VM, network and storage, proactively detecting potential performance issues and optimization opportunities through seasonal behavior and other analytics.

#### Q: Can I avoid problems and if needed, quickly find and solve them?

A: Problem Resolution and Avoidance analytics enable IT teams to proactively collaborate, troubleshoot and diagnose complex performance issues by offering Investigation runbooks that provide guided analytics to help you identify and resolve issues for every alarm type, while enabling improvement in cross-team collaboration, detecting anomalies, and automatically comparing to performance baselines to detect and correlate potential root causes of issues.

#### Q: What else?

A: For more detailed examples of how hundreds of customers have reduced mean time to problem resolution, reduced unplanned downtime, identified over-provisioned infrastructure elements like physical hosts, found physical layer issues, reduced the risk of consolidation and migration, identified failed multi-pathing, found the best backup windows, provided audit trails for compliance, detected replication network problems, found unused or under-utilized LUNs, and saved power, space, and cooling, contact your VirtualWisdom reseller.

## Products

#### Q: What is new with VirtualWisdom release 5.4?

A: VirtualWisdom's industry-leading app-centricity has been substantially advanced, extending visibility and performance insight into key business and application stakeholders. Highlights include:

- Application Discovery. Auto-discover and visualize key application services using standard interfaces, including ServiceNow integration, NetFlow analysis, and host integration using SSH or WMI.
- App-centric SLAs and Alarms. Setting thresholds and alarming is too cumbersome to manually do, so with VW 5.4, the alarm system learns your workload pattern and only alerts you to out-of-bound conditions. And with VW 5.4 Investigations, users are not only shown the system error and what it impacts, but also integrated remediation steps are built into the platform itself improve application response times, understand and resolve noisy-neighbors, before they impact your business apps.
- Enhanced Reports / Dashboard. VirtualWisdom 5.4 provides an intuitive summary view of the overall health, performance, and utilization of the entire infrastructure enabling quick determination of problem areas and directional trends. It displays side-by-side KPI and infrastructure metrics and delivers fast ROI from multiple pre-set shareable dashboards and reports, customizable for many IT and business function, from app owners to storage admins.
- New Data Sources. VirtualWisdom 5.4 offers direct technology integration to a variety of infrastructure devices and third-party platforms, including Gigamon, Cisco, NetFlow data, ServiceNow's CMDB, and FCoE metrics.
- Addition of SMB support to our NAS Performance Probe.
- Addition of support for Software-defined Storage and Hyper-converged systems, including Dell EMC ScaleIO, vSAN systems, Nutanix, HPE SimpliVity, and more.
- Storage Port Balancer Analytics. Identifies overloaded storage ports and makes HBA/Host move suggestions that would rebalance the front-end ports of a Fibre Channel storage array.
- And much more ... For more information, see the [What's New FAQ](#).

#### Q: What is new with VirtualWisdom release 5.6?

A: Highlights include:



- VirtualWisdom can seamlessly receive streamed monitoring data from Cisco's MDS 9700 32G Module, which offers built-in telemetry sensors for efficient streaming data collection in SAN environments. This brings many of the same benefits of the VirtualWisdom Performance Probe with TAPs, but offers a potential significant cost benefit.
- VirtualWisdom discovers and consumes App Dynamics app/service models. Shared Context/app topology enables shared understanding of how infrastructure supports apps SLAs (dashboards), to provide accelerating time to resolution of issues (analytics), and benchmarking/comparison over time of infrastructure performance (reporting).
- VirtualWisdom can fetch relevant data to an Investigation, and display it directly in the Investigation text. This makes the Investigation workflow faster, richer, and more meaningful.

### Q: What is the VirtualWisdom hardware probe?

A: Our family of hardware-based SAN and NAS Performance Probes are the most advanced, high-capacity line-rate data inspection and analysis devices available. They inspect, process, and analyze every FC frame header and SCSI Command on the Fibre Channel SAN links in real-time. They capture the true, unaltered, I/O profile of the actual application traffic, detecting application performance slowdowns and transmission errors by measuring every SCSI I/O transaction from start to finish. The SAN Performance Probe family consists of an ultra-high-density (8G) 48-port enterprise edition, and (16G) 12 and 24 port models suited for high-performance environments. The NAS Performance Probe is an 10G, 16-port, full line-rate model supporting both NFS and SMB protocols.

### Q: Do you support hyper-converged systems?

A: The short answer is: yes. Today, we support Del EMC ScaleIO, VMware vSAN enabled systems, Nutanix, HPE SimpliVity, VxRail, VxRack, and Cisco HyperFlex. For more details, refer to the [HCI FAQ](#).

### Q: What are TAPs?

A: Traffic Access Points (TAPs) provide a passive, fail-safe access point to storage network traffic on the Tapped link. This makes the light available for real-time performance monitoring, deep problem diagnosis and protocol layer analysis. TAPs are non-powered, non-mechanical devices that reflect a small portion of the signal through the TAP to another port, which provides a copy of the light to upstream, out of band Probes and Sensors. The passive TAP does not introduce any latency or overhead, has no impact on application or SAN performance, and is integrated with several industry leading Patch Panel Systems for simple deployment.

TAPs can sit anywhere between the HBA/NIC and the storage system, but are normally inserted between the storage array ports and SAN/NAS switch ports, preferably as part of the patch panel. Tapping between the Storage (Target) and the network switch is the recommended installation location for Virtual Instruments' SANInsight TAPs for a few reasons. Tapping the storage takes the best advantage of fan-in ratio, fewer links need to be tapped and conversations from all servers to the tapped storage port are tracked.

### Q Do the TAPs affect the performance of the SAN or NAS?

A Taps are passive and do not affect the performance of the SAN/NAS in any manner.

### Q: Does Virtual Instruments offer software-only monitoring?

A: Yes, we use software probes for VMs, switches, SDS, and some NAS systems. Some of our customers opt for software-only solutions, which is easier and faster to deploy than hardware-based monitoring.

The switch probe, our Network ProbeSW, is a standards-based software probe leveraging SMI-S and SNMP to collect extensive metrics from the Fibre Channel switching infrastructure (regardless of manufacturer or type of switch), from director class to top of rack FCoE, embedded gateway or other FC standard switching devices.

The ProbeVM Family of software-based probes collect and present hundreds of performance and utilization metrics from the associated physical server and hypervisor estate—including CPU utilization and status, memory utilization, disk I/O requests and capacity, as well as network requests and utilization. The VirtualWisdom ProbeVM family supports VMware vSphere<sup>®</sup>, IBM PowerVM<sup>®</sup>, and Microsoft Hyper-V<sup>®</sup> environments, presenting all of critical performance and utilization metrics from across the virtual estate.

As a VirtualWisdom Integration, ProbeSDS captures ScaleIO metrics, through the ScaleIO Gateway and sends them to the VirtualWisdom appliance to apply problem solving analytics across 100's of metrics.

VirtualWisdom is used to get control over cache and capacity utilization, optimize application performance, and quickly troubleshoot problems.

As a VirtualWisdom Integration, ProbeNetflow captures flow records from NetFlow, sFlow, Jflow, and IPFIX and sends them to the VirtualWisdom appliance. VirtualWisdom is used to get control over bandwidth utilization, optimize application performance, and quickly troubleshoot problems.

As a VirtualWisdom Integration, VirtualWisdom ProbeSDS for vSAN allows you to monitor the performance of your vSAN Hyper-Converged VxRack or Converged environments; investigating and remediating potential problems before they cause outages.

VirtualWisdom's ProbeNTAP software probes help provide additional visibility into how the storage array impacts the end-to-end system performance. ProbeNTAP is an API-based NAS storage software probe that collects and correlates health and utilization data from the underlying NAS arrays (NetApp OnTAP8 Clustered Systems).

### Q: Which storage infrastructure components is VirtualWisdom compatible with?

A: Virtual Instruments supports all our functionality as outlined in the product datasheets, product documentation, website content and all other VI collateral for all Fibre Channel or NFSv3, SMB 2 and 3-connected arrays. We do not maintain any official compatibility list of storage array support because thanks to our physical layer monitoring, we uniquely support all Fibre Channel and NFSv3/SMB arrays of all generations past and present, that adhere to the ANSI specifications. The practical benefit for our customers is that since our inception in 2008, we have not found a Fibre Channel or NFSv3 (and now SMB) array that we do not support, because the array vendors themselves must support these standards in order to be in the storage business. Unlike most monitoring products on the marketplace, Virtual Instruments' products monitor the very lowest level of the network stack, well below array firmware level issues.

VirtualWisdom supports all known, shipping FC switches that adhere to the SMI-S and SNMP standards. A complete list is available in our product release notes. In 2016, we will add an extensive list of Ethernet switches to our compatibility list.

VirtualWisdom supports all host Fibre Channel HBAs, independent of vendor. VirtualWisdom supports VMware ESX, Microsoft Hyper-V and IBM PowerVM hypervisors.

If you have any questions about your particular environment, we can answer your specific questions, and often provide customer references who already have components similar to or exactly like what you are using in your datacenter.

### Q: What benefits do VirtualWisdom analytics provide?

A: Analytics deliver the authoritative insights and consistency you need to maintain agility and sustain your competitive edge. For Problem Resolution and Avoidance, our analytics enable you to identify infrastructure issues before they impact application end users. Our Workload & Capacity optimization analytics allow you to understand workload behavior and optimize performance and placement across the life-cycle from Dev/Test to Production. And our Application Service Assurance analytics exist to guarantee delivery of the optimal infrastructure to applications. Our approach is to not only manage service levels but assure that performance comes from understanding business behavior and cycles

### Q: What types of Analytics do you support?

A: There are nine primary analytics available today, with more planned for the future:

#### **PROBLEM RESOLUTION AND AVOIDANCE**

**Event Advisor** enables you to specify an entity and a timeframe, and provides a prioritized list of potentially interesting (spikes, relevant performance issues, anomalous behavior, etc.) events and time periods that require attention, ranked by magnitude and duration.

**Trend Matcher** enables you to quickly identify cause of problems and potential problems. Leveraging baseline trends (specified by you or by Event Advisor), and target metrics, it compares against every device over specified timeframes and provides lists of correlated matching devices.

**Queue Solver** recommends the resetting of an execution (or queue depth) throttle on the HBA card(s) of specified host(s), which enables you to optimize the read or write response time of those hosts.

#### **WORKLOAD & CAPACITY OPTIMIZATION**

**Balance Finder** ensures that the hosts in the environment have functioning path failover to ensure application availability to data in the event of a link failure. Compares traffic patterns of all the ports associated with a single host to determine whether the multi-pathing software is functioning as intended.

**Seasonal Trend** provides data-informed predictions of resource needs within seasonal business patterns, by entity, by hour, day, week, month, quarter or year. Dramatically reduces false alerts, ensuring that actual problems are not ignored, as is often the case with simpler rules based alarms.

**VM Deployment Advisor** works in conjunction with the VM Coordinator and identifies the optimal cluster and host to deploy a VM, based on available capacity and expected VM workload across CPU, Memory, I/O and Network.

**VM Coordinator** Recommends optimal placement for VMs across an ESX, Hyper-V, or PowerVM clusters, and recommends reconfigurations to reduce contention for CPU or memory resources.

**Storage Port Balancer** identifies overloaded storage ports and makes HBA/Host move suggestions that would rebalance the front-end ports of a Fibre Channel storage array.

## APPLICATION SERVICE ASSURANCE

**Workload Analysis** captures and analyzes workload behavior and transfers production workload data to LDX-Enterprise, enabling the most hyper-realistic workload modeling, storage testing and validation possible today.

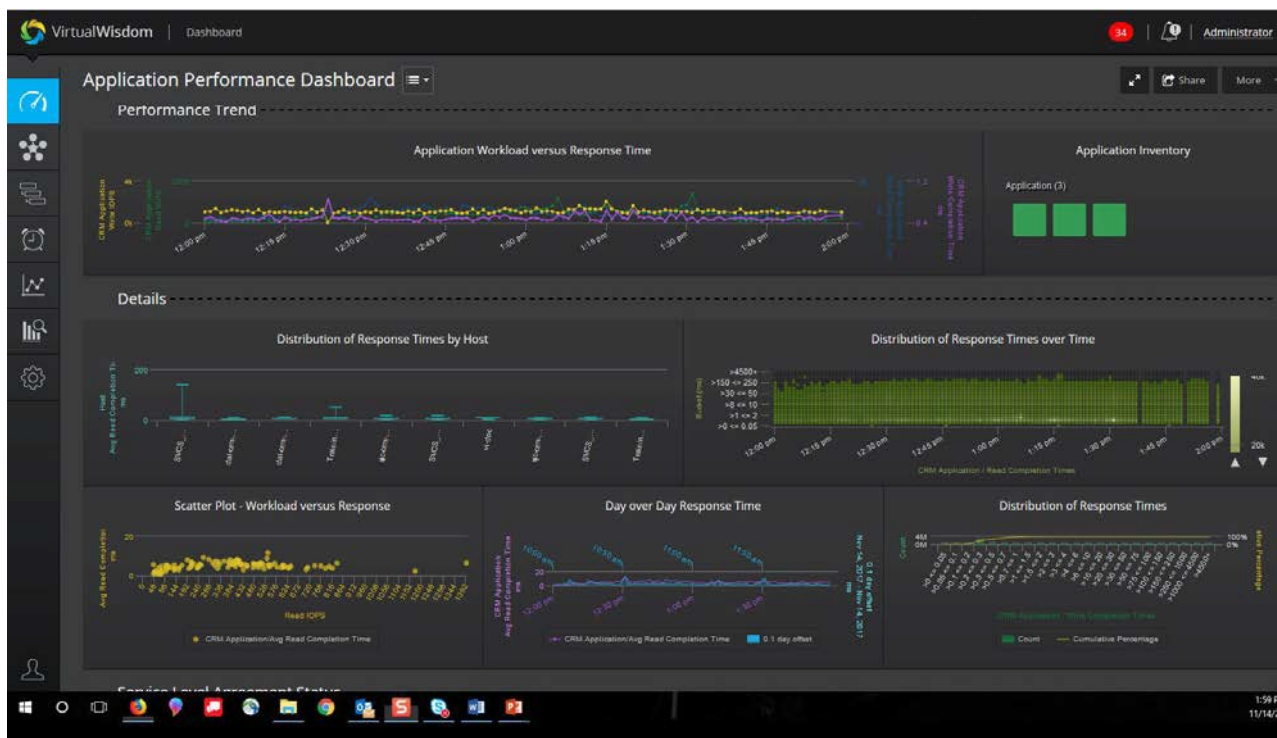
### Q: Is there a cost associated with VirtualWisdom Analytics?

A: The pricing for the analytics subscription is based specifically on your existing VirtualWisdom deployment. This ensures that you get exactly what you need for exactly what you have. Please contact your sales rep or reseller for more information.

## Product Functionality and Usability

### Q: What does your interface look like, CLI or GUI?

A: The intuitive VirtualWisdom graphical user interface increases the value of the VirtualWisdom solution to the entire organization, from IT operations to line of business leaders. The dynamic, app-centric GUI enables multiple teams to quickly and confidently answer questions—and deliver the right information at the right time. This means regardless of function (application, server, storage, virtualization, etc.), you can collaboratively fine-tune infrastructure performance based on business, application, workload and SLA requirements.



Example screen shot of the app-centric GUIs that enables you to manage in a way that makes the most sense, based on your role, responsibility, or concerns.

### Q: How easy or complex is VirtualWisdom to use?

A: The ongoing requirements of our enterprise customer base continually drive the direction, scalability, and usability of our industry-leading analytics platform. With the latest release of VirtualWisdom, you and your teams get more power, speed and analytics-driven control to manage your ever-evolving digital business with precision and confidence. Specially, the analytics modules of VirtualWisdom act as virtual system admins, leading you to answers, not just data. As an example, setting thresholds and alarming is too cumbersome to manually do. The Seasonal Trend Advisor learns from “seasonal” business patterns— whether a season is hourly, daily, weekly, monthly, quarterly, yearly, etc.

With it, customers can set multi-variate thresholds, and make tuning adjustments on-the-fly via data-informed prediction of resource needs. Its primary benefit is that it detects variances above or below established thresholds, based on the seasonality of business workloads. End users will typically take our 3- day Intro class which makes them extremely knowledgeable on VirtualWisdom setup and reporting.

As a proof point for ease-of-use, VirtualWisdom is the ONLY leading performance analysis solution which is deployed not only as a product, but also as a service. The vendor-supplied tools are too heavyweight for their own PS personnel to effectively use in a short term (1 or 2-week engagement) project. Over 500 datacenters rely on the ease of use and critical insight provided by VirtualWisdom.

### Q: How can VirtualWisdom be integrated into my existing environment?

A: VirtualWisdom easily and non-intrusively integrates into any physical or virtualized infrastructure. VirtualWisdom is an “out-of-band” solution that requires no agent running on the server or guest.

VirtualWisdom has no impact on application performance or response time. VirtualWisdom collects its monitoring data from several unique sources. First, The Virtual Server Probe collects data from hypervisor software. VirtualWisdom sees all of the data that hypervisor mgmt systems, like vCenter, collect. Second, the Network Switch Probe collects SAN switch health and utilization data from the existing SNMP or SMI-S utilities of the SAN switches. Third, ProbeSDS captures ScaleIO metrics. Fourth, ProbeNetflow captures flow records from NetFlow, sFlow, Jflow, and IPFIX, Fifth, ProbeSDS for vSAN allows you to monitor the performance of your vSAN Hyper-Converged or Converged environments. Fifth, with the release of version 5.6, VirtualWisdom gets data directly from the Cisco MDS 9700 telemetry, using no TAPs or hardware probes.

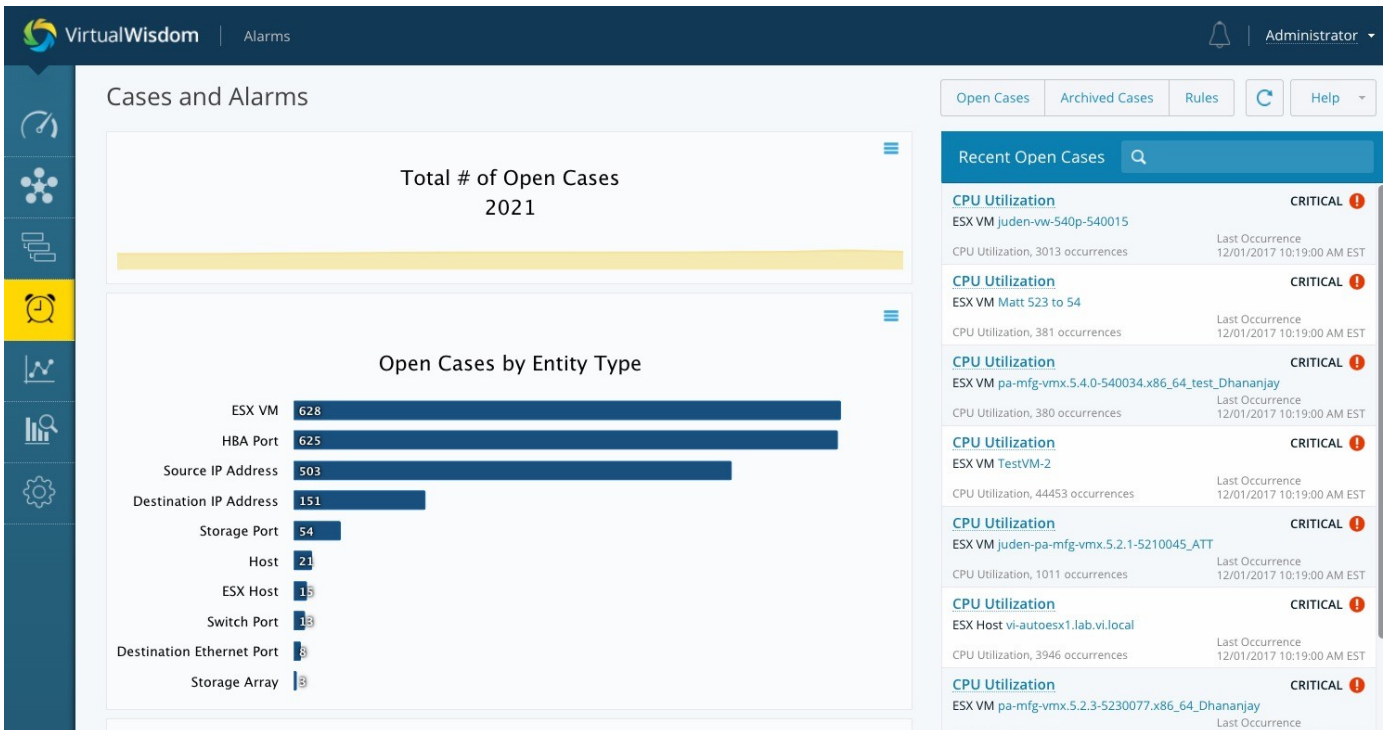
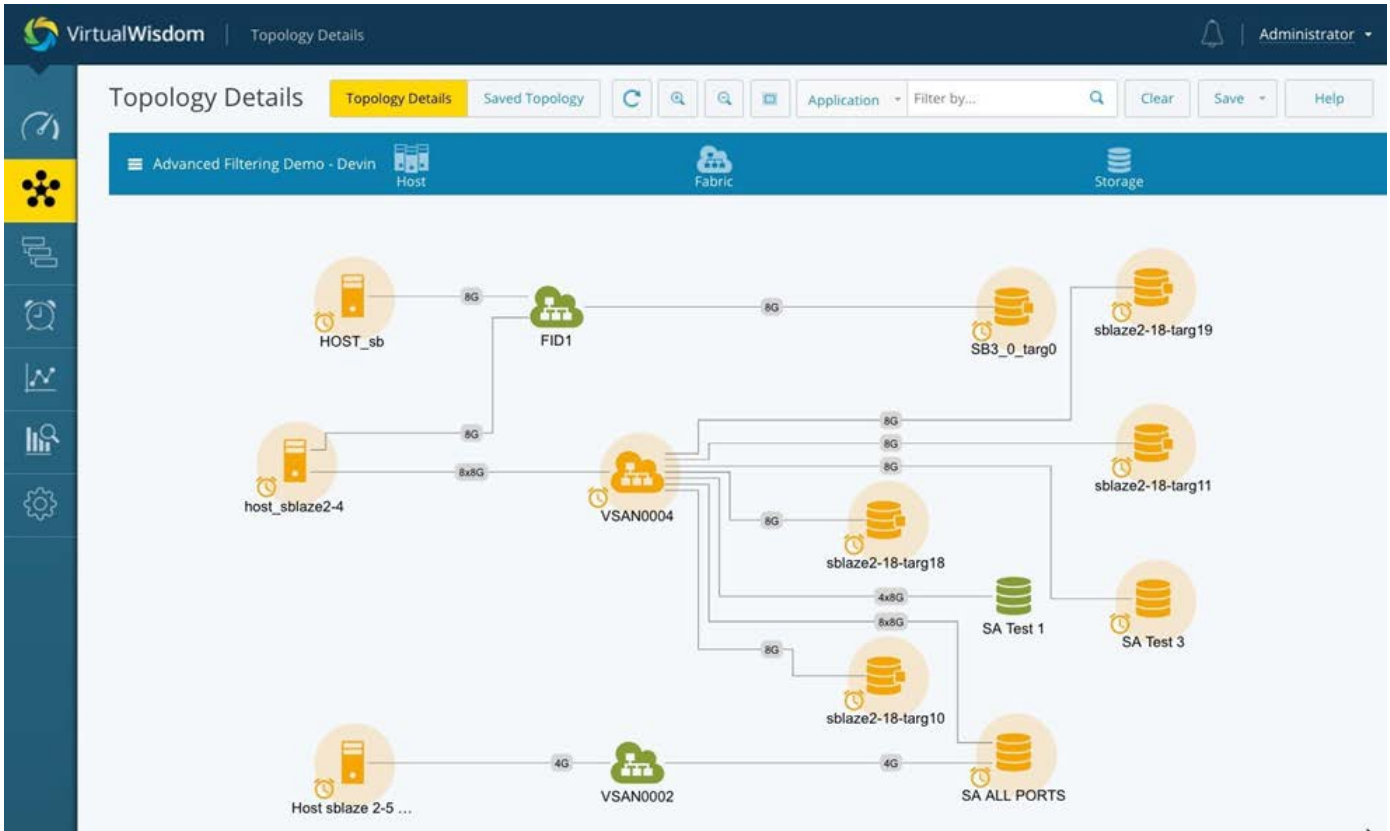
Seventh, and most importantly, VirtualWisdom directly measures I/O transaction data via Fibre Channel probes and NAS probes that “copy” the fibre channel frame header or IP packet data on the network. This is accomplished via a non-intrusive, light splitter or TAP (Traffic Access Point) that re-directs some of the light on the network. All this data is measured, analyzed and correlated via the VirtualWisdom Management Server application, which resides on a separate server. This data can then be used to easily feed or trigger alerts into any management platform such as vCenter, IBM Spectrum/Tivoli, BMC ProactiveNet, EMC Unisphere, or Symantec Command Center.

### Q: Do you work in a virtualized environment?

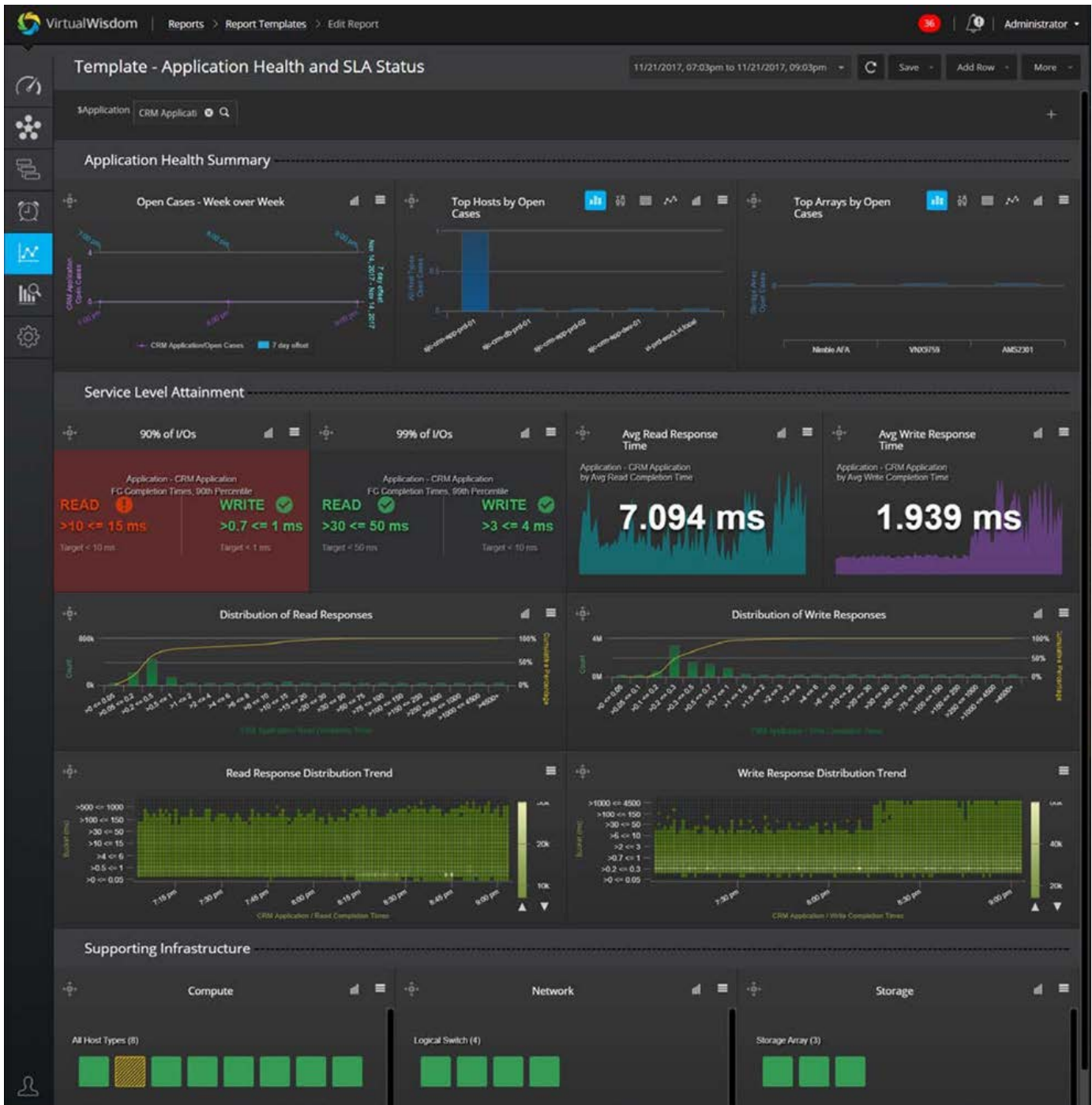
A: Yes, both server and storage virtualized environments. The vast majority of our customers use us in highly virtualized environments to give them comprehensive visibility from the VM to the LUN./ Filesystem.

### Q: Can you show me some sample output?

A: As samples, a topology screen with the light background, the alarms landing page, followed by an application SLA status screen, with dark background.







Q: Do you install agents?

A: VirtualWisdom achieves full functionality with absolutely no agents. We never affect the performance of the devices that we monitor.



Sales  
[Sales@virtualinstruments.com](mailto:Sales@virtualinstruments.com)  
 1.888-522.2557

Website  
[virtualinstruments.com](http://virtualinstruments.com)

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