Key Benefits

Ultimate collaborative testing solution that improves team productivity:

- Novice and expert users can leverage the power of WorkloadWisdom
- Tests and results can be shared within and across teams with a centralized view

Get the most out of your performance engineering, QA and support teams.

Storage technology vendors can actually test their systems with workloads that closely model realworld applications and determine the strengths and weaknesses of their networked storage arrays.

Howard Marks
Chief Scientist
Deep Storage, LLC

WorkloadWisdom

The industry’s only collaborativeworkload acquisition, modeling, and performance validation solution for storage technology vendors.

WorkloadWisdom is a browser-based software solution that provides advanced workload profile acquisition, simplified workload modeling, comprehensive test administration, and a detailed performance reporting framework.

Available as part of an integrated appliance or as a virtual machine, WorkloadWisdom offers a shared performance testing and validation platform that can be leveraged by QA, support, field, performance and development engineers.

WorkloadWisdom is used to analyze production workloads, create workload models, and then administer the generation of highly realistic simulated workloads against any file, block, or object storage target via WorkloadWisdom Workload Generators. Its intuitive, web-based GUI is built for all user levels to provide an advanced networked storage performance validation solution that incorporates a sophisticated workload modeling methodology.

WorkloadWisdom controls multiple load generators that groups of users can utilize on a global or local basis. Intuitive to use, WorkloadWisdom comes pre-configured with a test platform, protocol test suites, and test content.
WorkloadWisdom offers two primary benefits:

• Deeper understanding of storage system behavior through its highly realistic and granular workload modeling. This results in finding performance and scalability issues faster and a more comprehensive characterization of storage system performance.

• Superior testing and engineering productivity due to its simple user interface, automated testing, and highly collaborative environment. It dramatically simplifies the manageability of the testing resources and the overall performance testing process.

WorkloadWisdom provides:

• A simple interface for acquiring workload profiles from production systems, and configuring and running complex performance validation scenarios that complements your existing Test Development Environment (TDE) in the lab

• A convenient and effective way to share WorkloadWisdom generators, ports, and test content with all results in a centralized repository

• A centralized way to manage and track testing resource usage by individuals and teams

• An easy methodology to characterize production workloads with high fidelity and analyze test results.

Attaining a Deeper Understanding of Storage System Behavior

WorkloadWisdom offers a variety of facilities to enable an in-depth understanding of storage system performance behavior and limits that is unparalleled in the industry. In addition to our ability to perform extreme load generation to massive scale, key capabilities include the Workload Iterator, the ability to generate Composite Workloads, support for advanced test beds, the ability to generate compressible and deduplicable data content streams, and support for industry leading workload profile acquisition and analysis solutions.

The Workload Iterator

The Workload Iterator is a powerful feature of WorkloadWisdom that finds breaking points (blind spots) and optimal workloads (sweet spots) in storage arrays. It is built on top of a sophisticated high-fidelity networked storage workload model, allowing users to easily automate iterations over hundreds of parameter permutations that define many different characteristics of application and protocol workloads. These characteristics include block sizes, read vs. write percentages, sequential vs. random percentages, number of files and folders (NAS), LUN hot spots (SAN), load profiles, deduplication and compression ratios, FC queue depth, and more.

Running the Workload Iterator

Once the Iteration suite is defined, the Workload Iterator will automatically execute every permutation, and provide the user with a summarized real-time report. Each permutation runs independently, and the permutations are executed sequentially one by one until all permutations are completed.

During run time, a summary table is presented in real-time allowing the user to monitor the progress and the key performance indicators such as throughput, IOPS and latency for each iteration. In addition, the user has the ability to view a detailed dashboard by clicking on the status of a particular iteration, giving full insight to each permutation.
Using WorkloadWisdom has improved our testing coverage, reduced our testing time, and eliminated the need to buy additional servers.

Terry Schwartz
QA Manager
F5 Networks

WorkloadWisdom can simulate the faster and badder client — it’s great, like turning on a fire hose.

Colin Hutchison
Test Architect
Oracle

Composite Workload Editor

Taking a leap from traditional workload benchmarking methods that are based on freeware tools, where storage protocols are validated one at a time, independently, the WorkloadWisdom Composite Workload feature allows the user to create many different workloads, across different storage protocols, and run them all at the same time against the storage infrastructure. This results in a much more realistic and holistic emulation of production environments, such as commonly found in virtualized infrastructures.

Advanced Test Beds

WorkloadWisdom supports an advanced Test Bed facility where one can easily create multi-protocol Test Beds. This also supports the ability to run workloads across multiple test ports. It also supports the Test Bed Extractor utility, which enables running imported TDE Projects over different Test Beds by automatically extracting information relevant to a Test Bed (e.g. source address(es), destination address(es), Shares, LUNs, etc.) from the imported TDE Project.
Compression and Deduplication

Fiber Channel and iSCSI workloads support simple testing of data compression and deduplication with three simple parameters: compression percentage, deduplication percentage and the number of unique duplicates. WorkloadWisdom calculates the complex data compression percentages and data replication algorithms behind the scenes and generates compressible and deduplicable data content patterns.

Figure 5: Data reduction inputs to generate compressible and deduplicable content

Workload Acquisition and Analysis

There are two key modules that help storage professionals understand their current production workload profiles to better understand performance requirements:

WorkloadWisdom Workload Data Importer module

The Workload Data Importer software module of WorkloadWisdom imports most production array I/O data exported from storage array tools and other performance monitoring tools for workload profiling, simplifying the workload modeling and creation process. Examples of array data that is useful for workload profiling include: read/write ratios, random/sequential request mix, data/metadata command mix, and IOPS over time. The Workload Data Importer provides out-of-the-box policies for most major storage vendors and allows users to add profiles for new vendors.

Workload Analyzer module

Before now, there was no fast and simple way to analyze and characterize production workloads and their changing behaviors. The WorkloadWisdom Workload Analyzer is a software module of WorkloadWisdom that allows storage engineers to analyze temporal workload behavior via powerful visualization to understand workload I/O patterns that affect storage performance. The Workload Analyzer processes the data from both the Workload Data Importer and or VirtualWisdom Performance Probes. It creates a detailed workload profile that can be used to automatically generate a highly accurate workload model. If used with a WorkloadWisdom Workload Generator, these workload models can then be applied to any file, block or object storage system to fully evaluate its performance or to be used to efficiently troubleshoot performance problems.

Figure 2: Workload analyzer example; access pattern, IOPS over time.
Superior Testing and Engineering Productivity

WorkloadWisdom dramatically increases the testing productivity of QA, performance and development engineers. Customers typically run 10X more tests when using WorkloadWisdom as opposed to relying on freeware tools and the stacks of servers that are time-consuming to configure, maintain and analyze. In addition to the productivity-enhancing Workload Iterator described above, WorkloadWisdom offers the following features.

Choice of Standard Output Views

You may choose to view reports as a summary table, a time-based line graph, or as a histogram.

Simple Collaboration

Share WorkloadWisdom resources such as workload generators, ports, tests, and test results with specified groups or individuals based on their role within the organization. Access to specific resources and tests can be dynamically determined to support higher levels of security and efficiency. Such functionality allows team members to work more effectively with each other and increase the ROI in WorkloadWisdom Workload Generators.

Sample Workload Models

Pre-configured Protocol Workload Models Library

The following sample workload models are shipped with WorkloadWisdom: iSCSI, FC, NFSv3, NFSv4.1, SMB2.0, and Object storage. These workload models allow users to define and control key I/O access patterns with a simple web interface, and deploy them to a test bed. All workload models support the ability to specify I/O characteristics for Read and Write operations independently and select Data Content in the payload.

Pre-configured Application Workload Models Library

WorkloadWisdom provides a set of customizable workload models that are characterized and preconfigured for specific applications, such as OLTP, VDI, and various NFS and SMB workloads including OLTP database, fileserver, photo server, streaming video, Linux server, Windows server, and webserver. Such valuable assets allow users to generate realistic workloads without the need to do extensive research and manual data collection.

High Fidelity Workload Models

WorkloadWisdom supports a granular way to model workloads. In addition to varying the command mix, the solution also supports the ability to model directory structures, file size distribution, folders, block size distribution (figure 10) and I/O direction.
Simple Test Execution
Load, run and configure tests with a simple “push button” interface. WorkloadWisdom allows storage and network administrators to configure and execute tests without requiring protocol expertise or proficiency with the Test Development Environment (TDE).

Usage Tracking
Administrators of WorkloadWisdom Workload Generators can now see periodic metrics on actual usage of each device or groups of devices such as: port utilization, number of tests actually used, test duration, and total port hours. Ensures generators are being used to their full capacity.

Historical Data Capture and Presentation
Recall any output results and statistics from previous test runs for comparison and analysis.

Preconditioning Workload for Flash
Ensures you are testing a seasoned array and avoids getting artificially fast read results.

Test Lab Administration
Create and save configurations (network profiles) for test beds, devices under test, etc. Simply deploy their tests to pre-configured test beds, and allows network administrators to enforce network constraints, lowering incidences of IP space conflicts, VLA congestion, and other potential conflicts.

Batch Mode with Pass / Fail Conditions
Launch an execution of test series governed by logical conditions. Allows users to efficiently execute batteries of tests, sequentially or in parallel, which is common in regression testing.

Automation
Control all shared resources from a web service API. Allows for easy integration of WorkloadWisdom into a test automation harness and also integrates with build servers.

Deployment Options
WorkloadWisdom is available in two implementations: Pre-configured for superior performance and stability for faster time to value or as a Virtual Machine for flexible deployments.

Licensing and Supportive Platforms
Each WorkloadWisdom Workload Generator, whether physical or virtual, requires activation. Every WorkloadWisdom Workload Generator that Enterprise manages requires an add-on software license. WorkloadWisdom works with all WorkloadWisdom Workload Generators, including the WorkloadWisdom 1G Series, 10G Series, FC series, Unified Series, Enterprise Series, and Virtual Series. For more information on these products, please refer to the Product datasheet.

Required products
Workload Generators
Workload Generators are used to generate traffic based on workload models and access patterns that have been configured by WorkloadWisdom software. There are both hardware and virtual versions of the appliances. The hardware appliances are purposebuilt 2RU devices with a software and hardware architecture that has been specifically engineered to cost- effectively generate massive traffic loads that can test the performance and scalability limits of any storage subsystem, including the highest-end all flash or hybrid storage systems.
Performance Probes

VirtualWisdom Performance Probes are hardware-based monitoring devices that enable storage engineers and operations teams to capture network traffic and statistically analyze the workloads in real-time. Using optical TAPs on 10G Ethernet and 8/16G Fibre Channel, this data can be captured and the Workload Analyzer module of WorkloadWisdom to generate a highly accurate workload for replay in a test lab. This capture/analyze/replay capability will dramatically accelerate storage performance problem identification and resolution.

WorkloadWisdom Architecture

Figure 1: An architecture diagram of WorkloadWisdom and its related products.

About WorkloadWisdom

WorkloadWisdom empowers storage and network technology vendors with the insight they need to maximize the performance, scalability and reliability of their products. WorkloadWisdom accelerates time to market and helps prove the value of your products to prospective customers. Addressing file, block, and object storage performance validation, WorkloadWisdom Workload Generators and software products have the unique ability to stress today’s most complex flash and hybrid storage systems to their limits.

Select WorkloadWisdom Technology Vendor Customers