



Understanding TeamQuest Performance Software and EMC Symmetrix Integration

White Paper
TQ-WP24 Rev. A

Summary

In this paper, we will describe how TeamQuest® Performance Software integrates with EMC Symmetrix. TeamQuest Performance Software provides performance data from both the host system and Symmetrix system. Understanding their relationship will enable you to be more effective in your performance analysis and capacity planning efforts.

This paper will provide a basic overview and define some terms that will aid in the understanding of a Symmetrix storage system environment. The configuration and deployment of Symmetrix storage systems are varied and sometimes complex. We will present some basics that can be used as a foundation for your understanding of this environment.

An understanding of the EMC Symmetrix architecture and associated terminology is important to your performance analysis and capacity planning activities. Additionally, it is important to understand the relationship between the host devices and the Symmetrix devices.

This paper is written with the assumption that you are already familiar with the management and/or use of TeamQuest Performance Software.

This paper includes information from several EMC Corporation publications. Please refer to the bibliography.^{1,3}

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Symmetrix Terminology

Symmetrix is an integrated cached disk array (ICDA) designed for on-line data storage.

A Symmetrix channel director (*front-end director*) is a card that connects a host to the Symmetrix. Each front-end director can have up to four *ports* (0-3).

A Symmetrix disk director (*back-end director*) transfers data from disk to cache. Each back-end director can have up to four interfaces (C,D,E,F). Each back-end director interface can handle seven SCSI IDs (0-6).

Symmetrix *cache* memory buffers I/O transfers between the director channels and the storage devices.

Symmetrix Architecture

To understand the relationship between host physical devices and Symmetrix storage systems, you should understand that the Symmetrix virtualizes what the host sees. Hosts see physical devices. These physical devices are actually mappings to Symmetrix disk drives.

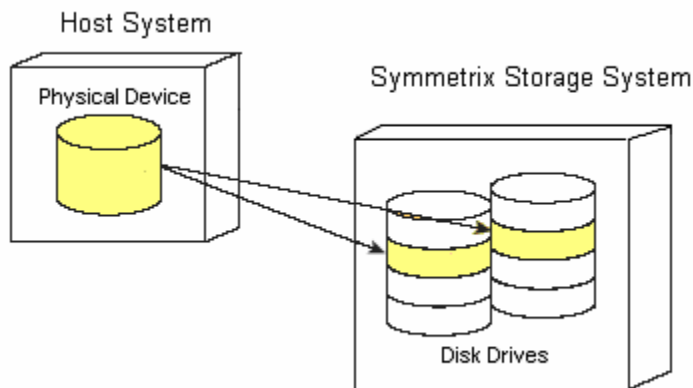


Figure 1

The host physical device may map to an entire physical disk drive, to part of a physical disk drive, or to multiple disk drives. Therefore, the host physical device is actually a logical device. The Symmetrix also maintains a logical representation of devices. Each host physical device maps directly to a Symmetrix device. For instance, a host physical device name (such as `/dev/rdisk/c3t5d2`) maps to a Symmetrix device name (such as 0012). This means that the host physical device and the Symmetrix device are the same logical device. A Symmetrix device consists of several components. The components that make up a Symmetrix device include a front-end director and port, the cache memory, a back-end director(s) and back-end director interface(s), and a portion of a disk drive(s). Figure 2 illustrates these components.

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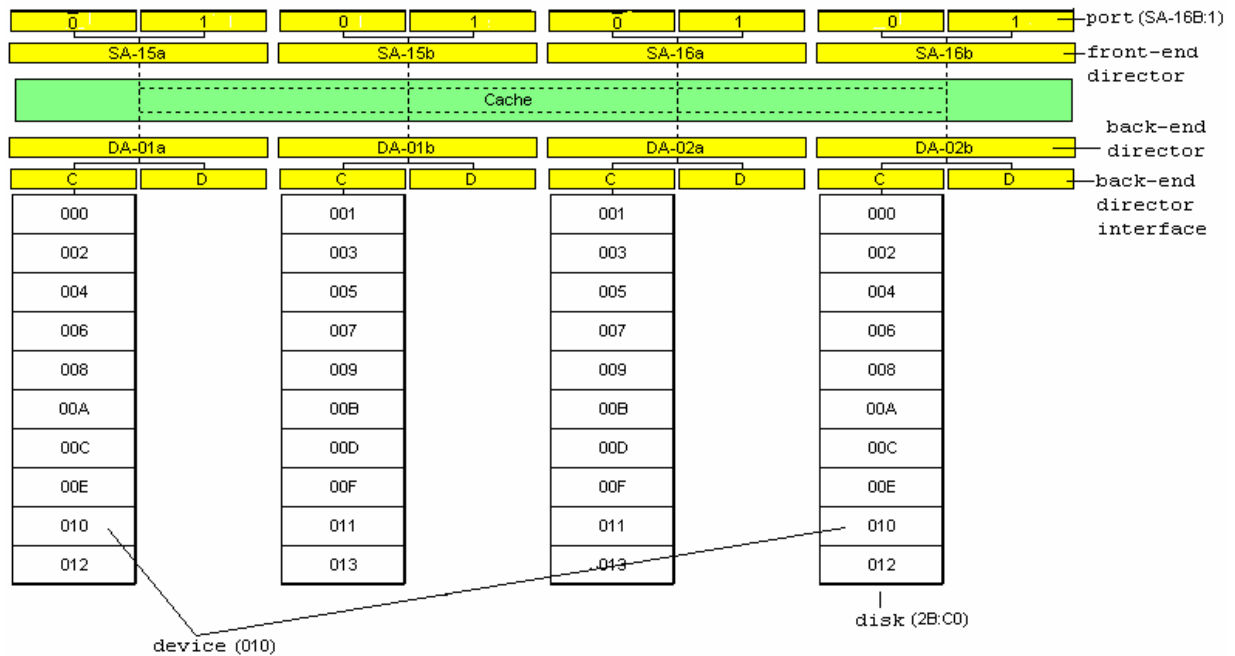


Figure 2

Performance Data

Performance data is available from the Symmetrix at the Symmetrix unit, physical device, Symmetrix device, port, and disk drive levels. TeamQuest Manager aggregates the performance data at these levels. The following table shows the data classes and resource identifiers used by TeamQuest Manager. These data classes and resource names are used to organize and identify the performance data within the TeamQuest performance database. The resource names are provided by the Symmetrix.

Data Class	Resource Name	Description
Symmetrix Unit	000000123456	Symmetrix ID
Symmetrix Physical Device	/dev/rdisk/c3t5d2	Host physical device name
Symmetrix Device	010	Symmetrix device name
Symmetrix Port	SA-16B:1	Concatenation of the front-end director name and port number
Symmetrix Disk	02B:C0	Concatenation of the backend-director ID, backend-director interface, and SCSI ID

The Symmetrix performance data collected by TeamQuest Manager is related primarily to throughput and cache hit. Additionally, TeamQuest Manager records the Symmetrix device configuration information. See the *TeamQuest Performance Software Statistics Reference* manual for a detailed listing and description of the data that is collected.⁴

Deployment

You may have one, several, or many Symmetrix storage systems in your environment. Each one of your Symmetrix systems probably has multiple host systems attached. TeamQuest Manager only requires that you run the TeamQuest EMC Symmetrix collection agent on one of the systems connected to any given Symmetrix system. You do not need to run the collection agent on every host system connected to each Symmetrix.

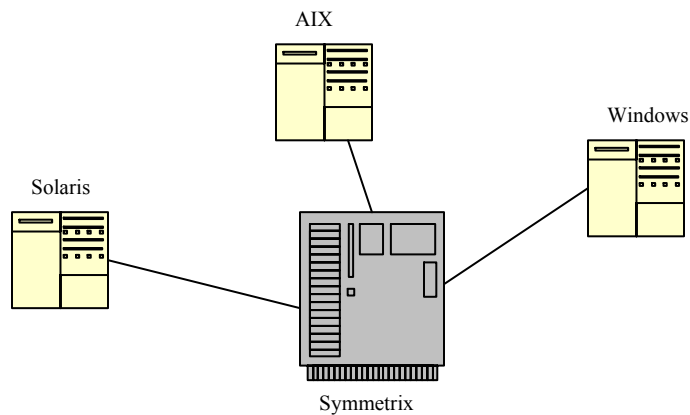


Figure 3

By running the agent from a single host, all of the Symmetrix configuration data is available except for the physical device names for the other hosts connected to the Symmetrix. However, TeamQuest Manager has included a name service that will retrieve the physical device names from other host systems. By enabling this service, you are able to get all of the configuration information without having to run the EMC Symmetrix collection agent on all of the hosts using the Symmetrix.

By default, your Symmetrix data will be stored in a local performance database on the host where you run the agent. If you are also collecting performance data for this host, you may want to separate the host data from the Symmetrix data by using multiple local databases. With separate databases, you have the flexibility to use different data sample rates for collecting the host performance data and the Symmetrix performance data. Since the Symmetrix performance data is “enterprise” data, you will probably also want to include it in an enterprise database. Including your Symmetrix data in an enterprise database will allow you to correlate its performance with the performance data from all of the hosts in your environment. Please read “Getting the Most out of the Enterprise Database”, December 2002 white paper for more information on using Enterprise databases.⁵

Using the EMC Symmetrix Performance Data

There are many uses for the EMC Symmetrix performance and configuration data. Let's examine one possible usage. The default TeamQuest Manager Disk alarm has gone off. The alarm notification identifies a physical disk with high utilization and service times. This physical disk is mapped to a Symmetrix storage system. What's next? Let's find out if or what Symmetrix components are contributing to the alarm condition. First, look at the Symmetrix configuration data (Figure 4) to see which Symmetrix device is mapped to this physical device and which Symmetrix components make up this device.

Row	Host Name	Physical Device	Device	Port	Disk	Hyper	Disk 0
1	w2k2emc	\\.\PHYSICALDRIVE2	017	SA-16B:1	1B:C0	12	
2	w2k2emc	\\.\PHYSICALDRIVE2	017	SA-16B:1	2A:C0	12	
3	w2k2emc	\\.\PHYSICALDRIVE1	013	SA-16B:1	1B:C0	10	
4	w2k2emc	\\.\PHYSICALDRIVE1	013	SA-16B:1	2A:C0	10	
5	balance	/dev/thdisk7	014	SA-15A:1	1A:C0	11	
6	balance	/dev/thdisk7	014	SA-15A:1	2B:C0	11	
7	monitor	/dev/rdisk/c3t0d0s2	012	SA-16A:1	1A:C0	10	
8	monitor	/dev/rdisk/c3t0d0s2	012	SA-16A:1	2B:C0	10	

Figure 4

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Once the Symmetrix device has been identified, check the Cache Hit Rate by Symmetrix Device report for the device (Figure 5). Are most of the requests being satisfied by the cache?

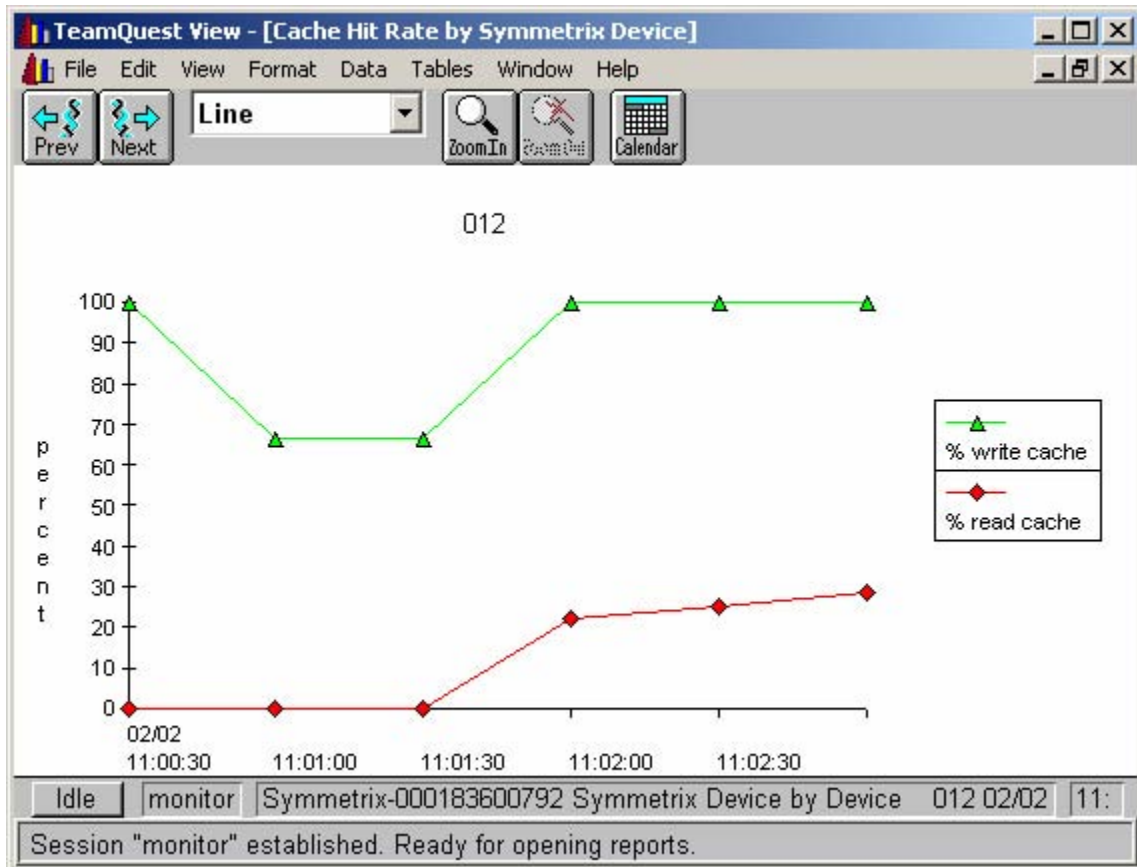


Figure 5

Also look at the Request by Symmetrix Device report for the device. Are there a large number of requests for this device? If these values are reasonable, look to see if the port or any of the disks that make up this device are busy (Figure 6).

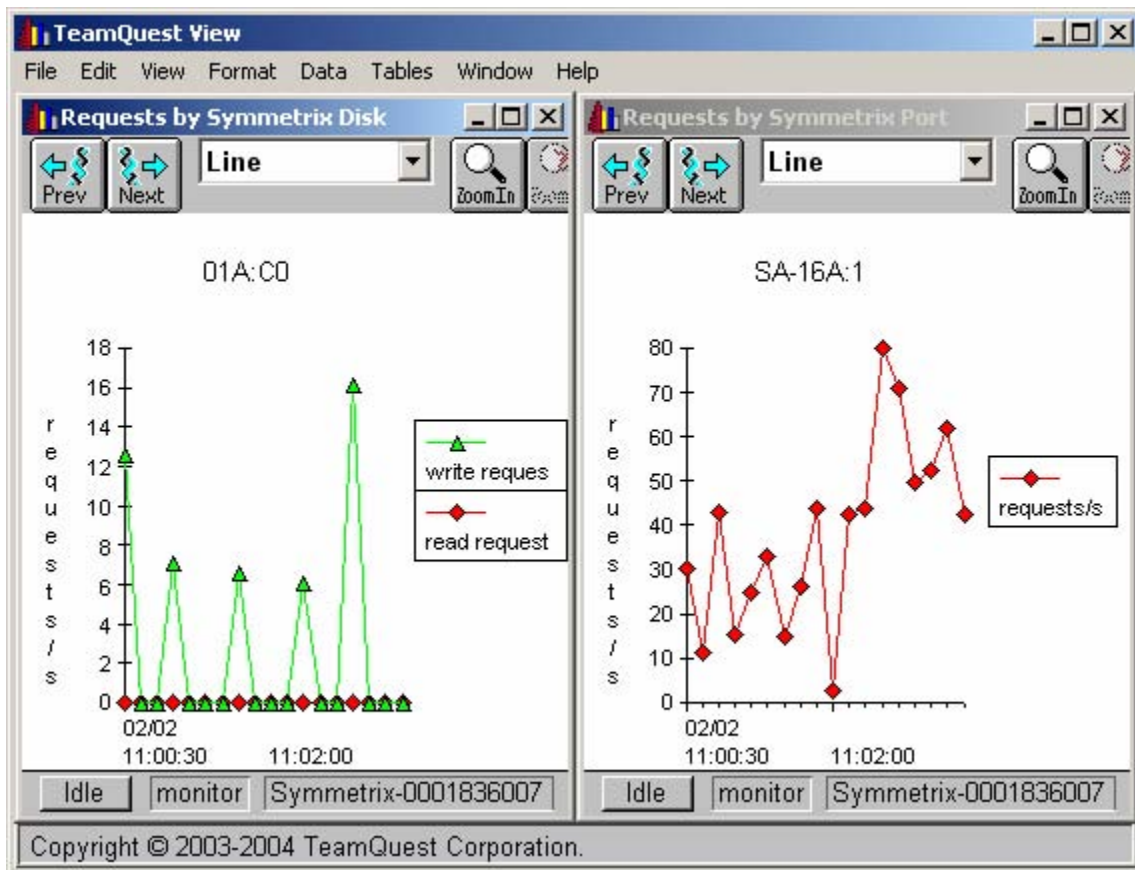


Figure 6

If any of the components are busy, look to see which devices share that component (Figure 4). Are the other devices using the component very active? If so, are they contributing to the poor performance for the device that generated the original alarm? Do other host systems physical disks share these components? Is the activity from another host system affecting the performance of the host system where the original alarm was generated? With the performance and configuration information collected by TeamQuest Manager from the host system(s), Symmetrix system(s) and host system application(s), you can quickly and easily answer these questions and identify where the bottleneck lies.

Bibliography

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3. *Using SYMCLI to Perform Storage Resource Management*, EMC Corporation, August 8, 2003.
4. *TeamQuest Performance Software Statistics Reference*, TeamQuest Corporation, TQ-10023.4
5. "Getting the Most Out of the Enterprise Database", TeamQuest Corporation, TQ-WP12 (Dec. 2002).

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