

Hitachi IT Operations Analyzer

Topological List View Enhances Ability to Monitor Complex IT Systems

Application Brief

By Yutaka Kudo and Saurabh (Manu) Batra

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Executive Summary

For many mid-sized and large businesses, IT infrastructure is more than just the data center — it is what runs the business. Ensuring that mission critical systems perform efficiently and reliably amid the complexity of multi-vendor, multi-platform infrastructures with often limited staff or generalist expertise can become an insurmountable task without the right tools.

Many organizations strive to amplify systems performance, availability and efficiencies through a variety of business choices: consolidating data centers, transitioning to Web-based operations, and adopting heavy enterprise resource planning (ERP) and customer relationship management (CRM) applications in hopes of improving customer satisfaction and bottom lines. Frequently, however, these efforts result in even greater complexities that diminish an administrator's ability to effectively monitor and manage it all with current resources.

Availability and performance monitoring tools are one way to help administrators better manage systems across the data center. While some of these tools monitor dozens of nodes for computer servers, networks or storage using a topology graph display format, challenges exist as the number of devices grows. For a monitoring tool to be beneficial, it needs to allow administrators to see the connections for each node and the dependencies. Viewing all of the connections on one screen might work for a small number of nodes, but as that number grows, the topology display becomes cumbersome to view and loses its usefulness.

Hitachi Data Systems introduces the Hitachi IT Operations Analyzer software with its unique patent-pending Topological List View feature, a powerful, proven approach to simplifying data center management with comprehensive performance and availability monitoring of up to 250 server, network and storage nodes.

The Topological List View provides flexible displays and user defined groups to enable administrators to quickly and easily see all logical connections and dependencies — through an intuitive, unified interface. Because the Topological List View grows vertically, administrators gain a simplified and universal end-to-end view of critical systems, networks and applications organized in a way that makes sense for their business and their budget.

This application brief focuses on the outstanding features and business value of the Topological List View.



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Closing the Efficiency Gap with the Right Tools

Today's business climate demands greater responsiveness of IT infrastructure in order to satisfy customer, regulatory and supplier mandates. In turn, administrators require more stringent performance, availability and recovery processes, and a way to manage the infrastructure effectively. But wide acceptance of server virtualization and other consolidation technologies, along with deployment of sophisticated business applications such as enterprise resource planning (ERP) and customer resource planning (CRM), have accelerated the complexity of many IT environments.

This trend is not limited to large enterprises as even mid-market organizations struggle to compete in the marketplace and improve IT and budget efficiencies. As the typical data center grows in complexity, administrators are challenged to monitor more devices and applications with fewer resources and with tools that may not be adequate for the job at hand. Most IT administrators in mid-market data centers tend to be generalists rather than specialists in separate data center technologies and are seeking ways to ease the escalating burden of monitoring sophisticated systems and tools.

This "efficiency gap" between requirements and resources drives the need for smarter and simpler ways to gain visibility into the system availability and performance across the data center. Hitachi IT Operations Analyzer software offers a paradigm shift in the way administrators can view and manage performance and availability of heterogeneous servers, networks and storage with the Topological List View.

End-to-end Visibility with Topological List View

The Topological List View is one of the key differentiating features of the Hitachi IT Operations Analyzer. The unique Hitachi patent-pending Topological List View provides unified end-to-end visibility into the logical connections and dependencies for up to 250 server, network and storage nodes. Most traditional availability and performance monitoring software products use topology graph displays that cover only part of the IT environment, making it difficult to correlate dependencies. Consequently, administrators must use separate monitoring products for portions of their environment.

Rather than requiring several tools for monitoring LAN and SAN environments, Topological List View provides administrators a way to monitor server, network and storage nodes in a single graphical user interface (GUI). The tool uses a tabular grid layout to display data center topology, showing the logical connections between server (physical and virtual), switch (Fibre Channel and IP) and storage nodes from different vendors. Topological List View allows nodes to be grouped, sorted and filtered without switching screens, and it uses auto discovery features to simplify topology mapping.

Because the Topological List View grows vertically, administrators get a complete picture of critical systems, networks and applications, and can quickly isolate issues and their related impacts — all from a single management screen. As a result, organizations can realize better system uptime, customer service levels and total costs of ownership.

Key Display Characteristics

Topological List View provides the following display characteristics:

- Topological List Layout
- End-to-end Topology View
- Logical Connections

Topological List Layout

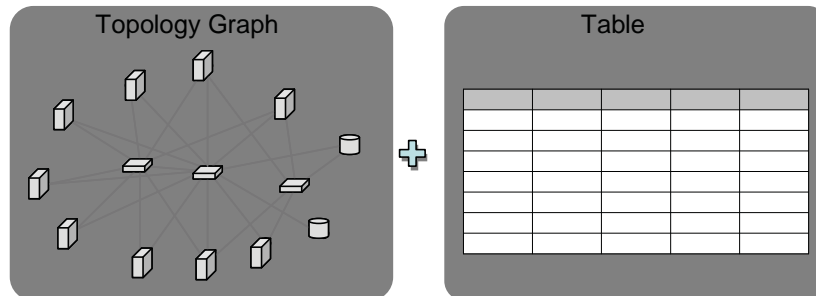
The topology graph that many other network monitoring products use somewhat resembles a spider's web in that it shows the interconnections between nodes. One of the key issues with this web layout is that it becomes increasingly more complex to visualize as new nodes and connections are added to the IT infrastructure. The topology graph grows multidimensionally, thereby losing its value, as the administrator can no longer view the environment on one screen.

A table format uses columns and rows to organize and present information. Cells within each row or under each column are then populated with pertinent data, enabling the table to grow and be viewed in an orderly, logical way, unlike the display limitations of the graph's multidimensional expansion. The user can easily identify the type of node displayed based on its position in the table. Showing objects in the tabular style can also eliminate redundancy that is common in topology graphs.

The topological list layout combines the best attributes of the topology graph and table views to enhance the administrator's visual maneuverability across the entire data center infrastructure. (See Figure 1.) By using a list layout, the topology only grows vertically as new nodes are added, making the display space efficient and the infrastructure easier to visualize. Sort and filter functionality gives the administrator flexible display options to segment and view the data needed.

The Hitachi tool uses columns to represent node types, including Backbone Networks, Local Area Networks (LANs), Computers (Server), Storage Area Networks (SANs) and Storage. The administrator then populates the cells under each column with the individual nodes, such as switches, servers and storage, for that node type. The rows represent the connections between each node type and are aligned horizontally to represent these connections. The topological list layout speeds the administrator's ability to see relationships across the data center, identify critical dependencies and resolve issues.

Figure 1. Topology Graph and Table



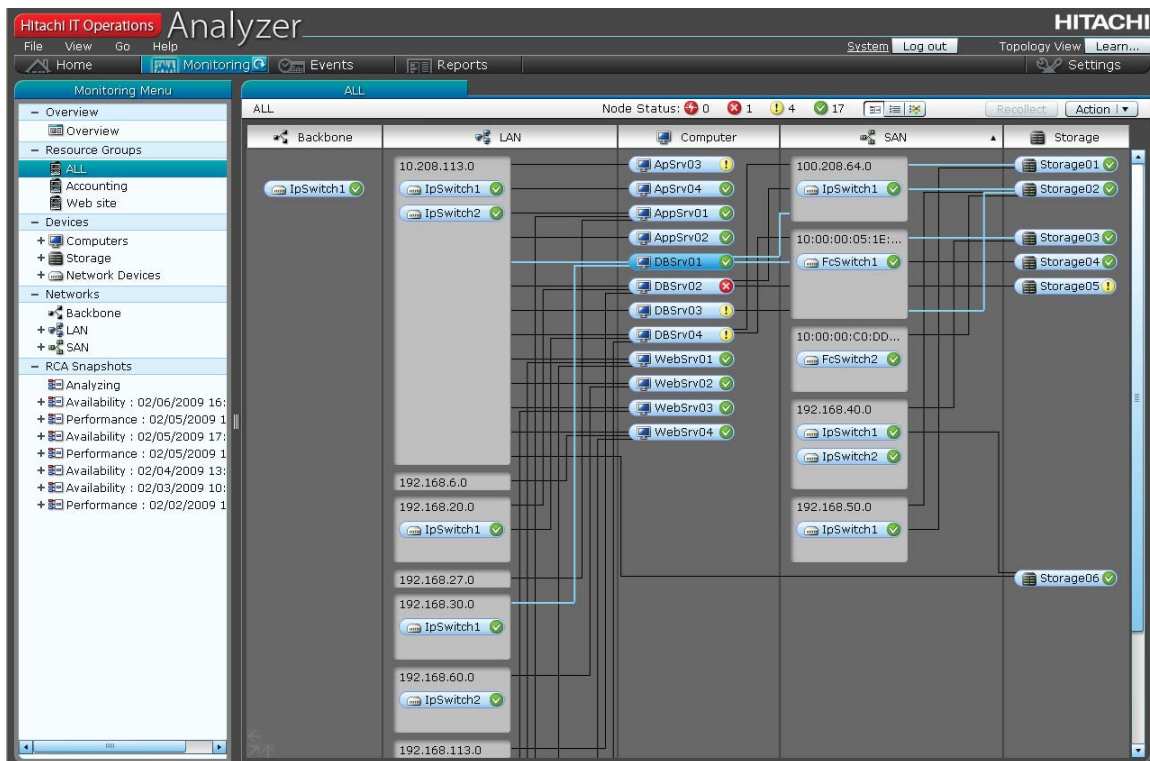
Hitachi IT Operations Analyzer Topological List View has benefits of both topology graph and table.

End-to-end Topology View

IT Operations Analyzer displays node-level topology across the screen, including Backbone, LAN IP switches, Computers, SAN Fibre Channel and Storage. Figure 2 shows a screenshot of the Topological List View. The system topology is displayed from the backbone network through to the respective storage devices, with node icons and connection lines between those icons. Each node also provides at-a-glance health status information to alert administrators of normal, warning and critical conditions related to performance and availability.

The benefit of this end-to-end topology view is comprehensive visibility of the data center layout in a single application. Organizations using multiple monitoring software products wind up with fragmented views rather than one big picture.

Figure 2. Sample Topological List View in Practice



IT Operations Analyzer topology view shows the topology of Backbone, LAN, Computer, SAN and Storage with their connections in the tabular style.

Backbone Column

The Backbone column lists the IP network switches that compose the backbone network. A switch is categorized under the Backbone column when it is part of a subnetwork with no edge (computer/storage) node connections. These IP network switches are shown without displaying connections to other LAN components, because the backbone network itself typically is essential for overall network availability and performance.

LAN Column

The LAN column shows IP switches and subnetworks (LANs). These subnetworks may have servers or other computers connected to them, and in the case when these subnetworks are used for an IP-SAN, they may also have storage connected.

Computer Column

The Computer column lists in adjacent order the computer nodes that are connected to particular LANs.

SAN Column

The SAN column lists Fibre Channel switches and all storage subnetworks. These SAN subnetworks may have computers connected with storage nodes, or storage nodes connected with each other.

Storage Column

The Storage column shows storage nodes and they are listed adjacent to the particular SAN or LAN to which they are connected.

Logical Connections

There are four types of connections represented in the Topological List View:

- LAN to Computer
- Computer to SAN
- SAN to Storage
- LAN to Storage

These connections show the logical relationships between nodes, providing the administrator with important relationship visibility. Administrators work at the logical level so physical connections such as one between an IP switch port and a network interface card or between a Fibre Channel switch and a host bus adapter are not displayed in the Topological List View.

The benefit of showing only logical connections is a drastic reduction in time to recover from failure because the administrator can instantly focus on the impact of an error rather than on the error itself. For example, the Topological List View uses horizontal lines to display the logical connections between SAN or LAN subnetworks and computer/server or storage nodes across the screen. As the administrator moves the mouse cursor across a node, the connections related to that node are highlighted, revealing any connection issues as well as the dependencies between nodes.

The subnetwork object icons are drawn with a height that corresponds with the number of connected computer node icons and/or storage node icons. This feature ensures enough space to clearly draw respective connection lines, which helps to keep the topology easy to traverse and reduce errors that might arise from mistaken associations resulting from densely drawn lines.

How It Works

In addition to its distinctive display characteristics, Topological List View has a flexible, efficient usage model designed to allow administrators to organize and view information the way they want. Many products on the market require the administrator to adapt to the tool's design rather than providing a tool that adapts to the needs of the business.

Topological List View employs drag-and-drop functionality for setting up resource groups, sorting controls for easier search tasks and point-and-click features for accessing detailed node information. Additionally, the Topological List View integrates with Root Cause Analysis features of IT Operations Analyzer to instantly show any affected infrastructure. (For more information, see the Hitachi Data Systems application brief on Hitachi IT Operations Analyzer Root Cause Analysis.)

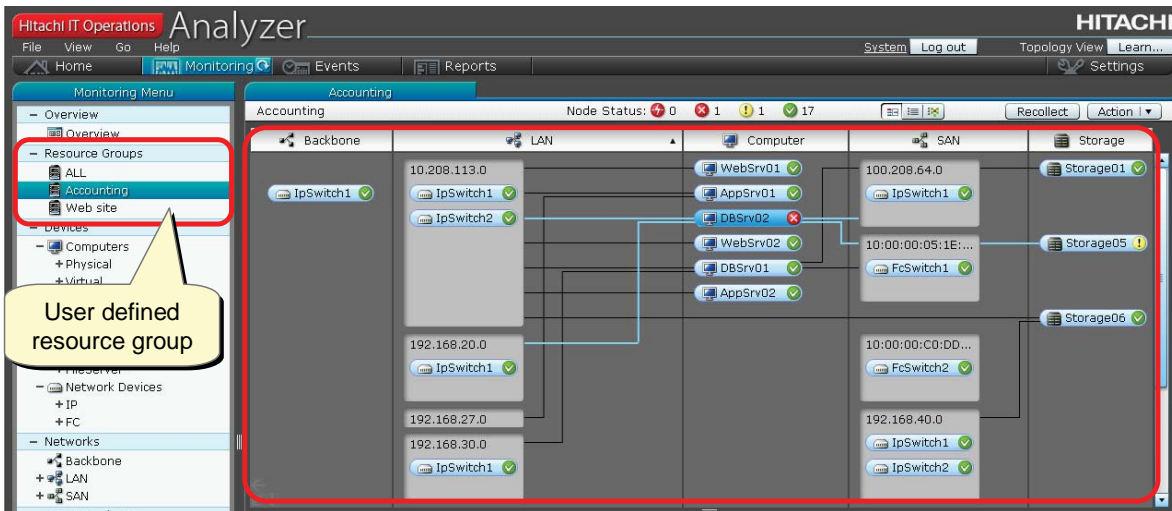
Node Filtering by User Defined Resource Group

While most administrators do not monitor nodes in an isolated manner, businesses vary greatly in how they organize departments, data and IT infrastructure. For these reasons, the Topological List View includes versatile topology mapping capabilities, including user defined resource groups. To create a new resource group (for example, a department, application or technology), the administrator simply “right mouse clicks” on the Resource Group icon, which opens a dialog box for the name of the new group to be entered. Adding nodes to that group is accomplished with the drag-and-drop feature. Customizable resource grouping promotes greater efficiencies by allowing the administrator to organize, monitor and focus on the areas which are most critical to the business.

Once the resource groups are established, viewing the components and relationships within a particular resource group is straightforward. By selecting a resource group in the left pane of the Topological List View, topology for nodes in that group are displayed. (See Figure 3.) On this display screen, administrators can concentrate on more specific application systems within a data center. Also, if selecting several resource groups, the administrator is able to switch the view back and forth. Connections between node icons are maintained while displaying the group nodes.

Besides having user defined groups the IT Operations Analyzer also supports default groups which are based on hardware types, like Computer, Storage and Network Devices, and also by logical IP Subnets and Storage Fabrics. These default groupings help the user get a jump start on logical and physical groupings in the data center.

Figure 3. Filtering by User Defined Group

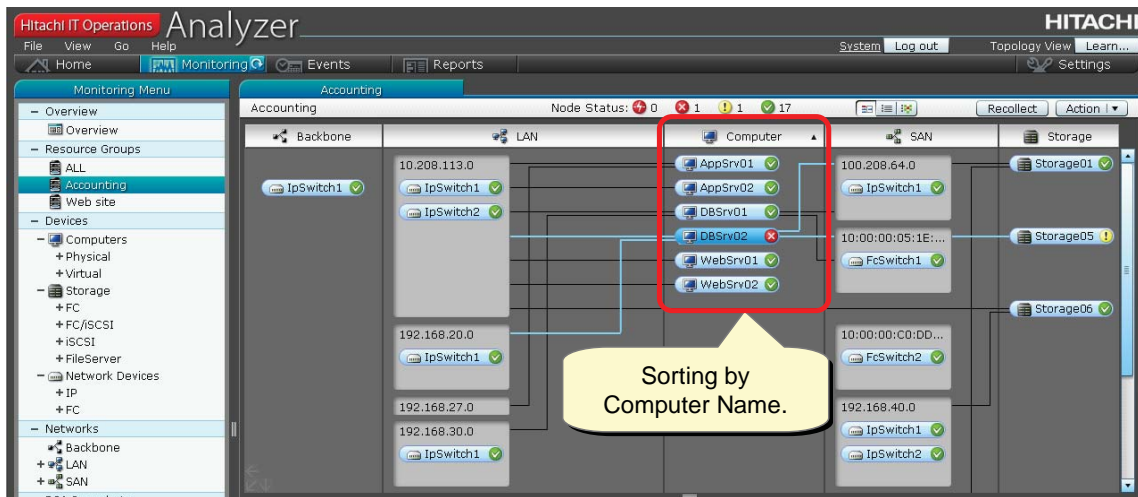


Only icons and connection lines corresponding to system nodes that are contained in the selected resource group are shown.

Node Sorting for Faster Problem Resolution

The Topological List View provides sorting capability on any of the columns. Items in each column can be sorted in alphabetical and numerical order. This feature saves the administrator valuable time when an error occurs by enabling him to quickly find a specific system node when searching problem dependencies or affected nodes. Clicking the column header sorts the nodes in that column while maintaining connections between them. (See Figure 4.)

Figure 4. Sorting by Using Column Header

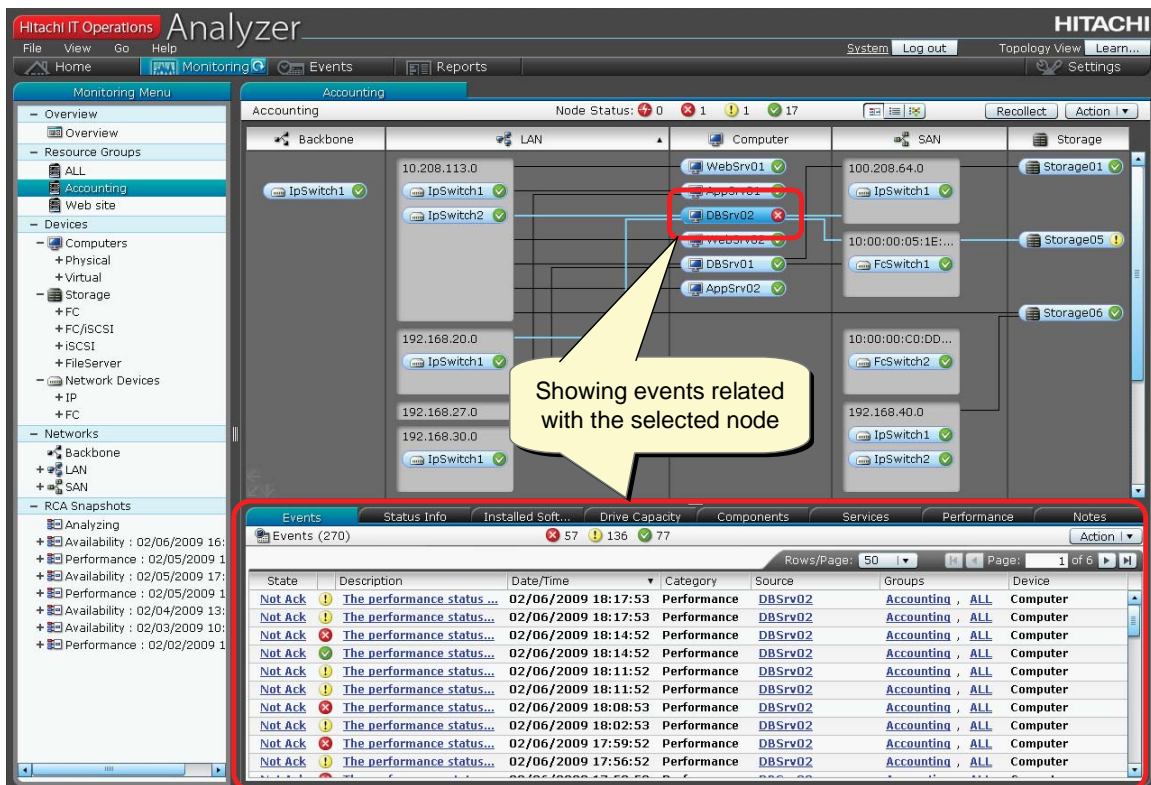


Computer node icons are sorted by computer name by clicking column header. Current sorting key is indicated by a triangle on the column header.

Accessing Detailed Information of Corresponding Components

The Topological List View allows administrators to promptly see the detailed information for a selected node. Displayed in the lower right pane of the screen is a detailed information section, which includes Events, Status, Installed Software, Drive Capacity, Components, Services, Performance and Notes. (See Figure 5.) Administrators are able to click on any of the information tabs to gain even mores within each of the information categories, helping to isolate and analyze key data for better decision making.

Figure 5. Sample Topological List View with Event List



Events related to the selected node are shown.

Conclusion

The Hitachi IT Operations Analyzer software uniquely delivers the Topological List View feature for simplified network path visibility across the data center for up to 250 heterogeneous server, network and storage nodes. Using a single console, the IT generalist is able to gain control over unmanageable complexities and growth with a unified end-to-end topological interface that monitors performance and availability of servers, network LAN and SAN switches and storage devices.

Ideal for the IT generalist, Topological List View combines attributes from both topology graph and table style formats for multiple easy-to-understand view options of node categories, individual nodes, logical connections and dependencies throughout the IT infrastructure. Topological List View employs intuitive functionality such as auto discovery, user defined resource grouping, health status, and sorting and filtering to help administrators accelerate problem resolution and reduce costly downtime. The tool allows administrators to organize and view critical infrastructure in ways that make sense for the business rather than adhering to rigid utilities inherent in the use of other monitoring products. Because the Topology List View orchestrates IT growth in an orderly, vertical manner, administrators are better able to manage the growing infrastructure — and support the business — without adding burden or resources.

Hitachi Data Systems is a world leader in reliability, quality and innovation, with many years of experience serving FORTUNE 500® companies. With the IT Operations Analyzer, midsize and large businesses are able to leverage Hitachi strengths in storage and systems management for smart, simple data center performance and availability monitoring.

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