

AdventNet Service Monitor

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October 1999

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Abstract

The AdventNet Service Monitor is a scalable, high-performance, customizable, service level monitoring tool for pro-active monitoring of service provider networks. It provides a higher level of management of network resources, where the services offered with those resources are directly monitored and managed. It gives service providers the capabilities to offer and manage service-level agreements.

Network Service Providers frequently need to quantify how well their services are doing, to ensure a high level of service to their customers. The AdventNet Service Monitor provides this capability by monitoring and collecting data from a number of sources, and relating this data to services. This gives the service provider immediate access to critical information on the services being offered.

The resources monitored include SNMP and RMON network devices, Internet and Intranet servers, mail servers, and many other systems and applications. In addition, an extensible architecture enables adding new kinds of monitoring and data collection easily. Policy based configuration enables rapid deployment and setup of the entire system. The policies set by the administrator are applied to new and discovered elements to quickly accomplish system configuration tasks.

With a service-level view of their network, Network Service Providers can directly see availability and performance of their network services. This allows finding ways to improve network services and measure the improvements to these services. It also enables the service provider to respond quickly to service outages.

Introduction

With the growth of the Internet and other voice and data networks, businesses have made a shift to placing more business critical functions onto the network. Many enterprises now rely on the network as an essential component to running their businesses, and even as an important competitive edge. They often see tremendous disruption to business operations when the network is unavailable or under-performs. Network service providers are called upon to meet this critical need by offering a higher level of service, and often asked to provide guaranteed levels of service.

Network management systems have traditionally been focused on collecting data from network elements, and providing fault, performance and configuration tools for these individual elements. Most network services, however, are made possible using a diverse set of network elements and resources. It is important to be able to manage the service itself, as well as individual elements and resources. Service-level management addresses this need by piecing together the service story from individual resources. This is very helpful in tracking, modifying, and enhancing the services offered through these resources.

AdventNet Service Monitor is designed to take the service-level view of a service provider network. The goal of any network is to provide services to its users, and for a network service provider this is well understood. Where the service provider needs help, is in automating the task of relating problems in the network elements and resources to service problems. Once this relationship is clear, it becomes easier to isolate and fix service problems. For example, a given customer's Internet service may depend on many resources, including a managed router on his premise, leased access lines to the nearest POP, frame relay virtual connections, and an Internet access router. When the customer's service is affected, it is often a time consuming process to relate individual problems with the service, and resolve them. AdventNet Service Monitor automates this task by monitoring the resources, and tying any resource problems to the customer's service.

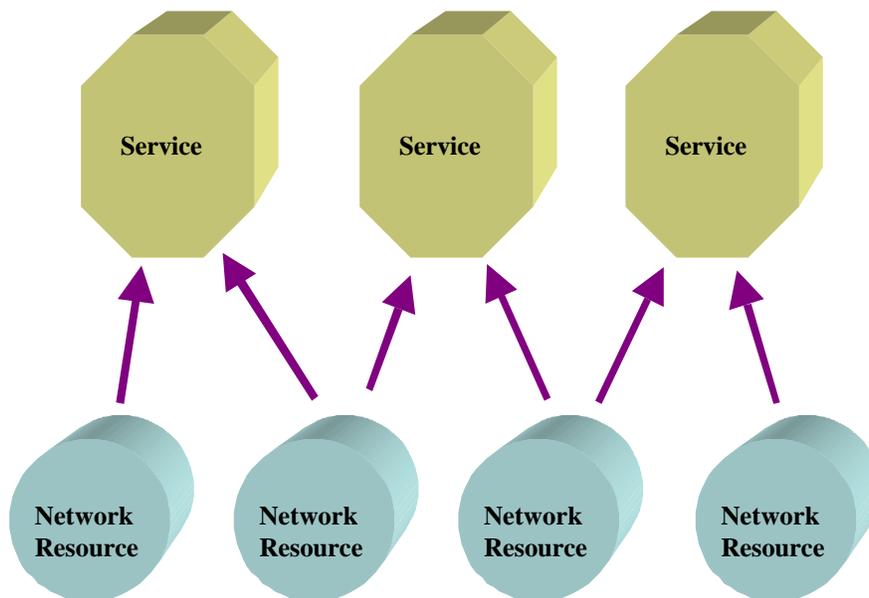


Figure 1: Network Services and Resources

In order to manage services, it is necessary to collect information from a variety of network and system elements that comprise the service. Without this collection, it is not possible to measure the service affected by all these elements. To support this monitoring and data collection, AdventNet Service Monitor provides software probes that collect data from many sources, including routers, RMON probes, web servers, and many other network elements. These probes can be easily extended to handle new kinds of data sources. This extensibility can be used to manage almost any kind of network service resource, and hence the network services.

System Architecture

The AdventNet Service Monitor uses a distributed architecture for maximum scalability. It applies standards-based, off-the-shelf, technology in a flexible way and distributes processing to achieve high throughput and scalability.

At the heart of the AdventNet Service Monitor is a scalable, high-performance, network

management server, the AdventNet Web NMS. This server integrates many network management functions and technologies. The management functions include event management, discovery, network topology, network maps, and performance monitoring. The server supports many standard protocols, like RMON, SNMP, JDBC, RMI, CORBA and other protocols.

The AdventNet Service Monitor allows using software probes centrally and at remote locations to maximize performance, and reduce network traffic. These probes are optimized to monitor and collect information from a variety of sources, including network devices, computer systems, web servers, mail servers, databases and applications. The probes are configured to reliably send processed information to the management server, using standard network protocols.

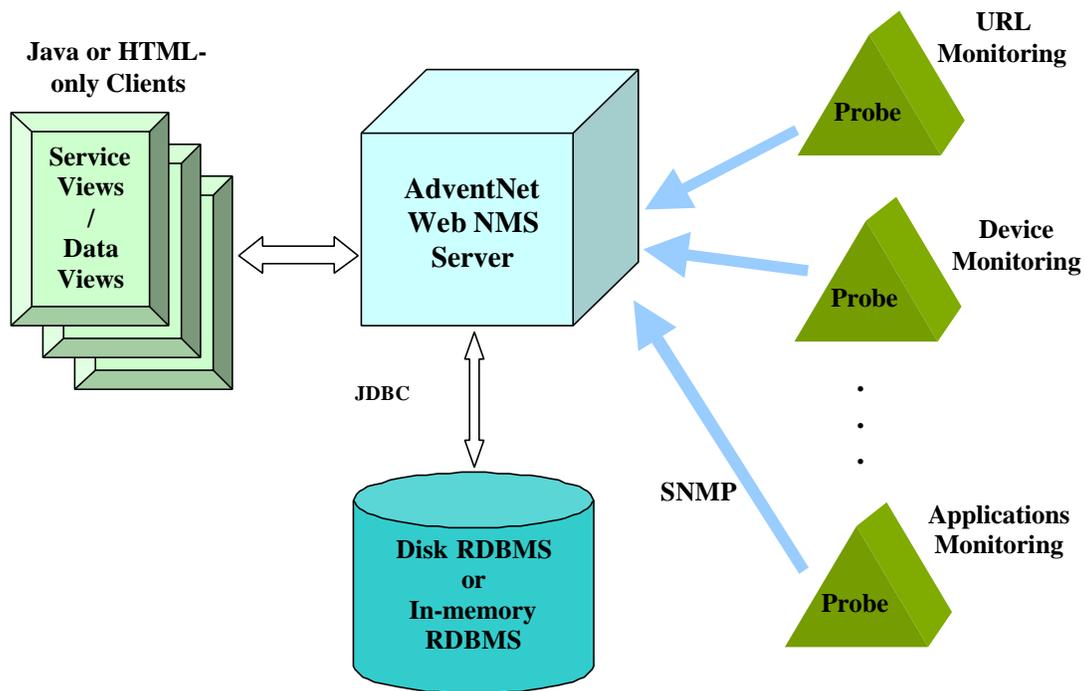


Figure 2: AdventNet Service Monitor Architecture

One of the important aspects of implementing a management solution is configuring the data collection process, which can be time-consuming without good tools. The AdventNet Service Monitor includes a policy engine for scalable administration of the server and probes. The probes are configured using flexible policies so probes are setup automatically when new types of devices are added onto the network and discovered.

Using Resource and Service profiles, the individual software probes can be configured to setup monitoring and data collection for each network resource. This allows monitoring a service from any chosen points on the network, which are controlled by, or accessible to, the service provider. These capabilities allow rapid deployment of the server and probes without significant initial investment of time or money.

Product Features

- **Service Views:** AdventNet Service Monitor takes a service-level view of network management, and provides operators and managers with tools to manage the service as a whole, as opposed to individual network elements or resources. A key component of this capability is service views, that show how exactly each service is doing, and quantitative measures of service levels. This enables better management of a customer's service by operators and managers.
- **Scalable Alarm and Event Management:** For any network service provider, the need to handle a large volume of events and collected data is critical to keeping the network well managed. Large networks already generate a huge volume of alarms and data, while small networks need to be well positioned when the inevitable growth occurs. The AdventNet Service Monitor allows the service provider the flexibility to start with small investment in hardware and software and easily scale with the growth of his network. One of the key features of the AdventNet Service Monitor is the scaling of the event processing capabilities. It supports very high processing rates using distribution. In cases where the performance is limited by the database access performance, AdventNet Service Monitor supports very efficient ways of getting a lot of data into the database. It also supports third-party in-memory databases to speed event processing when disk-bound databases do not meet the need.
- **Extensible Monitor/Probe architecture:** The AdventNet Service Monitor uses probes to monitor and collect data from many different managed elements. In order to monitor new kinds of services and any existing services not covered by standard probe capabilities, the probe architecture allows for adding new monitoring and data gathering functions. This allows service providers and AdventNet to easily add support for any desired monitoring and data collection. Using external probes to collect data makes the event processing more scalable. AdventNet Service Monitor can support a much wider range of data collection this way, e.g. probes for collecting the syslog data of a Unix machine. Additionally, it makes the processing more distributed, by allowing some of the event processing and filtering to be performed on the probe. This is an architecture that is secure, extensible, and is easy to create new kinds of monitoring and data collection.
- **Event Correlation:** Managing network events is a non-trivial task for networks of any size. For many networks this quickly becomes an unmanageable process given the current network management tools. Network administrators soon decide that keeping track of the volume of events, and picking out what's important is simply too much effort. Valuable information that would allow a network manager to be pro-active gets lost in the flood of events. AdventNet Service Monitor offers a better solution. Using simple techniques, that are easy to understand and use, AdventNet Service Monitor can be configured to filter and correlate events to provide each manager with information important to him or her. The fault management functions ensure that problems are tracked until they are fixed.
- **URL Status and Performance Monitoring:** In addition to monitoring network elements with ICMP, SNMP, and RMON, special application level monitors and data collectors have been implemented. An important example is for URL status and performance monitoring, which allows the management of Internet and Intranet web sites.

- **Application Monitoring:** In addition to the monitoring of URLs of web sites, monitors for mail servers, databases, and specific web server logs have also been implemented.
- **Alarm Management Policies:** To allow flexible processing of alarms and events in the system, AdventNet Service Monitor provides policies that can be configured by the administrators. These policies can be used to add specific features like escalation, launching trouble tickets, customer notifications, and other actions desired by administrators.
- **Reliable SNMP traps:** While supporting industry-standard protocols between probes and servers, and servers and clients, the architecture does not sacrifice reliability. In order to ensure the server receives all messages from probes, a reliable trap mechanism has been implemented using standard SNMP traps. This ensures that no messages from the probes to the server are missed, even under heavy load conditions. The reliable trap capability is used between the probe and the NMS and the event transport is standards based. It provides a mechanism for throttling the probes when the NMS is overloaded. This way we have better behaved servers when the load increases.
- **Industry Standard MIB Support:** The implementation of monitoring and data collection by the probes use industry standard MIBs defined by the IETF, rather than proprietary mechanisms to do the monitoring.
- **Configuration Policies:** To simplify administration, and provide quicker return on investment of time, a policy-based approach to system configuration is supported. Using the configuration policies, administration of a large network is more easily accomplished.
- **LDAP Directory based access control:** Fine grained access control to different operations and views can be controlled using LDAP directories. The server checks the directory for access rights for a given user and allows access only when permitted. The tree of operations and permissible views is added in the directory, and this allows the administrator to allocate access rights to individual users in a flexible manner.
- **Flexible RDBMS Storage:** The storage of event, alarm, polling, report, and other data is in relational database tables. In addition to Oracle, MySQL, and other relational databases, in-memory commercial databases are also supported. In-memory databases provide higher transaction performance, which is useful for handling very high event rates for sustained periods.
- **Choice of Client Access:** The user interface is available through standard web browsers, and users can choose between using HTML and using Java to view the information. Java-based clients that run outside the web browser can also be installed and used on the client systems.

Product Benefits

AdventNet Service Monitor gives the service provider a significant advantage in delivering quality services to its customers. Some of the important benefits are listed below.

- The service provider gains a comprehensive real-time view of each service that needs to be

monitored. Both availability and performance of the service can be readily viewed in summary or detailed form.

- ❑ Administrators and operators can get customized views of network services availability and performance.
- ❑ The fault management functions provide tracking of network problems, to ensure that problems are reported and tracked to resolution.
- ❑ Administrators and operators can get customized views of alarm lists, and work on specific subsets of problems that they need to manage, and quickly switch to other views and tasks as well.
- ❑ The service provider can offer, quantify and manage, service-level agreements for each of its network services.
- ❑ The service provider gets a very useful set of network management tools bundled with AdventNet Service Monitor for isolating and fixing problems on network devices.
- ❑ The service provider gets the ability to quickly track down the cause of a service problem, by finding the affected network resources using the AdventNet Service Monitor tools.
- ❑ The service provider operations staff can access the AdventNet Service Monitor capabilities in flexible ways, and from any standard web browser.