NETWORK INVENTORY COLLECTION SYSTEM FOR MANAGING AND MONITORING INFORMATION TECHNOLOGY ASSET

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ABSTRACT

The growth of Information Technology investment is predicted to develop rapidly in the next few years. This will urge the need of a tool to help IT managers to manage and monitor their asset frequently. IT asset management is a part of network management with its scopes are monitoring, controlling, and planning the existing source and components. In this paper, we will show that managing and monitoring the IT asset, including configuration system, devices, storage media, interfaces and installed applications, can be done thoroughly by utilizing the simple network management protocol (SNMP).

Keywords: inventory, management, monitor, snmp.

1 INTRODUCTION

The development of Information Technology in Indonesia is growing fast. It can be seen from the increase of the number hardware and software investment by government or private institutions. Moreover, it is predicted that the Information Technology investment will reach up to 30% in the next three years [1].

According to Subiyantoro [2], Information Technology sector is an important development for the economy. This recently has been strengthened by Indonesian Government through the declaration of *National Information & Communication Technology* (ICT) *Committee* in December 2006.

Amid the euphoria of Information Technology utilization, most of the decision makers have difficulty in allocating budget for Information Technology investment. Even though there are plenty of analysis methods, most of institutions focuses on accountancy based analysis like *cost-benefit analysis* and *return on investment* [3].

In this paper, we introduce a new method for collecting a number of assets, i.e. both hardware and software managed by IT manager. The method is based on the Simple Network Management Protocol (SNMP) which is running on most of current Local Area Network (LAN) as well as Wide Area Network (WAN) that based on TCP/IP protocol. The creation of SNMP is fostered by the need to help corporations to more adequately manage their network infrastructures [4].

In recent years, the network management community has investigated the use of more advance technologies, including Web Services (WS) [5] and Peer-to-Peer (P2P) distribution [6]. It can be shown by some investigations that these technologies can significantly improve the network management process [7]. Examples of this improvement include the ability of building more sophisticated management systems through Web Services composition, and the possibility to have more scalable and highly available management solutions using P2P systems. All of them are built as an extension the SNMP Protocol.

We focus our investigation to the utilization of SNMP protocol to absorb information about network infrastructure component, including hardware and software installed and managed in a LAN. We have built a system called Network Inventory Collection System (NICS) to gather a set of data representing a number of IT investment owned by a corporate institution.

The remaining of the paper is organized as follows. Section 2 describes the model and the design of the NICS system as well as exploitation of SNMP protocol to achieve our goal. The output of the NICS system is explained and analyzed in Section 3. Finally, we will draw conclusion in Section 4.

2 MODEL, ANALYSIS, DESIGN, AND IMPLEMENTATION

In this section, we will describe the model of the NICS system and the Unified Modeling Language (UML) design of our NICS application in term of use case diagram.

2.1 Model of The NICS System

In general, our system can be described as in Figure 1. NICS application server has a main task to

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collect data from Workstation/Server and Network Devices distributed through the local area network. In order that the data comprising hardware and software components is able to be absorbed by NICS application server, it is mandatory for the Workstation/Server and Network Devices to have SNMP agent installed. The data is kept by the SNMP agent in a Management Information Based (MIB). Later, the NICS application system will query the data from the MIB from each computer.

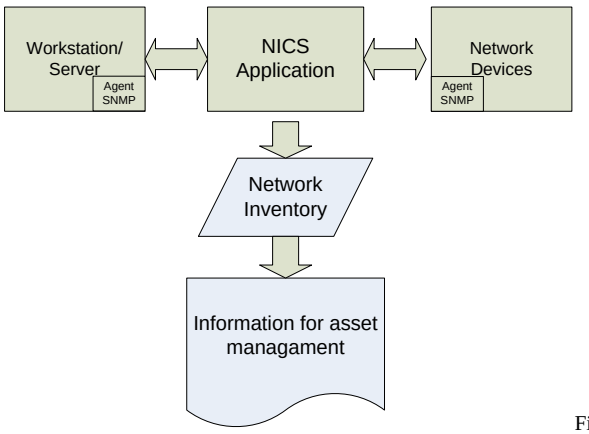

Figure 1. Diagram block of the Network Inventory Collection System (NICS)

NICS application also has the duty to store the data in a database system and makes it available for asset management and monitoring purposes.

The model of implementation of the NICS system is pictured in Figure 2.

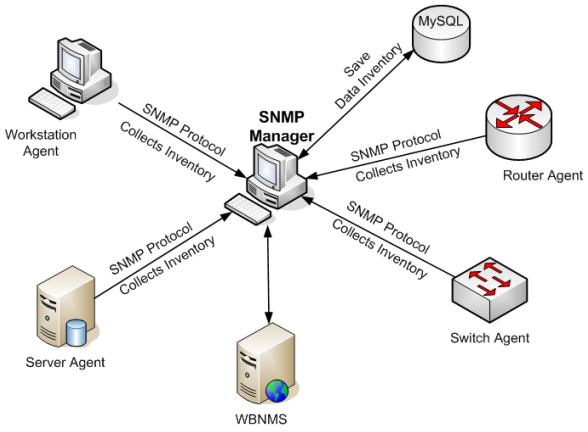

Figure 2. Implementation model of the NICS system

As can be seen from Figure 2, the NICS application is installed inside in the SNMP Manager, while each computer/server and network devices have SNMP agent run on their system. SNMP manager keep the query data in MySQL server.

SNMP manager definitely will not query the whole object in the MIB. Instead, we only query data which will be able to figure out the asset of IT component installed in a LAN. For that purpose, we have defined a set of SNMP object identification (OID) as it is shown in Table 1.

To represent the asset of IT component installed in a LAN of a corporate institution, we chose 5 (five) objects which are: system, interfaces, devices, storage, and installed software. Description of each object is explained in Table 1.

Table 1. OID and Object Name

OID	Object Name	Information
1.3.6.1.2.1.1.	System	*sysDescr, sysObjectID, sysContact, sysName, sysLocation, sysServices*
1.3.6.1.2.1.2.2.1	Interfaces	*InterfaceIndex, InterfaceDesc, InterfaceType, InterfaceMTU, InterfaceSpeed, InterfaceMAC, InterfaceInOcktet, InterfaceOutOcktet*
1.3.6.1.2.1.25.3	Devices	*DeviceIndex, DeviceType, DeviceDesc DeviceStatus.*
1.3.6.1.2.1.25.2	Storage	*StorageIndex, StorageType, StorageDesc, StorageAlocationUnit, StorageSize, StorageUsed.*
1.3.6.1.2.1.25.6	Installed software	*InstallSoftIndex, InstallSoftDesc, InstallSoftType, InstallSoftUpTime*

2.2 Use Case Diagram of The NICS Application

Figure 3 shows a graphical overview of the functionality provided by a NICS system in term of actors, their goal (represented by use case) and any dependencies between those use cases.

As can be seen from the figure, *User* is an actor to represent someone who has access to use the NICS system. Once the NICS application executed, the NICS application will scan through the whole network by utilizing SNMP Protocol. This process is handled by use case MIBs search and MIBs exploration. *SNMP agent* is also an actor that searches detailed information

of the workstation/server and network devices and keeps the information in the MIB. Data which contains information about hardware and software component of each computer/server and network devices, as a result of MIB search, is then filtered and collected by the NICS application in its database and is available for the user.

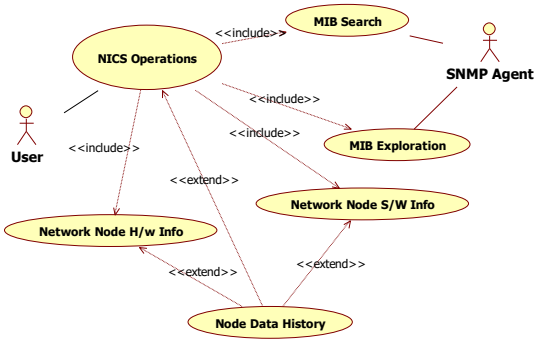

Figure 3. Use Case diagram of the NICS application.

Database design of the NICS and relation of each table are shown in Figure 4.

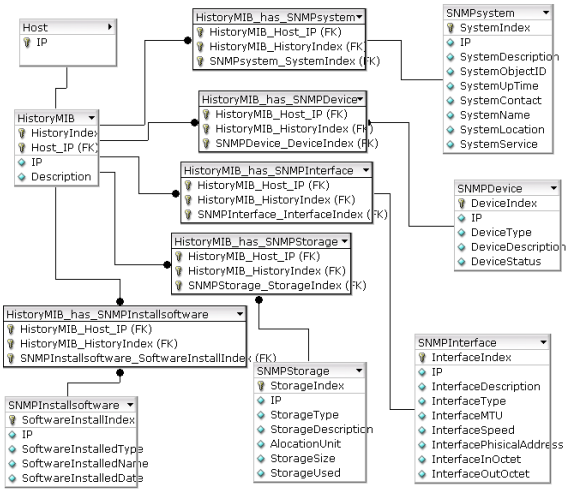

Figure 4. Database design of the NICS.

3 RESULT

In this section we will show some output forms of the NICS application comprising of 5 (five) objects that have been defined in the model. Figure 5 is a result of query to the OID 1.3.6.1.2.1.1. which represents description of the system, such as processor type, owner of the workstation, up-time, etc.

SysDesc	SysObjectID	SysUpTime	SysContact	SysName	SysLocation	SysService
Hardware: x86 Family 6 Model 14 Stepping 12 AT/AT COMPATIBLE - Software: Windows 2000 Version 5.1 (Build 2600 Multiprocessor Free)	1.3.6.1.4.1.311.1.1.3.1.1	0:0:26		ANJIK		76

Figure 5. Query result of object: *system*

The query result of the interface description is shown in Figure 6, including interface type, maximum speed of the interface, current traffic in and out.

ifDesc	ifType	ifMtu	ifSpeed	ifInOctets	ifOutOctects
MS TCP Loopback interface	24	1520	10000000	1526438	1526438
SiS191 Ethernet Controller - Packet Scheduler Miniport	6	1500	100000000	53410081	4852478

Figure 6. Query result of object: *interface*

The third trial query that should be done by the NICS system is description about device connected to the workstation/server. For example, the query result that contains description about device can be seen in Figure 7.

12 items found, displaying 1 to 10.
[First/Prev] **1**, 2 [Next/Last]

Device Type	Device Desciption	Device Status
Disk Storage	D:/	unknown
Disk Storage	Fixed Disk	Running
Keyboard	IBM enhanced (101- or 102-key) keyboard, Subtype=(0)	Running
Network	MS TCP Loopback interface	unknown
Network	SiS191 Ethernet Controller - Packet Scheduler Miniport	unknown
Pointing	5-Buttons (with wheel)	Running
Printer	Send To Microsoft OneNote Driver	Running
Printer	HP PSC 1400 series	Running
Printer	HP Deskjet D1300 series	Running
Printer	Adobe PDF Converter	Running

Figure 7. Query result of object: *Devices*

The figure shows that all devices that are connected to a workstation/server can be detected by the NICS system. This information will be very useful for IT managers to manage and to estimate the number of asset reside in their institution.

Fourthly, we will show the query result of object *Storage* in Figure 8. The figure shows that information about storage capacity as well as the usage of the storage can be provided by NICS system. In Figure 9 we show that monitoring to a certain workstation/ server or network devices can be done easily by comparing the capacity and the usage of the storage.

Storage Type	Storage Desciption	Storage Size, MB	Used, MB
Compact Disk	D:/	0.0	0.0
Fixed Disk	C:/ Label: Serial Number 34204d6f	29981.672	16753.938
Fixed Disk	E:/ Label:data Serial Number 14a85b16	36279.6	7796.3438
Physical Memory	Physical Memory	893.0625	543.4375
RAM Memory	Memory	893.09766	0.0
Virtual Memory	Virtual Memory	2162.0625	483.25

Figure 8. Query result of object: *Storage*

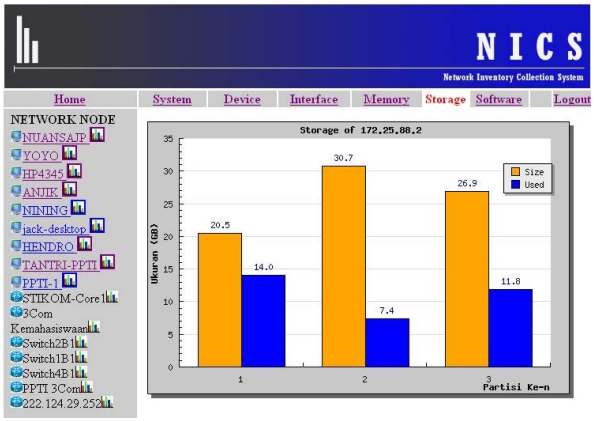

Figure 9. Monitoring of storage capacity and usage

Lastly, the NICS system is also able to provide information about installed application software as well as the operating system. The query result of the application software is shown in Figure 10.

175 items found, displaying 1 to 10.
[First/Prev] **1**, 2, 3, 4, 5, 6, 7, 8 [Next/Last]

SWInstalledType	SWInstalledName	SWInstalledDate
Application	3D-Album PicturePro Platinum	26/6/2008 15:52:24
Application	Adobe Flash Player ActiveX	6/6/2008 10:53:30
Application	Cain & Abel v3.8	27/5/2008 11:45:50
Application	Corel Applications	4/6/2008 10:57:22
Application	CrypTool 1.4.10	28/5/2008 11:27:52
Application	EditPlus 2	29/5/2008 9:43:2
Application	Microsoft Office Enterprise 2007	26/5/2008 12:24:34
Application	Expert Choice 11	6/7/2008 14:15:56
Application	Fedora Transformation Pack 1.0	28/5/2008 16:51:44
Application	Gel RC13a	24/6/2008 13:58:54

Figure 8. Query result of object: *Installed Software*

4 CONCLUSION AND DISCUSSION

We have shown that network management system that we have proposed in this paper is able do managing and monitoring process of all IT assets in a corporate institution that has LAN installed. By employing SNMP protocol, we were able to develop a set of information useful for predicting the number of IT assets automatically. If this data is kept and analyzed for several years, an IT manager will also be able to predict the number of investment that should be done in the next few years.

The Simple Network Management Protocol (SNMP) is still the *the facto* TCP/IP network management solution. However, we also realize that this solution is not sufficient when it is applied to the current computer networks that are connected to the Internet where it became a fragmented network with the introduction of NATs and firewalls. This will prevent the network administrators to find and access devices from other remote administrative domains. To accommodate this issue, in the future, we plan to introduce the use of web services and peer-to-peer technology in our NICS system.

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