Client-Server Hardware Detection Tool

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Abstract: - The paper describes the progress of hardware detection tool in the MS Windows operating system. The main goal was to create client-server software, which monitors hardware configuration of individual PC stations in the local network. The developed software collects information about workstation hardware from Windows Management Instrumentation. The hardware configurations are stored on the server in the database. The administrator has an overview of current hardware configuration of each computer and of history of their changes. Detailed overview of configurations is accessible on-line via web interface.

Key-Words: Hardware detection, network, client-server, database

1 Introduction

Operating system with Plug-n-Play technology can correctly detect the hardware, find and install the appropriate drivers for it, assign it a source and placing it in service to readiness to use. Everything does without user intervention or with only minimal use of his. Details of the process of hardware detection, install the appropriate drivers and run the device is described in [1].

The most important result of this contribution is software for computer network administrators. It consists of three parts:

- client stations and pursuing changes in the hardware configuration
- server communicating with these clients over the network
- database, where collected data are stored

Software provides administrators better supervision of computer hardware on the network. The main task of the application should be periodic monitoring hardware configuration of individual computers. If a change is detected, server saves the current configuration together with the time to the database. Thanks to the manager to have an overview of not only the latest configuration, but also the history of changes. On the Internet there are many similar projects, but are overwhelmingly developed commercially. Created application was created to serve the Faculty of Applied Informatics, TBU in Zlín, and there is also used [6].

2 WMI

The software described below collects information about workstation hardware from Windows Management Instrumentation. Windows Management Instrumentation (WMI) is an infrastructure management system that supports Windows monitor and manage system resources using commonly available interface provides logically organized and consistent model of operations, configuration and status Windows components [2]. Support for WMI was added to Windows NT 4 Service Pack 4 package. This is also provided in Windows 95 OSR2 and Windows 98 and Windows Millennium in all later versions.

WMI includes a repository of objects, which is a database object definitions, and includes a tool WMI Object Manager, which manages the collection of objects and object manipulation in repository and gathers information from WMI providers. Service providers WMI service provides communication between WMI and components of the operating system, applications and other systems. System Registry Provider receives such information from the registry, while SNMP provider provides data and events from SNMP devices. Providers provide information about their components and can potentially provide methods for working with components, properties that can be set or events that may warn the user to changes in components.

Windows programs use to communicate directly with the WMI COM API, which is the primary management interface. Other APIs are layered over

the API COM adapter and include an Open Database Connectivity (ODBC). Database developer uses WMI ODBC adapter to insert references to data objects in the database. Subsequently, a developer can easily generate reports with database queries containing data based on WMI. ActiveX controls, WMI support additional layer API. Web developers use ActiveX controls to build Web interfaces to WMI data. Another API for WMI Scripting administration is useful in scripts applications and programming languages. WMI scripting support is available for all programming languages offered by Microsoft. Cooperation of C# with WMI for getting information about your computer hardware is nicely described in [7]. WMI provides a unified model of access. See the figure 1.
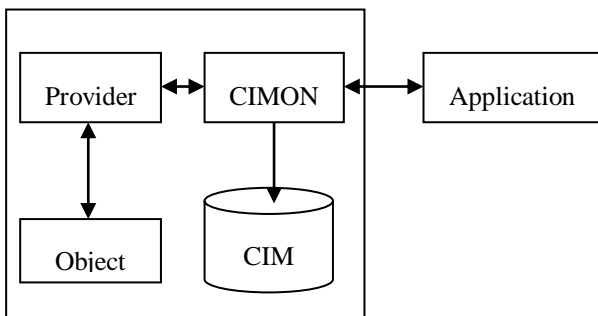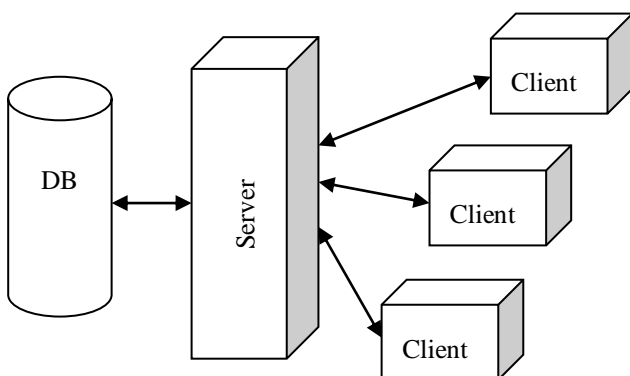

Fig. 1. Application communication with WMI

Fig. 2. Basic principle

3 Hardware Detection tool

The program (client) is installed on all computers and runs automatically at operating system start-up. Program detects the current hardware configuration. Of any hardware change is detected than sends a message to the server. Server expects messages from clients. In the case of receiving the data contained in the report, the hardware change is stored in the database. The Fig. 2 shows basic principle of the application.

3.1 Client

Program designed for the workstations has the task to start to check the current hardware configuration computer on which it was launched. Automatic startup of this program is by adding value to the following registry key in the MS Windows:

HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run

The client startup and establish a network connection to the server [3], [4]. If the server is correctly identified, it sends the client the date and time of its launch. These data stored in the database server. With their help, the administrator can determine if there the program is running on a station and if the station is able to connect to server.

Now the program finds the current hardware configuration and request information from the database server on the previous saved configuration. Information on the current configuration is compared with previous data sent to the server. Only if there is a change, the server sends the client an overview of the current configuration that can be stored in a database. In any case, than it terminates a network connection and consequently his work.

3.2 Server

Server performs the function of a program written for Windows as a service. This service is set to an automatic run on boot-up and ends when computer shutdown. The computer, on which the service will be installed, should be used as a server. Database MySQL server can be running on the same machine. Database structure and table relations are shown on the Fig. 3. Service as soon as it begins to start
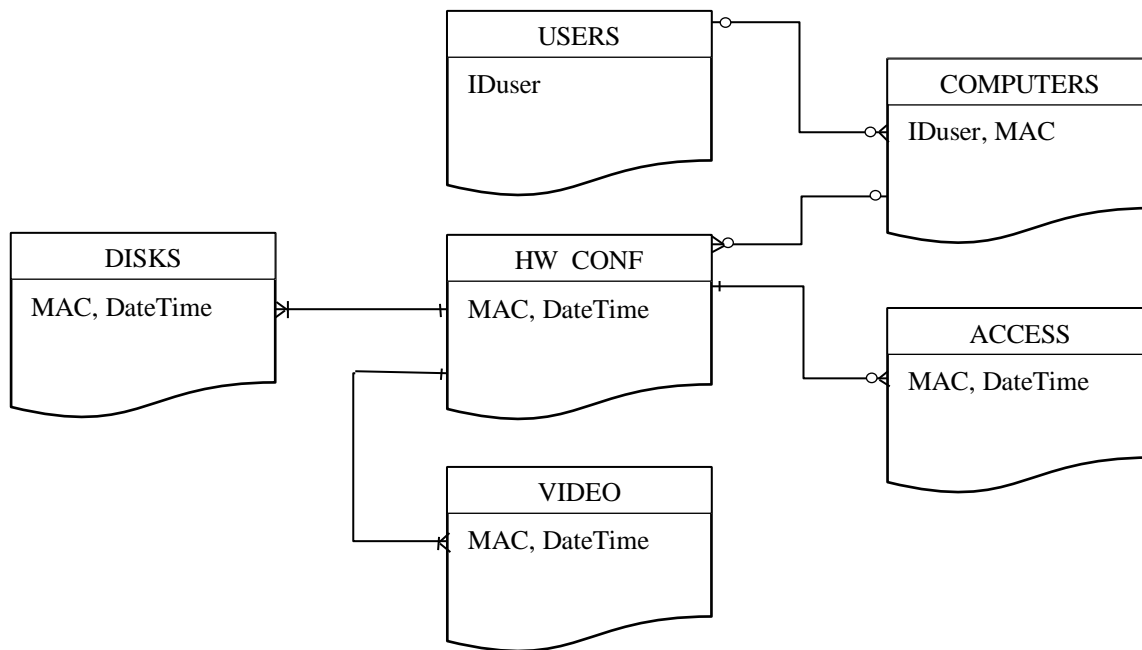
Fig. 3.: Database structure and table relations

listening on the specified port. If this port is someone connects, it sends a message service, which is identified. If the client accepts this identification, the server sends the date and time of its launch. After receiving this information, the service connects to the database server and stores the data into the appropriate table. The outcome will inform the client operations. Then comes from the client application to send data previously stored configuration. The service will again contact the database server and sends his request, which has resulted in information about the configuration of the station. These previously stored data service sends the client to be able to compare the current configuration. If the client finds a change, the client receives a service message with the current hardware configuration. Again there is a connection service to the database server to save the new configuration. Client service is again informed of the outcome of this command. Here network communication with the client end, as the client closes connection. The service waits for the connection of another client.

3.3 Interface
The application has a single interface for communication with the user, it is a web application. Allows administrators to view and edit records of all users and computers stored in the

Database (Fig. 4). These are a few websites interconnected links whose content is largely generated server-side script. Depending on which button the user clicks by the mouse, a page with some information and also to carry out orders placed the script on this page. Thus it is possible for example to view and edit records of all users in the system, add a new user, assign it a free computer, or delete records on the run station earlier than a defined number of days.

Each computer can be assigned to use one faculty staff. Site allows creating, editing and deleting records of users. User list is available from any other site users through the menu. Each user can be in addition identified by name and surname, telephone, mobile, e-mail address and room number where located. Furthermore, the user can be assigned one or more computers. In this case the user is listed in the statement more than once, each in connection with another computer.

4 Conclusion
Before the technology Plug and Play appeared, it was impossible to speak about the hardware detection. The user had to know which device he was adding into the system, where the most suitable drivers were, which sources it needs and how to install it all correctly so that the new device could be used in the system. Only after the technology Plug

PC1035			Vlastník	IBM
25.2.2009 9:55:31			Doména	NIS
			Celkem RAM	0,242 GB
Operační systém			Procesor	
Jméno	Microsoft Windows 2000 Professional C:/WINNT|/Device/Harddisk0/ Partition1		Výrobce	GenuineIntel
Verze	5.0.2195		Typ	Intel(R) Celeron(R) CPU 2.66GHz
Podverze	Service Pack 4		Popis	x86 Family 15 Model 4 Stepping 9
Seriové číslo	52792-270-5213721-09771		Počet (jader)	1
Základní deska			Síť	
Výrobce	Hewlett-Packard		IP adresa	10.200.101.35
Název	09E8h		MAC adresa	00:17:A4:16:B9:97
Verze			Adaptér	[00000005] Broadcom NetXtreme Gigabit Ethernet
Disk(y)			Video adaptér(y)	
Model pevného disku	ST340014AS		Model grafické karty	Intel(R) 82915G/GV/910GL Express Chipset Family
Připojný bod	\\.\PHYSICALDRIVE0		Velikost osazené paměti	64,000 MB
Kapacita disku	37,268 GB		Videoprocesor	Intel(R) 82915G/GV/910GL Express Chipset

Fig. 4.: Application web interface – HW details

and Play was introduced, the hardware installation was made much easier for users [5]. It is possible to approach information gained by the operating system when detecting the hardware devices by means of the service WMI – Windows Management Instrumentation. WMI provides a unified interface for collecting information and providing information about the system. The application consists of two basic components and web interface. A client monitors changes of hardware configuration on the workstation. The client gains information about current configuration thanks to WMI. Server communicates with individual clients and in case that a client discovers a changes, the client sends the data about current configuration to the server. The server, then, saves the data into the database. The administrator has an overview of current hardware configuration of each computer and of history of their changes, which has been the prime requirement.

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