WMIC-Based Technology Server Network Management Software Design

Hui Peng
Computer Intelligence and Intelligent Engineering
Guangxi Vocational & Technical Institute of Industry
Nanning, GuangXi Province, China
ph2910116@sina.com

Yao Wang
Computer Intelligence and Intelligent Engineering
Guangdong University of Technology
Guangzhou, Guangdong Province, China
huananwangyao@163.com

***Abstract* - Using the WMIC technology of Windows, through whose API to access and manage Windows resources and to obtain useful parameters of network management. You can quickly identify various of server monitoring parameters. At the same time this paper combine with JFREECHART technology for drawing the chart after calculation monitoring data. This paper put forward WMIC-based technology to obtain the data and application which comes from server system monitored .Experimental results show that data collection results consistent of the results collected by leading companies software.**

Index Terms – WMI;WMIC;JFREECHART;Network Management

I. INTRODUCTION

With the popularity of information, In order to improve companies core competitiveness, they invest in a lot of manpower and material resources to build their network. Not only did they are concerned about whether the system can run smoothly, but also they worried about capabilities of server management, because of multiple servers of each company come from different company or different models of same company, if get these servers which distributed in different nodes and had different brands together into a network management platform to manage, it is no doubt that this method play an important role in relieving the burden of the network operations members.

The WMIC extensions to WMI which provide a batch command script from the command line interface and implementation of system management support. Before the appearance of the WMIC, if you want to manage WMI system, WMI must use some specialized applications, such as : using WMI script programming API, or using a tool like CIM Studio[1].If you are not familiar with C++ programming language, not like a scripting language like VBScript and WMI namespace, or do not have the basic knowledge, it is very hard to use the WMI management system. WMIC alias mechanism has changed this situation through the WMI namespace and has provided a powerful, friendly command line interface[2]. By apply in JFREECHART approach shows the results to the user, formed on B / S structure of the fat client, thin server systems. In order to reduce the burden on the server, improve the efficiency of the sever network management. Therefore, A solution based on concept of link WMIC with JFREECHART is proposed in this paper to improve the remote server managing system, WMIC command statement is so powerful , low-cost and simple that enterprises can realize remote managing sever system quickly.

A. WMI Principle

WMI (Windows Management Instruction)[3] is the Microsoft implementation of Web-Based Enterprise Management (WBEM), and it has been an integral component of the Windows operating system since Windows 2000. WMI is an object-oriented repository that provides data about managed hardware and software. Central to WMI is the Common Information Model Object Manager (CIMOM) and a storage area called the CIM[4]repository. CIMOM offers a unified programming interface for accessing data stored in the repository. CIMOM also offers a plug-in model for providers that expose objects to be managed. The operating system includes a number of providers allowing access to and management of hardware drivers, event logs, registry keys, performance counters, network settings, threads, processes, and so on. Fig 1 is expressed by WMI architecture diagram.

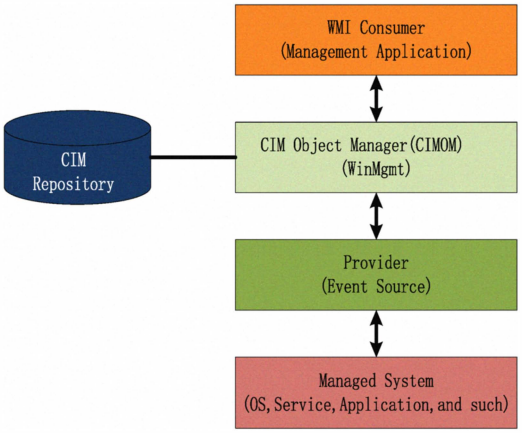

Fig 1 WMI Architecture

B. WMIC Technology

WMIC[5] extends WMI for operation from several command-line interfaces and through batch scripts. Before WMIC, you used WMI-based applications (such as SMS), the WMI Scripting API, or tools such as CIM Studio to manage WMI-enabled computers. Without a firm grasp on a programming language such as C++ or a scripting language

978-1-4244-7968-9/10/$26.00 ©2010 IEEE

such as VBScript and a basic understanding of the WMI namespace, do-it-yourself systems management with WMI was difficult. WMIC changes this situation by giving you a powerful, user-friendly interface to the WMI namespace. WMIC is more intuitive than WMI, in large part because of aliases. Aliases take simple commands that you enter at the command line, then act upon the WMI namespace in a predefined way. Fig 2 is show the relationship between WMIC and Windows Resources.

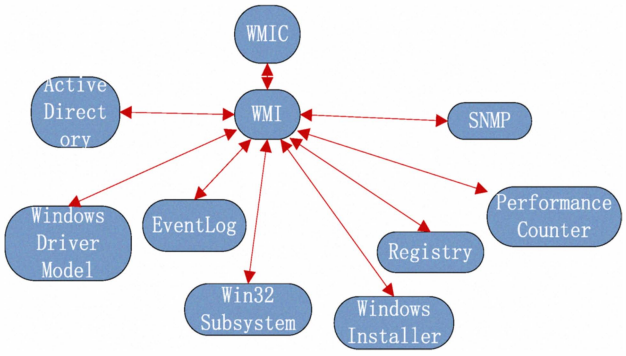

Fig 2 the relationship between WMIC and Windows Resources.

C. JFREECHART Principle

JFREECHART is a free 100% Java chart library that makes it easy for developers to display professional quality charts in their applications. JFREECHART 's extensive feature set includes:

1) A consistent and well-documented API, supporting a wide range of chart types.

2) A flexible design that is easy to extend, and targets both server-side and client-side applications.

3) Support for many output types, including Swing components, image files (including PNG and JPEG), and vector graphics file formats (including PDF, EPS and SVG).

D. JFREECHART Application

JFREECHART mainly be used to develops and produces all kinds of graphs. These graphs including: Cake chart, stick plot (ordinary stick plot as well as storehouse stick plot) ,line chart and so on. JFREECHART realizes the drawing function through the following core's object class: JFREECHART, XXXXXDataset, XXXXXPlot, XXXXXAxis, XXXXXUrlGenerator. No matter what chart you create, JFREECHART follows these step:

1) To establish Dataset. All the data saved in Dataset.

2) To establish JFREECHART. Put the data of dataset into JFREECHART.

3) To establish attributes of JFREECHART. This step may be omitted. You can use the JFREECHART default attributes of JFREECHART.

4) Show the page picture.

JFREECHART design is not very good in his project, create graph will use massive Factory method, this may simplify the code of foundation graph object, but it is a very troublesome thing for the programmer to expand one kind of new graph in project. Although had many problems, JFREECHART was still a very outstanding tool.

II. BASED ON WMIC AND JFREECHART REALIZES NETWORK MANAGEMENT SYSTEM

The principle of the supervisory system realized is that monitors the equipment in fixed time to obtain the data and each condition of monitoring equipment, and demonstrate the results. In this article, at first the system obtains some data through the monitoring procedure and saves these data to database immediately. After, through the JDBC visit database and show the renewed data by JFREECHART. In this system, the prime task is divided three parts to complete: Gain the system basic information; the data storage ;demonstrate the data change come from database by JFREECHART.

WMI supports multiple programming languages to access[6],including VBScript, C++, Delphi and other high-level language, based on rapid implementation and simple language, we use the WMIC command line to achieve [7].

1) The operation of remoter connection is as follows:

wmic:root\cli>/node: "objective IP" /USER ：" domain" \username

Enter password: xxxxxxxx

2) To achieve disk management

wmic:root\cli>diskdrive get caption, name, size, description// Read the disk parameters

The result shown in Fig 3

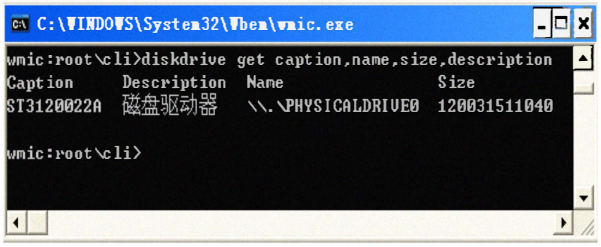

Fig 3 Show the result of reading the disk parameters

At the same time to present information clearly,WMIC results will be redirected to the HTML in Fig 4

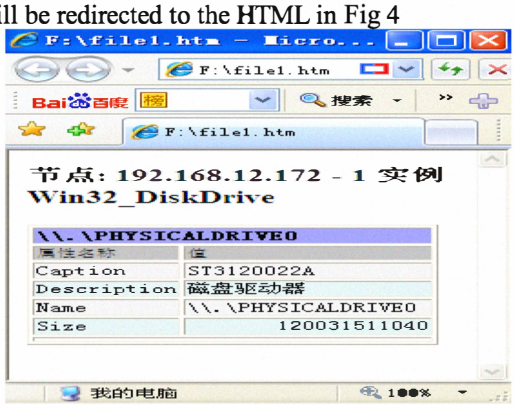

Fig 4 WMIC redirected to the HTML of the results

III. DYNAMIC SHOW THE RESULT BY JFREECHART

Now, we have an example of remaining disk .At first, you can obtain the data from the database through. JDBC. Then create a DataSet, because must realize the data timely, so it needs completed inside a thread. Therefore demonstration graph's Panel must realize the ApplicationFrame interface. The following procedure is to adds the Freespace data of disk to the curve inside DataSet

```
Public List<Object[]>  getDatabase(){
  try{
     Connection conn1 = null;
     Class.forName("com.mysql.jdbc.Driver");
    String jdbc="";
    String url = "jdbc:mysql://localhost:3306/" + "test";
    String user="uniframework";
    String password="uniframework";
    conn1 = DriverManager.getConnection
    (url,user,password);//Connect  the remote sever database
    String sql = "select Creattime , freespace from test_wmic";
    ResultSet result = conn1.createStatement().
    executeQuery(sql);
    List list = new ArrayList();
          while(result.next()){
               Timestamp t = result.getTimestampe");
             //Get the time of  reading sever parameter time
              double  l  =  result.getLong("freespace")  /
             1000000.0;//because  the  data  too  large,  so
             maximize the data
             if (t != null){
                 list.add(new Object[]{t, l});
                }
              }
             return list;
         }
             catch (Exception e){
             e.printStackTrace();
      }
             return null;
    }
Private  static  XYDataset   create Dataset() {
    ScrubSelected Web bean = new ScrubSelectedWeb();
  TimeSeries s1 = new TimeSeries("The freespace statistics");
    List<Object[]> list = bean.getDatabase();
        for (Object[] obj : list){
           s1.add(new Second
          ((Timestamp)obj[0]),(Double)obj[1]);
           }
 TimeSeriesCollection dataset=new TimeSeriesCollection();
    dataset.addSeries(s1);
     return dataset;
}
```

Set the JFREECHART panel to display the relationship between Freespace data of disk and monitoring time

```
Private  static  JFreeChart   createChart
    (DefaultCategoryDataset dataset) {

      JFreeChart chart = ChartFactory.createLineChart(
      "Time Series Chart Demo of FREESPACES Statistic",
       // Chart title
       " Monitoring time",// Domain axis label
        "FREESPACES/MB", // range axis label
        dataset, // data
        PlotOrientation.VERTICAL, // orientation
        true, // include legend
        true, // tooltips
        alse // urls
        );
plot.setDomainGridlinesVisible(true);//Show horizontal grid
plot.setRangeGridlinesVisible(true);//Show  ordinate  grid
domainAxis.setLabelFont(new  Font("Times  New
Roman",Font.BOLD,14));//Axis  title
domainAxis.setTickLabelFont(font);// Axis values
       return chart;
 }
```

The relationship between Freespaces data of disk and Monitoring time can be presented in Fig 5

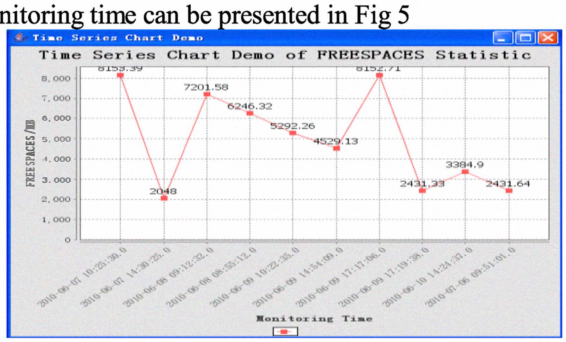

Fig 5 The chart present the relationship between Freespaces data of disk and Monitoring time

IV. CONCLUDING

This paper designed a system which based on WMIC and JFREECHART to monitor system performance regularly. Take full advantage of WMIC and JFREECHART technology strength to complete system quickly. Through the practical application testing, The curve generated by JFREECHART can react system performance acurately. The use of multi-threading technology to ensure reading data timely[8].

So far, this technology has been applied to a server network management system. And has made outstanding contributions to enhance the overall management including reasonable using resources, increasing the service response rate, and ensure the quality of services. This system is easy, secure and reliable and of the promotion of meaning, it is possible to be applied to various of offices resources management.

REFERENCES

[1] A. Boshier , "Windows Management Instrumentation: A Simple, Powerful Tool for Scripting Windows Management" [J] , *MSDN Magazine* 2000-04
[2] http://msdn.microsoft.com/en-us/default.aspx
[3] Fan send rain, Xiong Guixi, "based on WMI + .Net Remoting Computer Management System Design and Implementation" [J] *Research Design Results* 2007-03
[4] Distributed Management Task Force, Common Information Model (CIM) Infrastructure [S/OL]. 2008-06-12
[5] Zhu Qisheng, "I' m ugly but I am strong!--WMIC, the new super-command-line tool" [N] , *Windows & .Net Magazine* 2000-04
[6] Tang Zhong, He Huimin, Su Feiji, "WMI technologies in network management software, server design and implementation" [J] *Guilin University of Electronic Technology* 2008-12
[7] Windows weapon-WMIC use [J], *Hacker X Files* 2009
[8] J. Cooperstein, "Windows Management Instrumentation: Administering Windows and Applications Across Your Enterprise" [J] , *MSDN Magazine* 2000-05