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MONITOR SYSTEM BASED ON GSM SHORT MESSAGE FOR UNMANNED COMPUTER ROOM

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ABSTRACT

Based on the limitation of the traditional alarming system, we propose a monitor system based on GSM short message for unmanned computer room. Firstly, we design the monitor system structure. Secondly, we combine the dynamic and static information and proposed an information Publish-Subscribe platform. Finally, this platform supports message ordered by nodes, distributed information synchronization for multi-monitor center and offline message. The proposed monitor system is a loose coupling and extension system. So that's suitable for multi-department and large scale unmanned computer system. Our designed system has been worked at the computer room of Aero-engine Simulation Research Center and got excellent performance.

Keywords: *Unmanned Computer Room, GSM, Publish-Subscribe, Alarming.*

1. INTRODUCTION

In recent days, the large-scale cluster computer has extensive application on the area of energy resources and manufacturing industry [1, 2]. But the computer room of large-scale cluster computer system must be constant temperature and humidity. And more efficient computer room monitor and manage system are also needed. The traditional computer room management system needs the guard 24 hours on duty at the room and asks for help to technical experts if there exists an emergence situation [3]. This pattern has some problems below: ① 24 hours guard on duty and the guard has the ability to handle the computer under the emergence situation. This is an expensive cost; ② The guard must have the responsibility on duty and do not leave until the guard shift; ③ The guard must check the equipment of the computer room and fix the hidden trouble and fault [4].

Domestic and foreign have many supervisory systems which aim at the colony server. The Parmon system is the most early supervisory system using the Client-Server model development[5], using the java language development and guaranteed the probability. Domestic representation supervisory system is the Octopus colony supervisory system, which is developed by the Wuhan sharp computer system limited company using in the colony supervisory system of thousand association colony super network server. It is established on the local area network and Internet, all points carry on the condition and the resource.

In order to change the limitation of traditional computer room, based on the technology of GSM, we design and develop an unmanned computer room monitor system based on the structure. The system is divided to be backer server, monitor client and mobile terminal three parts. Our system has solved the trouble of traditional computer room monitor.

The remainder of the paper is organized as follows. In Section 2, we introduce the structure of our proposed monitor system in detail. The development and design of the software of this system are introduced in Section 3. In Section 4, the key technology of this system's design and development is mentioned. The result of the system is given in Section 5. Finally we give the conclusion of this paper in Section 6.

2. DESIGN OF THE SYSTEM STRUCTURE

The aim of our monitor system is that: the running state of each machine could be monitored from the client [5]. The manager of the system could get the alarm message when the emergence situation happens at the computer room. The system manager could control the computer from

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the remote by sending the order message from mobile terminal [6, 7, 8]. In order to satisfy the aim, we design a three layers architecture structure. They are backer server, monitor client and mobile terminal. The figure 1 shows that architecture structure.

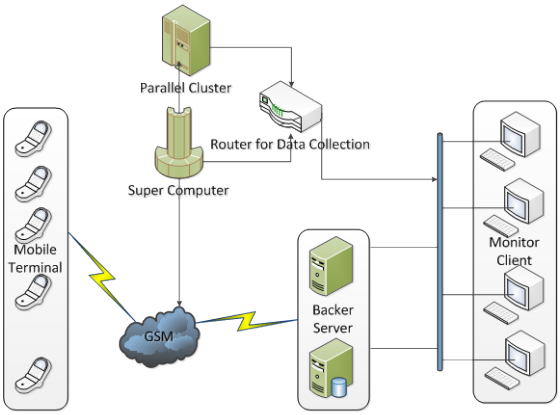

Figure 1: The Structure Of The Posposed Monitor System

From figure 1, we could find our proposed monitor system is constructed by three layers, now we give a brief introduction of them and discuss the relationship between them.

(1) The mobile terminal is used to receive the alarm message from the backer server or send the order message to the backer server. And the backer server then send the process result back to the mobile terminal.

(2) The backer server is composed by communication server and database server. That's a middleware platform which supports the message send and order. The mobile terminal and monitor client could send the message to the backer server or order the message from backer server. The backer server could process the order sent by the terminal and deliver the information to the terminal.

(3) The router for data collection could maintain and update the status of the machines in the room. And the router also could forward the order from the back server.

3. DESIGN AND APPLICATION OF THE SOFTWARE

Base on the proposed system structure. We design the software system for that structure. The design of system is shown by figure 2.

Every module in the backer server layer is built by COM (Component Object Model) technology, Database Server gets the status of machines and user privilege, Message Configure Server supplies the message order interface for every machine and matches the message with the particular machine. Monitor Server and Terminal Server are used for the management of monitor center software and mobile terminal software separately. Center Flow is used to manage and load the modules mentioned above. Every module in the mobile terminal software is also built by COM (Component Object Model) technology. In order to improve the robust of our monitor system, the loose coupling platform based on the software module could be realized in this platform.

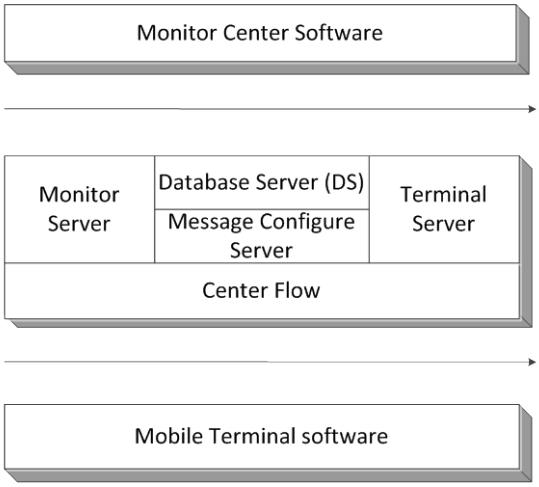

Figure 2: The Design Of The Software Platform

4. KEY TECHNOLOGY

4.1 The Definition Of Message Format

Every message mentioned in Section 3 could be divided to be three parts. They are PSField type message, COMField type message and DeviceField type message. Figure 3 shows the format of them in detail.

PSField			
SrcDeviceID (16bit)	DesDeviceID (16bit)	MesTypeID (16bit)	SelfRegister (1bit)
COMField			
SrcCOMID (128bit)	DesCOMID (128bit)	COMMesTypeID (16bit)	
DeviceField			
PropertyContent (variable length)	TTL (4bi)	MsgTime (14bit)	.....

Figure 3: Message Format

(1) PSField message contains four parts, the first one is SrcDeviceID which is the tag of send machine, the second one is DesDeviceID which is the tag of the received machine, the third one is MesTypeID which is the type of message, the final one is SelfRegister which is the tag of whether this message is a static order. The MesConfigServer

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could send the order to different terminal by the PSField.

(2) COMField contains three parts, the first one is SrcCOMID which is the tag of send machine COM, the second one is DesCOMID which is the tag of receive machine COM, and the final one is COMMesTypeID which is the tag of the COM type. CenterFlow could analysis COMField, the message will be delivered to the correct COM by looking up the order table.

(3) PropertyContent code in the DeviceField message contains the values of every property of message. We involve the XML to describe the property. The code TTL means the survival time of the message.

The description of cluster servers:

<StatusDescription>

<temp>42</temp>

<fanstatus>true</ fanstatus >

<powerstatus>56.3</ powerstatus >

</StatusDescription>

The description of the Terminal:

<CommandMessage>

<Alernode>nodeid</Alertnode>

<Message>Shut down the Cluster</Message>

<PubTime>2012-11-10 06:39:21</PubTime>

</CommandMessage>

4.2 Mixture Order Mode

There are static and dynamic mixture message order modes which are defined in Message Configure Server.

(1) The static message order mode is used when the system is idle. We call this mode active order because the order is sent from the cluster system to the terminal machine. Users could through the API of Message Configure Server to set the static order. The order relationship is stored in database and composed by SrcDeviceID, TypeID, DesDeviceID,

and IsPermanent, this means the TypeID type message which is sent from SrcDeviceID machine, and this message is ordered by DesDeviceID machine, if the IsPermanent is TRUE, it means the message could be transferred several times without limited.

(2) The dynamic model is used when the system is running. This mode is called passive order because the order is sent from the terminal to the cluster system. When the cluster server has received the order form the terminal, the Message Configure Server will analysis the SelfRegister code in the PSField. This order relationship will be added to the order table if the SelfRegister is set. IsPermanent would be set to be FALSE if the order is dynamic, the definition machine will receive the order from the terminal machine through the dynamic mode.

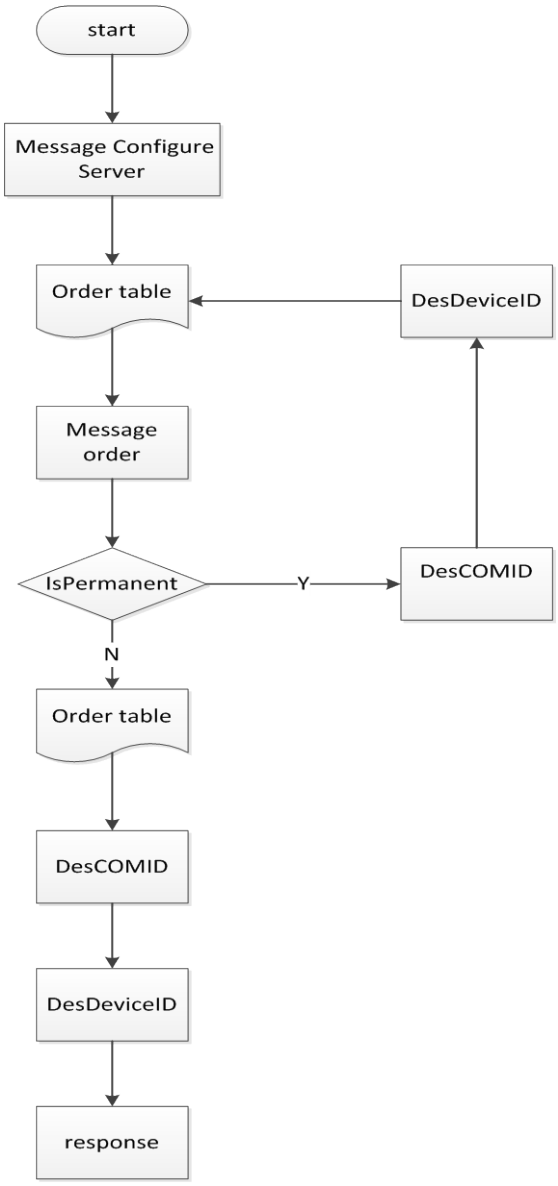

Figure 4: The Forward Pipeline Under Mixture Order Mode

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4.3 The Forward Pipeline Under Mixture Order Mode

The pipeline of the mixture order mode is shown in figure 4, when the system is stared, the static order table could be downloaded from the destination server machine by the MesConfigServer. Then the system check the IsPermanent, if the IsPermanent is FALSE, this order relationship should be added to the order table. Then the look up method is used to check the order machine of this message, this information will be added to the DesDeviceID codes in PSField. Meanwhile, the MesConfigServer module will utilize the router algorithm to determine which COM will forward this message, the ID of destination machine will be filled in the DesCOMID code of COMField. The message will be sent to CenterFlow. The CenterFlow module will process this message based the codes of the message to the terminal. If the message is sent successful, the MesConfigServer will delete the order relationship from the order table. If the IsPermanent code of this message is TRUE, the message will be saved to the sever machine and forward to destination machine for several times until the TLL code in DesDeviceField becomes 0.

5. SOME SAMPLES OF OUR SYSTEM

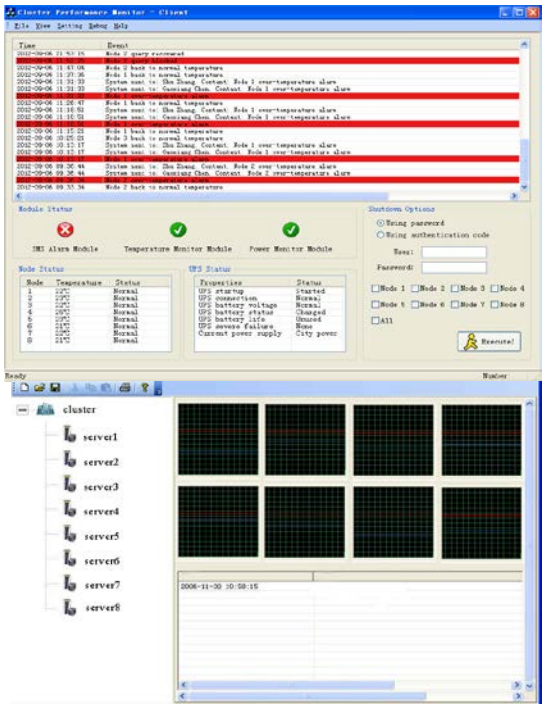

Figure 5: The Server And Client Of Our Monitor System

The platform proposed in this paper was applied on "the monitor cluster system for Aero-engine Simulation Research Center", there is one cluster system which has 128 duo-core CPUs, this cluster system is used for numerical analysis simulation and data share. Figure 5 shows the information of equipment in the center between server and client. The alarm message will send to the mobile terminal when the temperature of equipment is higher than the suggestion. The monitor system sends the temperature of equipment to the mobile terminal if it gets the instruction of query. The auto shut-down program will be start when the shut-down order is sent by the mobile terminal or the temperature is higher than the threshold temperature.

6. SUMMARY AND CONCLUSION

In this paper, we analyze the limitation of traditional computer room manager system. Based on the property of cluster monitor system, a monitor system based on GSM short message for unmanned computer room is proposed. That system gets well performance on information Publish-Subscribe on unmanned cluster monitor. This platform supports message ordered by nodes, distributed information synchronization for multi-monitor center and offline message. Different parts of this monitor system are loose coupling and easy to be extended. This system could be extensively used for unmanned computer room.

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