The Future Evolution Analysis of Cloud Resource Management Platform

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Abstract: The Internet service consists of three basic modes: Infrastructure as a Service IaaS (Infrastructure as a Service), Platform as a Service PaaS (Platform as a Service) and Software as a Service SaaS (Software as a Service), which are collectively referred to as Cloud Computing. With the highly increasing of the number of users and the demands, the manual process can't satisfy the needs of the business. This thesis mainly studies the cloud resource management process. The process focuses on the process engine, which can provide a set of process definition, process deployment, form design as well as the access control function of the software system. It can provide enterprises a complete set of software support environment using for process development and management. By dynamically creating a temporary path, the system achieves the dynamic process of cloud resource allocation. The future evolution of cloud resource management platform is expected in the last.

1. Introduction

Cloud computing service includes three main forms [1], namely IaaS services, PaaS services and SaaS services. IaaS is the business service in the virtualization technology. Its all servers' CPU and storage are integrated into a virtual pool of one or more resources to provide users with the required IT resources. This is the hardware hosting for users. PaaS service is a distributed platform service [2]. It provides users with development environment, operating system resources and other services through the Internet. Users can design, develop and test programs on the platform. SaaS service refers to a set of application software uniformly deployed by providers and provided to users through the Internet [3].

As a unified management of the overall infrastructure resources, cloud computing management platform needs to take into account the management of all physical devices that build IaaS resources, including minicomputers, X86 servers, network devices and storage devices [4]. At the same time, cloud computing management platform needs to have the ability to manage PaaS layer services, and finally realize unified management oriented to multiple domains, unified management oriented to different service levels (IaaS, PaaS, SaaS), and unified management oriented to multiple roles. The cloud computing management platform shall be responsible for the overall operation of telecom's private cloud computing services and the adaptation of related operation and maintenance management processes. After the development of virtualized data center, the number of physical machines and virtual machines to be managed is relatively large. Therefore, automatic tools are needed to complete the management of the life cycle of physical machines and virtual machines, the automatic management of related network and other resources, and the monitoring of resource utilization involved. Cloud computing resource management platform is a collection of management software, through which we can effectively manage the internal IT infrastructure of enterprises, improve operational efficiency, and enable enterprise IT system to better support the company's scale development [5].

2. The Implementation of the Cloud Resource Business Process Management Platform

With the development and popularization of cloud computing, enterprises and users enjoy more

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convenient services. With its low price, secure service, reliable performance and sTable service support, cloud computing PAAS has won the popularity of various cloud service providers that they quickly launched their own cloud service platform. The cloud resource business process management platform is realized here.

The following figure 1 is the schematic of the application virtual machine process instance system model. The picture describes the architecture of the cloud resource business process management system. It is mainly composed of distributed business process engine, business process design server, server cluster process definition file systems, database service system and Session which is a distributed storage shared server based on Redis in the process engine server.

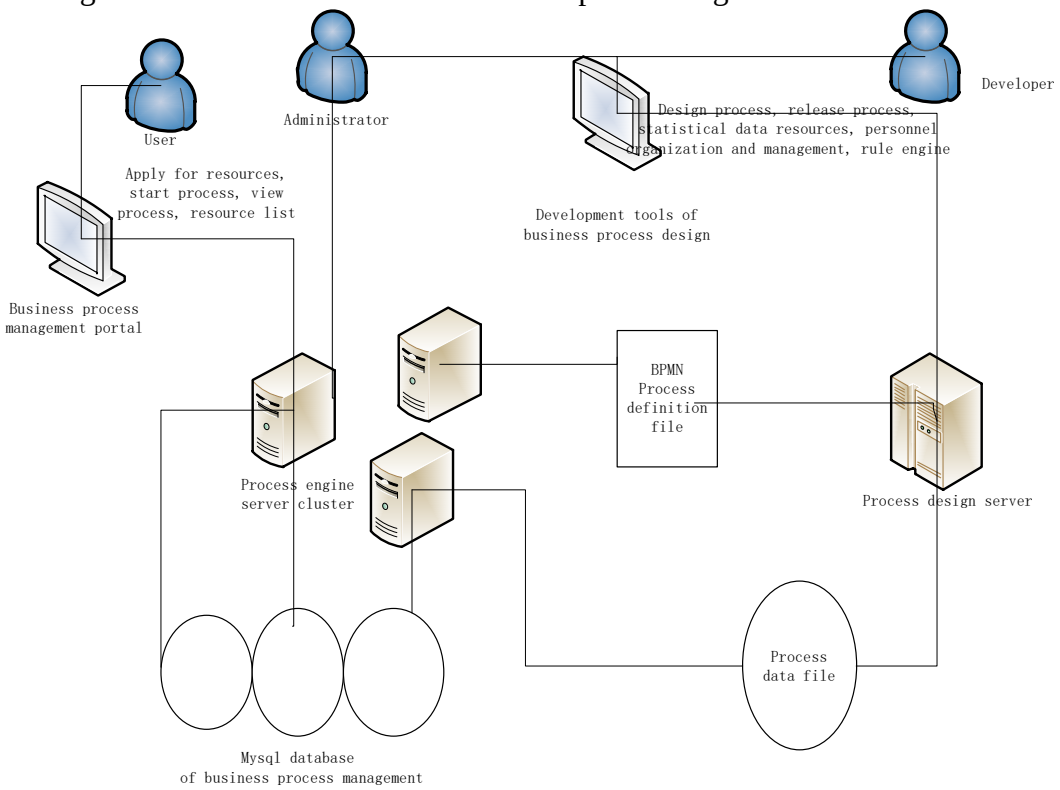

Fig. 1 The schematic of the application virtual machine process instance system model

Ordinary users access the business process management portal through the browser, and then apply for cloud resources, open process instance, view process list, application history and application resource list after log in the portal. In this process, all operations are carried out through the interaction and the process engine server, and at the same time, read and write operations of database files are carried out.

The administrator logs in to the business process management portal to audit tasks, assign user roles and manage process bindings. Meanwhile, the background server can read and write the process definition file and access the database through the call interface.

Process developers can log on to the process designer server page and conduct process design and development through Web Designer. After the process definition is completed, the process is deployed. At the same time, the process definition file is saved to the server to become accessible directories and the process definition information is saved to the database.

Two Ubuntu servers based on tomcat are adopted as process engine servers, one with Apache Ubuntu load balancing server. Both install Redis cluster servers with master-salve structure respectively, and one with haproxy high-availability service for managing Redis cluster servers. More server node cluster extensions are similar. In this deployment structure, Ubuntu system is adopted. IP and parameter information of each server are shown in Table 1.

Table 1 IP and parameter information of each server

MachineName	IP Address	OS	Role
Apache proxy	192.168.1.101	Ubuntu14.04	Load Banlence
Tomcat1	192.168.1.102	Ubuntu14.04	Process engine server
Tomcat2	192.168.1.103	Ubuntu14.04	Process engine server
Haproxy	192.168.1.111	Ubuntu14.04	High availability service broker
Redis Server1	192.168.1.112	Ubuntu14.04	Session cache server
Redis Server2	192.168.1.113	Ubuntu14.04	Session cache server
Tomcat0	192.168.1.100	Ubuntu14.04	Process design server

This paper adopts a unified organization structure database verification mechanism that its verification process is shown in figure 2. Firstly, Realm authentication of Tomcat's security domain is carried out. After the authentication, the corresponding user role and the process engine module that the user can access can be obtained to achieve the function authorized by the user accessing the process engine server. The specific process is as follows, that is,

i) Fill in the certification information and submit it. The user opens the browser and enters the Horizon login page of the cloud resource portal, enters the login information and submits it to Keystone that is the backend authentication service component.

ii) Service authentication component approves the submission information. The service authentication component namely Keystone determines whether a user has access to the home page by checking the database to verify whether the login information is legal.

iii) Encapsulate the business process request interface. When the user successfully logs into the personal center and invokes the business process service interface, the API is invoked to request the JBPM backend service with additional authentication information.

iv) Realm service authentication component authentication based on Tomcat. In the process of calling the interface, the authentication of the Realm component based on Tomcat was firstly carried out, and the authentication information of users was verified whether it is legal and to complete the unified authorization service mechanism by querying the database with the Realm component.

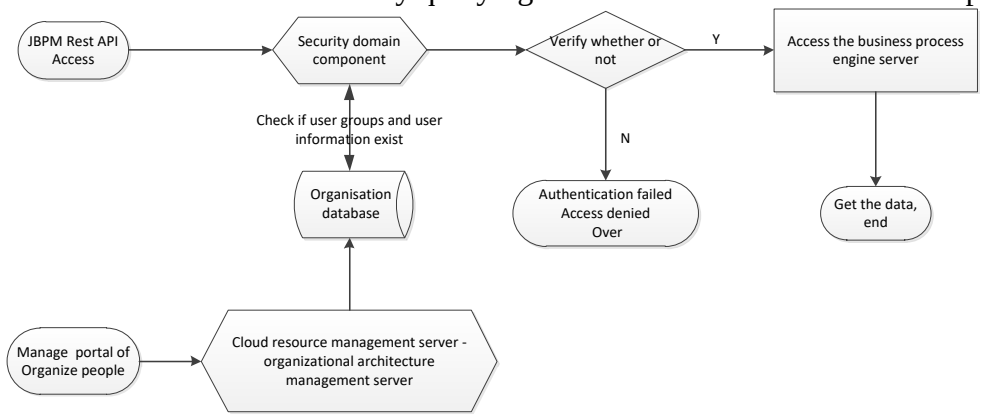

Fig. 2 The verification process

The organizational architecture database Table is located in the business process database Table, including the user information Table and the user role Table, where the user information Table includes the user name and password basic information, and the role Table includes the user name and the user role name. The design of user Table and user role Table is shown in Table 2 and 3.

Table 2 The users Table

Column name	Type	Whether the primary key	Whether the foreign key	Null or not
id	int	yes	no	no
username	varchar	yes	no	no
password	varchar	no	no	no
depart	int	yes	yes	yes
createtime	datetime	yes	no	yes

Table 3 The user role Table

Column name	Type	Whether the primary key	Whether the foreign key	Null or not
id	varchar	yes	no	no
username	varchar	no	yes	no
role	varchar	no	yes	yes
createtime	datetime	no	no	yes

3. Future Evolution of Cloud Resource Management Platform

Optimization of load balancing algorithm. The algorithm has the advantage of the service probability of each node is equal. But for the servers with different performance, it obviously is not optimal. Therefore, the introduction of dynamic adaptive strategy for service node, the response speed of the real-time computing and dynamic allocation request in busy degree will effectively improve the service response speed and improve the system throughput.

Introduce big data storage. Big data storage has an efficient processing efficiency for processing large quantities of data. The introduction of big data storage mechanism will effectively solve large quantities of log request data and carry out large quantities of data mining with a solid foundation.

Introduce log traffic monitoring service. Logs generate huge resources in the process of system operation. Effective logs play an indispensable role in monitoring requests, monitoring server operation, fixing bugs and optimizing system performance.

Improve the JBPM open interface. The business process management services based on JBPM have abundant resources, but some functional interfaces are not perfect yet. Enriching the JBPM open interface will help improve the scalability and usability of the system.

4. Summary

This thesis mainly involves JBPM business process management technology. Process management adopts JBPM process management mechanism. By automating business process diagram generation, dynamic audit management mechanism provide a more consistent cloud resource management workflow solution.

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