Design and Application of a Public Management System Based on Edge Cloud Computing

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Abstract. With the rapid development of IT industry, network sharing has been unable to meet the current resource management. Cloud computing has become an important tool for the development of various software systems. Using cloud computing to manage resources can effectively solve the current massive resource management problems. This paper analyzes the cloud computing technology, and then designs the resource management system on the basis of the technology, divides the whole system into three layers, and finally gives the core code of some modules.

Keywords: Cloud computing · Resource management · System

1 Introduction

With the rapid development of network, the business volume and data volume increase at explosive speed, which leads to the increase of the cost of data storage center. In this era of high computing speed and data explosion, for most enterprises, the performance of their computer equipment may never meet the needs, because the expansion speed of internal information of enterprises is far faster than imagined. The simple way is to purchase more and more advanced equipment to ensure the computing speed and storage capacity [1]. However, for some enterprises with less it budget, it is not a complete strategy to constantly replace the equipment. Moreover, the more and more additional costs caused by these more and more devices are also a problem. And even if there is enough money to buy more devices, with the increase of the number of devices, the differences between various storage architectures increase, and the fusion becomes poor, so it is difficult to manage and fully use storage resources in the network. Cloud computing is a computing mode, which is mainly used to solve the problem of sharing storage resources and data between servers and personal computers, so that the storage resources in the network can be fully utilized and managed easily. Figure 1 below shows how to use and manage storage resources in the network.
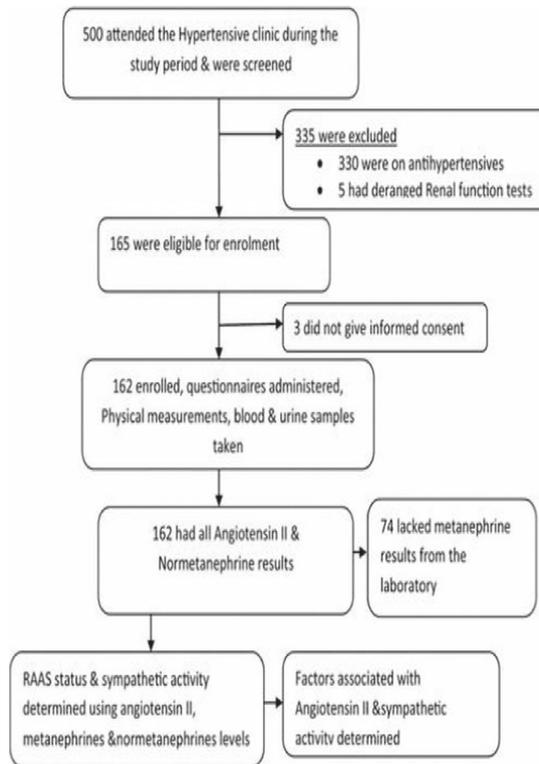
Cloud computing emerges as the times require.

Fig. 1. Leverage and manage storage resources in the network

The development of network makes people from all over the world close to each other, and people's activities cannot be carried out without the network. With the continuous expansion of network software and resources, the network is full of massive resources. With the continuous development of computer hardware, the computing ability of computer is greatly improved, but with the increase of resources, the computing capacity defects of a single computer are enlarged. Cloud computing is based on grid computing, and it dynamically expands the virtualization resources by increasing the correlation services [2].

2 Related Work

In this paper, we aim to design and application of a public management system based on edge cloud computing.

Therefore, performance audit is not performed. To this end, it is foreseen that perceptions of personnel be measured and survey be applied to a provincial unit of a public organization [1]. The purpose of Ref [2] is to analyse the effectiveness of reforms based on new public management concept in the United States and identify key elements for implementation in Ukraine. The contribution of Ref [3] is to describe the New Public

Management model, the implementation of which helps public institutions to respond to challenges posed by external and internal stakeholders. Ref [4] discuss challenges and innovation that public management encounters in the big data era and analysis the problems of public management under the influence of the big data, using the development characteristics of the big data era to increase the service ability and management ability of public management, to sum up, the reasonable innovative channels and to build a public management system that regards the big data as the core and all aspects can take coordinating cooperation. Analyzing local government legislation, the discretion of central government in local governance, and the changes in the status of local government in public governance, Ref [5] present the evolution of the local government system in Turkey during the Justice and Development Party government. Ref [6] argue for the thesis, the systematic interaction between state and society in the sphere of Islamic education is extremely useful. Other influential work includes Refs [7–10].

This paper consists of the following parts. The first part introduces the relevant background and significance of this paper, the second part is the related work of this paper, and the third part is data analysis. The fourth part is example analysis. The fifth part is conclusion.

2.1 Cloud Computing Overview

As a key technology in the era of interconnection of all things, edge computing has a wide range of application scenarios. Firstly, this paper analyzes the problems faced in the promotion of edge computing platform; Then, starting from the architecture, this paper analyzes the typical edge computing platforms, lists the requirements of edge computing application scenarios, and participates in the classification model of edge computing platforms [3]. The development of Internet of things applications has brought an exponential increase in terminal devices.

As shown in Fig. 2 below, "cloud" is the center of data storage and application services.

According to the Cisco network index, the number of network device connections will reach 50 billion by 2022, Among them, the proportion of IOT terminals will reach [4]. Due to the resource limitations of IOT terminals, remote cloud computing resources need to be used for services. If all data of the terminal is transmitted to the cloud Center for unified processing and then returned to the terminal, it is bound to bring great pressure to the network link and data center. It is also very easy to lead to cloud center overload and denial of service (DOS), affecting the end user experience.

$$\|\Delta x_{k+1}(t)\|e^{-\lambda t} \le e^{-\lambda t} \int_0^t e^{(pk_f+m_2+m_3)(t-\tau)}(m_1\|\Delta u_k(\tau)\| + pd)d\tau$$

$$\le m_1 \int_0^t e^{(pk_f+m_2+m_3-\lambda)(t-\tau)}e^{-\lambda t}\|\Delta u_k(\tau)\|d\tau$$

$$+ pd \int_0^t e^{(pk_f+m_2+m_3)(t-\tau)}d\tau \tag{1}$$

$$\|\Delta x_{k+1}(t) = \|e^{-\lambda t} \le e^{-\lambda t} \int_0^t e^{(pk_f+m_2+m_3)(t-\tau)} \tag{2}$$
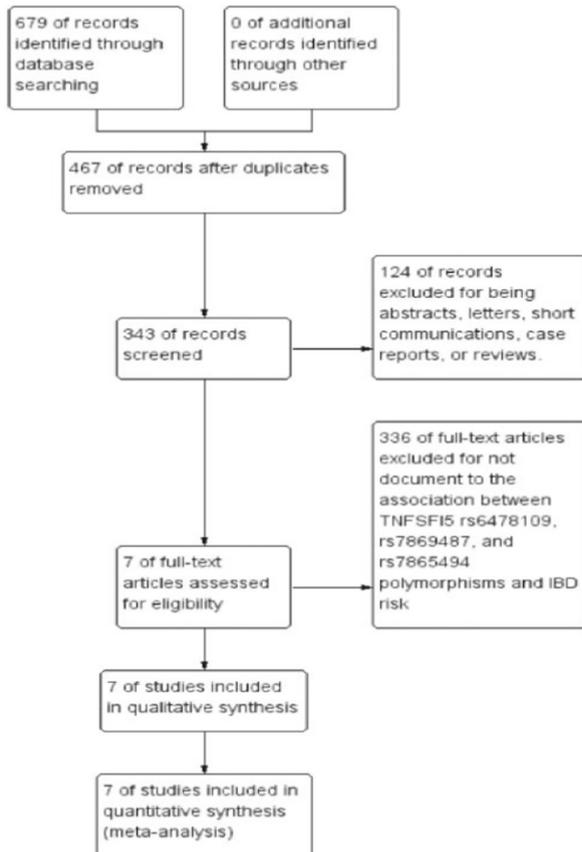
Fig. 2. "Cloud" as the center of data storage and application services

The edge calculation is studied η Some edge computing application cases are analyzed. Several current edge computing platforms are studied, and an improved architecture of mobile integration is proposed to enhance the adaptability of edge computing. However, the diversity of application scenarios leads to the lack of unified standards and a wide variety of edge computing, which limits the popularization and application of edge computing. Based on this, this paper analyzes and proposes the edge application parameters and the classification module of edge calculation and take "cloud" as the center of data storage and application services [5].

2.2   Cloud Computing Features

To become cloud computing, we must have the following five characteristics:

The network layer represents the connection mode supported by mobile edge computing. It consists of mobile cellular network, local network and extranet related hardware. The mobile edge host layer includes mobile edge hosts and mobile edge layer

management devices [6]. Mobile Edge hosts can be further divided into Mme applications and virtual infrastructure. The system layer is the most important layer of MEC. It consists of the me host in the operator network and the me components required to manage me applications. It is responsible for controlling MEC task allocation and system 12 fog calculation. Fog computing is a research achievement of Cisco, "Fog computing is a highly virtualized technology that can provide computing, storage and network services between terminal devices and traditional cloud computing data centers, but it is usually located at the edge of the network. Fog computing enables communication between different communication protocol layers and different communication protocol devices. Therefore, fog Computing supports various types of infrastructure, including but not limited to However, the rich equipment support makes the scheduling, operation, maintenance and deployment of fog computing platform more difficult.

User transparency. User transparency is an indispensable feature of cloud computing. User transparency greatly facilitates the use of users [7].

3   Data Analysis

ET in 2009, satyanarayanan m, a professor at Carnegie Mellon University, proposed eight resource rich micro data centers near edge devices with high-speed connection to the Internet (d) provide computing services to directly connected LAN users. Et saves user data directly in the cloud [8]. Even if the user moves to his cloudlet LAN, he can quickly rebuild application services for the user through cloud backup data. Cloudlet provides services to users through a high one hop network to minimize latency computing tasks and related properties, etc. The index file can be updated, and the query of all drawings can be provided in multiple ways; For example, according to the serial number, classification number, region, map name and scale of topographic map, we can carry out fuzzy query of a certain type of map, accurate query of a certain map, and comprehensive retrieval. This retrieval speed is several times faster than manual query, and it is accurate and reliable.

3.1   System Architecture Design

Under the guidance of the current goal of cloud computing resource management system, on the basis of several mature system architectures, the hierarchical architecture mode is used to design the system. The system design is shown in Fig. 3.

3.2   User Interaction Interface Layer

Edgex foundry is an open source project hosted by the Linux foundation ⑦], which aims to build a general and open platform for the development of edge computing, and has won del! With the support of more than 50 enterprises such as Baidu and ntel, edgex foundry is compatible with a variety of operating systems, supports a variety of hardware architectures, and supports communication between devices with different protocols [9]. As shown in Fig. 4, edgex foundry effectively improves the efficiency of application and service development based on micro service architecture design. Its micro service is
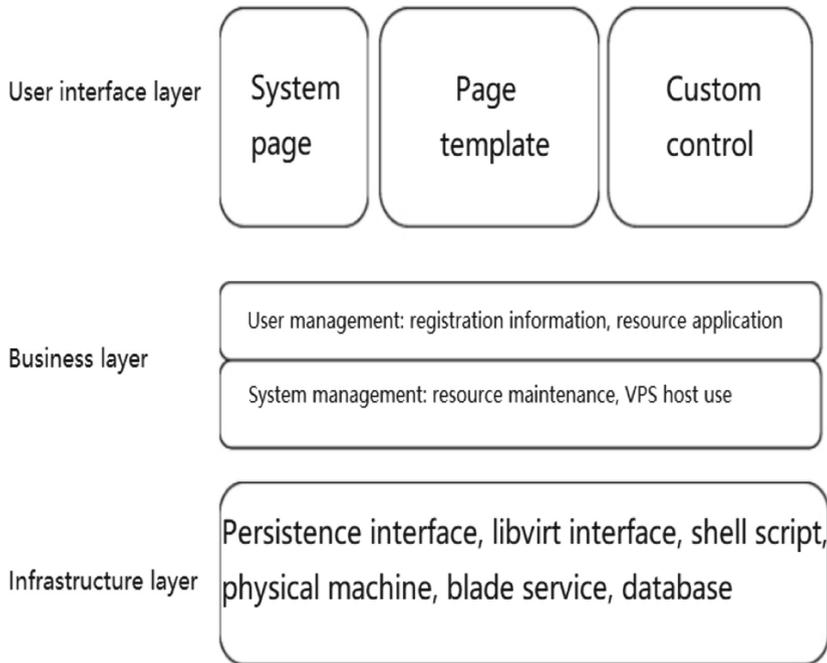
Fig. 3. The architecture model of cloud computing public management system

divided into four service layers and two basic system services. The four service layers of dgex foundry include core service layer, support service layer, export service layer and device service layer; System services include security services and management services. Based on the tailorability of microservices, the edgefoundry service can be run on low-performance devices. Therefore, edgex foundry supports heterogeneous devices such as embedded PCs, hubs, gateways, routers and local servers. Edgex foundry supports container deployment and effectively improves the operation efficiency of the platform.

3.3   Business Layer

Business layer is the core of the whole system [10]. For resource management, resources mainly refer to computing services, virtual machines and user information. After entering the system, there are two roles: general user and operator. In this layer, although there are relatively many operable functions, the business of the whole business layer can be divided into four modules, namely system management, resource application, user management and VPS host usage. As shown in Fig. 4, the core process of the whole system.
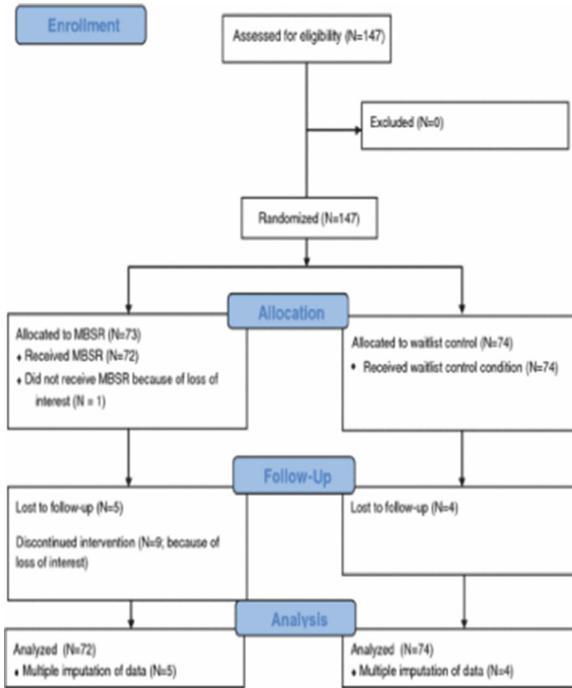
Fig. 4. Core process of the system

4 Example Analysis

Project planning. Information management system is an indispensable part of public management system [11]. It is a VF database development application program. It mainly includes user login, information input and modification, information query, score input, score query, system user management and so on. Therefore, the system has strong practicability.

System overview. After logging in, the system enters the main interface. The buttons on the left of the main interface are used for various queries, while the buttons on the right of the main interface are used for relevant management directly. It has the functions of adding, deleting and modifying information. Fully realize the main information management and query functions of the system [12].

Functional analysis. The following describes the functions of each module according to the demand analysis. According to the demand analysis, the system should have three modules and sixteen functions, namely management system module and information query module. Respectively deal with the addition, deletion and modification of student information and the query function of student information.

Login module (1) user login (2) user registration.

Management module (1) department management (2) class management (3) teacher management (4) information management (5) course management (6) score management.

The functions of each part of the system are described as follows:

User module: handle user login and visitor registration. Management module: the management module realizes the following 6 functions.

According to the design and analysis of the system, the realization of business layer module is the key point of the whole system.

4.1   Resource Application Module

To realize public management under the new normal, we must change the traditional management mode, change ideas and break through difficulties. The diversification of public management subjects is the characteristic and development trend of public management under the new normal. Compared with the past, the public management subject under the new normal highlights the position of the public in public management and increases the proportion of public governance [13]. The development of public management under the new normal should focus on strengthening the innovation of modern public management technical means, build a mechanism for the implementation of top-level design, and practice the socialist core values in the field of public management [14].

Resource application module is mainly used by the administrator of the system to allocate the resources applied by users after entering the system, and maximize the utilization of resources as much as possible. The specific functions of the module include virtual machine application, submission of calculation tasks, review progress results and approval of user application. Some of the core codes are as follows:

```php
<?php
include_ once('./common.php');
//Whether to close the site
checkcloseO;
//Login required
checkloginO;
//Spatial information
Sspace = getspace($_ SGLOBAL'supe_ uid"]);
if(empty($_ SCONFIG[my _status'])) {
showmessage('no_ privilege. my_ status');
}
```

4.2   VPS Host Module

This module is used to determine which computing tasks can be performed after the user has applied to the VPS host [15]. The specific operation mainly includes the switch, restart and connection time reminder of VPS host; In addition, audit the computing resources. In order to ensure that a user will not occupy the resources for a long time, set the latest completion time, and view the progress of its implementation in real time. The specific core code is as follows:

```
Smy_ appld = $appid;
$my_ suffx = base64_ _decode (urldecode (S_ _GET['my_ suf:x"));
$my_ prefix = getsiteurlO;
if (!$my_ sufix) {
header (Location: userapp.php?id='. Smy_ appld.
'&my_ sufix=' .urlencode(base64_ encode(/));
exit;
}
if (preg. _match(/^V/", $my_ suffx)) {
Surl = http://apps.manyou.com/. $my_ appld.
Smy_ _suffix;
} else {
if($my_ suffix) {
$url = http://apps.manyou.com/*. $my_ appld./.
Smy_ _suffix;
}else{
$url = htp://apps manyou.com/.$my_ appId;
}
```

5   Conclusion

This paper analyzes the resource management system of cloud computing. Firstly, it describes the basic concepts and characteristics of cloud computing, and analyzes its three service levels. Secondly, it designs the architecture of the system by analyzing the objectives of the system. Finally, it gives part of the source code of the core module of the system.

Computing delay and service capability: computing delay and service capability directly depend on the computing capability and resource scheduling strategy of edge computing nodes. In this regard, mobile edge computing and cloudlet use resource rich dedicated hosts as service nodes, which has significant advantages; The fog computing node is mainly composed of traditional equipment, so the computing performance is poor. Edgex foundry is compatible with different performance devices through the lightweight features of container and go language, and provides computing services on demand. Deployment and operation and maintenance: in the management and supervision of the edge computing platform, each platform follows the hierarchical management method. Usually, the supervision node acts as an agent, which is responsible for communicating with the underlying node and collecting the resources and status that can be provided by the underlying node. However, different edge computing platforms have different proxy settings and layered definitions. Due to the heterogeneity and diversity of nodes in fog computing platform, multiple scheduling layers need to be designed.

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