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Implementation of Middleware Architecture in Cloud Computing Environment

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Abstract: The cloud computing provides an efficient way of sharing the various resources. Most of the cloud computing platforms are not involved completely in service-oriented system architecture, which will bring more flexibility, high extendibility and reusability compared to existing cloud computing solutions. One of the key to service-oriented is cloud computing middleware. Considering if PaaS is the core is the cloud computing system, then the middleware is the core of PaaS. The exiting cloud computing platform is closely related to the middleware technology. Implementing the service-oriented on cloud computing is based on the assumption that middleware will be backbone of the cloud computing. Installing the new hardware based the new requirement on the existing system results in high cost. Even this will result in inefficient uses if existing hardware. Implementing the cloud computing results in efficient use of existing hardware to integrate with new hardware. Usage of cloud computing results in effective use of distributes resource. The general cloud computing platform helps the user to make use of rich resource and strong hardware support to resolve the larger-scaled computing at any time and any place. The middleware is the service-oriented system architecture of the cloud computing platform. This defines that middleware is a necessary part of the platform.

Keywords: Cloud Computing, Service Oriented System, Middleware

1. MIDDLEWARE: THE BACKBONE OF CLOUD COMPUTING

The cloud computing provide various types of cloud services. Some of the popular cloud services are IaaS, PaaS and SaaS. The Infrastructure-as-a-Service which provides users with computing, storing and other basic resources. The Platform-as a-Service by which users can establish and operate various operation systems on the PaaS The Software-as-a-Service which directly offers users email, business administration and other business applications.

Compare to other services, PaaS plays the role of calling basic resource from the bottom layer and providing support for various operating system of the upper layer.

The PaaS is also called sharing middleware which makes the Java EE AS, the message-oriented middleware, the EPM, the ESB and the portal server virtual. It can also integrate many middleware's into a resource pool of application foundation which offers users a high-end environment for developing, testing and operating the application. This will improve the better application usage of the cloud computing.

2. THE OVERVIEW OF PAAS ARCHITECTURE

The PaaS is a business model. PaaS is the tendency of SaaS. PaaS provides the personalized services with higher performance. If SaaS can provide the function of developing, testing and deploying online application.

There are various kind of technologies in the PaaS. The following five are very popular:

1) REST: The Representational State Transfer Technology, the callers can get part of services supported by the middleware.

2) Multiple tenants: It can make one individual system work for many organizations with good isolation and better safety. This technology can effectively reduce the purchase and maintenance cost of the application.

3) Parallel processing: It can process huge data.

4) Application server: Based on the original AS, it is optimized for the cloud computing system.

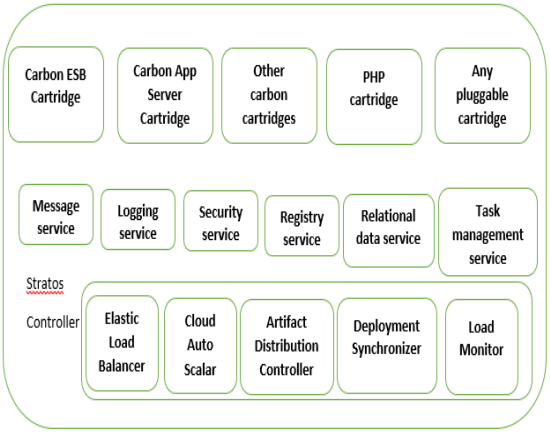

Fig : Reference view of PaaS Architecture

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5) Distributed cache: This distributed cache can not only effectively reduce the pressure of background, but increase the response speed.

3. THE MIDDLEWARE

The middleware defines as software in the intermediate zone of the system. They as divided into vertical and horizontal. Vertically defines the dimension of up and down. The middleware lies in the middle from the ground floor operating system, the database and other basic software to the internet applications of the top Layer. Downward, manages the network communication and computing resource.

Upward it provide the exploitation and operating environment for internet applications. Horizontally, considering the left and right, the middle provides range communication and exchange services for various business to solve the interconnection problem between systems. The middleware is an important hub to support the efficient operation of IT systems. This characteristic coincides with PaaS of the cloud computing.

4. THE SOA WITH CLOUD

Cloud computing provide services of different types services and levels and adapt different methods according to different services. All the services is based on the model of resource centralized management and user's application according to their needs, considered as core concept of cloud computing. SOA is a component module, which sends the application program as services to the users or other services and connecting them through good interface.

The service can be divided into service providers and service consumers. The service consumers submit their request through the interface and the service providers accept the request and process it and hand in the eventual results to the service consumers. This is the clear different between the service of cloud computing and that if SOA.

The services in cloud computing refers to the various functions and resources provided by cloud computing, where the service of SOA refers to a group/unit of software function. SOA can provide the service integration of cloud computing. The service provides remain in the center of cloud computing and follows the standards of SOA interfaces. Core factors of SOA's are Standard packaging, reusing and loose coupling arrangeable.

4.1 STANDARD ACKING(INTEROPERABILITY):

The traditional software structure has never solved the problem of interoperability. The openness of internet means each node has ability to adopt different components and platform technology. It restricts the technology details privately and there is no unified standard in component module and infrastructure itself in fields such as component description, release, discovery, invocation, data transmission, and interoperability protocol. The various undesirable technology restrictions result in huge difficulty of the alternation from software system to internet, which leads to progress of operation integration and restructuring.

The traditional middleware just achieves the access protocols such as JAVA use RMI. SOA achieves the link interoperability through SOAP protocol that supports the internet and has no relation with operation system.

4.2 THE COUPLING RELATINSHIP:

SOA structure helps to develop the process of coupling and decoupling. The traditional software couples the core sections of software known as internet link, data transmission and operation logic into an integration. It is hard for the software to adapt to this types of environment.

The distributed object technology separates the link logic and the message makes asynchronous processing in link logic, which is more flexibility. The data transmission is separated by message brokers and some distributed object of middleware's. This help the SOA structure achieves the complete decoupling of operation logic, internet link and data transmission through the service packaging.

4.3 SOFTWARE REUSE:

The re-usage of software is also called re-utilization. Multiple usages of the same object without modification or with little modification. This helps to improve the level of abstraction and enlarge the range of the reuse. The earliest reuse technology was subprogram. The subprogram are invented to reuse the some part of program among the different systems.

However the subprogram was the most primitive reuse. If the subprogram changed, it means that all the system that is depended on this has to be rebuild, tested and again published. The reuse of SOA solved this problem. The invention DLL component resolved this problem. Changing the piece of code no need to rebuild entire system code and testing. The developer can build only that part of DLL code changes and test it.

5. SOA CHARACTERS

There are some distinct essential features during the implement of SOA.
The service interface of the coarseness grades, loose coupling, reusable services, design control of the service interface, standard service interface, supporting many information patterns, accurately defined service contract.

SOA Service has dependent self-description, XML document, of the platform. Web Services Descriptive Language (WSDL) is a standard language used to describe services. SOA service communicates by using XML Schema.

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The communication between consumers and suppliers or between consumers and services happens mostly in an unaware environment of the supplier. Communication between services is also an important business documents internally processed by the corporation. SOA service can be maintained through the Registry plays the role of directory listing. The application program looks for and calls some service in Registry.
Every SOA service has a QoS. Key elements of QoS are demand for security, reliable communication and strategy about who can call the service.

6. SYSTEM ARCHITECTURE OF SOA

Service is like a pile of components and parts which are used to form the standard service by encapsulating. Same connector and rules are used for semantic expression. In order to assemble the service into a process and application, there is a need for effective management, including how to register the service, how to find the service and how to package the safety and reliability.

It is loose coupling among the services of the service structure. There are two good points about the loose coupling system. Once is flexibility and other is it continue exist when the inner structure and implementation of every service forming the application program changes gradually.

Based on the difference between the application system and structural method of the traditional software. Firstly, the components level of the modeling and management based on the application system if the SOA is service.
Service modeling mainly involved in service identification and granularity confirmation. Service identification is to make sure of the list of the candidates which can turn to be service within certain range, to make sure of the granularity of the service, and to identify the connector of the service.

Service governance is to define centrally, uniformly and effectively manage the already well encapsulated service.
Service arrangement is to pack and assemble the service according to the need of business process. Service assembly is based on the purpose of realizing the business process.

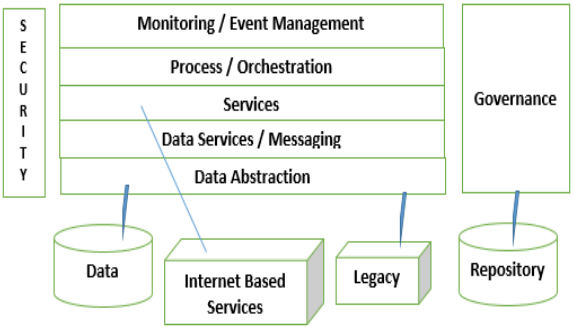

Fig : SOA Architecture Map

7. CONCLUSION

The Cloud Computing Middleware helps in quick and effectively set up and also manages the Cloud Platform with the help of the multilevel distributed virtual technology, intelligent system management and auto-deployment of resources.
Applicators can be set free from the fussy, complex and distributed resource management problem.
The Cloud Computing Middleware integrates various computing resources effectively.
The Cloud Computing Middleware platform allows any enterprise to use computer cluster like using one machine so that the unimaginable before large-scale system management and mass data processing.

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