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DELIVERING QUALITY SCIENCE TO THE WORLD

Simulation and Implementation of Cloud Computing Based on CloudSim

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Abstract: The rapid development of the Internet, the birth of a new era of cloud computing, and the gradual shift from concept to application. Under the control of virtualization, distributed file management and other high-end technology management and resources, making a lot of computer resources formed the "cloud" resource pool, can quickly and accurately according to user needs to provide the appropriate allocation of resources and accurate service tasks, making the utilization of resources can be greatly improved. In this paper, we introduced the definition of cloud computing platform, platform type, service mode, and using CloudSim to achieve the cloud computing simulation.
Keywords: Cloud computing, CloudSim simulation

1. CLOUD COMPUTING PLATFORM DEFINITION

Cloud computing from the proposed to become a hot research experts competing. The rapid development of cloud computing indicates that the technology can bring good application prospects and more economic benefits [1].

Cloud computing is a new computing model: the IT resources, data, applications as a service provided to the user through the Internet, cloud computing is an infrastructure management methodology, is a large number of highly virtualized resources management together to form a large Of the resource pool, used to provide a unified service [2].

2. THE TYPE OF CLOUD COMPUTING PLATFORM

(1) Public cloud

Public clouds are used by the public or large organizations and are typically owned by cloud service providers. Public cloud data is mainly external users, tend to open the service to external users. Services can be accessed over the Internet, but cloud computing resources are not owned.

(2) Private cloud

A private cloud is a cloud platform that is used by an organization solely for its own purposes. The data comes from the internal, service is also mainly for the internal. A private

cloud is the most common deployment pattern when building a cloud platform within a customer's premises.

(3) Industry cloud

Industry cloud refers to the industry or within a region to play a leading role or to grasp the key resources to establish and maintain the organization, in an open or semi-public manner, to the industry or related organizations and the public to provide paid or unpaid services.

3. SERVICE MODEL OF CLOUD COMPUTING

3.1 Infrastructure as a Service

With IaaS, users no longer need to purchase their own equipment (servers, networks, and ancillary equipment), no longer need to rent room, power supply, cooling, disaster recovery and other issues. In the infrastructure service model, you can avoid worrying about these issues, from suppliers through renting the way (only need to pay a certain amount of rent) to obtain the necessary resources (computing and storage devices) to build applications to load, and then power, Cooling, disaster recovery and other issues, without fear of fear, are IaaS suppliers to specifically responsible for. At home and abroad more leading manufacturers, abroad: VMware, Microsoft, IBM and HP; domestic: Teamsun, Alibaba and million net.

3.2 Platform as a Service

PaaS is a kind of application of IaaS. Generally speaking, the service provider will provide the platform to set up and maintain, and PaaS can be used in a development platform that provides SDK (Software Development Kit) Write deployment applications, and whether in the deployment or in the case of running, users do not need to back-end servers, the use of the operating system, network transmission and storage of the state and other operational status and situation to worry about.

3.3 Software as a Service

Through the SaaS model, users do not need to download the client application software, as long as a single browser can directly use the application on the cloud. SaaS vendors' main task is to maintain the hardware and software facilities in the cloud, while suppliers will be charged according to a certain mode of charging users to use the cost, which for the user will save a lot of complicated when trivia, and But also in the purchase of software, reduce certain expenses.

SaaS service model as a low-cost development, the development of a long history of the service model, so in today's software market, SaaS products, whether in number or category are rich and varied. At the same time, there have been a variety of classic products, the most representative of which is Google Apps, Office Web Apps.

4. CLOUD COMPUTING SIMULATION BASED ON CLOUDSIM

Because many applications have different configurations and certain deployment requirements, the deployment and experiment of cloud infrastructure not only generate energy consumption, but also the scheduling and allocation of various service models is also a big problem. CloudSim simulator using cloud computing, can completely avoid the infrastructure problems, seamless simulation of cloud computing facilities and services of the experiment.

4.1 Simulation experiment preparation

(1) JDK configuration

A. CloudSim need to run in the JDK1.6 version above, the experiment used jdk1.8.0_40 version, installation directory: D: \ Program Files (x86) \ Java \ jdk1.8.0_40 system variable -> New -> variable name : JAVA_HOME variable value: in the path by adding D: \ Program Files (x86) \ Java \ jdk1.8.0_40

B. System Variables -> Edit -> Variable Name: Path Variable Value:% JAVA_HOME% \ bin;

C. Test installation succeed

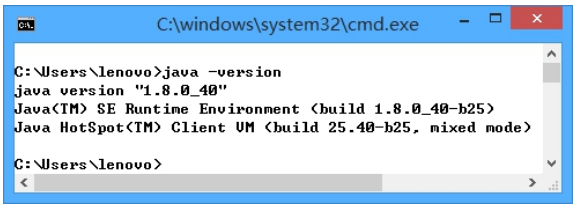

Fig1 Verify the successful installation of Java

(2) CloudSim configuration

The experiment download version of cloudsim-3.0.2, and configure. /Jars directory part of the jar package environment variables.

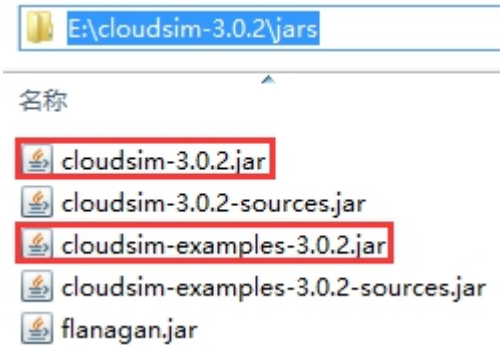

Fig2 Jar package in CloudSim

(3) CloudSim deployed to MyEclipse development tools CloudSim-3.0.2 will be introduced to the MyEclipse project. After debugging, there is no abnormalities or errors.

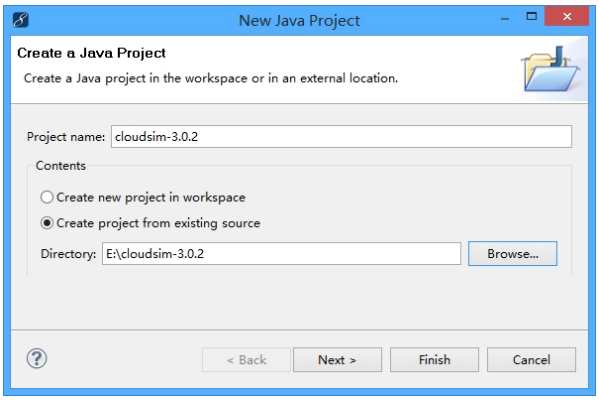

Fig3 Deploy the project to MyEclipse

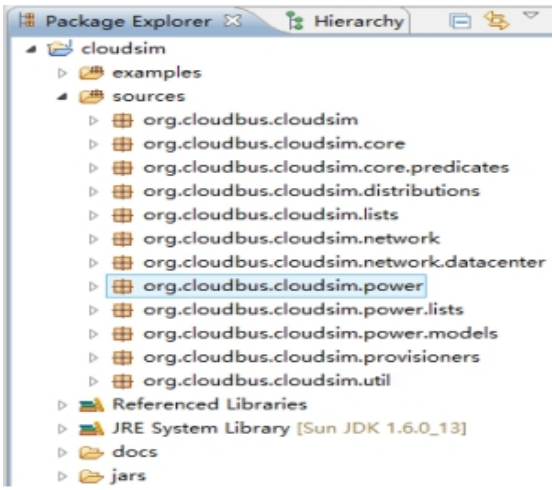

Fig4 Deployment of CloudSim package in the environment

4.2 Process flow

Design program flow chart as follow:

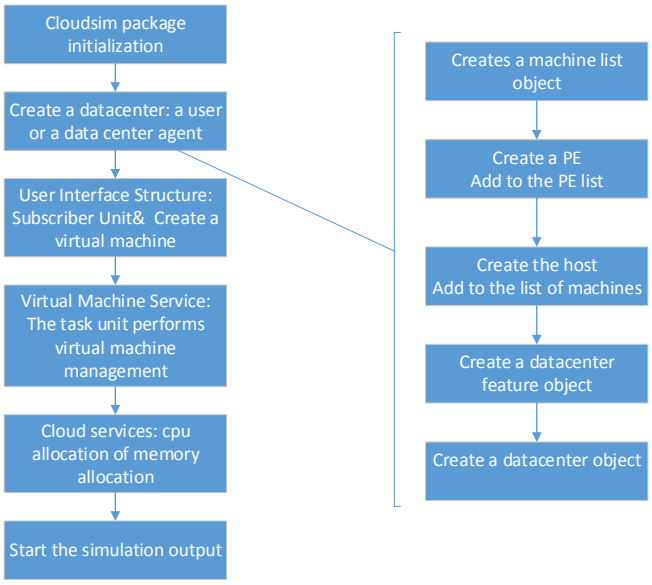

Fig5 Program flow chart

4.3 Achieve cloud computing environment simulation

When using CloudSim to simulate a cloud computing environment, users should be able to configure and test the emulator based on their needs, such as the number and characteristics of the host, the demand for cloud task resources, and so on. This design creates two hosts, one host per data center, and then two cloud tasks.

CloudSim simulation implementation steps:

(1) Initialize the CloudSim package

Initialization of CloudSim package work, including the number of cloud users, tracking events and date to initialize.

int num_user = 1;

Calendar calendar = Calendar.getInstance();

boolean trace_flag = false;

CloudSim.init(num_user, calendar, trace_flag);

(2) Create a data center

In the CloudSim simulation platform, a data center consists of one or more hosts, a host by one or more PEs and CPUs, by calling

Private static Datacenter createDatacenter (String name) {};

Create multiple datacenters. Create two data centers as required by the task:

private static Datacenter createDatacenter(String name){};

Datacenter datacenter0 = createDatacenter("Datacenter_0");

Datacenter datacenter1 = createDatacenter("Datacenter_1");

After the data center is created, each needs to create a host and a PE, and add PEs to the PE list.

MachineList mList( )= new MachineList( );

List<Pe> peList = new ArrayList<Pe>();

peList.add(new Pe(0, new PeProvisionerSimple(mips)));

Add pe to the PE list.Create a host should contain the host certain parameters: ID, memory, storage and so on.Create datacenter feature objects, including: operating system, machine lists, allocation policies, storage, etc.

DatacenterCharacteristics characteristics = new DatacenterCharacteristics(arch,os,vmm,hostList,time_zone,cost,costPerMem, costPerStorage, costPerBw);

Finally, you need to create a data center object

datacenter = new Datacenter(name, characteristics, new VmAllocationPolicySimple (hostList), storageList, 0);

(3) Create a data center Broker

The data center agent is responsible for coordinating users and service providers and deploying service tasks in the cloud based on the user's QoS (Quality of Service). This kind of extension can realize its own task scheduling algorithm and realize its own scheduling strategy.

DatacenterBroker broker = createBroker();

int brokerId = broker.getId();

(4) Create a virtual machine

Create a virtual machine and set the parameters (ID, MIPS, mirror size, allocate memory, CPU count, etc.) and submit it to the broker. The virtual machine is then added to the virtual machine list, which is then submitted to the agent.

Vm vm1 = ***new*** *Vm(vmid, brokerId, mips...) broker.submitVmList(vmlist);*

(5) Create a cloud task

This process requires setting the task user ID and submitting it to the task agent. But also set the number of cloud tasks and task length and some other information. Two cloud tasks were created in this design.

cloudletList = new ArrayList<Cloudlet>();

Cloudlet cloudlet1 = new Cloudlet(id, length...);

cloudletList.add(cloudlet1);

cloudletList.add(cloudlet2); broker.submitCloudletList(cloudletList);

CloudSim.startSimulation();

(6) Start the CloudSim simulation

CloudSim.startSimulation ();

(7) print out the simulation results

```
Console
<terminated> CloudSimExample4 [Java Application] C:\Users\lenovo\AppData\Local\Genuitec\Comr
Starting CloudSimExample4...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker is starting...
Entities started.
0.0: Broker: Cloud Resource List received with 2 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.0: Broker: Trying to Create VM #1 in Datacenter_0
[VmScheduler.vmCreate] Allocation of VM #1 to Host #0 failed by MIPS
0.1: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: Creation of VM #1 failed in Datacenter #2
0.1: Broker: Trying to Create VM #1 in Datacenter_1
0.2: Broker: VM #1 has been created in Datacenter #3, Host #0
0.2: Broker: Sending cloudlet 0 to VM #0
0.2: Broker: Sending cloudlet 1 to VM #1
160.2: Broker: Cloudlet 0 received
160.2: Broker: Cloudlet 1 received
160.2: Broker: All Cloudlets executed. Finishing...
160.2: Broker: Destroying VM #0
160.2: Broker: Destroying VM #1
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.
```

Fig 6 Procedures run-time steps

```
========== OUTPUT ==========
Cloudlet ID    STATUS    Data center ID    VM ID    Time    Start Time    Finish Time
    0        SUCCESS        2            0        160        0.2        160.2
    1        SUCCESS        3            1        160        0.2        160.2
*****Datacenter: Datacenter_0*****
User id         Debt
4               35.6
**********************************
*****Datacenter: Datacenter_1*****
User id         Debt
4               35.6
**********************************
CloudSimExample4 finished!
```

Fig7 Show the experimental results

5. CONCLUSION

Cloud platform is a more complex system architecture. Based on the development background and current situation of cloud computing platform, this paper introduces the definition, platform type and service mode of cloud platform, and uses CloudSim to simulate the cloud computing so as to better understand the structure of cloud computing, Middleware enables dynamic and effective management of cloud (soft and hard) resources, and provides a foundation for cloud applications to provide efficient, reliable development, deployment and operational support environments.

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