Introduction to Google App Engine

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**Abstract**:Cloud computing becomes more and more popular today. It makes get ride of administrators, huge investments on expensive hardware and human resources becomes true. This report is to present a general overview of the new coming service offered by Google company- Google App Engine.

**Keyword**: Cloud computing; Web based application; Service; Sandbox

**1.Introduction**

This is a platform which allows users to run and host their web applications on Google’s infrastructure. These applications are easy to build, easy to maintain and easy to scale whenever traffic and data storage needed. Google App Engine is a web application that allows you to run on Google's infrastructure. Google App Engine applications are easy to build and maintain, and can be easily scaled as your traffic and data storage needs grow. With Google App Engine, there is no longer a need to maintain a server: you only need to upload your application and it will immediately serve your users. Computing model in which different tasks are assigned using combination of connection, software and services accessed over a network is called “Cloud Computing”.

**2.Components**

**2.1Google account**

App Engine includes service APIs for integration with Google accounts. The application allows users to log in with a Google account and can access the email address and displayable name associated with the account. Using a Google account allows users to start using your application faster, because users do not need to create a new account. Google accounts also save you the trouble of implementing a user account system for your application only.

**2.2The application environment**

(1)Dynamic web serving, with full support for common web technologies

(2)Persistent storage with queries, sorting and transactions

(3)Automatic scaling and load balancing

(4)APIs for authenticating users and sending email using Google Accounts

(5)A fully featured local development environment that simulates Google App Engine on user’s computer

At present, Google App Engine officially supports Python language, JAVA language, Go language and PHP language, and corresponding to the development of perl, Google's development team is also in progress.

**2.3Sandbox**

Each application instance executes in a sandbox. The sandbox separates the application in its own protected and reliable environment which is independent of the operating system, hardware or the physical location of the web server. The application can only access other computers on the Internet through the provided URL and email service and API. Other computers can only connect to the application by making HTTP (or HTTPS) requests on standard ports. Applications running in a secure environment only provide limited access to the underlying operating system. These restrictions allow App Engine to distribute network requests for applications among multiple servers, and to start and stop servers to meet traffic demands. Sandbox isolates your application in its own secure and reliable environment, which has nothing to do with the hardware, operating system, and physical location of the network server. This prevents applications from performing malicious operations and enable GAE to optimize CPU and memory utilization for multiple applications on the same physical machine. Sandboxing also imposes various programmer restrictions: Applications have no access to the underlying hardware and only limited access to network facilities. Java applications can use only a subset of the standard library functionality.

**2.4The datastore**

A powerful distributed data storage service is present by App Engine. A query engine and transactional storing accessible through a simple API, both running on Google’s scalable infrastructure is provided with the App Engine datastore. This Python interface includes a data modeling API and similar to Structured Query Language (SQL) called GQL. Using these features developing data dependent applications should not be more difficult than creating it using normal web hosting service.

**2.5The Python Runtime environment**

The Runtime environment uses Python programming language. All methods, except those ones which violates the sandbox restriction, like attempting to open a socket or write into a file, are included in the library. All applications code must be written entirely only in Python language and code with extensions written in C is not supported.

A web application which emulates all of the app Engine services on the local computer is included in the App Engine software development Kit. All of the APIs and the libraries available in App Engine are included in it. Google app engine offers relatively low resource-provisioning overhead and an inexpensive pricing model for jobs shorter than one hour. GAE is a simple parallel computing framework that supports development of computationally intensive HPC algorithms and applications. The underlying Google infrastructure transparently schedules and executes the applications and produces detailed profiling information for performance and cost analysis. Although Google App Engine does not support many languages, with the help of the powerful Java Scripting Engine function of the JAVA language, many scripting languages can actually run on Google App Engine, such as Scala, Groovy, JavaScript, PHP, JRuby, etc.

**3.Service**

App Engine provides a variety of services so that you can perform routine operations while managing your application. The following APIs are provided to access these services:

**3.1 URL Fetch**

Applications can use the App Engine URL to obtain services to access resources on the Internet, such as web services or other data. The URL retrieval service uses the high-speed Google infrastructure used to retrieve web pages for many other Google products to retrieve web resources. For more information about the URL access service, please refer to URL access API reference.

**3.2Mail**

Applications can use App Engine's mail service to send emails. The mail service uses Google infrastructure to send email. For more information about mail services, see Mail API Reference.

**3.3Memcache**

The Memcache service provides a high-performance memory key-value cache for your application. You can access the cache through multiple instances of the application. Memcache is useful for data that does not require the permanent function and transaction function of the database, such as temporary data or data copied from the database to the cache for high-speed access. For more information about the Memcache service, see Memcache API Reference.

**3.4Image manipulation**

The picture service enables your application to manipulate pictures. Using this API, you can resize, cut, rotate, and flip pictures in JPEG and PNG formats. For more information about the image manipulation service, please refer to the image API reference

**4.A parallel Computing Framework**

Implementing a new application in our framework requires specialization for three abstract interfaces:JobFactory,WorkJob,and Result.

The master application is a Java program that implements JobFactory on the user’s local machine.JobFactory manages the algorithm’s logic and parallelization in several WorkJobs.Workjob is an abstract class implemented as part of each slave application-in particular, the runs() method, which executes the actual computational job.A GAE environment can have three types of failure: an exceeded quota,offline slave applications, or loss of connectivity.

**5.Conclusion**

Google app engine is useful because customers can create their applications locally, in real time, without uploading them. Then it comes the web based admin interface. This interface contains all the necessary tools to manage and debug user applications. And finally, the Datastore API, which is the Google’s scalable persistence layer. All it needs to be done is to define URL which user wants to use, writing the code and to upload the application. Everything else will be done by Google.

**References:**

[1]Google App Engine Alexander Zahariev, Helsinki University of Technology. TKK T-l 10.5190 Seminar on Internetworking 2009-04-27

[2]Evaluating High-Performance Computing on Google App Engine Rade Prodan,Michael Sperk,and Simon Ostermann,University of Innsbruck. IEEE Xplore