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Oracle Database and the Oracle Database Cloud

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Overview

The Oracle Database is the world's leading enterprise database. The Oracle Database Cloud Service is a rich and robust offering combining a rapid application development tool, instant deployment for applications, RESTful Web Service access and a set of packaged applications which install with a few mouse clicks. The Oracle Database Cloud is built on the Oracle Database and delivers the power and robustness of the Database, but also provides additional capabilities in a fully managed service

In terms of Cloud computing, the Oracle Database Cloud Service, although based on and resident in the Oracle Database, is a Platform-as-a-Service product, rather than a Database-as-a-Service product. This paper will describe the different categories in the Cloud computing taxonomy, provide an overview of the Database Cloud Service, and discuss the similarities and differences between using the Oracle Database Cloud Service and implementing private clouds based on an Oracle Database.

This paper will also provide you with a roadmap of your options for using the Oracle Database as the foundation for your Cloud computing environment, public or private.

Cloud taxonomy

Understanding the various types of Cloud computing is the first step to understanding the Oracle Database Cloud. The concept of Cloud computing has received a large amount of attention, but suffers from a lack of definition and understanding. On one level, any type of information technology can be called “Cloud” if you can access it over the Internet, where the basic concept of using computing power on a remote server with location transparency is in force.

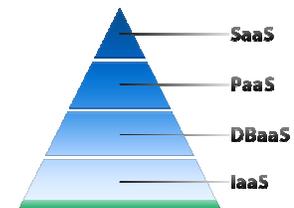
In another way, the use of Cloud computing as a general category is frequently more misleading than informative, leading to attempts to compare different products that have very little in common. This section will provide a framework for delineating the main categories of Cloud computing – SaaS, PaaS, DBaaS, IaaS.

The Cloud stack

All computing platforms are built on the concept of a technology stack, where one layer of technology is built on another. In the Cloud computing arena, different categories of products bring Cloud computing to different levels of the stack.

There are four main categories of Cloud computing solutions –

- Infrastructure-as-a-Service (IaaS), which gives users access to infrastructure components on a Cloud platform, such as operating systems and other system software
- Database-as-a-Service (DBaaS), which gives users access to databases running on a Cloud computing platform
- Platform-as-a-Service (PaaS), which gives users access to development and deployment environments running on a Cloud platform
- Software-as-a-Service (SaaS), which gives users access to solutions running on a Cloud computing platform



Each of these applications has its own set of characteristics and limitations, and each of them addresses a different set of user requirements.

Differences between Cloud computing categories

Different categories of Cloud computing offer different sets of value propositions to customers. These value propositions can be differentiated based on some common principals -

- A Cloud computing category describes the level at which users interact with the offering. For a Database-as-a-Service offering (DBaaS), you interact with the database; for Infrastructure-as-a-Service (IaaS), you interact with the infrastructure software
- All technologies beneath the Cloud computing level are transparent, both in terms of maintenance and operations. For Platform-as-a-Service (PaaS), you do not have to perform any maintenance operations on the database or system software.
- When you buy a type of Cloud computing offering, you are responsible for all layers of technology above the level of the Cloud computing category. For IaaS, you would be responsible for the database and platform tools, both in terms of license acquisition and maintenance operations. Because of this, Software-as-a-Service (SaaS) offerings have the lowest overall overhead, since the entire technology stack is within the Cloud, reducing overhead across the broadest range of operations.
- All technology beneath the Cloud computing level is inaccessible for configuration changes. For PaaS, you would not be able to configure the underlying database.

Database Cloud attributes

The Oracle Database Cloud is primarily a PaaS, although the Database Cloud can also be used as a DBaaS. Based on the distinctions described above, there are three basic attributes of the Database Cloud that match those of a PaaS offering -

- The overall operational effort required for the Database Cloud Service. The Database Cloud Service is a fully managed service, which does not require any operational effort for the underlying Oracle Database, as with a PaaS offering.
- The configuration options allowed with the Database Cloud Service. As with PaaS, you have very limited control over database instance level configuration parameters, including settings like the overall size of the SGA or whether to pin a particular table into cache. The Oracle Database Cloud manages these settings to provide optimal performance for all tenants, as described in the white paper on Performance and the Database Cloud.
- The interactions with Oracle Database. The Oracle Database gives you programmatic access to the underlying Oracle Database through SQL or PL/SQL, executed from inside the Oracle Cloud or through RESTful Web Services. This form of interaction is also associated with PaaS. You do not have access to the Database Cloud Service over the Internet with standard SQL*Net connectivity.

These differences are reflected in the way that most DBaaS offerings are implemented versus how the Oracle Database Cloud Service is implemented. DBaaS services typically give you your own Oracle instance in a virtual machine, while the Database Cloud Service uses a multi-tenant architecture for a more scalable approach.

The Oracle Database Cloud can also be used as a DBaaS, with the caveat that access to the Oracle Database is achieved through RESTful Web Services, rather than an API. The Database Cloud will still be fully managed, with limited configuration options if you choose to use the RESTful Web Service interface, rather than the full development and deployment capabilities.

Oracle Database Cloud for new and existing applications

The Database Cloud Service comes with three main components – a rapid application development and deployment tool, Application Express, that has been proven capable of enterprise-strength application development since its release in 2004; a RESTful Web Service interface which gives secure access to SQL and PL/SQL through this popular Web Service standard; and a collection of applications that can be installed and run with just a few clicks, providing instant business value.

The Database Cloud Service is a true multi-tenant offering, using schema isolation to secure each tenant's data. This architecture means that the underlying Oracle Database instance can use all of its robust resource sharing capabilities for tenants as it does for normal database users.

However, the nature of the Database Cloud Service means that you will not be able to simply move an existing Oracle Database from your own instance to the Database Cloud without some migration effort. Since the Database Cloud Service does not support SQL*Net access from outside the Oracle Cloud, you would either have to run an existing Java application in the Oracle Java Cloud, run an existing Application Express application in the Database Cloud, or replace existing SQL access calls with RESTful Web Services for data and logic access instead of standard SQL over SQL*Net. Depending on the architecture of your application, the migration effort required for this transformation might be significant.

In some cases, you may decide that you could save time by simply developing a new version of your application for the Database Cloud Service, secure in the knowledge that you could move the application and database to other Cloud and in-house platforms if you wished.

This caution only applies to migrating an existing application, which was possibly designed without any consideration for the architecture of the emerging PaaS platform of the Database Cloud Service. New applications, including robust enterprise strength systems, can be easily implemented with the Database Cloud Service's development platform.

Oracle Clouds – Public and private

The Oracle Database Cloud Service is a public Cloud service – fully managed and available on a monthly subscription basis. The Database Cloud Service gives you everything you need to create Software-as-a-Service products, as well as making the data in your Database Cloud Service available through the use of RESTful Web Services. As described above, there are limits on the flexibility of the Database Cloud Service, imposed to support

the schema-based multi-tenant model and to protect the data and performance integrity of the Database Cloud for all tenants.

Of course, the Oracle Database itself offers a much wider range of capabilities and options. Remember that the Oracle Database Cloud Service is entirely self-contained within an Oracle Database instance. This architecture means that you can easily migrate your applications and data from the Oracle Database Cloud to any on-premise Oracle database, or even another public Cloud provider, given the appropriate Oracle Database infrastructure.

Once you move your applications and data to a private Cloud, you can, if you wish, continue to use the multi-tenant architecture of the Oracle Database Cloud. This infrastructure is implemented through Oracle Application Express, a no cost feature that comes with every Oracle Database. In your own private Cloud, you have complete flexibility to add to the standard features of the Oracle Database Cloud, such as the use of any and all database options.

If you want to use your Oracle Database in a way that goes beyond the restrictions of the multi-tenant architecture, you always have the choice of moving to your own Cloud environment, whether this environment is in your data center or part of a public Cloud offering like Oracle Managed Cloud Services. You can access these cloud environments in different ways, such as through SQL*Net, or add in other Oracle Database options, such as Spatial or OBIEE. You can even move your data and applications to an Oracle XE instance and run your systems on your laptop.

There are many other choices of architecture available to you on an Oracle Database private cloud. For instance, you could implement a Real Applications Cluster with each node supporting one or more tenants. You could have multiple instances of an Oracle Database on a single machine, with each supporting any number of tenants. You could also have virtual machines that included Oracle Database instances for your private cloud architecture. You are only limited by the feature set of your particular Oracle Database – a feature set far too broad to even summarize in this paper.

The Cloud is bringing new and attractive choices for your computing environment. Whatever variety of Cloud computing suits you desire, the Oracle technology stack can address your needs.



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