Product Brief

Introducing Oracle Database 12c: Manage Many Databases as One

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Abstract: Oracle’s dramatic re-architecture of its latest enterprise relational database, Oracle Database 12c, offers database customers a long list of real improvements to support cloud implementations, enable the consolidation and management of many databases as one, and streamline the day-to-day work of database administrators.

Overview

Oracle announced general availability of Oracle Database 12c on June 25, 2013, pulling the commercial covers off unquestionably one of the most important architectural transformations in the history of the world’s leading database in its 25 years in the enterprise market. While many details about Oracle Database 12c were unveiled during Oracle OpenWorld in San Francisco in late September 2012, its general availability signals Oracle's go-to-market riposte against a reinvigorated database market. The reinvigorated market includes long-standing competitors like IBM, Microsoft, and SAP/Sybase, plus a rash of relatively recent “NOSQL” or “Not Only SQL” entries that, at least in the cloud database submarket, include intriguing alternatives from Amazon Web Services and Google.

In terms of performing an initial analysis of Oracle Database 12c's potential impact on customers, prospects, and the market, there are several competitive and customer angles to consider, but we will stick to two primary customer camps: (1) The relatively loyal Oracle database customer and (2) non-loyal Oracle customer or prospect. Let us first, however, consider the general competitive environment.

Analysis: Enterprise Database Upheaval Correlates to Other IT Trends

IT advances including cloud, virtualization, big data, collaboration, mobile, social media/business, sensor technologies, robotics, better CPU performance for the price, and embedded technologies have forever altered the applications that enterprises will implement going forward. Singularly, any of these technologies carries enough force to spawn a wave of IT disruption, but the fact that they are all happening simultaneously is causing massive upheaval in both the supply and demand side of IT. This true revolution is certainly not limited to the functions, user experience, and reach of enterprise applications, but also to the related development, deployment, and management of the infrastructures, databases, and middleware that underlie enterprise applications.

Despite all the upheaval, however, data remains the life blood that oxygenates the entire body of enterprise IT, and Oracle remains the leading technology supplier of the databases that capture, manage, and distribute data for enterprises. The problem, however, is that the Oracle database technology is not getting any younger, and in today's enterprises, more data, of different types, being delivered at faster rates, and for new purposes to new locations, have at times begun stretching the Oracle database.

Sensing that opening, a parade of database startups have appeared from places like Boston, Israel, and Silicon Valley, as well as from the open source community, over the past several years. At the same time, Oracle's established stalwart competitors have stepped up R&D, not just to protect their own respective bases, but also perhaps to poach Oracle customers. Finally, key movers in the cloud, Amazon Web Services and Google primarily, have engineered their own data management alternatives. Oracle has not faced this type of competitive pressure in a long time. One had to wonder: How would Oracle respond to the labyrinth of competitive thrusts? The main answer from Oracle is: Oracle Database 12c, and it is apparent to ESG that if Oracle was napping at all, it was doing so with one eye wide open.
Analysis: Install Base Will Experience Eyes Opened Wide Upon Seeing Oracle Database 12c

Technical details abound publicly about Oracle Database 12c, and rather than attempt to recount the details, we suggest readers visit [http://www.oracle.com/us/products/database/overview/index.html](http://www.oracle.com/us/products/database/overview/index.html). But here is a quick introduction that will focus on what ESG believes will prove out as the key features and benefits that will keep Oracle database customers mainly in their database seats despite the reinvigorated competition.

The ABCs of CDBs and PDBs

Oracle Database 12c introduces a new multitenant architecture that effectively divides, for the first time, the Oracle Database architecture and implementation into two primary parts, known as multitenant container databases (CDB) and pluggable databases (PDBs). Think of PDBs as the part of the database that contains the actual data needed by applications and their users. CDBs provide a resource managing runtime that currently houses up to 252 PDBs, and supplies services to PDBs such as: a single point for backup and patching, and dynamic resource allocation from the host infrastructure. In essence this allows DBAs to treat “many PDBs as one” to significantly improve database management practices and database performance.

Oracle Database 12c accomplishes this division by splitting its data dictionary and background processing between CDBs and PDBs: Each PDB carries its own metadata and namespace, making it a holistic instance ready for transport or replication across other CDBs. The CDB owns a root namespace that includes an Oracle-only part of the dictionary to allow for direct patch updates, plus an administrative layer that enables DBAs to perform a wide variety of functions and tuning—applied to the contained PDBs simultaneously. Seems simple enough on the surface, but the implications for Oracle customers and service providers are enormous.

Some key benefits of PDBs that particularly impress ESG include:

- **Secure multitenant applications**: By adding a layer of abstraction or containerization, Oracle Database 12c enables a new generation of multitenant applications to be secured at the database layer. It also provides cloud providers an easy, quick means to allocate and manage databases across multiple systems and data centers—without changing the application. Whether using public or private cloud for applications, this places Oracle Database 12c right in the middle of the cloud database discussion.

- **Disaster recovery, backup, patching, cloning, and upgrading flexibility**: Whether you use RMAN or Data Guard, or other Oracle tools, you can readily clone, move, or back up either an entire CDB, or individual PDBs, allowing for the flexible development of a variety of DR scenarios. You may also apply patches to all PDBs simultaneously under a single CDB, or move PDBs to new containers in order to selectively apply patches and perform upgrades. A key improvement is the addition of point-in-time recovery for individual pluggable databases, which will greatly facilitate development and testing as well as various restore scenarios.

- **Database prioritization**: Through a new CDB Administrator role, DBAs can apply different levels of priority to various PDBs within a CDB, allowing for a mixing and matching of databases that advance opportunities for consolidation and performance tuning; think of it as the idea of tiered storage applied to the actual database. It is important to note that pre-Oracle Database 12c database commands still apply, so the learning curve for DBAs for CDB administration is straightforward.

- **PDBs use far less memory than standalone databases**: “Background processes” consume memory. With Oracle Database 12c, multiple PDBs share a single group of “background processes,” a more efficient model compared to traditional standalone databases that each require their own background processes. As a result Oracle Database 12c requires less memory and offers better resource utilization, resulting in dramatic savings in highly consolidated environments.

- **No change required to applications to use PDBs**: Migrating an existing Oracle Database 11g to run within a consolidated mix of PDBs is straightforward and simple—simply plug it in as a CDB. No changes to the database or application code are required.
**Additional benefits of Oracle Database 12c:** The list of benefits, frankly, are too long and already documented to attempt to cover them all comprehensively herein, but in the “other key benefits category” ESG includes: (a) Oracle Database 12c adds flexibility and ease-of-use to the application of Oracle Real Application Clusters (RAC); (b) it potentially significantly increases performance and optimizes server/storage utilization; (c) it natively supports dynamic data masking, a critical data-layer security feature required for enterprise class applications with sensitive data; (d) it enables row pattern matching which helps with big data style discovery processes, functionality usually reserved for columnar or network/graph data models; and (e) it enables zero-data-loss for remote standby for disaster recovery over long distances.

**Interviews: Voices of Oracle Database 12c Beta Customers**

ESG has had the opportunity to speak with some of Oracle’s customers who participated in the Oracle Database 12c beta program, and we found customers amazed at how well Oracle’s new database performed. Given that Oracle Database 12c research and development began around five years ago, and given the dramatic architectural and implementation changes over previous versions of Oracle Database, the fact that Oracle allocated a full year for beta testing was a wise move.

**Aramark**

James Lui, Senior Oracle Application DBA at Aramark’s business services division, became involved in the beta because of his role with IOUG—Independent Oracle Users Group—and because in his words “we are fairly fearless when it comes to taking on new products and telling Oracle exactly how we feel.” The testing took place in January [2013], in the third and final beta test phase. James reported, “It was the best beta experience I have had in a long time, because it didn’t feel like a beta, but a real, delivered product. We found some very minor errors in the documentation, but the product itself exceeded expectations.”

Aramark wanted to perform a legitimately sized test, and so decided to try upgrading with a one terabyte Oracle R12 E-Business Suite replica. Out of roughly 600,000 objects there were only 49 invalids as a result of the upgrade, and according to James, “they were exactly the invalids Oracle told us would be invalid, all having to do with some of Oracle’s older code.”

Going forward, James saw a number of clear benefits associated with Oracle Database 12c. For example, he cited how Oracle Database 12c’s “SOA like” service naming flexibility would help Aramark on a number of fronts like latency and cost issues. For a global company like Aramark, it has been difficult to deal with database latency issues because the hurdles to moving databases have been a limiting factor. But with Oracle Database 12c it will be far easier to unplug and plug back in databases to take advantage of remote computing resources, or even “to shoot an instance to Asia or Eastern Europe to take advantage of less expensive hosting services.” He also cited how the service naming approach will help increase architectural flexibility and planning for heterogeneous environments.

In conclusion James said that the container approach would make testing and development far easier because, “We can take up and down pluggable databases for development and testing without interruption.” He advised DBAs at other organizations that they will no longer have to focus on hardware choices as much as they have in the past, and suggested, “Don’t be hesitant to try [Oracle Database] 12c. Most DBAs tend to be gun shy and with good reason, but we had no issues. Every customer will find something unique and useful about this revolutionary product. We had 155 years of DBA experience doing the testing and it was the best quality we have seen in a long time.”

**Postbank**

Jens-Christian Pokolm, Database Analyst at Postbank, one of Germany’s largest retail banks, told us that he first got involved two years ago when he first met with Oracle in San Francisco about the upcoming beta. In March 2012, a Postbank team went to Oracle’s development labs in Redwood Shores, CA to initiate beta testing, and they subsequently continued testing in local offices in Germany. He found Oracle Database 12c, “Most useful. It will make it easier to upgrade databases; just unplug the container and plug it into a new environment. Downtime will much be much shorter and the release upgrading will take place in a much shorter cycle.”
Jens-Christian also stated that there will be performance improvements and cost savings—for example, “The database nodes you can use for Oracle Database 12c will make much more memory available to individual pluggable databases, so you can use smaller configurations if you want.” He also felt system security was greatly improved, given that the container cannot see the data of the pluggable databases—the pluggable database is itself a holistic database. He also was pleased that with “Oracle Database 12.1 we can do a table recovery rather than just a table space recovery.”

“Given that we have about 400 databases in production and the same number in test and development, we will use the container and pluggable approach for database consolidation purposes,” Jens-Christian stated. Also initially, “we will move smaller and medium-size databases to Oracle Database 12c pluggable [databases] to take advantage of better optimized memory and administration enhancements. We will focus first on internal applications and information-only external applications.”

In Jens-Christian’s opinion, “DBAs should learn quickly how to work with pluggable databases” because of the related patch management and upgrade improvements. We have to distribute quarterly patches to the databases in my company, and we will do this faster and more safely because of the pluggable approach.” Jens-Christian is making plans to deploy Oracle Database 12c this year stating that “we plan to move our first apps in summer and go live in the autumn of 2013.” But he predicted that Postbank will start using Oracle Database 12c for testing and development purposes in the very near future.

Analysis: The Appeal for Oracle Database 12c Beyond Oracle Customers

It is clear to ESG that Oracle Database 12c will go a long way to prevent currently loyal Oracle database customers from moving haphazardly to other database options for cloud applications, for consolidation purposes, and for improving database administration processes.

Much of Oracle’s uphill climb winning in newer use cases has to do with developers wanting to choose databases offering data models that best match those use cases (e.g., columnar databases for analytics, graph databases for graph analytics, row-columnar hybrid for content rich applications, etc.). In addition, many of these competitive-to-Oracle databases are already available through a long list of public cloud providers, and a few are truly multitenant. In that buyer context Oracle Database 12c is not late to market per se, but simply the wrong type of database for emerging application use cases; it is still a relational database with a 25 year old legacy. Even if you would be hard-pressed to find a line of Oracle Database 12c code that was indeed 25 years old, perception is reality.

However, if Oracle deploys Oracle Database 12c as a service through many other cloud service providers, it will pick up new customers who want to use the cloud wholly or partially for transactional applications and even straightforward data warehouses. ESG expects that Oracle will indeed look to deploy Oracle Database 12c as an option on leading public enterprise cloud service providers such as Amazon Web Services and HP Cloud, and if recent deals announced with Microsoft and Salesforce.com are any indication, cloud service providers will likely be very receptive.

The Bigger Truth

Between engineered systems and now Oracle Database 12c, Oracle has once again stretched the leadership lifespan of the Oracle database. Oracle will move quickly to encourage its install base to upgrade to Oracle Database 12c, and Oracle has provided plenty of excellent reasons for customers to do so. ESG, in fact, recommends that customers should immediately take a close look at coming up to speed and starting the upgrade cycle to Oracle Database 12c. The benefits are many and Oracle has done an outstanding job of minimizing the risks. And every Oracle customer that shifts to Oracle Database 12c will be scratched off the list of potential migrations to one of Oracle’s primary competitors, at least for a few more years.

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