ONE STEP BEYOND:
Database-as-a-Service Reaches New Heights of Efficiency

With help from Oracle, building private database-as-a-service solutions is finally something any enterprise can do.

For newcomers to corporate IT, life before virtualization is hard to imagine. Ask any grizzled data center veteran about the old days, though, and that person will tell you all about the time, effort, and money he or she once spent standing up new servers.

Today, of course, provisioning servers can be as easy as launching new virtual machines. Yet for all the advantages virtualization can offer elsewhere in the stack, database professionals young and old alike know all too well that it does nothing to make provisioning, operating, and administering databases any less expensive, hands-on, or time-consuming than it’s always been.

Or at least that was the case until recently. Now, however, a built-in option for Oracle Database 12c called Oracle Multitenant is empowering businesses to build a new class of in-house database-as-a-service (DBaaS) solutions that turn setting up and managing databases into a truly point-and-click affair. Especially when used in combination with Oracle server hardware and management software, Oracle Multitenant finally makes consolidating databases as easy as consolidating servers. That seemingly simple yet long overdue breakthrough, it turns out, has radical implications for corporate agility, competitiveness, and profitability.

HURRY UP AND WAIT
Of course, DBaaS itself isn’t anything new. Businesses have been running DBaaS solutions in steadily rising numbers for years. In fact, 32.6 percent of businesses surveyed in 2013 had plans to utilize a DBaaS system, according to New York-based analyst firm 451 Research LLC, which also expects spending on DBaaS offerings to rise at a compound annual growth rate of 86 percent between now and 2016.
Such predictions make perfect sense in light of the significant provisioning advantages DBaaS solutions offer. At most companies today, overworked IT managers simply don’t have enough time to create all the databases their business counterparts need. “There are people out there who wait literally three or four months for a database to be created,” says Patrick Wheeler, Oracle’s senior director of database product management. All too often, those long delays lead impatient executives to bypass IT and set up new databases on their own using public cloud computing platforms. “They create these renegade, do-it-yourself IT departments,” Wheeler notes. That saddles the actual IT department with a host of new challenges and risks. For starters, all those siloed, roll-your-own databases make the already difficult job of managing and securing information all but impossible. “The more copies of data you proliferate, especially to different sites, the more difficult the data governance problem becomes,” observes Carl Olofson, research vice president for application development and deployment at Framingham, Mass.-based analyst firm IDC. And while IT didn’t create those off-site databases and has little control over them, it’s usually on the hook for supporting them just the same when something goes wrong.

Private DBaaS solutions liberate IT managers from such issues while giving business leaders the agility they crave. “If I’m doing a special analytic project, I can just stand up a database and do it. I don’t have to wait for a database to be provisioned [by IT],” Olofson says. Nor must users endure delays when they need more capacity, because DBaaS solutions can scale up databases quickly when demand rises and scale them back down just as rapidly when it drops. Solutions equipped with metering functionality, moreover, let IT departments bill business groups for those rises and dips with precision. “You can get a more accurate and fair chargeback because you only get charged for what you’re actually using,” Olofson states.

Technicians, meanwhile, can update, back up, and otherwise administer an entire collection of DBaaS databases at once, which reduces IT costs while enhancing security. “It’s kind of a best-of-both-worlds solution,” Wheeler states. “Your business units get the speed and flexibility they want while your IT department gets the control and efficiency it needs to meet its responsibilities.”

**Ultimate Efficiency**

That’s more than server virtualization can deliver on its own. Consolidating servers via virtualization improves hardware utilization and scalability, but still leaves administrators with a sea of virtual machines to provision and maintain. “All you’ve done is replace your physical sprawl with virtual sprawl,” says Michael Timpanaro-Perrotta, senior director of database management in Oracle’s Database Development Group. “You’ve reduced your hardware footprint but haven’t reduced the overall complexity of your environment significantly.”

Platform consolidation, an alternative to virtualization that has been possible since Oracle introduced its Real Application Clusters (RAC) technology over a dozen years ago, does add efficiencies by enabling administrators to manage multiple operating system instances as one. The databases running on top of those operating systems, however, still require separate resources and management. “You’ve got to allocate memory to all of your databases individually, and then upgrade them, patch them, and back them up individually too,” Timpanaro-Perrotta observes. “It’s a big step in the right direction, but there’s still a lot of wasted time, space, and budget.”

To realize the full potential of DBaaS, businesses must consolidate not just their servers and operating systems but their database schemas too. “That gives you the ultimate level of efficiency, because it allows a single shared set of memory and background processes to support more applications on fewer servers,” Timpanaro-Perrotta says.
Unprecedented Advantages

Until recently, however, implementing database schema consolidation was a complex, manual undertaking that few IT departments had the time or know-how to tackle. “A lot of companies have tried it, but they usually get frustrated and drop it,” Timpanaro-Perrotta says. “Conceptually it’s very attractive, but to try it on your own is a nightmare.” As a result, most companies that use DBaaS today implement workarounds that avoid schema consolidation.

That whole picture changed, however, with the introduction of Oracle Multitenant, which for the first time turns building and maintaining a privately hosted DBaaS environment into something any enterprise can do on its own without schema consolidation. With Oracle Multitenant, companies can quickly and easily create “container” databases filled with “pluggable” application-level databases that share common resources and background processes. Maintenance occurs at the container level, but application code connects only to the pluggable databases, so business systems function exactly as they always have without any changes.

For IT departments, it all adds up to a groundbreaking combination of painless deployment, streamlined management, unprecedented consolidation density, and granular control. “You can have more applications per server and manage them all as one, but do so without giving up data isolation or the ability to prioritize resource utilization,” Wheeler says.

A recent Oracle benchmark sheds light on the magnitude of savings Oracle Multitenant can deliver. The benchmark, which compared identical database workloads, found that consolidating with Oracle Multitenant led to 8x better memory utilization and a 2x reduction in storage input/output operations per second (IOPS). These improvements translated into an 80 percent increase in performance and consolidation of 50 percent more active databases on the same hardware.

The experiences of e-DBA Ltd., an Oracle database solution provider and Oracle Multitenant early adopter with offices in the United Kingdom and Australia, provide real-world confirmation of those results. “You can put a much higher number of databases on the same size piece of hardware. Clearly that has huge cost and efficiency advantages,” observes James Anthony, e-DBA’s technology director. So does the easier administration Oracle Multitenant enables, he adds. “I don’t think we realized how good the management efficiencies were going to be,” Anthony says. “They’ve surpassed our expectations.”

Furthermore, Oracle Multitenant makes provisioning a new database almost as easy as copying and pasting an existing one. For the many high-tech start-ups e-DBA supports, that’s a major plus. “Being able to just clone their existing production environment in a few moments is a big benefit for them,” Anthony notes. “It helps them be much more agile in their development.”

The same goes for the plug-and-play deployment flexibility Oracle Multitenant provides. Any time they want, administrators can quickly unplug a database from one container and replug it into another. “That allows you to do things like create a service catalog of separate container databases for your different SLA levels, and move databases from one to another on a drag-and-drop basis,” Wheeler says.

To ensure high availability, Oracle Multitenant integrates seamlessly with Oracle’s RAC and Data Guard technologies too. Both systems prevent a single point of failure from impacting uptime. RAC does so by distributing data processing across a centrally managed cluster of servers—if one server malfunctions, the others automatically pick up the slack. Data Guard similarly enhances reliability by allowing companies to maintain synchronized copies of a database at multiple locations. Should a production database go down, a backup copy can take over quickly, and in some configurations transparently.

Unbeatable Foundation

Of course, building a dependable, high-speed DBaaS environment takes more than just database software. Enterprise-grade host hardware is essential too, which is why many companies run Oracle Multitenant on Oracle’s Exadata Database Machine, a powerful and sophisticated server platform...
optimized from the inside out for database workloads. Equipped with up to 192 processor cores and as much as 300 TB of disk space, along with 40 GB/sec InfiniBand network connectivity, Exadata also offers cutting-edge caching, compression, and I/O resource management functionality. Together, those features improve database performance by 10x and reduce table sizes by up to 50x. "A general-purpose computer is exactly that," Wheeler notes. "Exadata is specifically engineered to run extremely fast, extremely dense databases."

Oracle Enterprise Manager, meanwhile, offers end-to-end lifecycle management functionality, including automated features for provisioning, monitoring, backing up, restoring, and retiring Oracle Multitenant databases. "All of those consoles are brought together in a single, unified environment that's very easy to use," Wheeler says. What's more, the system also includes the self-serve provisioning, metering, and chargeback functionality businesses need to maximize DBaaS efficiency. In fact, users of Oracle Enterprise Manager can improve administrative productivity by up to 20 percent, according to research from Crimson Consulting Group, of Palo Alto, Calif.

Together, Oracle Multitenant, Oracle Exadata, and Oracle Enterprise Manager form an unbeatable foundation for private DBaaS solutions. "We offer a comprehensive, enterprise-level database-as-a-service solution from a single company," Wheeler says. "No other vendor can match that." Nor can any other vendor match the consolidation density, provisioning speed, and ease of management Oracle delivers, or the cost savings it enables, because Oracle Multitenant isn't just the world's first automated database consolidation solution. So far, it's the only one. And since Oracle Multitenant is fully compatible with the proven, familiar Oracle Database platform, businesses can reap the benefits of in-house DBaaS in less time and with far less risk.

Those benefits are substantial too. With their steep consolidation ratios, Oracle-based DBaaS solutions help businesses lower their hardware, power, cooling, and administrative expenses. They also conserve valuable data center floor space and free up equally valuable DBAs to spend less time provisioning databases and more time contributing to strategic IT initiatives.

Most important of all, though, private DBaaS solutions based on Oracle hardware and software empower businesses to move faster and compete more effectively. "You don't have to wait months for a new application, or create one on your own in the public cloud and deal with all the problems that introduces," Timpanaro-Perrotta says. "That alone gets you more ROI sooner."

According to Anthony, those words are music to the ears of e-DBA's customers. "I would say that probably by early 2015, just about all of them will have migrated onto the [Oracle Multitenant] platform," he predicts. The advantages of leveraging the IT industry's densest, fastest, and most cost-effective DBaaS architecture are simply too compelling to ignore.

For more information, visit www.oracle.com