

Database Management Predictions 2019

Oracle DBAs Share Insights About
the Future of Cloud, Security, Artificial
Intelligence, and Autonomous Computing



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Database Maintenance

With more than 70 percent of IT budgets spent on general maintenance tasks, today’s IT leaders want to devote more time and money to innovation. We asked our DBAs to share their views on how day-to-day maintenance tasks will change as autonomous databases shoulder a progressively larger share of the workload.

According to Anuj Mohan, an Oracle ACE and technical account manager at Data Intensity, today’s midlevel DBAs still spend most of their time performing routine tasks such as backing up databases, monitoring database performance, and responding to alerts. He thinks autonomous databases are poised to change all that by automating many of these routine database management tasks. Will these changes be disruptive? Perhaps. But as Mohan points out, cycles of automation always bring changes to the day-to-day activities of database administrators—and new opportunities as well.

“Remember Oracle RMAN and Oracle Enterprise Manager?” he asks. “RMAN changed the way you do backup and recovery, and Oracle Enterprise Manager changed database management procedures.” When Oracle Exadata came along, the DBA role merged with the roles of system administrators and storage administrators, he adds—expanding the horizon of possibilities for highly skilled individuals. Today, that cycle of automation has reached its peak with Oracle Autonomous Database. “A lot of trivial DBA tasks will not be needed,”

Mohan notes, saying that this industrywide journey to automation has just begun. “In 2019 and succeeding years, DBA-managed on-premises databases will be competing against cloud-native autonomous capabilities,” he predicts. “However, skilled oversight will still be important. DBAs will still leverage advanced Oracle Enterprise Manager Cloud Control capabilities, along with Oracle Multitenant, to augment these automated tasks.”

“Oracle Enterprise Manager Cloud and other third-party tools, in conjunction with Oracle Multitenant will make managing large numbers of databases easier. DBAs will be able to manage 10 times or more databases after consolidation with Oracle Multitenant.”

—Anuj Mohan

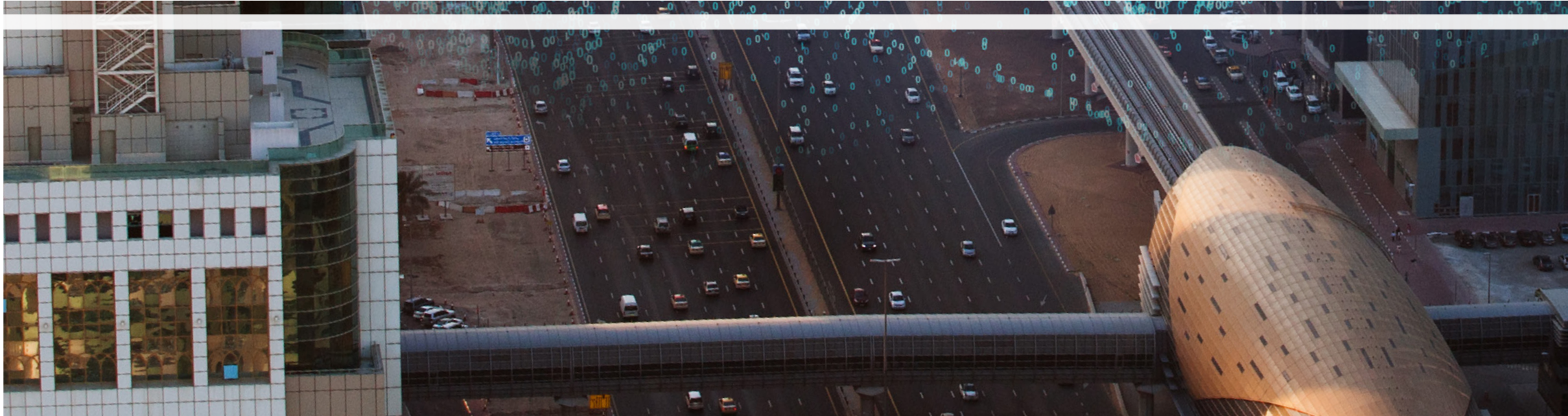
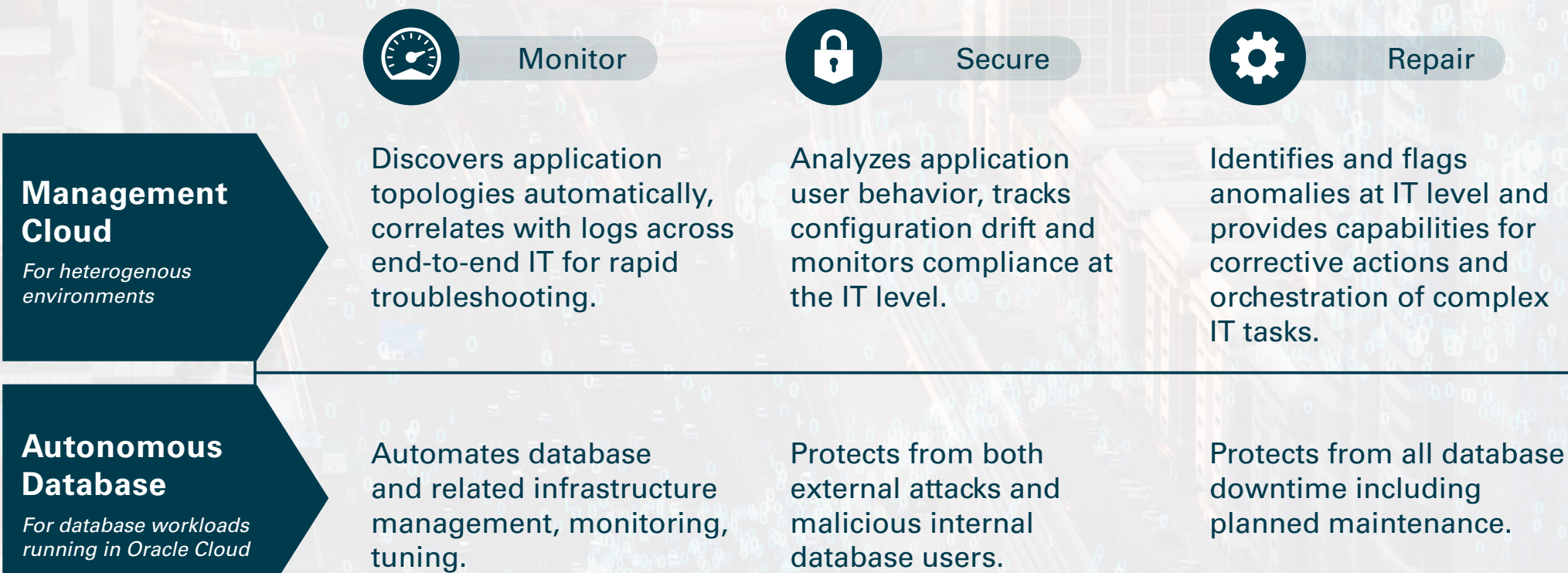


Anuj Mohan

Oracle ACE Technical Account Manager, Data Intensity



Automating Manual Tasks Across Application Stack



Database Security

According to a recent Oracle Threat Report, the number of security events will increase 100-fold by 2025, and automation will become the most reliable way of preventing, detecting, and mitigating those threats.

As security monitoring is automated, how can IT professionals identify the most pressing threats among all this noise? How will cybersecurity change in an era of machine learning and AI? And as automated bots respond to many threats automatically, what tasks remain for cybersecurity pros?

Michelle Malcher, a data protection and security architect at Extreme Scale Solutions, agrees that autonomous monitoring and auditing can identify many issues and threats against the database. “Autonomous detection procedures work in conjunction with automated and standardized provisioning of databases,” she explains.

“Increasing cybersecurity threats necessitate greater agility and stronger policies to control configuration drift,” adds Malcher. “Oracle Autonomous Database monitors cloud service settings, notifies DBAs of changes, and prevents configuration drift by allowing IT pros to restore approved settings at any time. This eliminates tedious investigations and makes it easier to prepare for compliance audits.”

Malcher says Oracle Autonomous Database will minimize the false positives and changes to the baseline configuration, which already includes security hardening. This frees up IT pros to focus on issues that require investigation, as opposed to having to track down details that are triggered because of a customization and are unrelated to security.

“Relying on automated bots to remediate threats might seem difficult or even frightening for security professionals who are accustomed to being in control,” Malcher says. “However, over time, as bots capture baseline changes, they will learn to identify and prevent unauthorized changes in entitlements, as well as control access to data, and use machine learning to strengthen security controls—even as regulations, behaviors, and attack vectors change.”

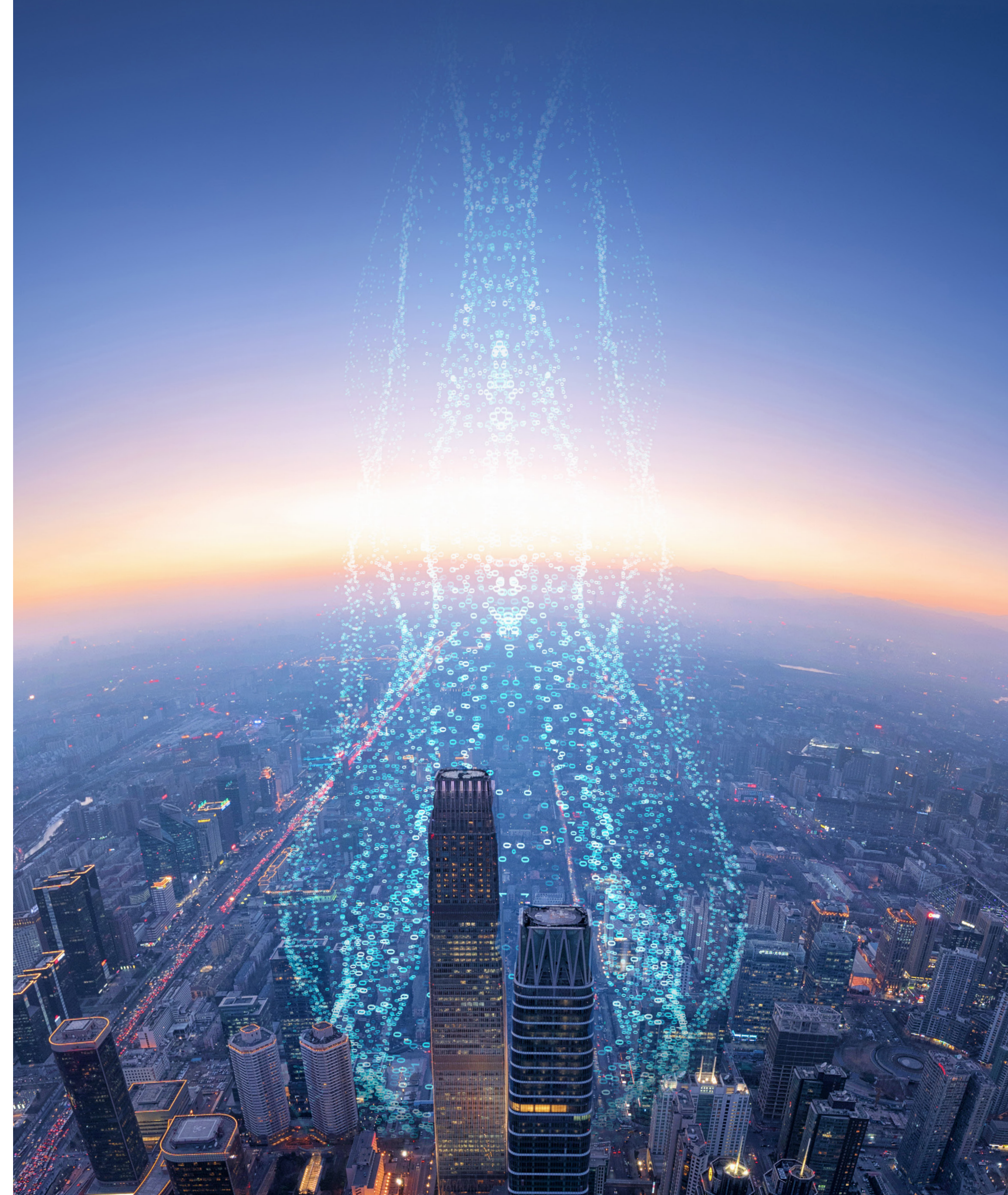
“Oracle Autonomous Database can quickly provision, resize, and relocate databases with little human interaction. However, as more database provisioning tasks are automated, DBAs will still need to classify the data.”

—Michelle Malcher



Michelle Malcher

Data Protection and Security Architect, Extreme Scale Solutions



Database Reliability, Availability, and Performance

All of the DBAs who contributed their insights here agreed about one important factor: Data is a crucial organizational asset and it must always be available, trusted, and secure. Help is at hand: IDC predicts that artificial intelligence will drive self-configurable and self-healing infrastructure, improving productivity and eliminating processes that are currently prone to human errors.¹

How do you get there?

The first step to ensure higher availability is to eliminate manual maintenance activities such as patching, updates, and upgrades while the system is running. To that end, Oracle CTO Larry Ellison predicts that 90 percent of data will one day be managed autonomously.²

Rich Niemiec, chief innovation/information officer at Viscosity North America, favors autonomous database management not only to improve uptime, but also to boost security. Furthermore, he predicts that as nefarious entities begin to use ML and AI technologies to attack databases, Oracle will be the “safe portal to go through to get to all other data sources (including Hadoop and other NoSQL databases).”

Niemiec sees the value in relying on the ML capabilities of Oracle Autonomous Database to automatically patch systems the moment vulnerabilities are discovered. “Oracle Autonomous Database has an edge due to its ability to automatically patch vulnerabilities seconds after an issue is discovered—and that time interval will drop to mere microseconds in the years ahead,” he predicts.

Even though software patches are applied automatically in the background and all actions are audited, DBAs will still have to monitor the unified audit trail logs and perform actions if necessary.

“CEOs will force DBAs to step into more-important roles—such as data architects, data managers, and chief data officers—as a company’s data and machine learning algorithms become important drivers of the stock price.”

—Rich Niemiec



Rich Niemiec

Chief Innovation/Information Officer, Viscosity North America



¹ Dan Vesset et al, “IDC FutureScape: Worldwide Analytics and Artificial Intelligence 2019 Predictions,” IDC research document US44389418, October 2018, [idc.com/getdoc.jsp?containerId=US44389418](https://www.idc.com/getdoc.jsp?containerId=US44389418).

² Oracle, “Sound Familiar? Larry Shares the Oracle Autonomous Database Story,” Oracle video, [video.oracle.com/detail/videos/all-videos/video/5850515741001](https://www.oracle.com/detail/videos/all-videos/video/5850515741001).

Data Growth

The total amount of enterprise data under management grows exponentially each year, and 39 percent of DBAs now handle 50 or more databases.

According to Julian Dontcheff, managing director and master technology architect at Accenture, the sheer size of the data is not a major factor when considering the productivity of DBAs, but rather, the number of instances and the variety of database brands and versions. “One thousand autonomous Oracle databases are much easier to manage than a mixture of 100 on-premises Oracle databases from versions 10g to 18c,” he suggests. “And if you have multiple database brands, then the complexity is even greater. Thus the long-term goal should be to move as many databases to Oracle Autonomous Database as possible.”

“When 100 percent of all routine tasks are part of autonomous, the productivity of DBAs will be measured via innovations and business benefits. Their role will become more visible and more appreciated.”

—Julian Dontcheff

According to Michelle Malcher, as more lines of business request databases, and the total amount of data under management grows, enterprises will require better management of all of the database groups—along with automation—enabling DBA teams to manage many as one. “Most enterprises employ dedicated DBAs who understand the processes and data,” she points out. “At Extreme-Scale Solutions, we have observed many efficiency gains from the database as a service [DBaaS] model. In addition to automation of most infrastructure and system administration tasks, we have seen faster time to market. Most cloud databases can be provisioned in 40 minutes or less, versus weeks using the old on-premises methods, and standardized DBaaS infrastructure can be rolled out in days instead of months. In our experience, migrating to the Oracle DBaaS model is seven times faster than an on-premises solution.”



Julian Dontcheff

Managing Director and Master Technology Architect, Accenture



Database Provisioning

Fact: 95 percent of today’s DBAs still manually create and update databases. We asked our experts how they think these numbers change as Database as a Service becomes more popular. Are business users now able to provision their own databases? What obstacles stand in the way, and how can these obstacles be surmounted?

Jim Czuprynski, a data enterprise architect at Zero Defect Computing, reminds us that automated database provisioning isn’t new. Lots of organizations have set up scripts to build Oracle Database environments, using everything from Puppet and Chef to shell scripts. “They get it—they know they need to be able to provision new databases quickly, especially with the onset of DevOps demands,” he notes.

“DBAs need to understand that there is a true sea change afoot, and there’s no way to stop these market forces. Hopefully, we’ll all be able to embrace this tidal wave and avoid being caught up in the undertow.”

—Jim Czuprynski

Czuprynski predicts that Oracle 19c portends dramatic changes to what DBAs will be focused on, especially with the new Automatic Indexing features of Autonomous Transaction Processing (ATP). “Add this to the performance-tuning dimension that Oracle 18c’s Autonomous Data Warehouse (ADW) already brings to read-mostly analytic reporting functionality, and it looks like DBAs will have a lot more time on their hands,” he predicts.

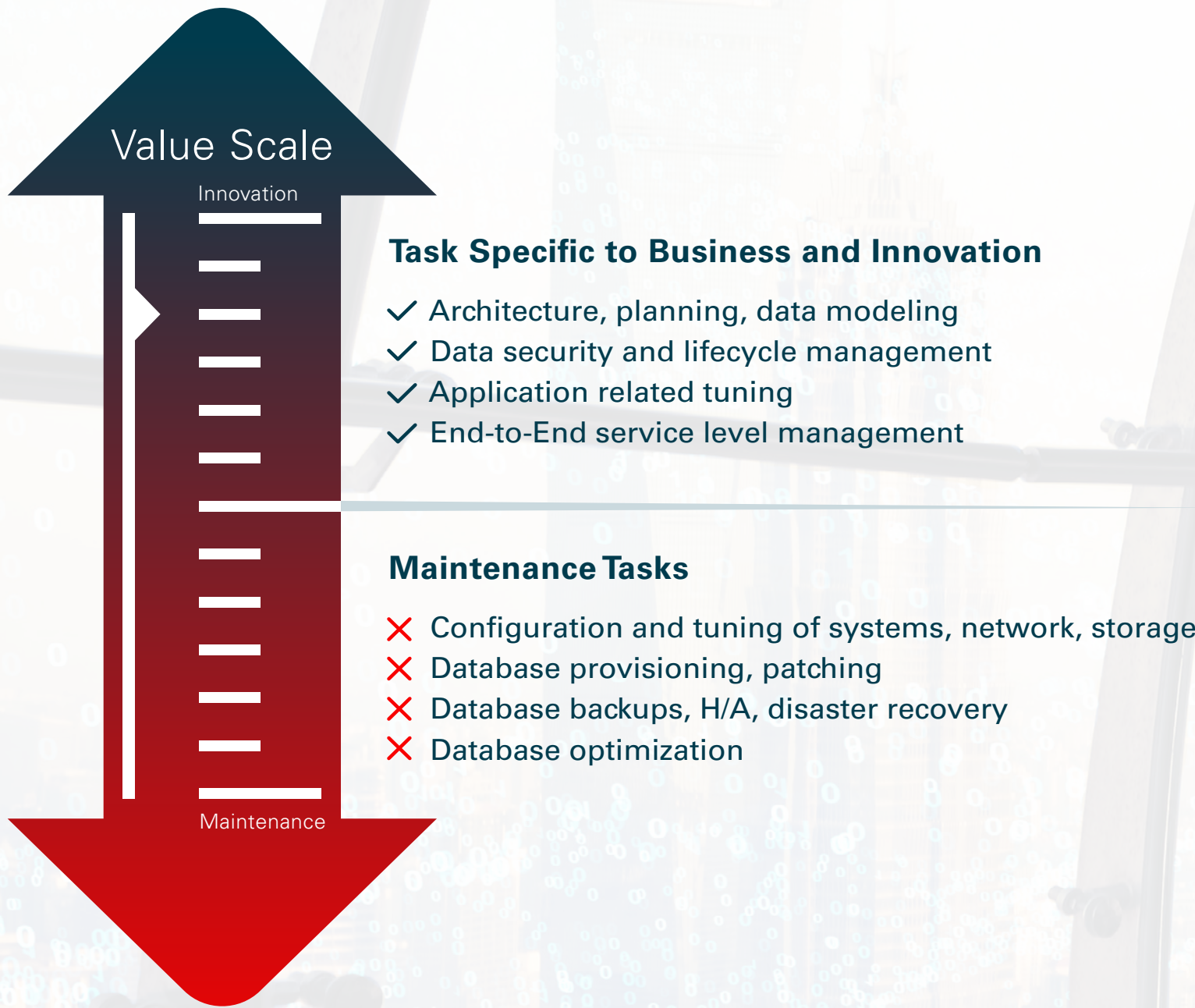
Michelle Malcher believes that optimizing performance begins with consistent provisioning, which in turn allows the business to be more agile and faster to market. She says that the demand for database provisioning will increase, as will pressures to manage many databases as one database, or “many-as-one”—which means DBAs will still play an important role.



Jim Czuprynski
Data Enterprise Architect, Zero Defect Computing

Autonomous Database Removes Generic Tasks

Freedom from Drudgery for DBA:
More Time to **Innovate** and improve the Business

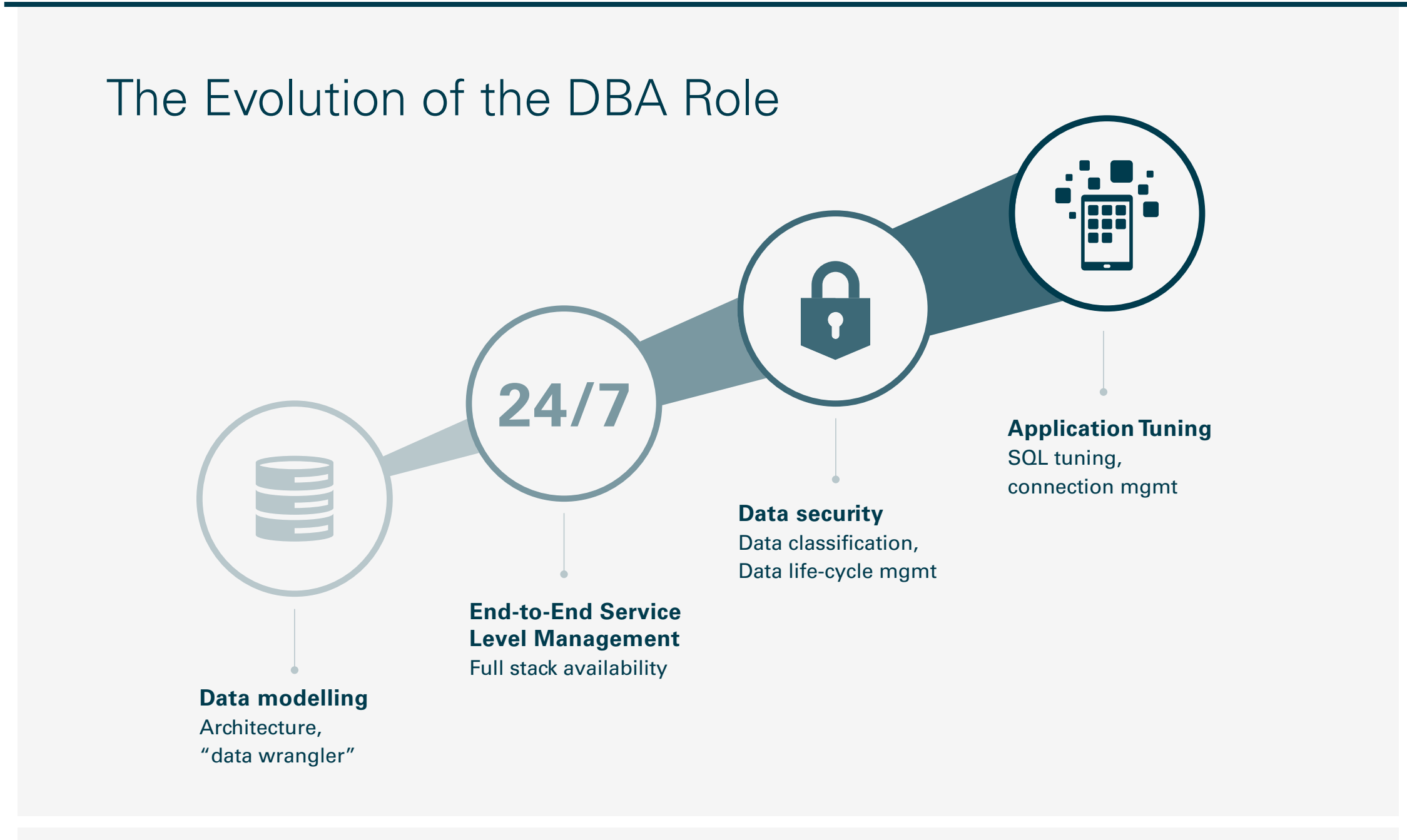


Database Scaling, Patching, and Tuning

Every year, billions of work hours are spent performing routine IT tasks that take up a huge amount of time, which makes them a likely target for automation.

For example, cloud services are evolving to include lifecycle and advanced run-time automation such as hot patching and real-time tuning. Oracle Autonomous Database uses AI and ML to self-patch, self-tune, detect and resolve anomalies, and optimize indexes.

Rich Niemiec thinks these autonomous capabilities will keep systems running optimally. For example, Oracle Database 19c will automatically index databases so that tuning is only required in some instances. “Eventually, this will happen faster and in a prescriptive—versus predictive—manner,” he says. “Oracle Autonomous Transaction Processing will perform automatic indexing to make things even faster, and having these systems in the cloud will allow companies to scale up at key times when capacity is needed, and to scale down to save money during lulls.”



Artificial Intelligence and Machine Learning

Oracle predicts that by 2025, the productivity gains delivered by AI and augmented experiences could be as high as 50 percent compared to today's operations. When asked how they think AI and ML technologies will infiltrate common data management activities, our experts were quick to respond.

All of these IT pros believe AI is poised to transform IT operations. In particular, AI will drive self-configurable and self-healing infrastructure, improving productivity and eliminating processes that are currently prone to human errors. According to IDC, this will lead to the redeployment and evolution of IT staff toward strategic IT initiatives.³

For example, AI algorithms will be able to review and understand configuration and log files throughout the IT infrastructure in ways that simply aren't possible using traditional collection and analysis methods. AI technology can predict a system crash or component failure long before a human might notice anything is wrong. It can learn patterns in networks, devices, and systems, and decode deviations that could reveal problems before an event occurs, as well as detect in-progress cyberattacks. Other types of AI technology can detect data and packet loss, improving security and minimizing compliance risks.⁴

For these and other reasons, Rich Niemiec predicts that ML and AI will be the fastest-growing areas of the technology sector over the next five years. He says Oracle will continue to offer the best built-in algorithms for database-driven ML, in which DBAs can move the algorithms to the data. "I call it supervised ML," he explains, "since the system utilizes 'training sets of labeled data' to learn and predict future behavior, as well as to make prescriptive decisions—just as autonomous cars learn to recognize patterns and images in their environments via deep learning technology."

Niemiec particularly likes Oracle's Supervised ML (which he says is ideal for forecasting apps) and Supervised ML for Regression and Classification (good for identity fraud and diagnostics). "Oracle is the best tool for supervised learning because the structure of Oracle data is favorable," he notes. He favors Oracle's Unsupervised ML for Dimensionality Reduction or Clustering, which can be used with data that is not labeled, classified, or categorized. "One of the best features of Oracle is built-in R packages and Spark Mlib algorithm integration," he adds.

Jim Czuprynski, who taught the performance-tuning courses for Oracle University for several years, is no stranger to database optimization techniques, nor the automated methods that guide them. He thinks AI and ML are starting to do what DBAs were supposed to do for years: apply well-proven tuning techniques based on performance statistics that reveal how SQL statements run within application workloads. "Many DBAs chase better performance in the short term by simply adding an index here or tweaking an initialization parameter there, but often without taking into account the overall performance improvement or degradation of the entire workload," he adds.

"If Oracle Autonomous Database delivers performance that is within one standard deviation of observed, expected performance—which detailed Active Session History (ASH) statistics and Automatic Workload Repository (AWR) snapshots have already proven it can achieve—then it certainly makes sense to deploy that technology," Czuprynski says. "This will allow DBAs to concentrate on building better systems using methodologies such as SmartDB and capabilities like Edition-Based Redefinition (EBR)."

³ Dan Vesset et al, "IDC FutureScape: Worldwide Analytics and Artificial Intelligence 2019 Predictions," IDC research document US44389418, October 2018, [idc.com/getdoc.jsp?containerId=US44389418](https://www.idc.com/getdoc.jsp?containerId=US44389418).

⁴ Ibid.



Migration to the Cloud

Oracle predicts that by 2025, 80 percent of enterprise (and mission-critical) workloads will move to the cloud. We asked our DBA experts what's involved in moving data-center workloads into the cloud, if they foresee this trend accelerating in the years ahead, and what the biggest implications will be.

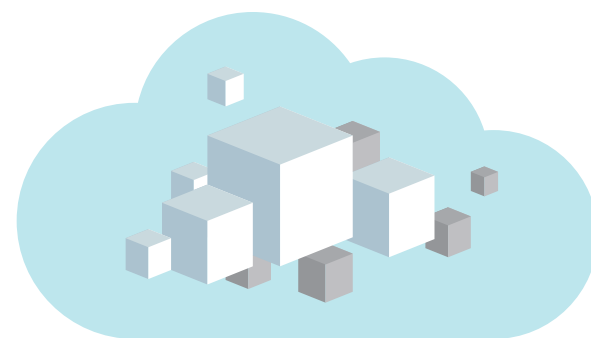
In Czaprynski's view, the shift to the cloud is more about effective orchestration and efficient governance of computing resources than it is about data-center outsourcing. "We are seeing the end of what we used to call shadow IT," he explains, "along with a transition to a more centralized solution for provisioning everything that an organization needs to quickly satisfy the needs of its DevOps teams, including well-secured and sanitized copies of crucial data."



Hybrid Cloud

In 2019, more companies will choose a hybrid-cloud approach and 83 percent of enterprise workloads will be in the cloud by 2020.⁵ Does your organization currently maintain a hybrid infrastructure? What types of new skills does this require?

Julian Dontcheff believes the adoption of a hybrid infrastructure is inevitable, and the new skills needed (such as cloud set-up, configuration, and monitoring) are mostly cloud-related. "DBAs will need to be able to assess the databases and define what they are best suited for," he notes. "Replication of data and databases will become more complex in hybrid environments—especially when different clouds are involved."



⁵ Louis Columbus, "83 Percent of Enterprise Workloads Will Be in the Cloud by 2020," Forbes online article, January 7, 2018, forbes.com/sites/louiscolumnbus/2018/01/07/83-of-enterprise-workloads-will-be-in-the-cloud-by-2020/#7142396c6261.



Career Development

As IT professionals position themselves to embrace automation, what do our IT experts predict will be the primary opportunities in the years ahead? What areas should they focus on to maximize their prospects and leverage these overall trends?

Oracle President Mark Hurd believes that 60 percent of the IT jobs that will exist in 2025 haven't been invented yet. During his keynote address at Oracle OpenWorld 2018, he predicted that autonomous operations will result in more people in IT, not fewer—but that these technology experts will be working on a different set of tasks from the ones they are working on today.

“By 2025, all cloud applications will include AI.”

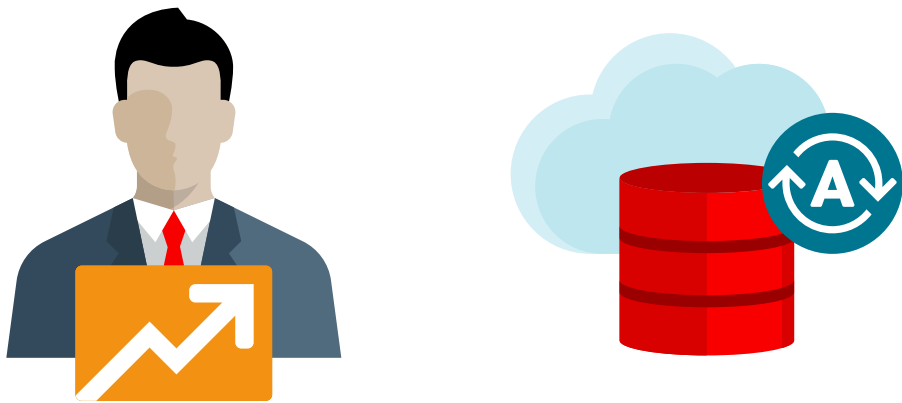
—Mark Hurd, President, Oracle

All the DBAs we surveyed agreed that database administration is on the brink of massive change as DBAs transition to a new role—what Czaprynski calls Enterprise Data Architects, or EDAs.

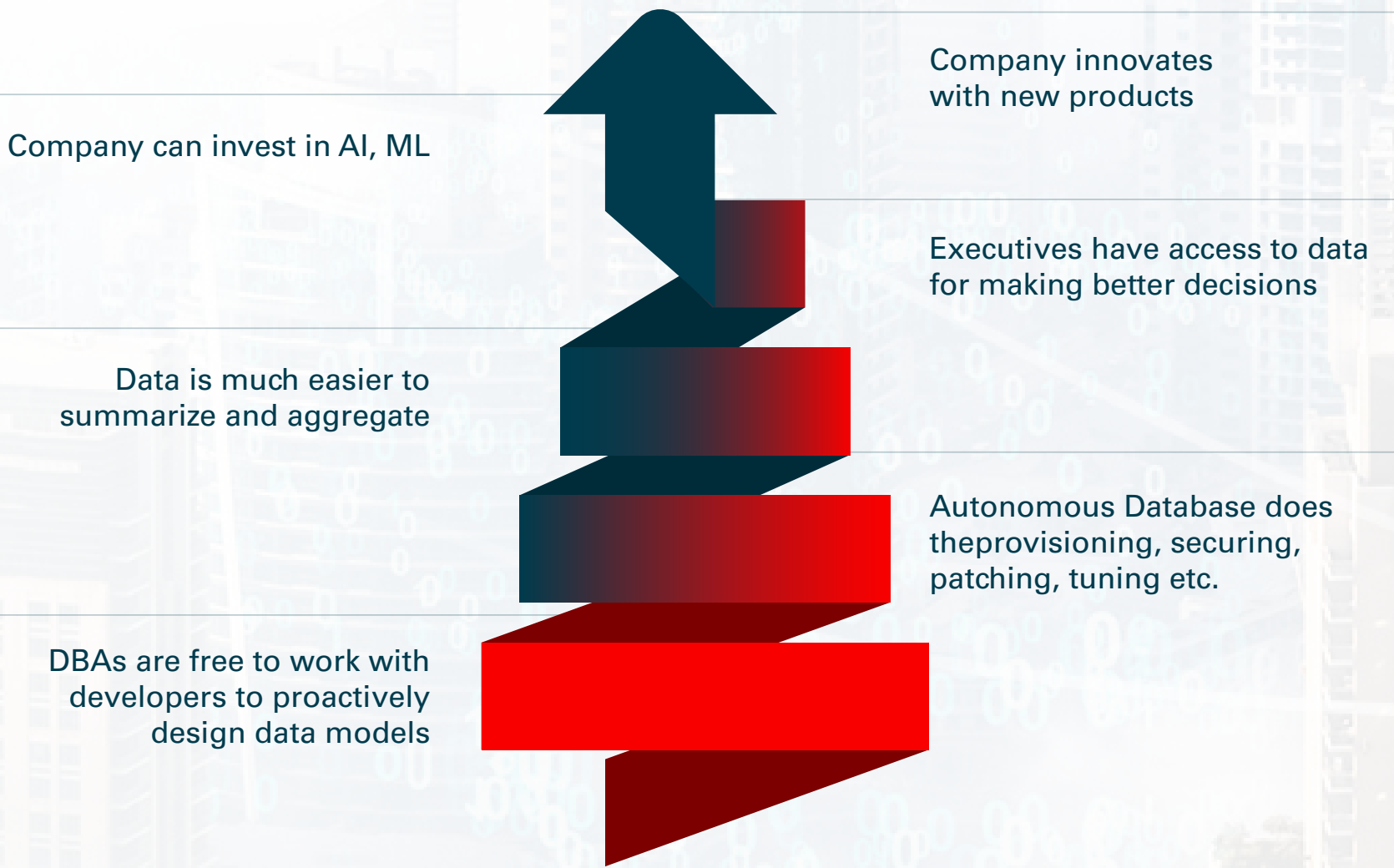
“The DevOps application-development model means we need to think like our developers and the business units they support,” he says. “That means we need to get ahead of development efforts, especially when building data models that support those efforts.”

Furthermore, the ongoing expansion in diverse external data sources—including JSON-based key value stores, HIVE tables stored within HDFS, and even the complex information stored within geographic information systems—means DBAs need to become less RDBMS-centric and more data-centric. “The sharpest tool out there for cutting through the dross and magnitudes of data, after all, is Oracle’s robust implementation of SQL and its myriad analytical functions,” Czaprynski says.

Finally, autonomous databases are getting smarter, Czaprynski points out, removing the need to be a “helicopter DBA” constantly hovering over the database realm for minor hiccups. “But that doesn’t mean we can safely forget what we already know about how an Oracle database really works,” he adds. “I draw a direct comparison to the recent Lion Air crash: Experienced pilots have observed that the crew appears to have treated the aircraft like it was just a complex computer, and simply forgot that they needed to concentrate on flying the plane.”



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Advice for Upwardly Mobile DBAs:
Ten Ways to Advance Your Career in an Era of Autonomous Database Technology



Report: Forrester—Guide to Lowering Cloud Costs and Innovating with Autonomous Database



Video: Sound Familiar? Larry Shares the Oracle Autonomous Database Story



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