White Paper

Move and Improve Self-Managed Enterprise Workloads with Oracle Cloud Platform

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IDC OPINION

The digital age has fundamentally altered both business processes and the technology that supports them. Fast-moving start-ups increasingly disrupt established industries, bringing new competition to the market. Consider how car-sharing apps have hurt the taxi trade, how home-sharing programs eat into hotel profits, and how vacation sites have all but eliminated travel agencies. Similar transformations affect the healthcare, insurance, and banking industries, among others.

The pursuit of digital transformation and the need to compete in fast-changing business environments challenge CIOs and other IT leaders. They must maintain legacy application functionalities while building new capabilities to meet evolving customer, employee, and partner expectations. By bringing the power of abstracted infrastructures, databases, software, and applications to traditional datacenters, cloud computing delivers flexibility at a lower cost. Cloud computing also automates database management, provides unlimited — and scalable — compute capacity, imbues old applications with new insight, dramatically increases system availability, and speeds time to market for new applications and services (see Figure 1).

FIGURE 1

Platform Services in the Cloud

App Dev	Integration	Analytics	Security	Autonomous DB
Container-native, serverless, chatbots, blockchain, AI	Oracle and non-Oracle apps, both on-premises and in the cloud	Data Ingest, reporting and analysis and visualization	Layers of defense across apps, users, data, and infrastructure	Self-driving, self-securing, self-repairing capabilities

Source: Oracle, 2019

But many organizations find they lack the time and skill to build and maintain cloud infrastructures in-house. Others want their onsite IT staffs to spend their time focusing on innovation projects – such as developing new applications, supporting new business ventures, and improving the customer experience. Machine learning automates datacenter operations like systems software maintenance and infrastructure optimization with modern security frameworks. IDC's surveys illustrate a stabilization/lockdown of existing infrastructure and an overall reduction of spending on servers, storage, networking, and other on-premise resources. These companies should choose to leave cloud migration and datacenter management to a trusted cloud services provider.

IN THIS WHITE PAPER

This white paper examines the advantages and challenges of migrating enterprise workloads to the cloud along with associated data. It discusses the benefits of working with a third-party cloud services provider and how to choose the right provider to meet enterprise needs. It also addresses how Oracle Corp.'s cloud platform, services, and applications help organizations transition from on-premise datacenters to cloud or hybrid cloud environments.

SITUATION OVERVIEW

Digital Transformation: The Promise and the Challenge

How did certain companies cause so much disruption in so little time? Some were born in the cloud, without the burden of an existing IT environment. They built their businesses not on physical datacenters but on an amalgam of cloud-delivered infrastructures. Others eagerly embraced cloud computing early, integrating it with their existing IT environments and modernizing IT in the process.

Cloud computing and innovative cloud services gave these companies the scalable computing capacity and automation needed to spur innovation and speed time to market with intelligent applications. Cloud-based analytics provided these companies with the insight necessary to craft and execute personalized engagement strategies that deliver products and messaging via consumers' devices of choice, at their moment of need, in alignment with their buying patterns.

The accelerating demand for innovative applications and services strains traditional datacenters. Built with older technologies, traditional datacenters are complex, hard to manage, and expensive. They are burdened with homegrown, highly customized applications that can't always meet the needs of today's business environment. Legacy technologies helped organizations meet business demands with monolithic applications that are hard to maintain. IDC surveys show that there are about 580 million applications built on legacy technologies. IDC predicts that by 2022, business demand to digitally transform will significantly accelerate the demand to modernize these applications.

No wonder, then, that CIOs and other IT professionals universally want to reduce datacenter costs while improving agility and increasing insight. They understand that a business' success – perhaps even its *survival* – necessitates datacenter transformation. Born-in-the-cloud companies have spoiled their customers: with choice, with ease, and with personalization. Customers demand the same from established businesses.

To transform, organizations with traditional datacenters must implement new capabilities, including:

- **Scalable computing capacity.** To quickly integrate data, apply business analytics, and run business-critical applications, organizations need computing power of millions of operations per second. Similar capacity is required for the development, testing, and deployment of new applications. Cloud computing service providers deliver this power on demand when businesses need it. Organizations can also scale back cloud-delivered environments, and save associated costs, when this much computing capacity is not needed on a consistent basis. IDC estimates spending on cloud management in all its forms across public and private implementations will reach about $63 billion by 2021.

- **Automation.** Automation eases arduous manual processes for datacenter management and maintenance – including patching, upgrades, and security – dramatically reducing the employee hours required to keep systems running.

- **Connection and insight.** Connectivity among applications, data, and other technologies improves the flow of information throughout the organization. Insight afforded by cloud-based analytics gives companies a more holistic view of their customers, enabling organizations to better tailor their offers and personalize messaging.

- **Improved disaster recovery (DR) and availability.** Cloud DR capabilities virtually eliminate manual processes for backup and restore, thereby significantly reducing failover and fallback times while cutting instances of disaster-related downtime to near zero. Routine maintenance tasks that would normally necessitate planned downtime can be performed while the system is running, improving availability.

- **Improved security.** Highly secure clouds help reduce the risks of breach associated with traditional datacenters and siloed applications. With insight across a variety of customers and implementations, cloud service providers bring deep end-to-end security expertise to application environments that is not easily replicable by any company acting alone. Clearly, cloud computing can help IT overcome many issues in traditional datacenters. However, cloud-delivered services come with their own set of challenges.

Choosing the Right Cloud: Considerations

Plotting a Cloud Strategy

Organizations must choose whether to build a private cloud or migrate to a public cloud – or choose some combination of the two. A mix of public clouds combined with traditional, physical operations is called a "hybrid cloud" environment. Management of a private cloud may be performed by in-house IT staff or by a trusted cloud services provider. Management of public cloud operations is performed by the cloud services provider.

Businesses should carefully examine their application portfolios and associated databases to determine which will perform best in the cloud and which should remain in their traditional, physical state. They must consider regulatory mandates for data storage and protection – including data sovereignty – along with issues such as data control and application latency.

Service levels are a second concern. Businesses must fully understand their needs for availability, automation, performance, and security and then determine which computing environment and which cloud services provider will help them meet those needs.

Move, or Move and Improve?

Before the introduction of commercial off-the-shelf (COTS) applications, organizations developed business-critical apps – such as ERM, ERP, human resource (HR), CRM, CX, and SCM programs – in-house. Over the years, these applications have become a burden for enterprises: IT professionals must spend significant amounts of time managing and maintaining these applications as well as dedicating computing capacity to their upkeep. Worse, these apps typically lack the type of analytic insight that can help businesses attract and retain customers, improve employee productivity, and deliver new experiences to partners, customers, and employees.

A custom CRM app can provide bank sales representatives with some good information about customers. A homegrown SCM program can let a shovel manufacturer know whether its products are stocked in stores. A custom enrollment program developed by a university helps students sign up for the classes they need.

But without cloud-enabled connections and associated analytics, these programs cannot:

- **Break down data silos** to find data wherever it lives in an organization, giving sales, finance, human resources, and marketing departments, among others, a more complete view of the information compiled in-house, enabling better decision making.

- **Append information** from outside databases to what is already known about a customer or a market. The financial services CRM can't connect with social networks, professional networks, or business databases to develop a more holistic view of each client. The shovel manufacturer cannot connect its SCM app with a weather database that predicts winter storms, telling it which retail customers will need increased inventory, and when.

- **Scale.** A customized program for student enrollment cannot scale to provide the additional computing power universities need in September and January, when many students are enrolling in new classes, and then scale back after enrollment periods end. The university must maintain this computing environment year-round.

Organizations must choose whether to migrate workloads to the cloud "as is" or use migration as an opportunity to both move and improve applications. Specifically, businesses must decide whether now is the time to use cloud-based analytics to disassemble data silos, forge new connections among apps and databases, and imbue their applications with artificial intelligence (AI), block chain capabilities, and other new functionalities.

Finding the Right Cloud Services Provider

Not all cloud service providers are created equal. In searching for a cloud service provider that can help migrate business-critical applications for both cost savings and innovation, organizations should consider cloud services providers that offer:

- The ability to migrate workloads to an enterprise-grade cloud with minimal risk
- Compatibility between cloud and on-premise operations
- Easily scalable computing environments and a pay-as-you-go cost structure
- A choice of deployment options in a multicloud environment
- The tooling necessary to automate both one-time migration and ongoing datacenter management
- The ability to manage workloads across cloud and on-premise infrastructures via a single console
- The ability to disassemble data silos and apply analytics for improved insight
- The ability to extend application deployment across a variety of devices – from mobile devices to the Internet of Things (IoT)
- Consistent enterprise-grade cloud security in on-premises or public deployments
- Faster, more reliable backup, restore, and disaster recovery operations
- Improved availability and reduced downtime
- Full-stack support with options to extend functionality in the future

Benefits of Cloud Migration

Cost savings and scalability are universal benefits of cloud migration. Other benefits are use case specific.

Move and Improve Custom Applications, Databases

Obtain true business insight from mountains of data by uploading applications and databases – including SQL, graph, and R databases – to the cloud. Improve application performance, increase availability, and more cost effectively and rapidly develop, test, and deploy new apps. Reduce on-premise storage needs and associated expenditures.

A common use of analytics is to mine in-house data and append it with commercially available information to imbue applications with the insight needed to better tailor offers and marketing campaigns to target audiences. Cloud-based services automate data discovery and preparation. On-demand provisioning and scalability speed application development, testing, and deployment, helping accelerate trying multiple approaches within a large investment.

Automate Datacenter Management, Application Development

Automated datacenter management dramatically reduces the human effort it takes to keep datacenters running. Automated patching, upgrades, and tuning – including the performance of routine maintenance tasks – are performed without human intervention. This process minimizes or even eliminates human error while freeing IT staff to focus on more innovative tasks. Automated code generation coupled with single-button deployment makes application development easier, and automation enabled with machine learning can further reduce human intervention.

Connect and Extend Applications and Data

There are a number of areas where robust connectivity breaks down silos of IT environments while driving transformational benefits to the business. Connectors and other technologies enable organizations to connect applications, databases, and devices to optimize the flow of information across the business (e.g., from engineering to supply chain or from supply chain to manufacturing). On-premise and cloud assets can be connected to data sources in multiple silos to increase application functionality. Organizations can also extend the deployment of applications and data across devices, websites, mobile apps, car dashboard applications, and the Internet of Things. Connecting diverse applications is quite common; for example, customers that invested in a custom CRM application or implemented a human capital management solution can connect to their on-premise or cloud-based ERP with an integration suite.

Simplify Disaster Recovery, Improve Availability

Disaster recovery is one use case where the benefits of the cloud are significant. Deploying a cloud-based disaster recovery solution saves enterprises from cumbersome, time-consuming tape-based DR processes while eliminating the expense of maintaining and managing a physical disaster recovery site. Applications and databases can be replicated to the cloud, and then – with only a few clicks on a dashboard – be restored to the organization's preferred computing environment. This process dramatically shortens backup and restore times.

High availability is critical in today's always-on business environment. Cloud SLAs guarantee the availability of data and apps, giving employees, customers, and partners 24 x 7 access to products and services. Cloud platforms also provide enterprises with a significant reduction in planned downtime, sometimes even eliminating it.

Mitigate Risk

Automation tools and highly secure, encrypted clouds help prevent breaches and mitigate the impact of any breach that should occur. Machine learning examines user behavior and automatically isolates and eliminates suspicious activity. Preventative controls intercept leaks and breaches across data repositories. Automation also reduces the risk posed by human error.

Accelerate Innovation

Massive computing capacity combined with self-generating code and continuous delivery pipelines enable enterprises to develop and deploy new apps within hours. Self-defining integrations cut deployment times for new business processes from days to minutes. Additional capabilities can help quickly provision data warehouses. All this helps organizations grow more agile and speeds time to market for new applications.

Oracle Cloud Platform and Automation Services

The integrated Oracle Cloud Platform offers infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS), and software-as-a-service (SaaS) capabilities. The platform empowers organizations to take meaningful steps toward genuine business transformation. It combines the elasticity and utility of a public cloud with the granular control, security, and predictability of an on-premise infrastructure. In doing so, it delivers a cost-effective, secure, high-performance, and highly available computing environment (see Figure 2). Oracle offers best-in-class storage, networking, and compute services, along with a broad range of cloud offerings to handle diverse use cases. The highly scalable nature of the Oracle Cloud Platform allows organizations to elastically grow or shrink compute or storage without downtime. On-demand pricing enables organizations to pay only for the computing capacity they use. A robust suite of tools automate and ease management. To accelerate application delivery, a full range of reporting and automated test functions are offered. Oracle also offers low-cost archive storage options, including options that meet regulatory and compliance standards.

FIGURE 2

The Oracle Cloud

Source: Oracle, 2019

Many enterprises turn to the Oracle Cloud Platform for its automation, security, and availability. Oracle Cloud capabilities automate management, scaling, monitoring, and tuning. Automation tools also apply and test upgrades and patches. This eliminates much of the human labor needed to provision, secure, monitor, back up, recover, troubleshoot, and tune data and applications. It also limits common occurrences of human error.

Organizations care deeply about their reputations, so security is always a concern. The security features of the Oracle Cloud Platform protect data and apps from both external attacks and malicious internal users. The platform automatically encrypts data and automatically applies and tests security updates. The platform can also prevent and intercept data leaks across repositories.

In today's 24 x 7 business environment, availability has never been more important. The Oracle Cloud Platform can be paired with associated services to offer up to 99.995% availability, typically with less than 2.5 minutes of downtime per month – including downtime caused by disaster or planned maintenance.

Oracle Cloud Platform solutions offer enterprises control over their migration journeys. What can be migrated? As many or as few applications and data sets as an organization wishes, including custom applications, COTS apps, Oracle apps, sandbox environments, enterprise data warehouses, and data marts. These can be moved "as is" or enhanced with services to connect and extend apps and apply business analytics. Specific "lift and shift" tools, coupled with end-to-end support, ease the migration of Oracle applications, including the Oracle E-Business Suite, JD Edwards EnterpriseOne, PeopleSoft, and Value Chain Planning. No other cloud services provider offers these tools. Many organizations also choose this time to upgrade from their homegrown applications to Oracle cloud-optimized apps for CX, ERP, SCM, EPM, and more (see the "Oracle Cloud Applications" section).

Organizations can also choose which type of clouds and management services work best for them. Choices include migration to the public Oracle Cloud Platform, migration to an on-premise private cloud built by Oracle, or to a hybrid cloud. Management can be performed by the enterprise, by Oracle, or by a combination thereof.

The Oracle Cloud Platform adds value to cloud migration via the Oracle Cloud Infrastructure, Oracle Autonomous Database, Oracle Integration Cloud, Oracle Analytics Cloud, and a menu of applications for critical business processes. Let's take a closer look at each in the sections that follow.

Oracle Cloud Infrastructure

At the heart of the Oracle Cloud Platform is the Oracle Cloud Infrastructure. It offers:

- **Fast and scalable compute resources.** From single-core VMs up to 52-core bare metal compute instances in large-scale clusters, Oracle Cloud Infrastructure scales for both traditional and cloud-native applications.

- **Enterprise-grade private virtual cloud networks.** These are designed to deliver flexibility, security, availability, and superior bandwidth. Enterprises connect to the cloud via a dedicated, high-bandwidth private connection for a consistent networking experience.

- **Storage options for mission-critical data.** From locally attached NVMe SSDs to file, block, object, and archive storage, Oracle Cloud Infrastructure offers cost-effective options for a variety of use cases.

- **Database on demand.** The Oracle Cloud Infrastructure enables fast and automated database migration, along with dedicated hardware, proven RAC reliability, data security, and granular controls.

- **Container infrastructure for deploying elastic, resilient systems.** Oracle Cloud Infrastructure delivers a complete and integrated set of services for orchestration, scheduling, management, operations, and analytics.

- **Cloud governance and security.** Oracle Cloud Infrastructure offers visibility across all application interfaces, along with identity and access management. Tagging capabilities help organize, manage, and control cloud resources.

Oracle Autonomous Database

Oracle Autonomous Database delivers automated patching, upgrades, and tuning. It can perform routine database maintenance tasks while the system is running. By automating these tasks, Oracle Autonomous Database dramatically reduces the man-hours spent on manual database management. This is significant because, according to Oracle estimates, up to 75% of current IT budgets are spent on this task.

Oracle Autonomous Database is self-driving, self-securing, and self-repairing. It automates database provisioning, management, monitoring, backup, recovery, and tuning. It protects itself from internal and external vulnerabilities and attacks, automatically applying security updates and end-to-end encryption. It protects against unplanned downtime, offers failover capabilities to keep operations running during planned downtime, and provides rapid, automated recovery from outages.

Oracle Autonomous Database is a component of the public Oracle Cloud PaaS. For organizations that wish to build private clouds on-premise, Oracle Exadata provides similar capabilities.

Oracle Integration Cloud

Oracle Integration Cloud is a cloud platform that eliminates barriers among business applications through a combination of machine learning, embedded best practice guidance, prebuilt integration, and process automation. It includes an extensive library of adapters for Oracle applications, COTS apps, and custom applications. These adapters enable enterprises to more quickly deliver new business services.

Oracle Integration Cloud can also help organizations rapidly create and host business applications directly from their browsers via Oracle's visual development environment. Employees can define business objects, integrate data from external systems, incorporate business processes, and design tailored interfaces.

Oracle Analytics Cloud

The Oracle Analytics Cloud is a platform that helps organizations find the business insight buried in mountains of data. It deploys analytics to help organizations delve deeper into corporate information, uncovering performance drivers, buying patterns, customer characteristics, and other information. Organizations can use this insight to model new scenarios, imbue apps with analytic intelligence, and make more informed decisions.

The Oracle Analytics Cloud also makes it easier for professionals throughout the organization to use analytics and to understand the insights they provide. Even line-of-business employees can engage with Oracle analytics services, asking questions in plain language, searching for answers, and receiving relevant, personalized insights in a context that makes sense.

Oracle Emerging Technology Offerings

As customers take steps in their digital transformation journey, several aspects of platform services like Internet of Things capabilities, mobile solutions, and blockchain tools are essential to leverage to achieve business goals. At the same time, expectations for immediate attention are driving demand for automated engagements with customers through conversational tools built into consumer-facing applications. To help customers, Oracle offers:

- **Oracle IoT Cloud Enterprise.** This is a secure and scalable platform designed to help organizations quickly build and deploy IoT applications as well as capture and analyze their IoT data.

- **Oracle Mobile Suite.** This suite provides support for the development of both the front-end client and the back-end integration layer of mobile systems and includes Oracle's mobile development framework for building on device mobile applications that run on a variety of devices and operating systems.

- **Oracle Blockchain Platform.** This enterprise-grade blockchain platform is designed to securely extend business processes and applications while enabling faster business transaction processing.

- **Oracle Digital Assistant.** This platform provides the tools that enable organizations to build AI-powered assistants that connect to your back-end applications.

Oracle Cloud Applications

For organizations that want to upgrade their COTS or homegrown applications to cloud-optimized programs, Oracle offers best-in-class SCM, ERP/EPM, HR, marketing, sales, service, and commerce software-as-a-service apps. These comprise a complete business suite to help organizations better connect people and processes, thereby driving innovation. Further:

- **Oracle CX Cloud Suite** helps organizations improve customer service by engaging customers across physical and digital channels.

- **Oracle HCM Cloud** enables human capital management departments to find and retain the best talent.

- **Oracle ERP Cloud** helps organizations streamline business processes with financial, procurement, and project portfolio management capabilities.

- **Oracle SCM Cloud** delivers the visibility, insights, and capabilities needed to create an intelligent supply chain. Its capabilities include product innovation, strategic material sourcing, outsourced manufacturing, integrated logistics, omni-channel fulfillment, and integrated demand and supply planning.

- **Oracle EPM Cloud** enables companies to drive predictable performance and report with confidence.

- **Oracle Internet of Things Applications** have been developed for enterprise assets, production lines, transportation fleets, and mobile workers. They include predictive algorithms to extend SCM, CX, HCM, and ERP processes with real-time IoT data and insights.

FUTURE OUTLOOK

As enterprises embark on their cloud adoption journeys, they must work to avoid additional technological debt. Therefore, they must carefully consider their long-term needs for a flexible set of technology tools. Open protocols and standards are important as they are key to supporting ongoing development. Portability of workloads in a multicloud environment is important so that applications can be positioned in locations that are best suited to ensure customer satisfaction at a competitive price.

While a "vanilla" movement of workloads to the public cloud can deliver some benefits, refactoring workloads to take advantage of cloud-native technologies — including containers and serverless platforms — can improve IT effectiveness. Organizations should ensure that the migration path they choose enables them to leverage emerging technologies such as blockchain and artificial intelligence into their application delivery capabilities.

Major ATM Company Centralizes Sales Information

A major ATM provider lacked any centralized sales information and had no end-to-end visibility of its customer base. This situation stymied sales teams. The company deployed Oracle Sales Cloud and the Oracle Cloud CX suite, integrated with JD Edwards databases. This process improved customer insight while enabling end-to-end account management for corporate sales teams. The ATM company also saw a 60% reduction in IT infrastructure costs, a 50% faster lead-to-sales cycle, and a 45% faster purchase cycle.

Large Power Company Dramatically Improves Backup, Restore Operations

A large Asian power company needed to meet regulatory standards for backup and restore processes. Its existing solution required the company to transport tapes offsite daily, eating up corporate time and money. Manual restore processes were arduous and lengthy, typically taking about 40 hours. The company worked with Oracle to implement a secure Oracle Database Backup Cloud solution. As a result, the company slashed restore times to 5.5 hours and gained anytime/anywhere access to backup data. It also eliminated the cost of maintaining a DR infrastructure that had stored more than 3,000 tapes.

A Data Science Company Hones Its Competitive Edge

A large data science company needed to maintain its competitive advantage by providing rapid analyses of ever-increasing volumes of data. By deploying Oracle Data Warehouse with Exadata, along with Oracle Advanced Analytics, the company accelerated its analysis time from one week to four hours. In breaking down data silos, the solution also helped this company analyze 100% of its data.

CHALLENGES/OPPORTUNITIES

Adoption of cloud computing requires enterprises to rethink the entire development life cycle, including the use of new application architectures to gain maximum benefit from cloud resources. While Oracle has made several tools available for migration, enterprises may still need additional help to execute their cloud strategies. Oracle should increase its professional services and partner with additional systems integration vendors that focus on business transformation.

The emergence of cloud-native technologies, including containers and serverless platforms, is presenting new opportunities for IT efficiencies. While Oracle is participating in standards bodies such as the Cloud Native Computing Foundation, including standards into its entire portfolio will help Oracle customers gain more benefits from this transformational journey.

CONCLUSION

To thrive in the digital age, enterprises must transform databases: making them more scalable, available, automated, connected, and intelligent. The right cloud services provider can help organizations transform while significantly reducing datacenter costs and freeing up time for onsite IT staffs to focus on more innovative tasks. As a recognized leader in cloud services, Oracle is uniquely positioned to help organizations chart their cloud strategies. The company offers a complete suite of cloud platforms, services, and applications. Oracle also provides clients with cloud choices: enabling them to implement cloud or hybrid cloud environments and migrating as many – or as few – applications and databases as required to meet business goals.

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