CISCO

# Improve IT Operations for Your Database Platforms

Oracle Database and Real Application Clusters on FlexPod

- We offer both hardware and software solutions that make deployment and ongoing management of your Oracle Database and RAC solutions fast, easy, secure, and automated.

- Monitor your Oracle licenses, alert when workloads are out of license, and bring them back into compliance.
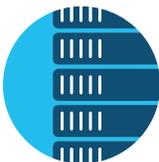
- Understand the impact your Oracle and non-Oracle workloads have in your data center.

- Keep your data and applications running at optimal levels and raise the security levels to keep your data secure.

Imagine that you could see into and simplify your application and database interaction, migration, management, and monitoring processes. It's possible with FlexPod® solutions from Cisco and NetApp.

If your enterprise applications rely on Oracle Database, perhaps with Oracle Real Application Clusters (RAC), your IT staff likely find the complexity hard to manage and the costs difficult to contain. That's because managing these environments is often a manual, time-consuming, and error-prone process. Add the difficult, if not impossible, process of determining dependencies, and patching, upgrading, scaling, or migrating to the cloud can be risky.

Without visibility into your IT infrastructure, your administrators probably spend too much time trying to analyze application and database availability and performance. This time-consuming process, together with the need to support spikes in demand and the inability to easily match IT resources to user, application, and database requirements, becomes a limiting factor. As your database grows or moves, keeping track of what is happening and where can frustrate your operations. You need to be able to automatically detect unauthorized actions (patches, updates, and access) and license threshold violations if you are to reduce compliance concerns.

A move to flexible infrastructure

Organizations are rethinking traditional approaches. The inflexible islands of computing created by siloed platforms, such as Oracle Exadata, SuperCluster, and RISC-based servers, are falling out of favor. Converged architectures are growing in popularity as IT staff experience the benefits of these modern platforms for applications and databases.

Make your Oracle environments the best they can be

"We have a very large Oracle environment using both Oracle Database and RAC and the entire Oracle E-Business Suite. It is one of the biggest in the world, running on over 1200 Cisco UCS blade servers. The combination of Tetration, Cisco Workload Optimization Manager, and AppDynamics running on Cisco UCS helps us make our Oracle environment the best it can possibly be. These tools are better together."

Sidney Morgan
Distinguished Engineer, Cisco IT

Modernizing IT infrastructure can raise questions.

- Are new technologies such as cloud and flash-based storage right for your applications?
- Can you model how your applications will perform with new technologies?
- Is increased performance the only goal?
- How much IT flexibility is needed?
- What effect will a new solution have on total cost of ownership?

Better together: Industry-leading solutions from Cisco and NetApp

FlexPod is an industry-leading converged infrastructure solution that integrates Cisco UCS® and NetApp storage. Together with Cisco® management software solutions, it can help simplify deployments and ongoing operations. Our management solutions—Cisco Tetration, Cisco Workload Optimization Manager, and Cisco AppDynamics® running on FlexPod—deliver powerful capabilities to your Oracle Database and Oracle RAC deployments. With these innovative tools, you can answer your questions and get the most out of your IT resources to improve efficiency, protect data, and reduce costs.

Ease your Oracle audit risk

Using Cisco Tetration and Workload Optimization Manager, you define policies that build application dependency maps in real time to support application operation and enforcement. For example, you can track your Oracle Database licenses against quotas, build policy fences, and receive alerts when conditions exist. The data collected by Cisco Tetration allows you to automatically move fenced workloads onto appropriate systems with Workload Optimization Manager.

Secure your Oracle data and applications

Cisco Tetration monitors, manages, and automates policy-based security across data centers to protect your enterprise. It alerts your IT staff to out-of-policy application workloads so that you remain compliant and don't inadvertently overextend your Oracle software licenses.

Dependency mapping gives you exceptional visibility. With this insight, you can better understand which applications use which databases and the network routes your data takes (Figure 1). As growth occurs, you can maintain security and immediately close unexpected gaps.

Monitor and automate compliance

"When we first loaded and ran Tetration across our enterprise, we noticed several of our workloads were out of compliance. We were able to quickly get those workloads back into compliance, which saved us paying additional licensing costs. Now, with Tetration and Cisco Workload Optimization Manager, we stay in compliance."

Sidney Morgan
Distinguished Engineer, Cisco IT

Cisco Tetration lets you:

- **Create an automated whitelist policy:** Real-time telemetry data delivers an automated whitelist policy for segmentation and allows you to track behavior changes to stay within policies and protect the valuable corporate data housed in your Oracle databases and RAC.

- **Use a zero-trust model:** The capability to enforce policies across on-premises and public clouds lets you establish zero-trust policies using application segmentation, monitor for compliance deviations, and identify problems in minutes on production systems to continuously protect your data.

- **Identify deviations in process behavior:** You can baseline server processes, identify behavior deviations that match malware-style execution, and detect the latest events, such as processor performance issues. This can limit your exposure to license audits, especially in a virtual environment, by flagging workloads that have migrated outside your license agreement so these workloads can quickly be brought back into compliance.

- **Detect software vulnerabilities:** Protect your business data by performing an inventory of installed software packages, with each version scanned for
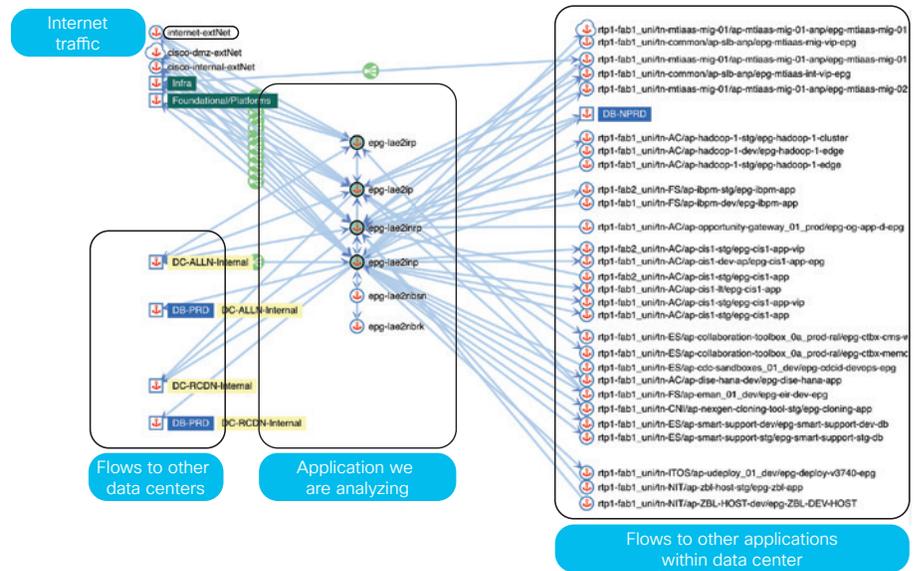

Figure 1 Cisco Tetration creates a dependency map across geographically dispersed data centers to provide visibility into application and database interdependency on IT services.

known vulnerabilities (Common Vulnerabilities and Exposures [CVEs] published daily by NIST) and specific remediation actions recommended to your IT staff.

· **Control user access:** Your business data is one of your greatest assets and needs to be protected both within the Oracle database and as the data moves through the network and is accessed by multilevel applications. Telemetry data is collected from endpoints to enhance your segmentation policies and restrict application access.

· **Know how safe your data is—**get a composite security score: Various parameters, including policy compliance

events, known vulnerabilities, and process behavior inconsistencies by workload, provide insight into the safety of your Oracle data and deployment.

· **Gain insight into how your network performance is affecting your Oracle database access:** Your IT staff can analyze per-flow performance, including hop-by-hop views, to quickly determine if a bottleneck is located on the network or a server.

Cisco Tetration uses lightweight agents that can run in a hypervisor (virtual server deployment) or in the operating system (bare-metal deployment). Data collection can run in a private or public cloud, or on a scale-as-you-grow FlexPod solution.

Automate management workloads with policies

Many organizations are realizing the benefits of a multicloud world, with software-as-a-service (SaaS) providers and private, public, and hybrid clouds a fundamental part of the business, often with an Oracle Database or RAC deployment at its heart. Remove the time-consuming and manual monitoring and adjusting of your environment using smart decision-automation capabilities where resources and infrastructure are dynamically adjusted based on real-time workload demand.
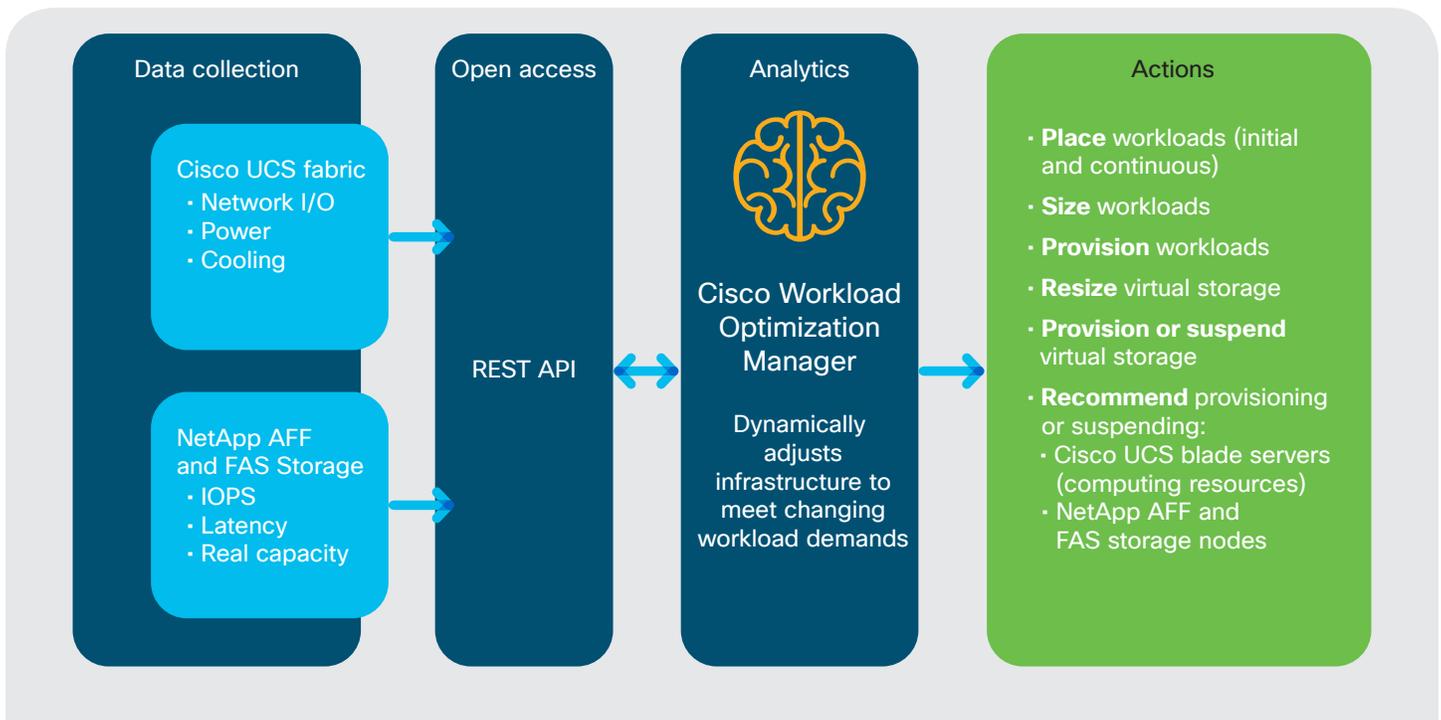

Figure 2 Cisco Workload Optimization Manager dynamically adjusts IT infrastructure to meet changing workload demands.

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Save Money

"We had a data center build-out planned because we thought we didn't have room for all the resources we needed. When we deployed Cisco Workload Optimization Manager, it created such an efficient environment, we didn't need to do the build-out, saving us $20 million. We cut the number of virtual machines roughly in half, and now have 80% less contention for resources among our virtual clusters. It has saved us both capital expenditures and operational costs."

Sidney Morgan
Distinguished Engineer,
Cisco IT

Making real-time decisions is difficult at scale. The performance demands of database and application workloads require timely access to the right amount of resources. All of this must be done while containing costs, adhering to licensing and data sovereignty requirements, and maintaining compliance. These tradeoffs must be analyzed in real time, all the time. The right approach uses self-managing workloads that make decisions about workload placement, scaling, and capacity without your staff having to be involved.

Cisco Workload Optimization Manager allocates database and associated application resources in real time based on policies that you define (Figure 2). With these policies preventive decision automation is supported by continuous analysis of your Oracle Database and RAC workload consumption, costs, and compliance constraints. Your database workloads get the resources they need when they need them so that your users get results in less time.

Gain optimal business performance from applications and databases

The transaction is one of the best measures of user experience and business impact (Figure 3).
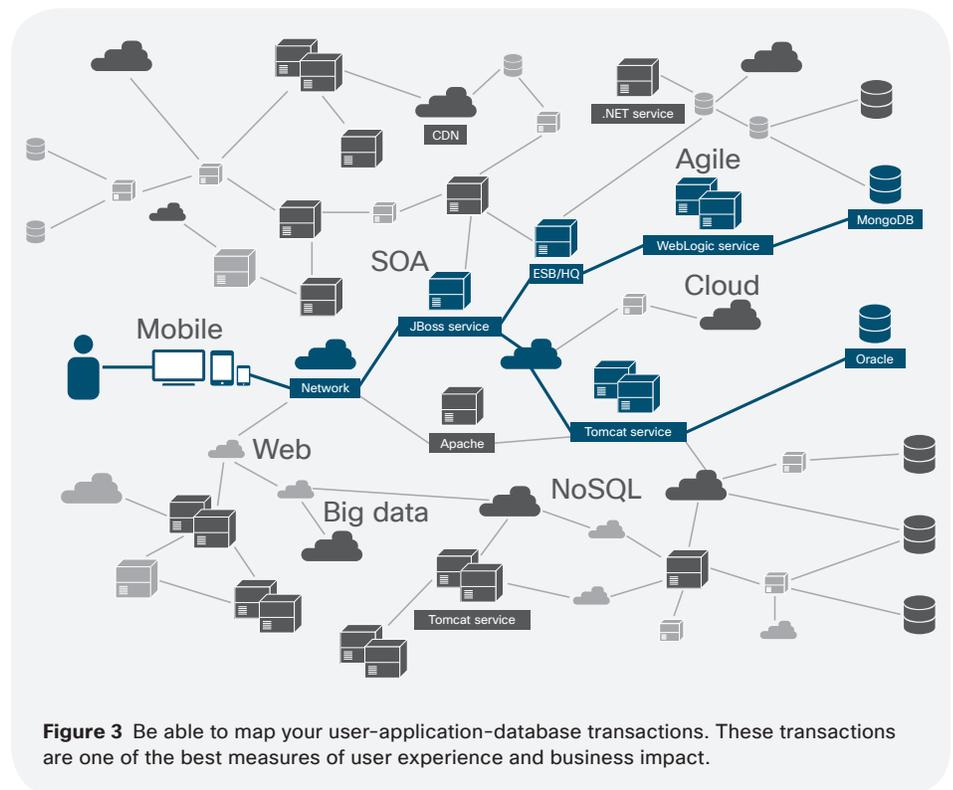

Figure 3 Be able to map your user-application-database transactions. These transactions are one of the best measures of user experience and business impact.
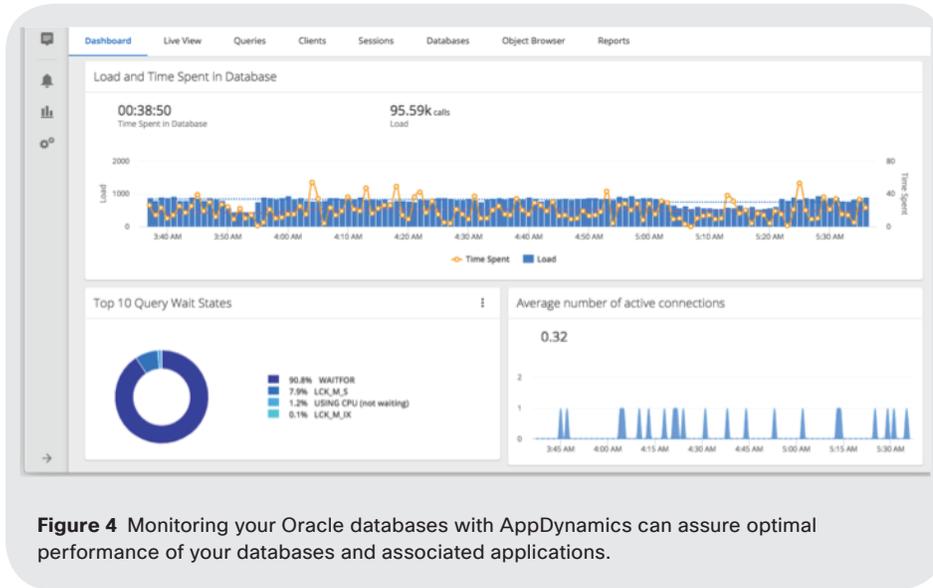
Figure 4 Monitoring your Oracle databases with AppDynamics can assure optimal performance of your databases and associated applications.

The Cisco AppDynamics suite of application and business performance monitoring solutions gives you visibility into every transaction and helps ensure that every part of the application ecosystem—infrastructure, individual services, and business outcomes—is optimized for performance, cost efficiency, and quality of service.

Cisco AppDynamics gives your Oracle Database, Oracle RAC, application, and IT infrastructure teams the skills and knowledge needed to deliver visibility across your network, data center, security, and applications (Figure 4). This superior level of insight allows them to watch every line of code and understand its impact on user experience and application performance, while providing real-time insight into your digital business.

FlexPod with Oracle

Cisco and NetApp are industry leaders in delivering converged infrastructure, such as FlexPod, for your data center, cloud, and edge

needs. Our solutions are designed to support Oracle solutions so that you can build a competitive, efficient, and cost-effective business.

FlexPod converged infrastructure

FlexPod is converged infrastructure built on powerful and flexible Cisco UCS servers, your choice of NetApp storage, Cisco Nexus® switching, and integrated and cloud-based management. With FlexPod you can modernize your operational model to stay ahead of business demands driving your Oracle deployments.

· **Cisco UCS:** Cisco Unified Computing System™ (Cisco UCS), powered by Intel® Xeon® Scalable processors, delivers best-in-class performance and reliability, availability, and serviceability
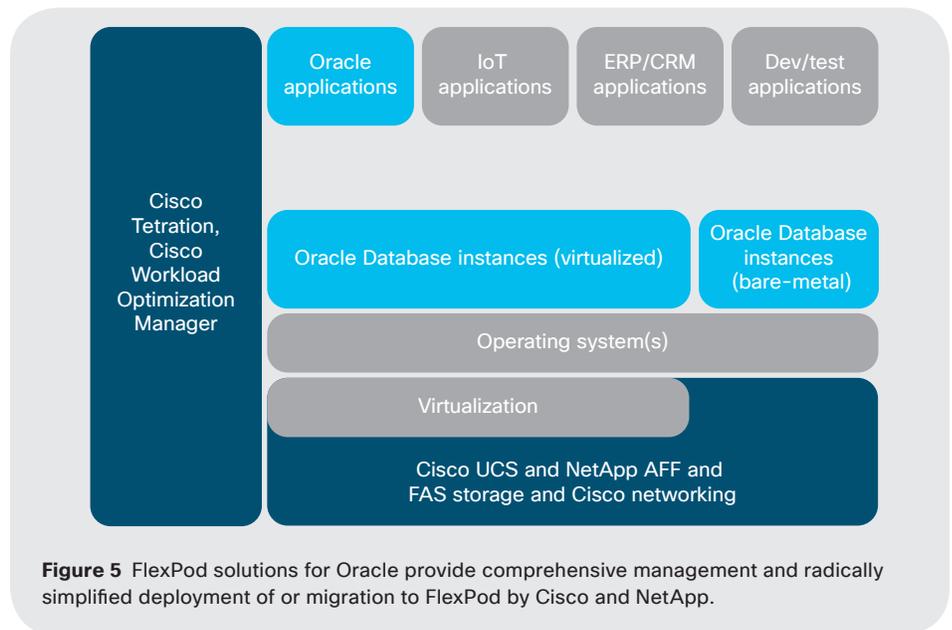

Figure 5 FlexPod solutions for Oracle provide comprehensive management and radically simplified deployment of or migration to FlexPod by Cisco and NetApp.

Infrastructure matters

"We've seen at least a threefold performance improvement for all our applications by moving our VMware environment and Oracle databases to NetApp All Flash FAS."

Chad Thibodeaux
CIO, McNeese State
University

(RAS) with exceptional data security for mission-critical applications. Although other servers may also incorporate the latest Intel processors, only Cisco integrates them into a unified system that includes computing, networking, management, and storage access and is built to deliver scalable performance to meet business needs

- **NetApp AFF A-Series:** This powerful, 100% NVME storage solution can accelerate your Oracle data accesses with guaranteed consistent and predictable low latency of 500 microseconds or less and guaranteed efficiency, with up to a 7:1 reduction in storage required due to inline data reduction.

- **NetApp FAS Hybrid Flash Arrays:** The NetApp FAS Series provides consolidated SAN and NAS storage that is perfect for your Oracle databases and associated applications.

Built-in management

FlexPod was designed with embedded management, giving you unprecedented control over your IT resources. Because we designed our systems to be deployed, provisioned, and managed through an API, our products are simpler, and so are our tools. Your choices include the following:

- Cisco Intersight™ is a cloud-based lifecycle management platform for your infrastructure, regardless of where it resides.

You can manage your traditional, hyperconverged, edge, and remote and branch offices through a single cloud-based GUI.

- Cisco UCS Manager supports the entire FlexPod infrastructure portfolio. It enables server, fabric, and storage provisioning, as well as device discovery, inventory, configuration, diagnostics, monitoring, fault detection, auditing, and statistics collection. You can extend these to thousands of servers in multiple domains with Cisco UCS Central Software.

- NetApp ONTAP data management software is the heart of the NetApp storage systems. It delivers enterprise-class, rich data services to enable versatility, efficiency, and comprehensive data protection.

- NetApp SnapCenter software simplifies application-consistent data protection and clone management. It allows your database administrators to manage their own data protection and copies with powerful policy and report capabilities.

- Third-party management plug-ins provide a seamless experience for those already using other monitoring, analysis, configuration, deployment, and orchestration tools. For example, the Cisco UCS Manager plug-in for Oracle Enterprise Manager 13c allows you to manage your Cisco UCS infrastructure with Oracle Enterprise Manager.

Reduced risk

Cisco Validated Designs and technical white papers help you simplify and accelerate your deployment or migration of Oracle environments to FlexPod. Our verified, lab-tested architectures provide detailed design and implementation guidance that reduces guesswork by giving your IT architects and administrators a guidebook for implementation. By following the guidelines in Cisco Validated Designs, you can quickly and reliably create the right IT infrastructure for your Oracle applications and databases.

Engineering leadership

We use our solutions in our business. For example, Cisco IT is one of the largest Oracle E-Business Suite environments worldwide. This gives us a unique perspective on deploying, configuring, running, managing, and migrating Oracle environments. If we run into problems with the Oracle environments in our IT department, we can proactively work to rectify issues in your environment.

Lower capital and operations costs

The first step in saving money is to reduce your capital expenditures for hardware and software. This can be accomplished in a number of ways.

- **Right-size your configuration:** There's no need to overprovision your hardware and software. We can help you evaluate your needs today and discuss scaling for the future. These planning assessments help reduce the amount of hardware, software licenses, and support you purchase up front. You can expand as your business and workloads expand.

- **Use frequency-optimized processors:** Oracle is very often licensed by the number and type of cores you deploy. FlexPod, with frequency-optimized processors, lets you retain performance while lowering your total core count. You can save hundreds of thousands or even millions of dollars in software and support costs for large deployments.

- **Gain processors dedicated to Oracle:** With FlexPod the CPUs you license for Oracle are used for Oracle, rather than sharing your CPU power to perform both Oracle database and data services workloads, as you would on systems such as Nutanix. This is achieved by having the data services performed within the storage system and not on your server.

- **Consolidate workloads:** Virtualization helps you use more of your IT infrastructure efficiently. It also can reduce the number of Oracle software licenses you need. In fact, you

can run multiple hypervisors side by side on separate Cisco UCS servers within the same Cisco UCS chassis or rack. For example, you can run Oracle VM on one Cisco UCS server and VMware vSphere on another within the same physical chassis or rack. This way, you can run Oracle Database on Oracle VM as a hard partition that assures that software licenses are limited to assigned processors. Other workloads can be run within the same chassis on VMware vSphere to increase the use of your system resources.

- **Migrate from expensive SPARC and RISC platforms:** New x86-architecture processors lead the market and deliver higher levels of performance over RISC processors in your data center today. You can move from expensive systems to high-performance platforms that cost less to acquire and maintain. And you can choose workhorse processors with lower core counts and higher frequencies to help reduce software license costs.

The second step in saving money is to reduce operating expenses. Moving to solutions based on FlexPod can:

- **Improve IT efficiency** with service profiles that help reduce manual and time-consuming tasks

- **Deliver uniform server configurations** to Oracle applications and databases

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For more information

- **Lower ongoing support costs** with fewer Oracle licenses required
- **Reduce power consumption**
- **Regain data center floor space**
- **Reduce operating costs** with solutions built for high reliability, availability, and serviceability

Get more business done

If you run Oracle applications and databases, consider FlexPod solutions from Cisco and NetApp. FlexPod converged infrastructure is designed to help you simplify deployment, maximize efficiency, reduce costs, and accelerate data processing. By combining these systems with Cisco Tetration, Workload Optimization Manager, and AppDynamics tools, you can better monitor, manage, and orchestrate your workloads to help your business be more effective, competitive, and profitable.