

TRANSFORMING DATABASE OPERATIONS WITH NUTANIX AND HPE

EXECUTIVE SUMMARY

Data and automation - automation of business processes that can acquire, transform, and act on data to deliver outcomes - are the key to success in the digitized economy. Businesses today demand the cloud-like agility and cloud-like economics of automated IT infrastructure and databases delivered as a service.

More data is being collected, stored, transformed, analyzed, and acted upon than ever before. So, automation is especially critical here, in that it allows organizations to achieve faster time to value – an important metric for digitized organizations.

The explosion in data generation has led to growth in the number of database platforms and instances deployed across organizations of all sizes. Many IT organizations and database professionals struggle to manage this, resulting in database operations not optimized for performance, agility, security, or cost.

This brief will explore the challenges that businesses and IT organizations face in greater detail. It will also examine how solutions like Nutanix Era on HPE GreenLake for databases can help drive optimized database-as-a-service (DBaaS) environments through a combination of right-sized infrastructure and automation.

DIGITAL TRANSFORMATION REQUIRES DATABASE OPERATIONS TRANSFORMATION

Every successful digital transformation project requires a greater reliance on technology. This begins with modernized infrastructure, optimized for the workloads and applications populating the datacenter. While this may sound like a simple statement, the impact on IT operations is anything but.

An IT organization that fails to transform its operations will fail the business. Operating, application, and database deployments will continue to take weeks, causing business units to form shadow IT operations by utilizing the public cloud. This dynamic will further stretch IT organizations, requiring multiple consoles and toolchains to manage the sprawling data center environment. And the cost to the business can be catastrophic.

The challenges faced by database administrators (DBAs) and database professionals are arguably more complex, and the impact of failure on the business can be more dire. DBAs in today's enterprise organizations are asked to do far more with far less. And while many would argue that the role of the DBA is transforming, a more accurate description is that the role is expanding.

Managing the lifecycle of a database is itself a full-time job – one generally performed after hours and during weekends. As any experienced database professional can attest, they spend many of these (after) hours on tedious activities such as patch management and performance tuning. These tasks require great attention to detail and can benefit from automation.

To put a practical lens on it, consider the following: A survey cited by Nutanix showed that 77%¹ of organizations had more than 200 database instances, with 82% having over 10 copies per instance. This dynamic amounts to over 2,000 database instances to provision, manage, optimize, refresh, and restore regularly.

IT organizations can realize significant savings and performance optimizations when deploying bundled "as-a-service" solutions such as Nutanix Era delivered on HPE GreenLake. The automation tools built into Era, combined with the HPE GreenLake edge-to-cloud platform, deliver a cloud-like experience on premises for IT organizations to stand up and maintain database environments more easily through optimized infrastructure, automation tools, and cloud economics.

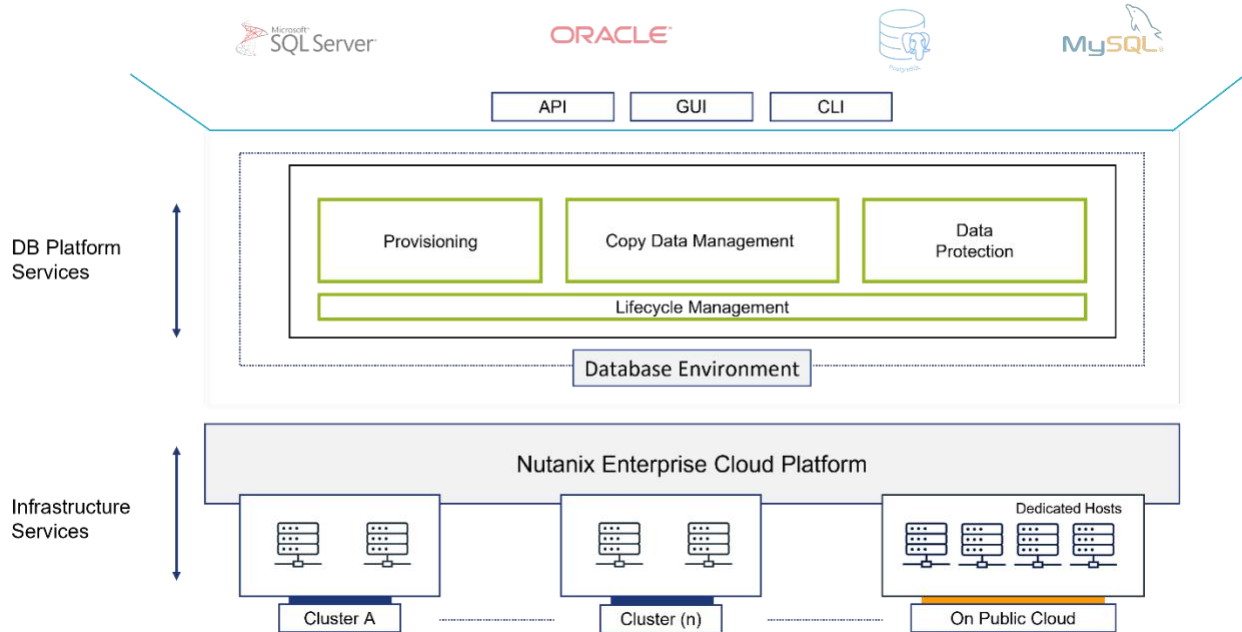
NUTANIX ERA – A DEEPER LOOK AT DATABASE-AS-A-SERVICE

The average enterprise organization has thousands of database instances deployed. Further, these instances span multiple database platforms, including the four most prolific – Oracle DBMS, Oracle MySQL, Microsoft SQL Server, and PostgreSQL.

Nutanix Era is a centralized control plane from which DBAs and database professionals can manage their increasingly diverse and distributed database environments. From deployment and provisioning to cloning and patch management, Nutanix delivers the one-click simplicity of the cloud for enterprise DBAs looking to focus on higher business value activities.

¹ <https://www.nutanix.com/blog/nutanix-era-databases-made-simple>

FIGURE 1: NUTANIX ERA – DATABASE AS A SERVICE



Source: Moor Insights & Strategy

Nutanix seems to have achieved a good balance of extracting the everyday management tasks associated with database platforms and centralizing them into its Era platform. As mentioned, these span the database lifecycle and include:

- **Provisioning** – From the Era interface, database administrators can create profiles based on desired end-states and deploy supported database instances. Era enables support for distribution-specific deployments, such as Oracle's high availability (HA) environment, known as Real Application Clusters (RAC). Further, Era enables its provisioning capabilities to be customized, which allows DBAs to meet company-specific needs across all database distributions from one console.

MI&S sees Era's provisioning capabilities as a potentially significant time (and cost) saver for any organization with a multi-database environment. Nutanix claims a 97% increase in database provisioning – measurable time to value.

- **Copy Data Management (CDM)** – CDM is precisely as its name implies – the management of data to prevent its unnecessary duplication in an enterprise. And as any experienced storage or database professional can attest, this is an issue that plagues many companies. Era utilizes Nutanix Time Machine to enable single-click zero-byte cloning and refreshing to any point in time.

Nutanix claims Era can deliver an approximate 60% reduction in storage requirements for operations such as copy and backup. This can mean significant cost savings for enterprise IT organizations.

- **Data Protection** – Those who have patched or otherwise updated live database environments understand the importance of snapshots for the potential need for rollbacks. This is as fundamental as the proverbial "making sure the power cord is plugged in." However, for larger databases, these snapshots can take considerable time.

Through Era technology, data protection is simple and fast – single-click operations for backup and restore in just a few minutes' time. Database environments that are multi-terabyte in size can be backed up and restored to any point in time in a significantly reduced window of time. While this may seem inconceivable, it is the very essence of what makes Era a true DBaaS for enterprise IT.

- **Lifecycle Management** – Database professionals spend a significant amount of time on database management, much of it on database patching. Anecdotally, after-hours database management is a topic on which MI&S frequently engages with enterprise IT, and it is one area where database professionals crave relief.

The patch automation capabilities built into Era simplify the patch management process and prevent database configuration sprawl. This issue can be especially prolific in departmental-level database environments such as MySQL.

And like each Era function, patch management is performed through a single click. Each database joins a management group (called a database train). As a database professional tests and publishes a patch, an operator can simply apply that patch to a specific train for scheduled (or real-time) patching.

Another good example of Era's database lifecycle management capabilities is its database scaling. Through the Era user interface, database administrators can scale up storage for supported environments by simply selecting a target database and choosing how much additional storage to allocate toward the database or log environment.

While the above addresses the capabilities of Era, it is perhaps more important to articulate why MI&S finds these functions compelling.

1. **Single control plane for database operations management.** We cannot overstate the value of a single interface to monitor and manage all enterprise database operations. One of the more considerable benefits of this is error reduction as database professionals move from console to console and must adhere to the nuanced commands and procedures for managing each environment. The unique requirements of each environment, combined with a nuanced interface, can lead to seemingly minor but significant unforced errors.

While Era delivers many of the benefits of deploying to the cloud, it gives IT organizations control over operating environments and database customizations (e.g., Postgres extensions) that can lead to core capability and performance limitations.

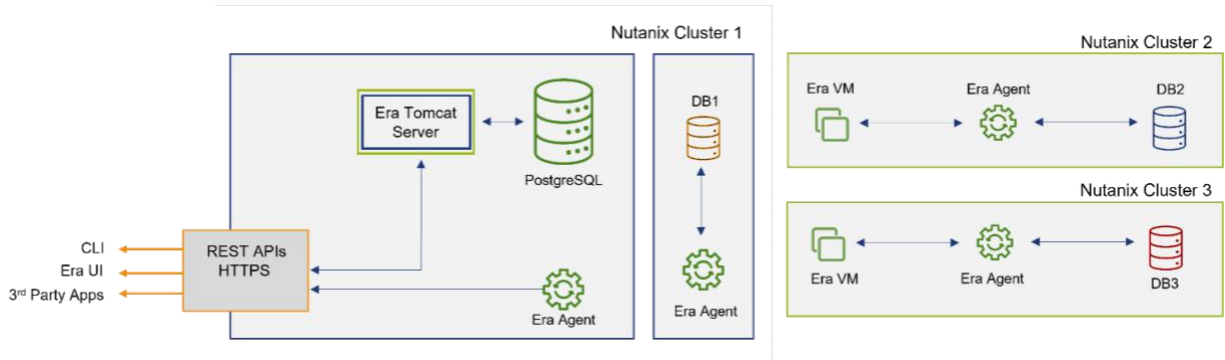
2. **Robust capabilities.** Usually, when companies try to consolidate into a single control plane, they sacrifice granular control levers and functions. This does not appear to be the case with Era, which surfaces these capabilities and enables those finer levels of control – be it for Oracle, Microsoft, Postgres, or MySQL.
3. **Single-click simplicity.** Just as Nutanix billed its original hyperconverged infrastructure (HCI) solution as making infrastructure invisible, MI&S sees Era as seemingly making database management largely invisible. Era reduces those most tedious and time-consuming tasks down to true cloud-like functions. And this, in turn, frees database professionals to focus on driving more strategic engagements with the business units.

We use the term “cloud-like” for a very specific reason. When utilizing DBaaS from a traditional cloud provider, IT organizations trade control for economics and simplicity. With Era, IT organizations can realize these benefits without giving up control over their operating environments. Custom database extensions on specific distributions can fall victim to the public cloud – causing performance issues and even a loss of capabilities. Era erases this concern.

ERA – A DOUBLECLICK

Nutanix positions Era as DBaaS for the enterprise hybrid multi-cloud, or, more simply put, whether your database environment is all on-premises, in the public cloud, or a hybrid deployment.

FIGURE 2 – ERA ARCHITECTURE



Source: Moor Insights & Strategy

The Era Server communicates with a lightweight Era virtual machine (VM) within a Nutanix cluster (VMware ESX or Nutanix AHV VM). These VMs act as control planes and communicate with an Era agent, communicating directly with the managed database.

Database cluster data and control are presented to the user through the Era user interface (UI), a command-line interface (CLI), and to other applications through a REST application programming interface (API).

Within the Era UI, Nutanix has smartly included a call-to-action button titled "API equivalent." By clicking this, administrators are presented the JSON and script equivalent of each capability (e.g., provisioning). This allows for quick and simple customization by administrators, which should be a considerable time saver as it applies to orchestration.

Based on what MI&S has seen in the market and discussions with IT organizations and DBAs, Nutanix is uniquely positioned to address real-world challenges with Era. Further, the simplified elegance of the Era UI should be a welcome change for database professionals.

NUTANIX AND HPE – TRUE DATABASE AS A SERVICE

While Era has addressed many cost concerns, costs resulting from database licensing are still higher than necessary due to under-optimized infrastructure or simply over provisioned instances, as capacity planning can sometimes be inaccurate. A survey by HPE showed that the typical enterprise overprovisions by 40% – 50% on average. In terms of database licensing, this can amount to millions of dollars.

Nutanix and HPE have partnered to deliver a certified Era solution running on HPE GreenLake for IT organizations, which should optimize performance and cost.

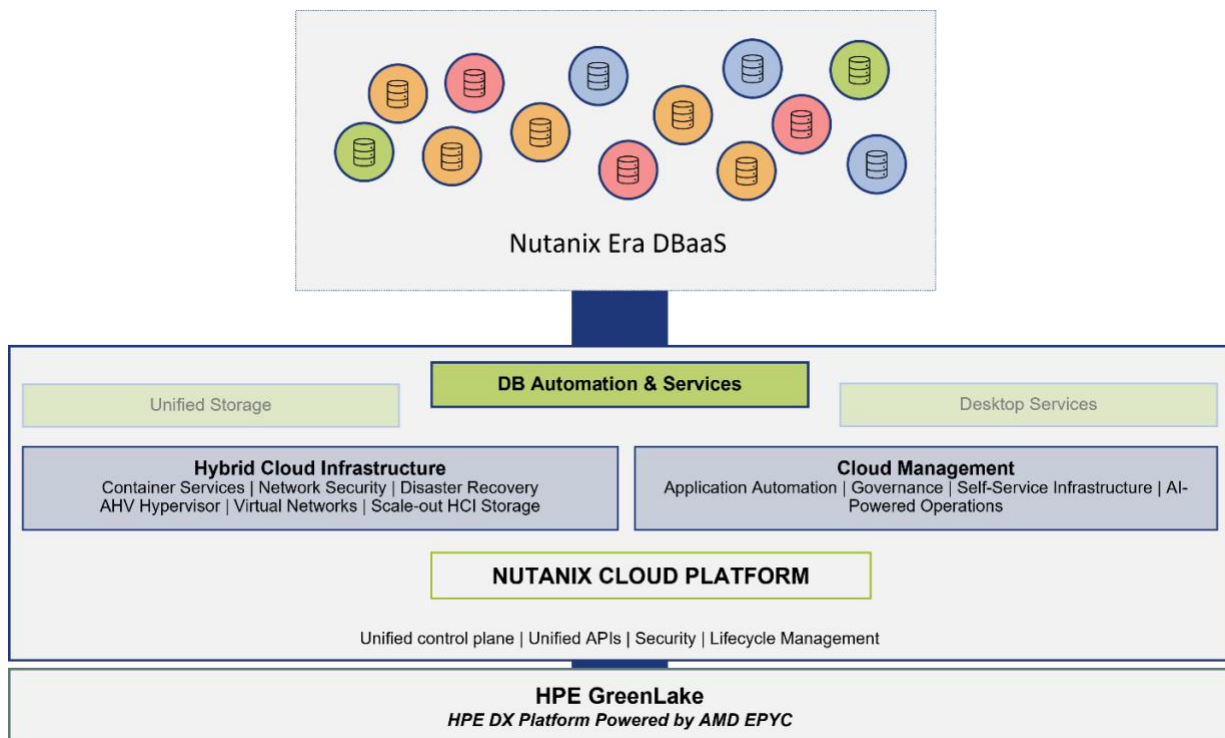
From a performance perspective, the two companies have tuned the solution to drive optimal database performance. This tuning is inclusive of target AMD EPYC CPUs coupled with memory and storage configurations.

From a cost perspective, there are two elements to consider. The first is CPU selection and ensuring the right number of cores are being used to power the Era-managed database environments. This exercise can be the single biggest cost savings an organization will realize through its DBaaS environment.

The second factor in optimizing for cost can be seen through GreenLake’s consumption-based pricing. As customers only pay for resources used on a day-to-day basis, “dead” cycles, whereby a database environment sits idle, and otherwise low utilization mean the customer doesn’t pay.

These two optimizations – performance and cost, combined with Era’s point-and-click simplicity drive cloud consumption for enterprise IT organizations.

FIGURE 3: HPE GREENLAKE & NUTANIX



Source: Moor Insights & Strategy

HPE GreenLake with Nutanix Era is based on an underlying HCI platform, powered by HPE ProLiant DX server. While there are multiple HPE ProLiant DX configurations, the HPE ProLiant DX385 Gen 10 server platform powered by AMD's EPYC processor is particularly well-suited for the application. This is due, in large part, to the processors' features, which should enable optimal database performance and cost savings.

FIGURE 4: HPE PROLIANT DX385 BY THE NUMBERS

Processor	2x AMD EPYC SoC <i>Up to 128 cores/256 threads</i>	<i>Up to 64 multithreaded cores per socket</i>	▪ Database density
Memory Capacity	8 TB DDR4 RAM <i>32 DIMMs</i>	<i>4TB DDR4 RAM per socket Support for 3200 MT/s</i>	▪ In memory database
Memory Bandwidth	16 Memory channels <i>341GB/s throughput</i>	<i>8 memory channels per socket</i>	▪ Database performance
I/O Capacity	Up to 8 PCIe Gen 3 slots <i>128 PCIe lanes</i>		▪ Rich accelerator support
Management	iLO 5	<i>Out of band management</i>	
Security	HPE Silicon Root of Trust	<i>Integrated with AMD Secure Processor</i>	▪ Secure firmware ▪ Secure encrypted memory ▪ Secure encrypted virtualization

Source: Moor Insights & Strategy

A dual-socket HPE ProLiant DX385 Gen10 Plus Server packs significant computational resources – up to 128 multithreaded cores accessing up to 8TB of DDR-4 RAM across 16 memory channels and 256MB of L3 cache per CPU.

When it is combined with Nutanix, IT organizations should achieve significant consolidation ratios while increasing the performance of their database environments. Further, through this combination, companies should realize substantial database licensing cost savings through the consultative and optimized deployment of HPE GreenLake with Nutanix Era cloud services.

It is worth drilling down on database licensing in a little more detail. There are two types of engagements MI&S envisions between HPE GreenLake with Nutanix Era and IT organizations:

- For new engagements, IT organizations can leverage the experience that HPE and Nutanix have in modeling and purchasing database licensing. As many organizations tend to overprovision, these savings can be significant. Further, by deploying on AMD EPYC, organizations have an opportunity to drive down licensing costs even further.

- Refactoring on HPE GreenLake should allow organizations to renegotiate existing agreements for considerable price considerations for existing database environments.

MI&S sees HPE GreenLake with Nutanix Era as unique in the enterprise DBaaS market, and an offering to which IT organizations should give serious consideration.

SECURITY – THE HIDDEN COST AND HIDDEN SAVINGS

While security is a critical element of any "as-a-service" offering, it is perhaps most significant for DBaaS. The enterprise database environment holds an organization's most critical assets.

And security is yet another reason to consider Nutanix Era on HPE GreenLake powered by the HPE ProLiant DX server portfolio. Each of these companies stands out in terms of embedding security at the lowest levels of its product offerings. This low-level protection is an important distinction to make, as most ransomware attacks begin with disguised and virtually undetectable rootkit insertions.

In this solution stack, security begins in the silicon. Servers built on AMD EPYC processors can take advantage of two distinct security functions that lock down data:

- **Secure memory encryption (SME)** – a capability that physically encrypts a server's memory, preventing memory scrape attacks and more involved memory extraction techniques.
- **Secure encrypted virtualization (SEV)** – a capability that enables the individual encryption of VMs, protecting even from the hypervisor and most privileged shared accounts. This assures that each VM is protected and also delivers isolation of performance.

HPE is also regarded as a leader at the server level through its comprehensive security posture and portfolio. Much like AMD, HPE embeds separate silicon to protect HPE ProLiant servers at the lowest levels. Before an HPE ProLiant server boots, its silicon root of trust chip scans over a million lines of code, looking for modified or replaced files that can lead to low-level rootkit attacks and the like.

And once booted into a known and pristine state, HPE servers continually scan for modifications to system files, signaling an attempted exploit. If such an event occurs,

HPE iLO software can remove the infected file and restore itself to its last known good state.

Perhaps HPE's most daring announcement came recently with Aurora, its vision, strategy, and tactical execution of delivering zero-trust environments to enterprise IT.

While security is top-of-mind for most IT professionals, it is not always a factor when considering refreshing database environments. This is an oversight that can be quite costly to an organization. Because of this, MI&S strongly suggests that IT organizations consider these evaluation criteria when assessing infrastructure and DBaaS solutions.

MI&S PERSPECTIVE

Digital transformation and the digitization of assets is a common theme in most discussions with IT organizations of all sizes. There is a universal recognition that automation and data are the keys to success in this new economy and that companies that fail to adapt will lose in the end. The end state for the successfully transformed business is the ability to execute faster, at a lower cost, and more securely.

The reliance on technology to drive the digitally transformed business has a cascading and potentially devastating effect on IT organizations. While IT professionals are being asked to deliver value to the business as technology consultants, the everyday task of deploying, optimizing, and managing IT infrastructure has not gone away. This aspect of IT operations grows with digital transformation and is especially true for database professionals supporting the data-driven business.

MI&S believes IT organizations must optimize for cost without sacrificing performance, thoroughly evaluating every element of the solution stack – from the CPU to the server to storage to the database management control plane. They should strongly consider Nutanix Era on HPE GreenLake as they look to deliver DBaaS to their business users.

The performance and security of the CPU and server platform, combined with HPE GreenLake's cloud-like economics and Era's single-click simplicity, make this a solution that every IT organization should consider as the first step in datacenter modernization.

For more information on Nutanix Era and HPE GreenLake, visit <https://www.nutanix.com/hpe/hpe-databases>

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