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TECH NOTE

Nutanix Database Service DataOps

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Contents

1. Introduction

Audience

This tech note is part of the Nutanix Solutions Library. We wrote it for decision makers, architects, operational staff, and developers. Consumers of the solution we describe here can belong to a broad variety of groups, including:

- Application architects and developers.
- Database administrators.
- DataOps.
- Test.
- QA.
- End users with no database or infrastructure knowledge.

Purpose

Nutanix Database Service (NDB) (formerly Nutanix Era) is a database as a service (DBaaS) software platform that automates and simplifies database administration, bringing one-click simplicity and invisible operations to database provisioning and life-cycle management. In this document, we present a conceptual and logical architectural overview of NDB and review the capabilities that NDB brings to the DBaaS market. We also discuss at a high level how you can integrate the NDB service with existing processes, tools, and services.

Document Version History

Version Number	Published	Notes
1.0	December 2020	Original publication.

Version Number	Published	Notes
1.1	April 2022	Content refresh. Minor fixes throughout document.
1.2	July 2022	Updated product naming from Nutanix Era to Nutanix Database Service.

2. DataOps

DevOps and cloud-like consumption models (internal and external) have together torn down barriers between people and infrastructure for many companies. From a development perspective, necessary resources that previously may have taken weeks to deploy can now be made available in a matter of minutes.

These improvements are striking, but many companies struggle to manage the critical logical construct data that is rapidly increasing in size and complexity. This data is spread out over many environments, datacenters, and clouds and is often both generated and consumed in silos. If the data isn't available for consumers (developers, end users, systems) when they need it, the business can be held back.

DataOps, or the life-cycle management of data, comes into play here. The precise definition of DataOps is still emerging and evolving, but for Nutanix, it's a streamlined process for making data available to anyone, anytime, anywhere, with truly agile data management and a security mindset.

DataOps manages both structured and unstructured data; this document discusses structured data, or how to manage data in relational databases.

Everyone benefits from better data management. When you take advantage of Nutanix DataOps capabilities, you can expect:

- An automated and predefined way of performing DataOps.
- The ability to move data between environments rapidly and in a controlled manner.
- Fast like-for-like data cloning.
- Fast point-in-time (PIT) restores.
- Fast data refresh.
- The ability to mask data for any data management operation.

- Role-based access control (RBAC).

In addition to these DataOps capabilities, the Nutanix solution provides:

- Rapid, validated, and secure deployment for the components, VMs, and database engines required to manage your data.
- Increased security for the components and database engines providing the data.
- Self-service capabilities.
- Respect for service-level agreements (SLAs), including:
  - Uptime.
  - Recovery point objectives (RPOs).
  - Recovery time objectives (RTOs).

3. Nutanix Database Service

This section describes NDB and maps its functionality to DataOps capabilities.

In addition to database administration (which includes DataOps) and database provisioning (of both single and clustered database environments), NDB also provides life-cycle management (provisioning and decommissioning) for required VMs according to Nutanix best practices. With these features, NDB gives you a complete, end-to-end DBaaS, including both VMs and databases.

NDB is easy to design, implement, operate, and consume, as it takes advantage of Nutanix hyperconverged infrastructure (HCI) and provides a straightforward UI, with self-service capabilities and a REST API.

NDB provides four main services:

- One-click provisioning
  - One-click provisioning of multiple database engines.
  - Provisioning with standardization through profiles.
  - Customizable recovery SLAs for continuous, daily, and monthly RPOs.
  - Pre-scripts and post-scripts.
- Copy data management (CDM)
  - One-click database cloning or refresh to any specific PIT.
  - Secure cloning with pre-post masking script insertion.
  - Create space- and time-efficient zero-byte database clones.
- Database protection
  - One-click database snapshots.
  - Store database working state for database rollbacks.
  - Create space-efficient and time-efficient database snapshots.

- Patching
  - One-click database patching.
  - Out-of-band database patching to eliminate database configuration sprawl.
  - Testing new database updates and patches before publishing to the patch train.

NDB uses profiles during provisioning and patching to let you decide how to configure the databases and VMs you deploy. Profiles exists for:

- Compute: vCPU and memory.
- Network: VLAN and IP management.
- Software: operating system and database binaries.
- Database parameters.
- Windows domain: Information required when joining a VM to a domain or creating domain objects.

By applying profiles when provisioning, you can keep the number of software profiles at a minimum, so your environment consumes less storage.

SLAs, which are applied when provisioning, define data retention policies and RPOs. You can change them for each time machine if you need to.

The following figure presents a logical overview of NDB, represented as the platform service, and its direct integrations with Nutanix HCI and the database engine it manages.

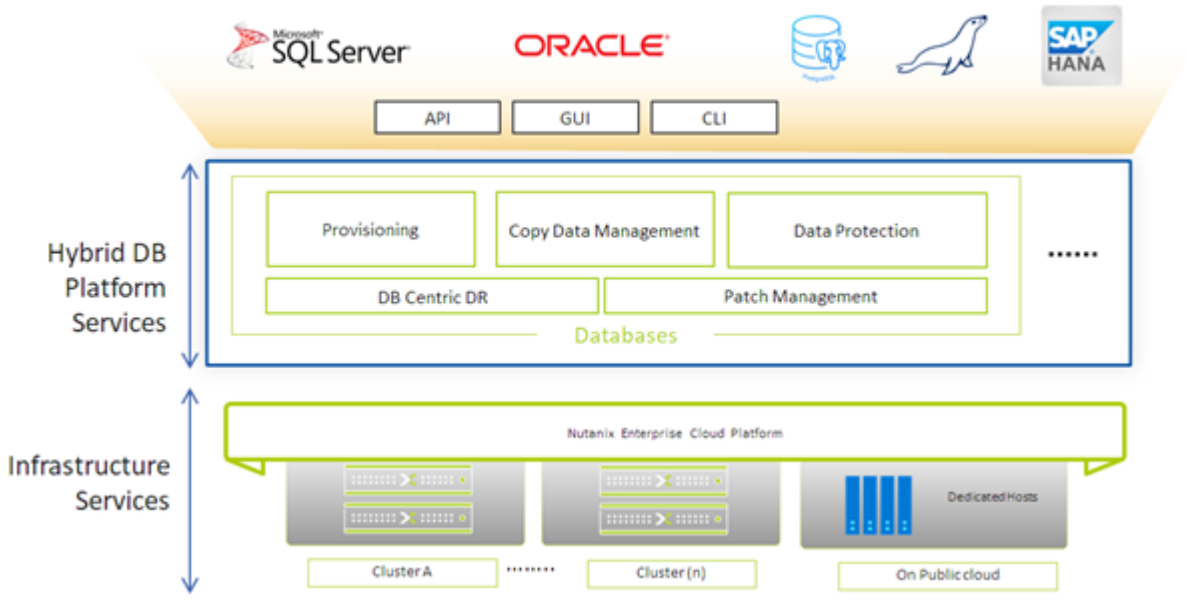

Figure 1: NDB Logical Overview

NDB RBAC makes it easy to define what tasks users or groups of users can perform. For additional information, see the References section.

Nutanix Database Service and DataOps

The NDB platform provides the DataOps capabilities required to manage and provide data to the organization when needed and in the format required. The following NDB functionalities deliver a true DataOps experience.

Life Cycle

Table: NDB DataOps Functionalities

Functionality	Description
Clone	Copy data from your source database to a new database server or to an existing database server. NDB uses a snapshot or PIT copy as the source for the new database.

Functionality	Description
Log catch-up	Secure transactional logs from the source database to NDB, used to perform PIT operations. The applied SLA profile specifies how often to transmit the transactional logs to NDB. You can trigger manual log catch-up operations when necessary.
Refresh	A refresh operation reverts a cloned database back to a specific PIT, which is useful during development and test. Refresh a database clone based on a schedule or by manually initiating a task.
Restore	Restore the source database to either a snapshot or PIT based on your requirements.
Snapshot and backup	NDB controls database snapshots at the storage layer. The system quiesces the database while the snapshot is taken. Snapshots are either taken at the interval specified during provisioning or created manually. The system can store the snapshots locally in the Nutanix cluster or on a remote Nutanix cluster.
PIT-driven operations	PIT clone, restore, and refresh operations allow you to pick any specific time for these operations; you're not bound to the time when a snapshot was taken. PIT operations are possible because NDB secures the transactional logs from the running databases, either at an interval specified during provisioning or as a manually initiated task.

Functionality	Description
Data masking	Alongside authorization and RBAC, data masking is also required to complete the security component for a DataOps platform. Using the pre-script and post-script capabilities in NDB, you can mask data when moving it between systems or environments.

DevOps processes for a software development life cycle can use most of the DataOps functionality addressed in this section. Two life-cycle processes available in NDB make it a perfect fit in the DevOps process to accelerate data services provided to application environments.

Table: NDB Life-Cycle Processes

Functionality	Description
Provision	Provision both the database and the database server (VM) according to predefined standards, processes, and versions. Available directly through the NDB UI, NDB APIs, or another third-party solution, NDB one-click provisioning ensures that you get the expected result every time.
Decommission	Clean up and remove objects that are no longer in use. The NDB decommissioning process provides a simple way to remove the components created and consumed during the life cycle of a database, including database servers, databases, snapshots, cluster constructs, and time machines.

Access Management

NDB can enforce control over what systems and users can access the data.

Table: NDB Access Management

Functionality	Description
Authorization	Control what database servers you can clone a source database to. This control is an important safeguard against data leakage between systems or environments.
RBAC	RBAC is essential for any service because it provides control and audit functionality. The NDB platform comes with predefined roles as well as an option to create your own roles. You can use both local users and Active Directory users and groups to control access to NDB. (Active Directory is the preferred option.)

Agility

Define and then let NDB control when data is refreshed to a previous point in time and when data expires. Taking advantage of the scheduling capabilities adds another layer of control and simplicity.

Table: NDB Scheduling

Functionality	Description
Schedules	NDB provides scheduling for clone expiration, clone refresh, and snapshot expirations.

Asset Tracking

NDB provides database inventory management, which helps track database servers and data sprawl.

Table: NDB Asset Tracking

Functionality	Description
Tags	Depending on how you use the NDB platform, you can take advantage of tags for chargeback or showback and as a way to provide additional information or a unique identifier. You can apply NDB tags at the database, time machine, clone, and database server levels.

4. Solution

This section presents a conceptual and logical design. We don't provide a complete design here, but rather an overview of what a DBaaS using NDB might look like. Specific requirements and constraints identified during a design process lead to a clean design for specific use cases.

Conceptual Overview

This section outlines entities included in a potential solution at a high level. To get a completely accurate conceptual overview, we need a thorough understanding of a customer's specific IT landscape, including requirements and constraints.

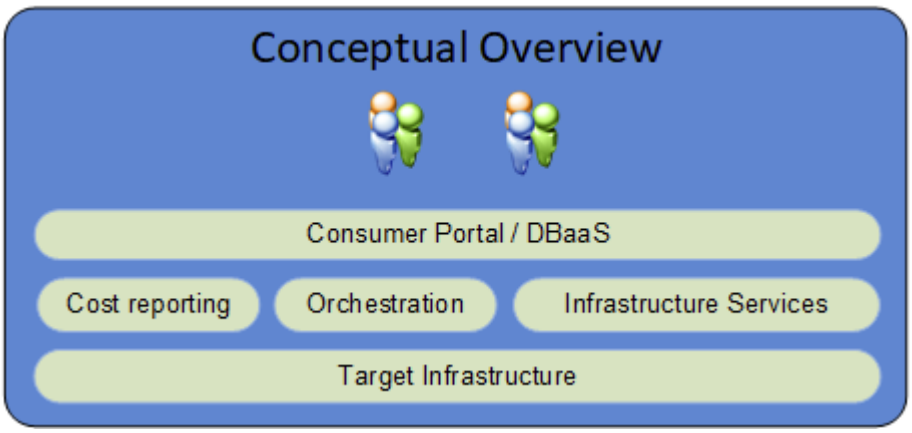

Figure 2: NDB Conceptual Overview

Table: NDB Conceptual Overview Details

Item	Description
Users	Multiple user categories can consume the service.
Consumer portal or DBaaS	User entry point and a platform to deliver DBaaS.

Item	Description
Cost reporting	Report on cost per individual user or group of users based on factors such as what is consumed or where the components (for example, VMs and DBs) are physically hosted.
Orchestration	Integrate with organization services to ensure they're updated with relevant information when you deploy and decommission databases and database VMs.
Infrastructure services	Core IT systems required for the solution.
Target infrastructure	Software and hardware used by the designed service.

Logical Design

This section provides a high-level logical design of the Nutanix components required to deliver the conceptual model. We briefly address the concept of self-service, but we don't discuss internal systems to be integrated into the solution, as these vary greatly between customers.

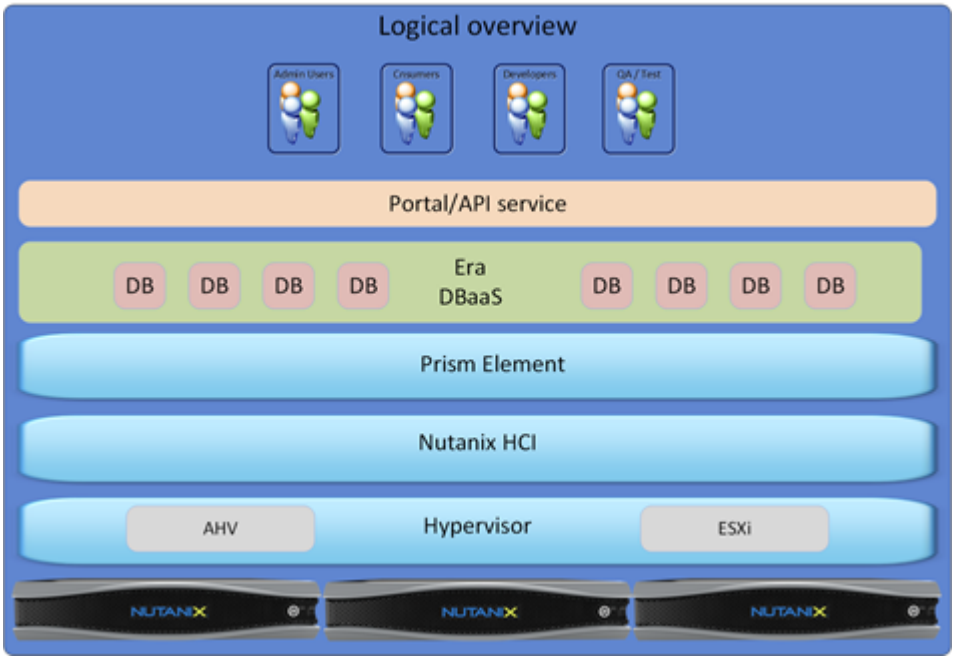

Figure 3: NDB Logical Overview

Table: NDB Logical Overview Details

Item	Description
Users	Depending on their area of responsibility, use case, and desired service, users can connect to any of the following logical constructs: NDB API, NDB UI, customer third-party API, or customer third-party UI.
Portal or API	Any existing portal or command line interface structure used by customers can integrate with NDB through our API. NDB provides self-service portal functionality for database administrators (DBAs).
NDB	Provides DBaaS for users and systems directly or through other integration points.
Prism Element	Connection point between NDB and Nutanix HCI.

Item	Description
AHV	The Nutanix hypervisor NDB can use to deliver DBaaS. NDB management components can run on AHV.
ESXi	The VMware hypervisor NDB can use to deliver DBaaS. NDB management components can run on ESXi.
Nutanix HCI	Nutanix AOS that provides the Nutanix core storage features.
Hardware	Can be Nutanix-branded, Nutanix Cloud Clusters (NC2), OEM appliances, or Nutanix-supported hardware.

5. Integration Capabilities

NDB provides a rich set of API capabilities that make it easy to integrate with existing automation and orchestration solutions.

The following list gives a few examples of how Nutanix helps customers integrate NDB with existing solutions:

- Nutanix Self-Service with NDB.
- Direct API access to NDB.
- Direct API access to Self-Service, which uses NDB services.
- Ansible with NDB.
- ServiceNow with NDB.
  - Use workflows directly between ServiceNow and NDB or the plugin for Self-Service or create customized ServiceNow workflows.
- vRealize Automation with NDB.

Any of the complementary solutions discussed in this section can use any functionality that NDB provides, including the following:

- Database provisioning.
- Taking snapshots.
- Clone operations.
- Refresh operations.
- Restore operations.
- Profile management.

6. References

1. Nutanix Database Service Solution Brief
2. Nutanix Database Service User Guide
3. Turn Your Database into a Service
4. Simplify Your Database Operations
5. Nutanix Database Service: Elegant and Efficient Database Operations in One Click
6. Self-Service in the Era of DBaaS

About Nutanix

Nutanix is a global leader in cloud software and a pioneer in hyperconverged infrastructure solutions, making clouds invisible and freeing customers to focus on their business outcomes. Organizations around the world use Nutanix software to leverage a single platform to manage any app at any location for their hybrid multicloud environments. Learn more at www.nutanix.com or follow us on Twitter @nutanix.

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