

TECH NOTE

Nutanix Database Service Management Plane Availability

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Contents

| | |
|---|----|
| 1. Introduction..... | 4 |
| Audience..... | 4 |
| Purpose..... | 4 |
| Document Version History..... | 4 |
| Nutanix Database Service..... | 5 |
| 2. Area and Location Availability Definitions..... | 6 |
| Region..... | 6 |
| Availability Zone..... | 6 |
| Datacenter..... | 7 |
| Computer Room..... | 7 |
| 3. Nutanix Database Service Architecture..... | 9 |
| Multicluster Nutanix Database Service Architecture..... | 11 |
| Nutanix Database Service High-Availability Configuration..... | 12 |
| 4. Nutanix Database Service Management Plane Availability Models..... | 15 |
| Model 1..... | 16 |
| Model 2..... | 17 |
| Model 3..... | 18 |
| Model 4..... | 18 |
| 5. Appendix..... | 19 |
| References..... | 19 |
| About Nutanix..... | 20 |
| List of Figures..... | 21 |

1. Introduction

Audience

This tech note is part of the Nutanix Solutions Library. We wrote it for architects and database administrators who seek to understand Nutanix Database Service (NDB) (formerly Nutanix Era) from an availability perspective. Because this document describes how to make the NDB management plane highly available, we recommend using it when designing and implementing NDB management plane business continuity. Readers should already be familiar with Nutanix, databases, and NDB.

Purpose

In this document, we cover the following topics:

- Area and location availability definitions.
- NDB management plane availability.

Note: This document describes the capabilities of NDB version 2.3.

Note: The NDB management plane doesn't come with traditional backup and restore capabilities.

Note: This document doesn't cover business continuity or disaster recovery for the database workloads managed by NDB.

Document Version History

| Version Number | Published | Notes |
|----------------|---------------|-----------------------|
| 1.0 | February 2021 | Original publication. |

| Version Number | Published | Notes |
|----------------|----------------|---|
| 2.0 | September 2021 | Updated the Era Architecture and Era Management Plane Availability Models sections to reflect Era version 2.3 capabilities. |
| 2.1 | July 2022 | Updated product naming from Nutanix Era to Nutanix Database Service. |

Nutanix Database Service

NDB (formerly Nutanix Era) automates and simplifies database administration, bringing one-click simplicity and invisible operations to database provisioning and life-cycle management.

NDB enables database administrators to perform operations such as database registration, provisioning, cloning, patching, and restore. It allows administrators to define provisioning standards with end-state driven functionality that includes network segmentation, high availability database deployments, and much more.

With the NDB multicluster capability, you can easily manage databases across multiple locations, both on-premises and in the cloud, with Nutanix clusters.

For more information, read the [NDB solution brief](#).

2. Area and Location Availability Definitions

This section offers suggested area and location availability definitions. Map them against your specific conditions.

Region

A region is a geographical area with one or more availability zones (AZs). Regions are independent from each other, so failures in one region don't affect another region. Typical examples include US East Coast, US West Coast, Europe North, Europe South, Asia East, and Asia South.



Figure 1: Area and Availability Definitions: Region

Availability Zone

One or more AZs reside within a region. Each AZ consists of at least one datacenter.

Implement AZs such that a normal failure (for example, a power plant malfunction) in one AZ doesn't affect another AZ. Large-scale disasters such as catastrophic earthquakes and nuclear strikes may disable more than one AZ in a region.



Figure 2: Area and Availability Definitions: Availability Zone

Datacenter

Datacenters (DCs) host hardware, management, and end user applications and services, including network routers, network switches, firewalls, load balancers (LBs), physical servers running Nutanix software, and third-party hypervisors (if required). One or more DCs reside within an AZ.

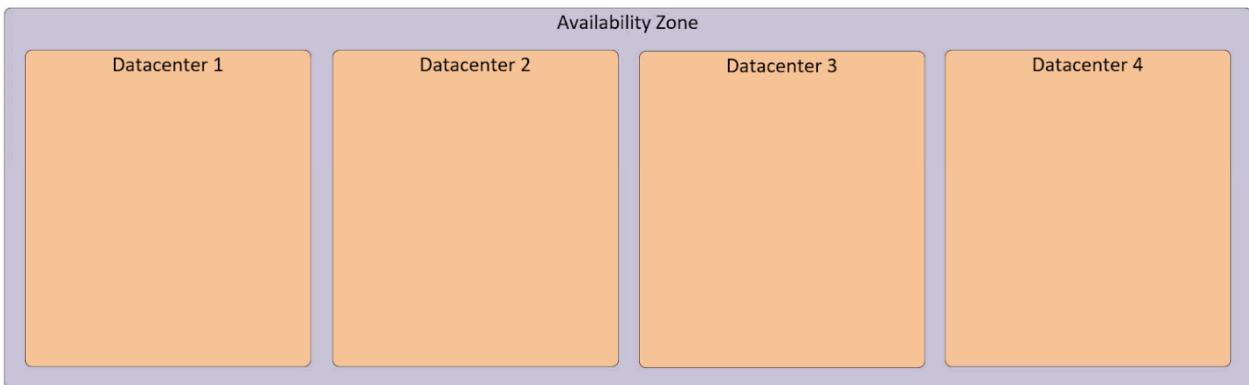


Figure 3: Area and Availability Definitions: Datacenter

Computer Room

The components hosted in a DC can occupy one or more computer rooms. Depending on the distance between the computer rooms and whether they share power and cooling, you can treat the computer rooms as either a single unit or multiple units from an availability perspective.

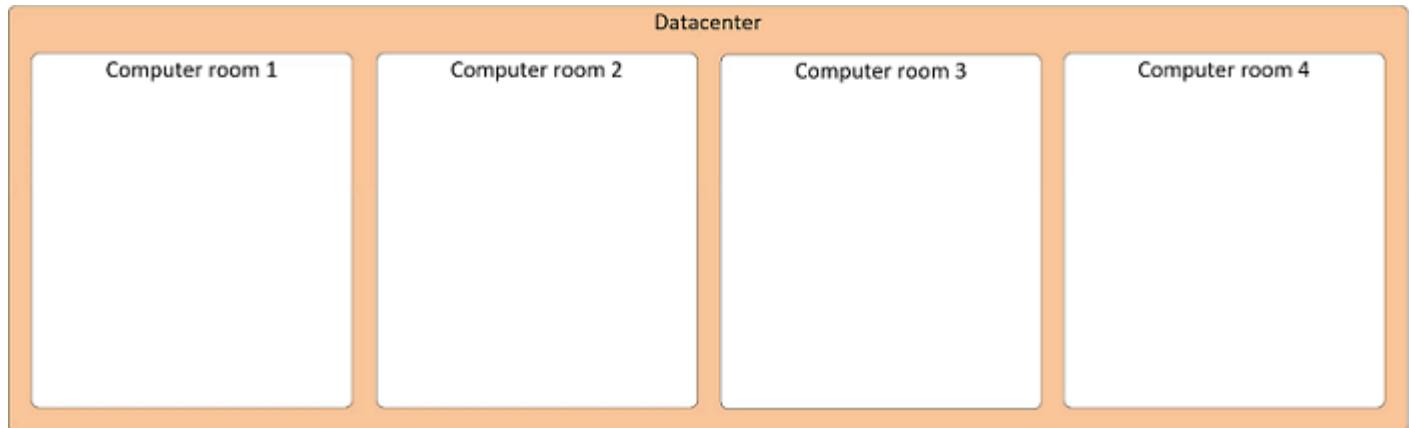


Figure 4: Area and Availability Definitions: Computer Room

3. Nutanix Database Service Architecture

NDB, the Nutanix database-as-a-service (DBaaS) management plane, operates on one or more VMs running in a Nutanix cluster with at least three Nutanix nodes (physical servers). The default NDB management plane deployment in a single Nutanix cluster consists of one VM running front-end services (API, agent, web service) and the back-end service (database or repository).

The following figure presents a logical implementation of NDB DBaaS, including the NDB management VM, the logical components, DBs, and one Nutanix cluster.

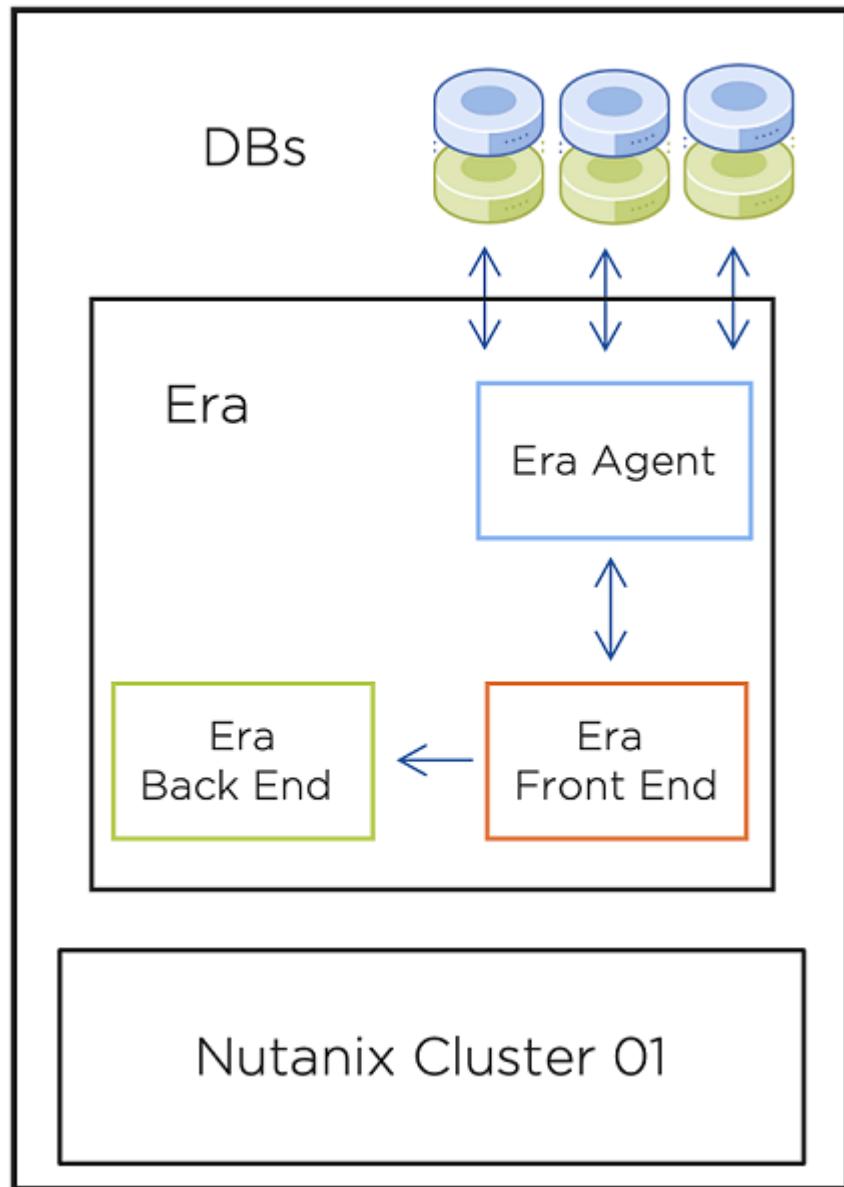


Figure 5: Logical Overview of NDB DBaaS for One Cluster

Multicloud Nutanix Database Service Architecture

NDB follows the Nutanix scale-out philosophy and can connect to more than one Nutanix cluster. To simplify administration and improve DB workload availability, you can place:

- DB server VMs in different Nutanix clusters to provide a clustered DB.
- DB snapshots in multiple Nutanix clusters (not only where the DB is hosted).
- DB log files in multiple Nutanix clusters (not only where the DB is hosted).

In a multicloud NDB environment, the NDB management plane requires one NDB management agent VM (running only the agent service) in each additional Nutanix cluster it manages.

The following figure expands on the previous one to include the three Nutanix clusters and three NDB management agent VMs.

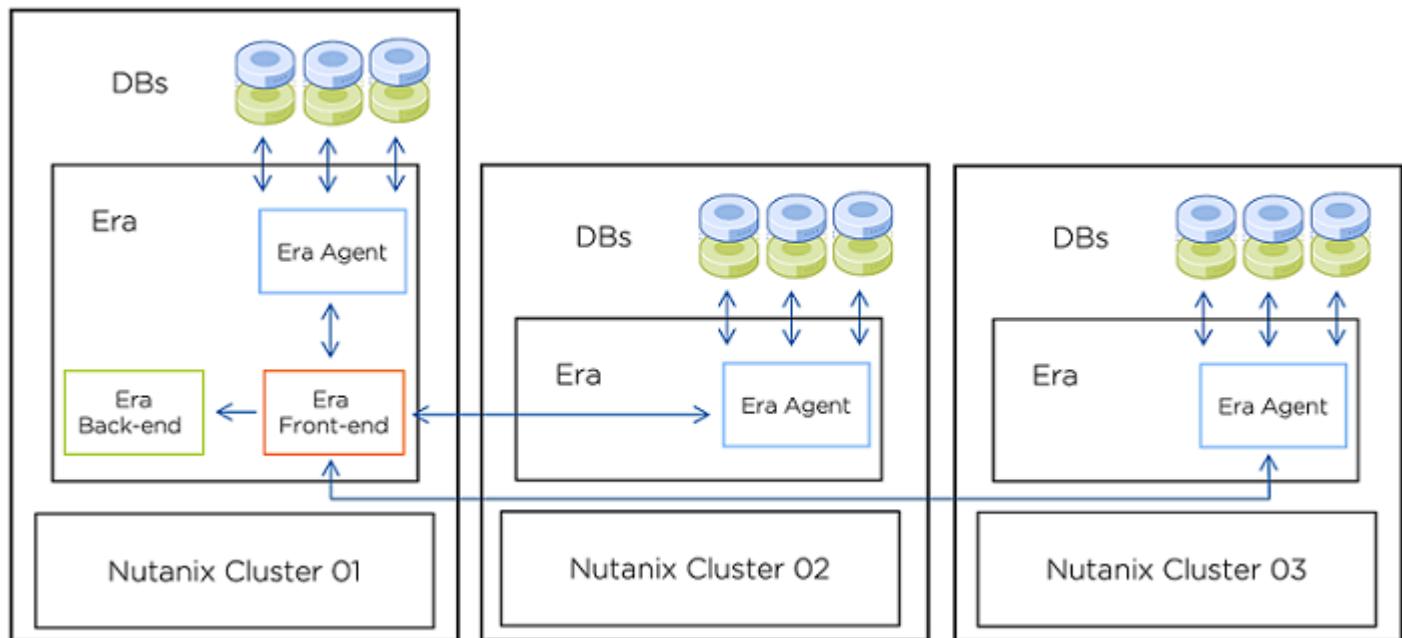


Figure 6: Logical Overview of NDB DBaaS for Three Clusters

Nutanix Database Service High-Availability Configuration

To increase availability at the NDB management plane layer, you can deploy it in a high-availability (HA) configuration. The consumers (users and third-party systems) access a virtual IP address that directs the session to the VM, which acts as the service leader. The following figure describes the logical components of a highly available NDB architecture.

Note: This setup has an additional component: an NDB proxy or API gateway.

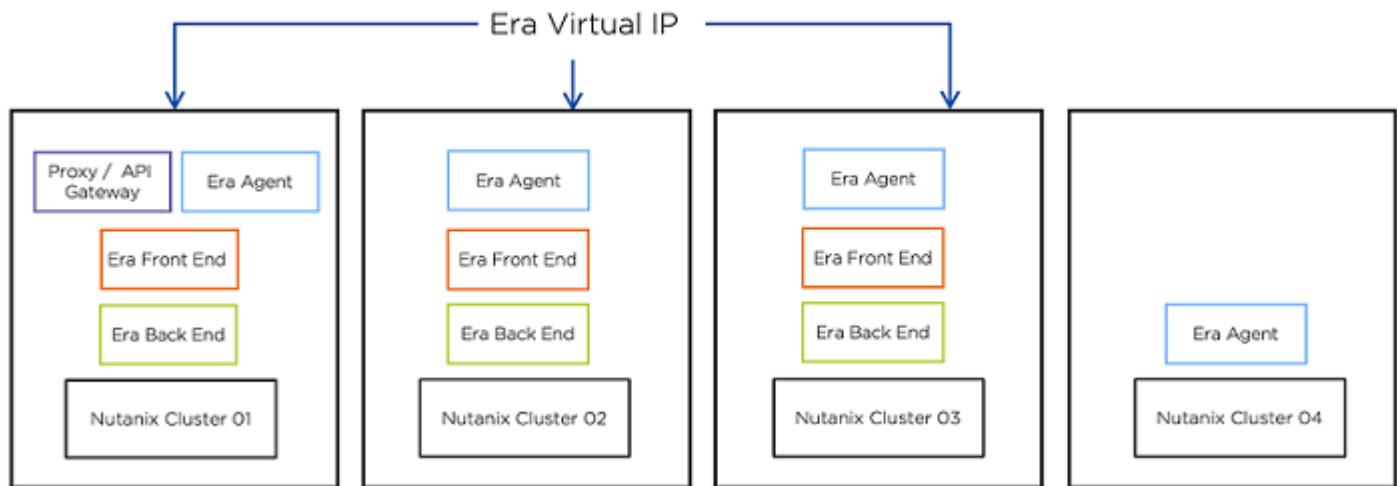


Figure 7: Logical Overview of NDB HA Configuration

If you use the highly available approach, the NDB management plane can deliver:

- Easy and fast deployment.
- Recovery point objective (RPO) 0.
- Recovery time objective (RTO) 0 or close to 0, based on which component is failing and its current role (primary, synchronous, or asynchronous).

NDB comes with built-in local data protection to safeguard the NDB management plane in the clusters where the components run. The method of protection is based on the configuration:

- Single cluster or multicluster setup with NDB as a single VM alongside the NDB agent VM:
 - › The system creates a Nutanix protection domain snapshot of the NDB VM every hour and maintains the most recent snapshot. NDB agent VMs aren't protected.
- Single cluster or multicluster setup with NDB HA:
 - › The system creates a Nutanix protection domain snapshot of the NDB front-end VMs every hour and maintains the most recent snapshot of each front-end VM.
 - › An NDB time machine protects the NDB back-end repository using the Brass SLA, which means that the system takes one application-consistent snapshot per day and retains each snapshot for seven days. NDB repository transaction logs aren't backed up, and the snapshots don't replicate to additional Nutanix clusters. NDB agent VMs aren't protected.

Contact [Nutanix Support](#) if you need to use the built-in data protection entities.

The following figure shows a logical NDB management plane HA implementation across multiple datacenters.

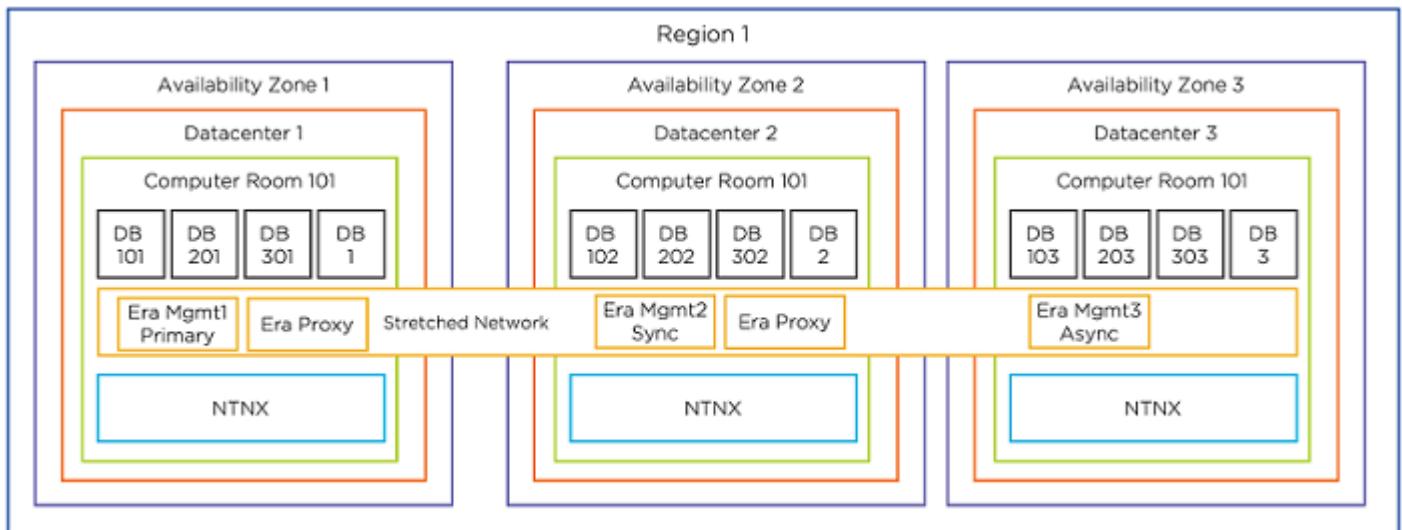


Figure 8: Logical Overview of NDB HA Setup Across Multiple Datacenters

The different NDB management plane deployment models require between three and ten NDB VMs at minimum, as shown in the following table.

Table: NDB Management Deployment Models and Required NDB VMs

| NDB Management Plane Deployment | Number of NDB Management Plane VMs |
|---|--|
| Single VM, single Nutanix cluster | One VM that runs all four services. |
| Single VM, multiple Nutanix clusters | At least three: two VMs in the Nutanix cluster where you deployed NDB and one VM in each additional Nutanix cluster that runs the NDB management agent. |
| HA configuration, single Nutanix cluster | At least nine: three VMs to provide the front-end services (API, agent, web), two VMs to provide an HA proxy service (used by the front-end services to communicate with the back-end service), three VMs to provide the back-end service (Postgres DB cluster), and one VM to run the NDB management agent. |
| HA configuration, multiple Nutanix clusters | At least ten: three VMs to provide the front-end services, two VMs to provide an HA proxy service (used by the front-end services to communicate with the back-end service), three VMs to provide the back-end service, and one VM in each Nutanix cluster that runs the NDB management agent. |

NDB management plane VMs are built on CentOS version 7.

We reference the NDB repository throughout this document, which is the Postgres database that serves as NDB's metadata store.

4. Nutanix Database Service Management Plane Availability Models

Before you explore the availability options, keep the following points in mind:

- The NDB management plane requires a quorum of the NDB back-end service instances to be available. If a quorum isn't available, the NDB management plane enters a read-only state.
- To avoid defining area and location availability (computer room, DC, AZ, and region) in a way that creates a single point of failure (SPOF) or risks putting the NDB management plane in read-only mode, distribute the NDB management plane as follows:
 - › DC1 runs the primary NDB back-end service.
 - › DC2 runs the synchronous NDB back-end service.
 - › DC3 runs the asynchronous NDB back-end service.

Consider the following parameters when you distribute the NDB management plane components:

- Physical distance.
- Available bandwidth.
- Availability, SLA, and uptime of the network connection (if placing components in multiple DCs, AZs, and regions).
- Guaranteed bandwidth for NDB back-end traffic (if placing components in multiple DCs, AZs, and regions).
- Era-provided HA proxy servers must be on the same L2 network.

Contact [Nutanix Support](#) if you need to rebuild the NDB-provided HA proxy VMs.

You can apply NDB management plane availability at any level (computer room, DC, AZ, or region).

The following NDB components are included in the availability option:

- NDB mgmt1 primary: runs both NDB front-end (including agent) and back-end services.
- NDB mgmt2 sync: runs both NDB front-end (including agent) and back-end services.
- NDB mgmt3 async: runs both NDB front-end (including agent) and back-end services.
- NDB proxy: proxy used for communication between NDB front-end and back-end services.

Implementation requires only the NDB management plane components. You can deploy and maintain any of the models through a single interface.

Model 1

In model 1, the NDB management plane is available as long as two of the computer rooms are operational.

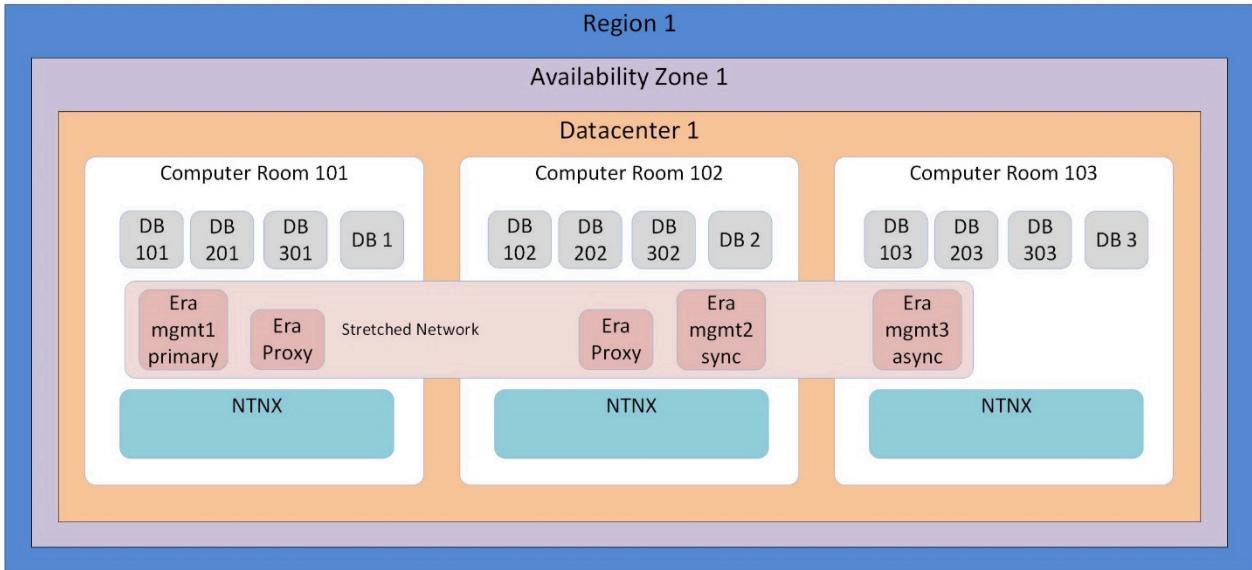


Figure 9: Model 1

Model 2

In model 2, the NDB management plane is available as long as two of the DCs are operational.

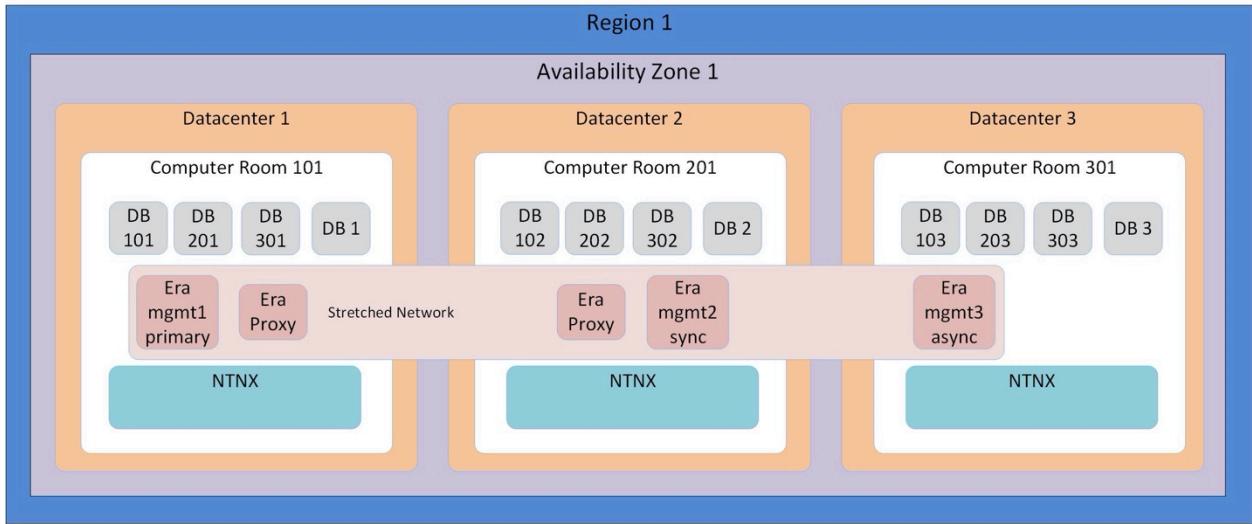


Figure 10: Model 2

Model 3

In model 3, the NDB management plane is available as long as two of the AZs are operational.

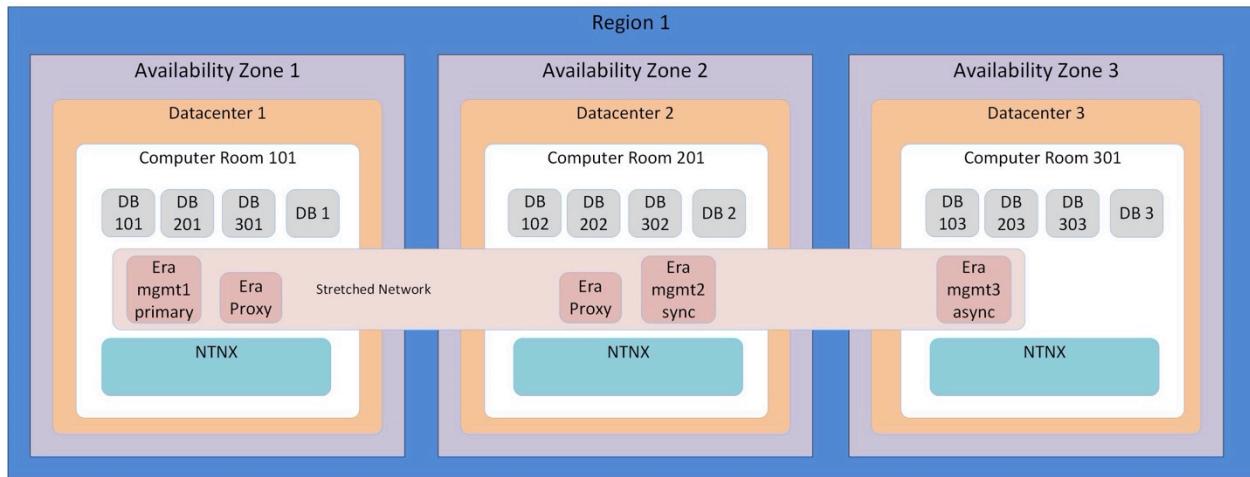


Figure 11: Model 3

Model 4

In model 4, the NDB management plane is available as long as two of the regions are operational.

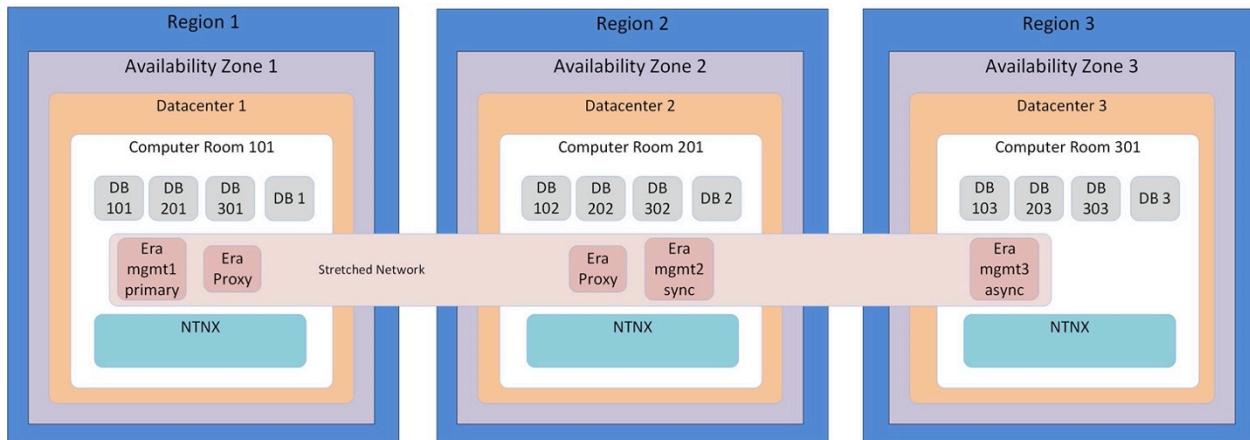


Figure 12: Model 4

5. Appendix

References

1. [Nutanix Database Service User Guide](#)
2. [Nutanix Database Service Database Data Protection](#)

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](https://twitter.com/nutanix).

List of Figures

| | |
|---|----|
| Figure 1: Area and Availability Definitions: Region..... | 6 |
| Figure 2: Area and Availability Definitions: Availability Zone..... | 7 |
| Figure 3: Area and Availability Definitions: Datacenter..... | 7 |
| Figure 4: Area and Availability Definitions: Computer Room..... | 8 |
| Figure 5: Logical Overview of NDB DBaaS for One Cluster..... | 10 |
| Figure 6: Logical Overview of NDB DBaaS for Three Clusters..... | 11 |
| Figure 7: Logical Overview of NDB HA Configuration..... | 12 |
| Figure 8: Logical Overview of NDB HA Setup Across Multiple Datacenters..... | 13 |
| Figure 9: Model 1..... | 17 |
| Figure 10: Model 2..... | 17 |
| Figure 11: Model 3..... | 18 |
| Figure 12: Model 4..... | 18 |