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API Reference v4 Introduction

Nutanix Legacy API Deprecation Note Nutanix Legacy API versions v0.8, v1, v2, and v3 will be deprecated and no longer supported starting with the AOS and PC Upgrade Release planned for Q4-CY2026. Customers with active service contracts will continue to receive support from Nutanix as per the Nutanix EOSL policy. Nutanix strongly recommends that all our customers and partners migrate their applications and tools to the latest v4 APIs and SDKs before the legacy APIs are deprecated.

Nutanix v4 APIs

Welcome! We are pleased to launch the Generally Available (GA) program for our version 4 (v4) family of Nutanix Prism APIs.

What is it and why is it important?

Nutanix APIs have grown over the past decade and now provide support for multiple endpoints, clusters, products, and operations. Our goal with the version 4 REST APIs is to provide a comprehensive and consistent set of APIs for operating the Nutanix Cloud Platform. v4 APIs have semantics based on open standards, delivering enhanced usability and developer experience.

Today, Nutanix offers [four different versions](#) of APIs. We provide diverse API support through these individual versions, and you might require a combination of these versions to address your requirements. v4 APIs will consolidate all our APIs into a single platform API. The Nutanix v4 APIs are being developed with an “API first” mentality where API documentation and supporting SDKs are published concurrently with each product version update.

What's new in v4?

Our new v4 API family delivers extensive new functionality for Nutanix API users. Some of the top new features include:

- For developers/API consumers
- SDK Support across Python, Go lang, Java and JS.
- A new developer portal with a comprehensive set of API, SDK documentation, and code samples.

- Enhanced usability, filtering, sorting, and selection through OData.
 - [API versioning](#).
 - API compatibility with and starting from the v4 RC release. EA versions of v4 API are not guaranteed to be backward compatible.

Related Documentation

Nutanix v4 API and SDK GA documentation is now live and can be accessed below. If you are an existing user of our v2.0 or v3 APIs you may wish to start with the [v4 API Migration Guide](#).

Note: The code sample library will be expanded as new APIs are released.

- [v4 API User Guide](#)
 - [v4 API Migration Guide](#)
 - [v4 API Documentation](#)
 - [Nutanix v4 API Versioning Scheme](#)
 - [All API References](#)
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Which APIs are included in this release?

The Generally Available ("GA") and Release Candidate ("RC") v4 API releases represent the next step for cloud consumption, integration, and automation of the Nutanix Cloud Platform. The launch publishes the following APIs in Prism Central.

| API Namespace | Namespace Endpoint | Status | Prism Central version | AOS version | Additional Software Requirements || --- | --- | --- | --- | --- | --- | --- | --- | --- | AI Ops |
aiops | GA | pc.2024.3 or later | 7.0 | || Cluster Management | clustermgmt | GA | PC 7.3 or later | 7.3 | || Files | files | GA | pc.2024.3 or later | 7.0 | File Server
5.1 and Files Manager 5.1 | || Identity and Access Management (IAM) | iam | GA | pc.2024.3 or later | 7.0 | || Lifecycle Management (LCM) | lifecycle | GA | PC 7.3
or later | 7.3 | LCM 3.2 | || Networking | networking | GA | PC 7.3 or later | 7.3 | || Prism | prism | GA | PC 7.3 or later | 7.3 | || Virtual Machine Management | vmm |
GA | PC 7.3 or later | 7.3 | || Data Protection | dataprotection | GA | PC 7.3 or later | 7.3 | || Flow Management | microseg | GA | PC 7.3 or later | 7.3 | ||
Monitoring | monitoring | GA | PC 7.3 or later | 7.3 | || Volumes | volumes | GA | PC 7.3 or later | 7.3 | || Licensing | licensing | GA | PC 7.3 or later | 7.3 | ||
Objects Storage Management | objects | GA | pc.2024.3.1 or later | 7.0.1 | Objects Manager 5.1.1 | || Data Policies | datapolicies | GA | PC 7.3 or later | 7.3 | ||
NCM Base Platform (Prism Reports) | opsmgmt | GA | pc.2024.3 or later | 7.0 | || Security | security | GA | PC 7.3 or later | 7.3 | ||

Use of v4 APIs in a Prism Element or Prism Central environment that does not meet the version requirements above may cause the request(s) to fail.

Subsequent releases of Prism Central will expose additional v4 APIs with each version. The following are the APIs in pipeline and will be released in future versions.

- Disaster Recovery
 - Foundation Central
 - Nutanix Cloud Manager (NCM) including Self Service
 - NDB (formerly Era)
 - NKE (formerly Karbon)

Frequently Asked Questions

- What are the different v4 API version schemes and types ?
 - See [Nutanix v4 API Versioning Scheme](#)
 - Can I use v4 EA or RC APIs in a production environment?
 - Only GA version of v4 APIs and SDKs is supported in production environment. EA or RC v4 APIs are not supported in production environments.
 - Will I receive support for the v4 EA or RC APIs?
 - The Nutanix support communities handle support for v4 EA and RC APIs. If you need support or have questions, refer to the “How It Works” section of the Nutanix [communities](#).
 - Where can I get more information regarding legacy API deprecation?

See the [Nutanix legacy API deprecation notification](#).

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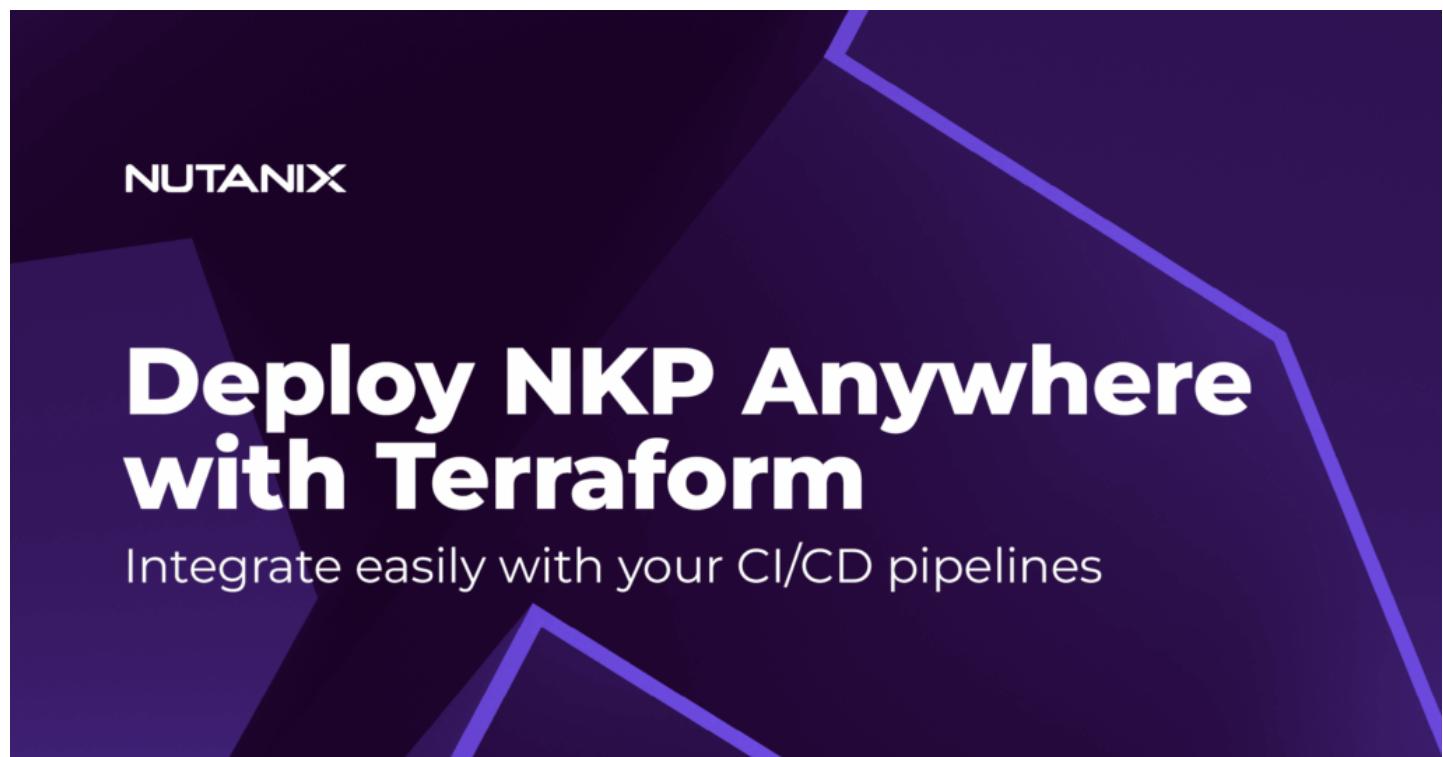
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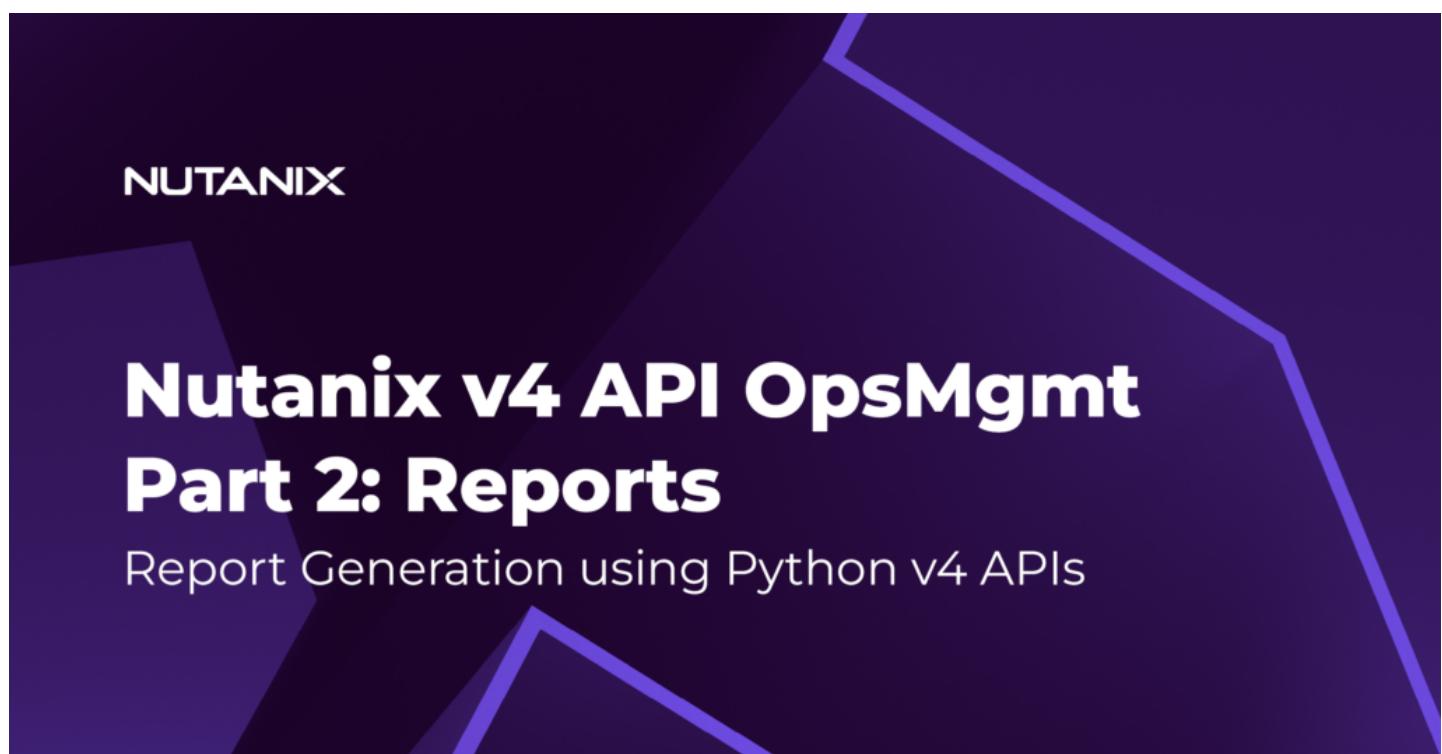
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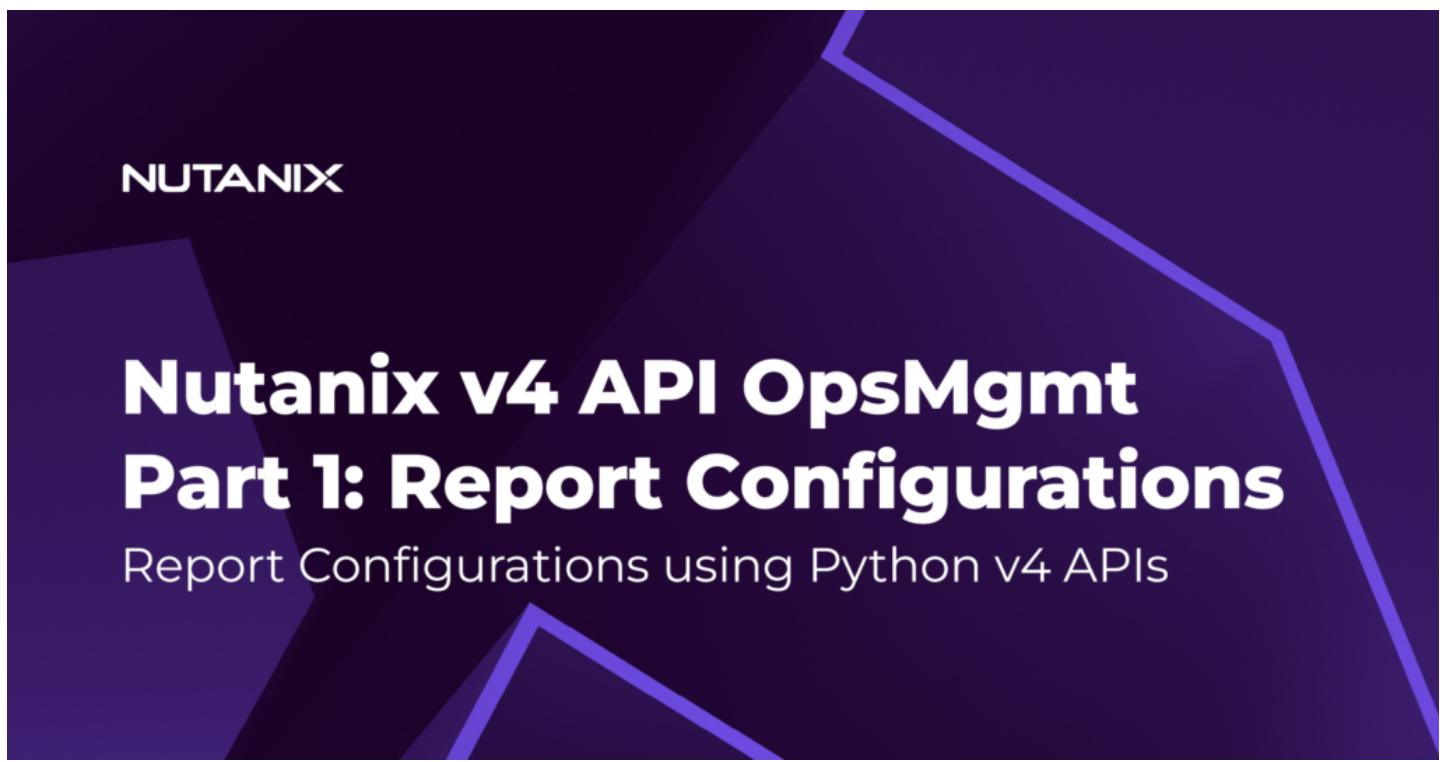
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These code samples are standalone examples only.

All code samples are unofficial, are unsupported and will require extensive modification before use in a production environment.

Most code samples are available on the NutanixDev GitHub code samples repo.

Did you know?

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Official documentation for the Nutanix Prism Element v2, Prism Central v3 and product REST APIs.

Announcing Generally Available v4 APIs and SDKs!■

We are excited to announce the launch of v4 APIs and SDKs out of public Release Candidate (RC) state and into general availability (GA). With this launch, v4 becomes our recommended version, and v4 APIs and SDKs are ready for you to use in your production environment.

[Go to v4 API Introduction](#)

Product APIs



[**API and SDK v4**](#)

The latest Generally Available (GA) and Release Candidate (RC) Nutanix APIs, including SDKs for Python, Java, Go, and Javascript.

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Core Nutanix cluster deployment tool, used to streamline the deployment of new and rebuilt Nutanix clusters.

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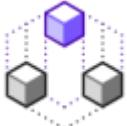
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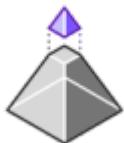
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Current GA Prism Central v3 API, allowing read and write control over registered clusters and various Prism Central services e.g. Nutanix Calm.

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Current GA Prism Element v2.0 API, allowing read and write control over individual clusters and managed entities e.g. cluster-local virtual machines and images.

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What is it and why is it important?

Nutanix APIs have grown over the past decade and now provide support for multiple endpoints, clusters, products, and operations. Our goal with the version 4 REST APIs is to provide a comprehensive and consistent set of APIs for operating the Nutanix Cloud Platform. v4 APIs have semantics based on open standards, delivering enhanced usability and developer experience.

Today, Nutanix offers [four different versions](#) of APIs. We provide diverse API support through these individual versions, and you might require a combination of these versions to address your requirements. v4 APIs will consolidate all our APIs into a single platform API. The Nutanix v4 APIs are being developed with an "API first" mentality where API documentation and supporting SDKs are published concurrently with each product version update.

What's new in v4?

Our new v4 API family delivers extensive new functionality for Nutanix API users. Some of the top new features include:

- For developers/API consumers
- SDK Support across Python, Go lang, Java and JS.
- A new developer portal with a comprehensive set of API, SDK documentation, and code samples.
- Enhanced usability, filtering, sorting, and selection through OData.
- [API versioning](#).

- API compatibility with and starting from the v4 RC release. EA versions of v4 API are not guaranteed to be backward compatible.

Related Documentation

Nutanix v4 API and SDK GA documentation is now live and can be accessed below. If you are an existing user of our v2.0 or v3 APIs you may wish to start with the [v4 API Migration Guide](#).

Note: The code sample library will be expanded as new APIs are released.

- [v4 API User Guide](#)
 - [v4 API Migration Guide](#)
 - [v4 API Documentation](#)
 - [Nutanix v4 API Versioning Scheme](#)
 - [All API References](#)
 - [Code Sample Library](#)
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Which APIs are included in this release?

The Generally Available ("GA") and Release Candidate ("RC") v4 API releases represent the next step for cloud consumption, integration, and automation of the Nutanix Cloud Platform. The launch publishes the following APIs in Prism Central.

| API Namespace | Namespace Endpoint | Status | Prism Central version | AOS version | Additional Software Requirements || --- | --- | --- | --- | --- | --- | --- | --- | AI Ops | aiops | GA | pc.2024.3 or later | 7.0 || Cluster Management | clustermgmt | GA | PC 7.3 or later | 7.3 || Files | files | GA | pc.2024.3 or later | 7.0 | File Server 5.1 and Files Manager 5.1 || Identity and Access Management (IAM) | iam | GA | pc.2024.3 or later | 7.0 || Lifecycle Management (LCM) | lifecycle | GA | PC 7.3 or later | 7.3 | LCM 3.2 || Networking | networking | GA | PC 7.3 or later | 7.3 || Prism | prism | GA | PC 7.3 or later | 7.3 || Virtual Machine Management | vmm | GA | PC 7.3 or later | 7.3 || Data Protection | dataprotection | GA | PC 7.3 or later | 7.3 || Flow Management | microseg | GA | PC 7.3 or later | 7.3 || Monitoring | monitoring | GA | PC 7.3 or later | 7.3 || Volumes | volumes | GA | PC 7.3 or later | 7.3 || Licensing | licensing | GA | PC 7.3 or later | 7.3 || Objects Storage Management | objects | GA | pc.2024.3.1 or later | 7.0.1 | Objects Manager 5.1.1 || Data Policies | datapolicies | GA | PC 7.3 or later | 7.3 || NCM Base Platform (Prism Reports) | opsmgmt | GA | pc.2024.3 or later | 7.0 || Security | security | GA | PC 7.3 or later | 7.3 ||

Use of v4 APIs in a Prism Element or Prism Central environment that does not meet the version requirements above may cause the request(s) to fail.

Subsequent releases of Prism Central will expose additional v4 APIs with each version. The following are the APIs in pipeline and will be released in future versions.

- Disaster Recovery
 - Foundation Central
 - Nutanix Cloud Manager (NCM) including Self Service
 - NDB (formerly Era)
 - NKE (formerly Karbon)

Frequently Asked Questions

- What are the different v4 API version schemes and types ?
 - See [Nutanix v4 API Versioning Scheme](#)
 - Can I use v4 EA or RC APIs in a production environment?
 - Only GA version of v4 APIs and SDKs is supported in production environment. EA or RC v4 APIs are not supported in production environments.
 - Will I receive support for the v4 EA or RC APIs?
 - The Nutanix support communities handle support for v4 EA and RC APIs. If you need support or have questions, refer to the “How It Works” section of the Nutanix [communities](#).
 - Where can I get more information regarding legacy API deprecation?

See the [Nutanix legacy API deprecation notification](#).

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Playbooks

These playbooks are provided as standalone examples only, are unofficial in nature and will need extensive modification before use in a production environment.

Most playbooks can be directly accessed from the NutanixDev GitHub playbooks repo. Larger playbooks will be published via dedicated repos when required.

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See the [Nutanix Terms of Use](#) for information on how these playbooks may be used.

Getting Started

The following key points apply before downloading and using these demo playbooks.

- X-Play Playbooks must be edited or updated using Prism Central. Editing the exported JSON is not supported.
- Demo Playbooks should only be used with the version of Prism Central listed in each playbook's notes. Operation on earlier versions of Prism Central is not guaranteed.
- For X-Play Playbooks that make use of Nutanix APIs, ensure relevant version compatibility checks are carried out before use. The v4 API namespace approach will require version validation i.e. that the Prism Central version is compatible with the API versions used in each playbook.
- References to environment-specific Prism Central UUIDs will need to be updated before use in your environment.

If you are new to automating with Nutanix X-Play Playbooks, we recommend reading the introductory article by Laura Jordana, [Getting Started with Nutanix X-Play](#).

Playbook Collection

[Update Image on PC](#)

- February 16, 2023
- Laura Jordana

Update a Prism Central image's configured URL based on a user-specified schedule.

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[Send Message on VM Creation](#)

- May 25, 2022
- Laura Jordana

Send a detailed Slack message when a VM is created.

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[Send Alerts to PagerDuty](#)

- September 2, 2021
- Sarah Hernandez

Forward along alerts and their details to PagerDuty

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- December 6, 2022
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Send any alert to Jira Service Desk via REST API.

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[Send Alert Details to Slack/Email/MSTeams](#)

- September 12, 2021
- Chris Rasmussen

Allows you to send any alert details to Slack, email or MS Teams.

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[Lookup Cluster VIP for VM](#)

- September 12, 2021

- Chris Rasmussen

Allows you to take a VM and lookup the corresponding cluster VIP.

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[External vCenter Actions for non-Nutanix VMs](#)

- March 21, 2022
- Laura Jordana

A library of 8 common playbooks to perform actions on external vCenter VMs managed by Prism Central.

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[Eject CD from PC](#)

- September 12, 2021
- Chris Rasmussen

Uses the manual trigger for selecting a VM and ejecting a CD-ROM for that VM.

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[Change VM to PXE Boot](#)

- September 12, 2021
- Chris Rasmussen

Uses REST API calls to pull the MAC address and cluster VIP, then uses an SSH action to login to the cluster VIP and run the acli command to update the VM to PXE boot.

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[Auto Quarantine a Bully VM](#)

- September 12, 2021
- Chris Rasmussen

Trigger a playbook when the VM bully alert is detected, and then uses add that VM to the *Quarantine: Default* category.

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[Auto Categorize VMs by OS](#)

- September 12, 2021
- Chris Rasmussen

Uses the VM created event trigger along with a set of branching actions to add VMs to categories based on their OS.

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[Auto Categorize New VMs](#)

- September 12, 2021
- Chris Rasmussen

Uses the VM created event trigger along with a set of branching actions to add VMs to categories based on their naming conventions.

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[Add/Remove VM from Category](#)

- September 1, 2021
- Laura Jordana

This playbook uses a simple manual trigger paired with a category action. There are 2 playbooks, for adding VMs to and removing VMs from categories.

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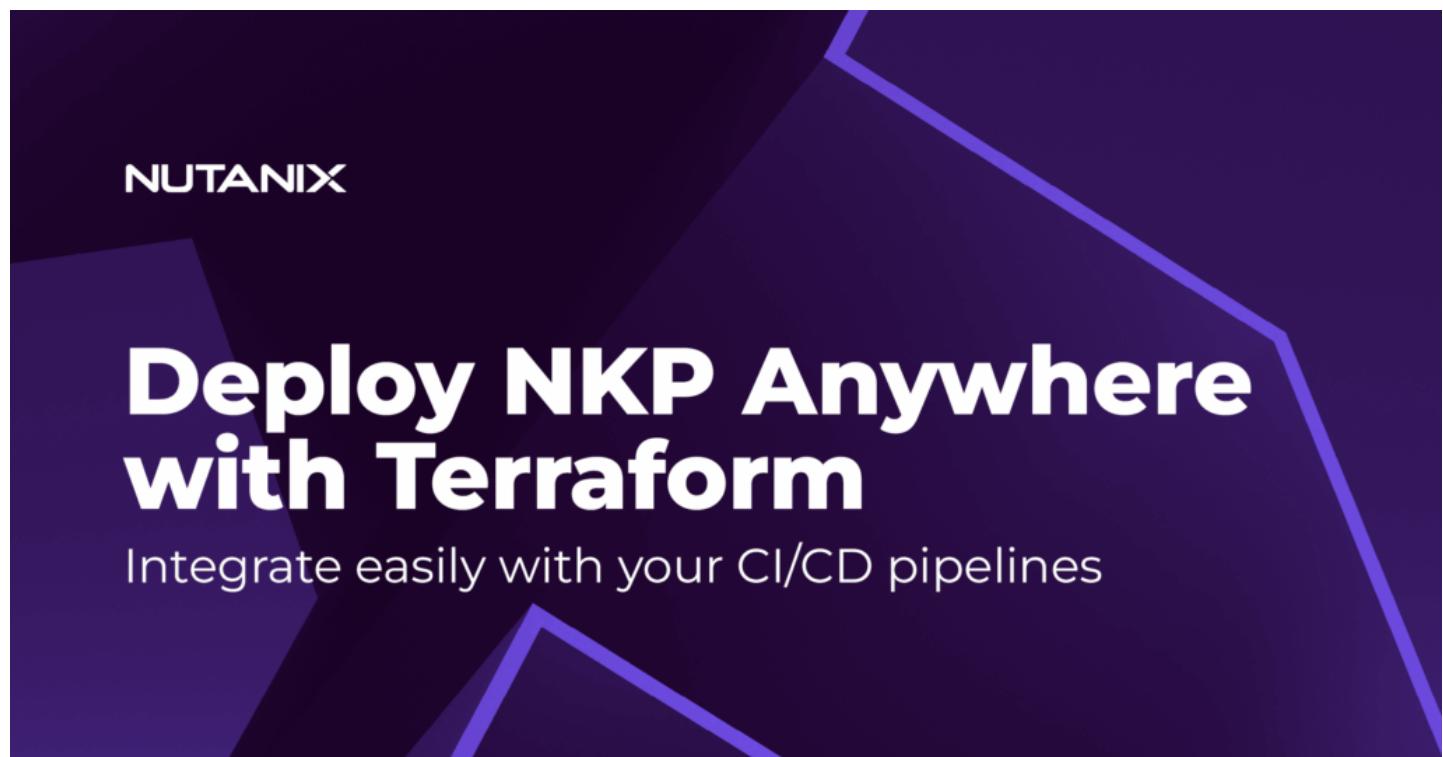
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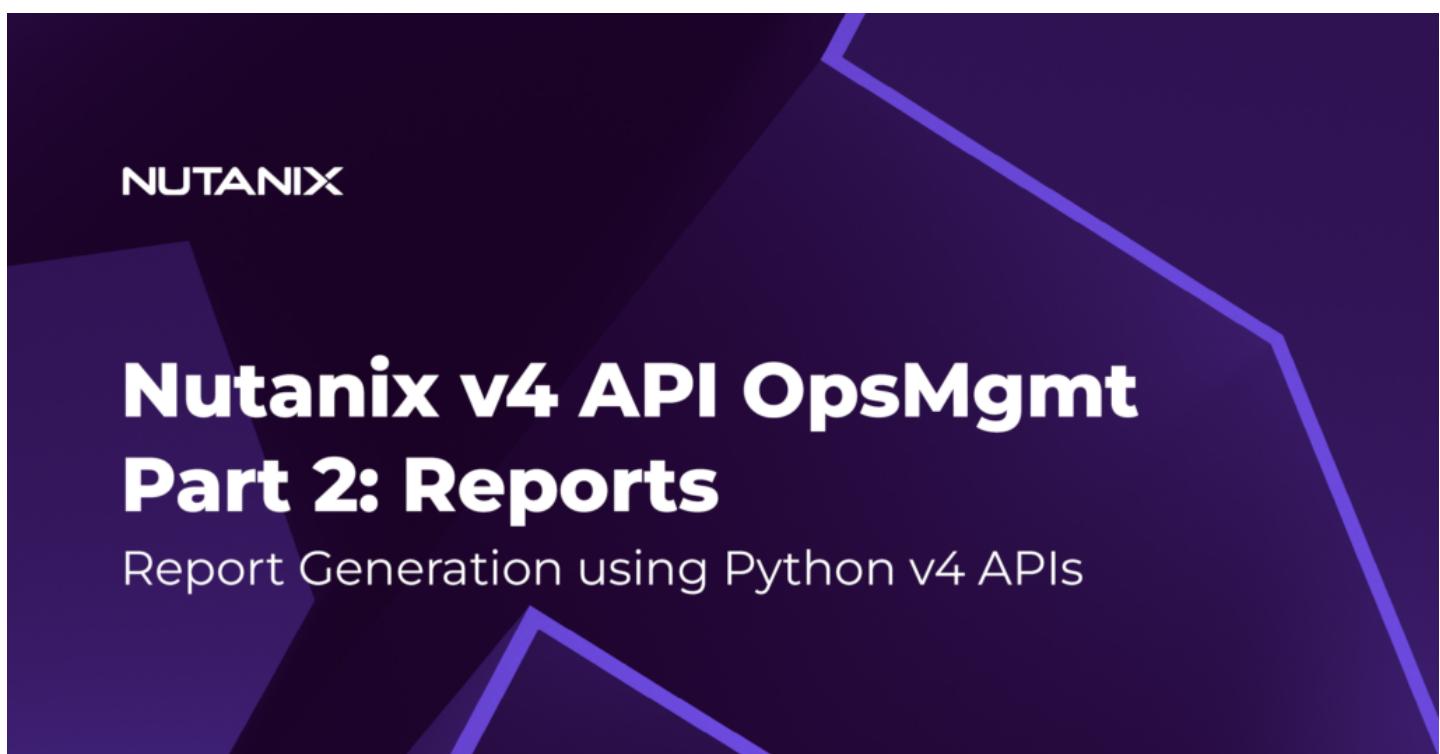
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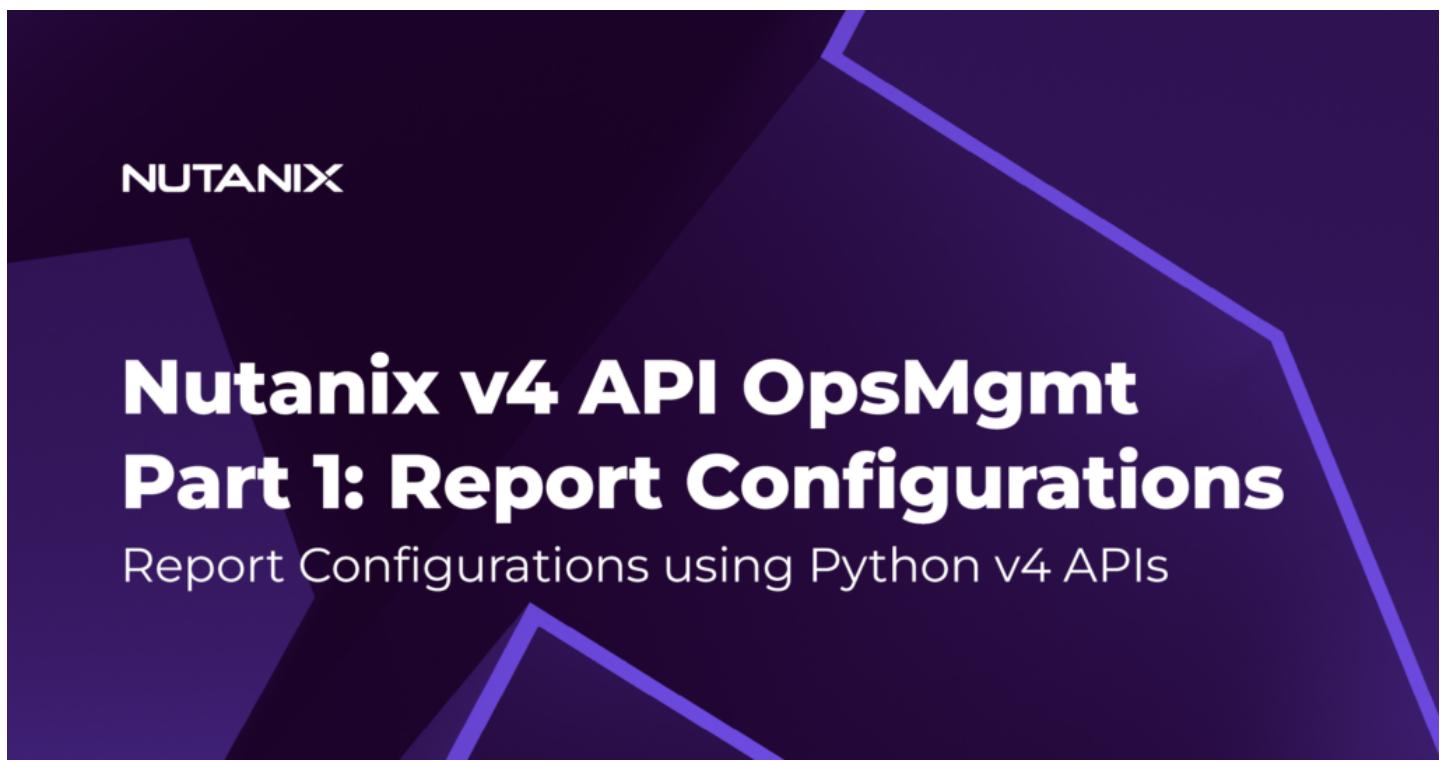
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Nutanix REST v4 API Migration Guide

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Introduction

Nutanix APIs have grown over the past decade and over a number of major releases to support multiple endpoints, clusters, products, and operations. The version 4 (or v4) REST APIs have been designed for consistency across all products, consolidation into a single platform API, and an “API first” mentality where API documentation and supporting SDKs are published concurrently with each product update.

Related Documentation

Nutanix v4 API and SDK GA documentation is now live and can be accessed below. If you are an existing user of our v2.0 or v3 APIs you may wish to start with this guide.

Note: The code sample library will be expanded as new APIs are released.

- [v4 API Introduction](#)
- [v4 API User Guide](#)
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The following table shows the available Nutanix v4 API Namespaces, the current version status (Early Access or Release Candidate) and the corresponding Prism Central + AOS version requirements.

Prism Central pc.2024.3 and AOS 7.0, released December 5th 2024, introduces Generally Available (GA) versions for many Nutanix v4 API namespaces.

These APIs represent the next step for cloud consumption, integration and automation of the Nutanix Cloud Platform. Subsequent releases will expose additional v4 APIs which will provide a single platform for all old and legacy Prism APIs. For more information, see the [Nutanix legacy API deprecation notification](#).

For some time, Nutanix API consumers have become accustomed to using various product-specific and Prism API endpoints, usually dependent on the action required. The table below shows a high-level description of the Prism API endpoint collections available today.

| API/Version/Name | Published By | Status | --- | --- | --- | --- | v1 | Prism Element Only | Available but deprecated; should not be used directly unless a v1-only action is required (e.g. virtual machine performance metrics) | v2.0 | Prism Element Only | GA; Generally available for all Prism Element users. The current API endpoints are applicable to cluster-local operations. Includes but is not limited to virtual machines, images and storage containers | v3 | Prism Central Only | GA; Generally available for all Prism Central users. These API endpoints are for multi-cluster operations. Includes but is not limited to virtual machines and images across multiple clusters, Nutanix Self Service Blueprints and applications and Flow Security Policies |

In nearly all cases, the recommendation has been to consume v3 API endpoints via Prism Central and fall back to v1 and v2.0 endpoints only when required.

Nutanix API Documentation

As with all existing Nutanix API reference information covering Prism Element v2.0 and Prism Central API v3, the Nutanix Developer Portal provides the entry point into official documentation for the new Nutanix v4 APIs.

The table below shows where existing and new documentation is published.

| Technology/API Version | URL | --- | --- | Prism Element v2.0 | https://www.nutanix.dev/api_references/prism-v2-0/ | Prism Central v3 | https://www.nutanix.dev/api_references/prism-central-v3/ | Prism Central v4 API and SDK | <https://developers.nutanix.com> | Other Nutanix products e.g. Self Service, Databases, Flow Security Central, Container Engine | <https://www.nutanix.dev/api-reference> |

Existing API Endpoint Examples

The table below shows some of the endpoints available across the various Nutanix Prism Element and Prism Central APIs, with usage examples.

Important note: Take care to note where each request should be sent. For example, v1 and v2.0 APIs may only be sent to Prism Element IP addresses or FQDNs (Prism Element). v3 APIs may only be sent to Prism Central IP addresses or FQDNs (Prism Central). All requests are sent over HTTPS port 9440.

Prism Element v1 - Storage Containers

| Endpoint | Entity Type/Name | Use Case | PE/PC? | Request Method | Request Path | --- | --- | --- | --- | --- | --- | --- | v1/containers | Storage Container | CRUD operations for cluster-local storage containers. Example shows listing all storage containers visible on a specific PE instance | PE | GET | /PrismGateway/services/rest/v1/containers |

Prism Element v2.0 - Storage Containers

Prism Central v3 - Virtual Machines

| Endpoint | Entity Type/Name | Use Case | PE/PC? | Request Method | JSON Payload | Request Path | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | v3/vms | Virtual Machine |
CRUD operations for virtual machines. Example shows listing all VMs visible on a specific PC instance. Note the example payload will return a list of the first 20
VMs only | PC | POST | {"kind": "vm"} | /api/nutanix/v3/vms/list |

Prism Central v3 - Flow Security Policies

| Endpoint | Entity Type/Name | Use Case | PE/PC? | Request Method | Request URL | --- | --- | --- | --- | --- | --- | --- | v3/network_security_rules | Flow Network Security Rule | CRUD operations for Flow Network Security Rules. Flow network security rules form the basis of network traffic flow control between virtual machines, typically managed via Prism Central categories. | PC | DELETE | /api/nutanix/v3/network_security_rules/{{uuid}} |

Note: For current Nutanix Prism Central v3 API documentation, see https://www.nutanix.dev/api_reference/apis/prism_v3.html.

Migration to Nutanix v4 APIs

The Nutanix v4 APIs provide multiple advantages over legacy APIs. For example:

- More detailed and improved documentation
- Elaborated error messages and responses
- Multi-language SDKs and accompanying code samples
- Operation-based API grouping into related namespaces and versions
- Support for standards-based Odata filters, covered in the [Nutanix v4 API User Guide](#)

Unlike Prism Central v3 APIs which were grouped under the global “Prism API” name, Nutanix v4 APIs are grouped by namespace. For detailed namespace information see the [Nutanix v4 API User guide](#).

v4 APIs - Multi Language SDKs

The Nutanix v4 APIs introduce an extensive set of SDKs. The new SDKs are the official and recommended method of consuming the new v4 APIs. It is strongly recommended that all users migrate to the Nutanix v4 API SDKs where possible.

At this stage, the following language SDKs are available:

- Python
- Java
- Go
- Javascript

Getting Started

December 2024: Getting started information, including development environment setup and code samples covering the Nutanix v4 APIs has been moved to the [Nutanix v4 API User guide](#).

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Announcing Generally Available v4 APIs and SDKs!■

We are excited to announce the launch of v4 APIs and SDKs out of public Release Candidate (RC) state and into general availability (GA). With this launch, v4 becomes our recommended version, and v4 APIs and SDKs are ready for you to use in your production environment.

[Go to v4 API Introduction](#)

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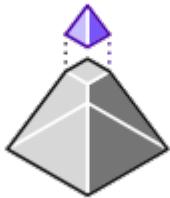
[BLOG](#)

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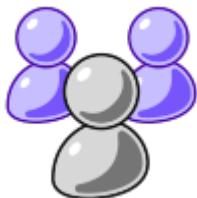
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Freedom to Build.

In addition to our blog, API reference and code samples, we're going to publish an ever-expanding collection of hands-on labs.

Aimed at providing ground-up, hands-on experience with building Nutanix-related developer scripts and apps, they will cover the most popular requests from our valuable developer community.

Labs



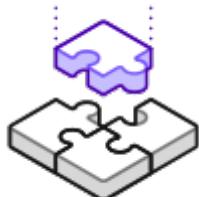
[Getting Started](#)



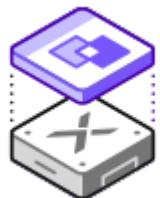
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Getting Started

These introductory labs are aimed at those preparing for the labs or those just getting started with the Nutanix APIs.

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- February 13, 2020
- Chris Rasmussen

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The automation labs take common tasks and show how they can be quickly automated using Nutanix.

[Nutanix Calm DSL Lab v1.0](#)

- September 1, 2020
- Chris Rasmussen

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[Nutanix Calm REST APIs](#)

- February 13, 2020
- Chris Rasmussen

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Nutanix API User Guide

The v4 API User Guide describes how the new set of v4 APIs represents the future of Nutanix platform automation by using APIs and software development kits (SDKs).

Nutanix Legacy API Deprecation Note Nutanix Legacy API versions v0.8, v1, v2, and v3 will be deprecated and no longer supported starting with the AOS and PC Upgrade Release planned for Q4-CY2026. Customers with active service contracts will continue to receive support from Nutanix as per the Nutanix EOSL policy. Nutanix strongly recommends that all our customers and partners migrate their applications and tools to the latest v4 APIs and SDKs before the legacy APIs are deprecated. See the Nutanix Legacy API Deprecation Notice, available here: <https://download.nutanix.com/misc/LegacyAPI-EOLNotification.pdf>

Nutanix v4 API User Guide

Table of Contents

Purpose

This v4 API User Guide describes how the new set of v4 APIs represents the future of [Nutanix](#) platform automation by using APIs and software development kits (SDKs).

Audience

This document is intended for new and existing Nutanix API users planning to use the [Nutanix v4 REST APIs and SDKs](#).

Related Documentation

For information about Nutanix v4 APIs and included features, see [Nutanix v4 API Introduction](#).

The snippets and pointers in this guide have demonstrated a number of key points. They are intended as a starting point and prepare users to create custom scripts and apps using the Nutanix v4 APIs and SDKs.

The related resources below are recommended for readers:

- [Nutanix v4 API migration guide](#)
- [Nutanix v4 API Developer Portal](#)
- [Nutanix v4 API Versioning Scheme](#)
- [Code sample repository](#)

Overview

The Nutanix v4 APIS were originally released as early access in Prism Central pc.2022.6 and have been redesigned from the ground up.

Nutanix APIs have grown over the past decade and now provide support for multiple endpoints, clusters, products, and operations. Our goal is to provide a comprehensive and consistent set of APIs and SDKs for operating the Nutanix Cloud Platform. The v4 API includes semantics based on open standards and delivers enhanced usability and developer experience. Nutanix SDKs provide libraries, documentation and resources to help developers build applications and solutions on the Nutanix Platform.

Automation can take the form of a custom script or application. In these cases, specific steps in a specific order are often required. Depending on the action required, the only way of achieving this level of custom automation is by using an API or an SDK where the user has complete control over every step in the process. From a customer perspective, some typical API and SDK use cases are:

- Retrieve information about an entity owned by a specific system. On the Nutanix Cloud Platform, this includes virtual machines, disk images, storage containers and overall cluster configuration. These are typically GET requests.
- Create an entity on a managed system. On the Nutanix Cloud Platform, this includes the creation of a managed entity such as a disk image, virtual machine or Nutanix Flow Network Security policy. These are typically POST requests.
- Update or change a managed entity. On the Nutanix Cloud Platform, this includes the modification of cluster configuration and alteration of a managed entity's configuration such as a disk image or virtual machine. These are typically PUT requests.
- Language-specific SDKs for integration of the Nutanix Cloud Platform into an existing environment or the integration of a third party system into the Nutanix Cloud Platform.

Nutanix v4 API and SDK Features

Note: For the purposes of this user guide, Python 3 will be used as the basis for all code samples.

The Nutanix v4 APIs include these significant features.

- **Language-specific SDKs.** The officially-supported languages are Python, Go, Java and JavaScript.
- **OData-compliant resource filtering.** Provides the ability to quickly find a specific resource instance without the need to send multiple requests that then require client-side processing.
- **Result sorting.** Provides the ability to specify a sort key during list requests. For example, a list of Prism Central disk images could be sorted by size (bytes).
- Improved exception handling with more meaningful error messages, along with a detailed per-namespace error code reference.
- A new developer portal covering all supported languages, SDKs and REST API endpoints.
- API versioning support and a defined versioning scheme.
- **Request idempotency via Ntnx-Request-Id header.** Provides support for request idempotency i.e. the ability to ensure a request is not duplicated or run more than once. This is done by providing a UUID-formatted header as Ntnx-Request-Id. Required for REST APIs only; Nutanix SDKs do not require the use of the Nutanix-Request-Id header.
- **Resource Etag via If-Match header.** This ensures mid-air collisions are avoided by providing resource-specific versions. In the event two API consumers modify the same resource, the first request will alter the resource Etag. The next user must request the resource's new Etag and details before submitting their own update request.
- OData Selection Projection. Controls which fields of an entity are displayed in the response. APIs generally return a default set of fields on a GET request. Selection Projection allows the user to specify a subset of fields to be returned, thereby decreasing response time and payload size.
- OData Expansion Projection. Controls which fields of a related entity are returned when requesting another specific entity. For example, listing volume groups using the Volumes namespace accepts an \$expand parameter to request the related cluster.
- Batch Operations. Allows users to generate a bulk payload for entity creation, modification, deletion or custom actions. Up to 500 entity actions can be included in a single batch request.
- Rate Limiting. When incoming requests exceed a certain limit, further requests will be temporarily blocked. Rate limits are dictated by the Prism Central type and configuration.

Software Requirements

Recommendations

Where possible, Nutanix recommends using the Nutanix v4 APIs via the new language-specific SDKs, depending on language support. [Getting Started](#) describes support languages. The v4 SDKs relieve the user of many manual actions through abstraction, resulting in a more streamlined experience. For example, the SDKs remove the need to manually manage the following actions.

- Connection between clients and Prism Central. When writing custom connection methods, Python developers often do this using the [requests](#) library.
- Authentication. The Nutanix v4 SDKs remove the need for you to create authentication methods in your code. Python developers might do this using the [HTTPBasicAuth](#) or [base64.b64encode](#) libraries.
- Custom exception handling. The v4 SDKs provide meaningful error information in the event of an invalid request or other problem while submitting a request.

In addition, to avoid the manual steps above, the Nutanix v4 SDKs create responses and accept user payloads that are based on fluent, action-relevant information.

For example, the Lifecycle Manager (LCM) SDK action [RecommendationsApi.compute_recommendations](#) accepts an instance of [RecommendationSpec](#). Compared to manually-created JSON payloads, this can be a significantly smoother experience.

However, Nutanix v4 APIs may need to be consumed via HTTP endpoints in situations where an official SDK is not available. When using HTTP endpoints the above actions must be manually managed; this guide demonstrates both approaches.

Request Requirements

The Nutanix v4 Python SDKs are named as follows:

“ntnx_py_client”

Throughout this guide code samples primarily reference the “vmm” namespace “ntnx_vmm_py_client”. The “vmm” namespace exposes operations on entities such as Prism Central virtual machines, images, placement policies and rate limits. Namespaces required for different operations will need to be installed and referenced individually. See <https://developers.nutanix.com> for information on currently available public Nutanix SDKs.

Getting Started with v4 APIs

As a first step, Nutanix recommends deciding how you will consume the v4 APIs. This will be directly via an HTTP endpoint or language-specific SDK.

Configuring Your Python Development Environment

With Python chosen as the base language for all code samples through this guide, the following steps demonstrate how to configure a demo development environment.

You can skip this section if you are already familiar with Python development environment setup, or if you have a preferred [alternative method](#).

Creating a Virtual Environment with "venv" and Linux or Mac OS X Bash Terminal

...

```
# verify python binary location and version
```

which python

returns python path e.g. /usr/bin/python

```
python --version
```

returns Python version. Python 3 versions 3.6, 3.7, 3.8 and 3.9 are fully tested and supported

create a working directory for demo code

```
mkdir -p ~/nutanix/api/v4 cd ~/nutanix/api/v4
```

create and activate a Python 3 virtual environment

alter the python path if necessary

demo virtual environment will be named venv

```
python -m venv venv . venv/bin/activate
```

verify python binary location again

this will be different with the virtual environment activated which python

returns python path e.g. /home/username/nutanix/api/v4/venv/bin/python

...

Create a pip requirements.txt file

It is common practice when using Python to create a special [requirements.txt](#) file. This file specifies the Python libraries and their versions that are required for a script to run correctly. In your demo directory, create a requirements.txt containing the following specifications.

Note regarding namespace versions This guide shows requirements.txt installing specific package versions that are correct at the time of writing. In the event "pip" shows an error about unavailable versions, check the error message for a list of available versions. For example: ERROR: Could not find a version that satisfies the requirement ntnx_vmm_py_client==4.1.2 (from versions: 4.0.1a1, 4.0.1b1, 4.0.1, 4.0.2a1, 4.0.3a1, 4.1.1) shows 4.1.1 as the latest available VMM GA package version.

This requirements.txt example installs all Nutanix v4 API namespaces available at the time of Prism Central and AOS 7.3 release (June 2025).

...

```
# create `requirements.txt` file
```

```
touch requirements.txt cat < requirements.txt requests==2.32.4 ruff==0.12.1 ntnx_vmm_py_client==4.1.1 ntnx_lifecycle_py_client==4.1.1  
ntnx_prism_py_client==4.1.1 ntnx_clustermgmt_py_client==4.1.1 ntnx_aiops_py_client==4.0.1 ntnx_networking_py_client==4.1.1  
ntnx_microseg_py_client==4.1.1 ntnx_iam_py_client==4.0.1 ntnx_opsmgmt_py_client==4.0.2 ntnx_datapolicies_py_client==4.1.1  
ntnx_dataprotection_py_client==4.1.1 ntnx_files_py_client==4.0.1 ntnx_licensing_py_client==4.1.1 ntnx_microseg_py_client==4.1.1  
ntnx_monitoring_py_client==4.1.1 ntnx_objects_py_client==4.0.1 ntnx_security_py_client==4.0.1 ntnx_volumes_py_client==4.1.1 EOF
```

...

Installing Requirements

With the requirements.txt file created as per our requirements, the script dependencies (requirements) can be installed as follows.

...

```
# install script requirements from `requirements.txt`
```

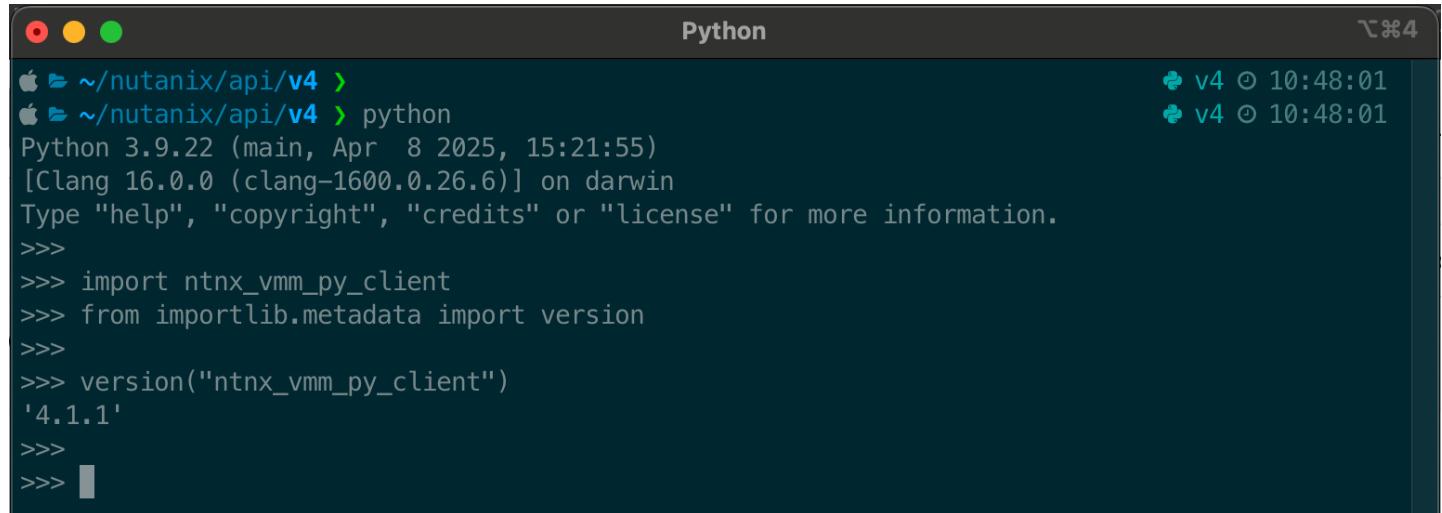
```
pip install -r requirements.txt --no-cache-dir
```

...

Note regarding pip install The --no-cache-dir command-line parameter prevents packages being installed from local cache. Without this parameter, pip may install from local cached packages, resulting in unexpected version installation.

Verifying Installation

Using the Python REPL (Read, Evaluate, Print, Loop) we can now verify if the [Nutanix v4 VMM SDK](#) was installed correctly. This demo shows the use of Python version 3.10.8 although the supported versions (3.6, 3.7, 3.8 and 3.9) should be used in production environments.



```
Python
>>> import ntnx_vmm_py_client
>>> from importlib.metadata import version
>>>
>>> version("ntnx_vmm_py_client")
'4.1.1'
>>>
```

Preparing Your Python Environment

To use this guide's Python code snippets, some preparation is required. The following code snippet is a bootstrap script that can be used for templating your own projects. The bootstrap script imports the Nutanix v4 SDKs used throughout this guide and instantiates a number of instances that can be used during both SDK and API snippets.

Note: The script snippets shown in this guide do not follow a specific code standard. The *ruff* library imported earlier can help with code formatting to a particular standard.

...

```
# common modules

import urllib3
```

alter these values to match your environment

required for both SDKs and APIs

```
prism_central_ip_address = "0.0.0.0" prism_central_username = "admin" prism_central_password = "password" """ setup testing environment for the Nutanix v4
SDKs """
```

import the Nutanix v4 vmm SDK

```
import ntnx_vmm_py_client
```

import the configuration module that manages IP address, username and password information

to avoid name collisions, each Nutanix v4 SDK module will be imported with dedicated names

```
from ntnx_vmm_py_client import Configuration as VMMConfiguration
```

import the configuration module that manages the API client

to avoid name collisions, each Nutanix v4 SDK module will be imported with dedicated names

additional namespaces will need to be imported for different tasks

see <https://developers.nutanix.com> for a complete list of available Python SDK namespaces

```
from ntnx_vmm_py_client import ApiClient as VMMClient
```

instantiate our demo environment's SDK configuration

```
config = VMMConfiguration() config.host = prism_central_ip_address config.username = prism_central_username config.password = prism_central_password
```

optional; disable SSL certificate verification and warnings

```
config.verify_ssl = False urllib3.disable_warnings(urllib3.exceptions.InsecureRequestWarning)
```

create the client

```
api_client = VMMClient(configuration=config) """ setup testing environment for the Nutanix v4 SDKs """ import json import requests.auth import HTTPBasicAuth
```

setup HTTP basic authentication

```
prism_central_auth = HTTPBasicAuth(prism_central_username, prism_central_password)
```

```
...
```

Authentication

The Nutanix v4 APIs provide authentication by the following methods.

- HTTP Basic Authentication i.e. username and password
- Can be used with standard user accounts and directory service accounts
- IAM (Identity and Access Management) API key
- Can be used with users of type "Service Account" only
- Intended for use during automated interaction e.g. script or third-party integration
- All API key configuration is completed using Nutanix v4 IAM APIs or SDKs; service accounts cannot be managed or added to authorization policies in the Prism Central user interface. Additionally, API keys cannot be created in the Nutanix Prism Central user interface.

Authentication: API Key Summary

The recommended API key authentication workflow can be summarized as follows.

1. Create a user of type "service account"
2. Create a new API key, associating the key with the new service account user. The new API key is shown once only so must be securely documented or saved during this step.
3. Create an authorization policy outlining the specific permissions required by the service account user, then associated the new service account with the new authorization policy

During subsequent API requests, specify the `X-Ntnx-Api-Key` header and set the header value to the API key generated in step 2.

Examples of using Nutanix v4 API key authentication are available here:

- Using the [Nutanix Python SDK](#)
- Using [Nutanix v4 REST APIs](#)

Depending on the type of action being performed, the following account type will be required.

- Read actions. These actions typically do not need administrator privileges. For example, retrieving cluster information or VM details.
- Create, update or delete actions usually require specific IAM or administrator permissions. For example, creating a virtual machine or updating an image.

Regardless of the action being performed, Nutanix recommends consuming the Nutanix v4 APIs and SDKs with a dedicated user account versus the built-in "admin" account.

The code snippets below are identical to those shown in the demo bootstrap script above and use HTTP Basic Authentication.

Authentication: Python SDK

The following code snippet demonstrates authentication using the Python SDK library.

```
...
```

```
# import required libraries, including Nutanix v4 Python VMM SDK
```

```
import ntnx_vmm_py_client from ntnx_vmm_py_client import ApiClient as VMMClient from ntnx_vmm_py_client import Configuration as VMMConfiguration config = VMMConfiguration() config.host = "prism_central_ip_or_fqdn" config.username = "prism_central_username" config.password = "prism_central_password"
```

useful during testing, not recommended in production environments

```
config.verify_ssl = False
```

```
...
```

Authentication: Python requests Library (HTTP Basic Authentication)

The following code snippet demonstrates the use of HTTP basic authentication with the Python `requests` library. This is identical to using HTTP basic authentication via `HTTPBasicAuth` with any other API that supports it.

Requests

The Nutanix v4 APIs and SDKs offer simple requests for the management of various actions.

HTTP POST, PUT and DELETE requests must be submitted with an accompanying JSON payload. This payload includes details about the action to be performed. This JSON payload is an example of creating a simple Prism Central image using the Nutanix v4 REST API “vmm” namespace.

```
...
```

```
{
```

```
"name": "rocky10cloud", "type": "DISK_IMAGE", "description": "Rocky Linux 10 Cloud Image from v4 APIs", "source": { "url": "{{rocky10_url}}", "$objectType": "vmm.v4.content.UrlSource" }, "clusterLocationExtIds": [ "{{cluster_uuid}}" ] }
```

```
...
```

For this demo, we'll build on the previously described snippets and create a request to list all Prism Central images.

Requests: Python SDK (List Images)

This example shows the use of the `async_req=False` parameter. Setting this parameter to `False` means Python will wait for the request to complete before returning to script or command execution.

```
...
```

```
# build on the previous Nutanix v4 SDK code snippet to request a list of Prism Central images  
api_client = VMMClient(configuration=config) api_instance = ntnx_vmm_py_client.api.ImagesApi(api_client=api_client) images_list = api_instance.list_images(async_req=False)
```

print the number of found images

```
print(images_list.metadata.total_available_results)
```

in our demo cluster this results in the response "11"

the number of images in your response will be different

```
...
```

Requests: Python requests Library (List Images)

Before continuing with the following Python “requests” code samples, ensure you have configured your environment as per “[Configuring Your Python Development Environment](#)”. This includes preparing your credentials for use with HTTP Basic Authentication.

This example shows the use of the Python `requests` library to generate a list of Prism Central images.

```
...
```

```
# build on the previous Nutanix v4 SDK code snippets to look at various Images API response types
```

assumes a list of Prism Central images is available as `images_list`

```
print(f"Images list is type {type(images_list)}")
```

returns Images list is type .

assumes an image has been created and the result is available as `image_create`

```
print(f"Image creation result type is type {type(image_create)}.)")
```

returns Image creation result type is type .# get an existing image first

assumes a list of Prism Central images is available as `images_list`

```
existing_image = api_instance.get_image_by_id(images_list.data[0].ext_id) print(f"Existing image result type is {type(existing_image)}.)")
```

returns Existing image result type is .

...

Responses

Responses from Nutanix v4 API and SDK requests differ slightly based on the method chosen. At the core of all responses, however, is almost identical data that can be used to either display information or make a decision regarding what the next action will be.

Note: The code snippets in this section are for demonstration purposes only and will require additional steps before use. See "[Using Etag and If-Match headers with Nutanix v4 APIs](#)" for more information.

Responses: Python SDK (List Images)

The Nutanix v4 Python SDK will return specific response types depending on the type of request. This code snippet demonstrates a number of different response types, based on the type of request that has been submitted.

...

```
# build on the previous Nutanix v4 SDK code snippets to look at various Images API response types
```

assumes a list of Prism Central images is available as `images_list`

```
print(f"Images list is type {type(images_list)}.)")
```

returns "Images list is type ."

assumes an image has been created and the result is available as `image_create`

```
print(f"Image creation result type is type {type(image_create)}.)")
```

returns "Image creation result type is type ."

get an existing image first

assumes a list of Prism Central images is available as `images_list`

```
existing_image = api_instance.get_image_by_id(images_list.data[0].ext_id) print(f"Existing image result type is {type(existing_image)}.)")
```

returns "Existing image result type is type ."

...

From the previous code snippet:

- Getting an existing Prism Central image via Nutanix v4 Python SDK returns an instance of [`ntnx_vmm_py_client.models.vmm.v4.content.GetImageApiResponse.GetImageApiResponse`](#)
- Listing Prism Central images returns [`ntnx_vmm_py_client.models.vmm.v4.content.ListImagesApiResponse.ListImagesApiResponse`](#)
- Creating a Prism Central image returns an instance of [`ntnx_vmm_py_client.models.vmm.v4.content.CreateImageApiResponse.CreateImageApiResponse`](#)

Responses: Python SDK Images List Parsing

After using the Nutanix v4 Python SDKs to obtain a list of Prism Central images, the `ntnx_vmm_py_client.models.vmm.v4.content.Ntnx.vmm.v4.images.ListImagesApiResponse` instance can be iterated as follows.

```
...
for image in images_list.data:
print(f"Image found with name {image.name}.")
...
...
```

Responses: Python `requests` Library (List Images)

Similar to previous Nutanix APIs, the Nutanix v4 REST APIs will return standards-compliant JSON when used via HTTP endpoint.

The example below shows a request to get the details of a specific Prism Central image.

```
...
# build on the previous Nutanix v4 Python requests code snippet to get details of a Prism Central image
```

set the Nutanix v4 API URL that will be used for this request

replace `image_extid` with the `ext_id` of an image in your environment

```
endpoint = "https://prism_central_ip_address_or_fqdn:9440/api/vmm/v4.1/content/images/image_extid" image_details = requests.get(endpoint, auth=prism_central_auth, verify=False)
```

use the `json()` method to print the image details `print(image_details.json())`

```
...
A partial VM images list request is shown below.
```

```
...
{
"data": [
{
"$reserved": {
"$fv": "v4.rl"
},
"$objectType": "vmm.v4.content.Image",
"extId": "e460b4c0-e4e4-4042-8e5b-85590797d51e",
"sizeBytes": 10737418240,
"createTime": "2025-06-25T00:42:47.425425Z",
"lastUpdateTime": "2025-06-25T00:42:47.425425Z",
"ownerExtId": "f0b701e7-163d-5358-abbc-2edb73bla38c",
"name": "rocky10cloud",
"description": "Rocky Linux 10 Cloud Image from v4 APIs",
"type": "DISK_IMAGE",
"clusterLocationExtIds": [
"0005f2f7-eee7-1995-6145-ac1f6b35fe5e"
]
}
],
"$reserved": {
"$fv": "v4.rl"
},
"$objectType": "vmm.v4.content.ListImagesApiResponse",
"metadata": {
"flags": [
{
"$reserved": {
"$fv": "v1.r0"
},
"$objectType": "common.v1.config.Flag",
"name": "hasError",
"value": false
}
],
"
```

```

{
    "$reserved": {
        "$fv": "v1.r0"
    },
    "$objectType": "common.v1.config.Flag",
    "name": "isPaginated",
    "value": true
},
{
    "$reserved": {
        "$fv": "v1.r0"
    },
    "$objectType": "common.v1.config.Flag",
    "name": "isTruncated",
    "value": false
}
],
"$reserved": {
    "$fv": "v1.r0"
},
"$objectType": "common.v1.response.ApiResponseMetadata",
"links": [
{
    "$reserved": {
        "$fv": "v1.r0"
    },
    "$objectType": "common.v1.response.ApiLink",
    "href": "https://10.0.0.1:9440/api/vmm/v4.1/content/images?$page=0&$limit=50",
    "rel": "last"
},
{
    "href": "https://10.0.0.1:9440/api/vmm/v4.1/content/images?$page=0&$limit=50",
    "rel": "self"
},
{
    "href": "https://10.0.0.1:9440/api/vmm/v4.1/content/images?$page=0&$limit=50",
    "rel": "first"
}
],
"totalAvailableResults": 8
}
}
```

```

#### **Responses: Python requests Library Images List Parsing**

After using the Nutanix v4 REST APIs to obtain a JSON-formatted list of Prism Central images, the `requests.models.Response` instance can be parsed as follows.

...

```

get a list of images, if not already done

image_list = requests.request("GET", url, auth=prism_central_auth, verify=False, timeout=10)

get information about the type of response print(type(image_list))

returns class 'requests.models.Response'>

get information about the type of iterator to use print(type(image_list.json()["data"]))

returns

with 'list' type obtained, check for results and print

```

## the name of the first image

```
if len(image_list.data) > 0: print(f"Image name: {image_list.data[0].name}")
```

returns each image's name # this list is specific to the user's Prism Central environment

Image name: rocky10\_cloud - Updated

...

## How To Use New v4 API Features

### OData Support and Compliance

#### Introduction

OData (Open Data Protocol) is an ISO/IEC approved [OASIS](#) standard that defines a set of best practices for building and consuming RESTful APIs. OData enables REST-based services having resources identified by Uniform Resource Locators (URLs) which provides intuitive and efficient retrieval of data. It allows users to discover and navigate through data sets using standard HTTP calls.

#### System Query Options

Odata specifications provide system query options which are query string parameters that control the amount and order of the data returned for the resource identified by the URL. The names of all system query options are prefixed with a dollar (\$) character.

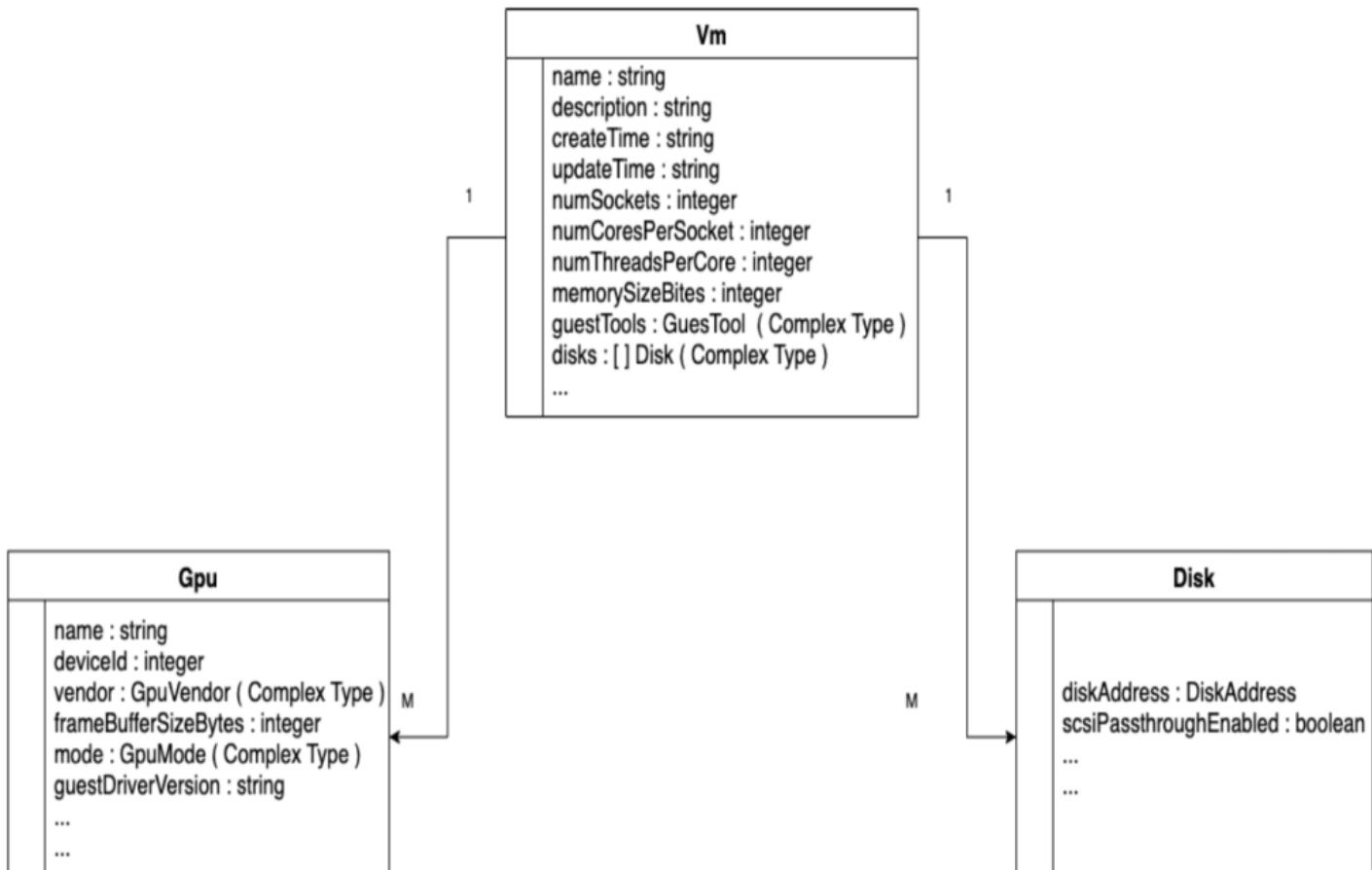
Nutanix v4 APIs support the following system query options.

1. \$select
2. \$expand
3. \$filter
4. \$orderby

All the system query options are explained with examples using the following example schema.

The schema has the following models.

- **Vm** : This model comprises attributes which describe a Virtual Machine.
- **Disk** : This model comprises attributes of a disk of a VM.
- **Gpu** : This model comprises attributes of a GPU of a VM.



OASIS Schema Example

#### Relationship between the models

- VM and disk have One-to-Many relation: a VM can have multiple disks.
- VM and GPU have One-to-Many relation: a VM can have multiple GPUs.

#### Resource Filtering

The \$filter system query option allows clients to filter a collection of resources that are addressed by a request URL. The expression specified with \$filter is evaluated for each resource in the collection, and only items where the expression evaluates to true are included in the response. Resources for which the expression evaluates to false or to null, or which reference properties that are unavailable due to permissions, are omitted from the response.

The following operations are supported with \$filter.

#### Logical Operator

```

Operation	OData Operator	Examples		---	---	---	---	---	---	---	---	---	---	---	---	---
Equals	eq	https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=name eq 'api_v4'		Not Equals												
ne	https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=name ne 'api_v4'		Greater Than	gt												
https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=numSockets gt 10		Greater Than or Equal	ge													
https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=numSockets ge 21		Less Than	lt													
https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=numSockets lt 20		Less Than or Equal	le													
https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=numSockets le 22		And	and													
https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=numSockets eq 1 and name eq 'api_v4'		Or	or													
https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=numSockets eq 1 or numSockets eq 22		Not	not													
https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=not startswith(name, 'pc')		In	in	https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=name in												
('test_1') |

```

#### String Method

```

Operation	OData Method	Examples	Description		---	---	---	---	---	---	---	---	---	---	---
Contains	contains	https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=contains(name, 'test')	Returns VMs in which name value contains the string 'test'		Starts With										
startswith	https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=startswith(name, 'a')	Returns VMs in which the name value starts with the string 'a'													
Ends With	endswith	https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=endswith(name, '1')	Returns VMs in which the name value ends with the string '1'		Lower case conversion	tolower	https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=tolower(name) eq 'TESTVM'	Returns VMs in which the name							
includes both 'testvm' and 'TESTVM' | | Upper case conversion | toupper | https://{{pc_ip}}:9440/api/vmm/v4.1/ahv/config/vms?$filter=toupper(name) eq 'testvm' |
Returns VMs in which the name includes both 'testvm' and 'TESTVM' |

```

#### Resource filtering: Lambda Functions

Lambda functions are applied on a property which is of array type. Nutanix v4 APIs support only lambda 'any' operator. The "any" operator applies a boolean expression for each member of a collection. It returns true if and only if the expression is true for any member of the collection, otherwise it returns false. A lambda expression is made up of lambda literal which can be any allowed ASCII character.

Consider the following scenario.

- Administrator runs a cluster providing a large number of disk images
- Requirement indicates a specific disk image needs to be found on the cluster in order to get information about that disk image
- Administrator does not know the disk image's unique identifier (`ext_id`)
- Administrator does know part of the disk image's name: `fileserver_`

OData filtering allows the administrator to send an image list request containing a filter. That filter can specify the request should only return images matching a certain pattern. In this example, images with a name starting with `fileserver_`.

#### **Resource filtering by name: Python SDK**

This script snippet shows a Nutanix v4 SDK image list request including the filter parameter.

Note: This snippet builds on previous snippets and assumes the SDK has already been initialized.

...

```
build on the previous Nutanix v4 Python requests code snippet to list images with OData filter
api_client = VMMClient(configuration=config) api_instance = ntnx_vmm_py_client.api.ImagesApi(api_client=api_client)
```

#### **request images list, filtering by name**

```
images_list_with_filter = api_instance.list_images(filter="startswith(name, 'fileserver')")
```

...

#### **Resource filtering by name: Python requests Library**

The script snippet below shows the same request but using the Python `requests` library. Note the query string added to the images list HTTP endpoint.

...

```
build on the previous Nutanix v4 Python requests code snippet to list images with OData filter
```

#### **set the Nutanix v4 API URL that will be used for this request**

```
endpoint = "https://prism_central_ip_address_or_fqdn:9440/api/vmm/v4.1/content/images?$filter=startswith(name, 'fileserver_')"
images_list_with_filter = requests.get(endpoint, auth=prism_central_auth, verify=False)
```

#### **use the json() method to print the image details**

```
print(images_list_with_filter.json())
```

...

#### **Sorting and Limiting**

The Nutanix v4 APIs support OData-compliant resource sorting and limiting. The `$orderby` system query option allows clients to request resources in ascending (default) or descending order.

Consider the following scenario.

- Administrator runs a cluster providing a large number of disk images
- Requirement indicates listing a specific number of images but that list should be sorted by name

OData filtering allows the administrator to send an image list request containing a filter. That filter can specify the request should return a maximum of "n" images, sorted by name.

#### **Sorting and limiting: Python SDK**

The script snippet below shows a Nutanix v4 SDK image list request including filter parameters. These filters will order disk images by name and return a maximum of 3 images.

Note: This snippet builds on previous snippets and assumes the SDK has already been initialised.

```
...
build on the previous Nutanix v4 Python requests code snippet to list a maximum of 3 images, sorted by name

api_client = VMMClient(configuration=config) api_instance = ntnx_vmm_py_client.api.ImagesApi(api_client=api_client)
```

## **request images list, sorted by name with a maximum of 3 images**

```
returned_images_list_filtered_limited = api_instance.list_images(_orderby="name asc", _limit=3)
```

## **show number of images returned by the request**

```
print(f"Images found: {len(images_list_filtered_limited.data)}")
```

## **with 'list' type obtained, check for results and print**

### **the name of the first image**

```
if len(image_list.data) > 0: print(f"Image name: {image_list.data[0].name}")
```

## **the demo environment returns the following, commented for script safety**

**Image name: rocky10\_cloud.qcow2**

```
...
```

### **Sorting and limiting: Python requests Library**

The script snippet below shows the same request but using the Python `requests` library. Note the query string added to the images list HTTP endpoint.

Note these URL querystring parameters: `?$limit=3&$orderby=name`

```
...
```

```
build on the previous Nutanix v4 Python requests code snippet to list a maximum of 3 images, sorted by name
```

## **set the Nutanix v4 API URL that will be used for this request**

```
endpoint = "https://prism_central_ip_address_or_fqdn:9440/api/vmm/v4.1/content/images?${limit=3}&${orderby=name}"
```

```
images_list_filtered_limited = requests.get(endpoint, auth=prism_central_auth, verify=False)
```

## **use the json() method to print the image details**

```
print(images_list_filtered_limited.json())
```

## **show how many images were found**

```
print(f"Images found: {len(images_list_filtered_limited.json()['data'])}")
```

## **iterate over the images, showing each name**

```
for image in images_list_filtered_limited.json()["data"]: print(f"Image name: {image['name']}")
```

## **the demo environment returns the following, commented for script safety**

**Image name: rocky10\_cloud.qcow2**

```
...
```

### **Selection Projection using \$select**

The `$select` system query option allows clients to request a specific set of properties for each entity or complex type.

Examples:

| Operation | URL | --- | --- | | Returns results a list of storage container names only |

https://{{pc\_ip}}:9440/api/clustermgmt/v4.1/config/storage-containers?\$select=name | | Returns results which has storage container name and extId |

https://{{pc\_ip}}:9440/api/clustermgmt/v4.1/config/storage-containers?\$select=name,containerExtId | | Returns storage container name, extId and replication factor | https://{{pc\_ip}}:9440/api/clustermgmt/v4.1/config/storage-containers?\$select=name,containerExtId,replicationFactor |

### Expansion Projection using \$expand

Expansion projections allow related entities to be included inline with a retrieved resource. OData provides an \$expand query option to support expansion projections. A request with a \$expand query option enables the reading of entries of an entity together with an associated entity.

Examples:

| Operation | URL | --- | --- | | Returns results a list of volume groups without any expansion projection |

https://{{pc\_ip}}:9440/api/volumes/v4.1/config/volume-groups | | Returns a list of volume groups including the related cluster projection |

https://{{pc\_ip}}:9440/api/volumes/v4.1/config/volume-groups?\$expand=cluster | | Returns a list of volume groups including the related metadata and cluster projections | https://{{pc\_ip}}:9440/api/volumes/v4.1/config/volume-groups?\$expand=metadata,cluster |

### Pagination

The Nutanix v4 APIs have Pagination support. When exposing large data sets through a list API, pagination is used to provide a mechanism to paginate a list of resources. Pagination can be achieved using:

- \$page
- \$limit

| Parameter | Type | Description | Example | --- | --- | --- | --- | --- | | \$page | Integer | The page or offset from where resources will be fetched in the list |

https://{{pc\_ip}}:9440/api/vmm/v4.1/ahv/config/vms?\$page=2 | | \$limit | Integer | The limit of resources to be fetched from the given offset |

https://{{pc\_ip}}:9440/api/vmm/v4.1/ahv/config/vms?\$page=2&\$limit=100 |

Note: Pagination uses a zero-based index. The formula to use to see which elements are returned in the list given a page and limit is the following.

...

starting index = page \* limit

ending index = (limit \* (page+1)) -1

...

### Request Idempotency

To ensure each API request is only carried out once, the Nutanix v4 APIs now implement standard request headers, identified by the Ntnx-Request-Id header. The Ntnx-Request-Id header is mandatory on nearly all POST, PUT and DELETE requests. Some asynchronous requests do not require the Ntnx-Request-Id header, as indicated in the Nutanix v4 API documentation.

NTNX-Request-Id is a unique identifier associated with each request. The provided value must be opaque and preferably in Universal Unique Identifier(UUID) format. This identifier is also used as an idempotence token for safely retrying requests in case of network errors. All the supported Nutanix v4 SDKs add this auto-generated request identifier to each request.

The method used to specify custom headers will vary depending on the API client. Using Postman, however, an example is shown below.

| Key             | Value                                | Description                                        |
|-----------------|--------------------------------------|----------------------------------------------------|
| Content-Type    | application/json                     |                                                    |
| Ntnx-Request-Id | b879e3c1-63b3-4957-8ca1-dbfdf045ea6a | Unique identifier for this request, in UUID format |

For a complete explanation and demonstration of Ntnx-Request-Id header usage, see the article titled [Using Request Id Headers with Nutanix v4 APIs](#).

### Request Idempotency: Nutanix v4 SDKs

**Note:** The Nutanix v4 SDKs handle the `Ntnx-Request-Id` header automatically. Users should not manually add or specify the `Ntnx-Request-Id` header when using the Nutanix v4 SDKs.

## Resource Etag

In the event of multiple users updating the same resource, it is possible for those updates to clash. This situation is known as a mid-air collision and results in incorrect or unknown results as the resource's configuration is not as expected.

To prevent this, the Nutanix v4 APIs now implement standard Etags, submitted via `If-Match` request headers. The `Etag` header is mandatory for all operations on existing entities and helps to eliminate the possibility of a mid-air collision.

Consider the following scenario.

- Administrator needs to update an existing disk image
- Administrator knows the `ext_id` of the existing disk image
- To prevent a mid-air collision, the disk image must be updated whilst specifying the image's current `Etag` as the value of the `If-Match` header

To complete this process, the steps are as follows.

1. Request the existing image:
2. Python SDK (assuming API instances are already setup as per previous snippets): `api_instance.api.get_image_by_id(image_ext_id: str)`
3. REST APIs: GET `https://{{prism_central_ip_address_or_fqdn}}:9440/api/vmm/v4.1/content/images/{{image_extid}}`
4. Obtain the image's Etag via the response headers:
5. Python SDK Etag property: `print(api_client.get_etag(existing_image))`
6. REST API Etag header: `print(existing_image.headers["Etag"])`
7. Generate image update request, using previously obtained Etag as the value of the `If-Match` header

Note: The code snippets in this section are for demonstration purposes only and will require additional steps before use.

## Resource ETag: Python SDK

The following snippet uses the Nutanix v4 Python SDK to obtain an existing image by `ext_id`, then obtain the image's `Etag` from the response.

...

```
build on the previous Nutanix v4 SDK code snippets to obtain an existing image's Etag
```

## get the existing image details

### replace ext\_id with the ext\_id of your image

```
existing_image = api_instance.get_image_by_id("ext_id")
```

### show the existing image's Etag

**the v4 APIs provide a `get_etag` function to make this simple `print(api_client.get_etag(existing_image))`**

...

## Resource ETag: Python requests Library

The following snippet uses the Python `requests` library to obtain an existing image by `ext_id`, then obtaining the image's `Etag` from the response.

...

```
build on the previous Nutanix v4 Python requests code snippet to obtain an existing image's Etag
```

## set the Nutanix v4 API URL that will be used for this request

### replace ext\_id with the ext\_id of your image

```
endpoint = "https://prism_central_ip_address_or_fqdn:9440/api/vmm/v4.1/content/images/ext_id"
```

## get the existing image details

```
existing_image = requests.get(endpoint, auth=prism_central_auth, verify=False)
```

## show the existing image's Etag

```
print(existing_image.headers["Etag"])
...
```

## Batch Operations

The Nutanix v4 release candidate (RC) APIs and SDKs include support for asynchronous batch operations. Batch operations allow users to construct a multi-operation payload that can be applied to a collection of related entities.

For example, in an environment where there are a large number of virtual machines that need to be updated at the same time, a batch operation payload can be constructed so that all VMs have the required changes made with only a single update request on the user side.

Batch operations return standard v4 API and SDK task identifiers that allow users to monitor the status of a batch operation, including up to 90 days of batch operation history.

Note: Up to 500 entities can be included in a single batch operation.

### Batch Operations: Python SDK

The following Python SDK code snippet shows the creation of a batch operation payload for creating 10 virtual machines. This code snippet assumes script preparation steps have been completed i.e. Prism Central IP address & credentials (etc).

- **ActionType.CREATE** will send a POST request. See [v4 API: Submit Batch CREATE Operation \(Python SDK\)](#) for a detailed example.
- **ActionType.MODIFY** will send a PUT request. See [v4 API: Submit Batch MODIFY Operation \(Python SDK\)](#) for a detailed example. Includes full usage of all required headers and parameters.

...

```
""" Use the Nutanix v4 SDKs to update submit a batch operation This demo creates 50 individual virtual machine
```

```
import ntnx_prism_py_client import ntnx_vmm_py_client

from ntnx_prism_py_client import Configuration from ntnx_prism_py_client import ApiClient

from ntnx_prism_py_client import BatchSpecPayload from ntnx_prism_py_client import BatchSpec from ntnx_prism_py_client import BatchSpecMetadata from
ntnx_prism_py_client import ActionType from ntnx_prism_py_client import BatchesApi
```

## setup configuration here i.e. Prism Central IP, credentials (etc)

```
batches_instance = BatchesApi(api_client=prism_client)
```

## the number of virtual machines to create plus an empty list that will be populated with each VM payload

```
vm_count = 10
batch_spec_payload_list = []
for i in range(int(vm_count)):
 vm_payload = {
 "name": f"newvm_{i}",
 "description": f"new batch operation vm #{i}",
 "memory_size_bytes": 1024 * 1024 * 1024, # obtain the cluster ID using clustermgmt namespace first "cluster"
 }
 ntnx_vmm_py_client.AhvConfigClusterReference("cluster_ext_id_here"), # add the VM batch payload to the list of VMs to be created
 batch_spec_payload_list.append(BatchSpecPayload(data=vm_payload))

batch_spec = BatchSpec(metadata=BatchSpecMetadata(action=ActionType.CREATE, name=f"multi_operation", # URI to the v4 vms API
uri="/api/vmm/v4.1/ahv/config/vms", stop_on_error=True, chunk_size=1,), payload=batch_spec_payload_list,)
```

## submit the request

```
print(f"Submitting batch operation to create {vm_count} VMs ...")
batch_response = batches_instance.submit_batch(async_req=False, body=batch_spec)
```

...

The response is an instance of **ntnx\_prism\_py\_client.models.prism.v4.operations.SubmitBatchApiResponse**, as follows.

...

```
>>> print(batch_response)
```

```
{'_object_type': 'prism.v4.operations.SubmitBatchApiResponse', '_reserved': {'$fv': 'v4.r0'}, '_unknown_fields': {}, 'data': {'_object_type': 'prism.v4.config.TaskReference', '_reserved': {'$fv': 'v4.r0'}, '_unknown_fields': {}, 'ext_id': 'ZXJnb24=:6b08f012-ed56-4489-5f87-fce4e897bfd'}}
```

...

## Rate Limiting

The Nutanix v4 APIs will enforce rate limiting. Whenever the incoming requests exceed a certain limit, further requests will be temporarily blocked. Once the number of incoming requests goes down, additional requests can be sent as normal.

The configured rate limit will vary based on the Prism Central configuration.

## Complete Code Samples: Request Idempotency and Resource Etag

These code samples demonstrate Prism Central image updates with end-to-end usage of the Nutanix v4 REST APIs and Python SDKs. Before using these code samples, ensure your Python environment is configured as per ["Configuring Your Python Environment"](#).

Note: These code samples assume there is at least one existing image in the configured Prism Central environment.

Both code samples can be downloaded from the Nutanixdev GitHub:

- [Update Prism Central image with Resource Etag: Python SDK](#) (Ntnx-Request-Id is not required when using the Nutanix v4 SDKs)
  - [Update Prism Central image with request idempotency and Resource Etag: Python requests library](#)

Update Prism Central image with Resource Etag: Nutanix Python SDK

This complete code sample uses the Nutanix v4 Python SDKs and resource Etag to update an existing Prism Central image.

This code sample can be run using the following syntax:

888

python .py

3

"" Use the Nutanix v4 SDKs to update a Prism Central image Requires Prism Central pc.2024.3 or later and AOS

```
"""\n import getpass\n import argparse\n import urllib3\n import sys
```

```
import ntnx_vmm_py_client from ntnx_vmm_py_client import ApiClient as VMMClient from ntnx_vmm_py_client import Configuration as VMMConfiguration from ntnx_vmm_py_client.rest import ApiException as VMMEException
```

```
""" suppress warnings about insecure connections consider the security implications before doing this in a production environment """
urllib3.disable_warnings(urllib3.exceptions.InsecureRequestWarning)
```

"" setup the command line parameters for this example only two parameters are required - the Prism Central IP address or FQDN - the Prism Central username; the script will prompt for the user's password so that it never needs to be stored in plain text """

```
parser = argparse.ArgumentParser() parser.add_argument("pc_ip", help="Prism Central IP address or FQDN") parser.add_argument("username", help="Prism Central username") args = parser.parse_args()
```

## get the cluster password

```
cluster_password = getpass.getpass(prompt="Enter your Prism Central password: ", stream=None,) pc_ip = args.pc_ip username = args.username
```

**make sure the user enters a password**

```
if not cluster_password: while not cluster_password: print("Password cannot be empty. \ Enter a password or Ctrl-C/Ctrl-D to exit.") cluster_password = getpass.getpass(prompt="Enter your Prism Central password: ", stream=None)
```

```
if name == "main": config = VMMConfiguration() config.host = pc_ip config.username = username config.password = cluster_password
config.max_retry_attempts = 1 config.backoff_factor = 3 config.verify_ssl = False
```

```
try: api_client = VMMClient(configuration=config) api_instance = ntnx_vmm_py_client.api.ImagesApi(api_client=api_client) # get a list of existing images
images_list = api_instance.list_images(async_req=False) if images_list.metadata.total_available_results > 0: print(f"Images found: {len(images_list.data)}") else:
print("No images found.") sys.exit()
```

```
images have been found - update the first image in the list
to begin, we must retrieve that image's details
existing_image = api_instance.get_image_by_id(images_list.data[0].ext_id)
```

```

get the existing image's Etag
existing_image_etag = api_client.get_etag(existing_image)
create a new Prism Central image
new_image = ntnx_vmm_py_client.models.vmm.v4.content.Image()
new_image.data = existing_image.data
new_image.name = f"{existing_image.data.name} - Updated"
new_image.type = existing_image.data.type

add the existing image's Etag as a new request header
api_client.add_default_header(header_name="If-Match", header_value=existing_image_etag)
update the image using an asynchronous request (will wait until completion before returning)
image_update = api_instance.update_image_by_id(body=new_image, extId=existing_image.data.ext_id, async_req=False)
print(image_update)

except VMMEException as e: print(f"Unable to authenticate using the supplied credentials. \ Check your username and/or password, then try again. \ Exception details: {e} ")
```

```

Update Prism Central image with request idempotency and resource Etag: Python requests Library

```

```
 """ Use the Nutanix v4 REST APIs to update a Prism Central image

```

Requires Prism Central pc.2024.3 or later and AOS 7.0 or later """ import requests import urllib3 import getpass import argparse import uuid import json import sys from base64 import b64encode

```

""" suppress warnings about insecure connections consider the security implications before doing this in a production environment """
urllib3.disable_warnings(urllib3.exceptions.InsecureRequestWarning)

```

```

""" setup the command line parameters for this example only two parameters are required - the Prism Central IP address or FQDN - the Prism Central username; the script will prompt for the user's password so that it never needs to be stored in plain text """
parser = argparse.ArgumentParser()
parser.add_argument("pc_ip", help="Prism Central IP address or FQDN") parser.add_argument("username", help="Prism Central username") args = parser.parse_args()

```

## **get the cluster password**

```
cluster_password = getpass.getpass(prompt="Enter your Prism Central password: ", stream=None,) pc_ip = args.pc_ip username = args.username
```

## **make sure the user enters a password**

```
if not cluster_password: while not cluster_password: print("Password cannot be empty. Enter a password or Ctrl-C/Ctrl-D to exit.") cluster_password = getpass.getpass(prompt="Enter your Prism Central password: ", stream=None)
```

```
try: """
 setup the HTTP Basic Authorization header based on the supplied username and password """
 encoded_credentials = b64encode(bytes(f'{username}:{cluster_password}', encoding="ascii").decode("ascii"))
 auth_header = f"Basic {encoded_credentials}"

```

```

setup the URL that will be used for the API request
url = f"https://:{pc_ip}:9440/api/vmm/v4.1/content/images"
"""
setup the request headers
note the use of {auth_header} i.e. the Basic Authorization credentials we setup earlier """
headers = {
 "Accept": "application/json",
 "Content-Type": "application/json",
 "Authorization": f'{auth_header}',
 "cache-control": "no-cache"
}

```

```

submit the request
try:
 response = requests.request("GET", url, headers=headers, verify=False, timeout=10)
 if response.ok:
 # show a total count of images found
 print(f'Total images found: {response.json()["metadata"]["totalAvailableResults"]}')
 else:
 print(f"An error occurred while connecting to {pc_ip}.")
 print(response.text)
 sys.exit()

```

```

images have been found - update the first image in the list
to begin, we must retrieve that image's details
existing_image_ext_id = response.json()["data"][0]["extId"]
get the existing image details
url = f"https://{{pc_ip}}:9440/api/vmm/v4.1/content/images/{{existing_image_ext_id}}"
existing_image = requests.get(url, headers=headers, verify=False, timeout=10)
get the existing image's resource Etag
existing_image_etag = existing_image.headers["Etag"]
create a new UUID to be used as the value of the Ntnx-Request-Id header
request_id = str(uuid.uuid1())
create new headers that include the existing image's resource Etag and Ntnx-Request-Id
headers = {
 "Accept": "application/json",
 "Content-Type": "application/json",
 "Authorization": f"{{auth_header}}",
 "cache-control": "no-cache",
 "If-Match": existing_image_etag,
 "Ntnx-Request-Id": request_id
}
create the image update's JSON request payload
update_payload = existing_image.json()["data"]
alter the image's name
update_payload["name"] = f'{update_payload["name"]} - Updated'
update the image
url = f"https://{{pc_ip}}:9440/api/vmm/v4.1/content/images/{{existing_image_ext_id}}"
update = requests.put(url, headers=headers, data=json.dumps(update_payload), verify=False, timeout=10)
print(update.json())
except Exception as ex:
 print(f"An {type(ex).__name__} exception occurred while \
connecting to {{pc_ip}}.\n Argument: {ex.args}.")

```

## **catching all exceptions like this should be generally be avoided**

```
except Exception as e: print(f"{e})
```

```
...
```

Nutanix v4 API Early Access ("EA") and Release Candidate ("RC") Do not use EA and RC features in a production environment. Your use of any EA and RC technology is subject to the Nutanix License and Service Agreement: <https://www.nutanix.com/legal/eula>

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**<https://www.nutanix.dev/nutanix-v4-api-versioning-scheme-and-types/>**

Nutanix v4 API Versioning Scheme and Types – Nutanix.dev

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## Nutanix v4 API Versioning Scheme and Types

Nutanix v4 API versioning scheme and types

### Nutanix v4 API Versioning Scheme

All APIs at Nutanix follow a semantic versioning scheme. In this scheme, Nutanix follows these conventions:

1. Use two digits to identify API versions prefixed with a version string 'v', for example, v4.0.[a1].
2. Given a two-part version number **vFamily.Revision.[Type]**, the **Family** represents a major version of the API, and the **Revision** represents the minor version. The **Type** is an optional field associated with an API version (see API Types below). Production APIs do not have this **Type** field present in the version string.

The versioning implies the following:

1. Two distinct API namespace families **may** not have any compatibility in structure, performance, or representation for any other API endpoints. Typically Nutanix v4, legacy v1, v2.0 and v3 APIs are interoperable. Interoperability restrictions will be documented on <https://developers.nutanix.com>, as required.
2. API and SDK client builds are compatible with their respective and following AOS and Prism Central versions API and SDK client versions together with earlier specific AOS and Prism Central versions and may not contain all latest features.

### API Development Stages

APIs go through different stages of development, and a scalable API platform must recognize these differences and allow consumers and producers to go through these transitions in a predictable manner. Accordingly, three different API Stages are introduced with the following characteristics.

**Early Access (EA) v4 APIs** – The following conditions apply to EA APIs:

- The API may contain unknown bugs. Enabling the feature might expose bugs in related features.
- EA APIs can be dropped or changed at any time without prior notice.
- API may change in incompatible ways without notice. Multiple alpha versions at different revisions may or may not be compatible. The API family and revision imply no compatibility, and none should be assumed.
- These APIs are not supported except for in the Nutanix support communities . If you need support or have questions, refer to the "[How It Works](#)" section of the Nutanix communities.
- It is not recommended for production use.
- The **Type** attribute of an EA v4 API is set to a (for example, v4.1.a1), where a represents the alpha version, and n is an integer that is incremented every time a new release of the EA v4 API occurs.

**3. Release Candidate (RC) v4 APIs** – The following conditions apply to RC APIs:

- RC v4 APIs are more stable than EA v4 APIs.
- APIs have been tested to be backward compatible across all API revisions within the v4 family, except EA versions.
- These APIs are not supported except for in the Nutanix support communities . If you need support or have questions, refer to the "[How It Works](#)" section of the Nutanix communities.
- Further along the development process than the EA APIs, but not recommended for production use.
- The **Type** attribute of an RC v4 API is set to b (for example, v4.1.b1), where 'b' represents the beta version and n is an integer that is incremented every time a new release of the RC v4 API occurs.

**5. Generally Available ( GA) v4 APIs** – GA APIs are characterized as follows:

- GA v4 APIs are available for production use and are officially supported.
- GA APIs are backward compatible across all API versions within the v4 family, except EA versions.

## Related Documentation

- [v4 API Introduction](#)
- [v4 API User Guide](#)
- [v4 API Migration Guide](#)
- [v4 API Documentation](#)
- [All API References](#)
- [Code Sample Library](#)

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**<https://www.nutanix.dev/self-service-dsl/>**

NCM Self Service DSL – Nutanix.dev

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## **NCM Self Service DSL**

NCM Self-Service DSL refers to the Domain-Specific Language (DSL) used in NCM Self-Service (formerly Calm), an application management platform. DSL is a specialized Python based programming language that allows users to define and automate tasks and application workflows within their infrastructure as code (IaC). It also has support for executing CLI commands empowering users to interact with and utilize Self-Service features and functionality in a convenient, efficient, and automated manner.

### **Announcing NCM Self-Service DSL Documentation**

We are happy to announce the release of our updated and redesigned NCM Self-Service DSL documentation. This release offers detailed getting started guides, tutorials and usage information.■

[Go to DSL Documentation](#)



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The resources on this page are selected articles and technical resources that are aimed at helping you get familiar with configuring and using the NCM Self-Service (formerly Calm) DSL.

### **Labs**

The labs below suit those that prefer to learn by doing. From start to finish, we'll walk you through learning the lab material.

#### [Nutanix Calm DSL Lab v1.0](#)

[Read More »](#)

September 1, 2020

### **Articles**

The articles below are a curated set of content from Nutanix.dev. This content relates specifically to the NCM Self Service DSL and it is strongly recommended to consume it in the order shown. This ensures the NCM Self-Service DSL is both introduced and that your environment is ready to use DSL.

#### **First time using the NCM Self-Service DSL?**

Start here!

[Go to NCM Self-Service DSL Introduction](#)

#### [Nutanix Calm DSL – Creating Custom Blueprint](#)

In our recent post, titled Introducing the Nutanix Calm DSL, we did exactly what the title says and introduced the Nutanix Calm DSL. The DSL,

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March 30, 2020

#### [Nutanix Calm DSL – Generating VM Specs](#)

In our most recent article, titled Nutanix Calm DSL – Creating Custom Blueprint, we talked about a whole bunch of different things. If you haven't

[Read More »](#)

April 6, 2020

## [\*\*Nutanix Calm DSL – Run Custom Actions\*\*](#)

In recent articles we've covered a few things now. Some of the highlights are: If you've followed the Calm DSL articles up to this point,

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April 17, 2020

## [\*\*Nutanix Calm DSL – Remote Container Development Part 1\*\*](#)

Welcome back to the next instalment of the series I'm calling "stuff about the Calm DSL". ■ In all honesty, the series doesn't have a

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April 24, 2020

## [\*\*From UI to Code – Calm DSL and Blueprint Decompile\*\*](#)

Regular readers of Nutanix.dev will be familiar with the Nutanix Calm DSL. If you haven't yet taken a dive into the Nutanix Calm DSL, please

[Read More »](#)

July 20, 2020

## [\*\*Nutanix Calm DSL – Blueprint Launch Parameters\*\*](#)

In recent articles I've talked a lot about the various things you can do with the Nutanix Calm DSL. The Calm DSL, due to being

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July 29, 2020

## [\*\*Nutanix Calm DSL – Managing Projects\*\*](#)

Until now, Nutanix Nutanix Calm DSL articles on Nutanix.dev have focused on the management of relatively specific entity types. In most cases, the Calm

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August 18, 2020

## [\*\*Nutanix Calm DSL – Quick Tips\*\*](#)

By now many will be aware of how powerful the simplest things can be. Things like working with Nutanix Calm, which can be controlled via

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September 1, 2020

## [\*\*Nutanix Calm DSL Lab – Available Now!\*\*](#)

In recent months there have been a number of articles published about the Nutanix Calm DSL. For example, I've covered: Introducing the Nutanix Calm DSL

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September 4, 2020

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## Nutanix REST API and SDK Versions (Updated)

### Table of Contents

### Nutanix API Introduction

When discussing the Nutanix Prism Element and Prism Central APIs, it is important to consider the different versions that are available. This article will discuss the versions that are available today. Each available version is described differently, as follows:

#### Authentication

Nutanix REST APIs support different methods of authentication, depending on the version being used. Nutanix legacy APIs (v0.8, v1, v2.0, v3) support:

- HTTP Basic Authentication by username and password
- Session cookie authentication

Nutanix v4 APIs and SDKs support:

- HTTP Basic Authentication by username and password
- Session cookie authentication
- API Key authentication for users of type service account

Requests on HTTP port 80 are automatically redirected to HTTPS port 443. This requires that a valid cluster or configured directory service credential is passed as part of the API request. To complete any Nutanix API request, a minimum of READ access is required. Appropriate administrative credentials are required for API requests that make entity or cluster changes; POST, PUT and DELETE.

#### Prism Element vs Prism Central

Prism Element APIs are cluster-specific and are designed to manage and manipulate entities within a specific cluster. Prism Central APIs include a larger set of APIs designed to manipulate entities that aren't necessarily specific to a single cluster. These include Nutanix products accessed via Prism Central, including but not limited to:

- NCM Self-Service
- Foundation Central

#### Security

The commands throughout this article show use of the `--insecure` cURL parameter. This parameter disables SSL certificate verification and allows connection even when a connection cannot be guaranteed secure. Consider the risk and security implications of bypassing certificate verification before using `--insecure` in a production environment.

## Nutanix API and SDK Versions

As of April 2025, there are four publicly available Nutanix API collections. Despite legacy versions (v0.8, v1, v2 and v3) being mentioned Nutanix Prism REST API Explorer, all customers are strongly recommended to either use or consider migration to the v4 APIs or SDKs. The versions available will typically be dictated by the Nutanix AOS or Prism Central version installed. For this article, v0.8 is mentioned for completeness reasons only and should not be used. The API versions available today are as follows.

- v1 (Prism Element only)
- v2.0 (Prism Element only)
- v3 (Prism Central only)
- v4 (GA/Generally Available, Prism Central only)

### Prism Element API v1

**Status: Deprecated:** should only be used when in rare situations where GA versions are not available.

Chronologically, API v1 was released before v0.8 and was used to manage VMs, storage containers, storage pools and many other cluster-specific entities. Before the release of API v2.0, the v1 and v0.8 APIs were how user scripts interacted with Nutanix clusters. Some of the API endpoints could only be used with the AHV hypervisor and some could be used across multiple hypervisors such as AHV and ESXi.

This URL demonstrates a v1 API request that lists all storage containers within a cluster:

...

```
https://:9440/api/nutanix/v1/containers
```

...

The same request can be submitted with cURL:

...

```
curl -X GET 'https://:9440/api/nutanix/v1/containers' -H 'Accept: application/json' -H 'Content-Type: application/json'
```

## Prism Element API v2.0

"The Nutanix REST APIs allow you to create scripts that run system administration commands against the Nutanix cluster. The API enables the use of HTTP requests to get information about the cluster as well as make changes to the configuration. Output from the API calls are returned in JSON format. The v2 API is an update of the v1 API. Users of the v1 API are encouraged to migrate to v2."

Source: [https://www.nutanix.dev/api\\_reference/apis/prism\\_v2.html](https://www.nutanix.dev/api_reference/apis/prism_v2.html) [Tweet](#)

**Status: Deprecated but supported;** should only be used when in rare situations where later GA versions or Prism Central are not available.

The Prism Element v2.0 APIs were the first GA version combining most functionality from the historical v0.8 and v1 APIs. Many of the entities and endpoints available in v0.8 and v1 were published in v2.0, along with back-end improvements and endpoint renaming. The v2.0 APIs were also the first official GA Nutanix API.

1. Rename: `containers` to `storage_containers`
2. Rename: `storagePools` to `storage_pools`
3. Endpoint naming standard from `camelCase` to `snake_case`

This URL demonstrates a Prism Element API v2.0 request to list all `storage_containers` within a cluster.

...

```
https://:9440/api/nutanix/v2.0/storage_containers
```

...

The same request can be submitted with cURL:

...

```
curl -X GET 'https://:9440/api/nutanix/v2.0/storage_containers' -H 'Accept: application/json' -H 'Content-Type: application/json'
```

...

## API v1 and v2.0 Summary

All APIs outlined so far return a JSON response that is easily consumable by many programming or scripting languages. Additionally, all API requests so far have been HTTP GET requests that do not require a JSON payload/POST body.

## Prism Central API v3

"Representational state transfer ( REST ) Application Programming Interface (API) 3.0 is based on an intentful API philosophy. According to the intentful API philosophy the machine should handle the programming instead of the user enabling the datacenter administrator able to focus on the other tasks."

Source: [https://www.nutanix.dev/api\\_reference/apis/prism\\_v3.html](https://www.nutanix.dev/api_reference/apis/prism_v3.html) [Tweet](#)

**Status: Available;** However, Nutanix recommends all Prism Central v3 API users begin planning for v4 API and SDK migration ASAP.

The Prism Central v3 APIs were released as GA on April 17th 2018 are supported on Prism Central Only. End user v3 APIs must not be consumed via Prism Element.

Prism Element API v1 and v2.0 HTTP GET requests list entities and request a specific entity. HTTP POST, PUT and DELETE requests are used to make changes.

The Prism Central v3 APIs operate slightly differently. The Prism Central v3 APIs are built around an Intentful paradigm, described as "**move the programming from the user to the machine.**" Instead of writing a large amount of code to complete a specific action, the intentful design allows the user to specify the desired state and the system will "figure out" the best way to get there. This is similar to configuration management frameworks like Salt, Puppet, Chef, Ansible and the PowerShell DSC.

This Prism Central v3 API requests a list of virtual machines, along with the following key differences between the same request using previous APIs.

- The request method is HTTP POST vs HTTP GET in Prism Element v1 and v2.0 APIs
  - A mandatory JSON payload specifies the type of entity being requested
  - A mandatory URL component indicates the request will list virtual machines
- ...

```
https://:9440/api/nutanix/v3/vms/list
```

...

This JSON payload is included with the request.

...

```
{"kind": "vm"}
```

...

The same request can be submitted with cURL:

...

```
curl -X POST 'https://:9440/api/nutanix/v3/vms/list' -H 'Accept: application/json' -H 'Content-Type: application/json'
```

...

## Prism Central API v4

"Our goal with the version 4 REST APIs is to provide a comprehensive and consistent set of APIs for operating the Nutanix Cloud Platform. v4 APIs have semantics based on open standards, delivering enhanced usability and developer experience."

Source: <https://www.nutanix.dev/api-reference-v4/> [Tweet](#)

**Status: GA (Generally Available) and RC (Release Candidate).** Note: GA and RC status is namespace-dependent.

Initially released as EA (Early Access) in Prism Central pc.2022.6, the Prism Central v4 APIs are a ground-up rewrite of the Nutanix Prism REST APIs. Some of the highlighted new features are as follows.

- Language-specific SDKs (Python, Java, Go, JavaScript)
- API namespaces for API separation
- Strict API versioning
- Request ID header support for request idempotency
- If-Match header support for mid-air collision avoidance
- Redesigned documentation portal
- Consistent object schemas across all supported entities
- Consistent URL patterns across all supported entities

This GET request demonstrates an images list request using the Prism Central v4 APIs. The "vmm" namespace is currently available as GA in Prism Central pc.2024.3 and AOS 7.0.

...

```
https://:9440/api/vmm/v4.0/content/images
```

...

The same request can be submitted with cURL:

...

```
curl -X GET 'https://:9440/api/vmm/v4.0/content/images' -H 'Content-Type: application/json' --insecure --basic
```

...

## cURL Command Analysis

The Prism Central v4 API request demonstrated above can be analysed as follows.

- curl -X GET – Run cURL and specify that we will be making an HTTP GET request
- https://<prism\_central\_virtual\_ip>:9440/api/vmm/v4.0/content/images – Specify the complete request URL
- -H 'Accept: application/json' – Specify the content types the server is able to understand

- `-H 'Content-Type: application/json'` – Tell the server what type of data is being sent
- `--insecure` – Ignore invalid SSL certificates. Use caution before ignoring SSL certificates in a production environment.
- `--basic` – Tell the cURL command that we will authenticate using HTTP Basic Authentication
- `--user <cluster_username>:<cluster_password>` – Specify the username and password to use during basic authentication

Important points to note:

1. The user must specify the namespace that exposes the required API. This example uses the `vmm` namespace.
2. The user must specify the API version. This example uses GA API version `v4.0`.

For more information, including documentation, guides and code samples, see the [Nutanix v4 API Introduction](#).

## Nutanix REST API Use Cases

For deprecation information see the [Nutanix Legacy API Deprecation Notification](#).

The following list summarises the different Nutanix API version use cases.

- **v4** (Prism Central)
  - Recommended APIs and SDK for all supported Nutanix API endpoints
  - *environment-wide* configuration and entity management
  - Supersedes all previous Nutanix API versions unless a specific API endpoint is not available in v4
- **v3** (Prism Central)
  - Upcoming deprecation (see note above)
  - All Prism Central API v3 users should migrate to API v4 when possible
  - Prism Central product management including Nutanix Self Service, Nutanix Kubernetes Platform, Nutanix Flow Network Security
- **v2.0** (Prism Element)
  - Upcoming deprecation (see note above)
  - All Prism Element API v2.0 users should migrate to API v4 when possible
  - Merge of v0.8 and v1 APIs into single GA API
  - *cluster-specific* legacy tasks. For example, storage container management, storage container performance statistics
- **v1** (Prism Element)
  - Deprecated
  - Legacy application support and VM performance metrics
  - Should not be used outside of specific circumstances

## Summary

This article covered the various Nutanix Prism Element and Prism Central API versions, the differences between them and why a specific version would be used. For more information, refer to these additional resources.

- [Nutanix v4 API Intro](#)
- [Nutanix.dev API Reference](#)
- [Nutanix.dev Labs](#)
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### **Grouped by language**

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Most code samples are available on the NutanixDev GitHub code samples repo.

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The Nutanix.dev code sample collection is also available as an unfiltered single-page view!

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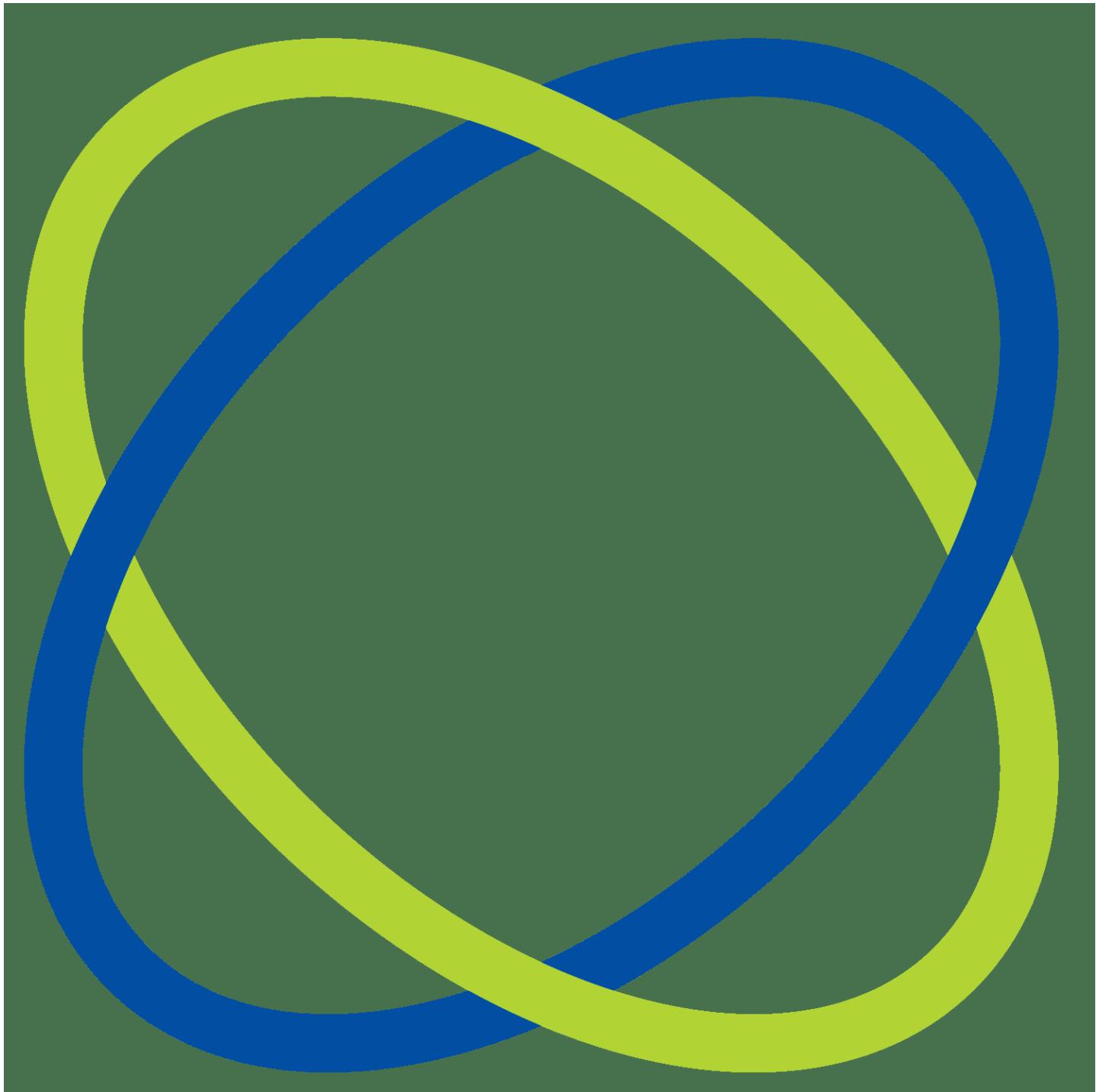
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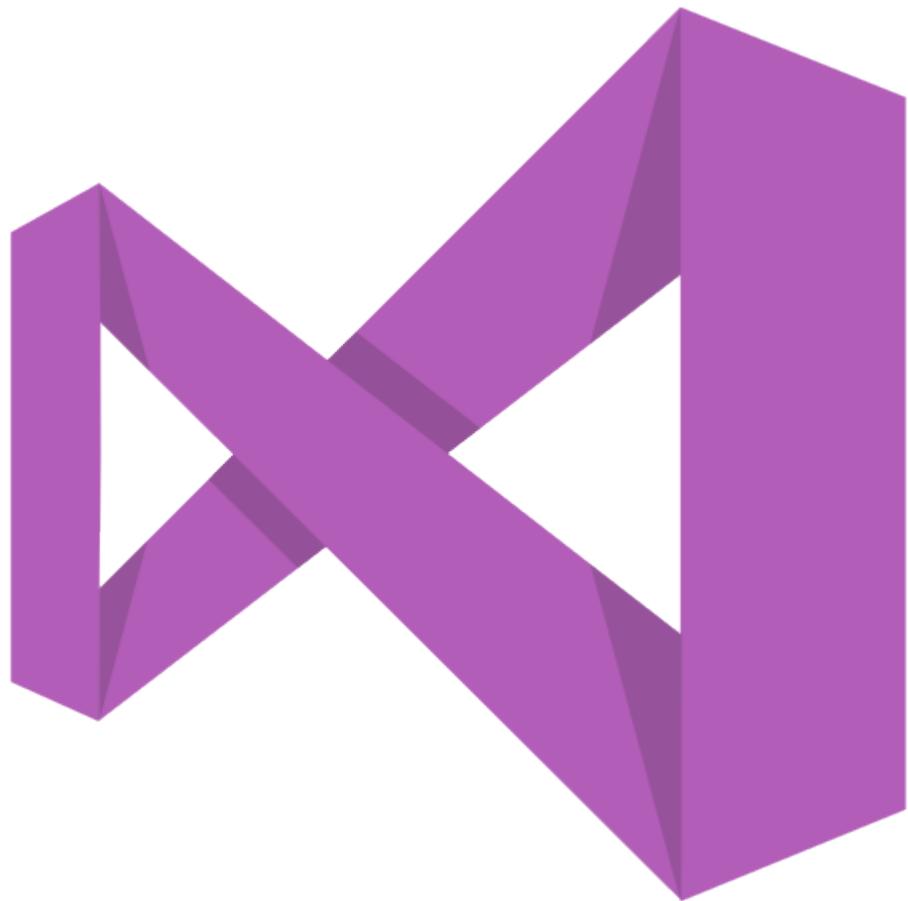
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[NCM SELF SERVICE](#)

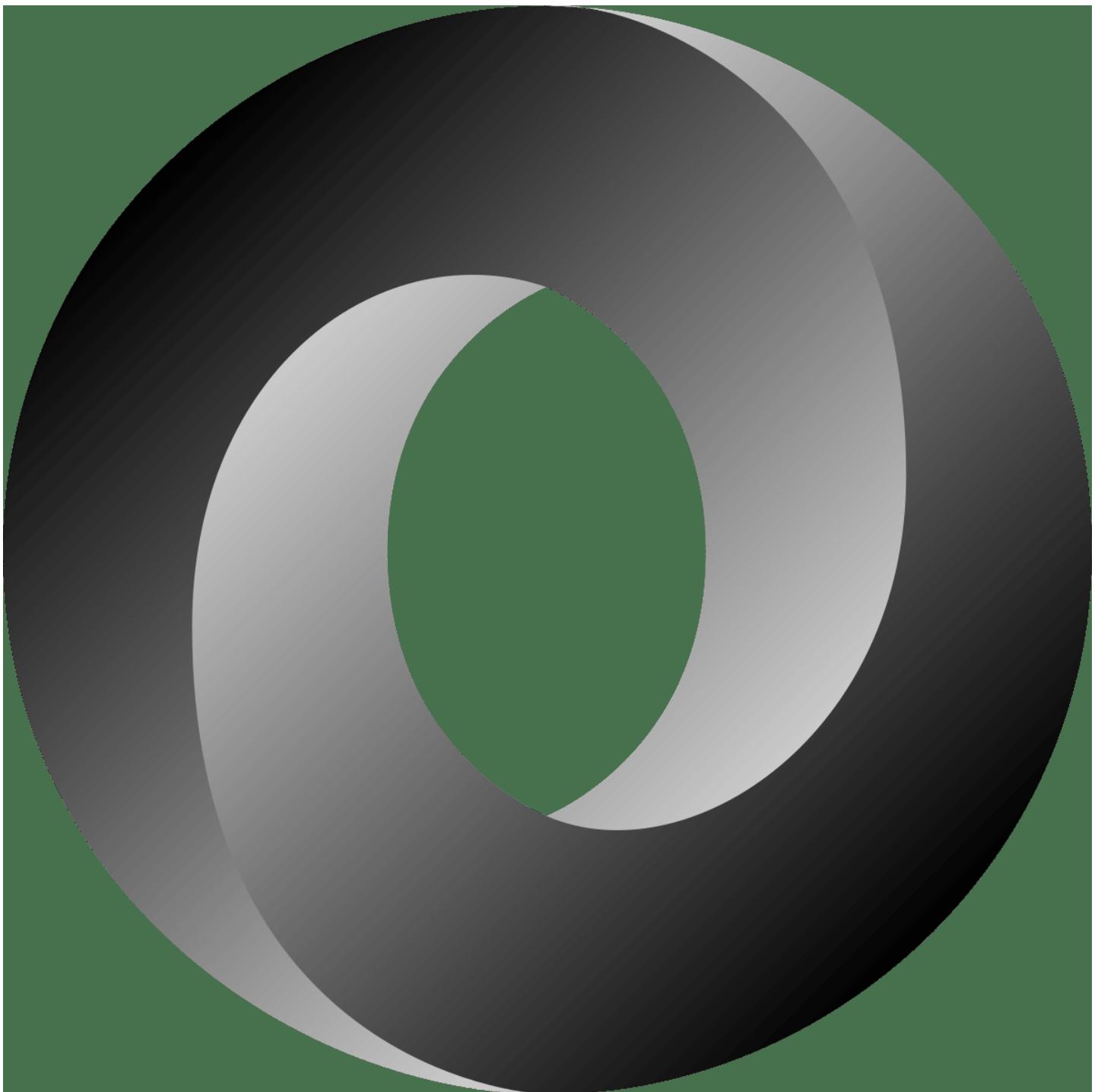


[MICROSOFT C#](#)

---



[GO](#)



[JSON](#)



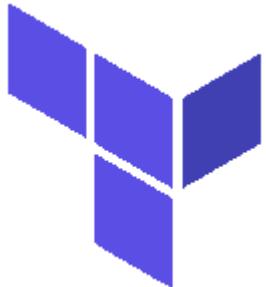
[PHP](#)



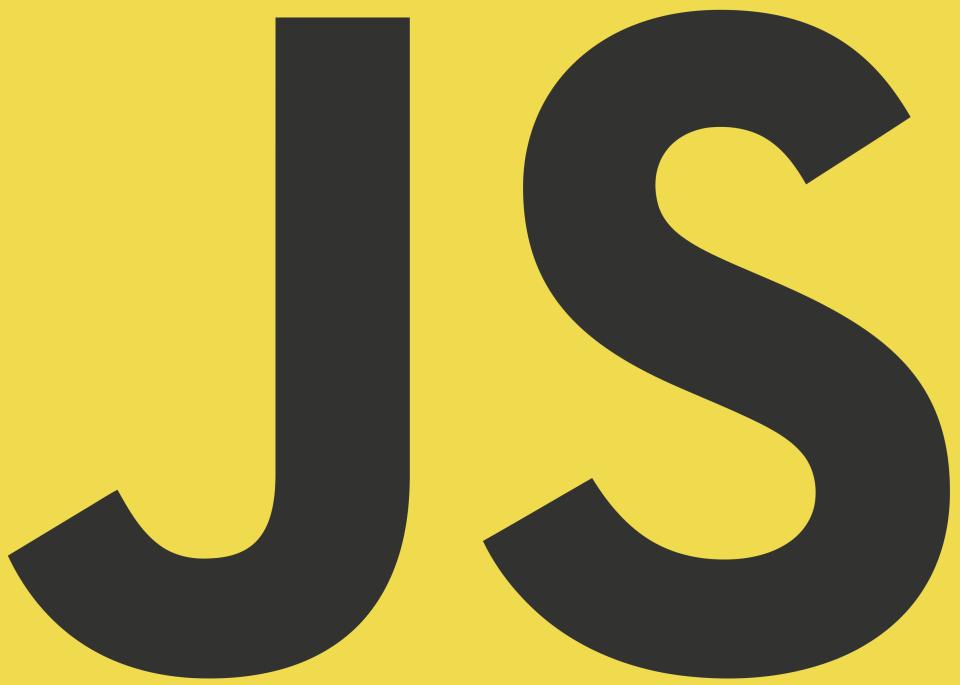
[POWERSHELL](#)



[PYTHON](#)



[TERRAFORM](#)



## [Javascript/JS](#)

### [v4 APIs and SDKs](#)

These samples are for the Nutanix v4 APIs and SDKs (all languages). They cover various common Nutanix Prism and product operations.

#### [v4 SDK: Create Prism Central Image \(JavaScript SDK\)](#)

This code is for demonstration purposes only and shows use of the Nutanix v4 JavaScript SDK to create a Prism Central image. Customisation will be

[Read More »](#)

July 22, 2025

#### [v4 API: Get VM Stats \(Python SDK\)](#)

This code is for demonstration purposes only and shows use of the Nutanix v4 Python SDK to request and display VM stats. Customisation will be

[Read More »](#)

May 5, 2025

## [v4 API: Generate Reports \(Python SDK\)](#)

This code sample is intended to accompany the Nutanix v4 APIs: OpsMgmt Series Part 2, Generating Reports article.

[Read More »](#)

March 3, 2025

## [v4 API: Generate Report Configurations \(Python SDK\)](#)

This code sample is intended to accompany the Nutanix v4 APIs: OpsMgmt Series Part 1, Generating Report Configurations article.

[Read More »](#)

March 3, 2025

## [v4 API: API Key Authentication \(Python SDK\)](#)

This code sample is intended to accompany the Nutanix v4 APIs: Using API Key Authentication article.

[Read More »](#)

January 20, 2025

## [v4 API: Submit Batch ACTION Operation \(Python SDK\)](#)

[Read More »](#)

June 27, 2024

## [v4 API: Submit Batch MODIFY Operation \(Python SDK\)](#)

[Read More »](#)

May 27, 2024

## [v4 API: Submit Batch CREATE Operation \(Python SDK\)](#)

[Read More »](#)

May 27, 2024

## [v4 API: Create Managed Subnet \(Python SDK\)](#)

[Read More »](#)

February 4, 2024

## [v4 API: Create Detailed Virtual Machine \(Python SDK\)](#)

[Read More »](#)

February 1, 2024

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## [Python](#)

These samples require Python 3.7 or later and demonstrate complete, standalone scripts for carrying out common API operations.

For easy sharing of parameters between scripts, most scripts accept their JSON payloads via an on-disk JSON-formatted text file.

Most scripts utilise **requests**, **urllib3**, **getpass**, **argparse** and **json** modules.

Repo directory: **python**

## [v4 API: Get VM Stats \(Python SDK\)](#)

This code is for demonstration purposes only and shows use of the Nutanix v4 Python SDK to request and display VM stats. Customisation will be

[Read More »](#)

May 5, 2025

## [v2 API: Get Energy Stats](#)

[Read More »](#)

March 19, 2025

## [v4 API: Generate Reports \(Python SDK\)](#)

This code sample is intended to accompany the Nutanix v4 APIs: OpsMgmt Series Part 2, Generating Reports article.

[Read More »](#)

March 3, 2025

## [v4 API: Generate Report Configurations \(Python SDK\)](#)

This code sample is intended to accompany the Nutanix v4 APIs: OpsMgmt Series Part 1, Generating Report Configurations article.

[Read More »](#)

March 3, 2025

## [v4 API: API Key Authentication \(Python SDK\)](#)

This code sample is intended to accompany the Nutanix v4 APIs: Using API Key Authentication article.

[Read More »](#)

January 20, 2025

## [v4 API: Submit Batch ACTION Operation \(Python SDK\)](#)

[Read More »](#)

June 27, 2024

## [v4 API: Submit Batch MODIFY Operation \(Python SDK\)](#)

[Read More »](#)

May 27, 2024

## [v4 API: Submit Batch CREATE Operation \(Python SDK\)](#)

[Read More »](#)

May 27, 2024

## [v4 API: Create Managed Subnet \(Python SDK\)](#)

[Read More »](#)

February 4, 2024

## [v4 API: Create Detailed Virtual Machine \(Python SDK\)](#)

[Read More »](#)

February 1, 2024

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## [PHP](#)

These samples require PHP 7.2 or later and demonstrate complete, standalone scripts for carrying out common API operations.

For easy sharing of parameters between scripts, most scripts accept their JSON payloads via an on-disk JSON-formatted text file.

Repo directory: `php`

## [Create custom Prism Central categories \[PHP\]](#)

PHP demo to show the creation of Prism Central categories via the v3 Prism Central REST APIs. Utilises "dotenv", Guzzle and PHP Composer.

[Read More »](#)

March 17, 2021

## [Bash Shell](#)

These samples are written specifically for use with Bash Shell; please note that modification will be required before use with the **sh** shell. All scripts are standalone and can be run without any other script dependencies.

All scripts utilise **jq**, a free sed-like JSON processor. JQ can be downloaded from [here](#).

Repo directory: **shell**

### [Migrate RHEL VMware Interfaces to AHV Interfaces](#)

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July 19, 2021

### [Setup Hourly Remote Support Tunnel](#)

[Read More »](#)

May 27, 2021

### [Space usage analyzing utility “space\\_check”](#)

[Read More »](#)

September 16, 2020

### [Get Cluster Realtime CPU Memory Usage without Prism](#)

Note: This code sample is intended for use within a Nutanix CVM (Controller Virtual Machine) SSH session.

[Read More »](#)

September 2, 2020

### [Karbon – Kubernetes dashboard install shell](#)

[Read More »](#)

July 21, 2020

### [Submit multiple requests with v3 batch API](#)

[Read More »](#)

February 9, 2020

### [Create VM with JSON spec \(basic\)](#)

[Read More »](#)

February 9, 2020

## [NCM Self-Service](#)

These code samples and blueprints are provided for use with [NCM Self Service](#). Please ensure NCM Self Service is enabled and available before using these code samples.

Repo directory: **calm** and **blueprints**

### [v4 API: LCM APIs & Dark Sites \(Python SDK\)](#)

[Read More »](#)

May 22, 2023

## [Basic Linux VM](#)

[Read More »](#)

December 13, 2020

## [C#](#)

These samples are intended for use with Visual Studio. Visual Studio Community can be downloaded from [here](#).

All C# code samples utilise Newtonsoft.Json, a popular high-performance JSON framework for .NET. Please see [here](#) for instructions on installing Newtonsoft.Json into your Visual Studio environment.

Repo directory: **csharp**

### [List all VMs on a specified cluster \(advanced; clusters with >500 VMs\)](#)

[Read More »](#)

February 9, 2020

### [List VMs on a specified cluster \(basic\)](#)

[Read More »](#)

February 9, 2020

## [PowerShell](#)

A default installation of PowerShell, e.g. on Windows 10 or Windows 2016 (or later) should have all required packages available.

To run these scripts the PowerShell **ExecutionPolicy** will need to be set to **RemoteSigned**. To do this, run the following command in an administrative PowerShell session:

**SetExecutionPolicy RemoteSigned**

Repo directory: **powershell**

### [NTNX NGT Startup Installer](#)

[Read More »](#)

January 12, 2022

### [Generate Password Encryption](#)

[Read More »](#)

January 12, 2022

### [Update VM Prism Central VM Category \(Powershell\)](#)

PowerShell script for use with Nutanix Era. Provisions Linux-based database engines, to call X-Play playbook that set VM categories in Prism Central. To use update

[Read More »](#)

December 23, 2021

### [Remove Ghost Device Script](#)

[Read More »](#)

September 22, 2021

### [Creates Complete Nutanix Environment Inventory](#)

Creates a complete inventory of a Nutanix Cluster configuration using CSV and PowerShell. For usage and disclaimer info, please see the .disclaimer file distributed with

[Read More »](#)

July 6, 2021

## [Nutanix Cluster Info Script](#)

Gather cluster information with Windows PowerShell.

[Read More »](#)

July 21, 2020

## [Enumerate Prism Group Accounts](#)

[Read More »](#)

June 5, 2020

## [Submit multiple requests with v3 batch API](#)

Use the Nutanix Prism Central v3 APIs to batch and launch multiple requests via a single “parent” request.

[Read More »](#)

February 9, 2020

## [Create VM with JSON spec \(basic\)](#)

Use Microsoft PowerShell and the Nutanix Prism Central v3 APIs to list cluster VMs. This basic sample lists the first 20 VMs only i.e. the

[Read More »](#)

February 9, 2020

## [Go](#)

A collection of Go code samples, provided by Nutanix Community and staff members.

To run these scripts please download and install Go from the [Go website](#).

Repo directory: `go`

## [v4 SDK Client: List Images \(Go SDK\)](#)

This code is for demonstration purposes only and shows use of the Nutanix v4 Go SDK to create a list Prism Central images. Customisation will

[Read More »](#)

October 5, 2022

## [Prism Central V3 API Script for Batch Tasks](#)

Automate sending Batch API calls to Prism Central, using GoLang. The script can be executed to send multiple tasks in one call to Prism Central.

[Read More »](#)

February 19, 2020

## [Create Multiple VM Clones](#)

Use Go and the Nutanix Prism Element v2.0 APIs to create multiple clones of the same VM. Please make sure to change the script's variables

[Read More »](#)

February 9, 2020

## [Javascript/JS](#)

A collection of JS code samples, provided by Nutanix Community and staff members.

Repo directory: `js`

## [v4 SDK: Create Prism Central Image \(JavaScript SDK\)](#)

This code is for demonstration purposes only and shows use of the Nutanix v4 JavaScript SDK to create a Prism Central image. Customisation will be

[Read More »](#)

July 22, 2025

### [\*\*v4 SDK: List Clusters \(JavaScript SDK\)\*\*](#)

This code is for demonstration purposes only and shows use of the Nutanix v4 JavaScript SDK to list all Prism Element clusters registered to the

[Read More »](#)

October 6, 2022

### [\*\*JSON Payloads\*\*](#)

A collection of JSON Payload samples, intended for use with Nutanix API requests.

To use these samples it is suggested than an application such as [Postman](#) be used.

Repo directory: **json**

### [\*\*v4 API: Create Prism Central Image\*\*](#)

Important note: To ensure request idempotency, this request requires use of the Ntnx-Request-Id header. Related Resources

[Read More »](#)

November 23, 2022

### [\*\*Prism Element v2.0: Cloud-init VM Customisation\*\*](#)

JSON payload to create a VM using the Nutanix Prism Element v2.0 APIs. Please make sure you replace all {{variable}} instances with values appropriate for

[Read More »](#)

June 7, 2022

### [\*\*Create Flow Network Security Policy\*\*](#)

JSON payload to create a Nutanix Flow Network Security Rule a.k.a Security Policy. To use this code sample, please make sure all variable placeholders are

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July 5, 2021

### [\*\*Send Multiple Requests as Batch\*\*](#)

JSON payload to create a CentOS 7 disk image from the publicly available CentOS 7 Cloud Image. Request Parameters The below parameters should be used

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June 18, 2020

### [\*\*Send Multiple Requests as Batch\*\*](#)

JSON payload to send multiple API requests as a single batch. This sample creates 4 virtual machines – 3 simple/shell VMs, and 1 detailed/advanced VM.

[Read More »](#)

June 18, 2020

### [\*\*Create Linux VM Customised with Cloud-Init\*\*](#)

JSON payload to create a detailed AHV VM that is then configured with Cloud-Init. All important VM parameters are specified, including base64-encoded Cloud-Init YAML spec.

[Read More »](#)

June 18, 2020

### [\*\*Update Existing VM\*\*](#)

JSON payload to update an existing AHV VM. “spec” and “metadata” for the existing VM must be obtained first, using a GET request to [https://\[prism\\_central\\_ip\\_address\]:9440/api/nutanix/v3/vms/\[vm\\_uuid\]](https://[prism_central_ip_address]:9440/api/nutanix/v3/vms/[vm_uuid]).

[Read More »](#)

June 18, 2020

### [Create Detailed VM](#)

JSON payload to create a VM that includes details for vCPU, cores per vCPU, RAM and storage. It also specifies the VM should have a

[Read More »](#)

June 17, 2020

### [Create Basic Shell VM](#)

JSON payload to create a basic shell VM. Only the required parameters are included, indicating that the Nutanix APIs should apply system defaults to parameters

[Read More »](#)

June 17, 2020

### [Terraform](#)

A collection of Terraform configurations aimed at demonstrating use of the Nutanix Terraform provider.

To use these configurations it is recommended to reference the Nutanix.dev article titled “Using the Nutanix Terraform Provider”. Please note this article will available after April 19th 2021.

Repo directory: `terraform`

### [Getting started with the Nutanix Terraform Provider](#)

[Read More »](#)

April 20, 2021

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