EXAM BLUEPRINT GUIDE

Nutanix Certified Master Multicloud Infrastructure (NCM-MCI) 6.10 Exam

Table of Contents

Authors

Joshua Andrews, Sr. Staff Technical Certification Developer

Jeff Hall, Manager, Technical Certification Development

Contributors

Chris McMahon, Advisory Portfolio Architect - NCM

Chris Nelson, Principal Portfolio Architect

Christian Marrero, System Engineer - Healthcare

Daniel Sullivan, Consultant

Dave Keefe, Advisory Portfolio Architect - NKP

Drew Plaster, Sr Network Systems Administrator

John Burton, Staff Systems Reliability Engineer

Jorge Aragoncortes, Sr technical Trainer

Joshua Hutchins, Staff Escalation Engineer

Kenneth Fingerlos, Director, Global Practices - Services

Lev Goronshtein, Advisory Systems Engineer

Lochan Serma, Staff Consulting Architect

Maroane Boutayeb, Global Unit Lead for the Nutanix

Matthew Gauch, Sr. Staff Escalation Engineer

Michael Heistruevers, Senior Systems Engineer

Nat Hatfield, Staff Escalation Engineer

Owen Thomas, Sr. Worldwide Trainer

Paul Monroe, Staff Escalation Engineer

Rickard Wendel, Senior Systems Engineer

Ross Davies, Advisory Systems Engineer

Ross Hunt, Staff Resident Architect

Samuele Cerutti, Advisory Systems Engineer

Shane Lindsay, Advisory Systems Engineer

Tod Holsenbeck, Director Professional Services

Todd Burris, Expert Systems Engineer

Vlad Glemb, Sr. Staff Consulting Architect

1. Exam

1.1 Purpose of Exam

The Nutanix Certified Master - Multicloud Infrastructure (NCM-MCI) 6.10 exam will measure a candidate's ability to analyze, evaluate, and optimize platform performance, configuration, and health. Successful candidates demonstrate mastery of these skills and abilities.

The exam will also validate the candidate's ability to remediate and evolve the platform to be in compliance with business requirements

1.2 Number of Questions

The NCM-MCI 6.10 exam consists of 17 scenarios that are to be performed in a live Nutanix multi-cluster environment.

1.3 Pricing

The cost for the NCM-MCI 6.10 exam is $299 USD.

1.4 Passing Score

The passing score for this exam is 3000, using a scaled scoring method. The scale is from 1000-6000. Scaled scores are calculated using a mathematical formula that considers a variety of factors, including the number and type of exam questions included in a specific version of the exam.

Because this combination may vary in different versions of the same examination, scaled scores provide a fair score for everyone based on the version of the exam taken.

1.5 How Objectives Relate to Questions on the Exam

Objectives summarize what the test is designed to measure. Objectives are developed by Exam Developers and Subject Matter Experts based on identified tasks that relate to the job of deploying and administering an AOS and Prism Central environment.

Once the initial development process is complete, these objectives are verified using an external group of individuals in the actual job role. Finally, a number of questions is determined for each objective, which relates directly to the criticality of the task in the job role.

1.6 Languages

The exam is available in English.

1.7 Time Limit

The time limit for the exam is 180 minutes.

1.8 Scheduling and Taking the Exam

This exam is delivered via remote proctoring or in-person at select test centers.

If you select remote proctoring, after registering for the exam and providing valid identification, you will receive information on how to take the exam from your location using a web browser. Because the exam is remote proctored, you will be provided with a locked down, monitored, secure exam experience.

If you select in-person testing, you will be able to select a test center near you. On the day of the exam, you will need to arrive at the test center 15 minutes prior to the exam start time with a valid government-issued ID.

1.9 Certification Tracks

The NCM-MCI 6.10 exam is a core component of the Nutanix Multicloud Infrastructure track. Passing this exam results in achieving the NCM-MCI 6 certification.

The certification requires a passing score on the exam. While it is not required that you attend a course, Nutanix provides training that covers the objectives on the exam. Details on the recommended training course are provided in Section 4.

1.10 Retake Policy

If a candidate fails an exam on the first attempt, he or she is allowed two additional attempts. There is a seven-day waiting period between attempts. Like the first attempt, these are paid for individually and Nutanix recommends that you allow sufficient time between attempts to be properly prepared and to maximize your chances for success.

Please note: After three attempts, you will be unable to take the exam for 60 days, after which you can email university.nutanix.com and request that your attempts are reset. Nutanix recommends you utilize the time to thoroughly review this guide and the related references and/or take the recommended training for this exam.

1.11 Exam Security

Nutanix reserves the right to refuse certifying a candidate who violates exam security policies. This includes copying and redistribution of exam material, using any type of study material during the exam itself, attempting to photograph exam items and taking an exam using a false identity. Your identity is captured as part of the exam registration process and must be validated before you will be allowed to take the exam.

1.12 Requirements

A candidate for the NCM-MCI 6.10 exam must hold an unexpired NCP or NCM certification in order to be eligible to schedule the exam.

To maintain your certification status, you must either renew your existing certification or take an equivalent NCM-level exam within another certification track.

1.13 Recertification

Once you have passed the Nutanix Certified Master – Multicloud Infrastructure 6.10 exam and achieved the NCM-MCI 6 certification, it will remain valid for three years.

To maintain your certification status, you must pass the next version of the NCM exam within two years of passing this exam.

1.14 Benefits of Certification

- Digital badge from Credly that you can share on social media
- Access to the Certification store at http://store.nutanix.com for shirts, mugs, and more
- Opportunity to participate as a SME to develop future exams
- Discount on attending Nutanix .NEXT

2. Intended Audience

A candidate taking the NCM-MCI 6.10 exam should have approximately 3-5 years of holistic IT infrastructure experience and 2-3 years of Nutanix virtualization experience or applicable training.

Successful candidates are typically senior IT staff new to Nutanix, Senior NOC/SOC escalation engineers and operators, and Tier 2/3 support personnel who are able to analyze business objectives and requirements, configure platforms to support stated business requirements, and have a high degree of familiarity with API calls and CLI functionalities.

Finally, the successful candidate should be able to analyze and implement business continuity plans and security policies.

3. Objectives Covered in the NCM-MCI 6.10 Exam

3.1 Introduction

It is recommended that candidates have the knowledge and skills necessary to deploy, administer and troubleshoot a Nutanix AOS environment before attempting the NCM-MCI 6.10 exam. It is also recommended that the candidate complete the training course described in Section 4 prior to taking the exam.

3.2 Objectives

Prior to taking this exam, candidates should understand each of the following objectives. Each objective is listed below; along with related tools the candidate should have experience with, and related documentation that contains information relevant to the objective. Please note that some documentation requires access via the Support Portal. Information on creating an account for use with the Support Portal can be found here.

All objectives may also be referenced in other product documentation not specifically highlighted below. The candidate should be familiar with all relevant product documentation or have the equivalent skills.

Section 1 - Monitoring & Troubleshooting

Objective 1.1 - Use prism analysis tools to identify performance issues

Knowledge

- Utilize performance graphs to look for anomalies
- Correlate events with issues observed with metric or entity charts
- Given a scenario, create analysis graphs to diagnose a problem
- Utilize prism central to identify resource constraints
- Given a scenario, review the MSSQL Instance Details to identify and resolve an issue.

References

- Performance Monitoring
- Reports Management
- Generating Events Summary Report

Objective 1.2 - Perform health check and collect logs

Knowledge

- Utilize prism to collect system logs capturing an event
- Proceed with the log gathering using CLI
- Review audit logs and troubleshoot cluster configuration issues.
- Given a problem description, utilize the NCC CLI to run the appropriate check(s)
- Use CLI commands to extract cluster configuration information

References

- Run NCC checks
- Log Collection

Objective 1.3 - Interpret alerts and take appropriate actions for remediation

Knowledge

- Identify components impacted and conduct root cause analysis
- Given an issue, use the KB article to provide a resolution.

References

- Network Configuration
- NCC Health Check: backup_schedule_check

Objective 1.4 - Create reports and custom metrics to monitor the environment

Knowledge

- Given a scenario select the correct entity and metrics to add to a graph
- Given a scenario create a custom alert when a threshold is passed
- Given a scenario, create reports to monitor workload inefficiencies. e.g. Latency
- Evaluate cluster performance using reports.

References

- Creating a Custom Report Configuration
- Adding a Custom View
- Configuring Report Settings

Section 2 - Optimize & Scale

Objective 2.1 - Utilize runway scenario to evaluate workload changes

Knowledge

- Review and analyze current and potential resource needs through the planning dashboard
- Given a scenario provide a cluster rightsizing for a greenfield deployment
- Given a scenario plan for a future cluster expansion

References

- Creating a Scenario
- Modifying a Scenario

Objective 2.2 - Implement workload-based best practices

Knowledge

- Locate, read, and understand workload specific BPG and Technotes
- Identify the preferred values for a workload based upon a supplied BPG
- Configure appropriate settings for a given EUC workload (e.g. vGPU, container, etc.)
- Identify VM settings for optimal performance according to SQL Server BPG,
- Identify optimal settings for VM and Storage Container for a given scenario

References

- Creating a Storage Container
- Microsoft SQL Server on Nutanix Best Practices
- Windows 11 on Nutanix AHV

Objective 2.3 - Utilize APIs to automate management tasks

Knowledge

- Manage cluster at scale conducting CRUD operations using APIs
- Conduct API-based information gathering and export\

References

- Nutanix Intentful API (3.1.0)
- categories
- network_security_rules
- vms

Objective 2.4 - Utilize Playbook for making a call to a REST API endpoint

Knowledge

- Configure cluster policies and features to meet minimum requirements for availability and resiliency (U/A)

- Configure cluster resiliency to meet application requirements
- Use “Rebuild Capacity Reservation” to enhance the cluster's self-healing mechanism.
- Set Cluster Resiliency Preference for a failure event vs planned outage

References

- Setting Cluster Resiliency Preference
- Reserving Rebuild Capacity

Objective 2.5 - Create/Configure VMs based on the requirements of the workload they will be hosting

Knowledge

- Given a scenario configure advanced VM settings
- Adjust VM configuration to meet high-intensity workload requirements
- Evaluate optimal storage configuration for a business-critical application
- Use X-Play to monitor and optimize VM performance

References

- Memory Overcommit
- Creating a VM

Section 3 - Security

Objective 3.1 - Perform advanced cluster configuration incl. security and hardening

Knowledge

- Configure SCMA and AIDE as determined by security requirements
- Implement hardening mechanisms from the Nutanix security guide based upon customer scenario
- Given a scenario create an appropriate RBAC structure to meet requirements
- Configure cluster lockdown mode
- Given a scenario configure network segmentation for a cluster

References

- Securing Traffic Through Network Segmentation
- Security Management Using Nutanix Command Line Interface

Objective 3.2 - Implement Flow Virtual Networking and Flow Network Security based upon security requirements

Knowledge

- Implement VPC's and gateways.
- Given a scenario, implement multi-tenancy and overlay networks.
- Protect a multi-tiered application using Flow Security Policies.
- Apply Security policies based on user group membership using a VDI Policy

References

- Flow Virtual Networking Configurations
- Application Security Policy Configuration
- network_security_rules

Objective 3.3 - Configure SYSLOG for advanced log management

Knowledge

- Given a set of parameters, configure a remote SYSLOG server
- Given a scenario, export logs for a specific service at a desired severity to a SYSLOG server
- Identify why SYSLOG messages are not being sent to a configured server

References

- Send Logs to Remote Syslog Server
- Configuring Syslog Monitoring

Objective 3.4 - Implement authentication according to best practices

Knowledge

- Replace self-signed certificates with customer's CA signed
- Given a scenario select the proper IAM authentication methods (AD, SAML, Local) and conduct configuration steps required
- Given a scenario create a custom role with required permissions
- Manage accounts and passwords according to provided requirements

References

SSL Certificate Management

Security Management Using Prism Central (PC)

Objective 3.5 - Implement encryption, including KMS

Knowledge

- Configure Data-at-Rest Encryption
- Configure Data-in-Transit Encryption
- Encrypt the storage of specific VMs within the environment

References

- Data-in-Transit Encryption
- Data-at-Rest Encryption
- Managing Storage Policies

Section 4 - Design & Architecture

Objective 4.1 - Configure Nutanix products and features to meet business needs

Knowledge

- Identify the need for an RF1 container and apply the correct configuration
- Identify the need for Load-Balanced Volume Groups, configure them, and enable the feature for the VM/VG(s) required
- Given a workload, ensure that the appropriate storage efficiency settings are enabled

References

- Volume Group Connectivity
- Storage Components

Objective 4.2 - Align cluster configuration to Nutanix Validated Design (NVD)

Knowledge

- Validate the CVM and Hypervisor VLAN configurations
- For a given workload type, validate CVM resource configurations
- For a given workload type, validate CPU oversubscription ratio
- For a given scenario, validate cluster high availability configuration.

References

- VM High Availability in Acropolis
- Controller VM (CVM) Specifications
- Resource Oversubscription

Section 5 - Business Continuity

Objective 5.1 - Create protection policies based on RPO and RTO requirements

Knowledge

- Given a scenario, configure an appropriate protection mechanism for a specific group of multi-tiered application respecting mission critical RPO/RTO requirement
- Given a scenario, troubleshoot a given Protection Policy/Protection Domain for specific multi-tiered application and update it respecting mission critical RPO/RTO requirements
- Troubleshoot protection policy with automatic assignment of target clusters.

Requirements

- Disaster Recovery Configuration
- Data Protection and Recovery with Prism Element

Objective 5.2 - Create recovery plans based upon application requirements

Knowledge

- Given a scenario create a recovery plan for a 3-tiered application
- Create a recovery plan which uses a custom script for application reconfiguration
- Create recovery plans and add/remove stages based on application requirements
- Create/modify recovery plans incl. network and IP mapping based on specific requirements
- Create/Update a RP Configuration from Async/NearSync to a Sync configuration
- Troubleshoot and resolve recovery plan issues.

Requirements

- Disaster Recovery Configuration
- Data Protection and Recovery with Prism Element

Objective 5.3 - Execute disaster recovery, including troubleshooting

Knowledge

- When performing an RP test and encountering errors, fix errors in order to achieve test
- When performing an RP failover and encountering errors on a VM IP configuration, fix issues and validate RP
- Given a scenario where a RP fails, troubleshoot and resolve the issue
- Given a scenario identify and resolve Metro AHV configuration issues

Requirements

- Disaster Recovery Configuration
- Data Protection and Recovery with Prism Element

4. NCM-MCI 6.10 Training Recommendations

4.1 Course Recommendation

Nutanix offers a course that provides training on the objectives tested for in the exam. More information on this course, including delivery methods and pricing, can be found at nutanix.com/training.

The course details are as follows

The Nutanix® Advanced Administration and Performance Management (AAPM) course will provide a deep dive for the experienced Nutanix administrator that will give a rich, nuanced understanding of the Nutanix platform, and will help get the most from the deployed Nutanix solutions.

AAPM is divided into six major sections, each focused on performance improvements and advanced administration techniques for different aspects of your clusters:

- **Storage**: Take a deep dive into AOS storage services, different aspects of Acropolis Distributed Storage, storage optimization, and storage best practices for application workloads.
- **Networks**: Learn how to optimize physical and virtual workloads, as well as how to implement Flow Virtual Networking and Virtual Private Clouds (VPCs).
- **VMs**: Learn about sizing the CVM and Prism Central VMs, alternate methods of VM provisioning (such as via CLI), how to work with GPUs, and how to improve VM storage and network performance.
- **Security**: Understand important features such as authentication, RBAC, IAM, and encryption. Learn how to use essential security products, such as Flow Security Central and Flow Network Security.
- **Analyzing Problems**: Explore ways to monitor and identify health issues, network performance, VM performance, and cluster performance.
- **Business Continuity and Disaster Recovery**: Learn about Nutanix data backup, web-scale data protection, protection from ransomware, self service restore, and third-party integrations. You will also learn how to use protection domains and Nutanix Leap for disaster recovery.

This course is available online or instructor-led. More information including schedules and how to register can be found at www.nutanix.com/university.

The material provided in the course covers a majority of the objectives (approximately 80%) that appear on the NCM-MCI 6.10 exam and is recommended for individuals who want to gain a good understanding of these objectives. Please note that additional exposure to a Nutanix environment is highly recommended.

5. Live Lab Considerations

5.1 General Lab Layout

The NCM-MCI 6.10 exam will launch into a Windows desktop. That desktop will have Firefox, Adobe Acrobat Reader, Postman, and Putty installed, and will have a folder with documentation and support PDFs.

The exam scenarios will be accessed from a web browser. Each scenario will include some or all of the following: background, requirement(s), configuration(s), access information and credentials.

The scenarios will be performed on live AOS clusters with one Prism Central VM. These clusters are nested in the Google Cloud Platform and have a few differences compared to physical environments, so some suspension of disbelief is required - for instance most VMs in the environment will not have hard drives or networking attached.

Differences that could affect a scenario will be described in the scenario.

5.2 Lab Components

The NCM-MCI 6.10 exam will provide access to two different AOS 6.5 clusters, each with one node. Both clusters are managed by a 2024.2 Prism Central instance.

5.3 Provided Documentation

The Windows desktop will have a folder containing the following PDFs:

- BP-2015-Microsoft-SQL-Server.pdf
- Intelligent-Operations-Guide-vpc_2024_2.pdf
- KB-3532 - SQL Server Best Practices - How to split a single datafile.pdf
- NCC-Guide-NCC-v4_5
- NCC Health Check_backup_schedule_check.pdf
- Network Automation_Nutanix Flow Network Security Policies via REST API - Nutanix.dev.pdf
- Nutanix-Flow-Network-Security-Guide-v4_2_0.pdf
- Nutanix-Security-Guide-v6_10.pdf
- NVD-2031-Hybrid-Cloud-6-5-On-Premises-Design.pdf
- NVD-2174-Hybrid-Cloud-6-5-Mid-Market-Design.pdf
- Prism-Central-Admin-Center-Guide-vpc_2024_2.pdf
- Prism-Central-Alert-Reference-vpc_2024_2.pdf
- Prism-Central-Guide-vpc_2024_2.pdf
- TN-2164-Windows-11-on-AHV.pdf

There will also be the same list of docs from the 6.5 exam available:

- Acropolis-Upgrade-Guide-v6_5.pdf
- Advanced NUMA Configuration Options in AHV.pdf
- Advanced-Admin-AOS-v6_5.pdf
- AHV host networking.pdf
- AHV-Admin-Guide-v6_5.pdf
- API-Ref-AOS-v6_5.pdf
- BP-2015-Microsoft-SQL-Server.pdf

- BP-2029-AHV.pdf
- BP-2125-Citrix-Virtual-Apps-and-Desktops-with-Flow.pdf
- Command-Ref-AOS-v6_5.pdf
- Enabling Jumbo MTU on AHV for UVMs.pdf
- Hardware-Admin-Guide.pdf
- Karbon-v2_4.pdf
- Leap-Xi-Leap-Admin-Guide-v2022_6.pdf
- NCC Health Check_ default_password_check and pc_default_password_check.pdf
- Nutanix Bible classic.pdf
- Nutanix-compliance-for-RHEL-STIGs-v6_5.pdf
- Nutanix-Flow-Guide-v6_5.pdf
- Nutanix-Security-Guide-v6_5.pdf
- Prism-Central-Guide-vpc_2022_6.pdf
- Prism-Element-Data-Protection-Guide-v6_5.pdf
- SSP-Admin-Guide-v6_5.pdf
- SSP-User-Guide-v6_5.pdf
- TN-2033-Citrix-Virtual-Apps-and-Desktops-on-AHV.pdf
- Updating Active Directory config via ncli fails with a _java.lang.NullPointerException_.pdf
- Web-Console-Guide-Prism-v6_5.pdf

5.4 Tips and Tricks

Here are a few suggestions to improve your exam experience:

- Be familiar with Prism Element pass-though from Prism Central. This may work better in the lab than directly accessing PE.
- Working on a higher resolution display will improve your exam experience.
- Make sure your desktop is not “zoomed in” or scaled. This is common on smaller laptops.
- If you cannot use a high-resolution display, you can scale the browser to improve visibility and ensure all parts of the GUI can be seen or accessed.
- Copy and paste hot-keys will not work. Use your mouse for copy and paste.
- Be familiar with Adobe Acrobat's Advanced Search function to search an entire folder of PDFs at once.
- While Postman is provided, you may find it easier to complete API items using the REST API Explorer for that component. All API items can be completed using the API Explorer.
- If you see an alert in a cluster or a configuration change you think should be made – but is not covered by a specific point in a scenario – do not change it. Only make changes as directed in the scenarios on the specific cluster or component referenced by the scenario.
- We suggest you complete the items in order. If you want to skip around, please use Notepad in the environment to track which scenarios you have completed. The interface will indicate if you have viewed a scenario but there is no indication if you completed it. You can also use the flag ability in the interface to note scenarios to review at the end.
- Partial credit will be given for each scenario, but scoring is performed after the exam is completed. If a scenario specifies to not reboot a component - and there is a scoring point

associated with not rebooting – if you reboot that component when working on another portion of the exam, you will not be awarded the point.

- The exam environment requires some suspension of disbelief. The clusters and their components are not created using best practices and performance and size considerations played into the design. Most of the VMs created for the scenarios may not have OSes installed or even virtual drives added. You will also see not all network information or configurations are available in the components.
- Make sure you read any notes included with the scenarios as they may have tips that take the environment design into consideration.

5. Resources

5.1 Nutanix Community Edition

The Nutanix Community Edition is a free product that allows you to deploy a Nutanix Enterprise Cloud. To download the software and build your own environment for exam preparation, click here.

5.2 Test Drive

You can also take a 2-hour Hyperconverged Test Drive, which utilizes the Nutanix Community Edition, by clicking here.

5.3 The Nutanix Next Community

The Nutanix Next Community is a social interaction site where professionals can connect with cloud builders from around the world, learn from IT Pros in the industry and share experiences. The community maintains an area focused on the NCP certification, which is located here.