CiTRIX®

1Y0-312 Citrix Virtual Apps and Desktops 7 Advanced Administration

Exam Preparation Guide 2.0

February 28, 2020

Disclaimer

This exam preparation guide is designed to provide candidates with necessary information about the 1Y0-312 exam, including study resources and ways to interpret the exam objectives to better enable candidates to assess the types of questions that may be asked during the exam. Please be aware that the content of this guide in no way ensures a passing score on the certification exam.

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Table of Contents

Exam Overview

Preparing for the Exam

Contributors & Marks

Exam Overview

Number of Items

The 1Y0-312 exam is a 71-question exam written in English. The exam consists of multiple choice items only. Some of the items on this exam will not be scored and thus will not affect your final result in any way. The unscored items are included in this exam solely for research purposes.

Passing Score

The passing score for this exam is 64%.

Time Limit

Type of Candidate	Time Limits*	Notes
Native English speakers	90 minutes	
Non-native English speakers that take the exam in countries where English is a foreign language	90 minutes +30 minutes (time extension)	Time extension granted automatically
Non-native English speakers that take the exam in countries where English is NOT a foreign language	90 minutes +30 minutes (time extension)	Must request time extension from Citrix. Submit your request here: Time Extension Request

The time limit for this exam is 90 minutes. The total seat time is 90 + 25 minutes.
The total seat time includes times allotted for the NDA and surveys.

Intended Audience

The 1Y0-312 exam is focused on topics that are most important to those who manage and support a Citrix Virtual Apps and Desktops 7 in an on-premises environment or Citrix Cloud looking to expand their Citrix Virtual Apps and Desktops skills to an advanced level. Those who manage and support complex environments may hold various job titles such as:

- Desktop Virtualization Engineers
- Desktop Virtualization Consultants
- Citrix Engineers
- Citrix Partners
- Systems Administrators

Registration and Administration

This exam is administered at Pearson VUE testing centers worldwide. To learn more about the rules and process of taking an exam, please visit http://training.citrix.com/exams.

Worldwide, visit the Pearson VUE website (http://www.pearsonvue.com/citrix) to locate a testing center in your area and register for an exam. You may also register in person at any Pearson VUE testing center. If you reside in the United States or Canada, you may also register by calling 1-800-931-4084.

Note: A $7 USD surcharge will be added to phone registrations.

Retake Policy

Candidates must wait 24 hours from their original appointment time before they can register to retake an exam. After a second attempt, and any attempt thereafter, the candidate must wait 14 calendar days to retake the exam.

Breach of this policy can result in sanctions up to and including a ban from taking Citrix exams and/or decertification.

For more information about our policies, including the Citrix Exam Retake Policy and the Candidate Conduct Policy, please visit http://training.citrix.com/exams
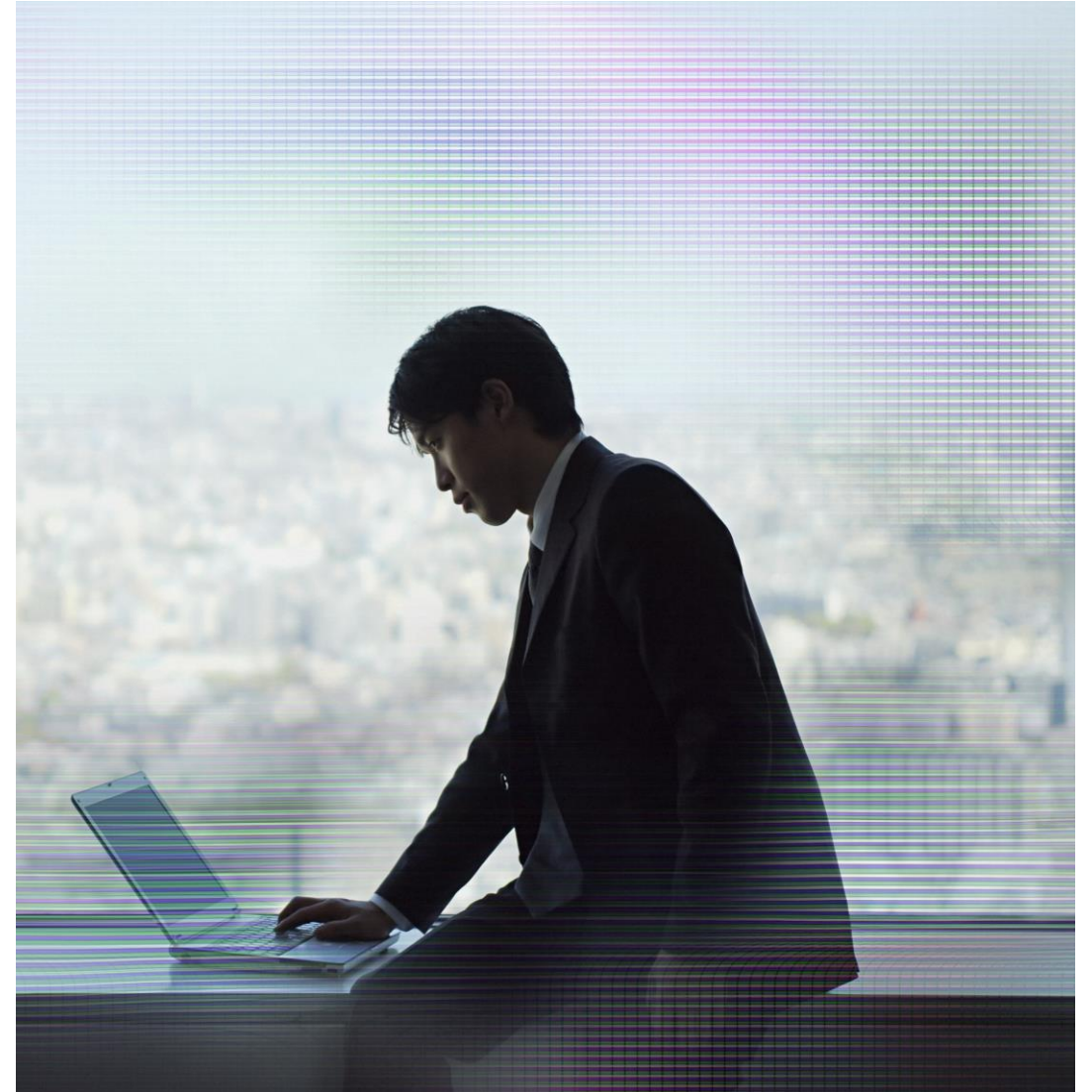
Preparing for the Exam

Recommended Knowledge and Skills

Candidates should have knowledge of the following prior to taking this exam:

- Knowledge of how the following Windows components integrate with Citrix technologies:
  - Active Directory Domain Services
  - Active Directory Certificate Services
  - Domain Name System (DNS)
  - Dynamic Host Configuration Protocol (DHCP)
  - Group Policy Objects (GPOs)
  - NTFS Permissions
  - Windows Authentication and Authorization
  - Knowledge of IIS
  - Roles and features of Windows Server 2016
- Knowledge of Microsoft Windows Operating Systems
  - Windows 10
  - Windows Server 2016
- Knowledge of SQL 2012 R2 and newer
  - Knowledge of SQL clustering and mirroring
- General networking skills (i.e. IP Address assignment/Subnets/VLANs)
- Knowledge of hypervisors
- Knowledge of shared storage configuration and management
- Knowledge of Microsoft licensing

Recommended Product Experience

We recommend that candidates have about six months of experience with the following products, technologies and related covered in the exam:

- Virtual Apps and Desktops 7 Build 1903
- App Layering Build 1903
- StoreFront Build 1903
- Workspace Environment Management Build 1903
- Citrix Gateway
- Citrix ADC
- Citrix Federated Authentication Service Build 1903
- Machine Creation Services
- User Profile Management

Recommended Training

Citrix Education recommends that candidates have hands-on experience with Citrix Virtual Apps and Desktops 7 Advanced Administration prior to taking this exam. One of the best ways to do this is by taking a formal Citrix training course.

The following course provides training on advanced administration of a Citrix Virtual Apps and Desktops 7 environment.

- CWS-315: Citrix Virtual Apps and Desktops 7 Advanced Administration(instructor-led training course or self-study)

As with all Citrix exams, it is recommended that candidates get hands-on experience by working directly with products covered on the exam.

Unauthorized Preparation Materials

Citrix Education monitors exam results to ensure that candidates are not using unauthorized materials to prepare for exams. If it is determined that a candidate used unauthorized materials to prepare for an exam, the candidate's score will be invalidated and his or her certification will be revoked.

Interpretation of Objectives

Candidates should refer to the objectives and examples listed in this guide in order to determine which topics will be on the exam, as well as examples of the topics that could be tested.

For example, if the objective reads, "Assess the printing infrastructure" and one of the examples reads, "Perform printer driver stress testing" candidates could expect to see:

- **A scenario describing a printing infrastructure:**
  - **Scenario:** A Citrix Architect is assessing the current printing infrastructure at CGE. As part of the assessment, the architect wants to perform printer driver stress testing.

- **A question that requires determining how to assess the printer drivers:**
  - How can the architect assess which printer drivers are in use in the current environment?

Note: The examples listed in the "Sections, Objectives, Examples and References" section of this guide do NOT encompass all potential topics that could be tested. The examples are only provided as guidance.

The objectives and examples for this exam were developed by Exam Project Managers and Subject Matter Experts (SMEs) based on identified tasks that relate managing and supporting Citrix Virtual Apps and Desktops 7 in an on-premises environment or Citrix Cloud.

Sections, Objectives, Topics and References

- Citrix Product Documentation: http://docs.citrix.com
- Citrix Support: http://www.citrix.com/support
- Citrix Blogs: http://blogs.citrix.com/

Objective Number	Objective	Topics	References
		Section 1: Architecture Overview	
1.01	Determine whether the number and sizing of the Citrix StoreFront components are appropriate for a production environment.	StoreFront Server Redundancy StoreFront Server Scalability	CWS-315 Module 5 / CWS-313 Module 05 https://docs.citrix.com/en-us/storefront/current-release/plan.html
1.02	Determine whether the number and sizing of the Citrix Gateway components are appropriate for a production environment.	Citrix Gateway Redundancy Citrix Gateway Scalability	CWS-315 Module 2 / CWS-313 Module 02 https://docs.citrix.com/en-us/netscaler-gateway/12/integrate-web-interface-apps/ng-wi-comm-wrapper-con/ng-wi-comm-sta-config-tsk.html https://docs.citrix.com/en-us/netscaler-gateway/12/high-availability/ng-ha-synchronize-appliances-tsk.html [Item ports] https://support.citrix.com/article/CTX101810 [Item ports]
1.03	Determine whether the number and sizing of the Citrix infrastructure components are appropriate for a production environment.	Citrix Delivery Controller Redundancy Delivery Controller Scalability Citrix Cloud Connector Redundancy Citrix Cloud Connector Scalability Considerations Citrix License Server Redundancy Options and Scalability Site Database Redundancy Options Site Database Scalability Citrix Director Redundancy & Scalability	CWS-315 Module 2 / CWS-313 Module 02 https://docs.citrix.com/en-us/tech-zone/design/reference-architectures/virtual-apps-and-desktops-service.html https://docs.citrix.com/en-us/storefront/current-release/plan.html https://docs.citrix.com/en-us/xenapp-and-xendesktop/7-15-ltsr/citrix-vdi-best-practices.html https://docs.citrix.com/en-us/licensing/current-release/clustered-license-servers.html

Objective Number	Objective	Topics	References
1.04	Determine whether the number and sizing of machines hosting HDX sessions is meeting the needs of a production environment.	Determine Redundancy Requirements for Machines Running the Virtual Delivery Agent Assess the Performance of Machines Running the Virtual Delivery Agent Optimizing the Performance of Windows workloads	CWS-315 Module 2 / CWS-313 Module 02 https://docs.citrix.com/en-us/workspace-environment-management/current-release.html https://support.citrix.com/article/CTX224676 https://docs.citrix.com/en-us/citrix-analytics
Section 2: Manage a Virtual Apps and Desktops Environment with Multiple Locations			
2.01	Determine how an FMA Zone architecture can be used in an environment with multiple resource locations.	What are Zones? Zones Deployment Options FMA Zones Architecture (Deployment Example) (Hidden Slide) Primary Zone Satellite Zones Reason to Create Zones Zones with Citrix Cloud	CWS-315 Module 3 / CWS-313 Module 03 https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/manage-deployment/zones.html
2.02	Determine how to configure and manage VDA Registration in a multi-zone environment.	VDA Registration Process and Methods Single Zone (Registration Communication Process) Multi Zone: Registration Communication Process Failover Registration Moving a Catalog From One Zone to Another Zone	CWS-315 Module 2 / CWS-313 Module 02 https://www.citrix.com/blogs/2016/07/12/vda-configuration-options-part-1/ https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/manage-deployment/vda-registration.html https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/manage-deployment/zones.html
2.03	Determine how to use zone preference settings.	Zone Preference (The default Zone Preference priority order) Customize Zone Preference Zone Preference (Order of Preference)	CWS-315 Module 2 / CWS-313 Module 02 https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/manage-deployment/zones.html

Objective Number	Objective	Topics	References
2.04	Determine how to configure Optimal Gateway Routing in a production environment.	Standard Routing Optimal Gateway Routing Optimal Gateway Routing Configuration Optimal Gateway Routing and Zones StoreFront Resource Aggregation Configure StoreFront Resource Aggregation	CWS-315 Module 2 / CWS-313 Module 02 https://www.citrix.com/content/dam/citrix/en_us/documents/white-paper/ns-optimal-gateway-routing-tech-wp.pdf https://docs.citrix.com/en-us/storefront/current-release/plan/high-availability-and-multi-site-configuration.html
2.05	Determine how to configure Subscription Store synchronization for a given scenario.	Subscription Store Replicating Subscriptions between Stores in a Server Group Replicating Subscriptions between StoreFront Server Groups Configuring Subscription Synchronization	CWS-315 Module 2 / CWS-313 Module 02 https://www.citrix.com/blogs/2014/10/10/what-subscriptions-and-server-groups-mean-for-storefront-designs/
Section 3: Implement Backups and Disaster Recovery			
3.01	Determine how to perform backups of key components and data in a Citrix Virtual Apps and Desktops environment.	Determining backup requirements and location StoreFront Configuration User Data (User profiles / home folders) Application Data Golden Images	CWS-315 Module 3 / CWS-313 Module 03 https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/technical-overview/databases.html https://docs.citrix.com/en-us/storefront/current-release/export-import-storefront-config.html https://docs.citrix.com/en-us/xenapp-and-xendesktop/7-15-ltsr/manage-deployment/local-host-cache.html

Objective Number	Objective	Topics	References
3.02	Determine how to translate requirements from a disaster recovery plan into an action plan in a Citrix Virtual Apps and Desktops environment.	Understand Disaster Recovery Requirements Access During a DR Event Resources During a DR Event Disaster Recovery and Citrix Cloud	CWS-315 Module 3 / CWS-313 Module 03 https://docs.citrix.com/en-us/citrix-virtual-apps-desktops-service/install-configure/install-cloud-connector/local-host-scale-and-size.html https://www.citrix.com/blogs/2014/03/29/xendesktop-gslb-dr-everything-you-think-you-know-is-probably-wrong/
3.03	Determine how to fail over a Citrix Virtual Apps and Desktops environment to a disaster recovery environment, and later restore the production environment.	Failing Over to a DR Environment Returning to Normal Operations	CWS-315 Module 3 / CWS-313 Module 03 https://www.citrix.com/blogs/2017/04/05/citrix-cloud-business-continuity-advantage/ https://www.citrix.com/content/dam/citrix/en_us/documents/white-paper/ensuring-high-availability-xenapp-and-xendesktop-deployments-on-citrix-cloud.pdf
	Section 4: Implement Advanced Authentication Methods		
4.01	Determine how one-time passwords can be used with RADIUS authentication in a Citrix Virtual Apps and Desktops environment.	One Time Passwords (OTP) What is RADIUS? Citrix Gateway and RADIUS Authentication	CWS-315 Module 4 / CWS-313 Module 04 https://docs.citrix.com/en-us/xenapp-and-xendesktop/7-15-ltsr/secure/federated-authentication-service.html
4.02	Determine how to implement smart card authentication in a Citrix Virtual Apps and Desktops environment.	Smart Cards with Citrix Virtual Apps and Desktops Smart Card PIN Prompts with Citrix Virtual Apps and Desktops	CWS-315 Module 5 / CWS-313 Module 05 https://docs.citrix.com/en-us/storefront/current-release/configure-authentication-and-delegation/configure-smart-card.html

Objective Number	Objective	Topics	References
4.03	Determine how to implement ADFS and SAML authentication in a Citrix Virtual Apps and Desktops environment.	Federated Identity Solutions Utilize Claims-based Identity Active Directory Federation Services (ADFS) and Security Assertion Markup Language (SAML) Citrix and SAML/ADFS	CWS-315 Module 4 / CWS-313 Module 04 https://docs.citrix.com/en-us/xenapp-and-xendesktop/7-15-ltsr/secure/federated-authentication-service/fas-architectures/fas-adfs.html https://docs.citrix.com/en-us/xenapp-and-xendesktop/7-15-ltsr/secure/federated-authentication-service.html https://docs.citrix.com/en-us/xenapp-and-xendesktop/7-15-ltsr/secure/federated-authentication-service/fas-architectures.html
Section 5: Improve App and Data Security		
5.01	Determine how to prevent jailbreak attacks by managing user assignments	User Assignments Remove Undesired Windows and Citrix Functionality Application and Web Browser Hardening Restrict Access to Internal Tools Application Whitelisting/Blacklisting Implementing Defense in Depth Breaking Out of the Application (Attacker Example)	CWS-315 Module 5 / CWS-313 Module 05 https://docs.citrix.com/en-us/receiver/windows/current-release/secure-communication/ica-file-signing.html https://docs.citrix.com/en-us/citrix-adc/12-1/ssl/how-to-articles/ssl-support-for-hsts.html
5.02	Determine how to minimize the impact of attacks.	Separate Applications Based on their Security Sensitivity Use NTFS to Isolate Applications on the Same Server Use Citrix Analytics to Detect Attacks and Apply Mitigations Session Recording How Session Recording Works	CWS-315 Module 5 / CWS-313 Module 05 https://docs.citrix.com/en-us/citrix-analytics/security-analytics/about.html https://docs.citrix.com/en-us/session-recording/current-release/troubleshooting/session-recording-agent-cannot-connect.html

Objective Number	Objective	Topics	References
		Section 6: Secure Machines Running the Virtual Delivery Agent	
6.01	Determine how to Encrypt VDA communications with TLS and how to enhance OS security through image management.	Limitations for Default Deployment Securing Internal Traffic with SecureICA Policy Securing Internal Traffic with Secure ICA (TLS Encryption) Secure the VDA Harden Components by Using a Golden Image Enable Cryptographic Checksum and Hashes on Golden Image and OS Creating a Locked-down VM Template	CWS-315 Module 6 / CWS-313 Module 06 CWS-315 Module 11 / CWS-313 Module 11 https://docs.citrix.com/en-us/storefront/downloads/end-to-end-encryption-with-xenapp-and-xendesktop.pdf https://docs.citrix.com/en-us/xenapp-and-xendesktop/7-15-ltsr/secure/tls.html
6.02	Determine how to use GPOs and Citrix Policies to lock down machines running VDAs.	Separate Policies for Users/Admins Citrix Security and Control Policy Template Citrix Policy Example (Clipboard Redirection) Citrix Policy Guides Using Citrix Gateway SmartAccess and SmartControl with Citrix Virtual Apps and Desktops Can I Use Registry Changes to Provide Further Lockdowns	CWS-315 Module 6 / CWS-313 Module 06 https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/policies/reference/ica-policy-settings.html https://www.citrix.com/content/dam/citrix/en_us/documents/guide/demo-guide-for-smart-access-smart-control.pdf

Objective Number	Objective	Topics	References
		Section 7: Advanced Troubleshooting	
7.01	Determine how to use various tools to troubleshoot a Citrix Virtual Apps and Desktops environment.	Citrix Director Environment Tests Citrix Diagnostics Toolkit Citrix Scout Citrix Supportability Pack Citrix Insight Services CDF Tracing Overview CDF Tracing Tools PowerShell When and how to use resource tools.	CWS-315 Module 7 / CWS-313 Module 07 https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/director.html https://support.citrix.com/article/CTX111961 https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/manage-deployment/cis.html https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/manage-deployment/cis/scout.html
7.02	Determine how to use basic PowerShell commands to get information about a Citrix Virtual Apps and Desktops environment.	PowerShell Structure Cmdlet Syntax PowerShell is Citrix Virtual Apps and Desktops Citrix Virtual Apps and Desktops Cmdlets Syntax Using Get-Command Using Get-Help Using Show-Command	CWS-315 Module 7 / CWS-313 Module 07 https://citrix.github.io/delivery-controller-sdk/Broker/Get-BrokerSite/
7.03	Determine how to troubleshoot StoreFront issues for a given scenario.	Troubleshooting StoreFront Credential Wallet Enumeration Subscriptions Store	CWS-315 Module 7 / CWS-313 Module 07 https://support.citrix.com/article/CTX133982 https://docs.citrix.com/en-us/storefront/current-release/set-up-highly-available-multi-site-stores.html#configure-subscription-synchronization

Objective Number	Objective	Topics	References
7.04	Determine how to troubleshoot Citrix Gateway issues for a given scenario.	Troubleshooting Citrix Gateway Login Page Not Accessible Unable to Authenticate through Citrix Gateway Error Message Appears after Authenticating Application Launch Issues through Citrix Gateway	CWS-315 Module 7 / CWS-313 Module 07 https://support.citrix.com/article/CTX206900 https://support.citrix.com/article/CTX114999
7.05	Determine how to validate FMA services and SQL connection health in a Citrix Virtual Apps and Desktops environment.	FMA Services Central Configuration Service (CSS) FMA Services and PowerShell SQL Connections Complete Connections and Communication (StoreFront Enumeration: SQL Server Site Database Query and App and Desktop Icon Enumeration)	CWS-315 Module 9 / CWS-313 Module 09 https://support.citrix.com/article/CTX127945 https://www.basvankaam.com/2016/12/15/the-citrix-xenapp-xendesktop-fma-services-complete-overview-new-7-12-services-included/ https://www.citrix.com/blogs/2016/04/14/under-the-hood-of-xenapp-xendesktop/
7.06	Determine how to troubleshoot VDA registration issues for a given scenario.	Troubleshooting VDA Registration Registration Communication Process Common Registration Failures Troubleshooting Methods Complete Connections and Communication	CWS-315 Module 10 / CWS-313 Module 10 https://support.citrix.com/article/CTX136668 https://support.citrix.com/article/CTX227521 https://support.citrix.com/CTX139415 https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/manage-deployment/zones.html
7.07	Determine how to troubleshoot common HDX connection issues for a given scenario.	Troubleshooting HDX Connections Analyzing Connection Requests Load Management Complete Connections and Communication (Session Launch: HDX Communication)	CWS-315 Module 11 / CWS-313 Module 11 https://developer-docs.citrix.com/projects/citrix-virtual-apps-desktops-sdk/en/latest/Broker/Get-BrokerConnectionLog/ http://support.citrix.com/article/CTX202150

Objective Number	Objective	Topics	References
center	Section 8: App Layering and Creating the Layers		
8.01	Determine how App layering components communicate.	Architecture Diagram Technical Overview ELM Server (Enterprise Layer Manager (ELM)) Configure the ELM Server How App Layering Creates Layers (Process Flow) How App Layering Creates a VM The Layered Image Boot Process Flow Citrix App Layering Management Console App Layering Connectors	CWS-315 Module 12 / CWS-314 Module 01 https://docs.citrix.com/en-us/citrix-app-layering/4/manage/storage.html https://docs.citrix.com/en-us/citrix-app-layering/4/install-appliance.html https://docs.citrix.com/en-us/citrix-app-layering/4/layer.html https://docs.citrix.com/en-us/citrix-app-layering/4/manage/appliance-settings.html
8.02	Determine how to create an OS Layer.	Create an OS Layer (The Process of Preparing an Operating System) Create an OS Layer (Enterprise Layer Manager (ELM) Preparation) How Many OS Layers? (How many do we need to build?)	CWS-315 Module 13 / CWS-314 Module 02 https://support.citrix.com/article/CTX225952 https://docs.citrix.com/en-us/citrix-app-layering/4/layer/create-os-layer.html
8.03	Determine how to create a Platform Layer.	Create a Platform Layer (The Process) Are Platform Layers Optional? (How many do we need to build?	CWS-315 Module 14 / CWS-314 Module 03 https://support.citrix.com/article/CTX225952 https://docs.citrix.com/en-us/citrix-app-layering/4/layer/create-platform-layer.html
8.04	Determine how to create an App Layer.	Create an App Layer (The Process) How Many App Layers? (How many do we need to build?) How to Update a Citrix Virtual Apps and Desktops Catalog Using Citrix App Layering?	CWS-315 Module 15 / CWS-314 Module 04 https://support.citrix.com/article/CTX225952 https://docs.citrix.com/en-us/citrix-app-layering/4/layer/create-app-layer.html

Objective Number	Objective	Topics	References
8.05	Determine how to create an Elastic App Layer.	Elastic App Layering Elastic App Layer Use Case How Many Elastic Layers? (How many do we need to build?)	CWS-315 Module 16 / CWS-314 Module 05 https://docs.citrix.com/en-us/citrix-app-layering/4/layer/assign-elastic-layers.html
8.06	Determine how to create User Layers.	Types of User Layers Requirements for all User Layers Requirements for Full User Layers User Layer Location Considerations for Configuring Storage Locations Configure Security Settings on User Layer Folders	CWS-315 Module 16 / CWS-314 Module 05 https://docs.citrix.com/en-us/citrix-app-layering/4/layer/enable-user-layers.html
Section 9: Deploy a Layered Image using Citrix Virtual Apps and Desktops		
9.01	Determine how to create an App Layering template.	Create a Template (The Process) OS Layers Platform Layers App Layers Elastic Layers User Layers	CWS-315 Module 6 / CWS-313 Module 06 https://docs.citrix.com/en-us/citrix-app-layering/4/publish/create-image-template.html https://docs.citrix.com/en-us/citrix-app-layering/4/publish/publish-layered-images.html https://docs.citrix.com/en-us/citrix-app-layering/4/publish/update-image-template.html
9.02	Determine how a Citrix Virtual Apps and Desktops image deployment changes when using Citrix App Layering.	Citrix Virtual Apps and Desktops Approach without App Layering Citrix Virtual Apps and Desktops Approach with App Layering Installing the Virtual Delivery Agent (Preparing the Eventual Layered Image for MCS) Using App Layering with MCS	CWS-315 Module 17 / CWS-314 Module 06 https://www.citrix.com/content/dam/citrix/en_us/documents/white-paper/citrix-application-layering-technical-overview.pdf https://docs.citrix.com/en-us/citrix-app-layering/4/plan.html https://docs.citrix.com/en-us/citrix-app-layering/4/manage/storage.html

Objective Number	Objective	Topics	References
		Section 10: Explore Layer Priority and Maintain an App Layering Environment	
10.01	Determine how layer priority affects the composition of layered images.	Layer Priority How does Layer Priority Affect the Boot Process? How does Layer Priority Work? Layer Priority Change Scenario	CWS-315 Module 7 / CWS-313 Module 07 https://support.citrix.com/article/CTX225934
10.02	Determine how to update different types of layers.	Updating Layers Layer Update Layer Deletion	CWS-315 Module 7 / CWS-313 Module 07 https://docs.citrix.com/en-us/citrix-app-layering/4/layer/update-layer.html
10.03	Determine how to maintain and update the App Layering environment.	ELM Server Coordination and Management ELM Backup Server ELM Multi-Location Creating Backups for Layers ELM Server Periodic Updates Updating the ELM Server	CWS-315 Module 18 / CWS-314 Module 07 https://www.citrix.com/products/citrix-virtual-apps-and-desktops/resources/app-layering-4x-availability-recovery-guide.html https://www.citrix.com/blogs/2017/08/07/enterprise-architect-techtalk-citrix-app-layering-faq/
10.04	Determine additional App Layering considerations and how to locate additional information as needed.	Layering Anti-Virus Layering Microsoft Office Layering Microsoft Office 365	CWS-315 Module 7 / CWS-313 Module 07 https://docs.citrix.com/en-us/citrix-app-layering/4/layer/app-layering-recipes.html https://support.citrix.com/article/CTX224566 https://docs.citrix.com/en-us/citrix-app-layering/4/layer/layer-antivirus-apps.html

Objective Number	Objective	Topics	References
		Section 11: Workspace Environment Management (WEM) Administration	
11.01	Determine how to deploy the components of a Workspace Environment Management (WEM) solution.	What is Workspace Environment Management (WEM)? WEM Technical Components Overview (On-premises) WEM Technical Components Overview (Citrix Cloud Service) Infrastructure Services (The Role) WEM Initial Installation The WEM Administration Console The WEM Agent The WEM Agent (Processing Cache) SQL Server Database Active Directory	CWS-315 Module 8 / CWS-313 Module 08 https://docs.citrix.com/en-us/workspace-environment-management/current-release/install-and-configure/agent-host.html https://docs.citrix.com/en-us/workspace-environment-management/service.html https://docs.citrix.com/en-us/workspace-environment-management/current-release/install-and-configure/agent-host.html
11.02	Determine how to perform general administration of WEM in a given scenario.	Configuration Set Configuration Set vs. User Settings User Statistics vs. Agent Statistics Delegating Administration Administrator Permissions Monitoring	CWS-315 Module 8 / CWS-313 Module 08 https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/administration.html https://support.citrix.com/article/CTX226487

Objective Number	Objective	Topics	References
Section 12: Use WEM to Centralize Environment Management, Optimize Performance and Secure Environments			
12.01	Determine how to manage user resources with WEM in a given scenario.	Adding Users and Machines to WEM Actions Filters Conditions Assignments	CWS-315 Module 20 / CWS-314 Module 09 https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/active-directory-objects.html https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/filters.html https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/advanced-settings.html
12.02	Determine how to manage user profiles using WEM in a given scenario.	Citrix Profile Management Citrix Profile Management Health Status	CWS-315 Module 20 / CWS-314 Module 09 https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/policies-and-profiles.html https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/administration.html#agents
12.03	Determine how to use various WEM Transformer features in a given scenario.	Transformer Settings General Settings Advanced Settings Advanced and Administration Settings Logon/Logoff & Power Settings	CWS-315 Module 9 / CWS-313 Module 09 https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/transformer-settings.html

Objective Number	Objective	Topics	References
12.04	Determine how to optimize machine performance using WEM.	Optimize and Manage with WEM Benefits to Using WEM to Optimize and Manage Fast Logoff CPU Management Memory Management I/O Management SBC/HVD Tuning	CWS-315 Module 10 / CWS-313 Module 10 https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/system-optimization.html https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/system-optimization/cpu-management.html https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/policies-and-profiles/environmental-settings.html
12.05	Determine how user logon times are optimized using WEM.	Login Time Scenario - Without WEM Login Time Scenario - With WEM	CWS-315 Module 10 / CWS-313 Module 10 https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/system-optimization/memory-management.html
12.06	Determine how to use WEM to increase the security of a Citrix Virtual Apps and Desktops environment.	Use WEM to Enforce Security on the Machine Running the VDA Application Security Process Management Environmental Settings	CWS-315 Module 11 / CWS-313 Module 11 https://docs.citrix.com/en-us/workspace-environment-management/current-release/user-interface-description/security.html
	Section 13: Migrate and Upgrade WEM		
13.01	Determine how to migrate user environment management to WEM in a given scenario.	To Make the Move Process Common Features to Move Migrating from On-Premises WEM to the WEM Citrix Cloud Service	CWS-315 Module 12 / CWS-314 Module 01 https://docs.citrix.com/en-us/workspace-environment-management/current-release/quick-start-guide.html https://docs.citrix.com/en-us/workspace-environment-management/service/migrate.html

Objective Number	Objective	Topics	References
13.02	Determine how to upgrade a WEM deployment in a given scenario.	WEM Component Upgrade Order Step 1: Upgrade the Infrastructure Services Step 2: Upgrade the Database Step 3: Upgrade the Administration Console Step 4: Upgrade the Agent	CWS-315 Module 12 / CWS-314 Module 01 https://docs.citrix.com/en-us/workspace-environment-management/current-release/downloads/workspace-environment-management-4-7.pdf https://docs.citrix.com/en-us/workspace-environment-management/current-release/upgrade.html
13.03	Determine how to implement redundancy in a WEM deployment.	Implement Multiple WEM Brokers Load Balance Multiple WEM Brokers Multi-Datacenter Architecture Options	CWS-315 Module 12 / CWS-314 Module 01 https://docs.citrix.com/en-us/workspace-environment-management/current-release/system-requirements.html https://www.citrix.com/blogs/2017/04/11/user-experience-on-steroids-citrix-workspace-environment-management/

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