IBM Cloud Professional Certification Program

Study Guide Series

Exam C1000-041 IBM Cloud Private Deployment V2.0.1.3

Contents

Purpose of Exam Objectives

When an exam is being developed, the Subject Matter Experts work together to define the role the certified individual will fill. They define all of the tasks and knowledge that an individual would need to have in order to successfully implement the product. This creates the foundation for the objectives and measurement criteria, which are the basis for the certification exam.

The Watson Developer Certification item writers used these objectives to develop the questions that they wrote and which will appear on the exam.

It is recommended that you review these objectives. Do you know how to complete the task in the objective? Do you know why that task needs to be done? Do you know what will happen if you do it incorrectly? If you are not familiar with a task, then go through the objective and perform that task in your own environment. Read more information on the task. If there is an objective on a task there is about a 95% chance that you WILL see a question about it on the actual exam.

After you have reviewed the objectives and completed your own research, then take the assessment exam. While the assessment exam will not tell you which question you answered incorrectly, it will tell you how you did by section. This will give you a good indication as to whether you are ready to take the actual exam or if you need to further review the materials.

Note: This is the high-level list of objectives. As you review these objectives, click for a more detailed level of how to perform the task.

High-level Exam Objectives

Section 1 - Fundamentals concepts of IBM Cloud Private	
1.1	Understand and explain Docker concepts and fundamentals as they relate to IBM Cloud Private
1.2	Understand and explain Kubernetes concepts and fundamentals
1.3	Understand and explain Kubernetes and IBM Cloud Private networking
1.4	Understand the architecture of persistent storage
1.5	Explain the Continuous Integration/Continuous Delivery (CI/CD) process within IBM Cloud Private
Section 2 - IBM Cloud Private Foundations	
2.1	Utilize Elasticsearch Logstash Kibana (ELK) to stream, store, search and monitor logs
2.2	Obtain detailed usage metrics for clusters and applications
2.3	Explain and utilize Helm package manager
2.4	Monitor clusters and application in ICP (Grafana and Prometheus)
2.5	Demonstrate knowledge of implementing network micro-segmentation in ICP
2.6	Understand and explain microservices mesh (Istio)
2.7	Demonstrate use of platform interfaces (CLI and Management console)
Section 3 - Planning for an IBM Cloud Private Deployment	
3.1	Understand and implement nodes and topologies
3.2	Understand and implement resiliency (HA)
3.3	Identify and explain platform hosting options and considerations
Section 4 - Administering and Maintaining and IBM Cloud Private Deployment	
4.1	Monitor performance and perform troubleshooting
4.2	Manage the Helm chart repositories and Docker image registries
4.3	Install, configure, and maintain user management and groups (namespaces, teams and users)
4.4	Add and remove resources to meet demand
Section 5 - Services available for IBM Cloud Private	
5.1	Understand Transformation Advisor (TA) concepts
5.2	Understand and utilize Vulnerability Advisor (VA)
5.3	Understand Cloud Automaton Manager concepts

Detailed Exam Objectives

Section 1 - Fundamentals concepts of IBM Cloud Private

1.1. Understand and explain Docker concepts and fundamentals as they relate to IBM Cloud Private

SUBTASK(S):
1.1.1. Recognize and describe the Docker workflow
1.1.2. Explain and use Docker image registries
    1.1.2.1. Login and use local Docker registry
    1.1.2.2. Downloading images from a public Docker registry
    1.1.2.3. Create and load Docker images
1.1.3. Explain the concepts behind Docker networking
1.1.4. Operate Docker independently of IBM Cloud Private
    1.1.4.1. Determine the status of containers with the Docker CLI
    1.1.4.2. Explain the process for building a docker image and the anatomy of a Docker file
    1.1.4.3. Start / Stop / Run / Remove Docker containers and images
    1.1.4.4. Start / Stop Docker on an ICP node
1.1.5. Install Docker on an ICP node

REFERENCES:
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_images/using_docker_cli.html
https://docs.docker.com/docker-hub/#use-official-repositories
https://docs.docker.com/config/containers/container-networking/
https://docs.docker.com/engine/reference/commandline/container_stats/
https://docs.docker.com/engine/reference/commandline/container/#child-commands
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/install_docker.html
https://docs.docker.com/develop/develop-images/baseimages/
https://docs.docker.com/engine/reference/builder/#format

1.2. Understand and explain Kubernetes concepts and fundamentals

SUBTASK(S):
1.2.1. Describe the Kubernetes building blocks
    1.2.1.1. Pods
    1.2.1.2. ReplicaSets
    1.2.1.3. Deployments
    1.2.1.4. Namespaces
    1.2.1.5. Labels
    1.2.1.6. StatefulSets
    1.2.1.7. DaemonSets

1.2.1.8. ConfigMaps
1.2.1.9. Secrets
1.2.1.10. Jobs
1.2.2. Describe ICP Nodes
1.2.2.1. Boot Node
1.2.2.2. Master Node
1.2.2.3. Proxy Node
1.2.2.4. Management Node
1.2.2.5. Worker Node
1.2.3. Explain the concepts of horizontal and vertical scaling
1.2.4. Describe Kubernetes Orchestration
1.2.5. Describe logs and how to access within Kubernetes
1.2.5.1. Audit logs
1.2.5.2. Pod logs

REFERENCES:
https://kubernetes.io/docs/home/?path=users&persona=app-developer&level=foundational

https://kubernetes.io/docs/reference/glossary/?fundamental=true
https://kubernetes.io/docs/concepts/
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/getting_started/architecture.html

1.3. Understand and explain Kubernetes and IBM Cloud Private networking

SUBTASK(S):
1.3.1. Explain the purpose of kube_proxy and what it does in an IBM Cloud Private environment
1.3.1.1. Describe IPTables and IPVS and why they are important to K8s
1.3.1.2. Explain how connectivity between pods and nodes is defined and established
1.3.2. Explain general Kubernetes networking concepts
1.3.2.1. Explain the local network within a pod
1.3.2.2. Explain where pod IP addresses come from
1.3.2.3. Explain where service IP addresses come from
1.3.3. Understand the role of Kubernetes services and how they work
1.3.3.1. Explain the different types of Kubernetes services
1.3.3.2. Explain how a node port is configured and how it is used
1.3.3.3. Explain what a ClusterIP service type is
1.3.3.4. Explain a headless service
1.3.4. Explain Ingress for IBM Cloud Private clusters
1.3.4.1. Configure services to be accessed via the Proxy Node
1.3.4.2. Describe how the Proxy Nodes can be tuned
1.3.4.3. Configure ingress for a workload using kubectl

1.3.5. Explain how Kubernetes DNS services work
    1.3.5.1. Explain how to ping / or return IP of a workload within its namespace
    1.3.5.2. Explain how to ping / or return IP a workload from outside of its namespace
    1.3.5.3. Understand how DNS is configured inside of a running pod
1.3.6. Explain three different k8s service types in ICP cluster
1.3.7. Explain load balancing in ICP clusters

REFERENCES:
https://kubernetes.io/docs/concepts/cluster-administration/networking/
https://kubernetes.io/docs/concepts/services-networking/service/
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/proxy_resource.html
https://github.com/jdiggity22/rtp-bootcamp/blob/master/PresentationPDFs/ICP%20Network%20-%20JMA.pdf
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/set_loadbalancer.html

1.4. Understand the architecture of persistent storage

SUBTASK(S):
1.4.1. Describe the supported file systems and storage with ICP
    1.4.1.1. Pros
    1.4.1.2. Cons
1.4.2. Understand Dynamic Storage concepts
1.4.3. Describe a Persistent Volume (PV) and how they are created
1.4.4. Describe a Persistent Volume Claim (PVC), how to they relate to PV, and how they are created
1.4.5. Describe the available Storage Classes within ICP
1.4.6. Describe how to create a Storage Class
1.4.7. Describe encryption options
1.4.8. Understand the basics of storage troubleshooting
    1.4.8.1. Add additional storage

REFERENCES:
https://v1-10.docs.kubernetes.io/docs/concepts/storage/persistent-volumes/
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/storage_class_all.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/etcd.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_cluster/cluster_storage.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_cluster/pv_land.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_cluster/app_storage.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/troubleshoot/storage.html

1.5. Explain the Continuous Integration/Continuous Delivery (CI/CD) process within IBM Cloud Private

SUBTASK(S):
1.5.1. Explain what is meant by Continuous Integration
1.5.2. Explain what is meant by Continuous Delivery
1.5.3. Describe what tools support CI/CD on IBM Cloud Private
    1.5.3.1. Microclimate
    1.5.3.2. Jenkins
    1.5.3.3. Urbancode Deploy

REFERENCES:

https://www.infoworld.com/article/3271126/application-development/what-is-cicd-continuous-integration-and-continuous-delivery-explained.html
https://www.ibm.com/cloud/garage/tutorials/cloud-private-jenkins-pipeline/
https://www.ibm.com/cloud/garage/content/course/cloud-private-jenkins-devops/0
https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=GMS14051USEN

Section 2 - IBM Cloud Private Foundations

2.1. Understand how to stream, store, search and monitor logs (Elasticsearch Logstash Kibana (ELK))

SUBTASK(S):

2.1.1. Describe the individual components and their functionalities of ELK in ICP
2.1.2. Describe the deployment of the ELK stack in ICP
    2.1.2.1. Understand how ICP deploys an ELK stack
    2.1.2.2. Know which pods of the ELK stack are more resource intensive and need careful resource planning
    2.1.2.3. Understand which ELK pods are the most resource intensive and in which ICP node they should be hosted
    2.1.2.4. Understand the impact of TLS encoding of logs and monitoring data in motion
2.1.3. Using Kibana Dashboard and Logs
    2.1.3.1. Understand how to bring up the Kibana dashboard
    2.1.3.2. Provide examples of queries to view logs

REFERENCES:

1. https://www.elastic.co/elk-stack
2. https://www.ibm.com/support/knowledgecenter/search/ELK?scope=SSBS6K_2.1.0.3

2.2. Obtain detailed usage metrics for clusters and applications

SUBTASK(S):

2.2.1. Describe ICP Metering Service and User Interface
    2.2.1.1. Understand how to view the metering data for applications in ICP
    2.2.1.2. Describe the details of metering for the platform nodes in ICP
    2.2.1.3. Describe the details of metering for containers in ICP
    2.2.1.4. Explain how the metric data can be exported outside and in which format
    2.2.1.5. Understand the use of metering service to manage chargebacks
    2.2.1.6. Understand how to track usage of IBM products running outside of ICP from within ICP
2.2.2. Describe the metrics within the ICP Dashboard
    2.2.2.1. Understand what metric data ICP dashboard provides
    2.2.2.2. Explain various Storage level metrics
    2.2.2.3. Explain how to locate unhealthy deployments from ICP Dashboard
    2.2.2.4. Explain the CPU and Memory metrics on ICP Dashboard

REFERENCES:

https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_metrics/metrics.html

https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_metrics/metering_service.html

2.3. Understand and explain package managers (Helm and tiller)

SUBTASK(S):

2.3.1. Describe Helm and its components in ICP
- 2.3.1.1. Explain the purpose of Helm in ICP
- 2.3.1.2. Understand the main components of Helm
  - 2.3.1.2.1. Describe their usage and relationship

2.3.2. Describe the operational aspects of Helm Client in ICP
- 2.3.2.1. Understand how to set up Helm CLI in a workstation for use in ICP
- 2.3.2.2. Describe where to get the Helm CLI

2.3.3. Describe how to use Helm Charts in ICP
- 2.3.3.1. Describe how to create a local Helm repository in ICP
- 2.3.3.2. Describe how to use an external non-IBM Helm repository in ICP
- 2.3.3.3. Describe how to upgrade a product bundled with ICP

2.3.4. Describe and understand air-gapped installation (no external internet connection) –

REFERENCES:

https://helm.sh/
https://www.ibm.com/support/knowledgecenter/search/Helm?scope=SSBS6K_2.1.0.3

2.4. Understand how to monitor clusters and application in ICP (Grafana and Prometheus)

SUBTASK(S):

2.4.1. Describe monitoring tools bundled with ICP
2.4.2. Describe how to customize the monitoring and alerting
2.4.3. Describe how to retain monitoring data during an upgrade
2.4.4. Explain how to access the monitoring dashboard
2.4.5. Describe the different dashboard views
- 2.4.5.1. Prometheus
- 2.4.5.2. Grafana

REFERENCES:

https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/monitoring.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/monitoring_data.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_metrics/monitor.html

2.5. Understand network micro-segmentation and concepts (Calico) in ICP

SUBTASK(S):

2.5.1. Explain the role of a network overlay inside of Kubernetes
2.5.2. Describe the role of Calico within ICP
    2.5.2.1. Explain the concept of micro-segmentation
    2.5.2.2. Explain the concept of network mesh
2.5.3. Explain how Kubernetes NetworkPolicy and Calico Policy can be used to provide network segmentation within the cluster
2.5.4. Identify general concepts within the IBM Cloud Private Calico implementation
    2.5.4.1. Explain why Calico relies upon etcd within the ICD cluster
    2.5.4.2. Identify BGP and the concept of route reflection
2.5.5. Explain the relationship of Calico to the OSI networking model (recognizing Layer 3 versus Layer 7 by concept TCP / UDP versus HTTP / HTTPS)

REFERENCES:

https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_network/set_network_policy.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_network/network.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_network/calicoctl.html

2.6. Understand and explain microservices mesh (Istio)

SUBTASK(S):

2.6.1. Describe the need of a Service Mesh in deploying microservice
    2.6.1.1. Describe the limitations of Kubernetes
    2.6.1.2. Explain the important QOSes provided by Istio
2.6.2. Describe the components of Istio and their usage
    2.6.2.1. Describe Istio “control plane” and functions of its components
    2.6.2.2. Describe Istio “data plane” and explain its functionality.
        2.6.2.2.1. Explain the working principle of Istio Data Plane.
        2.6.2.2.2. Explain how a user interacts with Istio Data Plane
2.6.3. Describe Istio in ICP
    2.6.3.1. Explain installation of Istio control plane in ICP
        2.6.3.1.1. Explain how Istio data plane gets deployed in ICP
        2.6.3.1.2. Explain auto-injection of side-cars
        2.6.3.1.3. Understand the difference between ‘kubectl’ and ‘istioctl’ commands
2.6.4. Describe tracing and monitoring in Istio
2.6.5. Describe intelligent routing in Istio
2.6.6. Describe Fault Injection
    2.6.6.1. Describe the necessity for fault injection in testing microservices
    2.6.6.2. Describe how ‘timeout’ and ‘abort’ faults are injected in an Istio environment

REFERENCES:

https://istio.io/docs/concepts/

https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_cluster/istio.html

2.7. Understand and use platform interfaces

SUBTASK(S):

2.7.1. Describe the IBM Cloud CLI and how it is used with IBM Cloud Private
2.7.2. Describe the IBM Cloud Private CLI and the use and functions
2.7.3. Describe the Kubernetes CLI(kubectl) and how it is used for administering IBM Cloud Private
2.7.4. Describe the Helm CLI and how it is used to create and deploy charts onto IBM Cloud Private.
2.7.5. Describe the different components of the IBM Cloud Private Management Console and how they are used to manage ICP resources.
2.7.6. Describe how to administer the cluster from the command line interface
    2.7.6.1. Describe the use of Configure Client from the ICP Management Console
    2.7.6.2. Describe how to use bx pr login -a <cluster>:<port> to connect to ICP
    2.7.6.3. Describe how to use docker login to access the private registry

REFERENCES:

https://console.bluemix.net/docs/cli/reference/ibmcloud/download_cli.html#install_use
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0/manage_cluster/install_cli.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/cli_commands.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/cfc_cli.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/app_center/create_helm_cli.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/cfc_gui.html

Section 3 - Planning for an IBM Cloud Private Deployment

3.1. Understand nodes and topologies

SUBTASK(S):

3.1.1. Describe what a node is and what node types are supported by IBM Cloud Private
- 3.1.1.1. Describe the IBM Cloud Private Boot node
- 3.1.1.2. Describe the IBM Cloud Private Master node
  - 3.1.1.2.1. Describe the functions of the master node
  - 3.1.1.2.2. Describe the reasons for having more than one master node
- 3.1.1.3. Describe the IBM Cloud Private Proxy node
  - 3.1.1.3.1. Describe the functions of the proxy node
  - 3.1.1.3.2. Describe how to define a System z proxy node
  - 3.1.1.3.3. Describe the reasons for having more than one proxy node
- 3.1.1.4. Describe the IBM Cloud Private Management node
  - 3.1.1.4.1. Describe the functions of the management node
  - 3.1.1.4.2. Describe when a management node can be added to a cluster
- 3.1.1.5. Describe the IBM Cloud Private Worker node
  - 3.1.1.5.1. Describe the functions of the worker node
- 3.1.1.6. Describe the IBM Cloud Private Vulnerability Advisor (VA) node
  - 3.1.1.6.1. Describe the functions of the VA node
- 3.1.1.7. Describe the IBM Cloud Private etcd node and when one would be needed

3.1.2. Describe how IBM Cloud Private works in a Resiliency (High Availability (HA)) Environment
- 3.1.2.1. Describe the minimum number of each node type to support a Resiliency (HA) environment
- 3.1.2.2. Describe the installation host file configuration for Resiliency (HA) and the use of the ***vip_iface*** parameter

3.1.3. Describe the purpose of host groups in the IBM Cloud Private installation hosts file

3.1.4. Describe how to add and remove worker nodes from a running ICP cluster

REFERENCES:

https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/installing/hosts.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/getting_started/architecture.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_applications/disable_service.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/vuln_advisor.html

3.2. Understand backup and restore concepts

SUBTASK(S):
3.2.1. Describe the two level of backups
3.2.2. List the components that should be backed up in ICP
    3.2.2.1. Describe the information/data stored within each component
3.2.3. Describe what should be saved after the installation completes
3.2.4. Describe the backup and restore options for each node type

REFERENCES:
https://medium.com/ibm-cloud/how-to-backup-and-restore-ibm-cloud-private-part-1-b6300dc1d7d8
https://medium.com/@epatro/how-to-back-up-an-ibm-cloud-private-environment-7bb0a5176c0b
https://github.com/ibm-cloud-architecture/icp-backup

3.3. Understand Resiliency (HA) concepts

SUBTASK(S):
3.3.1. Describe Resiliency (HA) as it relates to the nodes
    3.3.1.1. Boot Node
    3.3.1.2. Master Node
    3.3.1.3. Proxy Node
    3.3.1.4. Management Node
    3.3.1.5. Worker Node
    3.3.1.6. Vulnerability Adviser Node
    3.3.1.7. etdc Node
3.3.2. Describe the use of Virtual IP Addresses in a Resiliency (HA) environment
3.3.3. Describe the Installation options for Resiliency (HA) with the ICP offerings
    3.3.3.1. ICP Native
    3.3.3.2. ICP Enterprise
    3.3.3.3. ICP Community Edition
3.3.4. Describe the Shared Storage
    3.3.4.1. What directories must be shared
3.3.5. Describe Resiliency (HA) Cluster requirements
    3.3.5.1. Node assignment
    3.3.5.2. Communication
3.3.6. Describe Resiliency (HA) installation options
3.3.7. Describe upgrading ICP in a Resiliency (HA) environment

REFERENCES:
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.2/installing/high_availability.html

https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0/installing/install_HA.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_1.2.0/installing/install_HA.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/getting_started/architecture.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/high_availability.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/custom_install.html#HA
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/hosts.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/upgrade.html

Section 4 - Administering and Maintaining and IBM Cloud Private Deployment

4.1. Monitor performance and perform troubleshooting

SUBTASK(S):

4.1.1. Understand the underlying technologies ICP uses for monitoring at each level
4.1.2. Describe how to configure agents/containers/volumes/etc. to enable monitoring within ICP
4.1.3. Explain the dashboards on the ICP management console
4.1.4. Describe how to set or respond to alerts
4.1.5. Describe how to use the command line to troubleshoot in ICP
    4.1.5.1. kubectl exec
    4.1.5.2. kubectl logs

REFERENCES:

https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_metrics/monitoring_service.html
https://prometheus.io/docs/prometheus/latest/configuration/alerting_rules/
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_metrics/capacity_planning.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_metrics/logging_elk.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/troubleshoot/install.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/troubleshoot/container_fail.html
https://kubernetes.io/docs/concepts/workloads/controllers/daemonset/
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/installing/config_yaml.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_metrics/filebeat_scoping.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_applications/manage_jobs.html

4.2. Manage the Helm chart repositories and Docker image registries

SUBTASK(S):

4.2.1. Describe how to work with image registries
    4.2.1.1. Configure registry as appropriate

4.2.1.2. Add, update, or remove images as needed
4.2.1.3. View and deploy images as needed
4.2.2. Describe how to work with charts
4.2.2.1. Create chart as appropriate
4.2.2.2. Add chart to internal or external repository
4.2.2.3. Remove chart when obsolete
4.2.2.4. Upgrade/rollback chart versions

REFERENCES:
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/app_center/app_center.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/app_center/manage_helm_repo.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_images/image_manager.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/manage_images/imagepullsecret.html
https://docs.helm.sh/developing_charts

4.3. Install, configure, and maintain user management and groups (namespaces, teams and users)

SUBTASK(S):
4.3.1. Understand relationship between namespaces, teams, and users
4.3.2. Describe security options in ICP
4.3.3. Describe how to configure namespaces
4.3.3.1. Understand implications of team and user access
4.3.4. Describe how to configure teams
4.3.4.1. Understand implications of user on multiple teams
4.3.5. Describe how to configure and use an external LDAP

REFERENCES:
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/user_management/assign_role.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_images/change_scope.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/user_management/add_user.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/user_management/configure_ldap.html
https://www.ibm.com/support/knowledgecenter/SSBS6K_2.1.0.3/apis/access_api.html
https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/W1559b1be149d_43b0_881e_9783f38faaff/page/Overview%20of%20IBM%20Cloud%20Private
https://www.projectcalico.org/using-network-policy-in-concert-with-istio/

https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/user_management/teams.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/enable_pod_security.html

4.4. Add and remove resources to meet demand

SUBTASK(S):

4.4.1. Describe how to add additional nodes to a cluster
- 4.4.1.1. Describe how to set up a node so it can be added to the cluster
- 4.4.1.2. Describe how to add a worker node to a cluster
- 4.4.1.3. Describe how to add a System z worker node
- 4.4.1.4. Describe how to add a management node to a cluster
- 4.4.1.5. Describe how to add a proxy node to a cluster
- 4.4.1.6. Describe how to add a System z proxy node to a cluster
- 4.4.1.7. Describe how to add a VA node to a cluster

4.4.2. Describe how to add a host group to a cluster

4.4.3. Describe how to remove a node from a cluster

4.4.4. Describe how to add a storage provider to a cluster

REFERENCES:

https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/installing/add_node.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/installing/hosts.html#hostgroup
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/glusterfs_land.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/increase_gluster_storage.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/add_vsphere.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/gpfs.html

Section 5 - Services available for IBM Cloud Private

5.1. Understand Transformation Advisor (TA) concepts

SUBTASK(S):

5.1.1. Describe Application Modernization effort of IBM
- 5.1.1.1. Explain IBM's Application Modernization strategy

5.1.2. Describe the working principle and architecture of IBM Transformation Advisor
- 5.1.2.1. What are major components of Transformation Advisor?
- 5.1.2.2. Can Transformation Advisor be used to develop microservicee?
- 5.1.2.3. What are the steps to successfully execute Transformation Advisor for shifting loads to IBM cloud?
- 5.1.2.4. Can Transformation Advisor be used legally to shift on-prem traditional WebSphere workload to RedHat Openshift platform?

5.1.3. Describe the operational aspects of Transformation Advisor
- 5.1.3.1. What are the minimal steps necessary to successfully use Transformation Advisor for shifting loads to IBM cloud?
- 5.1.3.2. Is Transformation Advisor integrated with any DevOps process?
  - 5.1.3.2.1. Can any continuous integration and continuous deployment mechanism be plugged into Transformation Advisor?
- 5.1.3.3. Can Transformation Advisor run outside IBM Cloud Private?
- 5.1.3.4. Does the Data Collector component of Transformation Advisor execute in all the nodes of a WebSphere cell?
- 5.1.3.5. Is it OK to execute the Data Collector component of Transformation Advisor in a production environment?
- 5.1.3.6. How Transformation Advisor authenticate a user?
- 5.1.3.7. How many Kubernetes services comprise Transformation Advisor?

5.1.4. Describe the analysis done by Transformation Advisor
- 5.1.4.1. In how many categories Transformation Advisor categorizes applications hosted in traditional WebSphere Application servers?
  - 5.1.4.1.1. What are these categories?
  - 5.1.4.1.2. What inference a user can derive from the Transformation Advisor categorization?
- 5.1.4.2. Does Transformation Advisor pinpoint the locations in the original source code which need to be tweaked or redesigned?
  - 5.1.4.2.1. Does Transformation Advisor need to scan the source code to make the coe level analysis?

5.1.5. Describe the Migration Bundle generated by Transformation Advisor
- 5.1.5.1. Is any user interaction needed for the generation of migration bundle?
  - 5.1.5.1.1. Exactly what inputs are needed from the user for migration bundle generation?
- 5.1.5.2. What is needed for the Transformation Advisor execution to be able to successfully generate the migration bundle artifacts?

REFERENCES:
https://developer.ibm.com/recipes/tutorials/using-the-transformation-advisor-on-ibm-cloud-private/
https://developer.ibm.com/recipes/tutorials/using-the-transformation-advisor-on-ibm-cloud-private/

5.2. Understand Vulnerability Advisor (VA)

SUBTASK(S):
5.2.1. Describe the functions of IBM Cloud Private VA
5.2.2. Describe the recommended number of VA nodes
5.2.3. Describe how VA is enabled in the config.yaml file prior to installation
5.2.4. Describe how to add VA nodes into an existing IBM Cloud Private cluster
5.2.5. Describe how to configure the VA node after installation
    5.2.5.1. Describe how to configure the VA container crawler
    5.2.5.2. Describe how to configure the VA image crawler
    5.2.5.3. Describe how to configure the VA image crawler to rescan images
    5.2.5.4. Describe how to configure the Kafka and Elasticsearch curation intervals
5.2.6. Describe how to view the security reports produced by VA
5.2.7. Describe how to manage VA policies in IBM Cloud Private

REFERENCES:
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/manage_cluster/vuln_advisor.html
https://www.ibm.com/support/knowledgecenter/en/SSBS6K_2.1.0.3/installing/va_setup.html

5.3. Understand Cloud Automaton Manager concepts

SUBTASK(S):
5.3.1. Explain Infrastructure as Code and why it is important
5.3.2. Create and test Terraform templates
5.3.3. Understanding the fundamentals of Cloud Automated Manager supported cloud providers
    5.3.3.1. Understand basic architecture of major targeted cloud providers
    5.3.3.2. Understand how CAM interacts with ICP as a cloud provider
5.3.4. Create and publish services with the Service Composer
    5.3.4.1. Understand composer flow
    5.3.4.2. Understand variables with the Service Composer
    5.3.4.3. Understand components available for a service within Service Composer
5.3.5. Creating and deploying middleware / custom content with CAM
    5.3.5.1. Understand the deployment of content runtime servers

5.3.5.2. Understand the basics of automation using Chef

REFERENCES:

https://www.terraform.io/
https://www.ibm.com/support/knowledgecenter/SS2L37_2.1.0/cam_creating_template.html
https://www.ibm.com/support/knowledgecenter/SS2L37_2.1.0/index.html
https://www.ibm.com/support/knowledgecenter/SS2L37_2.1.0.2/content/cam_content_runtime_overview.html

Next Steps

1. Take the IBM Cloud Private Deployment V2.0.1.3 assessment test.

2. If you pass the assessment exam, visit pearsonvue.com/ibm to schedule your testing sessions.

3. If you failed the assessment exam, review how you did by section. Focus attention on the sections where you need improvement. Keep in mind that you can take the assessment exam as many times as you would like ($30 per exam), however, you will still receive the same questions only in a different order.