سرفصل های آموزشی

پک حرفه‌ای متخصص Cloud Computing

فهرست سرفصل‌های دوره‌های آموزشی

سرفصل‌های دوره آموزشی

Terraform

Understand infrastructure as code (IaC) concepts:

- Explain what IaC is
- Describe advantages of IaC patterns

Understand Terraform's purpose (vs other IaC):

- Explain multi-cloud and provider-agnostic benefits
- Explain the benefits of state

Understand Terraform basics:

- Handle Terraform and provider installation and versioning
- Describe plugin based architecture
- Demonstrate using multiple providers
- Describe how Terraform finds and fetches providers
- Explain when to use and not use provisioners and when to use local-exec or remote-exec

Use the Terraform CLI (outside of core workflow):

- Terraform format code
- Taint Terraform resources
- Import and reuse of terraform modules
- Terraform workspaces
- Terraform states
- Terraform verbose logging

Interact with Terraform modules:

- Contrast module source options
- Interact with module inputs and outputs
- Describe variable scope within modules/child modules
- Discover modules from the public Terraform Module Registry
- Defining module version

Navigate Terraform workflow:

- Describe Terraform workflow
- Initialize a Terraform working directory
- Validate a Terraform configuration
- Generate and review an execution plan for Terraform
- Execute changes to infrastructure with Terraform
- Destroy Terraform managed infrastructure

Implement and maintain state:

- Describe default local backend
- Outline state locking
- Handle backend authentication methods
- Describe remote state storage mechanisms and supported standard backends
- Describe effect of Terraform refresh on state
- Describe backend block in configuration and best practices for partial
- Configurations
- Understand secret management in state files

Read, generate, and modify configuration:

- Demonstrate use of variables and outputs
- Describe secure secret injection best practice
- Understand the use of collection and structural types
- Create and differentiate resource and data configuration
- Use resource addressing and resource parameters to connect resources together
- Use Terraform built-in functions to write configuration
- Configure resource using a dynamic block
- Describe built-in dependency management

Understand Terraform Cloud and Enterprise capabilities:

- Describe the benefits of Sentinel, registry, and workspaces
- Differentiate OSS and TFE workspaces
- Summarize features of Terraform Cloud

سرفصل‌های دوره آموزشی

Ceph Storage

Introduction to Ceph Cluster Storage

Install and Configure Ceph

- Creating the Ceph cluster
- Scaling up your Ceph cluster

Working with Ceph Block Device

- Configuring Ceph client
- Creating Ceph Block Device
- Mapping Ceph Block Device
- Resizing Ceph RBD
- Working with RBD clones
- Disaster recovery replication using RBD mirroring
- Configuring image mirroring
- Recovering from a disaster!

Ceph Object Storage

- Understanding Ceph object storage
- RADOS Gateway standard setup, installation, and configuration

Ceph Object Storage Multi-Site v2

- Functional changes from Hammer federated configuration
- Installing the Ceph RGW multi-site v2 environment

Ceph Filesystem

- Understanding the Ceph Filesystem and MDS
- Accessing Ceph FS through kernel driver
- Exporting the Ceph Filesystem as NFS

Monitoring Ceph Clusters

- Monitoring Ceph clusters – the classic way
- Monitoring Ceph MON
- Monitoring Ceph OSDs
- Monitoring Ceph MDS
- Introducing Ceph Metrics and Grafana
- Installing and configuring Ceph Metrics with the Grafana dashboard

Operating and Managing a Ceph Cluster

- Managing the cluster configuration file
- Running Ceph with system
- Scale-up versus scale-out
- Scaling down your Ceph cluster
- Replacing a failed disk in the Ceph cluster
- Upgrading your Ceph cluster
- Maintaining a Ceph cluster

Ceph scalability and high availability

- Understanding the CRUSH mechanism
- CRUSH map internals
- Ceph authentication and authorization
- I/O path from a Ceph client to a Ceph cluster

Production Planning and Performance Tuning for Ceph

- Ceph recommendations and performance tuning
- Ceph erasure-coding
- Ceph cache tiering

The Virtual Storage Manager for Ceph

- Understanding the VSM architecture
- Getting ready for VSM
- Creating a Ceph cluster using VSM
- Upgrading the Ceph cluster using VSM

Troubleshooting Ceph

- Initial troubleshooting and logging
- Troubleshooting network issues
- Troubleshooting placement groups
- Troubleshooting OSDs

سرفصل‌های دوره آموزشی

LPIC3-306

Topic 361: High Availability Cluster Management

361.1 High Availability Concepts and Theory (weight: 6)

Description: Candidates should understand the properties and design approaches of high availability clusters.

Key Knowledge Areas:

- Understand the goals of High Availability and Site Reliability Engineering
- Understand common cluster architectures
- Understand recovery and cluster reorganization mechanisms
- Design an appropriate cluster architecture for a given purpose
- Understand application aspects of high availability
- Understand operational considerations of high availability

Partial list of the used files, terms and utilities:

- Active/Passive Cluster
- Active/Active Cluster
- Failover Cluster

- Load Balanced Cluster
- Shared-Nothing Cluster
- Shared-Disk Cluster
- Cluster resources
- Cluster services
- Quorum
- Fencing (Node and Resource Level Fencing)
- Split brain
- Redundancy
- Mean Time Before Failure (MTBF)
- Mean Time To Repair (MTTR)
- Service Level Agreement (SLA)
- Disaster Recovery
- State Handling
- Replication
- Session handling

361.2 Load Balanced Clusters (weight: 8)

Description: Candidates should know how to install, configure, maintain and troubleshoot LVS. This includes the configuration and use of keepalived and ldirectord. Candidates should further be able to install, configure, maintain and troubleshoot HAProxy.

Key Knowledge Areas:

- Understand the concepts of LVS / IPVS
- Understand the basics of VRRP
- Configure keepalived
- Configure ldirectord

- Configure backend server networking
- Understand HAProxy
- Configure HAProxy

Partial list of the used files, terms and utilities:

- Ipvsadm
- Syncd
- LVS Forwarding (NAT, Direct Routing, Tunneling, Local Node)
- Connection scheduling algorithms
- keepalived configuration file
- ldirectord configuration file
- Genhash
- HAProxy configuration file
- load balancing algorithms
- ACLs

361.3 Failover Clusters (weight: 8)

Description: Candidates should have experience in the installation, configuration, maintenance and troubleshooting of a Pacemaker cluster. This includes the use of Corosync. The focus is on Pacemaker 2.x for Corosync 2.x.

Key Knowledge Areas:

- Understand the architecture and components of Pacemaker (CIB, CRMd, PEngine, LRMd, DC, STONITHd)
- Manage Pacemaker cluster configurations
- Understand Pacemaker resource classes (OCF, LSB, Systemd, Service,

STONITH, Nagios)

- Manage Pacemaker resources
- Manage resource rules and constraints (location, order, colocation).
- Manage advanced resource features (templates, groups, clone resources, multi-state resources)
- Obtain node information and manage node health
- Manage quorum and fencing in a Pacemaker cluster
- Configure the Split Brain Detector on shared storage
- Manage Pacemaker using pcs
- Manage Pacemaker using crmsh
- Configure and management of corosync in conjunction with Pacemaker
- Awareness of Pacemaker ACLs
- Awareness of other cluster engines (OpenAIS, Heartbeat, CMAN)

Partial list of the used files, terms and utilities:

- pcs
- crm
- crm_mon
- crm_verify
- crm_simulate
- crm_shadow
- crm_resource
- crm_attribute
- crm_node
- crm_standby
- cibadmin
- corosync.conf
- authkey
- corosync-cfgtool
- corosync-cmapctl
- corosync-quorumtool
- stonith_admin

- stonith
- ocf:pacemaker:ping
- ocf:pacemaker:NodeUtilization
- ocf:pacemaker:ocf:SysInfo
- ocf:pacemaker:HealthCPU
- ocf:pacemaker:HealthSMART
- sbd

Topic 362: High Availability Cluster Storage

362.1 DRBD (weight: 6)

Description: Candidates are expected to have the experience and knowledge to install, configure, maintain and troubleshoot DRBD devices. This includes integration with Pacemaker. DRBD configuration of version 9.0.x is covered.

Key Knowledge Areas:

- Understand the DRBD architecture
- Understand DRBD resources, states and replication modes
- Configure DRBD disks and devices
- Configure DRBD networking connections and meshes
- Configure DRBD automatic recovery and error handling
- Configure DRBD quorum and handlers for split brain and fencing
- Manage DRBD using drbdadm
- Understand the principles of drbdsetup and drbdmeta
- Restore and verify the integrity of a DRBD device after an outage
- Integrate DRBD with Pacemaker
- Understand the architecture and features of LINSTOR

Partial list of the used files, terms and utilities:

- Protocol A, B and C
- Primary, Secondary
- Three-way replication
- drbd kernel module
- drbdadm
- drbdmon
- drbdsetup
- drbdmeta
- /etc/drbd.conf
- /etc/drbd.d/
- /proc/drbd

362.2 Cluster Storage Access (weight: 3)

Description: Candidates should be able to connect a Linux node to remote block storage.
This includes understanding common SAN technology and architectures, including management of iSCSI, as well as configuring multipathing for high availability and using LVM on a clustered storage.

Key Knowledge Areas:

- Understand the concepts of Storage Area Networks
- Understand the concepts of Fibre Channel, including Fibre Channel Toplogies
- Understand and manage iSCSI targets and initiators
- Understand and configure Device Mapper Multipath I/O (DM-MPIO)
- Understand the concept of a Distributed Lock Manager (DLM)
- Understand and manage clustered LVM
- Manage DLM and LVM with Pacemaker

Partial list of the used files, terms and utilities:

- tgtadm
- targets.conf
- iscsiadm
- iscsid.conf
- /etc/multipath.conf
- multipath
- kpartx
- pvmove
- vgchange
- lvchange

362.3 Clustered File Systems (weight: 4)

Description: Candidates should be able to install, maintain and troubleshoot GFS2 and OCFS2 filesystems. This includes awareness of other clustered filesystems available on Linux.

Key Knowledge Areas:

- Understand the principles of cluster file systems and distributed file systems
- Understand the Distributed Lock Manager
- Create, maintain and troubleshoot GFS2 file systems in a cluster
- Create, maintain and troubleshoot OCFS2 file systems in a cluster
- Awareness of the O2CB cluster stack
- Awareness of other commonly used clustered file systems, such as AFS and Lustre

Partial list of the used files, terms and utilities:

- mkfs.gfs2
- mount.gfs2
- fsck.gfs2
- gfs2_grow
- gfs2_edit
- gfs2_jadd
- mkfs.ocfs2
- mount.ocfs2
- fsck.ocfs2
- tunefs.ocfs2
- mounted.ocfs2
- o2info
- o2image

Topic 363: High Availability Distributed Storage

363.1 GlusterFS Storage Clusters (weight: 5)

Description: Candidates should be able to manage and maintain a GlusterFS storage cluster.

Key Knowledge Areas:

- Understand the architecture and components of GlusterFS
- Manage GlusterFS peers, trusted storge pools, bricks and volumes
- Mount and use an existing GlusterFS
- Configure high availability aspects of GlusterFS
- Scale up a GlusterFS cluster
- Replace failed bricks
- Recover GlusterFS from a physical media failure
- Restore and verify the integrity of a GlusterFS cluster after an outage
- Awareness of GNFS

Partial list of the used files, terms and utilities:

- gluster (including relevant subcommands)

363.2 Ceph Storage Clusters (weight: 8)

Description: Candidates should be able to manage and maintain a Ceph Cluster. This includes the configuration of RGW, RDB devices and CephFS.

Key Knowledge Areas:

- Understand the architecture and components of Ceph
- Manage OSD, MGR, MON and MDS
- Understand and manage placement groups and pools
- Understand storage backends (FileStore and BlueStore)
- Initialize a Ceph cluster
- Create and manage Rados Block Devices

- Create and manage CephFS volumes, including snapshots
- Mount and use an existing CephFS
- Understand and adjust CRUSH maps
- Configure high availability aspects of Ceph
- Scale up a Ceph cluster
- Restore and verify the integrity of a Ceph cluster after an outage
- Understand key concepts of Ceph updates, including update order, tunables and features

Partial list of the used files, terms and utilities:

- ceph-deploy (including relevant subcommands)
- ceph.conf
- ceph (including relevant subcommands)
- rados (including relevant subcommands)
- rdb (including relevant subcommands)
- cephfs (including relevant subcommands)
- ceph-volume (including relevant subcommands)
- ceph-authtool
- ceph-bluestore-tool
- crushtool

Topic 364: Single Node High Availability

364.1 Hardware and Resource High Availability (weight: 2)

Description: Candidates should be able to monitor a local node for potential hardware failures and resource shortages.

Key Knowledge Areas:

- Understand and monitor S.M.A.R.T values using smartmontools, including triggering frequent disk checks
- Configure system shutdown at specific UPC events
- Configure monit for alerts in case of resource exhaustion

Partial list of the used files, terms and utilities:

- smartctl
- /etc/smartd.conf
- smartd
- nvme-cli
- apcupsd
- apctest
- monit

364.2 Advanced RAID (weight: 2)

Description: Candidates should be able to manage software raid devices on Linux. This includes advanced features such as partitonable RAIDs and RAID containers as well as recovering RAID arrays after a failure.

Key Knowledge Areas:

- Manage RAID devices using various raid levels, including hot spare discs, partitionable RAIDs and RAID containers
- Add and remove devices from an existing RAID
- Change the RAID level of an existing device
- Recover a RAID device after a failure
- Understand various metadata formats and RAID geometries

- Understand availability and performance properties of various raid levels
- Configure mdadm monitoring and reporting

Partial list of the used files, terms and utilities:

- mdadm
- /proc/mdstat
- /proc/sys/dev/raid/*

364.3 Advanced LVM (weight: 3)

Description: Candidates should be able to configure LVM volumes. This includes managing LVM snapshot, pools and RAIDs.

Key Knowledge Areas:

- Understand and manage LVM, including linear and striped volumes
- Extend, grow, shrink and move LVM volumes
- Understand and manage LVM snapshots
- Understand and manage LVM thin and thick pools
- Understand and manage LVM RAIDs

Partial list of the used files, terms and utilities:

- /etc/lvm/lvm.conf
- pvcreate
- pvdisplay

- pvmove
- pvremove
- pvresize
- vgcreate
- vgdisplay
- vgreduce
- lvconvert
- lvcreate
- lvdisplay
- lvextend
- lvreduce
- lvresize

364.4 Network High Availability (weight: 5)

Description: Candidates should be able to configure redundant networking connections and manage VLANs. Furthermore, candidates should have a basic understanding of BGP.

Key Knowledge Areas:

- Understand and configure bonding network interface
- Network bond modes and algorithms (active-backup, blance-tlb, balance-alb, 802.3ad, balance-rr, balance-xor, broadcast)
- Configure switch configuration for high availability, including RSTP
- Configure VLANs on regular and bonded network interfaces
- Persist bonding and VLAN configuration
- Understand the principle of autonomous systems and BGP to manage external redundant uplinks
- Awareness of traffic shaping and control capabilities of Linux

Partial list of the used files, terms and utilities:

- bonding.ko (including relevant module options)
- /etc/network/interfaces
- /etc/sysconfig/networking-scripts/ifcfg-*
- /etc/systemd/network/*.network
- /etc/systemd/network/*.netdev
- nmcli
- /sys/class/net/bonding_masters
- /sys/class/net/bond*/bonding/miimon
- /sys/class/net/bond*/bonding/slaves
- ifenslave
- ip