

VCAP VCF STORAGE TASKS · EXAM 3V0-23.25

Work task 1 to task 214 and you have designed, built, broken and fixed VCF storage

Exam 3V0-23.25, VMware Certified Advanced Professional in VCF Storage. The broadest blueprint in the advanced set: thirty-four objectives, no sub-objectives, and every one of the five sections filled. Sections A and B are architecture, C to G are the products and the vocabulary, H to J are design and sizing, K to U are the build, V and W are monitoring and troubleshooting, and X is timed drills. The code at the right of each task is the objective it practises.

Dr Pranay Jha · drpranayjha.com

A. STORAGE ARCHITECTURES

Objectives 1.1 and 1.2. Written work, and the only section you can do on a train.

- | | | |
|----|---|-----|
| 1. | Write what hyperconverged storage is, in one sentence, without using the word hyperconverged. | 1.1 |
| 2. | Write what traditional external storage is, in the same way. | 1.1 |
| 3. | Build a table comparing the two on scaling, failure domains, cost and operational ownership. | 1.1 |
| 4. | Record who owns storage in each model, and which team gets paged at night. | 1.1 |
| 5. | Given a greenfield site with no storage team, choose an architecture and justify it. | 1.2 |
| 6. | Given an estate with an existing array and three years left on support, choose and justify. | 1.2 |
| 7. | Write the one requirement that would overturn each of those two answers. | 1.2 |

B. SUPPORTED STORAGE TYPES

Objective 1.3. Five technologies, and the use case each one wins.

- | | | |
|-----|---|-----|
| 8. | Write what vSAN is and the use case it wins. | 1.3 |
| 9. | Write what iSCSI is and when you would still choose it. | 1.3 |
| 10. | Write what NFS is and the workload that suits it. | 1.3 |
| 11. | Write what Fibre Channel is and what justifies its cost. | 1.3 |
| 12. | Write what NVMe over Fabrics brings, and what it demands of the network. | 1.3 |
| 13. | Record which of these VCF supports as principal storage and which as supplemental. | 1.3 |
| 14. | Build one table: protocol, typical latency, failure domain, and what it needs from the network. | 1.3 |
| 15. | Given a latency-sensitive database, pick a storage type and defend it against the other four. | 1.3 |

C. VSAN OSA AND ESA

Objective 2.1. Get this wrong and a third of the exam goes with it.

- | | | |
|-----|---|-----|
| 16. | Draw the OSA data path, from guest write to capacity tier. | 2.1 |
| 17. | Draw the ESA data path, and mark where it differs. | 2.1 |
| 18. | Write what a disk group is, and record that ESA does not have them. | 2.1 |
| 19. | Record the device requirements for each architecture. | 2.1 |
| 20. | Record how compression works in each, and what is always on in ESA. | 2.1 |
| 21. | Record how deduplication differs between the two. | 2.1 |
| 22. | Record which RAID levels each supports, and the host count each needs. | 2.1 |
| 23. | Record which features are ESA only, and keep that list where you will see it. | 2.1 |
| 24. | Given an existing OSA cluster, write what moving to ESA would actually involve. | 2.1 |

D. VSAN COMPONENTS

Objective 2.2. The vocabulary every other objective assumes.

- | | | |
|-----|--|-----|
| 25. | Draw a vSAN cluster and label every component it is made of. | 2.2 |
| 26. | Write what an object is in vSAN, and list the object types. | 2.2 |

- | | | |
|-----|--|-----|
| 27. | Write what a component is, and how an object becomes several of them. | 2.2 |
| 28. | Record what a witness component does and why an object needs an odd number of votes. | 2.2 |
| 29. | Open an existing virtual machine and map its objects and components by hand. | 2.2 |
| 30. | Record where the vSAN traffic runs and what that VMkernel port needs. | 2.2 |
| 31. | Record what CLOM, DOM, LSOM and CMMDS each do, in one line each. | 2.2 |
| 32. | Record the storage pool in ESA and how it differs from a disk group. | 2.2 |
| 33. | Record the maximum component count per host for your version, and why it matters. | 2.2 |

E. PRINCIPAL AND SUPPLEMENTAL STORAGE

Objective 2.3. A VCF-specific distinction that catches people out.

- | | | |
|-----|--|-----|
| 34. | Write what principal storage means in a VCF workload domain cluster. | 2.3 |
| 35. | Write what supplemental storage means. | 2.3 |
| 36. | Record which storage types VCF accepts as principal, and which only as supplemental. | 2.3 |
| 37. | Record when principal storage is chosen, and whether it can be changed afterwards. | 2.3 |
| 38. | Open your own workload domain and record what is principal and what is supplemental. | 2.3 |
| 39. | Record what the management domain requires, and whether that differs. | 2.3 |
| 40. | Given a cluster that must present both vSAN and an existing array, write how you would build it. | 2.3 |

F. ADVANCED VSAN FEATURES

Objective 2.4. Know what each one is for before you are asked to configure it.

- | | | |
|-----|--|-----|
| 41. | List the advanced vSAN services and write one line on each. | 2.4 |
| 42. | Record the use case for vSAN File Service. | 2.4 |
| 43. | Record the use case for the vSAN iSCSI Target Service. | 2.4 |
| 44. | Record the use case for vSAN Data Protection, and which architecture it needs. | 2.4 |
| 45. | Record the use case for a stretched cluster, and what it does not protect against. | 2.4 |
| 46. | Record the use case for a two-node cluster. | 2.4 |
| 47. | Record the use case for cross-cluster capacity sharing. | 2.4 |
| 48. | Record the use case for data-at-rest encryption. | 2.4 |
| 49. | Mark which of these your own estate actually uses, and which you have only read about. | 2.4 |

G. DATASTORES AND SUPERVISOR STORAGE

Objectives 2.5 and 2.6. Where storage meets the rest of the platform.

- | | | |
|-----|--|-----|
| 50. | Write what a datastore is and list the types VCF supports. | 2.5 |
| 51. | Write what a datastore cluster is and what it gives you. | 2.5 |
| 52. | Record what Storage DRS does, and what it must not do to a vSAN datastore. | 2.5 |
| 53. | Record the components of a supported storage solution, end to end. | 2.5 |
| 54. | Write how storage is presented to a vSphere Supervisor. | 2.6 |
| 55. | Record what a storage policy becomes on the Kubernetes side. | 2.6 |

- | | | |
|-----|--|-----|
| 56. | Record what a persistent volume maps to underneath. | 2.6 |
| 57. | Open a namespace and trace one persistent volume down to its vSAN objects. | 2.6 |

H. DESIGNING A VSAN SOLUTION

Objective 3.1. Written design work, with no console open.

- | | | |
|-----|--|-----|
| 58. | Read a requirements scenario and separate requirements from constraints and assumptions. | 3.1 |
| 59. | Record the availability requirement and turn it into a failures to tolerate number. | 3.1 |
| 60. | Choose OSA or ESA for the scenario and justify it in three sentences. | 3.1 |
| 61. | Choose a fault tolerance method and record what it costs in usable capacity. | 3.1 |
| 62. | Design the network for the cluster, and record the bandwidth it needs. | 3.1 |
| 63. | Decide the host count, and record what drives it. | 3.1 |
| 64. | Record the design decisions you made, each with its justification and its risk. | 3.1 |
| 65. | Write what you would change if the budget were cut by a quarter. | 3.1 |
| 66. | Write what you would change if the availability requirement doubled. | 3.1 |

I. SIZING A VSAN SOLUTION

Objective 3.2. Arithmetic, and the place guesses get found out.

- | | | |
|-----|---|-----|
| 67. | Record the raw capacity of one host, and of the cluster. | 3.2 |
| 68. | Apply the fault tolerance method and record the usable capacity. | 3.2 |
| 69. | Record the slack space the design needs and why. | 3.2 |
| 70. | Record what compression and deduplication do to your sizing, and whether you may count on them. | 3.2 |
| 71. | Size for the failure of one host, and record what must stay free. | 3.2 |
| 72. | Record the effect of a storage policy change on an already sized cluster. | 3.2 |
| 73. | Size the same workload under RAID-1 and under RAID-5, and compare. | 3.2 |
| 74. | Record what you would tell a customer who sized on raw capacity. | 3.2 |
| 75. | Produce one sizing you would put your name to, with every assumption listed. | 3.2 |

J. DESIGNING NON-VSAN STORAGE

Objective 3.3. The half of design that is not vSAN.

- | | | |
|-----|---|-----|
| 76. | Read a scenario that rules out vSAN, and record why it is ruled out. | 3.3 |
| 77. | Choose a storage protocol for it and justify the choice. | 3.3 |
| 78. | Design the path from host to array, including multipathing. | 3.3 |
| 79. | Record the multipathing policy you chose and what the array vendor recommends. | 3.3 |
| 80. | Record how many paths each host needs and what a single point of failure would look like. | 3.3 |
| 81. | Design the datastore layout: how many, how big, and why. | 3.3 |
| 82. | Record what the design needs from the storage team, in their language. | 3.3 |
| 83. | Write the one thing most likely to be missed at implementation. | 3.3 |

K. DEPLOYING A VSAN CLUSTER

Objective 4.1. Section 4 begins, eighteen objectives of build work.

- | | | |
|-----|---|-----|
| 84. | Record the prerequisites for a vSAN cluster in a VCF workload domain. | 4.1 |
| 85. | Check the hardware against the compatibility list and record anything that fails. | 4.1 |
| 86. | Configure the vSAN VMkernel networking and confirm it is working. | 4.1 |
| 87. | Deploy a vSAN cluster within a workload domain. | 4.1 |
| 88. | Record each decision the deployment asked for. | 4.1 |
| 89. | Confirm the datastore is created and its capacity matches what you expected. | 4.1 |
| 90. | Run the health checks and resolve or record every warning. | 4.1 |
| 91. | Record how long the deployment took, end to end. | 4.1 |
| 92. | Record what you would check first if the cluster formed but the datastore was undersized. | 4.1 |

L. STRETCHED CLUSTERS

Objectives 4.2 and 4.14. The build and the day after.

- | | | |
|------|--|------|
| 93. | Draw a stretched cluster: both sites, the witness, and the traffic between them. | 4.2 |
| 94. | Record the latency and bandwidth requirements for each link. | 4.2 |
| 95. | Record what the witness is, where it goes, and what it must not be. | 4.2 |
| 96. | Deploy a vSAN stretched cluster within a workload domain. | 4.2 |
| 97. | Configure the fault domains and confirm each host landed in the right one. | 4.2 |
| 98. | Create a storage policy with site mirroring and apply it. | 4.2 |
| 99. | Record what secondary failures to tolerate does within a site. | 4.2 |
| 100. | Fail one site deliberately and record what happened to the workloads. | 4.14 |
| 101. | Recover the site and record how long resynchronisation took. | 4.14 |
| 102. | Fail the witness and record what still works and what does not. | 4.14 |
| 103. | Record the Day 2 tasks specific to a stretched cluster, and who performs them. | 4.14 |

M. TWO-NODE CLUSTERS

Objective 4.3. Small, awkward, and on the exam.

- | | | |
|------|--|-----|
| 104. | Record what a two-node cluster is for and where it is typically deployed. | 4.3 |
| 105. | Record what the witness does here and where it can live. | 4.3 |
| 106. | Record the networking options, including direct connect between the nodes. | 4.3 |
| 107. | Deploy a two-node vSAN cluster. | 4.3 |
| 108. | Confirm the witness is working and the objects are placed as you expected. | 4.3 |
| 109. | Record what happens when one node fails. | 4.3 |
| 110. | Record what happens when the witness fails. | 4.3 |
| 111. | Record the storage policy limits of a two-node cluster. | 4.3 |

N. STORAGE POLICIES

Objective 4.15. The control surface for everything vSAN does.

- | | | |
|------|---|------|
| 112. | List the rules a vSAN storage policy can contain. | 4.15 |
|------|---|------|

113.	Create a policy with a failures to tolerate setting and apply it.	4.15
114.	Create a policy using RAID-5 or RAID-6 and record the host count it needs.	4.15
115.	Configure disk striping in a policy and record what it changes.	4.15
116.	Configure an IOPS limit and prove it is enforced.	4.15
117.	Configure a space reservation and record its effect on the datastore.	4.15
118.	Apply a new policy to a running virtual machine and watch the resynchronisation.	4.15
119.	Record how much data moved and how long it took.	4.15
120.	Record what happens when a policy cannot be satisfied.	4.15
121.	Record which policy is the default and where that is set.	4.15

O. VSAN ENCRYPTION

Objective 4.7. Key management is the part that goes wrong.

122.	Record the difference between data-at-rest encryption and data-in-transit encryption.	4.7
123.	Record the key provider options and what each one requires.	4.7
124.	Configure a key provider and confirm it is trusted and available.	4.7
125.	Enable vSAN data-at-rest encryption on a cluster.	4.7
126.	Record what happened to the existing data, and how long it took.	4.7
127.	Record the difference in how OSA and ESA perform encryption.	4.7
128.	Perform a shallow rekey and record what it did.	4.7
129.	Record what a deep rekey does instead, and what it costs.	4.7
130.	Record what happens to the cluster if the key provider is unreachable at boot.	4.7

P. VSAN FILE SERVICE

Objectives 4.8 and 4.17. A file server built out of the cluster you already have.

131.	Record what vSAN File Service provides and which protocols it supports.	4.8
132.	Record its prerequisites, including the network and the addresses it needs.	4.8
133.	Configure the vSAN File Service on a cluster.	4.8
134.	Record what it deployed, including the agent virtual machines.	4.8
135.	Confirm the service is healthy and the file service domain is configured.	4.8
136.	Create an NFS file share and mount it from a client.	4.17
137.	Create an SMB file share and record what authentication it needed.	4.17
138.	Apply a storage policy and a quota to a share.	4.17
139.	Record how share permissions and access control are managed.	4.17

Q. VSAN ISCSI TARGET SERVICE

Objective 4.9. Block storage out of vSAN, for the things that need it.

140.	Record what the vSAN iSCSI Target Service is for, and what it is not for.	4.9
141.	Record its prerequisites and the network it needs.	4.9
142.	Enable the iSCSI Target Service on a cluster.	4.9
143.	Create a target and record what it asked for.	4.9
144.	Create a LUN within the target and apply a storage policy to it.	4.9
145.	Configure an initiator group and add an initiator to it.	4.9

- | | | |
|------|---|-----|
| 146. | Connect from a client and confirm the LUN is usable. | 4.9 |
| 147. | Record what authentication options exist and configure one. | 4.9 |

R. VSAN DATA PROTECTION

Objectives 4.4, 4.10 and 4.16. Native snapshots, and the architecture they need.

- | | | |
|------|--|------|
| 148. | Record what vSAN Data Protection provides, and which architecture it requires. | 4.4 |
| 149. | Record its prerequisites, including what must be deployed first. | 4.4 |
| 150. | Deploy the vSAN Data Protection components. | 4.4 |
| 151. | Confirm it is registered and healthy. | 4.4 |
| 152. | Configure vSAN Data Protection on a cluster. | 4.10 |
| 153. | Record how its snapshots differ from ordinary virtual machine snapshots. | 4.10 |
| 154. | Create a protection group and add workloads to it. | 4.16 |
| 155. | Create a recovery plan with a schedule and a retention. | 4.16 |
| 156. | Take a snapshot and record where it is stored and what it consumed. | 4.16 |
| 157. | Restore a workload from a snapshot and time the recovery. | 4.16 |

S. CAPACITY SHARING AND STORAGE CLUSTERS

Objective 4.6. Disaggregation, and the newest thing in this blueprint.

- | | | |
|------|---|-----|
| 158. | Write what vSAN cross-cluster capacity sharing does, in one sentence. | 4.6 |
| 159. | Write what a vSAN storage cluster is and how it differs from a normal cluster. | 4.6 |
| 160. | Record the requirements for both, including version and networking. | 4.6 |
| 161. | Configure cross-cluster capacity sharing between two clusters. | 4.6 |
| 162. | Mount the remote datastore on the client cluster and confirm it is usable. | 4.6 |
| 163. | Deploy a workload onto the shared capacity and record where its objects live. | 4.6 |
| 164. | Record what happens to the client cluster if the server cluster is unavailable. | 4.6 |
| 165. | Record when you would design for this, and when you would not. | 4.6 |

T. NON-VSAN STORAGE IN VCF

Objectives 4.5, 4.11 and 4.12. The other half of section 4.

- | | | |
|------|---|------|
| 166. | Record what VCF supports as principal storage for a non-vSAN workload domain cluster. | 4.5 |
| 167. | Record the prerequisites the storage must meet before VCF will accept it. | 4.5 |
| 168. | Deploy a workload domain cluster backed by non-vSAN storage. | 4.5 |
| 169. | Record each decision the deployment asked for, and how it differed from vSAN. | 4.5 |
| 170. | Present a new LUN or export to the hosts and rescan. | 4.11 |
| 171. | Create a datastore on it and confirm every host can see it. | 4.11 |
| 172. | Record the multipathing policy in use and change it deliberately. | 4.11 |
| 173. | Create a datastore cluster and add datastores to it. | 4.12 |
| 174. | Configure Storage DRS and record the automation level you chose. | 4.12 |
| 175. | Record what Storage DRS will and will not move, and what it needs to do so. | 4.12 |

U. DAY 2 ADMINISTRATION

Objectives 4.13 and 4.18. The work that fills the years after the build.

- | | | |
|------|--|------|
| 176. | List the Day 2 tasks a vSAN cluster needs, and how often each one is due. | 4.13 |
| 177. | Put a host into maintenance mode and record every data evacuation option. | 4.13 |
| 178. | Choose one option, run it, and record how much data moved. | 4.13 |
| 179. | Add a host to the cluster and confirm the capacity and components rebalanced. | 4.13 |
| 180. | Remove a disk or storage device and record what the cluster did. | 4.13 |
| 181. | Update vSAN as part of a cluster upgrade and record the order it enforced. | 4.13 |
| 182. | Record where resynchronisation is monitored and what a healthy one looks like. | 4.13 |
| 183. | Grow a non-vSAN datastore and confirm the hosts see the new size. | 4.18 |
| 184. | Unmount and detach a datastore cleanly, in the right order. | 4.18 |

V. MONITORING STORAGE

Objectives 5.1 and 5.2. Section 5 begins.

- | | | |
|------|--|-----|
| 185. | List the tools VCF gives you for monitoring vSAN and write what each is for. | 5.1 |
| 186. | Run the vSAN health checks and record every category they cover. | 5.1 |
| 187. | Open vSAN performance and record the metrics that matter at each layer. | 5.1 |
| 188. | Find the capacity view and record what it reports beyond used and free. | 5.1 |
| 189. | Set up a vSAN alert or alarm and trigger it. | 5.1 |
| 190. | Monitor a non-vSAN datastore and record which metrics are available. | 5.2 |
| 191. | Record what you can see about the array from VCF, and what you cannot. | 5.2 |
| 192. | Record which monitoring question needs the storage team, and what to ask them for. | 5.2 |

W. TROUBLESHOOTING STORAGE

Objectives 5.3 and 5.4. Create each fault, then diagnose it.

- | | | |
|------|--|-----|
| 193. | Write your diagnostic order for a vSAN performance complaint. | 5.3 |
| 194. | Break vSAN networking on one host and diagnose it from the symptoms. | 5.3 |
| 195. | Record what the health checks reported and how quickly. | 5.3 |
| 196. | Cause an object to become non-compliant and resolve it. | 5.3 |
| 197. | Cause a resynchronisation and diagnose why it is running. | 5.3 |
| 198. | Fill a vSAN datastore past a threshold and record what the cluster did. | 5.3 |
| 199. | Record what a failed capacity device looks like, and the recovery steps. | 5.3 |
| 200. | Break a path to a non-vSAN datastore and observe the failover. | 5.4 |
| 201. | Record what an all paths down event looks like, and how it differs from permanent device loss. | 5.4 |
| 202. | Diagnose a datastore that will not mount on one host only. | 5.4 |
| 203. | Write the five questions you would ask before escalating a storage problem. | 5.4 |

X. AGAINST THE CLOCK

Do this section twice in the final week, from a clean start, timing yourself.

- | | | |
|------|---|-----|
| 204. | Write the OSA against ESA comparison table from memory. 10 minutes. | 2.1 |
|------|---|-----|

205.	Size a vSAN cluster for a stated requirement, showing your working. 25 minutes.	3.2
206.	Deploy a vSAN cluster in a workload domain and pass the health checks. 30 minutes.	4.1
207.	Create three storage policies and apply one to a running workload. 20 minutes.	4.15
208.	Configure a stretched cluster fault domain layout and a site mirroring policy. 25 minutes.	4.2
209.	Enable encryption with a key provider, then perform a shallow rekey. 25 minutes.	4.7
210.	Configure File Service and publish an NFS share a client can mount. 30 minutes.	4.8
211.	Configure the iSCSI Target Service and connect an initiator. 25 minutes.	4.9
212.	Configure Data Protection and restore one workload from a snapshot. 30 minutes.	4.16
213.	Put a host in maintenance mode with full data migration and bring it back. 20 minutes.	4.13
214.	Diagnose one vSAN fault and one non-vSAN fault that somebody else created. 25 minutes.	5.3