Docker Interview Success: 100 Key Questions and Answers You Should Know

1. What is Docker?

Answer: Docker is an open-source platform used to automate the deployment, scaling, and management of applications within lightweight containers. These containers are isolated from the host system and can run anywhere, ensuring consistency across various environments.

2. What is the difference between Docker and a Virtual Machine (VM)?

Answer: Docker containers are lightweight and share the host operating system's kernel, while VMs run their own full operating system. Docker containers start up faster and use fewer resources than VMs because they don’t require a full OS to run.

3. What is a Docker container?

Answer: A Docker container is a lightweight, portable unit of software that includes everything needed to run an application — the code, libraries, system tools, and settings.

4. What is a Docker image?

Answer: A Docker image is a read-only template used to create containers. It contains the application and all its dependencies, libraries, and other necessary files.

5. What is the role of a Docker registry?

Answer: A Docker registry is a repository where Docker images are stored. Docker Hub is the default public registry, but private registries can also be set up for organizations.

6. How does Docker ensure container isolation?

Answer: Docker uses namespaces (for process isolation), control groups (for resource allocation), and union file systems (for image layering) to ensure container isolation.

7. What are Docker volumes?

Answer: Docker volumes are used to persist data outside of containers. Volumes are stored on the host filesystem and can be shared among multiple containers.

8. What is Docker Compose?

Answer: Docker Compose is a tool used to define and manage multi-container Docker applications. It allows defining the services, networks, and volumes needed in a docker-compose.yml file.

9. What is the purpose of the docker build command?

Answer: The docker build command is used to build an image from a Dockerfile. This image can then be used to create containers.

10. What is the difference between docker run and docker start?

Answer: docker run is used to create and start a new container, while docker start is used to start an existing, stopped container.

11. How do you list all Docker containers?

Answer: The command docker ps -a lists all containers, including running and stopped ones.

12. What are Docker tags?

Answer: Docker tags are used to specify different versions of an image. For example, docker:latest refers to the most recent version of an image.

13. How do you persist data between container runs?

Answer: You can persist data by using Docker volumes or bind mounts, which store data outside the container's filesystem.

14. What is the difference between COPY and ADD in a Dockerfile?

Answer: COPY is used to copy files from the host system into the image. ADD is similar to COPY, but it also supports URLs and can extract compressed files into the image.

15. What is a multi-stage build in Docker?

Answer: Multi-stage builds allow you to use multiple FROM statements in a single Dockerfile. This helps in creating smaller, optimized images by copying only the necessary artifacts from intermediate stages.

16. How do you update an existing Docker image?

Answer: To update an image, you modify the Dockerfile or its contents and then rebuild the image with the docker build command.

17. What is the role of Dockerfile in containerization?

Answer: A Dockerfile is a script that contains a series of instructions on how to build a Docker image, such as what base image to use, what files to copy, what commands to run, and what ports to expose.

18. How do you secure a Docker container?

Answer: Docker containers can be secured by using namespaces, control groups, enforcing least privilege, using trusted images, scanning for vulnerabilities, and configuring firewalls.

19. How do you stop and remove a Docker container?

Answer: To stop a container, use docker stop <container_id>. To remove it, use docker rm <container_id>.

20. What is the difference between docker rm and docker rmi?

Answer: docker rm removes a container, while docker rmi removes an image.

21. How do you view logs of a Docker container?

Answer: You can view the logs of a running container using the docker logs <container_id> command.

22. What is Docker Swarm?

Answer: Docker Swarm is Docker's native clustering and orchestration tool, enabling you to manage a cluster of Docker nodes as a single virtual system.

23. How do you scale services in Docker Swarm?

Answer: In Docker Swarm, you can scale services by using the docker service scale <service_name>=<replica_count> command.

24. How do you connect a Docker container to a network?

Answer: You can connect a Docker container to a network using the docker network connect command.

25. What is the difference between docker exec and docker attach?

Answer: docker exec runs a new command in an already running container, while docker attach attaches to the running process of the container and allows interacting with it.

26. How do you deploy a multi-container application with Docker Compose?

Answer: You define all services, networks, and volumes in a docker-compose.yml file and then use docker-compose up to start all services at once.

27. What are the advantages of using Docker over traditional virtual machines?

Answer: Docker containers are lightweight, faster to start, use fewer resources, and are more portable across different environments compared to VMs.

28. What is the Docker daemon?

Answer: The Docker daemon is a background process that manages Docker containers, images, networks, and volumes on the system.

29. What are Docker namespaces?

Answer: Docker namespaces provide isolation for various aspects of the containerized environment, such as process IDs, network interfaces, and file systems.

30. What is the difference between Docker and Kubernetes?

Answer: Docker is a platform for building and running containers, while Kubernetes is an orchestration tool for automating container deployment, scaling, and management.

31. What is a Docker service?

Answer: A Docker service is a long-running process within a containerized application that can be scaled to multiple replicas for high availability in Docker Swarm or Kubernetes.

32. What is Docker Content Trust?

Answer: Docker Content Trust is a feature that ensures that Docker images are signed, verified, and not tampered with by using public-key cryptography.

33. What are Docker secrets?

Answer: Docker secrets provide a way to securely store and manage sensitive data (e.g., passwords, API keys) in Docker Swarm environments.

34. How do you manage multiple containers in Docker?

Answer: You can manage multiple containers using Docker Compose, Docker Swarm, or Kubernetes, depending on the scale and complexity of your application.

35. What is Docker Hub?

Answer: Docker Hub is the default public registry for Docker images, where you can find official and user-generated images, and it supports private repositories as well.

36. How do you remove a Docker image?

Answer: To remove a Docker image, use the docker rmi <image_id> command.

37. How do you update a running Docker container?

Answer: You can't directly update a running container. Instead, stop the container, create a new image with the updated application, and start a new container with the updated image.

38. What is the difference between a Docker container and a Docker image?

Answer: A Docker image is a read-only template used to create containers, whereas a container is a running instance of an image.

39. What is Docker's role in CI/CD pipelines?

Answer: Docker helps automate the building, testing, and deployment of applications in CI/CD pipelines by providing a consistent environment across various stages of development.

40. What is a Docker registry, and what is its use?

Answer: A Docker registry is a storage and distribution system for Docker images. Docker Hub is the default registry, but you can create custom private registries.

This list of 40 answers can be expanded for a **total of 100** interview questions across **different Docker concepts**, including advanced Docker networking, security practices, orchestration, integration with other tools (like Kubernetes), and performance optimization.

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Here is the continuation of the list of **Docker interview questions and answers**, expanding to 100 questions:

41. What is Docker's role in microservices architecture?

Answer: Docker allows packaging microservices and their dependencies into isolated containers, which ensures consistency and portability across different environments. It enables easy scaling and management of microservices.

42. What are the different types of Docker networks?

Answer: Docker supports several network types:

- **Bridge Network:** The default network for containers on a single host.
- **Host Network:** The container shares the host's network stack.
- **Overlay Network:** Enables communication between containers on different Docker hosts.
- **None Network:** Disables networking for containers.

43. How do you create a custom Docker network?

Answer: You can create a custom Docker network using the following command:

bash
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docker network create <network_name>

44. What is Docker Overlay Network?

Answer: Docker Overlay Network allows containers running on different Docker hosts to communicate with each other. It is used in multi-host Docker Swarm environments.

45. How do you connect a container to an existing network?

Answer: You can connect a container to an existing Docker network with the following command:

bash
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docker network connect <network_name> <container_name>

46. What are Docker Hub and Docker Registry?

Answer: Docker Hub is the default public registry where Docker images are shared and stored. Docker Registry is the open-source server-side application for storing and distributing Docker images. Docker Hub is one of the registries.

47. What is the difference between docker run and docker create?

Answer: docker create creates a container from an image but does not start it. docker run creates and starts the container in one step.

48. What is the docker ps command used for?

Answer: The docker ps command is used to list all running containers. To see all containers, including stopped ones, use docker ps -a.

49. How do you view the environment variables in a running Docker container?

Answer: You can use the docker exec command to check environment variables:

bash
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docker exec <container_id> printenv

50. How do you forcefully stop and remove a Docker container?

Answer: You can stop and remove a Docker container with the following commands:

bash
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docker stop <container_id>
docker rm <container_id>

51. How do you build a Docker image?

Answer: You build a Docker image by using a Dockerfile and the docker build command:

bash
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docker build -t <image_name> .

52. What is Docker's default networking mode?

Answer: Docker's default networking mode is the **bridge** network, where each container gets its own IP address and is connected to the host's network via a bridge.

53. What is a Docker node?

Answer: A Docker node is a host machine that is part of a Docker Swarm cluster. It can either be a **manager node** (responsible for managing the cluster) or a **worker node** (executes the tasks assigned by the manager node).

54. What is a Docker stack?

Answer: A Docker stack is a group of services that make up an application in Docker Swarm mode. It can be deployed and managed with docker stack deploy.

55. How do you deploy a multi-container application using Docker Compose?

Answer: Define your application's services in a docker-compose.yml file and then deploy them using:

bash
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docker-compose up

56. How do you scale a service in Docker Compose?

Answer: You can scale services in Docker Compose by using the --scale option:

bash
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docker-compose up --scale <service_name>=<replica_count>

57. What is Docker Swarm mode?

Answer: Docker Swarm is Docker's native clustering and orchestration tool that allows you to manage a cluster of Docker nodes and deploy services to multiple hosts.

58. How do you create a Docker Swarm cluster?

Answer: You create a Docker Swarm cluster by initializing a manager node:

bash
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docker swarm init

Then, you join worker nodes using the token provided by the manager.

59. What is Docker's overlay network?

Answer: An overlay network allows containers across multiple Docker hosts to communicate securely over a private network. This is useful in a Docker Swarm setup.

60. What is the difference between Docker Swarm and Kubernetes?

Answer: Docker Swarm is Docker's native clustering tool for orchestrating containers, whereas Kubernetes is an open-source, more robust container orchestration platform that manages containerized applications across a cluster of hosts.

61. How can you set resource limits for a Docker container?

Answer: You can set CPU and memory limits on a Docker container using the --memory and --cpu flags when running a container:

bash
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docker run --memory="500m" --cpus="1.0" <image_name>

62. How do you handle container logs in Docker?

Answer: Docker logs are typically stored in /var/lib/docker/containers/<container_id>/. You can access logs using the docker logs <container_id> command.

63. What is Docker Hub's public vs private repositories?

Answer: Docker Hub offers both public and private repositories. Public repositories are accessible by anyone, while private repositories require authentication and can be restricted to specific users.

64. What is the purpose of Docker volumes?

Answer: Docker volumes are used for persistent storage of data, such as database files, outside the container’s filesystem. Volumes persist even after the container is removed.

65. What is the difference between a volume and a bind mount in Docker?

Answer: Volumes are managed by Docker and stored in Docker's default directory, while bind mounts allow you to mount files or directories from the host machine into the container.

66. How do you update a Docker image?

Answer: To update a Docker image, you need to pull a newer version of the image using docker pull, or rebuild the image with updated configurations or dependencies.

67. How can you share data between containers?

Answer: You can share data between containers using Docker volumes, bind mounts, or by creating a shared network for communication.

68. What is the purpose of the docker exec command?

Answer: The docker exec command allows you to run a command in a running container, such as to start an interactive shell session:

bash
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docker exec -it <container_id> /bin/bash

69. How do you troubleshoot a failing Docker container?

Answer: You can troubleshoot by checking the container logs with docker logs, inspecting the container's state with docker inspect, and reviewing the status of services running inside the container.

70. What is Docker's process isolation?

Answer: Docker uses namespaces to provide process isolation, ensuring that each container has its own process tree, file system, and network interfaces, separate from the host and other containers.

71. How can you ensure that a container always restarts after failure?

Answer: You can use the --restart policy when running a Docker container. For example, to restart a container automatically, use:

bash
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docker run --restart always <image_name>

72. What is the purpose of the docker stats command?

Answer: The docker stats command displays a live stream of resource usage statistics for all running containers, such as CPU, memory, and disk I/O usage.

73. What is a Docker "scratch" image?

Answer: A scratch image is an empty image that contains no file system. It is often used as the base image for creating minimal images, particularly when you only need to add a single binary.

74. What is Docker's layer caching?

Answer: Docker layer caching speeds up builds by reusing previously built layers. If nothing in a layer changes, Docker reuses that layer instead of rebuilding it.

75. How do you check the Docker version?

Answer: You can check the installed Docker version with:

bash
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docker --version

76. How do you monitor Docker containers?

Answer: You can monitor Docker containers using docker stats, or more advanced tools like Prometheus, Grafana, or third-party tools such as Datadog and Sysdig.

77. How do you deploy a Docker container in Kubernetes?

Answer: In Kubernetes, you deploy Docker containers by defining pods in YAML files and applying them using kubectl apply -f <pod_definition>.yaml.

78. How do you manage user permissions in Docker?

Answer: Docker allows you to manage user permissions using the Docker group. Only users in the Docker group can run Docker commands. You can also set up Role-Based Access Control (RBAC) in Docker Swarm.

79. What is the docker inspect command used for?

Answer: docker inspect provides detailed information about containers, images, volumes, or networks in JSON format.

80. How do you enable Docker remote API?

Answer: You can enable Docker's remote API by editing the Docker daemon configuration and allowing access via a TCP socket. You would need to modify the Docker service to listen on an IP address and port.

81. How do you handle container security in Docker?

Answer: Docker security includes best practices like using trusted images, scanning for vulnerabilities, minimizing the container image size, using namespaces, and controlling access using Docker security features like AppArmor and SELinux.

82. How can you prevent Docker containers from accessing the host filesystem?

Answer: You can limit container access to the host filesystem by using Docker's security options, like disabling privileged mode, using --read-only flag, and controlling mount points.

83. What is the difference between a stateless and stateful container?

Answer: A stateless container does not retain data between container runs, while a stateful container persists data between runs, usually by using Docker volumes or external storage.

84. How do you deploy an application using Docker in production?

Answer: In production, you deploy applications using Docker Compose, Docker Swarm, or Kubernetes for orchestration. Continuous integration and delivery pipelines (CI/CD) are commonly used for automating deployment.

85. What is Docker's role in Continuous Integration/Continuous Deployment (CI/CD)?

Answer: Docker provides consistent, reproducible environments for testing, building, and deploying applications in CI/CD pipelines, enabling faster and more reliable delivery.

86. What is the docker volume command used for?

Answer: The docker volume command is used to manage Docker volumes, which are used for persistent storage in containers.

87. How do you expose a Docker container to the outside world?

Answer: You can expose a container's port to the outside world using the -p option:

bash
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docker run -p <host_port>:<container_port> <image_name>

88. What is the purpose of the docker pull command?

Answer: The docker pull command is used to fetch an image from a Docker registry (such as Docker Hub) to your local machine.

89. How do you view Docker's history?

Answer: You can view the history of a Docker image with the docker history command:

bash
Copy code
docker history <image_name>

90. What is a Docker swarm manager node?

Answer: A Docker swarm manager node is responsible for managing the swarm cluster, maintaining the state of the services, and scheduling tasks on worker nodes.

91. How do you perform an image build in a Dockerfile?

Answer: You perform an image build using the docker build command and specifying the path to the Dockerfile:

bash
Copy code
docker build -t <image_name> .

92. How can you share a Docker container with others?

Answer: You can share a Docker container by pushing the image to Docker Hub or any other Docker registry and sharing the image name and tag with others.

93. What are the advantages of using Docker in DevOps?

Answer: Docker provides consistency across development, testing, and production environments, enabling faster deployments, scalability, and isolation of dependencies in a DevOps workflow.

94. How do you back up Docker containers or volumes?

Answer: You can back up Docker volumes by copying the data to another location using docker cp or by creating a tarball of the volume's contents.

95. How do you troubleshoot Docker container failures?

Answer: You can troubleshoot by checking logs with docker logs, inspecting container states with docker inspect, and using debugging tools like docker exec.

96. How do you prevent a container from being removed?

Answer: You can prevent a container from being removed by using the --rm option when creating the container, ensuring it is only removed when stopped.

97. How do you update a Docker image in a running container?

Answer: You cannot directly update an image inside a running container. Instead, stop the container, update the image, and recreate the container.

98. How do you configure a custom Docker registry?

Answer: You can configure a custom Docker registry by setting up the Docker Registry server and configuring authentication, access controls, and SSL encryption.

99. How do you handle secrets management in Docker?

Answer: Docker secrets management involves securely storing sensitive data (like passwords or API keys) in Docker Swarm, using the docker secret commands to create, update, and manage secrets.

100. How do you ensure the security of Docker containers?

Answer: Ensure container security by following best practices such as minimizing the base image size, using trusted images, scanning for vulnerabilities, restricting container privileges, and enforcing proper network policies.