Docker

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◆ **Basic Docker Interview Questions**

1. What is Docker?

Answer:
Docker is an open-source platform that automates the deployment of applications inside lightweight, portable containers. Containers package the application with all its dependencies, ensuring it runs consistently across environments.

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2. What is the difference between a virtual machine (VM) and a Docker container?

Answer:

- **VM:** Runs a full OS with its own kernel, heavy, slower to start.

- **Container:** Shares the host OS kernel, lightweight, faster, uses fewer resources.

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3. What is a Docker image?

Answer:
A Docker image is a **read-only template** that contains application code, libraries, and dependencies. It is used to create Docker containers.

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4. What is a Docker container?

Answer:
A container is a **runtime instance of a Docker image**. It is isolated, portable, and runs the packaged application.

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5. What is the difference between Docker image and Docker container?

Answer:

- **Image:** Blueprint or template (read-only).

- **Container:** Running instance of an image (read-write).

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6. What is a Dockerfile?

Answer:
A Dockerfile is a text file with instructions to build a Docker image (e.g., base image, copy files, install dependencies, expose ports, run commands).

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7. What are Docker volumes?

Answer:
Volumes are used to **persist data** generated by containers. Even if a container is deleted, the volume data remains.

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8. What is Docker Hub?

Answer:
Docker Hub is a cloud-based registry where Docker images can be stored, shared, and downloaded.

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9. What are the advantages of Docker?

Answer:

- Lightweight and portable.

- Consistent environment across dev, test, and production.

- Faster deployment.

- Efficient resource usage.

◆ Intermediate Docker Questions

10. What is the difference between CMD and ENTRYPOINT in Docker?

Answer:

- **CMD:** Provides default command/arguments for the container. Can be overridden at runtime.

- **ENTRYPOINT:** Defines the main command that always runs. CMD can supply arguments to it.

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

Answer:

- **COPY:** Copies files/folders from host to image.

- **ADD:** Same as COPY but also supports extracting tar files and downloading from URLs.

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12. What is Docker Compose?

Answer:
Docker Compose is a tool for defining and running **multi-container applications** using a `docker-compose.yml` file. Example: a web app + database.

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

Answer:

- **Docker Swarm:** Docker's native clustering tool, simple but limited.

- **Kubernetes:** Industry-standard container orchestration tool, more complex, scalable, and feature-rich.

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14. What are Docker namespaces?

Answer:
Namespaces provide **isolation** in Docker. They ensure processes, networking, users, and mounts in a container are separated from others.

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15. What are Docker cgroups (control groups)?

Answer:
Cgroups limit and isolate the **CPU, memory, and network resources** used by containers.

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16. What is the difference between bind mounts and volumes?

Answer:

- **Bind Mounts:** Map a specific host directory to a container.

- **Volumes:** Managed by Docker, stored in `/var/lib/docker/volumes/`, easier to back up and share.

◆ Advanced Docker Questions

17. How do you optimize Docker images?

Answer:

- Use smaller base images (like `alpine`).

- Minimize layers.

- Use `.dockerignore` to exclude unnecessary files.

- Combine RUN commands.

- Use multi-stage builds.

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18. How do you ensure security in Docker?

Answer:

- Run containers as non-root users.

- Use trusted images only.

- Regularly update images.

- Limit container privileges (using seccomp, AppArmor).

- Scan images for vulnerabilities.

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19. How does Docker networking work?

Answer:
Docker provides different network drivers:

- **bridge (default):** Containers communicate on same host.

- **host:** Container shares host's network.

- **overlay:** Used for multi-host communication (Swarm).

- **none:** No networking.

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20. How do you handle container logs in Docker?

Answer:

- By default, Docker stores logs in JSON format (`docker logs <container>`).

- Logs can be forwarded to centralized systems like ELK stack, Fluentd, or AWS CloudWatch.

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21. What happens when you run `docker run`?

Answer:

1. Docker checks if the image is available locally.

2. If not, it pulls the image from Docker Hub.

3. Creates a new container from the image.

4. Allocates filesystem, mounts volumes, assigns network.

5. Executes the container process.

👉 These are the **most asked Docker interview questions**.

Would you like me to also make a **quick one-page cheatsheet (Q&A in bullet points)** for fast revision before interviews?