Best practices for running Oracle Database and Weblogic Server on Docker

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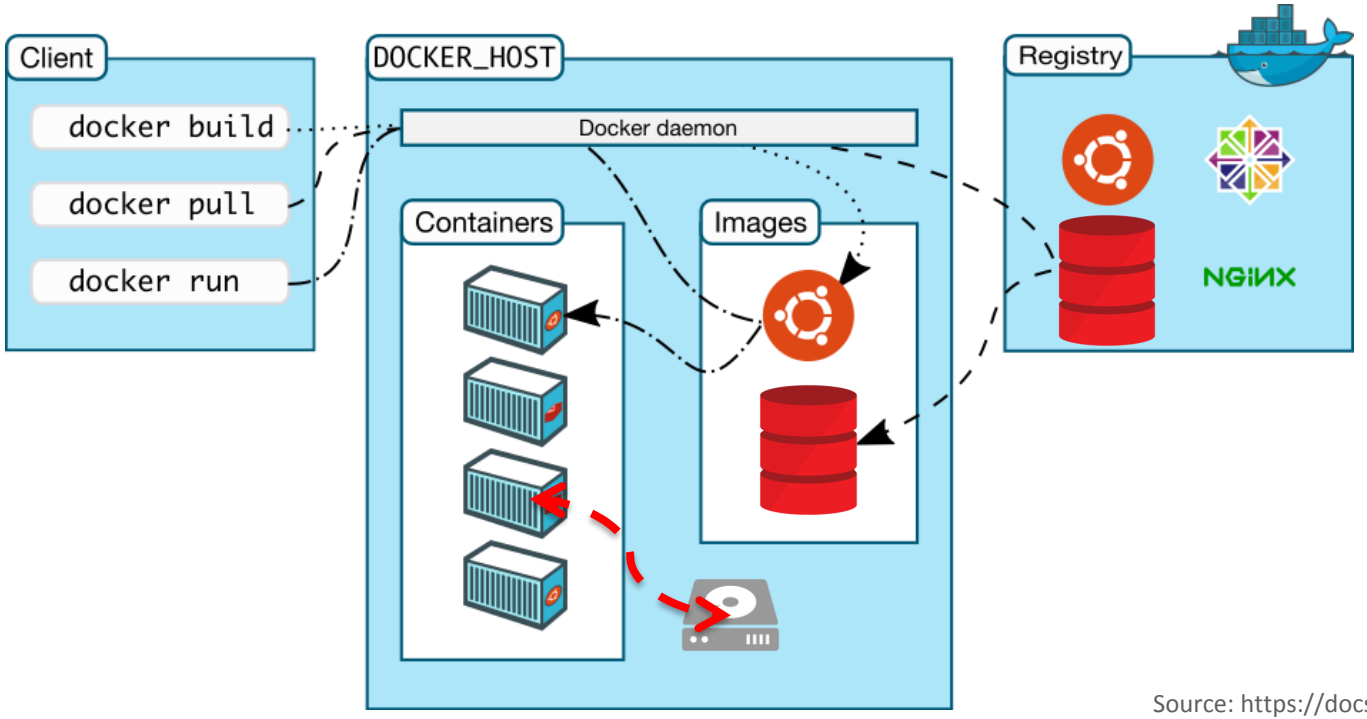
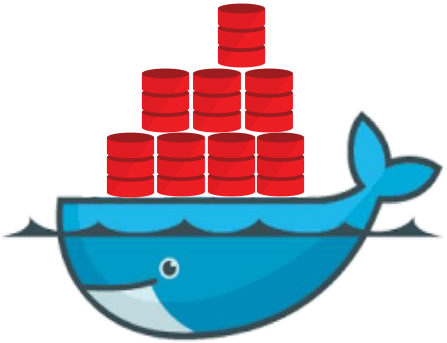
Docker Key Components

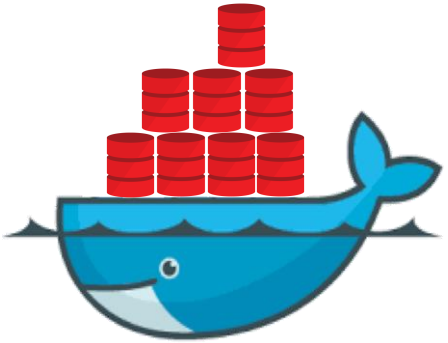




- Registry
- Images
- Containers
- Docker daemon/engine

Source: https://docs.docker.com/engine/docker-overview/

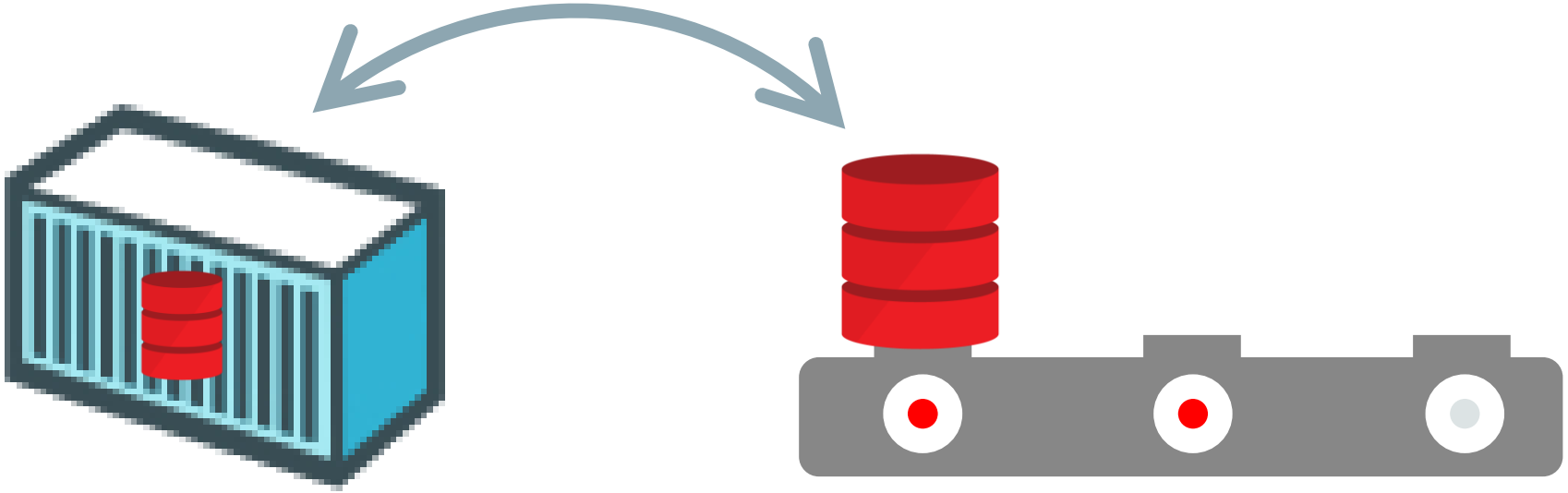
Oracle Database on Docker



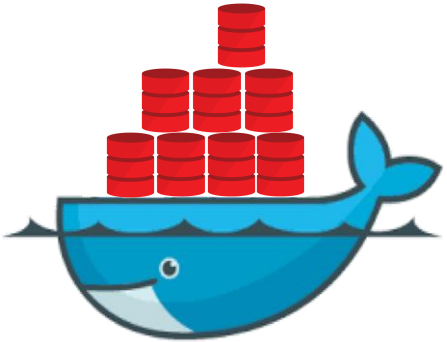
- Oracle Database is fully supported on Docker
  - Oracle Linux 7 - UEK 4
  - Red Hat Enterprise Linux 7
- Oracle images on Oracle Container Registry & Docker Store
- Docker build files on GitHub
- RAC is **not supported**

Oracle Database on Docker

- Docker container contains single-PDB CDB (**no MTO license required**)
- PDB can be plugged, unplugged, etc.
- PDB can move bi-directional



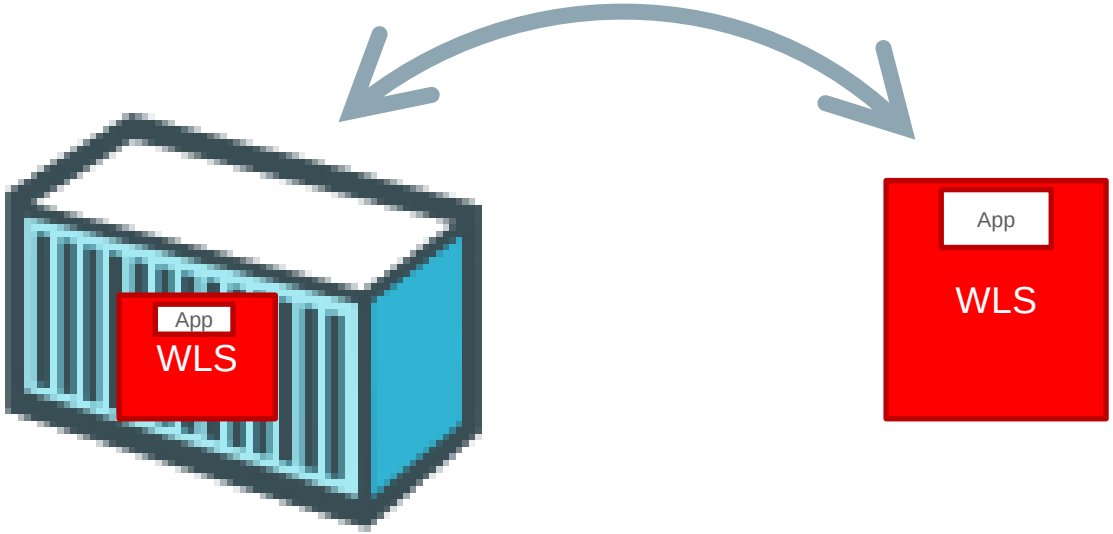
Oracle Weblogic Server on Docker



- Oracle WebLogic Server is fully supported on Docker
  - Oracle Linux 7 - UEK 4
  - Red Hat Enterprise Linux 7
  - Support Statement Doc ID 2017945.1
- Oracle images on Oracle Container Registry & Docker Store
- Docker build files on GitHub

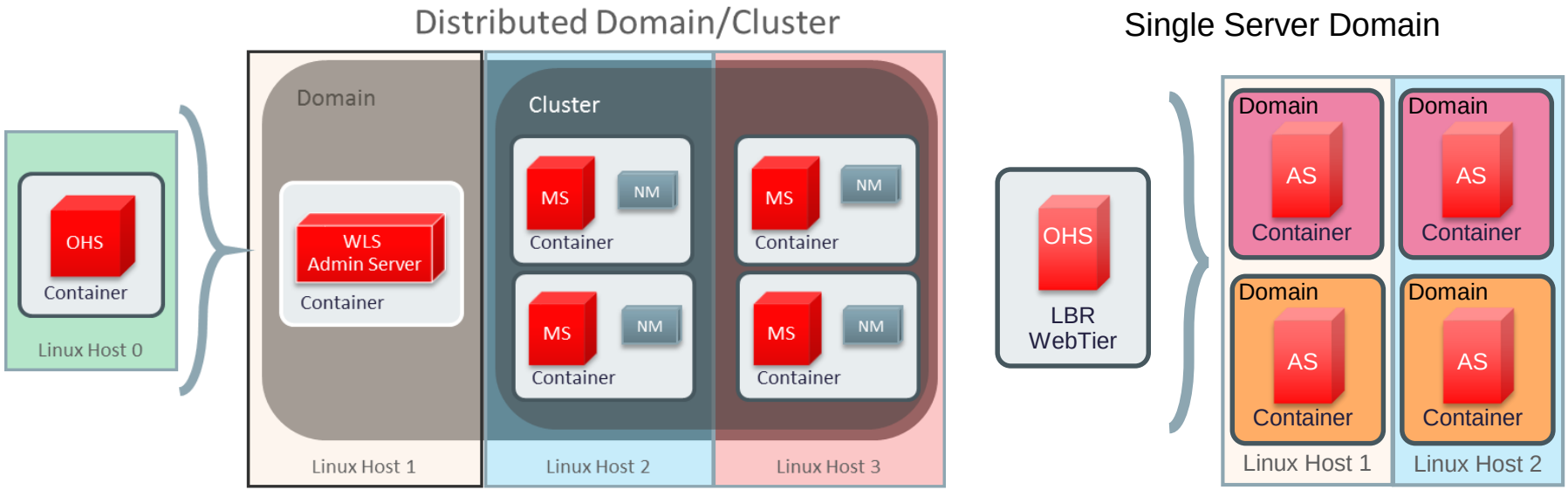
WebLogic Server on Docker

- Docker container contains single WebLogic Server



WebLogic Server on Docker

- WebLogic Configurations in Docker



BEST PRACTICES

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Oracle DB and Docker best practices

- Use `btrfs` (Oracle recommended) or `overlay2` storage drivers
- Do **not** use `btrfs` for data files storage
- B-tree filesystem
- Copy-on-write functionality
- Transparent compression
- Really **not a good fit** for your redo and undo
- Also not really a good fit for data files either
- Github issue #647

Oracle DB and Docker best practices

- `/dev/shm` mounted with no exec rights (and only 64MB by default)
- No native compiled PL/SQL
- No Java stored procedures
- No Automatic Memory Management
- …
- `docker run -v /dev/shm --tmpfs /dev/shm:rw,nosuid,nodev,exec,size=1g ...`

Docker volumes

Oracle DB/Weblogic and Docker best practices

- Docker volumes contain data that should be persisted throughout a container's lifespan
- Examples are:
  - Configuration files
  - Log files
  - Database files
  - Domain home
  - Stores (JMS store and JTA Tlogs)
- Files inside a container are owned by the UID of the container's user.
  - UID: 54321 for the `oracle` Unix user
  - Can be mapped to another UID with named volumes

Oracle DB/Weblogic and Docker best practices

- Three ways to create Docker volumes:
  - Anonymous volumes (no name specified)
  - Named volumes (a volume referred to by name)
  - Host-only volume (a location on the host)
  - Third party drivers for shared volume (NFS)

Oracle DB/Weblogic and Docker best practices

Anonymous volumes

- Create or run a container with '-v /container/fs/path' in docker create or docker run
- Use the VOLUME instruction in Dockerfile: VOLUME ["/container/fs/path"]
- Are not easily reusable across containers (you know, anonymous!)
- Transparently copy data from the image into the volume first!

```
"Type": "volume",
  "Name":"7a27a94df5192a20ec6a07502be9a2163faaa150e0076505937578ce785d5376",
"Source":
"/var/lib/docker/volumes/7a27a94df5192a20ec6a07502be9a2163faaa150e0076505937
578ce785d5376/_data",
"Destination": "/opt/oracle/oradata"
```

Oracle DB/Weblogic and Docker best practices

Named volumes

- Use docker volume create --name volume_name
- Create or run a container with '-v volume_name:/container/fs/path' in docker create or docker run

```
[oracle@localhost ~]$ docker volume create GeraldVol1
GeraldVol1
[oracle@localhost ~]$ docker volume inspect GeraldVol1
"Mountpoint": "/var/lib/docker/volumes/GeraldVol1/_data",
"Name": "GeraldVol1",
```

- Are great for making volumes specific
- Transparently copy data from the image into the volume first!
- But…

Oracle DB/Weblogic and Docker best practices

Named volumes

- Hold data in `/var/lib/docker/volumes`
- Is usually owned by `root`
  - Do you really want to give a user root access?
- Contains **all** volumes of all containers
  - Do you really want to give a user access to all volumes?

Oracle DB/Weblogic and Docker best practices

Host-only volumes

- Are created by specifying a location on the host
  - `docker run –v /home/gerald/volumes:…`
- Offer great flexibility where exactly volume data is being put
- But…

Oracle DB/Weblogic and Docker best practices

Host-only volumes

- **Do not** transparently copy data from the image into volume first!
- Have a static absolute path
- You have to set permissions on the file system accordingly first!
- They are “host-only”, i.e not cluster aware (other than being put on a SAN)

Oracle DB/WebLogic and Docker best practices

Docker volumes drivers

- Docker 1.8 and later support a volume plugin which can extend Docker with new volume drivers.
- You can use volume plugins to mount remote folders in a shared storage server directly, such as iSCSI, NFS, or FC.
- The same storage can be accessed, in the same manner, from another container running in another host.
- Containers in different hosts can share the same data.

WebLogic Server and Docker best practices

Docker volumes

- Data volume containers are data-only containers. After a data volume container is created, it doesn't need to be started. Other containers can access the shared data using --volumes-from.

```
# step 1: create a data volume container 'vdata' with two anonymous volumes
$ docker create -v /vv/v1 -v /vv/v2 --name vdata weblogic-12.2.1.3-developer
 # step 2: run two containers c3 and c4 with reference to the data volume container vdata
$ docker run --name c3 --volumes-from vdata -d weblogic-12.2.1.3-developer 'sleep 3600' $ docker run --name c4 --volumes-from vdata -d weblogic-12.2.1.3-developer 'sleep 3600'
```