



Container Storage Market Case Study



Summary

- Containerized applications' **persistence layer** decide what storage to utilize.
- The requirements for pre-containerization are very likely to stay.
- Persistence layer can be relational DBs, noSQL, or file based.
- If file based and sharing is needed by the application, NAS is a must.
- DBs generally like to use SAN. But small deployment can use NAS.
- Many core banking apps use DBs and FC.
- Many manufacturing apps are not FC-based, so NAS has a chance vs. iSCSI.

Critical stateful applications in banking

- Other than many “new” applications that mostly on the channel and payment side, the core banking business is quite stable
- Most banks already containerized the channel access, which is stateless.
- No immediate needs to move core banking to cloud-native
- Database heavy: many applications running Enterprise Databases

Case Study: Temenos® and Oracle®

- Temenos® is a leading provider for financial solutions.
- Temenos® is working with Redhat® (<https://www.temenos.com/community/partners/red-hat/>) to provide cloud-native banking solutions.
- For example, Temenos Transact provides core banking capabilities
- Transact can run on many platforms, e.g., IBM® LinuxOne™, IBM® public cloud, or AWS®.
- The storage needs are decided by DB needs. A key partner of it is Oracle® (<https://www.temenos.com/community/partners/oracle/>)

Storage choices for Oracle: Block/NFS

- Oracle 21c is the latest edition supporting containers.
- Some storage choice include Portworx (<https://ronekins.com/2021/11/19/getting-started-with-oracle-21c-on-kubernetes-with-portworx/>). Block is used in this example.
- NFS is used in this example (<https://blog.purestorage.com/purely-technical/run-oracle-19c-on-kubernetes-with-nfs-storage/>)
- Netapp® is offering Oracle in clouds (aws/azure). DBaaS is for SMB. So the cloud volume ONTAP® is not a problem for them (https://www.netapp.com/pdf.html?item=/media/57043-NA-627-0621_Guide_to_Databasing_in_the_cloud_Ebook.pdf). But for on-prim, Netapp is promoting its NVMe-FC for Oracle (<https://www.netapp.com/pdf.html?item=/media/26051-NA-544-10-Reasons-Oracle-Apps-on-NetApp.pdf>)

Conclusion

- Oracle is not giving up on ASM. Therefore, for Oracle DBs, the ASM+raw disk solution should provide the max benefit. The most efficient solution is to use SAN as external drives. NAS added a layer.
- Oracle ASM does not need REX (read-write-many) so SAN is sufficient.
- Existing FC customers most likely keep using SAN in containers.
- Help customers build a high-performance environment with Dorado

Conventional recommendations

- An old CERN experience for 10g suggests that using NFS can remove any FC needs. NFS performance is acceptable even though it might be slightly slower than block based ASM.
(https://indico.cern.ch/event/3580/contributions/1768766/attachments/712839/978641/nas_1.pdf)
- Oracle recommends ASM but does not limit the storage option to NAS. The block section is still ahead of the NAS section.
(<https://www.oracle.com/a/ocom/docs/database/rac-ondocker-bp-wp.pdf>)

Applications in Manufacturing

- Manufacturing enterprises need digital transformation, need the agility of new applications.
- However, they have many existing “stable” applications.
- On the edge, maybe a one-in-all system that can host both.

Case study: Tanzu®

- Many of the customers are already using VMware® virtual machines. Transition is relatively smooth. (<https://tanzu.vmware.com/content/white-papers/preparing-manufacturers-for-the-world-of-5g>)
- Both traditional applications based on VMs and new applications based on K8s can co-exist.
- Storage is managed via the datastore mechanism
- vSphere® provides CSI for block, vVol, and NAS volumes.

Applications decide the storage type

- Storage layer is fairly flexible on this platform. Apps can get blocks/vVols/NFS mounts as they wish
- What do applications want?
 - A piece of space to save something (configure files, etc)
 - DB-based storage to save data. This category includes relational DBs or NewSQL DBs.
- In Vmware® environment,
 - Lightweighted space -> vVols/NFS mount
 - Performance hungry apps -> SAN
 - Storage must be shared -> NFS mount

Case study: PTC® Thingworx®

- PTC® is a leading provider for manufacturing solutions.
- Thingworx® can be connected to multiple “persistence providers”, which include major DBs and cloud DBs.
- Via JDBC connectors
- Each persistence provider can provision its own storage needs
- Relational databases follow regular DB needs
- IoT stream data can be stored in InfluxDB®, a time-series DB.
 - InfluxDB is a write heavy DB and the document recommends SSDs.

Conclusion

- Manufacturing applications like Thingworx can use many persistence providers
- Rarely it will directly need any “shared file service”
- But NFS is easy to manage, need only IP network.
 - My guess is that speed is not the bottleneck because the persistence layer is simply for persistence
- The amount of data stored is not necessarily large
- DBs may run on top of VMs, such as VMware
- The DB may choose blocks/vVols/NFS on its own based on its needs. But very likely using IP in a manufacturing environment.
- Dorado is a good fit for storing manufacturing data

Thank You.

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