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Docker Security

To Docker or Not to Docker - A Security Perspective

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System Security - 5622V

Chair of IT-Security
University of Passau, Germany

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What is Docker?

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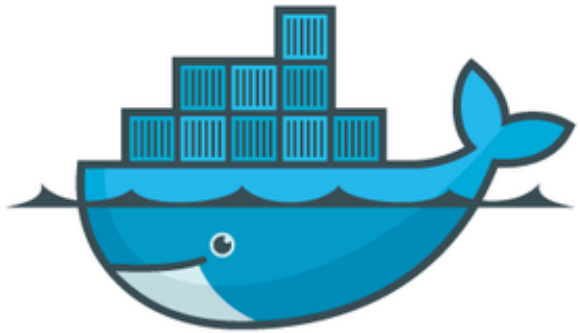

Movement in the cloud

Everyone wants to

- Migrate workloads to cloud
- Be portable across multiple environments
- Avoid cloud vendor lock-in

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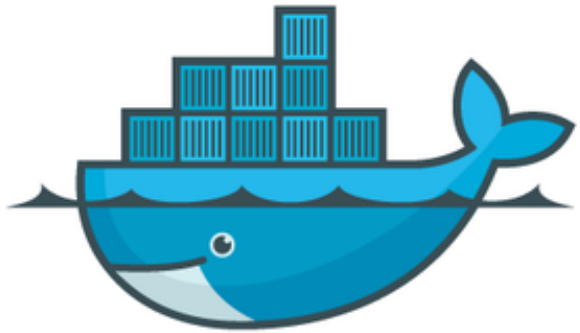

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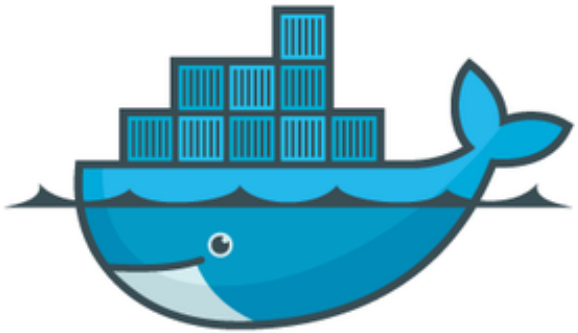

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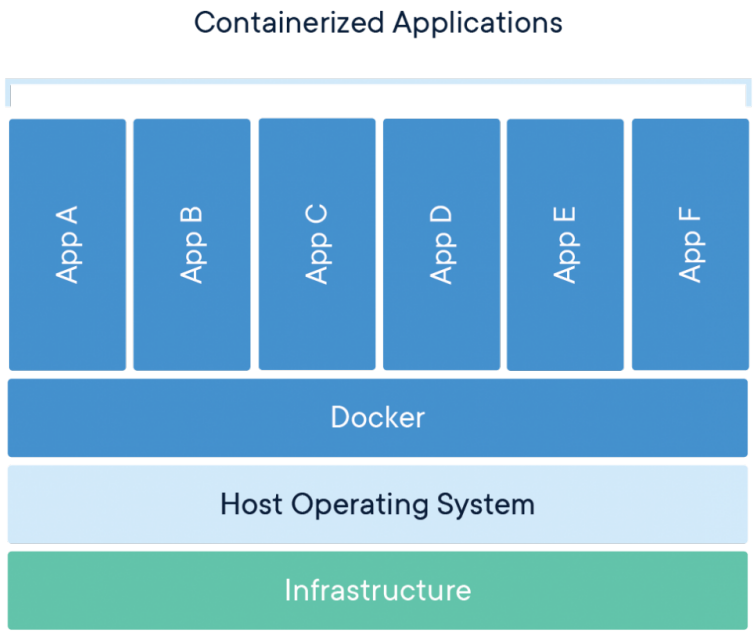

What is a container?

- Standardized packaging for software and dependencies
- Isolate apps from each other
- Share the same OS kernel
- Works with all major Linux and Windows sServer

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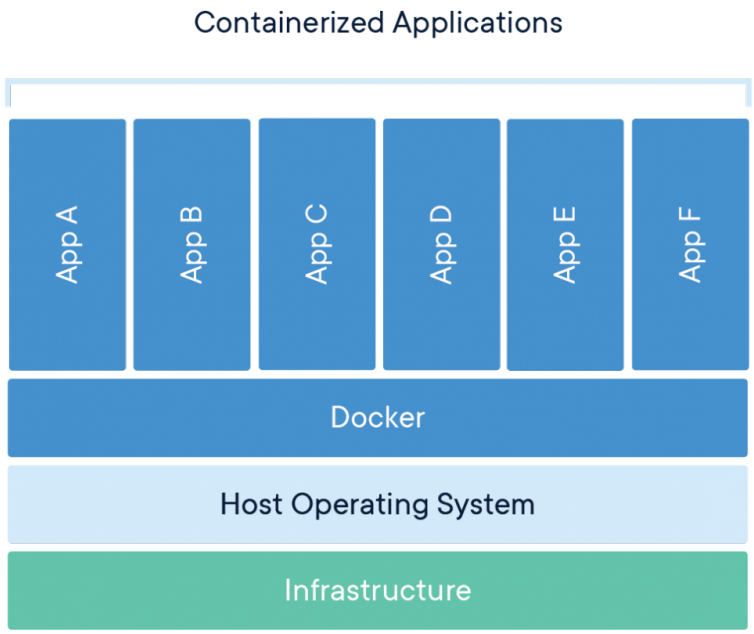

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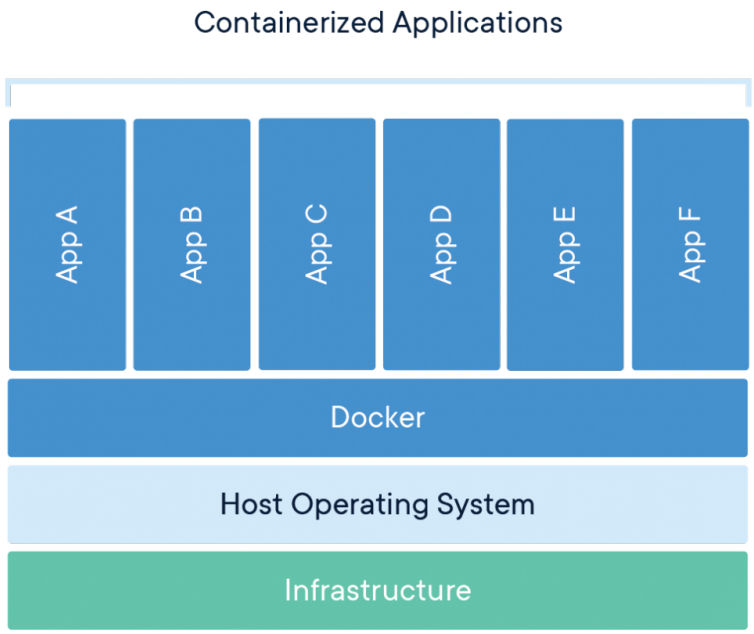

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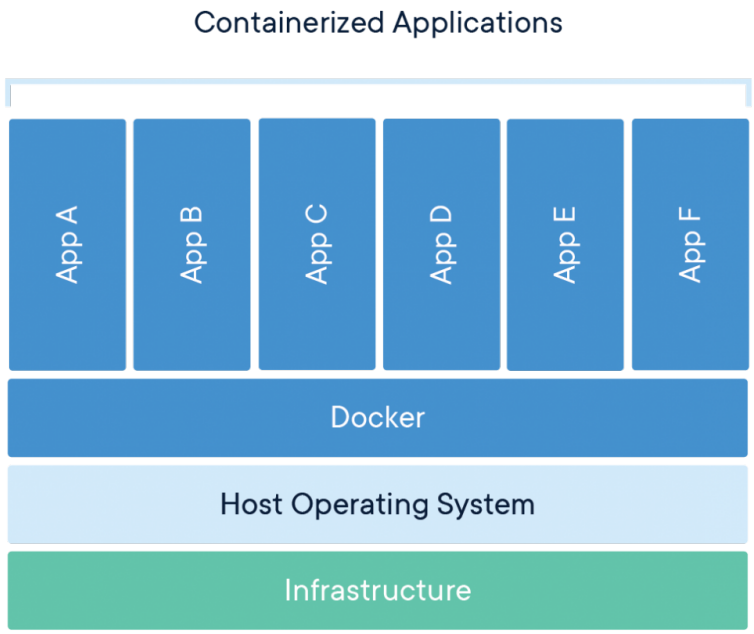

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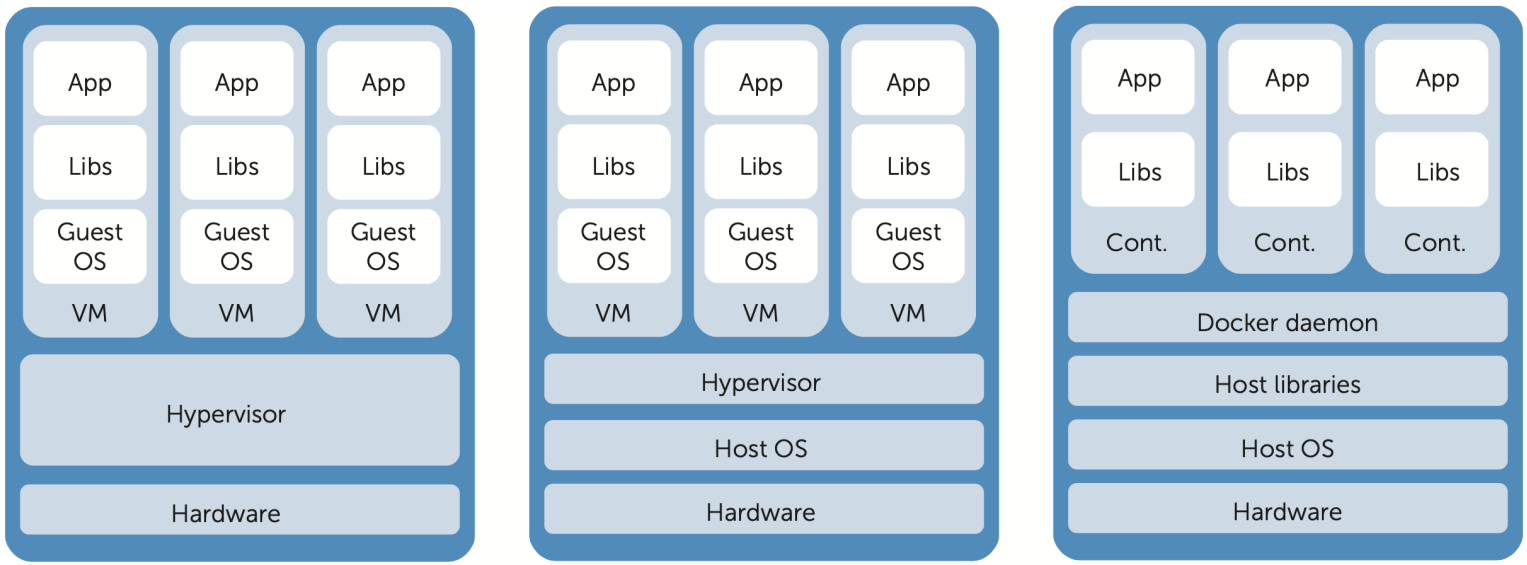

1. Type 1 hypervisor
2. Type 2 hypervisor
3. Container

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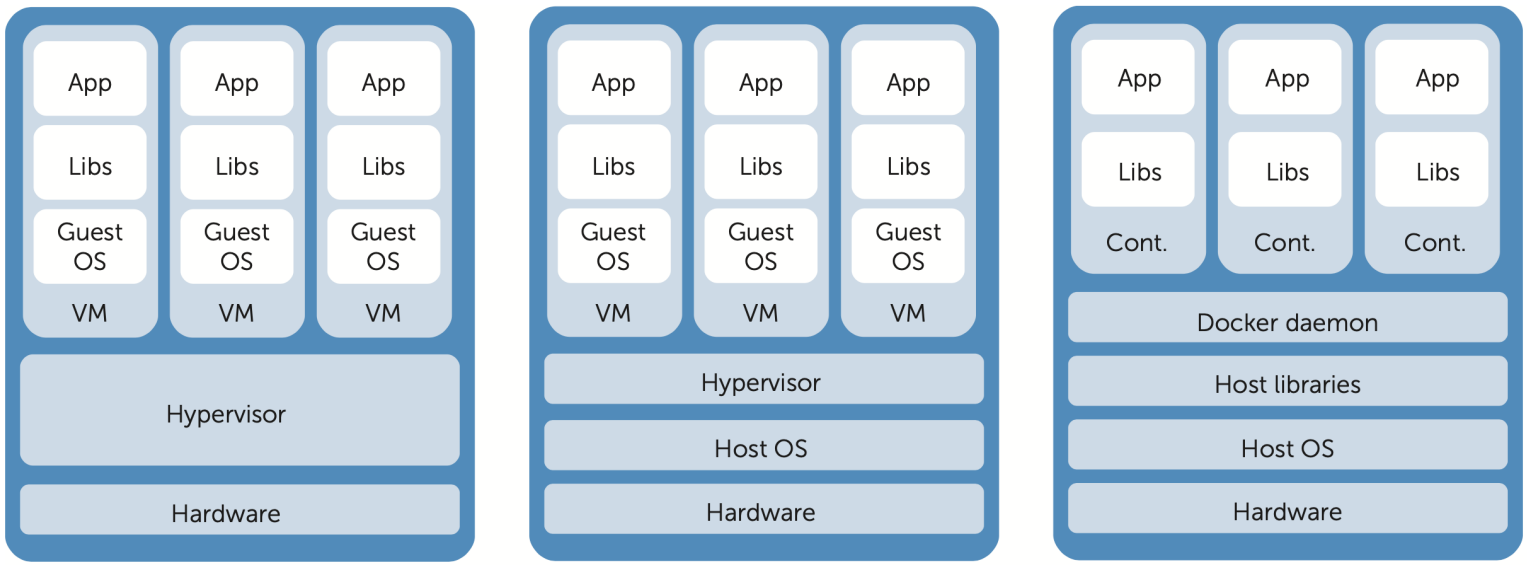

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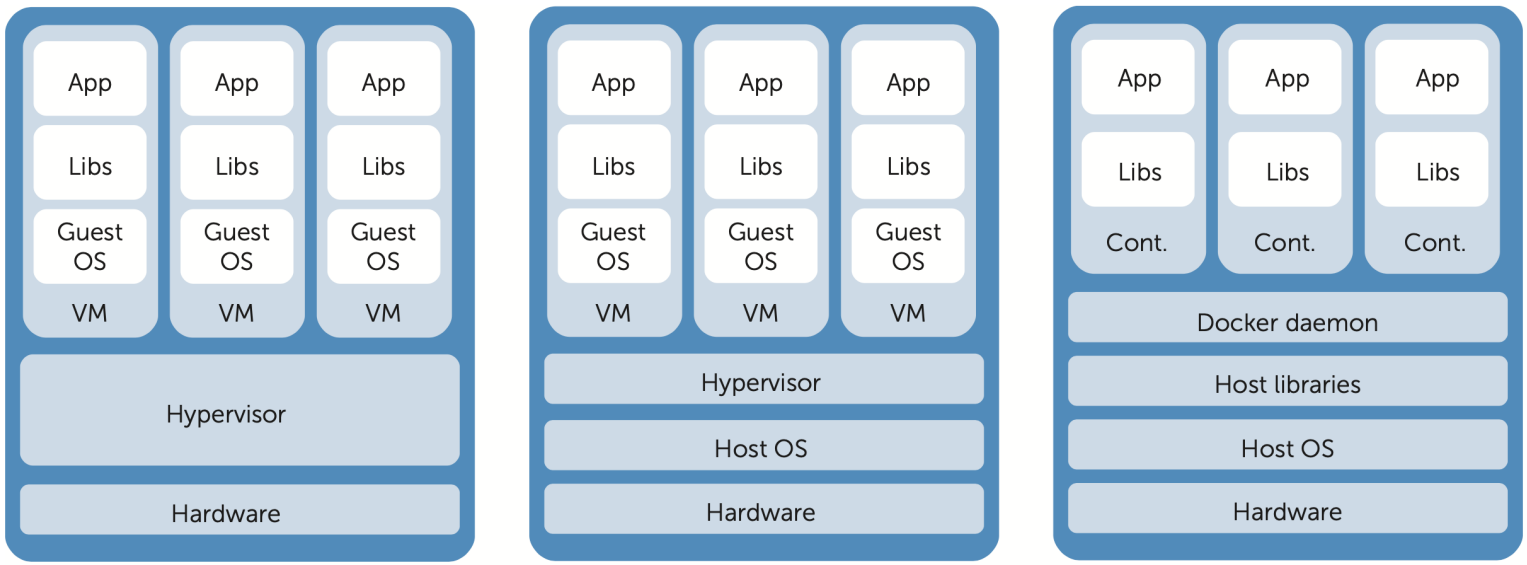

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Security relies on three factors:

- Isolation of processes at the userspace level (managed by Docker deamon)
- Enforcement of isolation by the kernel
- Network operations security

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Adversary models according to Combe et al.

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Direct adversaries

- Can sniff, block, inject or modify network and system communications
- They directly target the production machines
- Can compromise several system components (locally or remotely)

Indirect adversaries

- Same capabilities as direct adversaries
- Leverage the Docker ecosystem

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Targets according to Combe et al.

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- Containers
- Code repositories
- Image repositories
- Management network

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2. Security Overview

3. Vulnerabilities

4. Conclusion

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Insecure local configuration

- Default configuration on local systems is relatively secure
- Examples:
  - *-net=host*
    Full access to host network stack (enabling network sniffing, reconfiguration, and so on)
  - *-cap-add=¡CAP¿*
    Specified capabilities e.g. with *SYS_ADMIN*, a container can remount */proc* and */sys* subdirectories and change the host's kernel parameters

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Other possible vulnerabilities are:

- Image distribution vulnerabilities
- Weak local access control

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- Briefly highlighted Docker in general
- We had a overview at the Docker Security including the adversary models and possible targets
- Shortly investigated the possible vulnerabilities

Contact: fk@sec.uni-passau.de

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