



OST

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Distributed Systems (DSy)

Docker and Debugging

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Learning Goals

- Lecture 4 (Docker and Debugging)
 - What to do if it does not work
 - It runs on my machine – development with docker

How to Debug? / Pitfalls

- What is your base image
 - **Ubuntu**-based, **Debian**-based, **Alpine**-based, distroless
 - I usually use alpine-base images, its small can install packages if needed, has many tools onboard
 - increased attack surface vs. convenience
 - GNU libc (e.g. **distroless**) vs. musl (e.g., **alpine**)
 - Glibc: wide adoption, many distros use it, large binary
 - Musl: less used, smaller binary
 - Benchmarks, **old**, **older**
- Need glibc? → busybox docker, or **gcompat**
- → building outside docker, then copy binary to docker may fail
- **Alpine** has many tool
 - Mini root filesystem, 3.1MB
 - **Busybox**: nc, ping, sha256sum, wget, netstat
 - Alternative in the making: **Toybox**
- docker system prune -a
 - Remove everything (attention)

How to Debug? / Pitfalls

- What is going on in my container, why is it not running?
 - `docker exec -it <id> sh`
 - `nc / wget`
- Reach other container: ping cointainername
 - Docker-compose has own DNS and resolves to containernames
- Service bound to localhost?
 - This cannot run outside docker
- Check logfiles!
 - If you write your own application, handle cornercases at least with logging
- Example with netcat (nc)
 - `nc -l`
- `docker stats`
- Is docker application docker aware?
 - Docker memory limits are not hard limits, e.g., GC is not under pressure
 - If over limit, application restarts (if configured)
- Live-Code-Reloading: use volumes
- Check layers
- Performance: mulit-stage, `.dockerignore`

Pitfalls / Supply Chain Attacks

- Docker: aggressive caching – wget is cached!
Use version numbers

```
#Dockerfile
FROM golang:alpine
RUN wget https://app/package-latest.tar.gz
```

- Supply Chain Attacks in Software Development
 - Dependencies, build tools, package managers, registries
- **Feb 2024**: Popular compression library used in Linux distributions
 - Backdoor inserted by maintainer with commit rights
 - Provided SSH access to affected systems

- Dependency Problem
 - "Dependency hell" - nested dependencies create complex trees
 - Check your node_modules directory and count the files...
- Mitigation Strategies
 - Dependency scanning tools
 - Do not execute dependencies on your machine, but in a container
 - Another example: **preveltkit**
 - Also solves: it works on my machine → npm, node, etc. in the correct version