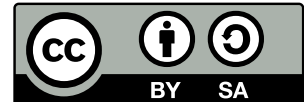


L08 Early Detection of Misconfiguration

Markus Raab

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Points in Time

- 1 Points in Time
- 2 Push vs. Pull
- 3 Early Detection
- 4 Meeting

Learning Outcomes

Students will be able to

- recall points of time relevant in configuration management.
- remind some arguments about pull vs. push.
- remember various strategies for earlier reduction of misconfiguration.

When are settings used?

From the application's perspective:

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- Load-time:** Configuration accesses are during the start of applications.
- Run-time:** Configuration accesses are during execution after the startup procedure.

Detection of Misconfiguration

Viewpoint

Different viewpoint: now from configuration management perspective.

Phases when we can detect misconfigurations:

- **Compilation stage in configuration management tool**

Detection of Misconfiguration

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- When configuration setting is actually used (run-time)
→ Latent Misconfiguration

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Problem

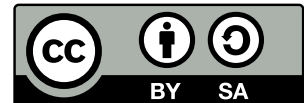
Earlier versus more context.

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Task

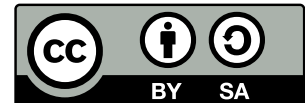
Do you prefer push or pull? What does your CM tool of choice use?

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Early Detection

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- Latent misconfigurations are particularly severe (75 % of high-severity misconfigurations).
- Latent misconfiguration needs longer to diagnose.

Checkers as plugins

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Because the checks occur before the resources are actually used, the checks are subject to race conditions.¹

¹For example, a path that was present during the check, can have been removed when the application tries to access it.

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Because the checks occur before the resources are actually used, the checks are subject to race conditions.¹

In some situations facilities of the operating system help², in others we have fundamental problems.³

¹For example, a path that was present during the check, can have been removed when the application tries to access it.

²For example, we open the file during the check and pass `/proc/<pid>/fd/<fd>` to the application. This file cannot be unlinked, but unfortunately the file descriptor requires resources.

³For example, if the host we want to reach has gone offline after validation.

Example [2]

Squid uses `diskd_program` but not before requests are served. Latent misconfiguration caused 7h downtime and 48h diagnosis effort.

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Finding

Configuration from all external programs need to be checked, too.

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Conclusion

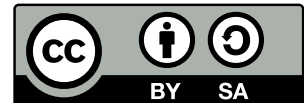
- provide external specifications for other tooling and configuration management
- use code generation to keep internal specifications consistent with external specifications (e.g. for refactoring)
- implement checkers as plugins
- execute checkers as early as possible, also for external programs executed later
- keep important resources allocated after checking

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Meeting

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- [1] Neil B Harrison, Paris Avgeriou, and Uwe Zdun. Using patterns to capture architectural decisions. *Software, IEEE*, 24(4):38–45, 2007. ISSN 0740-7459. doi: 10.1109/MS.2007.124.
- [2] Tianyin Xu, Xinxin Jin, Peng Huang, Yuanyuan Zhou, Shan Lu, Long Jin, and Shankar Pasupathy. Early Detection of Configuration Errors to Reduce Failure Damage. In *Proceedings of the 12th USENIX Symposium on Operating Systems Design and Implementation (OSDI'16)*, Savannah, GA, USA, November 2016.