CYBERUS
TECHNOLOGY

Automated hypervisor testing and benchmarking on hardware

Markus Napierkowski, Sebastian Eydam

KVM Forum 2024

Who we are

About us

- Self-funded, boot-strapped tech firm
- HQ in Dresden, 25 employees all over Germany

Qualifications

- Team of former Intel and FireEye experts
- Meltdown & Spectre discovery
- Granted several awards

CYBERUS
TECHNOLOGY

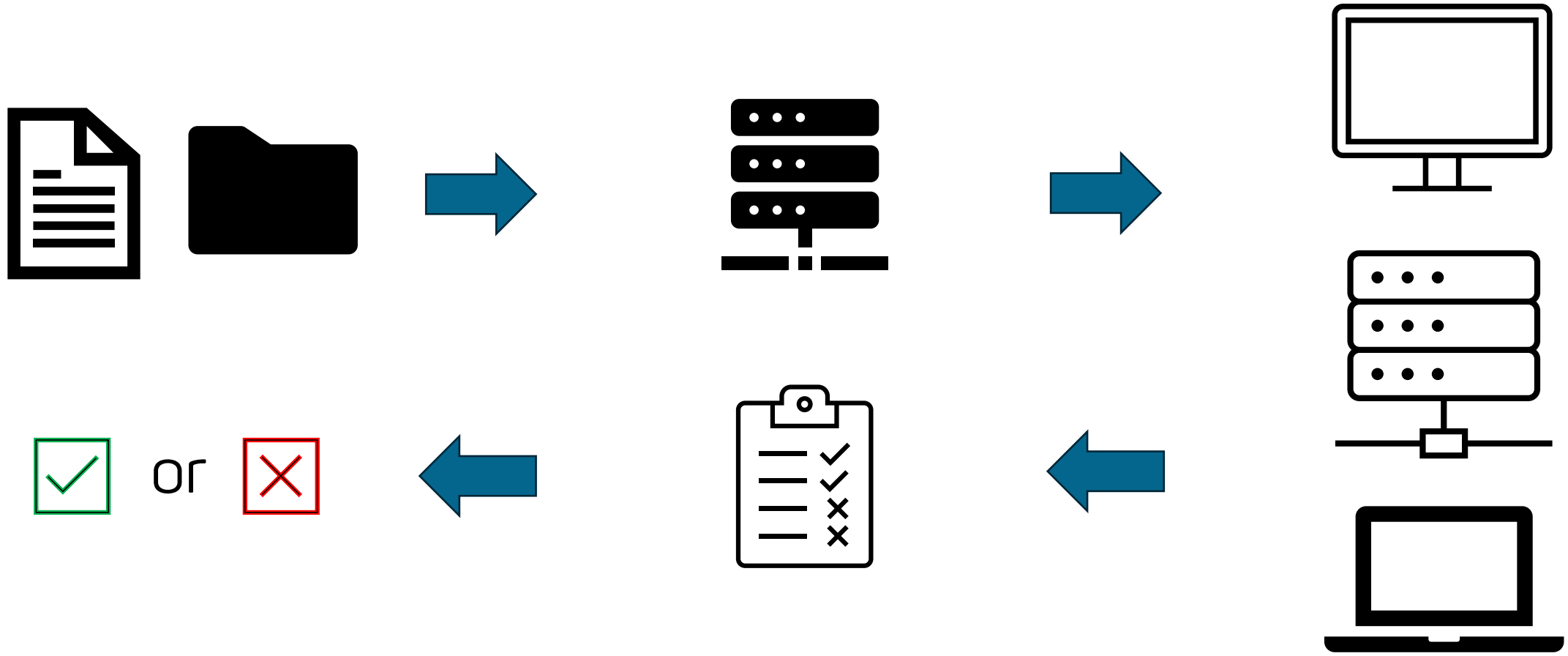
Fields of Expertise

- Virtualization (Cyberus Hypervisor)
- Test automation (Cidoka)
- Software Lifetime Extension (KronoCore)

Open-Source Interests:

- Cloud Hypervisor / VirtualBox
- Linux KVM
- NixOS / nixpkgs

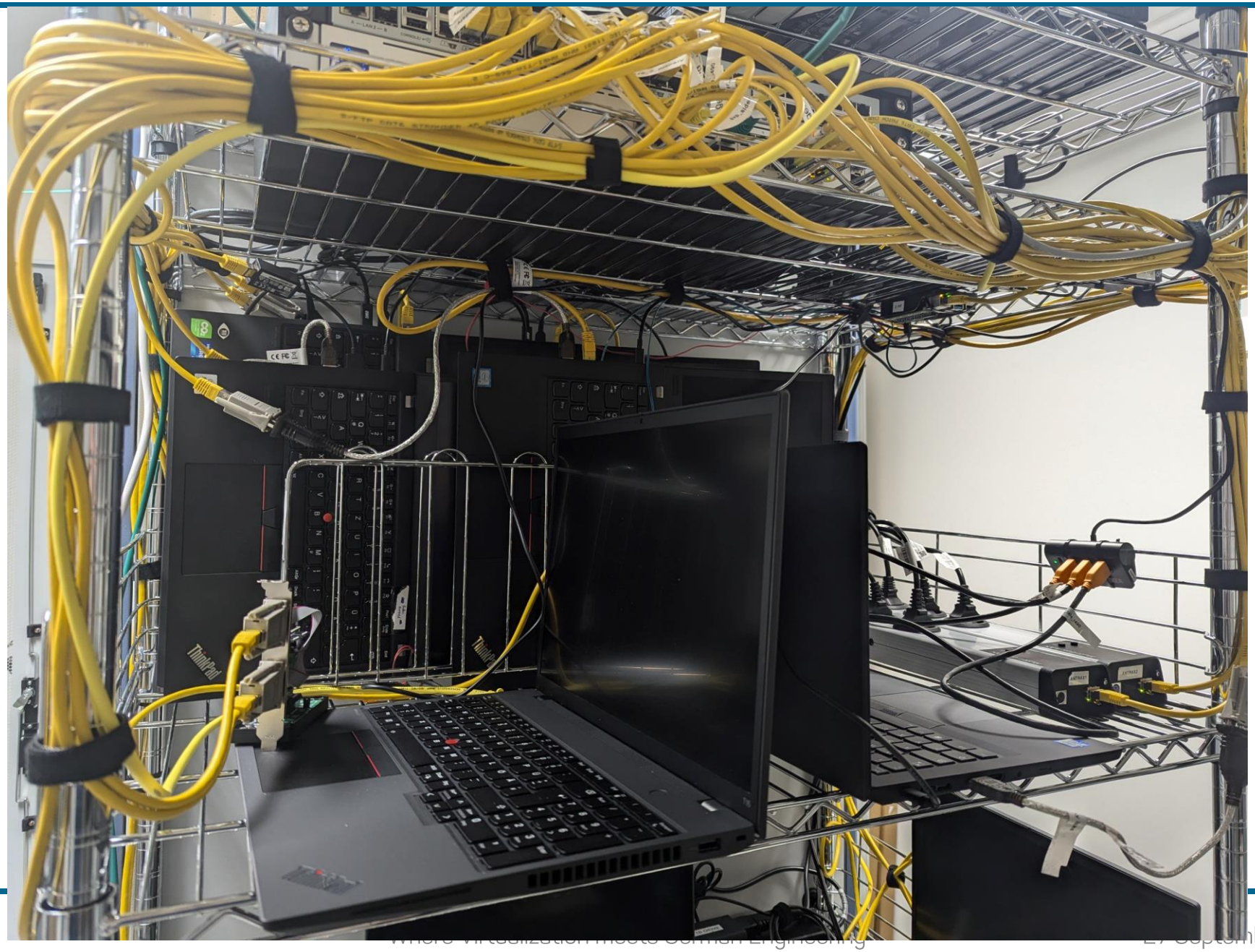
Our solution for on-hardware test automation: “SoTest”



Our solution for on-hardware test automation: “SoTest”

ID	Priority	Creation Time	User Name	Test Run Name	Progress	Running	Passed	Failed	Disabled	Total
83046	-1	2024-09-07 19:25:06 GMT+2	cyberus/engineering	virtualbox cyberus-release-7-0-20: Native SR-IOV		0	6	0	0	6
83045	-1	2024-09-07 19:20:32 GMT+2	cyberus/engineering	virtualbox cyberus-release-7-0-20: KVM SR-IOV		0	6	0	0	6
83044	-1	2024-09-07 19:15:50 GMT+2	cyberus/engineering	virtualbox cyberus-release-7-0-20: Native Benchmarks		0	17	1	0	18

Name	Tags	amd_m75q_gen2	amd_t16_gen2	coffee_lake_rw14	svp_alder_lake_p360	svp_alder_lake_t16	svp_comet_lake_x13	svp_kaby_lake_r_t480s	svp_raptor_lake_t16	svp_whiskey_lake_t490
Native Benchmark: hdparm	project:virtualbox ram:>=16g	✓	✓	✓	✓	✓	✓	✓	✓	✓
Native Benchmark: kernel-compile	project:virtualbox ram:>=16g	✓	✓	✓	✓	✓	✓	✗	✓	✓


ThinkPad

Challenges

- How can we make arbitrary hardware remote controllable?
- How can we integrate on-hardware testing into the development lifecycle?
- What about performance benchmarking?
- How can we handle throughput issues?
- How can we handle flakiness?

Making arbitrary hardware remote-controllable

Power Cycling

Software Configuration

Observe Behavior


FCC ID: 2ABCB-RPI32
IC: 20953-RPI32
HDMI
CAMERA
ETHERNET

Making arbitrary hardware remote-controllable

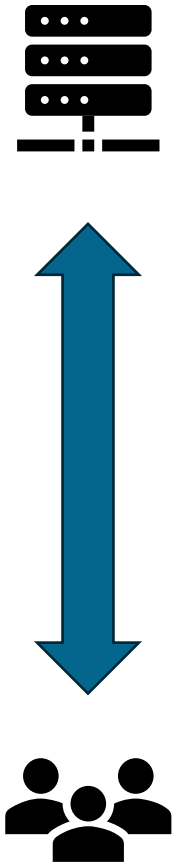
Power Cycling

Software Configuration

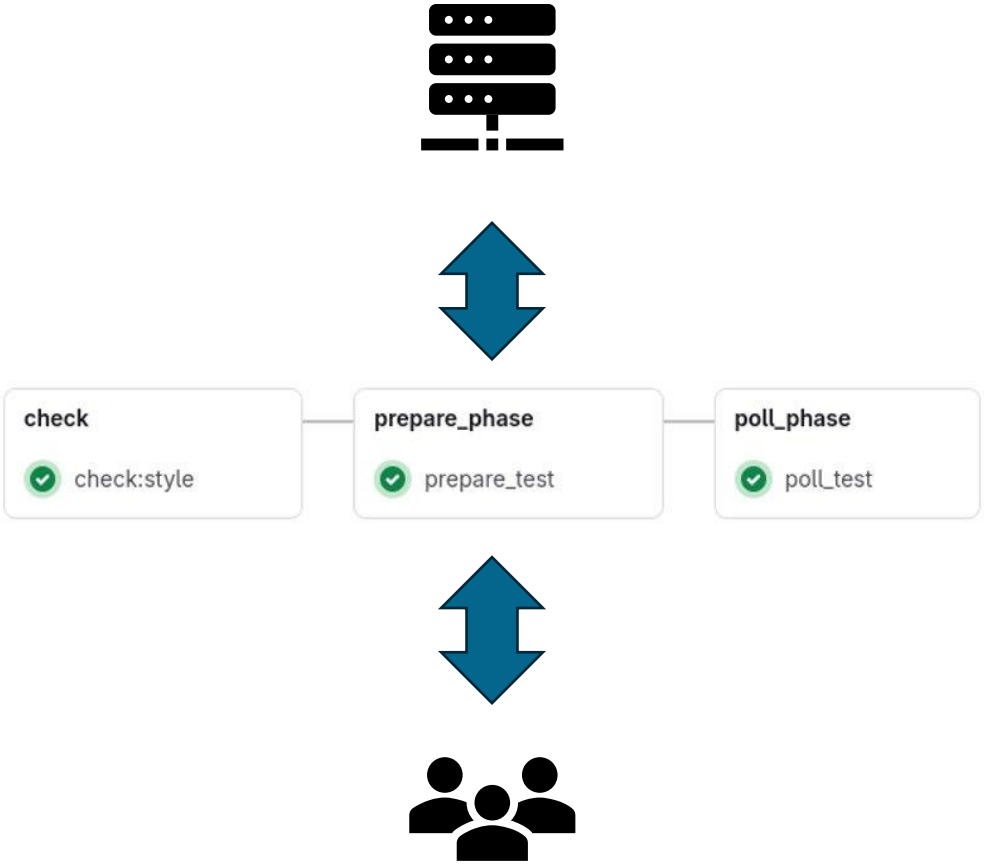
Observe Behavior


CONSOLE
CONSOLE
1020412149000885

Integration into developer workflow

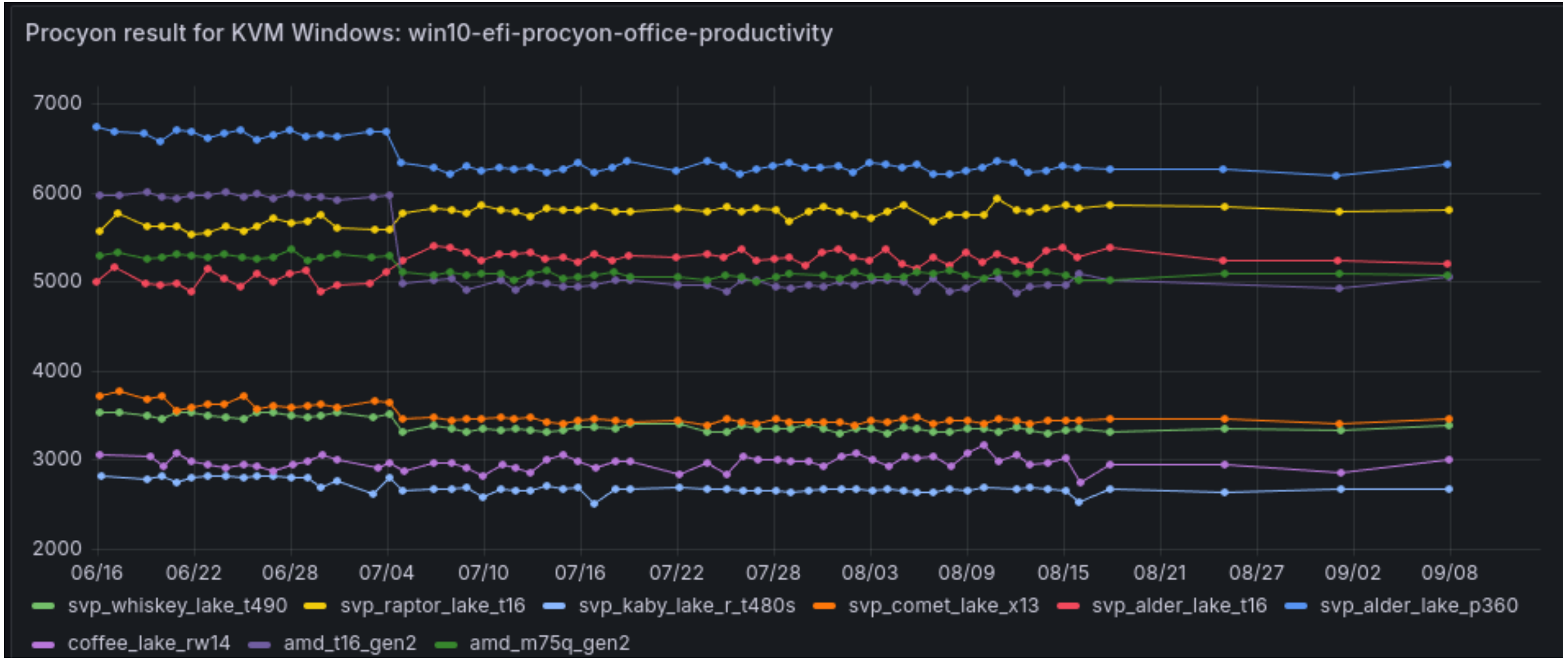


Integration into developer workflow



Integration into developer workflow

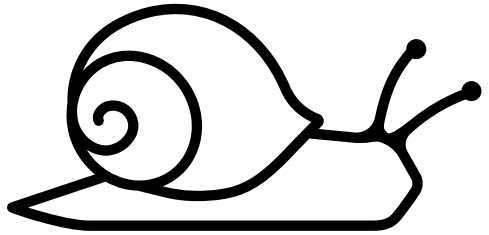
Performance Benchmarking



Performance Benchmarking

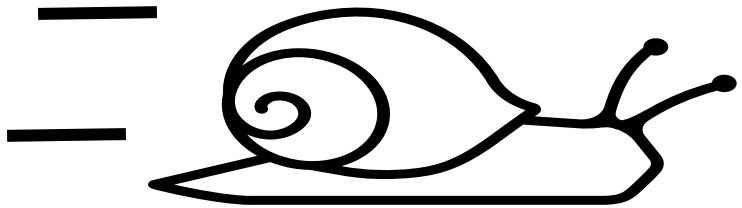
Optimizing Throughput

- Don’t run all tests every time
- Skip reboots



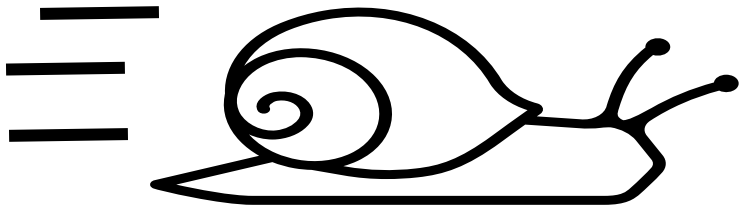
Optimizing Throughput

- Don’t run all tests every time
- Skip reboots
- “Any” Items



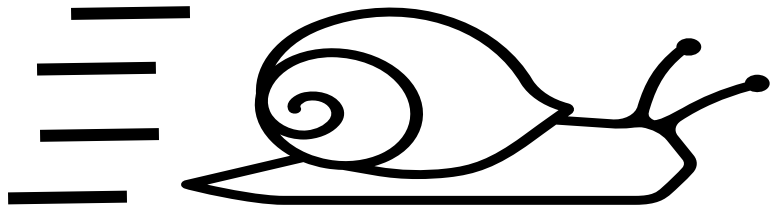
Optimizing Throughput

- Don’t run all tests every time
- Skip reboots
- “Any” Items
- Prioritized scheduling



Optimizing Throughput

- Don’t run all tests every time
- Skip reboots
- “Any” Items
- Prioritized scheduling
- Caching



Handling flaky tests

Temporary infrastructure issues

- Network Problems
- Machines in unexpected state
- Hardware issues

Issues in the test itself

- E.g., Windows driver installation fails

Summary

Automated Testing on Hardware can be hard.

But it pays off!