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squash the flakes!

KubeVirt Summit 2023
Talk by Daniel Hiller

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agenda

Talk will be 25 mins incl. QA

- introduction to flakes
- how do we minimize the impact
- how does the flake process work
- what tools do we have
- the future
- want to help?
- Q&A

what is a flake

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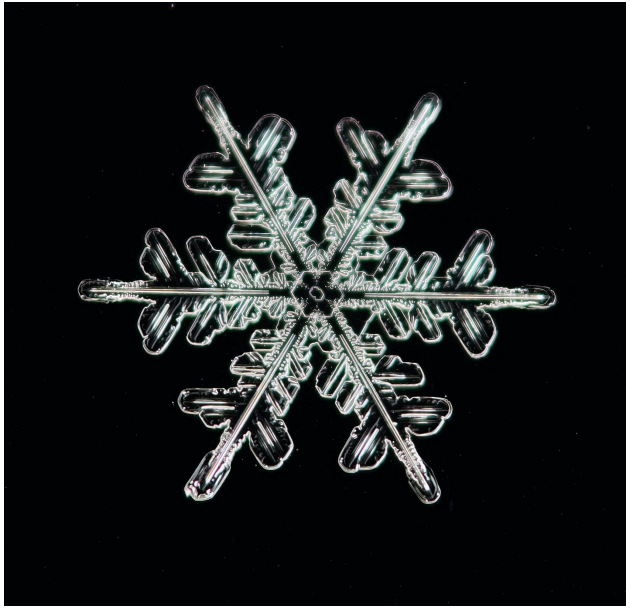
what is not a flake (in this context)

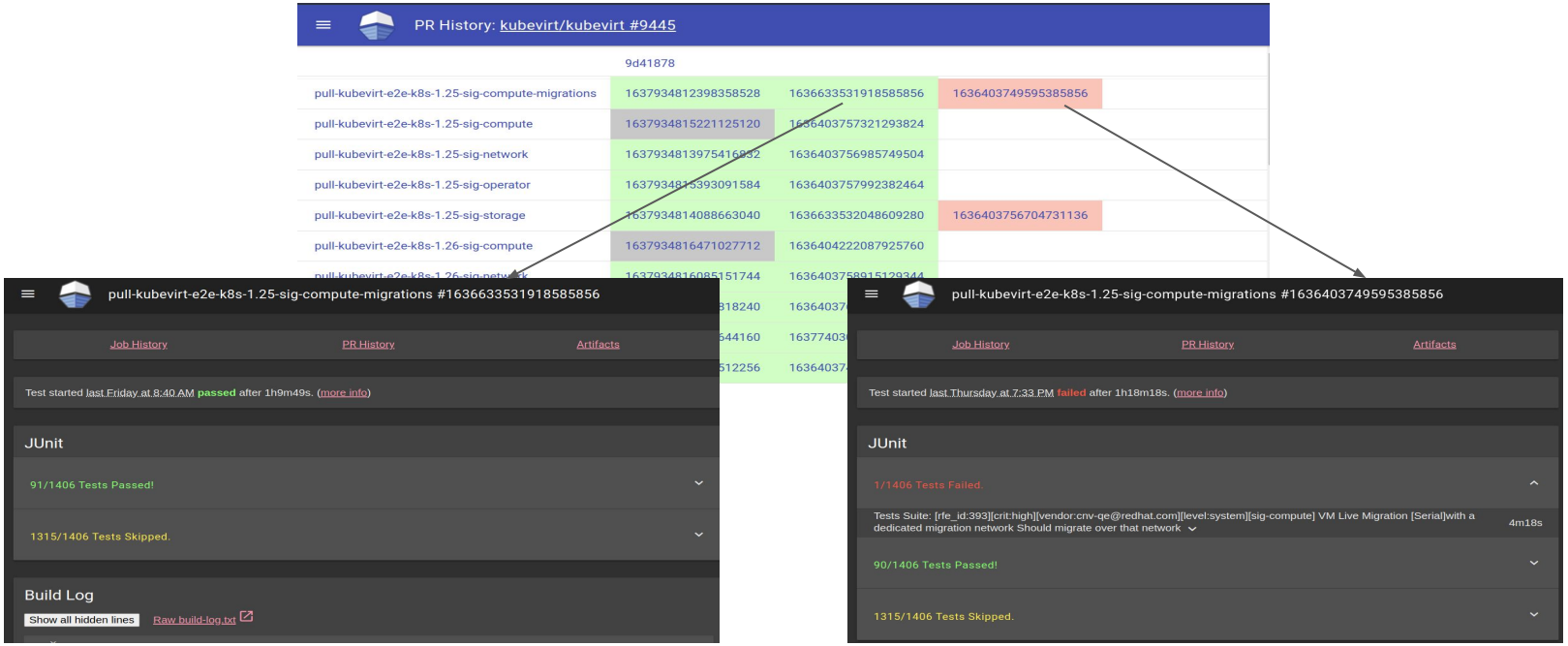


what is a flake

a **flake**
is an automated **test** that doesn't behave deterministically

i.e.
without any code change it fails and passes in successive runs

what is a flake



source: https://prow.ci.kubevirt.io/pr-history/?org=kubevirt&repo=kubevirt&pr=9445

what is the impact of flakes

from a survey:

- 97% of flakes were false alarms, and
- more than 50% of flakes could not be reproduced in isolation

source: “A survey of flaky tests”

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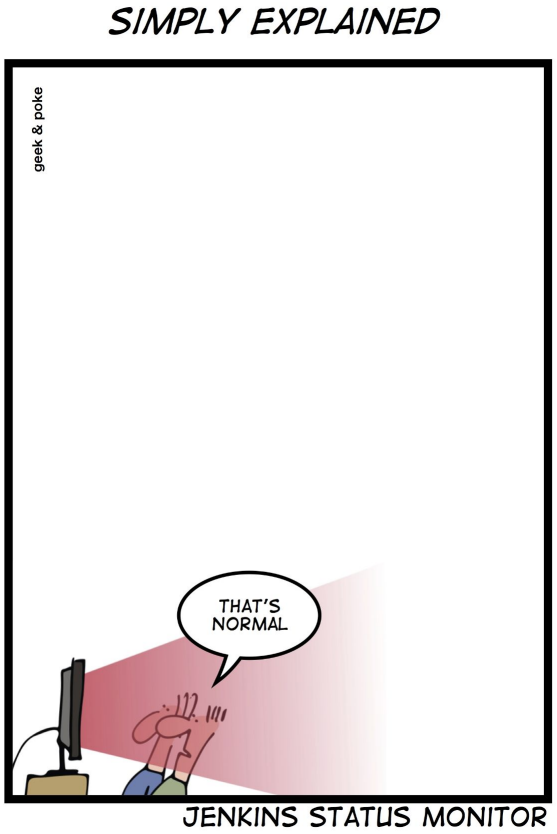
what is the impact of flakes

This leads people to believe that ignoring flaky tests is safe to do



what is the impact of flakes

*“... [A] Microsoft study demonstrated that the **0.02% of flaky test** failures from over 80 million test executions, over a 30-day period, could have been responsible for what would have been **5.7% of all the failed builds** in that period, had they not been identified“*

source: “A survey of flaky tests”

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what is the impact of flakes

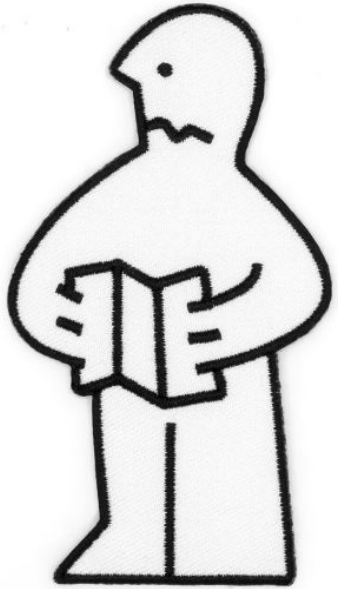
what is the impact of flakes

Flaky tests lead to:

- increase of CI load
- longer feedback cycles
- slowdown of merges
- invalidating the effect of test prioritization and acceleration techniques
- reverting the acceleration impact of batch testing
- devs losing trust in automated testing

what is the impact of flakes

Flaky tests lead to developer frustration!

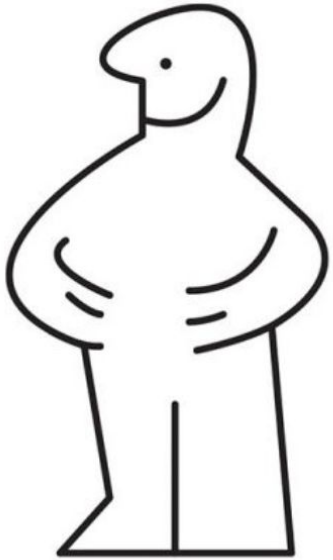


what is the impact of flakes

goal

reduce the impact of flakes as much and as fast as possible

to avoid developer dissatisfaction and keep frustration to a minimum



how we minimize the impact

tldr; exclude (aka quarantine) a flaky test from test runs as early as possible, but only as long as necessary

how we minimize the impact

requirements:

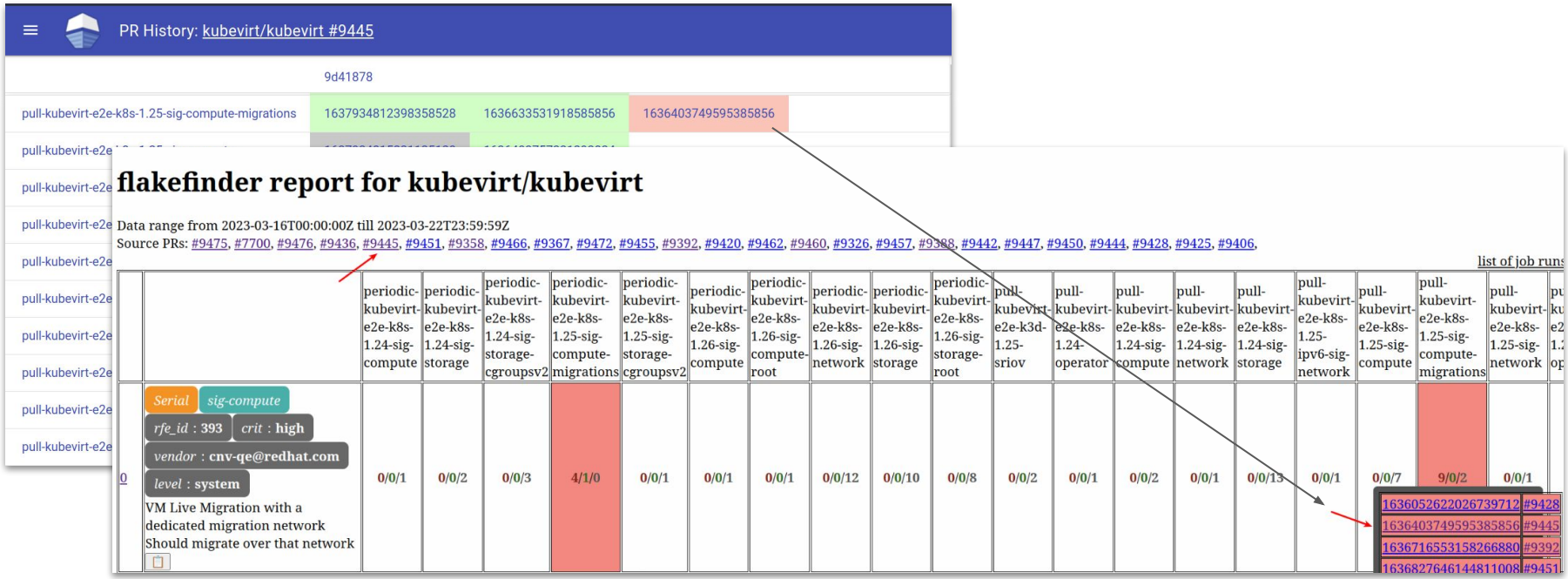
- a report over possible flaky tests
- a method to remove a test from the set of stable tests

how we minimize the impact

We assume that any PR that was merged into the codebase had all gating tests succeeding in the end.

Therefore any test run on a merged PR with test failures on the gating lanes would contain execution of flaky tests

how we minimize the impact



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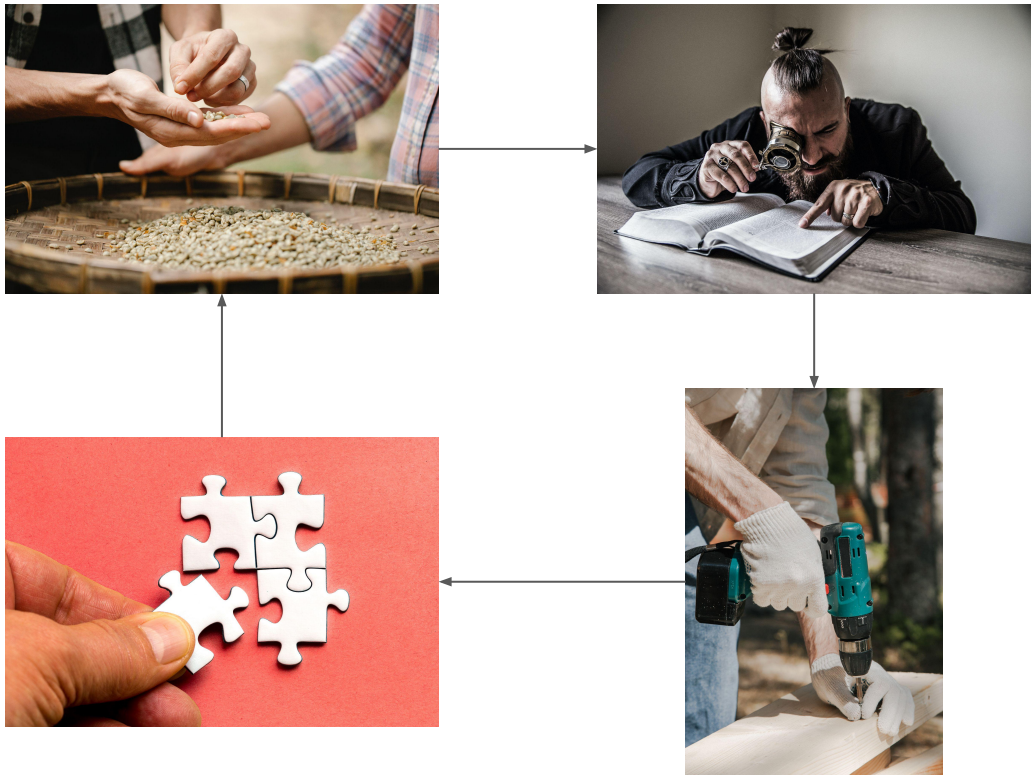
how does the flake process work

regular meeting

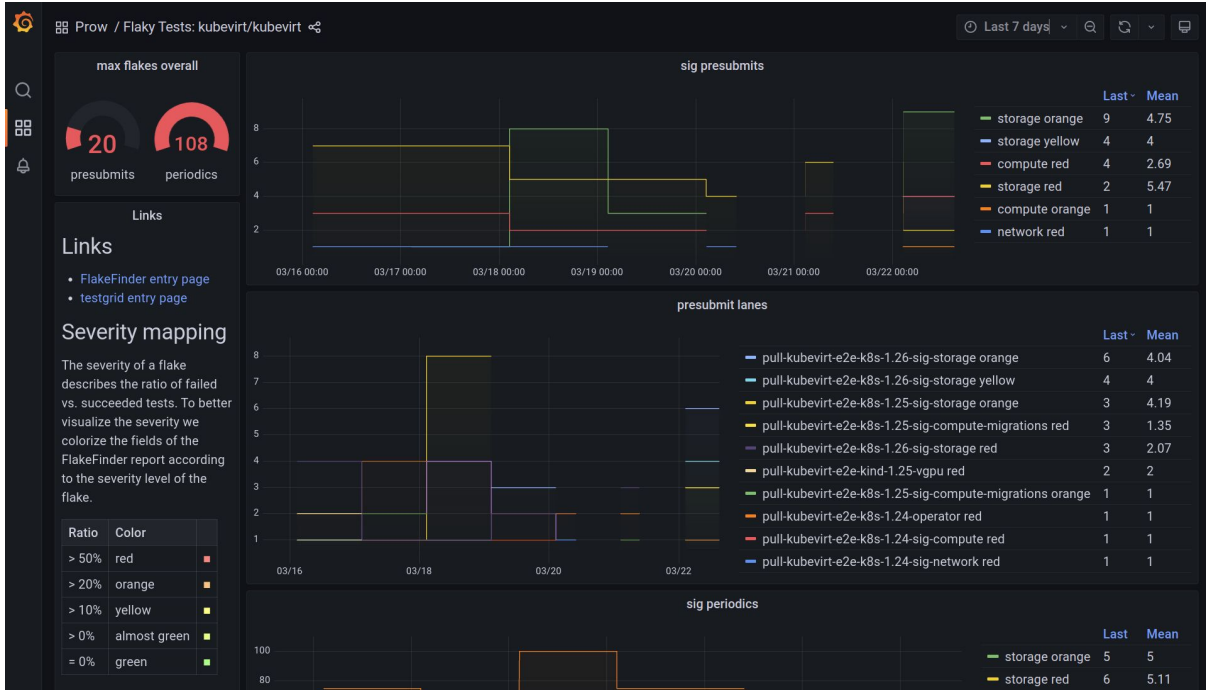
- look at flakes
- fix or quarantine
- hand to dev
- bring back in

emergency quarantine

source: QUARANTINE.md



what tools do we have



[flake report graph]

visualizes the flakefinder data

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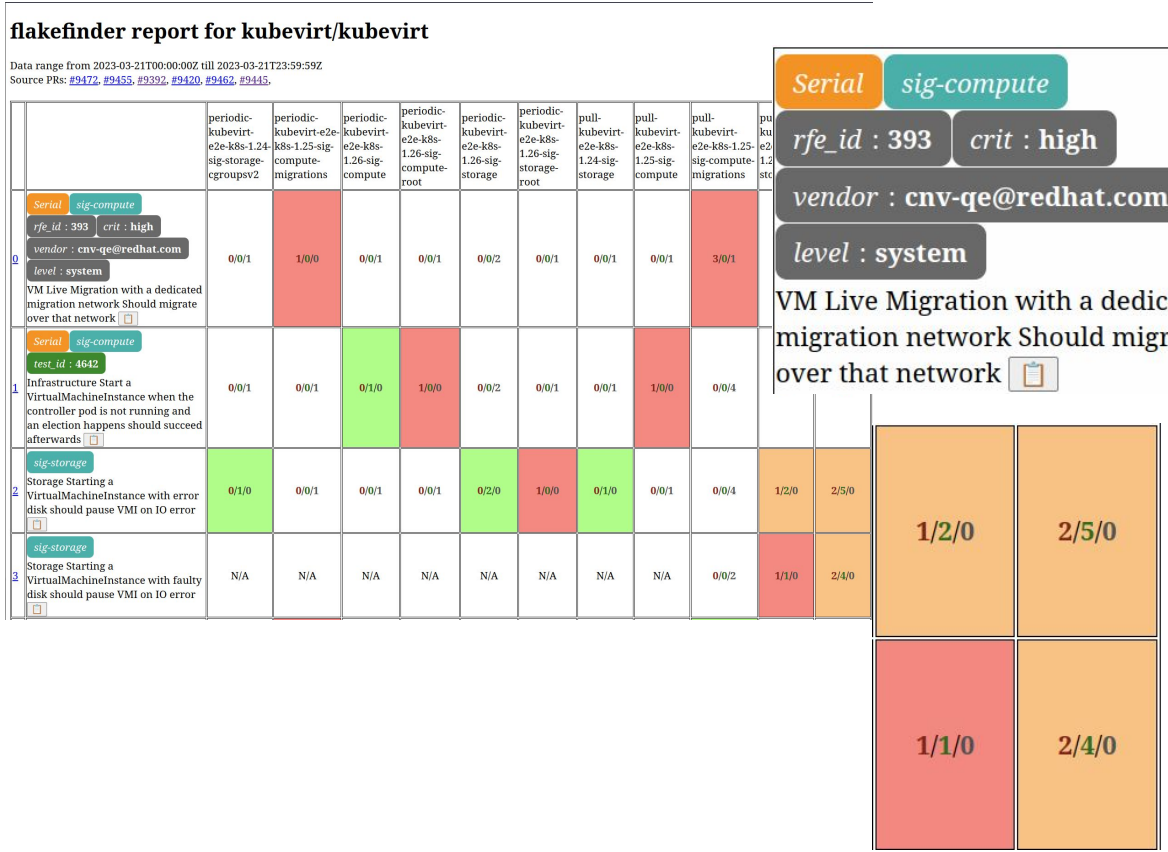
what tools do we have

[flakefinder](#) report

gives an overview of the current flaky tests



flakefinder report for kubevirt/kubevirt

Data range from 2023-03-21T00:00:00Z till 2023-03-21T23:59:59Z
Source PRs: #9472, #9455, #9392, #9420, #9462, #9445,

		periodic-kubevirt-e2e-k8s-1.24-sig-storage-cgroupsv2	periodic-kubevirt-e2e-k8s-1.25-sig-compute-migrations	periodic-kubevirt-e2e-k8s-1.26-sig-compute	periodic-kubevirt-e2e-k8s-1.26-sig-compute-root	periodic-kubevirt-e2e-k8s-1.26-sig-storage	periodic-kubevirt-e2e-k8s-1.26-sig-storage-root	pull-kubevirt-e2e-k8s-1.24-sig-storage	pull-kubevirt-e2e-k8s-1.25-sig-compute	pull-kubevirt-e2e-k8s-1.25-sig-compute-migrations	pu ku e2 1.2 sto	
0	Serial sig-compute rfe_id : 393 crit : high vendor : cnv-qe@redhat.com level : system VM Live Migration with a dedicated migration network Should migrate over that network	0/0/1	1/0/0	0/0/1	0/0/1	0/0/2	0/0/1	0/0/1	0/0/1	3/0/1		
1	Serial sig-compute test_id : 4642 Infrastructure Start a VirtualMachineInstance when the controller pod is not running and an election happens should succeed afterwards	0/0/1	0/0/1	0/1/0	1/0/0	0/0/2	0/0/1	0/0/1	1/0/0	0/0/4		
2	sig-storage Storage Starting a VirtualMachineInstance with error disk should pause VMI on IO error	0/1/0	0/0/1	0/0/1	0/0/1	0/2/0	1/0/0	0/1/0	0/0/1	0/0/4	1/2/0	2/5/0
3	sig-storage Storage Starting a VirtualMachineInstance with faulty disk should pause VMI on IO error	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0/0/2	1/1/0	2/4/0

Serial sig-compute
rfe_id : 393 crit : high
vendor : cnv-qe@redhat.com
level : system
VM Live Migration with a dedicated migration network Should migrate over that network

1/2/0 2/5/0
1/1/0 2/4/0

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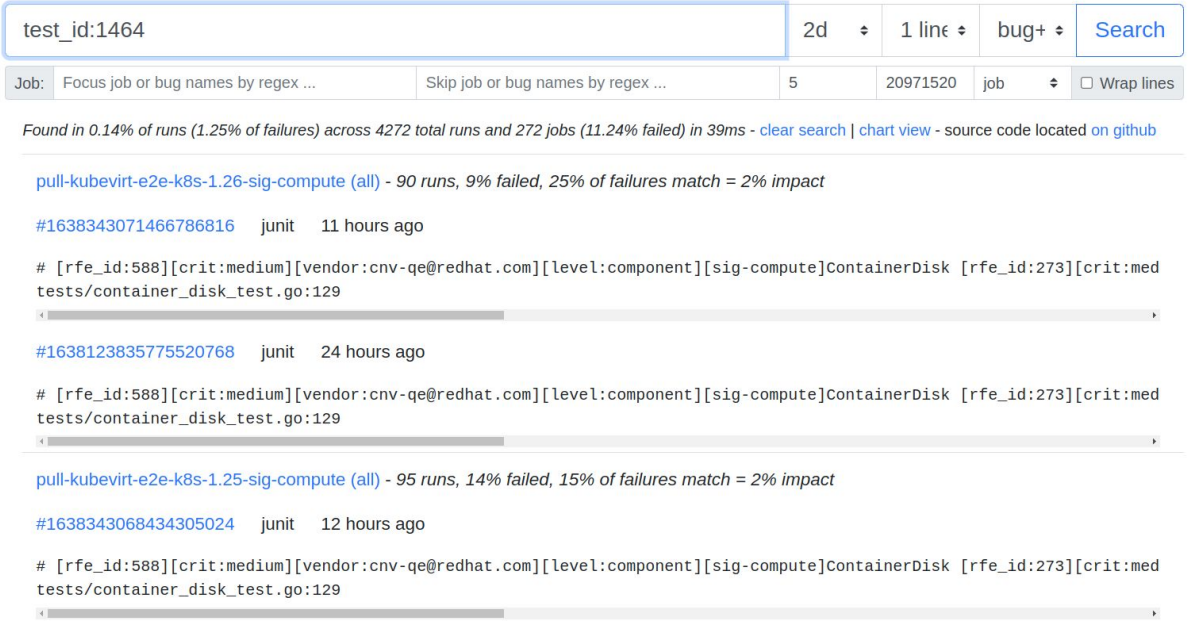
what tools do we have

[ci-search]

search for terms in prow job logs (see [openshift ci-search])



what tools do we have

ci honoring QUARANTINE label

```
# If KUBEVIRT_QUARANTINE is not set, do not run quarantined tests. When it is
# set the whole suite (quarantined and stable) will be run.
if [ -z "$KUBEVIRT_QUARANTINE" ]; then
    if [ -n "$KUBEVIRT_E2E_SKIP" ]; then
        export KUBEVIRT_E2E_SKIP="${KUBEVIRT_E2E_SKIP}|QUARANTINE"
    else
        export KUBEVIRT_E2E_SKIP="QUARANTINE"
    fi
fi
```

presubmits skipping quarantined tests

periodics including execution of the quarantined tests

```
176
177         It("[QUARANTINE]should successfully upgrade virt-handler", func() {
178                 var expectedEventsLock sync.Mutex
179                 expectedEvents := []string{
180                         "maxUnavailable=1",
181                         "maxUnavailable=10%",
182                         "virt-handler=ready",
183                         "maxUnavailable=1",
184                 }
185
186                 ds, err := virtCli.AppsV1().DaemonSets(flags.KubeVirtInstall
```

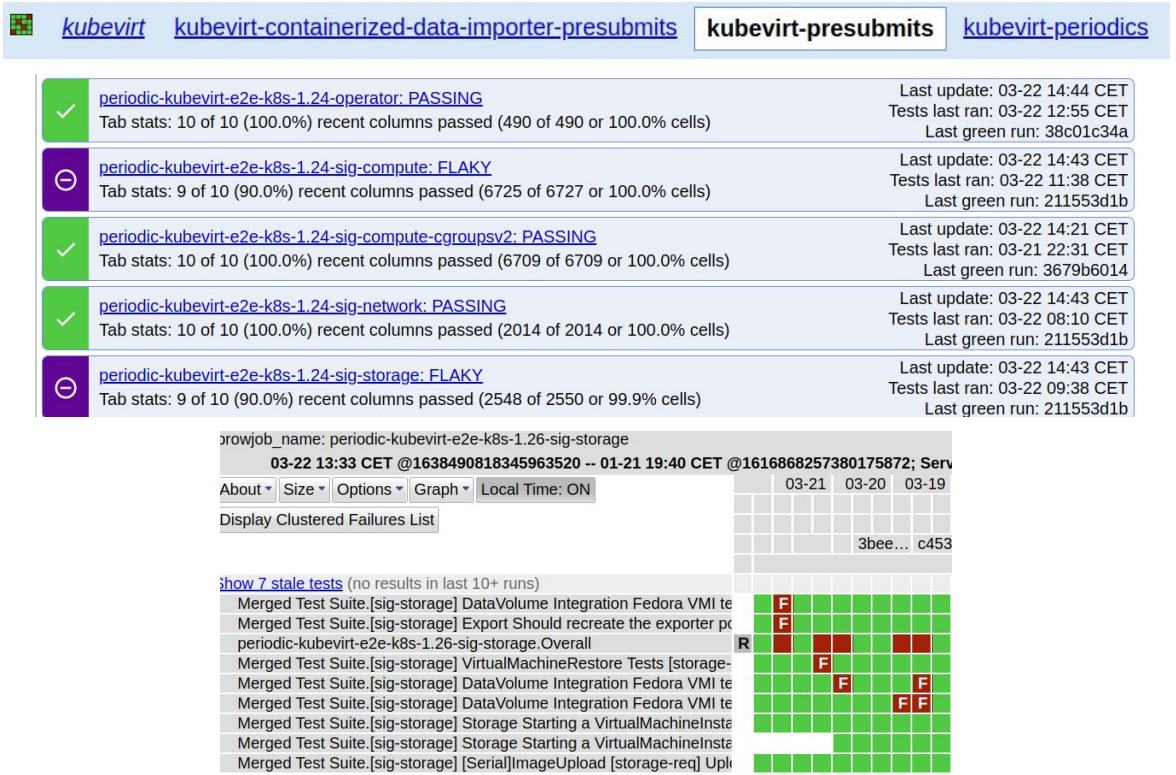
sources:

- https://github.com/kubevirt/kubevirt/blob/38c01c34acecfafc89078b1bbaba8d9cf3cf0d4d/automation/test.sh#L452
- https://github.com/kubevirt/kubevirt/blob/38c01c34acecfafc89078b1bbaba8d9cf3cf0d4d/hack/functests.sh#L69
- https://github.com/kubevirt/kubevirt/blob/38c01c34acecfafc89078b1bbaba8d9cf3cf0d4d/tests/canary_upgrade_test.go#L177

what tools do we have

[testgrid](#)

drill down on all jobs for kubevirt/kubevirt that are running inside KubeVirt Prow



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what tools do we have

[ci-health]

record metrics over merge-queue-length, time-to-merge, retests-to-merge and merges-per-day

README.md

kubevirt/kubevirt

avg merge queue length 4.00 ± std 3.38 | days to merge 0.47 ± std 0.27 | retests to merge 2.44 ± std 1.77

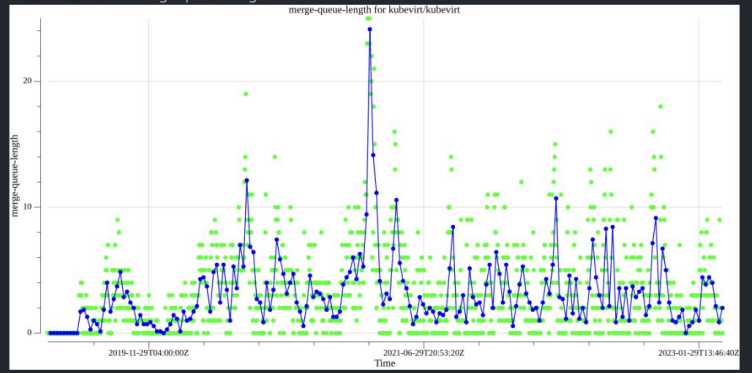
Latest execution data

Latest weeks data

Historical data evolution

These plots will be updated every week.

- kubevirt/kubevirt merge queue length:



Data available here.

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the future - more data, more tooling

gaps we want to close:

- improved checking of PRs against flakes
- a quick overview of how exactly we are progressing (beyond ci-health)
- overview of current number of flakes in quarantine, per sig, and how long they are in quarantine
- averages per day / per week, drilldown to flake level
- automatic quarantine PRs when new flakes have entered the codebase

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want to help?

- join #kubevirt-dev Slack channel
- join kubevirt-dev Google group
- fix flakes on kubevirt/kubevirt

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Q&A

mailto: dhiller@redhat.com

k8s slack: @dhiller