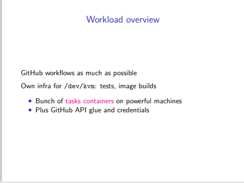
2022-02-14

(Mostly) Self-testing infrastructure updates

└Workload overview


Workload overview

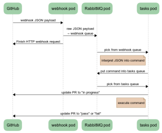
GitHub workflows as much as possible

Own infra for `/dev/kvm`: tests, image builds

- Bunch of tasks containers on powerful machines
- Plus GitHub API glue and credentials

- Last year topic: deploy proposed infra changes to staging env; hard problem, but have 80/20 solution now
- Everything that does not require /dev/kvm runs on GitHub: releases, translation updates, NPM cache, unit tests, URL checks, etc.
- Many of these effortlessly run on forks, some of them require some credential setup, but mostly unproblematic; ignored for this talk
- Our VM image builds and integration tests require direct QEMU control and thus /dev/kvm; still hard to come by, maintain custom infra
- For purposes of this talk: one webhook container and a sufficient number of tasks containers which need to run reasonably powerful hardware
- Communicates to GitHub via its API, and a small number of secrets

Production event flow


GitHub
webhook pod
RabbitMQ pod
tasks pod
webhook JSON payload
raw JSON payload → webhook queue
Finish HTTP webhook request
pick from webhook queue
interpret JSON into command
put command into tasks queue
pick from tasks queue
update PR to "in progress"
execute command
update PR to "pass" or "fail"
GitHub
webhook pod
RabbitMQ pod
tasks pod

Webhook payload → AMQP code

- three phases
- starts at top left with a GitHub event: open or update PR; calls URL in our infra with JSON payload
- payload is ephemeral → put as-is into AMQP webhook queue
- tasks bot picks off the payload from webhook queue, interprets it, turns it into a shell command such as a parameterized test invocation, puts into tasks queue
- tasks bot picks off command from tasks queue, sets PR status to "in progress", runs command, and sets PR status to pass/fail
- the first phase is really simple, and basically never changes; see link on the slide
- at the same time that's the hardest to replicate, as it requires privileged GitHub project configuration and production secret
- the other two phases are complex, change over time, don't depend on production secrets

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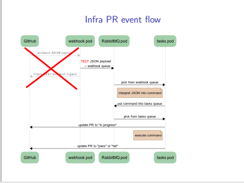
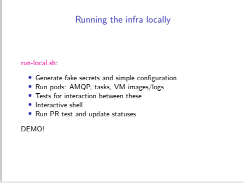
└─Infra PR event flow



- we realized that if we drop that first phase and replace it with a mocked JSON payload, we avoid the one thing that's hard to replicate: the GitHub webhook config
- we can run a test which does not require /dev/kvm, just something very fast and simple (quick python unittest); that's fine because the real tests get changed in a completely different project than the infrastructure; we just want to check the logic and glueing of the infra, not what particular payload it runs
- with these two simplifications, the deployment can run literally anywhere, including local dev machine and GitHub workflow


Running the infra locally

run-local.sh:

- Generate fake secrets and simple configuration
- Run pods: AMQP, tasks, VM images/logs
- Tests for interaction between these
- Interactive shell
- Run PR test and update statuses

DEMO!

- As you know, I am a huge fan of the “humans first” approach: it should be simple and safe to develop and run infra locally; that usually also makes it easy to deploy on clouds
- Created a run-local script to run everything in local user podman pods
- Show `tasks/run-local.sh` in Cockpit terminal
- See the creation of config/secrets, waiting for the tasks AMQP queue loop, image/log server upload/download test, and cleanup
- Show `tasks/run-local.sh -i`, `echo $AMQP_SERVER`, `bots/inspect-queue --amqp $AMQP_SERVER`, show pods

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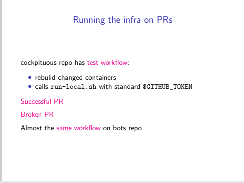
└─Running the infra on PRs



Running the infra on PRs

cockpituous repo has test workflow:

- rebuild changed containers
- calls `run-local.sh` with standard `$GITHUB_TOKEN`

Successful PR

Broken PR

Almost the same workflow on bots repo

- Real self-validation comes into play when sending a PR against our infra repo cockpituous
- We can run that script inside the GH workflow VM, deploy containers there, and give it the default GH token so that it can update PR statuses
- cockpituous' own unit tests are harmless, just some unit tests and pyflakes; does not need kvm
- shortcut the webhook path, but everything afterwards happens exactly like in production
- Open successful PR, show tests/tasks workflow; tasks container gets rebuilt as it changed, images container did not change; picks up queue item, runs unit tests, adds a status for it to the PR; point our localhost URL
- Second example is a broken PR with a typo'ed git CLI option; test fails

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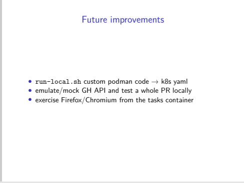
└─Future improvements



Future improvements

- `run-local.sh` custom podman code → k8s yaml
- emulate/mock GH API and test a whole PR locally
- exercise Firefox/Chromium from the tasks container

- the run-local script's startup of the containers is completely separate from what happens in production; podman play kube became better since then, may now be possible to share some YAML
- you can't run the whole logic locally right now, it has to happen as part of a GH PR; possibly the GH API can be mocked
- check browsers against a locally running cockpit, to check for regressions with the browser automation APIs or crashes; we had a lot of cases in the past already, and annoying to have to revert them in production

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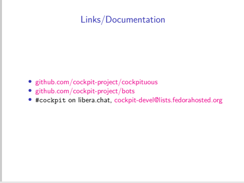

Links/Documentation

- github.com/cockpit-project/cockpituous
- github.com/cockpit-project/bots
- `#cockpit` on libera.chat, cockpit-devel@lists.fedorahosted.org

- finally, where can you look at our stuff and steal or contribute
- public cockpituous repo has all our infra containers and Ansible scripts
- bots is the code that runs inside containers; grab AMQP work queue item, invoke test, update translations, build VM image
- you can always say hi on IRC or ask on our mailing list