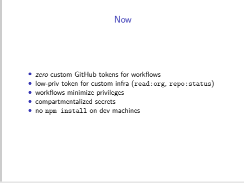
Naïve situation

(until ~ one year ago)

- Single almighty github.com/cockpituous token
- cockpit-project org wide secrets
- every developer does `npm install` all the time

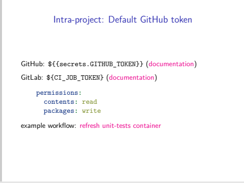
- Until mid 2020: ran all the automation on our own hardware
- Created a “cockpituous” GH user and token with permission to push to public repos, so that it could create PRs, used that everywhere
- Could not push to main branches due to branch protection rules
- Directory of all secrets, synced across all machines
- Then moved more and more stuff to GH workflows, but kept the secrets layout; just put them into the cockpit-project org
- standard web developer thing where packages.json specifies NPM dependencies, developers install with npm CLI



Now

- *zero* custom GitHub tokens for workflows
- low-priv token for custom infra (`read:org`, `repo:status`)
- workflows minimize privileges
- compartmentalized secrets
- no `npm install` on dev machines

- All of that nonsense is gone now
- Got rid of cockpituous token for all workflows
- We still need cockpituous token for our custom infra – tests must be able to update statuses, and check that the PR author is allowed to use the infra
- not super-dangerous any more if that token ever leaks, you can't modify any code that way
- Devs and CI don't run `npm install` any more, improves supply chain attacks and is much faster
- Want to walk through some details now, but only the "what's possible"; the "how" is in links
- We use GitHub, but these concepts are also present in GitLab



Intra-project: Default GitHub token

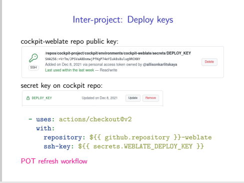
GitHub: `${{secrets.GITHUB_TOKEN}}` (documentation)

GitLab: `${CI_JOB_TOKEN}` (documentation)

```
permissions:
  contents: read
  packages: write
```

example workflow: refresh unit-tests container

- Most workflows only require access to their own project; unit tests, auto-filing an issue from URL check, or in my linked example, regularly refreshing the unit-tests container
- Both GitHub and GitLab provide a default token
- Fairly wide default permissions, but you can minimize them in your workflow; in our example, the only writing perm is for the GitHub container registry; it can otherwise read the repository and do nothing else



Inter-project: Deploy keys

cockpit-weblate repo public key:

```
/repos/cockpit-project/cockpit/environments/cockpit-weblate/secrets/DEPLOY_KEY
SHA256:+VrTm/JP5VaA8DomwjPfKgP74eYIuk8s8ulug9RCKNY
Added on Dec 8, 2021 via personal access token owned by @allisonkarlitskaya
Last used within the last week — Read/write
```

secret key on cockpit repo:

```
DEPLOY_KEY          Updated on Dec 8, 2021
```

```
- uses: actions/checkout@v2
  with:
    repository: ${{ github.repository }}-weblate
    ssh-key: ${{ secrets.WEBLATE_DEPLOY_KEY }}
```

POT refresh workflow

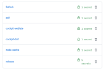
- some automation involves multiple projects; for example, our PO template refresh builds current cockpit main, generates PO template, and pushes it to the Fedora Weblate git repo
- we also have workflows which update an npm or webpack cache git repo
- deploy key is a public SSH key which gets granted push access to the repository you add it to
- you generate an SSH keypair, add public key as deploy key to target, add private key as secret to originating project - the one that has the workflow
- use it by cloning a repo through SSH instead of HTTP

Deploy key management

github-upload-secrets script
cockpit's deploy keys
GitHub documentation
GitLab documentation

- The point of deploy keys is that literally nobody “knows” them; they are generated and configured fully automatically
- We have a script for uploading a set of secrets to GitHub; usually from our very restricted CI secrets git (access for 3 people only)
- but this can also generate an SSH keypair and upload it directly to GitHub; carefully written to never hit the disk, and the privkey is immediately forgotten
- All of our projects have a deploy-keys.sh script which calls github-upload-secrets for all the deploy keys that it needs
- With that, we can refresh the keys arbitrarily often and don't have to remember the details; but it needs to be done by a project admin who has project admin permissions; we don't want to put such a powerful token into automation
- Again, this works both for GitHub and GitLab, documentation links on the slide

Environments

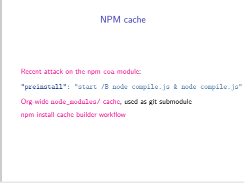


flathub	1 secret
self	1 secret
cockpit-weblate	1 secret
cockpit-dist	1 secret
node-cache	1 secret
release	5 secrets

in `weblate-sync-pot.yml`:

```
environment: cockpit-weblate
```

- one should minimize the exposure of secrets: usually a workflow only needs a tiny subset, and some might even not need any secrets at all
- Sort into sets of related secrets for different purposes, called environment; e.g. cockpit-weblate env only has the deploy key for the weblate repo; the release env has e.g. the Fedora password and the COPR token
- select a workflow's environment; this has the nice effect that if you don't specify it, a workflow has no secrets at all, as we don't have any org or project wide secrets any more; access to secrets is opt-in
- Again, management of the environments must be automated; we use the already mentioned github-upload-secrets script



NPM cache

Recent attack on the npm coa module:

`"preinstall": "start /B node compile.js & node compile.js"`

Org-wide `node_modules/` cache, used as git submodule

npm install cache builder workflow

- Finally, Describe our npm handling a bit; `npm install` is one of the most annoying things for developer: slow, large downloads, network flakes in CI
- Prone to supply chain attacks; e.g. 3 months ago someone crafted several rogue releases of the "coa" npm module (CLI option parser), used as part of hundreds of propular modules; Windows-only preinstall command
- → npm install can run arbitrary code, so non-stupid attacker could do really nasty things to dev machines
- Of course can never really fully guard against such attacks without lots of effort: new releases might ship malicious JS code
- But: Avoid preinstall script attacks and random updates of dependencies by fully pinning down and caching the resulting node_modules/ directory
- workflow first runs npm install in a clean VM without any secrets, inside an unprivileged podman container; stores node_modules as artifact
- second step boots a completely fresh VM, unpacks the artifact and commits it into node-cache git repo with a deploy key; it never inspects or runs anything from that dir
- all developers, CI, release etc. only ever uses the git cache as a submodule; updates gated by CI