



Google et l'entropie de son architecture de services distribués

De Borg à Kubernetes ou l'art d'ordonnancer des tâches

Alexis Moussine-Pouchkine (@alexismp)
Google Cloud Platform - Developer Relations



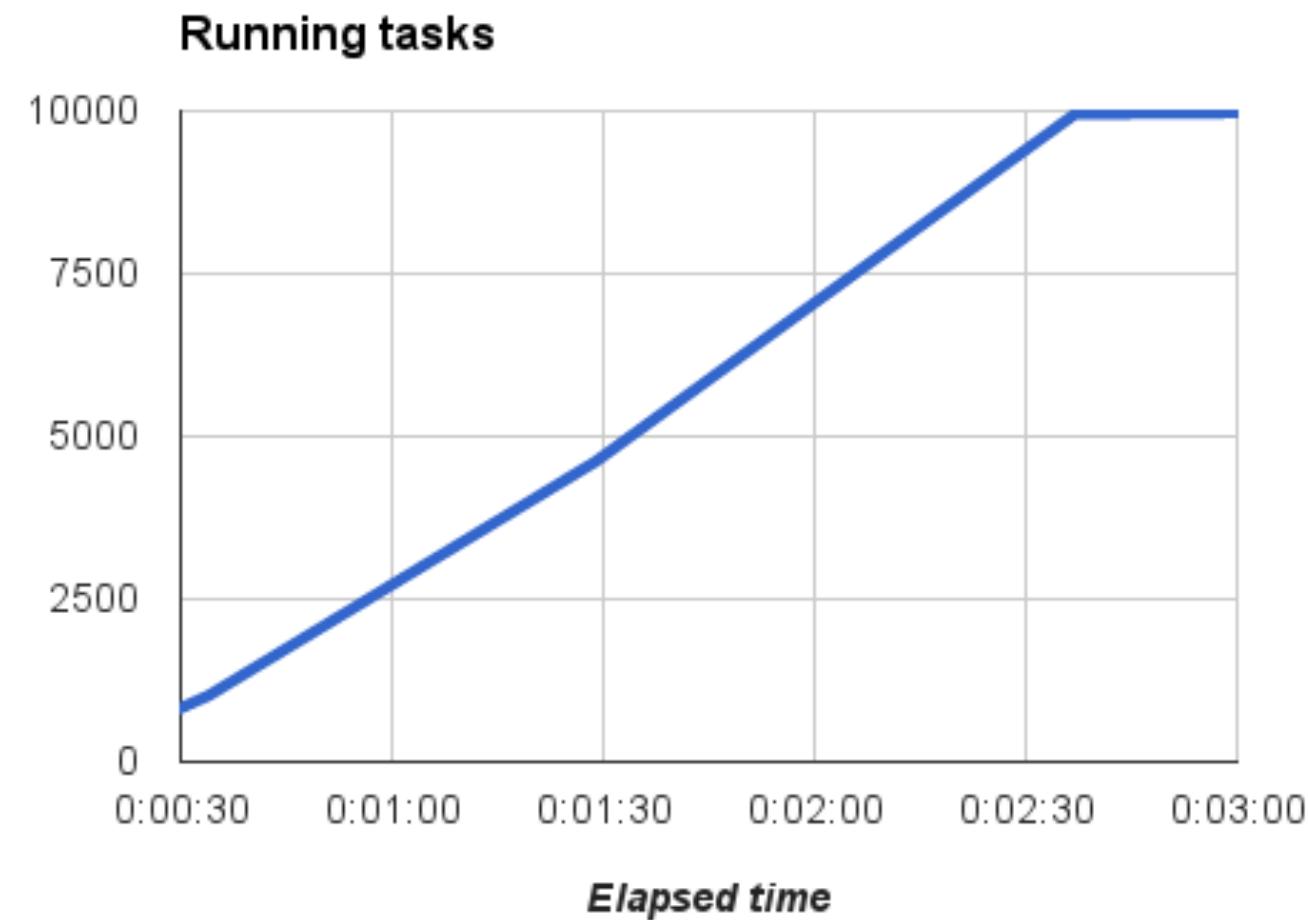


Image by Connie Zhou

User view

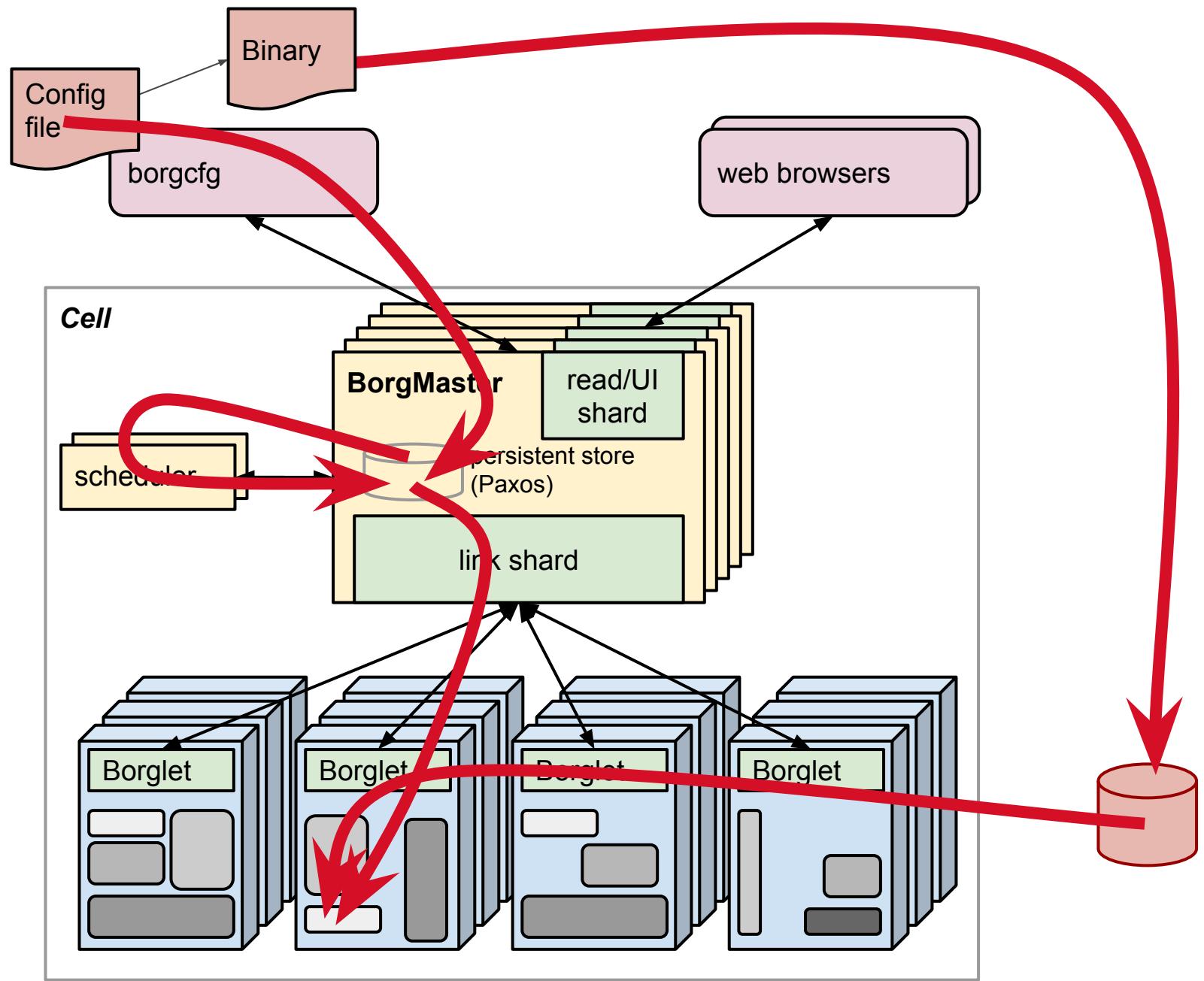
```
job hello_world = {
    runtime = { cell = 'ic' }                      // Cell (cluster) to run in
    binary = '.../hello_world_webserver'           // Program to run
    args = { port = '%port%' }                     // Command line parameters
    requirements = {                               // Resource requirements
        ram = 100M
        disk = 100M      (optional)
        cpu = 0.1
    }
    replicas = 10000     // Number of tasks
}
```

User view



User view

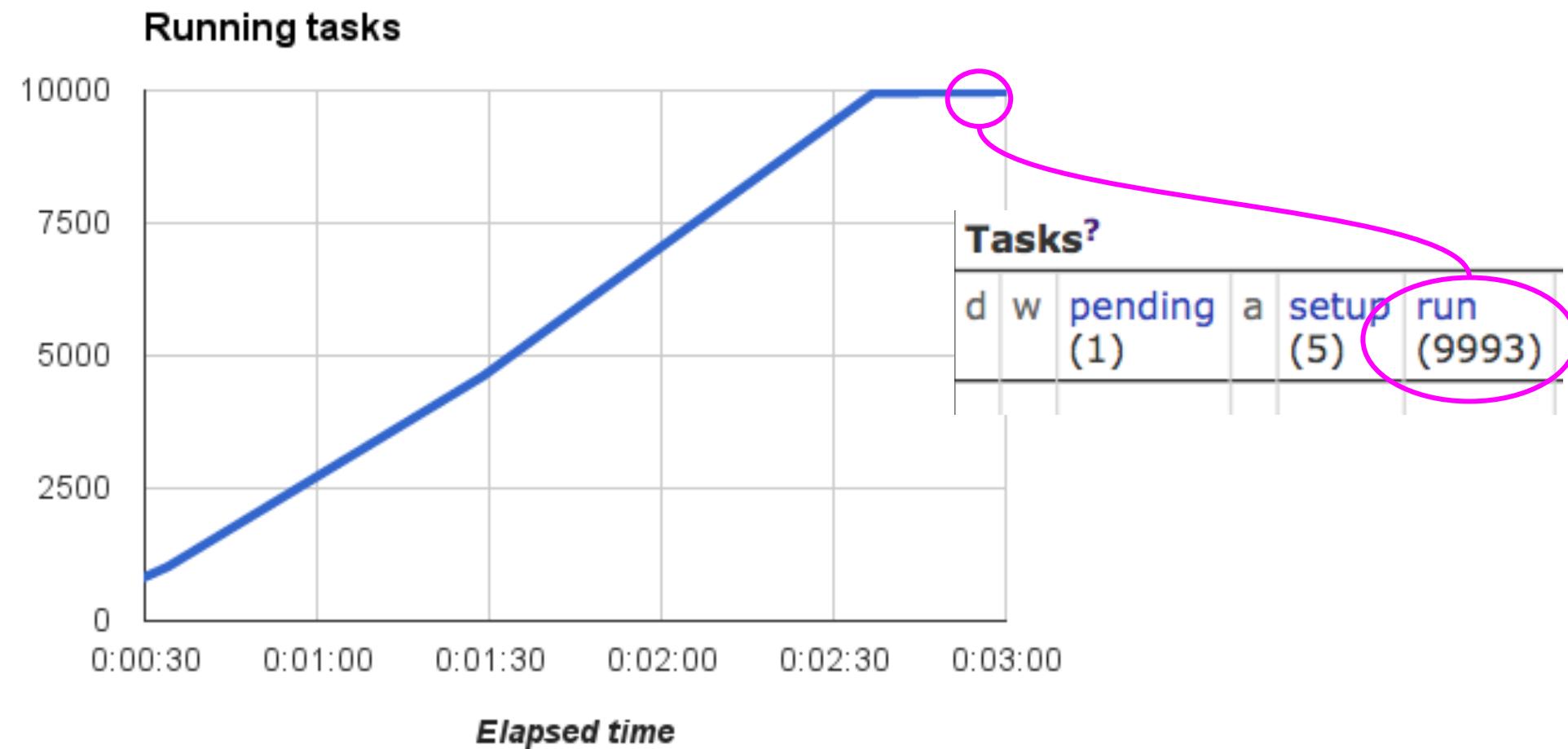
What just happened?



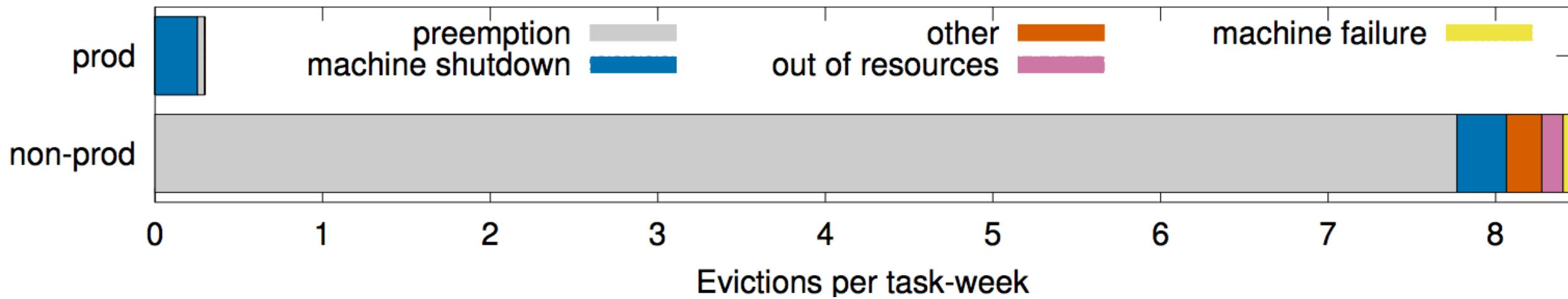
User view



User view



Failures



task-eviction rates
and causes

Failures



A 2000-machine service will
have >10 task exits per day
This is not a problem: it's normal



Efficiency

Multiple apps per machine

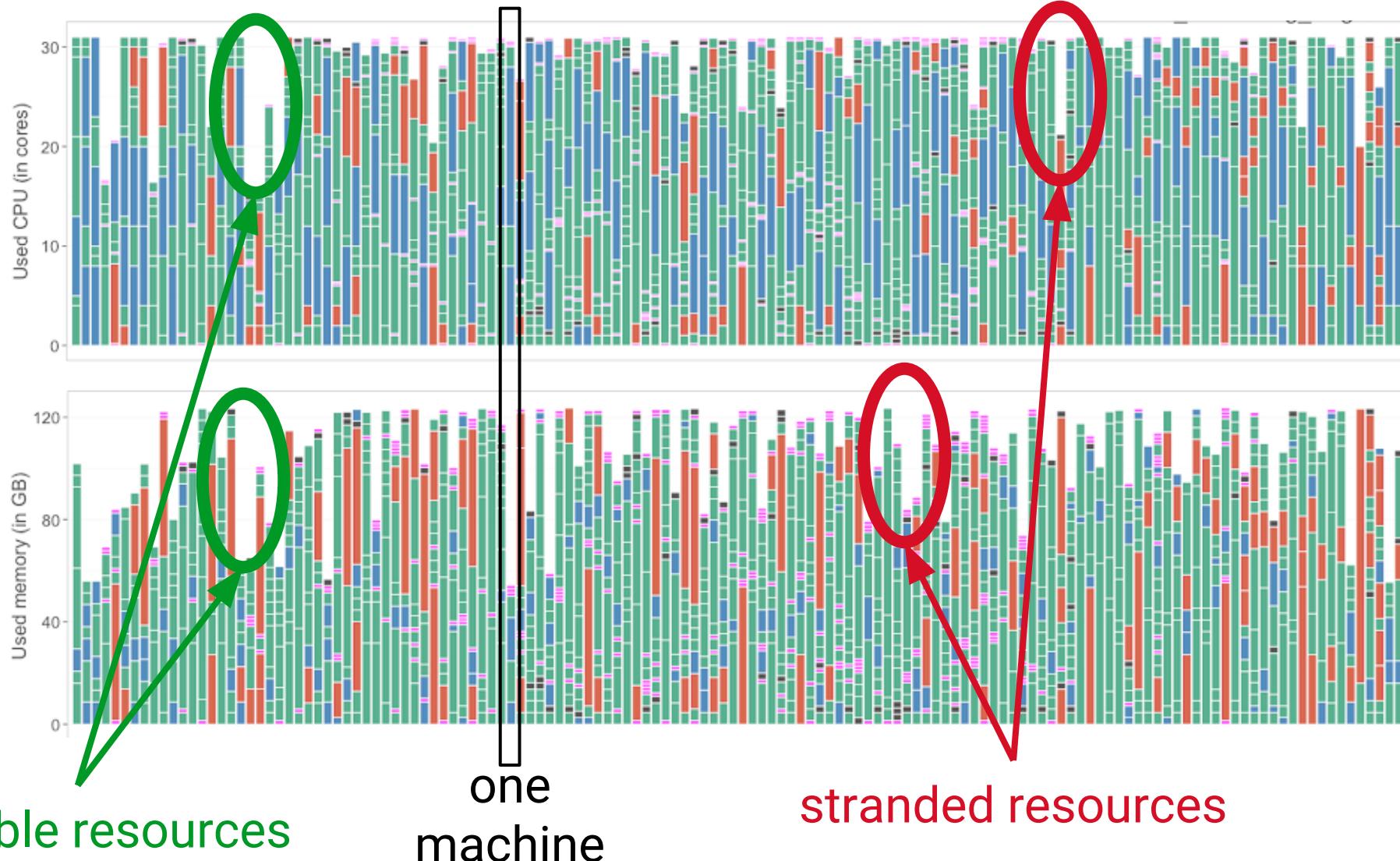
Advanced bin-packing algorithms

Sharing clusters between prod/batch

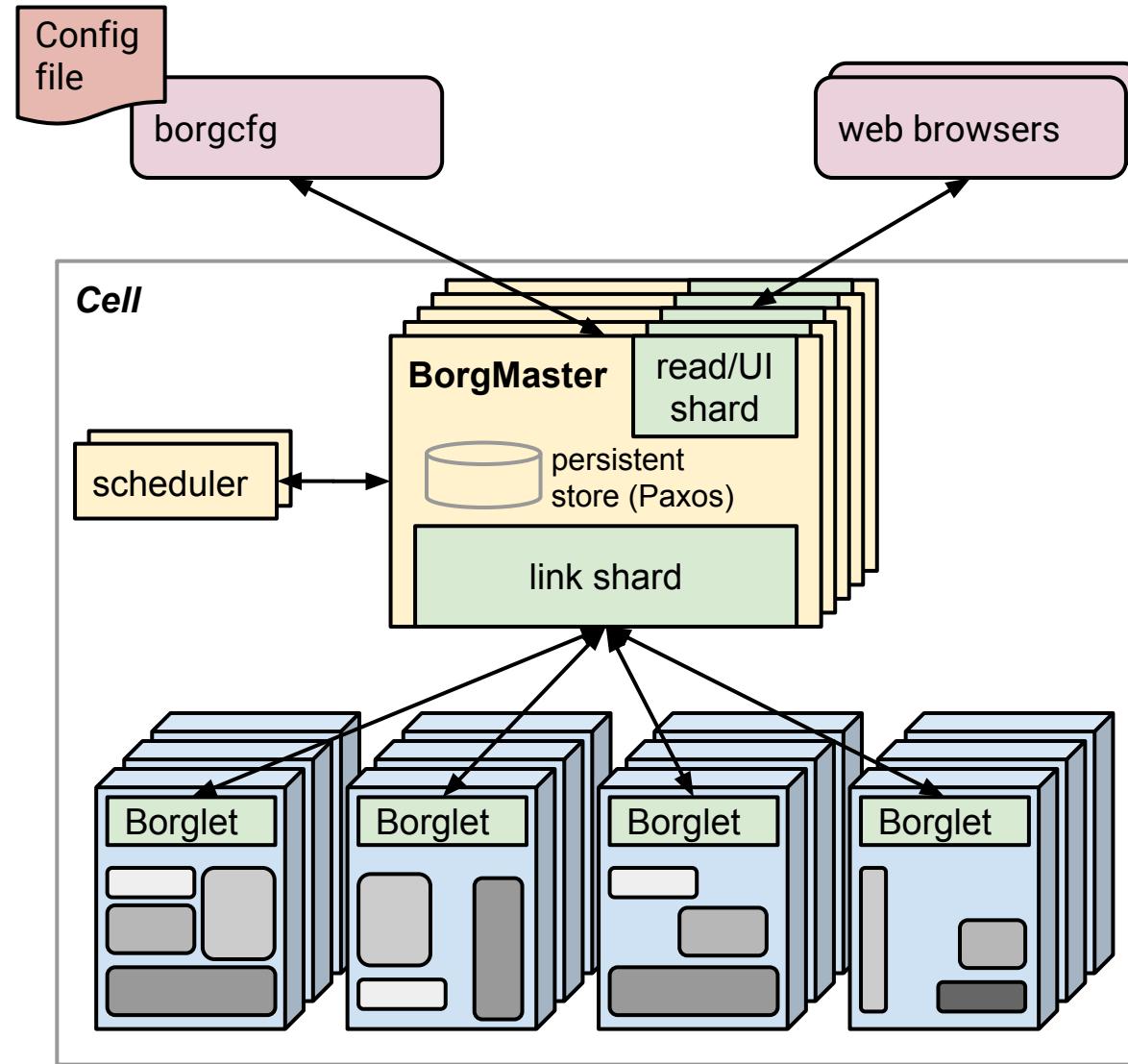
available resources

one machine

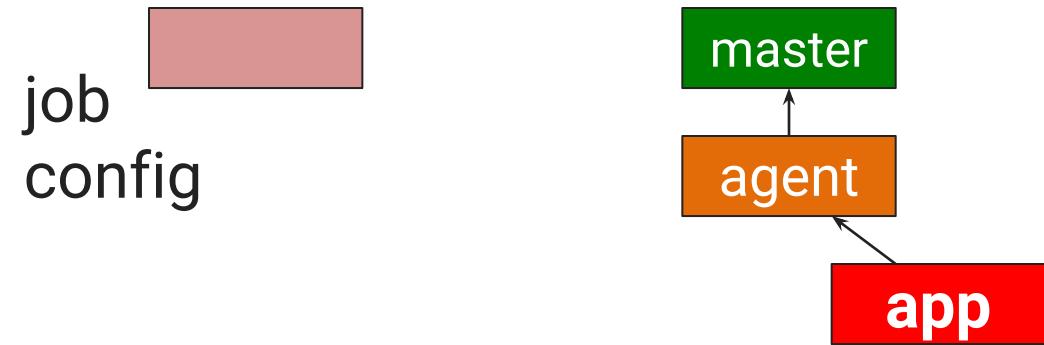
stranded resources



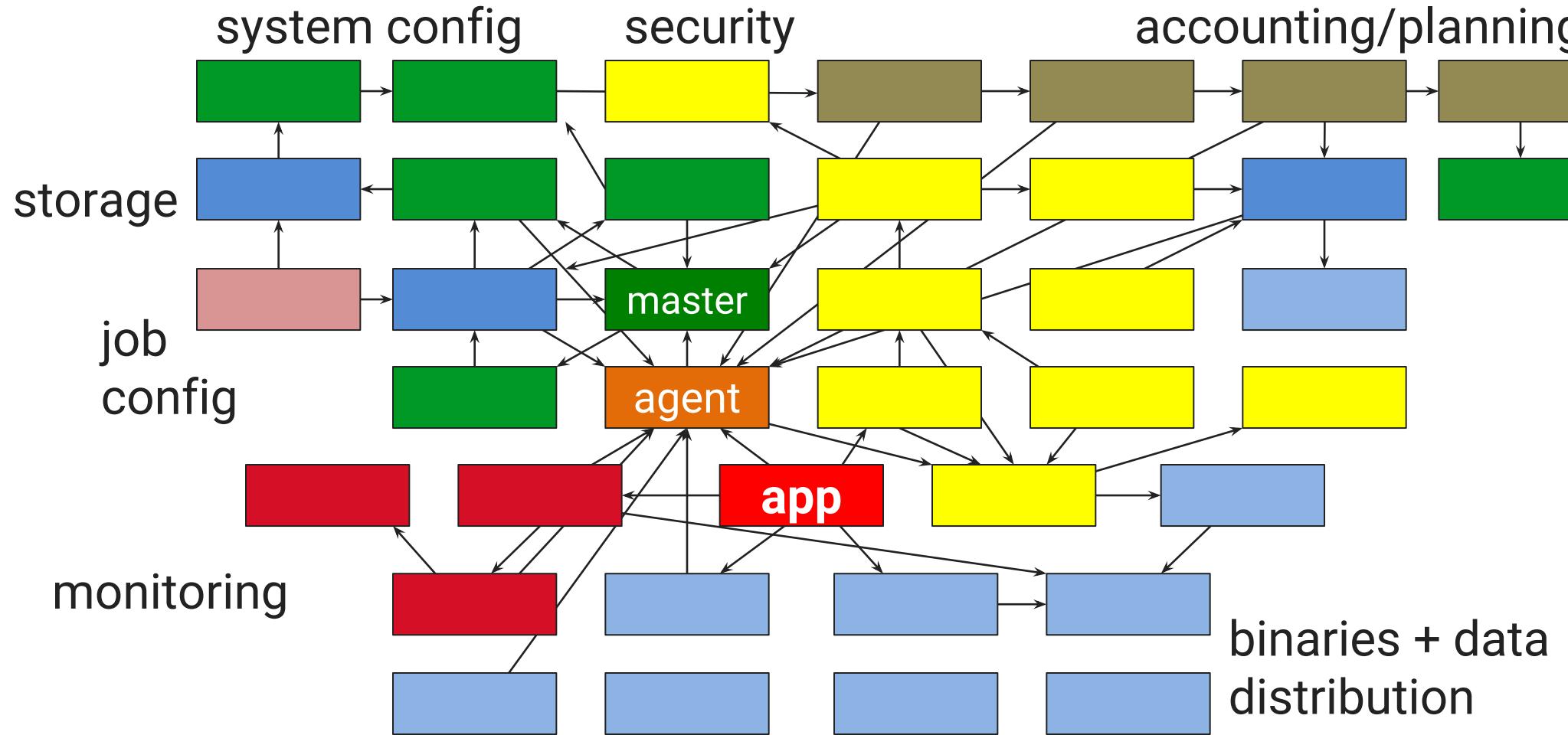
A few other moving parts



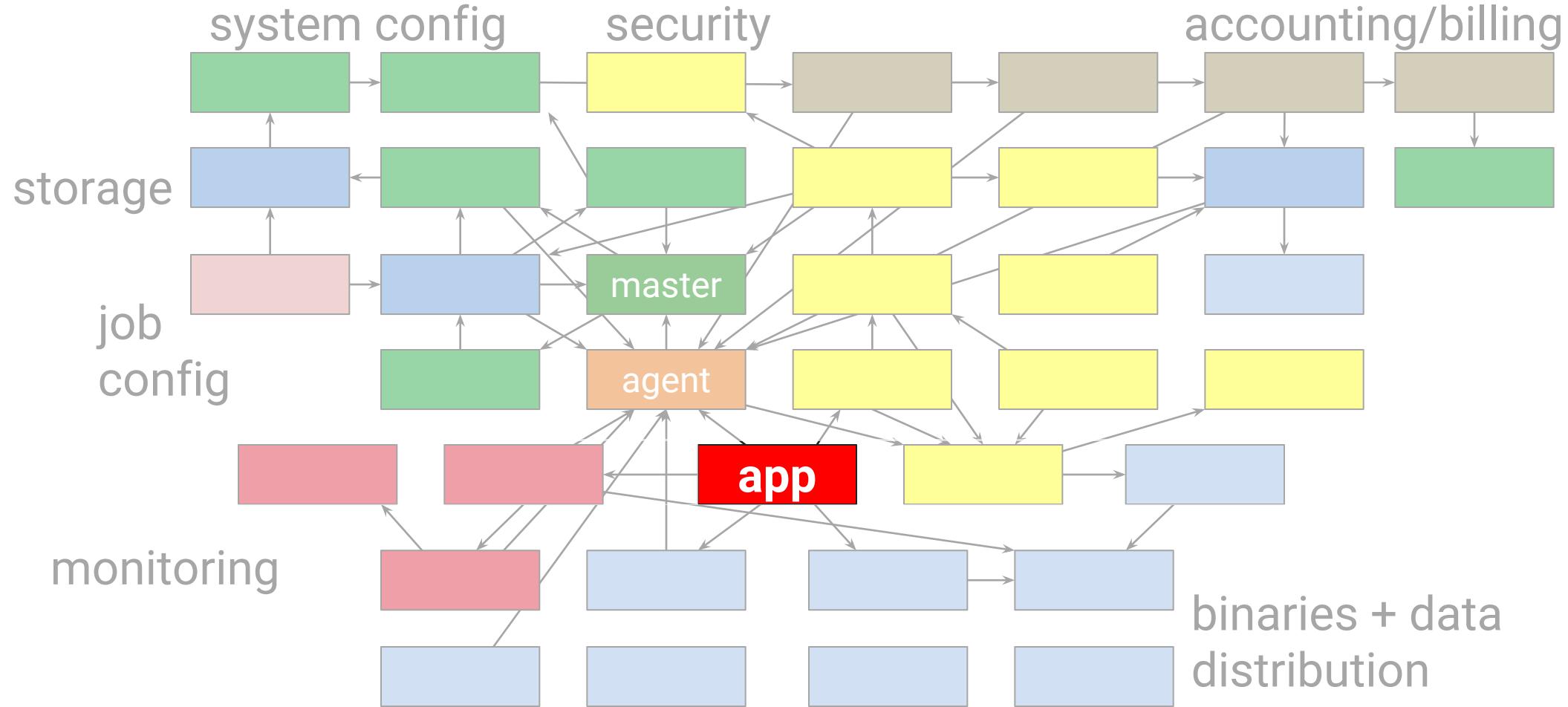
A few other moving parts



A few other moving parts



A few other moving parts

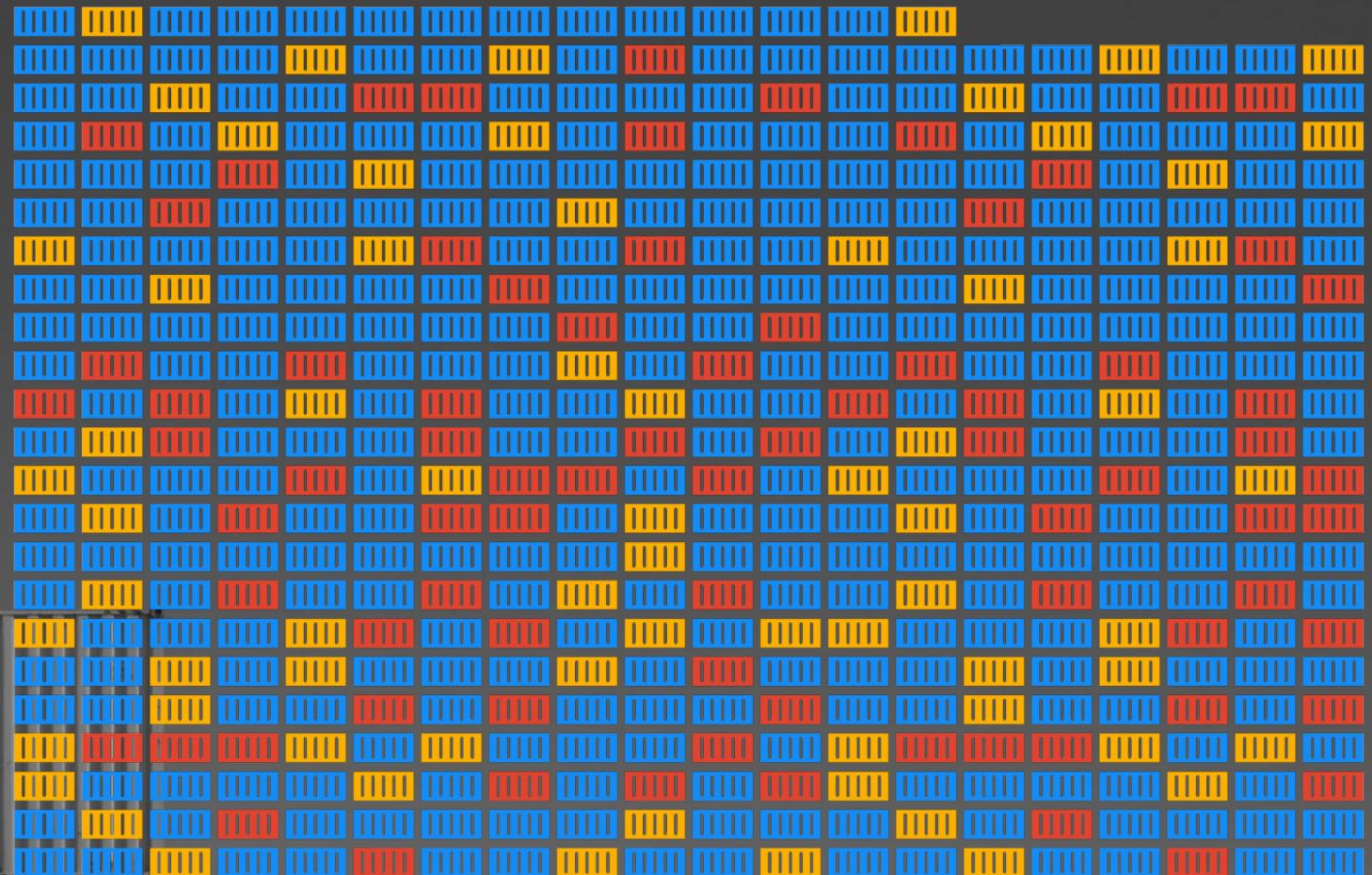


Containers at Google

Developed as the only
practical way to manage
Google-scale compute

Everything at Google runs in
a container

**We launch over
2 Billion
containers per week.**





Kubernetes

κυβερνήτης: *pilot or helmsman of a ship*

<http://kubernetes.io>



kubernetes by Google

The screenshot shows the GitHub repository page for 'GoogleCloudPlatform / kubernetes'. The page title is 'GoogleCloudPlatform / kubernetes'. It displays basic repository statistics: 13,870 commits, 35 branches, 59 releases, and 401 contributors. A pull request from 'yujuhong/reduce_noise' has been merged. The latest commit is 'ef41ceb3e4'. The sidebar on the right includes links for 'Code', 'Issues' (1,313), 'Pull requests' (206), 'Wiki', and 'Pulse'.

This repository Search Pull requests Issues Gist

Watch 904 Star 8,708 Fork 1,925

Code Issues 1,313 Pull requests 206 Wiki Pulse

Container Cluster Manager from Google <http://kubernetes.io>

13,870 commits 35 branches 59 releases 401 contributors

Merge pull request #10646 from yujuhong/reduce_noise ...

wojtek-t authored 7 hours ago latest commit ef41ceb3e4

Godeps Godep: add(github.com/juju/ratelimit): 772f5c38e468398c4511514f4f6aa9... 2 days ago

api/swagger-spec Merge pull request #10509 from nikhilindal/getToPost 2 days ago



Kubernetes

Direct Borg analogues:

- Borg containers => Docker containers
- alloc (task group) => pod (container group)
- Borglet => Kubelet
- Paxos => persistent, declarative specs
- reconciliation loops

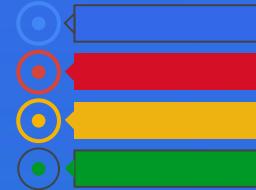




Kubernetes

New / improved:

- labels + label queries
- service abstraction
- composable microservices
- IP per pod



Kubernetes 1.0

OSCON - July 21, 2015 - Portland, Oregon

www.kuberneteslaunch.com (keynote livestream @ 19:30 CET)

Demo



Google Container Engine (GKE)

Google Container Registry



alexismp@google.com
@alexismp
google.com/+AlexisMP

<http://kubernetes.io>
[http://goo.gl/1C4nuo \(Borg paper\)](http://goo.gl/1C4nuo)