Maybe 3.0, or possibly 4.0. Could even be 5.0…

Glasgow

ScotGrid^2.0

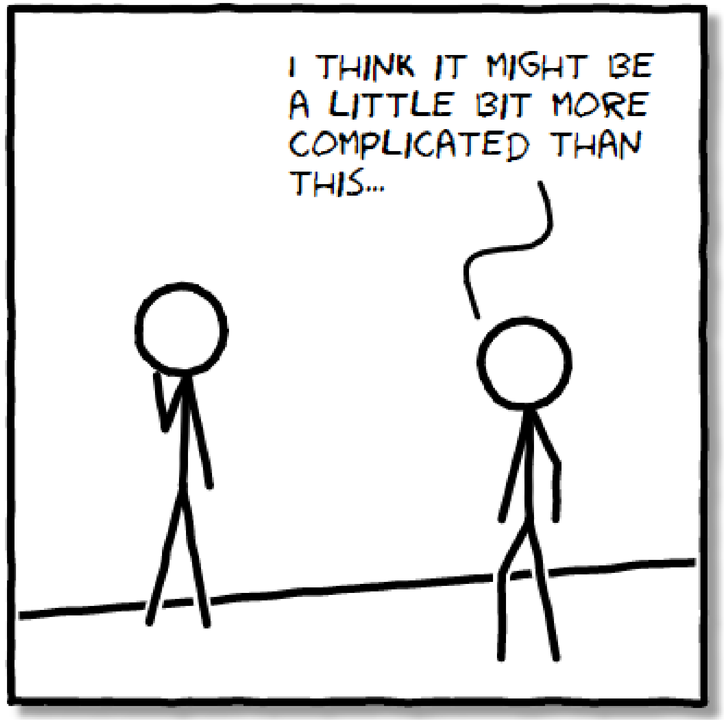
ScotGrid Face-to-Face

Edinburgh

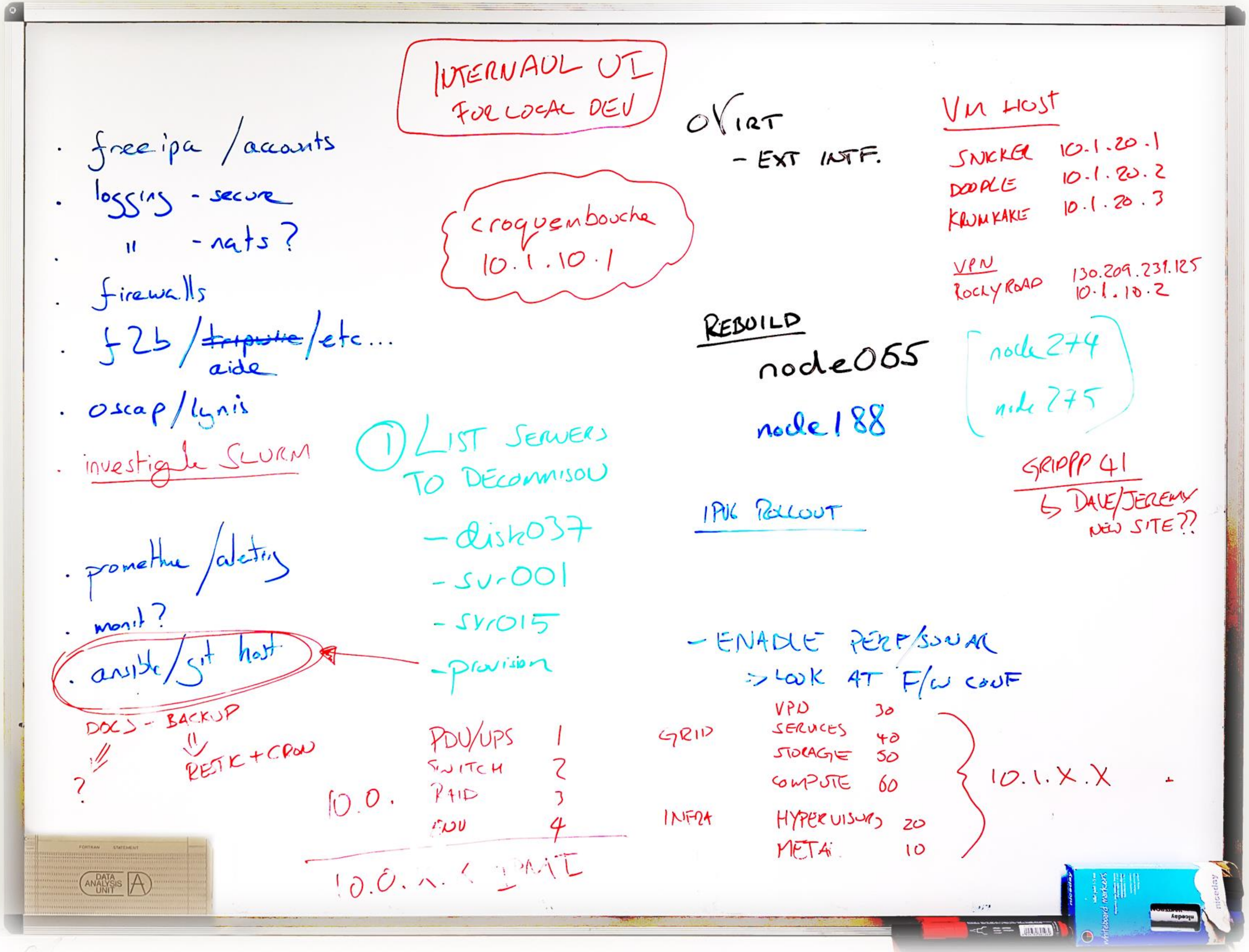
October 2018

Data Centre Migration: Early Planning

1. Build data centre
2. Install kit in data centre
3. Mumble mumble configuration blah blah blah
4. Turn it on


I THINK IT MIGHT BE A LITTLE BIT MORE COMPLICATED THAN THIS...

http://cmx.io



INTERNAUL UI
FOR LOCAL DEV

- freeipa /accounts
- logging - secure
- " - nats ?
- firewalls
- f2b / ~~tripwire~~ aide /etc...
- oscap/lynis
- investigate SLURM
- promethue /aleting
- monit ?
- ansible/git host

DOCS - BACKUP
?
RESTIC + CRON

croquembouche
10.1.10.1

① LIST SERVERS TO DECOMMISON
- disk037
- sv-001
- svr015
- provision

oVIRT
- EXT INTF.

REBUILD
node065
node188

IPV6 ROLLOUT

VM HOST

SNICKER	10.1.20.1
DOOPLE	10.1.20.2
KRUMKAKE	10.1.20.3

VPN

ROCKY ROAD	130.209.231.125 10.1.10.2

node274
node275

GRIPPP 41
↳ DAVE/JEREMY
NEW SITE??

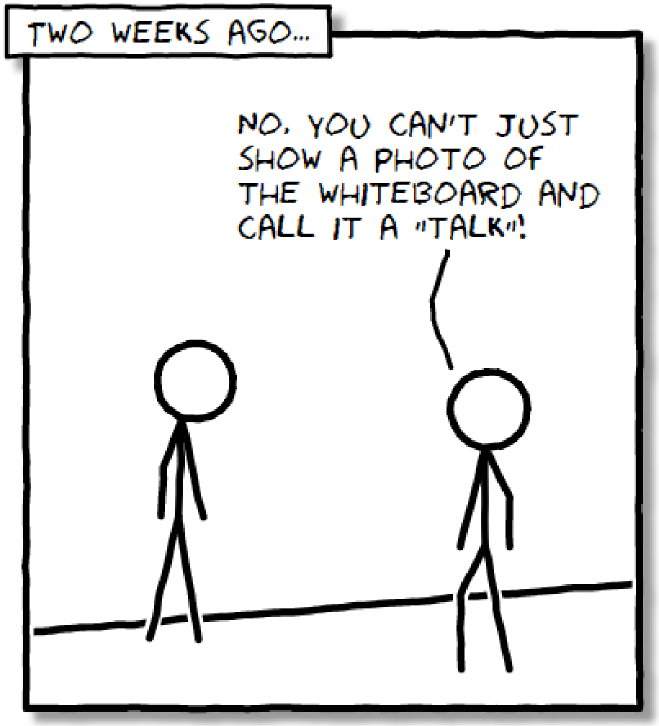
- ENABLE PERF/SONAR
=> LOOK AT F/W CONF

10.0.	PDU/UPS	1
	SWITCH	2
	RAID	3
	IDU	4

10.0.X.X IPMI

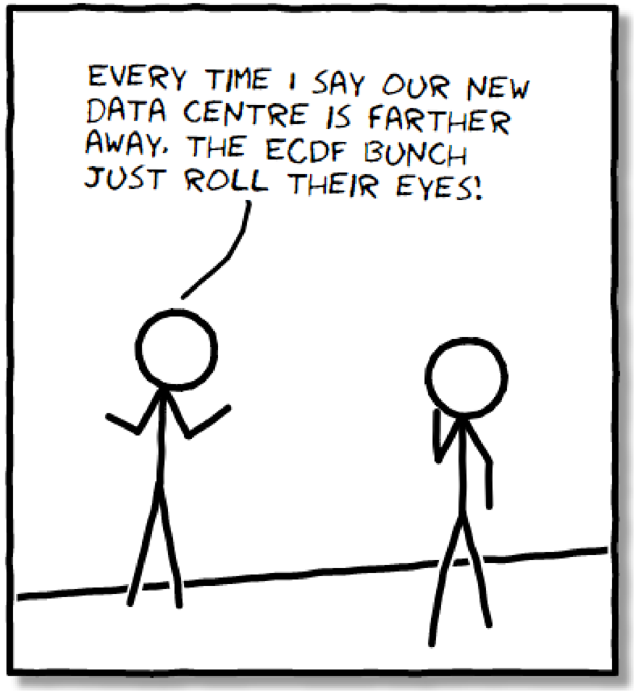
GRID	VPD	30
	SERVICES	40
	STORAGE	50
	COMPUTE	60
INFRA	HYPERVISORS	20
	META	10

10.1.X.X


TWO WEEKS AGO...
NO, YOU CAN'T JUST SHOW A PHOTO OF THE WHITEBOARD AND CALL IT A "TALK"!

ScotGrid 2.0

- Data centre move offers perfect opportunity to redesign site from the ground up
- Change in working practices: the cluster will no longer be just down the stairs
- Many important questions to answer:
  - How do we deploy and configure systems?
  - How do we manage jobs?
  - How do we manage storage?
  - How do we check that everything is working?
  - How do we secure it?
- Most important question to answer:
  - What do we call it?

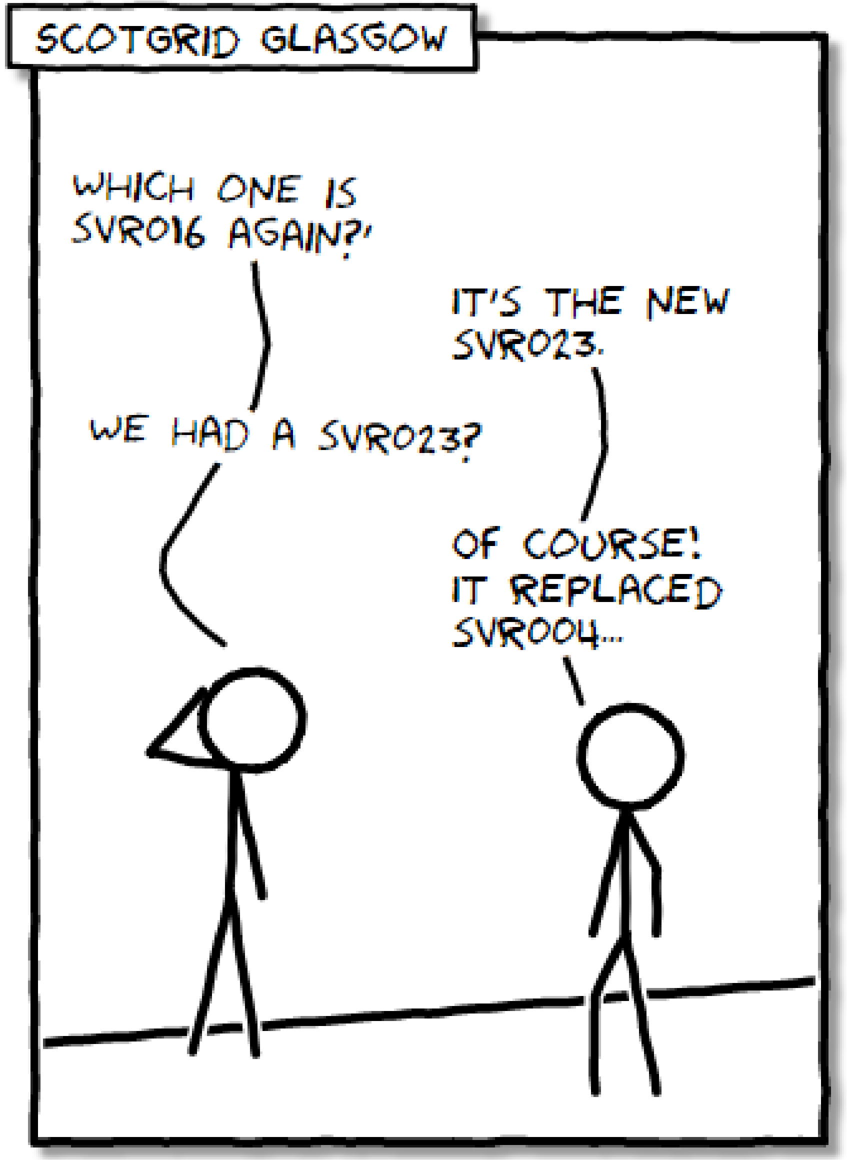

EVERY TIME I SAY OUR NEW DATA CENTRE IS FARTHER AWAY, THE ECDF BUNCH JUST ROLL THEIR EYES!

Legacy Names

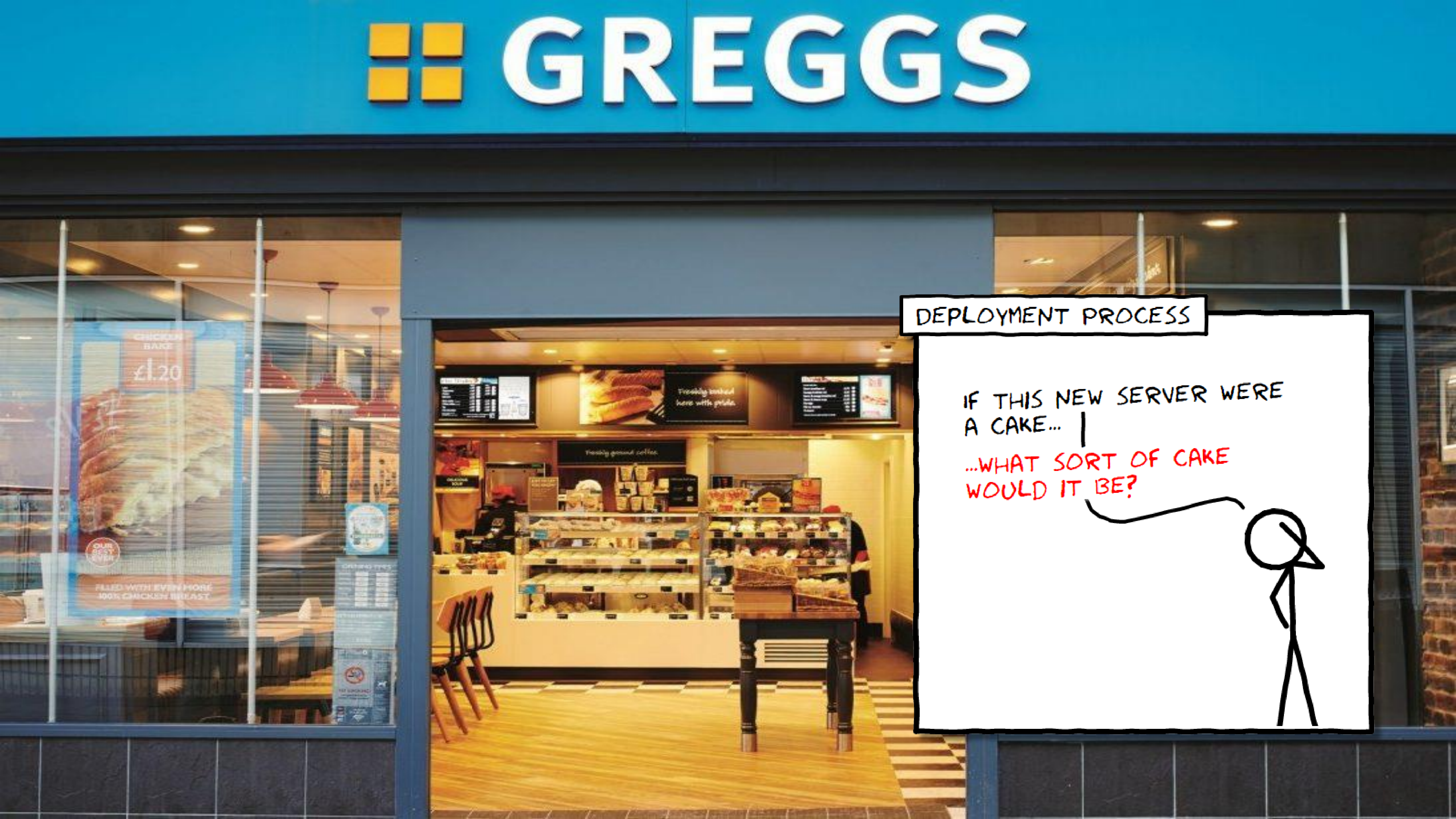
- Currently use an imaginative scheme:
  - `provision`
  - `svr000 – svr031`
  - `disk032 – disk089`
  - `node001 – node282`
  - `nat005 – nat007`

Almost makes sense, except this isn't a NAT, it's a Squid…

- Some "advantages" (e.g. can obtain certs without knowing what the machine will do) but can we do better?
- Decided to look to market leader for inspiration regarding comprehensive, distinctive, logical, memorable scheme…



GREGGS
CHICKEN BAKE
£1.20
OUR BEST EVER
FILLED WITH EVEN MORE 100% CHICKEN BREAST
Freshly baked here with pride.
Freshly ground coffee
BREAKFAST DEAL
£2
ANY FRESHLY MADE BREAKFAST ROLL + ANY REGULAR HOT DRINK


GREGGS
CHICKEN BAKE
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Freshly ground coffee
DEPLOYMENT PROCESS
IF THIS NEW SERVER WERE A CAKE...
...WHAT SORT OF CAKE WOULD IT BE?

ScotGrid 2.0 Names: Cake*

Provisioning / Configuration Management

`croquembouche`

VM Hosts

`snicker`
`doodle`
`krumkake`

Remote Access (VPN)

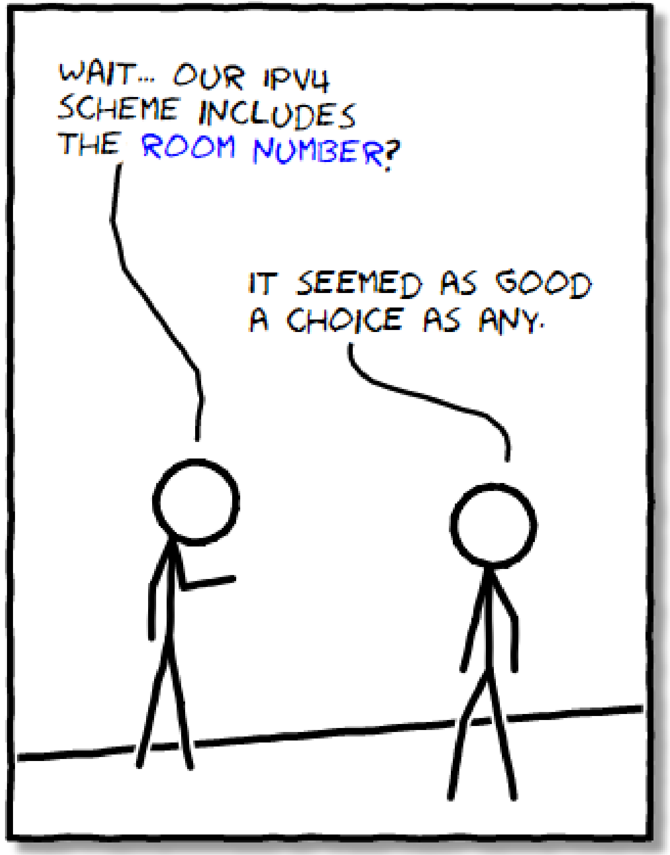
`rockyroad`

** Including sweet baked goods and confectionery*

Old Address Scheme

- Everything in 10.141.0.0/16
  - `provision → 10.141.100.1`
  - `svrN → 10.141.255.(0 + N)`
  - `diskN → 10.141.245.(0 + N)`
  - `natN → 10.141.246.(0 + N)`
  - `nodeN → 10.141.(floor((N – 1) / 253)).(((N – 1) % 253) + 1)`

Apart from svr000, which is actually svr016 in disguise


WAIT... OUR IPV4 SCHEME INCLUDES THE ROOM NUMBER?
IT SEEMED AS GOOD A CHOICE AS ANY.

New Address Scheme

`10.<NETWORK>.<TYPE>.N`

0	IPMI / Management
1	Primary

1	PDU / UPS
2	Network infrastructure
3	RAID / Storage
4	Environmental
10..19	Bare metal servers
20..29	Hypervisors
30..39	VPN
40..49	Services
50..59	Storage
60..	Compute

Haven't decided on this bit, but my vote is for .pasticceria

```
DNS (.beowulf.cluster)

10.1.10.1      croquembouche
10.1.20.1      snicker
10.1.20.2      doodle
10.1.20.3      krumkake
10.1.30.1      rockyroad
...
```

IPv6

- Doesn't this all become irrelevant when we move to IPv6?
  - It's taken over 20 years to get this far – we're not going to drop IPv4 before next summer
  - Some IPv6 addressing schemes incorporate IPv4 address

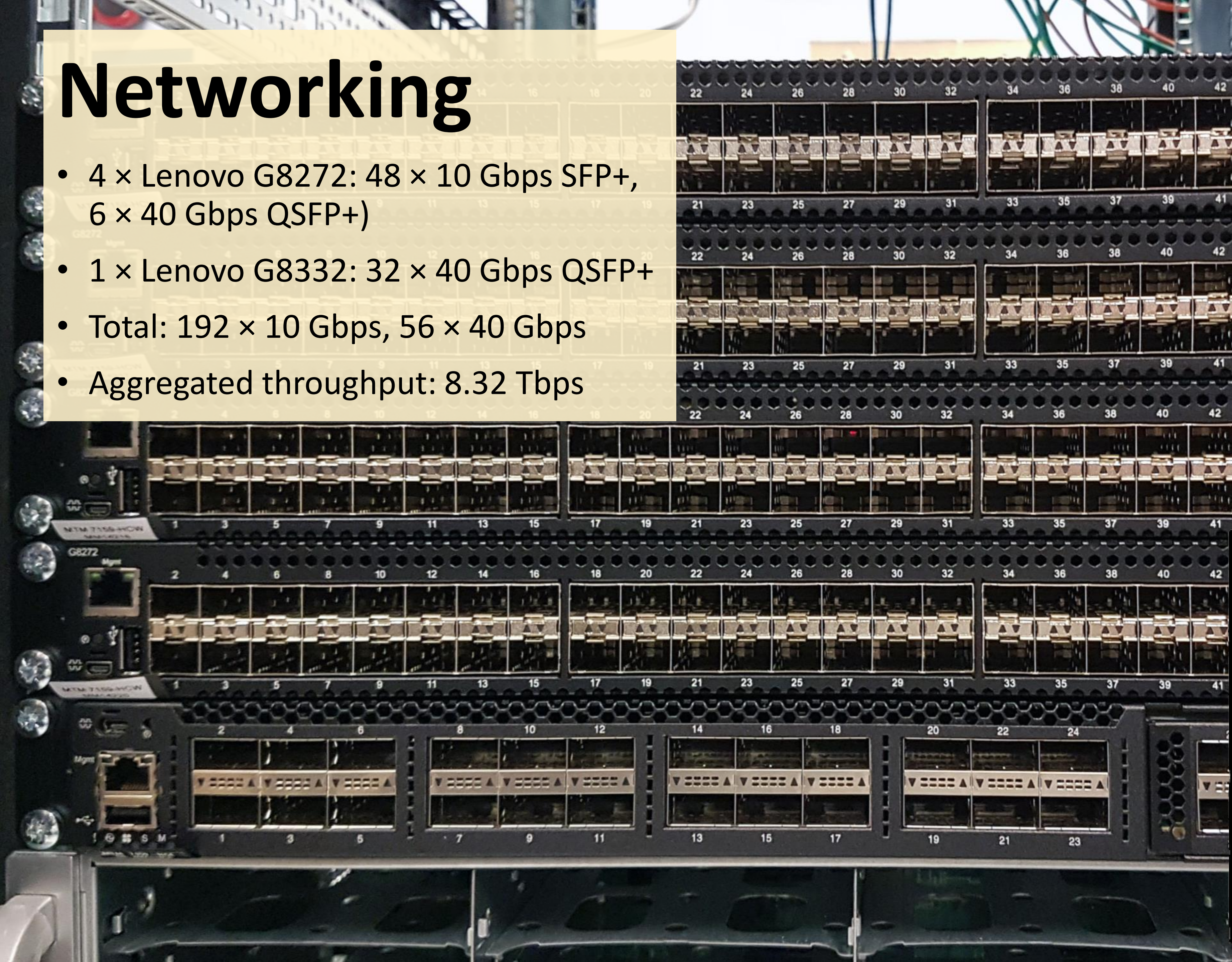
Still need to plan ahead so we get this…

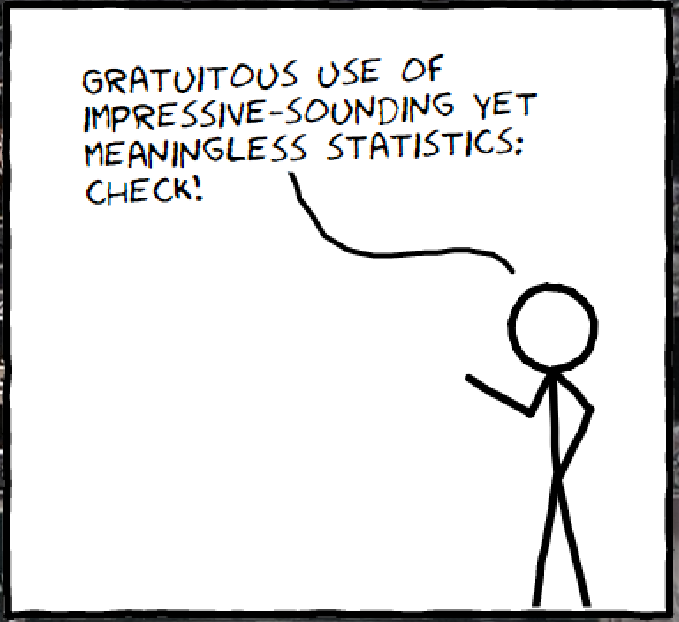
…and not this

G8272
Mgmt
MTM 7159-HCW
MM14442
G8272
Mgmt
MTM 7159-HCW
MM14217
G8272
Mgmt
MTM 7159-HCW
MM14218
G8272
Mgmt
MTM 7159-HCW
MM14220
Mgmt
S
M

Networking

- 4 × Lenovo G8272: 48 × 10 Gbps SFP+, 6 × 40 Gbps QSFP+)
- 1 × Lenovo G8332: 32 × 40 Gbps QSFP+
- Total: 192 × 10 Gbps, 56 × 40 Gbps
- Aggregated throughput: 8.32 Tbps




GRATUITOUS USE OF IMPRESSIVE-SOUNDING YET MEANINGLESS STATISTICS: CHECK!

Provisioning / Configuration Management

- PXE deployment: Cobbler?
  - Use at present, but concerns regarding continued support and development
  - PPE using bespoke alternative

But its name fits!

Because what you really want to do if you're worried about support is roll your own…!

- Configuration management: Ansible
  - PPE switched 2.5 years ago
  - Making increased use within ScotGrid, particularly for ad hoc tasks
  - Plan to switch entire configuration management to Ansible, other than in specific cases where another tool is required (e.g. third-party Puppet modules)

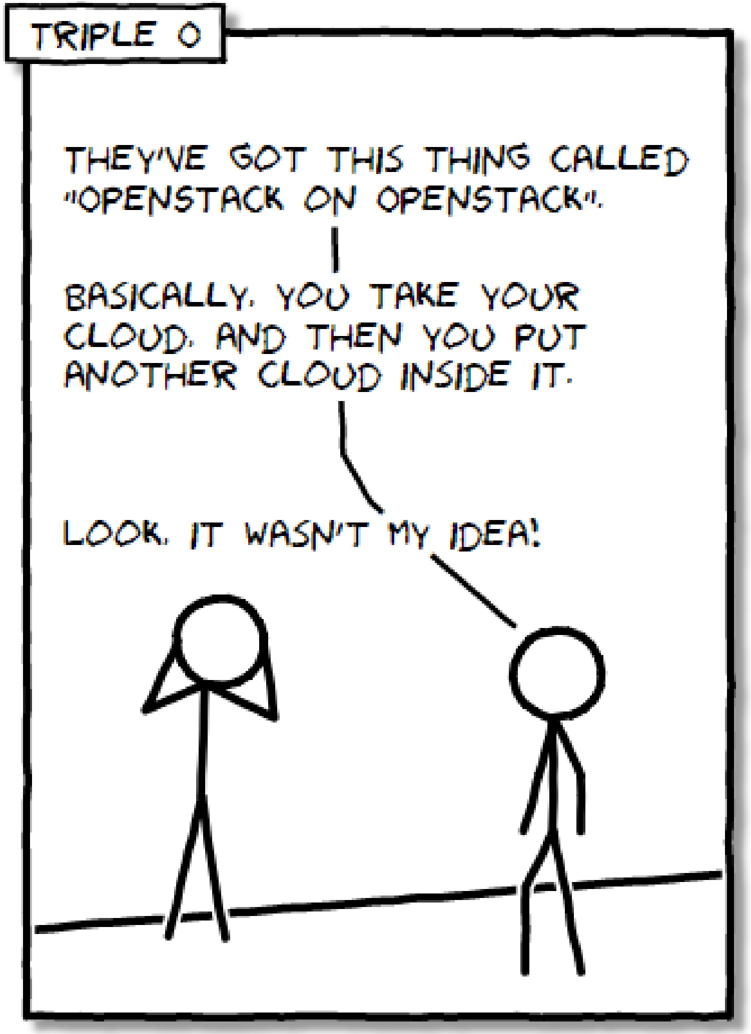
Virtualisation

- libvirt / KVM
  - Simple but limited features

Our current approach, also used by PPE

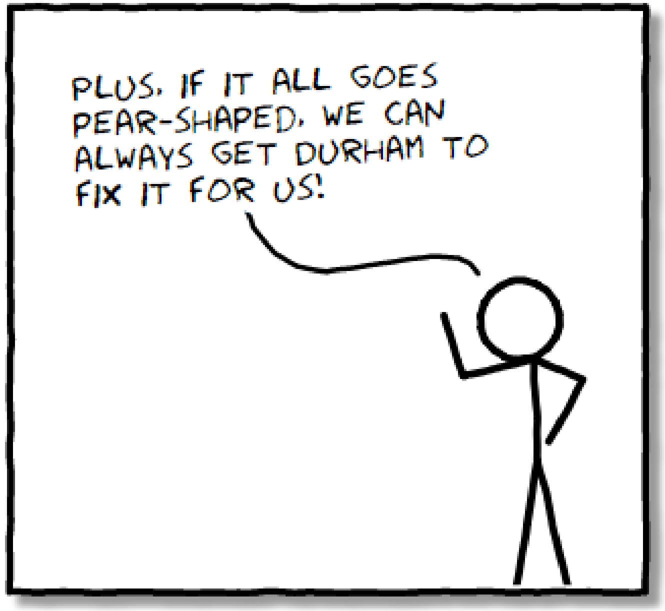
- oVirt
  - Complex but feature-rich
- OpenStack
  - Spent about a year (2015) investigating OpenStack
  - Gareth had another look recently
    - Offers greatest flexibility, but is incredibly complicated and would require significant investment of time
      - Unless you truly need a multi-tenant cloud, is it worth the pain?

But they have cake!


TRIPLE O
THEY'VE GOT THIS THING CALLED "OPENSTACK ON OPENSTACK".
BASICALLY, YOU TAKE YOUR CLOUD, AND THEN YOU PUT ANOTHER CLOUD INSIDE IT.
LOOK, IT WASN'T MY IDEA!

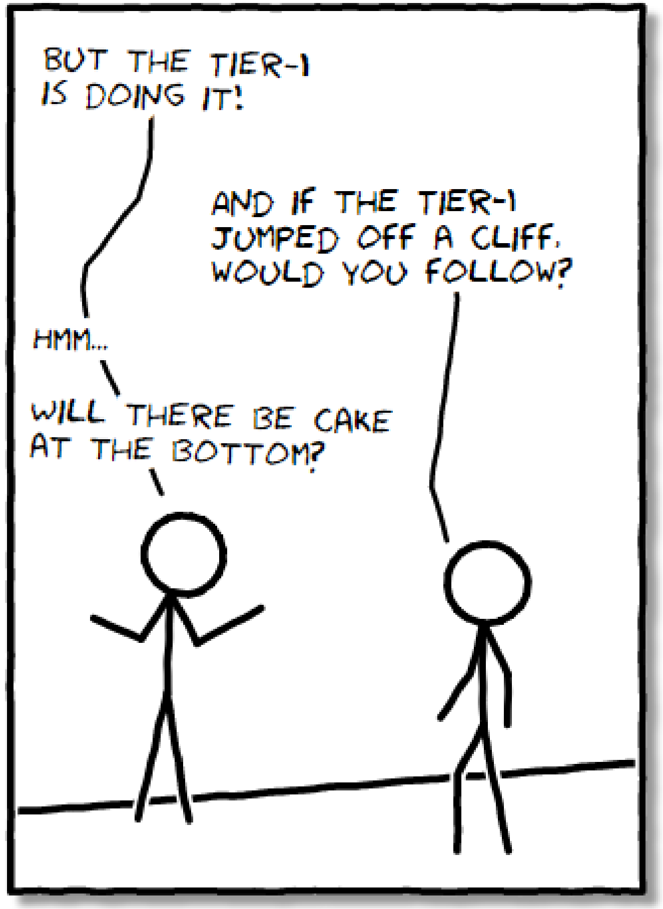
Identity Management

- Currently use local accounts
  - Compute nodes all have pool accounts (4,663!) defined locally
  - Admins tend to SSH from one place to another as root
  - No central management
  - No audit trail
  - Compute node deployment needlessly lengthy
- FreeIPA
  - Backed by Red Hat
  - Mature toolset, including Web UI

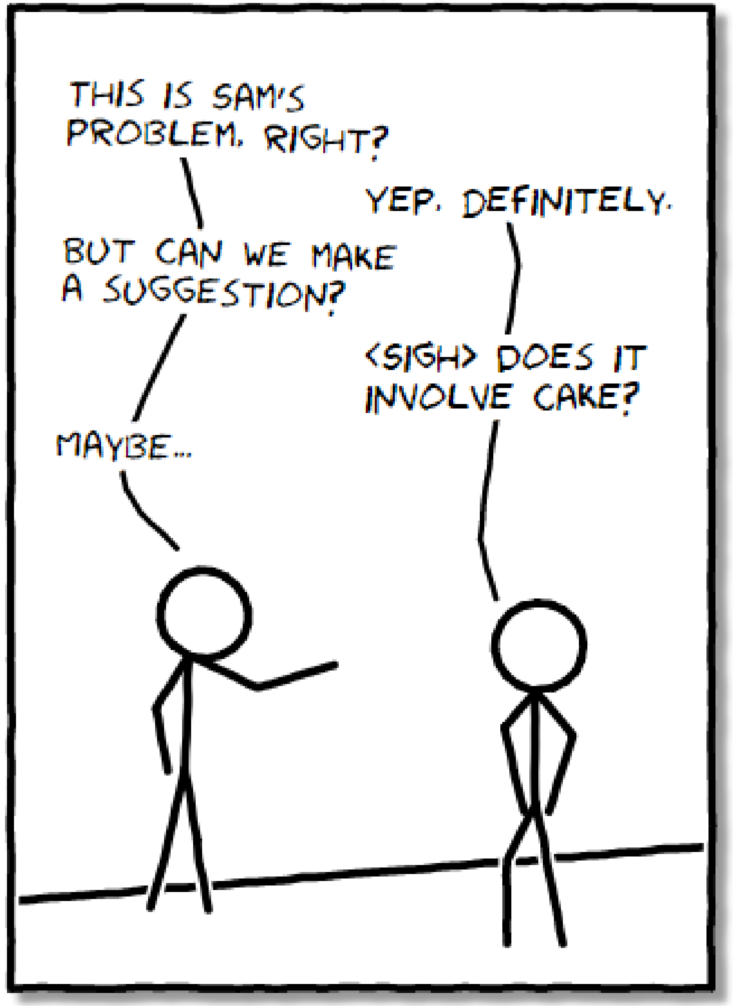

PLUS, IF IT ALL GOES PEAR-SHAPED, WE CAN ALWAYS GET DURHAM TO FIX IT FOR US!

Batch Systems

- Currently use HTCondor
  - We like it, but our configuration has grown over time, is now overly-complicated and needs to be rewritten from scratch
- SLURM
  - If we’re starting again anyway, why not consider alternatives?
- However…
  - RAL is fully invested in HTCondor – politically it may be wise to follow


BUT THE TIER-1 IS DOING IT!
AND IF THE TIER-1 JUMPED OFF A CLIFF, WOULD YOU FOLLOW?
HMM...
WILL THERE BE CAKE AT THE BOTTOM?

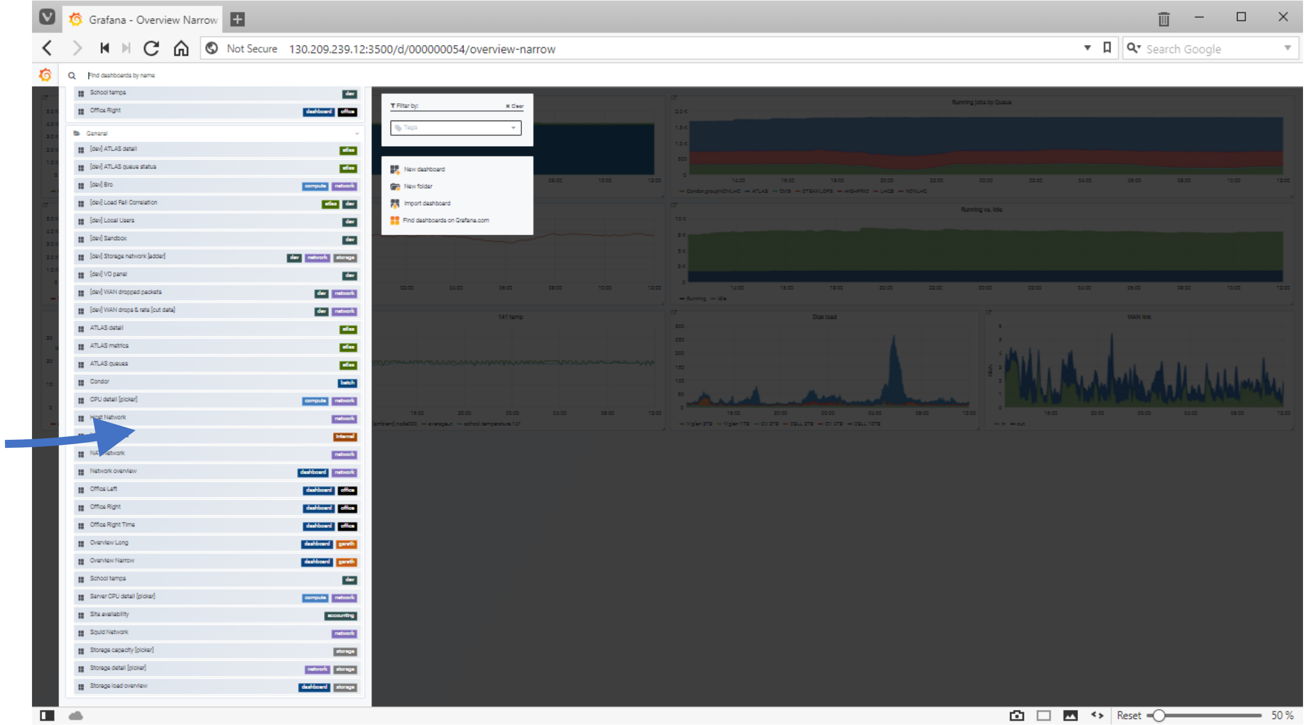
Storage


THIS IS SAM'S PROBLEM, RIGHT?
YEP. DEFINITELY.
BUT CAN WE MAKE A SUGGESTION?
<SIGH> DOES IT INVOLVE CAKE?
MAYBE...

ceph
ceph

Monitoring

- We have ~~lots of~~ too much monitoring
  - Some has fallen into disrepair since Dave switched focus to security (and moved to STFC!)
- Identify what we need and remove the rest?


Grafana - Overview Narrow

Not Secure 130.209.239.12:3500/d/000000054/overview-narrow

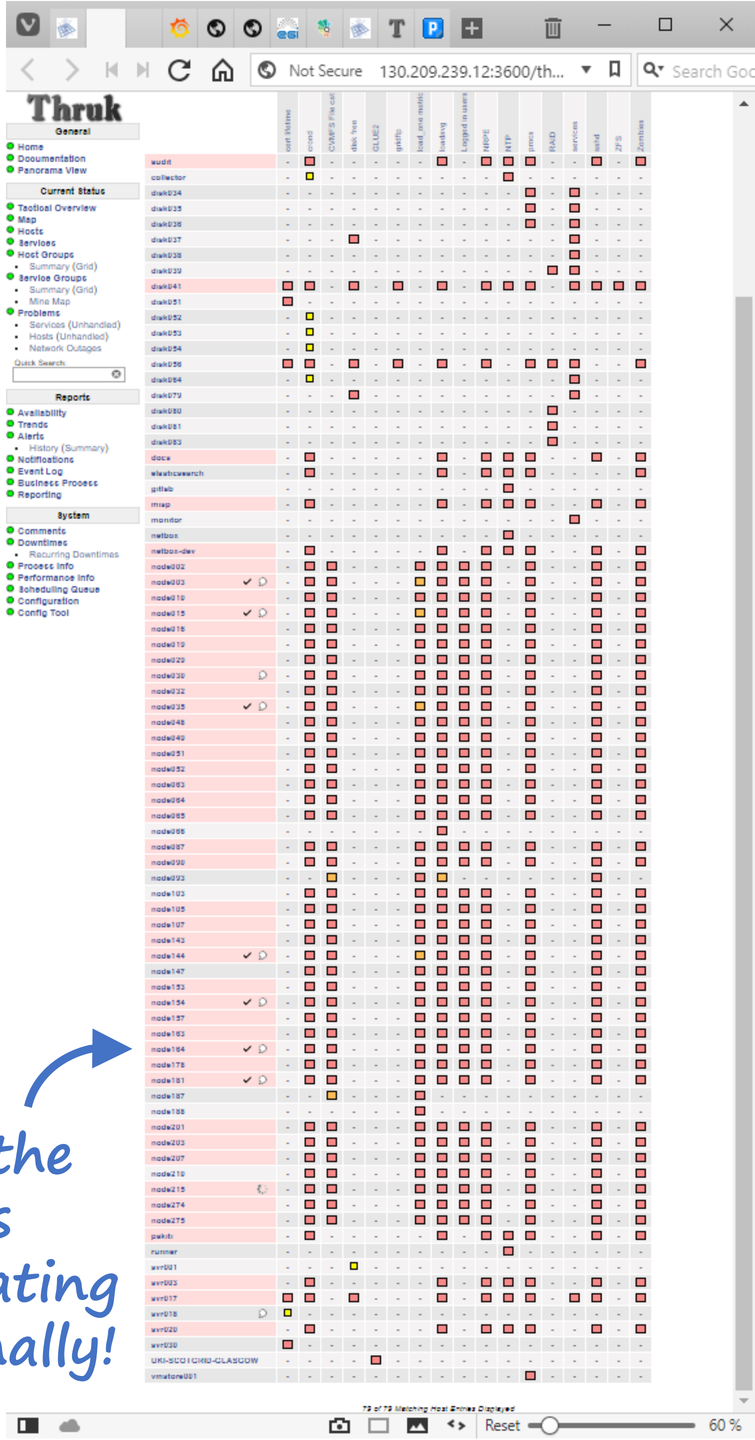
Find dashboards by name

- School temps — dev
- Office Right — dashboard, office

General

- [dev] ATLAS detail — atlas
- [dev] ATLAS queue status — atlas
- [dev] Bro — compute, network
- [dev] Load Fail Correlation — atlas, dev
- [dev] Local Users — dev
- [dev] Sandbox — dev
- [dev] Storage network [adder] — dev, network, storage
- [dev] VO panel — dev
- [dev] WAN dropped packets — dev, network
- [dev] WAN drops & rate [cut data] — dev, network
- ATLAS detail — atlas
- ATLAS metrics — atlas
- ATLAS queues — atlas
- Condor — batch
- CPU detail [picker] — compute, network
- Host Network — network
- internal
- NAT Network — network
- Network overview — dashboard, network
- Office Left — dashboard, office
- Office Right — dashboard, office
- Office Right Time — dashboard, office
- Overview Long — dashboard, gareth
- Overview Narrow — dashboard, gareth
- School temps — dev
- Server CPU detail [picker] — compute, network
- Site availability — accounting
- Squid Network — network
- Storage capacity [picker] — storage
- Storage detail [picker] — network, storage
- Storage load overview — dashboard, storage

Why have one dashboard when you can have 31?


Not Secure 130.209.239.12:3600/th...

Thruk

General
- Home
- Documentation
- Panorama View

Current Status
- Tactical Overview
- Map
- Hosts
- Services
- Host Groups
  - Summary (Grid)
- Service Groups
  - Summary (Grid)
  - Mine Map
- Problems
  - Services (Unhandled)
  - Hosts (Unhandled)
  - Network Outages

Quick Search:

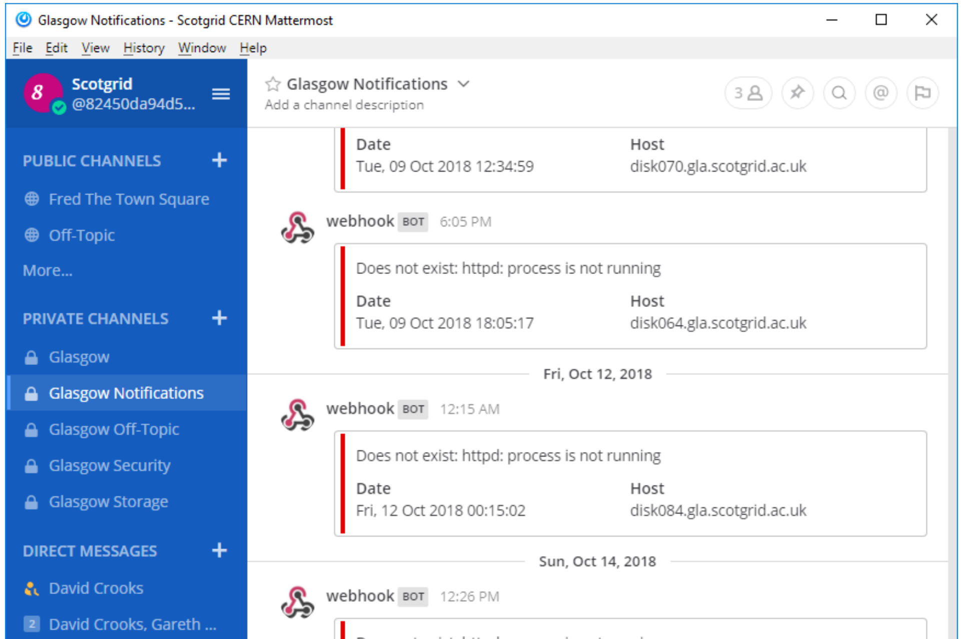
Reports
- Availability
- Trends
- Alerts
  - History (Summary)
- Notifications
- Event Log
- Business Process
- Reporting

System
- Comments
- Downtimes
  - Recurring Downtimes
- Process Info
- Performance Info
- Scheduling Queue
- Configuration
- Config Tool

Yes, the site is operating normally!

Monitoring

- Prometheus
  - Gareth has been looking into this
  - Running on many systems, both on grid and in PPE
  - Particularly useful for investigating performance issues:
    - ZFS grid storage
    - Jobs on local batch system
- Monit
  - Acts as watchdog
  - Already used to monitor parts of the storage
  - Probably don't need to be notified every time it does something!
- Alerting



Date Tue, 09 Oct 2018 12:34:59
Host disk070.gla.scotgrid.ac.uk

webhook BOT 6:05 PM

Does not exist: httpd: process is not running
Date Tue, 09 Oct 2018 18:05:17
Host disk064.gla.scotgrid.ac.uk

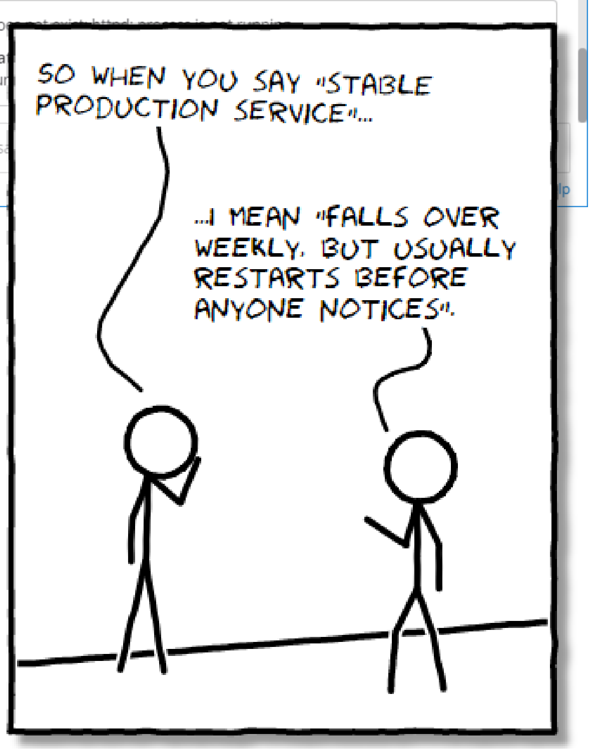
Fri, Oct 12, 2018

webhook BOT 12:15 AM

Does not exist: httpd: process is not running
Date Fri, 12 Oct 2018 00:15:02
Host disk084.gla.scotgrid.ac.uk

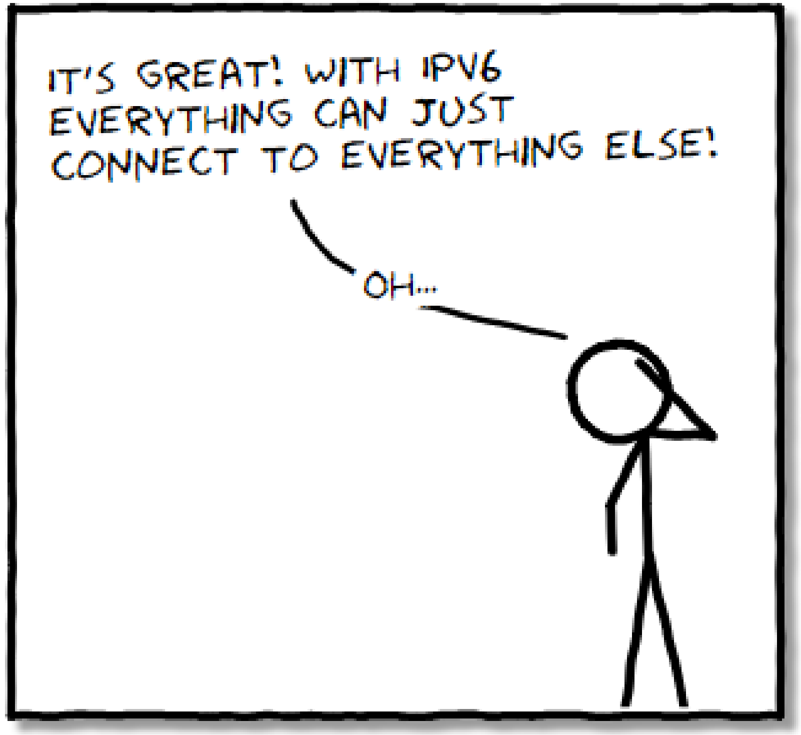
Sun, Oct 14, 2018

webhook BOT 12:26 PM


SO WHEN YOU SAY "STABLE PRODUCTION SERVICE"...
...I MEAN "FALLS OVER WEEKLY, BUT USUALLY RESTARTS BEFORE ANYONE NOTICES".

Security

- Firewalls
  - Presently, we don't really have any
  - More important with move to IPv6
- Fail2ban
- AIDE
  - Advanced Intrusion Detection Environment
- OpenSCAP
  - Security Content Automation Protocol
- Lynis
  - Security auditing


IT'S GREAT! WITH IPV6 EVERYTHING CAN JUST CONNECT TO EVERYTHING ELSE!
OH...

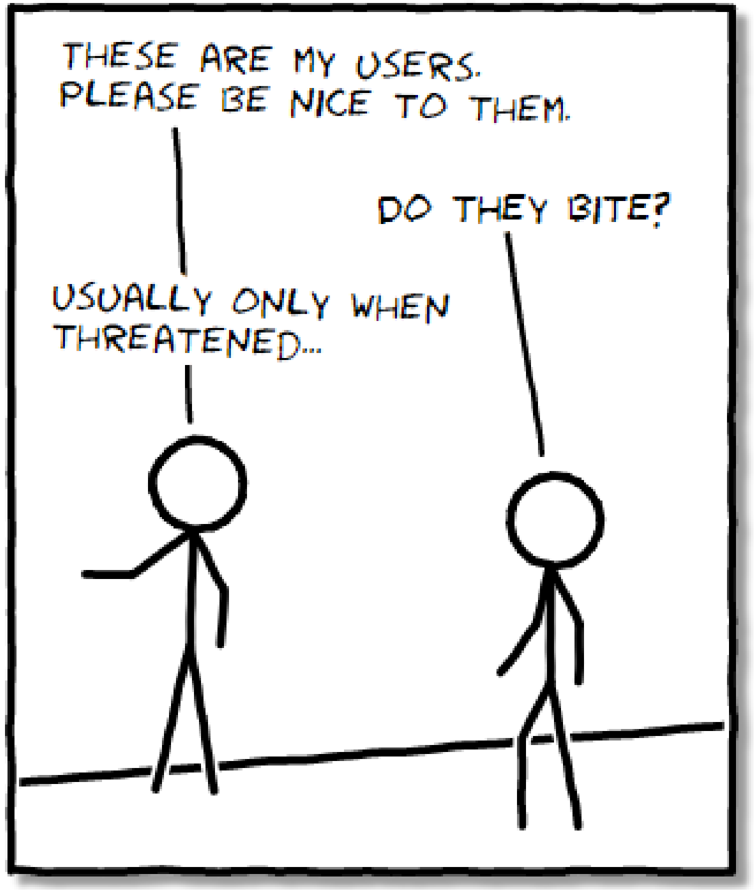
Miscellaneous

- Centralised syslog?
  - Currently dumps to the console, which is incredibly annoying!
- Back-up
  - restic + cron?
- Git
  - How many bells and whistles do we need?
- Documentation
  - We should have some!
  - We always moan about wikis, and then usually decide that anything else involves far too much effort

Internal UI

- Continuation of effort to merge tier-2 and tier-3 resources
  - We're making good progress!
  - "Key influencers" now indoctrinating new RAs and PhD students
- Increase adoption of grid by local users by providing entry point
- Offer some resources for interactive or rapid testing of jobs in grid environment to simplify development work

I talked about this last year


THESE ARE MY USERS. PLEASE BE NICE TO THEM.
DO THEY BITE?
USUALLY ONLY WHEN THREATENED...

Summary

- Data centre move offers unique opportunity to completely redesign Glasgow ScotGrid site
- Many questions about best solutions remain to be answered
- Time is short!
- You can never have too much cake

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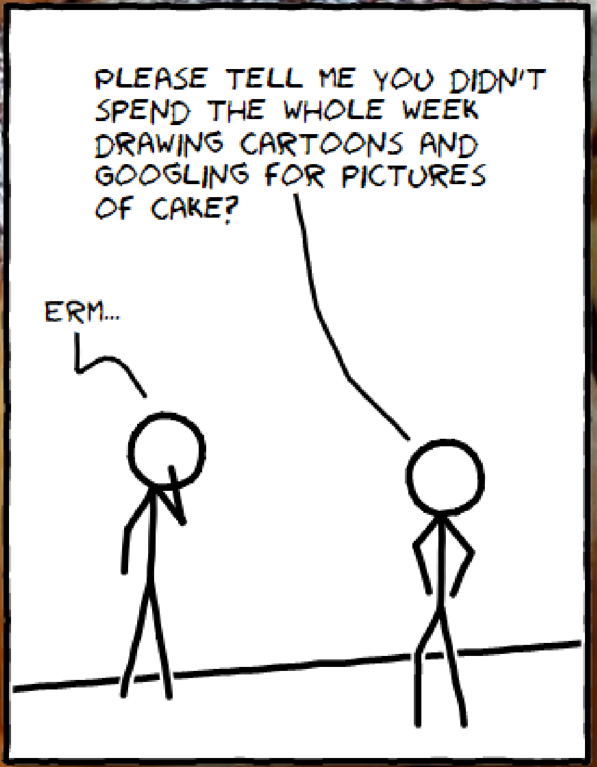
PLEASE TELL ME YOU DIDN'T SPEND THE WHOLE WEEK DRAWING CARTOONS AND GOOGLING FOR PICTURES OF CAKE?
ERM...