Testing Storage Systems: Methodology & Common Pitfalls

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#lisa14storage

What I wish I knew when I started
testing storage systems three years ago

Covering;
intro, challenges, experiences, lessons learned, tips and tricks, denouement

The Sanger Institute

Funded by Wellcome Trust

2nd largest research charity in the world.
~700 employees (~50 IT)

Large scale genomic research.
Sequenced 1/3 of the human genome (largest single contributor)

Intro

This is not the John Constable you are looking for..

Credit: Wikimedia

Who *are* all you people? Why did you come to *this* talk?

I'm part of the Informatics Support Group (HPC), also Storage Team
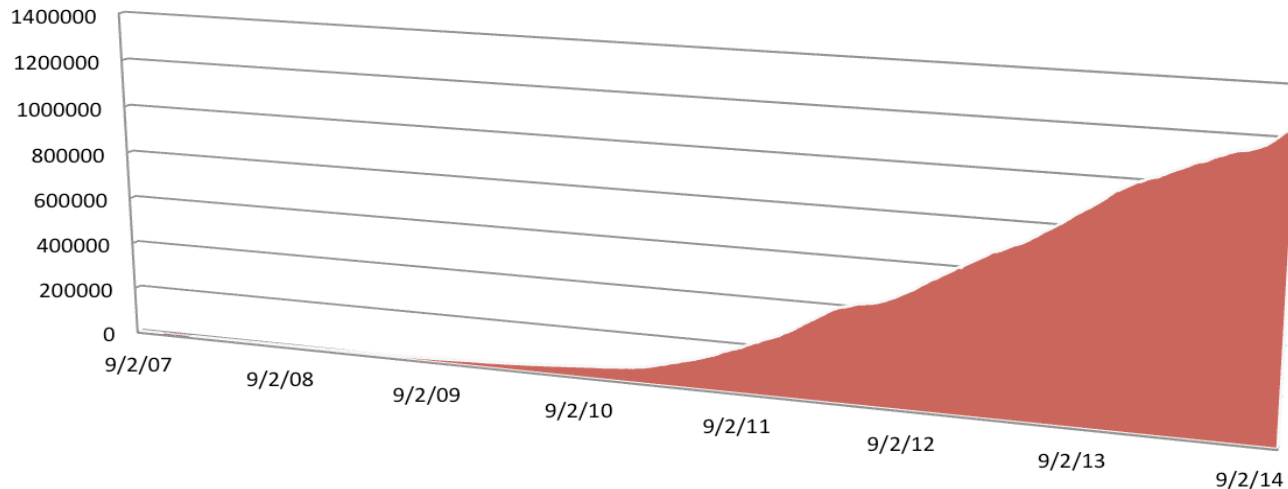
3 years at Sanger, 22 years in IT

What I've learned from evaluating seven different storage systems in 3 years

Intro

Charity (90% funded by Wellcome Trust)

Our users are scientists first, bioinformaticians second, unix geeks third

Cumulative PF Yield(GBases)

■ Cumulative PF Yield(GBases)

Why yes, the data is doubling every 12 months!

Yes, that's faster than 18 month disk/ transistor doubling rate

N.B. a kilobase (kb) is a unit of measurement in molecular biology equal to 1000 base pairs of DNA or RNA.

One megabase roughly equiv 1 MB data.

Intro

Challenges

Currently 12 staff managing 21PB

Our scientists predict up to 70PB
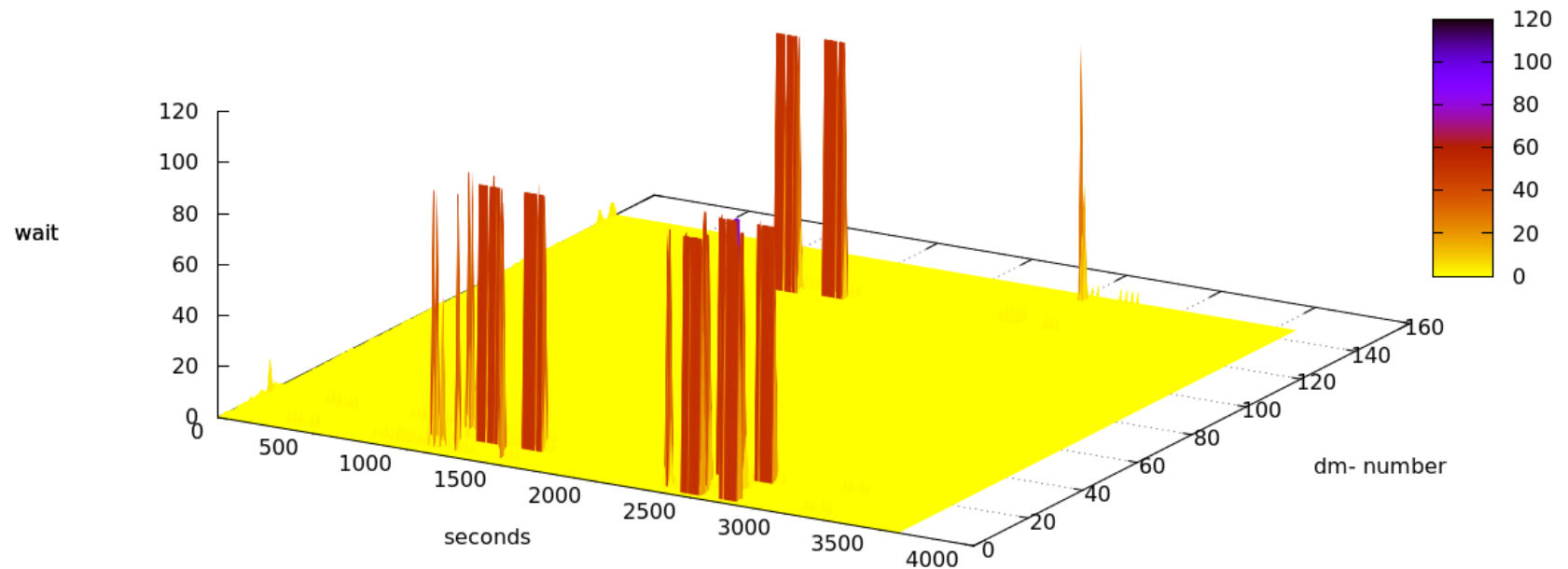within the next 5 years.

Its *all* spinning disk

NFS/CIFS (7PB), Lustre (10PB),
iRODS (4PB)
'Only' 350TB tape

(gnuplot FTW) iostat info on average queue size

Challenges

Experiences

Credit: Touring Club Suisse
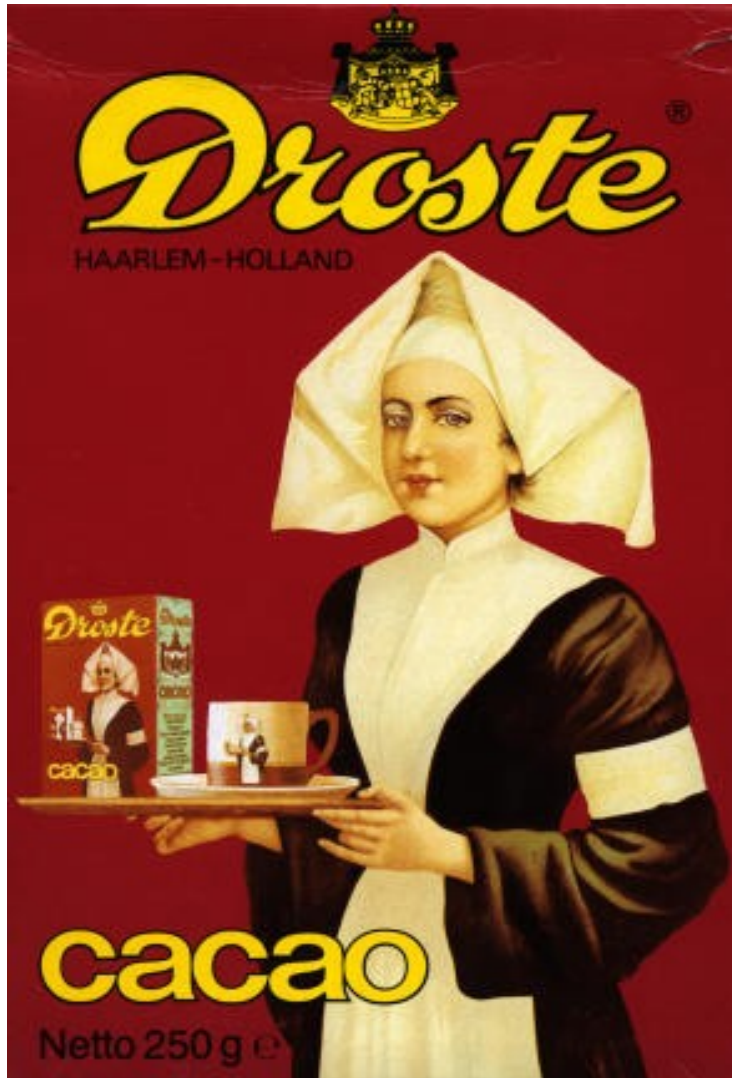https://www.flickr.com/photos/touring_club/

Can't make it go fast enough!

Our test or vendors equipment?

Our equipment or vendors' information?

What don't we know?

Experiences

Scriptable tests are good, but be careful..

25k snapshots in one dir

It didn't break (mostly)!

Credit:"Droste" by Jan (Johannes) Musset? - [4] [5]. Licensed under Public domain via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Droste.jpg#mediaviewer/File:Droste.jpg

Experiences

No fit between use case and hardware provided
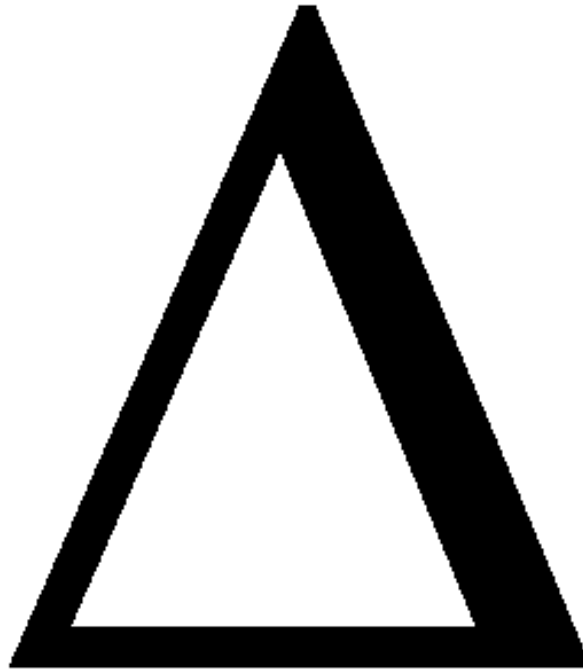
Credit: W Smith:
https://www.flickr.com/photos/wsmith

Avoid beta hardware if possible
(Try not to be their test lab)

Experiences

'We never thought of that'
or
not able to monitor disk enclosures

Experiences

Changes in Test Methodology Over Time

Test frameworks

Streaming IO
Random IO

Big Files!
Small Files!
Zero Length files!

Multithreaded
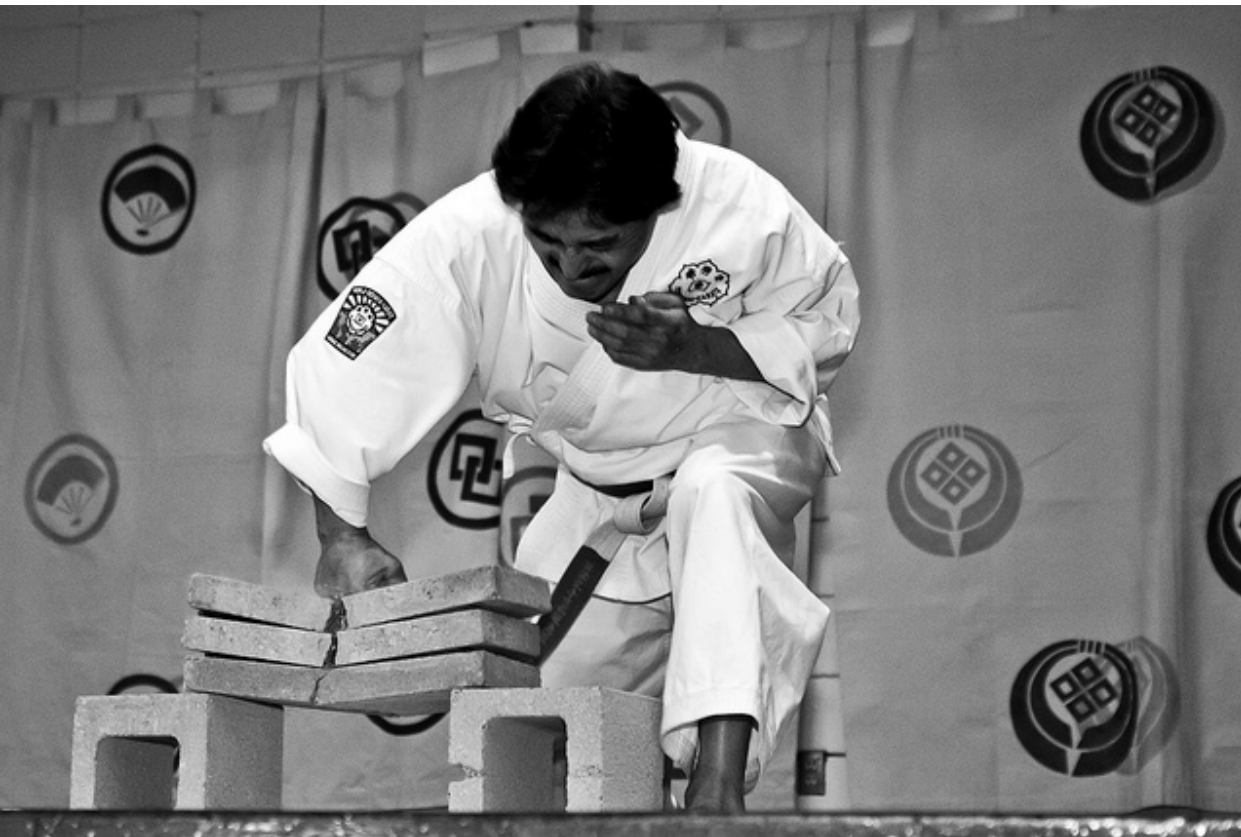or multi streams.

Experiences: Δ

Software and procedural

Credit: Gary
https://www.flickr.com/photos/38207720@N00/4159421486

Experiences: Δ

Sharing test plan with vendors

Experiences: Δ

Negative testing based on
what went wrong last time
& in production to date

Credit: Kenny Alexander
https://www.flickr.com/photos/boostdependent

Experiences: Δ

Monitoring of test systems and clients

Experiences: Δ

Project management

Experiences: Δ

Lessons Learned

Credit: Auntie P:
https://www.flickr.com/photos/auntiep
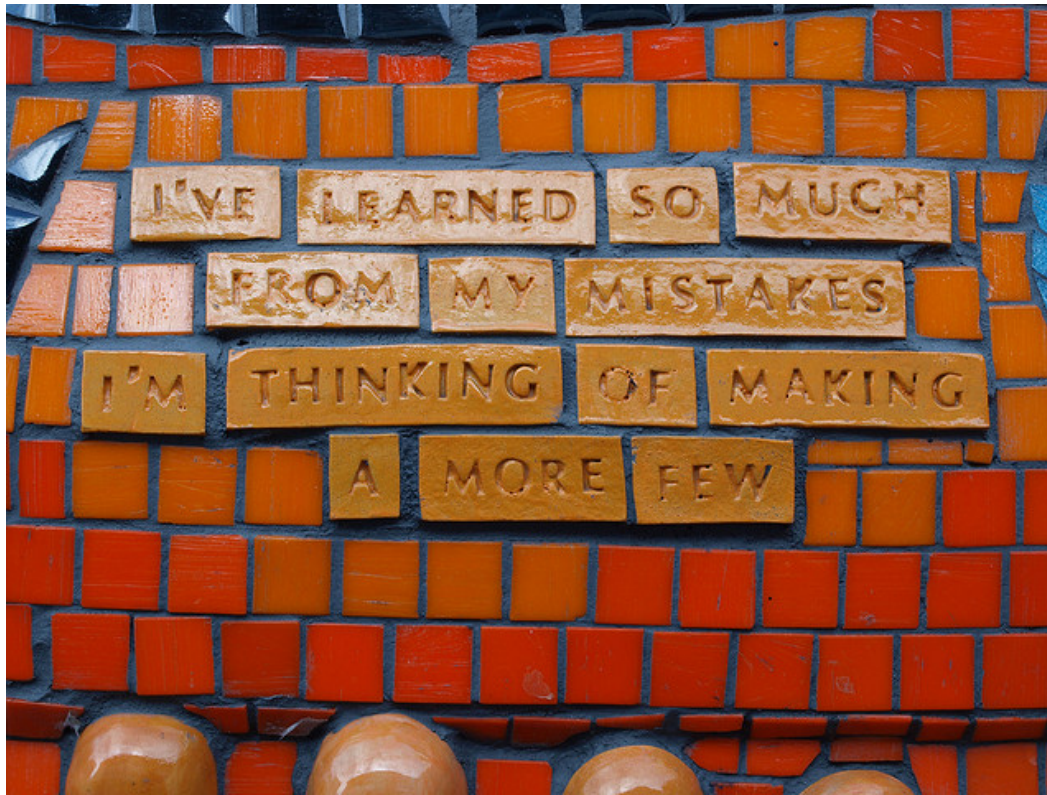
Good relationship
with vendors crucial

Meet the engineers/developers
if possible

Credit: https://www.flickr.com/photos/annstheclaf

Lessons Learned

Credit: James Vaughn (photo)
https://www.flickr.com/photos/x-ray_delta_one/

Learn new tech

Lessons Learned

You may fix your existing infrastructure along the way

Credit: Stéfan
https://www.flickr.com/photos/st3f4n/

Lessons Learned

Management is not a dirty word

Credit: Gary Burke
https://www.flickr.com/photos/klingon65/5516037577

Lessons Learned

Project management
(This can be just a regular conference call,
and an end date!)

Credit: Carsten Knoch
https://www.flickr.com/photos/netsrac/173500383

Lessons Learned

Clear internal communication

Credit: Darren Hester
https://www.flickr.com/photos/grungetextures/4215941524

Lessons Learned
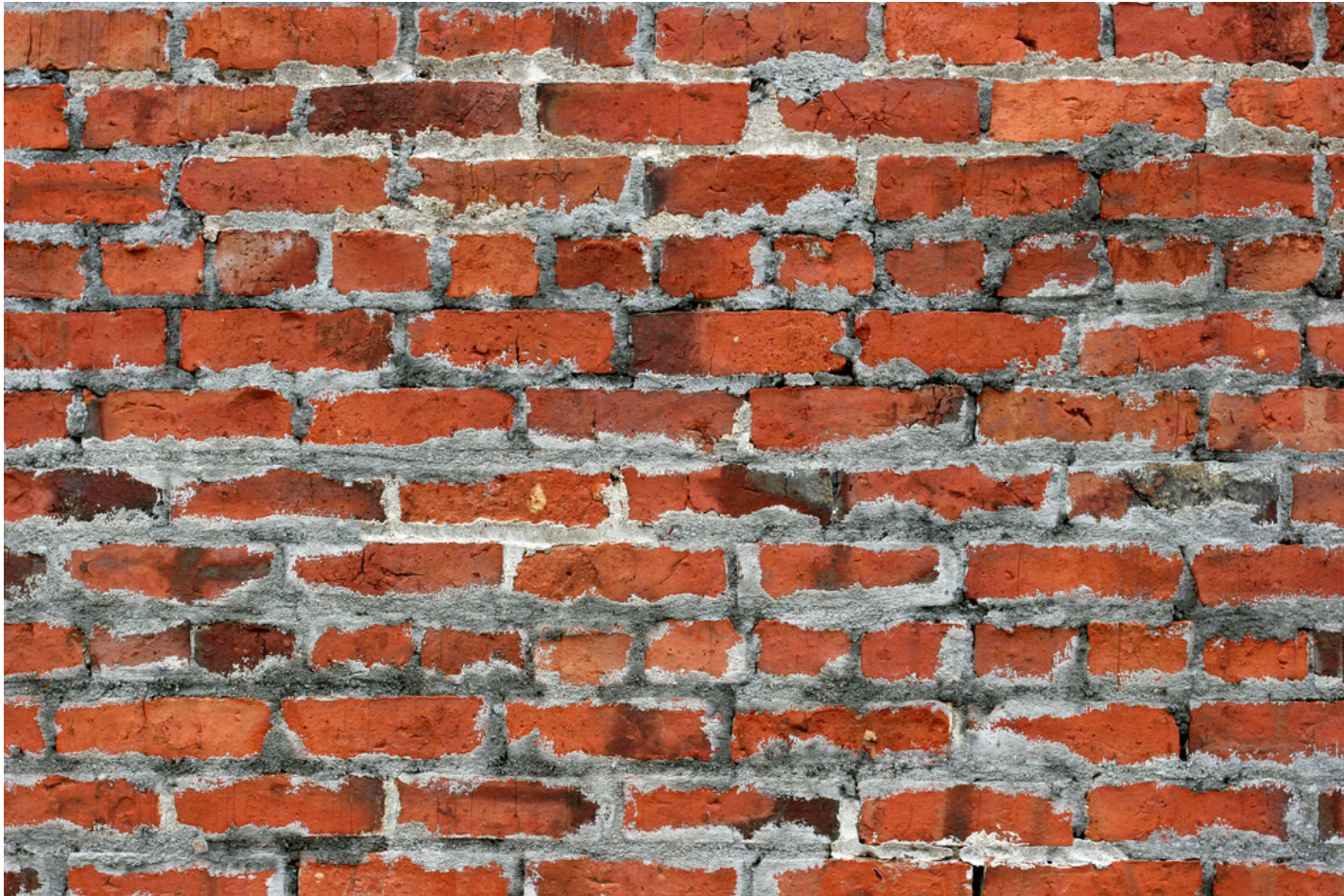
Tips and Tricks

Credit: Rinogmb off for a few day
https://www.flickr.com/photos/rinogmb

Negative Testing

Credit: HomeSpot HQ
https://www.flickr.com/photos/86639298@N02/

Tips and Tricks

Cable Pulling!

For e.g.

- Network (inc. one pair)
- Storage interconnects
- (FC, IB, Ethernet)
- Chassis interconnects

Credit: Eric
https://www.flickr.com/photos/emagic/

Tips and Tricks: Negative Testing

Failover
(Pref. while under load)

Tips and Tricks: Negative Testing

Disk failures

Tips and Tricks: Negative Testing

Useful

Software

Performance deep diving: https://github.com/brendangregg/perf-tools/

VDBench for IO generation on Block and filesystems http://www.oracle.com/technetwork/server-storage/vdbench-downloads-1901681.html

SNMP browsing GUI:

http://ireasoning.com/mibbrowser.shtml

Books

The Practice of System and Network Administration by Limoncelli, Hogan, Chalup

Systems Performance by Brendan Gregg

Useful Links:

monitoring driven infrastructure:
https://devblog.timgroup.com/2014/07/30/mdi-monitoring-driven-infrastructure/

Jason Dixon's talk on The state of open source monitoring;
https://speakerdeck.com/obfuscurity/the-state-of-open-source-monitoring

JISC Project Management (inc templates):
http://www.jisc.ac.uk/fundingopportunities/projectmanagement/planning.aspx

LiquidPlanner.com

https://blogs.oracle.com/brendan/entry/performance_testing_the_7000_series2

usenix
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1. What you will need to report on when the tickets come in
2. Plan your negative testing
3. Share with your vendor - involve them
4. Test script your frequent management tasks & questions
5. Graph all the things

Credit: Dani Figueiredo
https://www.flickr.com/photos/maxsummers/

Thank You!

Acknowledgement: Mr Woobey, Dr Coates, James Beal, Dr Clapham

Mark Flint

Dave Holland

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#keepcalmitsonlystorage

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