CS615 - Aspects of System Administration

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Stevens Institute of Technology
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http://www.cs.stevens.edu/~jschauma/615/

Why are you here?

`https://www.cs.stevens.edu/~jschauma/cgi-bin/615.cgi`

The Job of a System Administrator

What **exactly** does a *System Administrator* do?

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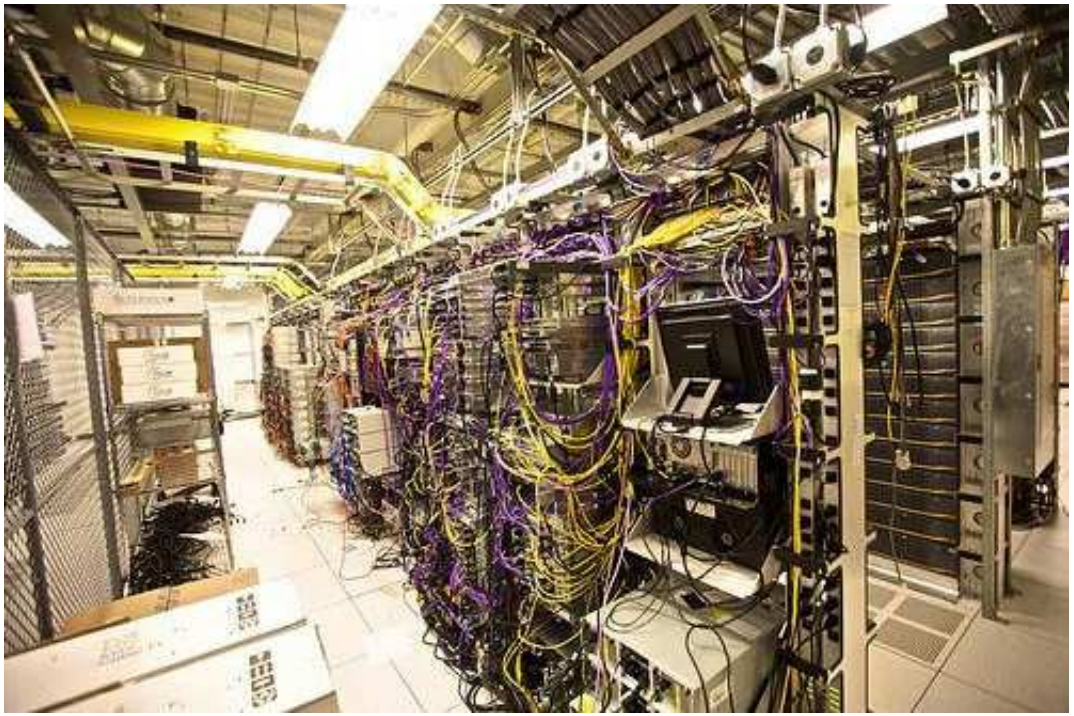

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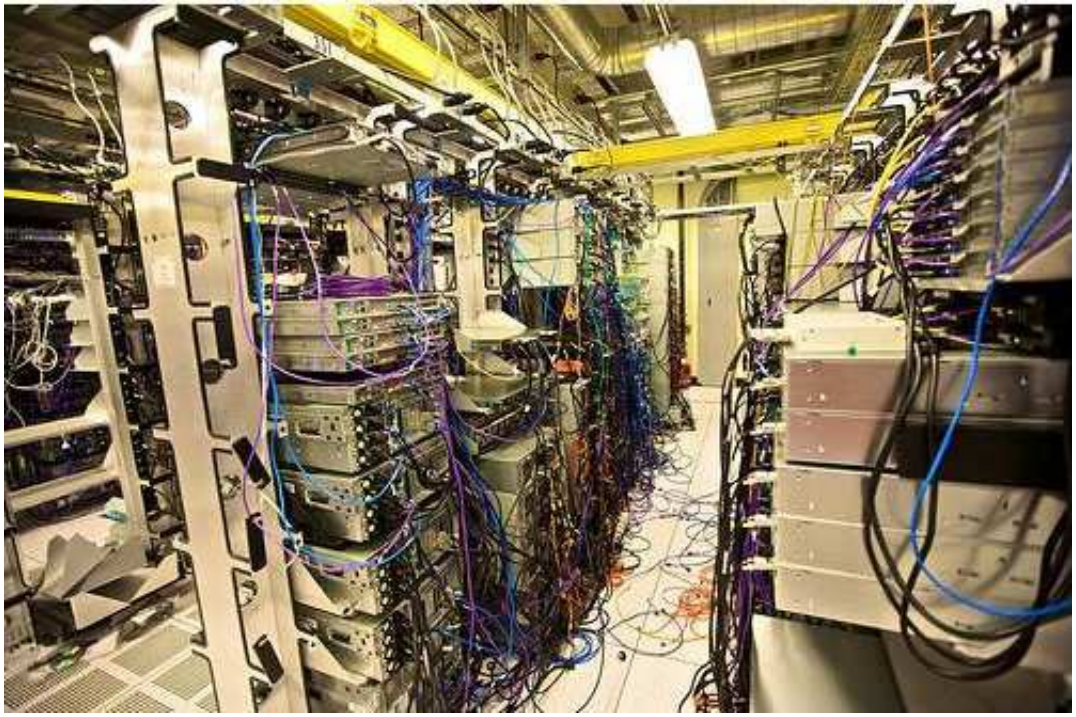

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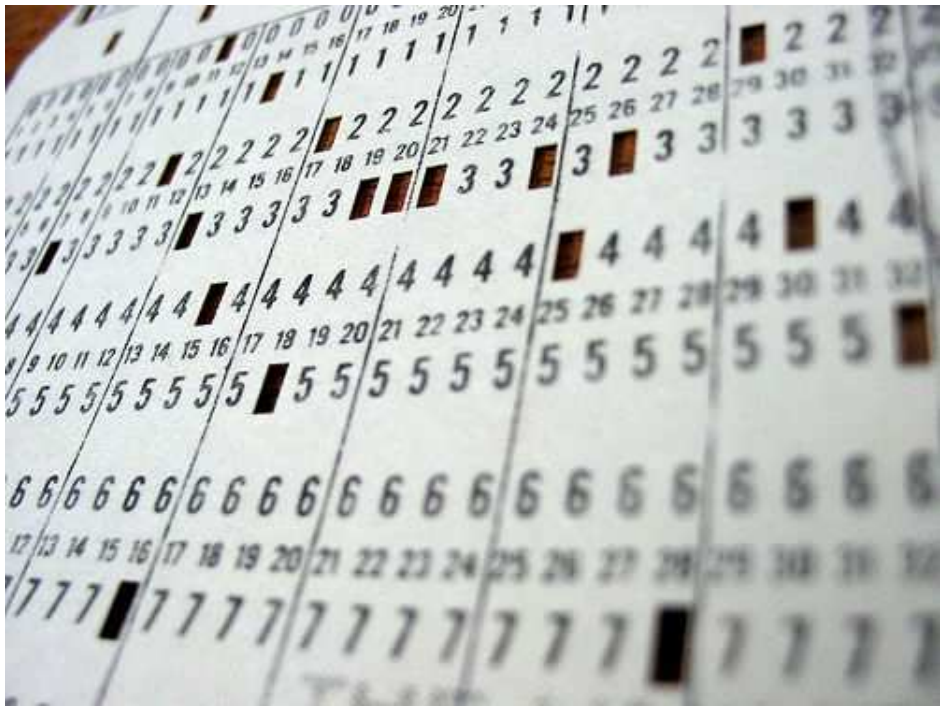

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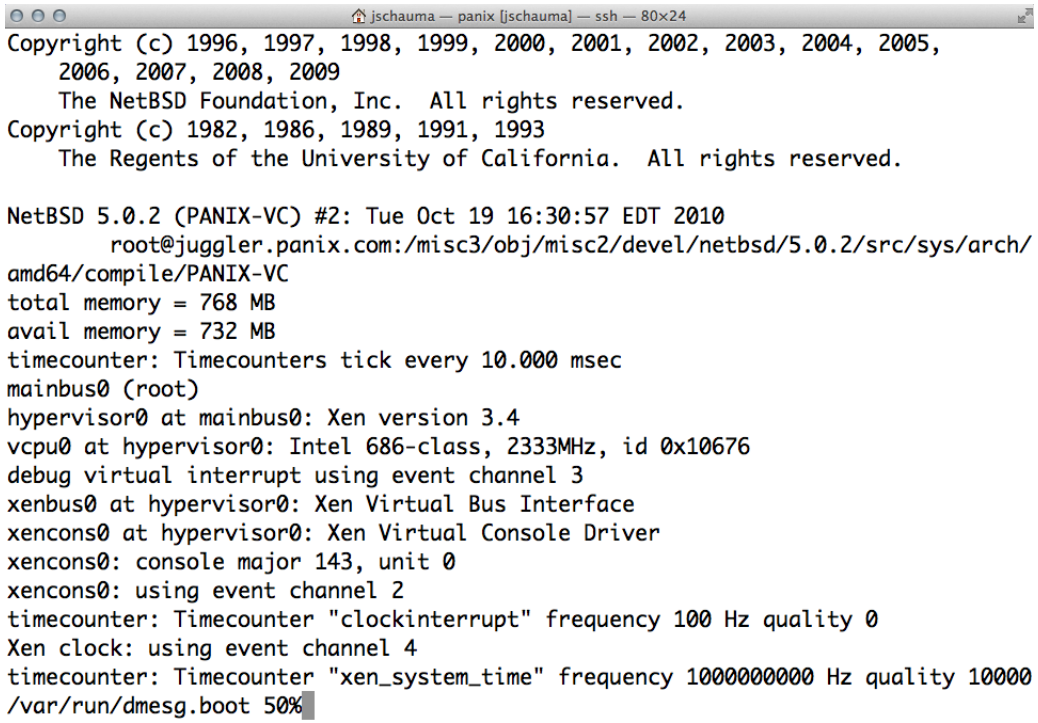

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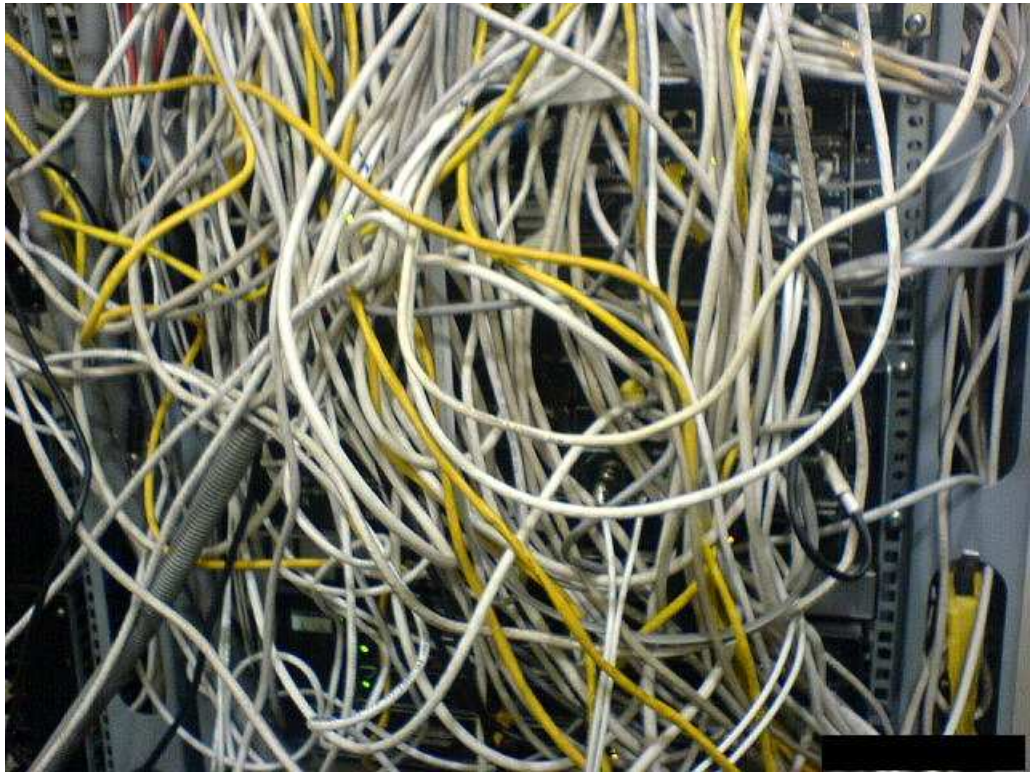

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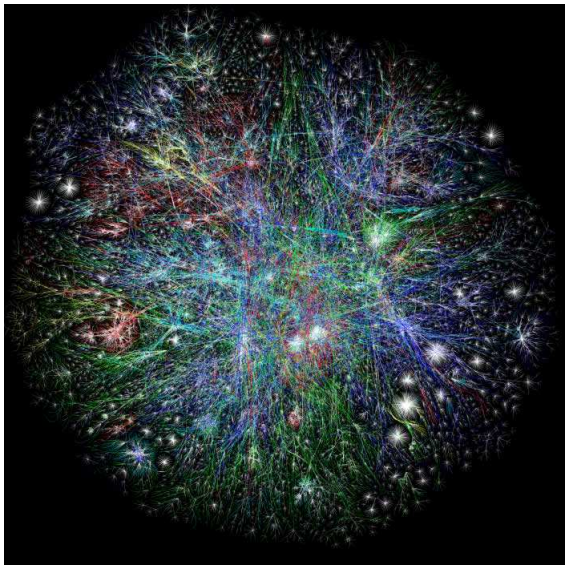

http://www.opte.org/maps/

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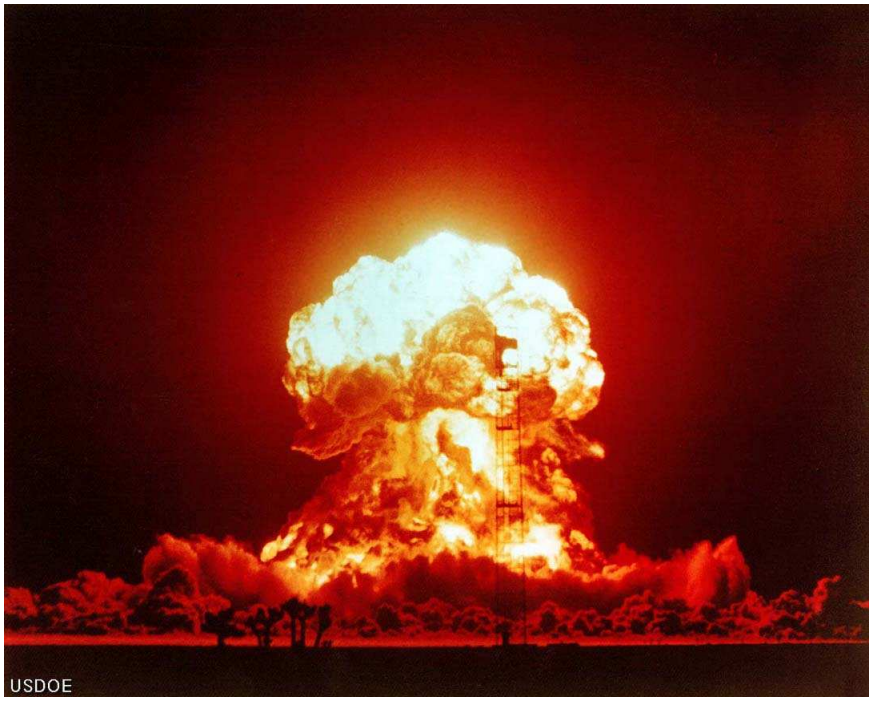

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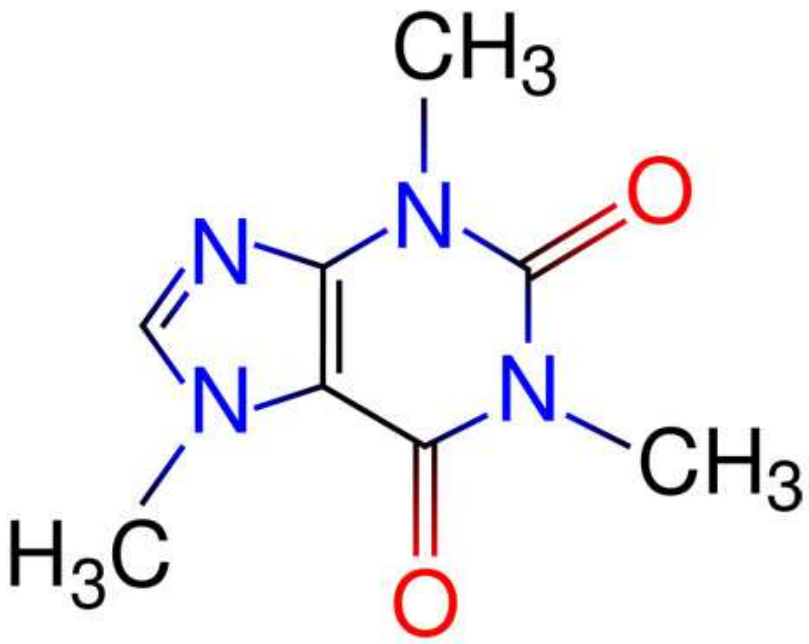

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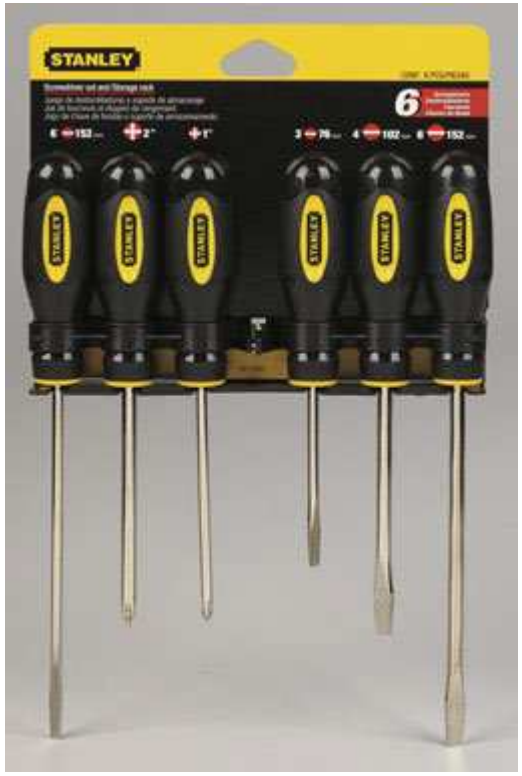

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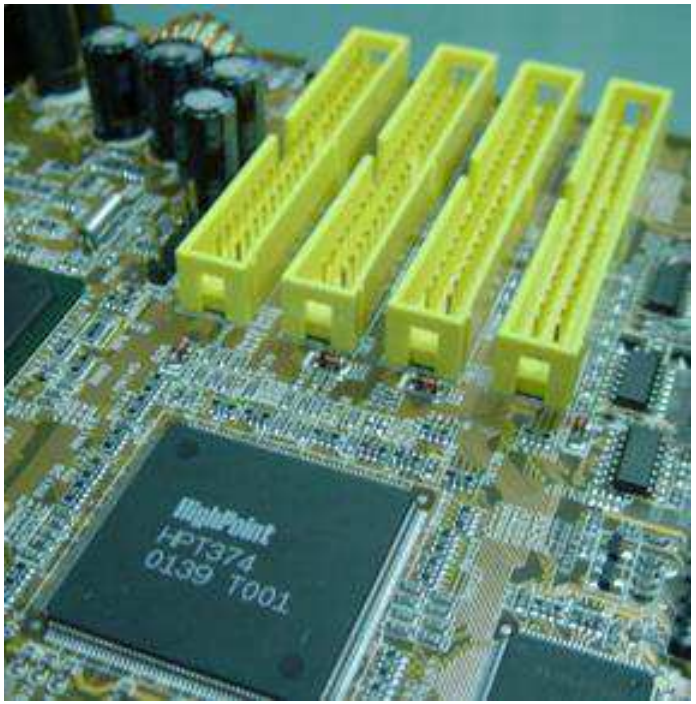

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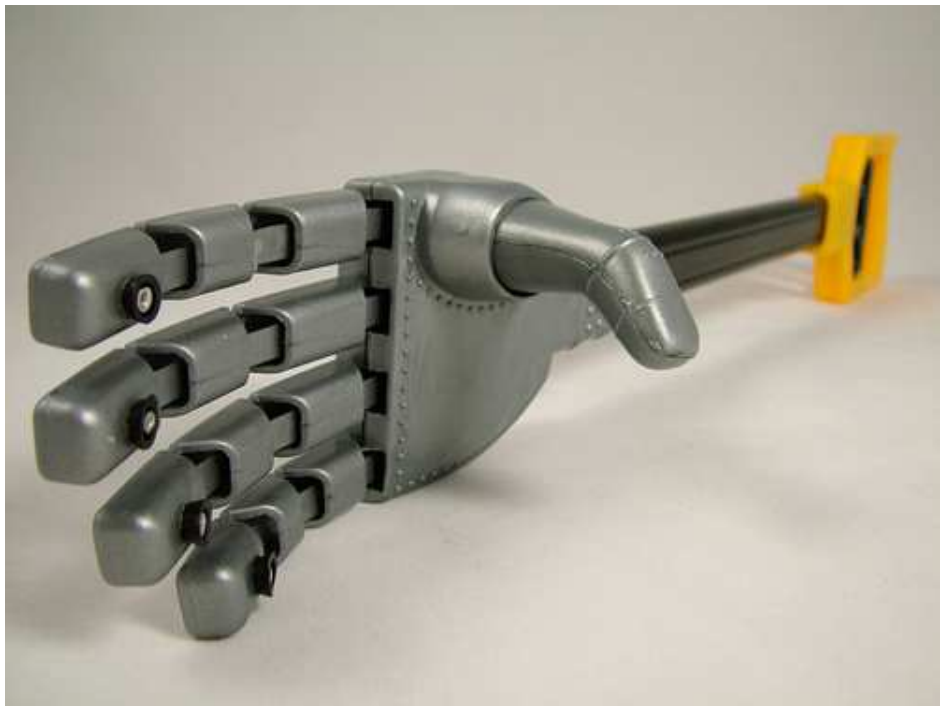

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See also: `http://is.gd/WUezLL`

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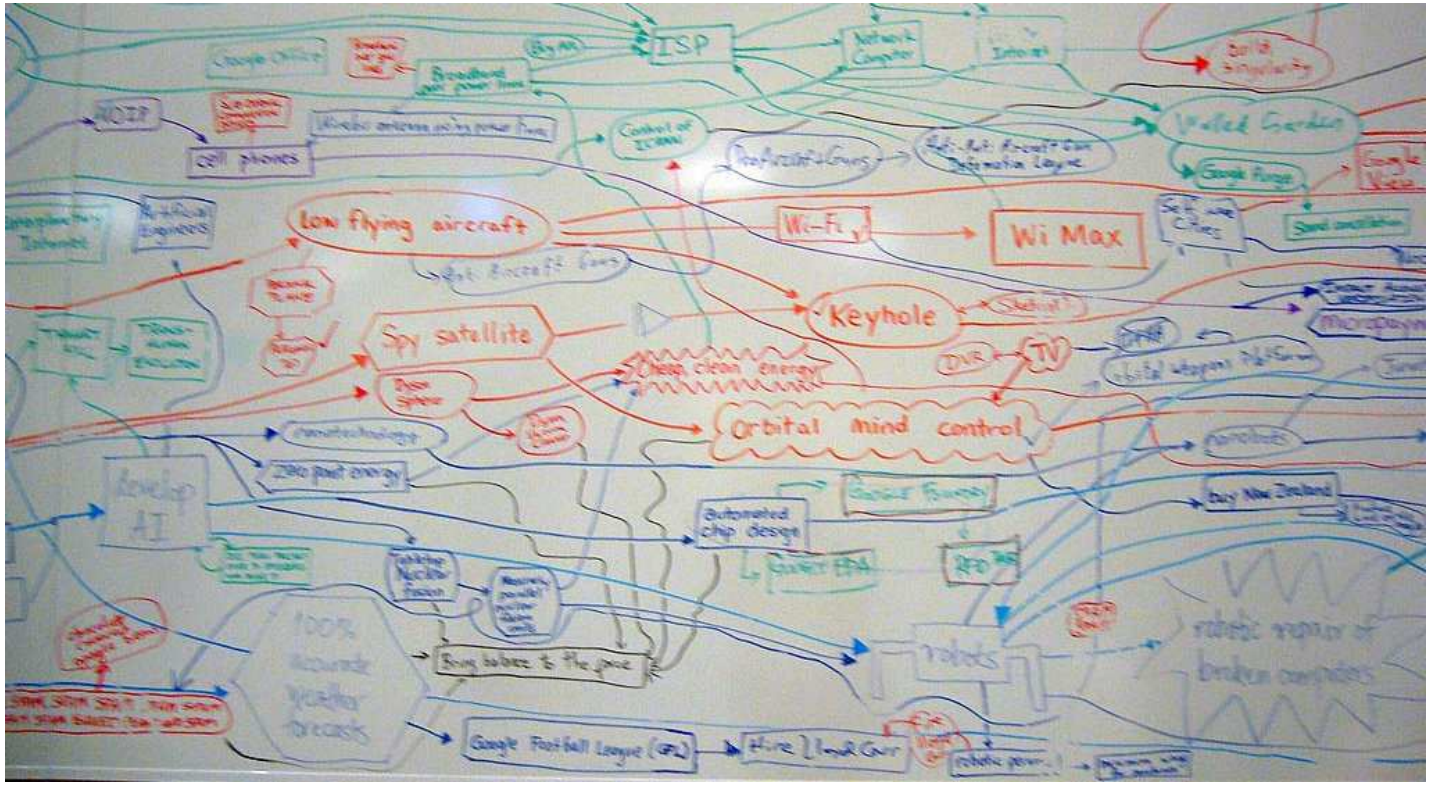

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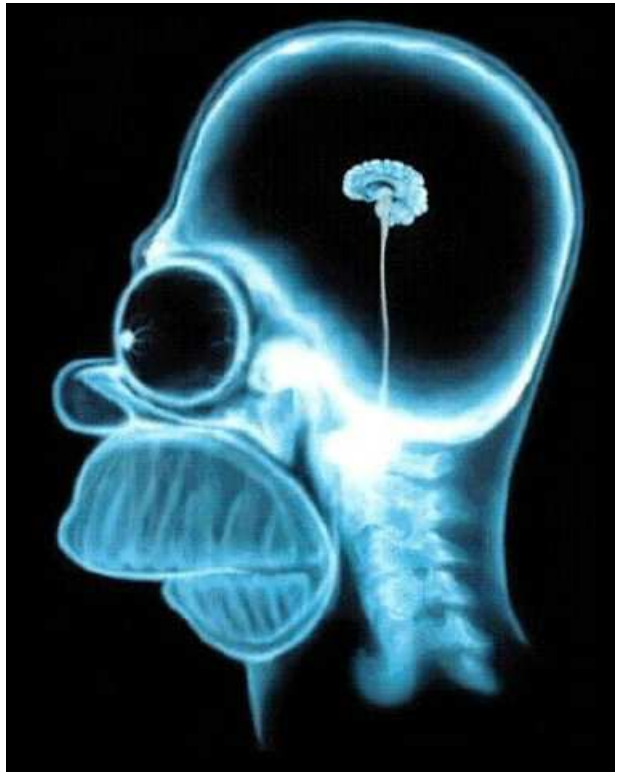

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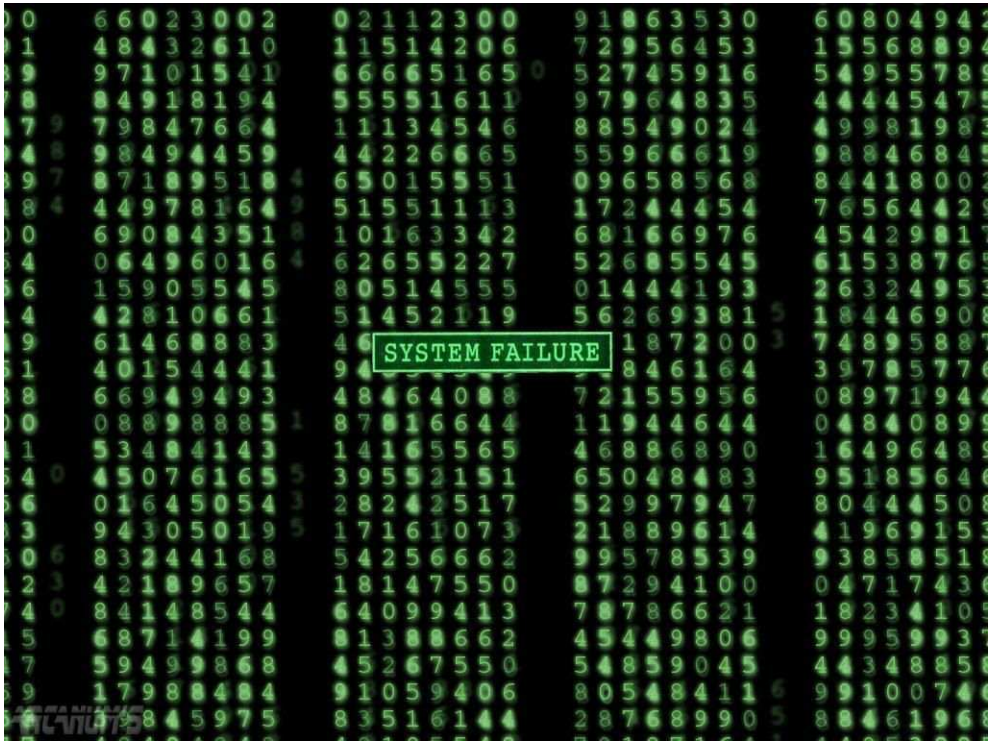

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- often known as Operator, Network Administrator, System Programmer, System Manager, Service Engineer, Site Reliability Engineer etc.

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- the organization's goals and policies

... and *Administration*?

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...all of which my involve a fair amount of *software development*, *programming* and *scripting*.

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- breadth of expertise as necessary as depth in some areas
- background knowledge and requirements vary

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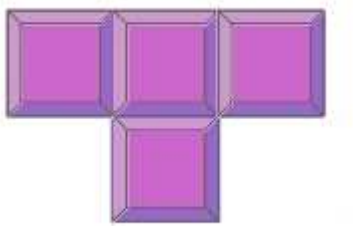

Learning System Administration

Breadth of knowledge:

- operating system concepts
- TCP/IP networking
- programming
- ...

Depth of knowledge:

- certain OS flavor
- specific service (DNS, E-Mail, Databases, Content-Delivery, ...)
- specific implementation/vendor (Oracle, Hadoop, Apache, Cisco, ...)
- specific are of expertise (security, storage, network, data center, ...)
- ...

SysAdmins' favorite Laws

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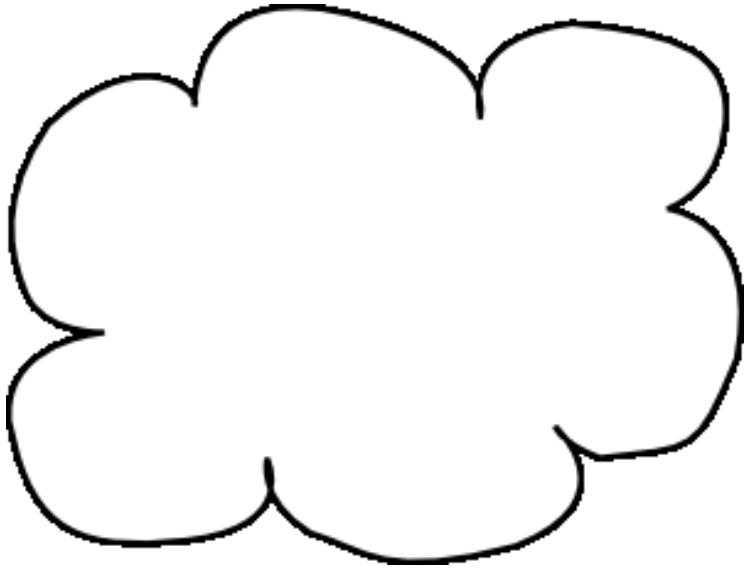
Throw in some philosophy for good measure:

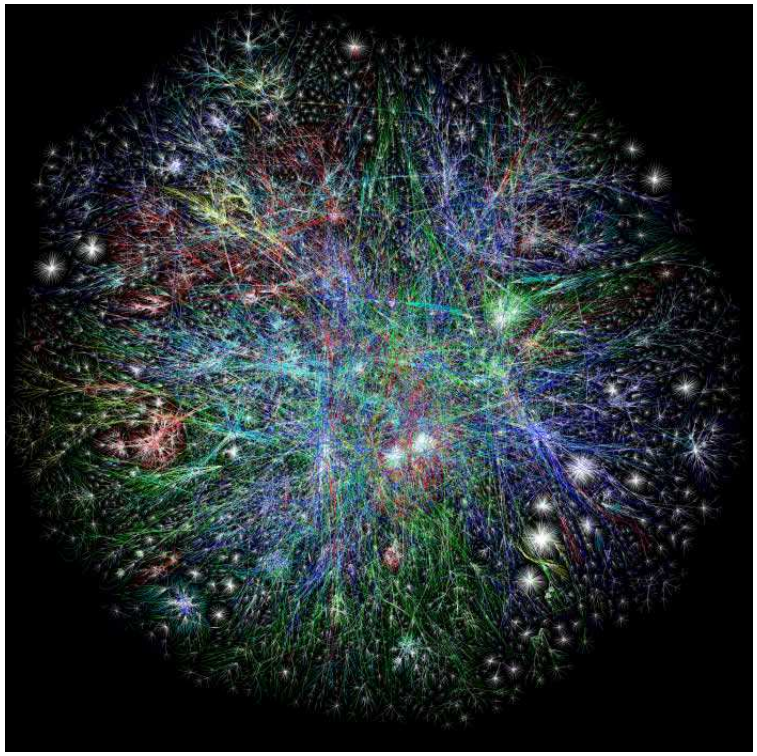
> *Causality: For every effect, there must be a cause.*

SysAdmins' favorite tool

People think the internet looks like this.



Or like this.



SysAdmins know it looks like this.

Hooray!

5 Minute Break

In reality...

About this class

We can only cover *some* of the aspects of System Administration.

Three Pillars of Exceptional System Design

We will give particular attention to these three core features:

- Scalability
- Security
- Simplicity

Three Pillars of Exceptional System Design: Scalability

System Overload

Three Pillars of Exceptional System Design: Scalability

Scaling Vertically

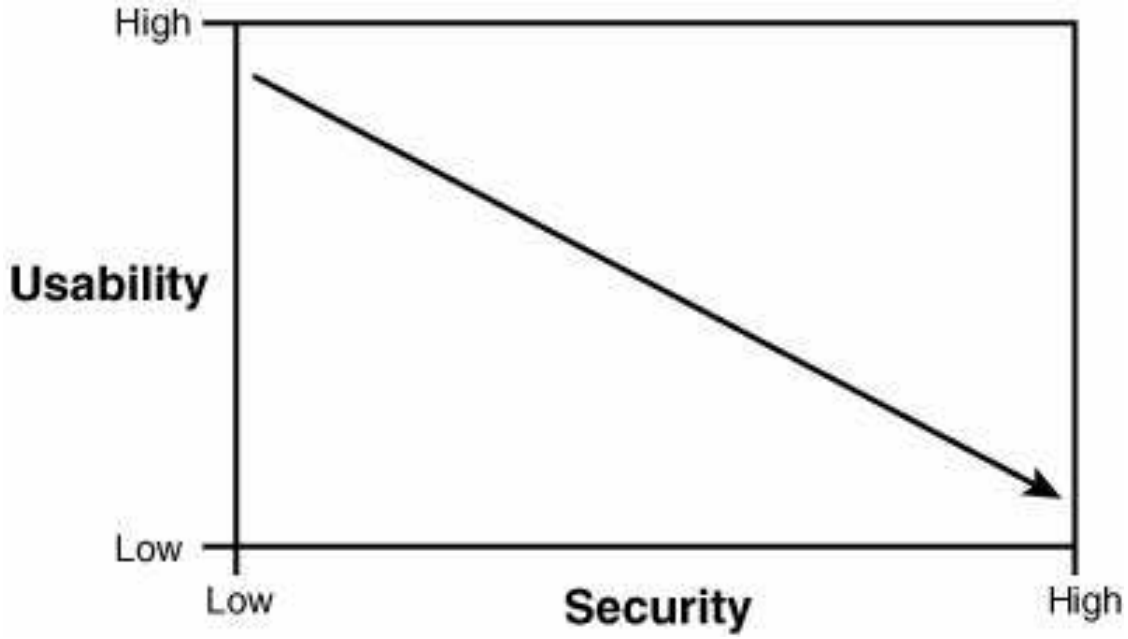
Three Pillars of Exceptional System Design: Scalability

Scaling Horizontally

Three Pillars of Exceptional System Design: Scalability

Scaling Down

Three Pillars of Exceptional System Design: Security



Three Pillars of Exceptional System Design: Security

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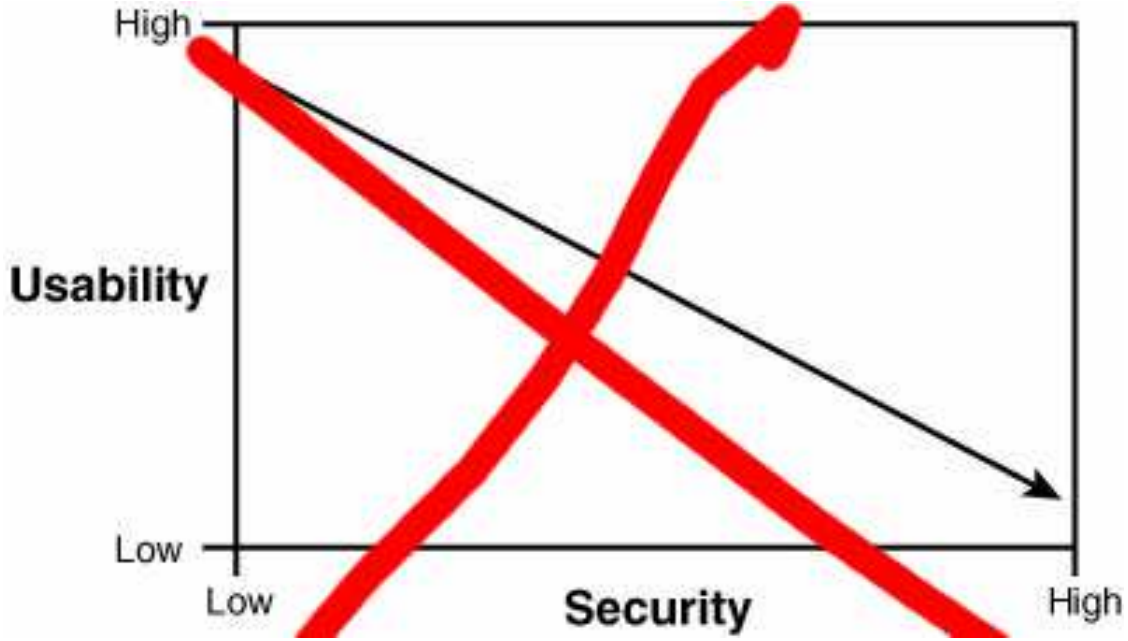

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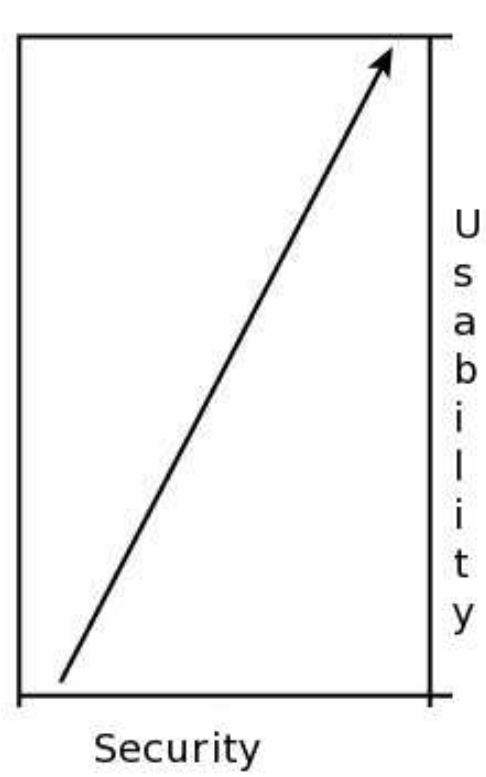

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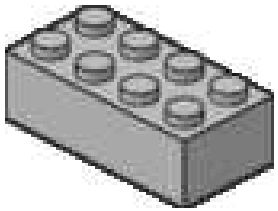

Three Pillars of Exceptional System Design: Simplicity

About this class

Suggested Reading:

- “Essential System Administration”, 3rd Edition, by Æleen Frisch
- “Unix System Administration Handbook”, 3rd Edition, by Evi Nemeth
- “Principles of Network and System Administration”, by Mark Burgess
- “Analytical Network and System Administration”, by Mark Burgess
- “The Practice of System and Network Administration”, by Thomas A. Limoncelli & Christine Hogan

Grading:

- class participation / lightning talks
- a number of homework assignments of varying weight
- a group project towards the end of the semester
- no curve

Syllabus

- 2014-01-22: Introduction, Overview, course basics
- 2014-01-27: UNIX history and basics / Filesystems and Disks
- 2014-02-03: Software Installation Concepts
- 2014-02-10: User Management, multi-user basics
- 2014-02-18: Automating Administrative Tasks
- 2014-02-24: Backup and Disaster Recovery
- 2014-03-03: Networking
- 2014-03-17: Popular services (DNS, SMTP)
- 2014-03-24: Configuration Management (Guest Lecturer)
- 2014-03-31: Popular services (HTTP, SNMP, SSH)
- 2014-04-07: System Security
- 2014-04-14 – 2011-04-28: AMA / Misc. topics / presentations / TBD

Syllabus

Miscellaneous topics and presentations may include:

- large scale logging
- heterogenous networks / multiple OS
- automated installation
- configuration management
- server room basics, cooling issues, racking etc.
- clustering
- spam
- . . .

Questions, Answers, Chatter...

- 10 minutes of Ask Me Anything / current events / lightning talks at the beginning of the class

  that does *not* mean you can come 10 minutes late

- course website, syllabus, assignments, course material:
  `https://www.cs.stevens.edu/~jschauma/615/`

- discussions and announcements:
  `https://lists.stevens.edu/cgi-bin/mailman/listinfo/cs615asa`

- who knows what: `https://twitter.com/cs615asa`

Let's do some homework!

`https://webchat.freenode.net/ -- #cs615asa`

`http://www.cs.stevens.edu/ jschauma/615/s14-hw1.html`

- ensure you have access to `linux-lab.cs.stevens.edu`
- create your website (if you don't already have it)
- create an AWS account
- create an EC2 instance
- access EC2 instance, run commands

Reading

Miscellaneous:

- http://www.opsschool.org/
- http://nixsrv.com/llthw
- http://linuxcommand.org/lc3_learning_the_shell.php
- http://www.sage.org/pubs/22_jobs/

UNIX history:

- http://www.bell-labs.com/history/unix/
- http://www.futuretech.blinkenlights.nl/admin/day1a.html
- http://www.levenez.com/unix/
- https://en.wikipedia.org/wiki/Operating_system

Reading

UNIX basics:

- chmod(1), chown(1), ls(1)
- intro(1), login(1), passwd(5)
- su(1), sudo(8)