

# The Eight Fallacies of Distributed Computing

Stephen Asbury - Strangeloop 2014



# About Stephen Asbury

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## History - Wikipedia Style

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*The list of fallacies generally came about at Sun Microsystems. L. Peter Deutsch, one of the original Sun "Fellows", is credited with penning the first seven fallacies in 1994; however, Bill Joy and Tom Lyon had already identified the first four as "The Fallacies of Networked Computing" [3] (the article claims "Dave Lyon", but this is considered a mistake). Around 1997, James Gosling, another Sun Fellow and the inventor of Java, added the eighth fallacy.*

***Wikipedia***

# Fallacy: a wrong

belief, a false or  
mistaken idea

It's a sub-conscious thing...

A large yellow excavator is shown from a side-front angle, working on a construction site. The machine has a long arm and a bucket attachment. It is positioned on a dirt surface with some tracks visible. The background shows a clear blue sky and some greenery in the distance.

The Network Is Reliable

# The Network Is Reliable

A photograph of a man with long brown hair, wearing a red coat, standing in a room with blue walls and yellow paneling. He is holding a large axe over his shoulder with both hands, looking towards the right side of the frame. A network cable is visible, running from the ceiling down the wall and being held by the man's hand near the axe handle.



The Network is Reliable

# Latency Is Zero



# Latency Is Zero

 **WolframAlpha** computational knowledge engine

3 millilightseconds as miles

Input interpretation:  
convert 3 light milliseconds to miles

Result:  
558.8 miles

A additional information



© Boaz/Flynetpictures.com

# Latency Is Zero



An aerial photograph of a busy urban street during the day. The street is filled with a dense mix of cars, including several yellow taxis, and groups of people walking on the sidewalks. In the background, there are large commercial signs for "Coca-Cola" and "La Casona PIZZA CAFE".

Bandwidth Is Infinite

# Bandwidth Is Infinite





**Bandwidth Is Infinite**



# The Network is Secure

A black and white photograph showing two men from the chest up. They are both wearing dark top hats and have beards. The man on the left is wearing a light-colored, patterned scarf and a textured jacket. The man on the right is wearing a dark scarf and a dark jacket. Both men are looking upwards and slightly to the left with serious expressions.

The Network is Secure

The Network is Secure



iCloud



Apple ID

Password



Keep me signed in



Topology Doesn't Change

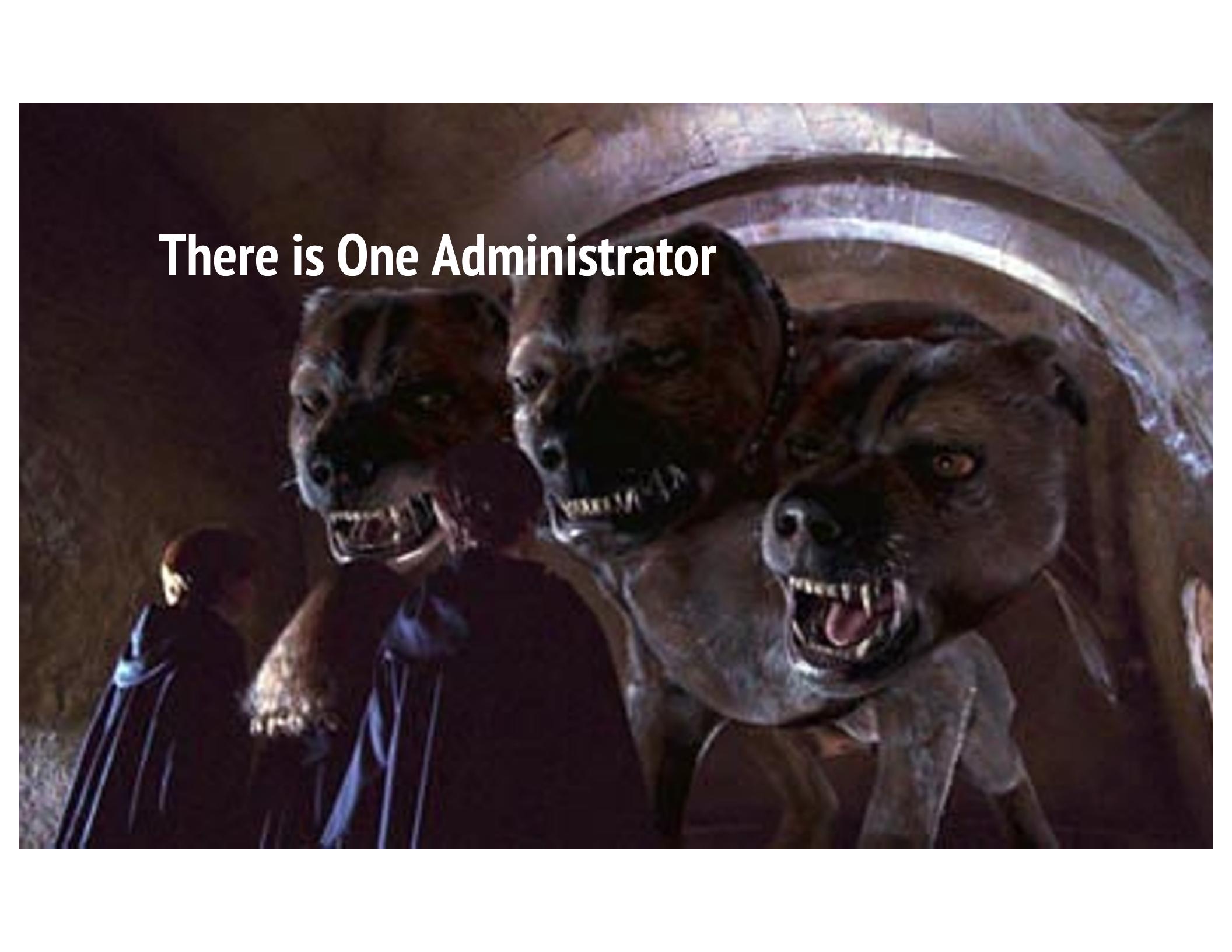


A screenshot from the video game Gears of War. In the center, a large glowing yellow and orange energy source, resembling a portal or a power core, is surrounded by several red laser beams forming a complex network. One beam originates from the bottom left, another from the top center, and others branch off to the right and top right. In the foreground, a character in a tan and brown military-style suit stands on the left, holding a weapon and looking towards the energy source. Another character in similar attire stands further back on the right. The setting is a dark, industrial-looking room with large columns and debris scattered on the floor. The text "Topology Doesn't Change" is overlaid in white at the top left of the image.

Topology Doesn't Change

# Topology Doesn't Change





There is One Administrator

A close-up photograph of a man's face. He has short brown hair, wears black-rimmed glasses, and has a light beard and mustache. He is looking directly at the camera with a neutral expression. The background is slightly blurred.

There is One Administrator

There is One Administrator



Transport Cost is Zero

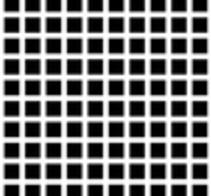
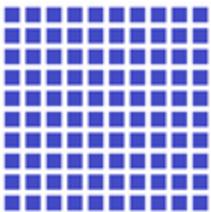
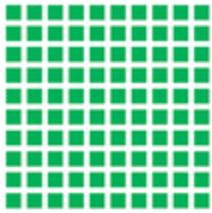
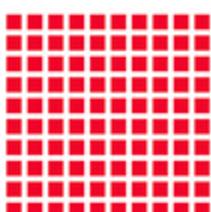
ConFLIX

A professional cyclist in a green jersey is shouting with his mouth wide open. He is wearing a green and white helmet and sunglasses. He is wearing a green jersey with 'PMU' and 'LIQUIGAS' logos. In the background, other cyclists are visible, one in a blue and white jersey and another in a red, white, and blue jersey.

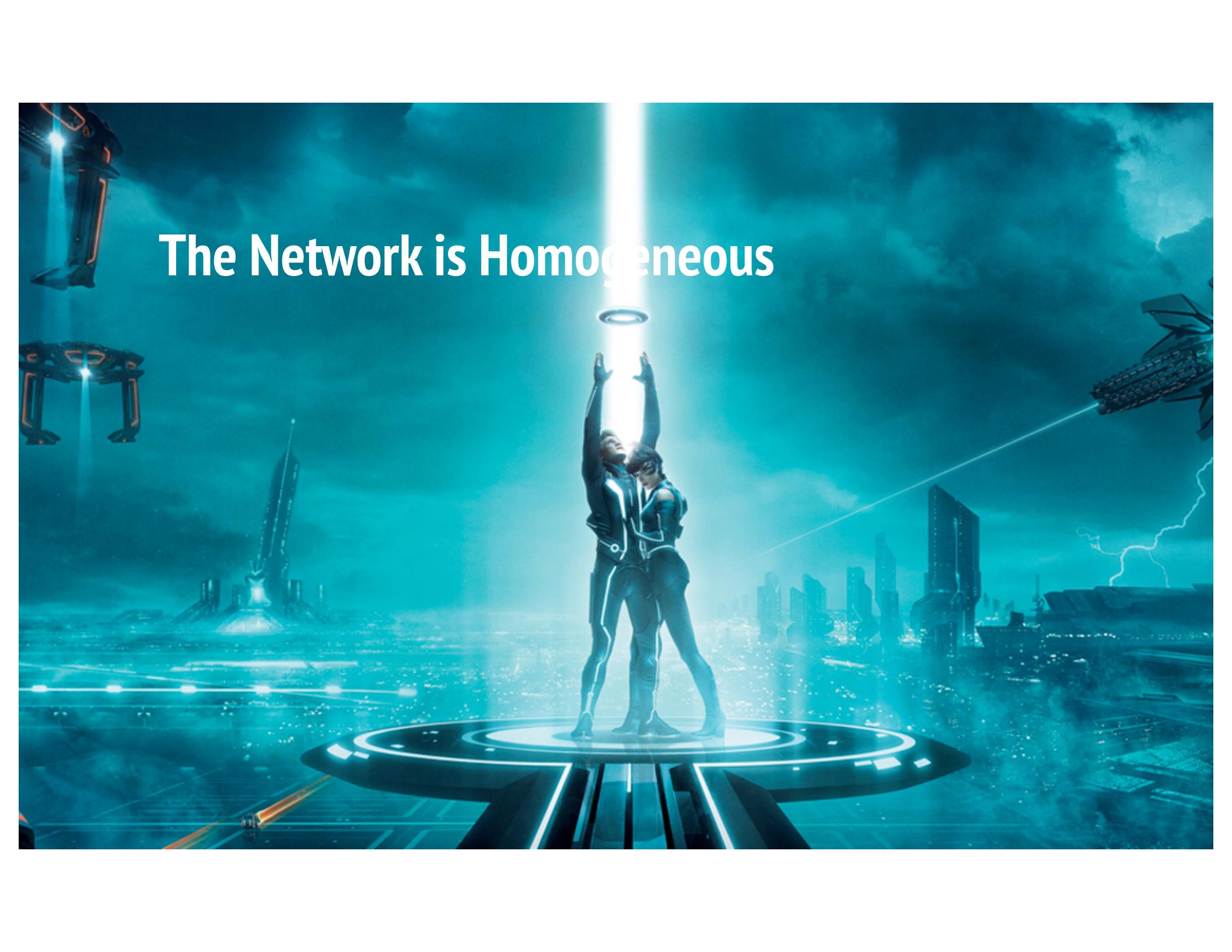
Transport Cost is Zero

# Transport Cost Is Zero

## Latency Numbers Every Programmer Should Know

<ul style="list-style-type: none"><li>■ 1ns</li><li>■ L1 cache reference: 0.5ns</li><li>■ Branch mispredict: 5ns</li><li>■ L2 cache reference: 7ns</li><li>■ Mutex lock/unlock: 25ns</li><li> = ■ 100 ns</li></ul>	<ul style="list-style-type: none"><li>■ Main memory reference: 100 ns</li><li> = ■ 1 μs</li><li> Compress 1KB with Zippy: 3 μs</li><li> = ■ 10 μs</li></ul>	<ul style="list-style-type: none"><li>■ Send 1KB over 1 Gbps network: 10 μs</li><li> SSD random read (1Gb/s SSD): 150 μs</li><li> Read 1MB sequentially from memory: 250 μs</li><li> Round trip in same datacenter: 500 μs</li><li> = ■ 1 ms</li></ul>	<ul style="list-style-type: none"><li>■ Read 1MB sequentially from SSD: 1 ms</li><li> Disk seek: 10 ms</li><li> Read 1MB sequentially from disk: 20 ms</li><li> Packet roundtrip CA to Netherlands: 150 ms</li></ul>
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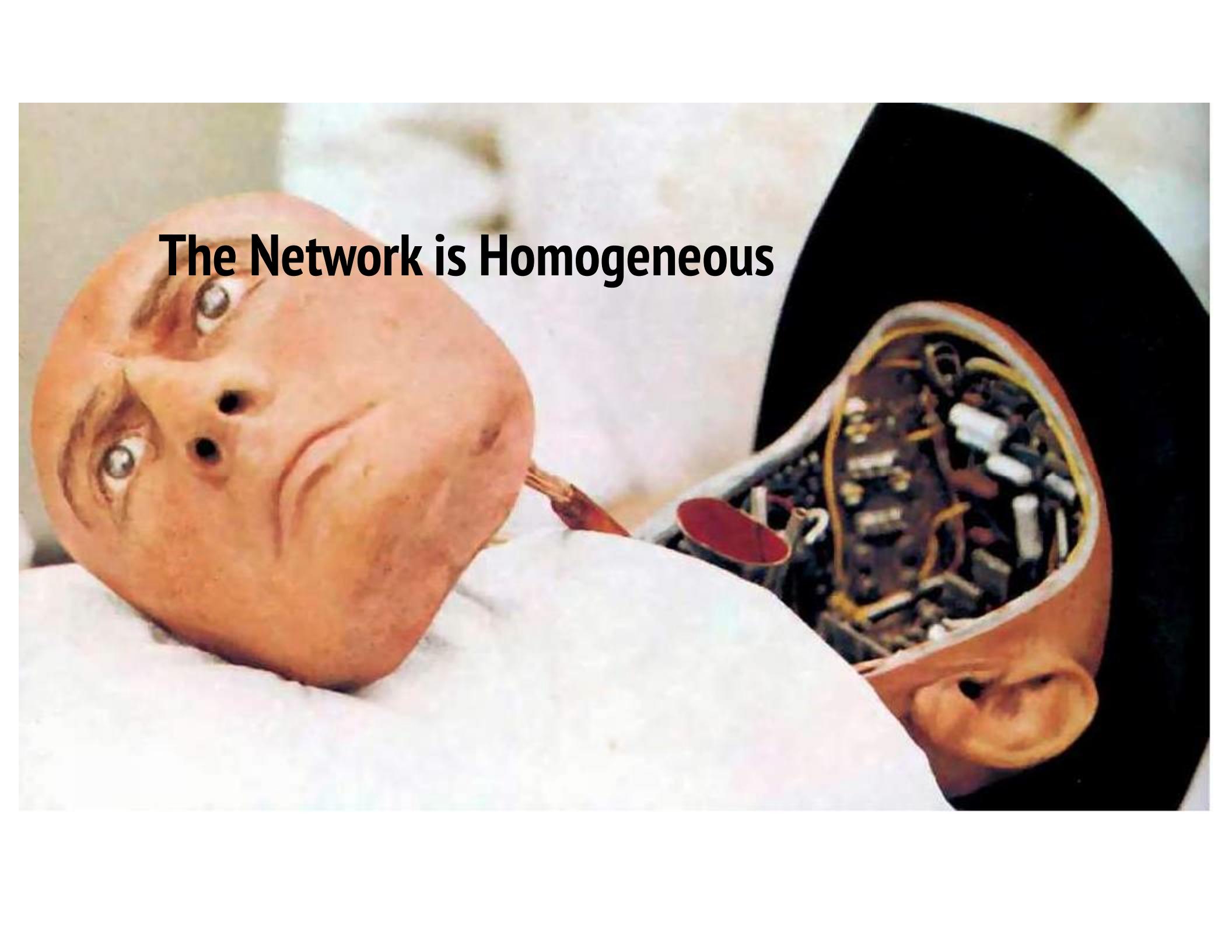
Source: <https://gist.github.com/2841832>



The Network is Homogeneous



The Network is Homogeneous



The Network is Homogeneous

# The Eight Fallacies

- The Network Is Reliable
- Latency Is Zero
- Bandwidth Is Infinite
- The Network Is Secure
- Topology Doesn't Change
- There Is One Administrator
- Transport Cost Is Zero
- The Network Is Homogeneous

# In The Real World

- CORBA, RMI, ...
- Web Sockets, Polling, ...
- Timeouts - good, bad and ugly
- Trust Physics
- Read the docs .. and .. TEST
- Are you real time?

Go back and watch the Jepsen II Talk

A close-up photograph of a police officer in uniform, pointing his right index finger upwards and slightly to the left. He is looking directly at the camera with a serious expression. The background is a dark, textured wall.

Let's Be Careful Out There

CALL

"FOR"  
"LIT"

Questions?

Comments?

Applause

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# Some References

- <https://blogs.oracle.com/jag/resource/Fallacies.html> - <http://www.rgoarchitects.com/Files/fallacies.pdf>">Arnon Rotem-Gal-Oz - <http://java.sys-con.com/node/38665>">Deutsch's Fallacies, 10 Years After
- <http://xkcd.com/1354>">XKCD - Heartbleed Explanation
- [http://www.nytimes.com/2014/02/24/business/media/comcast-and-netflix-reach-a-streaming-agreement.html?\\_r=0](http://www.nytimes.com/2014/02/24/business/media/comcast-and-netflix-reach-a-streaming-agreement.html?_r=0)">Netflix/Comcast - <http://arstechnica.com/tech-policy/2014/06/fcc-gets-comcast-verizon-to-reveal-netflixs-paid-peering-deals/>">Netflix/Verizon
- <http://spreadnetworks.com/>">Spread Networks
- <http://aphyr.com/tags/Jepsen>">Call Me Maybe & Jepsen
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- <https://github.com/elasticsearch/elasticsearch/issues/2488>">Elastic Search GC issue
- [http://www.wired.com/2014/08/shark\\_cable/](http://www.wired.com/2014/08/shark_cable/)">Sharks - <http://www.networkworld.com/article/2464035/cloud-computing/google-wraps-its-trans-pacific-fiber-cables-in-kevlar-to-prevent-against-shark.html>">More sharks
- <http://status.fogcreek.com/2012/05/may-5-6-network-maintenance-post-mortem.html>">Fog Creek Spanning Tree Flood
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- [http://www.cio.com.au/article/255165/sorting\\_facts\\_terry\\_childs\\_case/?pf=1](http://www.cio.com.au/article/255165/sorting_facts_terry_childs_case/?pf=1)">Terry Childs
- [http://en.wikipedia.org/wiki/August\\_2014\\_celebrity\\_photo\\_leaks](http://en.wikipedia.org/wiki/August_2014_celebrity_photo_leaks)">Celebrity photo hack & leak
- <http://www.somethingsimilar.com/2013/01/14/notes-on-distributed-systems-for-young-bloods/>">Notes on distributed systems for young bloods - <http://queue.acm.org/detail.cfm?id=2655736>">ACM paper on real world network problems - <http://rescomp.stanford.edu/~cheshire/rants/Latency.html>">Its the latency stupid