

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 blue track and a black bucket. It is positioned against a clear blue sky. The text "The Network Is Reliable" is overlaid in white.

The Network Is Reliable

The Network Is Reliable

A photograph of a man with long brown hair, wearing a red coat, standing in a hallway. He is holding a large axe with both hands, pointing it towards a light-colored wooden panelled wall. A single black network cable is visible, running from the wall through his hand and up the handle of the axe. The background shows a blue wall with a small framed picture and a white door frame.



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 1.000000000000000 miles



Latency Is Zero



An aerial photograph of a busy urban street during the day. The street is filled with a dense mix of vehicles, including numerous yellow and black taxis, several sedans, SUVs, and a few larger vehicles like vans and a motorcycle. Pedestrians are scattered throughout the scene, some walking on the sidewalks and others crossing the street at various points. In the background, there are several large commercial signs, most notably a prominent Coca-Cola sign on the left and a La Casona Pizza Cafe sign above a restaurant entrance. The overall atmosphere is one of a bustling, active city center.

Bandwidth Is Infinite

Bandwidth Is Infinite

A photograph of two dark-colored pickup trucks on a paved road. A massive, billowing cloud of dust or smoke is positioned between the two vehicles, obscuring the center of the road. The truck on the left is a compact SUV-like model, and the truck on the right is a larger pickup. The background shows a grassy field and some utility poles under a cloudy sky.



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



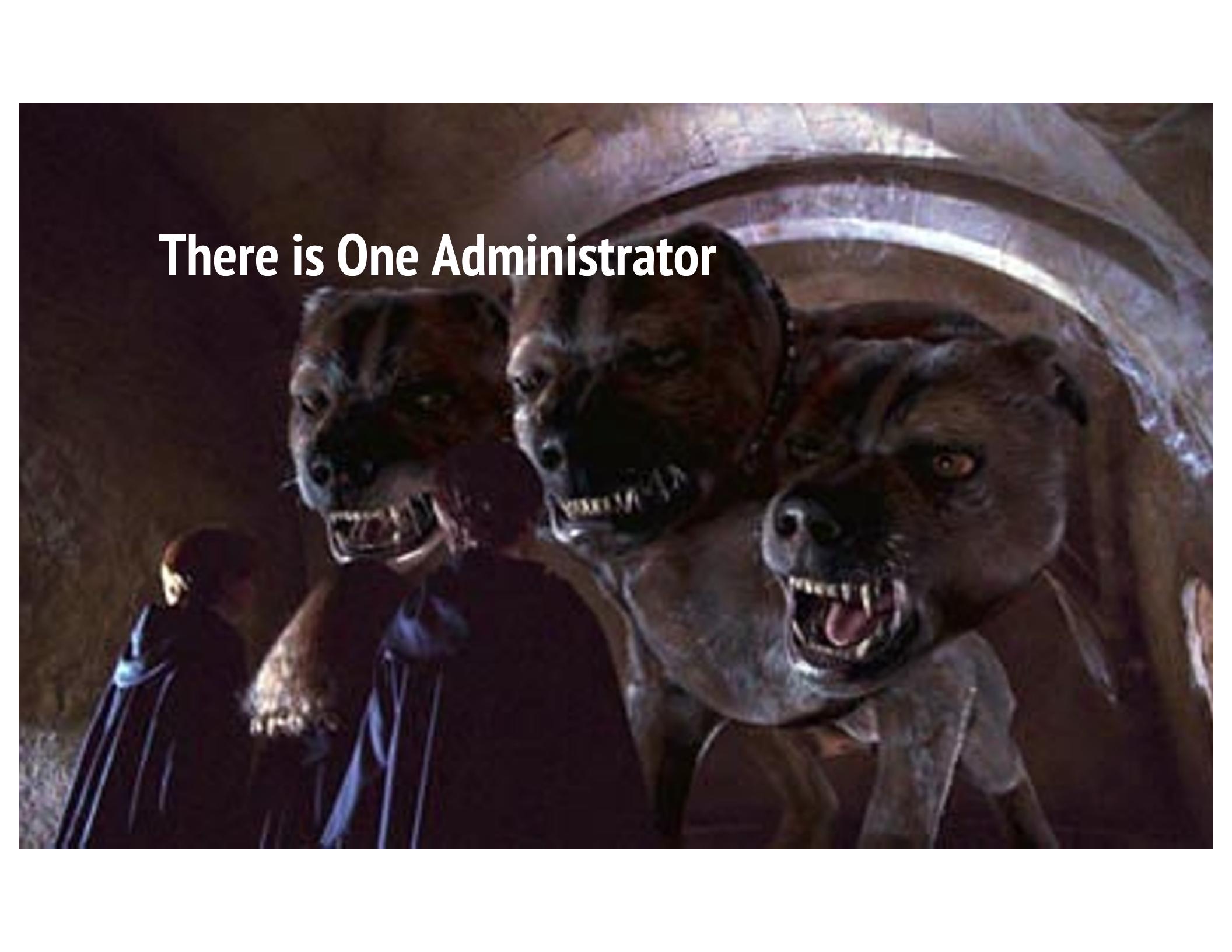
Topology Doesn't Change



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

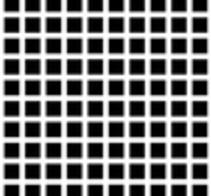
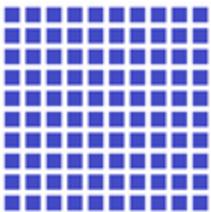
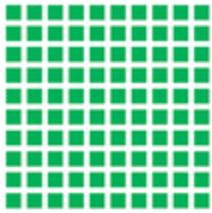
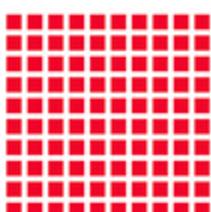
ConFLIX

A dynamic photograph of a professional cyclist in mid-stride, shouting with exertion. He wears a bright green short-sleeved jersey with 'PMU' and 'LIQUIGAS' logos, along with matching green and blue shorts. A white armband on his left arm also features the Liquigas logo. He is wearing a black and white helmet and sunglasses. The background is blurred, showing other cyclists and spectators, indicating a high-speed race.

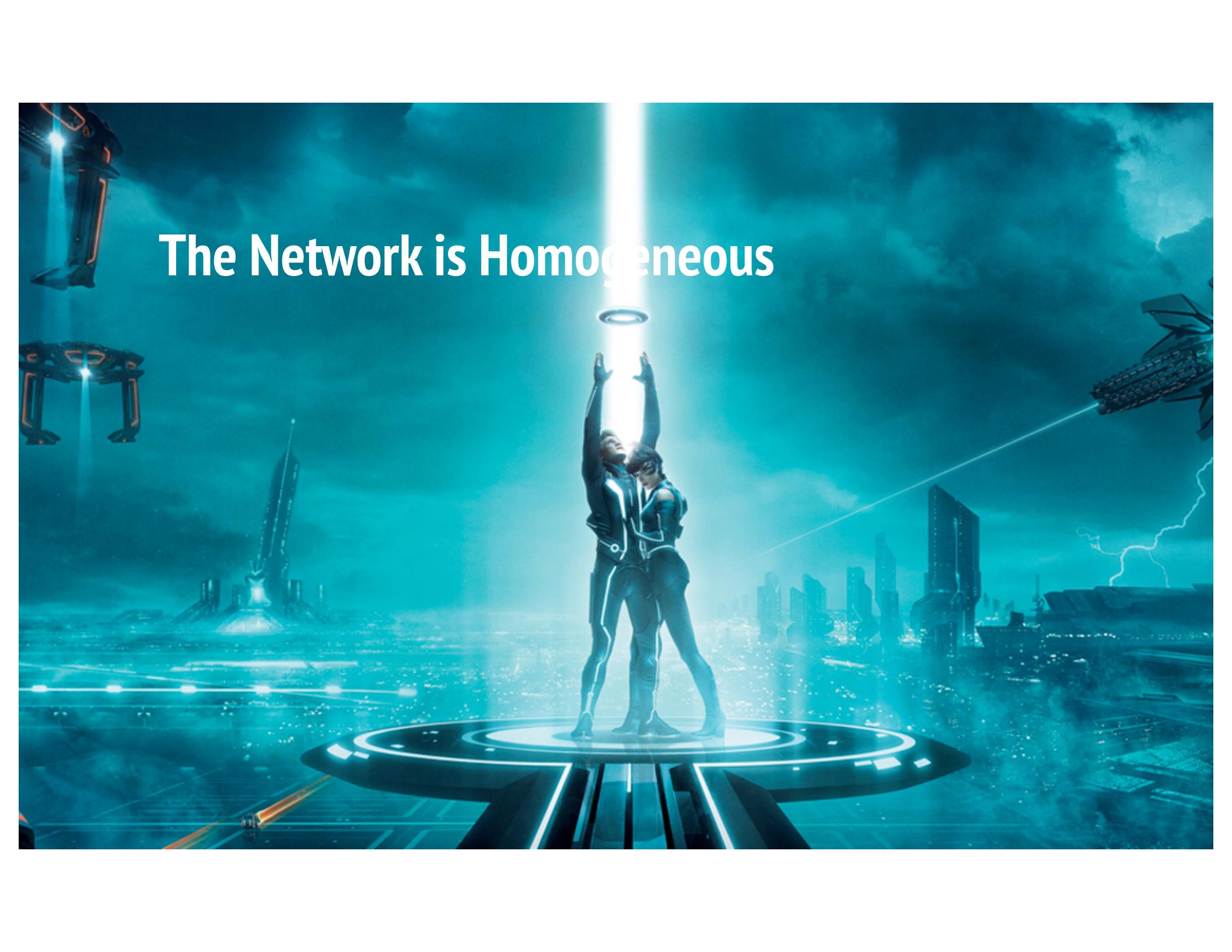
Transport Cost is Zero

Transport Cost Is Zero

Latency Numbers Every Programmer Should Know

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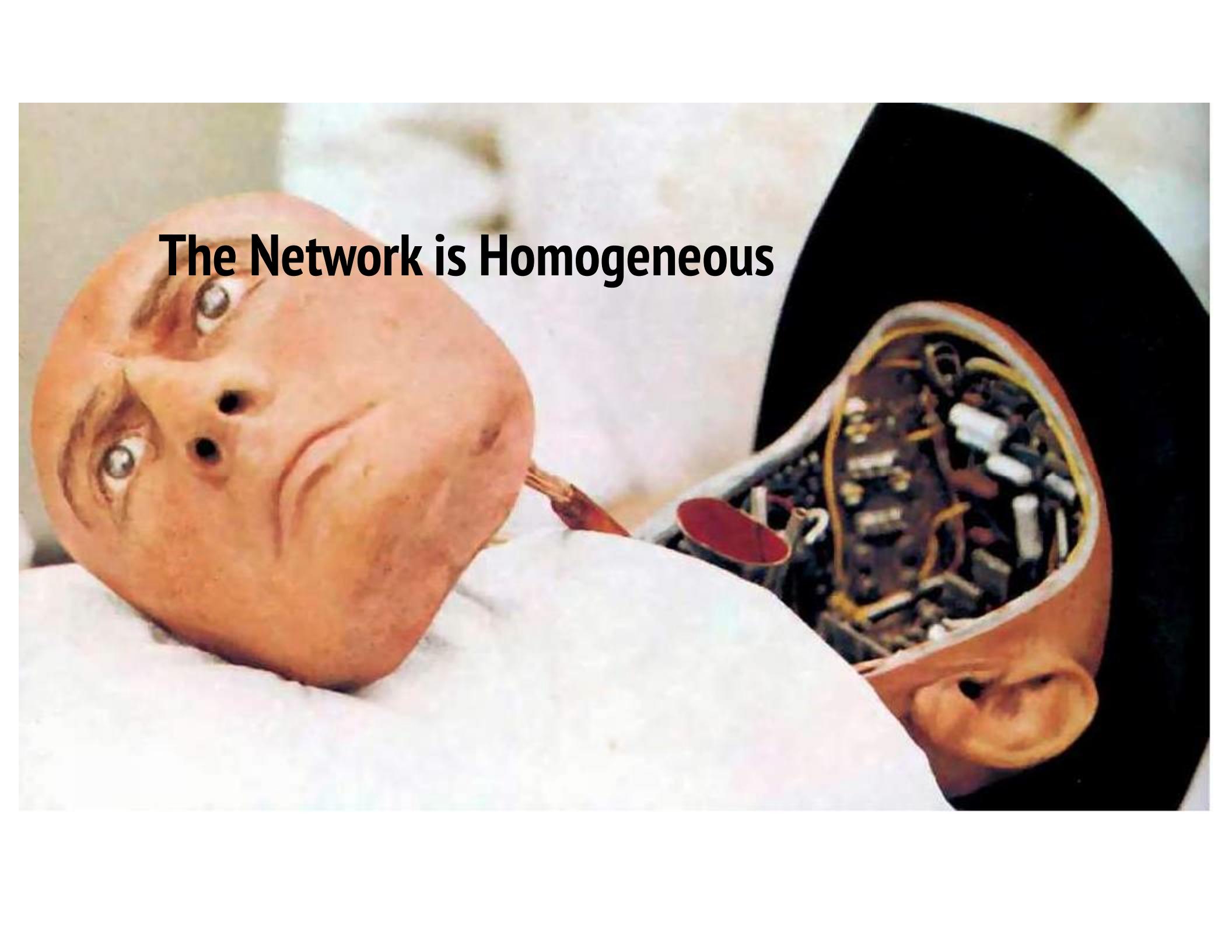
Source: <https://gist.github.com/2841832>



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">Netflix/Comcast - <http://arstechnica.com/tech-policy/2014/06/fcc-gets-comcast-verizon-to-reveal-netflixs-paid-peering-deals/>">Netflix/Verizon
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- <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