

Active Queue Management

{ Mahesh Paolini-Subramanya (@dieswaytoofast)
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Beware the Black Swan

The Business

& Phone services for SMBs

The Business

- Phone services for SMBs
- *Hosted* Phone services for SMBs

The Business

- Phone services for SMBs
- *Hosted* Phone services for SMBs
- *Hosted Cloud Communications* service for SMBs

The Business

- Phone services for SMBs
- *Hosted* Phone services for SMBs
- *Hosted Cloud Communications* service for SMBs

HUH WHAT?



A

MTCE TONE-
CLOCK EXPN
INTFC EXPN
INTFC

POWER UNIT

POWER SUPPLY





vmware®



The Metrics

The Metrics

& Phone Calls per Second

¶ Phone Calls per Second

x1000

The Metrics

The Metrics

& Simultaneous Phone Calls

& Simultaneous Phone Calls

x10,000

The Metrics

The Metrics

& HTTP API requests

& HTTP API requests



The Metrics

The Infrastructure

& Big pipes

The Infrastructure

- Big pipes
- Polyglot (Erlang, Java, Ruby, Perl,...)

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- Polyglot (Erlang, Java, Ruby, Perl,...)
- Loosely Coupled Systems

The Infrastructure

The Infrastructure

- Big pipes
- Polyglot (Erlang, Java, Ruby, Perl,...)
- Loosely Coupled Systems
- Multi-site / Multi-cluster

My Vacation





(Actually, the day before)



A small failure...



SYSTEM FAILURE

The Horror! The Horror!

The Infrastructure

- Big pipes
- Polyglot (Erlang, Java, Ruby, Perl,...)
- Loosely Coupled Systems
- Multi-site / Multi-cluster

The Infrastructure

- & Big pipes
- & Polyglot (Erlang, Java, Ruby, Perl,...)
- & Loosely Coupled Systems**
- & Multi-site / Multi-cluster

A close-up photograph of a woman with dark hair, wearing a dark turtleneck sweater. She is holding a white telephone receiver to her right ear with her left hand. Her right hand is raised to her forehead, with her fingers touching her temple, suggesting stress or frustration. She has a gold ring on her middle finger and a silver watch on her left wrist. The background is dark and out of focus.

Why are my calls failing?

A close-up photograph of a woman with dark hair, wearing a dark turtleneck sweater. She is holding a white corded telephone receiver to her ear with her left hand. Her right hand is raised to her forehead, with her fingers resting near her brow, suggesting stress or frustration. She has a gold ring on her middle finger and a gold watch on her left wrist. The background is dark and out of focus.

You better call me back!

A close-up photograph of a woman with dark hair, wearing a dark blazer over a white collared shirt. She is holding a white corded telephone receiver to her ear with her left hand. Her right hand is raised to her forehead, with her fingers partially covering her eyes. She has a weary or annoyed expression on her face. The background is dark and out of focus.

I'm still p***ed off!

A close-up photograph of a woman with dark hair, wearing a dark blazer over a light-colored shirt. She is holding a white corded telephone receiver to her ear with her left hand. Her right hand is raised to her forehead, with her fingers resting near her temple, suggesting stress or frustration. She has a gold ring on her middle finger and a black leather watch with a silver-toned buckle on her left wrist. The background is dark and out of focus.

And you're stupid Apps
don't work!

SYSTEM FAILURE

The Horror! The Horror!

Surely you Tested?

An aerial photograph capturing a massive flooding event. The entire landscape is inundated with dark, muddy floodwater. In the foreground, a complex network of roads and overpasses is submerged, with only their tops visible above the water level. To the left, a large industrial zone with numerous white buildings and parking lots is completely surrounded by floodwaters. In the center, a long, low-profile building, possibly a shopping mall or a large store, stretches across the frame. The background shows a wide expanse of floodwater extending towards distant hills and mountains under a heavy, overcast sky.

1000 year floods

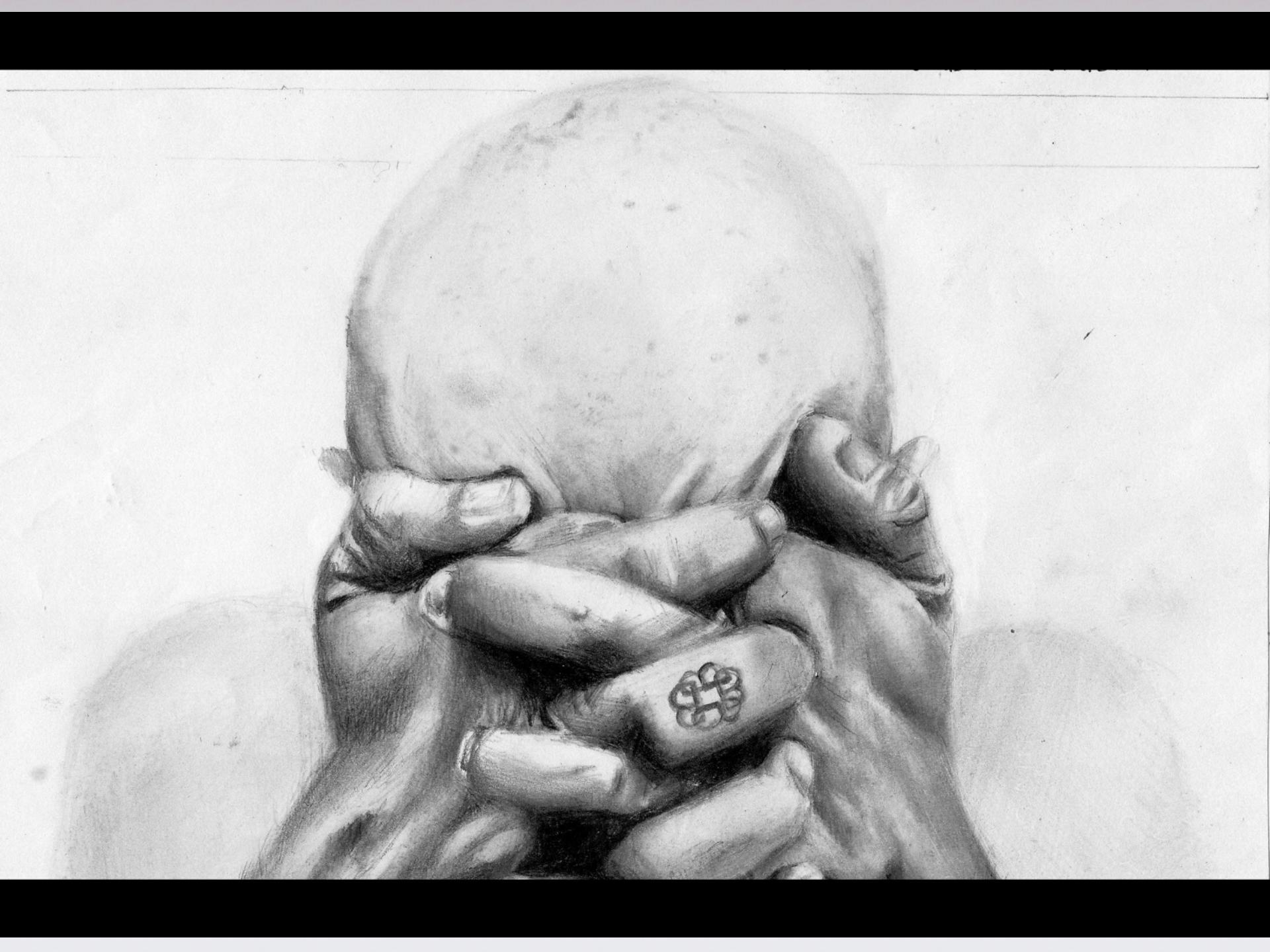




Barack Obama
For President
2008



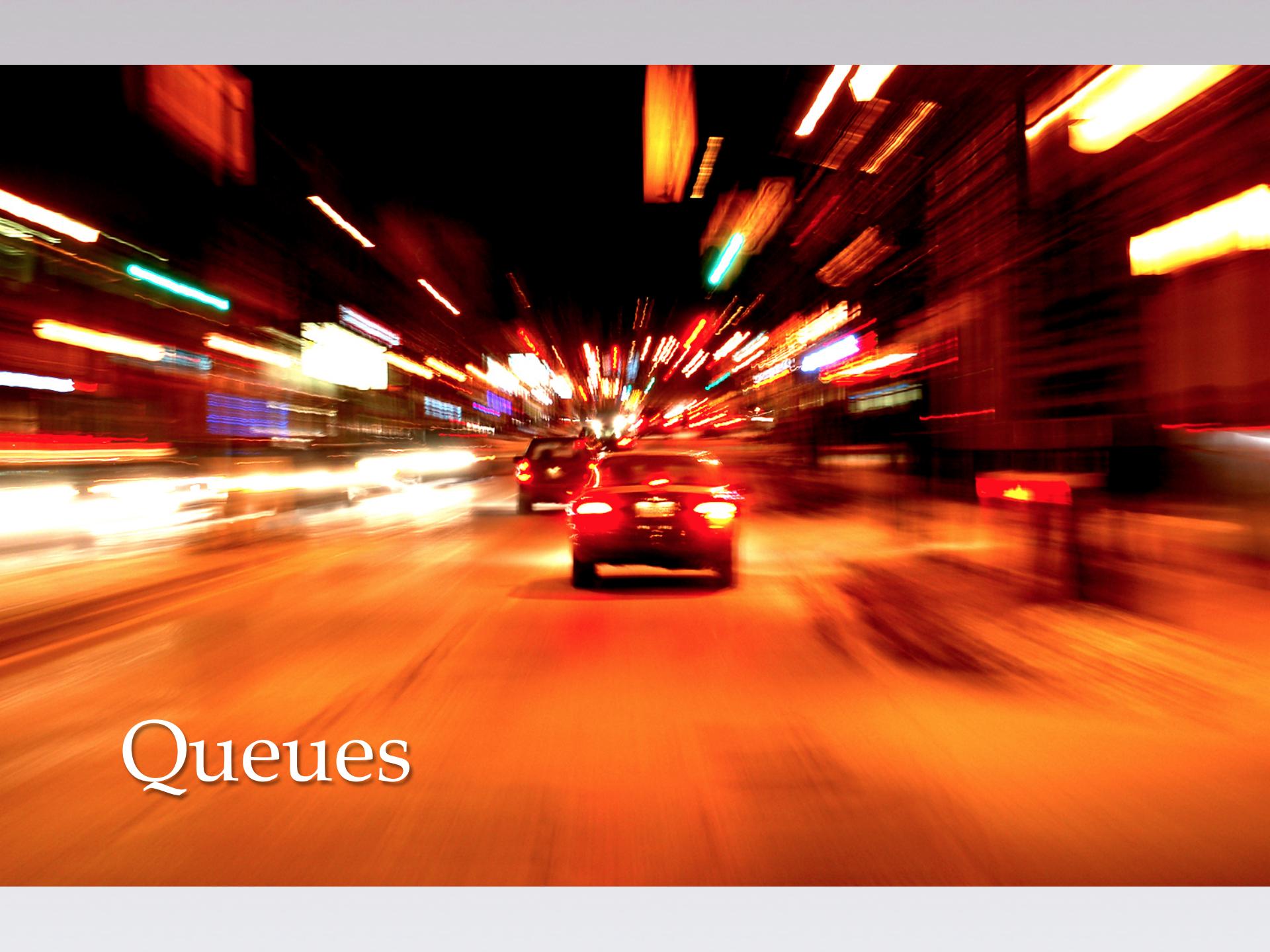
Romney 2012



A blurred, motion-filled night city street scene. In the center, a dark-colored car is moving away from the viewer, its red taillights glowing. The street is lined with buildings whose windows and signs are streaked with light, creating a vibrant, colorful blur. The overall effect is one of high speed and urban energy.

(Lack of) Speed Kills

Queues

A blurred, colorful night city street scene with motion blur and streaking lights.

Queues

A large, close-up illustration of the character Cartman from the animated TV show "South Park". He is depicted with his signature wide, white eyes and a neutral, slightly smug expression. He wears his iconic teal beret with a yellow pom-pom and a red zip-up hoodie over a white t-shirt. The background is plain white.

Queues

Queues





Queues

- ¶ Can you recover quickly?
- ¶ Buffer-bloat doesn't matter, right?
- ¶ Once up, can you deal with the backlog?
- ¶ Back-pressure isn't an issue, right?

Queues

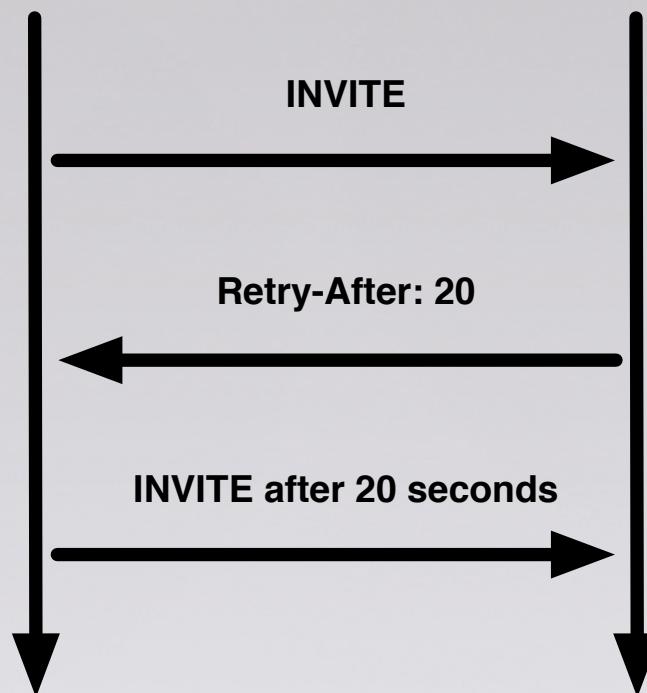
- ¶ Can you recover quickly?
- ¶ Buffer-bloat doesn't matter, right?
- ¶ Once up, can you deal with the backlog?
- ¶ Back-pressure isn't an issue, right?

Nope

Queues

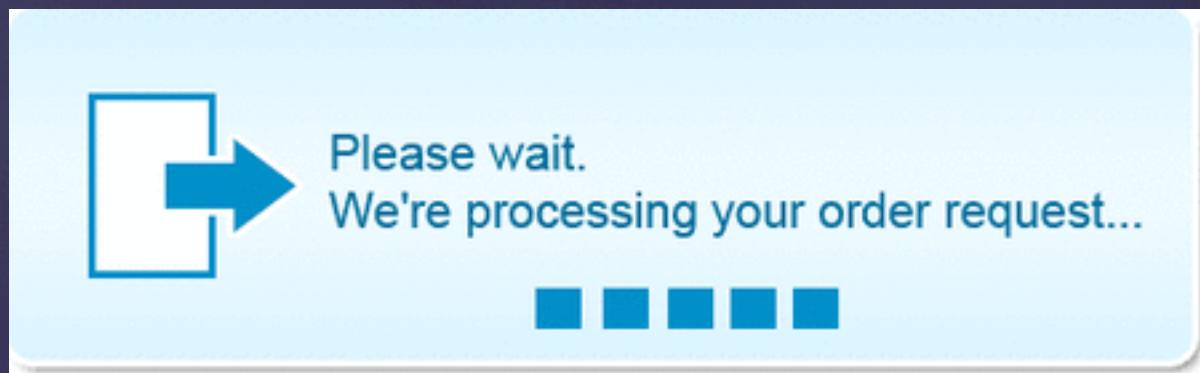
SIP CLIENT

SIP SERVER



Programmable

Behavioral





Self Managed

913



914



Self Managed





Queue Mgmt.

DEPARTURE	CARRIER - FLIGHT- PARTNER		GATE	TIME	STATUS
Detroit	UNITED UA 7982	US 7914	A2	4:45P	Now 6:25P
Detroit	DELTA DL 4089		B72	7:20P	On Time
Frankfurt	UNITED UA 916	LH 9051		5:15P	Canceled
Frankfurt	Lufthansa LH 419	UA 8826	B49	5:45P	Canceled
Frankfurt	Lufthansa LH 419.	UA 8826	B51	5:45P	Canceled
Frankfurt	UNITED UA 952	QR 5798		6:53P	Canceled
Geneva	UNITED UA 974	AC 5960		5:46P	Canceled
Greenville	UNITED UA 7185	QR 5661	A6	5:05P	Departed
Harrisburg PA	UNITED UA 7952	BD 4400	A4	5:05P	Now 6:24P
Hartford-BDL	UNITED UA 312	LH 9076	D23	5:15P	Boarding
Houston	UNITED UA 7595	US 7667	D6	5:18P	Boarding
Indianapolis	SOUTHWEST WN 913		B48	7:25P	Now 7:30P
Jeddah	Saudi Arabian	S 731	A5	8:00P	
Johannesburg	SOUTH AFRICAN SA 208	UA 9818	A14	5:40P	On Time
Johnstown, PA	UNITED UA 7821		A5	5:27P	On Time
Kansas City	DELTA DL 6119		D72		

Active Queue Mgmt.



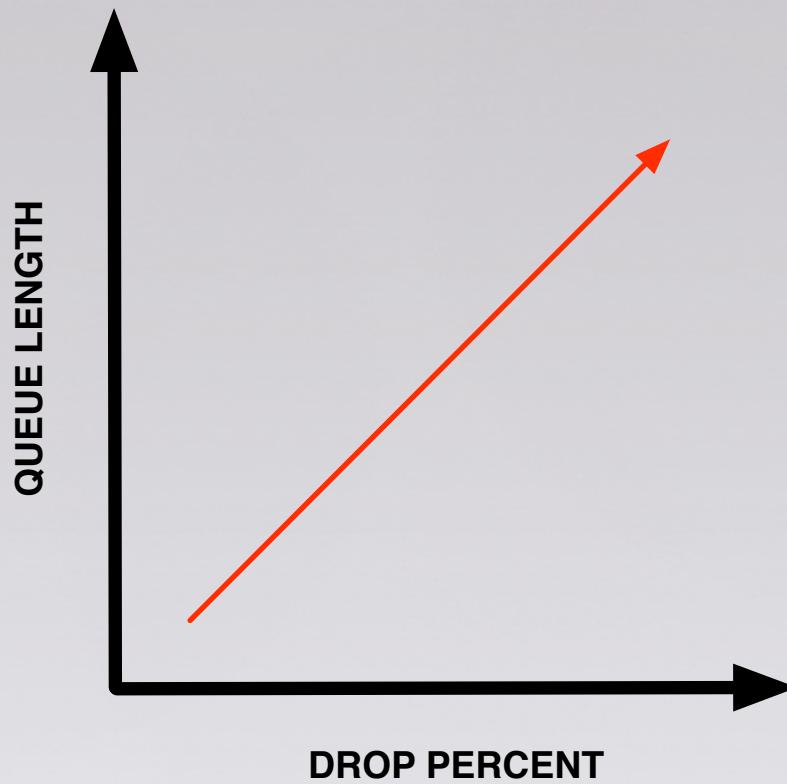
Something's gotta give

Tail Drop

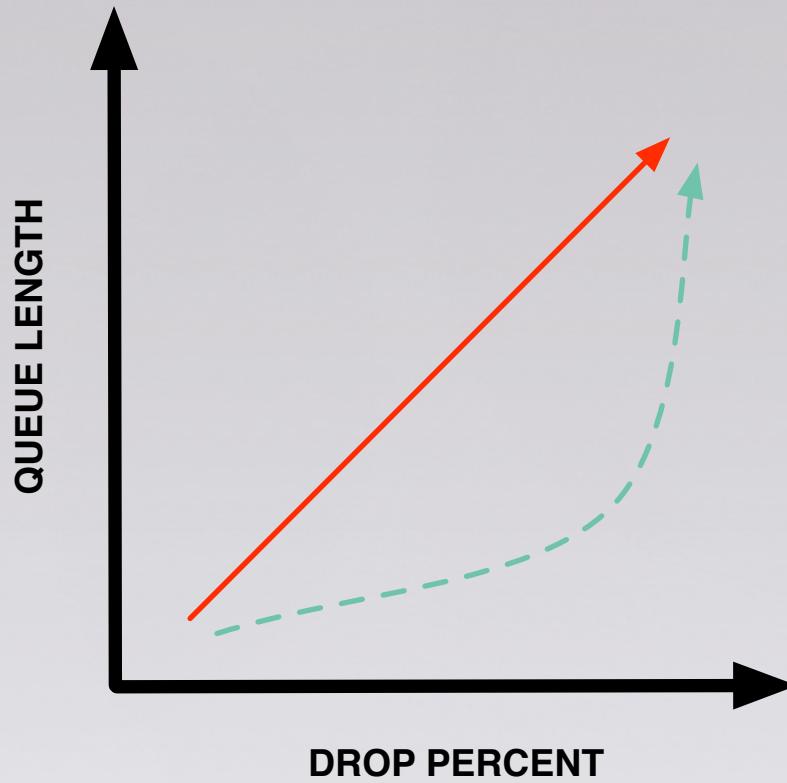
A black and white close-up portrait of a middle-aged man with dark hair and a receding hairline. He has a serious expression, looking directly at the camera. He is wearing a light-colored, vertically striped shirt.

God
(category – TCP/IP)

RED

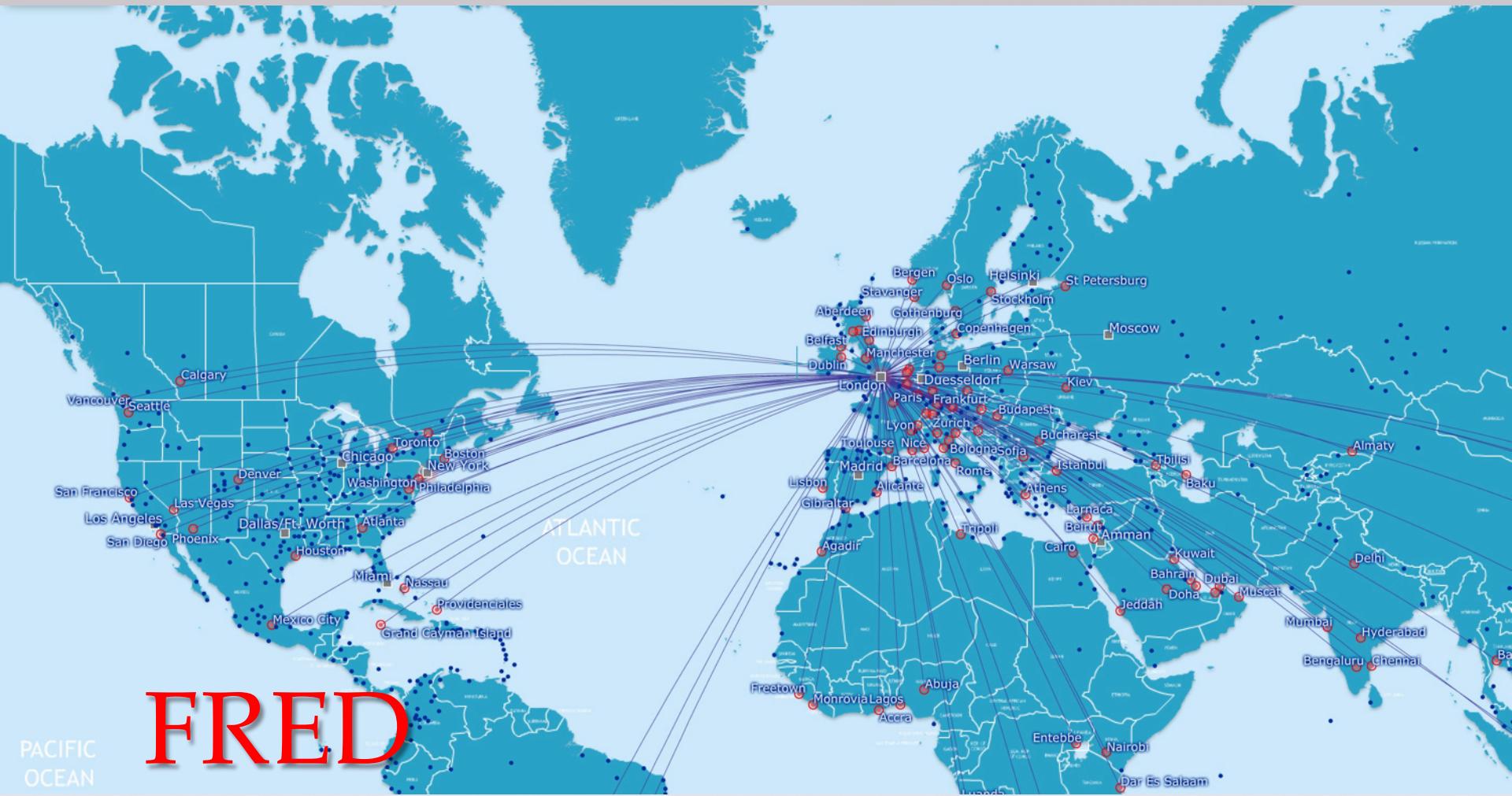


RED





Newark Airport







- SRED
- RRED
- ARED (and Blue!)
- CHOKe

RED – Many many more

& RED in a different Light

Special Mention

& RED in a different Light

& CoDel

Special Mention

What about Testing?

D-UH

What about Testing?

& Black swans will occur. Oh Yes

Bottom Line

- ¶ Black swans will occur. Oh Yes
- ¶ You can only improve what you control

Bottom Line

- ¶ Black swans will occur. Oh Yes
- ¶ You can only improve what you control
- ¶ Your business will define your discards

Bottom Line

- ¶ Black swans will occur. Oh Yes
- ¶ You can only improve what you control
- ¶ Your business will define your discards
- ¶ Agility is (always) your friend

Bottom Line

A close-up photograph of a woman with dark hair, wearing a white collared shirt. She is holding a white telephone receiver to her ear with her left hand. Her right hand is raised to her forehead, with her fingers resting near her brow, suggesting stress or frustration. She has a gold ring on her middle finger and a black watch with a silver-toned rectangular face on her left wrist. The background is dark and out of focus.

You, apparently, forgot
about me

The Fix

& Free calling



The Fix

- Free calling
- No VM



The Fix

- Free calling
- No VM
- No reporting



The Fix

- Free calling
- No VM
- No reporting
- Reject (most) APIs





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