

# Drinking from the Firehose

Mahesh Paolini-Subramanya (@dieswaytoofast)  
V.P. R&D, Ubiquiti Networks

Drinking from the Firehose

# Drinking from the Firehose

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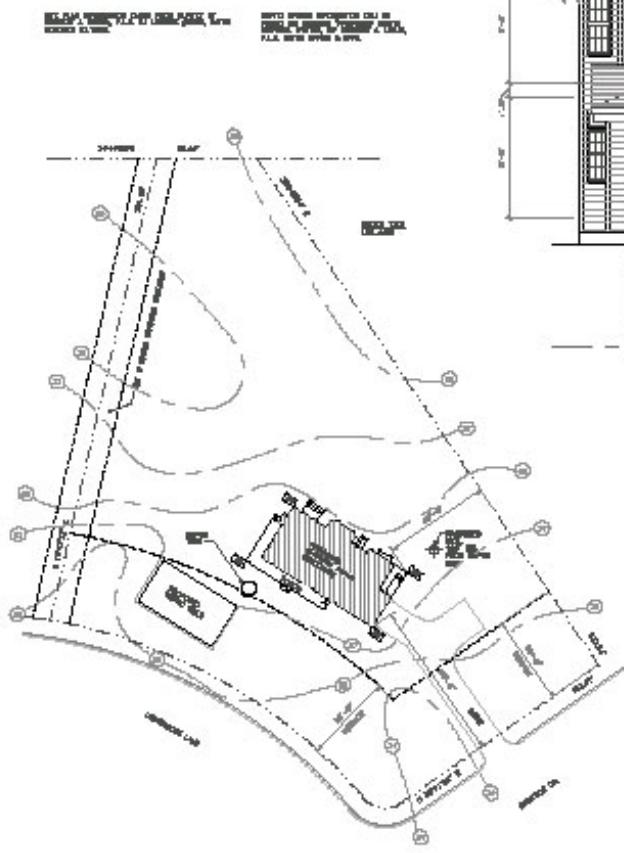
Aka: “Scale Matters”



UBIQUITI®  
NETWORKS

**BUILDING DATA**

USE GROUP A-3  
CONSTRUCTION CLASS SB  
AREA:  
FIRST FLOOR 1880 SF  
SECOND FLOOR 1800 SF  
TOTAL 3680 SF  
GARAGE 440 SF



SITE PLAN  
1'=30'-0"



RIGHT SIDE ELEVATION  
SCALE: 1/4"=1'-0"



LEFT SIDE ELEVATION  
SCALE: 1/4"=1'-0"

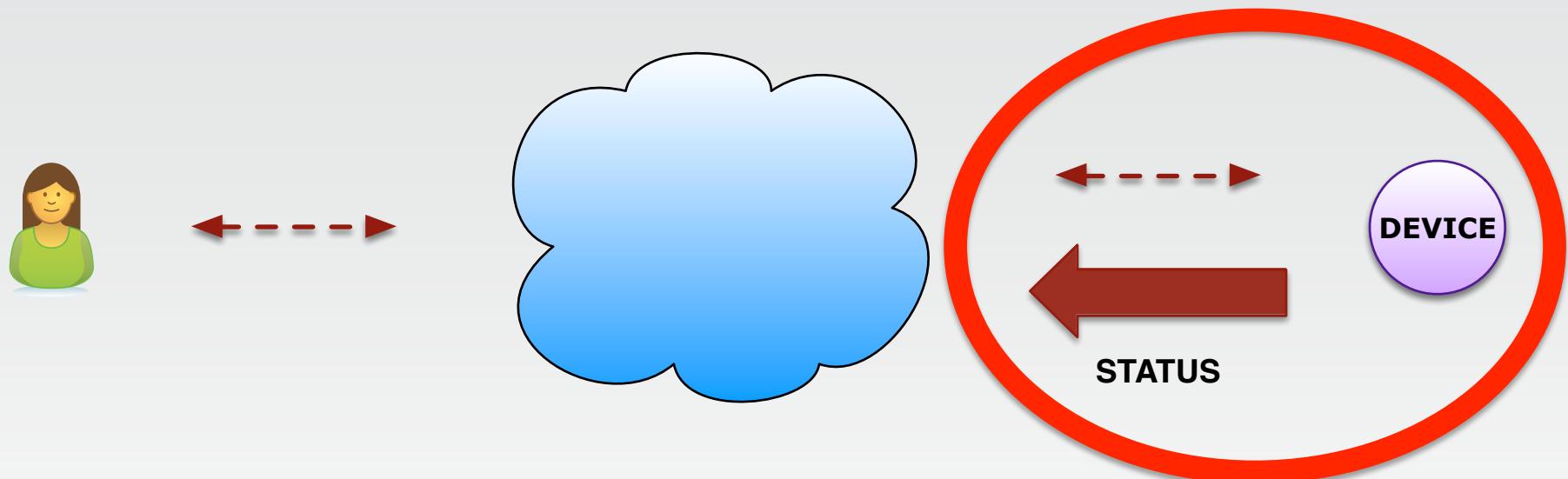
# ARCHITECTURE



# ARCHITECTURE



# Scale-Fail



Drinking from the Firehose

# Data Stores

# Data Stores

- State of the World

# Data Stores

- State of the World
- Historical Data

# Data Stores

- State of the World
- Historical Data
- Configurations

# Data Stores

- State of the World
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- Billing

ONE-SIZE FITS ALL

STORE

SALE

can fit





# Fault Tolerance

*From [http://www.erlang.org/download/armstrong\\_thesis\\_2003.pdf](http://www.erlang.org/download/armstrong_thesis_2003.pdf)*

Drinking from the Firehose

## Concurrency

# The Big Six

*From [http://www.erlang.org/download/armstrong\\_thesis\\_2003.pdf](http://www.erlang.org/download/armstrong_thesis_2003.pdf)*

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## Concurrency

### Fault detection

# The Big Six

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Fault detection

Fault Identification

# The Big Six

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```
20 my_chores(Food) ->
21     {ok, _Status} = feed_cat(Food).
22
23 feed_cat(oatmeal) -> {error, unhappy};
24 feed_cat(soap) -> {error, hairballs};
25 feed_cat(science_diet) -> {ok, purring};
26 feed_cat(_) -> {error, scratched_arms}.
~-
```

```
(prompt) 1> my_chores(oatmeal).
```

\*\* exception error: no match of right hand side value {error,unhappy}

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To Seal

RESEALABLE - Keeps Product Fresh!

New  
Advanced  
Formula

U.S. Veterinarians' #1 Choice  
to Feed Their Own Pets™



**SCIENCE DIET**

VETERINARIAN  
RECOMMENDED

CLINICALLY  
**PROVEN**  
—ANTIOXIDANTS—  
FOR A HEALTHY IMMUNE SYSTEM

100%  
GUARANTEED

High Quality Ingredients  
A Balanced Nutrition  
With Vitamins  
On Your MONEY BACK



Supports healthy kidney & vital organ function



Promotes lean muscle & ideal body weight



Easy to digest



Adult  
1-6 years

**Optimal Care™**  
**Original**

DRY CAT FOOD

Proactively balanced nutrition to maintain  
vital organ health and lean muscle



NET WT 8 lb (3.63 kg)

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To Top

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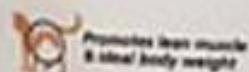
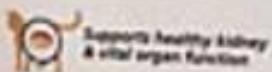
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# The Fault Tolerant System

Drinking from the Firehose

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**loosely-coupling**

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Drinking from the Firehose

# Loose Coupling

Drinking from the Firehose

Breeds Trust

Loose Coupling

WALLY, IS  
THERE ANY  
DIFFERENCE  
BETWEEN  
TRUST AND  
STUPIDITY?

HOLD  
THAT  
THOUGHT.  
I'LL BE  
RIGHT  
BACK.



Dilbert.com DilbertCartoonist@gmail.com



11-15-11 © 2011 Scott Adams, Inc. Dist. by Universal Uclick

OH.  
—

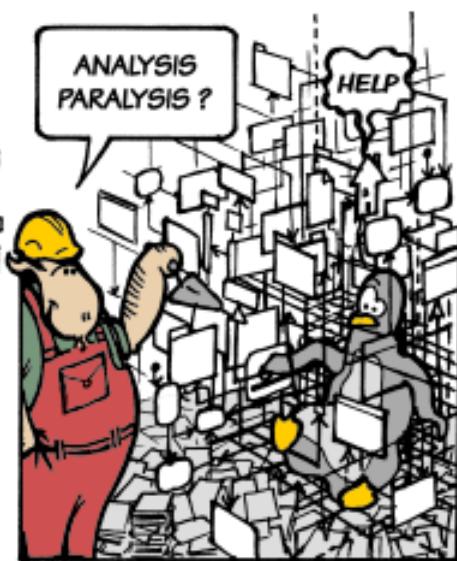
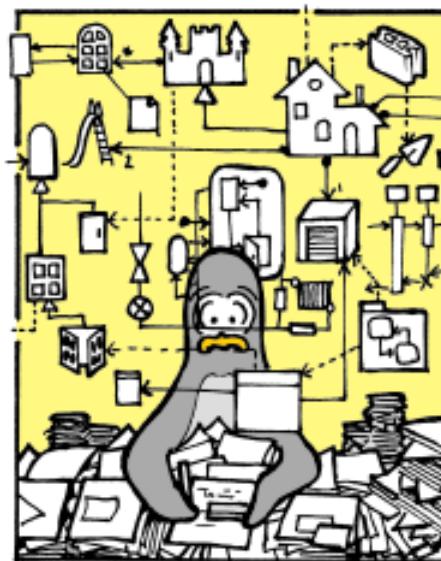
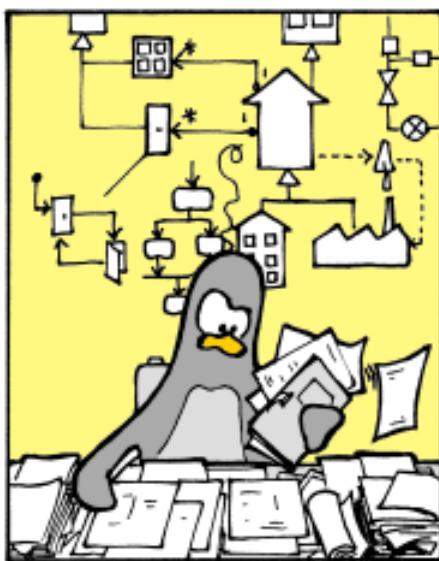


Drinking from the Firehose

Breeds Trust

Devotes Brainpower appropriately

Loose Coupling



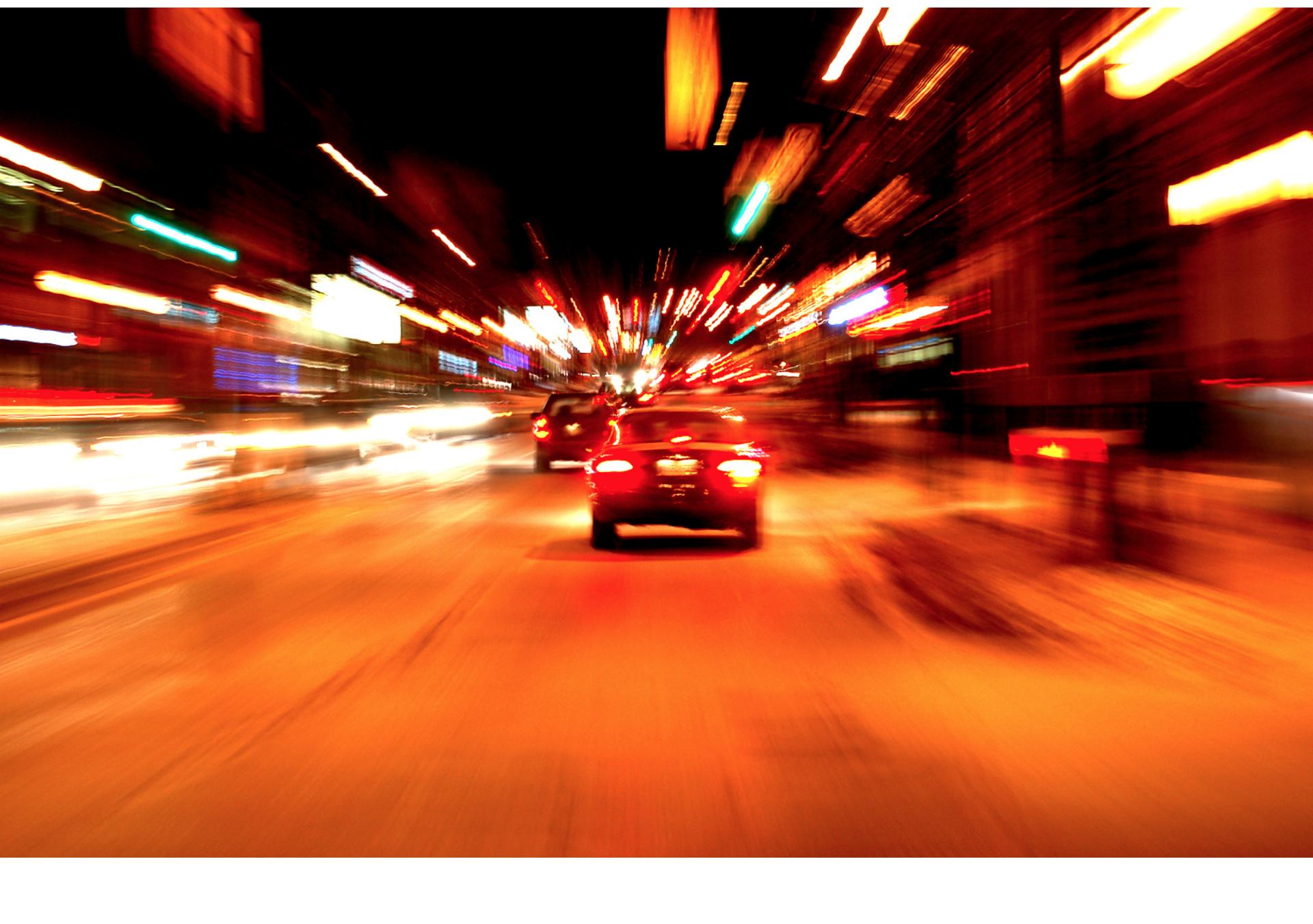
Drinking from the Firehose

Breeds Trust

Devotes Brainpower appropriately

Minimizes bugs

Loose Coupling



60 - 90% of all SW projects fail

10 – 25% of all SW projects get abandoned

## Fault Tolerance

I'M  
SIGNIFICANT!



SCREAMED THE  
DUST SPECK.



## Concurrency

Fault detection

Fault Identification

Error Encapsulation

Code upgrade

Stable Storage

The Big Six - Systems

## Concurrency

Fault detection

Fault Identification

Error Error Recovery

Code Upgrade

Scalable Storage

The Big Six - Systems

**MONITORING**

Drinking from the Firehose

Monitoring?

DRIVER DOOR  
OPEN

19°C

60

40

20

KM/H

100

120

140  
160



N

3557

T2 189.1



3

2

X10XW

4

ECO

READY







BE DIFFERENT

Concurrency

Fault detection

Fault Identification

Error Encapsulation

Code upgrade

Stable Storage

The Big Six Systems

# Polyglot Persistence

The Big Six Systems

Stable Storage

Code upgrade

Encapsulation

Fault isolation

Durability detection

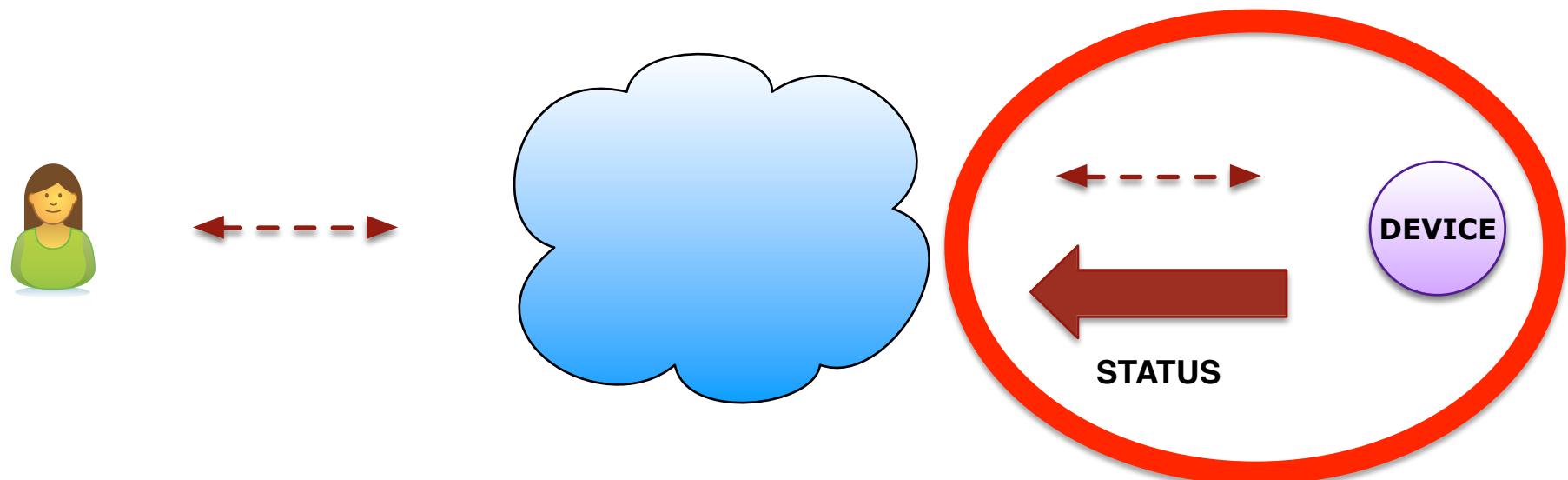
Concurrency



Drinking from the Firehose

# Polyglot Persistence

# Scale-Fail



# Data Stores

- State of the World
- Historical Data
- Configurations
- Billing

# Data Stores

- State of the World

# Data Stores

- State of the World ← **ElasticSearch**

# Data Stores

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- Historical Data

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- State of the World ← **ElasticSearch**
- Historical Data ← **Cassandra**

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- State of the World ← **ElasticSearch**
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Source: Wholly unscientific research by me.

# Data Stores

- State of the World ← **ElasticSearch**
- Historical Data ← **Cassandra**
- Configurations ← **Riak**

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Polyglot Persistence

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LOOSE COUPLING

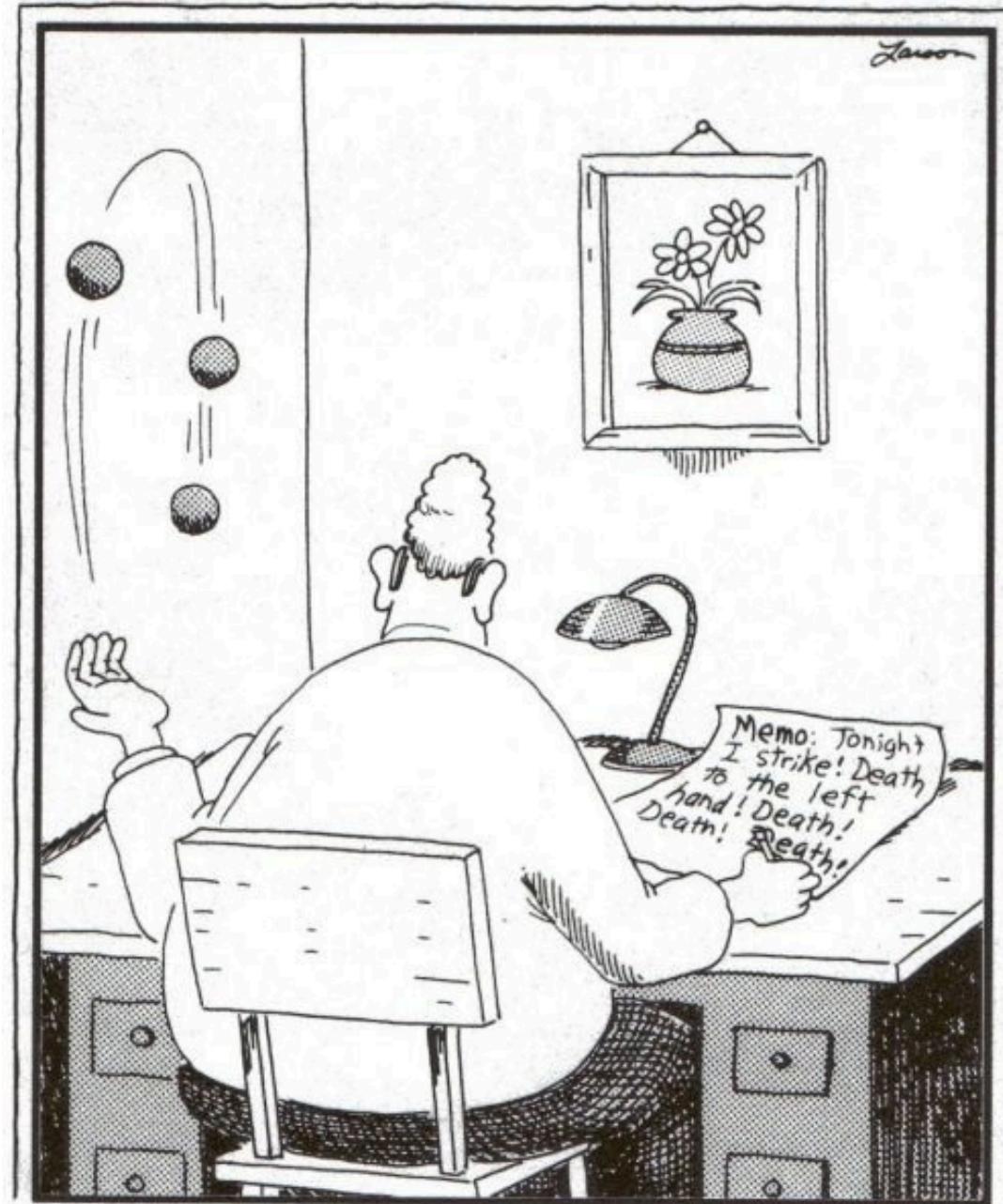
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MONITORING







Innocent and carefree, Stuart's left hand didn't know what the right was doing.

# Split Brain

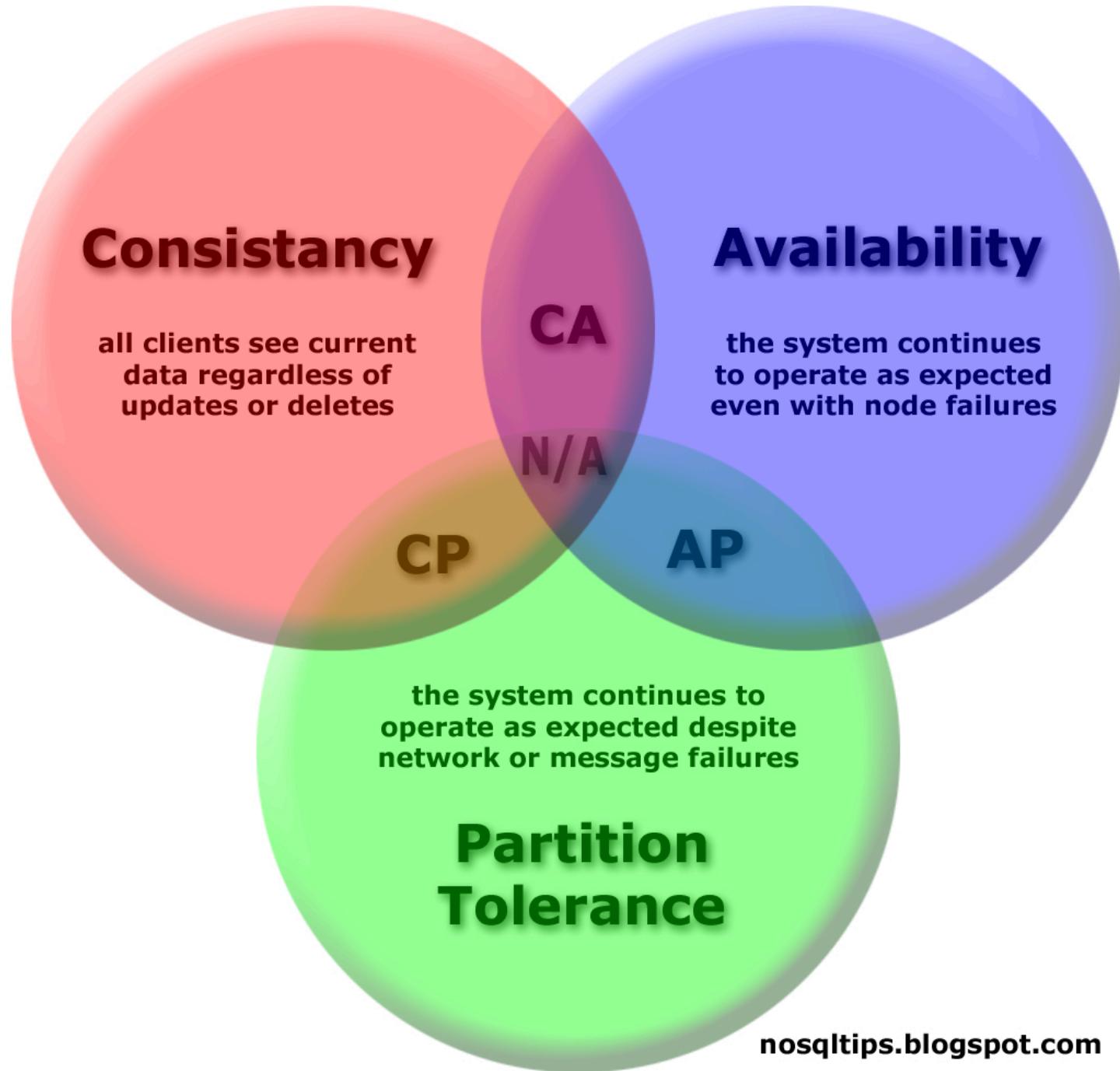
- Its ubiquitous (thanks [aphyr](#))

# Split Brain

- Its ubiquitous (thanks [aphyr](#))
- Zookeeper doesn't necessarily help

# Split Brain

- Its ubiquitous (thanks [aphyr](#))
- Zookeeper doesn't necessarily help
- Moving the problem around doesn't necessarily help





# Cheating

- Stale status messages are OK

# Cheating

- Stale status messages are OK
- Charts can miss data

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- Stale status messages are OK
- Charts can miss data
- Billing is sharded

# Cheating

- Stale status messages are OK
- Charts can miss data
- Billing is sharded
- Availability zones (google.co.uk)

## Scaling

~~POINTES~~ IS  
THE ART OF  
COMPROMISE.



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