BOWERBIRDS OF TECHNOLOGY

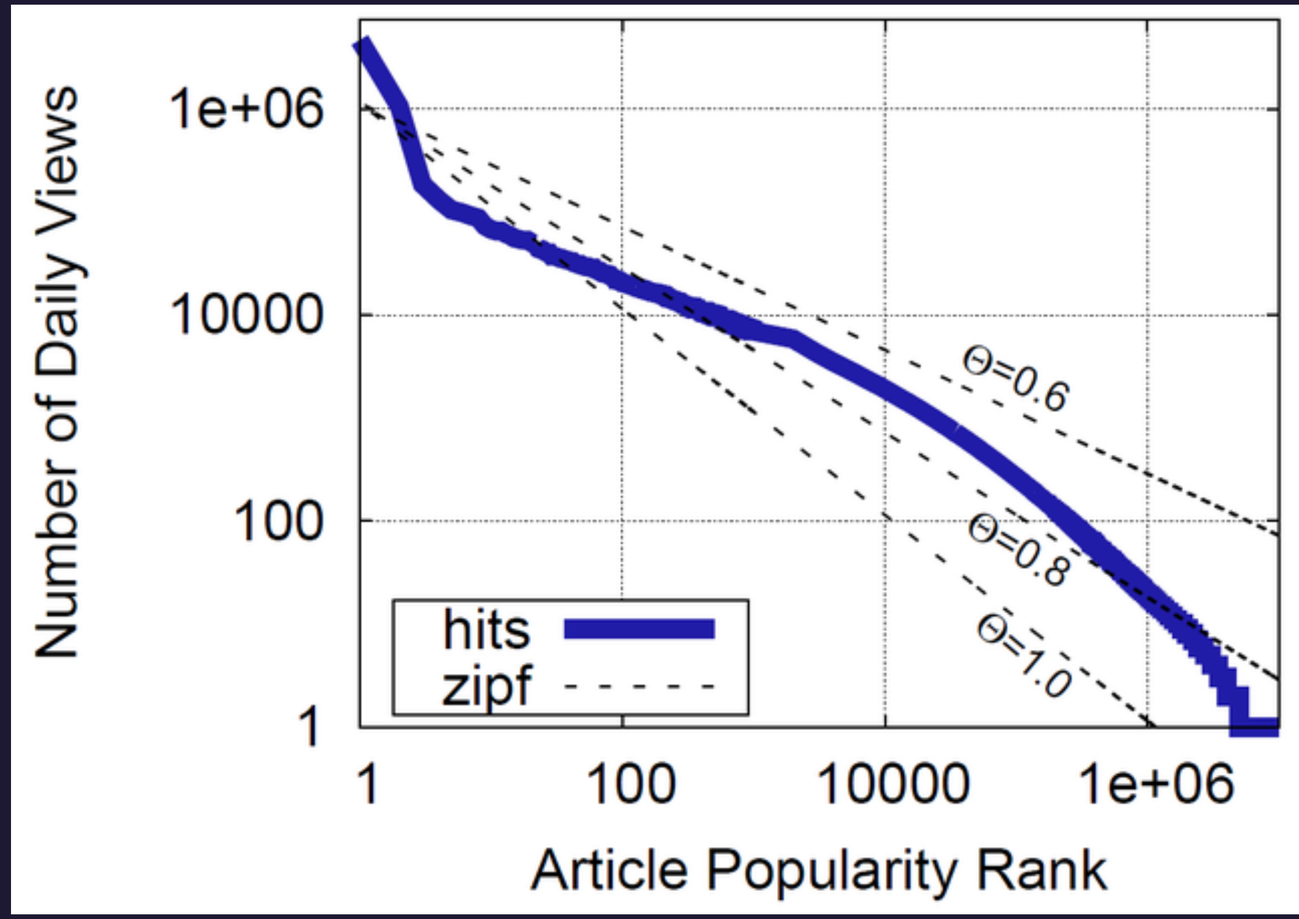
PYCON 2018

SAM KITAJIMA-KIMBREL @SKIMBREL

"Most websites aren't in the top 100 web sites."

CAL HENDERSON, DJANGOCON US 2008

ZIPF DISTRIBUTION



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YOU ARE NOT GOOGLE,
AND THAT'S OKAY!

I AM ALSO NOT GOOGLE

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WHAT ARE GOOGLE'S PROBLEMS?

ABSURDLY HIGH THROUGHPUT AND STORAGE DEMANDS

TENS OF THOUSANDS OF SERVERS
HUNDREDS OF DATACENTERS

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THOUSANDS OF DEVS

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(NEAR-)UNLIMITED RESOURCES

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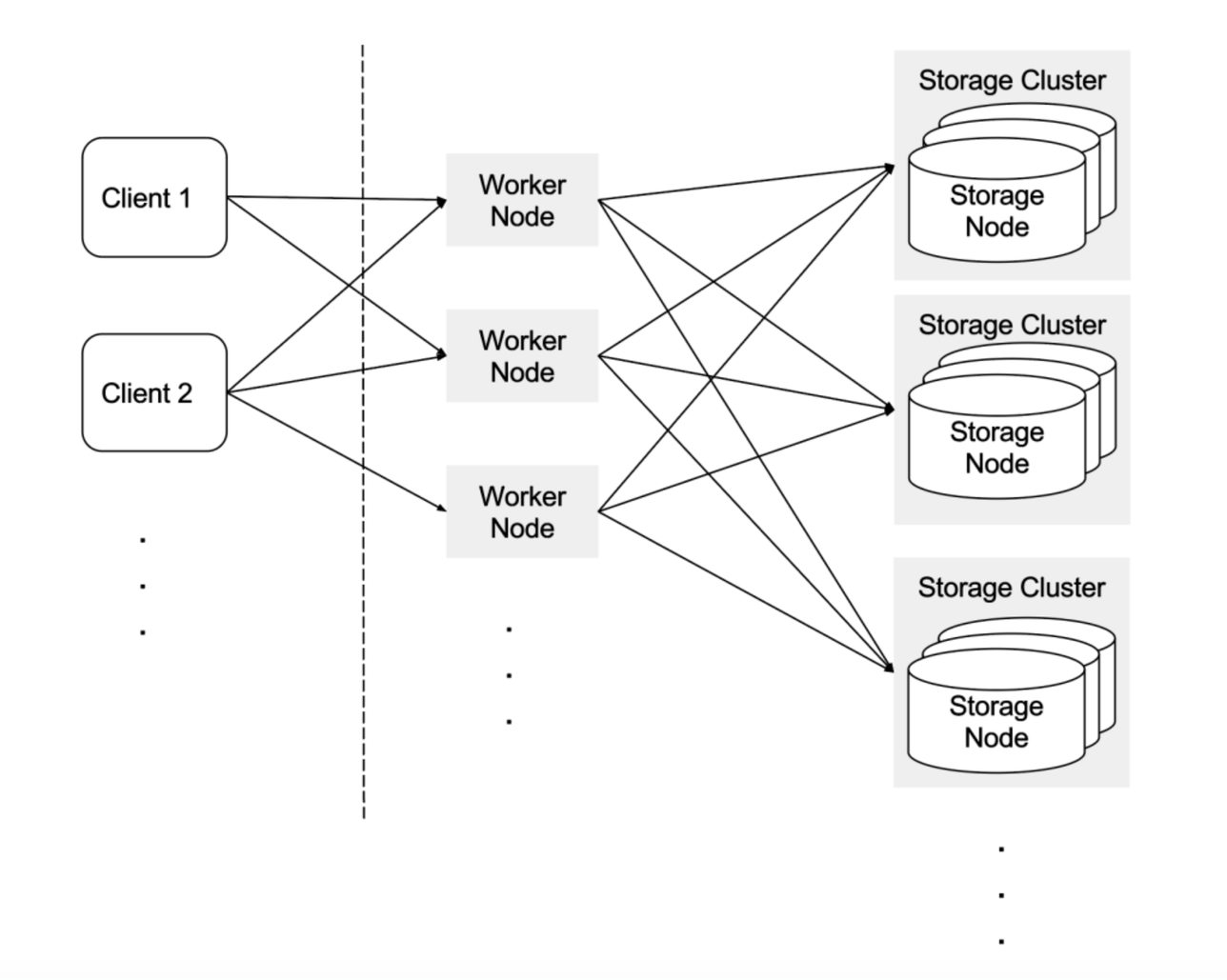
CASE STUDIES

UBER SCHEMALESS*

*INVOKING UBER AS A TECHNOLOGICAL EXAMPLE DOES NOT CONSTITUTE AN ENDORSEMENT OF UBER'S BUSINESS STRATEGY, ETHICS, OR CULTURE



"LINEARLY ADD CAPACITY
BY ADDING MORE SERVERS"

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"FAVOR WRITE AVAILABILITY OVER READ-YOUR-WRITE SEMANTICS"

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EVENT NOTIFICATIONS (TRIGGERS)

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WHAT IS IT, THEN?

"APPEND-ONLY SPARSE THREE-DIMENSIONAL PERSISTENT HASH MAP, VERY SIMILAR TO GOOGLE'S BIGTABLE"

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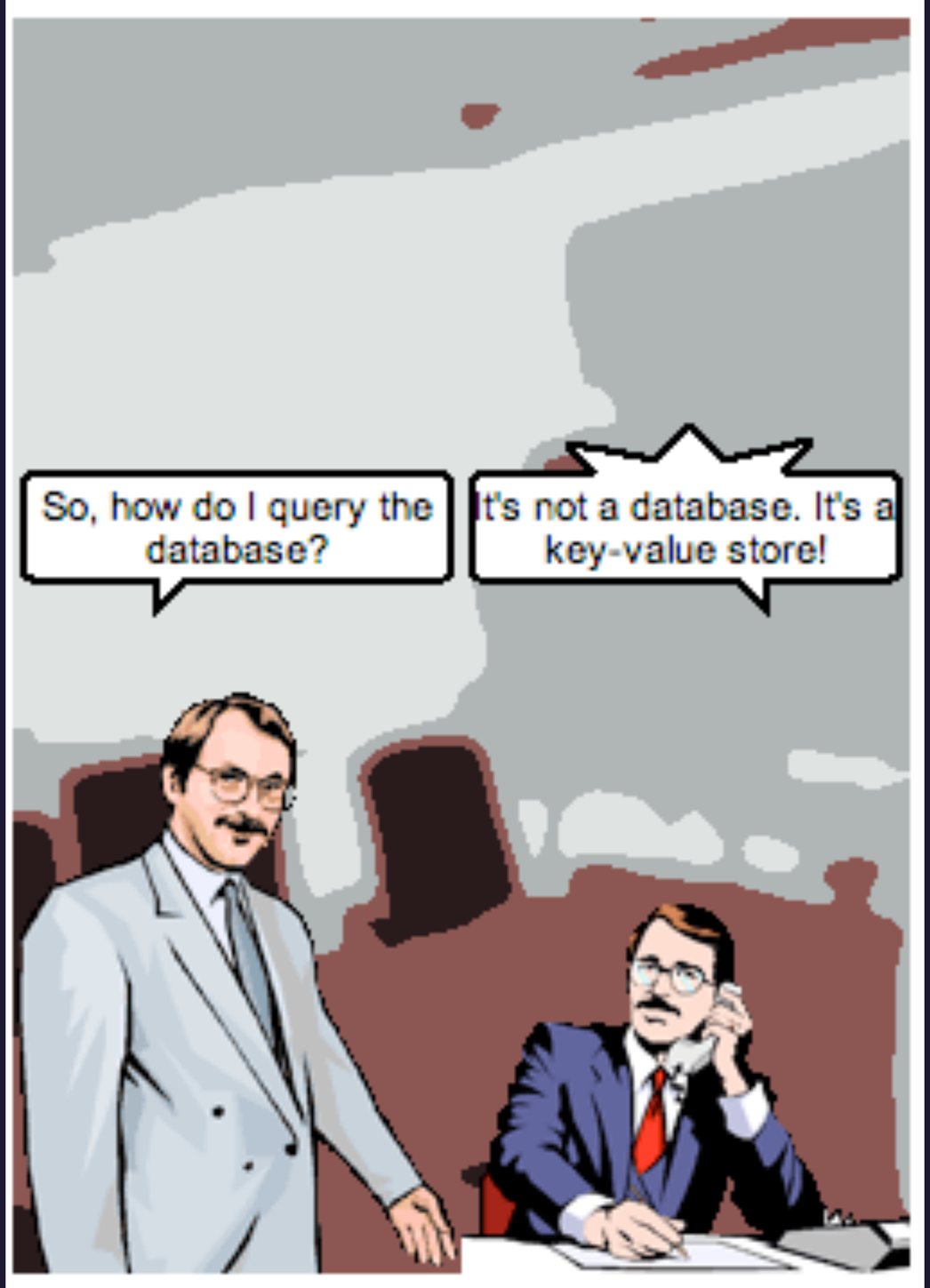
Fault-tolerance

"So, how do I query the database?"

"It's not a database. It's a key-value store!"



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"Ok, it's not a database. How do I query it?"

"You write a distributed map reduce function in Erlang!"

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"Did you just tell me to go **** myself?"

"I believe I did, Bob."

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THIS HAS A COST

NEW ABSTRACTIONS

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EVENTUAL CONSISTENCY

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FLEXIBLE QUERIES

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DEVELOPER FAMILIARITY

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AMAZON AND SERVICE ARCHITECTURE

"All teams will henceforth expose their data and functionality through service interfaces."

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"Teams must communicate with each other through these interfaces."

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"There will be no other form of interprocess communication allowed [...]the only communication allowed is via service interface calls over the network."

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"It doesn't matter what technology they use. HTTP, Corba, Pubsub, custom protocols – doesn't matter."

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"All service interfaces, without exception, must be designed from the ground up to be externalizable."

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"Anyone who doesn't do this will be fired."

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AMAZON LEARNED SOME THINGS

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"pager escalation gets way harder, because a ticket might bounce through 20 service calls before the real owner is identified"

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"every single one of your peer teams suddenly becomes a potential DOS attacker"

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"monitoring and QA are the same thing…"

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"…the only thing still functioning in the server is the little component that knows how to say 'I'm fine, roger roger, over and out' in a cheery droid voice"

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"you won't be able to find any of them without a service-discovery mechanism [...] which is itself another service"

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MASSIVELY SCALABLE
INFRASTRUCTURE
COSTS DEVELOPER TIME

BUT I WANT TO BE
GOOGLE!

GOOGLE WASN'T GOOGLE OVERNIGHT...

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"When I joined Google, it would take us about a month to crawl and build an index of about 50 million pages."

BEN GOMES

(HTTP://READWRITE.COM/2012/02/29/INTERVIEW_CHANGING_ENGINES_MID-FLIGHT_QA_WITH_GOOG/)

AND SOMETIMES
STILL IS NOT GOOGLE.

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"BORING" TECH CAN GO REALLY FAR

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EXPONENTIAL GROWTH FEELS SLOW AT FIRST

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ITERATE
ITERATE
ITERATE

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OK, I'M NOT GOOGLE (YET)
.... SO WHAT?

USER TRUST ABOVE ALL ELSE

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FAST, SAFE ITERATION

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HEALTHY TEAMS

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INCLUSIVE TEAMS

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LET'S BE BOWERBIRDS!

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BE A PICKY BIRD

PROJECT MATURITY

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MAINTAINERSHIP

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SECURITY

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STABILITY

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PROJECT ECOSYSTEM

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"OUT OF THE BOX"

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DOCUMENTATION

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SUPPORT AND CONSULTANTS

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LICENSING LANDMINES

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BUY VS BUILD

WHAT WOULD IT COST TO BUILD IT?

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HOW LONG WOULD IT TAKE?

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HOW HARD IS IT TO REPLACE?

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RELATIONSHIPS

TEAMS

SUSTAINABLE ON-CALL

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168 HOURS ÷
40 HOUR WORK WEEK =
4.2 PEOPLE

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168 HOURS ÷
40 HOUR WORK WEEK =
~~4.2~~ 5 PEOPLE

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168 HOURS ÷
40 HOUR WORK WEEK =
~~4.2~~ ~~5~~ 6 PEOPLE

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EMPOWERMENT AND AUTOMATION

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APPROPRIATE AVAILABILITY AND SCALABILITY

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99% UPTIME?

3.65 days/year

7.2 hours/month

1.68 hours/week

14.4 minutes/day

THREE NINES

8.76 hours/year

43.8 minutes/month

10.1 minutes/week

1.44 minutes/day

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FOUR NINES?

52.56 minutes/year

1.01 minutes/week

8.64 seconds/day

FIVE?!

5.26 minutes/year

DO YOU NEED THAT SLA?

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HEALTHY TEAMS

PSYCHOLOGICAL SAFETY

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INCLUSIVITY,
NOT JUST DIVERSITY

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SET GROUND RULES

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ADDRESS BIAS

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RETAIN AND PROMOTE

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GET PROFESSIONAL ASSISTANCE

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SUMMARY: HUMANS FIRST

HAPPY USERS

CUSTOMER EMPATHY

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KNOW YOUR USER TECH BASE

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KNOW YOUR IMPACT

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SET EXPECTATIONS

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DEGRADE GRACEFULLY

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(OVER)COMMUNICATE

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"we were unable to update the individual services' status on the AWS Service Health Dashboard (SHD) because of a dependency the SHD administration console has on Amazon S3"

AMAZON

(HTTPS://AWS.AMAZON.COM/MESSAGE/41926/)

GITLAB DATABASE FAILURE

HTTPS://ABOUT.GITLAB.COM/2017/02/10/POSTMORTEM-OF-DATABASE-OUTAGE-OF-JANUARY-31/

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(OVER)COMMUNICATE

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MEASURE SUPPORT PERFORMANCE

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DISASTER RECOVERY

IDENTIFY FAULT DOMAINS

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FAULT TOLERANCE HAS COSTS

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PRACTICE

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SECURITY

OWASP

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KNOW YOUR THREAT MODEL

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DON'T CHECK CREDENTIALS INTO GIT

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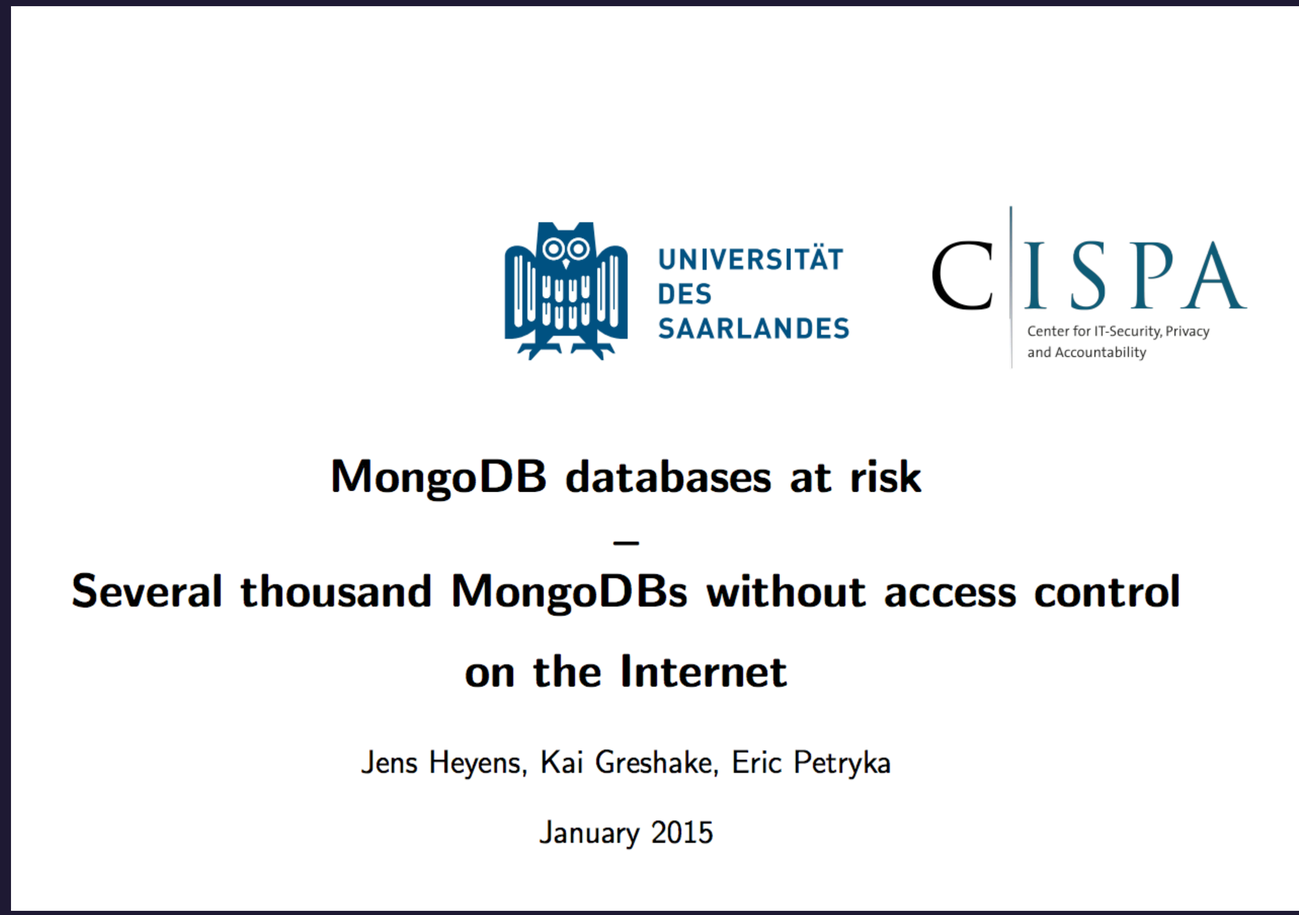
AND DON'T DO THIS



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COMMUNICATE (AGAIN)

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HAPPY BOWER-BUILDING!

FURTHER READING

https://samkimbrel.com/posts/bowerbirds.html

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