# design patterns & modularity in the npm registry

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# @ceejbot

# human brains are pattern-detection machines

the process of writing software is abstraction & pattern extraction

# patterns in code
# patterns in systems

# emergent patterns in npm's registry

Let's analyze them not just for how they scale

but how they promote modularity

# registry?

**registry**, *n*: the system of services that manage **package** tar archives + metadata

# 361,263 packages

# 2,278,817 million tarballs

# medium data (fits on 1 disk)

# npm's largest engineering project & its most obvious scaling challenge

monoliths
microservices
transaction logs
message queues

# monoliths:

## everything in one big process

# monoliths are okay
# easy to write & change
# perf more than good enough

# when you scale perf & team size monoliths are less okay

it's easy to write highly-coupled code
inside a non-modular monolith

# modularity: let's be less vague

Q: where does modularity come from?

A: information hiding

"On the Criteria To Be Used in Decomposing Systems into Modules"

— D. L. Parnas, 1972

# information

## data, its structures, the algorithms

**hide** info behind an interface

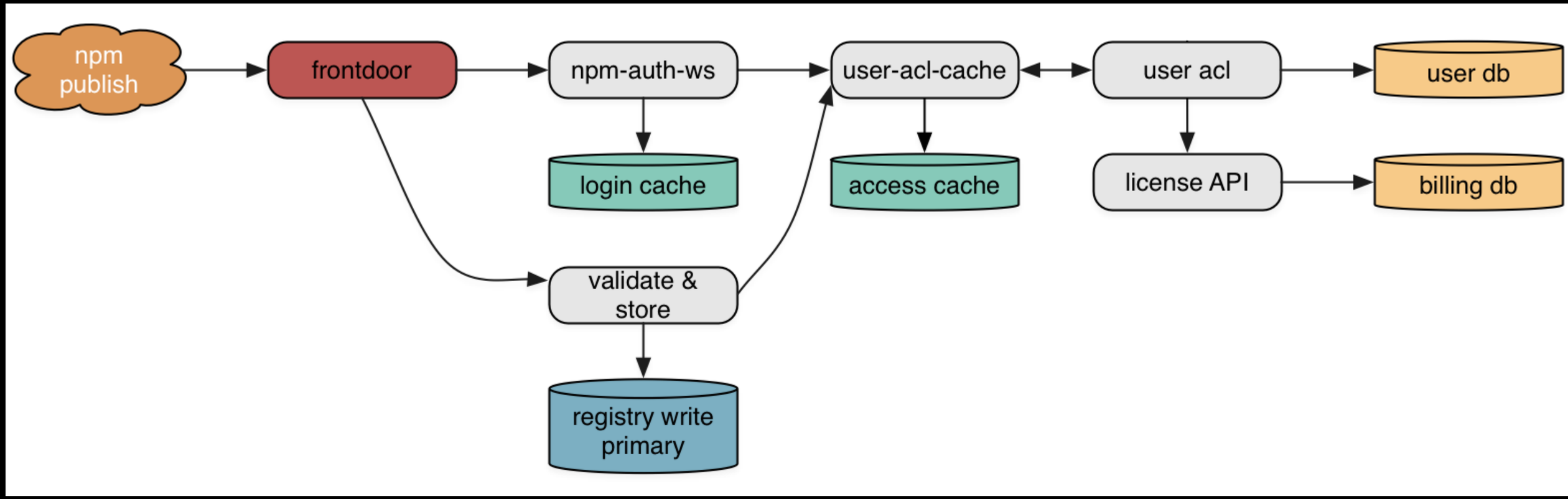
so you can **change** it

the hot trend is rewriting monoliths as microservices

you're forced to design an API
& put implementation inside a service

microservices can still
mess up modularity

can scatter a task across services
making retries & failure hard to cope with


npm publish
frontdoor
npm-auth-ws
user-acl-cache
user acl
user db
login cache
access cache
license API
billing db
validate & store
registry write primary

auth sets up package access on a publish

# as a side effect

what happens if a service crashes?
or if validation rejects a publish?


No, YOU Relax!

after publication, it's a different pattern:

# the transaction log

transaction log

write-ahead log (WAL)

commit log

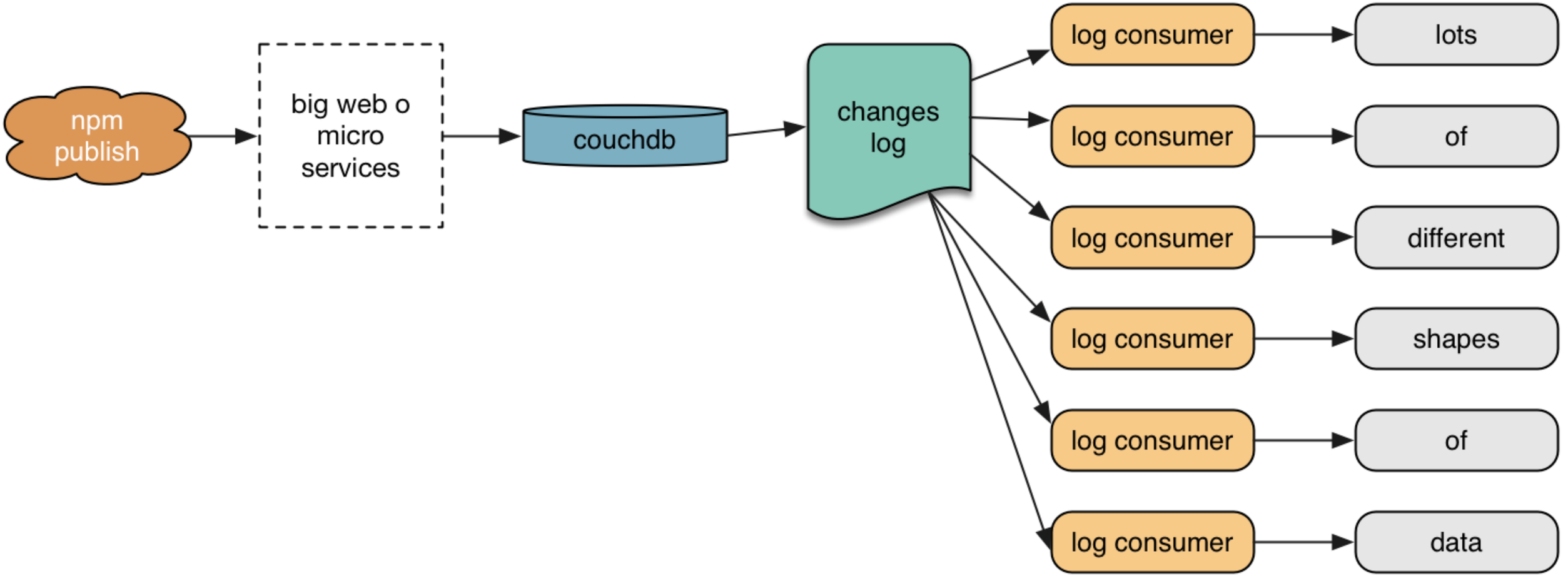
# The Log: What every software engineer should know about real-time data's unifying abstraction

# couchdb's super power

# the changes feed

# registry followers:

## consumers of couchdb's commit logs


npm
publish
big web o
micro
services
couchdb
changes
log
log consumer
log consumer
log consumer
log consumer
log consumer
log consumer
lots
of
different
shapes
of
data

→ distribute **tarballs**

→ invalidate our **CDN**'s cache

→ populate **postgresdb** to drive the website

→ index data in **ElasticSearch**

→ scan packages for **security leaks**

→ populate our registry **mirror**

→ fire **webhooks**

each log consumer does

one thing well

**Estragon:** Let's fix publication.

**Vladimir:** Fine. But how?

# message queues

# message queues
# inversion of control

**workers** consume messages & retry or unwind on failure

# a worker does one thing

puts a new message back into the queue

# you scale by adding more workers

queue has to be reliable

workers can crash

# http://queues.io

# queue disadvantages?

## we don't have them in production

# so ∞ disadvantages!

what's the pattern that emerges from this discussion of patterns?

# there is no silver bullet

# it's tradeoffs all the way down

what problem are you solving?
what tools do you have to hand?
what is your team experienced with?

you'll need to fight for **modularity**

no matter what you pick

make your users happy first
because that's the hard part

but know that you can

change your systems

# we'll be changing ours

## check back next year to hear how it turned out


You will see me again!