PAT HELLAND AND ME

HOW TO BUILD STATEFUL DISTRIBUTED APPLICATIONS THAT CAN SCALE ALMOST INFINITELY

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AND ME

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DATABASES

APPARENTLY, I LIKE TO STICK THEM IN THINGS…

SOME AXIOMS…

TO SCALE INFINITELY,
WE HAVE TO SCALE HORIZONTALLY

TO SCALE INFINITELY,
WE MUST AVOID COORDINATION

DISTRIBUTED TRANSACTIONS ARE A FORM OF COORDINATION

THEREFORE…
TO SCALE INFINITELY,
WE CAN’T USE TRANSACTIONS

WELCOME TO DISTRIBUTED SYSTEMS!

O, BY THE WAY, ALL THE RULES HAVE CHANGED

WHAT IS SCALING?

MORE AND MORE THINGS

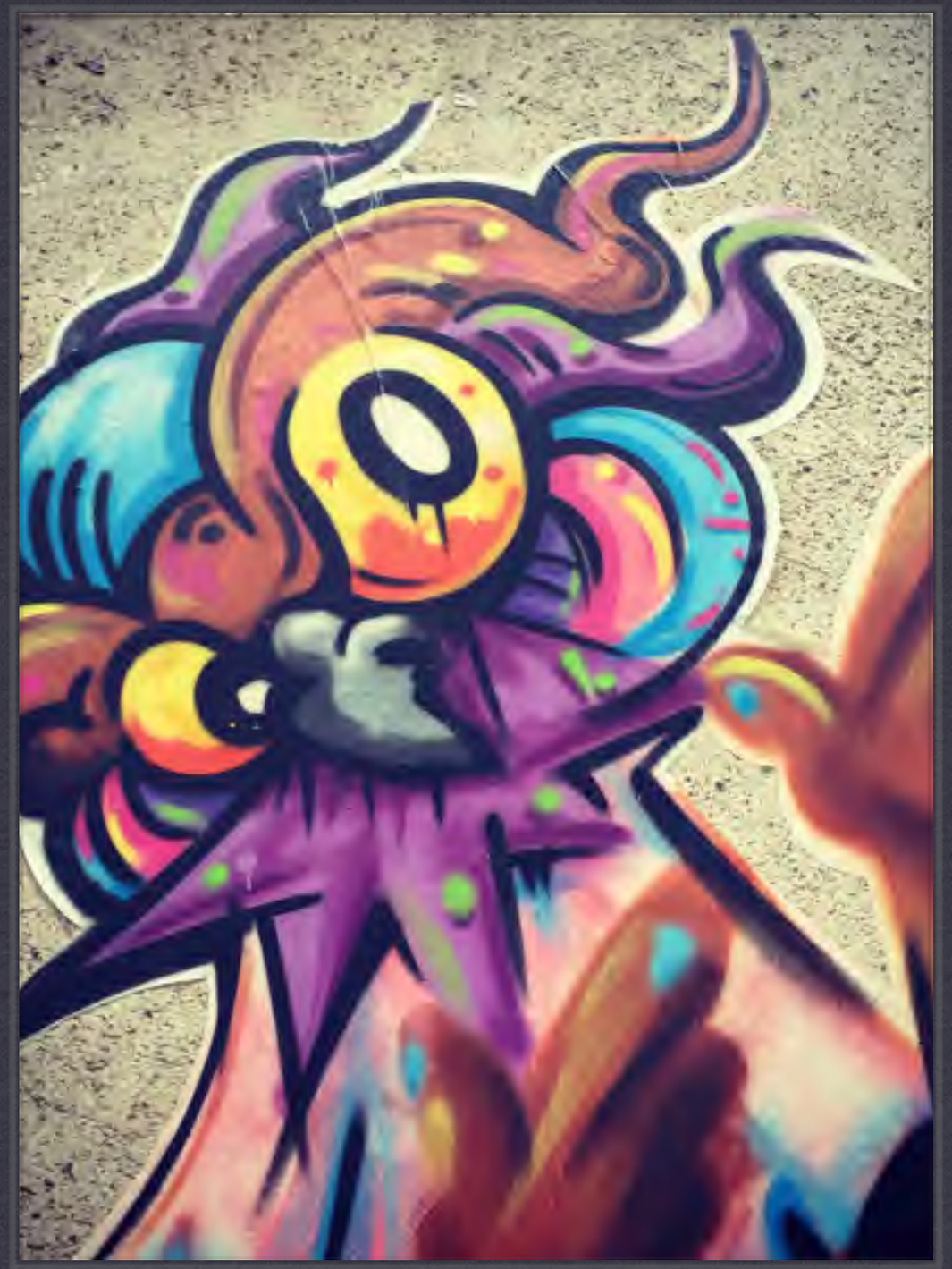
BUT, THEY DON'T GET BIGGER. THERE'S JUST…

MORE OF THEM. LOTS MORE.

WE SCALE ENTITIES

ENTITIES:

LIVE ON A SINGLE MACHINE AND ARE MANIPULATED INDIVIDUALLY



WHAT IS AN ENTITY?

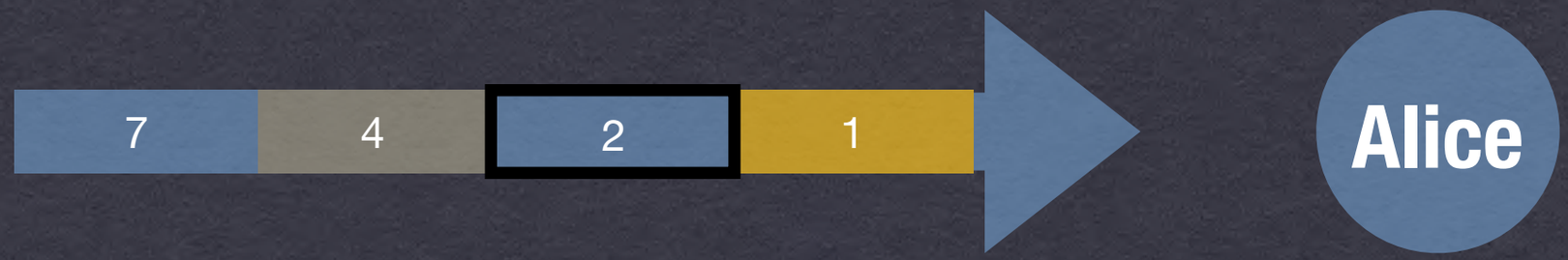
ENTITIES ARE BOUNDARIES OF ATOMICITY


7
4
2
1
Alice


8
6
5
3
Bob


7
4
2
1
Alice


8
6
5
3
Bob


7
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Alice


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7
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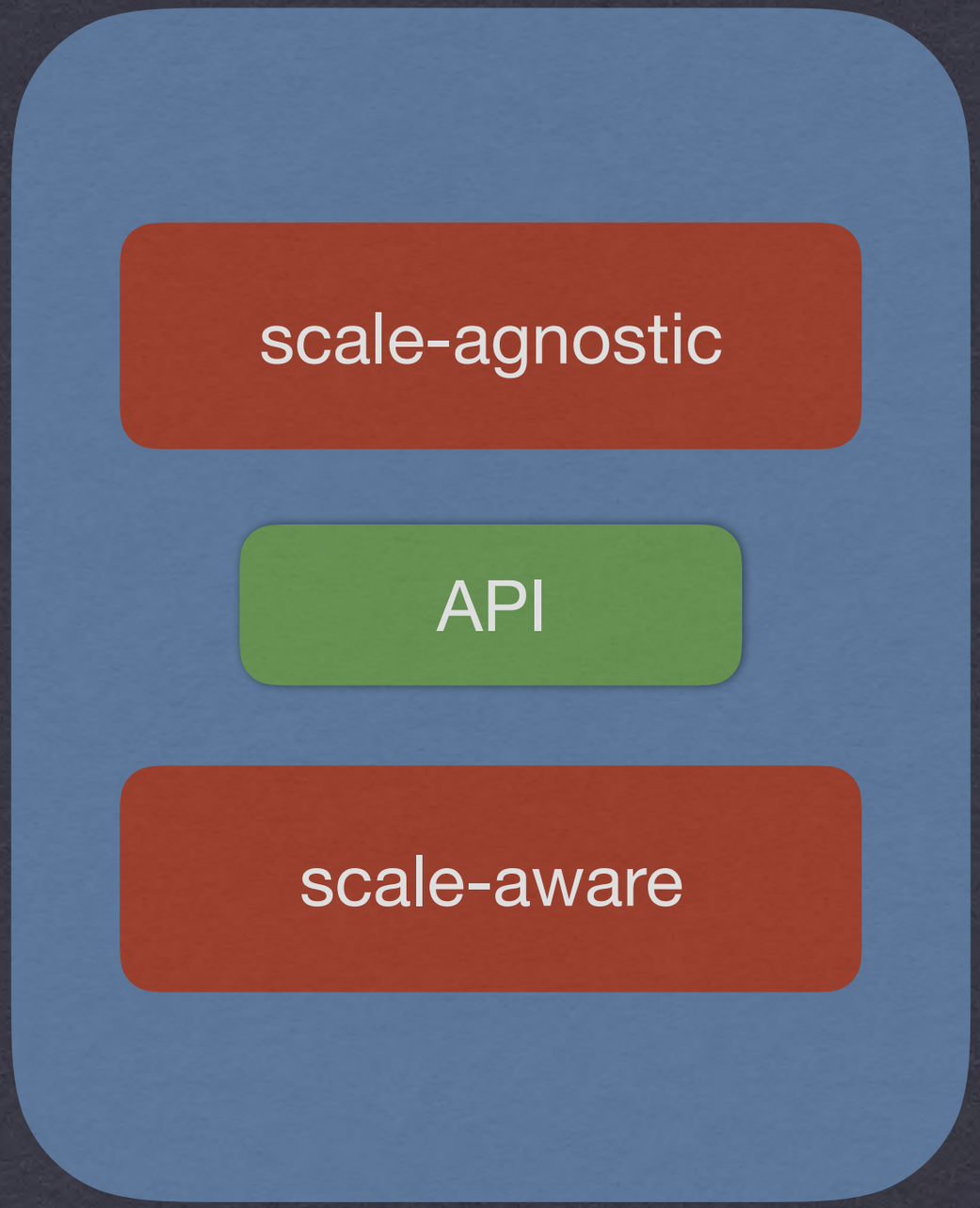
Alice

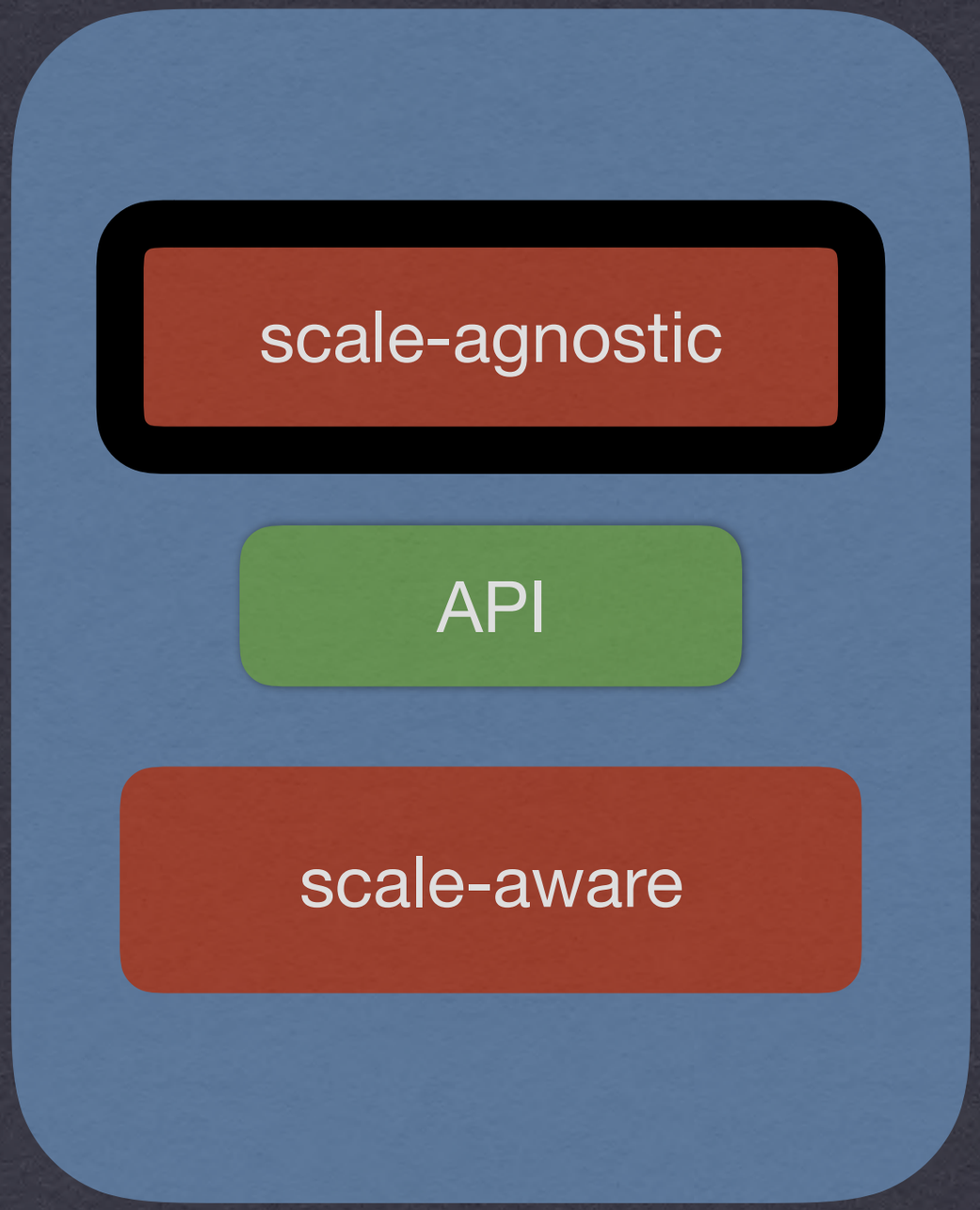

8
6
5
3
Bob

DENORMALIZE..

ALL THE THINGS!

TWO LAYER ARCHITECTURE


scale-agnostic
API
scale-aware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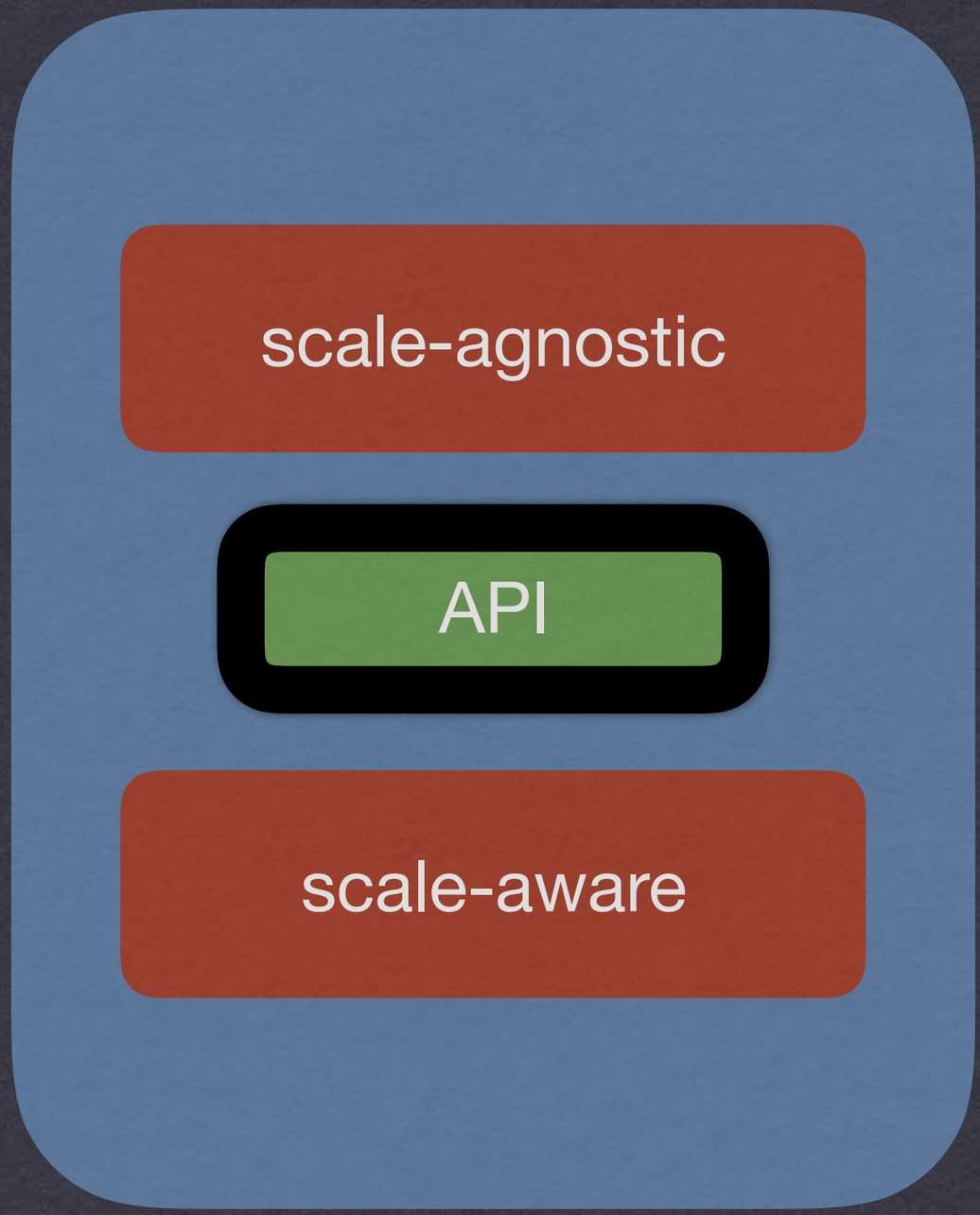
scale-aware

scale-agnostic

API

scale-aware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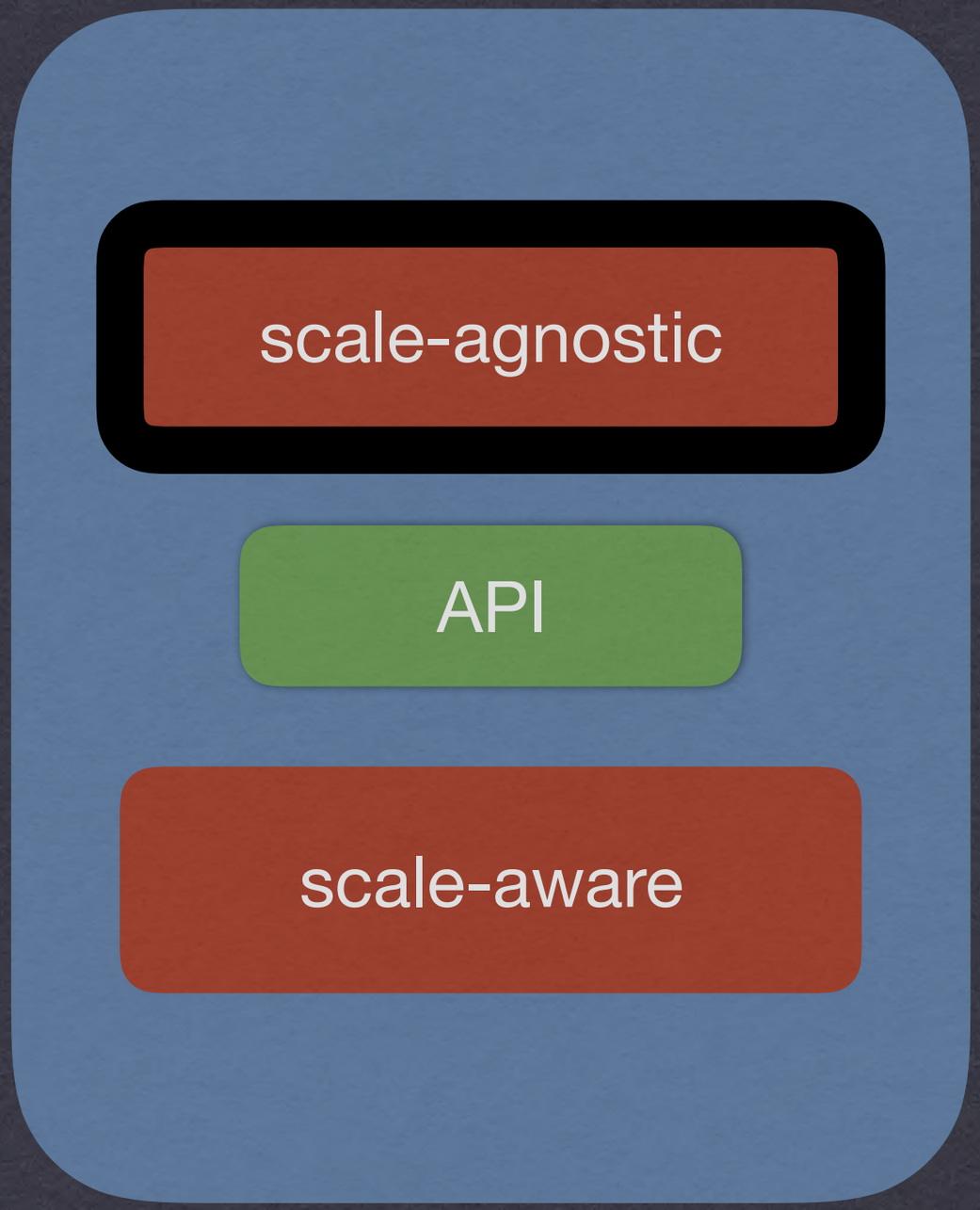

scale-agnostic
API
scale-aware

scale-agnostic

API

scale-aware

TO SCALE INFINITELY,
YOUR BUSINESS LOGIC HAS TO BE INDEPENDENT OF SCALE

WALLAROO

SCALE INDEPENDENT COMPUTING FOR PYTHON

AND IT’S NOT A DATABASE

ENTITIES

BUT WE CALL THEM…

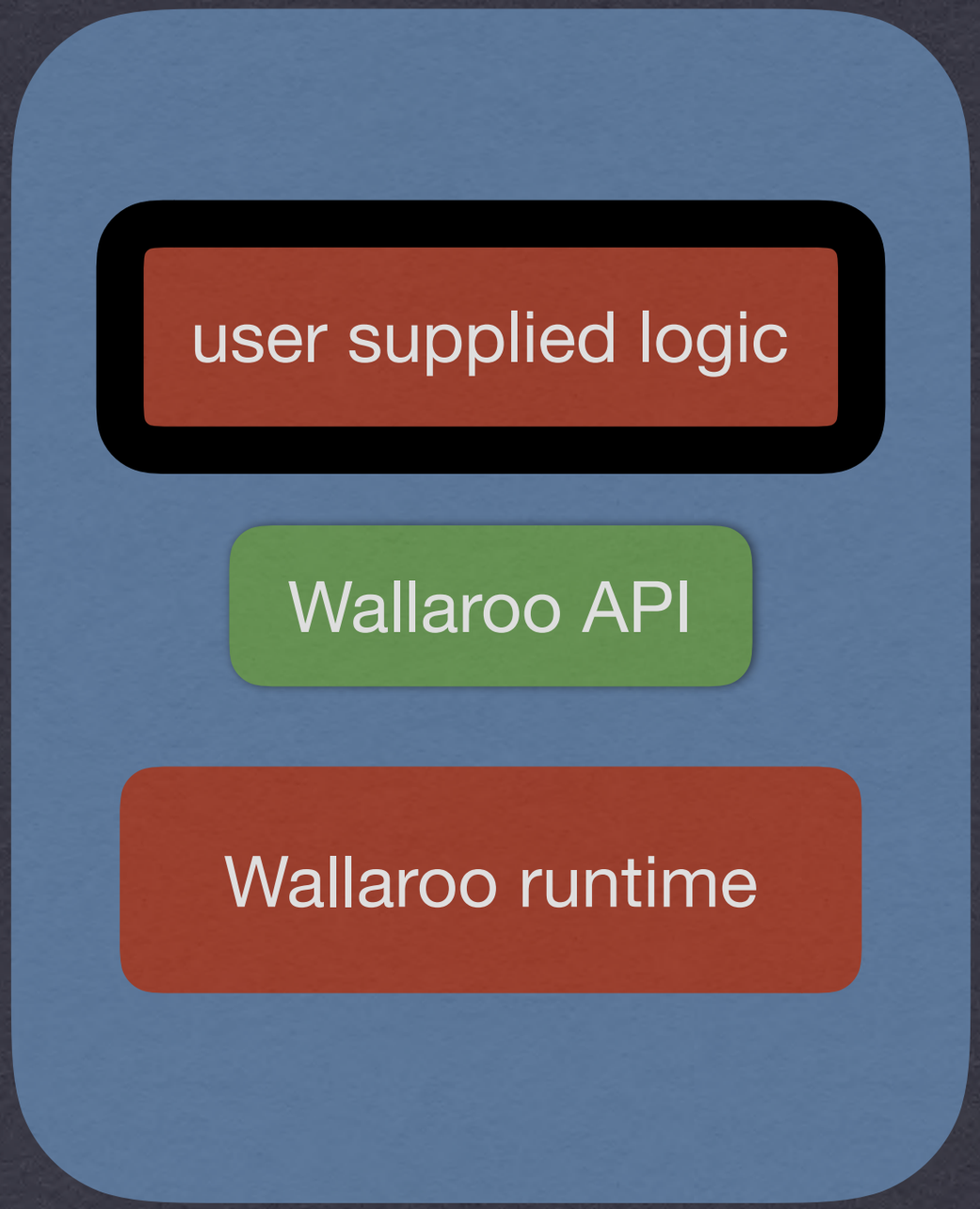
“STATE OBJECTS”

TWO LAYER ARCHITECTURE

BUT WE CALL IT…

“SCALE INDEPENDENCE”


user supplied logic
Wallaroo API
Wallaroo runtime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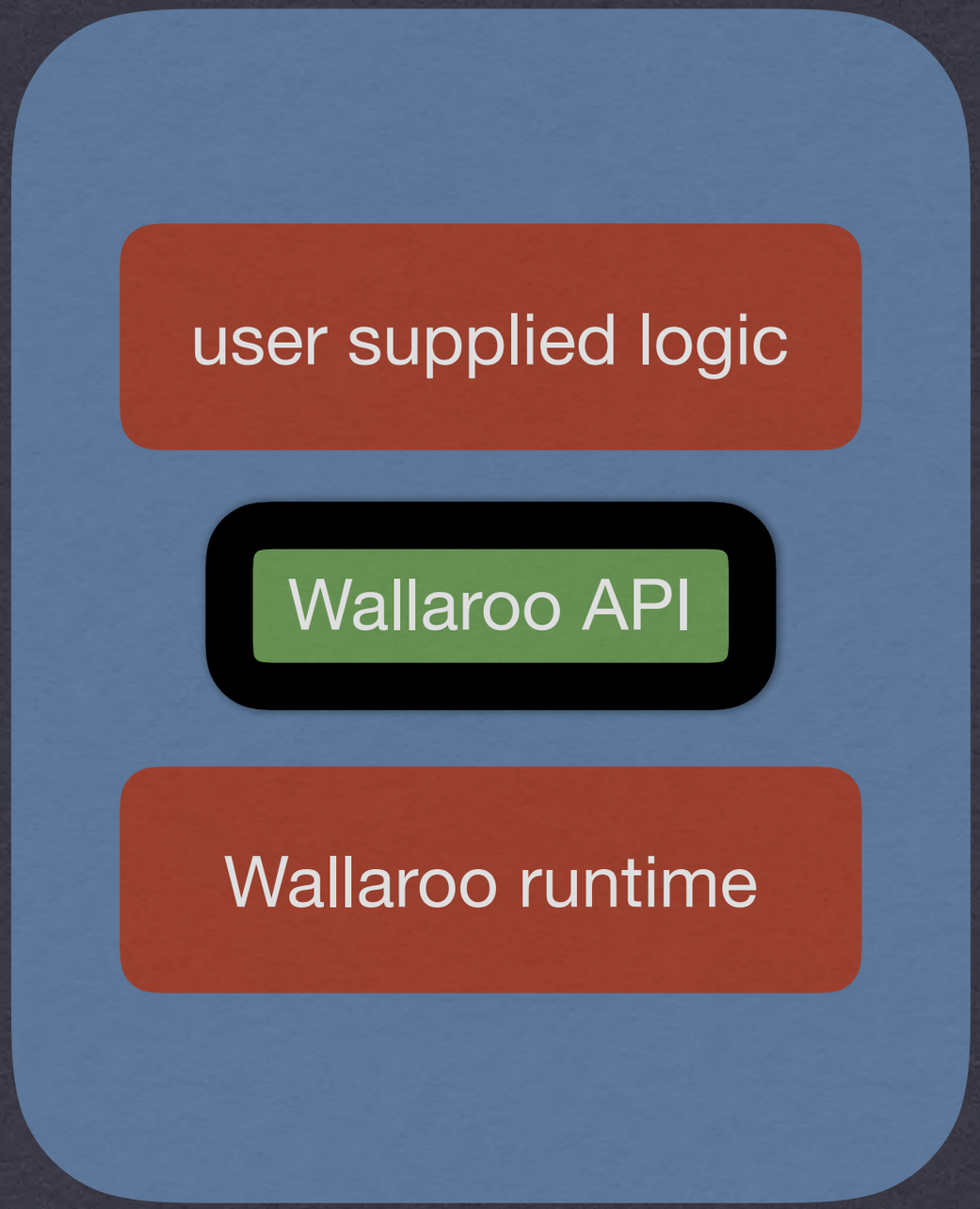
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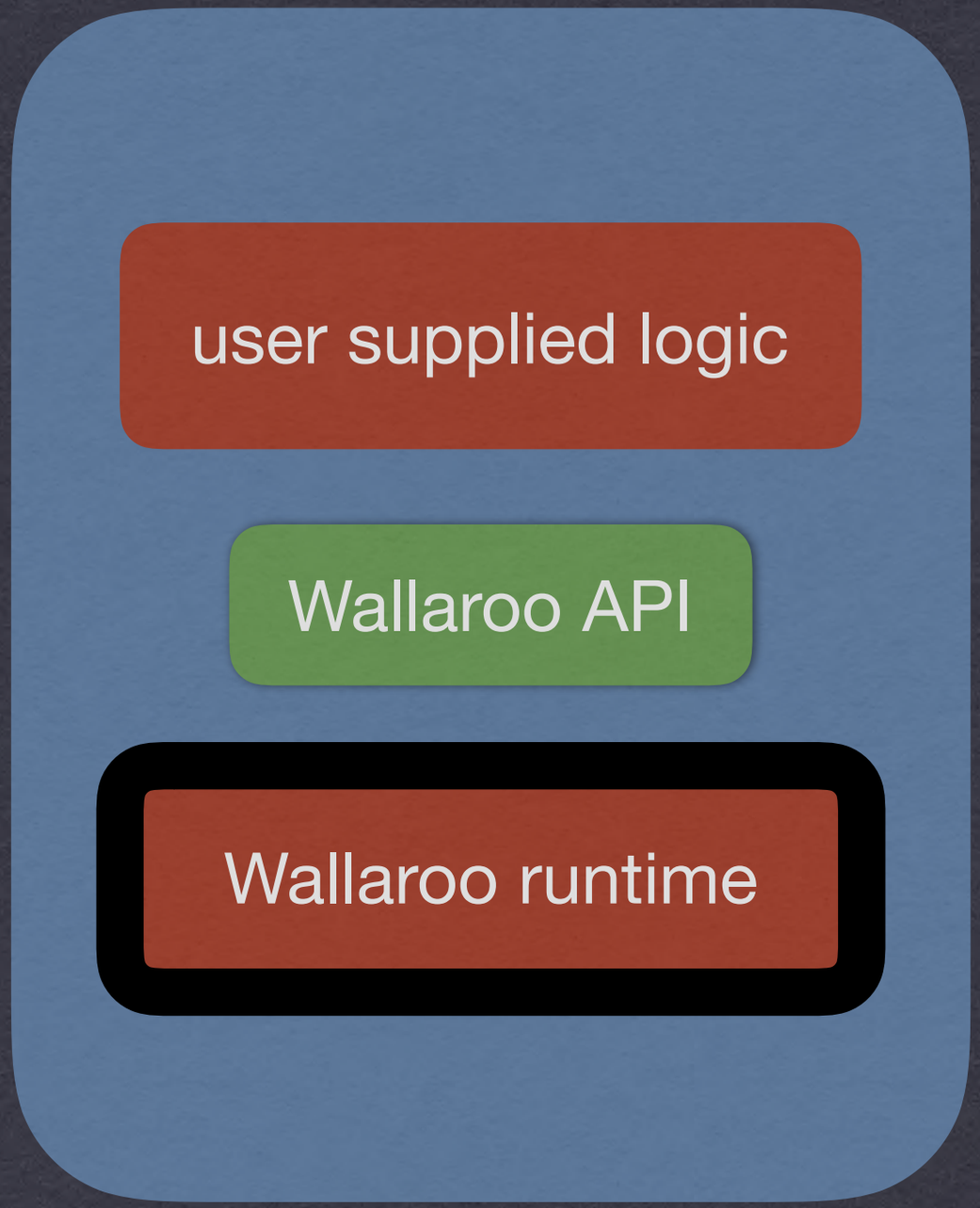

user supplied logic
Wallaroo API
Wallaroo runtime

WHAT'S HARD?

ALL OF IT? YOU'RE BUILDING A DISTRIBUTED SYSTEMS *FRAMEWORK*

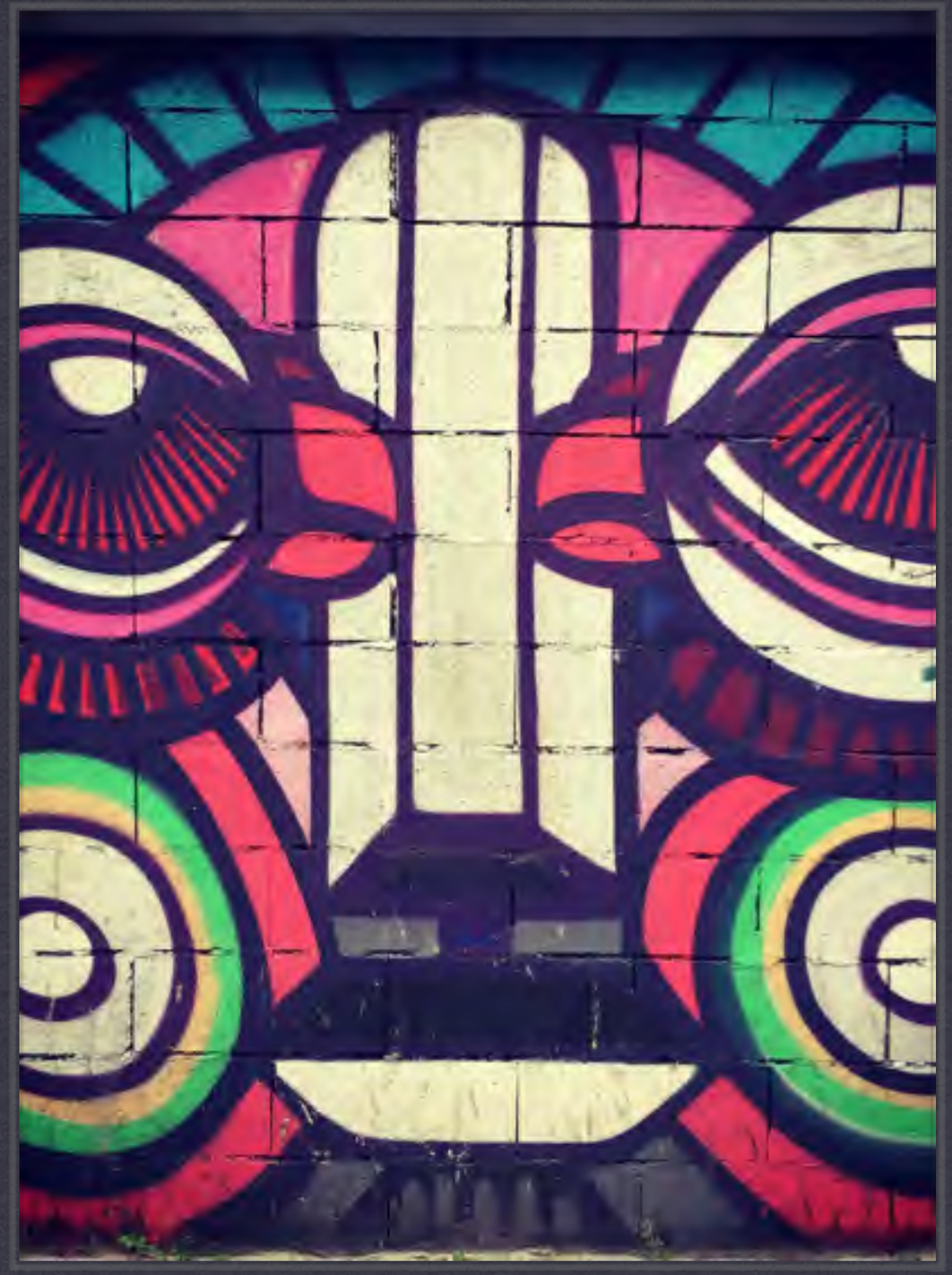
CAP THEOREM

CONSISTENCY VS AVAILABILITY…

YOU CAN’T ESCAPE IT.

MESSAGE DELIVERY

AT-MOST-ONCE? AT-LEAST-ONCE? EFFECTIVELY-ONCE? EXACTLY-ONCE?



MESSAGE ORDERING

WILL YOU MAINTAIN THE ORDERING AS YOU RECEIVED IT?

LOCAL KNOWLEDGE

YOU HAVE TO WORK HARD TO AVOID COORDINATION.

PROGRAMMING MODEL

YOU CAN GET WITH THIS, OR YOU CAN GET WITH THAT.

PERFORMANCE

IT'S A WORD IN THE DICTIONARY

NETWORK OVERHEAD

YOU AREN'T IN LOCAL MEMORY ANYMORE

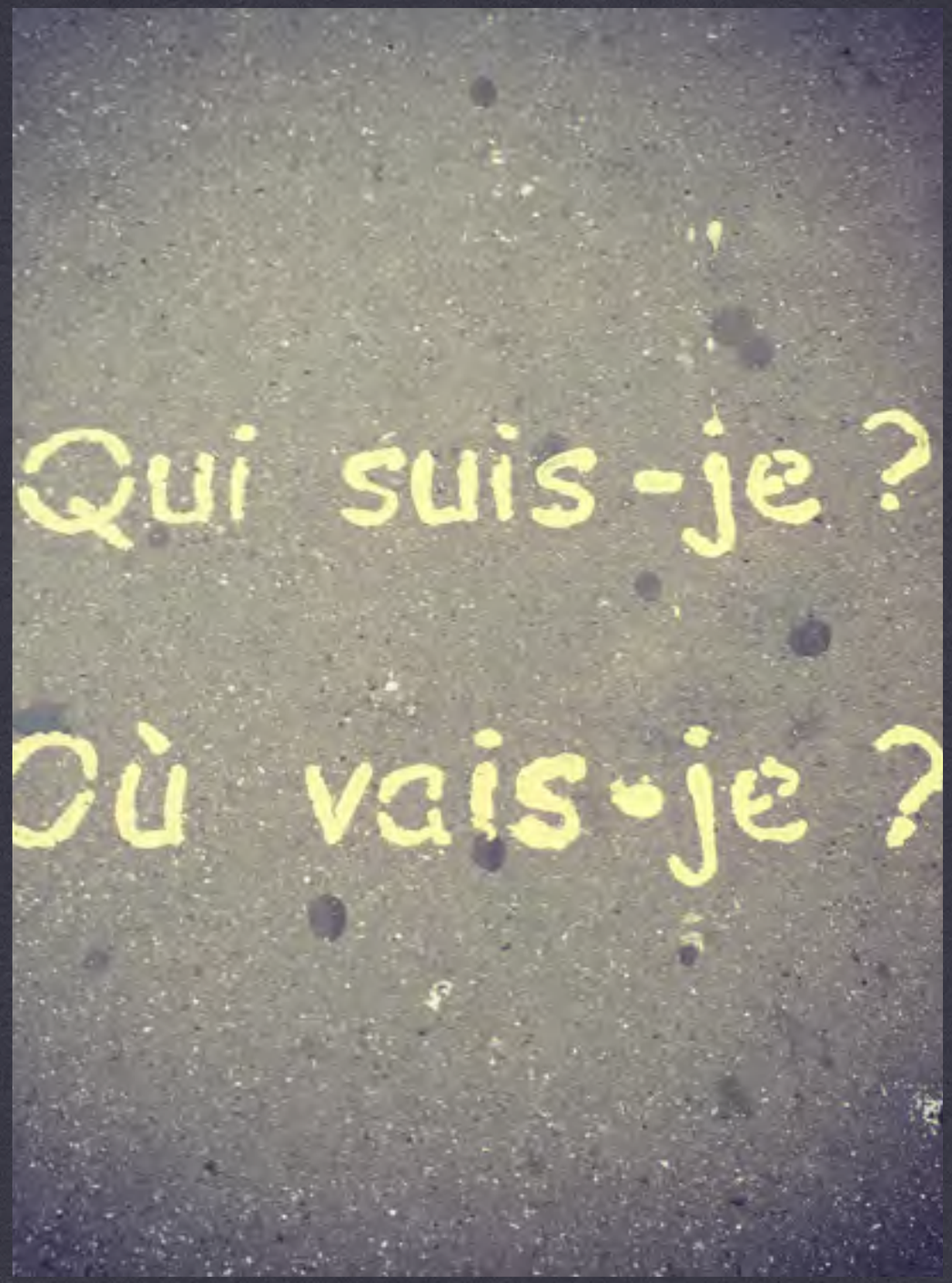
DATA SERIALIZATION

LE SIGH…

VERIFICATION

LET'S NOT GO THERE…

THAT'S AN ENTIRE LECTURE SERIES.



BTW… YOUR MULTI-CORE COMPUTER

IS ALSO A DISTRIBUTED SYSTEM.

BUT THAT'S A STORY FOR ANOTHER DAY.

LEARN MORE

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