PAT HELLAND AND ME

HOW TO BUILD STATEFUL DISTRIBUTED APPLICATIONS THAT CAN SCALE ALMOST INFINITELY
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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
DENORMALIZE...
ALL THE THINGS!
TWO LAYER ARCHITECTURE
scale-agnostic

API

scale-aware
scale-agnostic

API

scale-aware
TO SCALE INFINITELY, YOUR BUSINESS LOGIC HAS TO BE INDEPENDENT OF SCALE
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
user supplied logic

Wallaroo API

Wallaroo runtime
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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