

# TANGO – can ZMQ replace CORBA?

*or*

**MAKING**

**THINGS**

**SIMPLER**

# Ensō

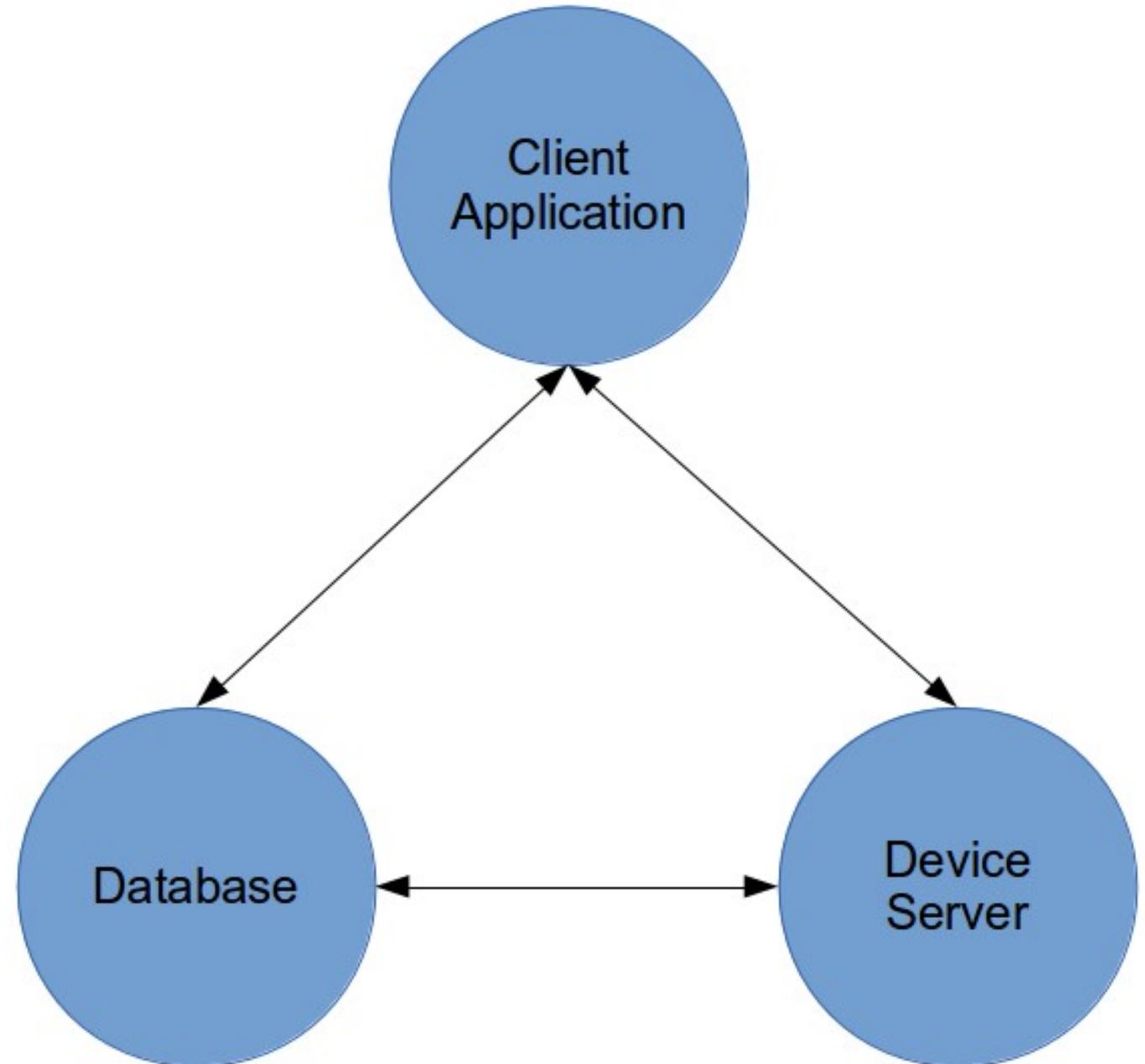


It takes 3

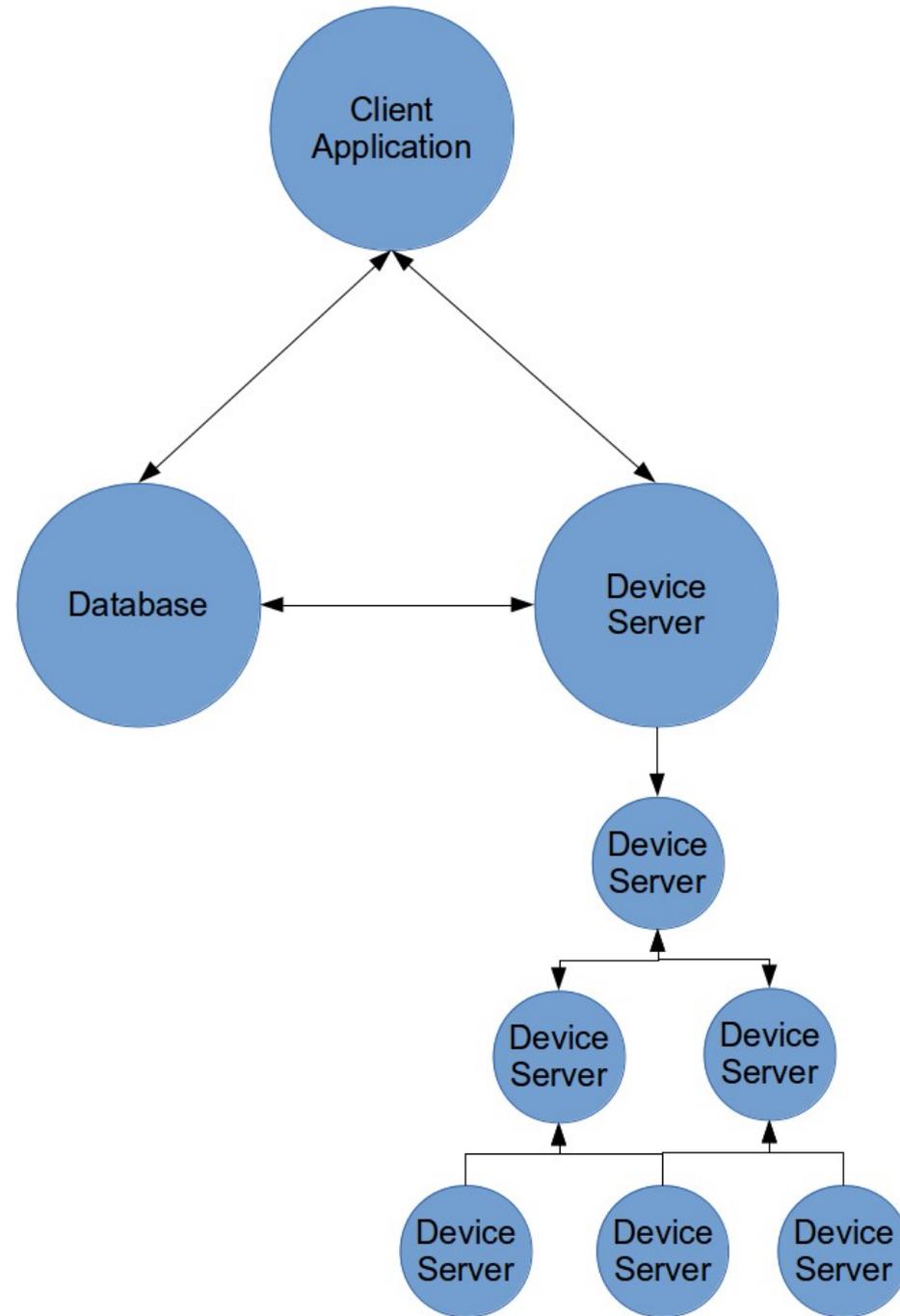
to **TANGO**  
Connecting things together



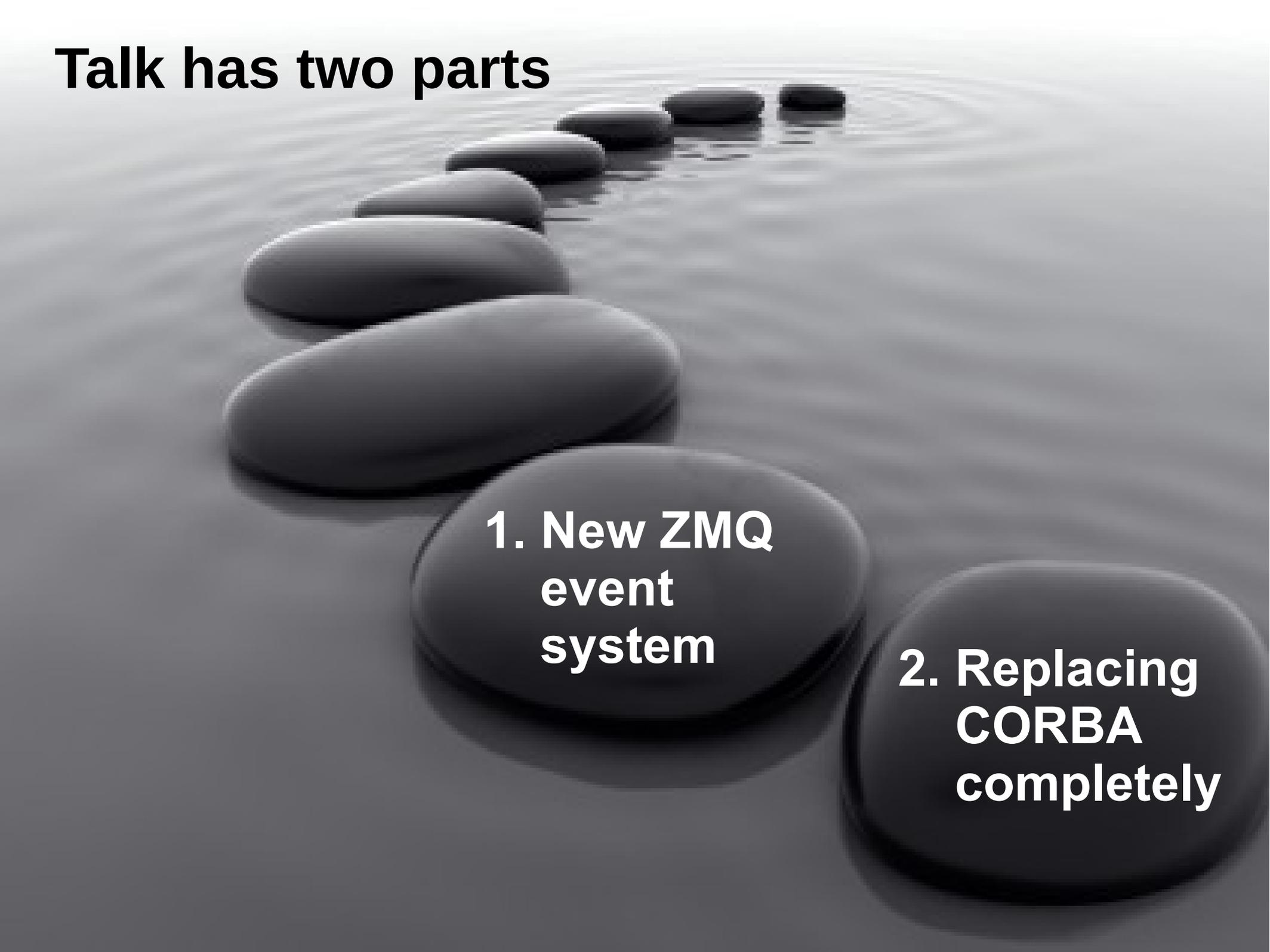
# Simple Peer-to-Peer



# Managing complexity simply



# Talk has two parts

A black and white photograph of a path of smooth, dark stepping stones leading from the foreground into the distance on a body of water. The stones are arranged in a slightly curved line, and the water shows ripples around them. The background is a bright, hazy horizon.

**1. New ZMQ  
event  
system**

**2. Replacing  
CORBA  
completely**

# What is wrong with CORBA?

**NOTHING!**

for TANGO

**A LOT!**

for new projects

# What is ZMQ ?

Library

A protocol

Sockets on steroids

Concurrency framework

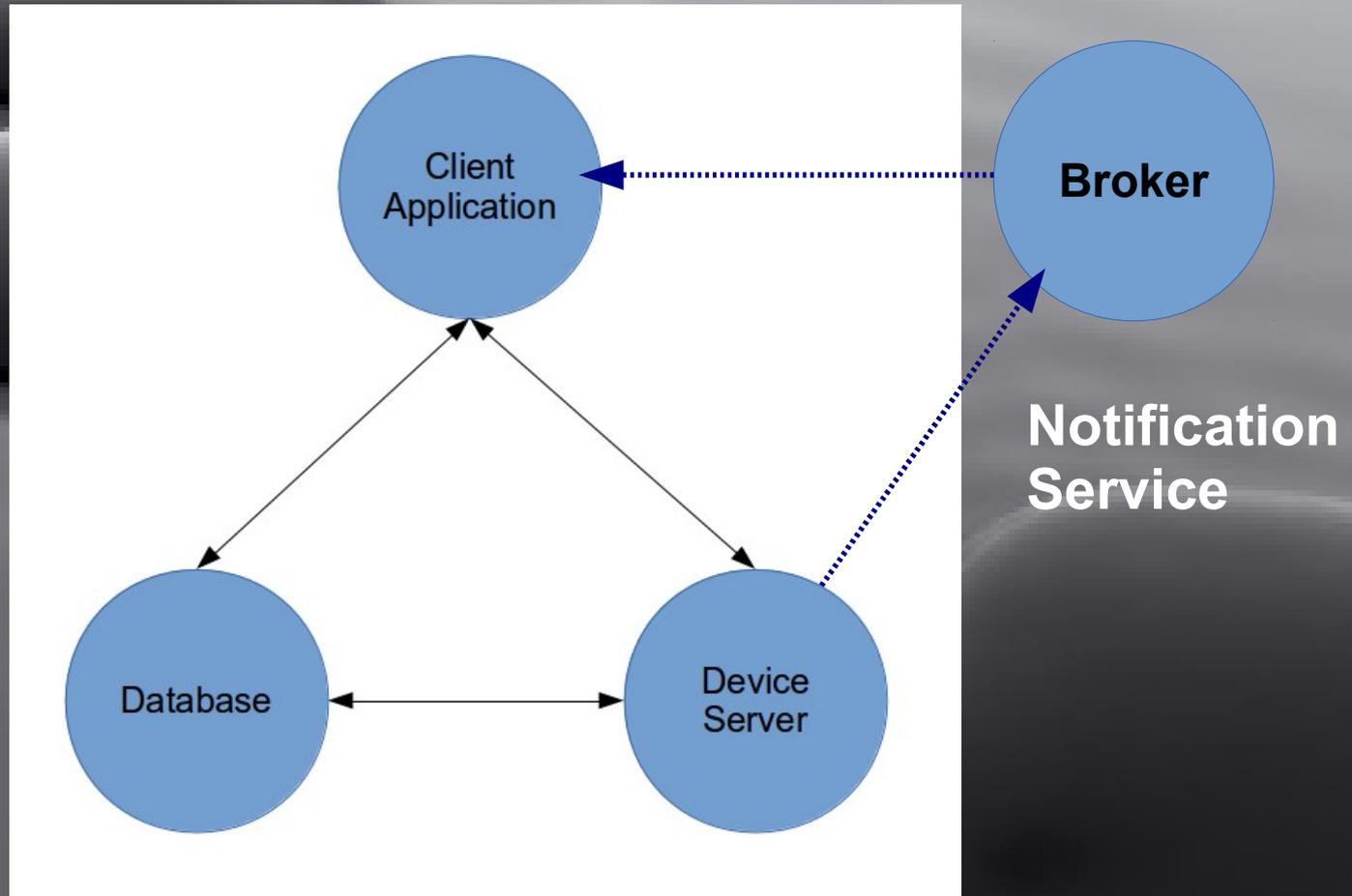
Asynchronous I/O  
high performance  
on multicores

<http://hintjens.com/>



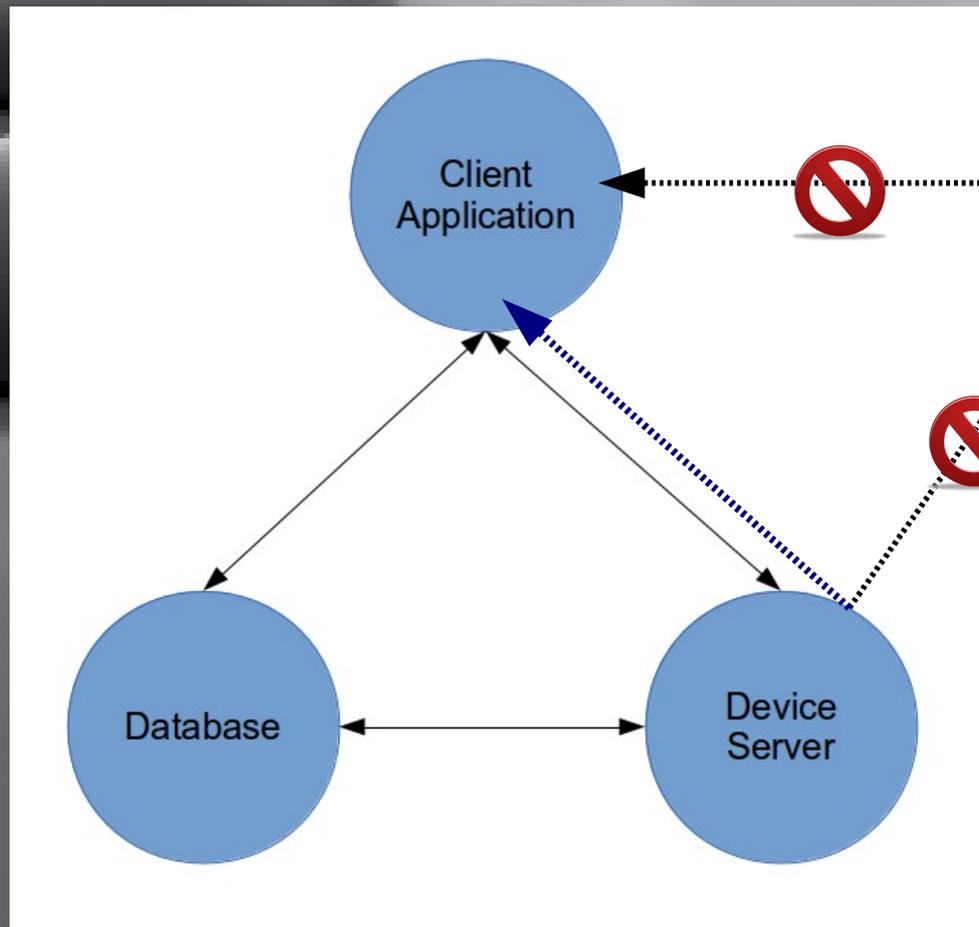
Pieter Hintjens

# TANGO events based on Notification Service



# TANGO ZMQ events

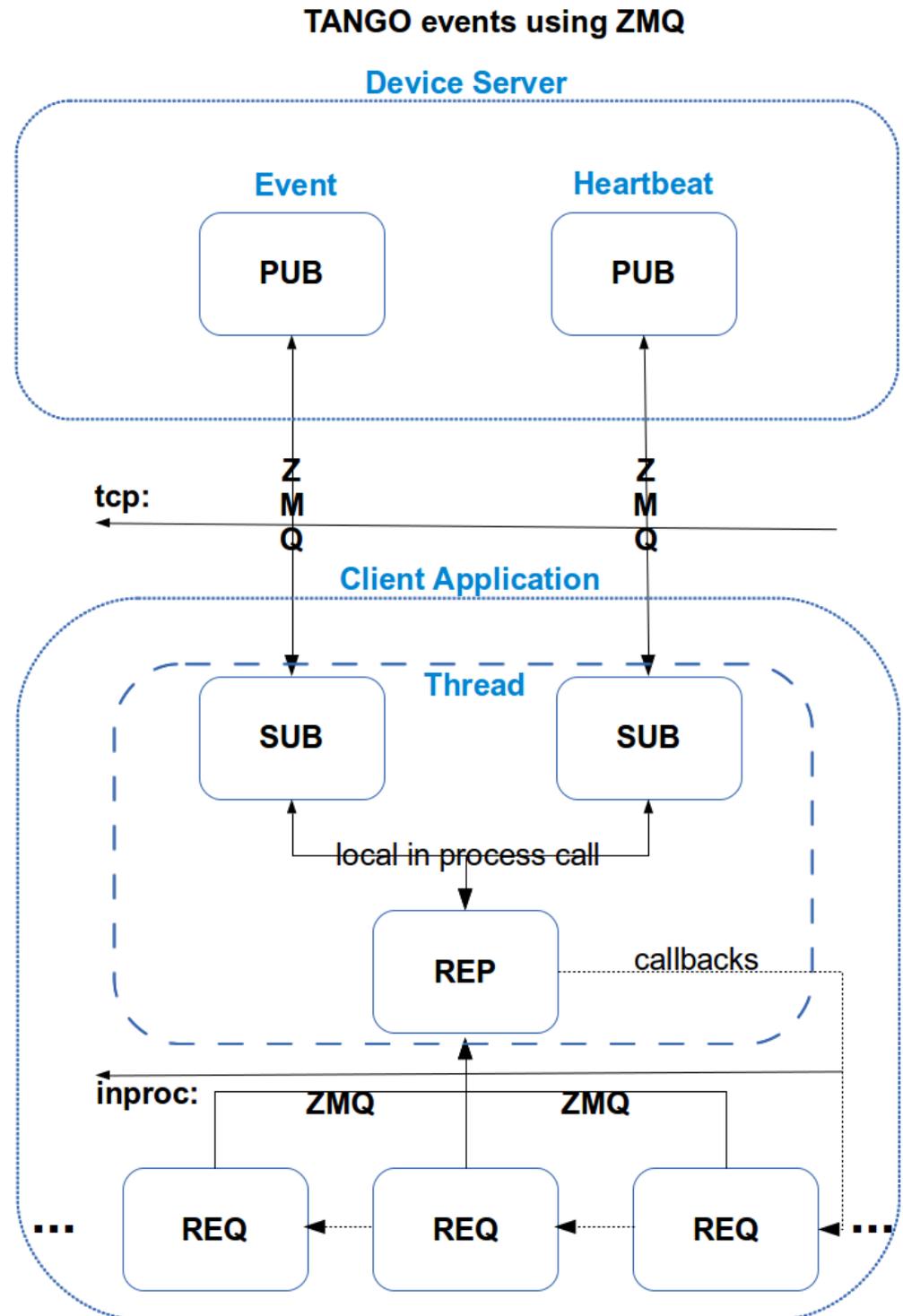
## Remove Broker



omniNotify  
= dead project

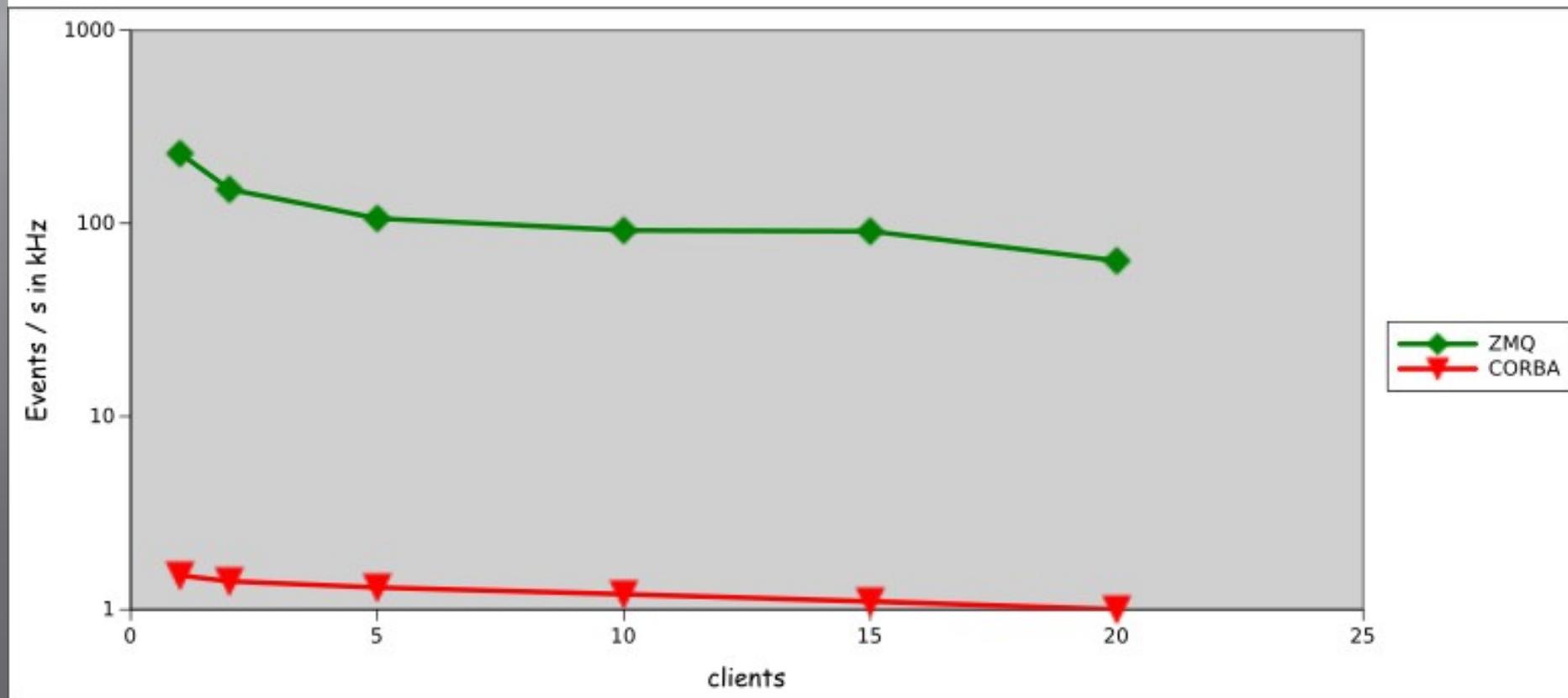
# TANGO ZMQ Events

- C++ and Java
- Few 1000 lines
- 18 months
- In 24/7 mode TANGO  $\geq$  8.1
- ZMQ  $\geq$  3.2



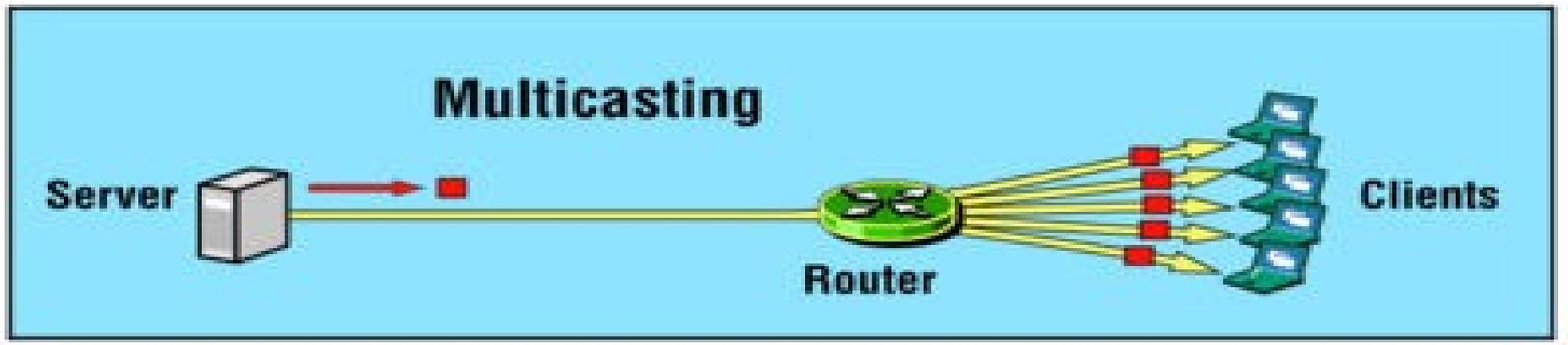
# Why ZMQ ?

TANGO scalar events with ZMQ (multicore Xeon @ 3 GHz)



*“What else ?”*

# Why ZMQ ?



*Adds support for multi-casting*

# Why TANGO can replace CORBA ?

**TANGO**

*has only*

**ONE interface**

**The  
Device**

*TANGO was designed so  
that CORBA could be replaced*

# **TANGO uses in CORBA**

A path of smooth, dark, rounded stones leads from the foreground into the distance on a light-colored, rippled surface, possibly water or a wet beach. The stones are arranged in a slightly curved line, receding towards the horizon. The background is a soft, out-of-focus light gray.

- 1. IDL**
- 2. IOR**
- 3. DII**
- 4. Corbaloc**
- 5. Collocation**
- 6. Interceptors**
- 7. CDR serialisation**
- 8. Binary performance**
- 9. Multi-language bindings**
- 10. OmniORB + JacORB threading**
- 11. Synchronous calling mechanism**

# TANGO implements

A black and white photograph of a path of smooth, dark stones leading across a body of water towards the horizon. The stones are arranged in a line, receding into the distance. The water is calm, with gentle ripples around the stones. The sky is a uniform light gray, suggesting an overcast day or a misty atmosphere.

1. Naming
2. Versioning
3. Persistence
4. Security
5. Startup
6. Logging
7. Polling
8. Caching
9. Rich Data types
10. Connection management

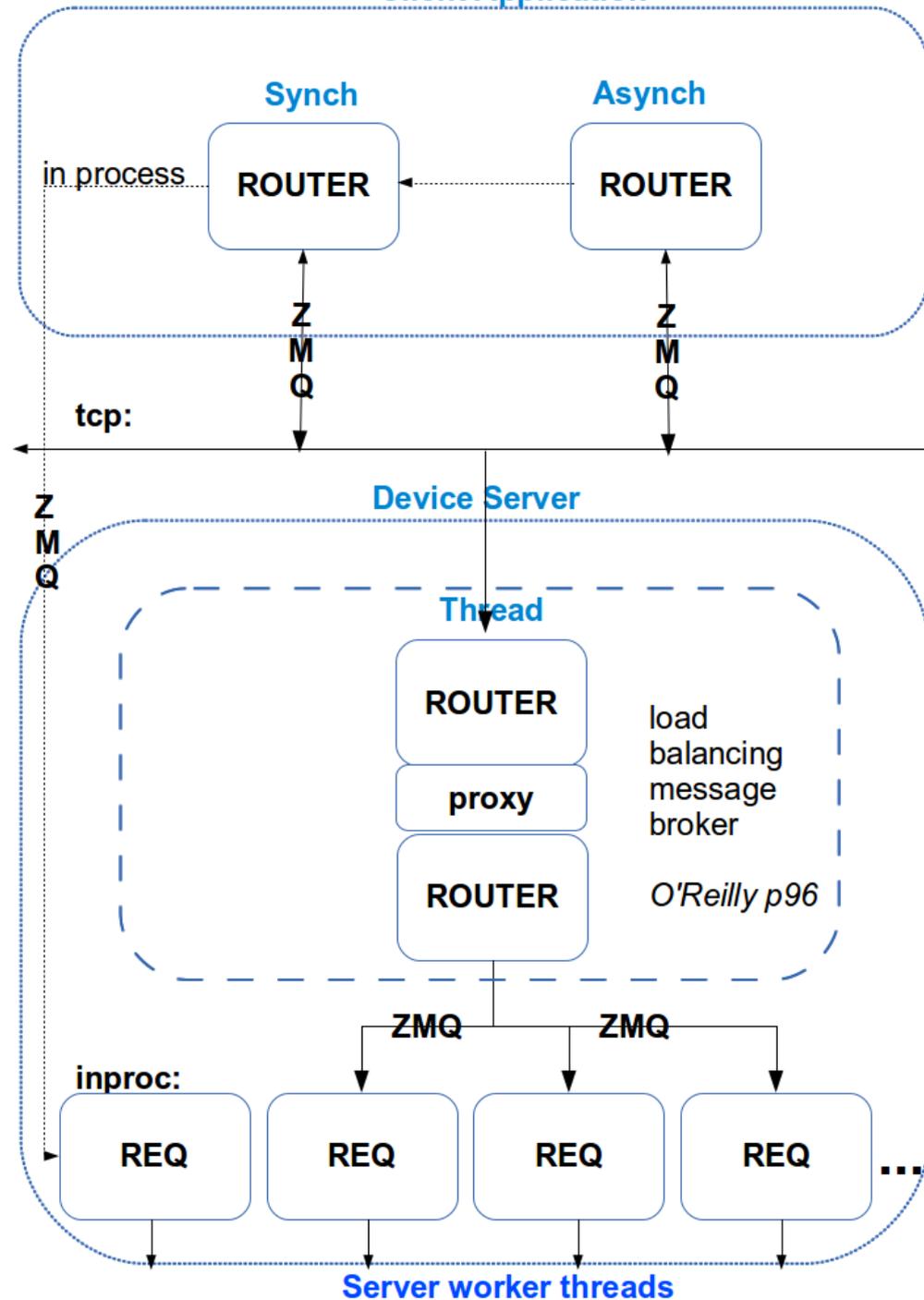
# Replacing CORBA

1. IDL – *TANGO has only ONE interface (Device)!*
2. IOR – replace with `<protocol>:<host><port><FQDN>`
3. DII – replace with **ROUTER-ROUTER** socket pattern
4. Corbaloc – same as for IOR
5. Collocation – replace with `<inproc>`
6. CDR serialisation – replace with open source library
7. Binary performance – **built-in** with ZMQ
8. Multi-language bindings – **built-in** with ZMQ
9. OmniORB + JacORB threading – use ZMQ concurrency
10. Synchronous calling mechanism – use **ROUTER**

# Device Servers based on ZMQ

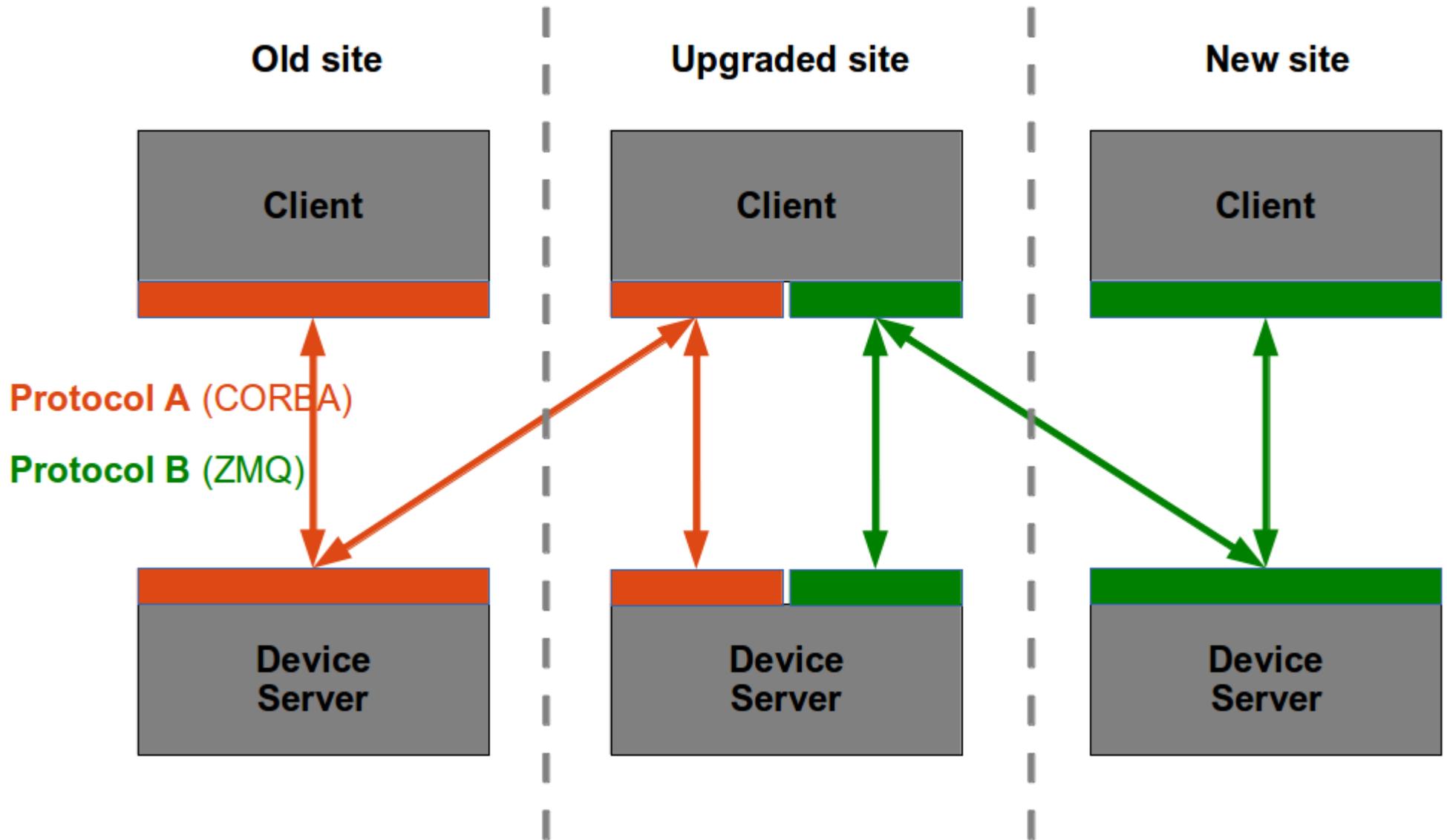
TANGO synchronous and asynchronous calls using ZMQ

Client Application



# Key to adoption = Compatibility

## Forwards and Backwards Compatibility



# What do we gain with ZMQ?

(1) **simplicity**

(2) **performance**

(3) support for **new protocols** e.g. **encryption, streaming, web, multi-casting, batching**

(4) **portability** for mobile and embedded platforms,

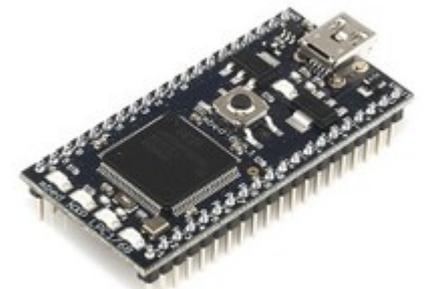
(5) larger more active **user community**

**longer life time** for TANGO due to more modern protocol

# TANGO Protocol

Devices on embedded platforms  
without Linux could publish the  
TANGO protocol (TANGOP) using a  
protocol stack like *picotcp*

**mbed LPC1768**



**Ethernet, USB and 32-bit  
ARM® Cortex™-M3 based**

# What do we lose with ZMQ?

**Some**

**Services**

**Serialisation**

**= more  
code to  
write**

# Conclusion

- **TANGO has successfully replaced the CORBA Notification service with a ZMQ event based system**
- **The performance increase can be up to 2 orders of magnitude**
- **Study of replacing CORBA completely in TANGO while maintaining backwards compatibility shows there are no show stoppers**
- **There are a number of advantages replacing CORBA completely with ZMQ not least of which are simplicity and ensuring TANGO stays modern**

# Next steps



- **Implement prototype**
- **Present it to the community**
- **Community decides to adopt TANGO 2.0**
- **Implementation and testing in C++, Python and Java will take  $\approx$  24 person months**