

# TANGO – can ZMQ replace CORBA?

*or*

**MAKING**

**THINGS**

**SIMPLER**

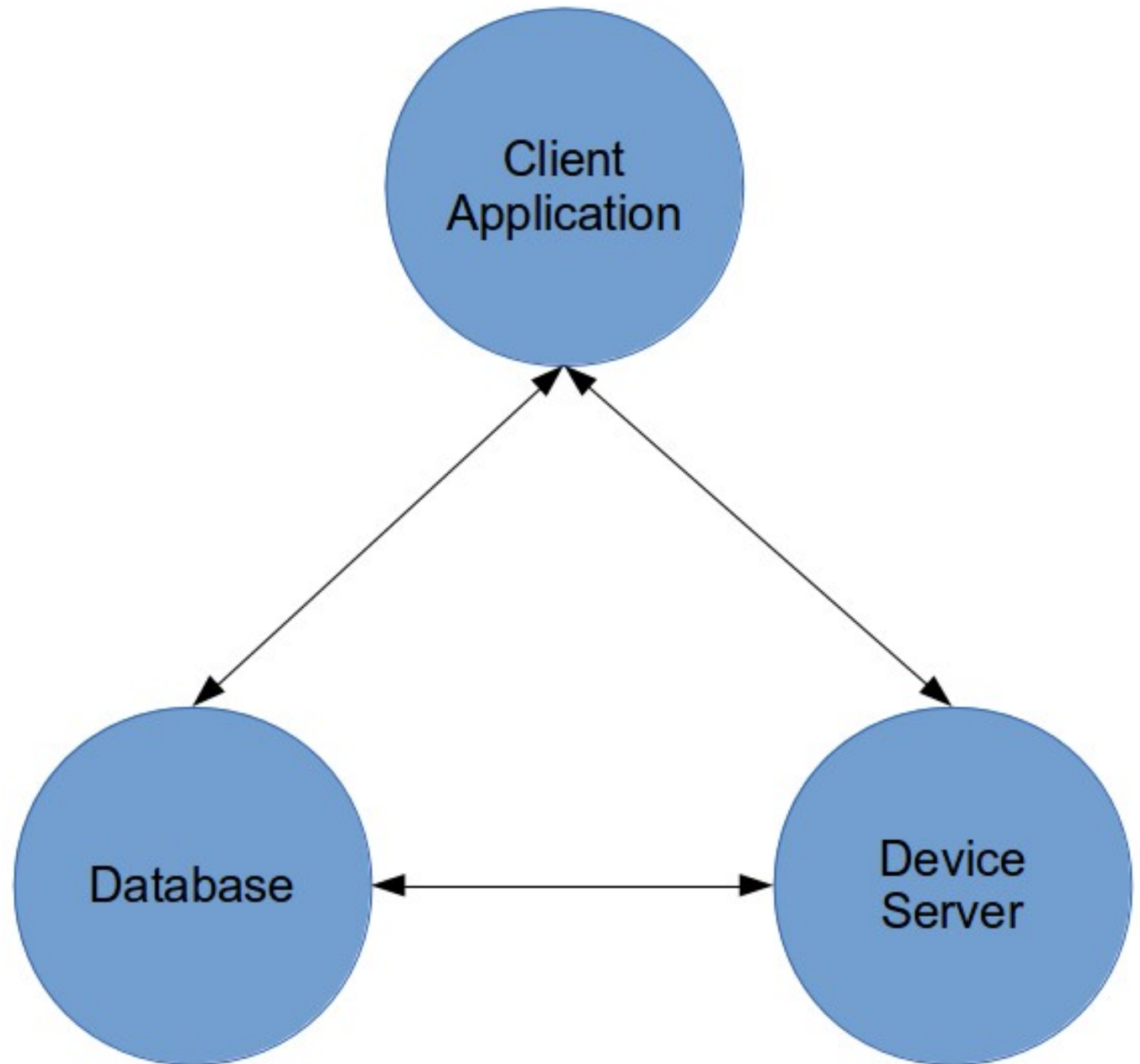
# Ensō



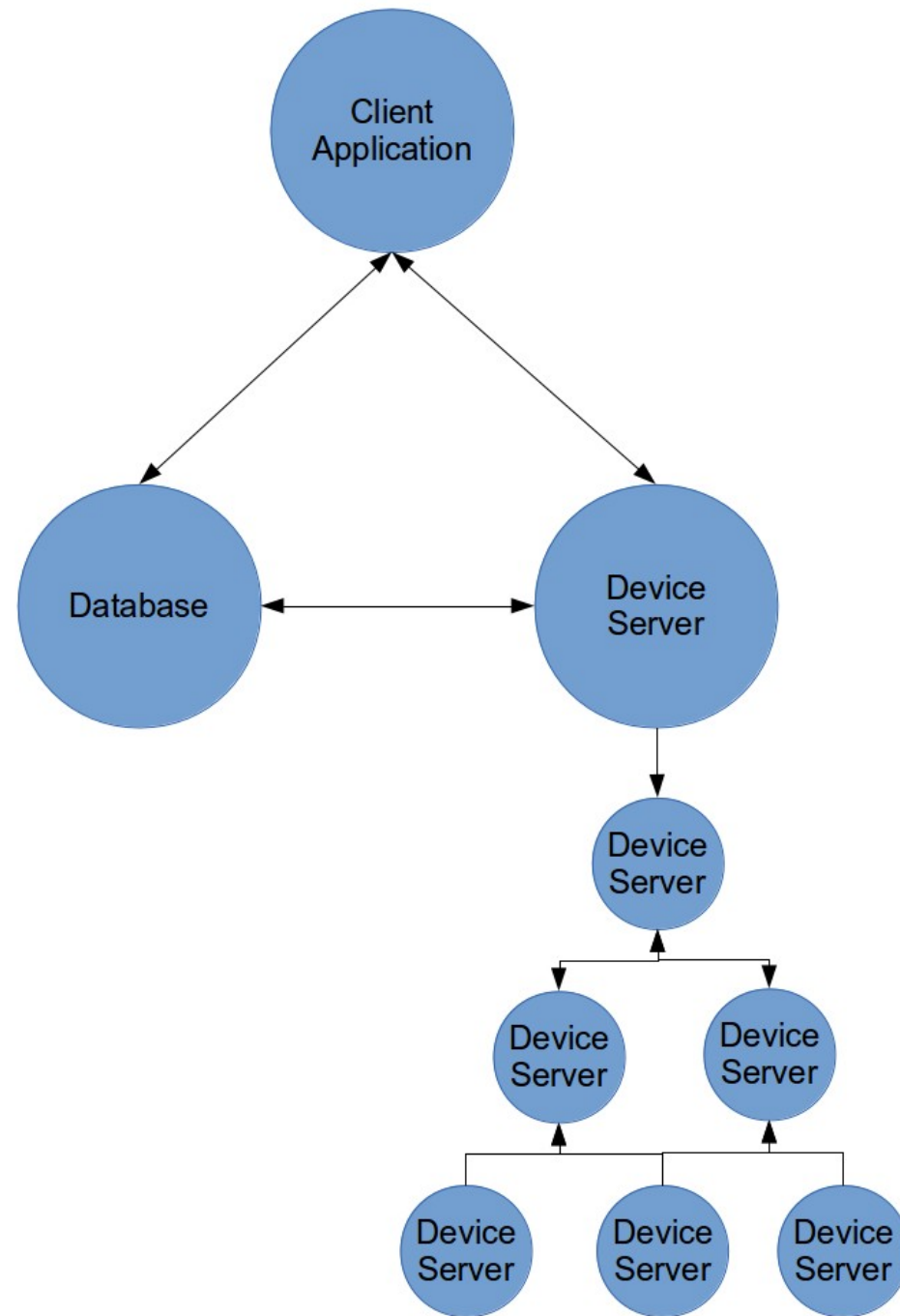
It takes 3  
to



# Simple Peer-to-Peer



# Managing complexity simply



# Talk has two parts



**1. New ZMQ  
event  
system**

**2. Replacing  
CORBA  
completely**

# What is wrong with CORBA?

A path of smooth, dark, rounded stones leads from the foreground into the distance on a calm, rippling water surface. The stones are arranged in a slightly curved line, receding towards the horizon. The water is dark and shows gentle ripples around the stones. The overall tone is monochromatic and serene.

**NOTHING!**

for TANGO

**A LOT!**

for new projects

# What is ZMQ ?

Library

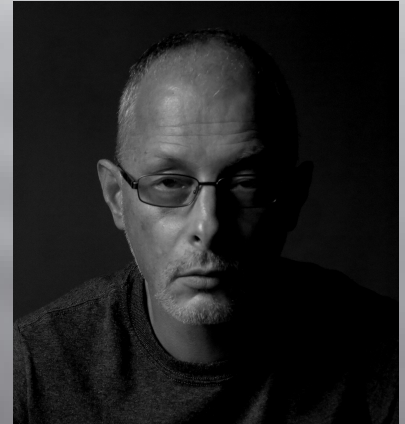
A protocol

Sockets on steroids

Concurrency framework

Asynchronous I/O  
high performance  
on multicores

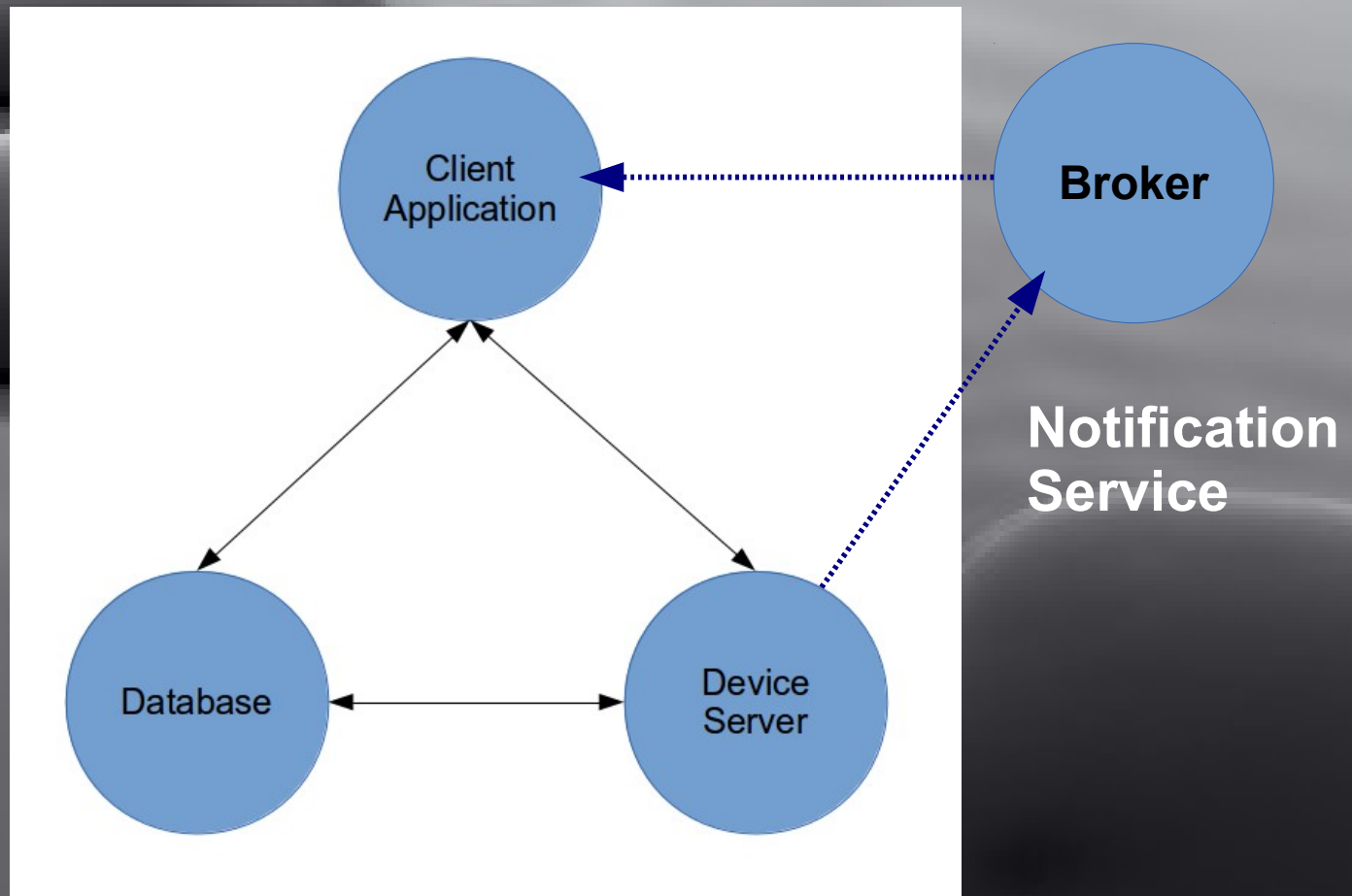
<http://hintjens.com/>



Pieter Hintjens

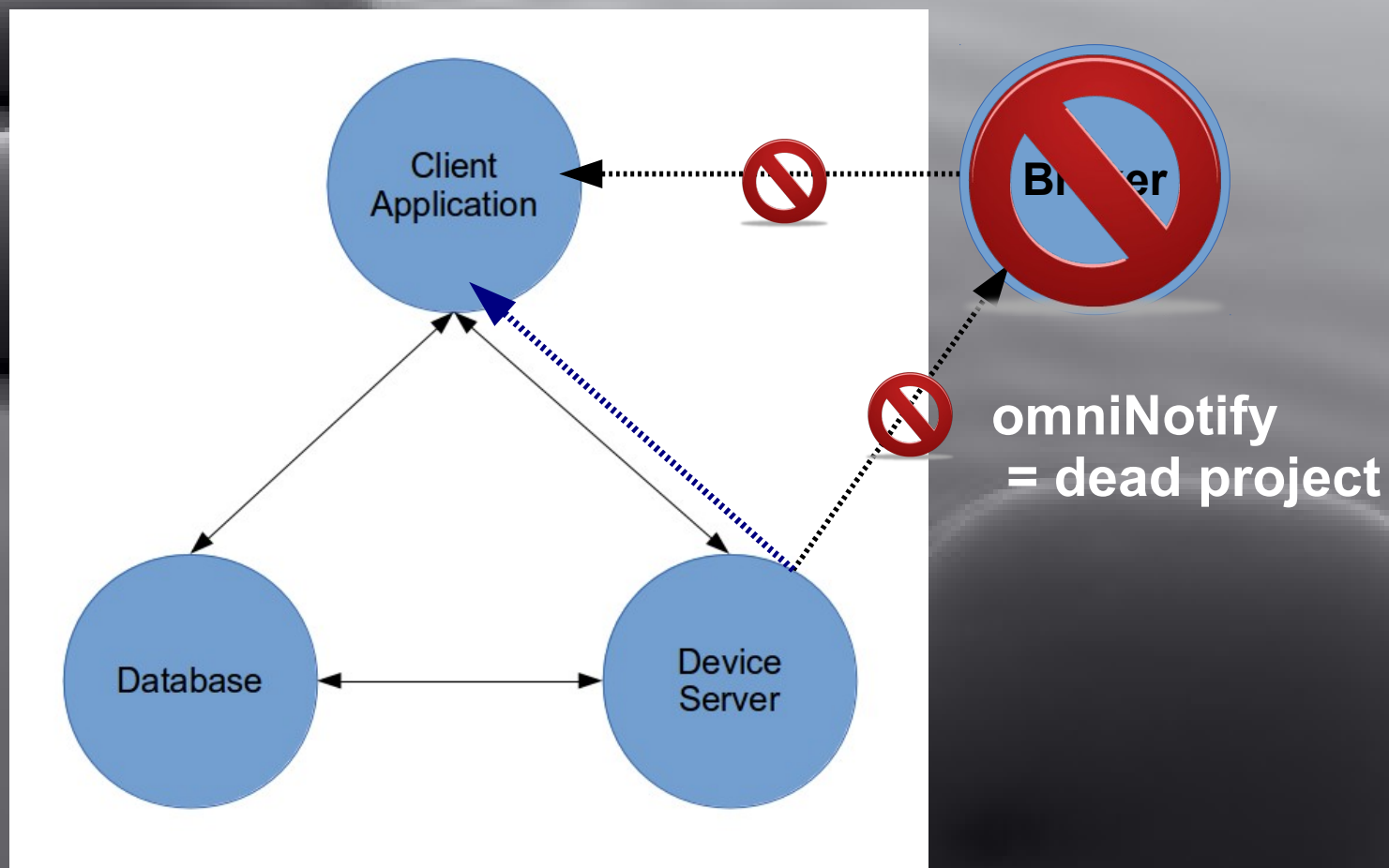


# TANGO events based on Notification Service



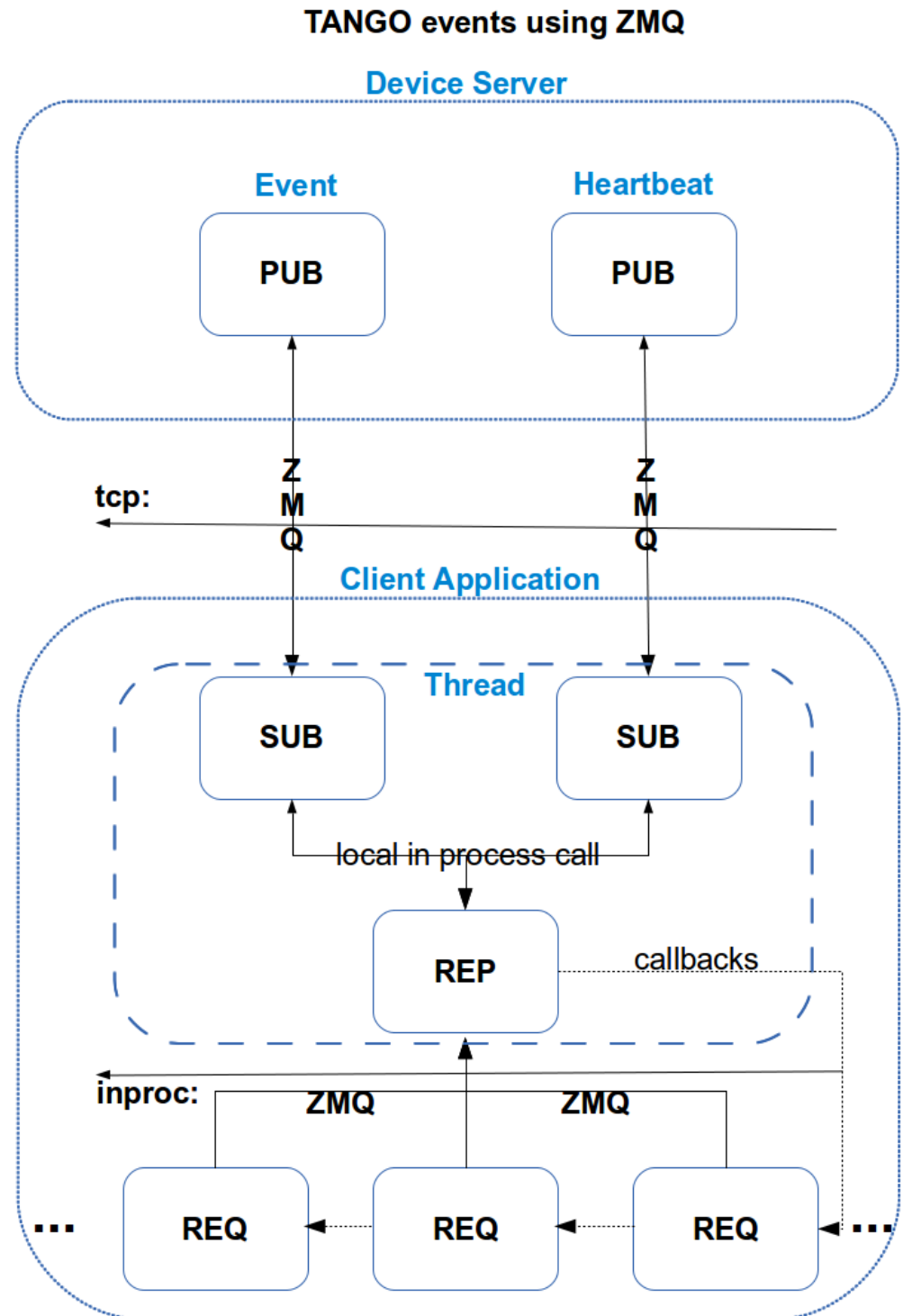
# TANGO ZMQ events

## Remove Broker



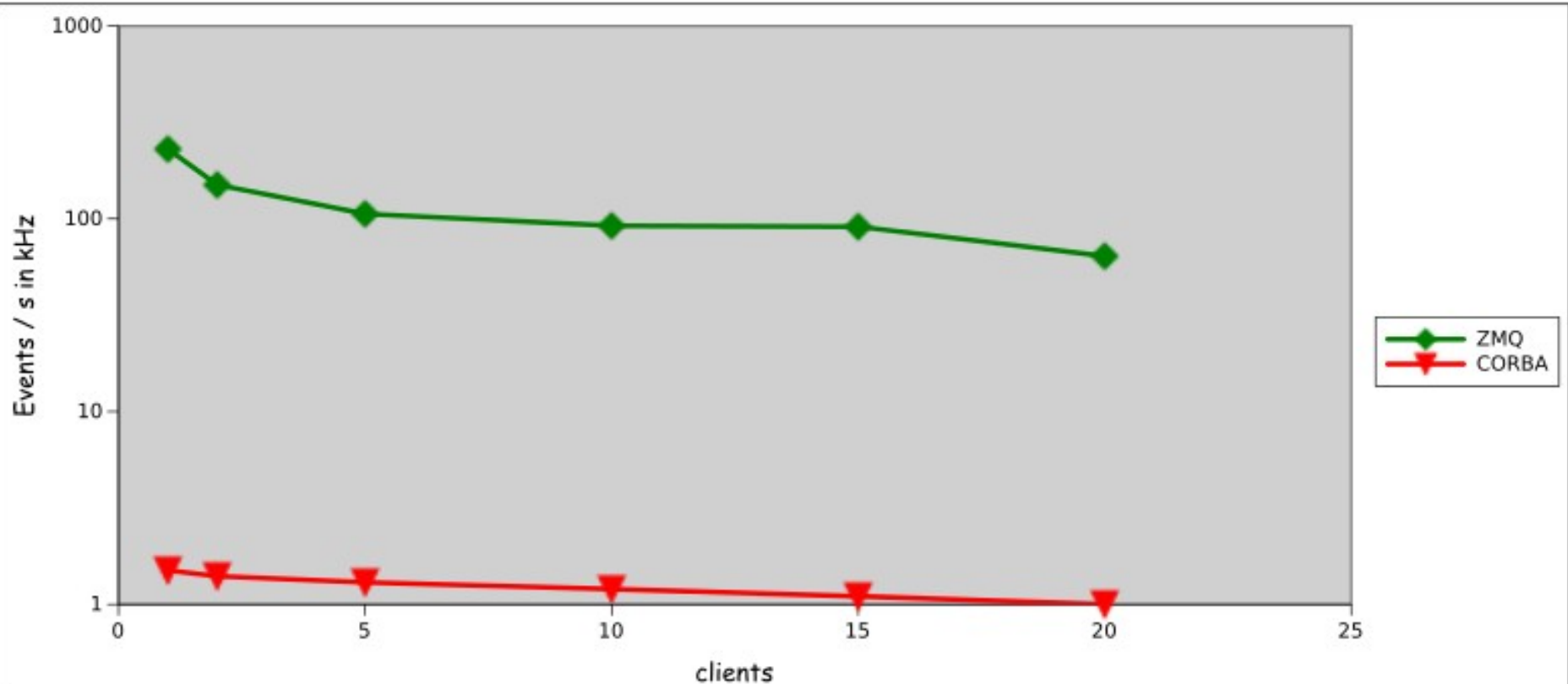
# TANGO ZMQ Events

- 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



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**



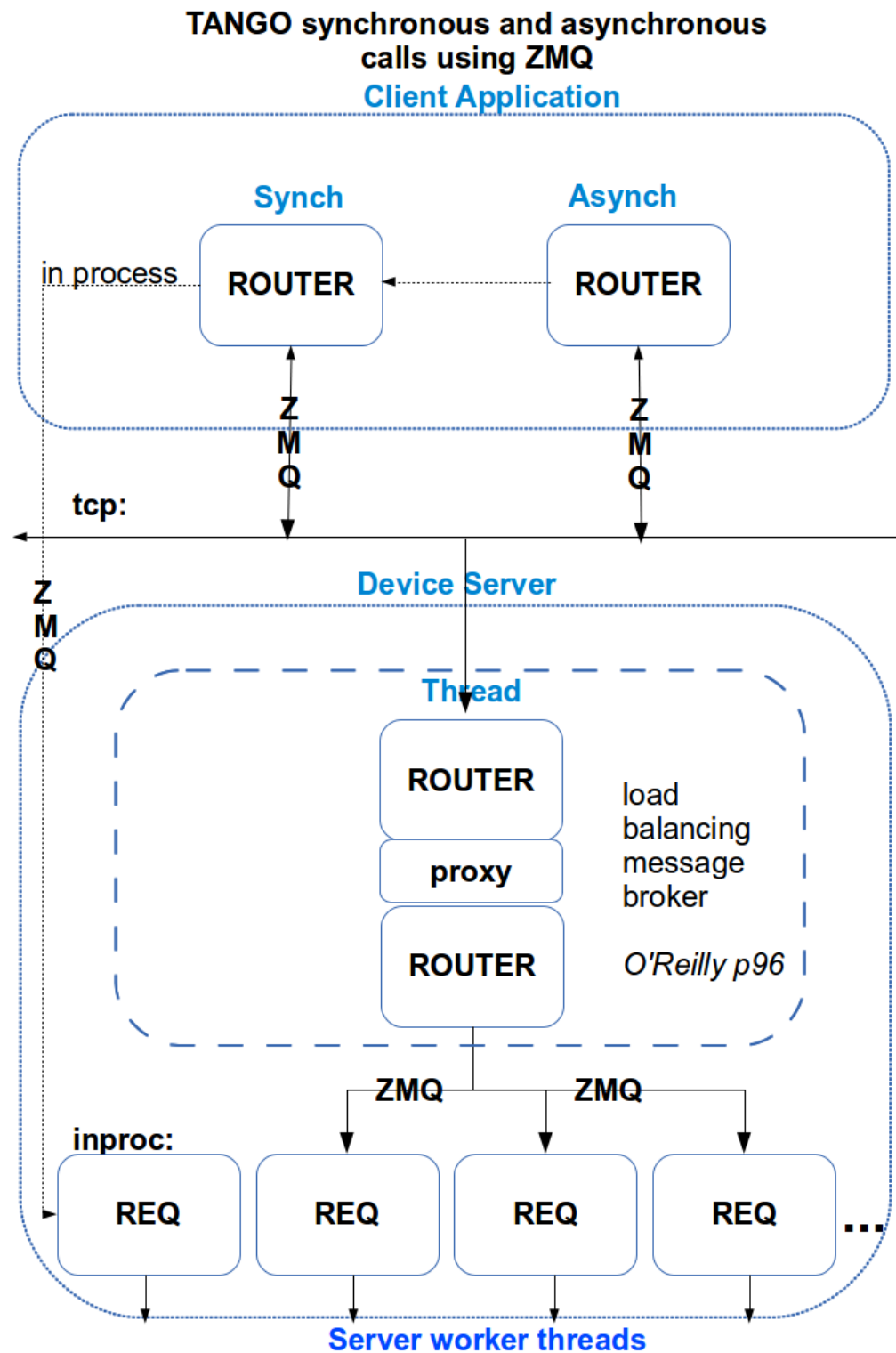
- 1. Naming**
- 2. Versioning**
- 3. Persistence**
- 4. Security**
- 5. Startup**
- 6. Logging**
- 7. Polling**
- 8. Caching**
- 9. Rich Data types**
- 10. Connection management**



# Replacing CORBA

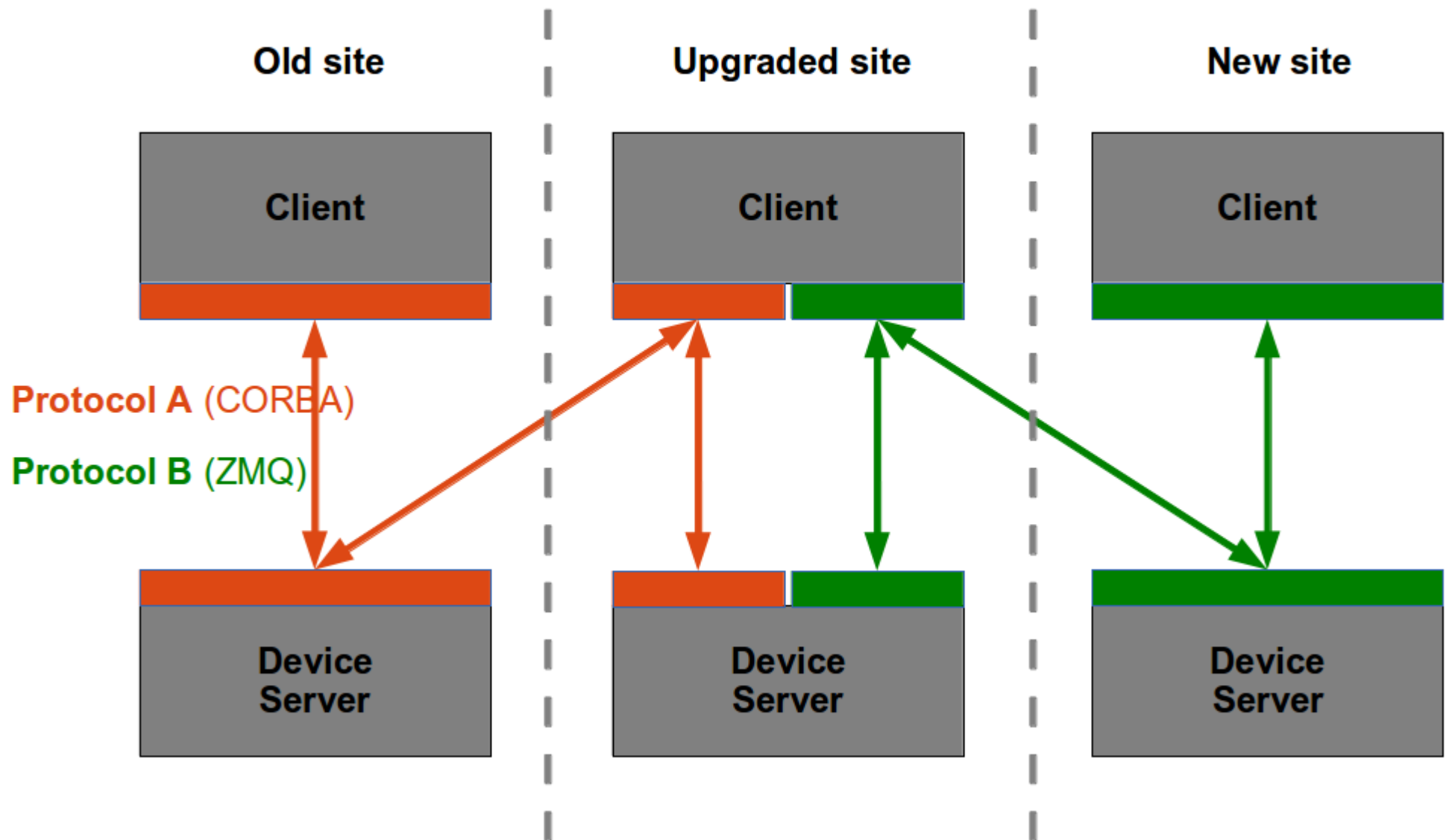
1. IDL – *TANGO has only ONE interface (Device)!*
2. IOR – replace with `<protocol>:<host><port><FQDN>`
3. DII – replace with **ROUTER-ROUTER** socket pattern
4. Corbaloc – same as for IOR
5. Collocation – replace with `<inproc>`
6. CDR serialisation – replace with open source library
7. Binary performance – **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



# 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

A series of smooth, dark, rounded stones are arranged in a path that leads from the foreground into the water. The stones are dark and have a glossy finish, reflecting the light. The water is calm, with gentle ripples around the stones. The background is a soft, out-of-focus view of the water and the horizon.

- **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**