dialog™

Video Stream Management
on Connected Devices

Service-oriented Architecture

ZeroMQ using Scala, Akka and Zookeeper

Toronto Scala Meetup — Dec 3, 2012

About mDialog

- Video streaming to connected devices (iOS, Xbox, AppleTV, Roku, Android, etc)
- Work with broadcasters and service providers
- Distributed system written primarily in Scala deployed on Amazon EC2

System Architecture

- Began migrating in 2011 from very large Rails app to distributed system written in Scala
- ZeroMQ for asynchronous messaging, load balancing
- Zookeeper for high availability, service registry

Asynchronous messaging

(aka zmq, ZeroMQ)

Powerful messaging library.

Not a message queue.

Why ZeroMQ

- Bindings for many languages
- Allow integration with legacy applications
- Fast, efficient
- Elegant support in Akka
- Async messaging great fit for Actor Model

```
import akka.actor._
import akka.zeromq._

val listener = system.actorOf(Props(new Actor {
  def receive: Receive = {
    case Connecting     ⇒ //...
    case m: ZMQMessage ⇒ //...
    case _              ⇒ //...
  }
}))

val subSocket = system.newSocket(SocketType.Sub,
  Listener(listener), Connect("tcp://127.0.0.1:1234"),
  Subscribe("foo"))

val pubSocket = system.newSocket(SocketType.Pub,
  Bind("tcp://127.0.0.1:1234"))

pubSocket ! ZMQMessage(Seq(Frame("foo"), Frame("bar")))
```

zeromq-scala-binding

(https://github.com/valotrading/zeromq-scala-binding)

- Used by Akka
- Interface identical to JZMQ
- Uses JNA as bridge to libzmq
- Does not require native component
- Can be quite a bit slower than JZMQ, which uses JNI

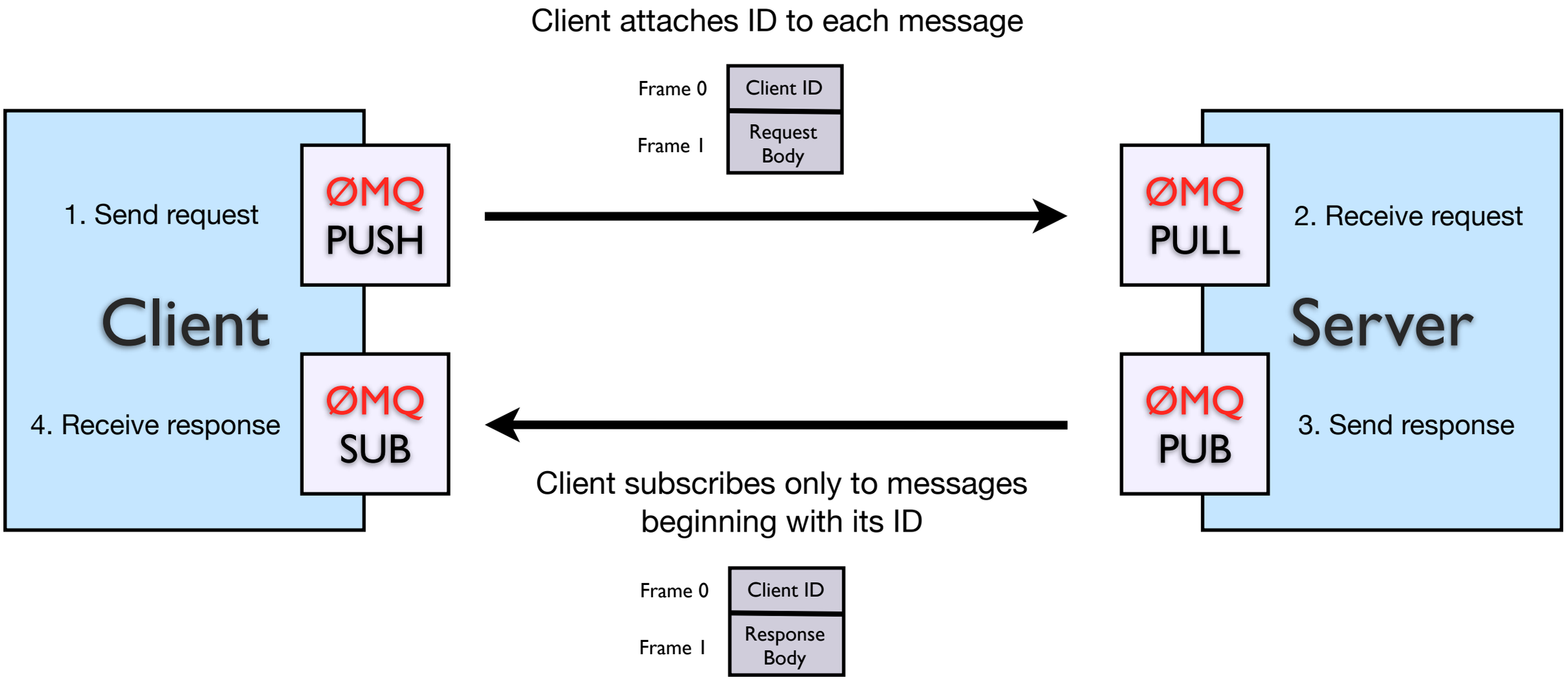
ZeroMQ messaging

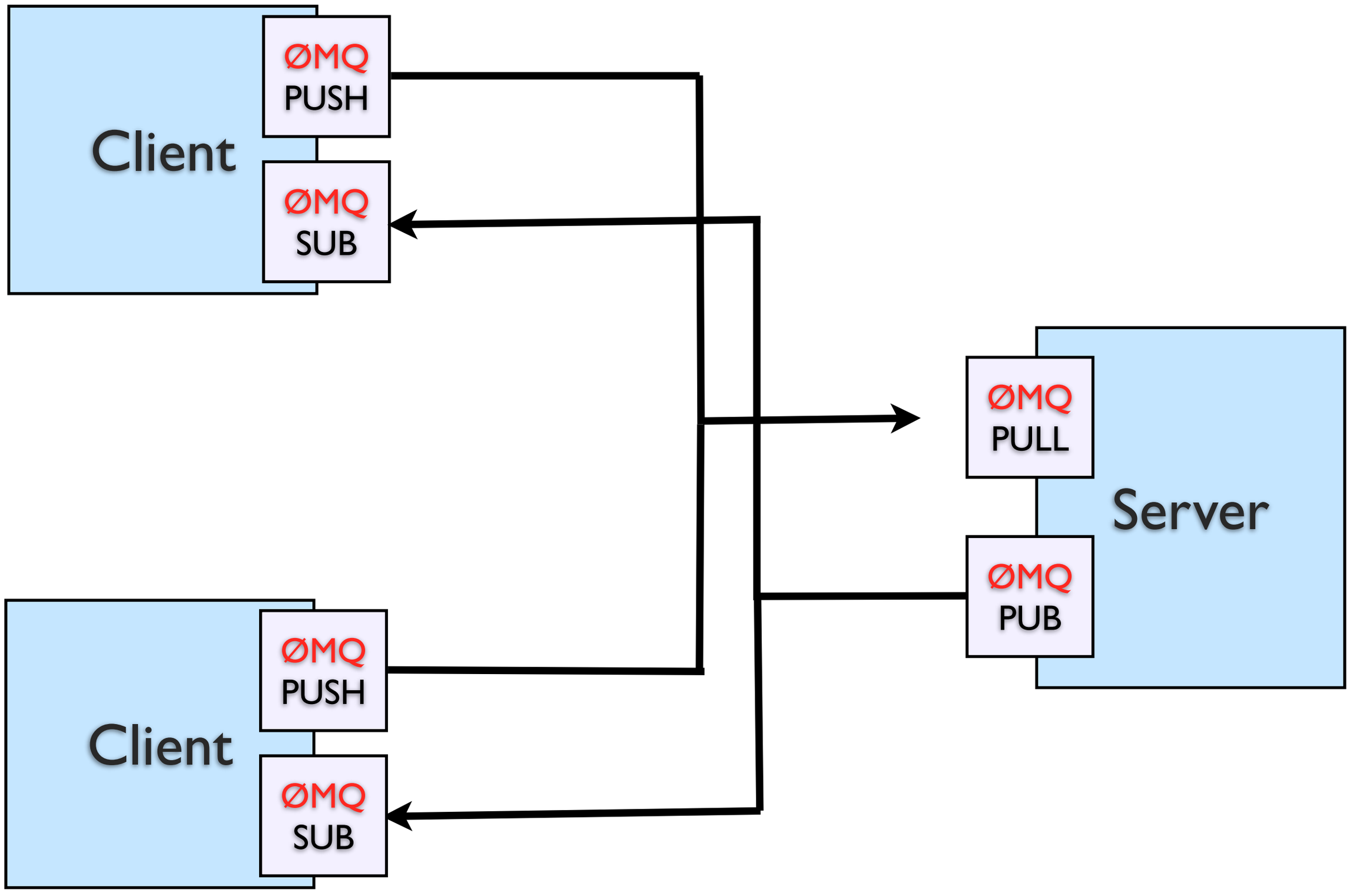
- Request - reply
- Publish - subscribe
- Push - pull
- Async request - reply

Our pattern:

Push requests to server, subscribe to responses

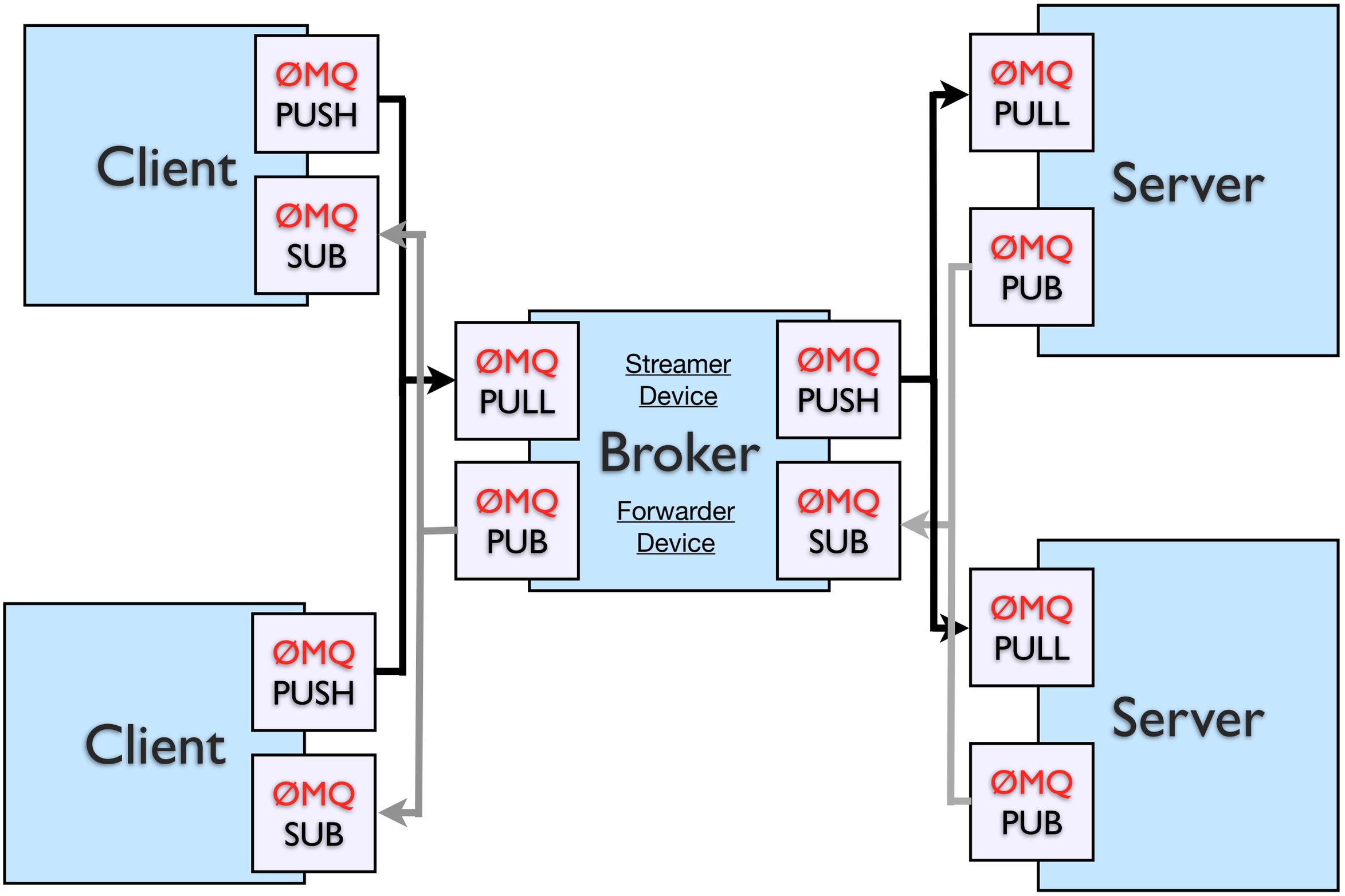
Basic protocol




Client
ØMQ
PUSH
ØMQ
SUB
ØMQ
PULL
Server
ØMQ
PUB
Client
ØMQ
PUSH
ØMQ
SUB

Load balancing

Simple brokers built with ZeroMQ “devices”


Client
ØMQ
PUSH
ØMQ
SUB
Client
ØMQ
PUSH
ØMQ
SUB
ØMQ
PULL
ØMQ
PUB
Streamer
Device
Broker
Forwarder
Device
ØMQ
PUSH
ØMQ
SUB
ØMQ
PULL
ØMQ
PUB
Server
ØMQ
PULL
ØMQ
PUB
Server

High availability

Zookeeper:
distributed coordination

Redundancy,
services **and** brokers

Zookeeper

- Service registry
- Track active services:
  - component instances
  - brokers
- Leader election
- Failover

In the end...

```
import akka.actor._
import com.mdialog.zombie._

val listener = system.actorOf(Props(new Actor {
  def receive = {
    case m: Message ⇒ println(new String(m.payload(0)))
  }
}))

val serviceHandler = system.actorOf(Props(new Actor {
  def receive = {
    case m: Message ⇒ sender ! m
  }
}))

val client = system.actorOf(Props(new ClientConnection(
  "my-service", Listener(listener),
  Subscribe("my-client-id"))))

val server = system.actorOf(Props(new ServerConnection(
  "my-service", Listener(serviceHandler))))

client ! Message("echo this")
```

Open source?

Not yet, but if you're interested...

Also from **mDialog**...

Smoke, simple HTTP services with Akka using Netty

http://github.com/mDialog/smoke

https github.com/mDialog/smoke — mDialog/smoke Reader

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Simple, asynchronous HTTP with Akka. — Read more

Clone in Mac ZIP HTTP SSH Git Read-Only https://github.com/mDialog/smoke.git Read+Write access

branch: master Files Commits Branches 2 Tags 1 Downloads

smoke / 78 commits

Release 0.3.0. Drop Mongrel2. We can bring it back later in a supplem…

chrisdinn authored 2 months ago latest commit 5a0038099f

src	2 months ago	Release 0.3.0. Drop Mongrel2. We can bring it back later in a supplem… [chrisdinn]
.gitignore	3 months ago	Ignore Eclipse files [Ivor Williams]
LICENSE	7 months ago	Initial commit. [chrisdinn]
README.md	2 months ago	Release 0.3.0. Drop Mongrel2. We can bring it back later in a supplem… [chrisdinn]
build.sbt	2 months ago	Release 0.3.0. Drop Mongrel2. We can bring it back later in a supplem… [chrisdinn]

We’re hiring Scala developers

Talk to me now or email cdinn@mdialog.com