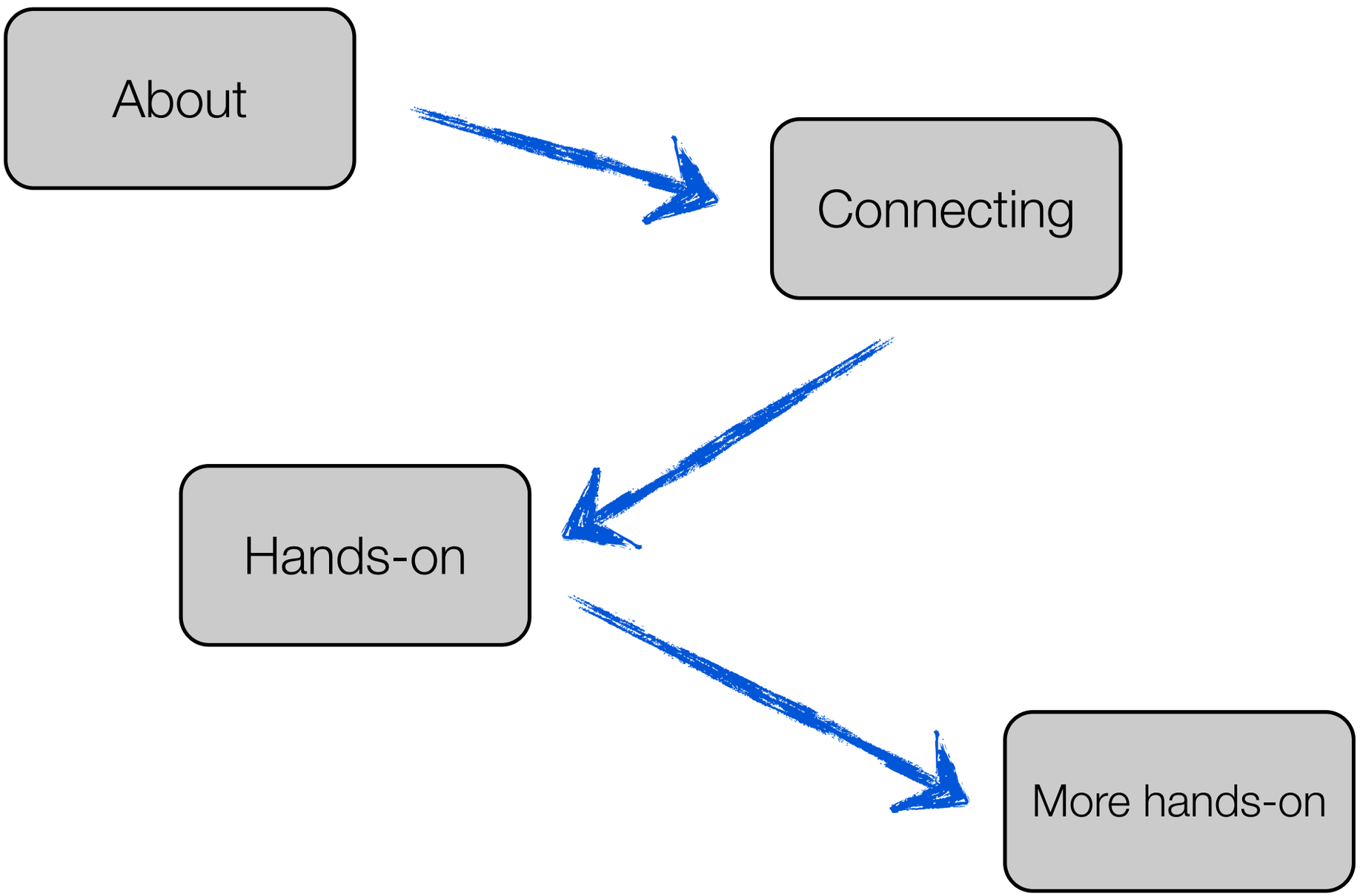
Designing systems in Processing with OOCSI

by Mathias Funk, December 2013

What we do today



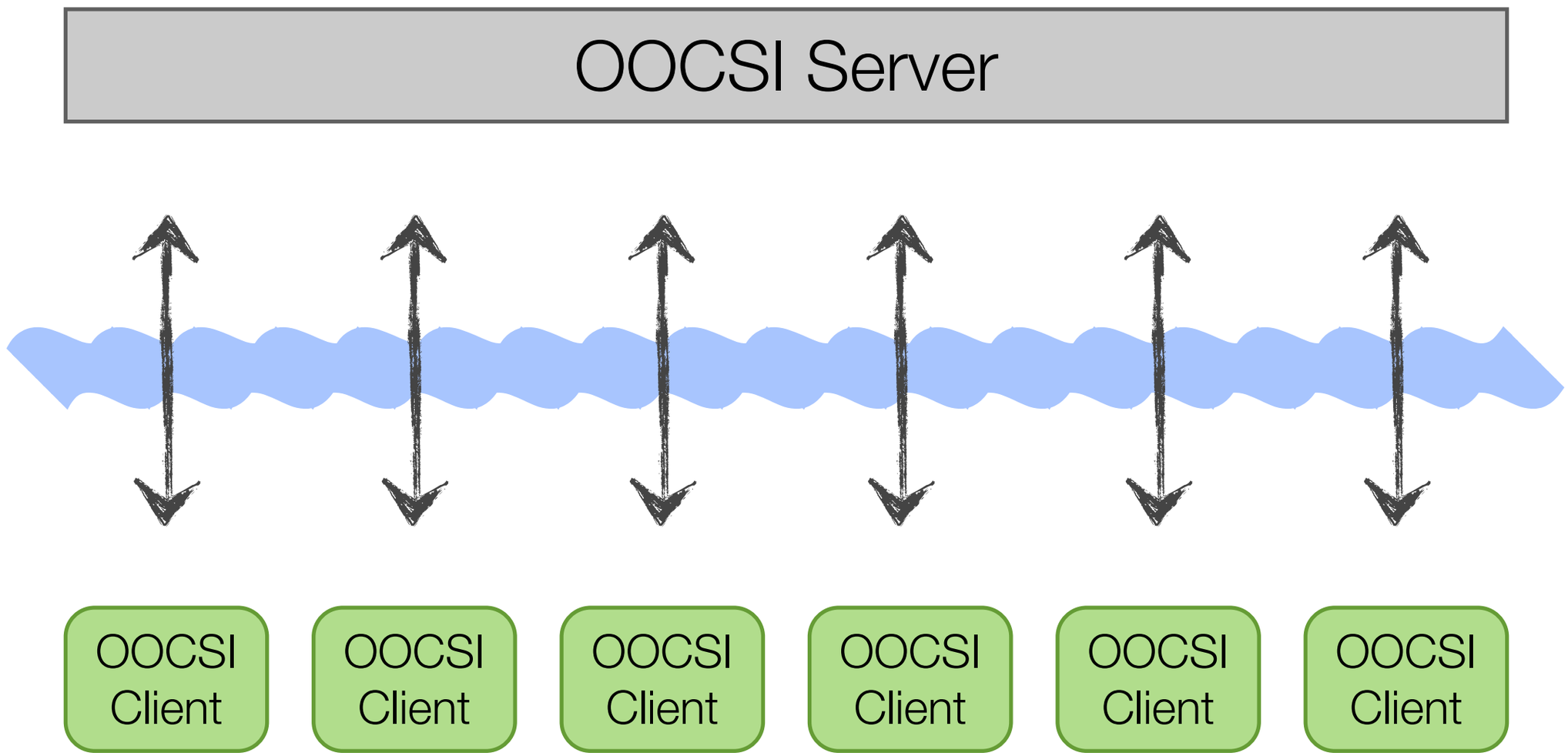
OOCSI

(Out of Control for Semantic Interactivity)

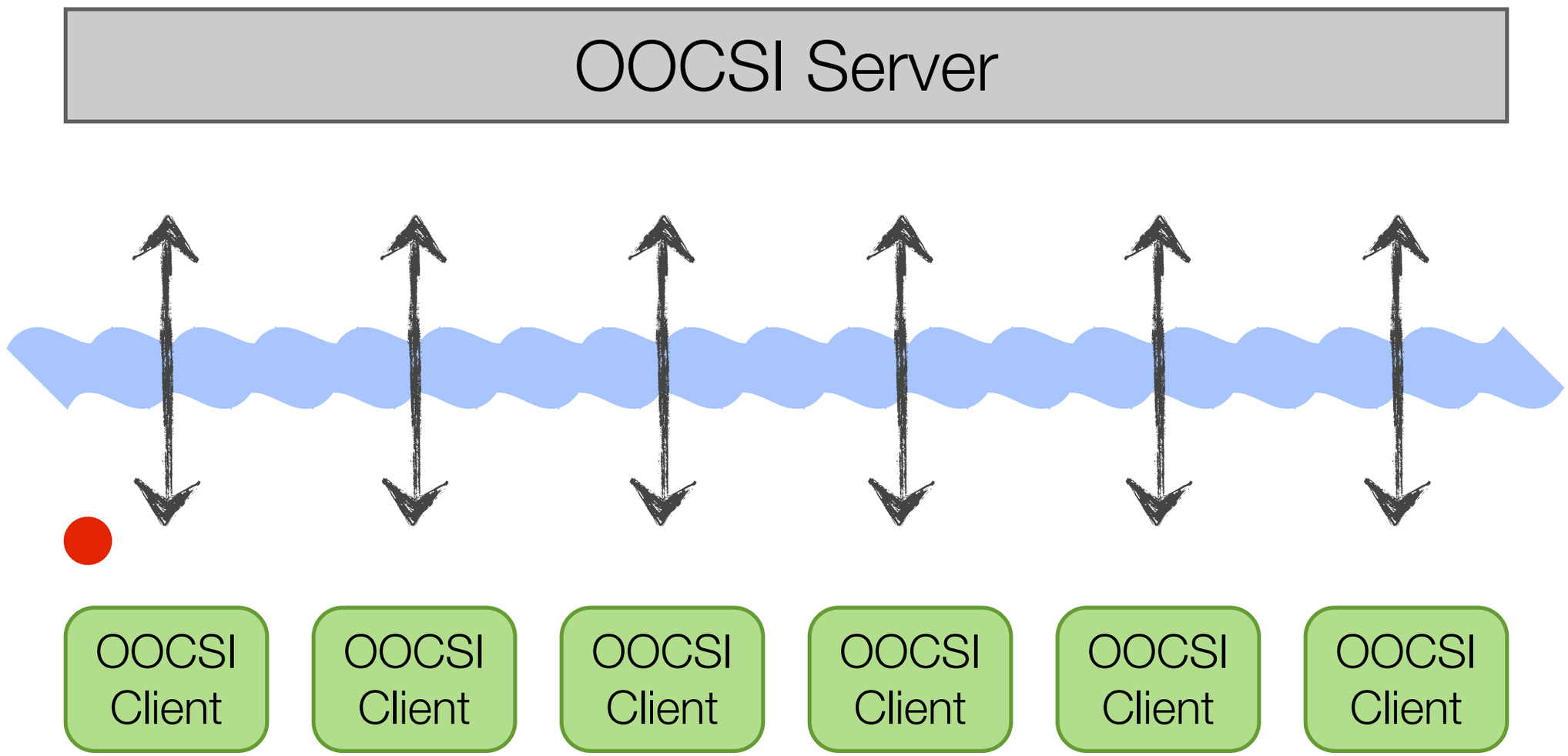
What is it?

A simple systems-interaction
fabric for use by designers.

- Easy communication between different computers
- Sending and receiving messages
- Channels (broadcasting to single or multiple computers)
- Data types, semantics, actions


OOCSI Server
OOCSI Client
OOCSI Client
OOCSI Client
OOCSI Client
OOCSI Client
OOCSI Client

Messages in OOCSI


OOCSI Server
OOCSI Client
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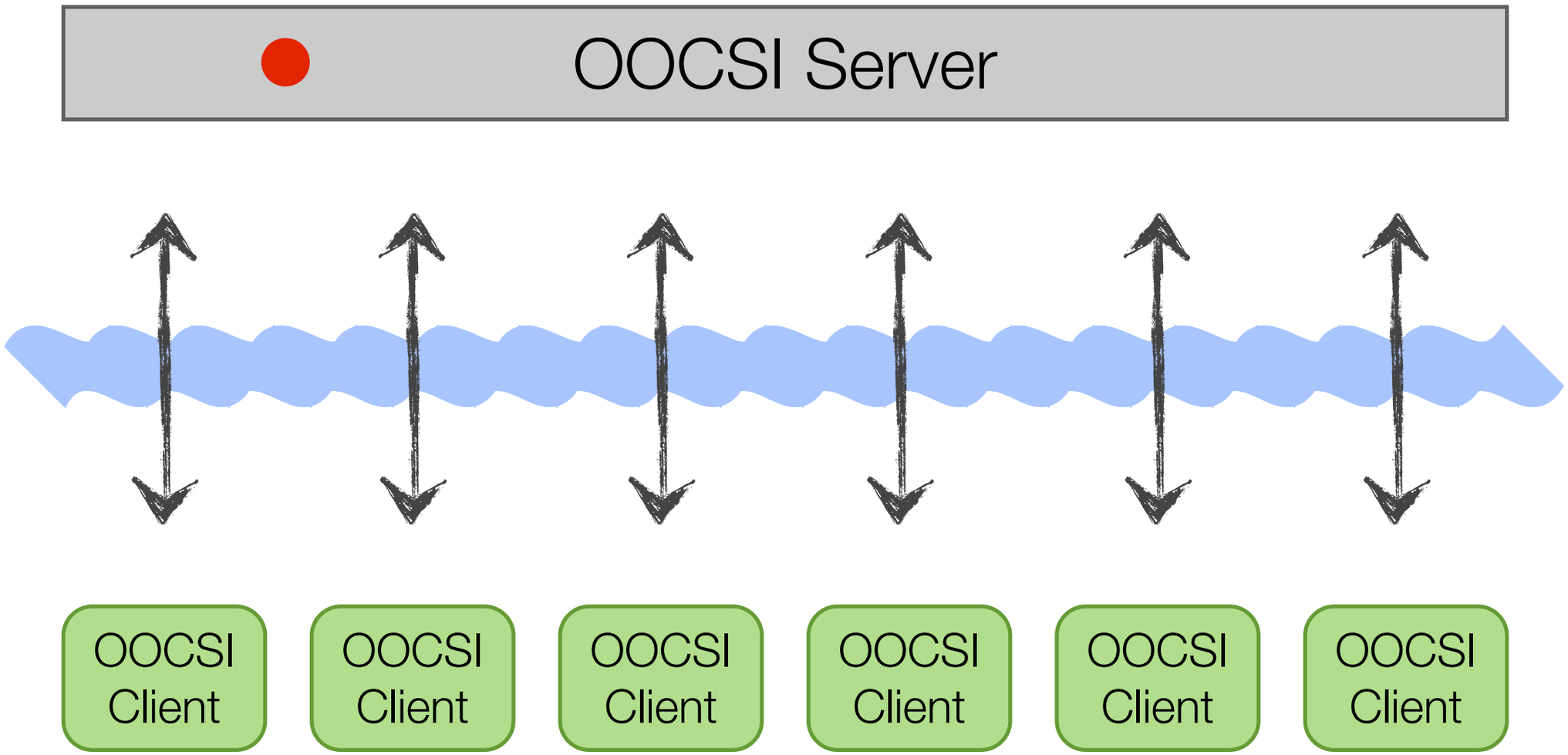
OOCSI Server
OOCSI Client
OOCSI Client
OOCSI Client
OOCSI Client
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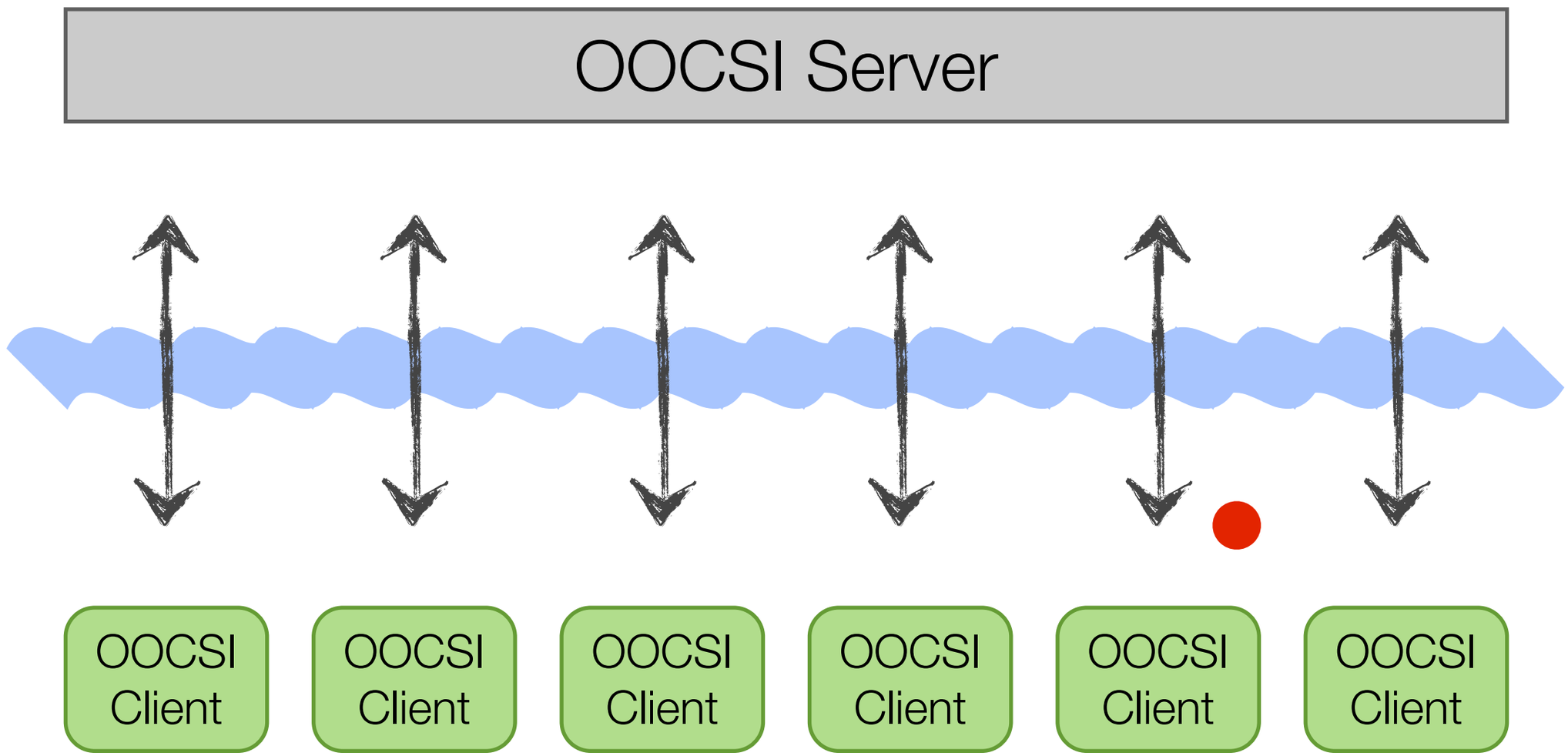
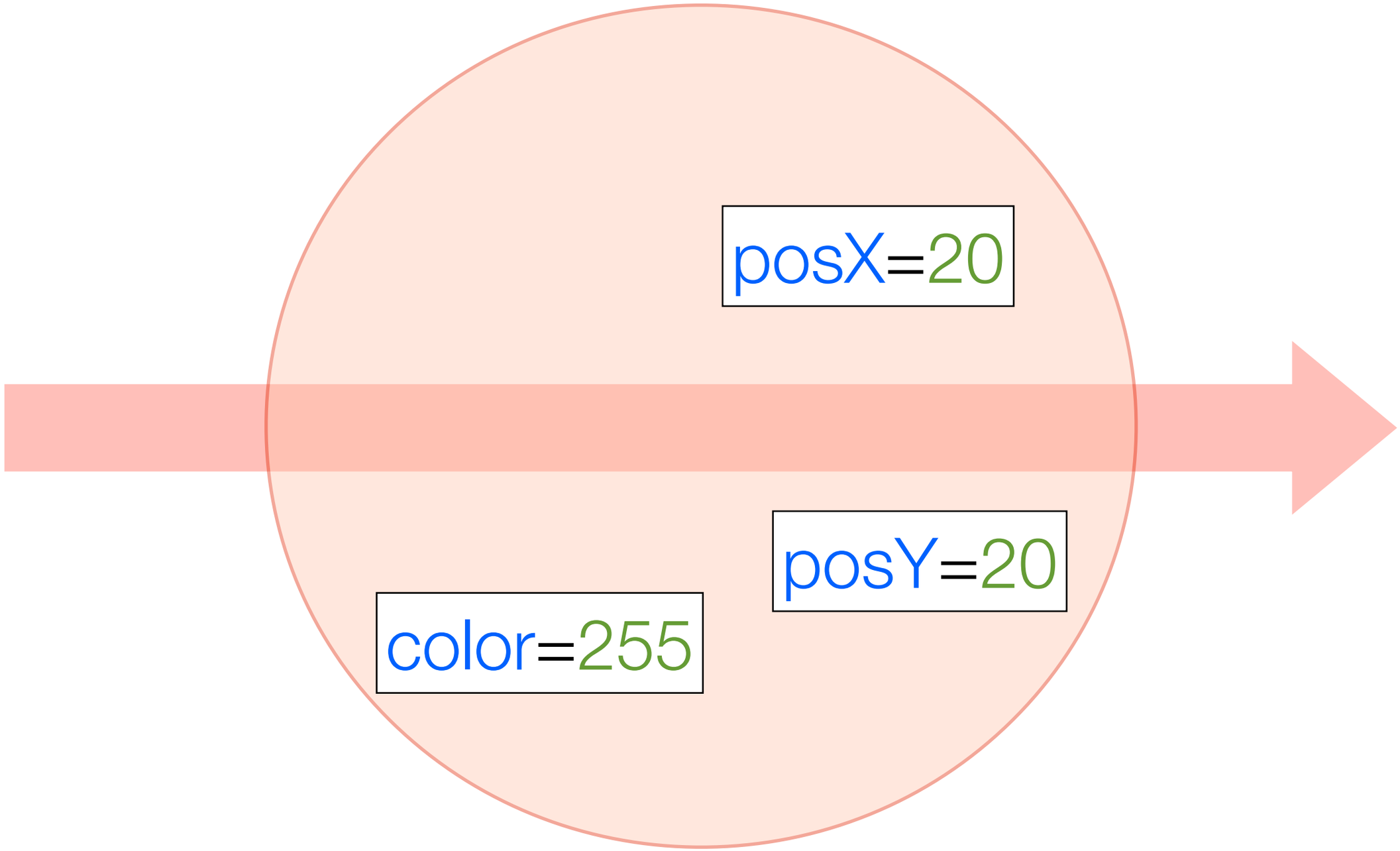
OOCSI Client


OOCSI Server
OOCSI Client
OOCSI Client
OOCSI Client
OOCSI Client
OOCSI Client
OOCSI Client

Inside a message

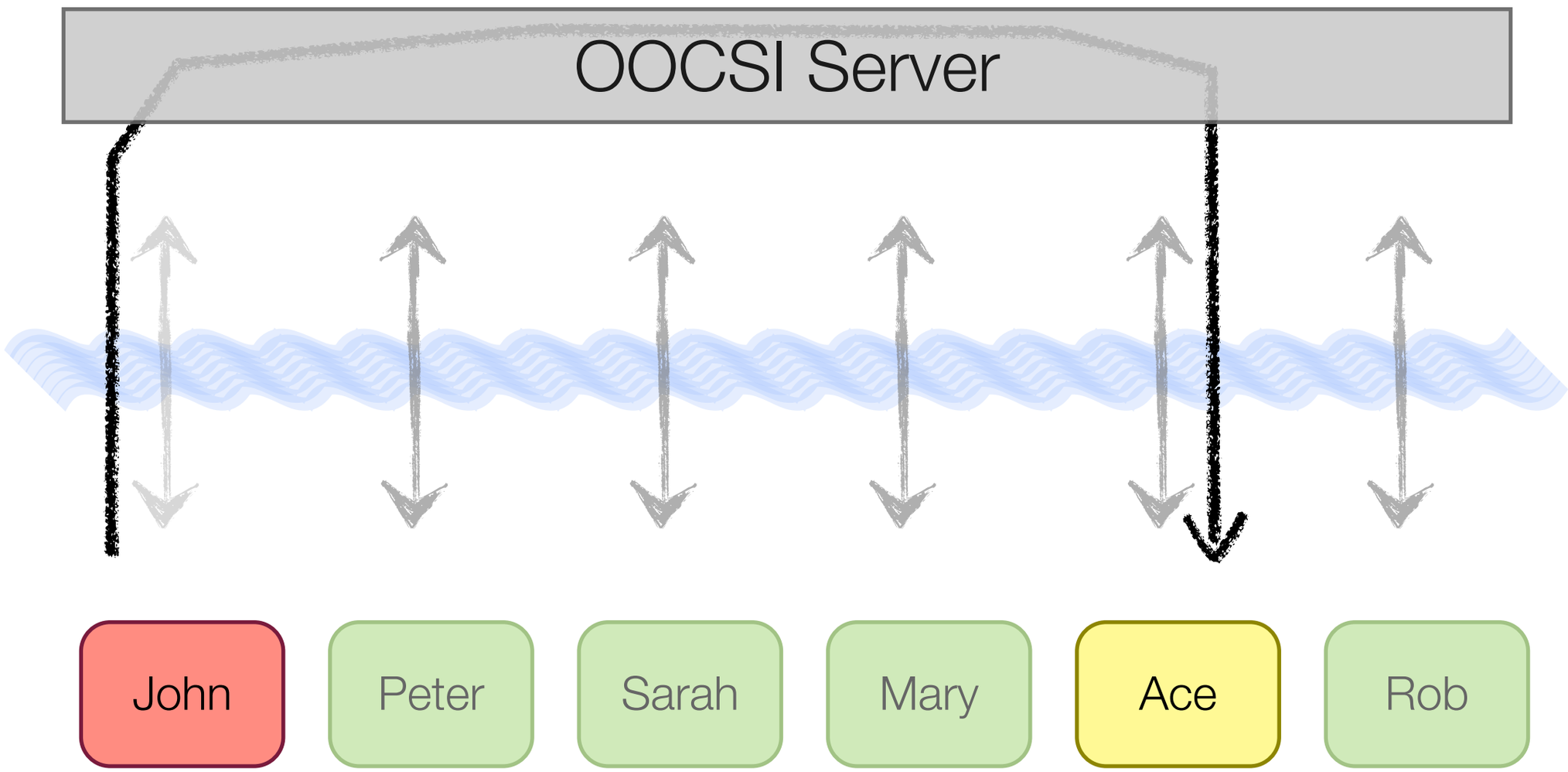


the name of the data

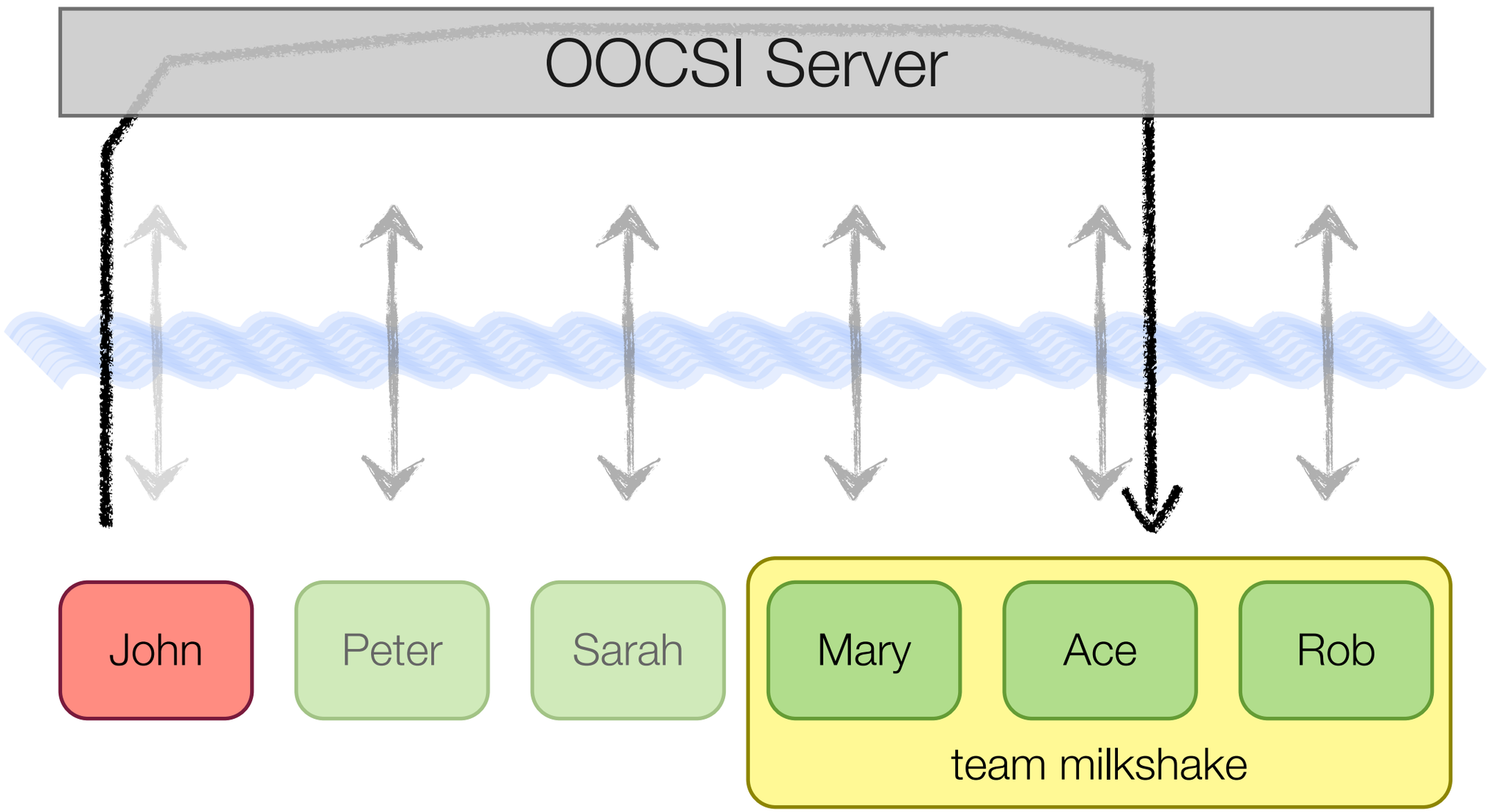
the actual data

key=value

Sending from single client to single client



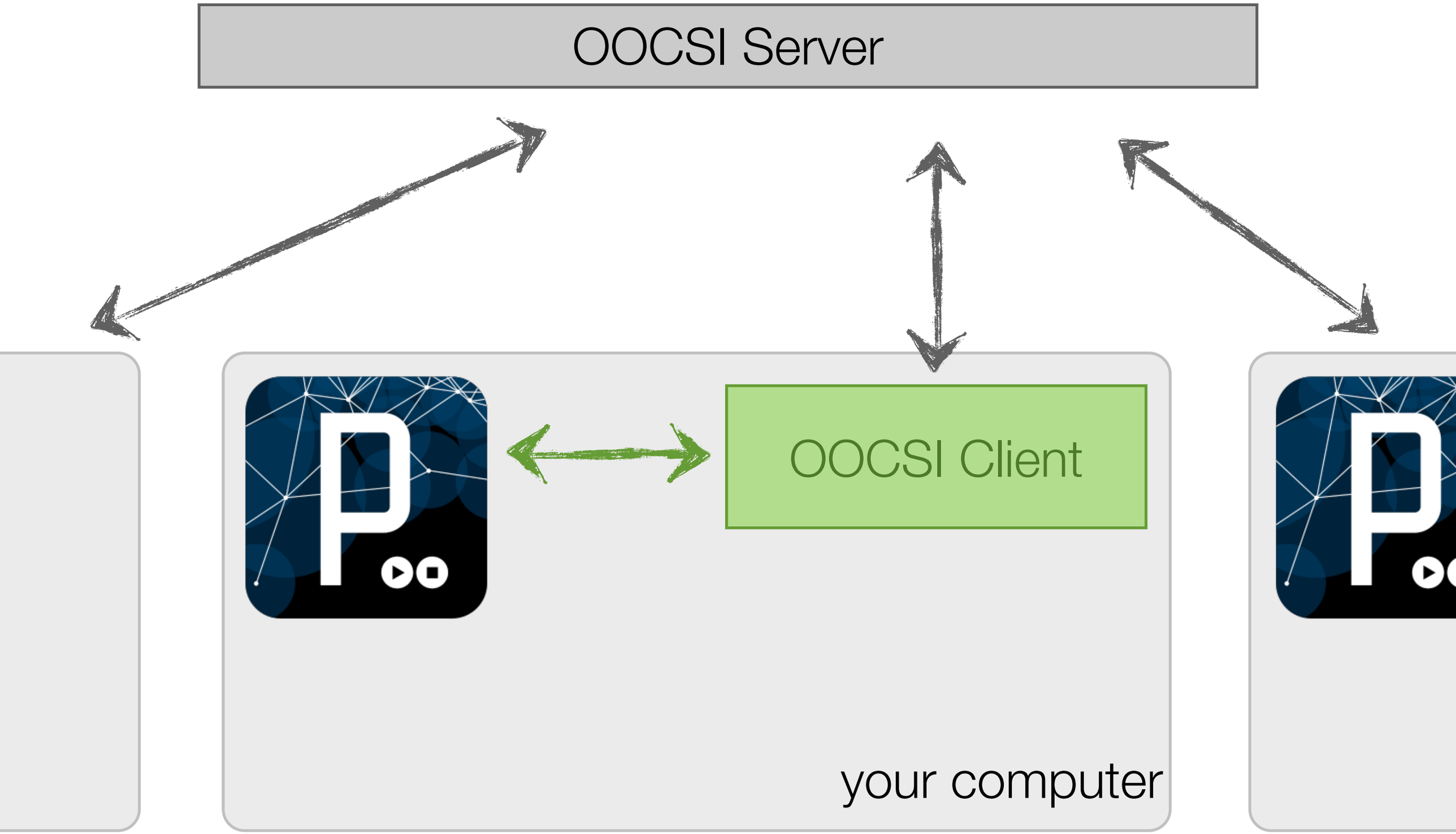
Sending from single client to whole group



Yes, all interesting,
but when can I play
with it myself?!

soon

Setup


OOCSI Server
OOCSI Client
your computer

How to install the OOCSI Processing library

1. Download this: http://bit.ly/1ek8QPA

2. You got Processing installed? (No -> www.processing.org)

3. Close Processing if running

4. Find the directory where it is installed

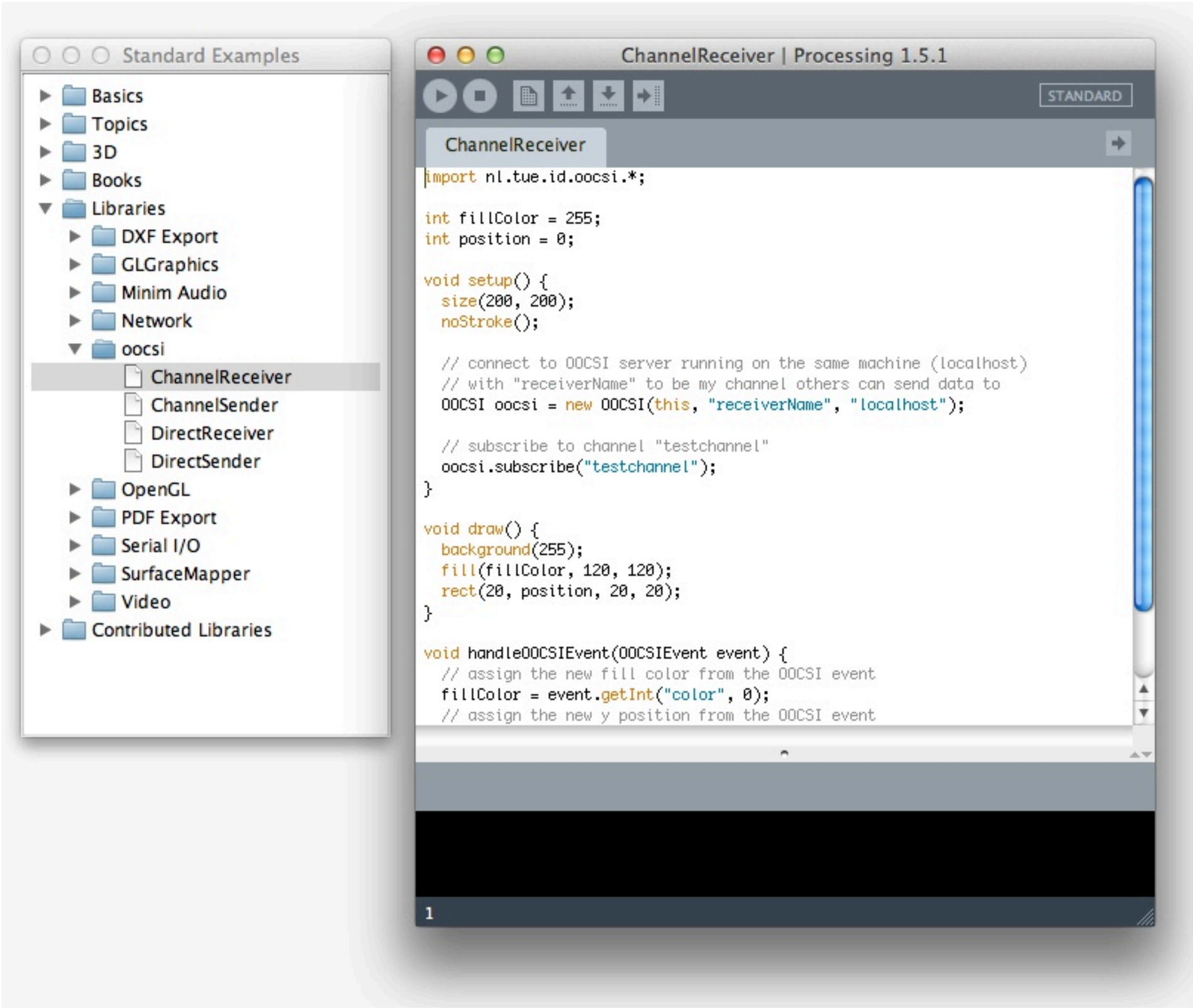
5. Find the subdirectory: modes/java/libraries

6. Extract downloaded zip file to that directory

7. Start Processing

Hands-on

First connection



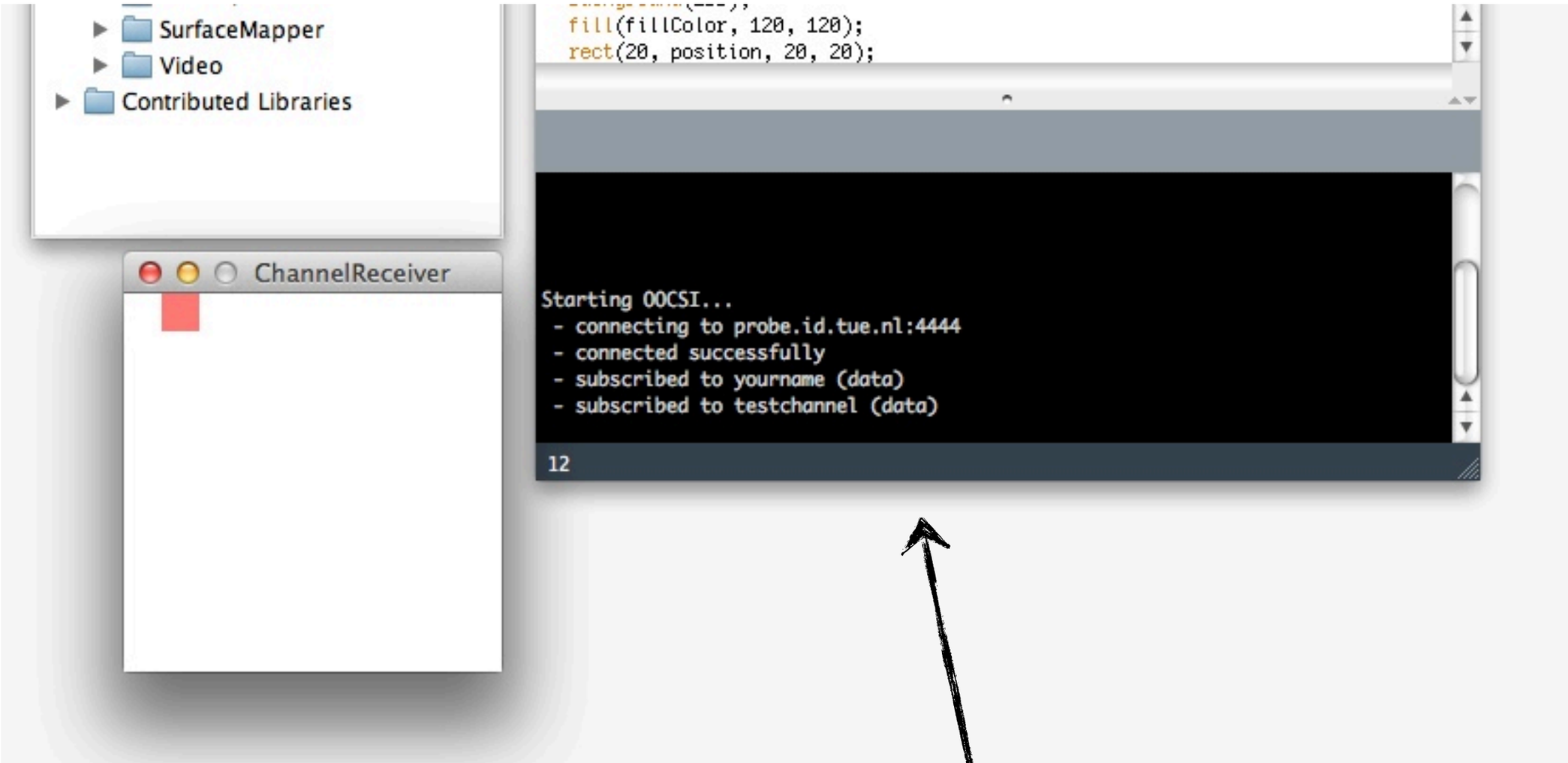
1. Change client name:

```
// connect to OOCSI server running on the same machine (localhost)
// with "receiverName" to be my channel others can send data to
OOCSI oocsi = new OOCSI(this, "yourname", "probe.id.tue.nl");

// subscribe to channel "testchannel"
oocsi.subscribe("testchannel");
```

2. Change server:

```
// connect to OOCSI server running on the same machine (localhost)
// with "receiverName" to be my channel others can send data to
OOCSI oocsi = new OOCSI(this, "yourname", "probe.id.tue.nl");

// subscribe to channel "testchannel"
oocsi.subscribe("testchannel");
```

Running the sketch...



Check out the messages

How does it work?

1 - Connecting to OOCSI

```
import nl.tue.id.oocsi.*;

OOCSI oocsi;

void setup() {
  size(200, 200);
  background(120);
  frameRate(10);

  // connect ot OOCSI server running on the same machine (localhost)
  // with "senderName" to be my channel others can send data to
  oocsi = new OOCSI(this, "John", "localhost");
}
```

- Register with a name, for example: “John” or “group3” or “Dolphin”
- Register at a running OOCSI server, for example: “localhost” or “probe.id.tue.nl”

2 - Subscribing (and receiving)

- Subscribe to messages by adding a method “handleOOCSIEvent”:

```
void handleOOCSIEvent(OOCSIEvent event) {
  // assign the new fill color from the OOCSI event
  fillColor = event.getInt("color", 0);
  // assign the new y position from the OOCSI event
  position = event.getInt("position", 0);
}
```

- Get data out with getInt, getBoolean, getFloat, getString or getObject calls
  - Always give a key to the data, such as “color” or “position”
  - Data types will be int, boolean, float, String or Object respectively
  - Provide default values in case the data does not exist

Standard Examples

- Basics
- Topics
- 3D
- Books
- Libraries
  - DXF Export
  - GLGraphics
  - Minim Audio
  - Network
  - oocsi
    - ChannelReceiver
    - ChannelSender
    - DirectReceiver
    - DirectSender
  - OpenGL
  - PDF Export
  - Serial I/O
  - SurfaceMapper
  - Video
- Contributed Libraries

ChannelSender | Processing 1.5.1

STANDARD

ChannelSender §

```
import nl.tue.id.oocsi.*;

OOCSI oocsi;

void setup() {
  size(200, 200);
  background(120);
  frameRate(10);

  // connect ot OOCSI server running on the same machine (localhost)
  // with "senderName" to be my channel others can send data to
  oocsi = new OOCSI(this, "senderName", "probe.id.tue.nl");
}

void draw() {
  // send to OOCSI ...
  oocsi
    // on channel "testchannel"...
  .channel("testchannel")
    // data labeled "color"...
    .data("color", mouseX)
      // data labeled "position"...
      .data("position", mouseY)
        // send finally
        .send();
}
```

connecting

sending

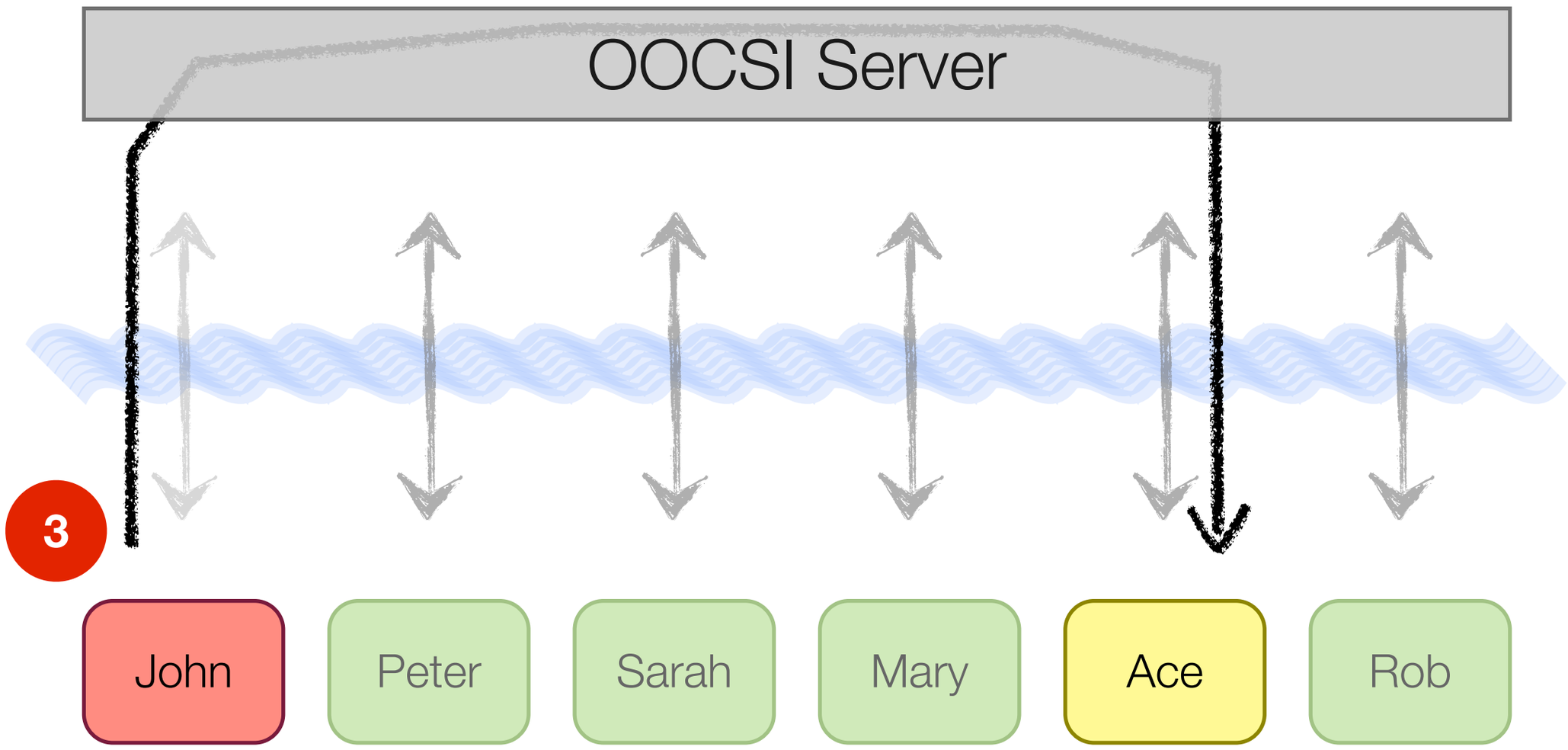
12

3 - Sending data

- Send messages with data by:
  - selecting a channel with `channel("testchannel")` or
  - selecting a single client with `channel("John")`
  - adding data with `data("key", value)`
  - sending it finally with `send()`

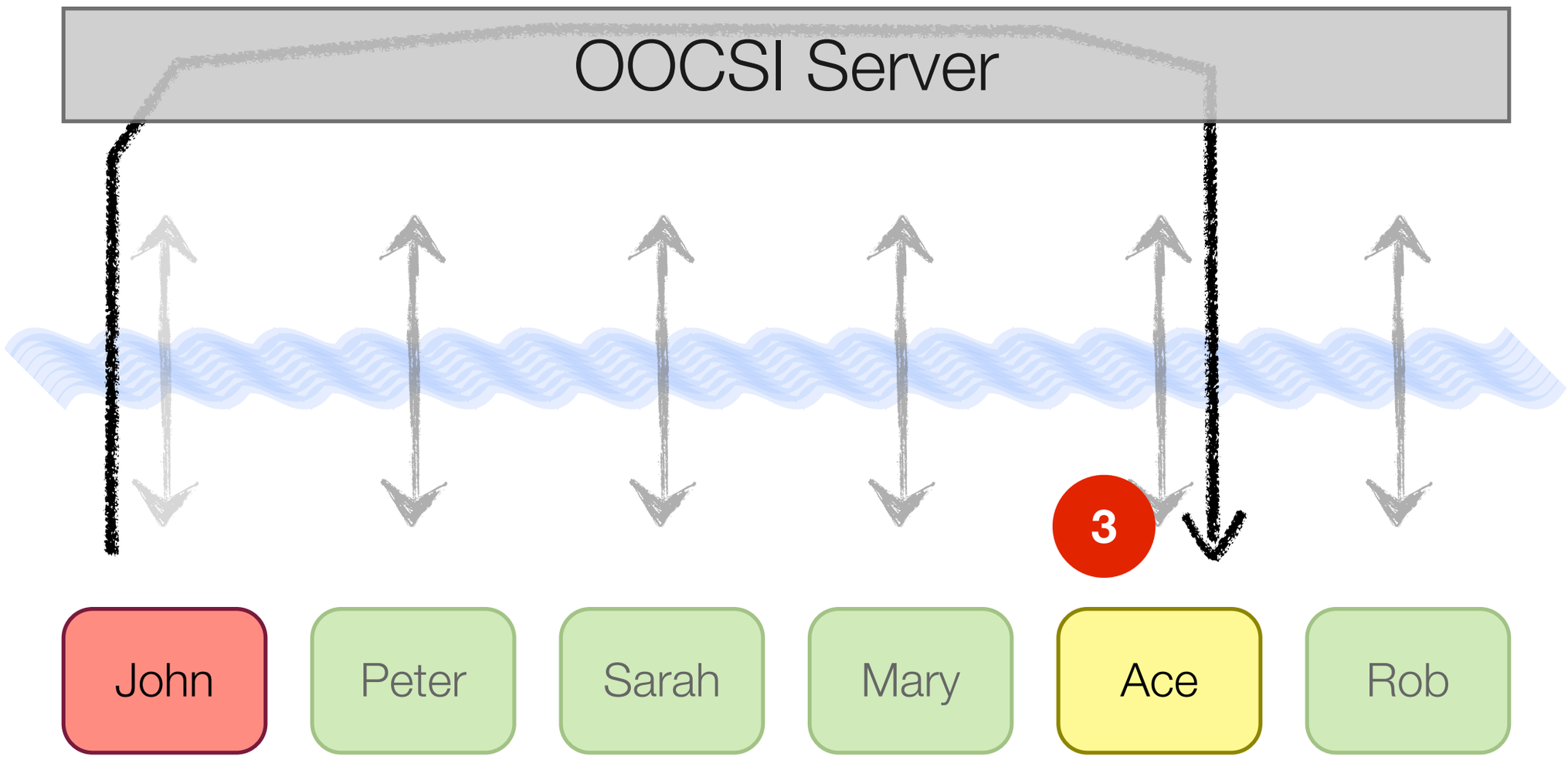
```
// send to OOCSI ...
oocsi
  // on channel "testchannel"...
.channel("testchannel")
  // data labeled "color"...
  .data("color", mouseX)
    // data labeled "position"...
    .data("position", mouseY)
      // send finally
      .send();
```

Sending data: client to client



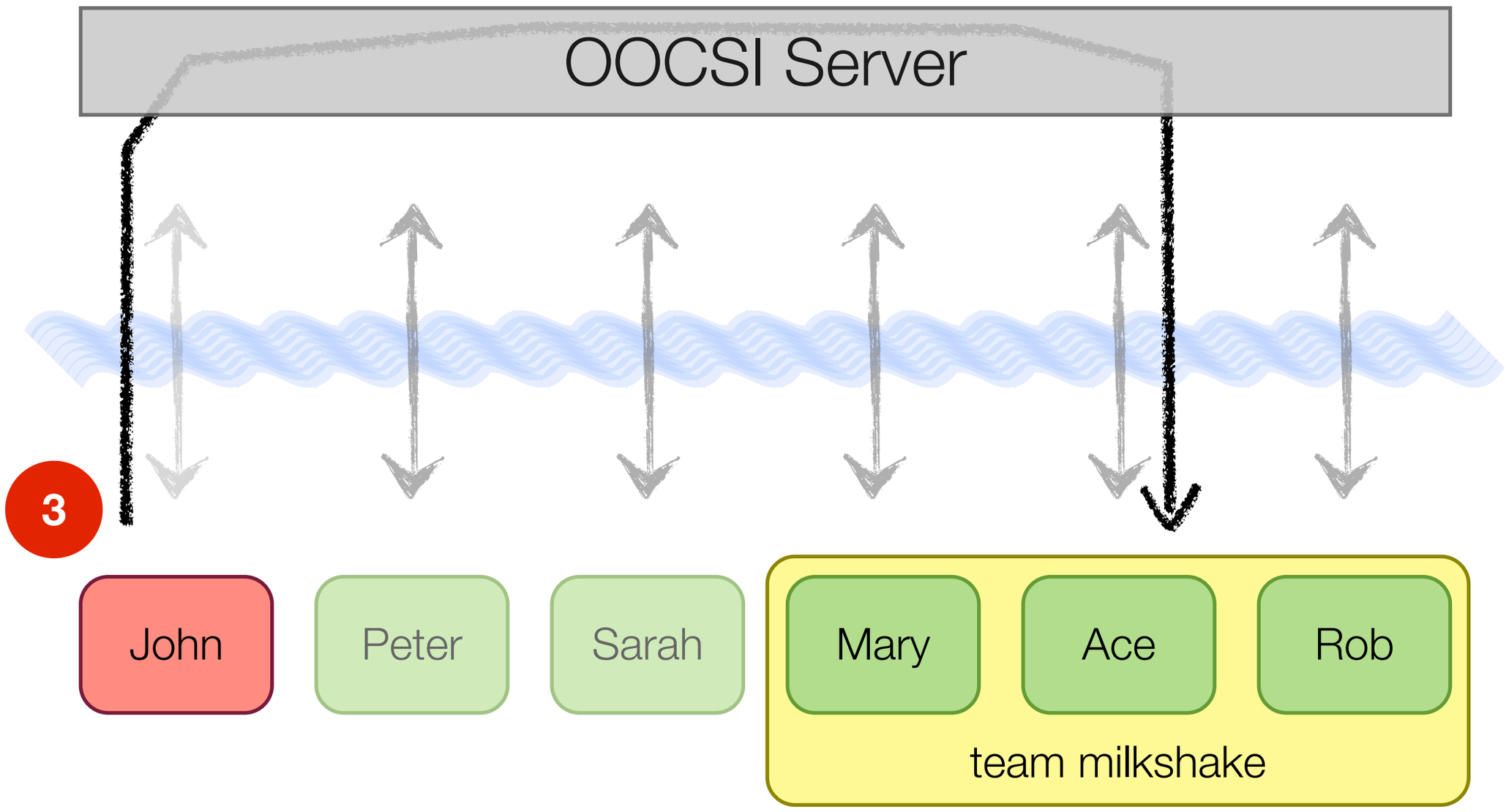

```
oocsi.channel("Ace").data("value", 3).send();
```

Sending data: client to client




```
oocsi.channel("Ace").data("value", 3).send();
```

Sending data: client to group



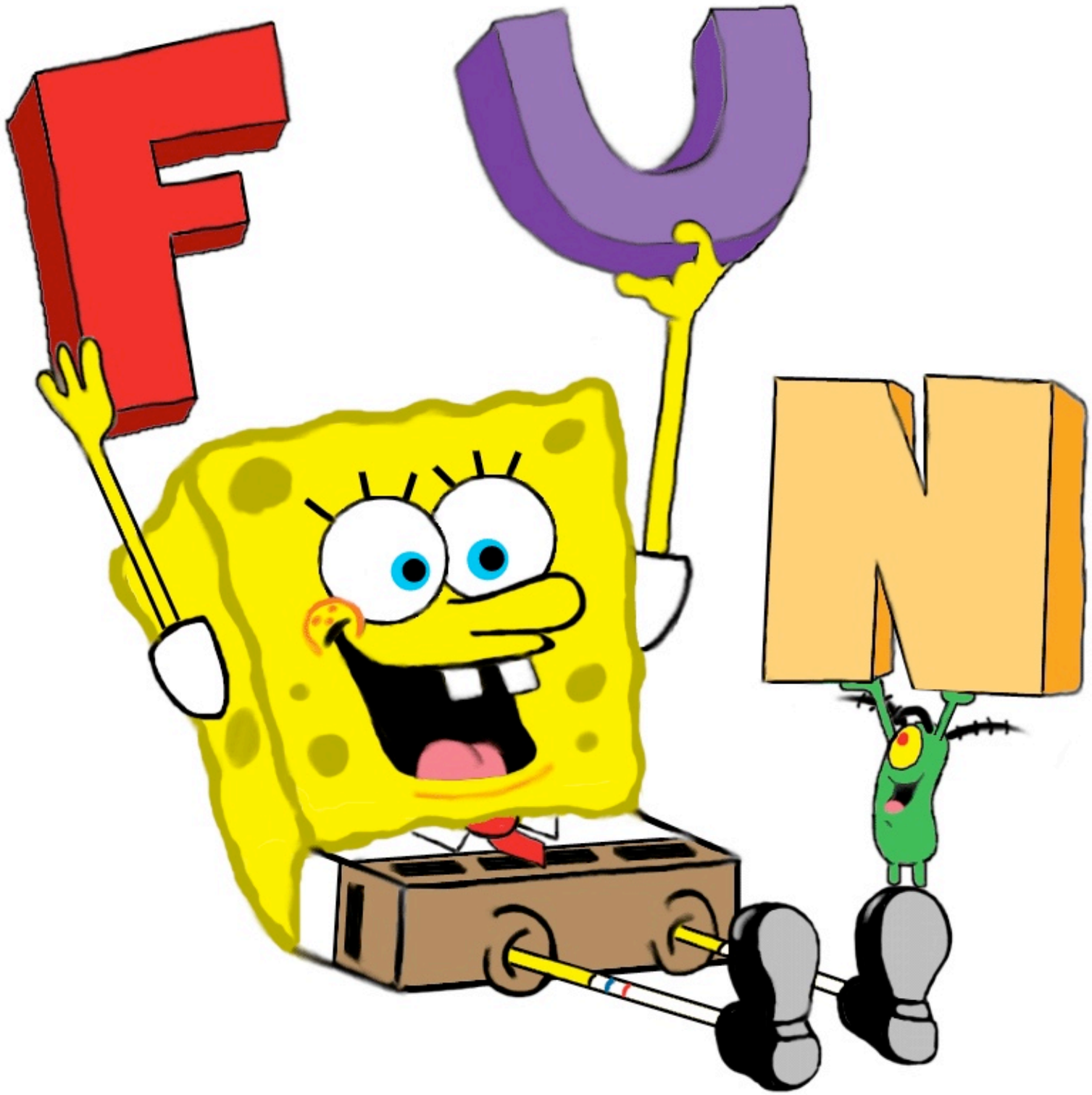

```
oocsi.channel("team milkshake").data("value", 3).send();
```

Remember:

Systems only work with cooperation!

Important hints

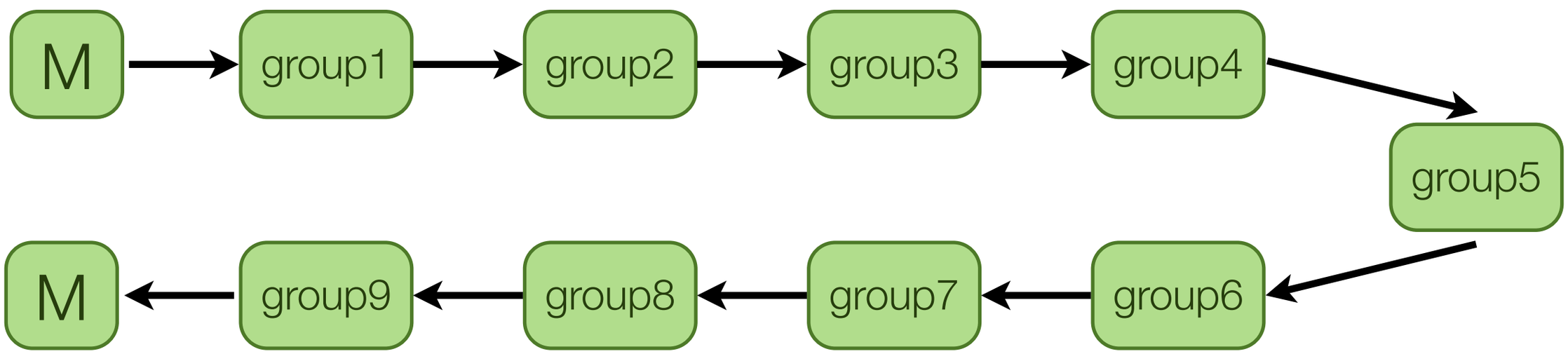
- Connect to the right server (“probe.id.tue.nl”)
- Check output on console
- Sending data
  - Use consistent naming for the data keys
  - Use consistent data types for the data values
  - Agree on what one is sending and how it can be received by others



Now, have some fun with OOCSI!

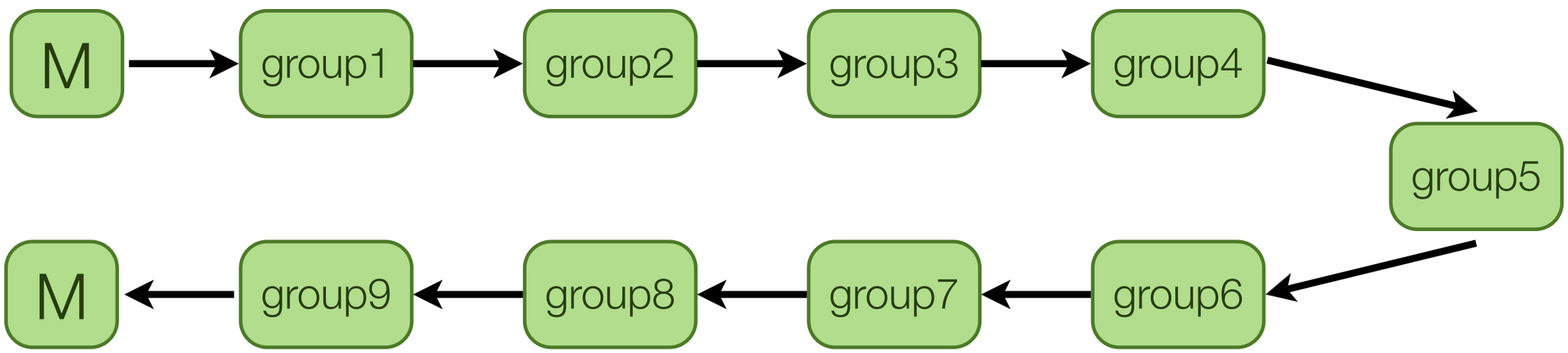
Hands-on: *the chain*

Every group adds 1

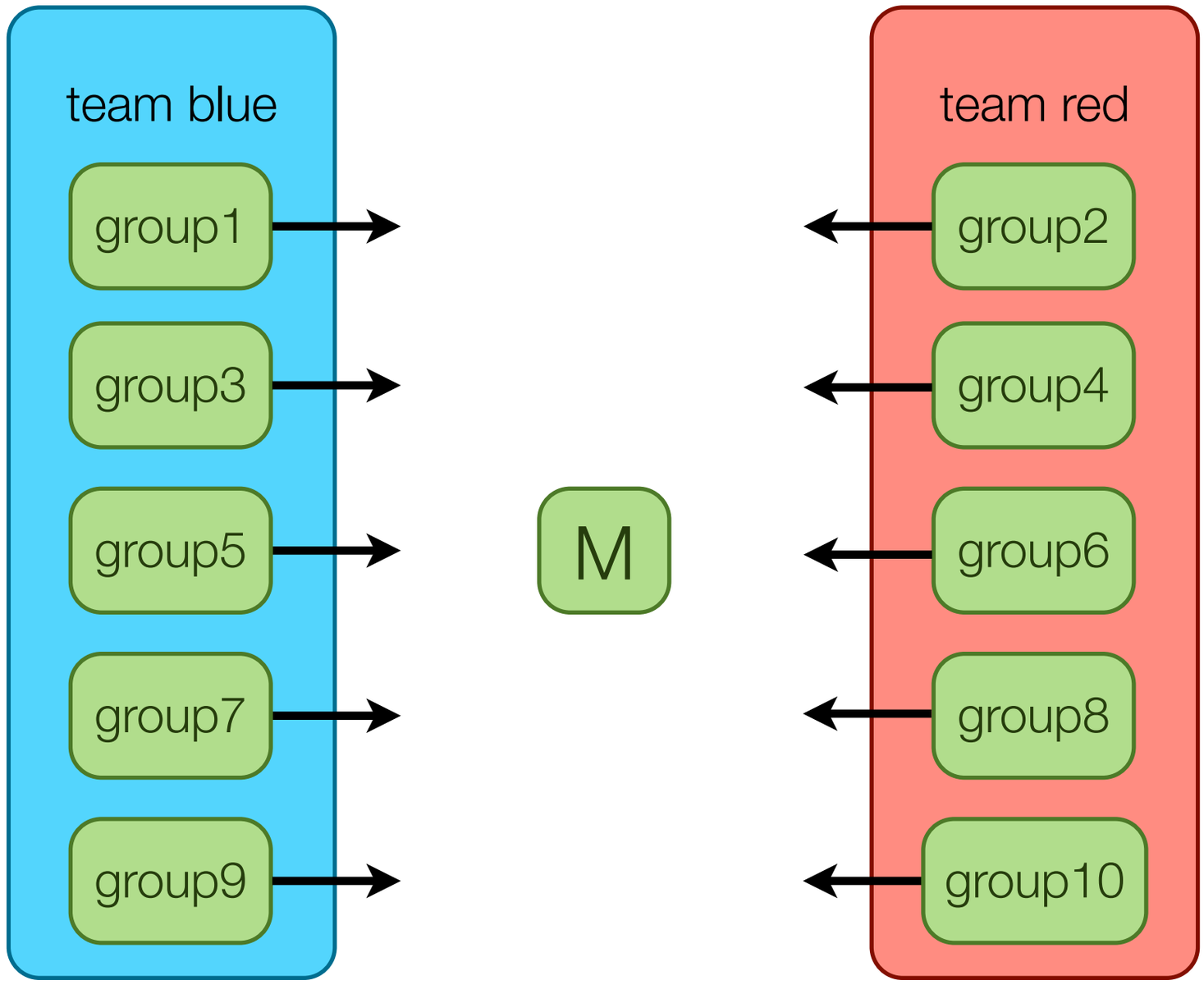


Hands-on: *the chain*

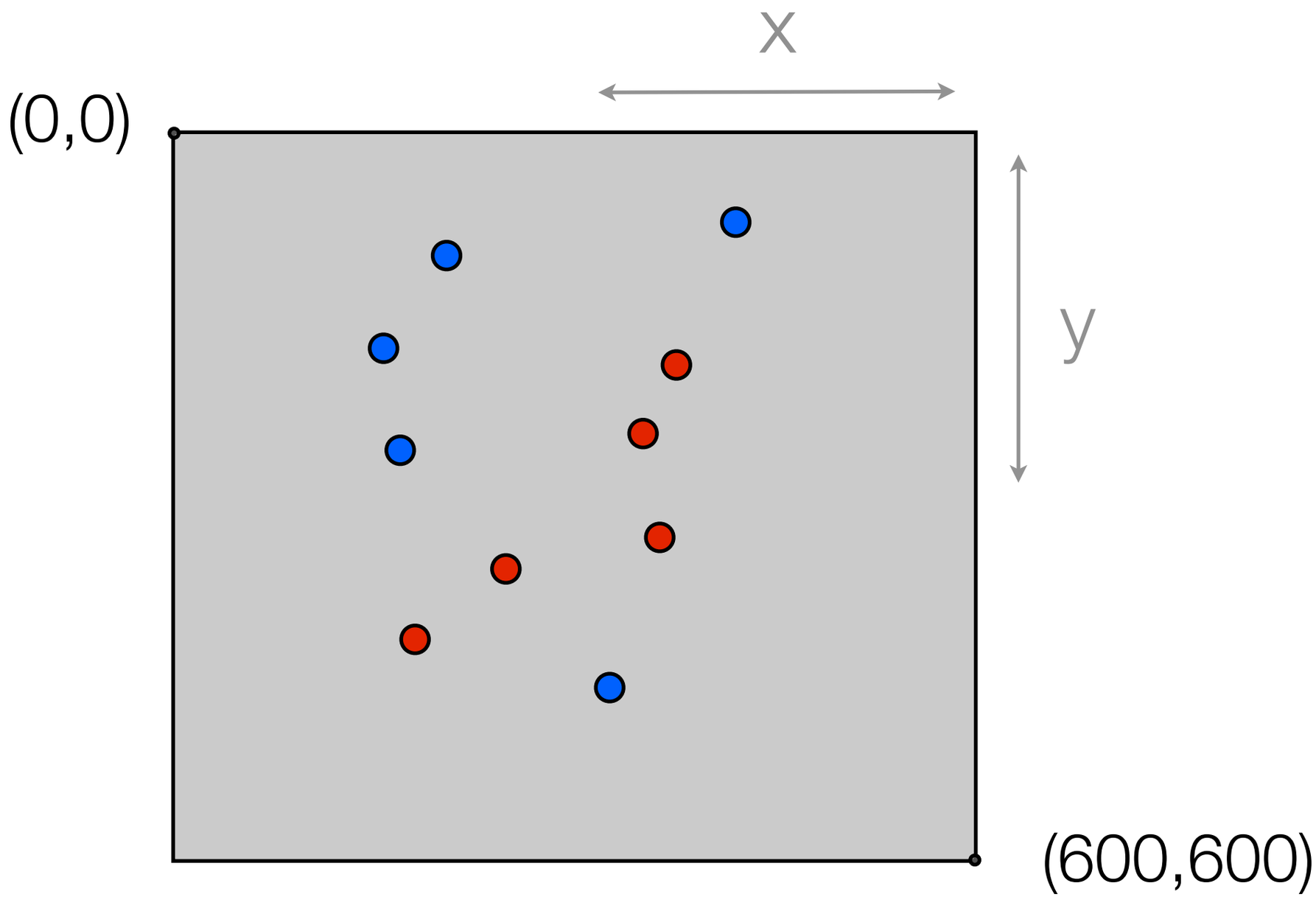
Every group adds group number



Hands-on: *the competition*



Hands-on: *the competition*



Hands-on: *the competition*

Try to stay alive (= don't touch walls)

- Receive: Position

```
void handleOOCSIEvent(OOCSIEvent event) {
  int x = event.getInt("x", 0);
  int y = event.getInt("y", 0);

  ...

}
```

- Send: Acceleration

```
oocsi.channel("M")
  .data("group", 1)
  .data("x", x)
  .data("y", y)
  .data("color", color(<RED>, <GREEN>, <BLUE>))
  .send();
```

Hands-on: *the competition*

Try to stay alive with gravity bursts

- Receive: Position

```
void handleOOCSIEvent(OOCSIEvent event) {
  int x = event.getInt("x", 0);
  int y = event.getInt("y", 0);

  ...

}
```

- Send: Acceleration

```
oocsi.channel("M")
  .data("group", 1)
  .data("x", x)
  .data("y", y)
  .data("color", color(<RED>, <GREEN>, <BLUE>))
  .send();
```

Hands-on: *the competition*

Let your team's balls flock in one place

- Receive: Position

```
void handleOOCSIEvent(OOCSIEvent event) {
  int x = event.getInt("x", 0);
  int y = event.getInt("y", 0);

  ...

}
```

- Send: Acceleration

```
oocsi.channel("M")
  .data("group", 1)
  .data("x", x)
  .data("y", y)
  .data("color", color(<RED>, <GREEN>, <BLUE>))
  .send();
```

Hands-on: *the competition*

Bounce balls into walls.

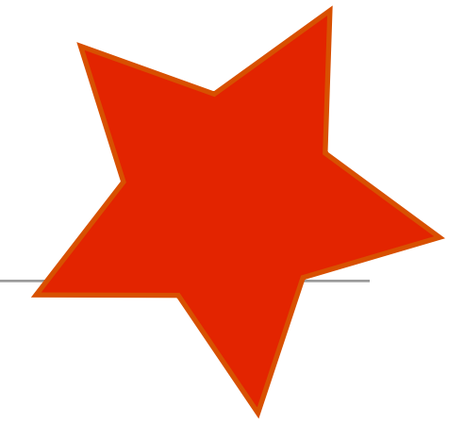
- Receive: Position

```
void handleOOCSIEvent(OOCSIEvent event) {
  int x = event.getInt("x", 0);
  int y = event.getInt("y", 0);

  ...

}
```

- Send: Velocity

```
oocsi.channel("M")
  .data("group", 1)
  .data("x", x)
  .data("y", y)
  .data("color", color(<RED>, <GREEN>, <BLUE>))
  .send();
```

Hands-on: *the collab*



Collaboratively paint the canvas

- Send: Position and color

```
oocsi
  .channel("M")
  .data("x", 100)
    .data("y", 20)
      .data("colorR", 100)
        .data("colorG", 180)
          .data("colorB", 120)
            .send();
```

Finally: *the code*

- If you want to
  - ...know how it works
  - ...extend it
- Check out: GitHub.com
  - Processing client code: https://github.com/iddi/oocsi-processing
  - Server code: https://github.com/iddi/oocsi