



Open Source WebRTC Communications Platform

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Grupo Internet de Nueva Generación

- **UPM Research Group**

- Telecommunications School (ETSIT)
- <http://ging.github.io>

- **Research topics**

- Web services architectures
- Videoconferencing systems
- Cloud Computing, IoT, Industry 4.0
- Identity Management
- Blockchain, Big data, Data modelling, Public Open Data, Digital Twins
- CEF Telecom European specifications



Grupo Internet de Nueva Generación

Licode team

- Álvaro Alonso
- Carlos Arriaga
- Juan Quemada
- Joaquín Salvachúa
- Gabriel Huecas

- Pedro Rodríguez



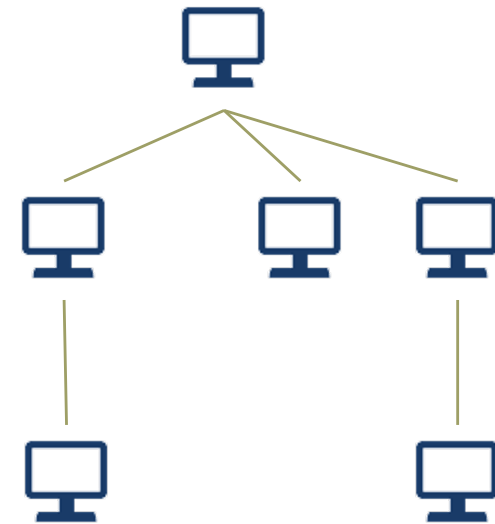
Antecedentes

- **Isabel** (199X – 200X)
 - Ubuntu native application
 - Mainly oriented to conferences
- **Marte 3.0** (2007)
 - Adobe Flash based Web application
 - Multidevice
- **VaaS** (2009)
 - Scalable
 - Cloud oriented



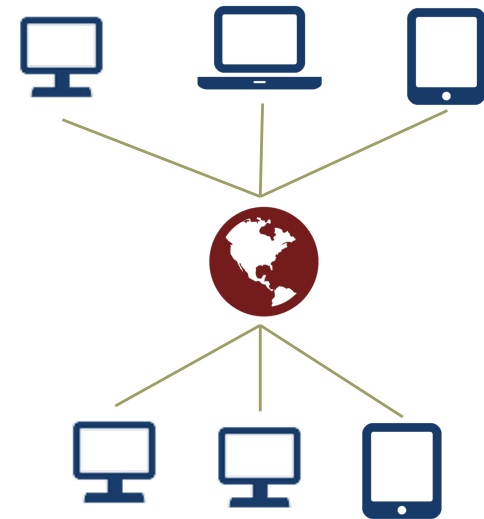
ISABEL

- Aplicación nativa: Ubuntu
- Orientada a conferencias
- Distintos modos de interacción
- Peer to peer: distribución basada en árboles
- Organizado en sesiones
- <https://github.com/ging/isabel>



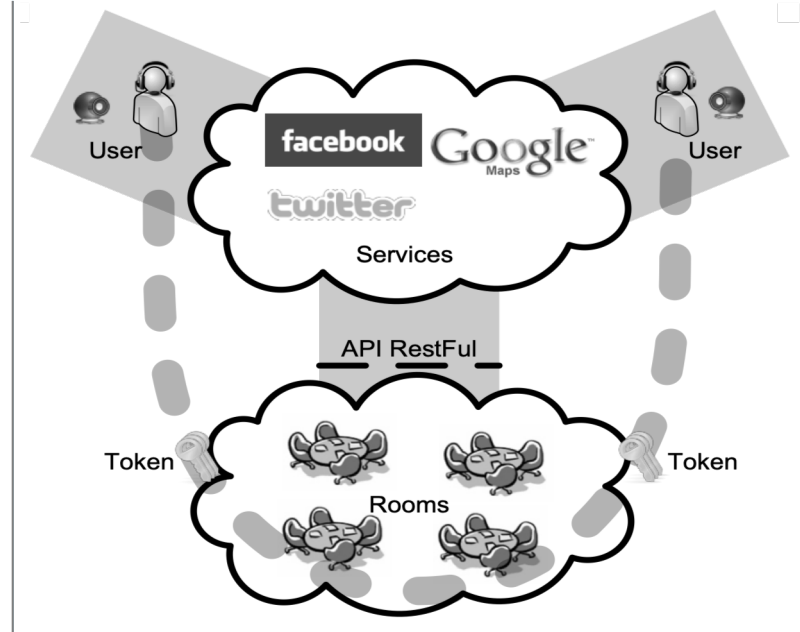
MARTE 3.0

- Aplicación Web: Flash
- Orientada a salas
- Distintos modos de interacción
- Centralizada: la carga la soporta un servidor único
- Multi dispositivo
 - Aplicación nativa para smartphones



2009: VIDEOCONFERENCIA COMO SERVICIO

- Separar la capacidad de videoconferencia de la aplicación
- Agnóstico de la tecnología de videoconferencia
- Provisión de salas, gestión de usuarios
 - API REST
- Autenticación delegada
 - Mauth
 - Se autentica el servicio, no el usuario



WEBRTC

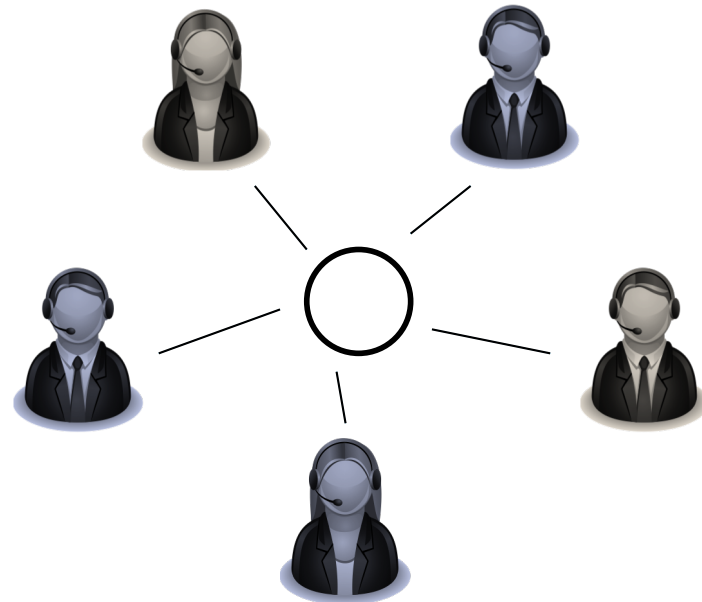
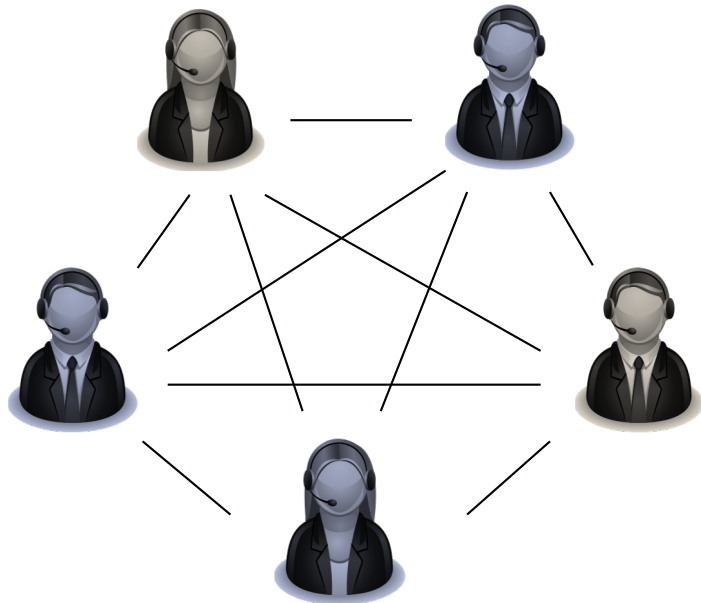
- 100% Web
- Implementación del cliente en los navegadores
- Multi-dispositivo
- Estándares establecidos
 - RTP, RTCP, ICE, etc.
- HTML5



HTML



P2P vs Centralized





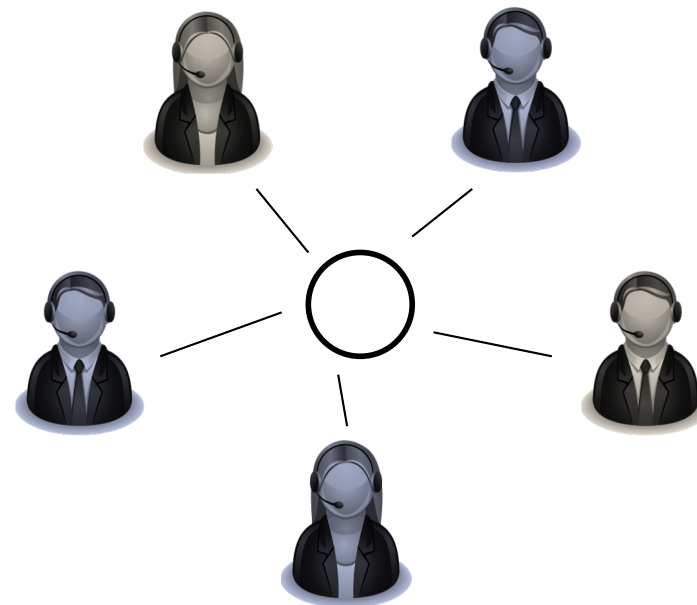
P2P Limitations

- Recording
- Large number of participants
- Heterogeneous endpoints
 - Client technologies
 - Codecs
 - Gateways
- Advanced features
 - Moderation



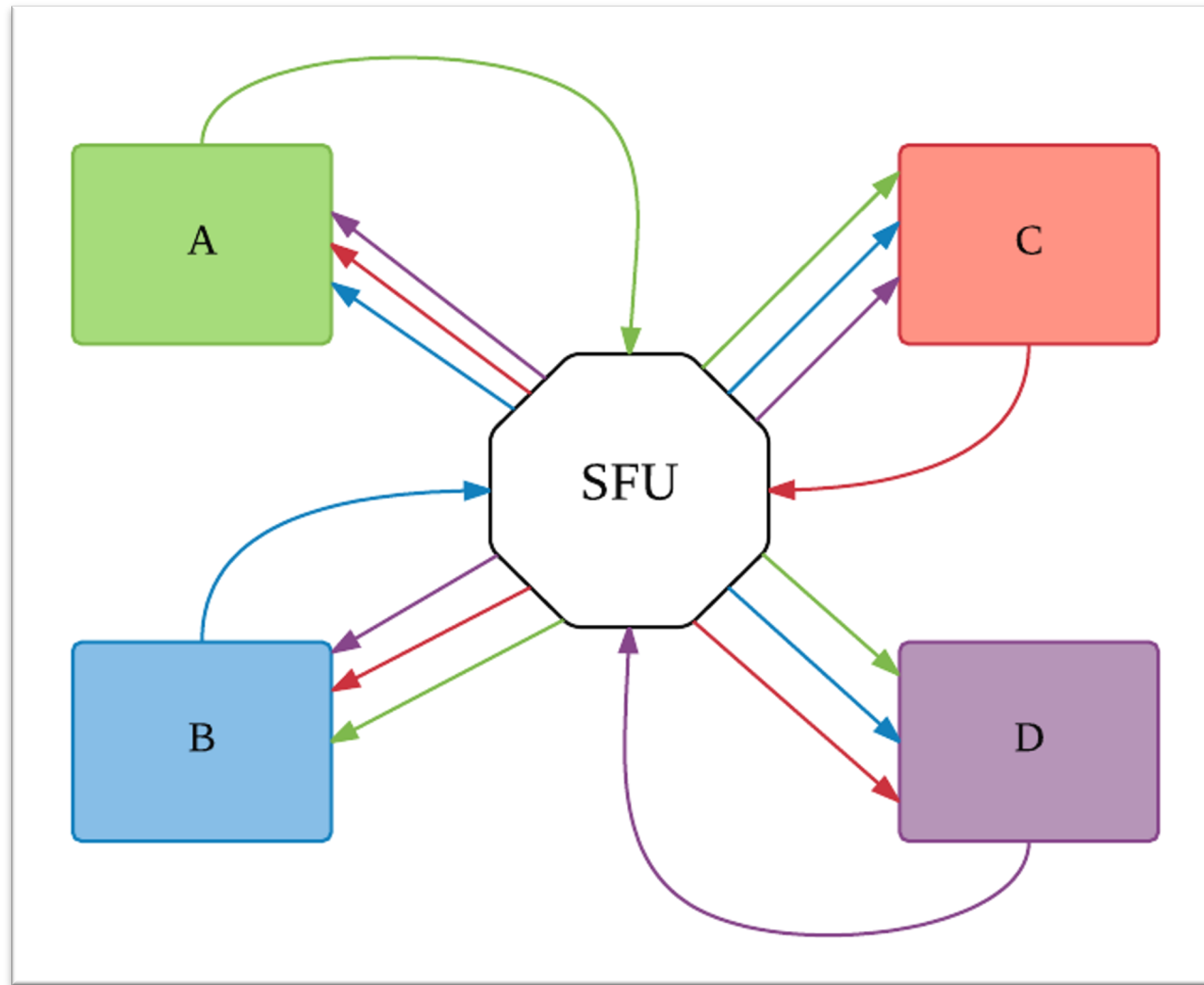
Multipoint Control Unit (MCU)

- Broadcasting
- Transcoding
- Composing
- Recording
- Call Signaling
- Conference Setup





Stream Forwarding Unit (SFU)



Licode

- Browser-based Real-time Communications
- **Video, Audio, Data**
- Recording, Screen Sharing.
- Based on **HTML5 & WebRTC**
- Designed to dynamically scale on-demand
- Encrypted communications



MCU DESIGN OBJECTIVES

- Focus on **video conference** & real-time **collaboration**
 - Video
 - Audio
 - Data (for user interaction)
 - Recording
- **Video Conference as a Service**
 - **REST** in the server to manage resources
 - **JavaScript** library in the client
 - **Customisation**



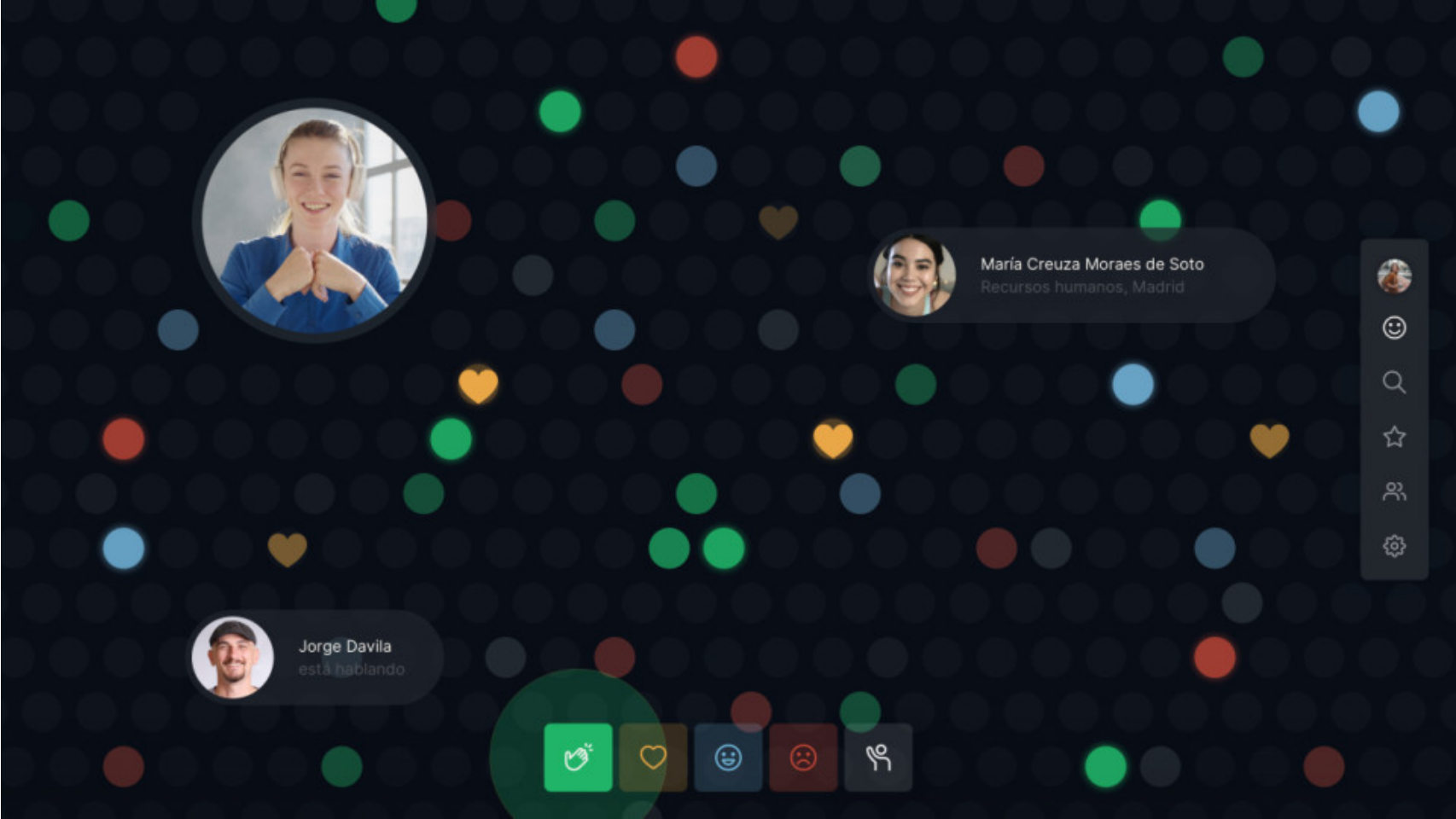
MCU DESIGN OBJECTIVES

- Easily deployable in **Cloud** environments
 - Private, public Hybrid
 - **Efficiently** use available **resources**
 - **Distributed** MCU
- Avoid **transcoding** whenever possible
- **Adaptable** video quality
 - Simulcast
 - SVC
 - Slideshow



USE CASES

VIDIV



USE CASES

SMARTERP



ICTIC 3 2021 – Conference Conference Status On Air Local Time 17:32 Conference's Time 15:32 [→ Leave] Settings Fullscreen

Communication

- Maria Francesca Frit...
Booth Partner
- Your Booth
Operator, Moderator, Maria Fr...
- All Interpreters
Booth Partner
- Other Chats

Maria Francesca Frittella
Booth Partner

Massa magna sed arcu in suscipit. Turpis enim cras sit enim.

just now

Me

Lorem Ipsum is the single greatest threat. We are not – we are not keeping up with other websites.

just now

Turpis enim cras sit enim.

just now

The classic latin passage that just never gets old, enjoy as much.

just now

Write your message here... SEND

Maria Franc... is Interpreting

Input Channels Relay Boothmate Audio Channel SPA

FLOOR – ENG ON 1 SPA+ OFF Boothmate ON Channel SPA

2 FRA+ OFF

Main Controls Output Channels

Microphone OFF SPACE

Mute Handover

A FRA ON Engaged

B ITA OFF Engaged

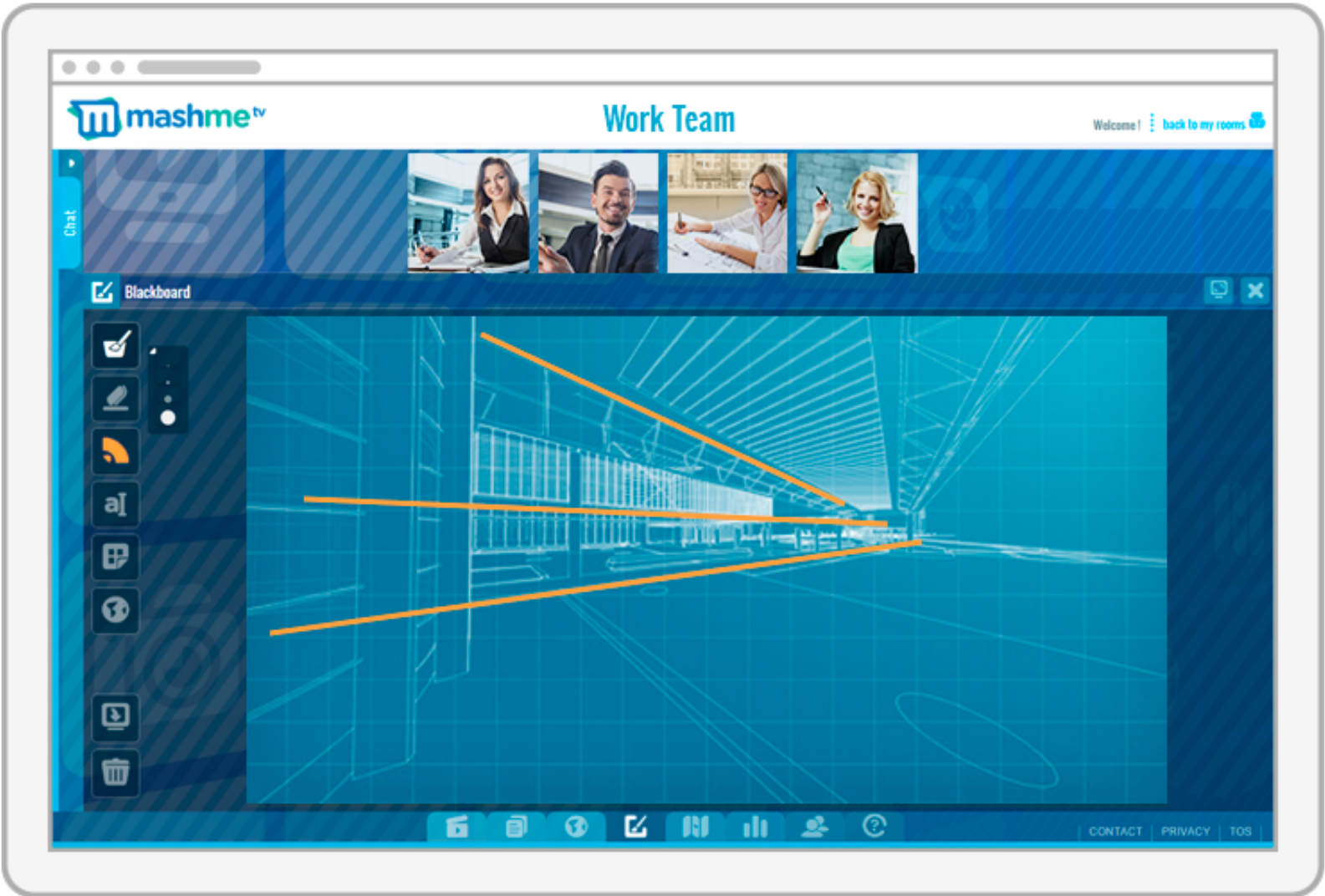
USE CASES

MINERVA UNIVERSITY



USE CASES

MASHME.IO (LOOPUP)



USE CASES

UNED

The screenshot shows the UNED website homepage. At the top left is a 'MENÚ' button with a hamburger icon. In the center is the UNED logo. To the right are search and language ('ES') icons, and a 'Campus UNED' link. Below the navigation is a 'Portada' breadcrumb and an 'Escuchar' button with a speaker icon. The main banner features a young woman with curly hair, wearing a denim jacket and a neon green top, celebrating with her arms raised. The banner text reads '30 Grados Universitarios Sin nota de corte' and 'Matricúlate'. Below the banner are three white buttons with icons and text: '¿Qué estudiar?' (with a book icon), 'Matricúlate' (with a document icon), and '¿Cómo se estudia?' (with a briefcase icon). The hashtag '#UNED50' is visible in the bottom right of the banner. A vertical social media sharing bar is on the right side of the banner. Below the banner is a row of smaller promotional tiles, including one with the word 'YES' and another for a 'Master universitario en Ciencia Política: Análisis Político'.

USE CASES

OTROS




Open source community



 <https://github.com/lynckia/licode>

 2900+ stars

 1000+ forks

 2500+ commits

 1000+ pull requests

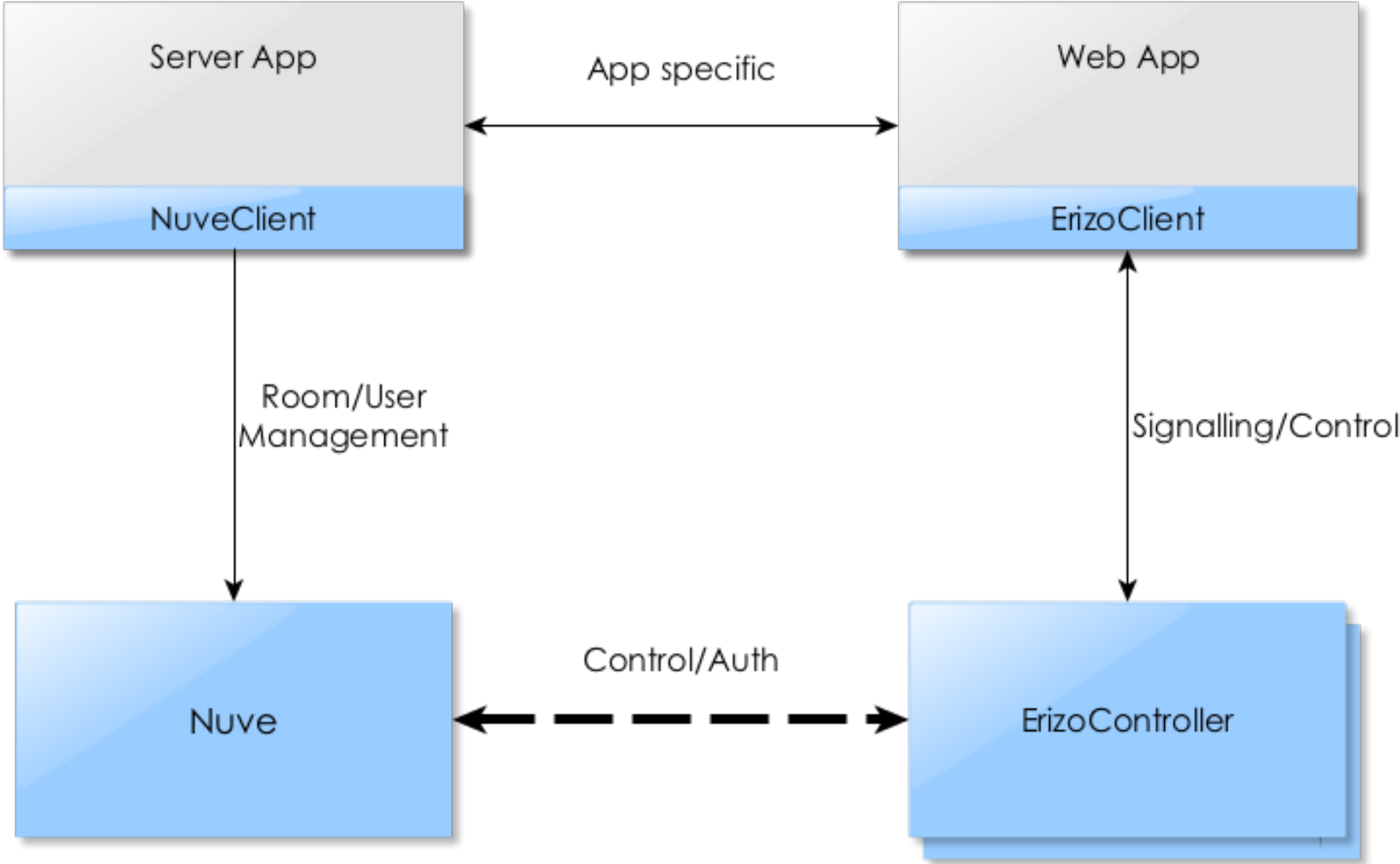
 900+ developers



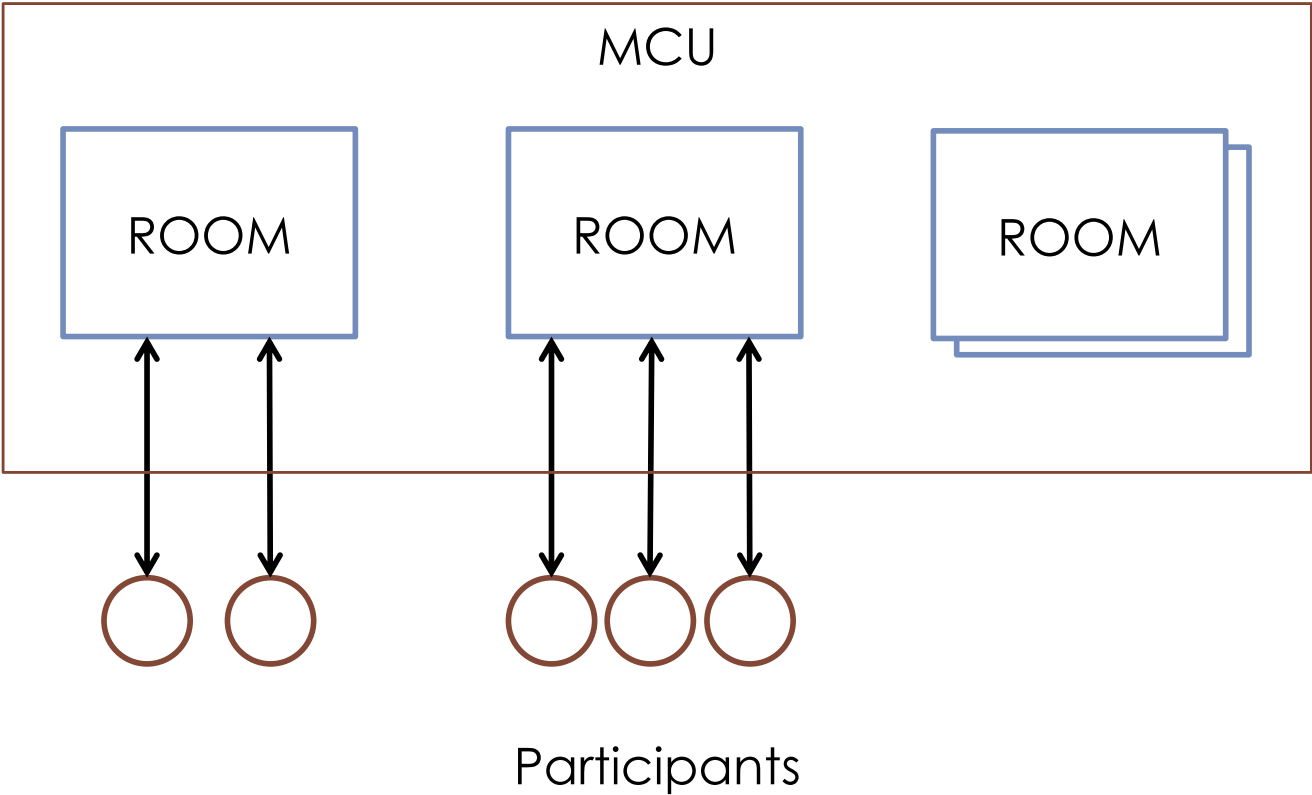
Documentation

- Project website
 - <http://lynckia.com/licode/>
- APIs docs
 - <http://licode.readthedocs.io/en/stable/>
- Demos
 - <https://chotis2.dit.upm.es/>
- Source code
 - <https://github.com/lynckia/licode>

ARCHITECTURE



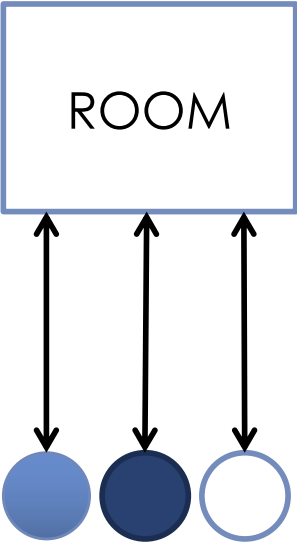
DISTRIBUTED MCU



DISTRIBUTED MCU



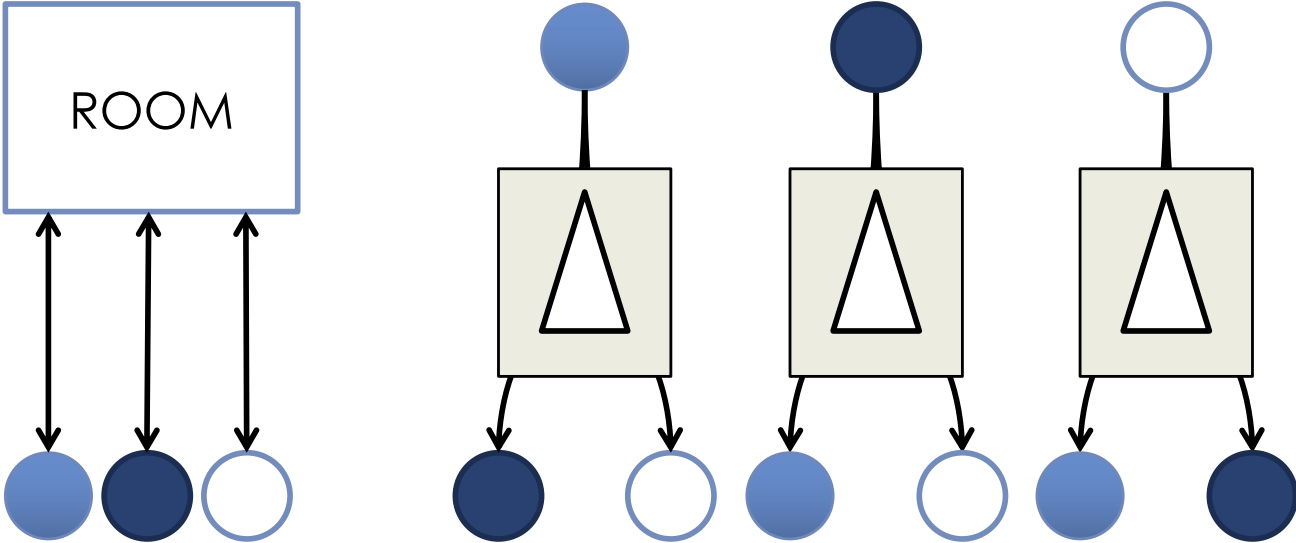
- Participant A
- Participant B
- Participant C



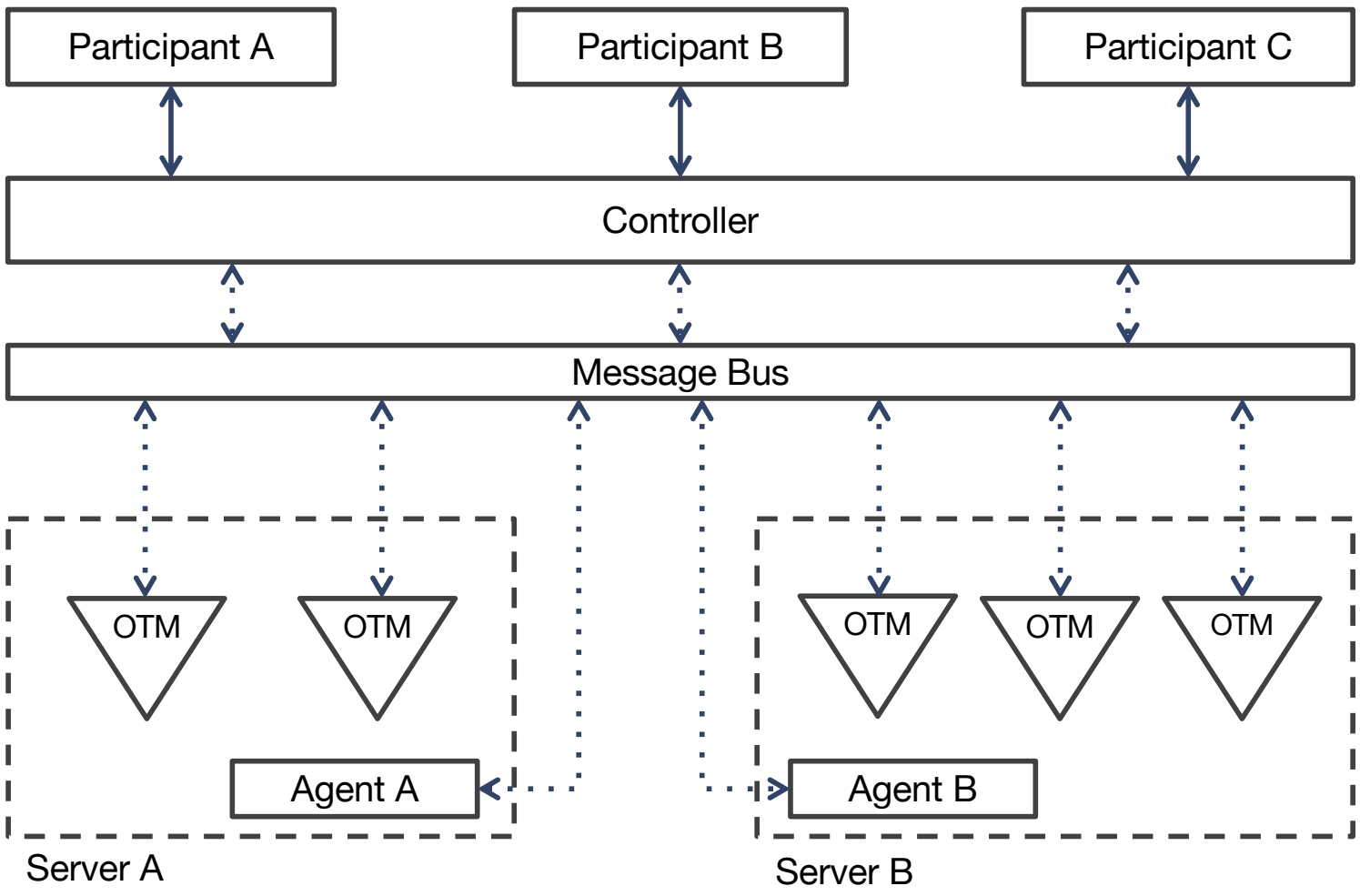
DISTRIBUTED MCU



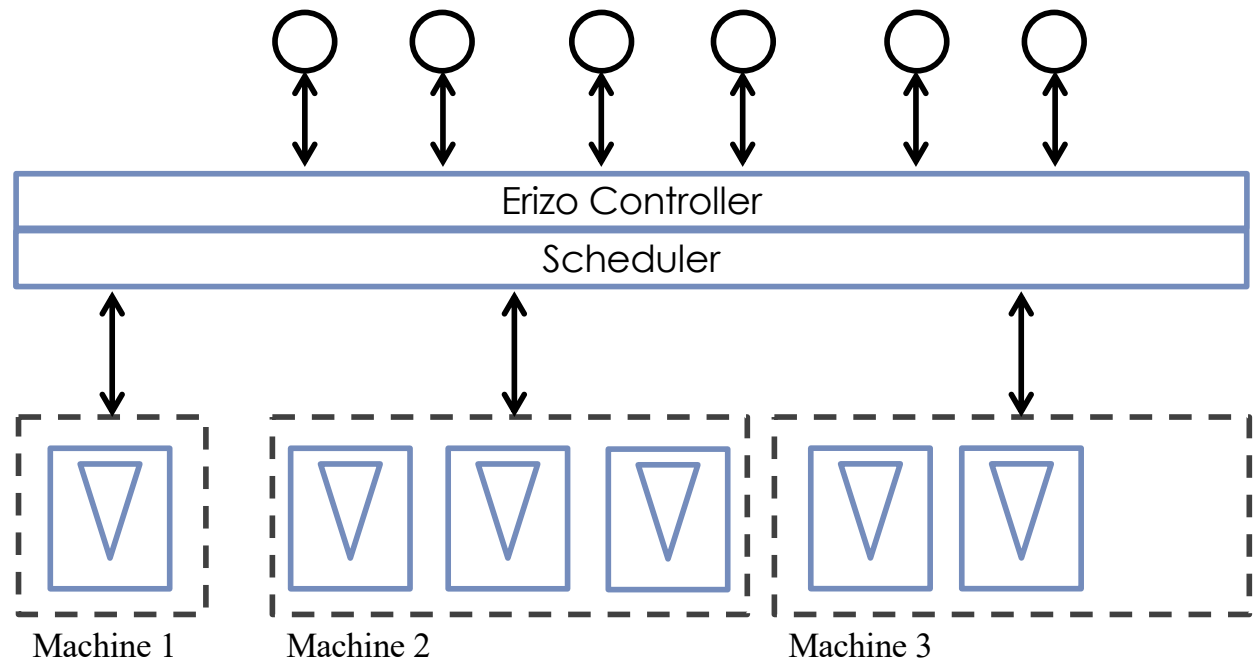
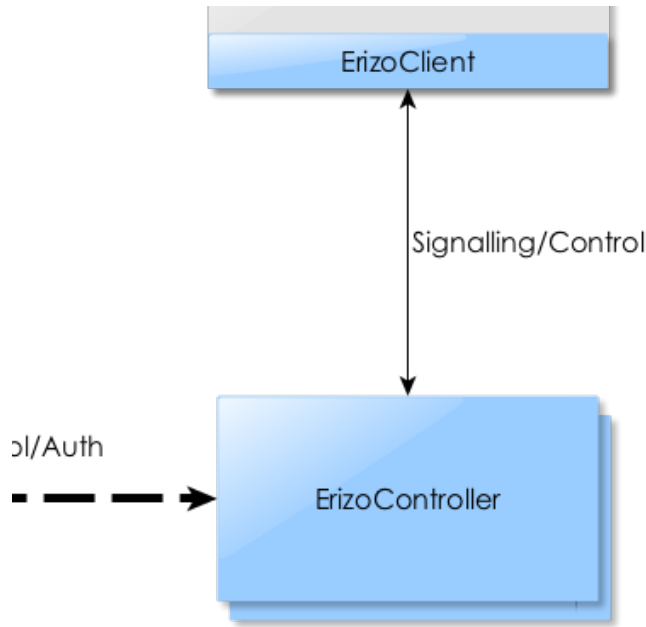
- Participant A
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DISTRIBUTED MCU

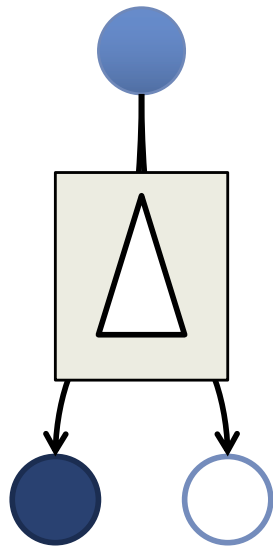


DISTRIBUTED MCU

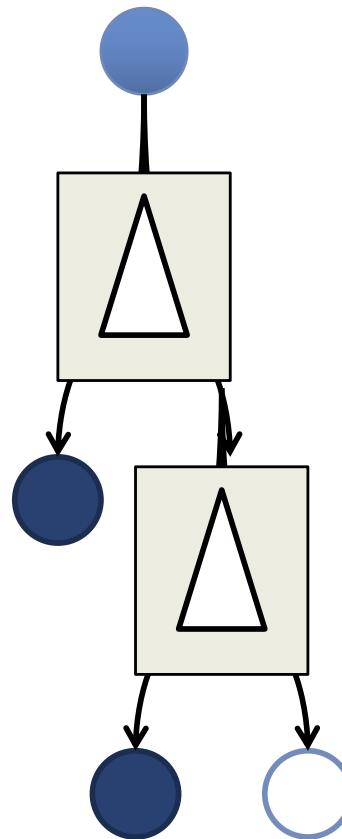




Retos actuales



Límite de suscriptores



Árboles de OTMs

- Media
- Control
- Distribución



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