Towards Distributed Architecture for Collaborative Cloud Services in Community Networks

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CONNECTED COMMUNITIES CONFINE

Clommunity

UPC UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Community Networks

ninux.org

guifi.net

0xFF FUNKFEUER FREE NET

freifunk.net

AWMN

Can we extend to the next level? Collaborative Cloud Services in Community Networks?

A *community cloud*:

- built in community network
- hosted on community-owned computing and communication resources
- providing services of local interest
- collaborative deployment and maintenance by citizens for citizens

NIST Definition

Community cloud. The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.

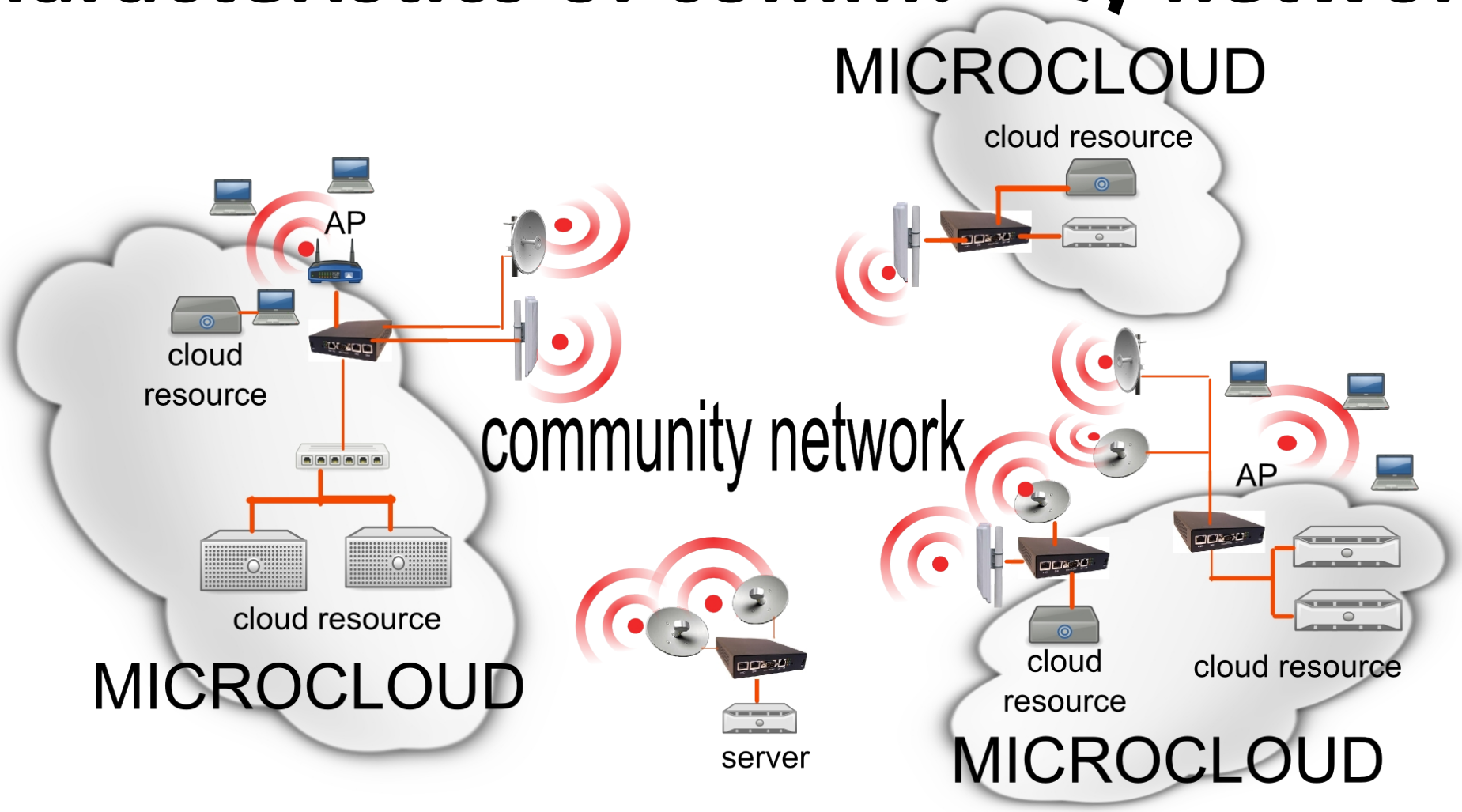
Collaborative Cloud Services in Community Networks

The vision of community cloud-based services

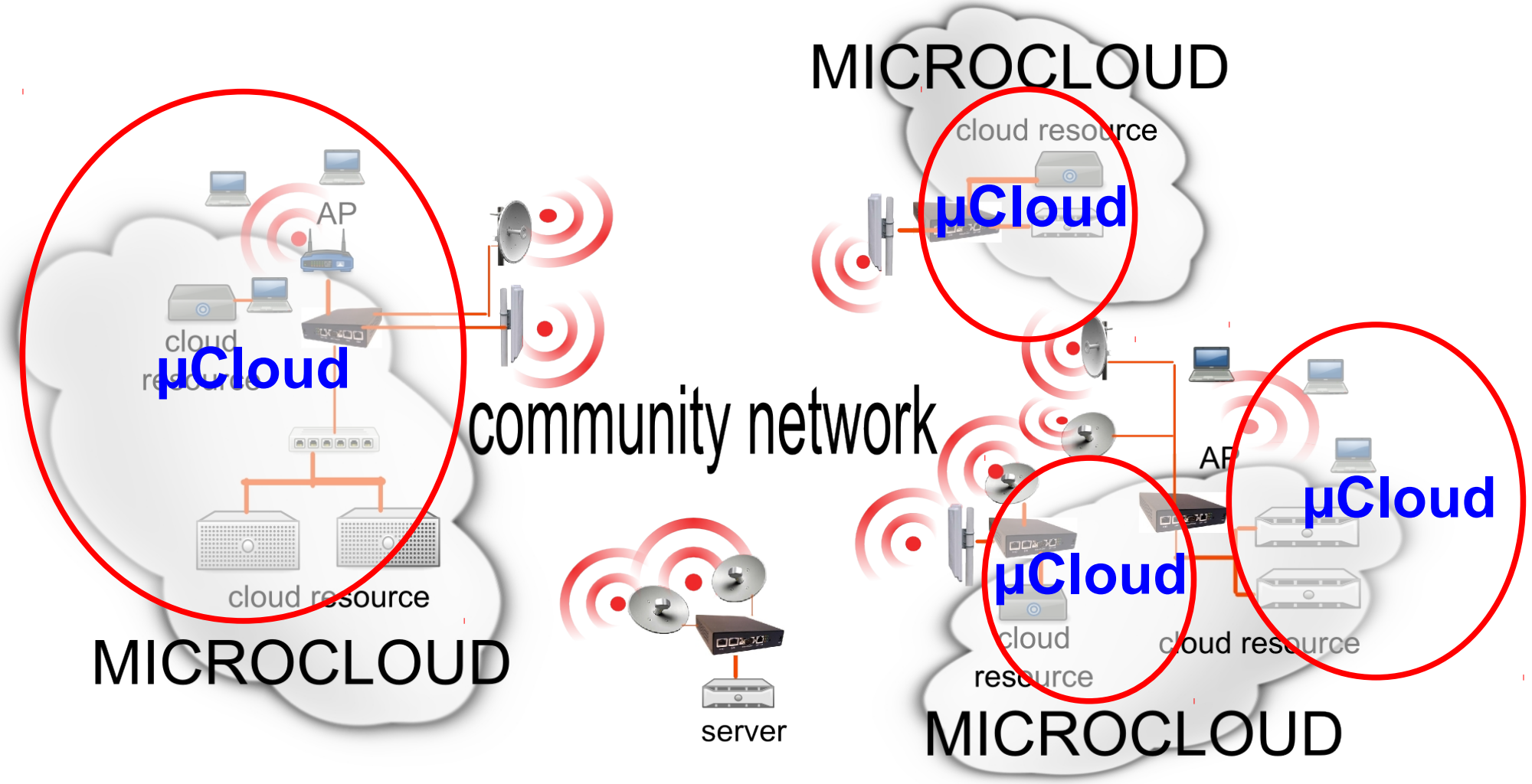
- IaaS: Popular CMP for management of the contributed computing resources
- PaaS: OS distribution, distributed services: storage, identity, communication, coordination
- SaaS: storage service, video streaming, collaborative work

- collaboratively provided and maintained.

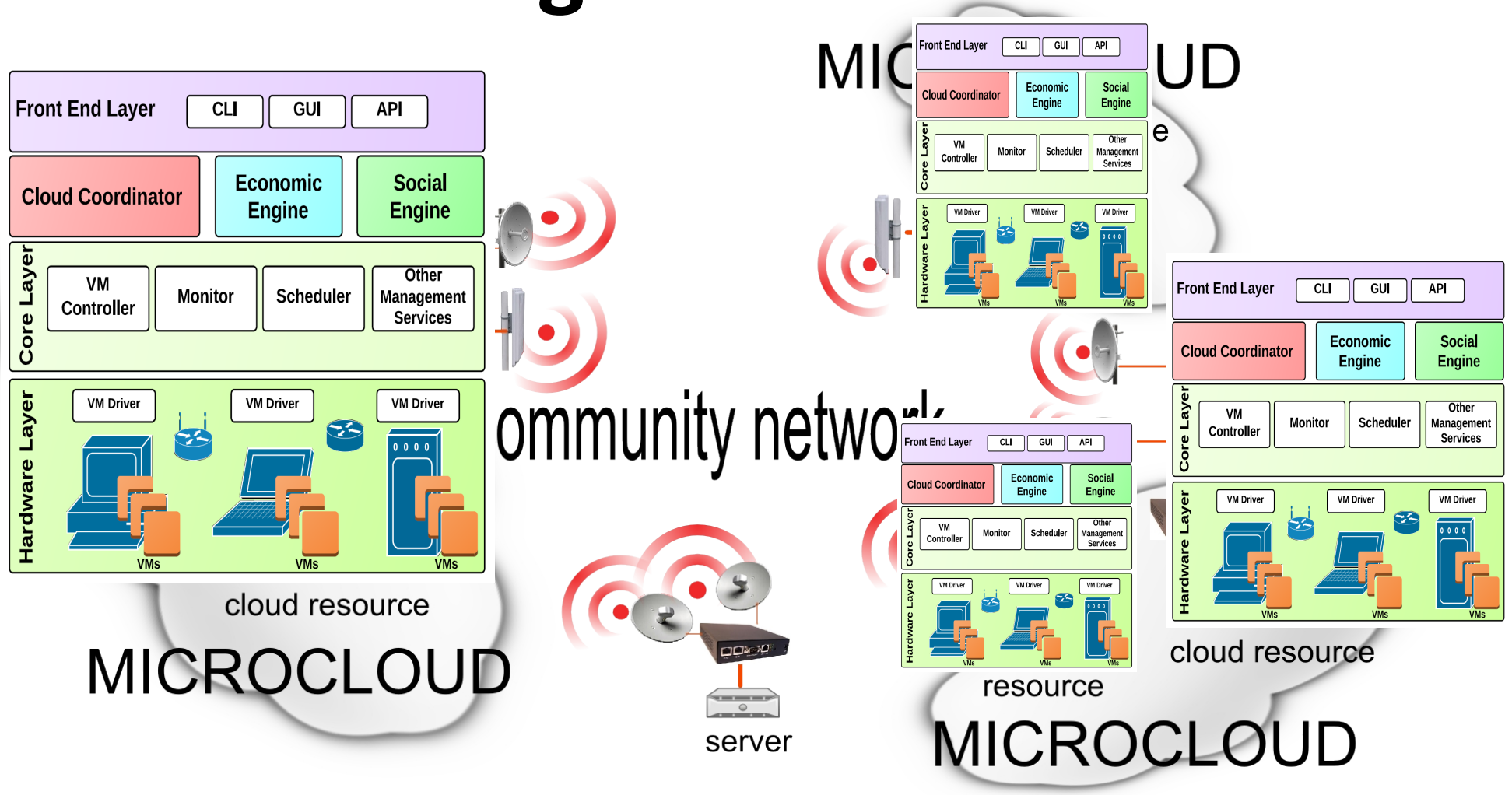
Expected scenario (derived from characteristics of community networks)



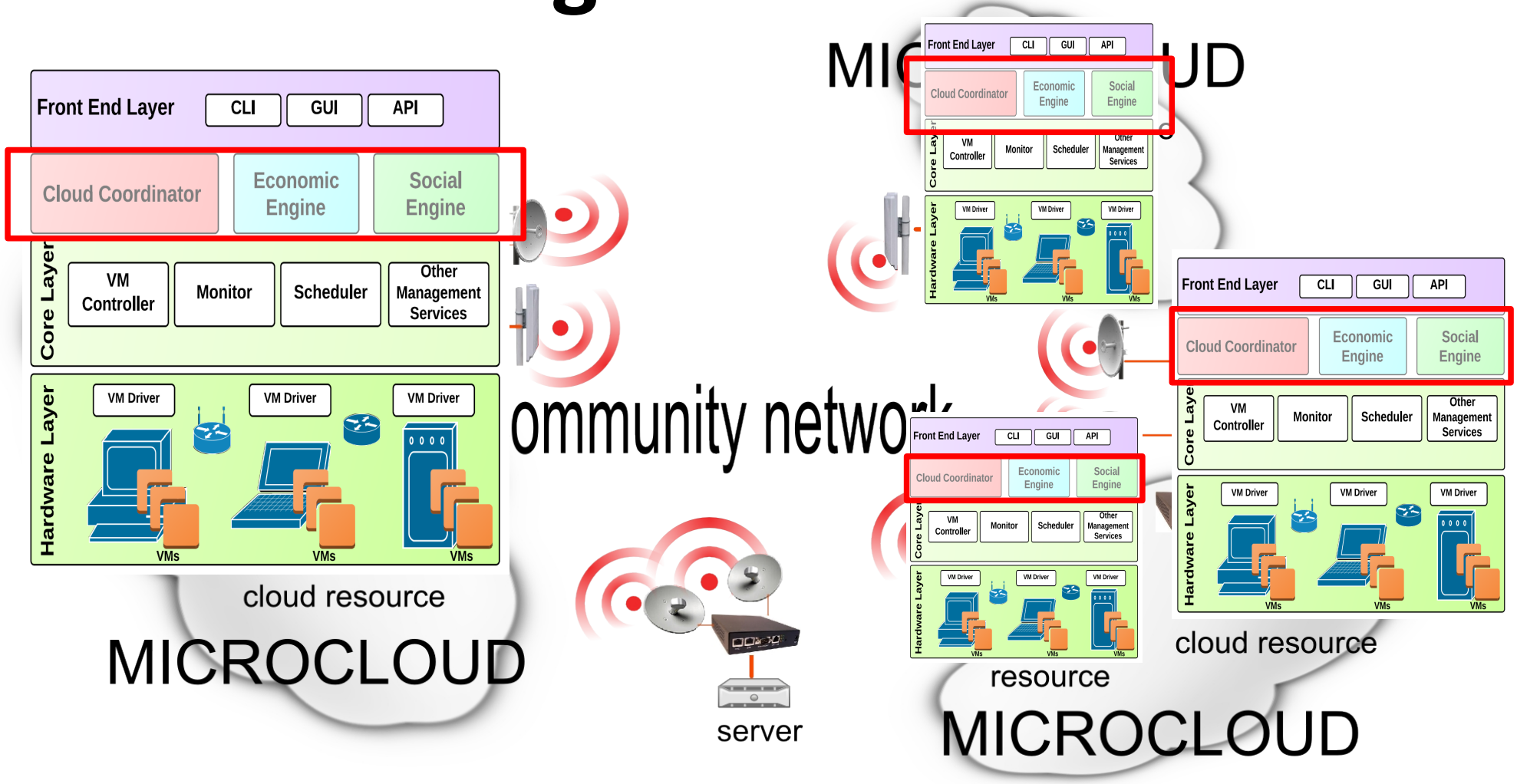
Microclouds and Intercloud



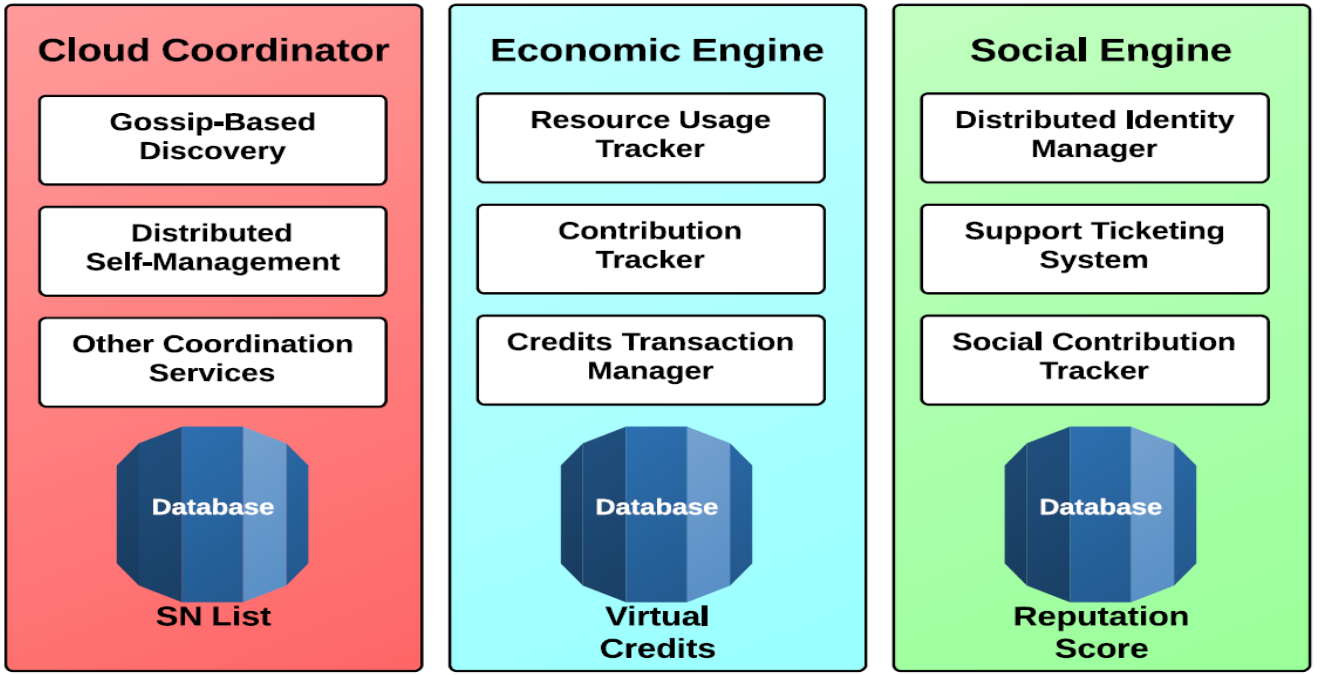
Proposed Community Cloud Management System

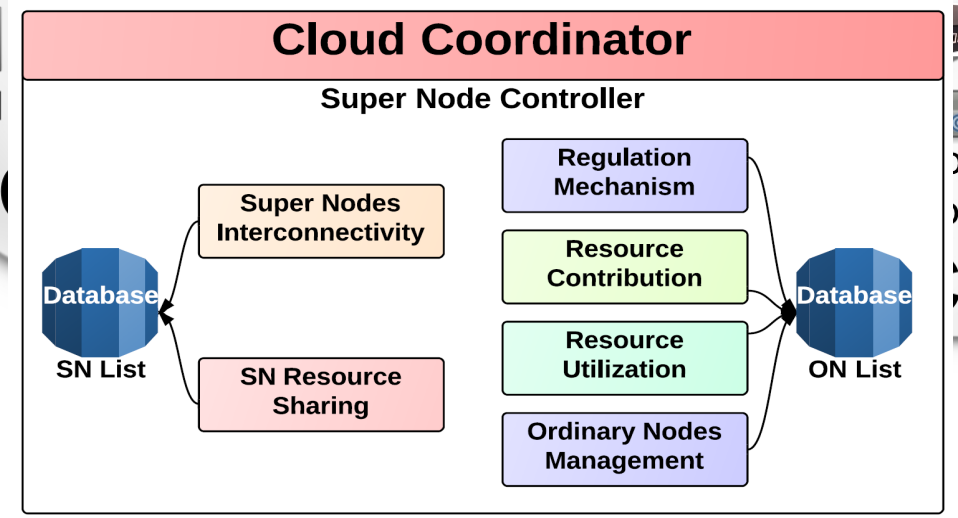


Proposed Community Cloud Management System

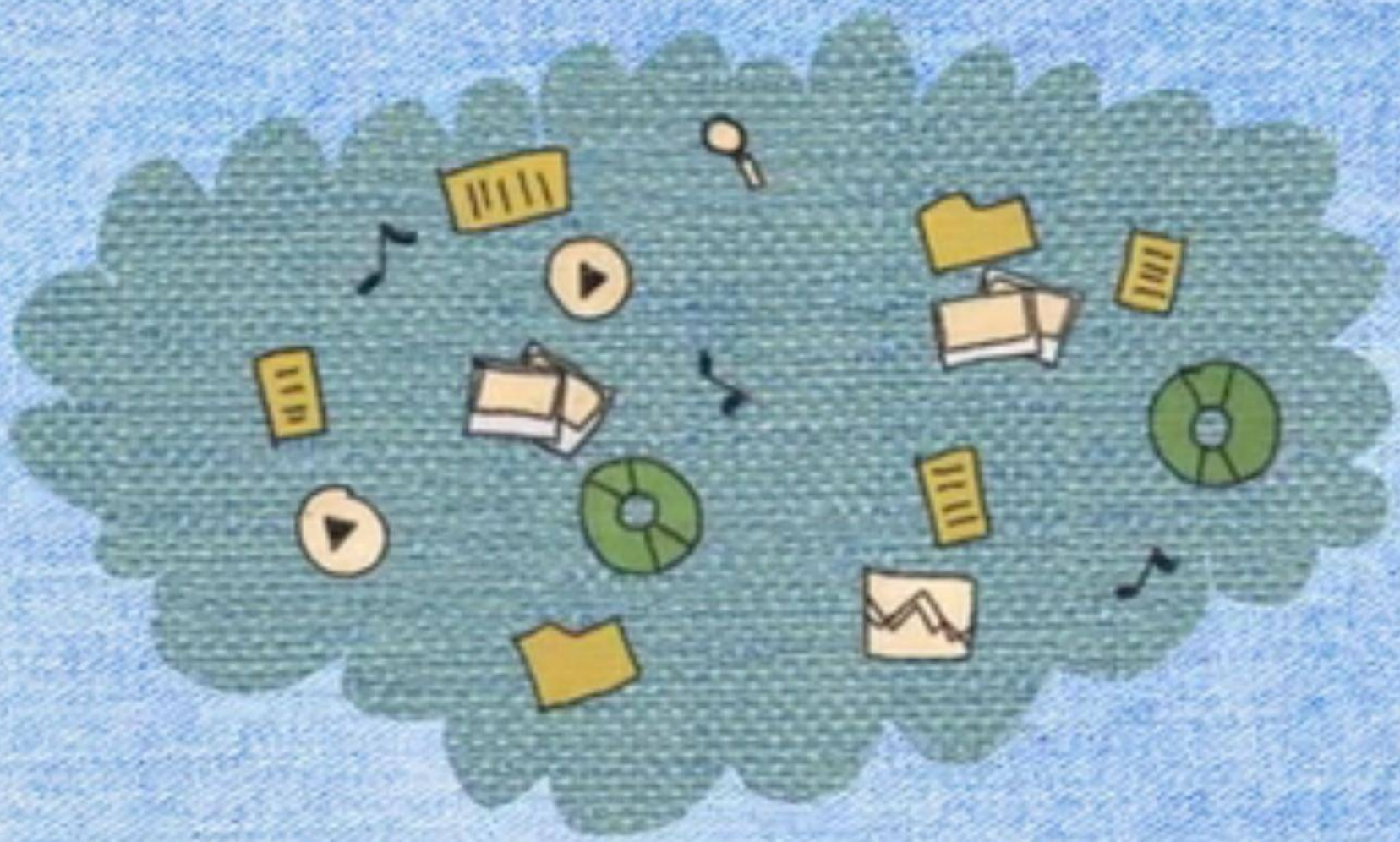


Specific architectural components

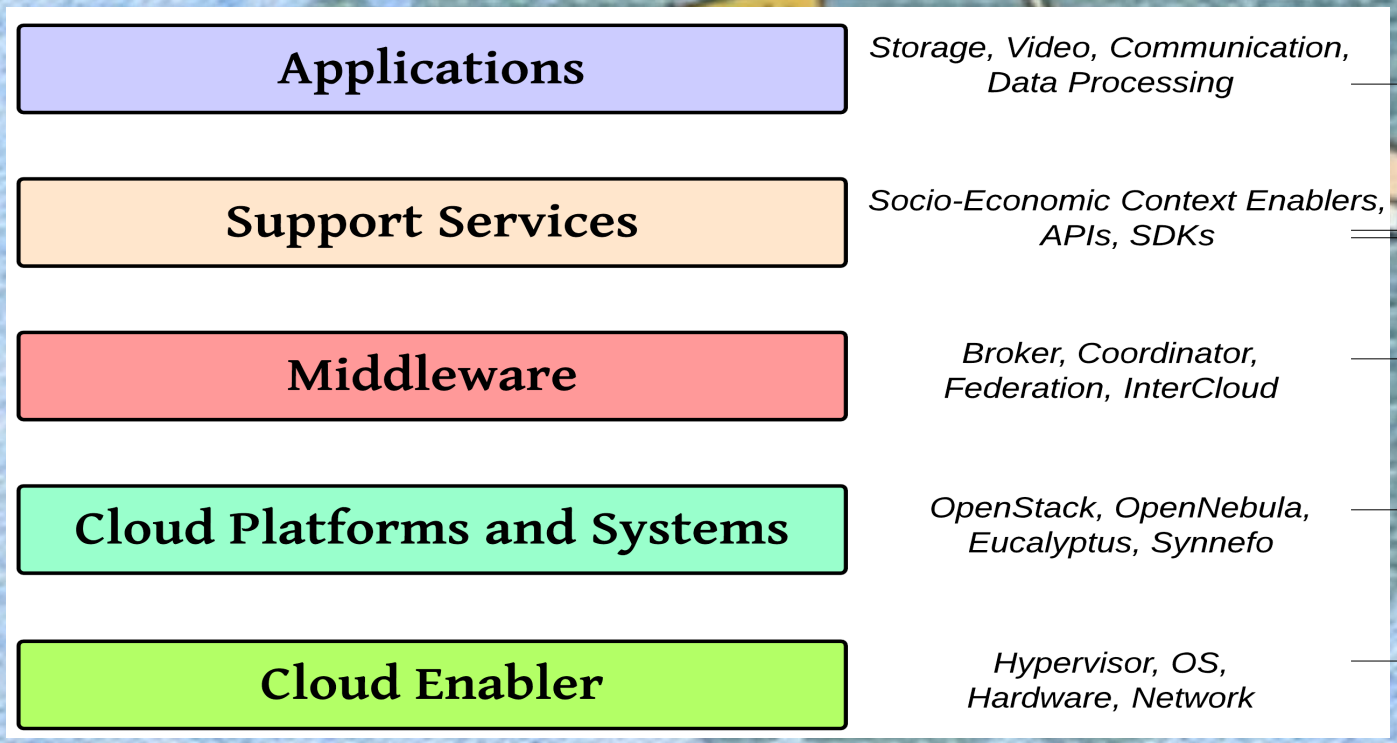




Cloud Deployment



Options



Solutions chosen

Tahoe-LAFS, ownCloud, Peerstreamer, BitTorrent

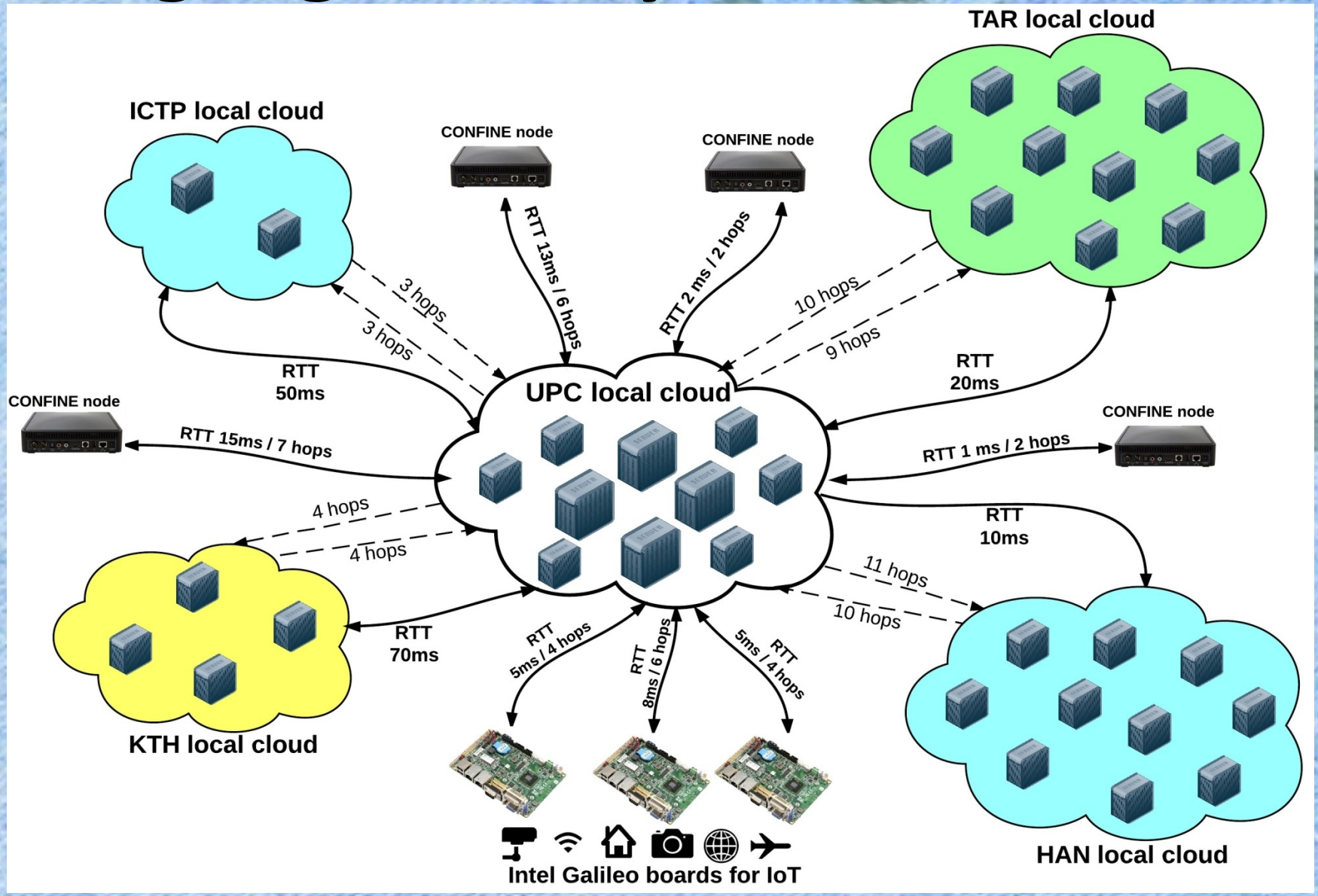
Simulations, needs working code!

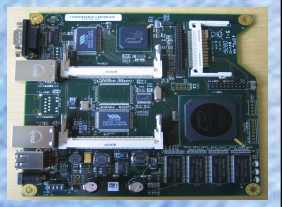
Cloudy distro

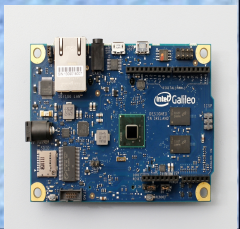
OpenStack, Eucalyptus, Proxmox, Confine

KVM, LXC

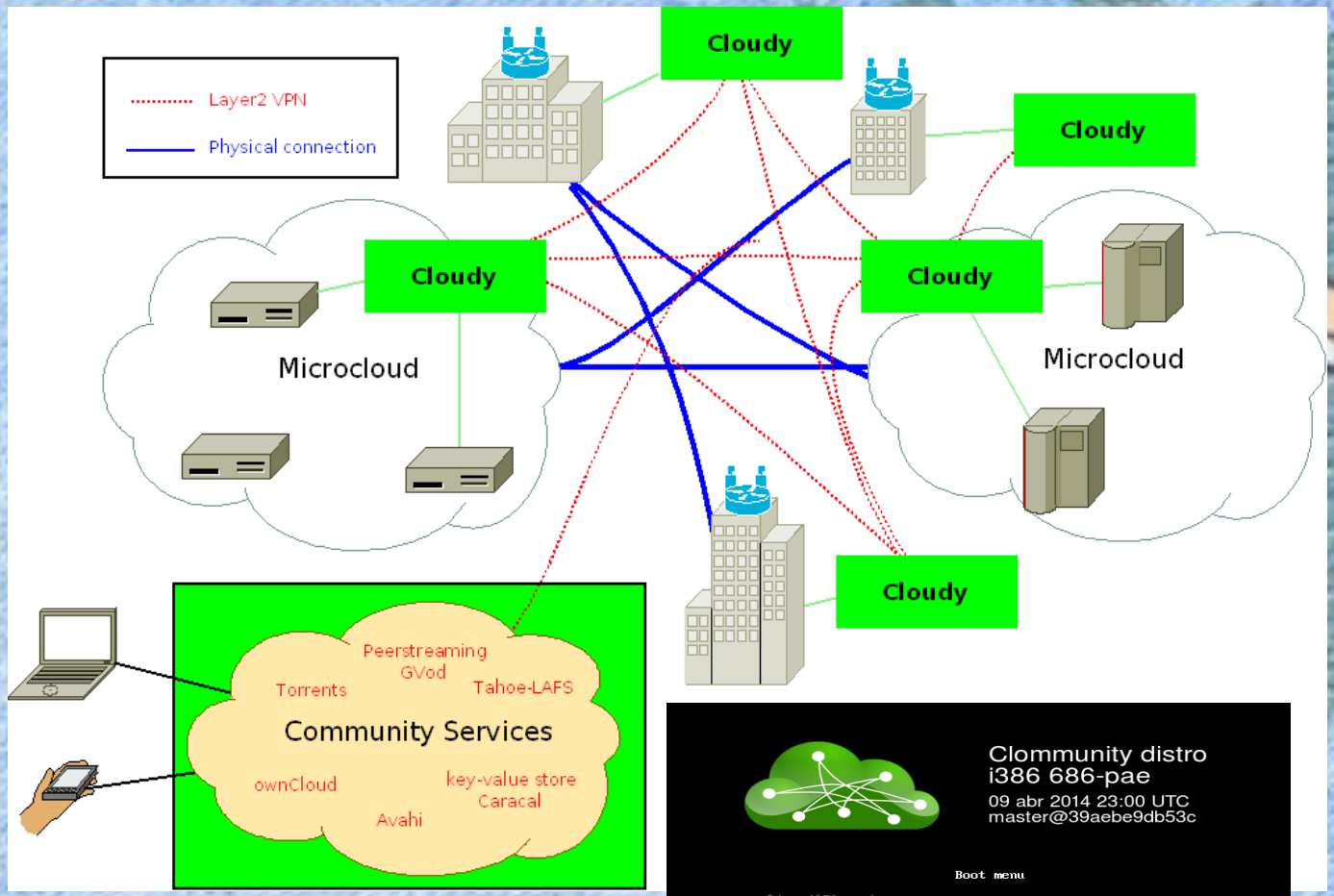
Heterogeneous hardware, geograhically distributed cloud







Cloudy distro approach: enforces collaboration



Cloudy is:

Debian-based Linux distribution

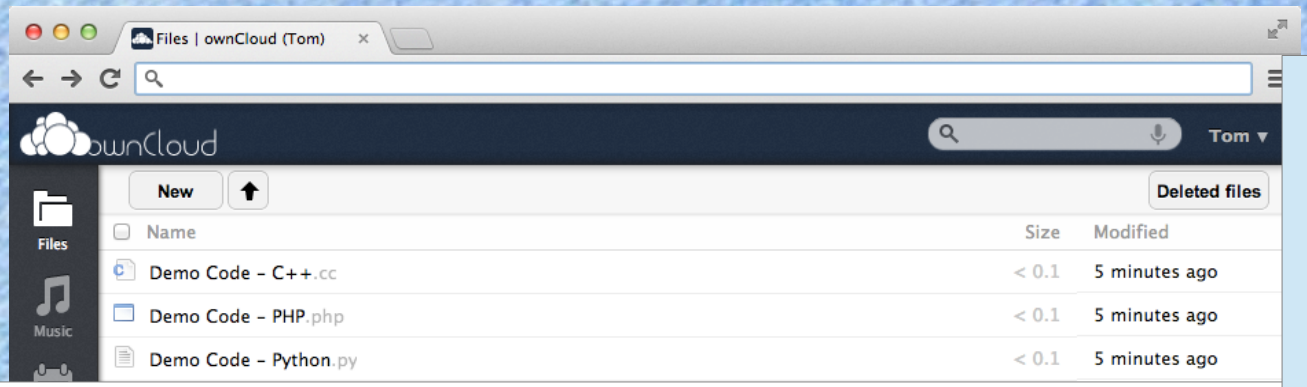
Contains cloud services (Tinc&Avahi) and applications (Tahoe-LAFS, Peerstreamer, VoIP)

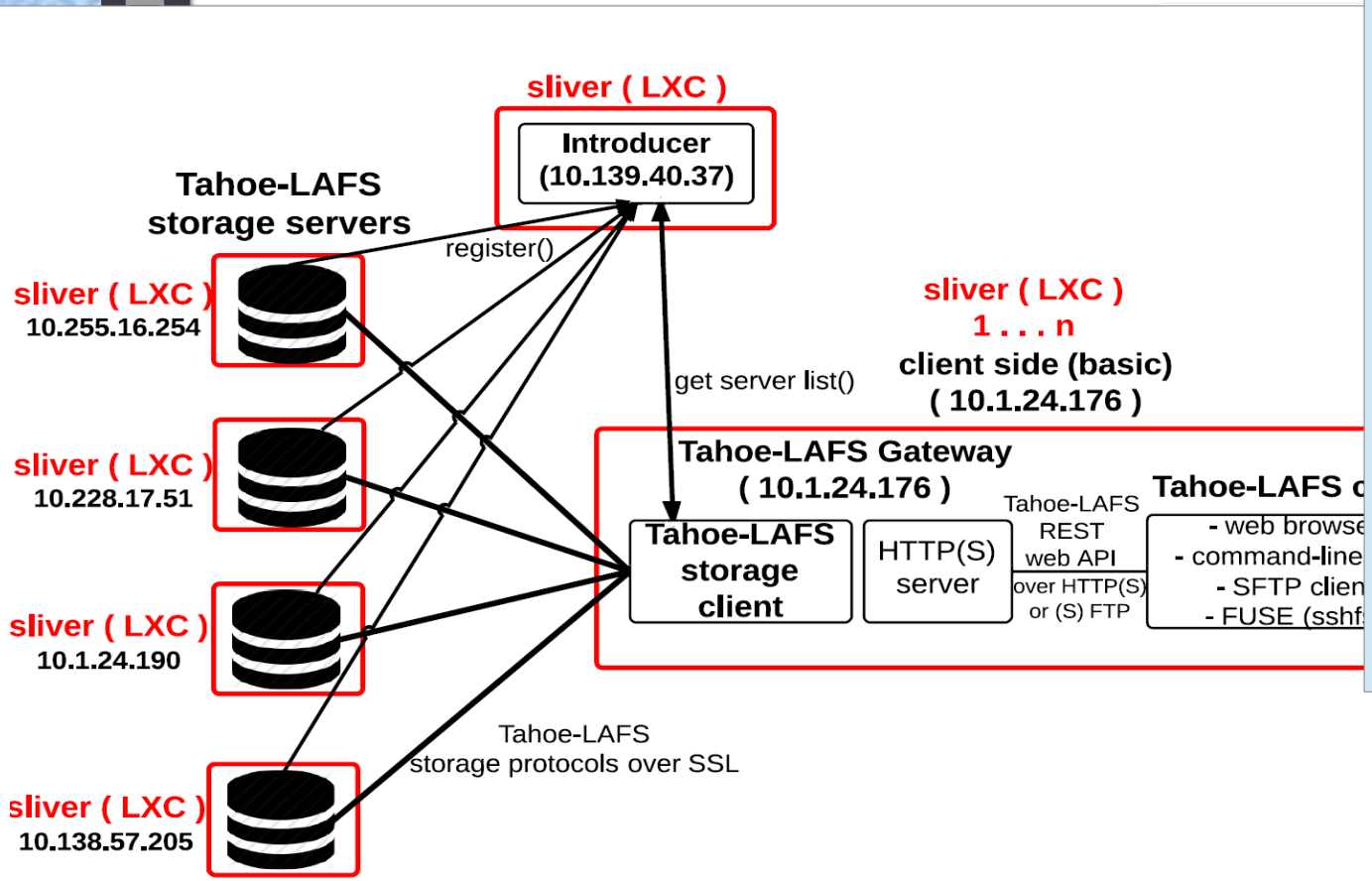
Contains some CN-specific tools

To be installed in VM or “bare metal”

Cloudy download: http://repo.clommunity-project.eu/images/

1st Exp: ownCloud and Tahoe-LAFS





Experimental setup

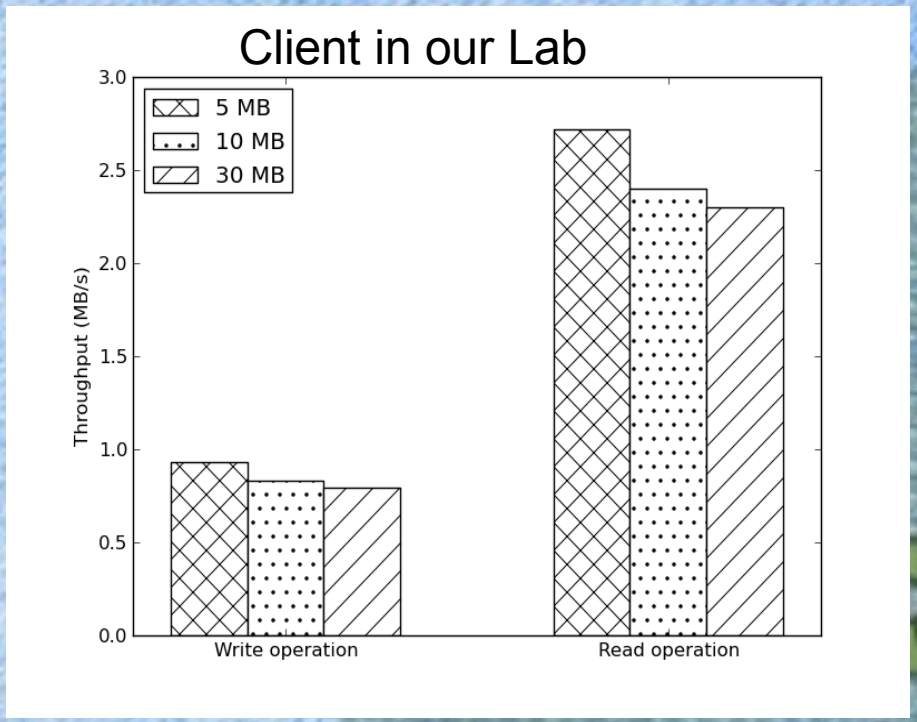
12 nodes in the community cloud: 4 nodes in Guifi.net, 4 nodes in UPC campus, 4 nodes in lab.

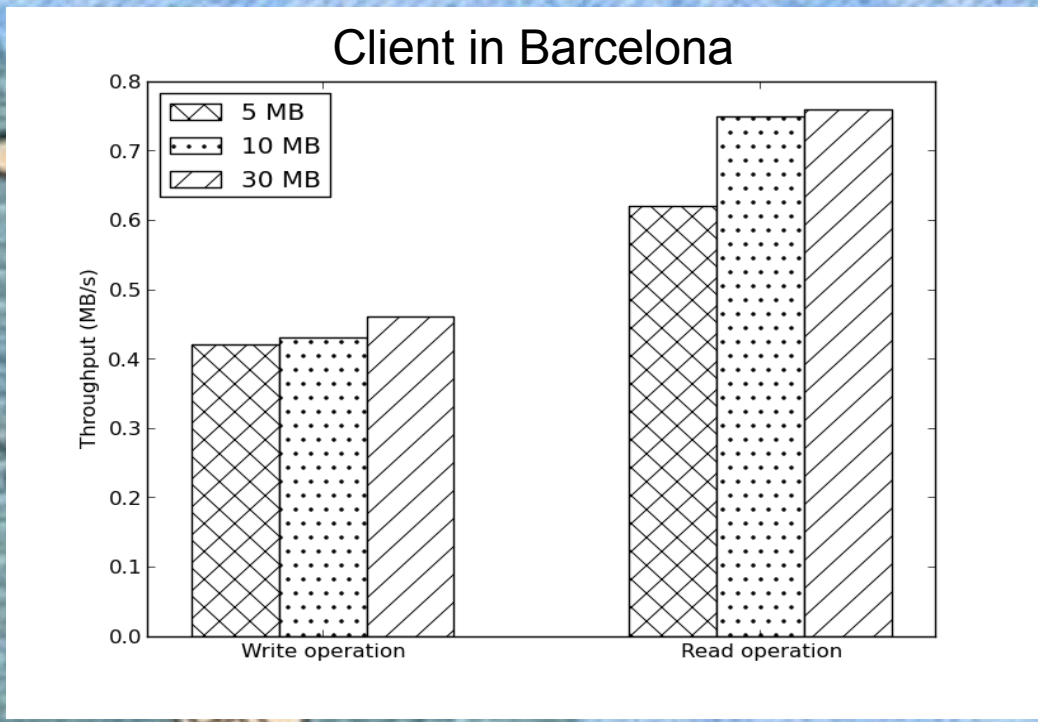
1 Tahoe-LAFS introducer on separate node.

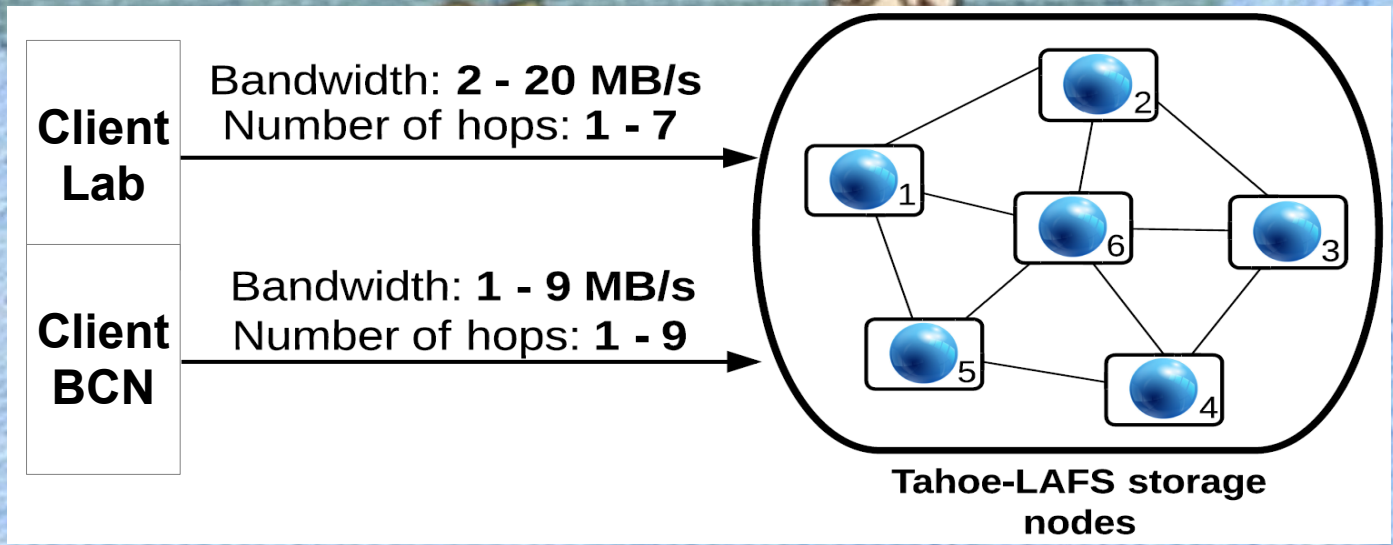
2 Tahoe-LAFS clients: 1st in lab, 2nd in Barcelona.

Evaluate **read and write operations** with different file sizes.

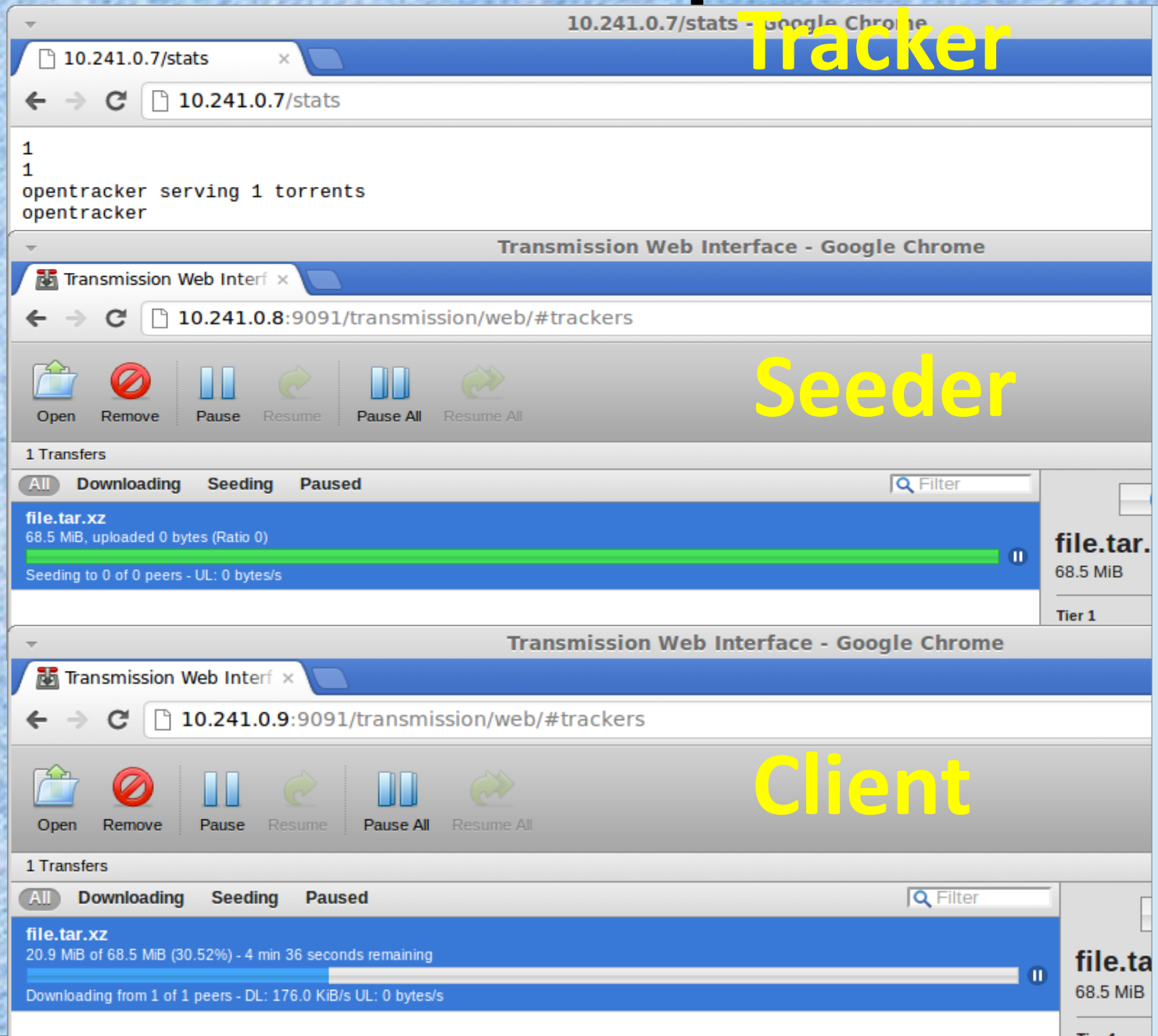
1st Exp: Results







2nd Exp: BitTorrent



Experimental setup

20 nodes BitTorrent system: 10 nodes in Guifi (Spain) and 10 nodes in AWMN (Greece), deployed in LXC containers. Tunnel Between CNs.

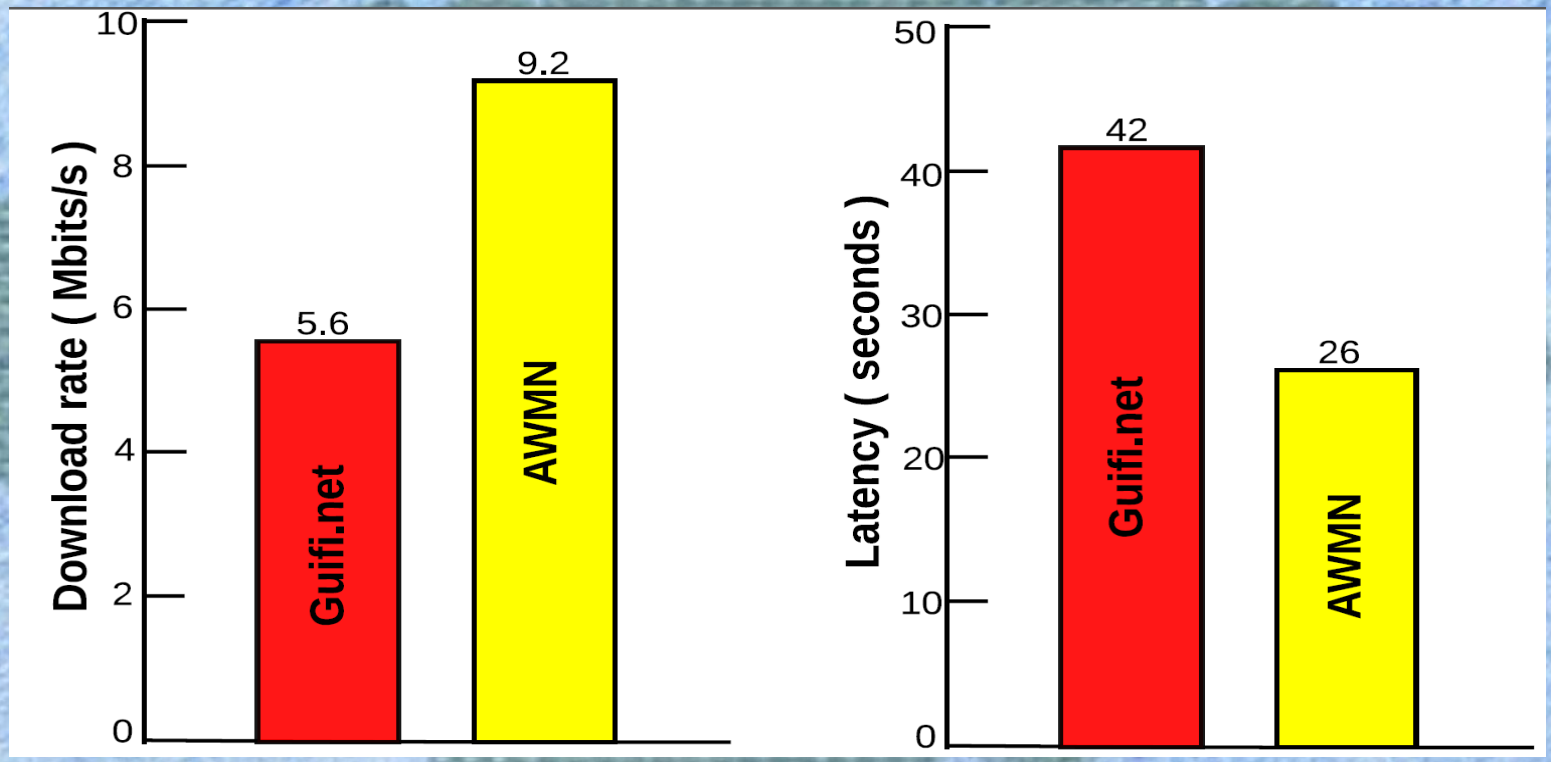
Transmission BitTorrent client.

Opentracker in Guifi.

Initial seeder node in AWMN.

Evaluate 30 MB **file download** with clients in Guifi and AWMN.

2nd Exp: Results



- **All clients successfully obtained the shared file.**

Conclusions and Future Work (I)

Architecture with specific components to enable clouds for communities.

Cloudy distro approach to integrate services.

Community cloud deployed, geographically distributed and heterogenous.

Experiments show feasibility and performance of applications in community cloud.

Conclusions and Future Work (II)

Looking for contributions from the research community and joint work.

Encourage real users.

Create community cloud eco-system.

A Community networking Cloud in a box

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Thank you

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