DECENTRALIZED INFRASTRUCTURE MONITORING ON ECLIPSE ZENOH

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The arrival of 6G ecosystem comes with a new set of characteristics:

• Distributed and decentralised infrastructure
• Network infrastructure generates monitoring data
• Data is used to control and optimize the network e.g. via AI
• AI algorithms can run in software defined nodes
Centralizing all monitoring data to the cloud does not scale

• The amount of generated data requires a distributed paradigm for data distribution and storage
WHY ECLIPSE ZENOH?

Eclipse Zenoh provides:

• Unification of data in motion (e.g. pub/sub), data at rest (e.g. datasets) and computations from embedded microcontrollers up to data centres

• Location transparency across the cloud-to-edge continuum

• Facilitates data representation transcoding, geo-distributed storages and distributed computations

• Supports IP and non-IP networks

• Supports distributed queries that enable decentralised monitoring of infrastructure capabilities and service functions

Unifies data in motion, data at rest and computations from embedded microcontrollers up to data centres

Provides a location-transparent API for high performance pub/sub and distributed queries across heterogeneous systems

Facilitates geo-distributed storage and integration with third party technology in a plug-and-play fashion
Distribute **values published** on a given **key expression** to all the **subscribers matching** that specific key expression.
Request **on-demand computation** of fresh **values** via a **distributed query** matching a given **key expression**.
DISTRIBUTED STORAGES

Store **on-demand computation** of fresh **values** via a **distributed query** matching a given **key expression**.
ANY TOPOLOGY

Peer-to-peer

• Clique and mesh topologies

Brokered

• Clients communicate through a router or a peer

Routed

• Routers forward data to and from peers and clients
ECLIPSE ZENOHO RUNS ANYWHERE

- Native libraries and API bindings for many programming languages
- Over various network technologies: from transport layer to data link
- On embedded and constrained devices
MULTICAST SCOUTING

• Zenoh performs **scouting to discover** other zenoh entities around e.g. routers or peers.

• Zenoh’s scouting mechanisms uses the **multicast capabilities** of the underlying network.

• When a new zenoh node is **discovered**, then a **zenoh session** can be established.

Default IP multicast group: 224.0.0.224
Default UDP scouting port: 7447
EXTENSIBLE: PLUGINS & BACKENDS

Eclipse Zenoh supports different plugins & backends

Interact with other technologies
DEMO: DISTRIBUTED INFRASTRUCTURE MONITORING WITH ECLIPSE ZENOH
ROLE OF ECLIPSE ZENOH IN ICT52-DAEMON

- Decentralized data pipeline for feeding Network Intelligence algorithms
- Support NI algorithms with different time scales across the network infrastructure

https://h2020daemon.eu/
DECENTRALIZED INFRASTRUCTURE MONITORING
DEMO EXECUTION (PRINTSCREEN OF TERMINALS)

Scenario pub/sub – Data-in-Motion

Publisher #1

Publisher #14

Subscriber
DECENTRALIZED INFRASTRUCTURE MONITORING

Query (pull last minute data)

demo/example/influxdb/**?_time=[now(-1m)..

Subscriber

Publisher #1

Publisher #14
DECENTRALIZED INFRASTRUCTURE MONITORING

Query (pull last minute data)

/dem/example/influxdb/**?_time=[now(-1m)..]

No storage, No historical data!

Subscriber

Publisher #1

Publisher #14
Scenario get historical data – Data-at-rest

Publisher #1

Publisher #14

Subscriber

Query

No storage, No historical data!
DECENTRALIZED INFRASTRUCTURE MONITORING

Query (pull last minute data)
/demo/example/influxdb/**?_time=[now(-1m)..]

Publisher #1
paris/1/anb/p1-23/ss-rsrp

Publisher #14
paris/14/anb/p14-2/ss-rsrp

Creating influxdb storage
paris/**
1. Start influxdb

2. Start Zenohd with adminscape permissions

3. Create the “influxdb” volume

4. Create the "demo/example/***" storage
DECENTRALIZED INFRASTRUCTURE MONITORING

Query (pull last minute data)
/demo/example/influxdb/**?_time=[now(-1m)..]

There is historical data!

Created influxdb storage

Publisher #1
paris/**/anb/**/ss-rsrp

Subscriber

Publisher #14
paris/1/anb/p1-23/ss-rsrp
paris/14/anb/p14-2/ss-rsrp
DEMO EXECUTION (PRINTSCREEN OF TERMINALS)

Scenario get historical data – using the "influxdb" storage

Now, there is historical data!
ECLIPSE ZENOH HANDLES

- Website: www.zenoh.io
- Discord Server: https://discord.gg/vSDSpqnbkm
- Roadmap: https://github.com/eclipse-zenoh/roadmap
THANK YOU FOR YOUR ATTENTION

(one6G)

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