A Smart City is a Green City

Policy based, context aware smart home/city energy management system

By

Mhammed Chraibi

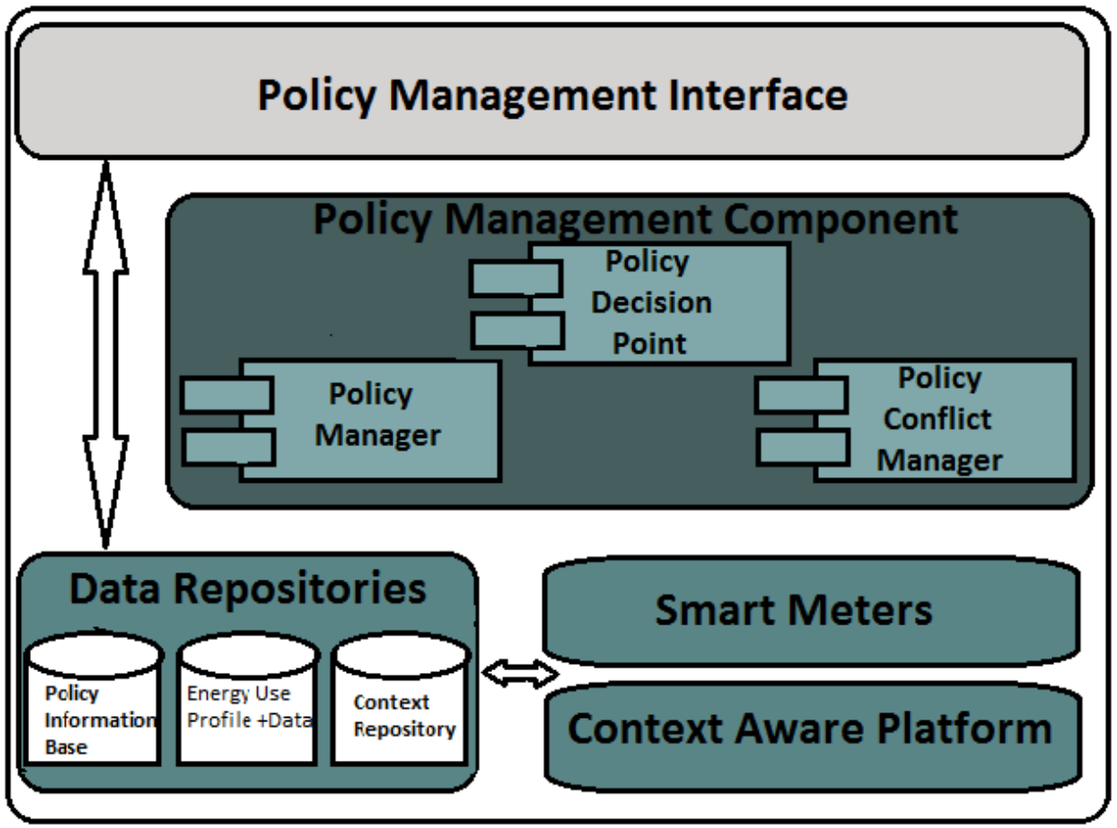
Smart Cities start with Smart Homes

- A smart home is where we have Smart appliances:
  - ➔ Appliances with smart meters + Embedded computers
- A green home is where we have several sources of energy
  - ➔ Solar, wind, grid, etc…
- A smart home is where energy management is efficient
  - ➔Not minimal
  - ➔Not fixed
  - ➔It has to be personalized!

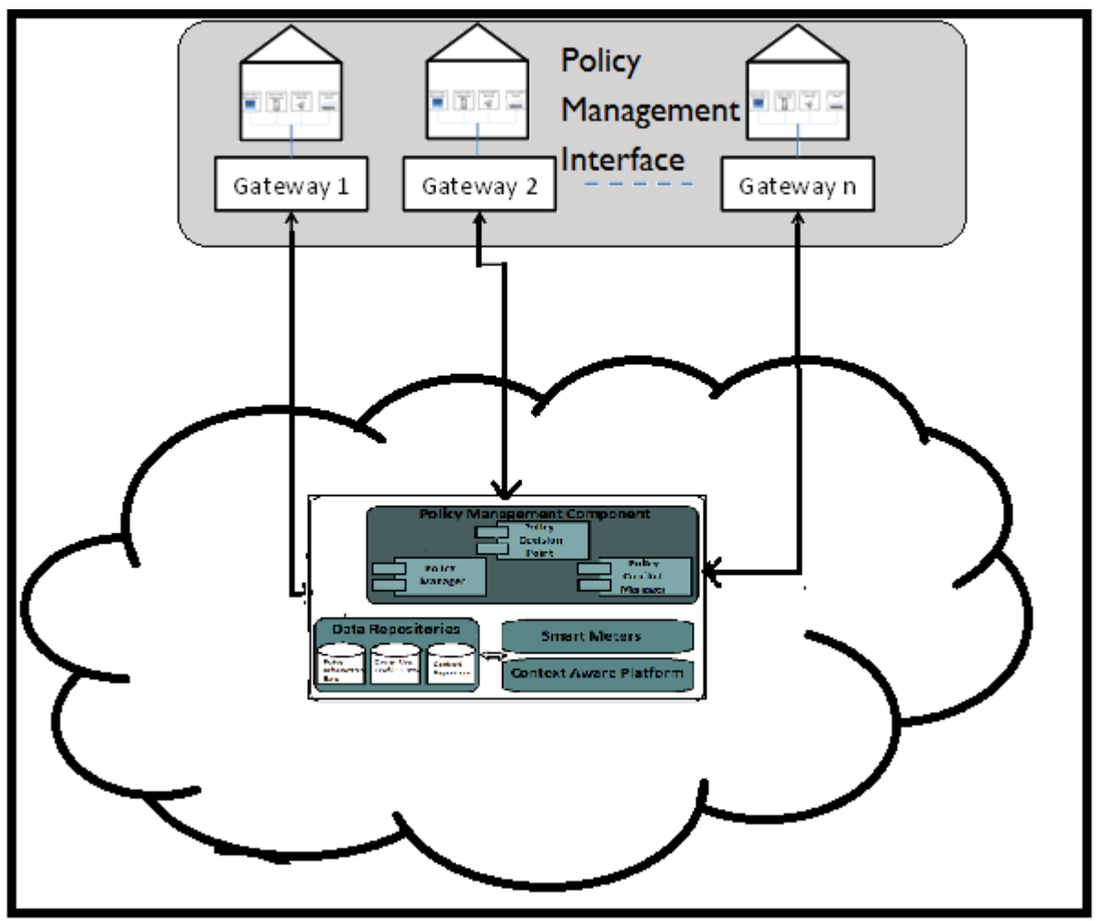
Context awareness + Software policies

- Clients need to be able to express their preferences in terms of energy management
  - Energy saving
  - Bill reduction
  - Comfort
- Decisions need to be made by the system depending on the context data collected

Proposed solution:



Where does it fit in the cloud?



COLLEGE of CHARLESTON

Aspen Olmsted, Ph.D

Assistant Professor of Computer Science and Graduate Program Director

Secure Data Engineering Lab

Research Interests

- Secure Databases
- Web Services (SOA Architectural Guarantees)
- Cloud PaaS
- Secure Software Engineering
- Cybersecurity (cIA)
- Heterogenous Integration

Smart cities/IOT Issues

- Process Authentication
- Message Delivery
  - Certificates
  - Public Clients
- Datastore Issues
  - ACID vs CAP
  - Guarantees
  - Durability

Authentication (C,I)

Accomplished

- Something you know for humans
- Something you have for humans
- Something about you for humans
- Someplace you are for machines

Missing

- Process Authentication
  - We do have Security Assertion Markup Language (SAML) for some use cases

Certificates (C,I)

Private Key Infrastructure (PKI)

Accomplished

- Machine to machine synchronous key exchange
- Validate the integrity of messages from machines

Outstanding Challenge

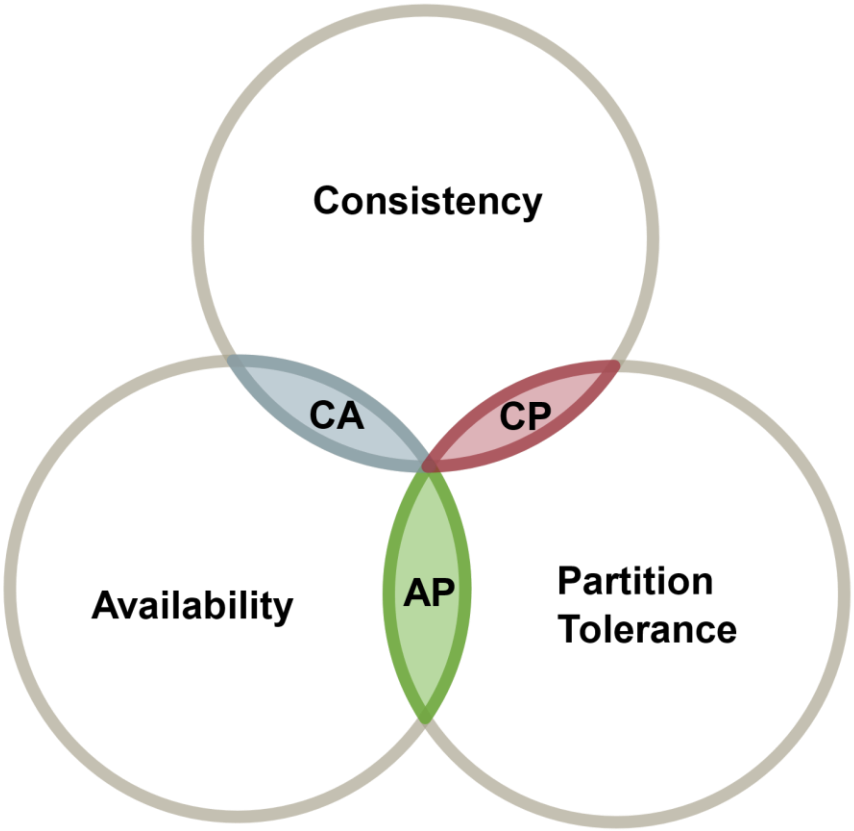
- Process identification
- How do clients get and store certificates

Cloud Clients Secure Messaging

- Clients may be public. Need a way to sign data sent to cloud without installing a certificate on client.

ACID vs CAP

- ACID Strong Properties
  - Atomic
  - Consistent
  - Isolated
  - Durable



Durability (I)

- Durability guarantees that we do not lose data after a transaction.
  - Server partitioning requires we update many machines synchronously to avoid lose.
  - Offline stores need to resolve conflicts based on many related factors

Database Guarantees

- Relational ACID databases do not scale well
- NoSQL (No ACID) do not work in all application domains
- We need new data architectures for cloud that provide real guarantees
  - Eventual consistently is not really consistent
  - GAE can do 1 trans/sec with consistency
- Streaming Data needs New Constraints

Smart Cities and Cloud Computing

Panel

“Peer-to-peer sourced mediation cloud platform for multimedia streams”

CloudComp 2017

Raimund K. Ege

Computer Science, Northern Illinois University, USA

ege@niu.edu

2/22/2017

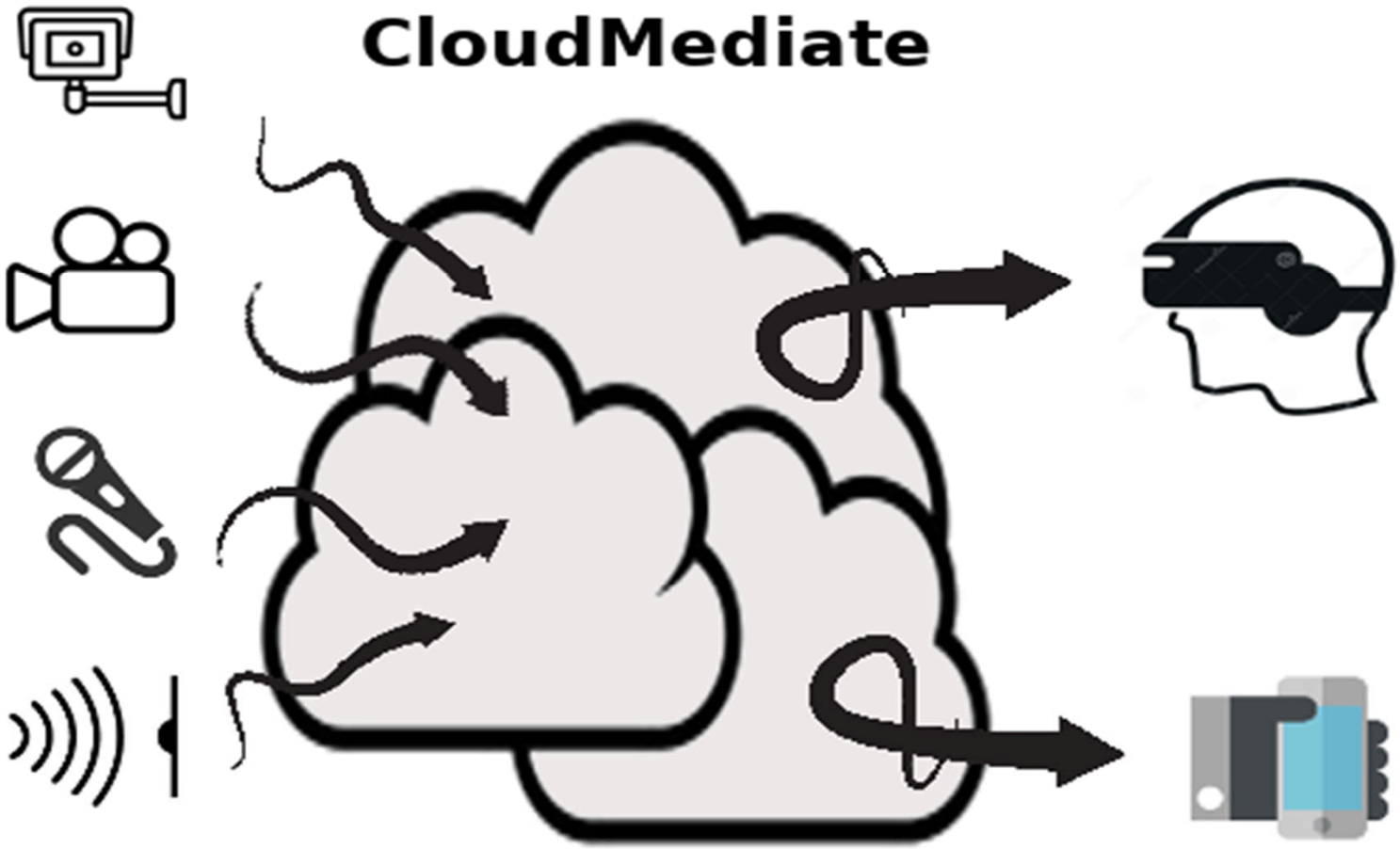
Background: PDA

- Low tech example: Google Maps on PDA
- What was PDA is now smart mobile device
  - smart watch, Google Glass, …
- High bandwidth connectivity: WLAN, LTE
  - plus: personal area networks
- Media out: video, audio, shaker, heater, …
- Media in: video, audio, geo-location, attitude, …

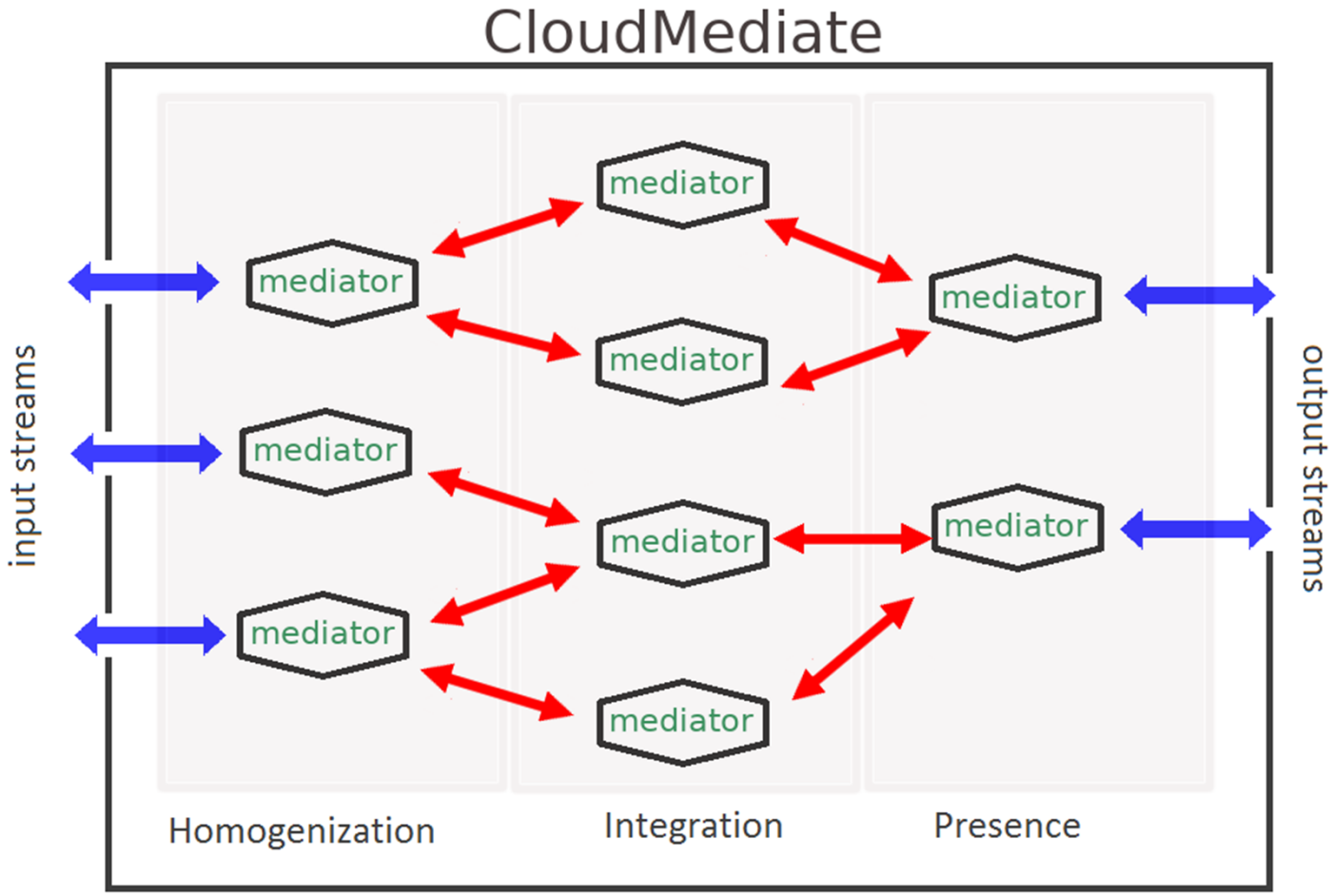
Application Scenarios

- Multi player games
  - game players wander game room
    - visualized from sensor streams (audio, video, …)
    - augmented with virtually-real objects and events
  - each player participates with mobile device
    - mobile device is source for additional multimedia
    - mobile device is presenting augmented reality
- First responders
  - enter burning building equipped with mobile devices
  - mobile devices gather and display augmented reality

Big Picture Idea



Mediator Architecture



Questions & Issues

- Multitude of cloud-connected sensors
- Privacy
- Access control
- Bandwidth
- Standards: vendors