ITU Kaleidoscope 2013
Building Sustainable Communities

Standard-based Publish-Subscribe Service Enabler for Social Applications and Augmented Reality Services

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Introduction

- Future Internet Public Private Partner initiative (funded by the EU Commission in 2010)
  - Use Case Projects (UCPs)
  - FI-WARE project: embraces all the Generic Enablers (GEs) commonly used by any UCP
- Publish / Subscribe: most required Generic Enabler
Generic Enabler Selection

- Standards Analyzed:
  - Industrial Open Standards
  - FI-WARE partners’ solutions

- Criteria:
  - Implemented and used solutions
  - Simplicity
  - Heterogeneous devices
  - Different application domains
OMA NGSI Standard

- Selected Standard
- Main characteristics:
  - On-request and subscription-based information retrieval from providers (such as context data and events)
  - Allows the creation of a federation of brokers (scalability and flexibility to the final solution)
OMA’s NGSI: data representation model

- **Context Element**
  - EntityId: xsd:string
  - EntityType: xsd:anyURI

- **Context Attributes**
  - Name: xsd:string
  - Type: xsd:anyURI
  - Value: xsd:any

- **Meta-Data**
  - Name: xsd:string
  - Type: xsd:anyURI
  - Value: xsd:any
FI-WARE’s NGSI RESTful binding

- No specific technological binding created within the OMA
- Based on XML standards and XSD schemas of the data resources parameters and interrogation methods
- Data handling through RESTful requests
  - Final solution follows Web service model

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NGSI used with Broker

Applications / Context Consumers

Context Broker

NGSI

Context Cache
History Database

NGSI

Android CxS
User Profile CxP
Location CxP
Civil Address CxP
Weather CxP
Proximity CxP
Environment CxP
Time CxP
Place CxP
Activity CxP

WS = External Web Service Query
CXC = Acts as Context Consumer
= Complex Processing
= Manages internal Database

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Publish/Subscribe GE: specification and architecture

- Based on:
  - Telecom Italia’s Context Management Platform
  - OMA’s NGSI architecture and API specifications
  - ContextML/CQL and FI-WARE’s NGSI interfaces
- Available on the project’s web site for virtually (IP-control) public use
  
  http://catalogue.fi-ware.eu/
Publish/Subscribe GE: reference implementation

- Currently on development by Telecom Italia
- Includes two interfaces:
  - RESTlike ContextML/CQL
  - RESTful FI-WARE’s NGSI
- Interfaces support comprehensive and extendable query and subscription mechanisms for data and context retrieval
RESTlike ContextML/CQL Interface

- Based on simple exchange of XML-based documents through HTTP requests (POST and GET)
- Already in use by Telecom Italia’s applications for few years:
  - Context management
  - Context-aware applications and services
- Tested
- Stable
RESTful FI-WARE’s NGSI Interface

- Still under development
- First release available in the project’s test-bed
  - Publishes context information from data producers to the Publish/Subscribe broker that makes it available for retrieval by context consumers

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4CaaSt Cloud Platform

- http://4caast.morfeo-project.org/
  Allows deployment and execution of services/applications that use platform’s Publish/Subscribe Service Enabler (Context as a Service/CaaS)

- Context Broker
  - Integrated into the cloud access control, provisioning, monitoring and charging subsystems
  - Is the core as a native Service Enabler
Social Relevant Applications

- 2 reference prototypes (many others come for Expo’15 Italy/Milan, Telecom Italia is a technological partner)
- Development by Telecom Italia
- Demonstrate the potential and advantages of the FI-WARE implementation and 4CaaSt integration of the OMA’s NGSI as Context Service Enabler
Augmented Reality (AR)

- **Target**
  - Mobile users having a smartphone with camera

- **Goal**
  - Provide an augmented view of real-life objects to the user

- **Operation**
  - Mobile user watches surrounding objects through the smartphone’s screen
  - Related information associated to the objects, is shown graphically through layers in real-time
AR: Client application

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Augmented Reality

- Information criteria
  - Mobile user’s location
  - Preferences
  - Social relationships
  - Others

- Use-cases
  - Tourism
  - Find a restaurant
  - Locate friends
  - Many others ...
AR: Architectural components

- Augmented Reality Content Server (ARCS)
  - Manages geo-tagged information, mobile users’ preferences, social information, user-generated content

- Client Application
  - Gathers data from the ARCS
  - Renders the graphical augmented view
  - Content generation
Social Reading

- **Target**
  - Mobile users with a smartphone

- **Goal**
  - Enhance reading experiences by creating a social community around the reader of eBooks

- **Operation**
  - While reading an eBook, the user has the possibility to annotate or comment a piece of text or paragraph to be shared with the community or Social Networks

- **Community**
  - Made up of service users
  - Relationships from popular social networks or by common reading interests

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Social Reading (2)

- Semantic Enrichment
  - Automatic Semantic Annotator
  - Recognition of places, POIs, names and concepts inside the notes and comments
  - Enrichment from different Linked Object Data (LOD) sources
  - Most probable entity algorithm
  - Related content suggested to the user

- Non-semantic manual enrichment
  - Reader can attach multimedia content to the notes or comments created
  - From common web sources
  - From existing files on his mobile device
  - Graphical interface
SR: Accessibility features

- Blindness
  - Integrated text to speech (TTS)
  - Set of voices
- Vision problems
  - Font and size adjustment
  - eBooks’ background color regulation
- Dyslexia
  - Currently under work
* La funzionalità di download nuovi libri da interfaccia web (1.) è disponibile solo da client Android

** Solo se si ha scelto di condividere anche su Facebook e/o Twitter
Future Work

- Generic Enabler
  - Full NGSI support mode
  - Integration with the FI Core Platform supporting
  - Integration into the FI-WARE security framework
  - Integrations with other important GEs, such as Big Data, Complex Event Processor, Multimedia Analysis, etc.
  - Integration with FI-PPP UCPs
Future Work (2)

- Collaboration with OMA for a further accomplishment and improvement of the OMA NGSI Enabler specification.
- PubSubHubbub4 will be considered to create a federation model of the Publish/Subscribe context brokers.
- Evaluation and eventual integration of standardized solutions such as XML and SIP presences, OMA Location.
- Semantic enhancement of the Publish/Subscribe context broker following the OWL standard, SPARQL communication pattern and RDF data representation model.
Conclusions

- **Real-life** big effort by industrial entities to bring their assets for the common usage of the **worldwide** open community
- Publish/Subscribe GE as an example solution openly defined and based on an open standard
- Service prototypes created and provided by Telecom Italia
- Services prototypes are impacting in both the user appealing and the **social** usefulness perspectives
Conclusions (2)

- Trials didn’t show any performance bottlenecks or latency with limited number of customers and moderate platform usage.
- Development, implementation and integration activities regarding this GE are still a work in progress.
- Support of the European Research Program funding Future Internet Public Private Partnership Program, including the FI-WARE project.
Thank you!

- Questions?