MASHUPS FOR THE INTERNET OF THINGS

glue.things – a Mashup Platform for wiring the Internet of Things with the Internet of Services

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glue.things is a mashup toolkit designed for applications and services in the Internet of Things

- **Connect** TVs, smartphones, wearable computing devices, and all of the consumer and business tools to the glue.things platform
- Easily **mash together** data streams of these devices and **build** new applications for them

- Finally, **distribute** mashup applications on an open and scalable marketplace

  glue.things provides all the necessary technological components, organized into a **coherent and robust mashup toolkit** covering both delivery and management aspects of device data streams, applications and their integration
GLUE.THINGS OVERVIEW

**Runtime**
Distribute, share and trade glue.things applications

**Composer**
Composition tool to aggregate and manipulate data

**Data Manager**
Registration and management of Smart Objects

**glue.things API & SDK**
Web Communication Protocol (REST, Sockets)

**glue.things Dashboard**
Smart Object Manager
Smart Object Composer
Smart Object Marketplace

**Connected Smart Objects**
- Mobiles
- Wearables
- TVs
- Sensors and Actuators

**Certifications**
- HTTPS
- CoAP
- MQTT
- STOMP
glue.things offers a mashup toolkit (client libraries, REST API, Web-based dashboard) to connect TVs, wearable computing devices, and all of the consumer and business tools to the Internet.

glue.things is a WoT hub: supports device integration and real-time communication (Web Sockets, MQTT and CoAP based on real-time data stream networks such as MeshBlu, PubNub and servIoTicy), data stream mashups, triggers / actions and finally distributed deployment of these mashups.

**Development process** is supported by the glue.things dashboard:
- configure and control data channels, meta-data, fine-grain permissions, conditional triggers, time-series data archiving and interconnection with other devices, apps and services
- aggregate, manipulate, and mash together device data streams with any Web service, define conditions statements, triggers and actions for these mashups
- Deploy and run the mashup applications on CloudFoundry, share and distribute them on a marketplace

Use glue.things client libraries, REST API and dashboard to easily create innovative mashup applications in **three steps**: 1. Connect, 2. Build and 3. Distribute.
GLUE.THINGS DASHBOARD

Data Manager

- Web-based tool for connecting and registering any device on glue.thing. Once your device is connected, you will retrieve real-time updates of your device.
- Manage and organize one or multiple devices
- Monitor their status and configure access policies for applications talking to them
- Visualize the output data of your devices in time series and predefined charts
- Modify data channels
- Token management for data policies and views on data
- Select predefined Triggers and Actions
Composer

- Provides you the capability to **aggregate, manipulate, and mashup** your device data with any Web service in a visual and intuitive way.

- Powerful mashup editor build on **Node-RED**

- Select your data channels from a collection of **devices and Web services**

- **Click and drop** your data channels on a canvas and connect them with flows

- Combine many data channels into one, **define conditions statements, triggers and actions**

- Deploy your mashup as application on **CloudFoundry**

Mashup applications are deployed as **Node-RED application** on CloudFoundry

- Support of **Multi-tenancy** and **Personalization**
GLUE.THINGS DASHBOARD

Marketplace

- Important to create network effect; increasing value of platform
- Distribute and share the output data of your devices and the final mashup application on a marketplace
- Define access policies and billing conditions
- Generated mashups of device output data and Web services including triggers and actions can be shared and distributed as application on a marketplace
- These applications provide user authentication and authorization capabilities
- Shared and distributed applications support APIs for third party access
- Subscribe to favorite mashup applications
- Define public mashups, private mashups and group mashups
My Automations

Debug FAMIUM App
Debugging automation for the FAMIUM APP

If Fame App Then Switch On Wemo

Showroom Demonstration
This automation displays all flows for our Showroom device installation

IF Door Bell THEN Turn on Philips Hue
If someone rings at the door bell, Philips Hue will be turn on.
DEVELOPER TOOLS

- Access and manage devices with the glue.things REST API and client libraries. Supported protocols: HTTP/TCP, STOMP/TCP, STOMP/WS, MQTT, CoAP, FAMIUM IoT (gateway to TV sets, set-top boxes, tablets and smartphones in the home environment)

- glue.things supports various software and hardware combinations needed to create mashup applications for the Internet of Things

- Client libraries for a variety of programming languages and platforms: Android, iOS, Spark, Flyport, Arduino, Raspberry Pi, mbed – ARM® microcontrollers, etc

- glue.things API exploits the simplicity and power of the well-known REST implementation with the support of JSON and XML data formats
Various efforts toward standardization for the Internet of Things

**W3C Interest Group on the Web of Things**

- **Key technologies** for Web of Things: REST, CoAP, XMPP, Web sockets, webRTC, MQTT, XML schema, linked data, JSON, JSON-ld, schema.org, mashups
- The domain is so broad and fragmented. Defining standards is really hard.
- How to break up the vertical software silos? Build the Web of services.
- Web of Things should be an application layer of the Internet of Things

**Conclusion:** Outline use cases and best practices to build the WoT. This is better as to build new standards.

**Positioning of glue.things:**
- Builds on key technologies for the Web of Things
- Contributes to an **interoperable approach** for connecting the Internet of Things with the Internet of Services
ETSI M2M

ETSI M2M 690 good for **industrial implementations** but not in the connected home and consumer environment.

Missing concepts regarding device discovery, indoor positioning, data subscriptions, identity management, semantics and meta data

**Barriers to implement ETSI M2M 690:**

- is mostly supported by operators
- less reference implementations
- the core architecture with two levels to store data is too complex for consumer devices
- the subscribe / notify mechanism is not appropriate
- mid interface is good for standardization but prohibitive from a performance perspective

**Positioning of glue.things:**

Provides an **agile platform across devices, communication, data and APIs** by addressing ETSI missing concepts and implementation barriers
Components and Features:

- **Cloud-based middleware** (CloudFoundry) between device gateways (standardized communication protocols: HTTP/TCP, STOMP/TCP, STOMP/WS, MQTT, CoAP) and applications

- **REST APIs** for sensors and actuators, device discovery, data subscriptions / notifications and identity management

- **Lightweight semantics** based on linked data for service publication, advanced discovery and analytic capabilities

- **Visual data stream mashups** with Node-RED including condition statements, triggers and actions (**If condition Then action**); basic operations for data filtering and manipulation via JavaScript

Application Scenarios:

- Entertainment, home management and automation

- Connected health, wearable devices, quantified self
THANK YOU

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