SAP Internet of Things – Webinar Series

Moderator: Jos Houben

- **SAP IoT Overview**
  - Nils Herzberg
  - Mar 8

- **SAP HANA Cloud Platform & HANA Cloud Integration**
  - Alex Braun / Piyush Gakhar
  - Mar 15

- **SAP Predictive Maintenance**
  - Simon Lee
  - Mar 21

- **SAP Logistics Hub**
  - Uwe Kürsten
  - Mar 22

- Create new business models based on vehicle data analysis with SAP Vehicle Insight
  - Mirjam Metzler
  - Mar 29

- **SAP Asset Intelligent Network**
  - Mathew Easley/Dirk Kempf
  - Apr 5

- **SAP IoT Application Services**
  - Harry Lube
  - Apr 26
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SAP HANA Cloud Platform for the Internet of Things
Device and process integration capabilities

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SAP HANA Cloud Platform - Architecture
Current & Planned Innovations

1) beta functionality, 2) planned innovations / future direction

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SAP offers reusable IoT Application Services that enable our customers and the ecosystem to efficiently build new and expand existing IoT applications. The IoT Application Services are planned as a scalable offering, which is simple to use, leveraging big data capabilities and allows for easy integration with S/4 HANA.

- SAP IoT Application Services are a powerful selection of micro-services and application components used to efficiently develop and run IoT scenarios for SAP, customers and partners supporting digitalization in all industries.

- SAP IoT Application Services will be easy to subscribe, simple to learn and allow everyone to develop, package, sell and run their own applications.

- Managing and storing things, track and trace capabilities, billing or rules management are just a few examples out of many planned micro services in this context.

- Intended part of this offering is the IoT Application Builder – a web-based IDE – supporting to easily model things and their properties and providing wizards and templates to build state of the art UI’s leveraging reusable components as well as data connectivity to the respective services.

1) Phased Delivery, 2) planned innovations / future direction
SAP provides dedicated capabilities for:
- Time-Series of numeric values and status data
- Events / Logs

The SAP-managed offering will include:
- Pre-defined analytics e.g. standardized time-series aggregates
- Statistics e.g. event counters, event frequency
- Search on events
- Limited set of built-in predictive services e.g. outlier detection
- Definition of rules which are run during the streaming process

For more specific analytical requirements, SAP will offer:
- Option to copy / extract data into customer-managed space where customer can choose toolset depending on HCP / 3rd party cloud available options
Basic capabilities:

- **Understand** things and their properties
- **Organize** things in groups & hierarchies
- **Shield** from storage complexity
- **Control** data access
- **Simplify** IoT application development
- **Enable** reuse
- **Support** Business Integration
- **Facilitate** co-deployment of IoT applications and partner services

*This is the current state of planning and may be changed by SAP at any time.*

[Diagram of various services including Object Visualizer, Object Analyzer, Vehicle Insights, UI & Application Services, Device Management, Thing Model, Data Integration, Storage / Analytics, Business Partner, Business Integration, Infrastructure and Technology.

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Application Thing Services
Overview

Meta Model & Hierarchies
- Thing types and properties, master data and time series
- Thing relations, structure and time dependency
- Asset structure modeling

Data Ingest
- The process of importing, transferring, loading and processing high volume data for later use or storage in a database
- High-volume ingestion service (messaging) incl. queuing capability
- Auto-scaling infrastructure & monitoring
- Cleansing & validation possibilities
- Option to run rules on the incoming data e.g. for generating events
- Option for customer-specific parsing logic to transform the data
- Seamless integration between IoT Services and IoT Application Services
- Support / clear interfaces for 3rd party device management

Data Management & Consumption
- Big data management – cheap/hot/warm/cold storage
- Org and tenant on- and off-boarding (configuration, data, events …)
- Multiple data types (integer, unsigned integer, double, time span, geo location)
- REST & OData API support, other protocols tbd
- Extensibility & UI configuration service
- Snapshot and historical time series data queries
- Optimal access APIs for charts (M4 algorithm)
- Analytical APIs on time series
- Events and correlation configuration
- Document services
# Application Service Documentation

## 1.4.1 Read Thing/Type Details

This Thing configuration service is used to read the details of the specific thing type.

### Request

<table>
<thead>
<tr>
<th>URL</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>/sap/op/thing/applications/ThingTypes/{Name}/Things/{Name}/</td>
<td>GET</td>
</tr>
</tbody>
</table>

#### Request Headers:

- **Content-Type**: application/json

#### Response Headers:

- **Content-Type**: application/json

### Base URI

- **Query String**:.setDescription
- **Description**: The base URI for a specific Thing Type

### Base URI with Parameters:

**Parameters**:

- **Name**: The name of the Thing Type

### Response Example

```
{
  "name": "ExampleThing",
  "description": "Example Thing Description",
  "attributes": [
    {
      "name": "Attribute1",
      "description": "Attribute1 Description"
    },
    {
      "name": "Attribute2",
      "description": "Attribute2 Description"
    }
  ],
  "methods": [
    {
      "name": "Method1",
      "description": "Method1 Description"
    },
    {
      "name": "Method2",
      "description": "Method2 Description"
    }
  ]
}
```
Further Application Services (1/2)
Overview

**Organisation & User Management**
- Realizes an IoT BP, compatible to the SAP BP Model (MDG)
- BP types (categories) and BP roles
- Organizations and persons
- Relating a BP person to a business user with authorizations on the cloud system (authorization)
- BP relationships to set up BP networks
- Organization and person onboarding with admin self services
- Combination of postal addresses with GPS coordinates
- Reuse object for BPs, things and any other objects on the platform
- Different objects can share a location

**Authorizations:**
- Tenant concept for data separation
- Object group hierarchy to bundle business objects like things, business partners, etc. where users have the same authorizations on
- Capabilities to define instance authorizations of user groups on object groups
- Inheritance of capabilities along the object group hierarchy
- Capabilities to define authorizations along attribute conditions
- Authorizations on thing properties
- Cross tenant authorizations enabling business processes along BP* relationships between different tenants
- Guarantee that persons/users can only access data along their individual authorizations
- Tenant onboarding to create a tenant with an owning organization, an initial object group and an administrator to run any further activities on the tenant
- Organization onboarding to create a BP of type organization with its initial object group in a tenant
- Person onboarding to create a BP of type person and assign it to a user and a user group for proper authorizations

* BP = Business Partner
Further Application Services (2/2)
Overview

Common Services
- Value help services for Units of Measure, languages, countries, …
- Conversion services (UoM, currency, address, date, …)
- Language support
- Where used services

Business Integration
- Business data integration like business partner, equipment master, asset structure, …
- Business process integration like CRM service order creation, PM work order creation, …

Track & Trace
- Management and administration of generic objects (things, transportation assets, …)
- Management of time dependent hierarchies and relationships between generic objects
- Complex processing of logistics events
- Rules management for track and trace
- Condition monitoring for transported goods

Rules Management / Alerting & Notification
- Rule builder: environment to manager (create, read, update, delete) a set of rules
- Rule conditions
  - Basic: condition on a single property (e.g. threshold exceeded – min/max)
  - Complex: conditions based on a set of properties
- Rule conclusion
  - Trigger service execution (backend))
  - Create and visualize notification (frontend)
  - Create and visualize event
Provide many single components with each having its own value and can be freely combined.
SAP IoT Developer Experience - DevX (2/2) based on SAP Web IDE *

SAP Web IDE is a powerful web-based integrated development tool to support the end-to-end application development lifecycle for the UI5 library

- Browser-based (Web) toolkit available on SAP HANA Cloud Platform
- An Integrated Development Environment to
  - create new SAPUI5/HTML5 IoT apps
  - extend SAPUI5/HTML5 IoT apps
- Quickly prototype, develop, test, package, and deploy applications. Supports the end-to-end application development lifecycle
- Leverage existing components, templates and sample apps for accelerating your development
- Deploy apps to HCP@Cloud Foundry*
- Enhance SAP Web IDE with additional plug-ins

* planned

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MindSphere – Siemens Cloud for Industry
First reference customer using HCP IE and SAP IoT Application Services

Siemens Plant Cloud Services

- World leader in industrial automation and drive technology
- Access to unique pool of practical experience & profound industry expertise
- Easy connectivity leveraging open standards
- Fast data processing on global large scale data storage
- Pro-active condition monitoring & energy data management
- Web based visualization of analytical insights
- Open development environment for OEM’s and their customers to develop and market their own applications
- Creating new business models