System Description (SysD)
DeviceRegistry System

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1 System Description Overview

The DeviceRegistry system stores information and unique identities for devices registered within an Arrowhead local cloud. The registration into a local cloud is part of the bootstrapping process of a local cloud. This registry shall in addition to registering device identity, also store metadata about the device and shall hold data on systems that are deployed to each registered device.

The DeviceRegistry system is one of the support core systems of the Arrowhead Framework. It provides one service and consumes the mandatory core services, see Figure 1. This registry in combination with the SystemRegistry creates a chain of trust from a hardware device to a hosted software system and its associated services.

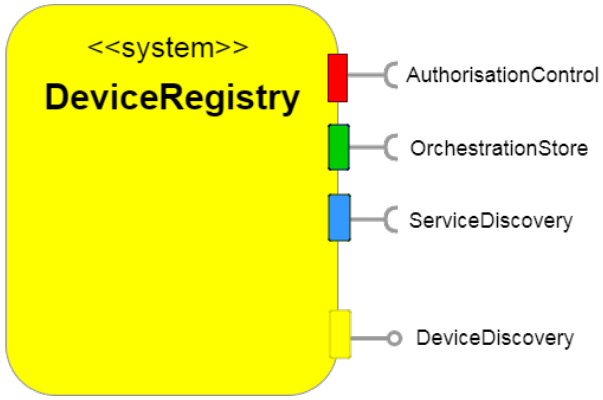

Figure 1: The DeviceRegistry system which produces the DeviceDiscovery service and consumes the AuthorisationControl, OrchestrationStore and ServiceDiscovery services.

The DeviceRegistry provides DeviceDiscovery service for device registration, de-registration and lookup based on a Java-based REST interface, which uses a MySQL database. It consumes the three mandatory core services, AuthorisationControl, OrchestrationStore and ServiceDiscovery.

All Arrowhead Framework Devices within a local cloud shall register within the DeviceRegistry by using the DeviceDiscovery service. As such DeviceDiscovery is regarded as a well known service, and shall be accessible using a multitude of SOA protocols like e.g. REST, CoAP, MQTT. The current implemented protocols for the DeviceRegistry system are documented in the IDD document.

This registry in combination with the SystemRegistry is necessary to create a chain of trust from a hardware device to a hosted software system and its associated services.

2 Use-cases

This section provides use cases that represent the actors and their interaction with DeviceRegistry system.

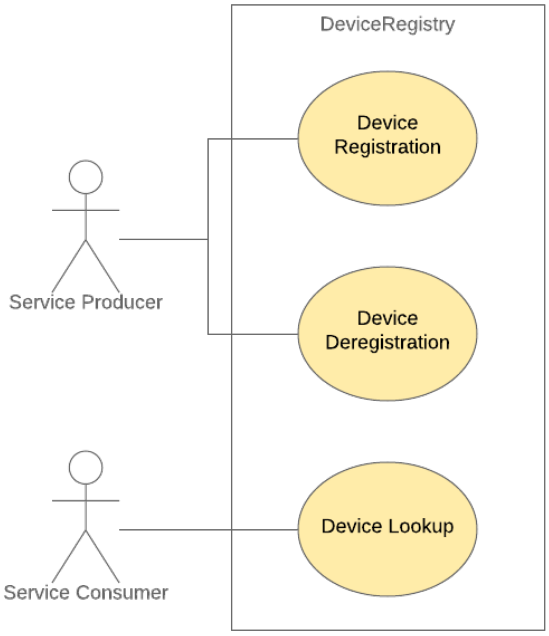

Figure 2: DeviceRegistry use cases

Device Lookup The use case Device Lookup is used by the service consumer to get the list of registered devices in the DeviceRegistry system, e.g. searches for a specific device instance with a specific ID (primary key).

Device Registration The use case Device Registration is used by the service producer to register its device in the DeviceRegistry system, e.g. stores a device instance in the database (instances must not contain IDs, but embedded entities can have IDs if they already exist).

Device De-registration The use case Device De-registration is used by the service producer to delete its device from the DeviceRegistry system, e.g. removes a device instance from the database.

3 System services

The DeviceRegistry system produces one service, as shown in Table 1, and consumes three services, as shown in Table 2. All documents and code related to DeviceRegistry system can be found in the repository of the Arrowhead Framework project, https://forge.soa4d.org/docman/?group_id=58.

3.1 Produced Services

The DeviceDiscovery service is used to register and de-register devices, their systems, as well as find devices among the registered devices in the DeviceRegistry system. Table 1 provides the produced service of DeviceRegistry and the location of the IDD document in the Arrowhead Framework repository.

Table 1: Produced services by the DeviceRegistry system

Service	**IDD Document Reference**
DeviceDiscovery	https://forge.soa4d.org/docman/view.php/58/175/Arrowhead_IDD_DeviceDiscovery_v1.0.pdf

3.2 Consumed Services

Table 2 provides the mandatory services consumed by DeviceRegistry system and the location of IDD document for each of them.

- The *AuthorisationControl* service provides the possibility of enabling fine grained access control to any resource/service for external requests; also provides customized information about the external consumer.
- The *OrchestrationStore* service provides functionality for storing and retrieving orchestration requirements, which is a set of rules for describing the ideal service required by a consuming system.
- The *ServiceDiscovery* service is used to register and unregister services, as well as find services among the registered serviced in the ServiceRegistry system.

Table 2: Consumed services by the SystemRegistry system

Service	**IDD Document Reference**
AuthorisationControl	https://forge.soa4d.org/docman/view.php/58/215/auth-40.zip
OrchestrationStore	https://forge.soa4d.org/docman/view.php/58/216/Orch-40.zip
ServiceDiscovery	https://forge.soa4d.org/docman/view.php/58/217/sr-40.zip

4 Security

Registration of a device to the DeviceRegistry system of a local cloud should allow:

- Authentication of devices requesting device registration
- Authentication of devices requesting device lookup
- Authentication of devices requesting device de-registration
- Authorization of device registration
- Authorization of device lookup
- Authorization of device de-registration

5 Revision history

5.1 Amendments

No.	Date	Version	Subject of Amendments	Author
1	2017-09-10	1.0	Initial Version	Ani Bicaku
2	2017-11-15	1.1	Initial Version	Ani Bicaku
3	2019-09-23	1.2	Updated Version	Ani Bicaku, Mario Zsilak

5.2 Quality Assurance

No.	Date	Version	Approved by
1			
2			