# SysD SystemRegistry v1.1

22 november 2018

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| silia.maksuti@fh-burgenland.at | 2(8) |

# 1  System Description Overview

The SystemRegistry system is used to provide a local cloud storage holding the information on which systems are registered with a local cloud, meta-data of these registered systems and the services these systems are designed to consume. The SystemRegistry system holds for the local cloud unique system identities for systems deployed within the Arrowhead Framework local cloud.
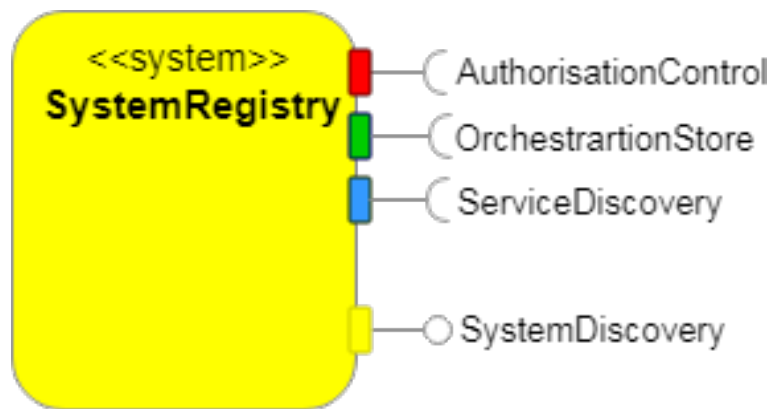


Figure 1: The SystemRegistry system, which produces the SystemDiscovery service and consumes the mandatory core services

The SystemRegistry provides SystemDiscovery service for system publication and lookup based on DNS and DNS-SD extention [1], [2], [3], [4], and consumes the three mandatory core services, AuthorisationControl, OrchestrationStore and ServiceDiscovery.

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

This registry in combination with the DeviceRegistry 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 SystemRegistry system.

## 2.1  System Lookup

The use case System Lookup is used by the service consumer to get the list of registered systems in the SystemRegistry system.

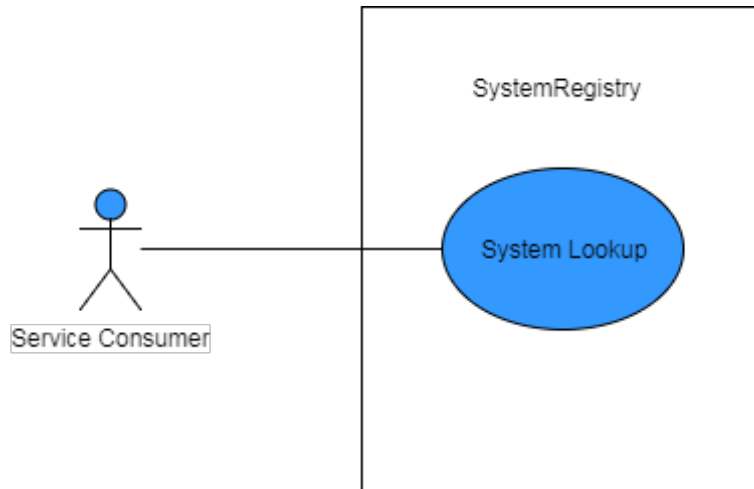| Document title | Document type |
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Figure 2: System Lookup use case

## 2.2 System Registration

The use case System Registration is used by the service producer to register its system in the System-Registry system.
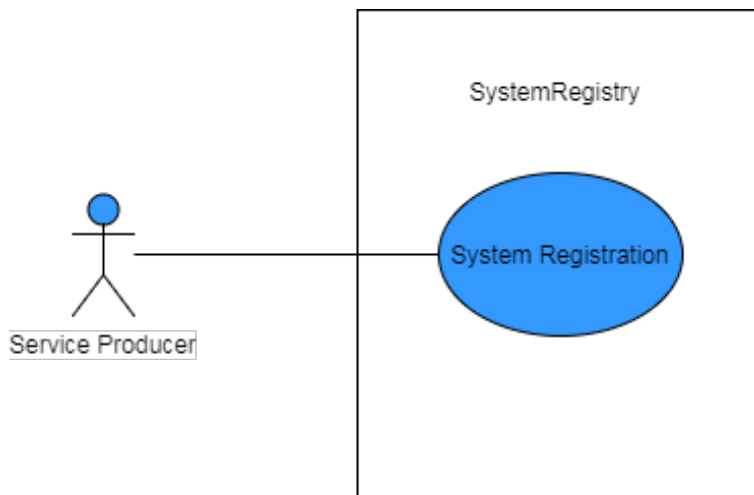
Figure 3: System Registration use case

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## 2.3 System Deletion

The use case System Deletion is used by the service producer to delete its system from the System-Registry system.
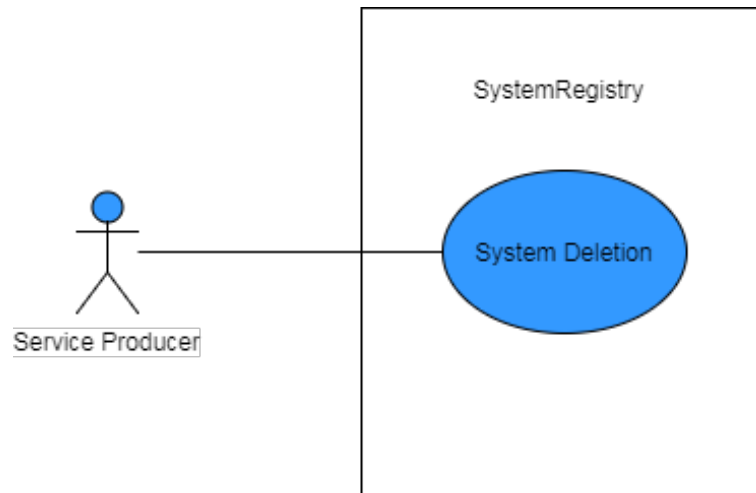


Figure 4: System Deletion use case

## 2.4 On-boarding/bootstrapping Procedure

A new device produced by a specific vendor (e.g., Siemens), which contains a Trusted Platfom Module (TPM), wants to connect to the Arrowhead local cloud. The on-boarding/bootstrapping procedure is needed between this device and the local cloud if they have no previous knowledge of each other. The device should register itself at the DeviceRegistry system, and each SW system running in that device should register itself at SystemRegistry system. Each SW system should further register the services in the ServiceRegistry system, as shown in 6.

# 3 Behaviour Diagrams

The behaviour diagram of the On-boarding/bootstrapping Procedure is shown in Figure 6.

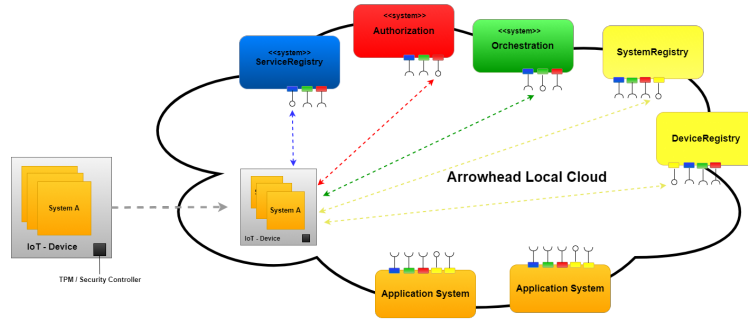| Document title | Document type |
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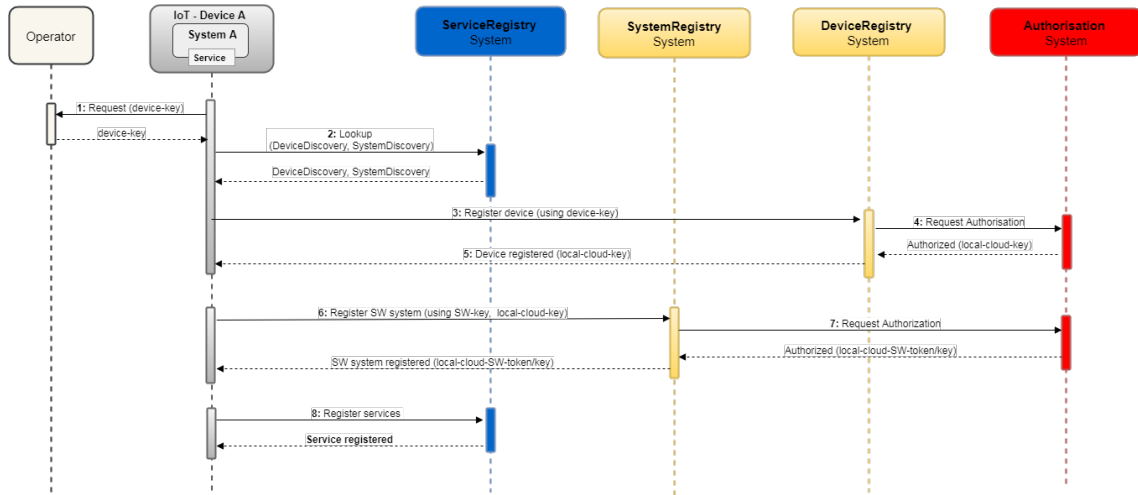Figure 5: On-boarding/bootstrapping Procedure use case



Figure 6: On-boarding/bootstrapping Procedure behaviour diagram

# 4 System services

The SystemRegistry system produces one service, as shown in Table 1, and consumes three services, as shown in Table 2. All documents and code related to SystemRegistry system can be found in the GIT repository of the Arrowhead Framework project, https://forge.soa4d.org/plugins/scmgit/cgi-bin/gitweb.cgi?p=arrowhead-f/arrowhead-f.git;a=tree;f=3_Core+Systems/2_Support+Core+Systems/3_SystemRegistry+system;h=e3f2c6cdc47fa4684b5b8fd75dc773439026a757;hb=HEAD.

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## 4.1 Produced Services

The SystemDiscovery service is used to register and unregister systems, their produced serviced and their hosting devices, as well as to find systems among the registered systems in the SystemRegistry system.

Table 1: Produced services by the SystemRegistry system

| Service | IDD Document Reference |
|---|---|
| SystemDiscovery | `https://forge.soa4d.org/plugins/scmgit/cgi-bin/gitweb.cgi?p=arrowhead-f/arrowhead-f.git;a=blob;f=3_Core+Systems/2_Support+Core+Systems/3_SystemRegistry+system/Documetation/IDD_SystemRegistry/Arrowhead_IDD_SystemDiscovery.pdf;h=4076e39a68d21aea2d1e288b3b46203245579a84;hb=HEAD` |

## 4.2 Consumed Services

The SystemRegistry system consumes the three mandatory core services, briefly described below.

The AuthorisationControl service provides the possibility of enabling fine grained access control to any resource/service for external requests; also provides customised 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.

# 5 Security

## 5.1 Security Objectives

Registration of a system to the SystemRegistry of a local cloud shall allow for

- Authentication of systems requesting system registration

- Authentication of systems requesting system discovery

- Authentication of system requesting system de-registration

- Authorization of system registration

- Authorization of system discovery

- Authorization of system de-registration

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Table 2: Consumed services by the SystemRegistry system

| Service | IDD Document Reference |
|---|---|
| AuthorisationControl | `https://forge.soa4d.org/plugins/scmgit/cgi-bin/gitweb.cgi?p=arrowhead-f/arrowhead-f.git;a=blob;f=3_Core+Systems/1_Mandatory+Core+Systems/3_Authentication/AA+certificate+system/Latest+docs/Arrowhead_IDD_Authorisation+Control+REST_WS-TLS-XML-SPAUTH.pdf;h=7e1141b8f5e52e23ae3e0730e9c2a4e348b7649d;hb=HEAD` |
| OrchestrationStore | `https://forge.soa4d.org/plugins/scmgit/cgi-bin/gitweb.cgi?p=arrowhead-f/arrowhead-f.git;a=blob;f=3_Core+Systems/1_Mandatory+Core+Systems/1_Orchestration/Arrowhead_IDD_Orchestration+Store+REST_WS-TLS-XML-SPORCH.pdf;h=026aaf66b4638ed7bb07f20ccb8d6879caf2c477;hb=HEAD` |
| ServiceDiscovery | `https://forge.soa4d.org/plugins/scmgit/cgi-bin/gitweb.cgi?p=arrowhead-f/arrowhead-f.git;a=blob;f=3_Core+Systems/1_Mandatory+Core+Systems/2_ServiceRegistry/Arrowhead_IDD_Service+Discovery+DNS-SD-TSIG-SPDNS.pdf;h=8e1bafeeb53bf5867d015bc72536342798b507f3;hb=HEAD` |

## 5.2 Assets

No defined yet.

## 5.3 Non-technical Security Requirements

No defined yet.

# References

[1] P. Mockapetris, "Rfc 1034: Domain names: concepts and facilities (november 1987)," *Status: Standard*, vol. 6, 2003.

[2] P.Mockapetris, "Rfc 1035 domain names. implementation and specification, november 1987," *URL http://www. ietf. org/rfc/rfc1035. txt*, 2004.

[3] R. Elz and R. Bush, "Rfc 2181 clarifications to the dns specification, internet engineering task force, http://tools. ietf. org/html/rfc2181, 1 page," 1997.

[4] S. Cheshire and M. Krochmal, "Rfc 6763: Dns-based service discovery," *Internet Engineering Task Force*, 2013.

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# 6  Revision history

## 6.1  Amendments

| No. | Date | Version | Subject of Amendments | Author |
|---|---|---|---|---|
| 1 | 2017-09-10 | 1.0 | Initial Version | Silia Maksuti |
| 2 | 2017-11-15 | 1.1 | Updated Version | Silia Maksuti |
| 3 | | | | |

## 6.2  Quality Assurance

| No. | Date | Version | Approved by |
|---|---|---|---|
| 1 | | | |
| 2 | | | |