ServiceRegistry System SysDD G3.2

**Abstract**

This document provides an overview on the ServiceRegistry System within Arrowhead generation 3.2.

This System is primarily implemented based on the DNS-SD BIND server, but registration, update and delete methods are only allowed through the REST interface of this System. Lookup is allowed via the DNS standard.

1. System Design Description Overview

Table 1 System Information

|  |  |
| --- | --- |
| **Full Name** | ServiceRegistry System G3.2M2 |
| **Owner** | Csaba Hegedűs, AITIA Inc., hegeduscs@aitia.ai |

This System provides the database, which stores information related to the currently actively offered Services within the Local Cloud.

In G3.2, this System is implemented twice, using two different database technologies:

* DNS-SD BIND server with a Java-bases REST interface
* The same Java-based REST interface, but using a MySQL database (this version is for quick setup and development only)

The purpose of this System is therefore to allow:

* Application Systems to register what Services they offer at the moment, making this announcement available to other Application Systems on the network.
* They are also allowed to remove or update their entries when it is necessary.
* All Application Systems can utilize the lookup functionality of the Registry to find appropriate Service offerings in the network.

However, it is worth noting, that within G3.2, the lookup functionality of Services is integrated within the “orchestration process”. Therefore, in the primary scenario, when an Application System is looking for a Service to consume, it shall ask the Orchestrator System via the Orchestration Service to locate one or more suitable Service Providers and help establish the connection based on metadata submitted in the request. Direct lookups from Application Systems within the network is not advised in G3.2, due to security reasons. There are only two exceptions to this guideline.

* Application Systems shall use the DNS-based, insecure ServiceRegistry interface to look up the DeviceRegistry and SystemRegistries upon bootstrapping (*not implemented yet!)*
* They also can look up the Orchestration Service using the DNS-based interface at all times.

However, the lookup of other Application Systems and Services directly is not within the primary use, since access will not be given without the Authorization token. The use of the TokenGeneration is restricted to the Orchestrator for general System accountability reasons. Yet again, this restriction is not mandatory, just a default setting (within Authorization System properties file).

The ServiceRegistry assumes that either the BIND server or the MySQL database is properly configured and set up when used. The setup guide for this module doesn’t contain guidelines on that, however, for the DNS server set up it is advised:

* the TSIG authentication schema is activated
* only the REST bridge possesses the TSIG keys: WRITE rights are only allowed through the REST interface
* all other Application Systems only have READ rights to the DNS server

There are no additional requirements for the MySQL-based Registry, besides the initialization with the supplied SQL scripts.

1. Services and Use-cases

This System only provides one Core Service:

* ServiceDiscoveryM3

This Service is provided with the following interfaces:

* ServiceDiscoveryM3\_REST-JSON-TLS
* ServiceDiscovery DNS-SD

There are two use case scenarios connected to the ServiceRegistry.

* Service registration, de-registration
* Service Registry querying (lookup)

There is another functionality that does not bound to any Services, just an internal part of the Service Registry. This is a periodical cleanup task that tries to ping every registered Service Provider in order to check whether they are alive on the network – or their entries shall be removed. This ‘PingProvidersTask’ is an internal method of the System and is configurable in the properties file of the Registry executable.

1. Internal structure

This module is a Java jar executable. Both implementations follow a simple software layout:

* Main class: instantiates the HTTP and/or HTTPS servers based on the properties files and command line arguments
* ServicerRegistryResource: contains the REST interface functions
* ServiceRegistry: contains the “business logic” behind the REST interface (e.g. related to registration or query)
* RegistryUtils: contain utility functions for the ServiceRegistry class
* PingProvidersTask: is responsible for pinging registered Service Providers and check whether they are active on the network or not (if not, they are auto-removed the database)

The SQL and DNS based implementations differ in the ServiceRegistry and RegistryUtils classes (responsible for the data management layer).

Used libraries:

* Java Jersey API
* Grizzly servlet container
* Hibernate ORM or DNS-SD Java client library

# Usage

Start the module as a Java executable. The following command line arguments are available:

* “-m <mode>” sets the server mode
  + “secure”: using HTTPS
  + “insecure”: using simple HTTP (default mode)
  + or “both” when two ports are used, one for simple HTTP and one for HTTPS server
* “-daemon” (Linux only!): starts the module in daemon mode, kill signals will prompt a normal shutdown, and the core system will de-register its services from the Service Registry.
* “-d”: starts the module in debug mode, which means every incoming REST request (URL + payload) and the corresponding response will be printed to the console output.

This is true for both implementations (DNS or MySQL based).

1. Security

This System can be secured via the HTTPS protocol. If it is started in secure mode, it verifies whether the Application System possesses a proper X.509 identity certificate and whether that certificate is Arrowhead G3.2-compliant in its making. This certificate structure and creation guidelines ensure:

* Application System is properly bootstrapped into the Local Cloud
* The Application System indeed belongs to this Local Cloud
* The Application System then automatically has the right to register its Services in the Registry.

If these criteria are met, the Application System’s registration or removal message is processed. An Application System can only delete or alter entries that contain the App. System as the Service Provider in the entry.

The BIND server is TSIG-secured and Application Systems only have READ access through the DNS interface. All other (CUD) methods can happen via the REST HTTPS interface, secured by SSL and X.509 identities.

1. Revision history

# Amendments

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Date | Version | Subject of Amendments | Author |
| 1 | 2017-09-29 | M2 | Initial | Csaba Hegedűs |

# Quality Assurance

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