FederatedAiSystems

System Description

Abstract
This is the template for System Description (SysD document) according to the Eclipse Arrowehad documentation structure.

Contents

1 Overview

This document describes the FederatedAiSystems, which getData from the preprocessing system (SysD), and uses various algorithm from the algorithm store system. The rest of this document is organized as follows. In Section 1.1, we the intended usage of the system. In Section 1.2, we describe fundmental properties provided by the system. In Section 1.3, we describe de-limitations of capabilitites ofn the system. In Section 2, we describe the abstract service functions consumed or produced by the system. In Section 3, we describe the security capabilitites of the system.

1.1 How This System Is Meant to Be Used

Describe the intended usage of the system. The system uses several machines that cooperate to train a model using preprocessed data.

Preferable a SysML/UML block diagram of the System should be provided. See the SysML profile and library (github.com/eclipse-arrowhead/profile-library-sysml) for support on how such block diagram should look like. Suitable tools are Eclipse Papyrus.

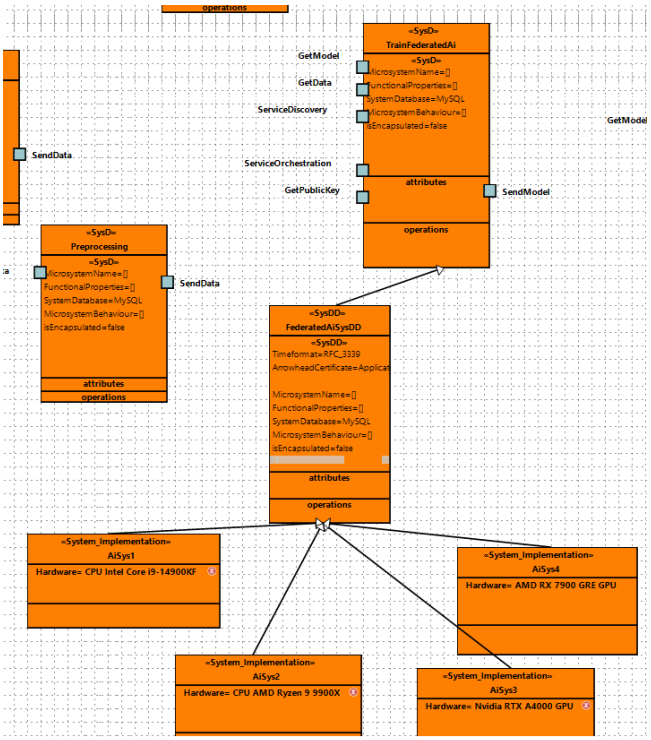

Figure 1: SysD (FederatedAisystem) document and several other systems and system implementations

1.2 System functionalities and properties

Narrative describe system functionalities and properties (no implmentation details) like e.g.:

1.2.1 Functional properties of the system

The service is connected to the core microsystems to allow local-cloud functionality.

Get model and data from other systems.

The System of system use SendGetData at the endpoints and within the system SendGetModel is also utilized.

Consumed services (for the endpoints of the Sos): SendGetData (GetData) (SD document) and the IDD doc (SendGetDataIDD) Produced services: SendGetData (GetResult) (SD document) and the IDD doc (SendGetDataIDD)

1.2.2 Non functional properties

- security, safely, energy consumption, CPUs/GPUs

  The information is sent using TCP/ IP which is a secure way of transmitting information. This method ensures reliable and orderly delivery, of information packets across the network(s). The method can use the IP of various systems to know where to send the packages. TCP is comparable with all OS, which is a good thing since we have 4 heterogeneous machines which we work with. In our case the information will

be transmitted over a local cloud. We have four different processing units 2 CPUs and 2 GPUs. The CPUs are of the type: Intel Core i9-14900KF and AMD Ryzen 9 9900X (120W), the GPUs are of the type: Nvidia RTX A4000 GPU, 13th Generation Intel® Core™ i7-13620H processor.

1.2.3 Data stored by the system

Brief overview of data stored to achieve the functionality of the system.

The system only temporarily stores data while updating the model; the weights need to be stored while it is updating the model.

1.3 Important Delimitations

The system can only update the federated models in proportion to how powerful the CPU/ GPU etc is.

2 Services

The system is a consumer of preprocessed data, it is also a consumer of a model that is a part of the
This section describes consumed and produced service. In particular, each subsection names a produced or consumed service indicating the different capabilities and associated interfaces of the service. Reference to the appropriate SD document shall be made. The services use SendGetModel and SendGetData.

2.1 Produced service

SendGetModel (sendmodel) (SD document) and the IDD doc (SendGetModelIDD)

2.2 Consumed services

SendGetModel (GetModel) (SD document) and the IDD doc (SendGetModelIDD), GetData (SD document)

3 Security

The system is connected to the Arrowhead core microsystems which provide service registry, orchestration, and authorisation. The information is sent using TCP/ IP which is a secure way of transmitting information. This method ensures reliable and orderly delivery, of information packets across the network(s). The method can use the IP of various systems to know where to send the packages. TCP is comparable with all OS, which is a good thing since we have 4 heterogeneous machines which we work with.

4 References

5 Revision History

5.1 Amendments

Revision history and Quality assurance as per examples below

No.	Date	Version	Subject of Amendments	Author
1	2024-10-20	4.6.2		Adam Epstein

5.2 Quality Assurance

No.	Date	Version	Approved by
1	2024-10-20	4.6.2	