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Interactive Session

A Study on Storing Environmental Data on SEDRIS for Cyber Physical Systems

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Abstract

To save the data used in simulation of Cyber Physical Systems (CPS), SEDRIS is required. But, SEDRIS need to define the format of saving environmental data because it supports only the basic data structure to save environmental data. In this paper, we define the right formats that have 4 types of environmental variables such as friction wind direction, wind speed, and pressure to save environmental data in simulation of CPS. And we also confirm the result of environmental data input in SEDRIS. Through this, we can expect to possibly simulate environmental data in CPS.

Keywords: SEDRIS, Cyber Physical Systems, Modelling & Simulation, Environmental data.

1. Introduction

The existing environment of simulation simulates the one system. But the simulation in Cyber Physical Systems (CPS) is performed by the combination of factors such as several embedded systems, the physical condition, and controlled real-time computing. Therefore the CPS requires the integrated management of various data in simulation and the expression for the synthetic environments. The *Sharing Environmental Data Responsibly with an Interface Specification* (SEDRIS) provides the cost-effective technology for the unified representation and interchange of environmental data, eliminates the expensive and recurrent costs compatible across domain boundaries, and covers multiple product formats [1]. SEDRIS can also save and manage all environmental data using in simulation. But SEDRIS need to define a format of inputting the environmental data because it supports a basic method to save in the database management system. In this paper, we define the format that have types of environmental variables such as friction wind direction, wind speed, and pressure to save environmental data in simulation of CPS. In addition, we confirm the result of environmental data input in SEDRIS.

2. Our defined metrics and input of environmental data in CPS

We define metrics as shown table 1 in order to save 4 types of environmental variables such as friction wind direction, wind speed, and pressure in the internal SEDRIS, which consists of time and data. The time part separates the absolute time and relative time. In data part, 4 types of the environmental variables are matched by the coordinates x, y, h.

Table 1. The metrics for representation of environmental data in CPS

No	Absolute time (M-D/Y)	Relative time (D–H:M–S)	Environmental data						
			x	y	h	Friction (Type)	Wind direction (Radian)	Wind speed (m/s)	Pressure (Bar)
1	4-5/2014	0-0:0-0	0	0	0	GROUND	1.57	10	0.001
2	4-5/2014	0-1:0-0	0	0	0	GROUND	1.57	10	0.001
3	4-5/2014	0-2:0-0	0	0	0	GROUND	1.74	20	0.001
4	...								

To save internally data in SEDRIS, it is possible to use the Application Programing Interface (API) of SEDIRIS Software Development Kit (SDK) [2]. But developers not easily use the low level APIs without understanding the structures of DRM, SRM, and EDCS. To solve this problem, we propose the SEDRIS High-level API (SHA) [3]. In this SHA, we add API for saving environmental data. And we confirm input result using the additional API as shown figure 1.

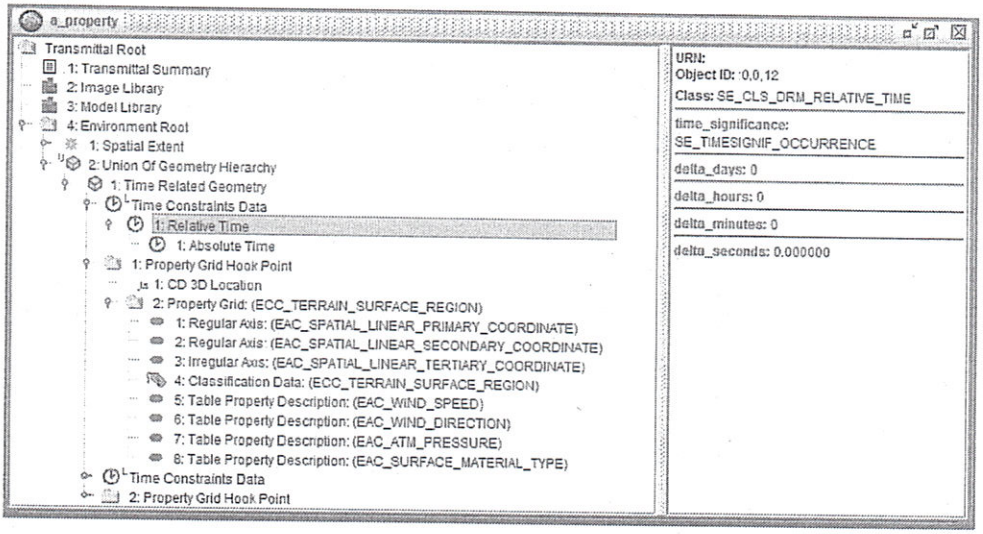

Figure 1. The input result of environmental data in SEDRIS

3. Conclusions

SEDRIS require defining a right format to save environmental data because it supports a basic method to save such as the database management system. Also, developers not easily use the low level APIs without understanding the structures of DRM, SRM, and EDCS. To solve this problem, we define metrics and add API for saving environmental data in SEDRIS. We actually input the environmental data with additional API. As a result, we confirm the inserted data in SEDRIS. Through this, we can expect to be possible the simulation of environmental data in CPS. Further research will be focused on terrain map of the complex format for additional environment data such as temperature, and humidity, so on.

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