LANGUAGES OF ARCHITECTURAL DESCRIPTION IN SYSTEM AND SOFTWARE ENGINEERING

II INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE

«Innovative Approaches in Higher Education in computer science»
November 25-26, 2019, Yekaterinburg

Timoshenko S.I., Ph.D., Associate Professor.
e-mail: s.i.timoshenko@urfu.ru

Center for Accelerated Learning IRIT-RTF
UrFU named after the first President of Russia B.N. Yeltsin
The work is devoted to languages describing the architecture of systems used in system and software engineering.

The languages ArchiMate and SysML are offered for study by bachelors and masters in IT areas.
Domain Standards

- GOST R 57195-2016 Kernel and language for methods of system and software engineering
System architecture

The system architecture as defined by GOST R 57100-2016 (ISO / IEC / IEEE 42010) is the basic concepts or properties of the system in the environment, embodied in its elements, relationships and specific principles of its design and development.

To describe the architecture of the system using:

- architecture framework;
- architecture description language.
The architecture structure defines conventions, principles and practices for describing architectures that are established within the scope.

Examples of the architecture structure are the Zahman architecture structure, the TOGAF open architecture group structure, the 4 + 1 Kruchten presentation model, and others.

This paper discusses architecture description languages, not architecture structures.
An architecture description language (otherwise, an architectural description language) is another form of architecture description.

It provides one or more kinds of models for different points of view of stakeholders.

As a rule, it has software tools for creating, analyzing and maintaining models.
Conceptual model of architecture description language
Applications of the architecture description language

- As a basis for analysis and evaluations of alternative system architectures.
- As elements of documentation in the development and maintenance of systems.
- As input to automated modeling and analysis tools.
- To ensure communication between the stakeholders involved in the project.
Examples of architecture description languages

- **Wright** — used for distributed simulation systems.
- **Rapide** — used in the design of distributed information systems.
- **AADL** — used in the automotive and aerospace industries.
- **ArchiMate** — used in the design of information systems.
- **SysML** — used in the design of hardware and software systems.
Suggestions for use in the educational process

To study with bachelors and masters in IT areas, it is proposed to use the ArchiMate and SysML languages.

The advantages of languages for use in the educational process are the visibility of the graphical representation of architecture, open documentation, support in various tools, including free cross-platform ones.

Both languages are systems engineering tools.
Using the ArchiMate Language

Advantages of the language:

- Easy to understand (has a small number of element types and relationships between them).
- There are free open source cross-platform tools (Archi).

Disadvantages:

- There is no way to parallelize the work.
- Limited reporting capabilities.
Site Architecture at ArchiMate
Using SysML

Advantages of the language:

- Easy to understand for those who know UML, because it is a subset of UML and some of the diagrams are common.
- There are free, open source, cross-platform tools (Modelio).

Disadvantages:

- In addition to IT experts, few people know UML.
- Limited reporting capabilities.
Why languages are useful for students

Using the ArchiMate and SysML languages will allow students to:

- To analyze and evaluate alternative implementations of the architecture of the developed system.
- Quality design documentation for the project.
- Provide communication between the stakeholders involved in the development and deployment of the developed system.
Thanks for attention!

Questions?

Contact details:

Timoshenko Sergey Ivanovich, Ph.D., Associate Professor.

Center for Accelerated Learning IRIT-RTF UrFU.

E-mail: s.i.timoshenko@urfu.ru