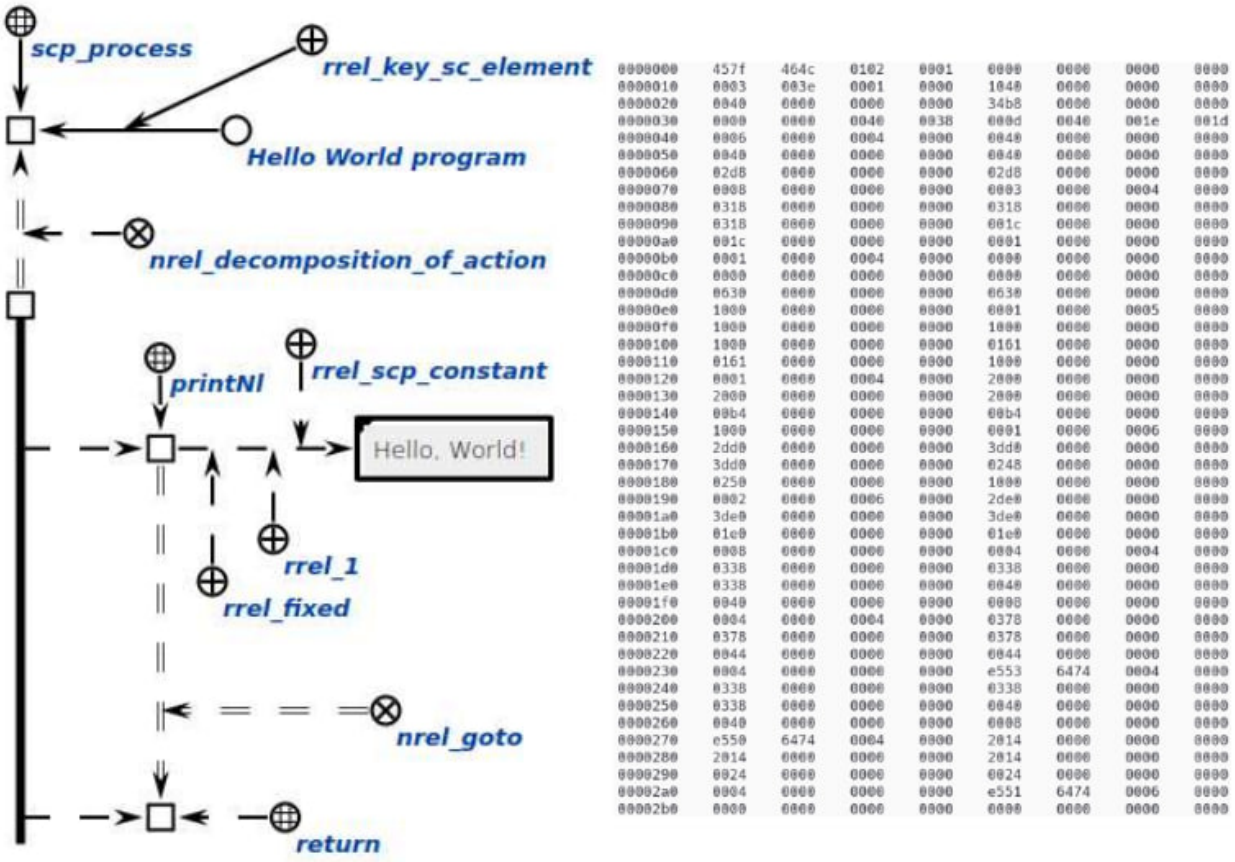

Figure 8: Example of a "Hello World" program written in SCP (left) and machine code (right)

An option was proposed to implement a mechanism for differentiation of access to the knowledge bases of ostissystems based on the ABAC model. The work examined an example of the architecture of the OSTIS Ecosystem based on the Matrix protocol, as well as ideas for the implementation of safety measures of a personal ostisassistant and for the agents' source code.

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ПРОБЛЕМЫ БЕЗОПАСНОСТИ ЭКОСИСТЕМЫ OSTIS

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В данной работе рассматриваются угрозы и уязвимости, актуальные для ostis-систем. Разграничение доступа к базам знаний остис-систем, реализация механизмов настройки персонального остис-ассистента и безопасность исходного кода агентов определены как основные направлениями обеспечения безопасности остис-систем. Предложены варианты реализации соответствующих механизмов безопасности по этим направлениям.

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Intelligent Tutoring System for Discrete Mathematics

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Abstract—The article presents a model of intelligent tutoring system for discrete mathematics. The model of such system uses methods and tools designed to build intelligent tutoring systems for any discipline and easy integration of new disciplines into the existing tutoring system.

***Keywords*—knowledge, knowledge base, intelligent systems, problem solver, interface, discrete mathematics.**

I. Introduction

Discrete mathematics is fundamental these days and finds wide application in various fields. These fields include logistics, geographic information systems, computer science, modeling of physical and mathematical phenomena. This variety of applications makes *discrete mathematics* attractive both to commercial organizations looking for process optimization and solving complex problems, and to non-profit organizations engaged in research and development of new methods and algorithms.

Moreover, there are many other fields in which discrete mathematics has potential for application, such as sociology, biology, chemistry, and economics. This emphasizes its importance and relevance in modern society. Hence, understanding *discrete mathematics* plays an important role in the progress of science and technology. Therefore, in order for people to learn this science in a convenient way, it is necessary to develop new teaching methods to make the educational material more effective and accessible.

Modern methods of tuition involve not only internal presence of the learner in a particular discipline, but also the possibility of distance learning. As a rule, many of those who already have higher professional education, wish to deepen their knowledge in the discipline of interest, to expand competence in a related professional field of activity and to obtain new skills and knowledge, giving the opportunity to occupy a more successful position in the professional environment.

The first mention of the concept of *intelligent tutoring systems* was defined in 1970 by J. Carbonell. More than 10 years later, real working intelligent tutoring systems appeared. The difference between *intelligent tutoring systems* and automated systems is that *automated system* is a *consolidated knowledge base*, based on the results of work with which the system gives the learner the results of correctly and incorrectly answered questions. In turn, *intelligent tutoring system* is aimed at the process of diagnosing learning, its correction. The essence of the work of such a system is not just in diagnosing the learner's mistakes, but also in issuing advice based on predetermined strategies of distance learning [1].

Intelligent tutoring system

:= [A set of software and hardware that uses *artificial intelligence* techniques to create interactive and adaptive educational tools. Such systems are usually able to adapt to the individual needs and knowledge level of each learner, offering personalized assignments, materials selection and feedback.]

Automated learning system

:= [A program or set of programs that facilitate or fully automate the learning process. They may include various functions such as organizing learning material, creating tests and assignments, and tracking student progress. Such systems are usually designed to optimize the learning process, reduce the time spent on routine teacher tasks, and improve learning efficiency.]

The main advantages of an intelligent tutoring system:

- personalized approach to learning, taking into account the individual needs and knowledge level of each student;
- the possibility of interactive classes and the use of visualization to explain theoretical concepts more clearly;
- automatic identification of students' weaknesses and suggestion of additional materials to reinforce the material;
- providing access to a wide range of educational