OPINION

for the dissertation of

Kristina Lyudmilova Ignatova

on the topic

"Models of cloud architectures for building a communication and information environment for collaboration work and management"

for acquiring the educational and scientific degree 'Doctor'
in the field of higher education "5. Technical Sciences"
in the professional field "5.2. Electrical Engineering, Electronics and Automation"

by Col. Assoc. Prof. Dr. Nikolai Todorov Stoyanov
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1. Characteristics of the dissertation

The dissertation presented for review is developed on 160 pages including an introduction, three chapters, general conclusions, conclusion and guidelines for future work, and used bibliographical sources. The main text of the dissertation is developed on 138 pages, including 5 tables and 35 figures.

1.1. Relevance of the developed problem

Information technology and the associated technological revolution have taken over all spheres of public life. Security and defense systems are no exception and the introduction of newer and more effective means of information processing, data transmission, decision support and more are one of the main highlights of the modern army.

Optimizing the resources used has always been one of the main tasks in the field of IT. With the advent of virtualization technologies and various types of cloud architectures optimizing the use of resources has entered a new stage. Cloud architectures have also changed the way we work between different users and provided the opportunity for constant connectivity and information awareness.

The relevance of the proposed dissertation is determined by the need to study the different types of cloud architectures and their applicability in security and defense.

I believe that the topic of the dissertation research is relevant both from a scientific and applied point of view. The PhD student focused the research on proposing a model for collaboration based on the use of cloud architectures.

1.2. Goals and objectives

The aim of the study defined in the paper is ….. "Based on cloud technologies and architectures to propose appropriate models for building a communication and information environment for collaboration work to support the management process for the needs of defense.". The tasks arising from this goal are formulated precisely and clearly, they are appropriate and feasible. Assumptions and restrictions are acceptable and do not affect the quality of development.

1.3. Structure of the dissertation

In the Introduction the author describes the relevance and general concept of scientific research, formulating the subject of research.

In the first chapter of the dissertation the author analyzes the subject area, paying attention to the specific characteristics of different types of cloud architectures by taking into account the trends in the development of research in the field of environments to support collaboration work. The chosen apparatus for formal description of the models proposed by the PhD student is presented in the same part of the study.

In the second chapter of the dissertation, the author has proposed several models for building communication and information environments for collaboration, namely:

• Cloud models for building CIS for the needs of defense.
• Generalized net models of cloud environments for collaboration.
An approach for determining the estimation parameters of the kernel in GN models is presented.

In the third chapter the author has presented the approaches for simulation of his proposed models. Presented are:

• Study of generalized net models using the GN-IDE simulation software environment.
• Approach for building a cloud CIS to work together for the needs of defense.
• Proposal for building a prototype of a cloud CIS for collaboration work for the needs of defense.

In the part "Conclusion" the results obtained in the dissertation research are systematized and summarized.

1.4. Literature sources used

The PhD student has studied and used 131 bibliography sources in Bulgarian and English. The overall presentation of the dissertation research shows that the PhD student has a broad view of the state of the problem and speaks well of his theoretical and practical training.

2. Analytical characteristics of the dissertation

The dissertation has a theoretical and applied nature. The theoreticality is determined by the approaches and methods used by the PhD student to formulate, formalize and propose a model of cloud CIS to support collaboration in security and defense. The applied nature of the dissertation is determined by the tasks related to the implementation of the research goal, the approach to their solution, as well as by the obtained applied results.

3. Contributions to the dissertation

The dissertation has contributions of scientific and applied nature. Scientific and applied contributions can be summarized as further development of knowledge in the field of approaches to modeling, design and construction of systems for collaboration work in the field of security and defense. The results obtained in the study show their applicability and content for solving practical tasks related to improving interaction and collaboration through the use of modern information technologies based on cloud architectures.

I accept the scientific and applied contributions defined in this way.

4. Publications and citations

Seven publications on the topic of the dissertation research are presented, and in one of them the dissertation is an independent author. Three of the publications are in English and the other four in Bulgarian.

I am aware of two citations of the presented works.

5. Authorship of the obtained results

From the presented publications it can be concluded that the dissertation and the results obtained in it are the personal work of the PhD student.

6. Abstract and author's reference

The abstract accurately reflects the dissertation, namely: the title, purpose, objectives, contributions of the author, conclusions and list of publications of the author on the topic of the dissertation.

7. Notes on the dissertation

The remarks and recommendations I have made in the following lines do not in any way call into question the results and contributions obtained.

The recommendations that I allow myself to address to the dissertation are:
• In the future work the author should make an efforts to publish existing and future results in renowned scientific journals at home and abroad.
• When using references from other sources, they should be clearly referenced.
• To be more precise and clear when defining the conclusions.

My overall assessment of the dissertation is positive. The dissertation demonstrates knowledge of the subject area and approach and practical knowledge and skills for the implementation in practice of the solutions proposed by him.

Conclusion

As a summary of the above, I believe that the conditions and requirements of the Law for the Development of Academic Staff in the Republic of Bulgaria and its regulations for awarding educational and scientific degree "Doctor" are met and I give a **positive assessment** of the candidate **Kristina Lyudmilova Ignatova**. scientific jury to award the **educational and scientific degree "Doctor" in the field of higher education 5. "Technical Sciences", professional field 5.2. "Electrical Engineering, Electronics and Automation", PhD program "Automated Information Processing and Control Systems".**

3 May 2022   Prepared the opinion:
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