

# **OPINION**

## **for a dissertation**

**for the acquisition of the educational and scientific degree "Doctor" in**

**Field of Higher Education – 5 "Technical Sciences"**

**professional field – 5.3. "Communication and Computer Technology"**

**PhD program – "Automated Information Processing and Management Systems"**

**Author:** Velin Sabinov Hadzhiev

**Topic:** "Modeling of operations for structuring, storing and processing data on the Internet"

**Member of the Scientific Jury:** Assoc. Prof. Dr. Eng. Borislav Hristov Milenkov

### **1. Topic and relevance of the dissertation**

Since the creation of the first computer in 1942, the areas of real life in which we want to use it have grown steadily. As the PhD student correctly pointed out in point 1.1 of the dissertation, the identification of the objects that "generate information", the creation of appropriate structures in which to store it for the purpose of processing it over time, is carried out by specialists – limited in number and expensive.

This work provides a solution to this problem by proposing a solution for each user (however, with knowledge above the minimum in the field of computer science and in particular databases) to create the structure for storing their data, as well as to perform manipulations on them – input, update, search and deletion.

Thus, I can confidently say that the topic of the present work is relevant and as the PhD student has noted on p. 148, it has been implemented.

### **2. Research methodology**

In the dissertation, a complex research approach is applied, which covers both theoretical analysis and experimental methods for modeling and simulation. The research is conducted using modern methods for structuring, storing and processing data, with an emphasis on the hybrid model for managing distributed data on the Internet.

In the process of work, the following basic research methods were used:

- Theoretical analysis – study and systematization of existing models and approaches for data management in the Web environment.
- Computer modeling – development of conceptual models for structuring, storing and processing data.
- Simulation studies – evaluation of the effectiveness of the proposed models through test environments and analysis of experimental results.
- Performance analysis – comparison of proposed models against existing solutions in terms of performance, sustainability and scalability.

The developed methodology provides an opportunity for an objective assessment of the applicability of the proposed models in real scenarios, demonstrating their effectiveness through simulation and practical tests. The use of a hybrid model allows the integration of different methods of data storage and processing, while minimizing the drawbacks of individual approaches.

### **3. Dissertation Contributions**

The PhD student has defined scientifically applied (six issues) and applied (three) contributions. I believe that they meet the tasks set for the fulfillment of the goal, namely – "modeling operations for structuring, storing and processing data on the Internet".

I accept the contributions thus proposed, but I think that the very creation of an algorithm for the operation of the information processing and management system is also a contribution.

#### **Scientific and applied contributions:**

- A comprehensive review of contemporary literature in the field of data modeling, structuring, storage, and processing on the internet has been carried out.
- A comprehensive analysis of architectures for data structuring, storage, and processing in cloud environments has been conducted. This analysis serves as the foundation for developing sustainable and scalable systems that meet the requirements for database accessibility for a wide range of users.
- A methodology has been developed for selecting and evaluating models for data structuring, storage, and processing, offering a systematic approach to adapting these models to specific requirements for data structuring, storage and processing.
- Models for data structuring, storage, and processing were evaluated and analyzed, with a focus on applying the developed methodology for their assessment. Software tools were utilized to provide an objective evaluation of critical aspects such as efficiency, sustainability, and scalability of the models.
- A hybrid model has been created that combines key functionalities of the selected models, addressing specific requirements for data structuring, storage, and processing, while ensuring database accessibility for a wide range of users. The developed data flow diagram demonstrates the model's effectiveness in various practical scenarios.
- A detailed SWOT analysis of the hybrid model has been conducted, confirming its potential for integration into real systems and highlighting its flexibility and resilience across various solutions.

#### **Applied contributions:**

- A method for optimizing data operations has been developed, integrating best practices and proven techniques for data structuring, storage, and processing. Its applicability has been demonstrated through simulations and tests in real conditions.
- The effectiveness of the proposed hybrid model has been validated through empirical testing, which includes assessments of performance, resilience, and scalability.
- Based on the method for optimizing data operations, a web-based system for data structuring, storage, and processing has been developed, offering access to databases for a wide range of users. Tests conducted in real-world scenarios confirm its practical effectiveness.

### **4. Publications and citations of publications on the dissertation**

The PhD student has presented 9 (nine) publications related to the topic of the dissertation. Five of them are in English and have been published in journals that are referenced and/or indexed in world-renowned databases. The remaining four are in Bulgarian and have been published in the

Proceedings of an International Scientific Conference or in the journal "Automation and Informatics".

In 8 (eight) of the articles, the PhD student is co-authored with his supervisor, being the first author, in one (under No. 8 of the list of publications on the dissertation) he is independent.

A reference for three citations of two of the articles on the dissertation (No. 7 and No. 8) is attached.

## **5. Authorship of the results obtained**

The dissertation of Mag. Ing. Velin Sabinov Hadzhiev is an independently conducted scientific research aimed at modeling operations for structuring, storing and processing data on the Internet. I believe that all the main scientific and applied results presented in the work are developed by the PhD student and reflect his contribution in this field.

The proposed models and methods are the result of in-depth research conducted at the Department of Automation, Information and Control Equipment at the Technical University of Gabrovo.

All presented results are correctly cited and there are no established cases of illegal use of other people's works. The presented ideas, models and methods have been developed by the PhD student independently or in co-authorship within the framework of his scientific supervision.

## **6. Opinions, recommendations and remarks on the dissertation**

During the review of the dissertation submitted for public defense, I noticed that the recommendations made by me during the preliminary defense were taken into account by the PhD student. However, probably due to oversight, on page 135 of the dissertation (page 34 of the abstract), in Fig. 4.7 there is one logical block left on which "YES" is not marked – the condition is met, "NO" – not met. However, from the presented flowchart of the algorithm for the operation of the system, it becomes clear how it works.

## **7. Conclusion:**

I believe that the submitted dissertation **meets** the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria. The results achieved give me grounds **to propose** the acquisition of the educational and scientific degree of "Doctor" by Master. Ing. Velin Sabinov Hadzhiev in the field of higher education – 5 "Technical Sciences", professional field – 5.3. "Communication and Computer Technology", PhD program – "Automated Information Processing and Control Systems"

04.02.2025

*Member of the Scientific Jury: ...../signature/.....*  
(Assoc. Prof. Dr. Eng. Borislav Milenkov)