OPINION

on the procedure for the defense of Doctoral Thesis

„Securing Data during Storage, Management and Transfer between Mobile Devices"

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

by

Ph.D. Candidate: **Peter Pashinov Sabev**

Scientific field: **4. Natural sciences, mathematics and informatics**

Professional field: **4.6 Informatics and Computer Science**

Doctoral program: "Software Technologies – Software engineering"

at **Department of Software Technologies**

Faculty of Mathematics and Informatics (FMI)

Sofia University "St. Kliment Ohridski" (SU)

The opinion is written by Prof. Olga Ilieva Geirgieva, Department of Software Technologies, FMI – SU as a member of the scientific jury according to an order № РД-38-128/1.03.2024 of the Rector of Sofia University "St. Kliment Ohridski".

1. General characteristics of Doctoral Thesis and the presented materials

The materials provided by the applicant to form the opinion contain documents that provide complete information about the application. In addition to the dissertation work, the summary in Bulgarian and English and the publications on the work, the doctoral student has submitted diplomas, certificates, references, reports, opinions and other documents in support of the doctoral studies. All of them assure that the requirements regarding the Law of Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its

application, as well as the Regulations of the SU on the terms and conditions for acquiring scientific degrees and occupying academic positions, are complied with.

The dissertation work is structured in five chapters - introduction, three chapters on the essence of the research and conclusion, a reference list and four appendices with lists of figures, of tables, a glossary of terms and additional appendices to support the main text of the work - a total of 188 pages. The contributions of the thesis and the list of publications supporting the thesis are presented as part of the concluding chapter. The dissertation contains 44 figures and 8 tables. The number of sources to which the text refers is large – 289 in total.

The dissertation work has been prepared with marked attention and precision of layout, details of the description of the work, applied technologies and analysis of the obtained results.

2. Data and personal impressions about the candidate

Peter Sabev graduated with a bachelor's degree in "Software Engineering" and a master's degree in "Information Protection in Computer Systems and Networks", both obtained at FMI of SU. As his teacher, I have excellent impressions of the candidate as an undergraduate. I gained a direct insight into his work during his doctoral studies at the Department of Software Technologies. As a doctoral student, he performed his duties conscientiously and on time, and also presented his dissertation work in full and detail.

3. Analysis of the scientific and the scientific-applied achievements of the candidate, contained in the presented doctoral thesis and the publications enclosed to it according to the procedure

The dissertation subject concerns an extremely relevant area of the present information technologies, relating to important issues of ensuring the security of the software in the part of the protection of the data used. The requirements to preserve the integrity, credibility, authenticity, confidentiality of data is a difficult and challenging, yet necessary goal, given the complexity and interconnectedness of the software systems and applications. An unquestionable merit of the presented dissertation work is that, based on an in-depth study and analysis of the current state of data security problems, a comprehensive methodology for evaluating the data security of software for mobile applications has been presented, developed and verified. Also, a practical software tool for security analysis is developed.

The contributions of the dissertation can be divided into two groups:

- **Scientific-applied results**

- A five-step methodology has been developed to analyze and assess the security of software that meets criteria for ensuring security and data protection. The proposed methodology has been verified against appropriately selected *Android* software applications.

- A method developed as a process for comparative analysis and evaluation of software security based on reasonably selected criteria, values and security evaluation rules is defined.

- A six-step methodology was developed to investigate the effectiveness of data protection in RAM and evaluate the performance of security criteria when using software for mobile devices.

- Criteria for evaluating the effectiveness of data protection are defined and specific use-case scenarios are originally defined for evaluating data security during the transition of different states of the RAM of the examined software.

- **Applied results**

- A specialized software tool to analyze and evaluate the effectiveness of the data protection in the RAM of software for mobile applications with security requirements is designed and developed.

- - The effectiveness of the data protection in RAM of particular password management software applications is analyzed and evaluated.

4. Approbation of the results

The contributions presented in the thesis are supported by four publications by the candidate, all in the field of computer science. Three of them are presented in international scientific publications in the field of doctoral studies, visible in the established SCOPUS database. The fourth publication is a book chapter with a cited ISBN. Two of the publications are in publications with the SJR index, one in a scientific journal (Journal of Information Security and Applications) and the other in the proceedings of a scientific conference. In all

publications, the applicant is the first author. Four citations of publications on the dissertation are visible in the SCOPUS system.

To meet the minimum national requirements, the applicant has submitted three of the publications described above. These publications exceed more than twice the required minimum points of indicator group Г for the scientific degree PhD. It can be confidently concluded that the scientific works meet the minimum national requirements (according to Art. 2b, paras. 2 and 3 of Law of Development of the Academic Staff in the Republic of Bulgaria) and, accordingly, the additional requirements of SU for acquiring an educational and scientific degree "Doctor" in the scientific field and the professional direction of the procedure.

There is no proven plagiarism in the submitted dissertation and scientific works under this procedure. A protocol and plagiarism check report provided in the documents clearly show that the peer-reviewed dissertation is the applicant's original research work.

5. Quality of the thesis abstract

The abstract of the dissertation is written up of 39 pages in Bulgarian and 35 pages in English. Its content follows the research presented in the dissertation, as the contributing parts of each chapter are also described. It summarizes accurately and sufficiently the analyzes and results of the scientific work.

6. Critical notes and recommendations

The many underlined explanations and introduced abbreviations make it difficult to read and understand the text. As I understand that this is the result of the doctoral student's effort for completeness and accuracy, as well as the presence of a large amount of professional terms and definitions, I would recommend that some of them be explained in the main text of the thesis.

7. Conclusion

Having familiarized myself with the doctoral thesis presented by the procedure and the scientific works accompanying it and based on the analysis of their significance and the scientific and scientific-applied contributions contained in them, **I confirm** that the presented dissertation work and the scientific publications to it, as well as the quality and originality of the results and achievements presented in them meet the requirements of the Law of

Development of the Academic Staff in the Republic of Bulgaria, the Rules for its application and the relevant Rules of the SU "St. Kliment Ohridski" for the candidate's acquisition of the educational and scientific degree "Doctor" in the scientific field 4. Natural sciences, mathematics and informatics and professional field 4.6. Informatics and Computer Science. In particular, the candidate satisfies the minimum national requirements in the professional field and no plagiarism has been found in the scientific works submitted for the competition.

Based on the above, I recommend the scientific jury to award Peter Pashinov Sabev an educational and scientific degree "Doctor" in scientific field 4. Natural sciences, mathematics and informatics, professional field 4.6. Informatics and Computer Science.

22.05.2024   Prepared the opinion: ....

/ **Prof. Olga Georgieva** /