

Review

On the procedure for defending a dissertation on the topic:

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

for acquisition of the educational and scientific degree “Doctor”

by

candidate: Peter Pashinov Sabev.

In the Scientific field: **4. Natural Sciences, Mathematics and Informatics**

Professional field: Informatics and Computer Sciences

Doctoral program: Software technologies, Department: Software engineering

Faculty of Mathematics and Informatics (FMI).

Sofia University “St. Kliment Ohridski” (SU).

The review has been prepared by prof. dr Nina Vasilevna Sinyagina

as a member of the scientific jury for the defense of this PhD thesis according to Order №:

ПД 38-128 /01.03.24, by of the Rector of the Sofia University .

1. General characteristics of the dissertation thesis and the presented materials

The text of the dissertation includes 188 pages of text, figures, tables, and diagrams, and consists of 5 chapters, 4 appendices, a list of references, and also a declaration of originality.

2. Short CV and personal impressions of the candidate

Doctoral candidate Peter Sabev was born in Haskovo in 1993. He received his secondary education by graduating from the Vocational High School of Mechanical and Electrical Engineering with a specialization in "Computer Systems and Technologies" with excellent grades. In 2012, he enrolled at Sofia University "St. Kliment Ohridski", Faculty of Mathematics and Informatics, and in 2016, he graduated with a Bachelor's degree in Software Engineering. From

2016 to 2018, he pursued a Master's degree in "Information Security in Computer Systems and Networks". Since 2019, he has been a doctoral student in the Department of Software Technologies. Even as a student, Mr. Sabev began his teaching career at Sofia University, conducting practical classes in "Object-Oriented Programming", "Introduction to Programming", and "Data Structures and Algorithms", and since 2018, he has been teaching "Security in Computer Networks". Additionally, Mr. Sabev has been involved in practical work at Astea Solutions AD, where he has held the positions of "Software Engineer" and "Senior Software Engineer" up to the present. He has participated in numerous research and scientific projects and has received various awards, certificates, and recognitions since his school and university days.

I have known the doctoral candidate since the master's program and believe that he is a very talented specialist with a strong sense of innovation in science and responsibility towards assigned tasks.

3. Content analysis of dissertation work

The author sets the following goal for his research: **To support the investigation of the security of HSS (high-security software) of the type PSM (password management software) / SDV (software digital vault) with a view to analyzing and assessing the security regarding the effectiveness of data protection in OS in the context of using HSS.** To achieve this goal, six main tasks are formulated.

The first chapter, titled "Introduction", presents the motivation for the conducted research and the expected benefits from achieving the set goal. The subject and object of the research are described, and the structure of the dissertation is proposed.

The second chapter provides a summarized study of the current state in the researched area. The analysis conducted is described, presenting

the main definitions and terminology used. Recommendations, approaches, and techniques for data protection in mobile devices applicable to HSS are given. The capabilities of some of the tools used in the research are briefly described.

The third chapter investigates a specific HSS, performing a comparative analysis based on defined security evaluation criteria. The methodology used to study PSM/SDV type HSS is provided.

The fourth chapter is dedicated to examining the effectiveness of data protection in OS for a specific type of HSS. The results of the accompanying experimental research are presented. A specially developed specialized software for detecting and extracting unprotected confidential data in OS is described.

The fifth chapter summarizes the main activities carried out to achieve the dissertation's goal and the corresponding tasks. The contributions of the conducted research and the related scientific publications are also shown, along with plans for future development.

The dissertation describes numerous studies, analyses, and investigations conducted, and their results and contributions can be summarized as follows:

Scientific: Methodologies for evaluating the security and effectiveness of data protection in OS for HSS are defined.

Scientific-applied:

1. Methods for applying various criteria for evaluating the security of PSM/SDV type HSS, as well as the

effectiveness of data protection in OS, have been developed.

2. The applicability of the methodologies defined by the doctoral candidate has been validated.
3. A specialized scenario for evaluating the effectiveness of data protection in OS using the selected set of criteria has been developed.
4. The results obtained have been analyzed, and an evaluation of the protection of confidential data in OS has been made.

Applied:

A specialized software tool for conducting experiments to evaluate the effectiveness of data protection in OS has been developed.

The topic of the dissertation is extremely relevant, as data protection in mobile devices remains an unresolved issue worldwide. I believe that the data obtained from the conducted research will be useful to specialists in this field.

4. Approbation of the results

A list of publications related to the dissertation is proposed, which includes 7 titles. One of the publications is in a scientific journal "Computer & Communication". 2 are in proceedings from international conferences, 3 are sectional reports from conferences, and 1 is a chapter from the book "Requirement for Securing Data in Android Application at Software Level" (Chapter 8). In all publications, the author is listed first. There are 2 citations of the publication "Android Password Managers and Vault Applications: An Investigation on Data Remanence in Main Memory".

Based on the critical analysis of the dissertation and the related publications, I can make the following conclusions:

- a) The scientific works meet the minimum national requirements, as well as the additional requirements of Sofia University "St. Kliment Ohridski" for obtaining the educational and scientific degree of "Doctor".
- b) The results presented by the candidate in the dissertation and related scientific works do not duplicate those from previous procedures.
- c) There is no proven plagiarism in the presented dissertation and scientific works according to the established legal procedure.

5. Qualities of the abstract

The abstract is compiled according to the requirements. Its content clarifies the relevance of the dissertation's topic, formulates the main goal of the research and the related tasks, and reflects the obtained results.

6. Critical notes and recommendations

1. The dissertation work is not very well balanced. Descriptions of well-known concepts take up too much space in comparison to other chapters (66 pg, out of a total 146 – description of the research)

2. Several figures are unclear and difficult to understand.

3. The declaration of originality is not signed by the author.

4. I have no fundamental objections, but there are some editorial and stylistic errors and omissions that do not diminish the essence and importance of the research conducted.

5. I recommend to the doctoral candidate to enhance their publishing activity with more publications in reputable journals. Additionally, I recommend attempting to write a textbook on the topic of the research conducted.

7. Conclusion

Having become acquainted with the PhD thesis presented in the procedure and the accompanying scientific papers and on the basis of the analysis of their importance and the scientific and applied contributions contained therein, I **confirm**, that the presented PhD thesis 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 ADAS in the Republic of Bulgaria, the Rules for its Implementation and the corresponding Rules at the Sofia University “St. Kliment Ohridski” (FMI-SU) for acquisition by the candidate of educational and scientific degree “Doctor”/the scientific degree “Doctor of Science” in the Scientific field **4 Natural sciences, Mathematics and Informatics**, Professional field: **4.6 Informatics and Computer Sciences**. In particular, the candidate meets the minimal national requirements in the professional field and no plagiarism has been detected in the scientific papers submitted for the competition.

Based on the above, I strongly **recommend the scientific jury to award Peter Pashinov Sabev** the educational and scientific degree “**Doctor**” in the Scientific field: **Natural sciences, mathematics, and informatics.**, Professional field: **Informatics and computer sciences.**

27.05.2024

Reviewer:.....

/prof. dr Nina Vasilevna Sinyagina/