

REVIEW
on the competition for the academic position
“Professor”
in the professional field 4.6. Informatics and Computer Sciences, Informatics
(Software technologies -
Network programming, Cloud technologies and Web technologies),
for the needs of Sofia University „St. Kliment Ohridski“ (SU),
Faculty of Mathematics and Informatics (FMI),
announced in SG No. 48 from 28.06.2022 and on the Internet sites of FMI and SU

Review prepared by: **prof., dr. Vladimir Todorov Dimitrov - FMI at SU “St. Kliment Ohridski”**, as a member of the scientific juri on the higher education area 4. Natural sciences, Mathematics and Informatics, professional field 4.6. Informatics and Computer Sciences and by the Order № ПД 38-519/25.08.2022 of the Rector of Sofia University.

Only one candidate has submitted documents for participation in the announced competition: Assoc. professor, Dr. Milen Yordanov Petrov, from the Department of Software Technologies, FMI, SU “St. Kliment Ohridski”.

I. COMMON DESCRIPTION OF APPLIED MATERIALS

1. Information about the application

The submitted documents from the applicant meet the requirements of the ADAS in RB, the RAADAS in RB and The Rules on the Terms and Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at Sofia University “St. Kliment Ohridski” (RTCAADOAPSU).

For participation in the competition, the candidate, Assoc. professor, Dr. Milen Yordanov Petrov applied a common list of 82 titles in Bulgarian and foreign scientific journals and scientific forums. Thirteen publications and a monography are applied for this competition.

Eighteen types of documents are presented according to the list of documents for application that show the candidate achievements.

The presented list of documents meets the requirements of the ADAS in RB, the RAADAS in RB and RTCAADOAPSU for participation in the competition for “professor”.

2. Information about the candidate

Assoc. professor, Dr. Milen Yordanov Petrov, graduated from secondary education in 1991 at SMG “Paisiy Hilendarski”, then in 1994 at PIME he graduated with a professional bachelor's degree ETME, then in 1996 at TU-Sofia, SDK specialized in Applied Sound Engineering, and in 1999 at TU-Sofia, FCSU, he graduated as a computer systems engineer, finally in 2010 he defended his doctorate thesis in Informatics at FMI at SU “St. Kliment Ohridski”.

The topic of the dissertation is “Interoperability between assessment systems in modern e-learning”.

In the period 2001-2006, he held the position of software engineer at NIS at SU “St. Kliment Ohridski”. In the period 2006-2007, he was an assistant at the Department of Information Technologies, FMI at SU “St. Kliment Ohridski”. After the transformation of the department in 2007, he was an assistant in the Department of Software Technologies until 2009. In the period 2009-2011, he was a senior assistant, then from 2011 to 2012, he was a senior assistant, and from 2012, he was an associate professor until now in the Department of Software Technologies. From 2017 until now, he has been the deputy Dean of academic activities at the Master's degrees.

3. General characteristics of the applicant's scientific work and achievements

The applicant submitted a total list of 82 publications. Of these, 1 monograph, 14 publications in scientific journals and 67 publications in materials of scientific conferences. The publications used in previous procedures for the acquisition of scientific degrees and titles are noted.

19 of the publications are referenced in Scopus, 16 - in Web of Science, 5 - in ACM Digital Library, 4 - in SpringerLink and 4 - in IEEE Xplore.

Associate Professor, Doctor Milen Yordanov Petrov has participated in 11 international projects, 4 funded by the Scientific Research Institute at the Ministry of Education and Science and 8 funded by the Scientific Research Institute at the SU "St. Kliment Ohridski". He was the project manager in 6 of the latter.

The scientific works presented on the list for participation in the competition meet the minimum national requirements (according to Article 2b, Paragraphs 2 and 3 of ZRASRB) and, accordingly, the additional requirements of SU “St. Kliment Ohridski” for occupying the academic position of “Professor” in the scientific field and professional direction of the competition.

There is no evidence of plagiarism in the scientific works submitted for the competition. I am not aware of the candidate's plagiarism record.

I accept that the scientific works meet the minimum national requirements (under Art. 2b, para. 2 and 3 of ADAS in RB) and respectively the additional requirements of Sofia University "St. Kliment Ohridski" for holding the academic position of "Professor" in the scientific field and professional direction of the competition.

There is no legally proven plagiarism and at least I am not aware of such in the scientific papers submitted at the competition.

4. Characterization and evaluation of the applicant's teaching activity

The teaching activity of the candidate at FMI covers the following disciplines: Introduction to Programming, Programming Languages, Object-Oriented Programming, Data Structures and Algorithms, Programming with C#/.Net (Masters), Java Server Technologies (Masters), Network Programming (Masters), Data Modeling and Database Design (Masters), Programming Technology, Web Technologies, Web Databases (Masters), Internet Programming and Web Technologies (Masters).

Associate Professor, Doctor Milen Yordanov Petrov is the scientific supervisor of over 100 master's degrees with defended diploma theses from various master's programs in the field of informatics and software technologies at FMI. There is also a PhD candidate. He is the supervisor of two other doctoral students, dismissed with the right to defense (in 2022) and one doctoral student in the process of training.

5. Substantive analysis of the scientific and applied scientific achievements of the candidate contained in the materials for participation in the competition

One monographic work and 13 scientific publications were submitted for the competition.

The author distinguishes his scientific achievements in the following thematic areas:

1. Technology-assisted learning.
2. Security of personal data and applications.
3. Optimization of traffic information.

The monograph covers all three thematic areas. It was designed specifically for the competition, and for that I will consider the monograph separately, and the other publications on the thematic areas.

The monograph

The presented monographic work is of 129 pages distributed in List of figures, List of tables, Acknowledgments, Introduction, Chapter I. Current trends in cloud, network and web

technologies, Chapter II. Cloud Technologies in Technology Assisted Learning, Chapter III. Web Technologies in Technology Assisted Learning, Chapter IV. Network Technologies in Technology Assisted Learning, Chapter V. Application of Network, Cloud, and Web Technologies in the APTITUDE Platform, Conclusion, Sources, and Index.

The monographic work presents the main scientific, scientific-applied and applied results obtained by Assoc. Professor, Dr. Milen Petrov, in connection with his participation in a competition for a professor in professional direction 4.6. Informatics and computer sciences (Software technologies - Network programming, Cloud technologies and Web technologies) - for the needs of FMI, "Software Technologies" department, announced in the Official Gazette, no. 48 of 28.06.2022.

In the Introduction (8 pages) the purpose, methodology of the work and the structure of the latter are presented.

The first section of the Introduction is the Introduction. This is not a very correct title as the two terms are used synonymously. The projects on which the results presented in the monograph has been obtained are indicated here.

The aim of the monographic work is to summarize the results obtained by the author in the fields of Network programming, Cloud technologies and Web technologies.

The subject of the monographic work is "research and development in the field of Network programming, Web application programming and design and development of Cloud architectures and software solutions".

The object of the study is the field of technology-assisted learning in informatics.

The structure of the research methodology is presented in an eight-step process. This process is applied in Chapters 2-4. In Figure 1, the chapter names do not correspond to those in the monograph.

The Conclusion to the Introduction states that the development process described can be adapted to different software development methods.

Chapter I. Current Trends in Cloud, Network, and Web Technologies (18 pages) introduces the topic areas. This chapter is overview in nature - a number of sources are cited, necessary terms are introduced, and a number of figures are included. Regarding the latter, when they are from a source, they should be in their original form and it should be indicated where they were taken from, and when they are developed by the author, they should be Bulgarian. This remark applies to the figures in the rest of the monograph as well.

Chapter II. Cloud Technologies in Technology Assisted Learning (32 pages) covers the first research area. This chapter presents the technological solution developed for the course

“Application-program interfaces for working with cloud architectures with Amazon Web Services (AWS)” at FMI of SU. The technologies used are the Terraform tool and the Boto3 library (Python SDK for AWS).

At the beginning of the chapter, the conceptual model of the solution for creating cloud architectures, its main components, users and roles is presented.

Then the functional requirements for the technological support of cloud application development within the above course are defined. Based on these functional requirements, the technological solutions are defined, which cover not only the already mentioned technologies.

Non-functional requirements are also specified in the chapter.

Following is a general cloud architecture of the course with a description of the modules and setup of the environments.

The presented development has been tested in the course.

Chapter III. Web Technologies in Technology Assisted Learning (32 pages) is devoted to the second research area.

This chapter has problems with in-text references. It is generally a good idea to review all references in the text before submitting it for print, and to update the content.

Essentially, a classification of web architectures in technology-assisted learning is first made.

The following is an exposition of the problems with the audio lectures. Some development support tools are reviewed and analyzed. The architecture of the developed audio lecture generation system is presented. This includes setting functional and non-functional requirements, modules, solution architecture, scenarios and testing. The result is the UltimateSpeakerBasic app.

This chapter also proposes a software architecture for automated support of university programming courses. First, an analysis of the available systems of this class is made and the focus is specifically on four of them.

The basis of the software architecture proposal is Gradle. The structure of the technology application is presented. Finally, the results of the system testing and an analysis of the mistakes made by the students are presented. Possibilities for future development of the proposal are outlined.

Chapter IV. Network Technologies in Technology-Assisted Learning (13 pages) presents some results of the application of network technologies in technology-assisted learning. It is a system for automating the assessment of homework using virtual environments.

First, an overview and analysis of systems of this class is made - the focus is on five representative ones. Based on the analysis, the requirements for a system for homework assessment automation are defined. Virtualization and solutions for integration with external environments are essential here.

The requirements, model of the subject area, the deployment of the system, and the possibilities of integration with Moodle are presented.

The result for now is a prototype system. Future development to come.

Chapter V. Application of network, cloud and web technologies in the APTITUDE platform (13 pages) is a summary of the results obtained in a single platform. The chapter text also has problems with references and figures.

The chapter first motivates the needs of architecture development. The methodology used includes the definition of an abstract model (Meta model) of the architecture, formalization of the concept and realization of a prototype of some of the components of the infrastructure.

First, the Meta model of APTITUDE is laid out, followed by its conceptual architecture. The presentation of the latter is made in UML.

Platform validation is done based on user cases.

The Conclusion (2 pages) presents the main contributions of the monograph.

The proposals made by the author in the monograph are original and verified. They solve important problems in the implementation of technology in education.

105 literary sources were used.

Scientific publications

Here I use the numbering from "10B./16. LIST of the publications of Prof. Dr. Milen Yordanov Petrov submitted for participation in the competition for professor of PN 4.6. Informatics and computer sciences (Software technologies - network programming, cloud technologies and web technologies), announced in SG no. 48/28.06.2022"

Technology-assisted learning

Publications [2, 5, 6, 7, 10, 13, 14] are devoted to this topic.

In [2], the possibilities for adapting and recommending educational content are investigated through the analysis of the personal data of the learners.

In [5, 13], an approach was proposed for the analysis of data generated by modern platforms for electronic learning and educational games, with the aim of personalizing the search for learning resources for learners. For this purpose, appropriate software architecture and ontology of the subject area have been developed.

[6, 10] proposed a software architecture for learning adaptation and generating recommendations for learning content and activities. An algorithm for predicting learning progress is presented. Machine learning is used to discover knowledge about learner and teacher activities.

[7] proposes a methodology and tools for improving and evaluating a software peer review system.

[14] also presents a software architecture configuration approach for peer learning. A set of criteria is used, according to which six categories of software configuration are classified.

Security of personal data and applications

Publications [4, 9, 11, 12] are classified on this topic.

[4] is dedicated to the processing of the personal data of the learners and in particular to their anonymization for the purpose of sharing.

[9] investigated different authentication methods based on a set of criteria and authentication modes.

[11] investigated data protection in password management applications in Android environment. Their protection in the main memory and the behavior of the applications during their execution are analyzed.

[12] proposes a method for collecting, storing and maintaining personal information in LMS systems (Anonymized Privacy Model). This is an LMS-independent method. It consists of an integration layer (Privacy Compliance Layer), a data anonymization layer and an analysis and reporting layer.

Optimization of traffic information

There is only one publication on the subject [3]. It offers a model for calculating the transport flow index as a whole and in individual sections. Data from public transport vehicles are used. The results are visualized on a map both in real time and as history.

6. Critical notes and recommendations

When preparing the materials for the competition, there are certain stylistic deviations and spelling errors that do not affect the candidate's achievements.

7. Personal impressions of the applicant

I have known the candidate since 2001, when he started working in the NIS at the "St. Kliment Ohridski" as a software engineer. In fact, he worked on projects for the Department of Information Technology. At that time, there were two informatics departments at FMI.

The further specialization of Associate professor, Doctor Milen Yordanov Petrov in the field of computer security became the basis for joint initiatives and work in this direction.

In particular, the candidate is the head of the Master's program “Information Protection in Computer Systems and Networks”.

Our joint work in the field of computer security is practical in nature and includes a range of expertise. One of the more notable expertise is the audit and certification of electronic voting machines at the request of the CEC. In the conditions of extremely difficult conditions, short deadlines and high pressure on this task, Associate Professor, Doctor Milen Yordanov Petrov showed high professionalism and teamwork skills. The developed methodology practically channels the further actions of auditing and certification of the electronic voting machines, which are still applied today by the authorized organizations in the subsequent elections.

I must note that there are few specialists of this rank in the field of computer security in the country. The candidate's teaching, research and practical activities are in complete sync, something that is not often found.

8. Conclusion on the application

Having become acquainted with the materials and scientific works presented in the competition and on the basis of the analysis of their importance and the scientific and applied contributions contained therein, I **confirm** that the scientific achievements meet the requirements of the ARAS in RB, the Regulations for its implementation and the corresponding Regulations of SU “St. Kliment Ohridski” for appointment on the academic position “Professor” in the science area and professional field of competition. In particular, the candidate meets the minimum national requirements in the professional field and it is not found plagiarism in submitted of scientific works in the competition.

I give my **positive** opinion to the application.

II. OVERALL CONCLUSION

Based on the above, I recommend to the scientific jury to suggest to the competent authority in the selection of the Faculty of Mathematics and Informatics at SU “St. Kliment Ohridski” to elect Associate professor, Doctor Milen Yordanov Petrov to take the academic position “Professor” in the professional field 4.6. Computer Science and Informatics.

02.10. 2022

Review prepared by:
(prof., dr. Vladimir Dimitrov)