

REVIEW

**on a competition for the occupation of an academic position "Professor"
in the professional field 4.6. Informatics and Computer Science (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 in the State Gazette no.48/ 28.06.2022 and at the FMI and
SU websites**

The review was prepared by **Prof. Dr. Olga Ilieva Georgieva**, Department of Software Engineering, FMI - SU in professional field 4.6. Informatics and computer sciences in the capacity of a member of the scientific jury for the competition according to Order No. RD 38-519 / 25.08.2022 of the Rector of Sofia University "St. Kliment Ohridski".

Only one candidate submitted documents for participation in the announced competition:

Assoc. Professor Dr. Milen Yordanov Petrov,

Sofia University "St. Kliment Ohridski", Faculty of Mathematics and Informatics.

I. General description of the presented materials

To participate in the competition, I was provided with the following materials prepared by Assoc. Professor Milen Petrov:

1. CV presented in European form;
2. Diploma of master-engineer degree in Computer systems, issued by Technical University-Sofia;
3. Diploma for PhD;
4. Diploma for the academic position "Associate Professor";
5. Document for work experience;
6. Document for academic workload for the last ten years.
7. Lists of the candidate's publications: a) of all publications and b) of the publications submitted for participation in the competition;
8. Reference on the applicant's activity, generated by the system "Авторите";
9. Reference with evidence for the fulfillment of the minimum national requirements by the Law of Act of Development of Personel of Republic of Bularia (LADPRB);
10. Reference for citations;
11. Reference for scientific contributions.
12. Reference for the indicators under Art. 122, para. 2 of the Regulations on the Terms and Conditions for Acquiring Scientific Degrees and Occupying Academic Positions at SU;
13. Copies of the publications for participation in the competition;
14. Summaries of publications for participation in the competition;
15. Copy of the State Gazette announcing the competition.

1. Data for the application

It is clear from the submitted documents that the applicant fulfills the requirements of the Law under Art. 29 para. 1 and 2 for holding the academic position "professor". He holds diploma No. 34394/22.07.2010 for the PhD in the scientific specialty "Informatics", having defended a dissertation on the topic "Interoperability between Evaluation Systems of the Contemporary e-learning" at FMI-SU in 2010. According to the certificate of work experience issued by Sofia University "St. Kliment Ohridski", Milen Petrov has held the academic position of "Associate Professor" at FMI-SU for ten years since 06.12.2012.

For participation in the competition under Art. 29 paras. 3 and 4 of LADPRB, the candidate submitted a list and corresponding copies of a total of 14 publications - monographic work and 13 scientific publications in scientific journals and conference proceedings. A reference and relevant evidence of the fulfillment of the minimum national requirements by the LADPRB and the Rules for its application is presented - a list with evidence for citations of the candidate's publications, also official notes and evidence for a successful defention of a doctoral student, official notes for participation in scientific and educational projects, as well as teaching activity at FMI-SU. Other documents are also presented - official notes, certificates, diplomas and awards in support of the candidate's achievements.

The documents presented for the competition fully comply with the requirements of the LADPRB Art. 29, as well as the Regulations for application of the law (RALADPRB) and the Regulations for the terms and conditions for acquiring scientific degrees and occupying academic positions at SU (RTCASDOAPSU).

2. Applicant reference

The training and professional development of Assoc. Professor Milen Petrov is in the field of software technologies, specializing in the design and development of software systems and components. His knowledge and experience covers a large volume of technologies, the ability to apply different processes for software development in different programming environments and the ability to propose new design solutions.

He graduated from the Sofia Mathematical High School "Paisiy Hilendarski", and then of the Semi-Higher Institute of Mechanical Engineering and Electrical Engineering majoring in electronic engineering and microelectronics. In 1999, he graduated from Technical University - Sofia with a Master degree in "Computer Systems", specialization in "Program Systems". He worked as a software engineer at Scientific Research Centre SU, and then successively as an Assistant, Assistant Professor and Associate Professor at FMI of SU. Currently, he is a leading lecturer in the Department of Software Engineering, FMI-SU, head of the master's program "Information Protection in Computer Systems and Networks" at the same department. He also combines his commitments as a teacher and researcher with the administrative workload of the deputy dean of FMI-SU in charge of master's

studies. In the reference submitted by the candidate, a number of his expert activities in support of various state institutions are noted.

3. General characteristics of the applicant's publication works and scientific research

All publications submitted for participation in the competition are in the field of software technologies and concern cloud, network and web technologies in three application areas: e-learning, security of data and software applications, optimization of information flows and in particular urban traffic. The monograph is in Bulgarian with the title "Cloud, Network and Web Technologies in Technology-Assisted Learning" with ISBN, published by the University Publishing House of TU-Sofia, Sofia under the review of two leading specialists in the field and has a volume of 134 pages. This work has all the attributes of a monograph and successfully meets the minimum national requirements for indicator B with 100 points.

All titles from the list for participation in the competition (10B/16) except publication 8 were published after 2012. The reference in NACID shows that they were not submitted for participation in previous competitions of the candidate. All works are in English and referenced in the established scientific databases *SCOPUS* and/or *WoS*. Of the recognized publications outside the monographic work, the candidate is first in two publications and in another one he is an only author. Two of the publications are in a scientific journal and a scientific series, respectively. The publications collect a total of 294 points under indicator D of the minimum national requirements for the competition with a required minimum of 200 points.

It should be emphasized that the available candidate citations visible in established databases exceed the number required to cover the minimum national requirements for this indicator. For example, the reference in the *SCOPUS* system shows that by the time this review was prepared, the candidate had 37 citations, which assures the good representativeness of the publications among the scientific community. The minimum national requirements fulfillment table lists 14 citations visible in *SCOPUS* and *WoS*, which score 112 points out of the required 100 for the indicator D.

In fulfillment of the indicator E Assoc. Professor Milen Petrov presented evidence of one defended doctoral student and of participation in 6 national and 7 international scientific and educational projects. Thus, according to this indicator, 250 points are covered against the required 100 points.

There is no proven plagiarism in the publications of Dr. Milen Petrov submitted for evaluation.

In summary, the presented scientific works and all other materials meet the minimum national requirements (according to Article 2b, Paragraphs 2 and 3 of LADPRB) and, accordingly, the additional requirements of Sofia University "St. Kliment Ohridski" for occupying the academic position of "Professor" in the scientific field and professional field of the competition.

4. Assessment of the pedagogical activity of the candidate

Milen Petrov teaches students from all levels of the university education - bachelor, master and doctoral students. Initially as a part-time expert from the practice, and subsequently from 2012 as an Associate Professor in the "Software Engineering" department of FMI at Sofia University "St. Kliment Ohridski" he always had hours significantly above the required workload.

In the years from 2006 to 2012, he led laboratory exercises in the bachelor degree education in the mandatory disciplines "*Introduction to Programming*", "*Object-Oriented Programming*" and "*Data Structures and Algorithms*", also "*XML Technologies for the Semantic Web*". "*Data Structures and Programming*".

From 2012 until now, the candidate is the holder of the discipline "*World-Wide Web*", subsequently transformed into "*Web Technologies*", which is mandatory for the bachelor degree education of the third year for the specialty "Software Engineering" and for the fourth year for the specialty "Computer Sciences" at FMI-SU. He is a lecturer at the elective courses in the Master's programs "*Java Network Programming*" and "*Data Modeling and Database Design*". In 2019 he introduced a new elective discipline "*Application-Program Interfaces for Working with Cloud Architectures with Amazon Web Services (AWS)*". The candidate presented part of the courses (lectures and exercises) in English to foreign students under the Erasmus+ program. All courses led by Assoc. Professor Milen Petrov are in the subject of the competition and are in the fulfillment of the tasks of the department that initiated the competition.

He successfully managed the master's program "*Information Protection of Computer Systems and Networks*", which is currently one of the most preferred master's programs at FMI - SU. A clear proof of his performance as a research supervisor is the number of graduates who have successfully defended their diplomas - a total of 114 from seven master's programs. He has one doctoral student who has defended his thesis and two who have been dismissed with the right to defend, one of them successfully presented himself at an internal defense and started a procedure for defending a dissertation. At the moment, Milen Petrov has one part-time doctoral student.

The documents present certificates, diplomas and photographic material in support of the work of Milen Petrov as the head of programming teams from FMI at SU, which take the first places in presenting national and international competitions.

5. Analysis of the applicant's scientific achievements covered by the materials for participation in the competition

Scientific papers contain scientific and applied results on the subject of the competition. In a large part of them, original architectural solutions are presented for building adaptive and recommendation systems, as well as for implementing systems with evaluation of sensitive information for users and effective solutions for its preservation and security. The applied contributions in the publications are in connection with the development and analysis of software

systems and products following the proposed conceptual models - systems supporting learning and systems guaranteeing the protection of personal information.

The monographic work contains an innovative methodology for research and development with the incorporation of various technologies - cloud, web and network, in a proposed new extensible software architecture. The architecture allows the adaptation and customization of the content of the software product according to the needs of the user. A conceptual model, functional and non-functional requirements, architecture and module structure of the software solution are presented in detail. An automated process of creating and maintaining cloud resources using web services has been proposed and implemented. The application of the methodology is to a technology-assisted learning system and an automation software system for homework grading.

Particularly relevant and necessary for the contemporary software systems are the proposed architectural solutions for building systems with personalization of content according for the user's data, as well as solutions for protecting personal data, the contributions of which can be summarized as follows.

A: Personalized learning systems:

- An innovative approach to the analysis of large data sets collected during the use of e-learning platforms and education games is proposed, and on this basis, a software architecture is proposed for data analysis and the generation of personal recommendations for each learner, as well as semantic search of learning resources.

- A software architecture of a system with adaptation and recommendations for learning content and activities in a learning course is proposed, based on algorithms from machine learning and an algorithm for predicting learning and the main activities of both the learner and the teacher.

- A methodology reduced to specific tools for evaluation and improvement of an existing software system during peer review is proposed.

- An approach is proposed, which is implemented in a specific system, to easily configure a software architecture for peer learning. For this, a classification into six categories of software configurations, evaluated according to selected criteria, is innovatively proposed.

B: Data security solutions:

- A methodology is proposed for storing and processing personal data of learners in learning management systems (LMS) by applying a developed hierarchical model for storing information during data anonymization processes and when sharing data with external systems.

- A method for collecting, storing and maintaining personal information in LMS is proposed, which is independent of any LMS system. The presented solution consists of an integration layer, a data anonymization layer and an analysis and reporting layer.

- The existing knowledge about the degree of data protection of popular Android password management applications has been enriched, and thus the possibilities of their use, by analyzing the behavior of the system during the execution of the protection processes.

B: Traffic information processing systems

- An index has been proposed to evaluate traffic of the urban transport based on real-time data. A real-time traffic estimation model is proposed completed with a traffic state map visualization mechanism.

Regardless of the fact that most of the publications are co-authored, considering the content, presentation and detail of the research and analysis presented, I have no doubt and am convinced of the significant personal contribution of the candidate.

The works presented for review show a high level of scientific achievements by providing solutions in a very dynamic field, significantly influenced by the rapid development of technologies in computer systems. They demonstrate innovation, present research with concrete solutions and implementations. The demonstrated scientific achievements have scientific significance and meet the criteria for occupying the academic position of "Professor".

6. Critical remarks and recommendations

I would recommend that the candidate's work be intensified in the direction of publishing the results in established scientific journals.

7. Personal impressions of the candidate

I have known Assoc. Professor Milen Petrov since 2008, when I became part of the staff of the "Software Engineering" department of FMI - SU. I have witnessed his successful academic development from Assistant to Associate Professor. He is a distinguished educator in the field of software design and development and is a sought-after lecturer and supervisor. Milen Petrov demonstrates the ability to work under heavy load. He successfully combines his commitments as a teacher of a large number of students and supervisor of graduate and doctoral students with his administrative duties as head of a master's program and as deputy dean in the management of FMI. He is always very actively involved in the work of the department with committed attention to problems, participates in work discussions, proposes and implements departmental solutions.

My personal impressions of Milen Petrov's work are entirely positive and support his candidacy for "Professor".

8. Conclusion for the application

After having familiarized myself with the materials and scientific works presented in the competition and based on the analysis of their significance and the scientific-applied and applied contributions contained in them, **I confirm** that the scientific achievements comply with the requirements of LADPRB, the Regulations for its application and the relevant Regulations of Sofia University "St. Kliment Ohridski" for the candidate to occupy the academic position of "Professor"

in the scientific field and professional field of the competition. 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.

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

II. GENERAL CONCLUSION

Based on the above, I strongly **recommend** the scientific jury to propose to the competent authority for the selection of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" to elect Associate Professor Milen Yordanov Petrov to occupy the academic position of "**Professor**" in professional field 4.6. Informatics and Computer Science (Software Technologies - Network Programming, Cloud Technologies and Web Technologies).

20.10.2022

Sofia

Prepared the review:

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