Newcastle University
School of Computing

OPINION

of the PhD student's scientific advisor, Doctor of Philosophy (PhD) Paul Ezhilchelvan, on the dissertation work of Zhanuzakov Mukhit Baurzhanovich, proposed for the degree of Doctor of Philosophy (PhD) in the specialty «8D06103 - Computer Sciences» on the topic «Research of fault-tolerant algorithms for reliable information processing»

I, Paul Ezhilchelvan, as the scientific supervisor of Mukhit Zhanuzakov, hereby present this official review of his PhD dissertation submitted for the degree of Doctor of Philosophy (PhD).

The dissertation is devoted to the study of fault-tolerance algorithms for reliable information processing in distributed enterprise systems. The research addresses an important and relevant problem related to reliability, scalability of distributed enterprise servers.

The relevance of the research is well substantiated. Modern distributed systems operate under conditions of increasing scale, heterogeneity, and uncertainty, which significantly raises the probability of failures. Existing fault-tolerance mechanisms often demonstrate limitations in scalability, computational overhead, and adaptability. In this context, the development of efficient and scalable fault-tolerance algorithms is of critical importance.

The main objective of the dissertation is to develop and analyze methods for fault-tolerant information processing that minimize performance overhead in failure-free operation while ensuring efficient and reliable rollback-recovery through optimal checkpointing interval computation. The set research tasks are logically structured and fully achieved within the framework of the dissertation.

The scientific novelty of the work lies in the development of new approaches for determining optimal checkpointing intervals in rollback-recovery algorithms. In particular, the author proposes: a model-based solution for computing checkpointing intervals in distributed enterprise systems; an original implementation of checkpointing interval calculation based on queuing theory. These contributions represent a significant advancement in the theory and practice of fault-tolerant distributed computing.

The reliability of the obtained results is supported by a comprehensive methodological framework, experimental validation, and approbation of the research outcomes at scientific seminars and international conferences.

The dissertation has a clear structure and logical organization. It consists of an introduction, four chapters, a conclusion, and references. The content of the chapters

consistently раскрывает theoretical foundations, methodological developments, and practical implementation of the proposed solutions.

The candidate has demonstrated a high level of independence in conducting research, strong analytical skills, and the ability to solve complex scientific and engineering problems.

In conclusion, the dissertation represents a completed scientific work that meets the requirements for PhD dissertations. The obtained results are scientifically sound, practically significant, and contribute to the development of fault-tolerant distributed systems.

I believe that the candidate fully deserves to be awarded the degree of Doctor of Philosophy (PhD) in the relevant field.

PhD, Paul Ezhilchelvan 

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