



DECLARATION OF GORDON MACPHERSON

I, Gordon MacPherson, am over twenty-one (21) years of age. I have never been convicted of a felony, and I am fully competent to make this declaration. I declare the following to be true to the best of my knowledge, information and belief:

1. I am Director Board Governance & IP Operations of The Institute of Electrical and Electronics Engineers, Incorporated (“IEEE”).
2. IEEE is a neutral third party in this dispute.
3. I am not being compensated for this declaration and IEEE is only being reimbursed for the cost of the article I am certifying.
4. Among my responsibilities as Director Board Governance & IP Operations, I act as a custodian of certain records for IEEE.
5. I make this declaration based on my personal knowledge and information contained in the business records of IEEE.
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8. The article below has been attached as Exhibit A to this declaration:

A.	Ali E. El-Desoky; Hisham A. Ali; Abdulrahman A. Azab, “A Pure Peer-To-Peer Desktop Grid framework with efficient fault tolerance”, published in 2007 International Conference on Computer Engineering & Systems, November 27 – 29, 2007.
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9. I obtained a copy of Exhibit A through IEEE Xplore, where it is maintained in the ordinary course of IEEE’s business. Exhibit A is a true and correct copy of the Exhibit, as it existed on or about August 10, 2021.

10. The article and abstract from IEEE Xplore show the date of publication. IEEE Xplore populates this information using the metadata associated with the publication.
11. Ali E. El-Desoky; Hisham A. Ali; Abdulrahman A. Azab, "A Pure Peer-To-Peer Desktop Grid framework with efficient fault tolerance" was published in the 2007 International Conference on Computer Engineering & Systems. The 2007 International Conference on Computer Engineering & Systems was held from November 27 – 29, 2007. Copies of this publication was made available no later than the last day of the conference. The article is currently available for public download from the IEEE digital library, IEEE Xplore.
12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

I declare under penalty of perjury that the foregoing statements are true and correct.

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DocuSigned by:
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Abstract:

P2P computing is the sharing of computer resources by direct exchange. P2P desktop grid is a P2P computing environment with desktop resources and usually built on the Internet infrastructure. The most important challenges for a P2P desktop grid involve: 1) minimizing reliance on central servers to achieve decentralization, 2) providing interoperability with other platforms, 3) providing interaction methodologies between grid nodes that overcome connectivity problems in the Internet environment, and 4) providing efficient fault tolerance to maintain performance with frequent faults. The main objective of this paper is to introduce a pure P2P desktop grid framework that built on Microsoft's .Net technology. The proposed framework composed of the following components, 1) a communication protocol based on both FTP and HTTP, for interaction between grid nodes to provide interoperability, 2) An efficient checkpointing approach to

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framework. Such framework will help in overcoming the problems associated to decentralization, interoperability, connectivity and fault tolerance. Performance evaluation has been implemented by running an application code built on variable dimensions' matrix multiplication on a desktop grid based on the proposed framework. Performed experiments have been focused on measuring the impact of failures on the execution time for different connectivity models. Experimental results show that using the proposed framework as an infrastructure for running distributed applications has a great impact on improving fault tolerance, beside achieving full decentralization, interoperability and solving connectivity problems.

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Contents

I. Introduction

The world's computing power and disk space is no longer primarily concentrated in supercomputer centers and machine rooms. Instead it is distributed in hundreds of millions of personal desktop and mobile computer systems belonging to the general public [6]. A characteristic of these systems is that they are relatively resource rich (in terms of CPU power, memory, and disk capacity) but are utilized only for a fraction of the time during a day. Even during the time they are in use, their average utilization is much less than their peak capacity [1].

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