

International Journal of High Performance Computing Applications

Decision Letter (hpc-16-0021)

From: guillaume.mercier@inria.fr

To: ahorti@riken.jp

CC:

BCC:

Subject: International Journal of High Performance Computing Applications - Decision on Manuscript ID hpc-16-0021

Body: 08-Jul-2016

Dear Dr. HORI: Manuscript ID hpc-16-0021 entitled "Overhead of Using Spare Nodes" which you submitted to the International Journal of High Performance Computing Applications, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter.

The reviewer(s) have recommended publication, but also suggest some minor revisions to your manuscript. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript.

To revise your manuscript, log into <https://mc.manuscriptcentral.com/ijhpca> and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

You will be unable to make your revisions on the originally submitted version of the manuscript. Instead, revise your manuscript using a word processing program and save it on your computer. Please also highlight the changes to your manuscript within the document by using the track changes mode in MS Word or by using bold or colored text.

Once the revised manuscript is prepared, you can upload it and submit it through your Author Center.

When submitting your revised manuscript, you will be able to respond to the comments made by the reviewer(s) in the space provided. You can use this space to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewer(s).

IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.

Because we are trying to facilitate timely publication of manuscripts submitted to the International Journal of High Performance Computing Applications, your revised manuscript should be uploaded as soon as possible. If it is not possible for you to submit your revision in a reasonable amount of time, we may have to consider your paper as a new submission.

Once again, thank you for submitting your manuscript to the International Journal of High Performance Computing Applications and I look forward to receiving your revision.

Sincerely,

Dr. Guillaume Mercier

Editor in Chief, International Journal of High Performance Computing Applications

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Editor's Comments to Author:

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author

This paper investigates the overhead of using spare nodes for fault tolerance in extreme-scale supercomputers. It is an extension of the EuroMPI'15 paper by the same authors. The approach focuses on substitution a failed node with a spare node, such that the substitution itself accommodates network architecture properties. As more than one spare nodes may be allocated at job start, a sliding substitution scheme that not only adds the spare node at a certain location of a 2D or 3D stencil code, but also changes the mapping of the spare node and of some live nodes to maintain a reasonable mapping of the 2D or 3D decomposition to the network architecture. The paper provides a detailed description of the concept, simulation and experimental results, and a discussion

Strengths: Overall this paper is excellent work and describes the concept in a way that is easy to follow and to understand. The discussion is highly valuable.

Weaknesses: Some of the details in the simulation and evaluation sections are missing. Was a specific simulator used and, if so, which one? Did the evaluation use microbenchmarks, if so, which ones? There are a few English language errors in the text. The Related Work section seems to be short. The Shadow Replication work by Rami Melhem et al. and ULFM could be added to this section. The impact of communication avoiding algorithms, which stencil codes are often targeted for, could be discussed.

Reviewer: 2

Comments to the Author
See the PDF

Reviewer: 3

Comments to the Author

This paper examines different strategies for allocating spare nodes to a job that has incurred node failures. Communication cost in terms of switch hops and contended links are used to determine the impact of reserving and then allocating spare nodes. The approach, analysis, and evaluation are limited to systems and applications with regular topologies and communication patterns. The paper proposes several different strategies, performs simulation to study the different strategies, and then compares the simulation results to results from actual systems for a 5P stencil operation, barrier, and reduce operations.

Resilience is likely to be an important problem as the size and number of components in large-scale parallel systems continues to increase. It is likely that the number of node failures will increase, so strategies for mitigating node failures will be important. This work offers up several strategies, although these approaches are focused on very regular topologies, which is an obvious starting point. There are several ways in which this paper could be improved. The 5P stencil benchmark is not really described in any detail, and all simulation and actual performance results are shown in relative terms. The paper could be improved by providing some more details of the benchmark, including important characteristics such as message size and message rate. Baseline results that show how the performance is impacted by suboptimal allocation patterns would be interesting as well. Since this work is most relevant for very large-scale jobs, a baseline analysis of actual performance degradation for different rank mappings would help set bounds for what the performance implications are. Details on the benchmark would help improve the ability of the benchmark to simulate actual applications. There are several working and grammatical errors that detract from the readability of the paper. It needs a through editing pass before publication.

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File 1: [spare-nodes.pdf](#)

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