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The Reproducibility Initiative

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This installment of Computer's *series highlighting the work published in IEEE Computer Society journals comes from* IEEE Transactions on Parallel and Distributed Systems.

Reproducibility is a foundation of solid scientific and technical research. The ability to repeat research is key to confirming the validity of a scientific discovery.[1] At *IEEE Transactions on Parallel and Distributed Systems* (*TPDS*), we are committed to enabling reproducible research through transparency and the availability and potential reuse of code. We have partnered with Code Ocean, New York, a cloud-based computational reproducibility platform, to pilot the postpublication peer review of code associated with papers published in *TPDS*. Authors who have published in *TPDS* can make their work more reproducible and earn a reproducibility badge by submitting their associated code for postpublication peer review.

The process begins when a *TPDS* author notifies the editor-in-chief (EiC) that she or he wishes to submit code for postpublication peer review. The EiC directs the author to upload the code to Code Ocean, which generates a "compute capsule" that includes the code, data, results, and computational environment specifications. Code Ocean sends the EiC a review copy of the compute capsule, which is passed on to the assigned reproducibility associate editor for the article.

TPDS has created a Reproducibility Editorial Board consisting of five reproducibility associate editors to handle the peer review process for submitted code: Alexandru Iosup (Vrije Universiteit Amsterdam, The Netherlands), Tevfik Kosar (University at Buffalo, New York), Radu Prodan (Institute of Information Technology, University of Klagenfurt, Austria), Omar Rana (Cardiff University, United Kingdom), and Jianfeng Zhang (Chinese Academy of Sciences, Beijing).

The reproducibility associate editor invites reviewers to evaluate the code; the process is similar to a paper peer review except that it is currently conducted via email outside of our traditional online submission system. Once a reviewer accepts, he or she receives the link to the compute capsule and a simple online form in which to complete the assessment. The reviewer is asked, among other things, whether he or she recommends a reproducibility badge for

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the associated article. Two badges are available:

1. *Code available*: The code provided by the authors, including any associated data and documentation, is reasonable and complete and can potentially be used to support the reproducibility of the published results.
2. *Code reviewed*: The code provided by the authors, including any associated data and documentation, is reasonable and complete, produces the described outputs when it is run, and can support the reproducibility of the published results.

Once the reviewer submits the report, the reproducibility associate editor can make a decision and inform the EiC which badge, if any, should be applied to the article in IEEE *Xplore*.

While the pilot will initially target previously published *TPDS* articles, we plan to expand it to include accepted articles in the near future. We encourage all published *TPDS* authors to submit related code and earn a reproducibility badge. Please contact parashar@rutgers.edu to express your interest in a postpublication peer review of your code.

REFERENCE

1. National Academies of Sciences, Engineering, and Medicine, *Reproducibility and Replicability in Science*. Washington, DC: National Academy Press, 2019. [Online]. Available: https://www.nap.edu/catalog/25303/reproducibility-and-replicability-in-science

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