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The case for free and open source software in research and scholarship

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Free and open source software (FOSS) is any computer program released under a licence that grants users rights to run the program for any purpose, to study it, to modify it, and to redistribute it in original or modified form. Our aim is to explore the intersection between FOSS and computational reproducibility. We begin by situating FOSS in relation to other 'open' initiatives, and specifically open science, open research, and open scholarship. In this context, we argue that anyone who actively contributes to the research process today is a computational researcher, in that they use computers to manage and store information. We then provide a primer to FOSS suitable for anyone concerned with research quality and sustainability—including researchers in any field, as well as support staff, administrators, publishers, funders, and so on. Next, we illustrate how the notions introduced in the primer apply to resources for scientific computing, with reference to the GNU Scientific Library as a case study. We conclude by discussing why the common interpretation of 'open source' as 'open code' is misplaced, and we use this example to articulate the role of FOSS in research and scholarship today.

This article is part of the theme issue 'Reliability and reproducibility in computational science: implementing verification, validation and uncertainty quantification *in silico*'.

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