

Variable precision computing: Applications and challenges

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The need for increased performance and reproducibility have led some scientific computing users to explore varying the level of numeric precision in certain portions of their code: 16-bit instead of 32-bit, or 32-bit instead of 64-bit. At the other end of the spectrum, researchers have explored using 128-bit arithmetic, or even much higher precision --- hundreds or even thousands of digits. Such work has underscored the need to develop new mathematical and software frameworks to support a dynamically variable level of precision, and, more generally, to rethink what "reproducibility" means in a variable precision environment. This talk summarizes some of the work being done in this arena, and outlines research problems in the area that need to be solved.