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Development of a Python Interface for Code-To-Code Adapter Library

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This paper presents the development of a Python interface for the Code-To-Code Adapter (CoToCoA) library. The CoToCoA library is a framework designed for coupled computations that enables direct program-to-program communication without intermediate files. Given that CoToCoA provides support for the programming languages C and Fortran and is dependent upon MPI, a library used for interprocess communication, this study has been developed to enhance the usability of CoToCoA by integrating it with Python. In order to effectively integrate CoToCoA with Python, two development approaches were evaluated: direct development in Python and the use of ctypes to call CoToCoA's C functions from Python. In addition, we conducted performance evaluations that focused on CoToCoA's two types of data transfer methods. These evaluations were designed to assess the efficiency of the developed Python interface. The recently developed Python interface facilitates the efficient transfer of data from C or Fortran-based simulation programs to Python, where it can be effectively analyzed or processed. This enhancement to the CoToCoA framework is of particular significance in the field of computational science, as it enables efficient data management across different programming languages.