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Optimal Program Execution Reversal Schedules

For adjoint calculations, debugging, interactive control and similar purposes one may need to reverse the execution of a computer program. The simplest option of recording a complete execution log and then reading it backwards requires massive amounts of storage. Instead one may generate the execution log piecewise by restarting the 'forward' calculation repeatedly from suitably placed checkpoints. Our goal is to minimize the temporal and spatial complexity as measured by the number of evaluation repeats and the number of checkpoints, respectively. We present optimal checkpointing schedules on serial machines and report preliminary results for program execution reversal on multi-processors.

Reference: Treeverse, An Implementation of Checkpointing for the Reverse or Adjoint Mode of Computational Differentiation Preprint IOKOMO-04-1997, TU Dresden, 1997, submitted to TOMS.