Quantum Information and Computing

Assignment 2 (due in two weeks)

October 25, 2022

1. **Checkpoints:** Write a subroutine to be used as a checkpoint for debugging.
   (a) Include a control on a logical variable (Debug=.TRUE. or .FALSE.)
   (b) Include an additional (optional) string to be printed.
   (c) Include additional (optional) variables to be printed.
2. **Documentation:** Rewrite Exercise 3 from Assignment 1 including
   (a) Documentation.
   (b) Comments.
   (c) Pre- and post- conditions.
   (d) Error handling.
   (e) Checkpoints.
3. **Derived types** In Fortran90 write a MODULE containing a double complex matrix derived TYPE that includes the components: Matrix elements, Matrix Dimensions, Matrix Trace, and Matrix Adjoint.
   (a) Define the correspondent TYPE.
   (b) Define a function/subroutine that initializes this new TYPE.
   (c) Define the functions/subroutines Trace and Adjoint.
   (d) Define the correspondent Interfaces of the previous points.
   (e) Define a subroutine that writes on file the Matrix TYPE in a readable form.
   (f) Include everything in a test program.