

DS 7347

High-Performance Computing (HPC) and Data Science

Session 15

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Debugging

Readings and Assignments

Debugging



- There are many debugging tools available.
- Some are compiler or language dependent.
- **gdb** is commonly used with the GCC toolchain
- **lldb** is commonly used with the LLVM-based toolchains
- **pdb** is commonly used with the Python
- Graphical debuggers also exist, *e.g.* NVIDIA Nsight, TotalView, and Intel Inspector.



run Run the code until the error.

step Step through the code line-by-line.

break Set breakpoints.

print Print the values of variables.



- Most compilers have a special flag that turns on debugging features, *e.g.* `-g`.
- It is also useful to turn off optimization flags for initial debugging, *e.g.* `-O0`.
- Most compiled language debuggers can also be used with multi-threaded programs.
- Multiple debuggers can be used with distributed memory applications, one for each process.



- Run executable and observe the error.
- Re-build the executable with debugging symbols included.
- Run the executable through a debugger.
- Step through the code's execution.
- Inspect the program's state.



- GNU Debugger
- LLDB Debugger
- GDB to LLDB Command Map



- The process is fairly similar to debugging compiled languages except that there is no build process.
- Debugging parallel Python applications is more difficult due to the inherent multi-process nature of Python parallelism and the variety of implementations.



- The process is fairly similar to standard debugging with GDB, etc. except that multiple instances of the debugger are used, one for each process
- Individual terminal sessions can be used for each debugger instance thus allowing for debugging both distributed and threaded applications.
- Works for both compiled and interpreted languages.

Readings and Assignments



Readings

None

Project

None