Beyond Fortran ...

What to do and where to go from here ...

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Overview

- Other Fortran Compilers
- C, C++
- Parallel Computing
  - Open MP
  - MPI
- Mathematical Computing Languages/Packages
  - Free
  - Paid
- Interpreted Languages
  - Python, R
  - NCL, Ferret, Grads (for Atmospheric and Oceanic Science Students)
  - Other packages like Mayavi, VI, Paraview, UVCDAT etc.,

Other Fortran Compilers

- Intel
- NAG
- Cray
- PGI etc.,

  Have non-standard features and can take advantage of certain features in the system architecture. They have more features

  Extremely good for Parallel Programming and interfacing them with other languages like C, C++, (within the same brand)

  Comes with debuggers, profilers etc., Helpful for large projects.

  Recommended for intense computations that demand Super Computers or workstations etc.,

C, C++

- Superior Compiled programming languages
- Does not have array slicing features
- Has almost all features of Fortran and more features
- Equally good to work with.
- Which to choose? Personal preference and application based choice.

Parallel Computing

- All programs run only in one processor/core
- This paradigm of programming Makes use of multiple cores simultaneously by splitting the work load between the cores.
- OpenMP (Open Specifications for Multi-Processing) is used for computers having shared memory
- MPI (Message Passing Interface) is used for computers having shared / distributed memory
- These are directives and functions that work on top of a compiled language like C, C++, Fortran
- Usage of OpenCL, OpenACC, Graphical Processing Units, OpenGL etc., are quite common

Mathematical Packages

- Paid
  - Matlab, Mathematica, Maple etc.,
  - Very very good and have a lot of extensive features
  - Interpreted language based packages
- Free
  - Scilab, Octave, Freemat etc.,
  - Newly emerging packages, completely free, some are software clones
  - They are also interpreted language based packages

Interpreted Languages ...

- There are many, I am concentrating on only two of them
- Python and R are very successful.
- Python:
  - Easy to learn
  - Emerging rapidly in scientific computations
  - Can integrate several other programming files into it
  - Nice graphics
- R:
  - Very powerful tool for statistics
  - Can produce high quality graphics
  - Preferred by many for data processing and data analysis

Other Packages and Tools ...

- Other packages (For Atmospheric and Oceanic Science Students/Researchers, but not restricted to them alone):
  - NCL
  - Ferret
  - Grads
  - UVCDAT
- Visualization tools:
  - Visit
  - Paraview
  - MayaVI
  - VI
  - VTK etc.,

Possible Upcoming tutorials – Proposal only

- Advanced Fortran tutorials (Next Series)
- Fortran + OpenMP
- Scientific Python
- Python + Fortran for scientific applications
- Fortran + MPI

Thank You!