

CS601: Software Development for Scientific Computing

Autumn 2023

Week9: Intermediate C++

Course in the next 7 weeks:

- Computational thinking
 - Data representation (IEEE 754, [Object-oriented design](#))
 - System Architecture (cache hierarchy, pipelined logic)
 - Language considerations (C/C++ features, [Generic programming etc.](#))
- Patterns / Motifs in Scientific Computing
 - Dense matrix computations, Sparse matrix computations, [FFT](#)
 - [N-body problems](#), [Structured and Unstructured grids](#)
- Tools
 - make, overview of compiler tool chain.
 - Doxygen, gdb, valgrind, gprof
 - ?

Object Orientation

- What does it mean to think in terms of object orientation?
 1. Give precedence to data over functions (*think: objects, attributes, methods*)
 2. Hide information under well-defined and stable interfaces (*think: encapsulation*)
 3. Enable incremental refinement and (re)use (*think: inheritance and polymorphism*)