Implementation of heterogeneous algorithms

- Scientific software for heterogeneous platforms
  - Well behind heterogeneous algorithms
- Heterogeneous algorithms are generic
  - *Problem* parameters
  - *Algorithmic* parameters
  - *Platform* parameters

Implementation of heterogeneous algorithms

- Good application should include
  - Core code implementing the algorithm for each combination of the values of its parameters
  - Extra code finding accurate platform parameters and optimal algorithmic parameters
    - » The code can account for more than 90% of the total size of the code of the application
    - » The code is anything but trivial

Programming systems for heterogeneous computing

- Programming system
  - Cannot help those having no idea of the design of heterogeneous parallel algorithms
    - » No automatic writing of the core code
  - Can help algorithm designers
    - » Write the code finding accurate platform and optimal algorithmic parameters
      - Application specific code (compiler)
      - Application independent code (RTS, library)

Programming systems for heterogeneous computing

- Parallel programming system
  - Can also help efficiently implement homogeneous algorithms on heterogeneous platforms
    - » The whole computation is partitioned into a large number of equal chunks
    - » Each chunk is performed by a separate process
    - » The number of processes run by each processor is proportional to the relative speed of the processor