

# Performance Programming: Theory, Practice and Case Studies

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# *Outline*

Introduction

Module I: Measuring Program Performance

Module II: Serial Optimization

Module III: Parallel Optimization

Module IV: Case Studies



# *Focus and Goals*

- Target audience: developers of technical and HPC applications
- Focus on C, FORTRAN 77, FORTRAN 95 on UNIX/Linux platforms
- Can be applied to applications in
  - Mechanical computer-aided engineering (MCAE)
  - Electronic design automation (EDA)
  - Computational chemistry
  - Bioinformatics
  - Operations research
  - Financial modeling
  - Reservoir simulation and seismic modeling
  - Mechanical computer-aided design (MCAD) modeling
  - Graphics rendering and imaging
  - Climate and weather



# *Why Program for Performance*

- Optimized Code
  - Solve a problem faster
  - Solve a larger problem
  - Solve problem of the same size but with fewer system resources

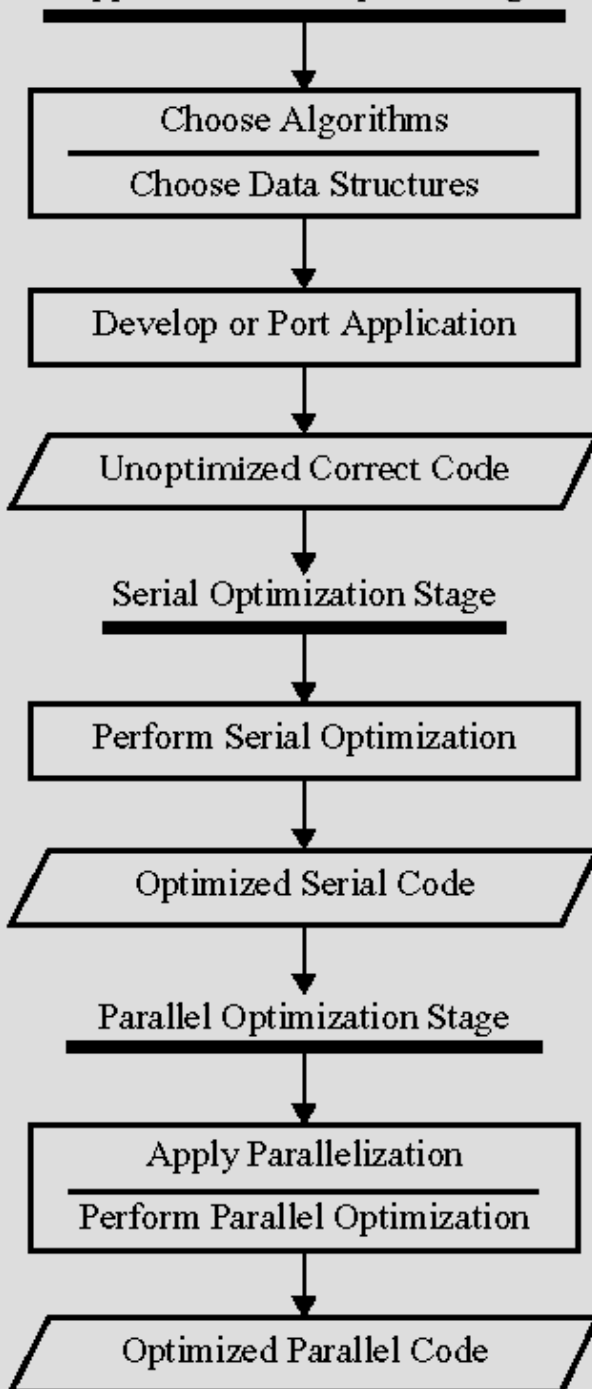


# *Performance Components*

- Hardware
  - CPU
  - Memory system
  - Disks and peripheral devices
- Software
  - Compilers
  - Libraries
  - Monitoring tools
- Parallelization Support
  - Multiple processors
  - Memory and OS support for MP
  - Parallelizing compilers
  - Clustering software



Application Development Stage



### Serial Optimization Stage

