

Tutorial M8 Outline

A. Introduction

B. The vector architecture and model

- 1) History and evolution of vector systems
- 2) Architectural features
- 3) Vector speedup
- 4) Memory system issues
 - a) Memory hierarchy
 - b) Bandwidth requirements
 - c) Banking

C. Programming for vector machines

- 1) Basic conditions for vectorization
- 2) What a vectorizing compiler will do
- 3) Vectorization show-stoppers
- 4) Stride and order-of-reference issues
- 5) Practical vectorization methodology and issues
 - a) Profiling
 - b) Common coding techniques
 - c) Performance measures
 - d) Effect on arithmetic results

D. Architectural case studies

- 1) NEC/Cray SX-6
- 2) Cray X1
- 3) Commodity processors with vector components

E. Advanced application case studies

- 1) Computational Fluid Dynamics (parallel unstructured mesh application)
- 2) Weather Modeling with MM5 (parallel structured mesh application)

F. Vectorization combined with multi-streaming and parallel programming

- 1) Multi-streaming issues and advantages
- 2) MPI parallelism
- 3) Co-Array Fortran (CAF) and Unified Parallel C (UPC) issues and advances