PURPOSE OF THESE MATERIALS

- Provide a consistent training experience for new OpenACC developers
- Provide college professors with materials to use in their coursework
- Designed to be modular to support 1 lecture up to a 2 day workshop
- We took an application-driven approach to reflect real-world experience of OpenACC programming
MODULE OVERVIEW

Topics to be covered

- Introduction to parallel programming
- Common difficulties in parallel programming
- Introduction to OpenACC
- Parallel programming in OpenACC
MODULE TWO: PROFILING

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MODULE OVERVIEW

Topics to be covered

- Compiling and profiling sequential code
- Explanation of multicore programming
- Compiling and profiling multicore code
MODULE THREE: OPENACC DIRECTIVES

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MODULE OVERVIEW

OpenACC Directives

- The parallel directive
- The kernels directive
- The loop directive
- Fundamental differences between the kernels and parallel directive
- Expressing parallelism in OpenACC
MODULE OVERVIEW

OpenACC Directives

- Multicore CPU vs GPU
- Introduction to GPU Data Management
- CUDA Managed Memory
- GPU Profiling with PGProf
MODULE FIVE: DATA MANAGEMENT

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OpenACC Data Management

- Explicit Data Management
- OpenACC Data Regions and Clauses
- Unstructured Data Lifetimes
- Data Synchronization
MODULE SIX: LOOP OPTIMIZATIONS

Speaker/Date
LOOP OPTIMIZATIONS

- Majority of program runtime is spent in loops
- Every loop can execute in a very different way
- Using OpenACC loop optimization, we can speed-up our most time-consuming portions of code
FORTHCOMING MODULES
ASYNCHRONOUS OPENACC

- Introduce the concept of asynchronous operation
- Introduce the ASYNC and WAIT features of OpenACC
- Introduce pipelining as an approach to overlap data transfers and computation
MODULE EIGHT: OPENACC INTEROPERABILITY

Speaker/Date
OPENACC INTEROPERABILITY

- Discuss ways in which OpenACC can be used with other programming models
- Demonstrate interoperability with:
  - Math Libraries
  - CUDA
  - MPI
MULTI-DEVICE OPENACC

- Introduce the concept of multiple accelerator devices
- Demonstrate multi-device OpenACC with runtime API
- Demonstrate multi-device OpenACC with MPI
- Build upon the examples in modules 7 and 8 to extent them across multiple devices