

**Advanced Julia Programming and Parallel Computing**

**Course Number:** JUL-104
**Duration:** 2 days

**Overview**

This Advanced Julia training course teaches attendees how to leverage the power of the Julia language to manage challenging computational jobs. Students learn how to harness Julia's robust compilation processes and how to scale across many threads, GPUs, processes, and machines.

**Prerequisites**

Students must have a basic knowledge of using Julia for daily data science tasks, as taught in [Introduction to Julia for Data Scientists](file:////training/julia-introduction). In addition, participants must have practical experience with daily data science jobs in any popular language (Julia, Python, R, or MATLAB)

**Materials**

All Julia programming training students receive comprehensive courseware.

**Software Needed on Each Student PC**

Students must have a modern web browser and Internet access. Accelebrate will provide installation instructions (for Windows, Linux, and macOS).

**Objectives**

* Optimize their Julia code for highest performance
* Build production-ready Julia packages
* Use Julia for complex high throughput data science workflows
* Leverage the power of language to parallelize and distribute computational workloads
* Understand how Julia code can be run on GPUs

**Outline**

* Introduction
* Writing Efficient, High Performant Julia Code
	+ Julia LLVM compiler system
	+ Macros and overview of metaprogramming
	+ Type stability
	+ Julia performance tips
	+ Non materialized data structures (sparse arrays, banded matrices)
* Julia Package Ecosystem
	+ Packages and artifacts
	+ Managing package repositories
	+ Managing packages
	+ Building production quality packages (CI, automated unit testing, coverage)
	+ Making a package public
* Parallel and Distributed Computing with Julia
	+ SIMD
	+ Green-threading and asynchronous computing
	+ Multi-threading
	+ Local multiprocessing
	+ Typical Julia parallelization design patterns
	+ Inter-process communication
	+ Computational clusters and distributed computing
* Introduction to GPU Computing
	+ Writing cross compiler compatible (GPU/CPU) Julia code
	+ CuArrays.jl
	+ Overview of deep learning with Flux.jl
* Conclusion