DS 7347
High-Performance Computing (HPC) and Data Science
Session 12

Robert Kalescky
Adjunct Professor of Data Science
HPC Research Scientist

June 2, 2022

Research and Data Sciences Services
Office of Information Technology
Center for Research Computing
Southern Methodist University

Outline

Session Question

Session Question

Tuesday

Describe the differences between interpreted and compiled languages.

Thursday

Why do software libraries matter?

Spack

Spack Changes

- Concretization changes.
- `--reuse` is now the default.

Comparative Introduction to Python and C++

Interpreted Languages

- An external program interprets the script.
- Common to have dynamic typing.
- Generally easier to program.

Compiled Languages

- An external program, a compiler, generates a “machine code“ executable
- Common to have static typing.
- Generally harder to program than scripting.

Hybrid Languages

- An external program generates an intermediate representation that is then interpreted.
- The CPython interpreter generates bytecode that is then interpreted serialy.
- Interpreting bytecode is generally faster.
- Javascript is another notable example.

Matrix-Matrix Multiplication

Python

- Naive and native Python
- NumPy using OpenBLAS

C++

- Naive and native C++
- Armadillo using OpenBLAS
- CBLAS using accelerator

Readings and Assignments

Readings and Assignments

Readings

- Matrix Multiplication Inches Closer to Mythic Goal
- Learning from Optimizing Matrix-Matrix Multiplication

Assignments

None