

Survey

This survey is carried out within the scope of the article in preparation "**Programming Languages for Data-Intensive HPC Applications: a Systematic Mapping Study**", initiated by **Vasco Amaral** (Univ. Nova de Lisboa) and co-authored by the 19 contributors to the SLR/SMS study during the last 3 years at the ICT COST Action IC1406 *High-Performance Modelling and Simulation for Big Data Applications* (cHiPSet).

Domain expert in HPC or Data-Intensive Computing?

Please fill this questionnaire and hand in to C. Kessler,

christoph.kessler@liu.se

Thank you!

For complementation and validation of the literature review results, we would like to compare with the honest estimations of **experts** in data-intensive high-performance computing (that is, **you**). Please help us in collecting a sufficiently large and broad statistical basis for this validation by answering this survey. It only takes 2-3 minutes.

Many thanks in advance!

1. How long have you been working in High Performance Computing?
☐ Not at all ☐ < 2 years ☐ 2 to 5 years ☐ 5 to 10 years ☒ > 10 years

2. In what areas of science or engineering have you worked?
(e.g., computer science, bioinformatics, material science, telecommunications ...)

COMPUTER SCIENCE, COMPUTER ENGINEERING

3. Do your High Performance Computing related activities consist primarily of
☐ Developing programming support tools, or ☒ Using existing programming tools?

4. How do you rate your level of technical knowledge about languages/frameworks for HPC?
☐ Very Poor ☐ Poor ☐ Neutral ☒ Good ☐ Excellent

5. Which programming *languages* do you *use* for High Performance Computing?

C/C++, ~~FORTRAN~~, FORTRAN

6. What are, in your view, the *key advantages* of these languages (in relation to the alternatives you know)?
(this may include language properties, performance, programmability, etc.)

PERFORMANCE, CONTROL OF DETAILS

7. What *actually* made you use these languages? (if not already covered in 7.)

FAMILIARITY, PERFORMANCE

8. Which other programming *frameworks* (e.g., *library*-based) and tools do you *use* for HPC?

BLAS, LAPACK, MPI, GraphBLAS

9. Which other HPC programming languages / frameworks / tools do you *know* about (but do not use)?

OPENMP, TRILINOS, MAGMA, MATLAB, SciPy, NumPy

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COMPUTER SCIENCE AND BIOINFORMATICS

3. Do your High Performance Computing related activities consist primarily of

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4. How do you rate your level of technical knowledge about languages/frameworks for HPC?

☐ Very Poor ☐ Poor ☐ Neutral ☐ Good ☒ Excellent

5. Which programming languages do you use for High Performance Computing?

CUDA, C, C++, OPENCL, VHDL, VERILOG

6. What are, in your view, the *key advantages* of these languages (in relation to the alternatives you know)? (this may include language properties, performance, programmability, etc.)

PERFORMANCE

7. What *actually* made you use these languages? (if not already covered in 7.)

PERFORMANCE AND PORTABILITY

8. Which other programming frameworks (e.g., library-based) and tools do you use for HPC?

OMPSS, OPENMP, STAPL, STARPU

9. Which other HPC programming languages / frameworks / tools do you *know* about (but do not use)?

PYTHON, FORTRAN

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BIOINFORMATICS + C.S.

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4. How do you rate your level of technical knowledge about languages/frameworks for HPC?

☐ Very Poor ☐ Poor ☒ Neutral ☐ Good ☐ Excellent

5. Which programming *languages* do you *use* for High Performance Computing?

Scala

6. What are, in your view, the *key advantages* of these languages (in relation to the alternatives you know)?
(this may include language properties, performance, programmability, etc.)

PROGRAMMABILITY, RICH EC SYSTEMS / OTHER TOOLS

7. What *actually* made you use these languages? (if not already covered in 7.)

AVAILABLE FRAMEWORKS

8. Which other programming *frameworks* (e.g., *library-based*) and tools do you *use* for HPC?

APACHE FLINK

9. Which other HPC programming languages / frameworks / tools do you *know* about (but do not use)?

mpi, OPENMP, CILK

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Chemical Engineering

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4. How do you rate your level of technical knowledge about languages/frameworks for HPC?

☐ Very Poor ☒ Poor ☐ Neutral ☐ Good ☐ Excellent

5. Which programming *languages* do you *use* for High Performance Computing?

FORTRAN, MESSAGE PASSING INTERFACE

6. What are, in your view, the *key advantages* of these languages (in relation to the alternatives you know)? (this may include language properties, performance, programmability, etc.)

easy to use, fast code development, reliable

7. What *actually* made you use these languages? (if not already covered in 7.)

Their simplicity in learning and using them

8. Which other programming *frameworks* (e.g., *library-based*) and tools do you *use* for HPC?

gLite for Grid Computing

9. Which other HPC programming languages / frameworks / tools do you *know* about (but do not use)?

Not familiar with others

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applied math - computer science

3. Do your High Performance Computing related activities consist primarily of

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4. How do you rate your level of technical knowledge about languages/frameworks for HPC?

☐ Very Poor ☐ Poor ☒ Neutral ☐ Good ☐ Excellent

5. Which programming *languages* do you *use* for High Performance Computing?

C++, C, FOR

6. What are, in your view, the *key advantages* of these languages (in relation to the alternatives you know)?
(this may include language properties, performance, programmability, etc.)

performance, knowledge available, examples, ...

7. What *actually* made you use these languages? (if not already covered in 7.)

either i learned them / the code was in that language -

8. Which other programming *frameworks* (e.g., *library-based*) and tools do you *use* for HPC?

mpi, open mp, openacc

9. Which other HPC programming languages / frameworks / tools do you *know* about (but do not use)?

cuda, ARM, Julia

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2. In what areas of science or engineering have you worked?

(e.g., computer science, bioinformatics, material science, telecommunications ...)

Mechanical Engineering

3. Do your High Performance Computing related activities consist primarily of

☐ Developing programming support tools, or ☒ Using existing programming tools?

4. How do you rate your level of technical knowledge about languages/frameworks for HPC?

☐ Very Poor ☐ Poor ☐ Neutral ☒ Good ☐ Excellent

5. Which programming languages do you use for High Performance Computing?

Fortran & C++

6. What are, in your view, the *key advantages* of these languages (in relation to the alternatives you know)? (this may include language properties, performance, programmability, etc.)

Performance, low-level control

7. What *actually* made you use these languages? (if not already covered in 7.)

Legacy codes.

8. Which other programming frameworks (e.g., library-based) and tools do you use for HPC?

API, OpenMP, Intel Parallel Studio tools, Libkind

9. Which other HPC programming languages / frameworks / tools do you know about (but do not use)?

OpenACC, Kokkos

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plasma physics, material science, CFD
3. Do your High Performance Computing related activities consist primarily of
☐ Developing programming support tools, or ☒ Using existing programming tools?
4. How do you rate your level of technical knowledge about languages/frameworks for HPC?
☐ Very Poor ☐ Poor ☐ Neutral ☐ Good ☒ Excellent
5. Which programming *languages* do you *use* for High Performance Computing?
C/F90 with MPI/OpenMP
6. What are, in your view, the *key advantages* of these languages (in relation to the alternatives you know)?
(this may include language properties, performance, programmability, etc.)
Standard, available, mature, supported by HPC Center
7. What *actually* made you use these languages? (if not already covered in 7.)
comfortable with these technologies, no need to learn
8. Which other programming *frameworks* (e.g., *library-based*) and tools do you *use* for HPC?
HDFS, linear algebra packages, python+mpi4py+numpy
StarPU, oshu
9. Which other HPC programming languages / frameworks / tools do you *know* about (but do not use)?
Legion, PGAS, HPX, X10, Chapel, PanSec