How Sustainable Is Your Programming Language? Analyzing the Impact of Power Cap on Energy Efficiency of Programming Languages

Simão Cunha
simaopscunha@outlook.pt
University of Minho, Portugal

Luís Silva
luis.m.peixoto@gmail.com
University of Minho, Portugal

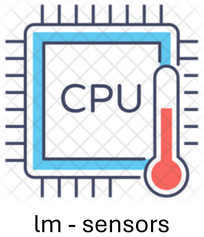
João Saraiva
saraiva@di.uminho.pt
University of Minho, Portugal

Analysis of programming languages' performance when running various CLBG problems.

The Computer Language 23.03 Benchmarks Game

- fannkuch-redux
- fasta
- n-body
- k-nucleotide
- spectral-norm
- reverse-complement
- mandelbrot
- binary-trees
- regex-redux

Temperature sensors & PowerCap



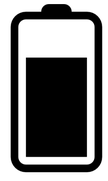
lm - sensors

Reads CPU temperature

Guarantee that all programs execute at the same (CPU) temperature

raplcap/powercap

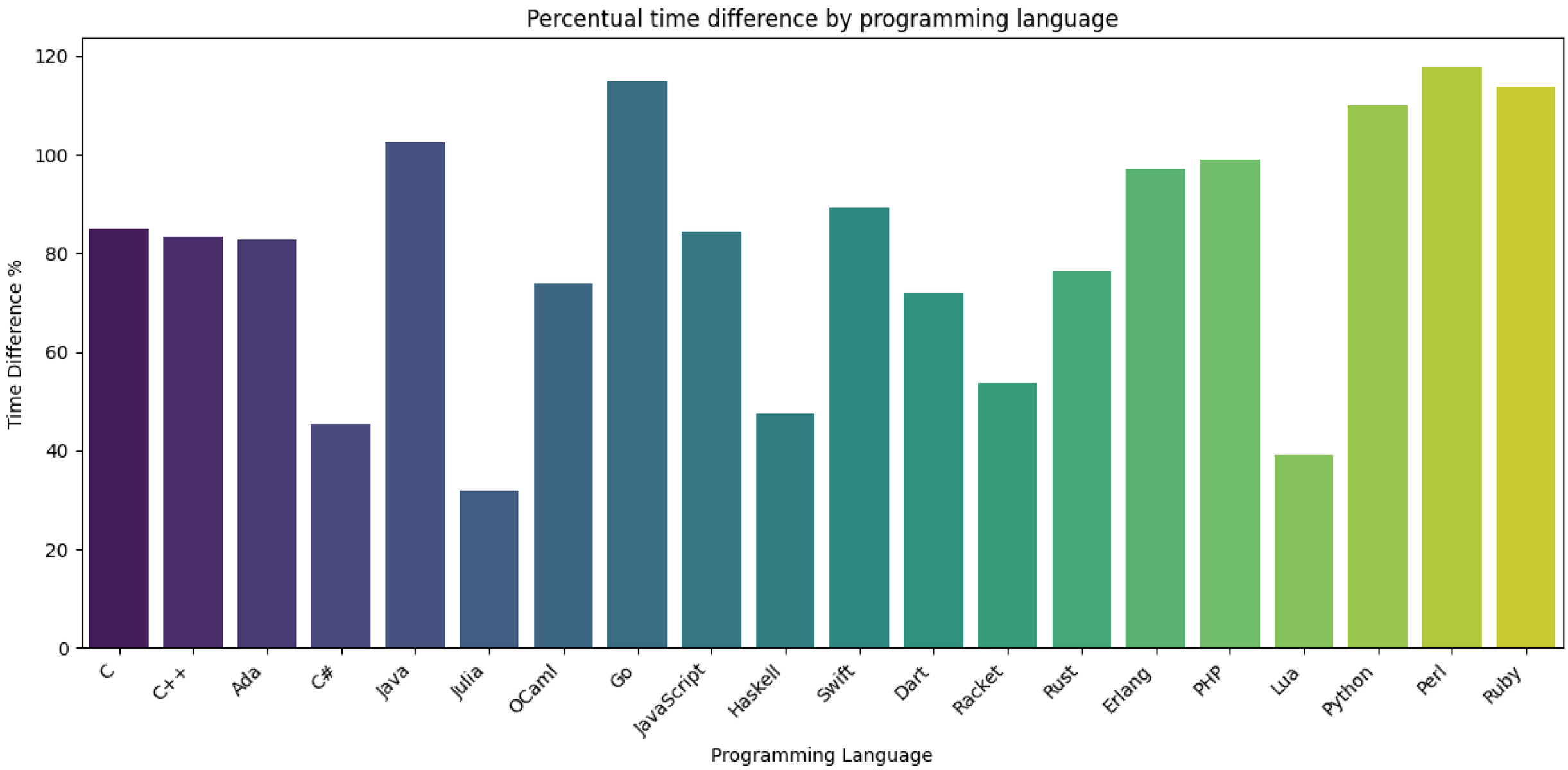
Limits CPU power



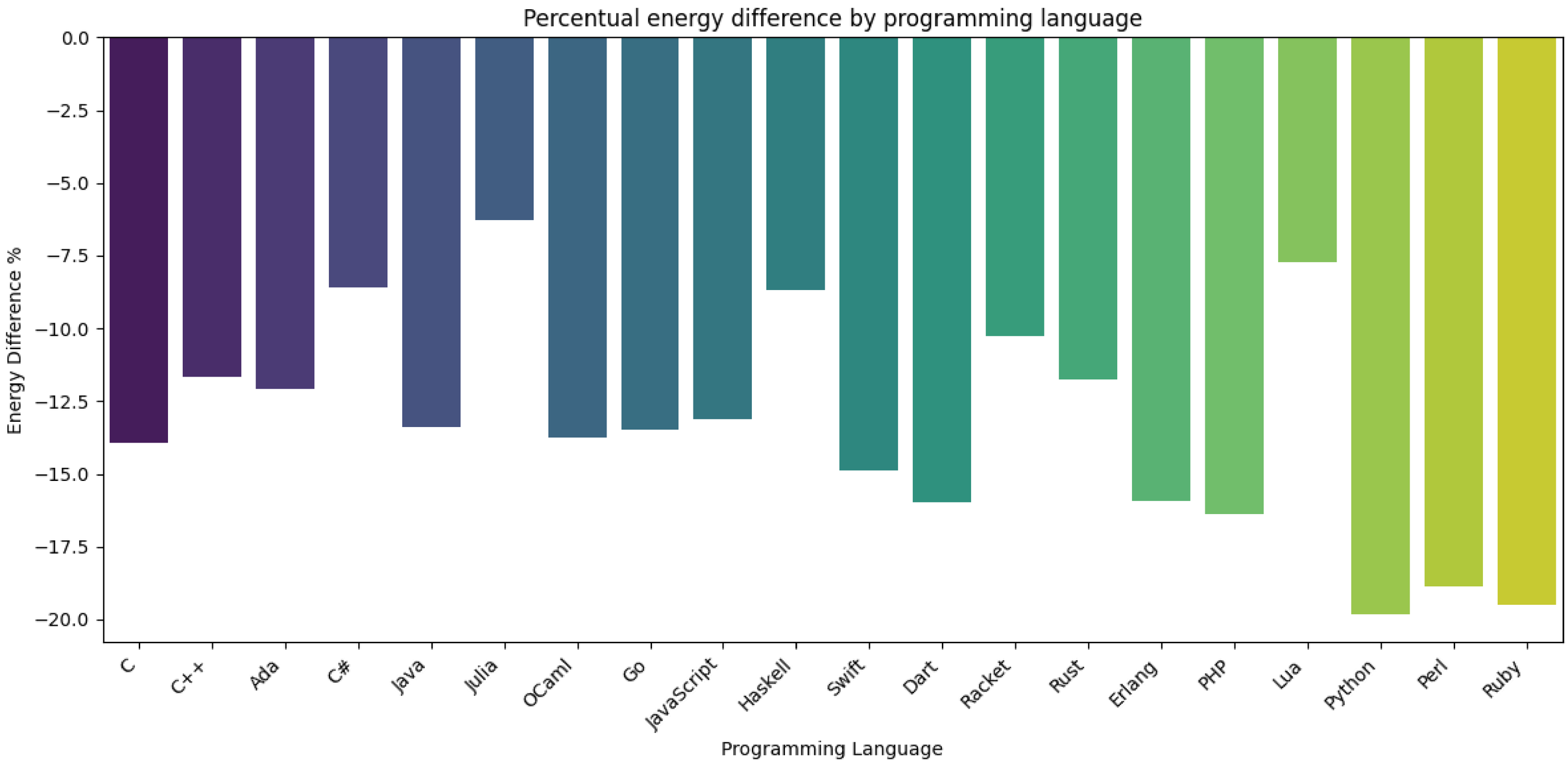
Consumes less energy

Longer execution time

Results – Execution time



Results – Energy consumption



Conclusions

- **C and C++ are the faster and greener programming languages.**
- **Ruby and Perl are the slowest and least greener programming languages.**
- **PowerCap reduces energy consumption, while increasing runtime in all the programming languages.**
- **Python reduces 19.80% its energy consumption by limiting the power of the CPU but is one of the most energy inefficient languages.**

Next steps

8th International Workshop on Green and Sustainable Software (GREENS'24)

Official website of the International Workshop on Green and Sustainable Software (GREENS)

Co-Located with:

ICSA24

Date:

June 4-5

Submission:

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