Comparing GPU kernels performance analysis tools

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DORSAL

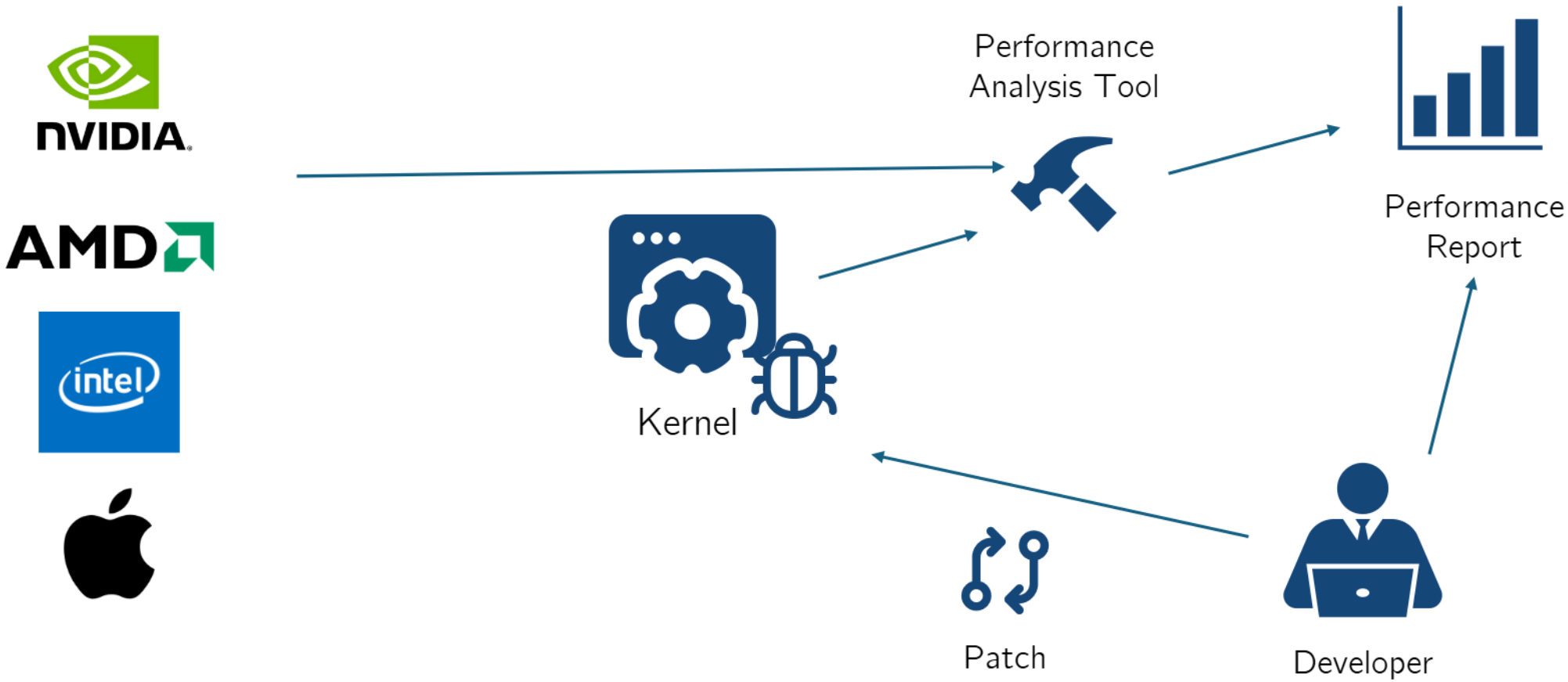
Progress Report Meeting, May 2025

POLYTECHNIQUE MONTRÉAL

Agenda

- Context & Motivation
- Proposed Methodology
- Expected Outcome
- Futur Work

Context & Motivation



Proposed Methodology

Benchmark with reference and faulty kernels

Run the benchmark with the tools

Analysing Tools Outputs and conclude on tools capabilities

Proposed Methodology

What is a faulty kernel ?

HPC Bugs taxonomy from a Systematic literature review

P. Helstab, "**A Systematic Review on Integrating Parallel Computing Techniques for High-Performance Computing: Challenges and Best Practices** ", présenté à AKTUELLE THEMEN DER SOFTWARETECHNIK AUS FORSCHUNG UND PRAXIS, U-Ulm, 2023.

HPC Bugs taxonomy from performance fixes in Open Source projects

M. A. Kalam Azad, N. Iqbal, F. Hassan, and P. Roy, "**An Empirical Study of High Performance Computing (HPC) Performance Bugs**" in *2023 IEEE/ACM 20th International Conference on Mining Software Repositories (MSR)*

Proposed Methodology

Grading Tools' detection capabilities

0 : Failure to detect
1 : Detection of anomaly
2 : Detection of the challenge
3 : Detection of the error
4 : Localization of the error

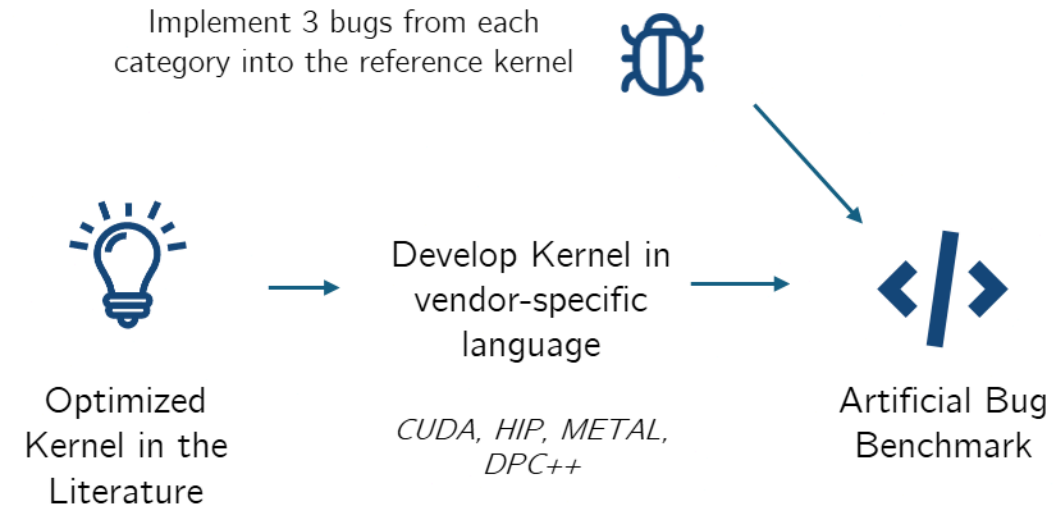
O_G: Only with the altered kernel tool output

R_G: With the optimized and altered kernel tool output

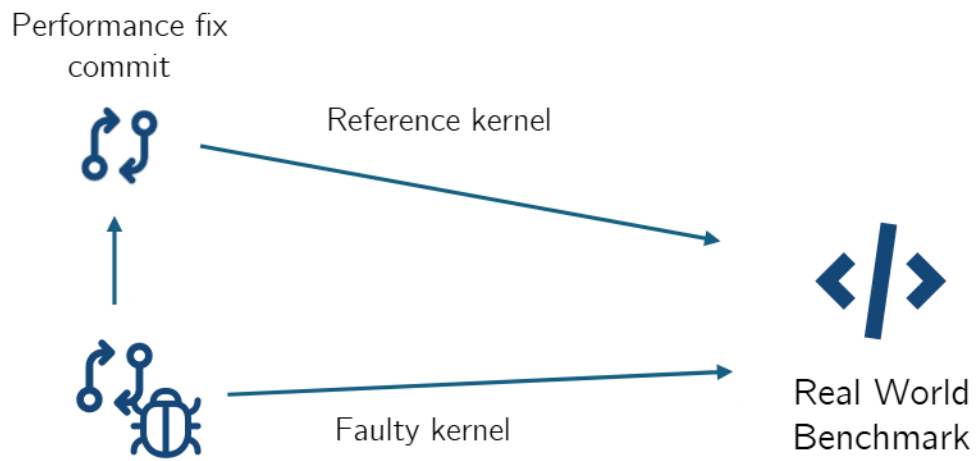
Proposed Methodology

Two different benchmark

HPC Bugs taxonomy from a Systematic literature review



HPC Bugs taxonomy from performance fixes in Open Source projects



Expected Outcome

Performance bug detection capabilities of Analysis tools.

Performance bug types and corresponding detection metrics.

Comparison of performance analysis tools (detection capabilities, overhead, complexity...)

Futur Work

Focus on Hip-Analyzer :

- Detection capabilities of Hip-Analyzer
- Develop visualisation for Hip-Analyzer traces

Thanks for your attention

Questions? Comments?

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