Best Practices for Benchmarking Diverse Architectures with Varied Workloads

Taking the Software Developer Perspective
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Challenge I: Finding meaningful benchmarks and understanding performance

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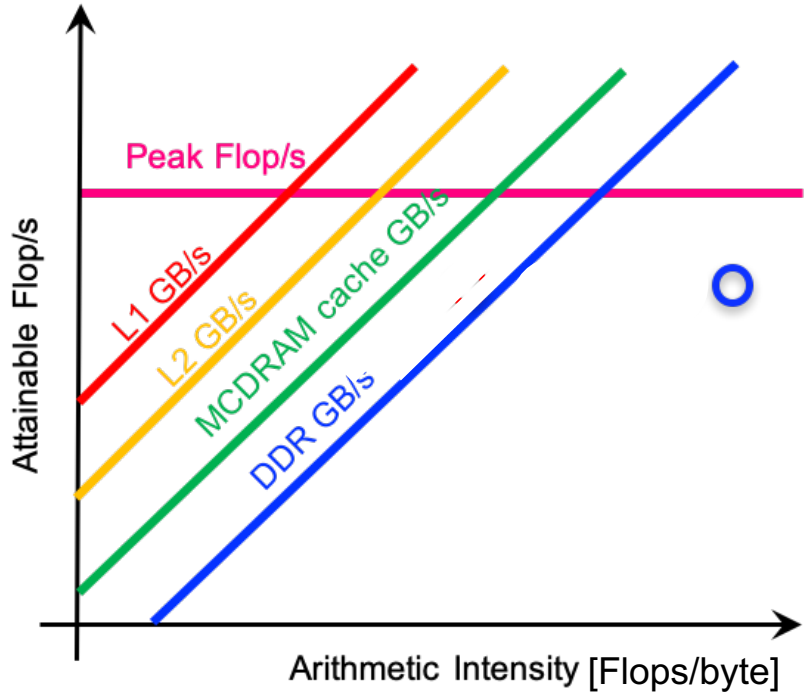

https://docs.nersc.gov/tools/performance/roofline/

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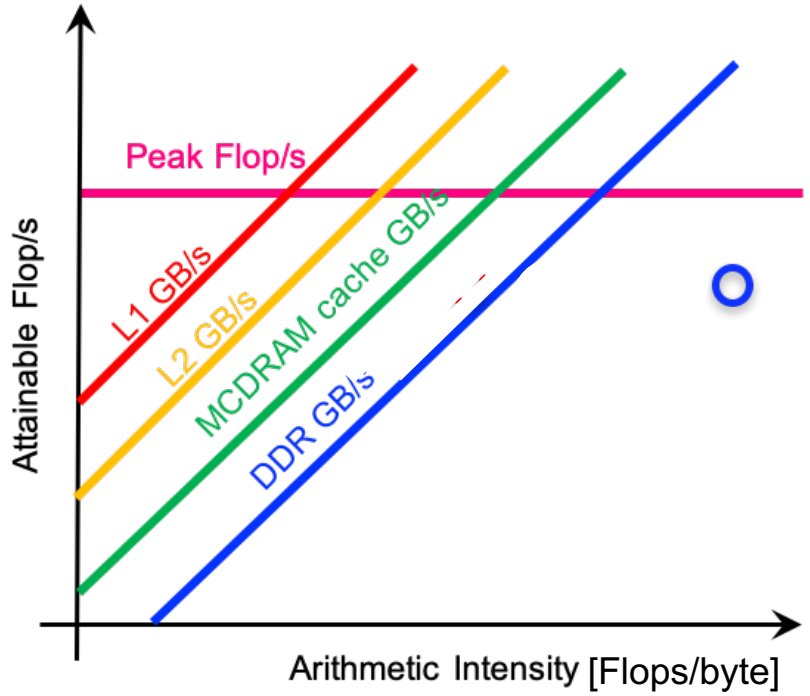
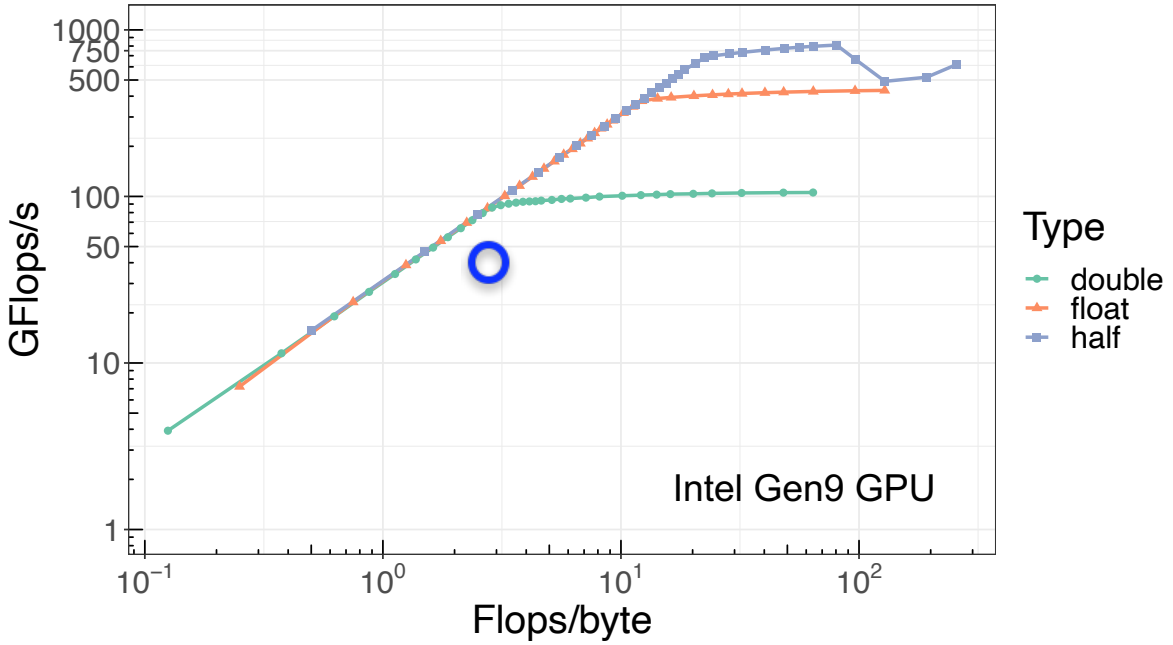
- The experimental Roofline helps evaluating whether the hardware delivers what it promises.





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Challenge II: Making performance results reproducible

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- Benchmark results are often presented without sufficient environment details.
- Hardware configuration, OS, driver version, software version, build options, and benchmark parameters all play an important role.
- Security updates can make a previous-achieved benchmark result irreproducible.
- We should make the reproducibility of benchmark results mandatory, e.g., submission of benchmark executable and all metadata a requirement.
- *Open questions: Licensing? Open data?*

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- We need to continuously benchmark relevant code on the target machines (Continuous Benchmarking).
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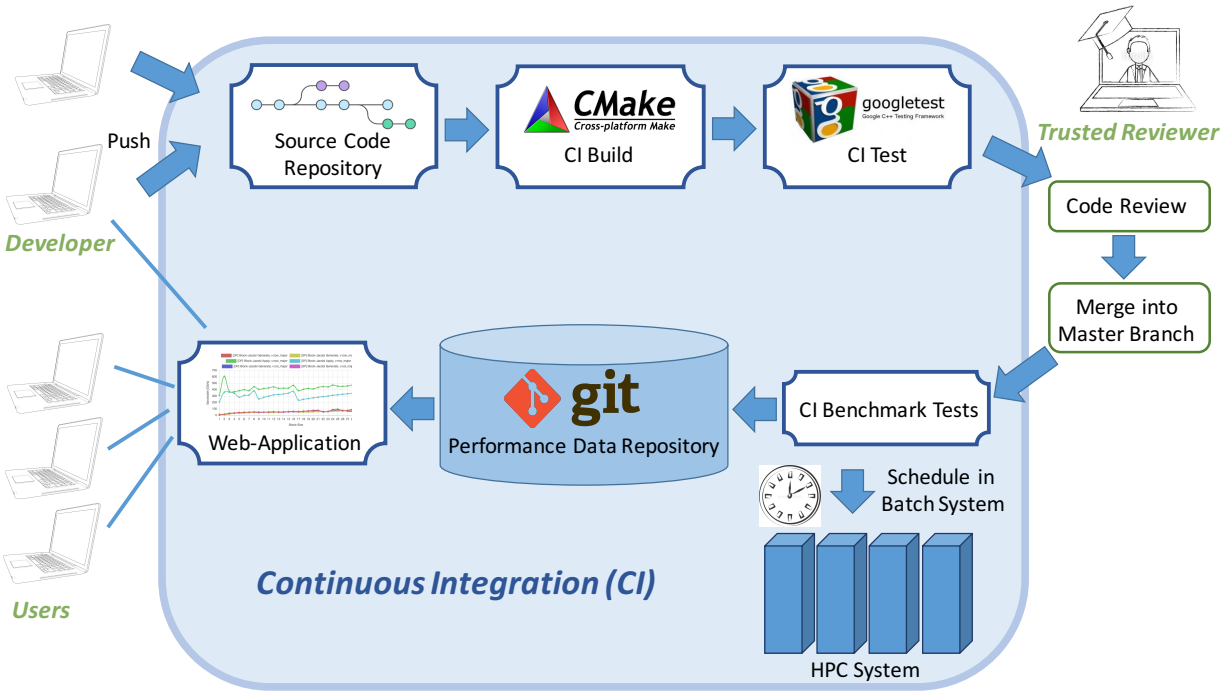
- Interactive visualization of public performance results over time allows users to identify performance peaks / corner cases.



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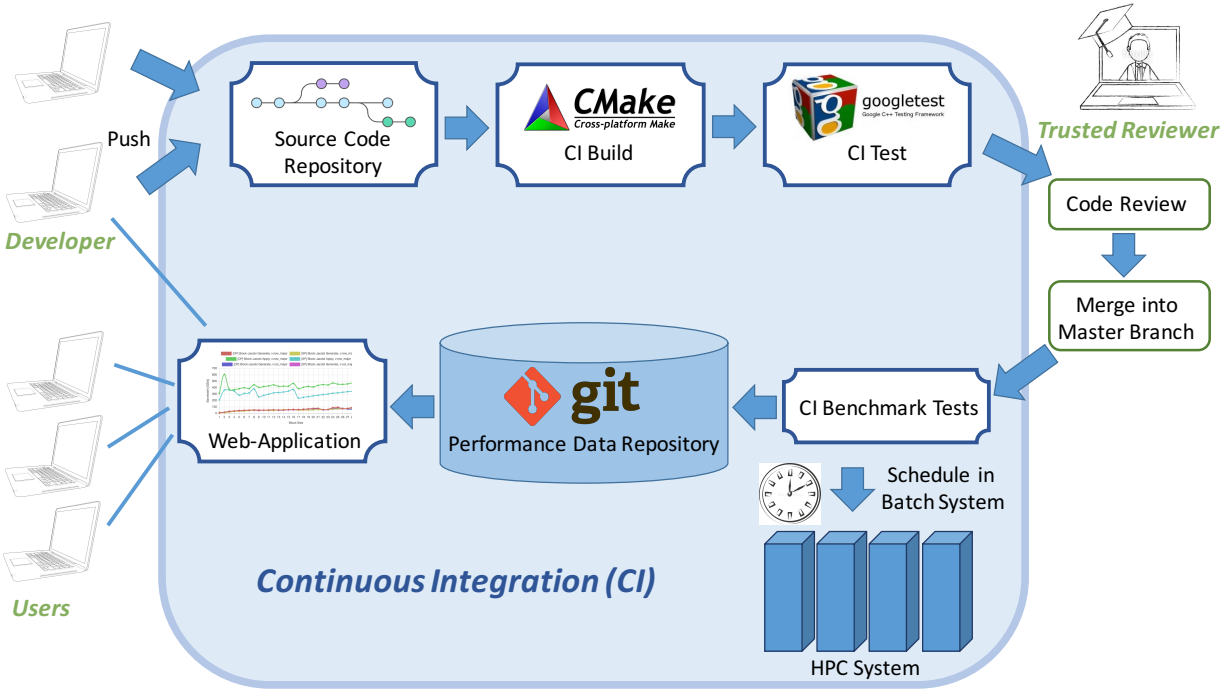

- *Continuous Benchmarking needs valuable compute cycles on leadership systems*
  - who pays for that?
- *This requires an automated framework to run jobs on HPC systems*
  - what about security, 2FA?