

Partitioned FFTC: An Improved Fast Fourier Transform for the IBM Cell Broadband Engine

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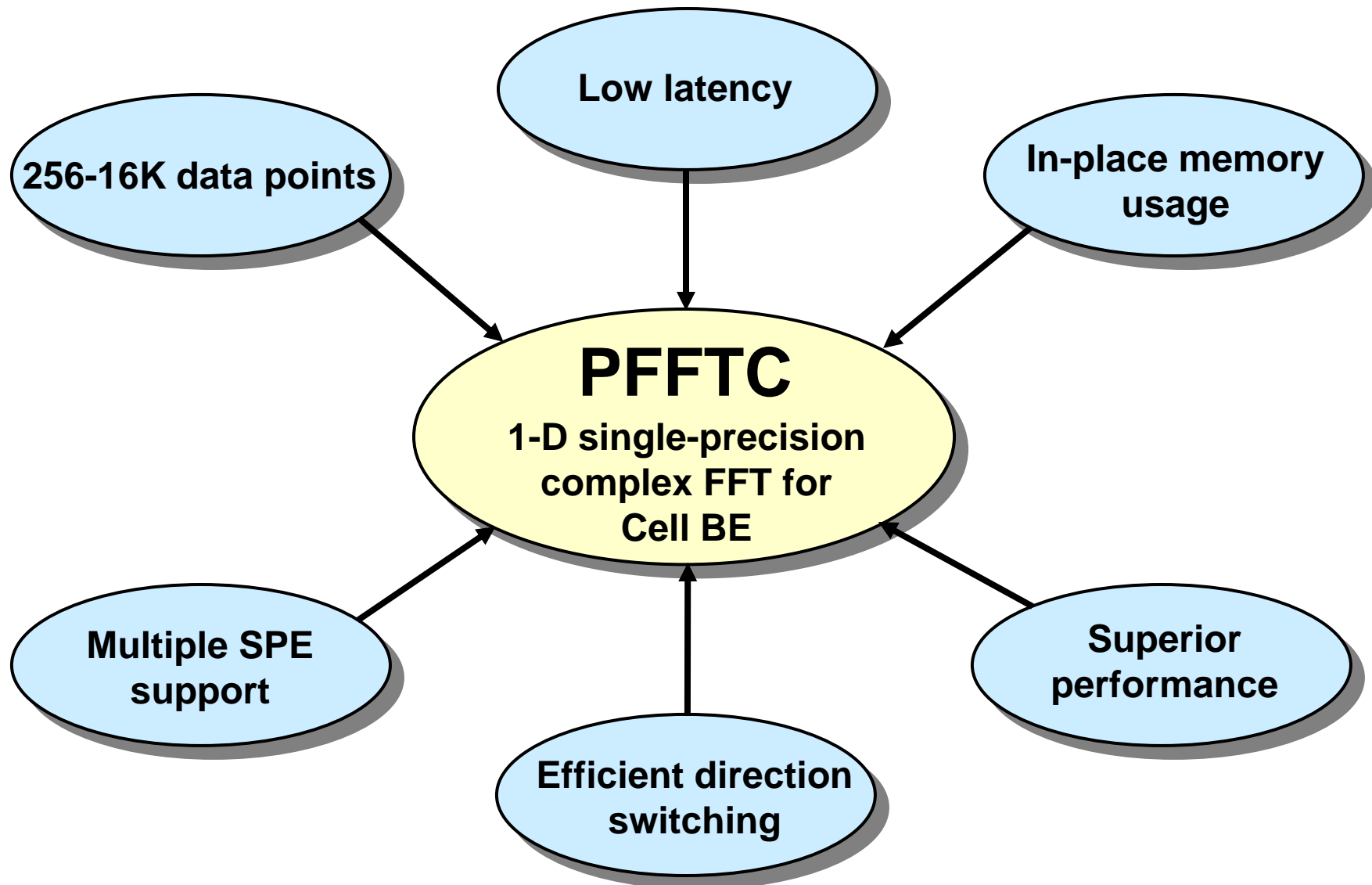
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Partitioned FFTC (PFFTC) Requirements



Algorithm Design:

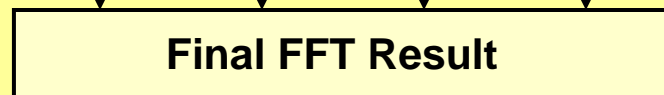
Partition



Solve



Combine

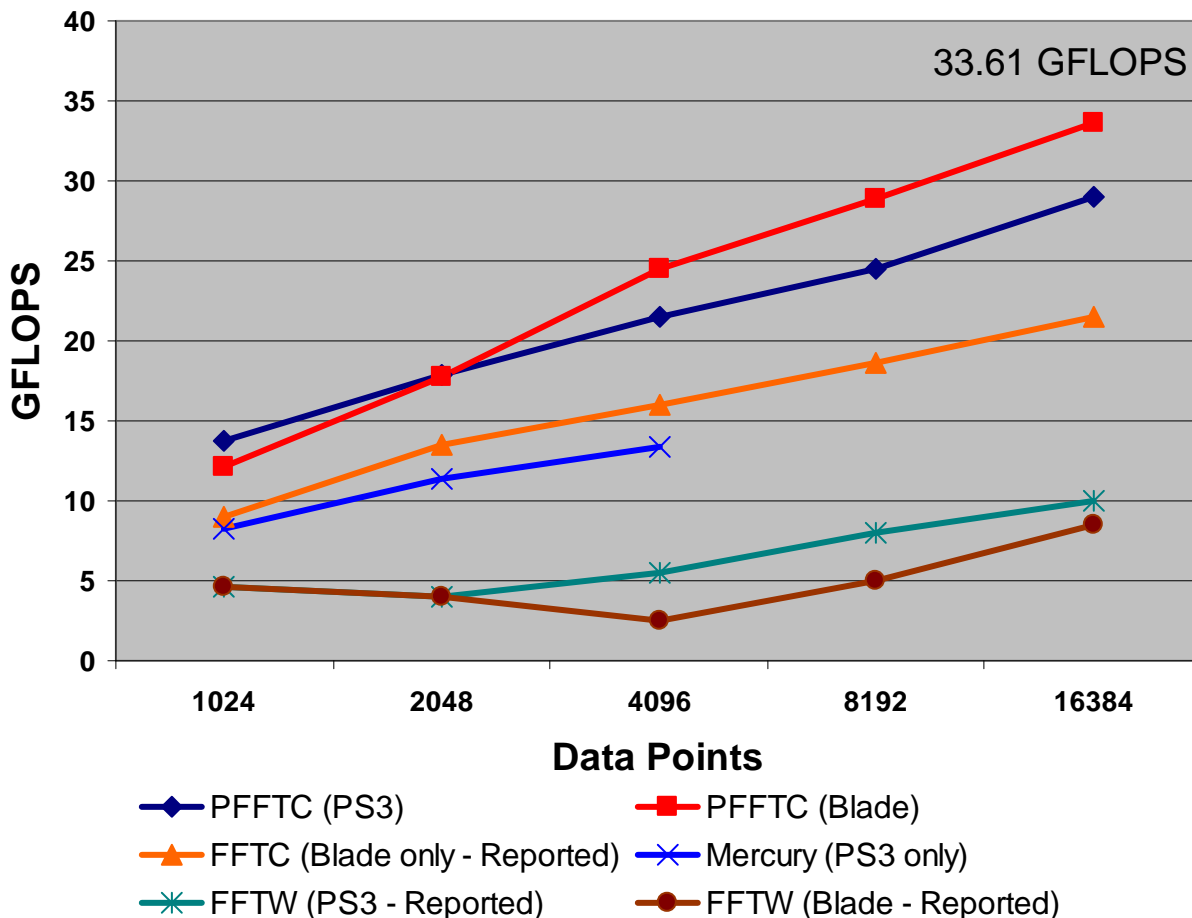


Supports 4, 8, or 16 partitions on 2-8 SPEs

Optimizations:

- Single-pass partitioning
- Register-level double buffering
- “Asynchronous” synchronization
- Communication-free combination stage

FFT GFLOPS vs. Problem Size



- PFFTC Features:**
- Lowest known latency on Cell BE
 - Peak performance of 33.61 GFLOPS for 16K problem size
 - Speedup of 31% - 56% over best prior Cell FFT
 - Further improvement to 40 GFLOPS possible by using Fused Multiply-Add (FMA)-based FFT in solution stage

* FFT GFLOPS based on $5N \log_2 N$ operations / runtime

See poster C.8 for more details