Arithmetical Complexity of a Software Correlator

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Complexity

- Per station processing
  1. FFT from time domain to frequency domain
     real-to-complex: $5 \log N_f$ flops/sample
  2. fractional bit shift
     complex multiplication 6 flops/sample
  3. FFT from frequency domain to time domain
     complex-to-real: $5 \log N_f$ flops/sample
  4. fringe stopping
     complex multiplication 6 flops/sample
  5. FFT from time domain to frequency domain
     real-to-complex $5 \log N_f$ flops/sample
- Per-baseline processing
  1. correlation
     complex multiplication 6 flops/frequency point
  2. integration
     addition/division 2 flops/frequency point

Some numbers

- Current JIVE correlator:
  16 stations, 8 bands, 4 polarizations, 32 spectral points
  at 1 Gb/s

  1.8 TFlops

- EVLA correlator:
  27 stations, 4 bands, 4 polarizations, 128 spectral points
  at 32 Gb/s

  244 TFlops

  So BlueGene/L at LLNL could do this!