

Complex Timing Experiment

- Common harness and interface across all experiments (e.g. Simple Timing).
- Uses fast 64 bit counter via rdhwr instruction.
- Measures micro-events, accurate to single digit cycles.
- Timer latency measured 2 ways, we use the minimum.
- Times vector of events, subtracts both timer and vector loop latencies.
- Creates vector of cycle times, then finds both minimum and normalized mean (bad or interrupted samples are rejected). If these are near we have high confidence of a successful experiment.
- Provides individual event cycle counts or graphing capability, across different floating point argument exponents.

Complex Timing: exp_sp (libscm expf)

- minimum timer latency of 82 cycles.
- Loop latency of 8 cycles
- Note these latencies are why we need a vector of operations sufficiently large to not be swamped by this noise. In this case we use length = 1024 to also fit in L1. We use a sample space of 1000 per point, mostly for brevity (the L1 interaction of the sampling algorithm is small and represents a secondary effect).
- Unbiased exponent < 6: exp_sp is 57 cyc/call, libm/expf is 259 cyc/call; speedup is 4.5 X.
- Unbiased exponent >= 6: exp_sp is 57 cyc/call, libm/expf is 784 cyc/call; speedup is 13.7 X.
- Pathological range reduction at the edge of the finite domain forces big slowdown. This is the negative side of the “peeling the onion” strategy employed by libm.

libscm Case Study: exp_sp/expf

