Tracing approaches

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Waveform tracing

- SystemC reference implementation
  - Simple and straight forward, ok for small designs
  - But: Bloated output, slow
- Using aliases and tracing only the primary signal
  - Improves on file size and a bit on speed
- Signal/ports notify tracer about changes
  - Improves on speed if signals change rarely
  - Abuses signal event mechanism, does not help with variables -> use a value wrapper like sc_variable (from SCC)
- Using alternative file format: Fast Signal Trace (FST)
  - Improves an file size dramatically (and on speed)

Results

	SystemC VCD	VCD dedup		VCD push		FST	
simulation time (s)	23,01	14,18	61,63 %	11,86	51,54 %	13,57	58,97 %
file size (Mbytes)	561,15	206,51	36,80 %	206,92	36,87 %	5,77	1,03 %
compressed file size (Mbytes)	164,33	36,20	22,03 %	38,36	23,34 %	5,77	

Transaction tracing

- No means to efficiently trace complex datastructures
- SCV provides some interface but it is ~~basically dead~~ in maintenance mode
  - The concept of streams, generators, transactions and attributes is pretty universal
  - Reference trace implemementation is bloated (text)
  - Tightly coupled to introspection apporach

Light weigt transaction recording (LWTR)

- Uses standardised binary representation (CBOR) with optional compression
- Optimized to efficient tracing
- Open-source with documented format
- Reader and writer in various languages available
- Bindings for tlm::tlm_generic_payload available

Results

	txlog	txftr		ctxftr	
simulation time (s)	163,82	121,16	73,96 %	125,00	76,31 %
file size (Mbytes)	496,89	60,06	12,09 %	8,02	1,61 %
SCV TX read time (s)	42,70	12,71	29,77 %	13,51	31,64 %
SCV TX overall (s)	49,93	18,89	37,83 %	20,35	40,76 %

Trace control

- Implement tracing is cumbersome as every module/signal needs to be explicitly traced -> therefore it is often skipped
- Generic tracing mechanism helpfull as part of sc_object

Improvement 1

- Using aliases and tracing only the primary signal
- Improves on file size for hierarchical designs
- Improves a bit on speed as not all signals/ports gets checked and recorded
- Implementation:
  SCC: vcd_pull_trace

Improvement 2

- Signal/ports notify tracer about changes
- Does not help with variables -> use a value wrapper like sc_variable (from SCC)
- Abuses signal event mechanism
- Improves on speed if signals change rarely
- Implementation:
  SCC: vcd_push_trace

Improvement 3

- Using alternative file format
- Choice: Fast Signal Trace (FST)
- Improves an file size dramatically and on speed
- Implementation:
  SCC: fst_trace