Index

A
Analog environment, 353
Analog filter, 369, 377
ANSI C ++, 1
Asynchronous counter, 90–93

B
Band-pass filter second-order delta sigma modulator, 427
Bessel filter, 369, 370
1 Bit input - 1 bit output inverter, 25–29
2 Bit input adder with 1 bit carry and 1 bit sum output, 34–39
32 Bit left/right barrel shifter, 65–72
4 1 Bit input NAND Gate, 29–34
4 Bit dual-purpose addition/subtraction module, 166, 167, 172, 182
4-Bit input 1-hot encoder, 59
Bit vector, 25, 40, 41, 43, 53, 54, 57, 72
Bitwise AND, 29, 34
Bitwise OR, 34
Booth multiplier, 131, 132, 136, 138
Built-in logic block observation, 326–352
Built-in self test signature analysis, 321–326
Butterworth filter, 369, 418

C
Carrier frequency, 388
CD-ROM reader, 437
Channel bandwidth, 387
Chebyshev filter, 370
Clock, 7–9
CMOS inverter, 421, 426
Combinational logic, 34, 59–65

D
8 Decoder, 72–78
#define, 13, 17, 21
D flip flop, 195–197, 312, 313, 322, 325
Data types, 7, 10–12
Debugging support, 8
Delta notification phase, 9, 10
Delta notification, 9, 10
Delta sigma modulator, 399, 409
Demultiplexer, 388, 390
Design space, 1
Discrete event clock driven demultiplexer, 449

E
Elaboration, 8, 9
Electrical linear networks (ELN), 353
#endif, 15, 18, 22
Evaluation phase, 10, 12
Event-driven simulation, 8, 9
Executable specification, 1
Explicit events, 185
Export, 8, 9

F
Fast Fourier Transform (FFT), 399
Feedback loop delay, 362
Fifth order delta-sigma modulator, 400
Fifth order low-pass filter, 369–370
Fifth order low-pass unity gain Butterworths' filter, 411, 418
Filter transfer function, 369–371, 375, 376
Finite state machine, 79, 93–97
Forward error correction, 98–125
Frequency response, 378

G
Gnuplot, 378

I
IEEE 754-2008 32 bit floating point addition, 146–161
IEEE 754-2008 32 bit floating point converter, 139–146
IEEE 754-2008 32 bit floating point multiplication, 161–166
IEEE 754-2008 protocol, 139–146, 162, 163
IEEE 802.3ba protocol, 98–127
#ifndef, 13, 17, 21
Immediate notification, 9
Implicit events, 79–183
Information loss, 399
Initialization, 9, 10
initialize(), 364
Input/output port, 364
Instruction level scoreboard, 201–234
Instrumentation amplifier, 439, 447
Integrator, 380

J
Jk master slave flip flop, 79–85

K
5.0 KHz mid-band frequency band-pass filter, 421
5.0 KHz mid-frequency band-pass filter, 418

L
LD_LIBRARY_PATH, 3, 5
Level sensitive scan clock generator, 309–312

M
Memory property, 79
Mixed signal system, 353
Modulator signal, 289, 388
Module, 7–10, 12
Moving average filter, 309
Multiple abstraction levels, 7
8 × 1 Multiplexer, 43–58

N
Noise shaping, 400
Noise spectrum, 400, 408
Non-linear circuit element, 365
Non-return-to-zero converter (NRZ), 388
Notification, 9, 10
Notify, 8–10, 185–190
Nyquist, 399, 408

O
Ohms per square, 439
Open systemC initiative (OSCI), 3
Output distortion, 399
Overridden method, 364

P
Parity generator, 98–127
Phase lagged, 388
Phase response, 378
Port, 7–10
Position-sensitive detector, 437, 439
post(), 20
Primitive channels, 13, 79–182
Primitive ELN module, 365
Process, 7–9, 11, 12, 17, 20
processin(), 364
Producer, 13–15
Pseudo-random number generator, 195–201
Pulse counter, 127–131

Q
Quadrature phase shift keying (QPSK), 387
Index 459

R
Random quantization noise, 399
Rate of data flow, 362
Reactive behavior, 1
Reference voltage, 380, 386
Ripple counter. See asynchronous counter, 90
Rotary encoder, 127–131
Runnable process, 9

S
Sallen-Key filter, 369–372, 374
sc_core::sc_clock, 13
sc_core::sc_in<T>, 13, 17, 21
sc_core::sc_out<T>, 14
sc_core::sc_start, 377
sc_core::sc_stop, 19, 23
sc_core::sc_trace_file, 28, 31, 68, 75
sc_create_vcd_trace_file, 46, 57, 62, 64, 68, 70, 75, 77
SC_CTHREAD, 8
SC_CTOR, 14, 15, 18, 22
sc_dt::sc_bit, 10
sc_dt::sc_bit<n>, 11
sc_dt::sc_int, 11
sc_dt::sc_logic, 11
sc_dt::sc_logic<n>, 11
sc_dt::sc_uint, 11
SC_METHOD, 8
SC_MODULE, 13, 14, 17, 21
sc_module, 13, 17
sc_port, 7, 9, 12
sc_prim_channel, 9, 10, 12
sc_semaphore, 13, 20
sc_signal, 12
sc_spawn, 8, 9
sc_string, 10
SC_THREAD, 8
sc_trace, 27, 31, 37, 46, 47, 63
sca_ac_analysis::sca_ac_delay, 367, 368
sca_ac_analysis::sca_ac_z, 368
SCA_CTOR, 364, 377
sca_eln::sca_ac_node, 411
sca_eln::sca_ac_node_ref, 419, 422
sca_eln::sca_ac_nullor, 386
sca_eln::sca_r, 422
sca_eln::sca_tdf::sca_rswitch, 365
sca_eln::sca_tdf::sca_vsink, 418, 422
sca_eln::sca_tdf::sca_vsource, 418, 422
sca_lsf::sca_de::sca_sink, 451
sca_lsf::sca_de::sca_source, 457
sca_lsf::sca_gain, 402
sca_lsf::sca_integ, 408
sca_lsf::sca_sub, 400
sca_lsf::sca_tdf::sca_sink, 408
sca_lsf::sca_tdf::sca_source, 408
sca_tdf::sca_in, 377
sca_tdf::sca_ltf_rd, 376
sca_tdf::sca_out, 377
sca_tdf::sca_signal<T>, 377
SCA_TDF_MODULE, 377, 384
sca_util::sca_complex& sca_ac_analysis::sca_ac, 367
sca_util::sca_complex, 367
Scheduler, 8–10
Scoreboard register, 202, 203, 205, 221, 234, 235, 236
SELinux, 3, 5, 359, 360
Sensitivity list, 8
Sequential logic, 65
Serial-in parallel-out shift register, 86–90
Set_attributes(), 364
Setenforce, 359
Sheet resistance, 439
Signal, 7, 8, 10, 12
Signal channel, 361, 362
Simulation, 1
Single-slope ADC, 380, 387
Small signal analysis, 367
std::cout, 28, 31, 32, 49–51, 53, 55, 56, 68, 70, 75, 77
std::endl, 48–53, 56, 57, 69, 70, 75–77
System description language (SDL), 1
SystemC 2.2.0, 3–5
SystemC 2.3.0, 4, 5, 357, 359, 360
SystemC-AMS 1.0, 357, 359, 360

T
T2 256 × 132 asynchronous memory array, 234, 254, 262
T2 64 × 45 content addressable memory array, 234, 263, 272
T2 flip flop bank, 278–281
TDF module, 361–365
Test harness, 1
Thermometer code generator, 59, 62
Time derivative, 367
Time integration, 367
Time step, 361, 364–366
Timed data flow (TDF), 353
Timed notification, 9, 10
Timeout, 8–10
Tracing, 8
Transaction level modelling (TLM), 1, 2
Triangle wave carrier DC modulator pulse width modulation, 234–278
Truth table, 34, 38, 72
trylock(), 17
trywait(), 20

U
unlock(), 17
Update phase, 10
Update request, 9, 10

V
Validation, 1
VCD trace, 25, 29, 33, 38, 39, 43, 57, 59, 64, 65, 70–72, 77

W
wait(), 20
Wait, 8–10, 185, 186
Wakeup multiplexer, 201–203, 205
Weighted LSF addition, 364
Weighted LSF multiplication, 365
Weighted LSF subtraction, 364
while(), 40, 44, 54, 60, 66, 73
Wide dynamic range, 400