

Table of Contents

The Authors	xi
Dedications	xiii
Preface	xv
Introduction	xix
Contributing Authors in Order of Appearance	xxi
PART I ANALYZING AND DRIVING VERIFICATION: AN EXECUTIVE'S GUIDE	1
Chapter 1 The Verification Crisis	3
Chapter 2 Automated Metric-Driven Processes	13
Introduction	13
The Process Model	15
The Automated Metric-Driven Process Model	16
Project Management Using Metric-Driven Data	28
What Are Metrics For?	29
Tactical and Strategic Metrics	29
Summary	30
Chapter 3 Roles in a Verification Project	31
Introduction	31
The Executive	31
Marketing	33
Design Manager	34
Verification Manager	34
Verification Architect/Methodologist	35
Design/System Architect	36
Verification Engineer	37
Design Engineer	38
Regressions Coordinator	39
Debug Coordinator	39
Summary	40
Chapter 4 Overview of a Verification Project	41
Introduction	41
Summary	49

Chapter 5 Verification Technologies	51
Introduction	51
Metric-Driven Process Automation Tools	52
Modeling and Architectural Exploration	58
Assertion-Based Verification	63
Simulation-Based Verification	70
Mixed-Signal Verification	73
Acceleration/Emulation-Based Verification	75
Summary	78
PART II MANAGING THE VERIFICATION PROCESS	79
Chapter 6 Verification Planning	81
Introduction	81
Chapter Overview	83
Verification Planning	86
Summary	105
Chapter 7 Capturing Metrics	107
Introduction	107
The Universal Metrics Methodology	109
Chapter 8 Regression Management	113
Introduction	113
Early Regression Management Tasks	114
Regression Management	114
Linking the Regression and Revision Management Systems	115
Bring-Up Regressions	116
Integration Regressions	119
Design Quality Regressions	121
Managing Regression Resources and Engineering Effectiveness	122
Regression-Centric Metrics	123
How Many Metrics Are Too Many?	125
Summary	127
Chapter 9 Revision Control and Change Integration	129
Introduction	129
The Benefits of Revision Control	131
Metric-Driven Revision Control	132
Summary	139
Chapter 10 Debug	141
Introduction	141

Debug Metrics	144
Summary	153

PART III EXECUTING THE VERIFICATION PROCESS 155

Chapter 11 Coverage Metrics	157
Introduction	157
Chapter 12 Modeling and Architectural Verification	163
Introduction	163
How to Plan	164
Tracking to Closure	165
Reusing Architectural Verification Environments	165
Summary	166
Chapter 13 Assertion-Based Verification	167
Introduction	167
How to Plan	170
Tracking to Closure	175
Opportunities for Reuse	177
Summary	179
Chapter 14 Dynamic Simulation-Based Verification	181
Introduction	181
How to Plan	183
Taxonomy of Simulation-Based Verification	187
Tracking to Closure	191
Summary	196
Chapter 15 System Verification	197
Introduction	197
Coverification Defined	199
Advancing SoC Verification	201
List of Challenges	202
ARM926 PrimeXsys Platform Design	205
Closing the Gap	207
DMA Diagnostic Program	208
Connecting the DMA Diagnostic to the Verification Environment	212
Connecting the Main() Function in C	215
Writing Stubs	216
Creating Sequences and Coverage	217
Conclusion	219
References	220

Chapter 16 Mixed Analog and Digital Verification	221
Abstract	222
Introduction	222
Traditional Mixed-Signal Verification	223
Verification Planning	225
Analog Mixed-Signal Verification Kit	229
Conclusion	233
Reference	234
Chapter 17 Design for Test	235
Introduction	236
Motivation	238
A Unified DFT Verification Methodology	239
Planning	240
Executing	241
Automating	243
Test Case	245
Benefits	248
Future Work	249
Conclusions	249
References	250
PART IV CASE STUDIES AND COMMENTARIES	253
Metric-Driven Design Verification: Why Is My Customer a Better Verification Engineer Than Me?	255
Abstract	255
Introduction	256
Section 1: The Elusive Intended Functionality	257
Section 2: The Ever-Shrinking Schedule	265
Section 3: Writing a Metric-Driven Verification Plan	270
Section 4: Implementing the Metric-Driven Verification Plan	274
Conclusion	277
Metric-Driven Methodology Speeds the Verification of a Complex Network Processor	279
The Task Looked to be Complex	280
Discovering Project Predictability	281
A Coverage-Driven Approach, a Metric-Driven Environment	282
A New Level of Confidence	283
Developing a Coverage-Driven SoC Methodology	285
Introduction	285
Verification Background	286
Current Verification Methodology	289

Coverage and Checking	292
Results and Futures	293
From Panic-Driven to Plan-Driven Verification Managing the Transition	297
Verification of a Next-Generation Single-Chip Analog TV and Digital TV ASIC	303
Abstract	303
Introduction	304
The Design	305
Verification Challenges	306
Addition of New Internal Buses	307
Module-Level Verification	309
Data Paths and Integration Verification	309
Management of Verification Process and Data	309
Key Enablers of the Solution	310
Results	320
Conclusions	322
Future Work	322
Management IP: New Frontier Providing Value Enterprise-Wide	325
Adelante VD3204x Core, SubSystem, and SoC Verification	329
Abstract	330
Introduction	330
Project Background	331
Verification Decisions	333
DSP Core Verification	335
DSP Subsystem Verification	338
SoC-Level Verification	341
Results and Future Work	342
SystemC-based Virtual SoC: An Integrated System-Level and Block-Level Verification Approach from Simulation to Coemulation	345
Abstract	346
Introduction: Verification and Validation Challenges	347
Virtual SoC TLM Platform	348
Functional Verification: Cosimulation TLM and RTL	350
Validation: Coemulation TLM-Palladium	352
Conclusion and Future Developments	353
Is Your System-Level Project Benefiting from Collaboration or Headed to Chaos?	355
Index	359