

Contents

1	Introduction	1
1.1	Software Testing	1
1.1.1	Regression Testing	2
1.1.2	Unit Testing	4
1.1.3	Distributed Testing	5
1.2	Cloud Computing	5
1.2.1	Cloud Services	7
1.2.2	Cloud Providers	8
1.2.3	Cloud Types	10
1.3	System Migration	11
1.3.1	Legacy Systems	11
1.3.2	Migration Techniques	12
1.3.3	SMART	13
1.4	The Problem of Lengthy Test Execution Times	15
1.5	Software Testing in the Cloud	16
2	SMART-T: Migrating Testing to the Cloud	19
2.1	SMART-T	19
2.2	Why Migrate Testing to the Cloud	21
2.2.1	Making Testing Faster	22
2.2.2	Making Testing Cheaper	23
2.2.3	Making Testing Better	24
2.3	When to Migrate Testing to the Cloud	26
2.3.1	Characteristics of the Application	27
2.3.2	Types of Testing	28
2.3.3	Cloud-Based Test Execution Environment	30
2.4	How to Migrate Testing to the Cloud	31
2.4.1	Trial Migration	32
2.4.2	Actual Migration	33
2.5	Summary	34

3	HadoopUnit: Test Execution in the Cloud	37
3.1	Hadoop	37
3.1.1	Hadoop Distributed File System	39
3.1.2	MapReduce	40
3.1.3	How Hadoop Works	43
3.2	Design of HadoopUnit	45
3.2.1	Test Case Extraction	46
3.2.2	The Map Function	46
3.2.3	The Reduce Function	47
3.3	Implementation of HadoopUnit	47
3.4	Using HadoopUnit	49
3.4.1	Install HadoopUnit on Master	49
3.4.2	Configure HadoopUnit for Test Execution	50
3.4.3	Execute Test Cases Using HadoopUnit	51
3.5	Summary	52
4	Case Studies	55
4.1	JUnit	56
4.1.1	Generated Test Cases	56
4.1.2	Hadoop	59
4.1.3	Spring	63
4.2	GCC	64
4.2.1	Business Drivers	64
4.2.2	Technical Factors	65
4.2.3	Trial Migration	65
4.2.4	Actual Migration	68
4.2.5	Results	68
4.3	XYZ	70
4.3.1	Business Drivers	70
4.3.2	Technical Factors	70
4.3.3	Discussion	73
4.4	Threats to Validity	74
4.4.1	The Application Under Test	74
4.4.2	The Type of Tests Executed	76
4.4.3	Changes Made During Migration	77
4.5	Summary	78
5	Conclusions	79
5.1	Summary of Results	79
5.1.1	Migrating to the Cloud	80
5.1.2	Test Execution in the Cloud	80
5.2	Lessons Learned	82
5.2.1	Migrating Testing to the Cloud	82
5.2.2	Test Execution in the Cloud	83
5.3	Closing Remarks	85

Appendix: SMART-T Questionnaire

87

References

95

About the Authors.

103