Contents

1 Introduction 1
- 1.1 Preliminaries . . . 6
  - 1.1.1 Magnetic Disk Drives . . . 6
  - 1.1.2 The Storage Network Model . . . 7
- 1.2 Tools . . . 11

2 Previous Results 13
- 2.1 Space Balance . . . 14
- 2.2 Availability . . . 16
- 2.3 Heterogeneity . . . 19
- 2.4 Adaptivity . . . 24
- 2.5 Complexity Issues . . . 27

3 Adaptive Data Distribution Strategies 31
- 3.1 Strategies for Homogeneous Networks . . . 32
  - 3.1.1 Nearest Neighbour Strategy . . . 32
  - 3.1.2 Cut-and-Paste Strategy . . . 35
- 3.2 Strategies for Heterogeneous Networks . . . 43
  - 3.2.1 The Level Strategy . . . 43
  - 3.2.2 The Share Strategy . . . 59
  - 3.2.3 The Sieve Strategy . . . 70

4 Application Storage Virtualisation 79
- 4.1 Storage Virtualisation . . . 80
- 4.2 Virtualisation with Share . . . 81
- 4.3 Device Driver under Linux . . . 85
  - 4.3.1 The Linux File System . . . 86
  - 4.3.2 Access to Block Devices . . . 87

4.4 Replacement 89

5 Performance Results **91**
5.1 The Test System 92
5.2 Artificial Workloads 93
5.2.1 Homogeneous Setting 95
5.2.2 Heterogeneous Setting 105
5.2.3 Space Consumption 110
5.3 Overhead Measurements 112
5.3.1 Space Consumption 119

6 Conclusions **121**

7 Acknowledgments **123**