CONTENTS

1. Introduction 1

1.1 Motivation 2

1.2 Problem Definition 3

2. An Overview of the Memory Management in Linux 4

2.1 Virtual Memory 4

2.1.1 Virtual Memory in Linux 5

2.1.2 Page Cache 6

2.1.3 Swap Cache 6

2.2 Memory Mapping 7

2.3 Paging 8

2.4 Demand Paging 9

2.5 Swap-out and discard page 10

3. Background Study 11

3.1 Adaptive approach 11

3.2 Static approach 19

3.3 Existing Compression Techniques 20

4. Proposed Approach 22

4.1 Proposed Model Overview 23

4.2 Proposed Design 24

4.2.1 Compressed Storage Model 24

4.2.2 Page Compression 26

4.2.3 Page Decompression 27

5. Implementation 28
5.1 Linux Internals 28
5.1.1 Page-out Daemon 29
5.1.2 Refill Inactive List 29
5.1.3 Shrink Cache 29
5.1.4 Shrink page list 29
5.2 Linux Memory Module Modifications 30
5.2.1 Flow of the Framework 30
5.2.2 Data structures 31
5.2.2.1 Flags 32
5.2.2.2 Methods 33
5.2.3 Kernel Modifications 34
6. Testing 37
7. Conclusion 39
7.1 Conclusion 39
7.2 Future Work 39
References 40
Appendix A 42
Appendix B 43