

REPUBLIQUE ALGERIENNE DEMOCRATIQUE ET POPULAIRE

Ministère de l'Enseignement Supérieur et de la Recherche Scientifique

UNIVERSITE DE CONSTANTINE

Vice Rectorat Chargé de La Post-Graduation
Institut d'Informatique

Thèse de Magister en Informatique
Option : Systèmes Informatiques

Présenté Par: **Mr BALI Mahboub Abdelmadjid**

Thème:

Studies in Disk Storage Strategies

**The Effect of Disc Scheduling Policies, Disc file Storage Distributions
and Prefetching on the Average Seek Time.**

Soutenue le : Samedi 30 Septembre 1995

devant le Jury composé de:

Président: Professeur Bettaz Mohamed (Université de Constantine)

Rapporteurs: Professeur D.C. Gilles (Université de Glasgow)
Dr Bellatar Brahim (Université de Batna)

Membres: Professeur Boulemdene Mohamed (Université de Batna)
Dr Khouadi Mohamed Kheireddine (Université de Constantine)
Dr Henni Abderrazak (Centre Universitaire de Biskra)

Contents

INTRODUCTION.	1
CHAPTER I. THE DISC SYSTEM.	
1. Physical Description.	6
2. Component of a Disc Access.	6
3. The Necessity of Disc Scheduling.	7
4. Disc Scheduling Policies :	10
4.1. First Come First Served.	10
4.2. Shortest Seek Time First.	11
4.3. Scan.	11
4.4. N-Step Scan.	13
4.5. Circular Scan.	14
5. Conclusion	15
CHAPTER II. THE THEORETICAL MODEL.	
1. A Study on Disc Track Distribution.	17
2. Evaluation of Disc Arm Movement.	
2.1. General Case: Continuous Function.	17
2.2. Special Case: Piece wise Function.	19
3. Disc Track Distribution.	22
3.1. Uniform Case.	23
3.2. Maximum at One End.	24
3.3. Maximum at the Middle.	28
3.4. Maximum at Both Ends.	32
4. Expected Results.	36
4.1. Queueing Theory.	36
4.2. Estimation of the Average Seek Time.	38
5. Conclusion.	41
CHAPTER III. SIMULATION OF THE DISC SYSTEM.	
1. An Introduction to Simulation.	43
1.1. Kind of Simulation:	44
1.1.1. Simulation by Trace.	44
1.1.2. Discrete Event Simulation.	44
1.1.3. Continuous Simulation.	44
1.2. Discrete Event Simulation.	45
1.2.1. Definitions.	45
1.2.2. Classification of Events.	45
1.2.3. Programming in Event Simulation	46

1.3.Statistical Analysis of the Simulation results.	49
1.3.1.How to estimate the result accuracy.	49
1.3.2.Calculation of the variance of sample mean	51
1.4.Conclusion.	53
2.Simulation of the Disc System.	54
2.1.The Simulation Model.	54
2.2.System Entities.	57
2.3.Disc Events.	58
2.4.Request Timing.	59
2.5.Outline of the Simulation program.	60
2.6.Typical Outputs.	61
2.7.Conclusion.	66

CHAPTER IV.BUFFERING.

1.Introduction	69
1.1.File Organization.	69
1.2.Aspect of Buffering and Sequentiality.	70
2.Buffering Techniques:	73
2.1.Simple Buffering.	73
2.2.Exchange Buffering.	73
2.3.Dynamic Buffering.	74
2.4.Circular Buffering.	75
2.5.The Buffer Pool.	75
2.5.1.Presentation.	75
2.5.2.Constructing a buffer pool.	78
2.6.Problem of Management.	79
2.7.Conclusion.	80
3.The Buffering Model.	81
3.1.Introduction.	81
3.2.The Simulation Model.	84
3.3.Outline of the Simulation Program.	86
3.4.Typical Outputs.	89
3.5.Conclusion.	93

CHAPTER V.IMPLEMENTATION OF THE SIMULATION PROGRAM.

1.Introduction	95
2.Data Structures.	98
2.1.data structures used by the simulation program.	98
2.2.data structures used by the disc scheduling policies.	102
3.Sample Values.	107
4.Statistics Parameters of the Simulation.	115
5.Coding,Output and Run.	118
 CONCLUSION.	 120
 BIBLIOGRAPHY.	 124
 ANNEXE.	 130