

EAC

DE LA SALLE UNIVERSITY

**PARTIAL MATCH RETRIEVAL WITH FIELD REPLICATION
USING GRAY CODE
715510**

A Thesis

Presented to the
Faculty of the Graduate Program
of the College of Computer Studies
De La Salle University

In Partial Fulfillment
of the Requirements for the Degree of
Master of Science in Computer Science

by
Yohanes Pintoko
October 1991

Prof. Marilou C. Jopillo
Adviser



DE LA SALLE UNIVERSITY

ABSTRACT

In this present research, a study on using gray code to improve the performance of Partial Match Retrieval with Field Replication, PMRFR, a query processing technique in object-oriented databases system (OO-DBS) is explored. PMRFR as a retrieval technique is a combination of Field Replication (FR) and Partial Match Retrieval (PMR). FR allows individual instances variables to be selectively replicated throughout classes of a nested object and PMR is a multiattribute hashing technique to retrieve data efficiently, specifying one or more fields of the objects.

The study is focused on enhancing the performance of PMRFR using gray code. A mathematical model was used to compare the performance of binary code and gray code.

The study shows that gray code achieves better clustering of the directories, therefore, reduce access time needed to retrieve objects from database.



DE LA SALLE UNIVERSITY

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENT	i
ABSTRACT	ii
TABLE OF CONTENTS	iii
LIST OF FIGURES	v
CHAPTER 1. INTRODUCTION	1
1.1. Background of the Study : Object-oriented Database	1
1.2. Statement of the Problem	11
1.3. Objectives of the Study	11
1.3.1. General Objective	11
1.3.2. Specific Objectives	11
1.4. Significance of the Study	12
1.5. Scope and Limitation of the Study	12
1.6. Methodology of the Study	13
CHAPTER 2. REVIEW OF RELATED LITERATURES	15
CHAPTER 3. CONCEPTUAL FRAMEWORK	20
3.1. Field Replication in Object-oriented Databases	20
3.1.1. In-Place Replication	22
3.1.2. Separate Replication	24



DE LA SALLE UNIVERSITY

3.2.	Partial Match Retrieval	25
3.3.	Partial Match Retrieval with Field Replication (PMRFR).	31
CHAPTER 4. DESIGN ISSUES		36
4.1.	Gray Code and Cluster	36
4.2.	Calculation of the Exact Number of Cluster for a Query under Binary Code	41
4.3.	Calculation of the Exact Number of Clusters for A Query under Gray Code	47
4.4.	Average Number of Clusters for the Binary Codes	51
4.5.	Average Number of Clusters for Gray Code	52
CHAPTER 5. COMPARISON OF PERFORMANCE OF GRAY CODE AND BINARY CODE		57
CHAPTER 6. CONCLUSION AND RECOMMENDATION		63
APPENDIX A	GLOSSARY OF TERMS	66
APPENDIX B	LIST OF SYMBOLS DEFINITION	69
REFERENCES		72



DE LA SALLE UNIVERSITY

LIST OF FIGURES

	Page
Fig. 1. Object-Oriented Database System	5
Fig. 2. Vehicle Database	6
Fig. 3. Object-Instances and OID references	8
Fig. 4. Reference to other objects through Nested Attributes	10
Fig. 5. Field Replication in Employee Object	21
Fig. 6. In-Place Replication, Forward and Inverted Path	23
Fig. 7. Separated Replication, Forward and Inverted Path	23
Fig. 8. Distribution of the Objects before Insertion	28
Fig. 9. Redistribution of the objects after Insertion	28
Fig. 10. PMR for employee object	30
Fig. 11. Partial Match Retrieval with In-Place Replication	33
Fig. 12. Partial Match Retrieval with Separate Replication	33
Fig. 13. Inverted Path in PMRFR	34
(a) In-Place Replication	
(b) Separated Replication	
Fig. 14. Examples of Gray Code and Binary Code	36
Fig. 15. Illustrations of the improved Clustering of Gray Codes	40



DE LA SALLE UNIVERSITY

Fig. 16. Illustration of the improved access of Gray Codes	41
Fig. 17a. Partial Match Retrieval with Field Replication using Binary Codes	42
Fig. 17b. Partial Match Retrieval with Field Replication using Gray Codes	43

