Subject Description

The subject addresses the problems related to performance of relational database systems. In its introductory part, the subject presents an internal architecture of relational database servers and typically available performance measurement and performance tuning software tools. Two groups of solutions are investigated: structural and operational. The structural solutions presented in the subject include denormalization of relational tables, indexing, clustering, partitioning, and creation of materialized views. The operational solutions presented in the subject include application of specialized SQL to performance tuning, optimization of SQL and PL/SQL, application of cost-based optimizations, and performance tuning through modification of parameters of relational database server.

Subject Learning Outcomes

On successful completion of this subject, students will be able to:
1. Combine performance measurement and performance tuning software tools to identify and to solve the performance problems in relational database systems.
2. Create denormalized relational tables, indexes, clusters, partitioned relational tables, and materialized views to improve performance of database systems.
3. Create advanced SQL statements to improve the performance of database systems.
4. Compare and create different implementations of SQL statements to improve the performance of database systems.
5. Summarise an internal architecture of relational database server and the roles of its components.
6. Estimate an impact on the appropriate configuration of system initialization parameters on the performance of relational database systems.
7. Summarise the principles of benchmarking in relational database management systems.

Lecture Schedule

Week	Topic	Reading
1	Introduction - typical database performance problems,	[2].1

	Architecture of relational database server	[5].2, [8], [10]
	Internal relational database structures	[5].2, [8], [10]
2	SQL implementation techniques, relational algebra,	[1].4.2,
	Performance measurement tools	[2].7, [3].11, [5].3, [6], [9], [11]
	Denormalization	[2].4, [3].15, [5].4
	Decomposition, derived information	[3].15, [5].4
3	Principles of performance tuning	[2].1
	Denormalization	[2].4, [3].15, [5].4
	Decomposition, derived information	[3].15, [5].4
4	Indexing	[2].3, [3].4, [5].5,9, [7], [8].11
5	Clustering	[3].1, [5].5
	Materializations	[3].5
	Partitioning	[8].13
6	Storage management and defragmentation,	[5].21, [8].10

	Performance tuning with advanced SQL	Oracle SQL Reference Manual
7	Implementation of relational operations Query processing, Optimization of query processing	[1].12 [1].14, [1].15, [5].7, [9]
8	SQL Tuning	[2].4, [5].8,9,10,11,14, [9].10-13
9	SQL Tuning (cont.) PL/SQL Tuning Tuning application interfaces	[5].8,9,10,11,14, [6], [9].10-13 [5].12 [2].5
10	Tuning relational database server	[5].17,18,19,20, [8].4,5, [4].7
11	Tunig relational database server	[5].17,18,19,20, [8].4,5, [4].7
12	Performance tuning of database transactions	[1].16,17, [5].15, [8].6,7,8
13	Performance tuning of database transactions	2.[Appendix B]