

Distributed Database Management Systems

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Fundamental References

- M.T. Özsü and P. Valduriez. *Principles of Distributed Database Systems, 2nd edition*. Prentice Hall, 1999.
- M.T. Özsü and P. Valduriez. “Distributed and Parallel Database Systems”, In *Handbook of Computer Science and Engineering*, A. Tucker (ed.), CRC Press, 1997, pages 1093–1111 (Chapter 48).
- M. T. Özsü. “The Push/Pull Effect - Can Distributed Database Technology Meet The Challenges of New Applications?” *Database Programming & Design*, April 1997.
- S. Ceri and G. Pelagatti. *Distributed Databases - Principles and Systems*. McGraw Hill, 1984.
- D.A. Bell and J.B. Grimson. *Distributed Database Systems*. Addison-Wesley, 1992.

Other References

- Distributed Query Processing:
 - C.T. Yu and W. Meng. *Principles of Database Query Processing for Advanced Applications*. Morgan-Kaufmann, 1998.
 - J.C. Freytag, D. Maier, and G. Vossen. *Query Processing for Advanced Database Systems*. Morgan-Kaufmann, 1994.
 - D. Kossmann. “The State of the Art in Distributed Query Processing”, *ACM Computing Surveys*, 32(3), September 2000.
 - G. Graefe. “Query Evaluation Techniques for Large Databases”, *ACM Computing Surveys*, 25(2): 73-170, June 1993.
 - P. Mishra and M. H. Eich. “Join Processing in Relational Databases”, *ACM Computing Surveys*, 24(1): 63-113, March 1992.

Other References

- I Transaction Management:
 - I P.A. Bernstein and E. Newcomer. *Principles of Transaction Processing for the Systems Professional*, Morgan Kaufmann, 1997.
 - I J. Gray and A. Reuter. *Transaction Processing - Concepts and Techniques*. Morgan Kaufmann, 1993.
 - I P.A. Bernstein; V. Hadzilacos and N. Goodman. *Concurrency Control and Recovery in Database Systems*. Addison-Wesley, 1987. (out of print)
 - I A.K. Elmagarmid. *Transaction Models for Advanced Database Applications*. Morgan Kaufmann, 1992.
 - I M. Buretta. *Data Replication*, Wiley, 1997.
 - I V. Kumar (ed.). *Performance of Concurrency Control Mechanisms in Centralized Database Systems*, Prentice Hall, 1996.
 - I V. Kumar and S.H. Son. *Database Recovery*, Kluwer, 1998.
 - I C.H. Papadimitriou. *The Theory of Concurrency Control*. Computer Science Press, 1986.

Other References

I Interoperability:

- A.K. Elmagarmid, M. Rusinkiewicz, and A. Sheth (eds.). *Management of Heterogeneous and Autonomous Database Systems*, Morgan Kaufmann, 1998.
- O.A. Buchres and A.K. Elmagarmid (eds.). *Object-Oriented Multidatabase Systems*, Prentice-Hall, 1996.
- K.R. Dittrich and A. Geppert (eds.). *Component Database Systems*, Morgan-Kaufman, 2000.
- M.L. Brodie and M. Stonebraker. *Migrating Legacy Systems*, Morgan Kaufmann, 1995.
- A. Bouguettaya, B. Benatallah, and A. Elmagarmid (eds.). *Interconnecting Heterogeneous Information Systems*, Kluwer, 1998.
- J. Siegel (ed.). *CORBA Fundamentals and Programming*, Wiley, 1996.
- K. Brockschmidt. *Inside OLE, 2nd edition*, Microsoft Press, 1995.
- K. Geiger. *Inside ODBC*, Microsoft Press, 1995.

Other References

I Parallel Database Servers:

- I P. Valduriez (ed). *Data Management and Parallel Processing*. Chapman and Hall, 1992.
- I M. Abdelguerfi and K-F. Wong. *Parallel Database Techniques*. IEEE Computer Society Press, 1988.
- I P. Valduriez. “Parallel Database Systems: Open Problems and New Issues,” *Parallel and Distributed Databases*, April 1993, 1(2): 137–165.
- I D. DeWitt and J. Gray. Parallel Database Systems: The Future of High-Performance Database Systems. *Communications of ACM*, June 1992, 35(6), 1992.

Other References

- Distributed Object Management:
 - E. Bertino and L. Martino. *Object-Oriented Database Systems*. Addison-Wesley, 1993.
 - A. Kemper and G. Moerkotte. *Object-Oriented Database Management*. Prentice-Hall, 1994.
 - A. Dogac, M.T. Özsü, A. Biliris, T. Sellis (ed.). *Advances in Object-Oriented Database Systems*. Springer-Verlag, 1994.
 - M.T. Özsü, U. Dayal and P. Valduriez (eds.). *Distributed Object Management*. Morgan Kaufman, 1994.
 - W. Kim (ed). *Modern Database Management – Object-Oriented and Multidatabase Technologies*. Addison-Wesley/ACM Press, 1994.
 - S. Zdonik and D. Maier (eds.). *Readings in Object-Oriented Database Systems*. Morgan Kaufmann, 1990.
 - R.G.G. Cattell. *Object Data Management*, 2nd edition. Addison-Wesley, 1994.

Other References

I Data Warehousing

- I There are **many** books. A small sample:
 - W. Inmon. *Building the Data Warehouse*. John Wiley and Sons, 1992.
 - A. Berson and S.J. Smith. *Data Warehousing, Data Mining, and OLAP*. McGraw Hill, 1997.
 - S. Chaudri and U. Dayal. Overview of Data Warehousing and OLAP Technology. *ACM SIGMOD Record*, March 1997, 26(1), pp. 65-74.
 - *IEEE Q. Bull. Data Engineering, Special Issue on Materialised Views on Data Warehousing*, June 1995, 18(2).

Other References

I Mobile Databases

- A. Helal et al. *Any Time, Anywhere Computing*, Kluwer, 1999.
- T. Imielinski and H. Korth. *Mobile Computing*. Kluwer Publishers, 1996.
- E. Pitoura and G. Samaras. *Data Management for Mobile Computing*. Kluwer Publishers, 1998.
- T. Imielinski and B.R. Badrinath. Data Management Issues in Mobile Computing. *Communications of ACM*, October 1994, 37(10):18-28.
- M. H. Dunham and A. Helal. Mobile Computing and Databases: Anything New? *ACM SIGMOD Record*, December 1995, 24(4): 5-9.
- G. H. Forman and J. Zahorjan. The Challenges of Mobile Computing, *Computer*, April 1994, 27(4):38-47.

Other References

I Web Data Management

- I S. Abiteboul, P. Buneman, D. Suciu. *Data on the Web*, Morgan Kaufmann, 2000.
- I D. Florescu, A. Levy, and A. Mendelzon, “Database Techniques for the World Wide Web: A Survey”, *ACM SIGMOD Record*, 27(3): 59-74, 1998.