Bibliography

[57391] ISO/IEC JTC1/SC21 N 5739. Database language SQL, April 1991.

[69392] ISO/IEC JTC1/SC21 N 6931. Database language SQL (SQL3), June 1992.

[A$^+$76] M. M. Astrahan et al. System R: a relational approach to data management. *ACM Trans. on Database Systems*, 1(2):97–137, 1976.

[AA93] P. Atzeni and V. De Antonellis. *Relational Database Theory*. Benjamin/Cummings Publishing Co., Menlo Park, CA, 1993.

[AABM82] P. Atzeni, G. Ausiello, C. Batini, and M. Moscarini. Inclusion and equivalence between relational database schemata. *Theoretical Computer Science*, 19:267–285, 1982.

[AB86] S. Abiteboul and N. Bidoit. Non first normal form relations: An algebra allowing restructuring. *Journal of Computer and System Sciences*, 33(3):361–390, 1986.

[AB87a] M. Atkinson and P. Buneman. Types and persistence in database programming languages. *ACM Computing Surveys*, 19(2):105–190, June 1987.

[AB87b] P. Atzeni and M. C. De Bernardis. A new basis for the weak instance model. In *Proc. ACM Symp. on Principles of Database Systems*, pages 79–86, 1987.

[AB88] S. Abiteboul and C. Beeri. On the manipulation of complex objects. Technical Report, INRIA and Hebrew University, 1988. (To appear, *VLDB Journal*.)

[AB91] S. Abiteboul and A. Bonner. Objects and views. In *Proc. ACM SIGMOD Symp. on the Management of Data*, 1991.

[ABD$^+$89] M. Atkinson, F. Bancilhon, D. DeWitt, K. Dittrich, D. Maier, and S. Zdonik. The object-oriented database system manifesto. In *Proc. of Intl. Conf. on Deductive and Object-Oriented Databases (DOOD)*, pages 40–57, 1989.

[ABGO93] A. Albano, R. Bergamini, G. Ghelli, and R. Orsini. An object data model with roles. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 39–51, 1993.

[Abi83] S. Abiteboul. Algebraic analogues to fundamental notions of query and dependency theory. Technical Report, INRIA, 1983.

[Abi88] S. Abiteboul. Updates, a new frontier. In *Proc. of Intl. Conf. on Database Theory*, 1988.

[Abi89] S. Abiteboul. Boundedness is undecidable for datalog programs with a single recursive rule. *Information Processing Letters*, 32(6):281–289, 1989.

[Abr74] J.R. Abrial. Data semantics. In *Data Base Management*, pages 1–59. North Holland, Amsterdam, 1974.

[ABU79] A. V. Aho, C. Beeri, and J. D. Ullman. The theory of joins in relational databases. *ACM Trans. on Database Systems*, 4(3):297–314, 1979.

[ABW88] K. R. Apt, H. Blair, and A. Walker. Towards a theory of declarative knowledge. In J. Minker, editor, *Foundations of Deductive Databases and Logic Programming*, pages 89–148. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[AC78] A. K. Arora and C. R. Carlson. The information preserving properties of relational data base transformations. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 352–359, 1978.

[AC89] F. Afrati and S. S. Cosmadakis. Expressiveness of restricted recursive queries. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, pages 113–126, 1989.

[ACO85] A. Albano, L. Cardelli, and R. Orsini. Galileo: A strongly-typed, interactive conceptual language. *ACM Trans. on Database Systems*, 10:230–260, June 1985.

[ACY91] F. Afrati, S. Cosmadakis, and M. Yannakakis. On datalog vs. polynomial time. In *Proc. ACM Symp. on Principles of Database Systems*, pages 13–25, 1991.

[ADM85] G. Ausiello, A. D'Atri, and M. Moscarini. Chordality properties on graphs and minimal conceptual connections in semantic data models. In *Proc. ACM Symp. on Principles of Database Systems*, pages 164–170, 1985.

[AF90] M. Ajtai and R. Fagin. Reachabiliy is harder for directed than for undirected finite graphs. *Journal of Symbolic Logic,* 55(1):113–150, 1990.

[AG85] S. Abiteboul and G. Grahne. Update semantics for incomplete databases. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 1–12, 1985.

[AG87] M. Ajtai and Y. Gurevich. Monotone versus positive. *J. ACM*, 34(4):1004–1015, 1987.

[AG89] M. Ajtai and Y. Gurevich. Datalog versus first order. In *IEEE Conf. on Foundations of Computer Science,* pages 142–148, 1989.

[AG91] S. Abiteboul and S. Grumbach. A rule-based language with functions and sets. *ACM Trans. on Database Systems*, 16(1):1–30, 1991.

[AGM85] C. E. Alchourrón, P. Gärdenfors, and D. Makinson. On the logic of theory change: partial meet contraction and revision functions. *Journal of Symbolic Logic*, 50:510–530, 1985.

[AGSS86] A. K. Aylamazan, M. M. Gigula, A. P. Stolboushkin, and G. F. Schwartz. Reduction of the relation model with infinite domains to the finite domain case. In *Proceedings of USSR Academy of Science (Dokl. Akad. Nauk. SSSR)*, vol. 286,(2), pages 308–311, 1986. (In Russian.)

[AH87] S. Abiteboul and R. Hull. IFO: A formal semantic database model. *ACM Trans. on Database Systems*, 12(4):525–565, 1987.

[AH88] S. Abiteboul and R. Hull. Data functions, datalog and negation. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 143–153, 1988.

[AH91] A. Avron and Y. Hirshfeld. Safety in the presence of function and order symbols. In *Proc. IEEE Conf. on Logic in Computer Science*, 1991.

[AK89] S. Abiteboul and P. C. Kanellakis. Object identity as a query language primitive. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 159–173, 1989. To appear in *J. ACM*.

[AKG91] S. Abiteboul, P. Kanellakis, and G. Grahne. On the representation and querying of sets of possible worlds. *Theoretical Computer Science*, 78:159–187, 1991.

[AKRW92] S. Abiteboul, P. Kanellakis, S. Ramaswamy, and E. Waller. Method schemas. Technical Report CS-92-33, Brown University, 1992. (An earlier version appeared in Proceedings 9th ACM PODS, 1990.)

[ALUW93] S. Abiteboul, G. Lausen, H. Uphoff, and E. Waller. Methods and rules. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 32–41, 1993.

[AP82] P. Atzeni and D. S. Parker. Assumptions in relational database theory. In *Proc. ACM Symp. on Principles of Database Systems*, pages 1–9, 1982.

[AP87a] F. Afrati and C. H. Papadimitriou. The parallel complexity of simple chain queries. In *Proc. ACM Symp. on Principles of Database Systems*, pages 210–213, 1987.

[AP87b] K. R. Apt and J. -M. Pugin. Maintenance of stratified databases viewed as a belief revision system. In *Proc. ACM Symp. on Principles of Database Systems*, pages 136–145, 1987.

[AP92] M. Andries and J. Paredaens. A language for generic graph-transformations. In *Proc. Intl. Workshop WG 91*, pages 63–74. Springer-Verlag, Berlin, 1992.

[APP$^+$86] F. Afrati, C. H. Papadimitriou, G. Papageorgiou, A. Roussou, Y. Sagiv, and J. D. Ullman. Convergence of sideways query evaluation. In *Proc. ACM Symp. on Principles of Database Systems*, pages 24–30, 1986.

[Apt91] K. R. Apt. Logic programming. In J. Van Leeuwen, editor, *Handbook of Theoretical Computer Science*, pages 493–574. Elsevier, Amsterdam, 1991.

[Arm74] W. W. Armstrong. Dependency structures of data base relationships. In *Proc. IFIP Congress*, pages 580–583. North Holland, Amsterdam, 1974.

[ASSU81] A. V. Aho, Y. Sagiv, T. G. Szymanski, and J. D. Ullman. Inferring a tree from the lowest common ancestors with an application to the optimization of relational expressions. *SIAM J. on Computing*, 10:405–421, 1981. Extended abstract appears in *Proc. 16th Ann. Allerton Conf. on Communication, Control and Computing*, Monticello, Ill., Oct. 1978, pp. 54–63.

[ASU79a] A. V. Aho, Y. Sagiv, and J. D. Ullman. Efficient optimization of a class of relational expressions. *ACM Trans. on Database Systems*, 4(4):435–454, 1979.

[ASU79b] A. V. Aho, Y. Sagiv, and J. D. Ullman. Equivalence of relational expressions. *SIAM J. on Computing*, 8(2):218–246, 1979.

[ASV90] S. Abiteboul, E. Simon, and V. Vianu. Non-deterministic languages to express deterministic transformations. In *Proc. ACM Symp. on Principles of Database Systems*, pages 218–229, 1990.

[AT93] P. Atzeni and R. Torlone. A metamodel approach for the management of multiple models and the translation of schemas. *Information Systems*, 18:349–362, 1993.

[AU79] A. V. Aho and J. D. Ullman. Universality of data retrieval languages. In *Proc. ACM Symp. on Principles of Programming Languages*, pages 110–117, 1979.

[AV87] S. Abiteboul and V. Vianu. A transaction language complete for database update and specification. In *Proc. ACM Symp. on Principles of Database Systems*, pages 260–268, 1987.

[AV88a] S. Abiteboul and V. Vianu. The connection of static constraints with boundedness and determinism of dynamic specifications. In *3rd Intl. Conf. on Data and Knowledge Bases*, pages 324–334, Jerusalem, 1988.

[AV88b] S. Abiteboul and V. Vianu. Equivalence and optimization of relational transactions. *J. ACM*, 35(1):130–145, 1988.

[AV88c] S. Abiteboul and V. Vianu. Procedural and declarative database update languages. In *Proc. ACM Symp. on Principles of Database Systems*, pages 240–250, 1988.

[AV89] S. Abiteboul and V. Vianu. A transaction-based approach to relational database specification. *J. ACM*, 36(4):758–789, October 1989.

[AV90] S. Abiteboul and V. Vianu. Procedural languages for database queries and updates. *Journal of Computer and System Sciences*, 41:181–229, 1990.

[AV91a] S. Abiteboul and V. Vianu. Datalog extensions for database queries and updates. *Journal of Computer and System Sciences*, 43:62–124, 1991.

[AV91b] S. Abiteboul and V. Vianu. Generic computation and its complexity. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, pages 209–219, 1991.

[AV91c] S. Abiteboul and V. Vianu. Non-determinism in logic-based languages. *Annals of Math. and Artif. Int.*, 3:151–186, 1991.

[AV94] S. Abiteboul and V. Vianu. Computing with first-order logic. *Journal of Computer and System Sciences*, 1994. To appear.

[AvE82] K. Apt and M. van Emden. Contributions to the theory of logic programming. *J. ACM*, 29(3):841–862, 1982.

[AVV92] S. Abiteboul, M. Y. Vardi, and V. Vianu. Fixpoint logics, relational machines, and computational complexity. In *Conf. on Structure in Complexity Theory*, pages 156–168, 1992.

[AW88] K. R. Apt and H. A. Walker. Arithmetic classification of perfect models of stratified programs. Technical Report TR-88-09, University of Texas at Austin, 1988.

[B$^+$86] D. G. Bobrow et al. CommonLoops: Merging lisp and object-oriented programming. In *Proc. ACM Conf. on Object-Oriented Programming Systems, Languages, and Applications*, pages 17–29, 1986.

[B$^+$88] D. S. Batory et al. Genesis: An extensible database management system. *IEEE Transactions on Software Engineering*, SE-14(11):1711–1730, 1988.

[Ban78] F. Bancilhon. On the completeness of query languages for relational data bases. In *7th Symposium on the Mathematical Foundations of Computer Science*, pages 112–123. Springer-Verlag, Berlin, LNCS 64, 1978.

[Ban85] F. Bancilhon. A note on the performance of rule based systems. Technical Report DB-022-85, MCC, 1985.

[Ban86] F. Bancilhon. Naive evaluation of recursively defined relations. In M. L. Brodie and J. L. Mylopoulos, editors, *On Knowledge Base Management Systems—Integrating Database and AI Systems*, pages 165–178. Springer-Verlag, Berlin, 1986.

[Bar63] H. Barendregt. Functional programming and lambda calculus. In J. Van Leeuwen, editor, *Handbook of Theoretical Computer Science, vol. B*, pages 321–363. Elsevier, Amsterdam, 1990.

[Bar84] H. Barendregt. *The Lambda Calculus: Its Syntax and Semantics*. North Holland, Amsterdam, 1984.

[BB79] C. Beeri and P. A. Bernstein. Computational problems related to the design of normal form relational schemas. *ACM Trans. on Database Systems*, 4(1):30–59, March 1979.

[BB91] J. Berstel and L. Boasson. Context-free languages. In J. Van Leeuwen, editor, *Handbook of Theoretical Computer Science*, pages 102–163. Elsevier, Amsterdam, 1991.

[BB92] D. Beneventano and S. Bergamaschi. Subsumption for complex object data models. In *Proc. of Intl. Conf. on Database Theory*, pages 357–375, 1992.

[BBC80] P. A. Bernstein, B. T. Blaustein, and E. M. Clarke. Fast maintenance of semantic integrity assertions using redundant aggregate data. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 126–136, 1980.

[BBG78] C. Beeri, P. A. Bernstein, and N. Goodman. A sophisticate's introduction to database normalization theory. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 113–124, 1978.

[BBMR89] A. Borgida, R. J. Brachman, D. L. McGuinness, and L. A. Resnick. CLASSIC: A structural data model for objects. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 58–67, 1989.

[BC79] O. P. Buneman and G. K. Clemons. Efficiently monitoring relational databases. *ACM Trans. on Database Systems*, 4(3):368–382, September 1979.

[BC81] P. A. Bernstein and D. W. Chiu. Using semi-joins to solve relational queries. *J. ACM*, 28(1):25–40, 1981.

[BCD89] F. Bancilhon, S. Cluet, and C. Delobel. Query languages for object-oriented database systems: the O_2 proposal. In *Proc. Second Intl. Workshop on Data Base Programming Languages*, 1989.

[BCW93] M. Baudinet, J. Chomicki, and P. Wolper. Temporal deductive databases. In A. U. Tansel et al., editors, *Temporal Databases—Theory, Design, and Implementation*, pages 294–320. Benjamin/Cummings Publishing Co., Menlo Park, CA, 1993.

[BDB79] J. Biskup, U. Dayal, and P. A. Bernstein. Synthesizing independent database schemas. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 143–152, 1979.

[BDFS84] C. Beeri, M. Dowd, R. Fagin, and R. Statman. On the structure of Armstrong relations for functional dependencies. *J. ACM*, 31(1):30–46, 1984.

[BDK92] F. Bancilhon, C. Delobel, and P. Kanellakis, editors. *Building an Object-Oriented Database System: The Story of O_2*. Morgan Kaufmann, Inc., Los Altos, CA, 1992.

[BDM88] F. Bry, H. Decker, and R. Manthey. A uniform approach to constraint satisfaction and constraint satisfiability in deductive databases. In *Proc. of Intl. Conf. on Extending Data Base Technology*, pages 488–505, 1988.

[BDW88] P. Buneman, S. Davidson, and A. Watters. A semantics for complex objects and approximate queries. In *Proc. ACM Symp. on Principles of Database Systems*, pages 302–314, 1988.

[BDW91] P. Buneman, S. Davidson, and A. Watters. A semantics for complex objects and approximate answers. *Journal of Computer and System Sciences*, 43:170–218, 1991.

[Bee80] C. Beeri. On the membership problem for functional and multivalued dependencies in relational databases. *ACM Trans. on Database Systems*, 5:241–259, 1980.

[Bee90] C. Beeri. A formal approach to object-oriented databases. *Data and Knowledge Engineering*, 5(4):353–382, 1990.

[Ber76a] C. Berge. *Graphs and Hypergraphs*. North Holland, Amsterdam, 1976.

[Ber76b] P. A. Bernstein. Synthesizing third normal form relations from functional dependencies. *ACM Trans. on Database Systems*, 1(4):277–298, 1976.

[BF87] N. Bidoit and C. Froidevaux. Minimalism subsumes default logic and circumscription. In *Proc. IEEE Conf. on Logic in Computer Science*, pages 89–97, 1987.

[BF88] N. Bidoit and C. Froidevaux. General logic databases and programs: Default logic semantics and stratification. Technical Report, LRI, Université de Paris-Sud, Orsay, 1988. To appear in *J. Information and Computation*.

[BFH77] C. Beeri, R. Fagin, and J. H. Howard. A complete axiomatization for functional and multivalued dependencies. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 47–61, 1977.

[BFM+81] C. Beeri, R. Fagin, D. Maier, A. O. Mendelzon, J. D. Ullman, and M. Yannakakis. Properties of acyclic database schemes. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, pages 355–362, 1981.

[BFMY83] C. Beeri, R. Fagin, D. Maier, and M. Yannakakis. On the desirability of acyclic database schemes. *J. ACM*, 30(3):479–513, 1983.

[BFN82] P. Buneman, R. Frankel, and R. Nikhil. An implementation technique for database query languages. *ACM Trans. on Database Systems*, 7:164–186, 1982.

[BG81] P. A. Bernstein and N. Goodman. The power of natural semi-joins. *SIAM J. on Computing*, 10(4):751–771, 1981.

[BGK85] A. Blass, Y. Gurevich, and D. Kozen. A zero-one law for logic with a fixed point operator. *Information and Control*, 67:70–90, 1985.

[BGL85] R. J. Brachman, V. P. Gilbert, and H. J. Levesque. An essential hybrid reasoning system: Knowledge and symbol level accounts of KRYPTON. In *Intl. Joint Conf. on Artificial Intelligence*, pages 532–539, 1985.

[BGW$^+$81] P. A. Bernstein, N. Goodman, E. Wong, et al. Query processing in a system for distributed databases (SDD-1). *ACM Trans. on Database Systems*, 6:602–625, 1981.

[BHG87] P. A. Bernstein, V. Hadzilacos, and N. Goodman. *Concurrency Control and Recovery in Database Systems*. Addison-Wesley, Reading, MA, 1987.

[Bid91a] N. Bidoit. *Bases de Données Déductives (Présentation de Datalog)*. Armand Colin, Paris, 1991.

[Bid91b] N. Bidoit. Negation in rule-based database languages: A survey. *Theoretical Computer Science*, 78:3–83, 1991.

[Bis80] J. Biskup. Inferences of multivalued dependencies in fixed and undetermined universes. *Theoretical Computer Science*, 10:93–105, 1980.

[Bis81] J. Biskup. A formal approach to null values in database relations. In H. Gallaire, J. Minker, and J.M. Nicolas, editors, *Advances in Data Base Theory, vol. 1*, pages 299–341. Plenum Press, New York, 1981.

[Bis83] J. Biskup. A foundation of Codd's relational maybe-operations. *ACM Trans. on Database Systems*, 8(4):608–636, 1983.

[BJO91] P. Buneman, A. Jung, and A. Ohori. Using powerdomains to generalize relational databases. *Theoretical Computer Science*, 91:23–55, 1991.

[BK86] C. Beeri and M. Kifer. An integrated approach to logical design of relational database schemes. *ACM Trans. on Database Systems*, 11:134–158, 1986.

[BKBR87] C. Beeri, P. C. Kanellakis, F. Bancilhon, and R. Ramakrishnan. Bounds on the propagation of selection into logic programs. In *Proc. ACM Symp. on Principles of Database Systems*, pages 214–226, 1987.

[BL90] N. Bidoit and P. Legay. Well! an evaluation procedure for all logic programs. In *Proc. of Intl. Conf. on Database Theory*, pages 335–348. Springer-Verlag, Berlin, LNCS 470, 1990.

[BLN86] C. Batini, M. Lenzerini, and S. B. Navathe. A comparative analysis of methodologies for database schema integration. *ACM Computing Surveys*, 18:323–364, 1986.

[BLT86] J. A. Blakeley, P.-A. Larson, and F. W. Tompa. Efficiently updating materialized views. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 61–71, 1986.

[BM91] C. Beeri and T. Milo. A model for active object oriented databases. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 337–349, 1991.

[BMG93] J. A. Blakeley, W. J. McKenna, and G. Graefe. Experiences building the open OODB query optimizer. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 287–296, 1993.

[BMSU81] C. Beeri, A. O. Mendelzon, Y. Sagiv, and J. D. Ullman. Equivalence of relational database schemes. *SIAM J. on Computing*, 10(2):352–370, 1981.

[BMSU86] F. Bancilhon, D. Maier, Y. Sagiv, and J. D. Ullman. Magic sets and other strange ways to implement logic programs. In *Proc. ACM Symp. on Principles of Database Systems*, pages 1–15, 1986.

[BNR⁺87] C. Beeri, S. Naqvi, R. Ramakrishnan, O. Shmueli, and S. Tsur. Sets and negation in a logic database language (LDL1). In *Proc. ACM Symp. on Principles of Database Systems*, pages 21–37, 1987.

[Bor85] A. Borgida. Features of languages for the development of information systems at the conceptual level. *IEEE Software*, 2:63–72, 1985.

[BP83] P. De Bra and J. Paredaens. Conditional dependencies for horizontal decompositions. In *Proc. Intl. Conf. on Algorithms, Languages and Programming*, pages 67–82. Springer-Verlag, Berlin, LNCS 154, 1983.

[BPR87] I. Balbin, B. S. Port, and K. Ramamohanarao. Magic set computation for stratified databases. Technical Report TR 87/3, Dept. of Computer Science, University of Melbourne, 1987.

[BR80] C. Beeri and J. Rissanin. Faithful representation of relational database schemes. Technical Report RJ2722, IBM Research Laboratory, San Jose, CA, 1980.

[BR87a] C. Beeri and R. Ramakrishnan. On the power of magic. In *Proc. ACM Symp. on Principles of Database Systems*, pages 269–283, 1987.

[BR87b] I. Balnbin and K. Ramamohanarao. A generalization of the differential approach to recursive query evaluation. In *Journal of Logic Programming*, 4(3), 1987.

[BR88a] F. Bancilhon and R. Ramakrishnan. An amateur's introduction to recursive query processing strategies. In M. Stonebraker, editor, *Readings in Database Systems*, pages 507–555. Morgan Kaufmann, Inc., Los Altos, CA, 1988. An earlier version of this work appears in *Proc. ACM SIGMOD Conf. on Management of Data*, pp. 16–52, 1986.

[BR88b] F. Bancilhon and R. Ramakrishnan. Performance evaluation of data intensive logic programs. In J. Minker, editor, *Foundations of Deductive Databases and Logic Programming*, pages 439–517. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[BR91] C. Beeri and R. Ramakrishnan. On the power of magic. *J. Logic Programming*, 10(3&4):255–300, 1991.

[BRS82] F. Bancilhon, P. Richard, and M. Scholl. On line processing of compacted relations. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 263–269, 1982.

[BRSS92] C. Beeri, R. Ramakrishnan, D. Srivastava, and S. Sudarshan. The valid model semantics for logic programs. In *Proc. ACM Symp. on Principles of Database Systems*, pages 91–104, 1992.

[Bry89] F. Bry. Query evaluation in recursive databases: Bottom-up and top-down reconciled. In *Proc. of Intl. Conf. on Deductive and Object-Oriented Databases (DOOD)*, pages 20–39, 1989.

[BS81] F. Bancilhon and N. Spyratos. Update semantics of relational views. *ACM Trans. on Database Systems*, 6(4):557–575, 1981.

[BS85] R. J. Brachman and J. G. Schmolze. An overview of the KL-ONE knowledge representation system. *Cognitive Science*, 9:171–216, 1985.

[BS93] S. Bergamaschi and C. Sartori. On taxonomic reasoning in conceptual design. *ACM Trans. on Database Systems*, 17:385–422, 1993.

[BST75] P. A. Bernstein, J. R. Swenson, and D. C. Tzichritzis. A unified approach to functional dependencies and relations. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 237–245, 1975.

[BTBN92] V. Breazu-Tannen, P. Buneman, and S. Naqvi. Structural recursion as a query language. In *Proc. of Intl. Workshop on Database Programming Languages*, pages 9–19. Morgan Kaufmann, Inc., Los Altos, CA, 1992.

[BTBW92] V. Breazu-Tannen, P. Buneman, and L. Wong. Naturally embedded query languages. In *Proc. of Intl. Conf. on Database Theory*, pages 140–154. Springer-Verlag, Berlin, LNCS, 1992.

[BV80a] C. Beeri and M. Y. Vardi. On the complexity of testing implications of data dependencies. Technical Report, Department of Computer Science, Hebrew University of Jerusalem, 1980.

[BV80b] C. Beeri and M. Y. Vardi. A proof procedure for data dependencies (preliminary report). Technical Report, Department of Computer Science, Hebrew University of Jerusalem, August 1980.

[BV81a] C. Beeri and M. Y. Vardi. The implication problem for data dependencies. In *Proc. Intl. Conf. on Algorithms, Languages and Programming*, pages 73–85, 1981. Springer-Verlag, Berlin, LNCS 115.

[BV81b] C. Beeri and M. Y. Vardi. On the properties of join dependencies. In H. Gallaire, J. Minker, and J. M. Nicolas, editors, *Advances in Data Base Theory, vol. 1*, pages 25–72. Plenum Press, New York, 1981.

[BV84a] C. Beeri and M. Y. Vardi. Formal systems for tuple and equality generating dependencies. *SIAM J. on Computing*, 13(1):76–98, 1984.

[BV84b] C. Beeri and M. Y. Vardi. On acyclic database decompositions. *Inf. and Control*, 61(2):75–84, 1984.

[BV84c] C. Beeri and M. Y. Vardi. A proof procedure for data dependencies. *J. ACM*, 31(4):718–741, 1984.

[BV85] C. Beeri and M. Y. Vardi. Formal systems for join dependencies. *Theoretical Computer Science*, 38:99–116, 1985.

[C+76] D. D. Chamberlin et al. Sequel 2: a unified approach to data definition, manipulation and control. *IBM J. Research and Development*, 20(6):560–575, 1976.

[Cam92] M. Campbell. *Microsoft Access – Inside and Out*. Osborne McGraw-Hill, New York, 1992.

[Car88] L. Cardelli. A semantics of multiple inheritance. *Information and Computation*, 76:138–164, 1988.

[Cat94] R. G. G. Cattell, editor. *The Object Database Standard: ODMB-93*. Morgan Kaufmann, Inc., Los Altos, CA, 1994.

[CCCR+90] F. Cacace, S. Ceri, S. Crespi-Reghizzi, L. Tanca, and R. Zicari. Integrating object-oriented data modeling with a rule-based programming paradigm. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 225–236, 1990.

[CCF82] I. M. V. Castillo, M. A. Casanova, and A. L. Furtado. A temporal framework for database specification. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 280–291, 1982.

[CF84] M. A. Casanova and A. L. Furtado. On the description of database transition constraints using temporal logic. In H. Gallaire, J. Minker, and J. -M. Nicolas, editors, *Advances in Data Base Theory, vol. 2*. Plenum Press, New York, 1984.

[CFI89] J. Cai, M. Fürer, and N. Immerman. An optimal lower bound on the number of variables for graph identification. In *IEEE Conf. on Foundations of Computer Science*, pages 612–617, 1989.

[CFP84] M. A. Casanova, R. Fagin, and C. H. Papadimitriou. Inclusion dependencies and

their interaction with functional dependencies. *Journal of Computer and System Sciences*, 28(1):29–59, 1984.

[CGKV88] S. S. Cosmadakis, H. Gaifman, P. C. Kanellakis, and M. Y. Vardi. Decidable optimization problems for database logic programs. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, 1988.

[CGP93] L. Corciulo, F. Giannotti, and D. Pedreschi. Datalog with non-deterministic choice computes NDB-PTIME. In *Proc. of Intl. Conf. on Deductive and Object-Oriented Databases (DOOD)*, 1993.

[CGT90] S. Ceri, G. Gottlob, and L. Tanca. *Logic Programming and Databases*. Springer-Verlag, Berlin, 1990.

[CH80a] A. K. Chandra and D. Harel. Structure and complexity of relational queries. In *IEEE Conf. on Foundations of Computer Science*, pages 333–347, 1980.

[CH80b] A. K. Chandra and D. Harel. Computable queries for relational data bases. *Journal of Computer and System Sciences*, 21(2):156–178, 1980.

[CH82] A. K. Chandra and D. Harel. Structure and complexity of relational queries. *Journal of Computer and System Sciences*, 25(1):99–128, 1982.

[CH85] A. K. Chandra and D. Harel. Horn clause queries and generalizations. *J. Logic Programming*, 2(1):1–15, 1985.

[Cha81a] A. K. Chandra. Programming primitives for database languages. In *Proc. ACM Symp. on Principles of Programming Languages*, pages 50–62, 1981.

[Cha81b] C. Chang. On the evaluation of queries containing derived relations in relational databases. In H. Gallaire, J. Minker, and J.-M. Nicolas, editors, *Advances in Database Theory, vol. 1*, pages 235–260. Plenum Press, New York, 1981.

[Cha88] A. K. Chandra. Theory of database queries. In *Proc. ACM Symp. on Principles of Database Systems*, pages 1–9, 1988.

[Cha94] T. -P. Chang. *On Incremental Update Propagation Between Object-based Databases*. Ph.D. thesis, University of Southern California, Los Angeles, 1994.

[Che76] P. P. Chen. The entity-relationship model – Toward a unified view of data. *ACM Trans. on Database Systems*, 1:9–36, 1976.

[CHM94] I-M. A. Chen, R. Hull, and D. McLeod. Local ambiguity and derived data update. In *Fourth Intl. Workshop on Research Issues in Data Engineering: Active Database Systems*, pages 77–86, 1994.

[Cho92a] J. Chomicki. History-less checking of dynamic integrity constraints. In *Proc. IEEE Intl. Conf. on Data Engineering*, 1992.

[Cho92b] J. Chomicki. Real-time integrity constraints. In *Proc. ACM Symp. on Principles of Database Systems*, 1992.

[Cho94] J. Chomicki. Temporal query languages: A survey. In *Proc. 1st Intl. Conf. on Temporal Logic*, 1994.

[Chu41] A. Church. *The Calculi of Lambda-Conversion*. Princeton University Press, Princeton, NJ, 1941.

[CK73] C. C. Chang and H. J. Keisler. *Model Theory*. North Holland, Amsterdam, 1973.

[CK85] S. S. Cosmadakis and P. C. Kanellakis. Equational theories and database constraints. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, pages 73–284, 1985.

[CK86] S. S. Cosmadakis and P. C. Kanellakis. Functional and inclusion dependencies: A graph theoretic approach. In P. C. Kanellakis and F. Preparata, editors, *Advances in Computing*

Research, vol. 3: The Theory of Databases, pages 164–185. JAI Press, Inc., Greenwich, CT, 1986.

[CKRP73] A. Colmerauer, H. Kanoui, P. Roussel, and R. Pasero. Un système de communication homme-machine en français. Technical Report, Groupe de Recherche en Intelligence Artificielle, Université Aix-Marseille, 1973.

[CKS86] S. S. Cosmadakis, P. C. Kanellakis, and S. Spyratos. Partition semantics for relations. *Journal of Computer and System Sciences*, 32(2):203–233, 1986.

[CKV90] S. S. Cosmadakis, P. C. Kanellakis, and M. Y. Vardi. Polynomial-time implications problems for unary inclusion dependencies. *J. ACM*, 37:15–46, 1990.

[CL73] C. L. Chang and R. C. T. Lee. *Symbolic Logic and Mechanical Theorem Proving*. Academic Press, New York, 1973.

[CL94] D. Calvanese and M. Lenzerini. Making object-oriented schemas more expressive. In *Proc. ACM Symp. on Principles of Database Systems*, 1994.

[Cla78] K. L. Clark. Negation as failure logic and databases. In H. Gallaire and J. Minker, editors, *Logic and Databases*, pages 293–322. Plenum Press, New York, 1978.

[CLM81] A. K. Chandra, H. R. Lewis, and J. A. Makowsky. Embedded implicational dependencies and their inference problem. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, pages 342–354, 1981.

[CM77] A. K. Chandra and P. M. Merlin. Optimal implementation on conjunctive queries in relational data bases. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, pages 77–90, 1977.

[CM90] M. Consens and A. Mendelzon. GraphLog: A visual formalism for real life recursion. In *Proc. ACM Symp. on Principles of Database Systems*, pages 404–416, 1990.

[CM93a] M. Consens and A. Mendelzon. The hy+ hygraph visualization system. In *Proc. ACM SIGMOD Symp. on the Management of Data*, 1993.

[CM93b] M. Consens and A. Mendelzon. Low complexity aggregation in GraphLog and Datalog. *Theoretical Computer Science*, 116(1):95–116, 1993. A preliminary version was published in the Proceedings of the Third International Conference on Database Theory, Springer-Verlag, Berlin, LNCS 470, 1990.

[Cod70] E. F. Codd. A relational model of data for large shared data banks. *Comm. of the ACM*, 13(6):377–387, 1970.

[Cod71] E. F. Codd. Normalized database structure: A brief tutorial. In *ACM SIGFIDET Workshop on Data Description, Access and Control*, November 1971.

[Cod72a] E. F. Codd. Further normalization of the data base relational model. In R. Rustin, editor, *Courant Computer Science Symposium 6: Data Base Systems*, pages 33–64. Prentice-Hall, Englewood Cliffs, NJ, 1972.

[Cod72b] E. F. Codd. Relational completeness of database sublanguages. In R. Rustin, editor, *Courant Computer Science Symposium 6: Data Base Systems*, pages 65–98. Prentice-Hall, Englewood Cliffs, NJ, 1972.

[Cod74] E. F. Codd. Recent investigations in relational data base systems. In *Information Processing 74*, pages 1017–1021. North Holland, Amsterdam, 1974.

[Cod75] T. Codd. Understanding relations (installment #7). In *FDT Bull. of ACM Sigmod* 7, pages 23–28, 1975.

[Cod79] E. F. Codd. Extending the data base relational model to capture more meaning. *ACM Trans. on Database Systems*, 4(4):397–434, 1979.

[Cod82] E. F. Codd. Relational databases: A practical foundation for productivity. *Comm. of the ACM*, 25(2):102–117, 1982.

[Coh86] D. Cohen. Programming by specification and annotation. In *Proc. of AAAI*, 1986.

[Coh89] D. Cohen. Compiling complex database transition triggers. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 225–234, 1989.

[Coh90] J. Cohen. Constraint logic programming languages. *Comm. of the ACM*, 33(7):69–90, 1990.

[Com88] K. Compton. 0-1 laws in logic and combinatorics. In *1987 NATO Adv. Study Inst. on Algorithms and Order*, pages 353–383, 1988.

[Coo74] S. A. Cook. An observation on a time-storage trade-off. *Journal of Computer and System Sciences*, 9:308–316, 1974.

[Cos83] S. S. Cosmadakis. The complexity of evaluating relational queries. *Inf. and Control*, 58:101–112, 1983.

[Cos87] S. S. Cosmadakis. Database theory and cylindric lattices. In *IEEE Conf. on Foundations of Computer Science*, pages 411–420, 1987.

[Cou90] B. Courcelle. Recursive applicative program schemes. In J. Van Leeuwen, editor, *Handbook of Theoretical Computer Science, vol. B*, pages 459–492. Elsevier, Amsterdam, 1990.

[CP84] S. S. Cosmadakis and C. H. Papadimitriou. Updates of relational views. *J. ACM*, 31(4):742–760, 1984.

[CRG+88] S. Ceri, S. Crespi Reghizzi, G. Gottlob, F. Lamperti, L. Lavazza, L. Tanca, and R. Zicari. The algres project. In *Proc. of Intl. Conf. on Extending Data Base Technology*. Springer-Verlag, Berlin, 1988.

[CT48] L. H. Chin and A. Tarski. Remarks on projective algebras. *Bulletin AMS*, 54:80–81, 1948.

[CT87] S. Ceri and L. Tanca. Optimization of systems of algebraic equations for evaluating datalog queries. In *Proc. of Intl. Conf. on Very Large Data Bases*, 1987.

[CTF88] M. A. Casanova, L. Tucherman, and A. L. Furtado. Enforcing inclusion dependencies and referential integrity. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 38–49, 1988.

[CV81] T. Connors and V. Vianu. Tableaux which define expression mappings. Technical Report, Computer Science Department, University of Southern California, 1981. Presented at XP2 Conf. on Theory of Relational Databases, Pennsylvania State University, June 1981.

[CV83] M. A. Casanova and V. M. P. Vidal. Towards a sound view integration methodology. In *Proc. ACM Symp. on Principles of Database Systems*, pages 36–47, 1983.

[CV85] A. K. Chandra and M. Y. Vardi. The implication problem for functional and inclusion dependencies is undecidable. *SIAM J. on Computing*, 14(3):671–677, 1985.

[CV92] S. Chaudhuri and M. Y. Vardi. On the equivalence of datalog programs. In *Proc. ACM Symp. on Principles of Database Systems*, pages 55–66, 1992.

[CV93] S. Chaudhuri and M. Y. Vardi. Optimization of *real* conjunctive queries. In *Proc. ACM Symp. on Principles of Database Systems*, pages 59–70, 1993.

[CV94] S. Chaudhuri and M. Y. Vardi. On the complexity of equivalence between recursive and nonrecursive datalog programs. In *Proc. ACM Symp. on Principles of Database Systems*, pages 107–116, 1994.

[CW85] L. Cardelli and P. Wegner. On understanding types, data abstraction and polymorphism. *ACM Computing Surveys*, 17:471–522, December 1985.

[CW89a] W. Chen and D. S. Warren. C-Logic of complex objects. In *Proc. ACM Symp. on Principles of Database Systems*, pages 369–378, 1989.

[CW89b] S. R. Cohen and O. Wolfson. Why a single parallelization strategy is not enough in knowledge bases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 200–216, 1989.

[CW90] S. Ceri and J. Widom. Deriving production rules for constraint maintenance. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 566–577, 1990.

[CW91] S. Ceri and J. Widom. Deriving production rules for incremental view maintenance. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 577–589, 1991.

[CW92] W. Chen and D. S. Warren. A goal oriented approach to computing well founded semantics. In *Proc. of the Joint Intl. Conf. and Symp. on Logic Programming*, pages 589–606, 1992.

[CW93] S. Ceri and J. Widom. Managing semantic heterogeneity with production rules and persistent queues. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 108–119, 1993.

[DA83] C. Delobel and M. Adiba. *Bases de Données et Systèmes Relationnels*. Dunod Informatique, Paris, 1983.

[Dal87] E. Dalhaus. Skolem normal forms concerning the least fixpoint. In E. Börger, editor, *Computation Theory and Logic, vol. 270*, pages 101–106. Springer-Verlag, Berlin, LNCS, 1987.

[Dat81] C. J. Date. Referential integrity. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 2–12, 1981.

[Dat86] C. J. Date. *An Introduction to Database Systems*. Addison-Wesley, Reading, MA, 1986.

[Daw93] A. Dawar. *Feasible Computation through Model Theory*. Ph.D. thesis, University of Pennsylvania, 1993.

[Day89] U. Dayal. Queries and views in an object-oriented data model. In *Proc. of Intl. Workshop on Database Programming Languages*, pages 80–102, 1989.

[DB82] U. Dayal and P. A. Bernstein. On the correct translation of update operations on relational views. *ACM Trans. on Database Systems*, 8(3):381–416, 1982.

[DC72] C. Delobel and R. C. Casey. Decomposition of a database and the theory of boolean switching functions. *IBM J. Research and Development*, 17(5):370–386, 1972.

[DD89] L. M. L. Delcambre and K. C. Davis. Automatic validation of object-oriented database structures. In *Proc. IEEE Intl. Conf. on Data Engineering*, pages 2–9, 1989.

[Dec86] H. Decker. Extending and restricting deductive databases. Technical Report KB-21, ECRC, Munich, 1986.

[Del78] C. Delobel. Normalization and hierarchical dependencies in the relational data model. *ACM Trans. on Database Systems*, 3(3):201–222, 1978.

[Dem82] R. Demolombe. Syntactical characterization of a subset of domain independent formulas. Technical Report, ONERA–CERT, Toulouse, 1982.

[DF92] C. J. Date and R. Fagin. Simple conditions for guaranteeing higher normal forms in relational databases. *ACM Trans. on Database Systems*, 17:465–476, 1992.

[DG79] B. S. Dreben and W. D. Goldfarb. *The Decision Problem: Solvable Classes of Qualificational Formulas*. Addison-Wesley, Reading, MA, 1979.

[DH84] U. Dayal and H. Y. Hwang. View definition and generalization for database integration in a multidatabase system. *IEEE Trans. on Software Engineering,* SE-10(6):628–644, 1984.

[DHL91] U. Dayal, M. Hsu, and R. Ladin. A transaction model for long-running activities. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 113–122, 1991.

[DiP69] R. A. DiPaola. The recursive unsolvability of the decision problem for a class of definite formulas. *J. ACM*, 16(2):324–327, 1969.

[DM86a] E. Dahlhaus and J. A. Makowsky. Computable directory queries. In *11th CAAP 86*, pages 254–265, Springer-Verlag, Berlin, LNCS 214, 1986.

[DM86b] A. D'Atri and M. Moscarini. Recognition algorithms and design methodologies for acyclic database. In P. C. Kanellakis and F. Preparata, editors, *Schemes Advances in Computing Research, vol. 3*, pages 164–185. JAI Press, Inc., Greenwich, CT, 1986.

[DM92] E. Dalhaus and J. A. Makowsky. Query languages for hierarchic databases. *Information and Computation*, 101(1):1–32, November 1992.

[DMP93] M. A. Derr, S. Morishita, and G. Phipps. Design and implementation of the Glue-Nail database system. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 147–156, 1993.

[dMS88] C. de Maindreville and E. Simon. Modelling non-deterministic queries and updates in deductive databases. In *Proc. of Intl. Conf. on Very Large Data Bases*, 1988.

[Don92] G. Dong. Datalog expressiveness of chain queries: Grammar tools and characterizations. In *Proc. ACM Symp. on Principles of Database Systems*, pages 81–90, 1992.

[DP84] P. DeBra and J. Paredaens. Horizontal decompositions for handling exceptions to functional dependencies. In H. Gallaire, J. Minker, and J. -M. Nicolas, editors, *Advances in Database Theory, vol. 2*, pages 123–144. Plenum Press, New York, 1984.

[dR87] M. de Rougemont. Second-order and inductive definability of finite structures. *Zeitschr. Math. Logik und Grundlagen d. Math.*, 33:47–63, 1987.

[DS91] G. Dong and J. Su. Object behaviors and scripts. In *Proc. of Intl. Workshop on Database Programming Languages*, pages 27–30, 1991.

[DS92] G. Dong and J. Su. Incremental and decremental evaluation of transitive closure by first-order queries. Technical Report TRCS 92-18, University of California, Santa Barbara, 1992. To appear in *Information and Computation*.

[DS93] G. Dong and J. Su. First-order incremental evaluation of datalog queries (extended abstract). In *Proc. of Intl. Workshop on Database Programming Languages*, 1993.

[DST93] G. Dong, J. Su, and R. Topor. Nonrecursive incremental evaluation of datalog queries. Technical Report, Department of Computer Science, University of Melbourne, Australia, 1993. To appear in *Annals of Mathematics and Artificial Intelligence.*

[DT92] G. Dong and R. Topor. Incremental evaluation of datalog queries. In *Proc. of Intl. Conf. on Database Theory*, pages 282–296, 1992.

[DV91] K. Denninghoff and V. Vianu. The power of methods with parallel semantics. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 221–232, 1991.

[DV93] K. Denninghoff and V. Vianu. Database method schemas and object creation. In *Proc. ACM Symp. on Principles of Database Systems*, pages 265–275, 1993.

[DW85] S. W. Dietrich and D. S. Warren. Dynamic programming strategies for the evaluation of recursive queries. Technical Report TR 85-31, Computer Science Department, SUNY at Stony Brook, New York, 1985.

[DW87] S. W. Dietrich and D. S. Warren. Extension tables: Memo relations in logic programming. In *Proc. of the Symposium on Logic Programming*, 1987.

[DW94] U. Dayal and J. Widom. *Active Database Systems*. Morgan Kaufmann Publishers, Inc., Los Altos, CA. In preparation, to appear in 1994.

[EFT84] H. D. Ebbinghaus, J. Flum, and W. Thomas. *Mathematical Logic*. Springer-Verlag, Berlin, 1984.

[EGM94] T. Eiter, G. Gottlob, and H. Mannila. Adding disjunction to Datalog. In *Proce. ACM Symp. on Principles of Database Systems*, pages 267–278, 1994.

[EHJ93] M. Escobar-Molano, R. Hull, and D. Jacobs. Safety and translation of calculus queries with scalar functions. In *Proc. ACM Symp. on Principles of Database Systems*, pages 253–264, 1993.

[Ehr61] A. Ehrenfeucht. An application of games to the completeness problem for formalized theories. *Fund. Math.*, 49:129–141, 1961.

[Eme91] E. A. Emerson. Temporal and modal logic. In J. Van Leeuwen, editor, *Handbook of Theoretical Computer Science*, pages 997–1072. Elsevier, Amsterdam, 1991.

[EN89] R. Elmasri and S. B. Navathe. *Fundamentals of Database Systems*. Benjamin/Cummings Publishing Co., Menlo Park, CA, 1989.

[End72] H. B. Enderton. *A Mathematical Introduction to Logic*. Academic Press, New York, 1972.

[Esw76] K. P. Eswaran. Aspects of a trigger subsystem in an integrated data base system. In *Proceedings of the 2nd International Conference in Software Engineering*, San Francisco, CA, pages 243–250, 1976.

[ESW78] R. Epstein, M. Stonebraker, and E. Wong. Distributed query processing in a relational database system. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 169–180, 1978.

[Fag72] R. Fagin. Probabilities on finite models. *Notices of the American Mathematical Society*, October: *A714*, 1972.

[Fag75] R. Fagin, Monadic generalized spectra. *Zeitschrift für Mathematische Logik und Grundlagen der Mathematik,* 21:89–96, 1975.

[Fag76] R. Fagin. Probabilities on finite models. *Journal of Symbolic Logic*, 41(1):50–58, 1976.

[Fag77a] R. Fagin. The decomposition versus synthetic approach to relational database design. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 441–446, 1977.

[Fag77b] R. Fagin. Multivalued dependencies and a new normal form for relational databases. *ACM Trans. on Database Systems*, 2:262–278, 1977.

[Fag79] R. Fagin. Normal forms and relational database operators. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 153–160, 1979.

[Fag81] R. Fagin. A normal form for relational databases that is based on domains and keys. *ACM Trans. on Database Systems*, 6(3):387–415, 1981.

[Fag82a] R. Fagin. Armstrong databases. In *Proc. IBM Symp. on Mathematical Foundations of Computer Science*, 1982.

[Fag82b] R. Fagin. Horn clauses and database dependencies. *J. ACM*, 29(4):952–985, 1982.

[Fag83] R. Fagin. Degrees of acyclicity for hypergraphs and relational database schemes. *J. ACM*, 30(3):514–550, 1983.

[Fag93] R. Fagin. Finite-model theory—A personal perspective. *Theoretical Computer Science*, 116:3–31, 1993.

[FC85] A. L. Furtado and M. A. Casanova. Updating relational views. In W. Kim, D. S. Reiner, and D. S. Batory, editors, *Query Processing in Database Systems*. Springer-Verlag, Berlin, 1985.

[FHMV95] R. Fagin, J. Y. Halpern, Y. Moses, and M. Y. Vardi. *Reasoning about Knowledge*. MIT Press, Cambridge, MA, 1995.

[Fit85] M. Fitting. A Kripke-Kleene semantics of logic programs. *Logic Programming*, 4:295–312, 1985.

[FJT83] P. C. Fischer, J. H. Jou, and D. M. Tsou. Succinctness in dependency systems. *Theoretical Computer Science*, 24:323–329, 1983.

[FKL97] J. Flum, M. Kubierschky, and B. Ludaescher. Total and partial well-founded datalog coincide. To appear, *Proc. of Intl. Conf. on Database Theory,* 1997.

[FKUV86] R. Fagin, G. Kuper, J. D. Ullman, and M. Y. Vardi. Updating logical databases. In P. C. Kanellakis and F. Preparata, editors, *Advances in Computing Research, vol. 3*, pages 1–18. JAI Press, Inc., Greenwich, CT, 1986.

[FM92] J. A. Fernandez and J. Minker. Semantics of disjunctive deductive databases. In *Proc. of Intl. Conf. on Database Theory*, pages 21–50. Springer-Verlag, Berlin, LNCS 646, 1992.

[FMU82] R. Fagin, A. O. Mendelzon, and J. D. Ullman. A simplified universal relational assumption and its properties. *ACM Trans. on Database Systems*, 7(3):343–360, 1982.

[FNS91] C. Faloutsos, R. Ng, and T. Sellis. Predictive load control for flexible buffer allocation. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 265–274, 1991.

[For81] C. L. Forgy. OPS5 user's manual. Technical Report CMU-CS-81-135, Carnegie-Mellon University, 1981.

[For82] C. L. Forgy. Rete: A fast algorithm for the many pattern/many object pattern match problem. *Artificial Intelligence*, 19:17–37, 1982.

[Fra54] R. Fraissé. Sur les classifications des systèmes de relations. *Publ. Sci. Univ. Alger*, I:1, 1954.

[Fre87] J. C. Freytag. A rule-based view of query optimization. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 173–180, 1987.

[Fri71] H. Friedman. Algorithmic procedures, generalized Turing algorithms, and elementary recursion theory. In R. O.Gangy and C. M. E.Yates, editors, *Logic Colloquium '69*, pages 361–389. North Holland, Amsterdam, 1971.

[FT83] P. C. Fischer and D. -M. Tsou. Whether a set of multivalued dependencies implies a join dependency is np-hard. *SIAM J. on Computing*, 12:259–266, 1983.

[FUMY83] R. Fagin, J. D. Ullman, D. Maier, and M. Yannakakis. Tools for template dependencies. *SIAM J. on Computing*, 12(1):36–59, 1983.

[FUV83] R. Fagin, J. D. Ullman, and M. Y. Vardi. On the semantics of updates in databases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 352–365, 1983.

[FV86] R. Fagin and M. Y. Vardi. The theory of data dependencies: A survey. In M. Anshel and W. Gewirtz, editors, *Mathematics of Information Processing: Proceedings of Symposia in Applied Mathematics*, vol. 34, pages 19–71. American Mathematical Society, Providence, RI, 1986.

[Fv89] C. C. Fleming and B. von Halle. *Handbook of Relational Database Design*. Addison-Wesley, Reading, MA, 1989.

[Gal87] A. Galton. *Temporal logics and their applications*. Academic Press, New York, 1987.

[Gar70] M. Gardner. The game of life. *Sci. American*, 223, 1970.

[Gär88] P. Gärdenfors. *Knowledge in Flux: Modeling the Dynamics of Epistemic States*. MIT Press, Cambridge, MA, 1988.

[GD87] G. Graefe and D. J. DeWitt. The EXODUS optimizer generator. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 160–172, 1987.

[GD94] S. Gatziu and K. R. Dittrich. Detecting composite events in active database systems using petri nets. In *Proc. Fourth Intl. Workshop on Research Issues in Data Engineering: Active Database Systems*, pages 2–9, 1994.

[GdM86] G. Gardarin and C. de Maindreville. Evaluation of database recursive logic programs as recurrent function series. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 177–186, 1986.

[GG88] M. Gyssens and D. Van Gucht. The powerset algebra as a result of adding programming

constructs to the nested relational algebra. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 225–232, 1988.

[GH83] S. Ginsburg and R. Hull. Characterizations for functional dependency and Boyce-Codd normal form families. *Theoretical Computer Science*, 27:243–286, 1983.

[GH86] S. Ginsburg and R. Hull. Sort sets in the relational model. *J. ACM*, 33:465–488, 1986.

[Gin66] S. Ginsburg. *The Mathematical Theory of Context-Free Languages*. McGraw-Hill, New York, 1966.

[Gin93] S. Ginsburg. Object and spreadsheet histories. In A. U. Tansel et al., editors, *Temporal Databases – Theory, Design, and Implementation*, pages 272–293. Benjamin/Cummings Publishing Co., Menlo Park, 1993.

[GJ79] M. R. Garey and D. S. Johnson. *Computers and Intractibilitiy: A Guide to the Theory of NP-Completeness*. Freeman, San Francisco, 1979.

[GJ82] J. Grant and B. E. Jacobs. On the family of generalized dependency constraints. *J. ACM*, 29(4):986–997, 1982.

[GJ91] N. H. Gehani and H. V. Jagadish. ODE as an active database: Constraints and triggers. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 327–336, 1991.

[GHJ$^+$93] S. Ghandeharizadeh, R. Hull, D. Jacobs, et al. On implementing a language for specifying active database execution models. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 441–454, 1993.

[GHJ94] S. Ghandeharizadeh, R. Hull, and D. Jacobs. [Alg,C]: Elevating deltas to be first-class citizens in a database programming language. Technical report USC–CS–94–581, Computer Science Dept., University of Southern California, Los Angeles, September, 1994.

[GJS92a] N. H. Gehani, H. V. Jagadish, and O. Shmueli. Composite event specification in active databases: Model & implementation. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 327–338, 1992.

[GJS92b] N. H. Gehani, H. V. Jagadish, and O. Shmueli. Event specification in an active object-oriented database. Technical memorandum, Bell Labs, Holmdel, NJ, 1992.

[GJS92c] N. H. Gehani, H. V. Jagadish, and O. Shmueli. Event specification in an active object-oriented database. In *Proc. ACM SIGMOD Symp. on the Management of Data*, 1992.

[GKLT69] Y. V. Glebskiĭ, D. I. Kogan, M. I. Liogonkiĭ, and V. A. Talanov. Range and degree of realizability of formulas in the restricted predicate calculus. *Kibernetika*, 2:17–28, 1969.

[GKM92] A. Gupta, D. Katiyar, and I. S. Mumick. Counting solutions to the view maintenance problem. In K. Ramamohanarao, J. Harland, and G. Dong, editors, *Proc. of the JICSLP Workshop on Deductive Databases*, 1992.

[GL82] Y. Gurevich and H. R. Lewis. The inference problem for template dependencies. In *Proc. ACM Symp. on Principles of Database Systems*, pages 221–229, 1982.

[GL88] M. Gelfond and V. Lifschitz. The stable model semantics for logic programs. In *Intl. Conf. on Logic Programming*, pages 1070–1080, 1988.

[GM78] H. Gallaire and J. Minker. *Logic and Databases*. Plenum Press, New York, 1978.

[GMN84] H. Gallaire, J. Minker, and J. -M. Nicolas. Logic and databases: A deductive approach. *ACM Computing Surveys*, 16(2):153–185, 1984.

[GMR92] G. Grahne, A. O. Mendelzon, and P. Z. Revesz. Knowledgebase transformations. In *Proc. ACM Symp. on Principles of Database Systems*, pages 246–260, 1992.

[GMS93] A. Gupta, I. S. Mumick, and V. S. Subrahmanian. Maintaining views incrementally. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 157–166, 1993.

[GMSV87] H. Gaifman, H. Mairson, Y. Sagiv, and M. Y. Vardi. Undecidable optimization

problems for database logic programs. In *Proc. IEEE Conf. on Logic in Computer Science*, pages 106–115, 1987.

[GMSV93] H. Gaifman, H. Mairson, Y. Sagiv, and M. Y. Vardi. Undecidable optimization problems for database logic programs. *J. ACM*, 40:683–713, 1993.

[GMV86] M. H. Graham, A. O. Mendelzon, and M. Y. Vardi. Notions of dependency satisfaction. *J. ACM*, 33(1):105–129, 1986.

[GO93] E. Grädel and M. Otto. Inductive definability with counting on finite structures. In *6th Workshop on Computer Science Logic CSL 92*, pages 231–247. Springer-Verlag, Berlin, LNCS 702, 1993.

[Goo70] L. A. Goodman. The multivariate analysis of qualitative data: Interactions among multiple classifications. *J. Amer. Stat. Assn.*, 65:226–256, 1970.

[Got87] G. Gottlob. Computing covers for embedded functional dependencies. In *Proc. ACM Symp. on Principles of Database Systems*, pages 58–69, 1987.

[GPG90] M. Gyssens, J. Paredaens, and D. Van Gucht. A graph-oriented object database model. In *Proc. ACM Symp. on Principles of Database Systems*, pages 417–424, 1990.

[GPSZ91] F. Giannotti, D. Pedreschi, D. Saccà, and C. Zaniolo. Nondeterminism in deductive databases. In *Proc. of Intl. Conf. on Deductive and Object-Oriented Databases (DOOD)*, pages 129–146. Springer-Verlag, Berlin LNCS 566, 1991.

[GR83] A. Goldberg and D. Robson. *Smalltalk-80: The Language and Its Implementation*. Addison-Wesley, Reading, MA, 1983.

[GR86] G. Grahne and K.-J. Raiha. Characterizations for acyclic database schemes. In P. C. Kanellakis and F. Preparata, editors, *Advances in Computing Research, vol. 3: The Theory of Databases*, pages 19–42. JAI Press, Inc., Greenwich, CT, 1986.

[Gra77] J. Grant. Null values in relational databases. In *Inf. Proc. Letters*, pages 156–157, 1977.

[Gra79] M. H. Graham. On the universal relation. Technical Report, University of Toronto, Toronto, Ontario, Canada, 1979.

[Gra83] E. Grandjean. Complexity of the first-order theory of almost all structures. *Information and Control*, 52:180–204, 1983.

[Gra84] G. Grahne. Dependency satisfaction in databases with incomplete information. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 37–45, 1984.

[Gra91] G. Grahne. *The Problem of Incomplete Information in Relational Databases*. Springer-Verlag, Berlin, 1991.

[Gra93] G. Graefe. Query evaluation techniques for large databases. *ACM Computing Surveys*, 25(2):73–170, 1993.

[Gre75] S. Greibach. *Theory of Program Structures: Schemes, Semantics, Verification*. Springer-Verlag, Berlin, LCNS 36, 1975.

[GS82] N. Goodman and O. Shmueli. Tree queries: A simple class of queries. *ACM Trans. on Database Systems*, 7(4):653–677, 1982.

[GS84] N. Goodman and O. Shmueli. The tree projection theorem and relational query processing. *Journal of Computer and System Sciences*, 28(1):60–79, 1984.

[GS86] Y. Gurevich and S. Shelah. Fixed-point extensions of first-order logic. *Annals of Pure and Applied Logic*, 32:265–280, 1986.

[GS87] G. Gardarin and E. Simon. Les systèmes de gestion de bases de données deductives. *Technique et Science Informatiques*, 6(5), 1987.

[GS94] S. Grumbach and J. Su. Finitely representable databases. In *Proc. ACM Symp. on Principles of Database Systems*, 1994.

[GST90] S. Ganguly, A. Silberschatz, and S. Tsur. A framework for the parallel processing of datalog queries. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 143–152, 1990.

[GT83] N. Goodman and Y. C. Tay. Synthesizing fourth normal form relations from multivalued dependencies. Technical Report, Harvard University , 1983.

[Gun92] C. Gunter. The mixed powerdomain. *Theoretical Computer Science*, 103:311–334, 1992.

[Gur] Y. Gurevich. Personal communication.

[Gur66] Y. Gurevich. The word problem for certain classes of semigroups (In Russian.). *Algebra and Logic*, 5:25–35, 1966.

[Gur84] Y. Gurevich. Toward a logic tailored for computational complexity. In M. M. Richter et al., editor, *Computation and Proof Theory*, pages 175–216. Springer-Verlag, Berlin, LNM 1104, 1984.

[Gur88] Y. Gurevich. Logic and the challenge of computer science. In E. Borger, editor, *Trends in Theoretical Computer Science*, pages 1–57. Computer Science Press, Rockville, MD, 1988.

[GV84] M. H. Graham and M. Y. Vardi. On the complexity and axiomatizability of consistent database states. *Proc. ACM Symp. on Principles of Database Systems*, pages 281–289, 1984.

[GV91] S. Grumbach and V. Vianu. Tractable query languages for complex object databases. In *Proc. ACM Symp. on Principles of Database Systems*, 1991.

[GV92] G. Gardarin and P. Valduriez. ESQL2: An object-oriented SQL with F-logic semantics. In *Intl. Conf. on Data Engineering*, 1992.

[GW89] G. Graefe and K. Ward. Dynamic query evaluation plans. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 358–366, 1989.

[GW90] J. R. Groff and P. N. Weinberg. *Using SQL*. Osborne McGraw-Hill, New York, 1990.

[GZ82] S. Ginsburg and S. M. Zaiddan. Properties of functional dependency families. *J. ACM*, 29(4):678–698, 1982.

[GZ88] G. Gottlob and R. Zicari. Closed world databases opened through null values. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 50–61, 1988.

[Hab70] S. J. Haberman. *The general log-linear model*. Ph.D. thesis, Department of Statistics, University of Chicago, 1970.

[Hal93] J. Y. Halpern. Reasoning about knowledge: a survey circa 1991. In A. Kent and J. G. Williams, editors, *Encyclopedia of Computer Science and Technology, Vol. 27 (Supplement 12)*. Marcel Dekker, New York, 1993.

[Han89] E. H. Hanson. An initial report on the design of ariel: a dbms with an integrated production rule system. In *SIGMOD Record*, 18(3):12–19, 1989.

[Har78] M. A. Harrison. *Introduction to Formal Language Theory*. Addison-Wesley, Reading, MA, 1978.

[Har80] D. Harel. On folk theorems. *Comm. of the ACM*, 23:379–385, 1980.

[HCL$^+$90] L. Haas, W. Chang, G. M. Lohman, J. McPherson, P. F. Wilms, G. Lapis, B. Lindsay, H. Pirahesh, M. Carey, and E. Shekita. Starburst midflight: As the dust clears. *IEEE Transactions on Knowledge and Data Engineering*, 2(1):143–160, 1990.

[Hel92] L. Hella. Logical hierarchies in PTIME. In *Proc. IEEE Conf. on Logic in Computer Science*, 1992.

[Her92] C. Herrmann. On the undecidability of implications between embedded multivalued database dependencies. Technical Report, Technische Hochschule Darmstadt, Germany. February 24, 1992.

[HH93] T. Hirst and D. Harel. Completeness results of recursive data bases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 244–252, 1993.

[HJ91a] R. Hull and D. Jacobs. Language constructs for programming active databases. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 455–468, 1991.

[HJ91b] R. Hull and D. Jacobs. On the semantics of rules in database programming languages. In J. Schmidt and A. Stogny, editors, *Next Generation Information System Technology: Proc. of the First International East/West Database Workshop, Kiev, USSR, October 1990*, pages 59–85. Springer-Verlag, Berlin, LNCS 504, 1991.

[HK81] M. S. Hecht and L. Kerschberg. Update semantics for the functional data model. Technical Report, Bell Laboratories, Holmdel, NJ, January 1981.

[HK87] R. Hull and R. King. Semantic database modeling: Survey, applications, and research issues. *ACM Computing Surveys*, 19:201–260, 1987.

[HK89] S. E. Hudson and R. King. Cactis: A self-adaptive, concurrent implementation of an object-oriented database management system. *ACM Trans. on Database Systems*, 14:291–321, 1989.

[HKM93] G. Hillebrand, P. Kanellakis, and H. Mairson. Database query languages embedded in the typed lambda calculus. In *Proc. IEEE Conf. on Logic in Computer Science*, pages 332–343, 1993.

[HKR93] G. Hillebrand, P. Kanellakis, and S. Ramaswamy. Functional programming formalisms for OODB methods. In *Proc. NATO ASI Summer School on OODBs*, Kasadaci, Turkey, 1993.

[HLM88] M. Hsu, R. Ladin, and D. R. McCarthy. An execution model for active data base management systems. In *Intl. Conf. on Data and Knowledge Bases: Improving Usability and Responsiveness*, pages 171–179, 1988.

[HLY80] P. Honeyman, R. E. Ladner, and M. Yannakakis. Testing the universal instance assumption. *Inf. Proc. Letters*, 10(1):14–19, 1980.

[HM81] M. Hammer and D. McLeod. Database description with SDM: A semantic database model. *ACM Trans. on Database Systems*, 6(3):351–386, 1981.

[HMN84] L. J. Henschen, W. W. McCune, and S. A. Naqvi. Compiling constraint-checking programs from first-order formulas. In H. Gallaire, J. Minker, and J. -M. Nicolas, editors, *Advances in Data Base Theory, vol. 2*, pages 145–169. Plenum Press, New York, 1984.

[HMT71] L. Henkin, J. D. Monk, and A. Tarski. *Cylindric Algebras*. North Holland, Amsterdam, 1971.

[HN84] L. J. Henschen and S. A. Naqvi. On compiling queries in recursive first-order databases. *J. ACM*, 31(1):47–85, 1984.

[Hon82] P. Honeyman. Testing satisfaction of functional dependencies. *J. ACM*, 29(3):668–677, 1982.

[HS89a] R. Hull and J. Su. On accessing object-oriented databases: Expressive power, complexity, and restrictions. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 147–158, 1989.

[HS89b] R. Hull and J. Su. Untyped sets, invention, and computable queries. In *Proc. ACM Symp. on Principles of Database Systems*, pages 347–359, March 1989.

[HS93] R. Hull and J. Su. Algebraic and calculus query languages for recursively typed complex objects. *Journal of Computer and System Sciences*, 47:121–156, 1993.

[HS94] R. Hull and J. Su. Domain independence and the relational calculus. *Acta Informatica* 31:513–524, 1994.

[HTY89] R. Hull, K. Tanaka, and M. Yoshikawa. Behavior analysis of object-oriented databases: Method structure, execution trees and reachability. In *Proceedings 3rd International Conference on Foundations of Data Organization and Algorithms*, pages 372–388, 1989.

[Hul83] R. Hull. Acyclic join dependency and data base projections. *Journal of Computer and System Sciences*, 27(3):331–349, 1983.

[Hul84] R. Hull. Finitely specifiable implicational dependency families. *J. ACM*, 31(2):210–226, 1984.

[Hul85] R. Hull. Non-finite specifiability of projections of functional dependency families. In *Theoretical Computer Science*, 39:239–265, 1985.

[Hul86] R. Hull. Relative information capacity of simple relational schemata. *SIAM J. on Computing*, 15(3):856–886, August 1986.

[Hul87] R. Hull. A survey of theoretic research on typed complex database objects. In J. Paredaens, editor, *Databases*, pages 193–256. Academic Press, London, 1987.

[Hul89] G. Hulin. Parallel processing of recursive queries in distributed architectures. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 87–96, 1989.

[HW92] E. N. Hanson and J. Widom. An overview of production rules in database systems. Technical Report RJ 9023 (80483), IBM Almaden Research, October 1992.

[HY84] R. Hull and C. K. Yap. The Format model: A theory of database organization. *Journal of the ACM*, 31(3):518–537, 1984.

[HY90] R. Hull and M. Yoshikawa. ILOG: Declarative creation and manipulation of object identifiers (extended abstract). In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 455–468, 1990.

[HY92] R. Hull and M. Yoshikawa. On the equivalence of data restructurings involving object identifiers. In J. D. Ullman, editor, *Studies in Theoretical Computer Science (a festschrift for Seymour Ginsburg)*, pages 253–286. Academic Press, New York, 1992. See also article of same title in *Proc. ACM Symp. on Principles of Data Base Systems*, 1991.

[IK90] Y. E. Ioannidis and Y. C. Kang. Randomized algorithms for optimizing large join queries. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 312–321, 1990.

[IL84] T. Imielinski and W. Lipski. The relational model of data and cylindric algebras. *Journal of Computer and System Sciences*, 28(1):80–102, 1984.

[Imi84] T. Imielinski. On algebraic query processing in logical databases. In H. Gallaire and J. Minker, editors, *Advances in Data Base Theory, vol. 2*. Plenum Press, New York, 1984.

[Imm82] N. Immerman. Upper and lower bounds for first-order definability. *Journal of Computer and System Sciences*, 25:76–98, 1982.

[Imm86] N. Immerman. Relational queries computable in polynomial time. *Inf. and Control*, 68:86–104, 1986.

[Imm87a] N. Immerman. Expressibility as a complexity measure: Results and directions. Technical Report DCS-TR-538, Yale University, New Haven, CT, 1987.

[Imm87b] N. Immerman. Languages which capture complexity classes. *SIAM J. on Computing*, 16(4):760–778, 1987.

[IN88] T. Imielinski and S. Naqvi. Explicit control of logic programs through rule algebra. In *Proc. ACM Symp. on Principles of Database Systems*, pages 103–116, 1988.

[INSS92] Y. E. Ioannidis, R. T. Ng, K. Shim, and T. K. Sellis. Parametric query optimization. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 103–114, 1992.

[INV91a] T. Imielinski, S. Naqvi, and K. Vadaparty. Incomplete objects – A data model for design and planning applications. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 288–197, 1991.

[INV91b] T. Imielinski, S. Naqvi, and K. Vadaparty. Querying design and planning databases. In *Proc. of Intl. Conf. on Deductive and Object-Oriented Databases (DOOD)*, pages 524–545, 1991.

[Ioa85] Y. E. Ioannidis. A time bound on the materialization of some recursively defined views. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 219–226, 1985.

[Jac82] B. E. Jacobs. On database logic. *J. ACM*, 29(2):310–332, 1982.

[JH91] D. Jacobs and R. Hull. Database programming with delayed updates. In *Proc. of Intl. Workshop on Database Programming Languages*, pages 416–428, 1991.

[JK84a] M. Jarke and J Koch. Query optimization in database systems. *ACM Computing Surveys*, 16(2):111–152, 1984.

[JK84b] D. S. Johnson and A. Klug. Testing containment of conjunctive queries under functional and inclusion dependencies. *Journal of Computer and System Sciences*, 28:167–189, 1984.

[JL87] J. Jaffar and J. L. Lassez. Constraint logic programming. In *Proc. ACM Symp. on Principles of Programming Languages*, pages 111–119, 1987.

[Joh91] D. S. Johnson. A catalog of complexity classes. In J. Van Leeuwen, editor, *Handbook of Theoretical Computer Science*, pages 67–162. Elsevier, Amsterdam, 1991.

[Joy76] W. H. Joyner Jr. Resolution strategies as decision procedures. *J. ACM*, 23:398–417, 1976.

[JS82] G. Jaeschke and H. -J. Schek. Remarks on the algebra on non first normal form relations. In *Proc. ACM Symp. on Principles of Database Systems*, pages 124–138, 1982.

[Kam81] Y. Kambayashi. *Database: A Bibliography*. Computer Science Press, Rockville, MD, 1981.

[Kan88] P. C. Kanellakis. Logic programming and parallel complexity. In J. Minker, editor, *Foundations of Deductive Databases and Logic Programming*, pages 547–586. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Kan91] P. C. Kanellakis. Elements of relational database theory. In J. Van Leeuwen, editor, *Handbook of Theoretical Computer Science*, pages 1074–1156. Elsevier, Amsterdam, 1991.

[KC86] S. Khoshafian and G. Copeland. Object identity. In *Proc. OOPSALA*, 1986.

[KDM88] A. M. Kotz, K. R. Dittrich, and J. A. Mülle. Supporting semantic rules by a generalized event/trigger mechanism. In *Intl. Conf. on Extending Data Base Technology*, pages 76–91, 1988.

[Kel82] A. M. Keller. Updates to relational databases through views involving joins. In Peter Scheuermann, editor, *Improving Database Usability and Responsiveness*. Academic Press, New York, 1982.

[Kel85] A. Keller. Algorithms for translating view updates to database updates for views involving selections, projections and joins. In *Proc. ACM Symp. on Principles of Database Systems*, pages 154–163, 1985.

[Kel86] A. M. Keller. The role of semantics in translating view updates. *IEEE Computer*, 19(1):63–73, January 1986.

[Ken78] W. Kent. *Data and Reality*. North Holland, Amsterdam, 1978.

[Ken79] W. Kent. Limitations of record-based information models. *ACM Trans. on Database Systems*, 4:107–131, 1979.

[Ken89] W. Kent. The many forms of a single fact. In *Proc. of the IEEE Compcon Conf.*, 1989.

[Ker88] J-M. Kerisit. *La Méthode d'Alexander: Une Technique de Déduction*. Ph.D. thesis, Université Paris VII, 1988.

[KG94] P. Kanellakis and D. Goldin. Constraint programming and database query languages. To appear in Springer-Verlag, Berlin, editor, *Proc. 2nd Conference on Theoretical Aspects of Computer Software (TACS)*, 1994.

[Kif88] M. Kifer. On safety, domain independence, and capturability of database queries. In C. Beeri, J. W. Schmidt, and U. Dayal, editors, *Proc. 3rd Intl. Conf. on Data and Knowledge Bases*, pages 405–415. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[KKR90] P. Kanellakis, G Kuper, and P. Revesz. Constraint query languages. In *Proc. 9th ACM Symp. on Principles of Database Systems*, pages 299–313, Nashville, 1990.

[KKS92] M. Kifer, W. Kim, and Y. Sagiv. Querying object-oriented databases. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 393–402, 1992.

[KL86a] M. Kifer and E. Lozinskii. A framework for an efficient implementation of deductive databases. In *Proc. of the Advanced Database Symposium*, Tokyo, 1986.

[KL86b] M. Kifer and E. L. Lozinskii. Filtering data flow in deductive databases. In *Proc. of Intl. Conf. on Database Theory*, 1986.

[KL89] W. Kim and F. Lochovsky, editors. *Object-Oriented Concepts, Databases, and Applications*. Addison-Wesley, Reading, MA, 1989.

[Kle67] S. C. Kleene. *Mathematical Logic*. North Holland, Amsterdam, 1967.

[Klu80] A. Klug. Caculating constraints on relational tableaux. In *ACM Trans. on Database Systems*, 5:260–290, 1980.

[Klu82] A. Klug. Equivalence of relational algebra and relational calculus query languages having aggregate functions. *J. ACM*, 29(3):699–717, 1982.

[Klu88] A. Klug. On conjunctive queries containing inequalities. *J. ACM*, 35(1):146–160, 1988.

[KLW93] M. Kifer, G. Lausen, and J. Wu. Logical foundations of object-oriented and frame-based languages. Technical Report 93/06, Computer Science Department, SUNY at Stony Brook, NY, 1993.

[KM91a] H. Katsuno and A. O. Mendelzon. On the difference between updating a knowledge base and revising it. In *Proc. of the Second Intl. Conf. on Principles of Knowledge Representation and Reasoning*, pages 387–394, 1991.

[KM91b] H. Katsuno and A. O. Mendelzon. Propositional knowledgebase revision and minimal change. *Artificial Intelligence*, 52:263–294, 1991.

[KN88] R. Krishnamurthy and S. A. Naqvi. Nondeterministic choice in datalog. In *5th Intl. Conf. on Data and Knowledge Bases*, pages 416–424. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Kni89] K. Knight. Unification: a multidisciplinary survey. *ACM Computing Surveys*, 21(1):93–124, 1989.

[Kol83] P. G. Kolaitis. Lecture notes on finite model theory, 1983.

[Kol91] P. G. Kolaitis. The expressive power of stratified logic programs. *Information and Computation*, 90(1):50–66, 1991.

[Kon88] S. Konolige. On the relation between default and autoepistemic logic. *Artificial Intelligence*, 35(3):343–382, 1988.

[Kow74] R. A. Kowalski. Predicate logic as a programming language. In *Proc. IFIP.'74*, pages 569–574, 1974.

[Kow75] R. A. Kowalski. A proof procedure using connection graphs. *J. ACM*, 22:572–595, 1975.

[Kow81] R. Kowalski. Logic as database language. Unpublished manuscript, Dept. of Computing, Imperial College, London, 1981.

[KP81] S. Koenig and R. Paige. A transformational framework for the automatic control of derived data. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 306–318, 1981.

[KP82] A. Klug and R. Price. In determining view dependencies using tableaux. In *ACM Trans. on Database Systems*, 7:361–381, 1982.

[KP86] P. Kanellakis and C. H. Papadimitriou. Notes on monadic sirups. Unpublished manuscript, 1986.

[KP88] P. G. Kolaitis and C. H. Papadimitriou. Why not negation by fixpoint? In *Proc. ACM Symp. on Principles of Database Systems*, pages 231–239, 1988.

[KRS88a] M. Kifer, R. Ramakrishnan, and A. Silberschatz. An axiomatic approach to deciding query safety in deductive databases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 52–60, 1988.

[KRS88b] R. Krishnamurthy, R. Ramakrishnan, and O. Shmueli. A framework for testing safety and effective computability of extended Datalog. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 154–163, 1988.

[KS91] H. F. Korth and A. Silberschatz. *Database System Concepts, 2d ed*. McGraw-Hill, New York, 1991.

[KT88] D. B. Kemp and R. W. Topor. Completeness of a top-down query evaluation procedure for stratified databases. In *Proc. Fifth Intl. Symp. on Logic Programming*, pages 195–211, 1988.

[KU84] A. Keller and J. D. Ullman. On complementary and independent mappings. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 143–148, 1984.

[Küc91] V. Küchenhoff. On the efficient computation of the difference between consecutive database states. In *Proc. of Intl. Conf. on Deductive and Object-Oriented Databases (DOOD)*, pages 478–502, 1991.

[Kuh67] J. L. Kuhns. Answering questions by computer: a logical study. Technical Report RM-5428-PR, Rand Corp., 1967.

[Kun87] K. Kunen. Negation in logic programming. *Logic Programming*, 4:289–308, 1987.

[Kun88] K. Kunen. Some remarks on the completed database. In *Intl. Conf. on Logic Programming*, pages 978–992, 1988.

[Kup87] G. M. Kuper. Logic programming with sets. In *Proc. ACM Symp. on Principles of Database Systems*, pages 11–20, 1987.

[Kup88] G. M. Kuper. On the expressive power of logic programming languages with sets. In *Proc. ACM Symp. on Principles of Database Systems*, pages 10–14, 1988.

[Kup93] G. M. Kuper. Aggregation in constraint databases. In *Proc. First Workshop on Principles and Practice of Constraint Programming*, 1993.

[KV84] G. Kuper and M. Y. Vardi. A new approach to database logic. In *Proc. ACM Symp. on Principles of Database Systems*, pages 86–96, 1984.

[KV87] P. Kolaitis and M. Y. Vardi. The decision problem for the probabilities of higher-order properties. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, pages 425–435, 1987.

[KV90a] D. Karabeg and V. Vianu. Parallel update transactions. *Theoretical Computer Science*, 76:93–114, 1990.

[KV90b] P. G. Kolaitis and M. Y. Vardi. 0-1 laws and decision problems for fragments of second-order logic. *Information and Computation*, 87:302–338, 1990.

[KV90c] P. G. Kolaitis and M. Y. Vardi. On the expressive power of Datalog: tools and a case study. In *Proc. ACM Symp. on Principles of Database Systems*, pages 61–71, 1990.

[KV91] D. Karabeg and V. Vianu. Simplification rules and axiomatization for relational update transactions. *ACM Trans. on Database Systems*, 16(3):439–475, 1991.

[KV92] P. G. Kolaitis and M. Y. Vardi. Infinitary logics and 0-1 laws. *Information and Computation*, 98:258–294, 1992.

[KV93a] G. Kuper and M. Y. Vardi. On the complexity of queries in the logical data model. *Theoretical Computer Science*, 116:33–58, 1993.

[KV93b] G. M. Kuper and M. Y. Vardi. The logical data model. *ACM Trans. on Database Systems*, 18:379–413, 1993.

[KW85] A. M. Keller and M. Winslett Wilkins. On the use of an extended relational model to handle changing incomplete information. *IEEE Transactions on Software Engineering*, SE-11:620–633, 1985.

[KW89] M. Kifer and J. Wu. A logic for object-oriented logic programming (Maier's O-logic revisited). In *Proc. ACM Symp. on Principles of Database Systems*, pages 379–393, 1989.

[Lan88] B. Lang. Datalog automata. In *Proc. 3rd Intl. Conf. on Data and Knowledge Bases*, pages 389–404. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Lee91] J. Van Leeuwen, editor. *Handbook of Theoretical Computer Science*. Elsevier, Amsterdam, 1991.

[Lei69] A. C. Leisenring. *Mathematical Logic and Hilbert's ε-symbol*. Gordon and Breach, New York, 1969.

[Lei89a] D. Leivant. Descriptive characterization of computational complexity. *Journal of Computer and System Sciences*, 39:51–83, 1989.

[Lei89b] D. Leivant. Monotonic use of space and computational complexity over abstract structures. Technical Report CMU-CS-89-212, Carnegie-Mellon University, 1989.

[Lei90] D. Leivant. Inductive definitions over finite structures. *Information and Computation*, 89:95–108, 1990.

[Lel87] W. Leler. *Constraint Programming Languages*. Addison-Wesley, Reading, MA, 1987.

[Lev84a] H. J. Levesque. The logic of incomplete knowledge bases. In M. L. Brodie, J. L. Mylopoulos, and J. W. Schmidt, editors, *On Conceptual Modeling*, pages 165–189. Springer-Verlag, Berlin, 1984.

[Lev84b] H. J. Levesque. Foundations of a functional approach to knowledge representation. *AI J.*, 23:155–212, 1984.

[Lib91] L. Libkin. A relational algebra for complex objects based on partial information. In *LNCS 495: Proceedings of Symp. on Mathematical Fundamentals of Database Systems*, pages 36–41. Springer-Verlag, Berlin, 1991.

[Lie80] Y. E. Lien. On the semantics of the entity-relationship model. In P. P. Chen, editor, *Entity-Relationship Approach to Systems Analysis and Design*, pages 155–167, 1980.

[Lie82] E. Lien. On the equivalence of database models. *J. ACM*, 29(2):333–363, 1982.

[Lif88] V. Lifschitz. On the declarative semantics of logic programs with negation. In J. Minker, editor, *Foundations of Deductive Databases and Logic Programming*, pages 177–192. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Lin90] S. Lindell. *An analysis of fixed-point queries on binary trees*. Ph.D. thesis, University of California at Los Angeles, 1990.

[Lin91] S. Lindell. An analysis of fixed-point queries on binary trees. *Theoretical Computer Science*, 85:75–95, 1991.

[Lip79] W. Lipski. On semantic issues connected with incomplete information databases. *ACM Trans. on Database Systems*, 4(3):262–296, 1979.

[Lip81] W. Lipski. On databases with incomplete information. *J. ACM*, 28(1):41–70, 1981.

[LL86] N. Lerat and W. Lipski. Nonapplicable nulls. *Theoretical Computer Science*, 46:67–82, 1986.

[LL90] M. Leven and G. Loizou. The nested relation type model: An application of domain theory to databases. *The Computer Journal*, 33:19–30, 1990.

[Llo87] J. W. Lloyd. *Foundations of logic programming*, *2d ed*., Springer-Verlag, Berlin, 1987.

[LM89] V. S. Lakshmanan and A. O. Mendelzon. Inductive pebble games and the inductive power of Datalog. In *Proc. ACM Symp. on Principles of Database Systems*, pages 301–311, 1989.

[LM93] D. Leivant and J. -Y. Marion. Lambda calculus characterizations of polytime. In *Proceedings of the International Conference on Typed Lambda Calculi and Applications*, 1993. (To appear in *Fundamenta Informaticae*.)

[LMG83] K. Laver, A. O. Mendelzon, and M. H. Graham. Functional dependencies on cyclic database schemes. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 79–91, 1983.

[LN90] R. J. Lipton and J. F. Naughton. Query size estimation by adaptive sampling (extended abstract). In *Proc. ACM Symp. on Principles of Database Systems*, pages 40–46, 1990.

[LO78] C. L. Lucchesi and S. L. Osborn. Candidate keys for relations. *Journal of Computer and System Sciences*, 17(2):270–279, 1978.

[Loh88] G. M. Lohman. Grammar-like functional rules for representing query optimization alternatives. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 18–27, 1988.

[Low15] L. Lowenheim. Uber Möglichkeiten im relativekalkul. *Math. Ann.*, 76:447–470, 1915.

[Loz85] E. Lozinskii. Evaluating queries in deductive databases by generating. In *Proc. 11th Intl. Joint Conf. on Artificial Intelligence*, pages 173–177, 1985.

[LP81] H. R. Lewis and C. H. Papadimitriou. *Elements of the Theory of Computation*. Prentice-Hall, Englewood Cliffs, NJ, 1981.

[LMR92] J. Lobo, J. Minker, and A. Rajasekar. *Foundations of Disjunctive Logic Programming*. MIT Press, Cambridge, MA, 1992.

[LRV88] C. Lecluse, P. Richard, and F. Velez. O_2, an object-oriented data model. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 424–434, 1988.

[LS87] U. W. Lipeck and G. Saake. Monitoring dynamic integrity constraints based on temporal logic. *Information Systems*, 12(3):255–269, 1987.

[LST87] J. W. Lloyd, E. A. Sonenberg, and R. W. Topor. Integrity constraint checking in stratified databases. *Journal of Logic Programming*, 4:331–343, 1987.

[LTK81] T. Ling, F. Tompa, and T. Kameda. An improved third normal form for relational databases. *ACM Trans. on Database Systems*, 6(2):326–346, 1981.

[LV87] P. Lyngbaek and V. Vianu. Mapping a semantic database model to the relational model. In *Proc. ACM SIGMOD Symp. on the Management of Data*, 1987.

[LV89] A. Lefevre and L. Vieille. On deductive query evaluation in the DedGin* system. In *Proc. 1st Internat. Conf. on Deductive and Object-Oriented Databases*, pages 225–246, 1989.

[LW93a] L. Libkin and L. Wong. Semantic representations and query languages for or-sets. In *Proc. ACM Symp. on Principles of Database Systems*, pages 37–48, 1993.

[LW93b] L. Libkin and L. Wong. Some properties of query languages for bags. In *Proc. of Intl. Workshop on Database Programming Languages*, pages 97–114, 1993.

[Mai80] D. Maier. Minimum covers in the relational database model. *J. ACM*, 27(4):664–674, 1980.

[Mai83] D. Maier. *The Theory of Relational Databases*. Computer Science Press, Rockville, MD, 1983.

[Mai86] D. Maier. A logic for objects. From a Workshop on Foundations of Deductive Databases and Logic Programming held in Washington, D.C., pages 6–26, 1986.

[Mak77] A. Makinouchi. A consideration of normal form of not-necessarily-normalized relations in the relational data model. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 447–453, 1977.

[Mak81] J. A. Makowsky. Characterizing data base dependencies. In *8th Colloquium on Automata, Languages and Programming*. Springer-Verlag, Berlin, 1981.

[Mak85] D. Makinson. How to give it up: A survey of some formal aspects of the logic of theory change. *Synthèse*, 62:347–363, 1985.

[Mal86] F. M. Malvestuto. Modelling large bases of categorical data with acyclic schemes. In *Proc. of Intl. Conf. on Database Theory*, 1986.

[MB92] R. M. MacGregor and D. Brill. Recognition algorithms for the Loom classifier. In *Proc. Natl. Conf. on Artificial Intelligence*, 1992.

[MBW80] J. Mylopoulos, P. A. Bernstein, and H. K. T. Wong. A language facility for designing database-intensive applications. *ACM Trans. on Database Systems*, 5:185–207, June 1980.

[MD89] D. McCarthy and U. Dayal. The architecture of an active database management system. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 215–224, 1989.

[ME92] P. Mishra and M. H. Eich. Join processing in relational databases. *ACM Computing Surveys*, 24:63–113, 1992.

[MFPR90] I. S. Mumick, S. Finkelstein, H. Pirahesh, and R. Ramakrishnan. Magic is relevant. In *Proc. ACM SIGMOD Symp. on the Management of Data*, 1990.

[Min88a] J. Minker, editor. *Foundations of Deductive Databases and Logic Programming*. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Min88b] J. Minker. Perspectives in deductive databases. *J. Logic Programming*, 5(1):33–60, 1988.

[MIR93] R. Miller, Y. Ioannidis, and R. Ramakrishnan. The use of information capacity in schema integration and translation. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 120–133, 1993.

[MIR94] R. Miller, Y. Ioannidis, and R. Ramakrishnan. Schema equivalence in heterogeneous systems: bridging theory and practice, in *Information Systems*, 19:3–31, 1994.

[Mit83a] J. C. Mitchell. The implication problem for functional and inclusion dependencies. *Information and Control*, 56:154–173, 1983.

[Mit83b] J. C. Mitchell. Inference rules for functional and inclusion dependencies. In *Proc. ACM Symp. on Principles of Database Systems*, pages 58–69, 1983.

[MM79] A. O. Mendelzon and D. Maier. Generalized mutual dependencies and the decomposition of database relations. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 75–82, 1979.

[MMS79] D. Maier, A. O. Mendelzon, and Y. Sagiv. Testing implications of data dependencies. *ACM Trans. on Database Systems*, 4(4):455–469, 1979.

[MMSU80] D. Maier, A. O. Mendelzon, F. Sadri, and J. D. Ullman. Adequacy of decompositions of relational databases. *Journal of Computer and System Sciences*, 21(3):368–379, 1980.

[MMW94] A. O. Mendelzon, T. Milo, and E. Waller. Object migration. In *Proc. ACM Symp. on Principles of Database Systems*, 1994.

[MNS+87] K. Morris, J. F. Naughton, Y. Saraiya, J. D. Ullman, and A. Van Gelder. YAWN! (yet another window on NAIL!). *Data Engineering*, 10(4), 1987.

[Moo85] R. C. Moore. Semantics considerations on non-monotonic logic. *Artificial Intelligence*, 25:75–94, 1985.

[Mor83] M. Morgenstern. Active databases as a paradigm for enhanced computing environments. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 34–42, 1983.

[Mor88] K. Morris. An algorithm for ordering subgoals in NAIL! In *Proc. ACM Symp. on Principles of Database Systems*, pages 82–88, 1988.

[Mos74] Y. N. Moschovakis. *Elementary Induction on Abstract Structures*. North Holland, Amsterdam, 1974.

[MR85] H. Mannila and K. -J. Räihä. Small Armstrong relations for database design. In *Proc. ACM Symp. on Principles of Database Systems*, pages 245–250, 1985.

[MR88] H. Mannila and K. -J. Räihä. Generating Armstrong databases for sets of functional and inclusion dependencies. Technical Report A-1988-7, University of Tampere, Department of Computer Science, Tampere, Finland, 1988.

[MR90] J. Minker and A. Rajasekar. A fixpoint semantics for disjunctive logic programs. In *J. Logic Programming*, 1990.

[MR92] H. Mannila and K. -J. Räihä. *The Design of Relational Databases*. Addison-Wesley, Wokingham, England, 1992.

[MRW86] D. Maier, D. Rozenshtein, and D. S. Warren. Window functions. In P. C. Kanellakis and F. Preparata, editors, *Advances in Computing Research, vol. 3*, pages 213–246. JAI Press, Inc., Greenwich, CT, 1986.

[MS81] D. McKay and S. Shapiro. Using active connection graphs for reasoning with recursive rules. In *Proc. 7th Intl. Joint Conf. on Artificial Intelligence*, pages 368–374, 1981.

[MS92] V. M. Markowitz and A. Shoshani. Represented extended Entity-Relationship structures in relational databases. *ACM Trans. on Database Systems*, 17:385–422, 1992.

[MSPS87] A. Marchetti-Spaccamela, A. Pelaggi, and D. Saccà. Worst-case complexity analysis of methods for logic query implementation. In *Proc. ACM Symp. on Principles of Database Systems*, pages 294–301, 1987.

[MSY81] D. Maier, Y. Sagiv, and M. Yannakakis. On the complexity of testing implications of functional and join dependencies. *J. ACM*, 28(4):680–695, 1981.

[MUG86] K. Morris, J. D. Ullman, and A. Van Gelder. Design overview of the NAIL! system. In *3rd Int. Conf. on Logic Programming*, LNCS 225, pages 554–568, Springer-Verlag, Berlin, 1986.

[MUV84] D. Maier, J. D. Ullman, and M. Y. Vardi. On the foundations of the universal relation model. *ACM Trans. on Database Systems*, 9(2):283–308, 1984.

[MUV86] K. Morris, J. D. Ullman, and A. Van Gelder. Design overview of the NAIL! system. In *Proc. Third Intl. Conf. on Logic Programming*, pages 554–568, 1986.

[MV86] J. A. Makowsky and M. Y. Vardi. On the expressive power of data dependencies. *Acta Informatica*, 23:231–244, 1986.

[MW88a] D. Maier and D. S. Warren. *Computing with Logic: Logic Programming with Prolog*. Benjamin/Cummings Publishing Co., Menlo Park, CA, 1988.

[MW88b] S. Manchanda and D. S. Warren. A logic-based language for database updates. In J. Minker, editor, *Foundations of Deductive Databases and Logic Programming*, pages 363–394. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Nau86] J. F. Naughton. Data independent recursion in deductive databases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 267–279, 1986.

[NCS91] R. Ng, C. Caloutsos, and T. Sellis. Flexible buffer allocation based on marginal gains. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 387–396, 1991.

[ND82] J. -M. Nicolas and R. Demolombe. On the stability of relational queries. Technical Report, ONERA-CERT, Toulouse, 1982.

[Nej87] W. Nejdl. Recursive strategies for answering recursive queries – The RQA/FQI strategy. In *Proc. of Intl. Conf. on Very Large Data Bases*, 1987.

[NG78] J. -M. Nicolas and H. Gallaire. Database – Theory vs. interpretation. In H. Gallaire and J. Minker, editors, *Logic and Databases*, pages 33–54. Plenum Press, New York, 1978.

[Nic78] J -M. Nicolas. First order logic formalization for functional, multivalued, and mutual dependencies. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 40–46, 1978.

[Nic82] J. -M. Nicolas. Logic for improving integrity checking in relational databases. *Acta Informatica*, 18(3):227–253, 1982.

[Nij76] G. M. Nijssen, editor. *Modelling in Data Base Management Systems*. North Holland, Amsterdam, 1976.

[NK88] S. Naqvi and R. Krishnamurthy. Database updates in logic programming. In *Proc. ACM Symp. on Principles of Database Systems*, 1988.

[NPS91] M. Negri, S. Pelagatti, and L. Sbattella. Formal semantics of SQL queries. *ACM Trans. on Database Systems*, 16(3):513–535, 1991.

[NRSU89] J. F. Naughton, R. Ramakrishnan, Y. Sagiv, and J. D. Ullman. Argument reduction by factoring. In *Proc. of Intl. Conf. on Very Large Data Bases*, 1989. To appear in *Theoretical Computer Science*.

[NS87] J. F. Naughton and Y. Sagiv. A decidable class of bounded recursions. In *Proc. ACM Symp. on Principles of Database Systems*, pages 227–236, 1987.

[NT89] S. Naqvi and S. Tsur. *A language for data and knowledge bases*. Computer Science Press, Rockville, MD, 1989.

[Ora89] *SQL Language Reference: ORACLE Server for OS/2*. Oracle Corp. Redwood Shores, CA, 1989.

[Osb79] S. L. Osborn. Towards a universal relation interface. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 52–60, 1979.

[OW93] G. Özsoyoğlu and H. Wang. A survey of QBE languages. *Computer*, 26, 1993.

[OY87] Z. M. Özsoyoğlou and L. -Y. Yuan. A new normal form for nested relations. *ACM Trans. on Database Systems*, 12(1):111–136, 1987.

[Pai84] R. Paige. Applications of finite differencing to database integrity control and query/transaction optimization. In H. Gallaire, J. Minker, and J. -M. Nicolas, editors, *Advances in Data Base Theory, vol. 2*, pages 171–209. Plenum Press, New York, 1984.

[Pap85] C. P. Papadimitriou. A note on the expressive power of prolog. *Bulletin of the EATCS*, 26:21–23, 1985.

[Pap86] C. H. Papadimitriou. *The Theory of Concurrency Control*. Computer Science Press, Rockville, MD, 1986.

[Pap94] C. Papadimitriou. *Computational Complexity*. Addison-Wesley, Reading, MA, 1994.

[Par78] J. Paredaens. On the expressive power of the relational algebra. *Inf. Proc. Letters*, 7(2):107–111, 1978.

[Par79] J. Paredaens. Transitive dependencies in a database scheme. Technical Report R387, MBLE, Brussels, 1979.

[PBGG89] J. Paredaens, P. De Bra, M. Gyssens, and D. Van Gucht. *The Structure of the Relational Database Model*. EATCS Monographs on Theoretical Computer Science No. 17. Springer-Verlag, Berlin, 1989.

[Pea88] J. Pearl. *Probabilistic Reasoning in Intelligent Systems*. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Per91] D. Perrin. Finite automata. In J. Van Leeuwen, editor, *Handbook of Theoretical Computer Science*, pages 1–58. Elsevier, Amsterdam, 1991.

[Pet89] S. V. Petrov. Finite axiomatization of languages for representation of system properties. *Information Sciences*, 47:339–372, 1989.

[PG88] J. Paredaens and D. Van Gucht. Possibilities and limitations of using flat operators in nested algebra expressions. In *Proc. ACM Symp. on Principles of Database Systems*, pages 29–38, 1988.

[PI94] S. Patnaik and N. Immerman. Dyn-FO: A parallel, dynamic complexity class. In *Proc. ACM Symp. on Principles of Database Systems*, 1994.

[PJ81] J. Paredaens and D. Janssens. Decompositions of relations: a comprehensive approach. In H. Gallaire, J. Minker, and J. -M. Nicolas, editors, *Advances in Data Base Theory, vol. 1*, pages 73–100. Plenum Press, New York, 1981.

[PM88] J. Peckham and F. Maryanski. Semantic data models. *ACM Computing Surveys*, 20:153–190, 1988.

[Por86] H. H. Porter. Earley deduction. Technical Report TR CS/E-86-002, Oregon Graduate Center, Beaverton, OR, 1986.

[Pos47] E. L. Post. Recursive unsolvability of a problem of Thue. *J. of Symbolic Logic*, 12:1–11, 1947.

[PPG80] D. S. Parker and K. Parsaye-Ghomi. Inference involving embedded multivalued dependencies and transitive dependencies. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 52–57, 1980.

[Prz86] T. Przymusinski. On the semantics of stratified deductive databases. In *Proc. Workshop on the Foundations of Deductive Databases and Logic Programming*, pages 433–443, 1986.

[Prz88] T. Przymusinski. Perfect model semantics. In *Intl. Conf. on Logic Programming*, pages 1081–1096, 1988.

[Prz89] T. Przymusinski. Every logic program has a natural stratification and an iterated least fixpoint model. In *Proc. ACM Symp. on Principles of Database Systems*, pages 11–21, 1989.

[Prz90] T. Przymusinski. Well-founded semantics coincides with three-valued stable semantics. *Fundamenta Informaticae*, XIII:445–463, 1990.

[PSV92] D. S. Parker, E. Simon, and P. Valduriez. SVP – A model capturing sets, streams, and parallelism. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 115–126, 1992.

[PV88] J. Pearl and T. Verma. The logic of representing dependencies by directed graphs. In *Proceedings, AAAI Conference, Seattle, WA. July, 1987*, pages 374–379, 1988.

[PW80] F. C. N. Pereira and D. H. D. Warren. Definite clause grammars for language analysis – A survey of the formalism and a comparison with augmented transition networks. *Artificial Intelligence*, 13:231–278, 1980.

[PY92] C. H. Papadimitriou and M. Yannakakis. Tie-breaking semantics and structural totality. In *Proc. ACM Symp. on Principles of Database Systems*, pages 16–22, 1992.

[QW91] X. Qian and G. Wiederhold. Incremental recomputation of active relational expressions. *IEEE Trans. on Knowledge and Data Engineering*, 3:337–341, 1991.

[Rad64] R. Rado. Universal graphs and universal functions. *Acta Arith.*, 9:331–340, 1964.

[Ram91] R. Ramakrishnan. Magic templates: A spellbinding approach to logic programs. *J. Logic Programming*, 11:189–216, 1991. See also *Proc. Joint Symp. and Intl. Conf. on Logic Programming*, 1988.

[RBS87] R. Ramakrishnan, R. Bancilhon, and A. Silberschatz. Safety of recursive horn clauses with infinite relations (extended abstract). In *Proc. ACM Symp. on Principles of Database Systems*, pages 328–339, 1987.

[RD75] J. Rissanen and C. Delobel. Decomposition of files, a basis for data storage and retrieval. Technical Report RJ1220, IBM Res. Lab, San Jose, CA, 1975.

[Rei78] R. Reiter. On closed world databases. In H. Gallaire and J. Minker, editors, *Logic and Databases*, pages 56–76. Plenum Press, New York, 1978.

[Rei80] R. Reiter. A logic for default reasoning. *Artificial Intelligence*, 13(1):80–132, 1980.

[Rei84] R. Reiter. Towards a logical reconstruction of relational database theory. In M. L. Brodie, J. L. Mylopoulos, and J. W. Schmidt, editors, *On Conceptual Modeling*, pages 191–238. Springer-Verlag, Berlin, 1984.

[Rei86] R. Reiter. A sound and sometimes complete query evaluation algorithm for relational databases with null values. *J. ACM*, 33(2):349–370, 1986.

[Ris77] J. Rissanen. Independent components of relations. *ACM Trans. on Database Systems*, 2(4):317–325, 1977.

[Ris78] J. Rissanen. Theory of relations for databases – A tutorial survey. In *Proc. 7th Symp. on Mathematical Foundations of Computer Science*, pages 536–551. Zadopane, Springer-Verlag, Berlin, LNCS 64, 1978.

[Ris82] J. Rissanen. On equivalence of database schemes. In *Proc. ACM Symp. on Principles of Database Systems*, pages 23–26, 1982.

[RKS88] M. A. Roth, H. F. Korth, and A. Silberschatz. Extended algebra and calculus for nested relational databases. *ACM Trans. on Database Systems* 13(4):389–417, 1988.

[RLK86] J. Rohmer, R. Lescoeur, and J. M. Kerisit. The Alexander method – A technique for the processing of recursive axioms in deductive databases. *New Generation Computing*, 4(3):273–286, 1986.

[Rob65] J. A. Robinson. A machine oriented logic based on the resolution principle. *J. ACM*, 12(1):23–41, 1965.

[Roe87] D. Roelants. Recursive rules in logic databases. Technical Report R513, Philips Research Laboratories, Bruxelles, 1987.

[Ros89] K. Ross. A procedural semantics for the well-founded negation in logic programs. In *Proc. ACM Symp. on Principles of Database Systems*, pages 22–33, 1989.

[Ros91] K. A. Ross. *The Semantics of Deductive Databases*. Ph.D. thesis, Stanford University, 1991.

[Rou91] B. Rounds. Situation-theoretic aspects of databases. In *Proc. of Conf. on Situation Theory and Applications; CSLI vol. 26*, pages 229–256, 1991.

[RS79] L. Rowe and K. A. Schoens. Data abstractions, views and updates in RIGEL. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 71–81, 1979.

[RS91] J. Richardson and P. Schwartz. Aspects: Extending objects to support multiple independent roles. In *Intl. Conf. on Principles of Knowledge Representation and Reasoning*, pages 298–307, 1991.

[RSB+87] K. Ramamohanarao, J. Shepherd, I. Balbin, G. Port, L. Naish, J. Thom, J. Zobel, and P. Dart. The NU-Prolog deductive database system. *Data Engineering*, 10(4):10–19, 1987.

[RSS92] R. Ramakrishnan, D. Srivastava, and S. Sudarshan. CORAL: control, relations and logic. In *Proc. of Intl. Conf. on Very Large Data Bases*, 1992.

[RSSS93] R. Ramakrishnan, D. Srivastava, S. Sudarshan, and P. Seshadri. Implementation of the CORAL deductive database system. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 167–176, 1993.

[RSUV89] R. Ramakrishnan, Y. Sagiv, J. D. Ullman, and M. Y. Vardi. Proof-tree transformations and their applications. In *Proc. ACM Symp. on Principles of Database Systems*, pages 172–182, 1989.

[RSUV93] R. Ramakrishnan, Y. Sagiv, J. D. Ullman, and M. Y. Vardi. Logical query optimization by proof-tree transfomation. *J. Computer and System Sciences*, 47, pages 222–248, 1993.

[RU94] R. Ramakrishnan and J. D. Ullman. A survey of research on deductive database systems. In *J. of Logic Programming*, to appear.

[SAC+79] P. Selinger, M. M. Astrahan, D. D. Chamberlin, R. A. Lorie, and T. G. Price. Access path selection in a relational database management system. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 23–34, 1979.

[Sag81] Y. Sagiv. Can we use the universal assumption without using nulls? In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 108–120, 1981.

[Sag83] Y. Sagiv. A characterization of globally consistent database and their correct access paths. *ACM Trans. on Database Systems*, 8(2):266–286, 1983.

[Sag88] Y. Sagiv. Optimizing datalog programs. In J. Minker, editor, *Foundations of Deductive Databases and Logic Programming*, pages 659–698. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Sag90] Y. Sagiv. Is there anything better than magic? In *Proc. North American Conf. on Logic Programming*, pages 235–254, 1990.

[Sci81] E. Sciore. Real-world MVDs. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 121–132, 1981.

[Sci82] E. Sciore. A complete axiomatization of full join dependencies. *J. ACM*, 29:373–393, 1982.

[Sci83] E. Sciore. Inclusion dependencies and the universal instance. In *Proc. ACM Symp. on Principles of Database Systems*, pages 48–57, 1983.

[Sci86] E. Sciore. Comparing the universal instance and relational data models. In P. C. Kanellakis and F. Preparata, editors, *Advances in Computing Research, vol. 3: The Theory of Databases*, pages 139–163. JAI Press, Inc., Greenwich, CT, 1986.

[SDPF81] Y. Sagiv, C. Delobel, D. S. Parker, Jr., and R. Fagin. An equivalence between relational database dependencies and a fragment of propositional logic. *J. ACM*, 28:435–453, 1981.

[Sek89] H. Seki. On the power of Alexander templates. In *Proc. ACM Symp. on Principles of Database Systems*, pages 150–159, 1989.

[SF78] K. C. Sevcik and A. L. Furtado. Complete and compatible sets of update operations. In *Intl. Conf. on Management of Data (ICMOD)*, Milan, Italy, 1978.

[SG85] D. E. Smith and M. R. Genesereth. Ordering conjunctive queries. *Artificial Intelligence*, 26:171–215, 1985.

[She88] J. Shepherdson. Negation in logic programming. In J. Minker, editor, *Foundations of Deductive Databases and Logic Programming*, pages 19–88. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Shi81] D. Shipman. The functional data model and the data language daplex. *ACM Trans. on Database Systems*, 6:140–173, 1981.

[Shm87] O. Shmueli. Decidability and expressiveness aspects of logic queries. In *Proc. ACM Symp. on Principles of Database Systems*, pages 237–249, 1987.

[SI88] H. Seki and H. Itoh. A query evaluation method for stratified programs under the extended CWA. In *Proc. Fifth Intl. Symp. on Logic Programming*, pages 195–211, 1988.

[SI84] O. Shmueli and A. Itai. Maintenance of views. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 240–255, 84.

[Sic76] S. Sickel. A search technique for clause interconnectivity graphs. *IEEE Trans. on Computers*, C-25:72–80, 1976.

[Sie88] J. H. Siekmann. Unification theory. *J. Symbolic Computation*, 7:207–274, 1988.

[SJGP90] M. Stonebraker, A. Jhingran, J. Goh, and S. Potamianos. On rules, procedures, caching and views in data base systems. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 281–290, 1990.

[SKdM92] E. Simon, J. Kiernan, and C. de Maindreville. Implementing high level active rules on top of a relational dbms. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 315–326, 1992.

[SL90] A. P. Sheth and J. A. Larson. Federated database systems for managing distributed, heterogeneous, and autonomous databases. *ACM Computing Surveys*, 22:184–236, 1990.

[SL91] J. Seib and G. Lausen. Parallelizing datalog programs by generalized pivoting. In *Proc. ACM Symp. on Principles of Database Systems*, pages 78–87, 1991.

[SLRD93] W. Sun, Y. Ling, N. Rishe, and Y. Deng. An instant and accurate size estimation method for joins and selection in a retrieval-intensive environment. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 79–88, 1993.

[SM81] A. M. Silva and M. A. Melkanoff. A method for helping discover the dependencies of a relation. In *Advances in Data Base Theory*, ed. by H. Gallaire, J. Minker, and J. -M. Nicolas, pages 115–133. Plenum Press, New York, 1981.

[Sno90] R. Snodgrass. Temporal databases: status and research directions. *ACM SIGMOD Record*, 19(4):83–89, December 1990.

[Soo91] M. Soo. Bibliography on temporal databases. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 14–23, 1991.

[SP94] D. Suciu and J. Paredaens. Any algorithm in the complex object algebra with powerset needs exponential space to compute transitive closure. In *Proc. ACM Symp. on Principles of Database Systems*, pages 171–179, 1994.

[SR86] M. Stonebraker and L. Rowe. The design of Postgres. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 340–355, 1986.

[SR93] S. Sudarshan and R. Ramakrishnan. Optimizations of Bottom-up evaluation with non-ground terms. In *Proc. of Intl. Logic Programming Symp*, 1993.

[SS86] Y. Sagiv and O. Shmueli. The equivalence of solving queries and producing tree projections. In *Proc. ACM Symp. on Principles of Database Systems*, pages 160–172, 1986.

[Sto81] M. Stonebraker. Operating system support for database management. *Comm. of the ACM*, 24:412–418, 1981.

[Sto88] M. Stonebraker, editor. *Readings in Database Systems*. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[Sto92] M. Stonebraker. The integration of rule systems and database systems. *IEEE Transactions on Knowledge and Data Engineering*, 4:415–423, 1992.

[Str91] B. Stroustrup. *The C++ Programming Language, 2d ed*. Addison-Wesley, Reading, MA, 1991.

[SU82] U. F. Sadri and J. D. Ullman. Template dependencies: A large class of dependencies in relational database and their complete axiomatization. *J. ACM*, 29(2):363–372, 1982.

[Su92] J. Su. Dynamic constraints and object migration. Technical Report TRCS-9202, Computer Science Department, University of California, Santa Barbara, 1992. To appear, *Theoretical Computer Science*; see also *Proc. of Intl. Conf. on Very Large Data Bases*, 1991.

[SV89] Y. Sagiv and M. Y. Vardi. Safety of datalog queries over infinite databases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 160–172, 1989.

[SW82] Y. Sagiv and S. Walecka. Subset dependencies and a completeness result for a subclass of embedded multivalued dependencies. *J. ACM*, 29(1):103–117, 1982.

[SWKH76] M. Stonebraker, E. Wong, P. Kreps, and G. Held. The design and implementation of Ingres. *ACM Trans. on Database Systems*, 1(3):189–222, 1976.

[SY80] Y. Sagiv and M. Yannakakis. Equivalence among expressions with the union and difference operators. *J. ACM*, 27(4):633–655, 1980.

[SZ86] D. Saccà and C. Zaniolo. On the implementation of a simple class of logic queries for databases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 16–23, 1986.

[SZ88] D. Saccà and C. Zaniolo. The generalized counting method for recursive logic queries. *Theoretical Computer Science*, 62:187–220, 1988.

[SZ89] L. A. Stein and S. B. Zdonik. Clovers: The dynamic behavior of type and instances. Technical Report CS-89-42, Computer Science Department, Brown University, 1989.

[SZ90] D. Saccà and C. Zaniolo. Stable models and non-determinism in logic programs with negation. In *Proc. ACM Symp. on Principles of Database Systems*, pages 205–217, 1990.

[Tan88] L. Tanca. *Optimization of Recursive Logic Queries to Relational Databases*. Ph.D. thesis, Politecnico di Milano and Universita' di Napoli, 1988.

[Tar55] A. Tarski. A lattice theoretical fixpoint theorem and its applications. *Pacific J. Math*, 5(2):285–309, 1955.

[TCG$^+$93] A. U. Tansel, J. Clifford, S. Gadia, S. Jajodia, A. Segev, and R. Snodgrass. *Temporal Databases – Theory, Design, and Implementation*. Benjamin/Cummings Publishing Co., Menlo Park, CA, 1993.

[TF82] D. -M. Tsou and P. C. Fischer. Decomposition of a relation scheme into Boyce-Codd normal form. *SIGACT News*, 14(3):23–29, 1982.

[TF86] S. J. Thomas and P. C. Fischer. Nested relational structures. In P. C. Kanellakis and F. Preparata, editors, *Advances in Computing Research, vol. 3*, pages 269–307. JAI Press, Inc., Greenwich, CT, 1986.

[Tha91] B. Thalheim. *Dependencies in Relational Databases*. Teubner Verlagsgesellschaft, Stuttgart and Leipzig, 1991.

[TK84] V. A. Talanov and V. V. Knyazev. The asymptotic truth value of infinite formulas. In *All-union seminar on discrete mathematics and its applications*, pages 56–61, 1984.

[TL82] D. C. Tsichritzis and F. H. Lochovsky. *Data Models*. Prentice-Hall, Englewood Cliffs, NJ, 1982.

[Tod77] S. Todd. Automatic constraint maintenance and updating defined relations. In B. Gilchrist, editor, *Proc. IFIP 77*, pages 145–148. North Holland, Amsterdam, 1977.

[Top87] R. Topor. Domain independent formulas and databases. *Theoretical Computer Science*, 52(3):281–307, 1987.

[Top91] R. Topor. Safe database queries with arithmetic relations. Technical Report, Computer Science Department, University of Melbourne, 1991. Abstract appears as *Safe Database Queries with Arithmetic Relations*, Proc. 14th Australian Computer Science Conf., Sydney, 1991, pp. 1–13.

[TS88] R. W. Topor and E. A. Sonenberg. On domain independent databases. In J. Minker, editor, *Foundations of Deductive Databases and Logic Programming*, pages 217–240. Morgan Kaufmann, Inc., Los Altos, CA, 1988.

[TT52] A. Tarski and F. B. Thompson. Some general properties of cylindric algebras. *Bulletin of the AMS*, 58:65, 1952.

[TY84] R. E. Tarjan and M. Yannakakis. Simple linear-time algorithms to test chordality of graphs, test acyclicity of hypergraphs, and selectively reduce acyclic hypergraphs. *SIAM J. on Computing*, 13(3):566–579, 1984.

[TYF86] T. J. Teorey, D. Yand, and J. P. Fry. A logical design methodology for relational databases using the extended entity-relationship model. In *ACM Computing Surveys*, pages 197–222, 1986.

[UG88] J. D. Ullman and A. Van Gelder. Parallel complexity of logical query programs. *Algorithmica*, 3(1):5–42, 1988.

[Ull82a] J. D. Ullman. The U.R. strikes back. In *Proc. ACM Symp. on Principles of Database Systems*, pages 10–22, 1982.

[Ull82b] J. D. Ullman. *Principles of Database Systems, 2d ed*. Computer Science Press, Rockville, MD, 1982.

[Ull85] J. D. Ullman. Implementation of logical query languages for databases. *ACM Trans. on Database Systems*, 10(3):289–321, 1985.

[Ull88] J. D. Ullman. *Principles of Database and Knowledge Base Systems, vol. I*. Computer Science Press, Rockville, MD, 1988.

[Ull89a] J. D. Ullman. Bottom-up beats top-down for datalog. In *Proc. ACM Symp. on Principles of Database Systems*, pages 140–149, 1989.

[Ull89b] J. D. Ullman. *Principles of Database and Knowledge Base Systems, vol. II: The New Technologies*. Computer Science Press, Rockville, MD, 1989.

[Van86] A. Van Gelder. A message passing framework for logical query evaluation. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 155–165, 1986.

[VandB93] J. Van den Bussche. *Formal Aspects of Object Identity*. Ph.D. thesis, University of Antwerp, 1993.

[VandBG92] J. Van den Bussche and D. Van Gucht. Semi-determinism. In *Proc. ACM Symp. on Principles of Database Systems*, pages 191–201, 1992. (Full version to appear in *Journal of Computer and System Sciences.*)

[VandBGAG92] J. Van den Bussche, D. Van Gucht, M. Andries, and M. Gyssens. On the

completeness of object-creating query languages. In *IEEE Conf. on Foundations of Computer Science*, pages 372–379, 1992.

[VandBP95] J. Van den Bussche and J. Paredaens. The expressive power of complex values in object-based data models. In *Information and Computation,* 120:220–236, August, 1995.

[VanG86] A. Van Gelder. Negation as failure using tight derivations for general logic programs. In *IEEE Symp. on Logic Programming*, pages 127–139, 1986.

[VanG89] A. Van Gelder. The alternating fixpoint of logic programs with negation. In *Proc. ACM Symp. on Principles of Database Systems*, pages 1–11, 1989.

[VanGRS88] A. Van Gelder, K. A. Ross, and J. S. Schlipf. The well-founded semantics for general logic programs. In *Proc. ACM Symp. on Principles of Database Systems*, pages 221–230, 1988.

[VanGRS91] A. Van Gelder, K. A. Ross, and J. S. Schlipf. The well-founded semantics for general logic programs. *J. ACM*, 38:620–650, 1991.

[VanGT91] A. Van Gelder and R. Topor. Safety and translation of relational calculus queries. *ACM Trans. on Database Systems*, 16:235–278, 1991.

[Var81] M. Y. Vardi. The decision problem for database dependencies. *Inf. Proc. Letters*, 12(5):251–254, 1981.

[Var82a] M. Y. Vardi. The complexity of relational query languages. In *Proc. ACM SIGACT Symp. on the Theory of Computing*, pages 137–146, 1982.

[Var82b] M. Y. Vardi. On decomposition of relational databases. In *IEEE Conf. on Foundations of Computer Science*, pages 176–185, 1982.

[Var83] M. Y. Vardi. Inferring multivalued dependencies from functional and join dependencies. *Acta Informatica*, 19:305–324, 1983.

[Var84] M. Y. Vardi. The implication and finite implication problems for typed template dependencies. *Journal of Computer and System Sciences*, 28:3–28, 1984.

[Var85] M. Y. Vardi. Querying logical databases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 57–65, 1985.

[Var86a] M. Y. Vardi. On the integrity of databases with incomplete information. In *Proc. ACM Symp. on Principles of Database Systems*, pages 252–266, 1986.

[Var86b] M. Y. Vardi. Querying Logical Databases. *J. Computer and Systems Sciences*, 33, pages 142–160, 1986.

[Var87] M. Y. Vardi. Fundamentals of dependency theory. In E. Borger, editor, *Trends in Theoretical Computer Science*, pages 171–224. Computer Science Press, Rockville, MD, 1987.

[Var88] M. Y. Vardi. Decidability and undecidablity results for boundedness of linear recursive queries. In *Proc. ACM Symp. on Principles of Database Systems*, pages 341–351, 1988.

[Vas79] Y. Vassiliou. Null values in database management, A denotational semantics approach. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 162–169, 1979.

[Vas80] Y. Vassiliou. *A Formal Treatment of Imperfect Information in Data Management*. Ph.D. thesis, University of Toronto, 1980.

[VBKL89] L. Vieille, P. Bayer, V. Kuchenoff, and A. Lefebvre. Eks-v1: A short overview. In *Proc. ACM SIGMOD Symp. on the Management of Data*, 1989. Technical exhibition.

[vEK76] M. H. van Emden and R. A. Kowalski. The semantics of predicate logic as a programming language. *J. ACM*, 23(4):733–742, 1976.

[Ver89] J. Verso. Verso: a database machine based on non-1nf relations. In H. Schek, S. Abiteboul, P. Fisher, editors, *Nested Relations and Complex Objects*, LNCS, page 361. Springer-Verlag, Berlin, 1989.

[Via87] V. Vianu. Dynamic functional dependencies and database aging. *J. ACM*, 34(1):28–59, 1987.

[Via88] V. Vianu. Database survivability under dynamic constraints. *Acta Informatica*, 25:55–84, 1988.

[Vie86] L. Vieille. Recursive axioms in deductive databases: The Query/Subquery approach. In L. Kerschberg, editor, *Proc. First Intl. Conf. on Expert Database Systems*, pages 179–193, 1986.

[Vie87a] L. Vieille. A database-complete proof procedure based on sld-resolution. In *Proc. of the Fourth Intl. Conf. on Logic Programming*, pages 74–103, 1987.

[Vie87b] L. Vieille. Recursion in deductive databases: DedGin, a recursive query evaluator. In *Des Bases de Données aux Bases de Connaissances*, Sophia-Antipolis, France, 1987. Also available as Technical Report TR-KB-14, ECRC, Munich.

[Vie88] L. Vieille. From QSQ towards QaSSaQ: Global optimization of recursive queries. In L. Kerschberg, editor, *Proc. Second Intl. Conf. on Expert Database Systems*, pages 421–436, 1988.

[Vie89] L. Vieille. Recursive query processing: The power of logic. *Theoretical Computer Science*, 69:1–53, 1989.

[Vos91] G. Vossen. *Data Models, Database Languages and Database Management Systems*. Addison-Wesley, Wokingham, England, 1991.

[VV92] V. Vianu and G. Vossen. Conceptual-level concurrency control for relational update transactions. *Theoretical Computer Science*, 95:1–42, 1992.

[WF90] J. Widom and S. J. Finkelstein. Set-oriented production rules in relational database systems. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 259–264, 1990.

[WH92] Y. -W. Wang and E. N. Hanson. A performance comparison of the Rete and TREAT algorithms for testing database rule conditions. In *IEEE Conf. on Data Engineering*, pages 88–97, 1992.

[WHW90] S. Widjojo, R. Hull, and D. S. Wile. A specificational approach to merging persistent object bases. In A. Dearle, G. Shaw, and S. Zdonik, editors, *Implementing Persistent Object Bases: Proc. of Fourth Intl. Workshop on Persistent Object Systems*, pages 267–278. Morgan Kaufmann, Inc., Los Altos, CA, 1990.

[Wie92] G. Wiederhold. Mediators in the architecture of future information systems. *IEEE Computer*, 25(3):38–49, March 1992.

[Win86] M. Winslett. A model-theoretic approach to updating logical databases. In *Proc. ACM Symp. on Principles of Database Systems*, pages 224–234, 1986.

[Win88] M. Winslett. A framework for comparison of update semantics. In *Proc. ACM Symp. on Principles of Database Systems*, pages 315–324, 1988.

[WO90] O. Wolfson and A. Ozeri. A new paradigm for parallel and distributed rule-processing. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 133–142, 1990.

[Won93] L. Wong. Normal forms and conservative properties for query languages over collection types. In *Proc. ACM Symp. on Principles of Database Systems*, pages 26–36, 1993.

[WS88] O. Wolfson and A. Silberschatz. Distributed processing of logic programming. In *Proc. ACM SIGMOD Symp. on the Management of Data*, pages 329–336, 1988.

[WW75] C. P. Wang and H. H. Wedekind. Segment synthesis in logical data base design. *IBM J. Res. and Develop.*, 19:71–77, 1975.

[WY76] E. Wong and K. Youssefi. Decomposition—A strategy for query processing. *ACM Trans. on Database Systems*, 1(3):223–241, 1976.

[Yan81] M. Yannakakis. Algorithms for acyclic database schemes. In *Proc. of Intl. Conf. on Very Large Data Bases*, pages 82–94, 1981.

[YC84] C. T. Yu and C. C. Chang. Distributed query processing. *ACM Computing Surveys*, 16, 1984.

[YO79] C. T. Yu and M. Z. Özsoyoğlu. An algorithm for tree-query membership of a distributed query. In *Proc. IEEE COMPSAC*, pages 306–312, 1979.

[YP82] M. Yannakakis and C. Papadimitriou. Algebraic dependencies. *Journal of Computer and System Sciences*, 25(2):3–41, 1982.

[Zan76] C. Zaniolo. *Analysis and Design of Relational Schemata for Database Systems*. Ph.D. thesis, University of California at Los Angeles, 1976. Technical Report UCLA-Eng-7669, Department of Computer Science.

[Zan82] C. Zaniolo. A new normal form for the design of relational database schemata. *ACM Trans. on Database Systems*, 7:489–499, 1982.

[Zan84] C. Zaniolo. Database relations with null values. *Journal of Computer and System Sciences*, 28(1):142–166, 1984.

[Zan87] C. Zaniolo, editor. *IEEE Data Engineering 10(4)*, 1987. Special issue on databases and logic.

[ZH90] Y. Zhou and M. Hsu. A theory for rule triggering systems. In *Intl. Conf. on Extending Data Base Technology*, pages 407–421, 1990.

[Zlo77] M. Zloof. Query-by-example: A data base language. *IBM Systems Journal*, 16:324–343, 1977.

[ZM90] S. B. Zdonik and D. Maier, editors. *Readings in Object-Oriented Database Systems*. Morgan Kaufmann, Inc., Los Altos, CA, 1990.