

DATABASE SYSTEMS: A BRIEF TIMELINE

	Event	Consequence
Pre-1960s		
1945	Magnetic tapes developed (the first medium to allow searching).	Replaced punch cards and paper tape.
1957	First commercial computer installed.	
1959	McGee proposed the notion of generalized access to electronically stored data.	
1959	IBM introduced the Rmac system.	Read data in a non-sequential manner, and access to files became feasible.
The '60s		
1961	The first generalized DBMS-GE'S Integrated Data Store (IDS)-designed by Bachman; wide distribution by 1964. Bachman popularized data structure diagrams.	Formed the basis for Network Data Model developed by Conference on Data Systems Languages Database Task Group (CODASYL DBTG).
1965-1970	<ul style="list-style-type: none"> • Generalized file management systems developed by numerous vendors. • Information Management System (IMS) developed by IBM. • IMS DB/DC (database/data communication) System was the first large-scale DB/DC system. • SABRE, developed by IBM and American Airlines. 	<p>Provided two-level conceptual/user view organization of data.</p> <p>Formed the basis for Hierarchical Data Model.</p> <p>Supported network views on top of the hierarchies.</p> <p>Allowed multiple-user access to data involving a communication network.</p>
The '70s		
	Database technology experienced rapid growth.	Commercial systems followed CODASYL DBTG Proposal, but none fully implemented it. IDMS system by B. F. Goodrich, Honeywell's IDS II, UNIVACs DMS 1100, Burroughs's DMS-II, CDCs DMS-170, Phillips's PHOLAS, and Digital's DBMS-11. Several integrated DB/DC systems: Cincom's TOTAL plus ENVIRON/I. DBMS developed as an academic discipline and a research area.
1970	The relational model is developed by Ted Codd, an IBM research fellow.	Laid foundation for database theory.
1971	CODASYL Database Task Group Report.	
1975	ACM Special Interest Group on Management of Data organized first SIGMOD international conference.	Provided a forum for dissemination of database research.
1975	Very Large Data Base Foundation organized first VLDB international conference.	Provided another forum for dissemination of database research.
1976	Entity-relationship (ER) model introduced by Chen. <ul style="list-style-type: none"> • Research projects in the '70s: System R (IBM), INGRES (University of California, Berkeley), System 2000 (University of Texas, Austin), Socrate 	

Project (University of Grenoble, France), ADABAS (Technical University of Darmstadt, W Germany).

- Query Languages developed in the '70s: SQUARE, SEQUEL (SQL), QBE, QUEL.

The '80s

DBMSs developed for personal computers (DBASE, PARADOX, etc).

Allowed PC users to define and manipulate data. They lacked multiview/multiaccess support and insulation between programs and data.

1983 ANSI/SPARC survey revealed >100 relational systems had been implemented by the beginning of the '80s.

Emergence of commercial relational DBMS (DB2, ORACLE, SYBASE, INFORMIX, etc).

1984 Preliminary SQL standard published. Business world influenced by "Fourth Generation Languages." Proposal for Network Definition Language (NDL) made by ANSI.

Generated complete application programs starting from a high-level nonprogrammer language interface.

- **Trends in the '80s:** Expert Database Systems, Object-oriented DBMS, client-server architecture for distributed databases.

Allowed new database applications, networking and distributed data management.

The '90s

- Demand for extending DBMS capabilities to meet new applications.
- Emergence of commercial object-oriented DBMSs.
- Demand for developing applications utilizing data from a variety of sources.
- Demand for exploiting massively parallel processors (MPPs).

DBMS features for spatial, temporal, and multimedia data, incorporating active and deductive capabilities.

Emergence of standards for data query and exchange (SQL2, PDES, STEP); extension of DBMS capabilities to heterogeneous and multi-database systems.

Improved performance of commercial DBMSs.