

IEEE Standard Glossary of Data Management Terminology

Circuits and Devices

Communications Technology

Computer

Sponsored by the
Standards Coordinating Committee of the
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IEEE Standard Glossary of Data Management Terminology

Sponsor
**Standards Coordinating Committee
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IEEE Computer Society**

Approved May 31, 1990
IEEE Standards Board

Abstract: IEEE Std 610.5-1990, *IEEE Standard Glossary of Data Management Terminology*, identifies terms currently in use in the field of Data Management. Standard definitions for those terms are established.

Keywords: Data management; glossary; terminology; definitions; dictionary

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Foreword

(This Foreword is not a part of IEEE Std 610.5-1990, IEEE Standard Glossary of Data Management Terminology.)

The computer field is continuing to expand. New terms are being generated and new meanings are being adopted for existing terms. The IEEE Computer Dictionary project was undertaken to document this vocabulary. Its purpose is to identify terms currently in use in the computer field and to establish standard definitions for these terms. The dictionary is intended to serve as a useful reference for those in the computer field and for those who come into contact with computers either through their work or in their everyday lives.

The completed dictionary will contain terms from thirteen areas: Computer Hardware, Software Engineering, Mathematics of Computing, Theory of Computation, Computer Applications, Artificial Intelligence, Data Management, Image Processing and Pattern Recognition, Modeling and Simulation, Computer Graphics, Computer Networking, Computer Security and Privacy, and Computer Languages. This glossary contains the terms related to Data Management.

Every effort has been made to use definitions from established standards in this dictionary. When existing standards were found to be incomplete, unclear, or inconsistent with other entries in the dictionary, however, new, revised, or composite definitions have been developed.

At the time this glossary was approved, the following people formed the Steering Committee of the Computer Dictionary working group:

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IEEE Standard Glossary of Data Management Terminology

1. Scope

This glossary defines terms in the field of Data Management. Every effort has been made to include all terms in this field. Terms were excluded if they were considered to be parochial to one group or organization, company proprietary or trademarked, multi-word terms whose meaning could be inferred from the definitions of the component words, or terms whose meaning in the computer field could be directly inferred from their standard English meaning.

2. Dictionary Structure

Entries in the dictionary are arranged alphabetically. An entry may consist of a single word, such as "data," or a phrase, such as "least significant character." Phrases are given in their natural order (least significant character) rather than in reversed order (character, least significant).

Blanks are taken into account in alphabetizing. They precede all other characters. Hyphens and slashes are alphabetized as blanks.

If a term has more than one definition, the definitions are numbered. The order of the definitions does not imply preference or frequency of use. In most cases, noun definitions are given first, followed by verb and adjective definitions as applicable. Examples and notes have been added to clarify selected definitions.

The following cross-references are used to show a term's relationship to other terms in the dictionary:

- *Contrast with* refers to a term with an opposite or substantially different meaning.
- *Syn* refers to a synonymous term.
- *See also* refers to a related term.
- *See* refers to a preferred term or to a term where the desired definition can be found.

3. References

In those cases in which a definition is directly quoted from an existing dictionary or glossary, the following references apply:

[610.2] IEEE Std 610.2-1987, *IEEE Standard Glossary of Computer Applications Terminology* (ANSI).¹

[1012] IEEE Std 1012-1986, *IEEE Standard for Software Verification and Validation Plans* (ANSI).

[1084] IEEE Std 1084-1986, *IEEE Standard Glossary of Mathematics of Computing Terminology* (ANSI).²

When the following drafts standards are approved and published they will become part of these references:

[P610.12] IEEE P610.12, Draft Glossary of Software Engineering Terminology.

[ANDIPS] ANSI X3, *American National Dictionary for Information Processing Systems*.³

[ANDIPS/ISO] Definitions found in [ANDIPS] above and approved for usage internationally as adopted by the International Organization for Standardization (ISO).

¹IEEE publications are available from the Service Center, the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

²This Standard will be renumbered as 610.1 when republished.

³This material is reproduced with permission from American National Standards Committee X3 Technical Report, *American National Dictionary for Information Processing Systems*, X3/TR1-82, copyright 1982 by the Computer Business Equipment Manufacturers Association (CBEMA), 311 1st Street NW, Suite 500, Washington, DC 20001. ANSI documents are available from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018.

4. Definitions for Data Management Terms

access. (1) The process of obtaining data from or placing data into a storage device. *Syn:* **storage access**. *See also:* **access method**; **access mode**.

(2) To obtain data from or place data into a storage device as in (1). *See also:* **direct access**; **indexed access**; **indexed sequential access**; **partitioned access**; **sequential access**.

access method. A method for logically structuring data so that the storage location of any specific data item is well-defined. *See also:* **basic access method**; **direct access method**; **queued access method**. *Syn:* **access technique**.

access mode. A technique that is used to access logical records within a file. *See also:* **direct access mode**; **file access mode**; **indexed sequential access mode**; **sequential access mode**.

access path. The manner in which related data items are linked to one another to permit access.

access technique. *See:* **access method**.

access type. *See:* **file access mode**.

accuracy control character. A control character used to indicate whether the data with which it is associated are in error, are to be disregarded, or cannot be represented on a particular device. *Syn:* **error control character**. [ANDIPS]⁴

ACK. Abbreviation for **acknowledge character**.

acknowledge character (ACK). (1) A transmission control character transmitted by a station as an affirmative response to the station with which the connection has been set up. [ANDIPS/ISO]

(2) A transmission control character transmitted by a receiver as an affirmative response to a sender. An acknowledge character may also be used as an accuracy control character. *See also:* **negative acknowledge character**. [ANDIPS]

⁴Acronyms in brackets correspond to those of the References in Section 3.

active data dictionary. A data dictionary that ensures its own consistency with a system by limiting the data items that may be used by a process to those that are defined in the data dictionary. *Syn:* **embedded data dictionary**. *Contrast with:* **passive data dictionary**.

active file. (1) A file that is in current use.

(2) A file with an expiration date that has not yet been reached.

actual key. A key that directly expresses the physical location of a logical record on a storage medium.

ad hoc (ad hoc). Pertaining to an item such as a computer program or database used for a particular and specific purpose; for example, an ad hoc query. *Note:* Usually the item is used for a relatively short time, then discarded.

ad hoc query. A query that is used for a particular and specific purpose. *Note:* Such a query is usually used once or twice, then discarded.

add. To insert a record into an existing file.

add file. A file containing records that are being added or are to be added to a master file.

add record. A record that is to be added or which has been added to a master file. *Contrast with:* **deletion record**.

address calculation sort. An insertion sort in which each of the items to be sorted is inserted into one of several lists, according to an address calculated from its value, and the resulting lists are then merged. *Syn:* **multiple list insertion sort**.

address table sorting. A sorting technique in which a table of addresses that point to the items to be sorted is manipulated instead of moving the items themselves. *See also:* **key sorting**; **list sorting**.

Adel'son-Velskii and Landis (AVL) tree. A height-balanced binary tree in which the difference in height of the two subtrees of

any node is at most 1. *Note:* Also referred to as a HB tree; a height-balanced 1-tree.

aggregate. *See:* data aggregate.

algebraic coding function. In hashing, a hash function that returns the result of evaluating some polynomial in which selected digits of the original key are used as coefficients. For example, in the function below, the first three digits of the original key are evaluated as a , b , and c , respectively, in the polynomial $a + b x + c x^2$ with $x=14$.

Original key	Calculation	Hash value
964721	$9 + 6(14) + 4(14)^2 = 877$	877
864765	$8 + 6(14) + 4(14)^2 = 876$	876

alias. *See:* alternate name.

alignment. Pertaining to data that are stored beginning at certain machine-dependent boundaries. Such data is said to be "aligned," otherwise it is said to be "unaligned;" for example, a four-bit data item is aligned if it begins on a full-word boundary of eight-bit words. *Syn:* boundary alignment.

alpha. (1) Abbreviation for alphabetic.
(2) * Deprecated abbreviation for alphanumeric.

alphabet. An ordered set of all the letters or symbols used in a language, including letters with diacritical signs where appropriate, but not including punctuation marks.

alphabetic. Pertaining to data that consist solely of letters from the same alphabet. For example, (AaBbCcDdEe...) plus the space character. *Syn:* alpha. *See also:* alphanumeric; character.

alphabetic character set. A character set that contains alphabetic characters and that may contain control characters, special characters, and the space character, but not digits.

alphabetic code. A code that uses alphabetic characters to represent data.

alphabetic shift. A control for selecting the alphabetic character set on an keyboard or

printer. *Contrast with:* numeric shift. *See also:* shift character.

alphabetic string. A character string consisting solely of alphabetic characters.

alphameric. Abbreviation for alphanumeric.

alphanumeric (alphameric). Pertaining to data that contain the letters of an alphabet (AaBbCcDdEeFfGgHh...), the decimal digits (0123456789), and may contain control characters, special characters and the space character.

alphanumeric character set. A character set that contains alphanumeric characters.

alphanumeric code. A code that uses alphanumeric characters to represent data.

alter. (1) To insert, delete, or modify a data record.
(2) To change a logical relationship or physical structure of a database. *See also:* modify.

alternate index. An index (2) that uses alternate keys to reference indexed data. *See also:* secondary index.

alternate key. (1) In a relation, a candidate key that is not chosen to be the primary key for that relation.
(2) A secondary key for an indexed sequential file. *See also:* alternate index; prime key.

alternate name. Any name besides the data element name by which a data item is known. *Note:* Often stored in data dictionaries. *Syn:* alias.

ancestor. Relative to a given node x within a tree, any node y for which x is a descendent node of y .

anomaly. In data management, an irregularity that arises when processing an improperly structured database. For example, in order to retrieve all the SUPPLIERS from the following database, one would have to search sequentially through all the PARTS

INVENTORY segments. This is said to be an *anomaly* (see Fig 1).

PARTS INVENTORY

PART NO.	NAME	INVENTORY AMOUNT	SUPPLIER NO.
----------	------	------------------	--------------

SUPPLIER

SUPPLIER NO.	NAME	ADDRESS	NO. ORDERED
--------------	------	---------	-------------

Fig 1
Anomaly

application. The use to which a computer system is put; for example, a payroll application, an airline application, or a network application.

application program. A computer program that is used for a specific application.

application view. *See:* logical database.

archival database. A copy of a database saved for later reference or use.

area. (1) A named collection of records within a database. *Note:* May contain occurrences of one or more record types, and a record type may have occurrences in one or more area. *Syn:* realm.

(2) In CODASYL, a part of a database that can be opened or closed as a unit. *Note:* This term was used in early CODASYL documents, but is now considered deprecated.

arithmetic. Pertaining to data that has the characteristics of base, scale, mode, and precision. *Note:* Used to represent numbers. *See also:* binary picture data; coded arithmetic data; decimal picture data; numeric data. *Contrast with:* string.

array. An n -dimensional ordered set of data items identified by a single name and one or more indices, so that each element of the set is individually addressable. *See also:* linear array. [P610.12]

association. In data management, a relationship established in a data model to represent a connection between entities that is not reflected solely by the attributes inherent in the entities.

associative lookup. Table lookup performed on a table that is stored in associative memory.

atomic condition. The basic qualification condition in a query, consisting of the name of a data item, a logical operation, and a value; for example, LASTNAME = 'Jones.' *See also:* item condition; query condition; record condition.

atomic data element. A data element that cannot be broken into constituent data elements. *Contrast with:* composite data element.

attribute. (1) A characteristic of an item; for example, the item's color, size, or type. *See also:* data attribute. [P610.12]

(2) In a relation, a named characteristic, property, or description of an entity. *Note:* Also known as data element, data field, data item or column in a table. *See also:* column. *Syn:* data field.

attribute data element. A data element within a record that represents a property, feature, or characteristic of the subject of that record; for example, the data element "date of birth" in a record containing "name," "address," and "date of birth" of a person. *Contrast with:* primary data element.

automated data medium. *See:* machine-readable medium.

automatic check. A check that is built into a device in order to verify the accuracy of information transmitted, manipulated, or stored by that device. *Syn:* built-in check; hardware check.

AVL tree. Acronym for Adel'son-Velskii and Landis tree. A height-balanced binary tree. *Note:* Also referred to as a HB tree; a height balanced 1-tree.

B-tree (B tree). (1) A height-balanced search tree of order n in which each node contains

keys $\{k_1, k_2, \dots, k_m\}$ in ascending order, where $m \leq n - 1$. The i -th subtree of that node contains all the key values falling between k_{i-1} and k_i , with the first subtree containing all key values less than k_1 and the last subtree containing all key values greater than k_m . For example, in the B-tree in Fig 3 below, the lowest nodes contain "values less than 10," "11-19," "20-44," "45-59," and "values greater than 60," respectively. *Note:* The height balance of a B-tree is zero. *Syn:* B-tree index. *See also:* B'-tree; B*-tree.

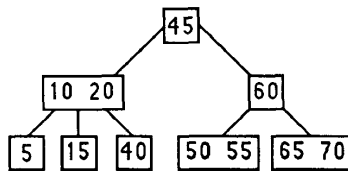


Fig 2
B-Tree of Order 3

(2) A B-tree as in (1) in which every nonterminal node except the root has at least $n/2$ subtrees. *Note:* When a node overflows, it is split into two separate nodes, with the parent node updated accordingly.

* (3) *See:* binary tree.

* Deprecated.

B'-tree. A modified B-tree in which identifiers for all nodes are stored in terminal nodes.

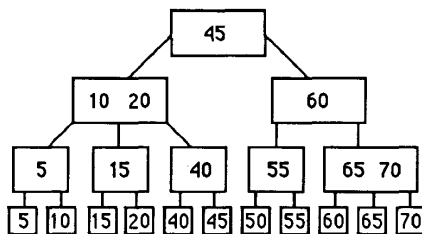


Fig 3
B*-Tree of Order 3

B*-tree. A B-tree in which the root node has between 2 and $2+1$ descendants, and each remaining node has between $(2m-1)/3$ and m descendants. That is, two-thirds of the available space in each node is used. *Note:* When a node overflows, keys from that node

are moved into one of its sibling nodes if possible; otherwise the node, together with one of its sibling nodes, is split into three nodes.

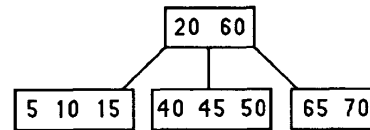


Fig 4
B*-Tree of Order 3

B-tree index. *See:* B-tree.

back out. *See:* rollback.

backspace character (BS). A format effector character that causes the print or display position to move one position backward along the line without producing the printing or display of any graphic.

backup (back-up). (1) A system, component, file, procedure, or person available to replace or help restore a primary item in the event of a failure or externally-caused disaster. [P610.12]

(2) To create or designate a system, component, file, procedure, or person as in (1). [P610.12]

backward recovery. The reconstruction of a file to a given state by reversing all changes made to the file since it was in that state. *Contrast with:* forward recovery; inline recovery. [P610.12]

balanced merge. A merge in which the subsets to be merged are equally distributed among half of the available storage, then the subsets are merged onto the other half of storage. *Contrast with:* unbalanced merge.

balanced merge sort. A merge sort in which the sorted subsets created by internal sorts are equally distributed among half of the available storage, the subsets are merged onto the other half of the available storage, and this process is repeated until all the items are in one sorted set. *Contrast with:* unbalanced merge sort.

balanced tree. *See:* **height-balanced tree.**

BAM. Acronym for **basic access method.**

base relation. A relation that is not derivable from other base relations in a given database. *Contrast with:* **derived relation.**

basic access method (BAM). An access method in which each input or output statement invokes a corresponding machine operation. For example, when reading a file with 10 records, exactly 10 READ operations will be invoked. *Contrast with:* **direct access method; queued access method.** *See also:* **basic direct access method; basic indexed sequential access method; basic partitioned access method; basic sequential access method.**

basic direct access method (BDAM). A variation on the basic access method that allows direct access to the data.

basic indexed sequential access method (BISAM). A variation on the basic access method that allows indexed sequential access to the data. *See also:* **queued indexed sequential access method.**

basic partitioned access method (BPAM). A variation on the basic access method that allows partitioned access to the data.

basic sequential access method (BSAM). A variation of the basic access method that allows sequential access to the data. *See also:* **indexed sequential access method; queued sequential access method; virtual sequential access method.**

Batcher's parallel sort. A merge sort in which corresponding items in two ordered subsets are simultaneously compared and, if necessary, exchanged; the resulting subsets are divided in half and interleaved with one another, and these steps are repeated until the merge is complete. *Note:* This algorithm is particularly appropriate for parallel processing. *Syn:* **merge exchange sort; odd-even sort.** *See also:* **bitonic sort.**

BCD real data. Acronym for **binary-coded decimal real data.**

BCNF. Acronym for **Boyce/Codd normal form.**

BDAM. Acronym for **basic direct access method.**

BEL. Abbreviation for **bell character.**

bell character (BEL). A control character that is used when there is a need to call for human attention and that may activate an alarm or other attention devices. [ANDIPS/ISO]

binary. (1) Pertaining to a selection in which there are two possible outcomes. [1084]
(2) Pertaining to the numeration system with a radix of two. [1084]

binary chop. * *See:* **binary search.**
* Deprecated.

binary code. A code that uses exactly two distinct characters, usually 0 and 1, to represent data or instructions.

binary coded decimal (BCD) real data. A technique for assigning numeric characters such that each decimal digit is represented by a unique arrangement of binary digits with an implied radix point at a specified position.

decimal	163.3 ₁₀
BCD real	0001 0110 0011 . 0011 ₂

binary coded decimal character set. A character set containing all 64 characters that can be represented as permutations of six bits.

binary data. Numeric data used to represent binary digits. *See also:* **binary picture data; fixed-point binary data; packed binary data.**

binary digit (bit). (1) A unit of information that can be represented by either a zero or a one. [P610.12]
(2) An element of storage that can hold a unit of information as in (1). [P610.12]
(3) A numeral used to represent one of the two digits in the binary numeration system; zero (0) or one (1). *See also:* **binary element; byte; word.** [P610.12]

binary digit character. A character within a picture specification that represents a binary digit.

binary element. A data element that can assume either of two possible values or states. *See also:* **binary digit**. [1084]

binary insertion sort. An insertion sort in which each item in the set to be sorted is inserted into its proper position in the sorted set using a binary search algorithm. *Contrast with:* **two-way insertion sort**.

binary picture data. Arithmetic data that is associated with a picture specification that allows binary digit characters, a radix point, exponent characters, and sign characters. *Syn:* **numeric bit data**. *Contrast with:* **decimal picture data**.

binary radix trie search. A radix trie search using a binary trie in which only one bit is considered on each branch. *See also:* **multi-way radix trie search**.

binary relation. A relation with two attributes.

binary search. A dichotomizing search in which, at each step of the search, the remaining set of items is partitioned into two equal parts. *Syn:* **binary chop**; **bisection**; **logarithmic search**. *Contrast with:* **fibonacci search**; **interpolation search**. *See also:* **binary search tree**; **binary tree search**.

binary search tree. A search tree of order 2.

binary tree. A tree in which each nonterminal node has at most two subtrees. *Note:* B tree is sometimes used incorrectly in reference to a binary tree. This usage is considered deprecated. *See also:* **binary search tree**; **complete binary tree**; **full binary tree**; ***n*-ary tree**; **weight-balanced tree**.

binary tree search. A search in which the items in the set to be searched are placed in a binary tree, and the tree is traversed making key comparisons until the argument is found, or the end of the tree is encountered. *See also:* **binary search**; **digital tree search**.

BISAM. Acronym for **basic indexed sequential access method**.

bisection. *See:* **binary search**.

bit. Acronym for **binary digit**.

bit string. A sequence of binary digits; for example, the bit string 0101001. *See also:* **character string**.

bitonic merge. *See:* **bitonic sort**.

bitonic sort. A variation on Batchier's parallel sort in which one of the two ordered subsets begins in reverse order and the items to be compared and exchanged are selected from the same subset. *Syn:* **bitonic merge**.

blank character. A graphic representation of the space character. [ANDIPS]

block. (1) A group of contiguous storage locations, computer program statements, records, words, characters, or bits that are treated as a unit. *Syn:* **data block**. [P610.12]
(2) To form a group as in (1). *Contrast with:* **deblock**. [P610.12]

block gap. **See:* **interblock gap**.
* Deprecated.

block length. The number of units in a block. *Syn:* **block size**.

block overhead. Any information, besides the actual data, that is stored with a block; for example, the size and location of the records within the block is considered overhead. *See also:* **loading factor**.

block size. *See:* **block length**.

blocked record. A record that is contained in a block that contains at least one other record. *See also:* **spanned record**; **unblocked record**.

blocking. The process of creating a block from one or more records. [P610.12]

blocking factor. The number of logical records in a block.

bonding. A technique used in database design, in which two or more data items are defined and physically stored together; for example, one might bond data items FIRST-NAME and LAST-NAME.

bottom. (1) In a queue, the position of the item that has been in the queue for the shortest time.

(2) In a stack, the position of the item that has been in the stack for the longest time.
Contrast with: **top**.

boundary alignment. *See:* **alignment**.

Boyce/Codd Normal form (BCNF). Developed by R. F. Boyce and E. F. Codd, one of the forms used to characterize relations; a relation is said to be in Boyce/Codd Normal form if every determinant in the relation is or contains a candidate key; that is, no attribute is transitively dependent on any key. *Note:* This is an extension of third normal form.

BPAM. Acronym for basic partitioned access method.

branch. In data management, a synonym for subtree.

branch node. *See:* **nonterminal node**.

brother. *See:* **sibling node**.

BS. Acronym for the backspace character.

BSAM. Acronym for basic sequential access method.

bubble sort. An exchange sort in which adjacent pairs of items are compared and exchanged, if necessary, and all passes through the set proceed in the same direction. *Syn:* **exchange selection sort**; **propagation sort**; **sifting sort**. *Contrast with:* **cocktail shaker sort**.

bucket. (1) An area of storage that may contain more than one record and that is referenced as a whole by some addressing technique.
(2) In hashing, a section of a hash table that can hold all records with identical hash values.

buffer. (1) A device or storage area used to store data temporarily to compensate for differences in rates of data flow, time of occurrence of events, or amounts of data that can be handled by the devices or processes involved in the transfer or use of the data.

Syn: **input buffer**; **input/output area**; **output buffer**. [P610.12]

(2) To allocate, schedule, or use devices or storage areas as in (1). [P610.12]

buffer pool. A collection of buffers that can be allocated and used as needed.

buffer storage. A storage device that is used as a buffer. *Syn:* **buffer store**.

buffer store. *See:* **buffer storage**.

buffered input. Input that is received using buffers.

built-in check. *See:* **automatic check**.

byte. (1) A group of adjacent binary digits operated upon as a unit and usually shorter than a computer word (frequently connotes a group of 8 bits). [1084]

(2) An element of computer storage that can hold a group of bits as in (1). [P610.12]

calc algorithm. *See:* **hash function**.

calc chain. *See:* **collision chain**.

CAN. Abbreviation for the **cancel character**.

cancel character (CAN). (1) A control character used by some convention to indicate that the data with which it is associated are in error or are to be disregarded. *Syn:* **ignore character**. [ANDIPS/ISO]

(2) An accuracy control character used to indicate that the data with which it is associated are in error or are to be disregarded. [ANDIPS]

candidate key. In a relational data model, any minimal set of attributes within a relation that forms a key that is a determinant of all attributes in the relation. *Note:* In normalization, one of the candidate keys of each relation is chosen as the primary key and the others are known as alternate keys.

See also: **compound key**.

canonical model. A data model that represents the inherent structure of the data, independent of any specific implementations.

canonical synthesis. A technique for generating a canonical model from the relations in a database.

cardinality. (1) The number of elements in a set.
(2) In a relational data model, the number of tuples in a relation.

carriage return character (CR). A format effector that causes the print or display position to move to the first position on the same line. *Syn:* **new-line character**. [ANDIPS/ISO]

cascade merge sort. An unbalanced merge sort in which the distribution of the sorted subsets is based on the cascade numbers. *See also:* **polyphase merge sort**.

catalog (catalogue). (1) A directory of the location of files within a system. *See also:* **file directory**.
(2) The set of all indices used to reference a file, database, or system.
(3) The index to all other indices. *Syn:* **master index**.
(4) To enter information about a file, database, or system as in (1) and (2).

catenate. *See:* **concatenate**.

cell. *See:* **data element; data item**.

chain. (1) *See:* **circularly-linked list**.
(2) **See:* **linked list**.
* Deprecated.

chain field. *See:* **link field**.

chained list. *See:* **linked list**.

chaining. A method for storing records in which each record has a link field that is used to access subsequent records.

chaining search. A search in which each item contains a means for locating the next item

to be considered in the search.

character. A letter, digit, or other symbol that is used to represent data. *See also:* **alphabetic; alphanumeric**. [1084]

character code. A code that uses unique numeric values to represent character data; for example, in ASCII the hexadecimal value 40 is used to represent the character "@."

character fill. To insert into a storage medium, as often as necessary, the representation of a specified filler character that does not itself convey data but that may delete unwanted data or initialize storage. *See also:* **zero fill**.

character set. (1) The set of all characters that is defined for a given system. [1084]
(2) A finite set of unique characters upon which agreement has been reached and that is considered complete for some purpose; for example, all the letters, numbers, and symbols used in a language.
(3) A finite set of unique representations called characters, made to denote and distinguish data; for example, the 26 letters of the English alphabet; 0 and 1 of the boolean alphabet; the set of signals in the Morse code alphabet; and the 128 ASCII characters. *See also:* **alphabetic character set; alphanumeric character set; coded character set; numeric character set**.

character string. A sequence of characters; for example, the character string 72ZABC. *See also:* **bit string**.

character string picture data. Picture data that is associated with a picture specification that specifies at least one alphanumeric character.

character variable. A variable that may assume values of any character within some character set.

character-deletion character. A character within a line of terminal input specifying that it and the immediately preceding character are to be removed from the line; for example, if "\ " is the character-deletion character in the string "ABD\C," the follow-

ing would appear on the terminal: "ABC."
See also: **line-deletion character**.

check. To verify the accuracy of data transmitted, manipulated, or stored by any unit or device in a computer. *See also:* **automatic check; check character; check key; consistency check; echo check; sequence check**.

check character. (1) A character used for the purpose of performing a check.
(2) A single character from a check key.

check key. A key that is used for the purpose of performing a check; for example, in the following example the check key is equal to the sum of the first and last digit in field x ; this check key could be used to ensure that field x is accurate and complete.

record number	field x	check key
1	0125	5
2	1136	7
3	2228	10

check problem. A test or problem that is chosen to determine whether an operations or computer program is operating properly.

child node. In a tree, a descendant node having a given node as its parent node. *Syn:* **daughter; son**. *Contrast with:* **parent node**. *See also:* **sibling node**.

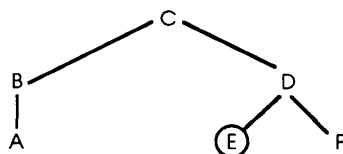


Fig 5
E is a Child Node of Node D

child segment. In a hierarchical database, a segment that has a parent segment and that is dependent on that segment for its existence. *Note:* If the parent segment is deleted, the child segment must be deleted. *Contrast with:* **parent segment**. *See also:* **dependent segment; logical child segment; physical child segment; twin segment**.

circular list. *See:* **circularly-linked list**.

circularly-linked list. A linked list in which the last item contains a pointer to the first item. *Syn:* **chain; circular list; ring**.

coalesce. To combine two or more sets into one set. *See also:* **collate; merge**.

cocktail shaker sort. An exchange sort in which adjacent pairs of items are compared and exchanged, if necessary, and alternate passes through the set proceed in opposite directions. *Contrast with:* **bubble sort**.

CODASYL. Acronym for **Conference on Data Systems Languages**. An organization that establishes standards for database structures.

CODASYL database. A database that adheres to the standards established by the Database Task Group of CODASYL. *Note:* A network database is generally accepted to be synonymous with a CODASYL database.

CODASYL model. A network database model defined by the CODASYL organization. The CODASYL model is based on sets that are used to specify associations between different record types that exist in a database. *Syn:* **flex model**.

CODASYL set. *See:* **set**.

code. (1) A set of rules used to convert data from one form of representation to another. *Syn:* **coding scheme; data code; data element tag**.

(2) Data that have been converted from one form of representation to another, using a set of rules as in (1). *See also:* **code set; coded representation; symbol**. *Syn:* **encoded data**.

(3) Data that have been expressed in symbolic form.

(4) A character or bit pattern that is assigned a particular meaning; for example, a status code.

(5) To convert data from one form of representation to another, using a set of rules as in (1). *See also:* **decode; encode**.

(6) To represent data in symbolic form. [1084]

(7) * *Syn:* **code set**.

* Deprecated.

code converter. A device or system that changes the representation of data from one code to another.

code extension character. Any control character used to indicate that one or more of the succeeding coded representations are to be interpreted according to a different code or according to a different coded character set. [ANDIPS/ISO]

code set. The complete set of coded representations used by a particular code. For example, the set of three-letter codes used to represent airports.

code value. *See:* **coded representation.**

code-decode table. A table that identifies a correspondence between encoded and decoded data items. *Syn:* **encode-decode table; look-up table.**

coded arithmetic data. Data stored in a form that is acceptable for arithmetic calculations without conversion to an intermediate form; for example, data stored in integer form.

coded character set. A set of characters for which coded representations exist. *Syn:* **coded representation; code set.**

coded representation. The result of applying a code to a particular item of data. For example, the designation ORY for Paris International Airport, obtained by applying the international three-letter code for airports. *Syn:* **code value.** *See:* **coded character set.**

coding scheme. *See:* **code (1).**

collate. To arrange items from two or more ordered subsets into one or more other subsets. The resulting subsets will commonly contain at least one item from each of the original subsets and may be ordered in some specified order that is not necessarily the order of any of the original subsets. *See also:* **coalesce; collating sequence (1); merge.** *Contrast with:* **decollate.**

collating sequence. (1) A sequence assigned to a set of items such that any two sets that are in that assigned order can be collated.

(2) A specified arrangement of the items in a set used in sequencing. *Syn:* **sequence (5).**

(3) * *See:* **order (2).**

* *Deprecated.*

collating significance. Any attribute of a set that may be used to define a specified arrangement to be used in collating.

collision. In hashing, the occurrence of the same hash value for two or more different keys. *Syn:* **hash clash.** *See also:* **synonym.**

collision chain. A list used in hashing to hold all the keys for which the hash address is identical. *Syn:* **calc chain.**

collision resolution. In hashing, the process of applying further calculations or other means to resolve a collision. Methods include open-address hashing, separate chaining, and the use of buckets. *Syn:* **rehashing.**

column. A vertically corresponding set of entries in a table. *See also:* **attribute (2).** *Contrast with:* **row.**

column sort. *See:* **distribution sort.**

column vector. A matrix with only one column. That is, a matrix of size m -by-1. *Contrast with:* **row vector.**

column-major order. A method for storing the elements of a matrix in computer memory, in which elements are ordered in a column-by-column manner, that is, all elements of column 1, followed by all elements of column 2, etc. *Contrast with:* **row-major order.**

combination. An unordered sequence of items chosen from a set. *See also:* **forbidden combination.** *Contrast with:* **permutation.**

command character. *See:* **control character.**

commercial character. (1) One of the set of characters used commonly in commercial operations; for example, CR (credit) and DB (debit).

(2) A character within a picture specification that represents one of the characters as in (1).

communication control character. *See:* **transmission control character.**

compare. To examine two items to determine their relative magnitudes, their relative positions in a given sequence, or whether they are identical.

comparison. (1) The process of examining two or more items for identity, similarity, equality, relative magnitude, or for order in a sequence.
(2) The result of such an examination as in (1).

complete binary tree. A complete tree of order 2. *Note:* The nodes in the tree can be read sequentially from left to right; top to bottom. *Syn:* **full binary tree.**

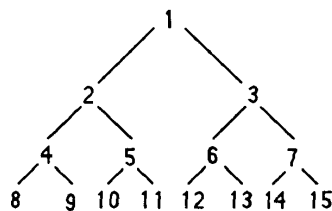


Fig 6
Complete Binary Tree

complete tree. A tree of order n in which each node has exactly n subtrees. *Syn:* **full tree.** *See also:* **heap.**

complex data. Numeric data used to represent complex numbers.

complex data structure. *See:* **nonprimitive data structure.**

complex number. A number consisting of a real part (a) and an imaginary part (b), expressed in the form $a + bi$, where $i^2 = -1$. [1084]

component data element. A component of a data structure. *Syn:* **component element; element.**

component element. *See:* **component data element.**

composite data element. A data element that contains two or more data elements that can be referred to either collectively or individually; for example, a data element named "date of birth" containing data elements "year," "month," and "day." *See also:* **data aggregate.** *Syn:* **data chain; molecular data element.** *Contrast with:* **atomic data element.**

compound key. A candidate key consisting of more than one attribute.

compound list. *See:* **list structure.**

computational data. *See:* **fixed-point data.**

computer program. A combination of computer instructions and data definitions that enable computer hardware to perform computational or control functions.

computer word. *See:* **word.**

concatenate. To append one item to the end of another so as to form a single unit in a contiguous pattern. For example, if we concatenate 'AP' with 'PLE,' the result is 'APPLE.' *Syn:* **catenate.**

concatenated key. (1) A key derived from the concatenation of two or more keys. *Syn:* **fully concatenated key; multifield key.**
(2) A concatenation of the keys for the first N segments found in a hierarchical path. For example, in the structure below, the concatenated key for segment x is "AFINANCE006."

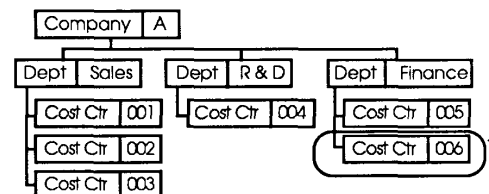


Fig 7
Concatenated Key

conceptual data definition language. A data definition language used to describe the format layout and contents of all data stored in a database, the result of which is a concep-

tual schema. *Note:* May also include authorization levels and validation procedures.

conceptual design. The process of developing a conceptual schema for a database.

conceptual model. *See:* **conceptual schema.**

conceptual record. A record within a conceptual view.

conceptual schema. (1) A description of the format and layout of the entire data contents of a database. *Note:* The schema is written using a conceptual data definition language. It may include authorization levels and validation procedures.

(2) The comprehensive, logical description of the information environment in which an enterprise exists, free of both the physical structure and application systems considerations. *Syn:* **conceptual model; enterprise view.** *Contrast with:* **external view; internal schema.**

conceptual view. The format and layout of the entire data content of a database, as described in a conceptual schema. *Note:* There may be many external views of a database, but only one conceptual view.

concurrent reorganization. Database reorganization in which users have access to the reorganized portion of the database while one or more reorganization processes are modifying other portions of the database.

condition. *See:* **atomic condition; item condition; qualification condition; query condition; record condition.**

Conference on Data Systems Languages (CODASYL). The organization that establishes industry standards for database structures.

conjunction. (1) The logical 'AND' operator.
(2) The result of joining two conditions by the logical 'AND' operator. *Contrast with:* **disjunction.** *See also:* **conjunctive query.**

conjunctive query. A database query formed by using one of the logical operators 'AND' and 'OR.'

consecutive spill method. *See:* **linear probing.**

consistency check. A check that verifies that an item of data is compatible with certain rules specified for that data. For example, one might wish to check the consistency between two data elements ORDER-DATE and DELIVER-DATE such that DELIVER-DATE may not be earlier than ORDER-DATE. *See also:* **crossfooting check; limit check; range check; validity check.**

containment. The result of placing all occurrences of a repeating group within the same logical record.

control character. (1) A character whose occurrence in a particular context initiates, modifies, or stops a control operation. A control character may be recorded for use in a subsequent action, and it may have a graphic representation in some circumstances. *See also:* **accuracy control character; device control character; print control character; transmission control character.** *Syn:* **command character; functional character; instruction character; operational character.**

(2) A character that initiates some kind of physical control action but is not printed on the output page. For example, line feed, tab, form feed.

control total. *See:* **hash total.**

controlled list. (1) A list whose access is controlled in some way; for example, access to an array is controlled by its index variable.
(2) A list that can contain a finite number of entries.

controlled list data element. A data element that is contained in a controlled list.

converse inorder traversal. The process of traversing a binary tree in a recursive fashion as follows: the right subtree is traversed, then the root is visited, then the left subtree is traversed. *Contrast with:* **converse postorder traversal; converse preorder traversal.** *See also:* **inorder traversal.**

converse postorder traversal. The process of traversing a binary tree in a recursive fashion as follows: the left subtree is traversed, then the root is visited, then the right subtree is traversed. *Contrast with:* **inorder traversal; preorder traversal.**

ion as follows: the right subtree is traversed, then the left subtree is traversed, then the root is visited. *Contrast with:* **converse inorder traversal**; **converse preorder traversal**. *See also:* **postorder traversal**.

converse preorder traversal. The process of traversing a binary tree in a recursive fashion as follows: the root is visited, then the right subtree is traversed, then the left subtree is traversed. *Contrast with:* **converse inorder traversal**; **converse postorder traversal**. *See also:* **preorder traversal**.

CR. (1) Acronym for the **carriage return character**.

(2) Abbreviation denoting the symbol for "credit."

cross-index. A link between two files containing related data. For example, in a library, the subject card catalog is a cross-index for the title and author card catalogs. *See also:* **cross-indexed file**; **inverted file**.

cross-indexed file. A file whose contents are linked with another file through a cross-index. *See also:* **inverted file**.

cross-indexing. (1) The process of linking entities in two files to facilitate searches performed on data contained in those files. *See also:* **cross-indexed file**.

(2) A method of linking entities as in (1).

crossfooting check. A consistency check in which two totals obtained by adding the same set of numbers in different sequences are compared.

currency symbol character. A character within a picture specification that represents the currency sign. *Note:* \$ is commonly used.

DA. Acronym for **data administrator**.

DAM. Acronym for **direct access method**.

data. (1) Anything observed in the documentation or operation of software that deviates from expectations based on previously verified software products or reference documents. [P610.12, 1012]

(2) A representation of facts, concepts, or in-

structions in a manner suitable for communication, interpretation, or processing by humans or by automatic means. *Note:* "Data" is plural for datum, but is often used as a collective noun, as in "The data is in this file." *See also:* **data type**; **logical data**; **null data**; **numeric data**; **pointer data**. [P610.12]

data administrator (DA). An individual who is responsible for the definition, organization, supervision, and protection of data within some organization. *See also:* **database administrator**.

data aggregate. A collection of two or more data items that are treated as a unit. *See also:* **composite data element**. *Syn:* **aggregate**; **group item**.

data attribute. A characteristic of a unit of data.

data bank. (1) A collection of data libraries. *Note:* A record contains one or more items, a file contains one or more records, a library contains one or more files, and a data bank contains one or more libraries.

(2) A collection of data relating to a particular subject area. *Note:* The data may or may not be machine-readable.

data block. *See:* **block**.

data carrier. Material that serves as a data medium or to which a data medium is applied and that facilitates the transport of data; for example, a punch card, a disk, or a plastic card with a magnetic surface that serves as the data medium. *See also:* **data medium**.

data chain. *See:* **composite data element**.

data code. *See:* **code**.

data compaction. Any technique used to encode data in order to reduce the amount of storage it requires. *Contrast with:* **data compression**.

data compression. Any technique used to reduce the amount of storage required to store data. *Contrast with:* **data compaction**.

data conversion. To change data from one form of representation to another; for example, to convert data from an ASCII representation to an EBCDIC representation.

data definition. A description of the format, structure, and properties of a data item, data element, or data structure.

data definition language (DDL). (1) A language for describing the organization of data within a database. *Note:* In some software, the logical organization is described; in some, both the logical and physical organizations are described.

(2) A language used to describe the logical structure of a database. *Syn:* data description language; database description language; database descriptive language; schema definition language; schema language. *Contrast with:* data manipulation language. *See also:* database manipulation language; subschema data definition language.

data density. The amount of data that can be stored in one unit of data medium. For example, the number of bits stored in an inch of magnetic tape medium.

data description language. *See:* data definition language.

data dictionary. A collection of entries specifying the name, source, usage, and format of each data element used in a system or set of systems. *See also:* data directory. *Syn:* data element dictionary.

data dictionary system. A software system that maintains and manages a data dictionary.

data dictionary/directory (DD/D). *See:* data dictionary; data directory.

data directory. A collection of entries specifying the data name, source, location, ownership, usage and format of each data element used in some system or set of systems. *See also:* data dictionary.

data element. (1) A uniquely named and defined component of a data definition; a data

“cell” into which data items (actual values) can be placed. For example, the data element AGE, into which data items 1, 2, ... can be placed. *Note:* The terms **data element** and **data item** are often used interchangeably or with the reverse definitions from those given here. No standard of use exists at this time. *Syn:* cell.

(2) A data definition as in (1) that cannot be divided into other individually named data definitions. *See also:* attribute; data item.

data element dictionary. *See:* data dictionary.

data element tag. *See:* code.

data entry. To input data into a computer system.

data exchange. (1) The use of data by more than one computer program or system. *See also:* data interchange; exchange data.

(2) The movement of data between two or more programs or systems.

data field. *See:* attribute.

data file. *See:* file.

data glossary. A collection of entries specifying a data definition and a specification of its uses.

data hierarchy. A set of directed relationships between two or more units of data, such that each unit has one and only one owner. *See also:* hierarchy.

data independence. The degree to which the logical view of a database is immune to changes in the physical structure of the database.

data integrity. The degree to which a collection of data is complete, consistent, and accurate. *See also:* data security; database integrity; integrity. *Syn:* data quality.

data interchange. The use of data by two or more different systems. *See also:* data exchange.

data item. A value contained in a data element; for example the data element AGE