Database Design Appendix C, app3.tex This file is ©1977 and 1983 by McGraw-Hill and ©1986, 2001 by Gio Wiederhold.

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Appendix C Symbols Used

Mathematical Symbols Used

[]	CEIL, next higher integer
	FLOOR, next lower integer
\approx	approximately equal
ü.	much greater than
!	factorial
#	number of
$\log_y x$	logarithm base y of x
$\log x$	natural logarithm of x , base $e = 2.71828182846$
$\sum_{k} f(k)$	sum of all $f(k)$ for the integer k's specified
\ominus	one of the comparison operators $> \ge = \neq \le <$
\wedge	and, true if both sides are true
\vee	or, true if either side is true
	where, precedes a conditional clause
\cap	set intersection
U	set union
—	set difference
×	cartesian product
<u>_</u>	select tuples from a relation
Π	project attributes from a relation
\bowtie_{i}	join two relations based on equality of the attributes a, b
	reference connection
*	ownership connection
\rightarrow	subset connection
\subset	subset of
E	member of
\forall	for all
\Rightarrow	becomes
{ }	enclose a set
Ì Ĵ	enclose a reference

Programming and Syntax Symbols As Used

In general we follow the convention of PL/1, a language originally developed by IBM to serve both scientific and commercial programming tasks. Some examples use Ada. a language sponsored by the US Defense department, COBOL, a widely used commercial language, and Pascal, a popular language for teaching.

a + b	addition
a - b	subtraction
a * b	multiplication
a/b	division
MOD(a,b)	modulo, integer remainder of division
a ** b	exponentiation, a to the power b
a = b	depending on context in PL/1, assignment or equality comparison
a > b	greater than comparison, true if a greater than b
a > b	greater or equal comparison, true if a greater or equal to b
$a \wedge b$	and, true if both a , b true (& in PL/1)
a∨b	or, true if either a, b true (in PL/1)
¬ C	not, true if c false and vice versa (\neq in Ada, Pl/1)
s w	catenation, string w appended to string s (& in Ada)
s c	where, do \mathbf{s} if the predicate (conditional) clause \mathbf{c} is true
RIJS	union of relations R and S
RŇS	intersection of relations R and S
$R \times S$	cross product of relations R and S
R — S	difference, remove tuples matching S from R
⊆R.ex	select tuples of R according to expression ex
∏ R.a	projection of attributes a of R
R.a⊠S.b	Join R and S, on equality of attribute values in a and b
R.al 🖂 S.b	Outerjoin including all tuples
,	field separator
:>	key and goal fields separator
;	statement separator
	termination of computational section
ss,	section ss may be repeated
[ss]	section ss is optional
{ss/tt}	sections ss, tt are alternatives
::=	is defined by
/* Note */	explanatory comments
a.b	qualification of variable b by a higher-level variable a ,i.e., employee.name
"Word"	character string constant
_	(underline) pseudo-alphabetic character without syntactic meaning used for
	legibility within variable names. (In COBOL – is used for this function.)

Database Design

Variables Used in Performance Formulas

anumber of different attributes in a fileSec. 3-1-1a'average number of attributes in a recordSec. 3-1-1, 3-6-3BblocksizeSec. 2-22bblock transfer time = B/t Eq. 2-13Bfrblock transfer time = B/t Eq. 2-17, 2-20CCost factorsSec. 2-2, 2dcost factorsSec. 2-2, 2dcost factorsSec. 2-3, 4Dspace required for dataEq. 5-1, Sec. 5-3, 3dnumber of records that have been invalidatedSec. 3-1-3Fsubscript denoting a fetch for a specific recordSec. 3-0, 2dspace required for an interblock gapSec. 2-2, 3hclassification variableSec. 3-4-31subscript denoting insertion of a recordSec. 3-4-31subscript denoting insertion of a recordSec. 2-2, 5KKilo or thousand (1024) timesSec. 2-2, 5knumber of racks per cylinderSec. 2-2, 5Mmultiprogramming factorEq. 5-11, 7-3-3Mmultiprogramming factorSec. 3-1-3, 3-2-3, 3-3-3, 3-5-3nsubscript denoting gitting the next serial recordSec. 3-1-2, 3-2-3nnumber of records that overflowSec. 3-1-3, 3-2-3, 3-3-3, 3-5-3pspace required for a oppleterSec. 2-2, 5-4 to 5-6nspace required for a oppletionEq. 5-2, 5-4 to 5-6nspace required for a oppleterSec. 2-2, 2-3nsubscript denoting an the toverflowSec. 3-1-3, 3-2-3, 3-3-3, 3-5-3 </th <th>A</th> <th>average space required for attribute name</th> <th>Sec. 3-1-3</th>	A	average space required for attribute name	Sec. 3-1-3
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Ysubscript denoting a reorganization of a file $= 1.0 \pm 2.4, 0 \pm 2.6, 0 \pm 0.6, 0 \pm 0.6$	x	number of levels in an index structure. master leve	1 Eq. 3-27, 3-49, 3-97
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