

ERRATA
for
Database System Concepts, 5th Edition
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ERRATA FOR FIRST PRINTING:

Chapter 1

Page 15, Para 1, Line 6: “.. employee a set ..” → “.. employ a set ..”

Page 17, bullet 3: “among a member from each of” → “among members from each of”.

Page 18, last para, Line 2: “that that” → “that”

Chapter 2

Page 57, Para 1:

$$r \bowtie s = \Pi_{R \cup S} (\sigma_{r.A_1 = s.A_1 \wedge r.A_2 = s.A_2 \wedge \dots \wedge r.A_n = s.A_n} (r \times s))$$

→

$$r \bowtie s = \Pi_{R \cup S} (\sigma_{r.A_1 = s.A_1 \wedge r.A_2 = s.A_2 \wedge \dots \wedge r.A_n = s.A_n} (r \times s))$$

Page 58, Caption of Figure 2.22:

“Result of $\Pi_{branch_name}(\sigma_{branch_city = \text{“Brooklyn”}}(branch))$.”
→ “Result of $\Pi_{branch_name}(\sigma_{branch_city = \text{“Brooklyn”}}(branch))$.”

Page 62: The last-but-one paragraph in this page (starting with “There are cases ..”) should be moved above the query $\mathcal{G}_{\text{count-distinct}(branch_name)}(pt_works)$

Page 67: “If the resultant multiset is empty, the aggregate result is null.” → “If the resultant multiset is empty, the aggregate result is null, except for the count operation, whose result is 0.”

Page 68, Section 2.6.1, para 1, last line: “ E is a relational-algebra query.” → “ E is a relational-algebra expression.”

Page 71, Column 2, Line 1: “Division /” → “Division \div ”

Chapter 3

Page 76, lines 2 and 3: “(2)” → “(Chapter 2)”, “(5)” → “(Chapter 5)”, and “It includes also ..” → “It also includes ..”.

Page 78, para 2 (the paragraph starting with Figure 3.2): Change “would not be a primary key *customer*;” → “would not be a primary key for the *customer* relation;”

Page 98, Section 3.8.2: This section uses the term “view” which is defined only later in Section 3.9.1. We suggest reading the entire Section 3.8 (Complex Queries) after reading Section 3.9.

¹Errors reported by: Alex Coman, Ravindra Guravannavar, Arvind Hulgeri, Rohit Kulshreshtha, Joe H. C. Lu, Alex N. Napitupulu, H. K. Park, Jian Pei, Fernando Saenz Perez, Donnie Pinkston, Rajarshi Rakshit, Sandeep Satpal, Amon Seagull, Barry Soroka, Praveen Ranjan Srivastava, Hans Svensson, Moritz Wiese and Eyob Delele Yirdaw. Their help is deeply appreciated.

Page 106, para 2: Change “which we discuss in Section 3.2.” → “as we discuss later in Section 4.2.2.”

Page 111, line 1: Change “condition joins” → “theta joins”.

Page 111, para 2, line 2: Change “simple example of inner joins.” → “simple example of a join; SQL uses the term *inner join* to denote a join, to distinguish it from an outer join).”

Page 116, Figure 3.11: Change the second attribute of *participated* from *car* to *license*,

Page 120, Exercise 3.22: Attribute *student_id* of relation *student*, and attributes *student_id* and *course_id* of relation *registered* should be underlined to denote that they are primary key attributes.

Page 120, Exercise 3.23: Attribute *student_id* of relation *marks* should be underlined to denote that it is a primary key attribute.

Chapter 4

Page 152, Figure 4.12, last-but-one line: Add a space between **table** and *empl*.

Page 155, Section 4.8, Para 1: Drop the sentence “We covered the basics of SQL earlier in this chapter.”

Change “some of the more complex features of SQL” → “some new features added to SQL as part of SQL:2003.”

Replace the sentence starting with “Many of these features ..” by “You should be aware that not all database systems support these features.”

Chapter 5

Page 197, Figure 5.15: Change the second attribute of *participated* from *car* to *license*,

Chapter 6

Page 202, bullet 2, line 8: Change “.. constraints on the entities.” → “.. constraints on the entities and relationships.”

Page 211, Bullet 1: Change “**Oneto-one**” → “**One-to-one**”.

Page 211, Bullet 2: Change “**One-to -many**” → “**One-to-many**”.

Page 212 Para 3 (the paragraph just before Section 6.2.3.1 Entity Sets): At the end of this para, add the sentence:

“Recall the definition of keys for relations, from Section 2.1.3; we now define corresponding notions of keys for entities and relationships.”

Page 234, Figure 6.22: Line from relationship *manages* to the aggregation should stop at the box, and not extend up to the diamond representing relationship *works_on*.

Page 241, Section 6.9.1: *loan* = (*loan_number*, *amount*) → *loan* = (*loan_number*, *amount*)

Page 244, Section 6.9.3.2:

account = (*account_number*, *balance*, *branch_name*)

branch = (*branch_name*, *branch_city*, *assets*)

→

account = (*account_number*, *balance*, *branch_name*)

branch = (*branch_name*, *branch_city*, *assets*)

Page 244, Figure 6.27: Attribute *account_number* should be underlined.

Page 246, bullet 2:

$employee = (\underline{person_id}, name, street, city, salary)$
 $customer = (\underline{person_id}, name, street, city, credit_rating)$

→

$employee = (\underline{person_id}, name, street, city, salary)$
 $customer = (\underline{person_id}, name, street, city, credit_rating)$

Page 248, schema at the top of the page:

$depositor = (\underline{customer_id}, \underline{account_number})$
 $cust_banker = (\underline{customer_id}, \underline{employee_id}, type)$

→

$depositor = (\underline{customer_id}, \underline{account_number}, access_date)$
 $cust_banker = (\underline{customer_id}, \underline{employee_id}, type)$

Chapter 7

Page 270 (4th line from bottom): In “.. a pair of attributes ($customer_id, loan_amount$) ..”
change $loan_amount \rightarrow loan_number$

Page 274, Figure 7.6: Remove the arrow head on the line from the $works_in$ to $employee$.

Page 281: “ $2 \times 2^n = 2^{n+1} \rightarrow “2^n \times 2^n = 2^{2n}”$.”

Page 288: Change the heading of Section 7.5 from “Decomposition Using Functional Dependencies” → “Algorithms for Decomposition” here, and also in the table of contents. (Section 7.3 also has the heading “Decomposition Using Functional Dependencies”, which should not be changed.)

Page 290, first bullet: “.. holds on , but ..” → “.. holds, ..”

Page 291, Section 7.5.2, second para:

1. “Section 7.3.3” → “Section 7.3.4”.
2. Replace “in F , which in this case is also F_c .” → “in F .”
3. Replace the two functional dependencies shown, by:

$F_1: customer_id, employee_id \rightarrow branch_name, type$
 $F_2: employee_id \rightarrow branch_name$
 $F_3: customer_id, branch_name \rightarrow employee_id$

(Note: Without F_3 , the schema would not be in 3NF).

4. Replace the part of the paragraph starting with “and consider two schemas in the **for** loop.” and ending with “... and so the **if** condition fails.” by:

“The attribute $branch_name$ is extraneous in the right-hand side of F_1 . No other attribute is extraneous, so F_c contains $customer_id, employee_id \rightarrow type$, as well as F_2 and F_3 . The algorithm then generates as R_1 the schema ($customer_id, employee_id, type$), as R_2 the schema, ($employee_id, branch_name$), and as R_3 the schema ($customer_id, branch_name, employee_id$). The algorithm then finds that R_1 contains a candidate key, so no further relation schema is created.

Before creating a schema R_i , the algorithm checks if it is contained in an already created schema R_j . The algorithm can be extended to delete any already created schema R_i that is contained in a schema R_j that is created later. In the above example, R_2 is contained in R_3 , and hence R_2 can be deleted from the decomposition, by this algorithm extension.”

Page 292, end of 2nd paragraph: Add the sentence:

“The algorithm may decompose a relation even if it is already in 3NF, as the preceding example illustrated; however, the decomposition is still guaranteed to be in 3NF.”

Chapter 8

Page 322, Figure 8.6: “`result.setContentType("text/html");`” → “`response.setContentType("text/html");`”

Page 338, 3rd line from bottom: “`system-administrator`” → “`system_administrator`”

Page 354, Exercise 8.22: In “`https://mybank.com`, the the HTTPS protocol”, delete one of the two occurrences of “the”.

Chapter 9

Page 365: In “`city varchar(20)`
 `zipcode varchar(9)`”,
add a comma after “`zipcode`”.

Page 366: In “`name row(...lastname varchar(20))`
 `address row(...`
add a comma after “`varchar(20))`”.

Page 366: In “`city varchar(20)`
 `zipcode varchar(9)`”,
add a comma after “`zipcode`”.

Page 378, last-but-one bullet item: In “Each table stores the primary key (..) and the attributes are defined locally”, change “attributes are” → “attributes that are”.

Chapter 10

Page 412, Section 10.4.2.1, Para 2: “A simple FLWOR expression that returns the account numbers for checking accounts is based on ..”

→

“A simple FLWOR expression that returns account numbers of accounts with balance greater than 400, shown below, is based on ..”

Page 415, 1st query: change “`for$d in /bank/...`” → “`for $d in /bank/...`”

Chapter 11

Page 449, 3 lines from bottom: In “NV-RAM buffers are ... found in in RAID controllers”
change “in in” → “in”.

Page 458, last line: Change “They have a fairly large capacity (640 megabytes), ..”
→ “They have a storage capacity of 640 to 700 megabytes, ..”

Chapter 12

Page 483, Figure 12.1: The left part of this figure (with the table containing “Brighton”, “Mianus” and “Redwood”, and associated pointers) should be deleted.

Page 495, Figure 12.13: In procedure `insert_in_leaf`,

“Let K_i be the least value in L that is less than K ” \rightarrow “Let K_i be the highest value in L that is less than K ”.

Page 496, Figure 12.15: Change “Redwood” \rightarrow “Perryridge” in the root node. (Note: the B^+ -tree is correct even with Redwood, but the deletion algorithm in Figure 12.17 generates the tree with “Perryridge” in the root.)

Page 496, Para 2: Change “now contains the keys “Mianus” and “Redwood”.” \rightarrow “now contains the keys “Mianus” and “Perryridge”.”

Also change “(the node containing only the search key “Redwood”) now contains redundant information and can be deleted from its parent” \rightarrow “(the node that originally contained the search key “Redwood”) is then deleted from its parent”.

Page 497, Figure 12.16: Change “Redwood” \rightarrow “Perryridge” in the internal node just below the root. (Note: The note for the change to Figure 12.15 also applies here.)

Chapter 13

Page 542, Para 2, Line 2:

In “Run generation requires seeks for reading data for each of the two runs and as well as for writing the run.” change “two runs” \rightarrow “runs”, and
“the run.” \rightarrow “the runs.”.

Page 549, bullet numbered 1:

In “Sorting the relation *customer* ... $400 * (2 \lceil \log_{24}(400/25) \rceil + 1) = 1200$ block transfers.” change “ $400 * (2 \lceil \log_{24}(400/25) \rceil + 1)$ ” \rightarrow “ $400 * (2 \lceil \log_{24}(400/25) \rceil + 1)$ ”.

Page 552, third para, one line from bottom: Change

“We can use a memory ... up to $3K * 3K$, which is is 36 gigabytes”
 \rightarrow “We can use a memory ... up to $3K * 3K$ blocks, which is 36 gigabytes”

Chapter 14

Page 600, Exercise 14.2(b): $\sigma_{B < 4}(A \mathcal{G}_{max(B)}(R))$ and $A \mathcal{G}_{max(B)}(\sigma_{B < 4}(R))$

\rightarrow

$\sigma_{B < 4}(A \mathcal{G}_{max(B)} \text{ as } B(R))$ and $A \mathcal{G}_{max(B)} \text{ as } B(\sigma_{B < 4}(R))$.

Chapter 16

Page 637, Figure 16.4, replace `grant-X(A,T2)` \rightarrow `grant-X(A,T1)`

Page 659, top of page: Replace “Multiversion two-phase locking or variations of it are used in some commercial database systems” \rightarrow

“**Snapshot Isolation** is a multiversion concurrency control protocol based on validation, which, unlike multiversion two-phase locking, does not require transactions to be declared as read-only or update. Snapshot-isolation does not guarantee serializability, but is nevertheless supported by many database systems. See the bibliographical notes for more information.”

Page 669, just before Section 16.9: Add the following paragraph:

“Many database systems run, by default, at the read-committed level of consistency, although they allow the consistency level to be changed. Even if the consistency level is explicitly set to serializable, the PostgreSQL and Oracle database systems use a concurrency control protocol called Snapshot Isolation, which does not ensure serializability. See Section 16.5.2 and the bibliographic notes for details. ”

Page 681, paragraph 4: Replace the two sentences starting with “Oracle uses a form of snapshot-based isolation ...” and ending with “... is covered in Chapter 29” →

“PostgreSQL, Oracle and SQLServer all support forms of the Snapshot Isolation protocol mentioned in Section 16.5.2. Details can be found in Chapters 26, 27 and 29 respectively.

It should be noted that on PostgreSQL (as of version 8.1.4) and Oracle (as of version 10g), setting the isolation level to serializable results in the use of Snapshot Isolation, which does not guarantee serializability. As an example, consider two transactions: Transaction 1, which reads A and updates B (based on what it read), and Transaction 2, which reads B and updates A (based on what it read). Snapshot Isolation allows these transactions to run concurrently, which can result in a non-serializable executions. Fekete et al. [2005] describe how to ensure serializable executions under Snapshot Isolation, by rewriting certain transactions to introduce conflicts; these conflicts ensure that the transactions cannot run concurrently under Snapshot Isolation. ”

Chapter 23

Page 885, last paragraph before Section 23.1.4: In

“.. whereas a RAID 1 implementation would require $r + w$ I/O operations per second.”

Change $r + w \rightarrow r + 2w$.

Chapter 28

Page 1037, in the heading of Section 28.5: “Multidimensionalsal” → “Multidimensional”.