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SQL Assignment

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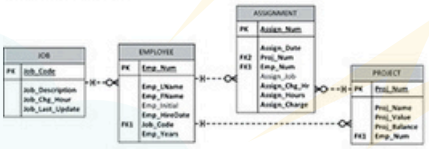
The ConstructCo database stores data for a consulting company that tracks all charges to projects. The charges are based on the hours each employee works on each project. The structure and contents of the ConstructCo database are shown in Figure 1.

Relational diagram



Database name: Ch07_ConstructCo

Table name: JOB

JOB_CODE	JOB_DESCRIPTION	JOB_CHG_HOUR	JOB_LAST_UPDATE
500	Programmer	35.75	20-Nov-21
501	Systems Analyst	96.75	20-Nov-21
502	Database Designer	125.00	24-Mar-22
503	Electrical Engineer	84.50	20-Nov-21
504	Mechanical Engineer	67.90	20-Nov-21
505	Civil Engineer	55.78	20-Nov-21
506	Clerical Support	26.87	20-Nov-21
507	DSS Analyst	45.95	20-Nov-21
508	Applications Designer	48.10	24-Mar-22
509	Bio Technician	34.55	20-Nov-21
510	General Support	18.36	20-Nov-21

Table name: EMPLOYEE

EMP_NUM	EMP_LNAME	EMP_FNAME	EMP_INITIAL	EMP_HIREDATE	JOB_CODE	EMP_YEARS
101	News	John	G	08-Nov-04	502	17
102	Senior	David	H	12-Jul-93	501	28
103	Arbough	June	E	01-Dec-00	500	21
104	Ramoras	Anne	K	15-Nov-91	501	30
105	Johnson	Alice	K	01-Feb-97	502	25
106	Smithfield	William		22-Jun-08	500	13
107	Alonzo	Maria	D	10-Oct-97	500	24
108	Washington	Ralph	B	22-Aug-95	501	26
109	Smith	Larry	W	18-Jul-01	501	20
110	Olenko	Gerald	A	11-Dec-99	505	22
111	Wabash	Geoff	B	04-Apr-95	506	27
112	Smithson	Darlene	M	23-Oct-98	507	23
113	Joenbrood	Delbert	K	15-Nov-00	508	21
114	Jones	Annelise		20-Aug-97	508	24
115	Bawangi	Travis	B	25-Jan-96	501	26
116	Pratt	Gerald	L	05-Mar-01	510	21
117	Williamson	Angie	H	19-Jun-00	509	21
118	Frommer	James	J	04-Jan-09	510	13

Table name: PROJECT

PROJ_NUM	PROJ_NAME	PROJ_VALUE	PROJ_BALANCE	EMP_NUM
15	Evergreen	1453500.00	1002350.00	103
18	Amber Wave	3500500.00	2110346.00	108
22	Rolling Tide	805000.00	500345.20	102
25	Starflight	2650500.00	2309880.00	107

Table name: ASSIGNMENT

ASSIGN_NUM	ASSIGN_DATE	PROJ_NUM	EMP_NUM	ASSIGN_JOB	ASSIGN_CHG_HR	ASSIGN_HOURS	ASSIGN_CHARGE
1001	22-Mar-22 18		103	503	84.50	3.5	295.75
1002	22-Mar-22 22		117	509	34.55	4.2	145.11
1003	22-Mar-22 18		117	509	34.55	2.0	69.10
1004	22-Mar-22 18		103	503	84.50	5.9	498.55
1005	22-Mar-22 25		108	501	96.75	2.2	212.85
1006	22-Mar-22 22		104	501	96.75	4.2	406.35
1007	22-Mar-22 25		113	500	50.75	3.8	192.85
1008	22-Mar-22 18		103	503	84.50	0.9	76.05
1009	23-Mar-22 15		115	501	96.75	5.6	541.80
1010	23-Mar-22 15		117	509	34.55	2.4	82.92
1011	23-Mar-22 25		105	502	105.00	4.3	451.50
1012	23-Mar-22 18		108	501	96.75	3.4	328.95
1013	23-Mar-22 25		115	501	96.75	2.0	193.50
1014	23-Mar-22 22		104	501	96.75	2.8	270.90
1015	23-Mar-22 15		103	503	84.50	6.1	515.45
1016	23-Mar-22 22		105	502	105.00	4.7	493.50
1017	23-Mar-22 18		117	509	34.55	3.8	131.29
1018	23-Mar-22 25		117	509	34.55	2.2	76.01
1019	24-Mar-22 25		104	501	110.50	4.9	541.45
1020	24-Mar-22 15		101	502	125.00	3.1	387.50
1021	24-Mar-22 22		108	501	110.50	2.7	298.35
1022	24-Mar-22 22		115	501	110.50	4.9	541.45
1023	24-Mar-22 22		105	502	125.00	3.5	437.50
1024	24-Mar-22 15		103	503	84.50	3.3	278.85
1025	24-Mar-22 18		117	509	34.55	4.2	145.11

Figure 1: The ConstructCo Database

Details

Note that the ASSIGNMENT table in Figure 1 stores the JOB CHG HOUR values as an attribute (ASSIGN CHG HR) to maintain historical accuracy of the data. The JOB CHG HOUR values are likely to change over time. In fact, a JOB CHG HOUR change will be reflected in the ASSIGNMENT table. Naturally, the employee primary job assignment might also change, so the ASSIGN JOB is also stored. Because those attributes are required to maintain the historical accuracy of the data, they are not redundant. Given the structure and contents of the ConstructCo database shown in Figure 1, use SQL commands to answer the following problems.

P1. Write the SQL code required to list the employee number, last name, first name, and middle initial of all employees whose last names start with Smith. In other words, the rows for both Smith and Smithfield should be included in the listing. Sort the results by employee number. Assume case sensitivity.

P2. Using the EMPLOYEE, JOB, and PROJECT tables in the ConstructCo database, write the SQL code that will join the EMPLOYEE and PROJECT tables using EMP NUM as the common attribute. Display the attributes shown in the results presented in Figure 2, sorted by project value.

PROJ_NAME	PROJ_VALUE	PROJ_BALANCE	EMP_LNAME	EMP_FNAME	EMP_INITIAL	JOB_CODE	JOB_DESCRIPTION	JOB_CHG_HOUR
Rolling Tide	805000.00	500345.20	Senior	David	H	501	Systems Analyst	96.75
Evergreen	1453500.00	1002350.00	Arbough	June	E	500	Programmer	35.75
Starflight	2650500.00	2309880.00	Alonzo	Maria	D	500	Programmer	35.75
Amber Wave	3500500.00	2110346.00	Washington	Ralph	B	501	Systems Analyst	96.75

Figure 2: The Query Results for Problem 2

P3. Write the SQL code that will produce the same information that was shown in Problem P2., but sorted by the employee's last name.

P4. Write the SQL code that will list only the distinct project numbers in the ASSIGNMENT table, sorted by project number.

P5. Write the SQL code to validate the ASSIGN_CHARGE values in the ASSIGNMENT table. Your query should retrieve the assignment number, employee number, project number, the stored assignment charge (ASSIGN CHARGE), and the calculated assignment charge (calculated by multiplying ASSIGN CHG HR by ASSIGN HOURS). Sort the results by the assignment number.

P6. Using the data in the ASSIGNMENT table, write the SQL code that will yield the total number of hours worked for each employee and the total charges stemming from those hours worked, sorted by employee number. The results of running that query are shown in Figure 3.

EMP_NUM	EMP_LNAME	SumOfASSIGN_HOURS	SumOfASSIGN_CHARGE
101	News	3.1	387.50
103	Arbough	19.7	1664.65
104	Ramoras	11.9	1218.70
105	Johnson	12.5	1382.50
108	Washington	8.3	840.15
113	Joenbrood	3.8	192.85
115	Bawangi	12.5	1276.75
117	Williamson	18.8	649.54

Figure 3: Total Hours and Charges by Employee

P7. Write a query to produce the total number of hours and charges for each of the projects represented in the ASSIGNMENT table, sorted by project number. The output is shown in Figure 4.

PROJ_NUM	SumOfASSIGN_HOURS	SumOfASSIGN_CHARGE
15	20.5	1806.52
18	23.7	1544.80
22	27.0	2593.16
25	19.4	1668.16

Figure 4: Total Hours and Charges by Project

P8. Write the SQL code to generate the total hours worked and the total charges made by all employees. The results are shown in Figure 5.

SumOfSumOfASSIGN_HOURS	SumOfSumOfASSIGN_CHARGE
90.6	7612.64

Figure 5: Total Hours and Charges, All Employees

The structure and contents of the SaleCo database are shown in Figure 6. Use this database to answer the following problems.

Relational diagram

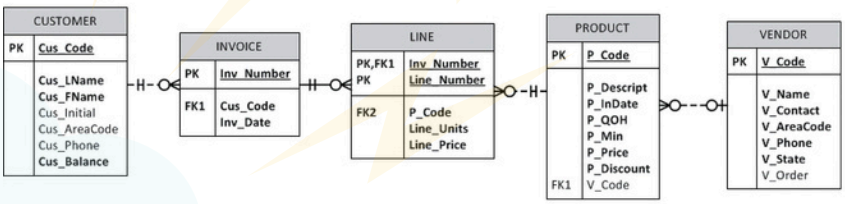


Table name: CUSTOMER

CUS_CODE	CUS_LNAME	CUS_FNAME	CUS_INITIAL	CUS_AREACODE	CUS_PHONE	CUS_BALANCE
10010	Ramas	Alfred	A	615	844-2573	0.00
10011	Dunne	Leona	K	713	894-1238	0.00
10012	Smith	Kathy	W	615	894-2285	345.86
10013	Olowski	Paul	F	615	894-2180	536.75
10014	Orlando	Myron		615	222-1672	0.00
10015	O'Brian	Amy	B	713	442-3381	0.00
10016	Brown	James	G	615	297-1228	221.19
10017	Williams	George		615	290-2556	768.93
10018	Farriss	Anne	G	713	382-7185	216.55
10019	Smith	Olette	K	615	297-3809	0.00

Table name: VENDOR

V_CODE	V_NAME	V_CONTACT	V_AREACODE	V_PHONE	V_STATE	V_ORDER
21225	Bryson, Inc.	Smithson	615	223-3234	TN	Y
21226	SuperLoo, Inc.	Flushing	904	215-8995	FL	N
21231	D&E Supply	Singh	615	228-3245	TN	Y
21344	Gomez Bros.	Ortega	615	889-2546	KY	N
22567	Dome Supply	Smith	901	678-1419	GA	N
23119	Randsets Ltd.	Anderson	901	678-3998	GA	Y
24004	Brackman Bros.	Browning	615	228-1410	TN	N
24288	ORDVA, Inc.	Hakford	615	898-1234	TN	Y
25443	B&K, Inc.	Smith	904	227-0093	FL	N
25501	Damal Supplies	Smythe	615	890-3529	TN	N
25595	Rubicon Systems	Orton	904	456-0092	FL	Y

Table name: INVOICE

INV_NUMBER	CUS_CODE	INV_DATE
1001	10014	16-Jan-22
1002	10011	16-Jan-22
1003	10012	16-Jan-22
1004	10011	17-Jan-22
1005	10018	17-Jan-22
1006	10014	17-Jan-22
1007	10015	17-Jan-22
1008	10011	17-Jan-22

Table name: LINE

INV_NUMBER	LINE_NUMBER	P_CODE	LINE_UNITS	LINE_PRICE
1001	1	13-Q2/P2	1	14.99
1001	2	23109-HB	1	9.95
1002	1	54778-2T	2	4.99
1003	1	2238/QPD	1	38.95
1003	2	1546-QQ2	1	39.95
1003	3	13-Q2/P2	5	14.99
1004	1	54778-2T	3	4.99
1004	2	23109-HB	2	9.95
1005	1	PVC23DRT	12	5.87
1006	1	SM-18277	3	6.99
1006	2	2232/QTY	1	109.92
1006	3	23109-HB	1	9.95
1006	4	89-WRE-Q	1	256.99
1007	1	13-Q2/P2	2	14.99
1007	2	54778-2T	1	4.99
1008	1	PVC23DRT	5	5.87
1008	2	WR3/TT3	3	119.95
1008	3	23109-HB	1	9.95

Table name: PRODUCT

P_CODE	P_DESCRIPT	P_INDATE	P_QOH	P_MIN	P_PRICE	P_DISCOUNT	V_CODE
11QER/31	Power painter, 15 psi., 3-nozzle	03-Nov-21	8	5	109.99	0.00	25595
13-Q2/P2	7.25-in. pwr. saw blade	13-Dec-21	32	15	14.99	0.05	21344
14-Q1/L3	9.00-in. pwr. saw blade	13-Nov-21	18	12	17.49	0.00	21344
1546-QQ2	Hrd. cloth, 1/4-in., 2x50	15-Jan-22	15	8	39.95	0.00	23119
1558-QWI	Hrd. cloth, 1/2-in., 3x50	15-Jan-22	23	5	43.99	0.00	23119
2232/QTY	B&D jigsaw, 12-in. blade	30-Dec-21	8	5	109.92	0.05	24288
2232/QME	B&D jigsaw, 8-in. blade	24-Dec-21	6	5	99.87	0.05	24288
2238/QPD	B&D cordless drill, 1/2-in.	20-Jan-22	12	5	38.95	0.05	25595
23109-HB	Claw hammer	20-Jan-22	23	10	9.95	0.10	21225
23114-AA	Sledge hammer, 12 lb.	02-Jan-22	8	5	14.40	0.05	
54778-2T	Rat-tail file, 1/8-in. fine	15-Dec-21	43	20	4.99	0.00	21344
89-WRE-Q	Hicut chain saw, 16 in.	07-Feb-22	11	5	256.99	0.05	24288
PVC23DRT	PVC pipe, 3.5-in., 8-ft	20-Feb-22	188	75	5.87	0.00	
SM-18277	1.25-in. metal screw, 25	01-Mar-22	172	75	6.99	0.00	21225
SW-23116	2.5-in. wd. screw, 50	24-Feb-22	237	100	8.45	0.00	21231
WR3/TT3	Steel matting, 4'x8'x1/6", .5" mesh	17-Jan-22	18	5	119.95	0.10	25595

Figure 6: The SaleCo Database

P9. Write a query to count the number of invoices. Write a query to count the number of customers with

P10. a balance of more than $500. Using the output shown in Figure 7 as your guide, generate a list of

P11. customer purchases, including
the subtotals for each of the invoice line numbers. The subtotal is a derived attribute calculated by multiplying LINE UNITS by LINE PRICE. Sort the output by customer code, invoice number, and product description. Be certain to use the column aliases as shown in the figure.

CUS_CODE	INV_NUMBER	P_DESCRIPT	Units Bought	Unit Price	Subtotal
10011	1002	Rat-tail file, 1/8-in. fine	2	4.99	9.98
10011	1004	Claw hammer	2	9.95	19.90
10011	1004	Rat-tail file, 1/8-in. fine	3	4.99	14.97
10011	1008	Claw hammer	1	9.95	9.95
10011	1008	PVC pipe, 3.5-in., 8-ft	5	5.87	29.35
10011	1008	Steel matting, 4'x8'x1/6", .5" mesh	3	119.95	359.85
10012	1003	7.25-in. pwr. saw blade	5	14.99	74.95
10012	1003	B&D cordless drill, 1/2-in.	1	38.95	38.95
10012	1003	Hrd. cloth, 1/4-in., 2x50	1	39.95	39.95
10014	1001	7.25-in. pwr. saw blade	1	14.99	14.99
10014	1001	Claw hammer	1	9.95	9.95
10014	1006	1.25-in. metal screw, 25	3	6.99	20.97
10014	1006	B&D jigsaw, 12-in. blade	1	109.92	109.92
10014	1006	Claw hammer	1	9.95	9.95
10014	1006	Hicut chain saw, 16 in.	1	256.99	256.99
10015	1007	7.25-in. pwr. saw blade	2	14.99	29.98
10015	1007	Rat-tail file, 1/8-in. fine	1	4.99	4.99
10018	1005	PVC pipe, 3.5-in., 8-ft	12	5.87	70.44

Figure 7: Summary of Customer Purchases with Subtotals

P12. Write a query to display the customer code, balance, and total purchases for each customer. Total purchase is calculated by summing the line subtotals (as calculated in Problem P11.) for each customer. Sort the results by customer code, and use aliases as shown in Figure 8.

CUS_CODE	CUS_BALANCE	Total Purchases
10011	0.00	444.00
10012	345.86	153.85
10014	0.00	422.77
10015	0.00	34.97
10018	216.55	70.44

Figure 8: Customer Purchase Summary

P13. Modify the query in Problem P12. to include the number of individual product purchases made by each customer. (In other words, if the customer's invoice is based on three products, one per LINE NUMBER, you count three product purchases. Note that in the original invoice data, customer 10011 generated three invoices, which contained a total of six lines, each representing a product purchase.) Your output values must match those shown in Figure 9, sorted by customer code.

CUS_CODE	CUS_BALANCE	Total Purchases	Number of Purchases
10011	0.00	444.00	6
10012	345.86	153.85	3
10014	0.00	422.77	6
10015	0.00	34.97	2
10018	216.55	70.44	1

Figure 9: Customer Total Purchase Amounts and Number of Purchases

P14. Use a query to compute the total of all purchases, the number of purchases, and the average purchase amount made by each customer. Your output values must match those shown in Figure 10. Sort the results by customer code.

CUS_CODE	CUS_BALANCE	Total Purchases	Number of Purchases	Average Purchase Amount
10011	0.00	444.00	6	74.00
10012	345.86	153.85	3	51.28
10014	0.00	422.77	6	70.46
10015	0.00	34.97	2	17.48
10018	216.55	70.44	1	70.44

Figure 10: Average Purchase Amount by Customer

P15. Create a query to produce the total purchase per invoice, generating the results shown in Figure 11, sorted by invoice number. The invoice total is the sum of the product purchases in the LINE that corresponds to the INVOICE.

INV_NUMBER	Invoice Total
1001	24.94
1002	9.98
1003	153.85
1004	34.87
1005	70.44
1006	397.83
1007	34.97
1008	399.15

Figure 11: Invoice Totals

P16. Use a query to show the invoices and invoice totals in Figure 12. Sort the results by customer code and then by invoice number.

CUS_CODE	INV_NUMBER	Invoice Total
10011	1002	9.98
10011	1004	34.87
10011	1008	399.15
10012	1003	153.85
10014	1001	24.94
10014	1006	397.83
10015	1007	34.97
10018	1005	70.44

Figure 12: Invoice Totals by Customer

P17. Write a query to produce the number of invoices and the total purchase amounts by customer, using the output shown in Figure 13 as your guide. Note the results are sorted by customer code. (Compare this summary to the results shown in Problem P16..)

CUS_CODE	Number of Invoices	Total Customer Purchases
10011	3	444.00
10012	1	153.85
10014	2	422.77
10015	1	34.97
10018	1	70.44

Figure 13: Number of Invoices and Total Purchase Amounts by Customer

P18. Write a query to generate the total number of invoices, the invoice total for all of the invoices, the smallest of the customer purchase amounts, the largest of the customer purchase amounts, and the average of all the customer purchase amounts. Your output must match Figure 14.

Total Invoices	Total Sales	Minimum Customer Purchases	Largest Customer Purchases	Average Customer Purchases
8	1126.03	34.97	444.00	225.21

Figure 14: Number of Invoices, Invoice Totals, Minimum, Maximum, and Average Sales

P19. List the balances of customers who have made purchases during the current invoice cycle – that is, for the customers who appear in the INVOICE table. The results of this query are shown in Figure 15, sorted by customer code.

CUS_CODE	CUS_BALANCE
10011	0.00
10012	345.86
10014	0.00
10015	0.00
10018	216.55

Figure 15: Balances for Customers Who Made Purchases

P20. Provide a summary of customer balance characteristics for customers who made purchases. Include the minimum balance, maximum balance, and average balance, as shown in Figure 16.

Minimum Balance	Maximum Balance	Average Balance
0	345.86	112.48

Figure 16: Balance Summary for Customers Who Made Purchases

P21. Create a query to find the balance characteristics for all customers, including the total of the outstanding balances. The results of this query are shown in Figure 17.

Total Balances	Minimum Balance	Maximum Balance	Average Balance
2089.28	0.00	768.93	208.93

Figure 17: Balance Summary for All Customers

P22. Find the listing of customers who did not make purchases during the invoicing period. Sort the results by customer code. Your output must match the output shown in Figure 18.

CUS_CODE	CUS_BALANCE
10010	0.00
10013	536.75
10016	221.19
10017	768.93
10019	0.00

Figure 18: Balances of Customers Who Did Not Make Purchases

P23. Find the customer balance summary for all customers who have not made purchases during the current invoicing period. The results are shown in Figure 19.

Total Balance	Minimum Balance	Maximum Balance	Average Balance
1526.87	0.00	768.93	305.37

Figure 19: Summary of Customer Balances for Customers Who Did Not Make Purchases

P24. Create a query that summarizes the value of products currently in inventory. Note that the value of each product is a result of multiplying the units currently in inventory by the unit price. Sort the results in descending order by subtotal, as shown in Figure 20.

P_DESCRIPT	P_QOH	P_PRICE	Subtotal
Hicut chain saw, 16 in.	11	256.99	2826.89
Steel matting, 4'x8'x1/6", .5" mesh	18	119.95	2159.10
2.5-in. wd. screw, 50	237	8.45	2002.65
1.25-in. metal screw, 25	172	6.99	1202.28
PVC pipe, 3.5-in., 8-ft	188	5.87	1103.56
Hrd. cloth, 1/2-in., 3x50	23	43.99	1011.77
Power painter, 15 psi., 3-nozzle	8	109.99	879.92
B&D jigsaw, 12-in. blade	8	109.92	879.36
Hrd. cloth, 1/4-in., 2x50	15	39.95	599.25
B&D jigsaw, 8-in. blade	6	99.87	599.22
7.25-in. pwr. saw blade	32	14.99	479.68
B&D cordless drill, 1/2-in.	12	38.95	467.40
9.00-in. pwr. saw blade	18	17.49	314.82
Claw hammer	23	9.95	228.85
Rat-tail file, 1/8-in. fine	43	4.99	214.57
Sledge hammer, 12 lb.	8	14.40	115.20

Figure 20: Value of Products Currently in Inventory

P25. Find the total value of the product inventory. The results are shown in Figure 21.

Total Value of Inventory
15084.52

Figure 21: Total Value of All Products in Inventory

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