

# Database Management System for Construction Company Crystal Absheron

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## **Abstract**

The article is devoted to the topic of the importance of using the database, building and using the database management system for construction company Crystal Absheron are shown. The database consists of several tables, including employees, customers, contract numbers, payment methods, customer pin codes, supply process, list of apartments and so on. At the same time, the tables included in the database were shown through visual images, and the importance of using relevant information was studied. The data interface was created using the C# programming language.

**Keywords:** *database, database management systems, SQL, C# programming language.*

## **Introduction**

Engineering and construction industry is one of the largest industries with its size, complexity and budget. In the construction sector, works are carried out on a project basis and many different occupational groups and functions are needed. Each of these groups engages in different activities and produces different information. Every information produced becomes the input of the next stage and affects the result. In the construction industry, where there is such an active interaction, information technologies will be effective methods for capturing, storing, sharing information and using it in another project. Information technologies are expected to create changes in all areas of the construction industry.

Research questions are :

- In which areas is it more useful to build a database in the construction sector?
- How does a database facilitate the work process in construction company?
- The importance of SQL queries.
- Methods of constructing queries in SQL.

### **1. Database management systems for construction company**

The construction sector is directly effective in the production of more than 200 sub-sectors. With this feature, it has a great say in the economy and employment. The

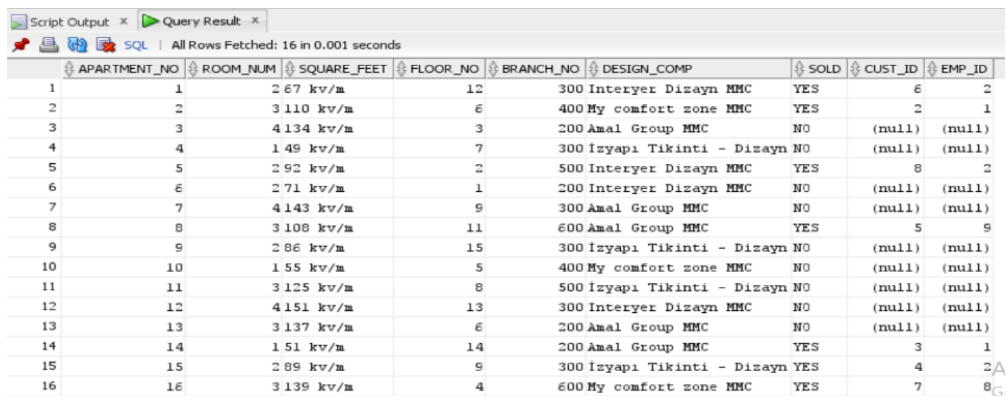
possible economic crises in the construction sector and the narrowing of the working areas affect the country and world economy as well as the sub-sectors. In our country, the construction industry has its own problems, especially image. After the great disaster in 1999, the sector suffered from a loss of confidence as well as being affected economically.

A database is a collection of data or records. A database management system (DBMS) is a software system that uses a standard method for storing and organizing data. Data can be added, updated, deleted or passed using various standard algorithms and queries.

Data in the database can be arranged as tables, rows, columns and indexes. It totally depends on the type of data and the preferences of the users and its main purpose is to find the relevant information easily. Because the main purpose of databases is to store large amounts of data in a way that can be accessed quickly when it is used and managed easily (Cohen, 2019; Datapro Research Corporation, 2020; Fong, 2015; Palmer, 2020).

Structured query language (SQL) is a popular query language that is frequently used in all types of applications. SQL used for designing database management system for Crystal Absheron construction company.

Let's say that a customer approaches the Narimanov branch to inquire about houses. Based on the conditions he gave, he wants a house with 3 rooms, above the 5th floor, between 100-150 square meters. Based on the conditions he gave, let's query our database and see what suitable houses we have available.

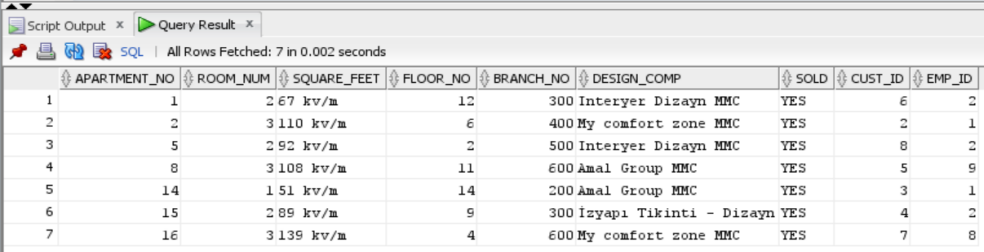


APARTMENT_NO	ROOM_NUM	SQUARE_FEET	FLOOR_NO	BRANCH_NO	DESIGN_COMP	SOLD	CUST_ID	EMP_ID
1	1	2 67 kv/m	12	300	Interyer Dizayn MMC	YES	6	2
2	2	3 110 kv/m	6	400	My comfort zone MMC	YES	2	1
3	3	4 134 kv/m	3	200	Amal Group MMC	NO	(null)	(null)
4	4	1 49 kv/m	7	300	Izyapı Tikinti - Dizayn	NO	(null)	(null)
5	5	2 92 kv/m	2	500	Interyer Dizayn MMC	YES	8	2
6	6	2 71 kv/m	1	200	Interyer Dizayn MMC	NO	(null)	(null)
7	7	4 143 kv/m	9	300	Amal Group MMC	NO	(null)	(null)
8	8	3 108 kv/m	11	600	Amal Group MMC	YES	5	9
9	9	2 86 kv/m	15	300	Izyapı Tikinti - Dizayn	NO	(null)	(null)
10	10	1 55 kv/m	5	400	My comfort zone MMC	NO	(null)	(null)
11	11	3 125 kv/m	8	500	Izyapı Tikinti - Dizayn	NO	(null)	(null)
12	12	4 151 kv/m	13	300	Interyer Dizayn MMC	NO	(null)	(null)
13	13	3 137 kv/m	6	200	Amal Group MMC	NO	(null)	(null)
14	14	1 51 kv/m	14	200	Amal Group MMC	YES	3	1
15	15	2 89 kv/m	9	300	Izyapı Tikinti - Dizayn	YES	4	2
16	16	3 139 kv/m	4	600	My comfort zone MMC	YES	7	8

Figure 1. *SELECT \* FROM apartment\_info;*

Here we see that the table shows the branches with their corresponding ids. But we also want to see exactly which branch these branch ids are so we can direct the customer accordingly. For this we need to join the branch and

APARTMENT\_INFO tables. Let me explain briefly, let's say that we want to look at sold houses, for this we can write a query as follows:



The screenshot shows a SQL query result window with the following data:

	APARTMENT_NO	ROOM_NUM	SQUARE_FEET	FLOOR_NO	BRANCH_NO	DESIGN_COMP	SOLD	CUST_ID	EMP_ID
1	1	2	67 kv/m	12	300	Interyer Dizayn MMC	YES	6	2
2	2	3	110 kv/m	6	400	My comfort zone MMC	YES	2	1
3	5	2	92 kv/m	2	500	Interyer Dizayn MMC	YES	8	2
4	8	3	108 kv/m	11	600	Amal Group MMC	YES	5	9
5	14	1	51 kv/m	14	200	Amal Group MMC	YES	3	1
6	15	2	89 kv/m	9	300	Izyapı Tikinti - Dizayn	YES	4	2
7	16	3	139 kv/m	4	600	My comfort zone MMC	YES	7	8

**Figure 2.** *SELECT \* FROM apartment\_info WHERE sold='YES';*

It was also necessary to see who these apartments were sold to and the information about them, but from the result returned from above, we see that only the customers' ids are reflected, so if we want to bring customer information, the APARTMENT\_INFO table and the CUSTOMERS\_MAIN\_INFO table should be shared by columns (in our case, this is CUST\_ID) we can join and fetch the relevant customer related columns from the CUSTOMERS\_MAIN\_INFO table.

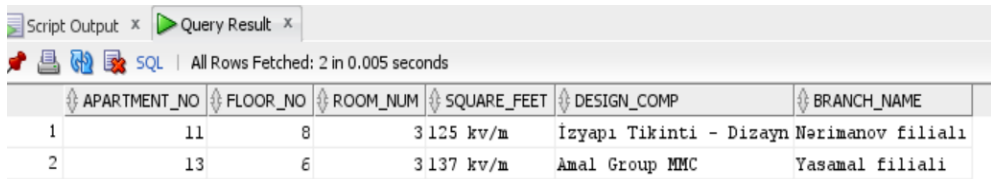
In our situation, we need the BRANCH\_NAME column from the branch table, so the APARTMENT\_INFO table and the branch table should be joined by BRANCH\_ID, which is the primary key in the branch table, and BRANCH\_NO, which is the corresponding foreign key in the APARTMENT\_INFO table. It is possible to join two or more tables, if the names of the columns to be joined are the same in both tables, it is necessary to give an alias (name) to the joined tables in order to distinguish them from each other, otherwise it is not necessary, but the code is more neat and readable it is recommended to name the tables for Now we can finally see if there are houses that match the client's wishes.

```

SELECT
    a.apartment_no,
    a.floor_no,
    a.room_num,
    a.square_feet,
    a.design_comp,
    b.branch_name
FROM
    apartment_info a
JOIN branch b ON a.branch_no = b.branch_id
WHERE
    a.room_num = 3
AND a.square_feet BETWEEN '100' AND '150'

```

*AND a.floor\_no > 5*  
*AND sold = 'NO';*



The screenshot shows a 'Query Result' window with two rows of data. The columns are APARTMENT\_NO, FLOOR\_NO, ROOM\_NUM, SQUARE\_FEET, DESIGN\_COMP, and BRANCH\_NAME. The first row has values 1, 11, 8, 3 125 kv/m, İzyapı Tikinti - Dizayn Nerimanov filiali. The second row has values 2, 13, 6, 3 137 kv/m, Amal Group MMC, Yasamal filiali.

APARTMENT_NO	FLOOR_NO	ROOM_NUM	SQUARE_FEET	DESIGN_COMP	BRANCH_NAME
1	11	8	3 125 kv/m	İzyapı Tikinti - Dizayn Nerimanov filiali	
2	13	6	3 137 kv/m	Amal Group MMC	Yasamal filiali

## 2. Designing Queries to the Database

In SQL, joins are commands used to conditionally combine rows of two or more tables based on a related column between the tables. A join condition is a relationship between some columns in the data tables involved in the SQL join. SQL joins are mainly used to extract data from tables that have a one-to-one, one-to-many, or many-to-many relationship

**Example 1:** Let's say we want to see how much the customers paid us in total for houses bought with dollars. That he has a debt. For this, we will write select on the CUSTOMERS\_MAIN\_INFO and SALES\_OPERATIONS tables. There is a column called CUST\_DEBT in the SALES\_OPERATIONS table that shows the remaining debt, if there is no debt, it will show 0.

```

SELECT
    c.customer_id,
    c.first_name
    || '
|| c.last_name AS cust_fullname,
    [c.pin_kod,
    s.op_no,
    s.apartment_no,
    s.branch,
    s.currency_code,
    s.payment_amount,
    s.cust_debt,
    s.payment_date,
    s.contract_no
FROM
    customers_main_info c
INNER JOIN sales_operations s ON c.customer_id = s.cust_code
WHERE

```

```

s.cust_debt != 0
AND s.currency_code = 'USD';

```

This query will bring us customers who bought the apartment in dollars and did not have 0 balance. If we want to see the total amount (in azn) of all the customers who owe us money:

```

SELECT SUM(s.cust_debt) * 1.7
FROM customers_main_info c
INNER JOIN sales_operations s
ON c.customer_id = s.cust_code
WHERE
s.cust_debt != 0
AND s.currency_code = 'USD';

```

**Example 2.** Let's write the query showing how much and how many apartments each manager sold during the last month.

```

SELECT a.emp_id,
a.satis_meneceri,
SUM
COUNT (APARTMENT_NO)
FROM (
SELECT e.emp_id,
e.first_name || ' ' || e.last_name,
cn.price ,
s.apartment_no
FROM employees_info e
INNER JOIN sales_operations s
ON e.emp_id=s.sales_person
INNER JOIN customers_main_info c
ON c.customer_id=s.cust_code
INNER JOIN contract_info cn
ON cn.cust_id=c.customer_id
WHERE work_dept='Sales department'
AND payment_date BETWEEN trunc (add_months (sysdate, -1), 'month')
AND last_day (add_months (sysdate, -1))) a
GROUP BY a.emp_id,
a.satis_meneceri;

```

In general, the table we created will offer us great advantages in easing the work process. Because the database we have built in Oracle SQL Developer provides us with more convenient construction of data with all its details.

## Conclusion

The benefits of DBMS to the construction company are :

- Improved data sharing and data security
- Effective data integration
- Minimized data inconsistency
- Faster data access
- Better decision-making
- Recovery and Backup

## References

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