


<b>Project Case</b>	
ISYS6123   ISYS6123003 Introduction to Database Systems	
<b>Information Systems</b>	<b>E232-ISYS6123-JN02-00</b>
<i>Valid on Even Semester Year 2022/2023</i>	<b>Revision 00</b>

1. Kelompok tidak diperkenankan untuk:

*Members of the group are prohibited from:*

- Melihat sebagian atau seluruh jawaban kelompok lain,  
*Seeing a part or the whole answer from other groups,*
- Menyadur sebagian atau seluruh jawaban dari buku, catatan, video, dan jenis referensi lainnya,  
*Retell a part or the whole answer from books, notes, videos, and other references,*
- Menyadur sebagian atau seluruh jawaban dari internet,  
*Retell a part or the whole answer from the internet,*
- Mengumpulkan jawaban yang tidak sesuai dengan tema soal,  
*Submitting an answer with a different theme from the given case,*
- Melakukan tindakan yang menyebabkan jawaban dicontek oleh orang lain atau kelompok lain, baik disengaja maupun tidak disengaja,  
*Doing action that could result the answer being copied by someone or other groups, intentionally or unintentionally,*
- Melakukan tindakan kecurangan lainnya.  
*Committing other dishonest actions.*

2. Jika kelompok terbukti melakukan tindakan seperti yang dicantumkan pada butir ke-1, maka nilai mahasiswa dan/atau kelompok yang melakukan kecurangan, baik menyontek atau dicontek, akan dinolkan sesuai dengan peraturan yang berlaku.

*If it has been proven that a group has committed dishonest actions outlined in point 1 above, the whole groups related to the incident, regardless of which one copies or has their answer copied, will be issued a score of zero according to the regulation.*

3. Jawaban yang dapat diterima dan dinilai adalah jawaban yang dikumpulkan sebelum batas waktu yang telah ditentukan.

*The answer must be submitted before the designated deadline to be accepted and graded,*

4. Jawaban akan dinilai berdasarkan teknik atau metode yang diajarkan pada kelas praktikum dengan menggunakan software yang sudah ditentukan.

*The scoring will be based on the materials taught during the practicum classes using the designated software. Using different software than requested may result in your answer not being graded.*

5. Jika Anda tidak membaca peraturan ini, maka Anda dianggap sudah membaca dan menyetujuinya.

*By taking this exam, you agree to these regulations, regardless of whether you have read it or not.*

6. Persentase penilaian untuk matakuliah ini adalah sebagai berikut:

*The score will be distributed as follows:*

<b>Tugas Mandiri</b> <i>Assignment</i>	<b>Proyek</b> <i>Project</i>	<b>UAP</b> <i>Final Exam</i>
40%	60%	-

7. Perangkat lunak yang digunakan pada matakuliah ini adalah sebagai berikut:

*This course uses the following software:*

<b>Software</b> <i>Software</i>
Microsoft Office 365 SQL Server Developer 2019 SQL Server Management Studio 18.9.1 Visual Paradigm Community Edition 16.3

8. Ekstensi file yang harus dikumpulkan untuk matakuliah ini adalah sebagai berikut:

*Your answers must be in the following file extensions:*

<b>Tugas Mandiri</b> <i>Assignment</i>	<b>Proyek</b> <i>Project</i>	<b>UAP</b> <i>Final Exam</i>
SQL	SQL, VPP, Image Files (JPG / PNG)	-

9. File yang harus dikumpulkan adalah keseluruhan jawaban beserta dengan aset yang digunakan (gambar, audio, video, dll) dan dokumentasi proyek yang berisikan link referensi aset dan penjelasan mengenai aplikasi yang dibuat (terlampir bersama dengan soal).

*Include other files that can support your project, such as: all files in your project, other files (image, audio, video, etc.) used in your project, \*.doc file (documentation of your project) that contains all pages in your project, reference links of additional files (image, audio, video, etc.) used in your project, the description about how to use your application, etc.*

**Soal***Case*

## **JigitalclouN**

**JigitalclouN** is an international server rental services provider that also sells the server hardware used to host the servers. As a successful international company, **JigitalclouN** always manages to find the most strategic yet economic locations all around the world to place their servers. Therefore, it requires an efficient data management system to store and manage all its data, especially regarding the server rental transactions which happen all the time and the server sales which occur a bit less often but are still complicated to manage.

Every **staff** that is hired by **JigitalclouN** has a job to **serve each customer who wants to rent servers or purchase server hardware**. Every staff must oblige to the following **requirements** to become a staff, which are:

- Every staff working at **JigitalclouN** must have completed their personal **information** like full name, gender, email, date of birth, phone number, address, and salary. Every staff has an **identification number** with the following format:

**JCN-SXYZZ**

**X** → Number between 3 – 7 inclusive

**Y** → Number between 1 – 2 inclusive

**Z** → Number between 0 – 9 inclusive

- Every **server** has a **memory** and **processor** hardware assigned.
- Every **memory** has its full product name, model code, price, frequency in megahertz (MHz), and capacity in gigabytes (GB). Every **memory** hardware has an **identification number** with the following format:

**JCN-MXYZZ**

**X** → Number between 3 – 7 inclusive

**Y** → Number between 1 – 2 inclusive

**Z** → Number between 0 – 9 inclusive

- Every **processor** has its full product name, model code, price, clock speed in megahertz (MHz), and the number of cores. Every **processor** hardware has an **identification number** with the following format:

**JCN-PXYZZ**

**X** → Number between 3 – 7 inclusive

**Y** → Number between 1 – 2 inclusive

**Z** → Number between 0 – 9 inclusive

- Every **server** has a geographical **location** associated with it which is where the physical server hardware is located. This information is important because the distance from the server to the user will determine the latency.
- Every **location** has the name of the city and country it is in, the zip code, and the latitude and longitude of the exact point. Every **location** has an **identification number** with the following format:

**JCN-LXYZZ****X** → Number between 3 – 7 inclusive**Y** → Number between 1 – 2 inclusive**Z** → Number between 0 – 9 inclusive

- Every **server** has the identifier of its **memory**, **processor**, and **location** alongside the price it is sold at. Every **server** has an **identification number** with the following format:

**JCN-VXYZZ****X** → Number between 3 – 7 inclusive**Y** → Number between 1 – 2 inclusive**Z** → Number between 0 – 9 inclusive

- Every **rental transaction** made by a customer has all the **information** about staff, customer, servers rented, the starting date of the rental and the rental duration in months for the rental transaction. Every **rental transaction** has an **identification number** with the following format:

**JCN-RXYZZ****X** → Number between 0 – 2 inclusive**Y** → Number between 1 – 2 inclusive**Z** → Number between 0 – 9 inclusive

- Every **sale transaction** made by a customer has all the **information** about staff, customer, servers sold, and the transaction date. Every **sale transaction** has an **identification number** with the following format:

**JCN-SXYZZ****X** → Number between 0 – 2 inclusive**Y** → Number between 1 – 2 inclusive**Z** → Number between 0 – 9 inclusive

Every **customer** that wants to **make any transaction** at **JigitalclouN** must oblige to the following **transaction requirements**, those are:

- Every **customer** that wants to **make a transaction** must have already completed their **personal information** like name, gender, email address, date of birth, phone number, and address. Every customer has an **identification number** with the following format:

**JCN-CXYZZ****X** → Number between 3 – 7 inclusive**Y** → Number between 1 – 2 inclusive**Z** → Number between 0 – 9 inclusive

- **Customers** can **rent and purchase one or more servers** in every transaction.

The data stored must follow a certain set of **constraints** forced by **JigitalclouN**.

- **Staff email** must **follow the format “XXX@XXX.XXX”** where the ‘XXX’ parts can be any sequence of character but cannot be empty.
- **Staff salary** must be **in between 3500000 and 20000000** (not inclusive).
- **Location latitude** must be **between -90 and 90** (inclusive) and must have a precision point of 6 digits.
- **Location longitude** must be **between -180 and 180** (inclusive) and must have a precision point of 6 digits.
- **Rental starting date** must be **at least on the first day of 2012** and **cannot be in the future**.
- **Customer gender** must be **either “Male” or “Female”** (without quote).
- **Customer** must be **at least 15 years old**.
- All data must **not be null**.

Right now, **JigitalclouN** is still using an outdated and inefficient manual data management system to maintain the server sale and rental transactions. You, as a new database administrator at **JigitalclouN**, are asked to create a **database system** that can **store data and maintain the sales and rentals**. The tasks that you need to do are:

- Create **Entity Relationship Diagram** to maintain the sales and rentals.
- Create a database system using **DDL syntax** that is relevant to the sales and rentals.
- Create query using **DML syntax** to fill the tables in database systems with data based on the following conditions:
  - **Master table** must be filled with **more than or equals 10 data**.
  - **Transaction table** must be filled with **more than or equals 15 data**.
  - **Transaction detail table** must be filled with **more than or equals 25 data**.
  - For the **memory** table, it is advised to confine to the following ranges:

Advised data ranges for Memory	
Memory Frequency (MHz)	Between <b>1000</b> to <b>5000</b>
Memory Capacity (GB)	Between <b>1</b> to <b>256</b>

- For the **processor** table, it is advised to confine to the following ranges:

Advised data ranges for Processor	
Clock Speed (MHz)	Between <b>1500</b> to <b>6000</b>
Number of Cores	Between <b>1</b> to <b>24</b>

- Create query using DML syntax to **simulate the transactions process** for transaction and purchase. DML syntax to fill database and DML syntax to simulate the transactions process should be a **different query**.
- To support database management process in **JigitalclouN**, you are asked to provide some **queries** that result in important data. The queries you need to provide are:
  1. Display StaffId, StaffName, StaffGender, StaffSalary, and LongestPeriod (obtained from the maximum amount of rental duration of the handled transactions) for every staff who have a salary less than 15000000 and have handled rental transactions with customers younger than 20 years old.
  2. Display Location (obtained from LocationCityName, followed by a space and LocationCountryName), CheapestServerPrice (obtained from the ServerPriceIDR of the server with the lowest price located in each location) for every location that has a server using processor with clock speed faster than 3000 MHz. and is located at most 30 degrees from the equator (LocationLatitude must be at least -30 and at most 30).
  3. Display RentalID, MaxMemoryFrequency (obtained from the maximum MemoryFrequencyMHz followed by ' MHz'), TotalMemoryCapacity (obtained from the sum of MemoryCapacityGB followed by ' GB') for each rental transaction which occurs on the last quarter of 2020.
  4. Display SaleID, ServerCount (obtained from the number of servers in each transaction), AverageServerPrice (obtained from the average of ServerPriceIDR divided by 1000000 followed by ' million(s) IDR'), for each sale transaction occurring in 2016 until 2020 and has AverageServerPrice of more than 50000000.

5. Display SaleID, MostExpensiveServerPrice (obtained from the most expensive server price in the transaction), HardwareRatingIndex (obtained from  $((0.55 * \text{ProcessorClock} * \text{ProcessorCoreCount}) + (\text{MemoryFrequency} * \text{MemoryCapacityGB} * 0.05)) / 143200$ ) formatted to 3 decimal places) for the sale transactions which has server listed in the top 10 most expensive servers which occurs in odd years.

**(ALIAS SUBQUERY)**

6. Display ProcessorName (obtained from the first word of ProcessorName followed by a space and ProcessorModel), CoreCount (obtained from ProcessorCoreCount followed by ' core(s)', ProcessorPriceIDR for the most expensive processors among the ones having the same core count and is used in servers located in the northern hemisphere (LocationLatitude is starts from 0 up to 90). The result must not be duplicate.

**(ALIAS SUBQUERY)**

7. Display HiddenCustomerName (obtained from the first letter of CustomerName followed by '\*\*\*\*\* '), CurrentPurchaseAmount (obtained from the amount of sale transactions made), CountedPurchaseAmount (obtained from the amount of sale transactions made), RewardPointsGiven (obtained from the total spending (counted from the sum of ServerPriceIDR for all transactions made) of the customer divided by 1000000 followed by ' point(s)'), for each customer who is in the top 10 customer with most spending in server purchasing (sale transactions) in 2015 until 2019 period.

**(ALIAS SUBQUERY)**

8. Display StaffName (obtained from 'Staff ' followed by the first word of StaffName), StaffEmail (obtained from replacing part after the '@' in StaffEmail with 'jigitalcloun.net'), StaffAddress, StaffSalary (obtained from StaffSalary divided by 10000000 followed by ' million(s) IDR'), TotalValue (obtained from the sum of  $(\text{ServerPriceIDR} / 120 * \text{RentalDuration})$ ) for every staff who have a salary below the average staff salary and has a TotalValue more than 10000000.

**(ALIAS SUBQUERY)**

9. Create a view named 'ServerRentalDurationView' to display Server (obtained from Replacing 'JCN-V' in ServerID with 'No. '), TotalRentalDuration (Obtained from the total rental duration

on the server followed by ' month(s)'), MaxSingleRentalDuration (Obtained from the maximum rental duration on the server followed by ' month(s)') for all servers located in the southern hemisphere (Latitude is below 0 down to -90) which have more than 50 months of total rental duration.

10. Create a view named 'SoldProcessorPerformanceView' to display SaleID, MinEffectiveClock (obtained from the minimum value of  $\text{ProcessorClockMHZ} * \text{ProcessorCoreCount} * 0.675$ , displayed with 1 decimal places followed by ' MHz'), MaxEffectiveClock (obtained from the maximum value of  $\text{ProcessorClockMHZ} * \text{ProcessorCoreCount} * 0.675$ , displayed with 1 decimal places followed by ' MHz') for every rental transaction that rents a server using a processor with a core count of a power of 2 and that has a MinEffectiveClock of at least 10000.

**File that must be collected:**

1. Entity Relationship Diagram (.vsdx, .png)
2. Query to create the database system (.sql)
3. Query to insert data into tables (.sql)
4. Query to simulate the transactions processes (.sql)
5. Query to answer the 10 cases (.sql)