**Table of Contents**

[**ABSTRACT** 3](#_Toc156153933)

[**Chapter 1. INTRODUCTION** 4](#_Toc156153934)

[**1.1.** **Brief information about my team’s project** 4](#_Toc156153935)

[**1.2.** **The reason for choosing the topic.** 4](#_Toc156153936)

[**Chapter 2. ABOUT OUR PROJECT OF COMPUTER COMPONENTS SALES SYSTEM** 6](#_Toc156153937)

[**2.1.** **Research on business operations.** 6](#_Toc156153938)

[**2.2.** **Business narratives and identifying the management entities.** 6](#_Toc156153939)

[**2.3.** **Collection data.** 7](#_Toc156153940)

[**Chapter 3. ANALYZE AND DESIGN DATABASE** 8](#_Toc156153941)

[**3.1. Analysis and Listing of Data Tables.** 8](#_Toc156153942)

[**3.2. ERD.** 10](#_Toc156153943)

[**3.3. Relation Scheme.** 10](#_Toc156153944)

[**3.4. SQL scripts build database.** 12](#_Toc156153945)

[**3.5. SQL script insert data to database.** 15](#_Toc156153946)

[**Chapter 4. USE CASE AND SOLUTIONS** 20](#_Toc156153947)

[**4.1. List of Usecase.** 20](#_Toc156153948)

[**4.2. The solutions.** 20](#_Toc156153949)

[**Chapter 5. DASHBOARD REPORT** 27](#_Toc156153950)

[**5.1 Dashboard** 27](#_Toc156153951)

[**CONCLUSION** 29](#_Toc156153952)

[**REFERENCES** 30](#_Toc156153953)

# **ABSTRACT**

With the aim of mastering the knowledge gained in the Database Systems course, we have carried out this project. The main content of the project involves applying the acquired knowledge to establish a business database for the computer components model in the United States, Europe, and Australia. The report consists of 5 main parts:

* Introduction: An overview of my team’s project.
* About our project of computer components sales system: Presentation of the choice of the field, the decision-making process, and details about the business model.
* Analyze and design database: Analyzing and designing the database for the business model.
* Usecase and solutions: Some use cases and solutions for the business model are addressed using SQL commands.
* Dashboard report: Utilizing Power BI to build reports for the business model based on the obtained data.

# **Chapter 1. INTRODUCTION**

* 1. **Brief information about my team’s project**

Our team's project describes the process of researching and selecting a computer components business model in the regions of the United States, Europe, and Australia. This includes investigating sales activities in these regions from 2013 to 2018 from various retailers on information websites and public databases. Subsequently, applying the knowledge of the database systems learned, we designed and built a database management system for the computer components business model.

* 1. **The reason for choosing the topic.**

With the development of society today, computers have become indispensable tools for humans in various aspects of life: work, entertainment, connectivity, and more. In recent years, the Covid-19 pandemic has had a negative impact on the global economy. Most industries have experienced a slowdown, but the computer industry, in particular, has witnessed explosive growth. The pandemic forced many businesses to adopt remote working arrangements, making desktop computers an essential device for home-based work that every household needs

Following statistics of Canalys, **The**[worldwide PC market](https://www.canalys.com/newsroom/global-pc-market-Q4-2023) **ended its streak of annual shipment declines in the last quarter of 2023, posting a modest year-on-year growth of 3%. Total shipments of desktops and notebooks rose to 65.3 million units. Shipments of notebooks hit 51.6 million units, up 4% from 2022, while desktop shipments landed at 13.7 million units, declining 1%. For the full year 2023, PC shipments totaled 247 million units, marking a 13% drop compared to 2022. The market is now poised for growth, with AI-capable PCs set to provide an additional boost during the ongoing refresh cycle and beyond.**

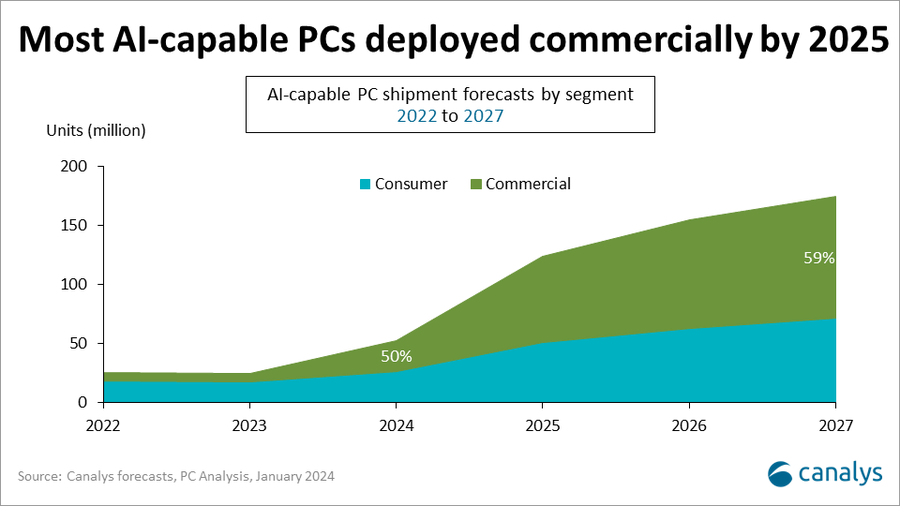


Figure 1. PC Shipments forecasts by segment

Additionally, the current global memory chip crisis is contributing to the continuous increase in market value for computer components.

For these reasons, our team has decided to choose the business model of computer components.

# **Chapter 2. ABOUT OUR PROJECT OF COMPUTER COMPONENTS SALES SYSTEM**

* 1. **Research on business operations.**

A computer is composed of numerous components, each manufactured by different companies. In order to establish an effective business model, we conducted research on the business operations within this sector through information provided by existing market vendors, statistical websites, e-commerce platforms, media outlets, and public databases

Through our investigations, we identified three computer component products CPU, GPU, and RAM that exhibit stable demand, a minimal decrease in prices, and a tendency to increase in price due to the impact of the chip crisis.

**“**The Random Access Memory (RAM) market is experiencing significant growth due to the increasing demand for high-performance computing systems in various industries such as gaming, data centers, and artificial intelligence. The market is expected to witness a CAGR of 6% during the forecast period. The increasing use of smartphones and the growing adoption of cloud computing are also contributing to market growth. Additionally, the development of advanced technologies like DDR5 and HBM (High Bandwidth Memory) is expected to drive the growth of the RAM market in the future. However, the high cost associated with these technologies may hinder market growth to some extent.**”, (**Following Linkedin)

**“**Due to the COVID-19 pandemic, the global Graphics Processing Unit (GPU) market size is estimated to be worth USD 22940 million in 2022 and is forecast to a readjusted size of USD 35800 million by 2028 with a CAGR of 7.7% during the review period.” **, (**Following Linkedin)

**“**North America Computer CPU Processors market is estimated at USD million in 2021, while Europe is forecast to reach USD million by 2028. The proportion of the North America is Percent in 2021, while Europe percentage is Percent, and it is predicted that Europe share will reach Percent in 2028, trailing a CAGR of Percent through the analysis period 2022-2028. As for the Asia, the notable markets are Japan and South Korea, CAGR is Percent and Percent respectively for the next 6-year period.**”, (**Following Linkedin)**.**

Additionally, there is a market that significantly influences the prices of the three mentioned components. That is the market for cryptocurrencies. We can observe that the rapid growth of cryptocurrencies has attracted many investors to this market. A notable feature of the cryptocurrency market is the existence of coins that can be obtained through solving complex calculations (commonly known as 'mining'). This activity relies heavily on the computational power of computer components such as RAM, CPU, GPU. Therefore, the prices of these components are also affected by the value of cryptocurrencies.

* 1. **Business narratives and identifying the management entities.**

Through the business investigation process, we have decided to build a computer component business model with three main products: RAM, CPU, and GPU.

After deciding on the business model, we proceeded to the next step: identifying the entities that need to be managed to facilitate business operations as well as generate reports and determine strategies suitable for the upcoming market conditions.

The first entities that need to be managed are the products we sell, information about the devices. Next is the sales activity of the devices, the timing of device sales. And finally, entities related to cryptocurrencies and the market, as analyzed for their impact on the business model in section 2.1.

* 1. **Collection data.**

To formulate appropriate business strategies, we conducted data collection on device information, sales activities of distributors, and the cryptocurrency market during the period from 2013 to 2018. From this data, we built a management database and generated reports for business operations.

The dataset we utilized was collected from the public Kaggle database.

# **Chapter 3. ANALYZE AND DESIGN DATABASE**

## **3.1. Analysis and Listing of Data Tables.**

Below is the list of tables we will use to build the database for the business model.

The DIM\_CPU\_PROD table: Information about CPU products.

* Manufacturer: Manufacturer.
* Series: Product series.
* CPU\_Name: CPU name.
* Cores: Number of cores.
* Socket: Socket type.

The DIM\_CRYPTO\_DATA table: Information about cryptocurrency-related data.

* Code: Cryptocurrency code.
* Currency\_Name: Full name of the cryptocurrency.
* Is\_Mineable: Whether it is mineable or not.

The DIM\_GPU\_PROD table: Information about GPU products.

* Processor\_Manufacturer: Processor manufacturer.
* Processor: Processor type.
* GPU\_Manufacturer: GPU manufacturer.
* Memory\_Capacity: Memory capacity.
* Memory\_Type: Memory type.

The DIM\_MERCHANT table: Information about suppliers or retailers.

* Merchant: Supplier name.

The DIM\_RAM\_PROD table: Information about RAM products.

* Manufacturer: Manufacturer.
* RAM\_Name: RAM name.
* Memory\_Type: Memory type.
* Speed: Speed read and write data.
* Capacity: Capacity.

The DIM\_REGION table: Information about geographical regions, where the computer components sales.

* Code: Region code.
* Currency: Currency type.

The DIM\_TIME table: Information about time of the computer components sales.

* Year: Year.
* Month: Month.
* Day: Day.
* Week: Week.

The FACT\_CPU\_PRICE table: Data about the price of CPUs at a specific time and in a specific region.

* ProdId: Foreign key linked to DIM\_CPU\_PROD.
* TimeId: Foreign key linked to DIM\_TIME.
* RegionId: Foreign key linked to DIM\_REGION.
* MerchantId: Foreign key linked to DIM\_MERCHANT.
* Price\_USD: CPU price in USD.
* Price\_Original: Original price of the CPU.

The FACT\_CRYPTO\_RATE table: Data about the price and fluctuations of cryptocurrencies within a specific time period.

* CodeId: Foreign key linked to DIM\_CRYPTO\_DATA.
* TimeId: Foreign key linked to DIM\_TIME.
* OpenPrice: Opening price.
* ClosePrice: Closing price.
* High: Highest price.
* Low: Lowest price.

The FACT\_GPU\_PRICE table: Data about the price of GPUs at a specific time and in a specific region.

* ProdId: Foreign key linked to DIM\_GPU\_PROD.
* TimeId: Foreign key linked to DIM\_TIME.
* RegionId: Foreign key linked to DIM\_REGION.
* MerchantId: Foreign key linked to DIM\_MERCHANT.
* Price\_USD: GPU price in USD.
* Price\_Original: Original price of the GPU.

The FACT\_RAM\_PRICE table: Data about the price of RAM at a specific time and in a specific region.

* ProdId: Foreign key linked to DIM\_RAM\_PROD.
* TimeId: Foreign key linked to DIM\_TIME.
* RegionId: Foreign key linked to DIM\_REGION.
* MerchantId: Foreign key linked to DIM\_MERCHANT.
* Price\_USD: RAM price in USD.
* Price\_Original: Original price of the RAM.

## **3.2. ERD.**

Based on the table list, we have drawn an entity-relationship diagram using draw.io.

A diagram of a flowchart

Description automatically generated

Figure 2. Entity Relation Diagram.

## **3.3. Relation Scheme.**

Here is Relation Scheme coverted from ERD data.

A diagram of a company

Description automatically generated with medium confidence

Figure 3. Relation Scheme.

## **3.4. SQL scripts build database.**

**USE** **[**Computer\_Components**]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_CPU\_PROD] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**DIM\_CPU\_PROD**](**

**[**Id**]** **[**int**]** **NOT** **NULL** **PRIMARY** **KEY,**

**[**Manufacturer**]** **[**nvarchar**](**255**)** **NULL,**

**[**Series**]** **[**nvarchar**](**255**)** **NULL,**

**[**CPU\_Name**]** **[**nvarchar**](**255**)** **NULL,**

**[**Cores**]** **[**int**]** **NULL,**

**[**Socket**]** **[**nvarchar**](**255**)** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_CRYPTO\_DATA] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**DIM\_CRYPTO\_DATA**](**

**[**Id**]** **[**int**]** **NOT** **NULL** **PRIMARY** **KEY,**

**[**Code**]** **[**nvarchar**](**255**)** **NULL,**

**[**Currency\_Name**]** **[**nvarchar**](**255**)** **NULL,**

**[**Is\_Mineable**]** **[**int**]** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_GPU\_PROD] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**DIM\_GPU\_PROD**](**

**[**Id**]** **[**int**]** **NOT** **NULL** **PRIMARY** **KEY,**

**[**Processor\_Manufacturer**]** **[**nvarchar**](**255**)** **NULL,**

**[**Processor**]** **[**nvarchar**](**255**)** **NULL,**

**[**GPU\_Manufacturer**]** **[**nvarchar**](**255**)** **NULL,**

**[**Memory\_Capacity**]** **[**float**]** **NULL,**

**[**Memory\_Type**]** **[**nvarchar**](**255**)** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_MERCHANT] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**DIM\_MERCHANT**](**

**[**Id**]** **[**int**]** **NOT** **NULL** **PRIMARY** **KEY,**

**[**Merchant**]** **[**nvarchar**](**255**)** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_RAM\_PROD] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**DIM\_RAM\_PROD**](**

**[**Id**]** **[**int**]** **NOT** **NULL** **PRIMARY** **KEY,**

**[**Manufacturer**]** **[**nvarchar**](**255**)** **NULL,**

**[**RAM\_Name**]** **[**nvarchar**](**255**)** **NULL,**

**[**Memory\_Type**]** **[**nvarchar**](**255**)** **NULL,**

**[**Speed**]** **[**int**]** **NULL,**

**[**Capacity**]** **[**float**]** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_REGION] PM \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**DIM\_REGION**](**

**[**Id**]** **[**int**]** **NOT** **NULL** **PRIMARY** **KEY,**

**[**Code**]** **[**nvarchar**](**255**)** **NULL,**

**[**Currency**]** **[**nvarchar**](**255**)** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_TIME] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**DIM\_TIME**](**

**[**Id**]** **[**int**]** **NOT** **NULL** **PRIMARY** **KEY,**

**[**Year**]** **[**int**]** **NULL,**

**[Month]** **[**int**]** **NULL,**

**[**Day**]** **[**int**]** **NULL,**

**[**Week**]** **[**int**]** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[FACT\_CPU\_PRICE] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**FACT\_CPU\_PRICE**](**

**[**ProdId**]** **[**int**]** **NULL,**

**[**TimeId**]** **[**int**]** **NULL,**

**[**RegionId**]** **[**int**]** **NULL,**

**[**MerchantId**]** **[**int**]** **NULL,**

**[**Price\_USD**]** **[**float**]** **NULL,**

**[**Price\_Original**]** **[**float**]** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

-- Thêm Foreign Key cho cột ProdId

**ALTER** **TABLE** **[**dbo**].[**FACT\_CPU\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_CPU\_PRICE\_DIM\_CPU\_PROD

**FOREIGN** **KEY** **(**ProdId**)** **REFERENCES** **[**dbo**].[**DIM\_CPU\_PROD**](**Id**);**

-- Thêm Foreign Key cho cột TimeId

**ALTER** **TABLE** **[**dbo**].[**FACT\_CPU\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_CPU\_PRICE\_DIM\_TIME

**FOREIGN** **KEY** **(**TimeId**)** **REFERENCES** **[**dbo**].[**DIM\_TIME**](**Id**);**

-- Thêm Foreign Key cho cột RegionId

**ALTER** **TABLE** **[**dbo**].[**FACT\_CPU\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_CPU\_PRICE\_DIM\_REGION

**FOREIGN** **KEY** **(**RegionId**)** **REFERENCES** **[**dbo**].[**DIM\_REGION**](**Id**);**

-- Thêm Foreign Key cho cột MerchantId

**ALTER** **TABLE** **[**dbo**].[**FACT\_CPU\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_CPU\_PRICE\_DIM\_MERCHANT

**FOREIGN** **KEY** **(**MerchantId**)** **REFERENCES** **[**dbo**].[**DIM\_MERCHANT**](**Id**);**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[FACT\_CRYPTO\_RATE] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**FACT\_CRYPTO\_RATE**](**

**[**CodeId**]** **[**int**]** **NULL,**

**[**TimeId**]** **[**int**]** **NULL,**

**[**OpenPrice**]** **[**float**]** **NULL,**

**[**ClosePrice**]** **[**float**]** **NULL,**

**[**High**]** **[**float**]** **NULL,**

**[**Low**]** **[**float**]** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

-- Thêm Foreign Key cho cột CodeId

**ALTER** **TABLE** **[**dbo**].[**FACT\_CRYPTO\_RATE**]**

**ADD** **CONSTRAINT** FK\_FACT\_CRYPTO\_RATE\_CodeId

**FOREIGN** **KEY** **(**CodeId**)** **REFERENCES** **[**dbo**].[**DIM\_CRYPTO\_DATA**](**Id**);**

-- Thêm Foreign Key cho cột TimeId

**ALTER** **TABLE** **[**dbo**].[**FACT\_CRYPTO\_RATE**]**

**ADD** **CONSTRAINT** FK\_FACT\_CRYPTO\_RATE\_TimeId

**FOREIGN** **KEY** **(**TimeId**)** **REFERENCES** **[**dbo**].[**DIM\_TIME**](**Id**);**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[FACT\_GPU\_PRICE] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**FACT\_GPU\_PRICE**](**

**[**ProdId**]** **[**int**]** **NULL,**

**[**TimeId**]** **[**int**]** **NULL,**

**[**RegionId**]** **[**int**]** **NULL,**

**[**MerchantId**]** **[**int**]** **NULL,**

**[**Price\_USD**]** **[**float**]** **NULL,**

**[**Price\_Original**]** **[**float**]** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

-- Thêm Foreign Key cho cột ProdId

**ALTER** **TABLE** **[**dbo**].[**FACT\_GPU\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_GPU\_PRICE\_DIM\_GPU\_PROD

**FOREIGN** **KEY** **(**ProdId**)** **REFERENCES** **[**dbo**].[**DIM\_GPU\_PROD**](**Id**);**

-- Thêm Foreign Key cho cột TimeId

**ALTER** **TABLE** **[**dbo**].[**FACT\_GPU\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_GPU\_PRICE\_DIM\_TIME

**FOREIGN** **KEY** **(**TimeId**)** **REFERENCES** **[**dbo**].[**DIM\_TIME**](**Id**);**

-- Thêm Foreign Key cho cột RegionId

**ALTER** **TABLE** **[**dbo**].[**FACT\_GPU\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_GPU\_PRICE\_DIM\_REGION

**FOREIGN** **KEY** **(**RegionId**)** **REFERENCES** **[**dbo**].[**DIM\_REGION**](**Id**);**

-- Thêm Foreign Key cho cột MerchantId

**ALTER** **TABLE** **[**dbo**].[**FACT\_GPU\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_GPU\_PRICE\_DIM\_MERCHANT

**FOREIGN** **KEY** **(**MerchantId**)** **REFERENCES** **[**dbo**].[**DIM\_MERCHANT**](**Id**);**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[FACT\_RAM\_PRICE] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**CREATE** **TABLE** **[**dbo**].[**FACT\_RAM\_PRICE**](**

**[**ProdId**]** **[**int**]** **NULL,**

**[**TimeId**]** **[**int**]** **NULL,**

**[**RegionId**]** **[**int**]** **NULL,**

**[**MerchantId**]** **[**int**]** **NULL,**

**[**Price\_USD**]** **[**float**]** **NULL,**

**[**Price\_Original**]** **[**float**]** **NULL**

**)** **ON** **[PRIMARY]**

**GO**

-- Thêm Foreign Key cho cột ProdId

**ALTER** **TABLE** **[**dbo**].[**FACT\_RAM\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_RAM\_PRICE\_DIM\_RAM\_PROD

**FOREIGN** **KEY** **(**ProdId**)** **REFERENCES** **[**dbo**].[**DIM\_RAM\_PROD**](**Id**);**

-- Thêm Foreign Key cho cột TimeId

**ALTER** **TABLE** **[**dbo**].[**FACT\_RAM\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_RAM\_PRICE\_DIM\_TIME

**FOREIGN** **KEY** **(**TimeId**)** **REFERENCES** **[**dbo**].[**DIM\_TIME**](**Id**);**

-- Thêm Foreign Key cho cột RegionId

**ALTER** **TABLE** **[**dbo**].[**FACT\_RAM\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_RAM\_PRICE\_DIM\_REGION

**FOREIGN** **KEY** **(**RegionId**)** **REFERENCES** **[**dbo**].[**DIM\_REGION**](**Id**);**

-- Thêm Foreign Key cho cột MerchantId

**ALTER** **TABLE** **[**dbo**].[**FACT\_RAM\_PRICE**]**

**ADD** **CONSTRAINT** FK\_FACT\_RAM\_PRICE\_DIM\_MERCHANT

**FOREIGN** **KEY** **(**MerchantId**)** **REFERENCES** **[**dbo**].[**DIM\_MERCHANT**](**Id**);**

**GO**

## **3.5. SQL script insert data to database.**

To add more data to the newly created database, we use the INSERT INTO statements to sequentially insert each record of data.

Example scipts for DIM\_GPU\_PROD table:

**USE** **[**Computer\_Components**]**

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**INSERT** **INTO** DIM\_CPU\_PROD **(**Id**,** Manufacturer**,** Series**,** CPU\_Name**,** Cores**,** Socket**)**

**VALUES** **(**0**,** 1**,** AMD**,** Amd 2650**,** Amd Sempron 2650**,** 2**,** AMD Socket AM1**)**

**GO**

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**INSERT** **INTO** DIM\_CPU\_PROD **(**Id**,** Manufacturer**,** Series**,** CPU\_Name**,** Cores**,** Socket**)**

**VALUES** **(**1**,** 2**,** AMD**,** Amd 3850**,** Amd Sempron 3850**,** 4**,** AMD Socket AM1**)**

**GO**

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**INSERT** **INTO** DIM\_CPU\_PROD **(**Id**,** Manufacturer**,** Series**,** CPU\_Name**,** Cores**,** Socket**)**

**VALUES** **(**2**,** 3**,** AMD**,** Amd 5150**,** Amd Athlon 5150**,** 4**,** AMD Socket AM1**)**

**GO**

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**INSERT** **INTO** DIM\_CPU\_PROD **(**Id**,** Manufacturer**,** Series**,** CPU\_Name**,** Cores**,** Socket**)**

**VALUES** **(**3**,** 4**,** AMD**,** Amd 5350**,** Amd Athlon 5350**,** 4**,** AMD Socket AM1**)**

However, due to the large number of records, we have switched to using the BULK INSERT statement to read and add data to the tables from CSV files:

**USE** **[**Computer\_Components**]**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_CPU\_PROD] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**DIM\_CPU\_PROD**]**

**FROM** 'G:\Source\effect-data\data\DIM\_CPU\_PROD.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_CRYPTO\_DATA] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**DIM\_CRYPTO\_DATA**]**

**FROM** 'G:\Source\effect-data\data\DIM\_CRYPTO\_DATA.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_GPU\_PROD] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**DIM\_GPU\_PROD**]**

**FROM** 'G:\Source\effect-data\data\DIM\_GPU\_PROD.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_MERCHANT] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**DIM\_MERCHANT**]**

**FROM** 'G:\Source\effect-data\data\DIM\_MERCHANT.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_RAM\_PROD] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**DIM\_RAM\_PROD**]**

**FROM** 'G:\Source\effect-data\data\DIM\_RAM\_PROD.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_REGION] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**DIM\_REGION**]**

**FROM** 'G:\Source\effect-data\data\DIM\_REGION.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[DIM\_TIME] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**DIM\_TIME**]**

**FROM** 'G:\Source\effect-data\data\DIM\_TIME.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[FACT\_CPU\_PRICE] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**FACT\_CPU\_PRICE**]**

**FROM** 'G:\Source\effect-data\data\FACT\_CPU\_PRICE.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[FACT\_CRYPTO\_RATE] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**FACT\_CRYPTO\_RATE**]**

**FROM** 'G:\Source\effect-data\data\FACT\_CRYPTO\_RATE.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[FACT\_GPU\_PRICE] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**FACT\_GPU\_PRICE**]**

**FROM** 'G:\Source\effect-data\data\FACT\_GPU\_PRICE.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

/\*\*\*\*\*\* Object: Table [dbo].[FACT\_RAM\_PRICE] \*\*\*\*\*\*/

**SET** ANSI\_NULLS **ON**

**GO**

**SET** QUOTED\_IDENTIFIER **ON**

**GO**

**BULK** **INSERT** **[**dbo**].[**FACT\_RAM\_PRICE**]**

**FROM** 'G:\Source\effect-data\data\FACT\_RAM\_PRICE.csv'

**WITH** **(**

**FORMAT=**'CSV'**,**

FIRSTROW**=**2**,**

FIELDTERMINATOR**=**','**,**

ROWTERMINATOR**=**'0x0a'

**)**

**GO**

# **Chapter 4. USE CASE AND SOLUTIONS**

## **4.1. List of Usecase.**

Some business questions regarding the business model and the constructed database.

* What are the highest-priced GPUs in each region?
* What is the total revenue from RAM sales per month in a specific region?
* How many mineable CPUs are there, and what are their prices?
* What is the list of mineable GPUs and their corresponding prices?
* Which regions have a total CPU price exceeding a specific threshold of 5 million currency units?
* When there is a new GPU price, what details are recorded in the log table?
* What are the details of prices and technical specifications for CPUs available in the view?
* How is the stored procedure used to retrieve RAM prices based on a specific region and time?
* How do you execute a transaction to update new prices for CPUs and GPUs, followed by a commit or rollback?
* Which CPUs and GPUs have the highest prices in history?
* Which RAM has the highest price in history?
* What are the details of prices and technical specifications for the CPU with the highest price of all time?
* What are the details of prices and technical specifications for the GPU with the highest price of all time?
* What are the details of prices and technical specifications for the RAM with the highest price of all time**?**

## **4.2. The solutions.**

* What are the highest-priced GPUs in each region?

**WITH** RankedGPU **AS** **(**

**SELECT**

GPU**.\*,**

Price**.[**RegionId**],**

Region**.[**Currency**],**

Price**.[**Price\_USD**],**

**RANK()** **OVER** **(PARTITION** **BY** Price**.[**RegionId**]** **ORDER** **BY** Price**.[**Price\_USD**]** **DESC)** **AS** **Rank**

**FROM**

**[**dbo**].[**DIM\_GPU\_PROD**]** **AS** GPU

**JOIN**

**[**dbo**].[**FACT\_GPU\_PRICE**]** **AS** Price **ON** GPU**.[**Id**]** **=** Price**.[**ProdId**]**

**JOIN**

**[**dbo**].[**DIM\_REGION**]** **AS** Region **ON** Price**.[**RegionId**]** **=** Region**.[**Id**]**

**)**

**SELECT**

**\***

**FROM**

RankedGPU

**WHERE**

**Rank** **=** 1**;**

* What is the total revenue from RAM sales per month in a specific region?

**SELECT**

T**.[Month],**

**SUM(**Price**.[**Price\_USD**])** **AS** TotalRevenue

**FROM**

**[**dbo**].[**FACT\_RAM\_PRICE**]** **AS** Price

**JOIN**

**[**dbo**].[**DIM\_TIME**]** **AS** T **ON** Price**.[**TimeId**]** **=** T**.[**Id**]**

**WHERE**

Price**.[**RegionId**]** **=** 2

**GROUP** **BY**

T**.[Month];**

* How many mineable CPUs are there, and what are their prices?

**SELECT**

CPU**.[**CPU\_Name**],**

CPU**.[**Manufacturer**],**

Price**.[**Price\_USD**]**

**FROM**

**[**dbo**].[**DIM\_CPU\_PROD**]** **AS** CPU

**JOIN**

**[**dbo**].[**FACT\_CPU\_PRICE**]** **AS** Price **ON** CPU**.[**Id**]** **=** Price**.[**ProdId**]**

**JOIN**

**[**dbo**].[**DIM\_CRYPTO\_DATA**]** **AS** Crypto **ON** CPU**.[**Id**]** **=** Crypto**.[**Id**]**

**WHERE**

Crypto**.[**Is\_Mineable**]** **=** 1**;**

* What is the list of mineable GPUs and their corresponding prices?

**SELECT**

GPU**.[**Processor**],**

GPU**.[**GPU\_Manufacturer**],**

Price**.[**Price\_USD**]**

**FROM**

**[**dbo**].[**DIM\_GPU\_PROD**]** **AS** GPU

**JOIN**

**[**dbo**].[**FACT\_GPU\_PRICE**]** **AS** Price **ON** GPU**.[**Id**]** **=** Price**.[**ProdId**]**

**JOIN**

**[**dbo**].[**DIM\_CRYPTO\_DATA**]** **AS** Crypto **ON** GPU**.[**Id**]** **=** Crypto**.[**Id**]**

**WHERE**

Crypto**.[**Is\_Mineable**]** **=** 1**;**

* Which regions have a total CPU price exceeding a specific threshold of 5 million currency units?

**SELECT**

Region**.[**Id**]** **AS** RegionId**,**

Region**.[**Currency**],**

**SUM(**Price**.[**Price\_USD**])** **AS** TotalPrice

**FROM**

**[**dbo**].[**FACT\_CPU\_PRICE**]** **AS** Price

**JOIN**

**[**dbo**].[**DIM\_REGION**]** **AS** Region **ON** Price**.[**RegionId**]** **=** Region**.[**Id**]**

**GROUP** **BY**

Region**.[**Id**],** Region**.[**Currency**]**

**HAVING**

**SUM(**Price**.[**Price\_USD**])** **>** 5000000**;**

* When there is a new GPU price, what details are recorded in the log table?

**CREATE** **TRIGGER** trg\_UpdateGPUInfo

**ON** **[**dbo**].[**FACT\_GPU\_PRICE**]**

**AFTER** **INSERT**

**AS**

**BEGIN**

**INSERT** **INTO** **[**dbo**].[**GPU\_Log**]**

**SELECT**

**[**ProdId**],**

**[**TimeId**],**

**[**RegionId**],**

**[**MerchantId**],**

**[**Price\_USD**],**

**[**Price\_Original**],**

**GETDATE()** **AS** LogDate

**FROM**

inserted**;**

**END;**

**INSERT** **INTO** **[**dbo**].[**FACT\_GPU\_PRICE**]** **(**ProdId**,** TimeId**,** RegionId**,** MerchantId**,** Price\_USD**,** Price\_Original**)**

**VALUES** **(**997158**,** 1**,** 20140914**,** 2**,** 31**,** 651.7384130657**);**

**SELECT** **\*** **FROM** sys**.**triggers **WHERE** parent\_id **=** **OBJECT\_ID(**'[dbo].[FACT\_GPU\_PRICE]'**);**

**SELECT** **\*** **FROM** **[**dbo**].[**GPU\_Log**];**

* What are the details of prices and technical specifications for CPUs available in the view?

**CREATE** **VIEW** vw\_CPU\_Details **AS**

**SELECT**

CPU**.[**CPU\_Name**],**

CPU**.[**Cores**],**

CPU**.[**Socket**],**

Price**.[**Price\_USD**]**

**FROM**

**[**dbo**].[**DIM\_CPU\_PROD**]** **AS** CPU

**JOIN**

**[**dbo**].[**FACT\_CPU\_PRICE**]** **AS** Price **ON** CPU**.[**Id**]** **=** Price**.[**ProdId**];**

* How is the stored procedure used to retrieve RAM prices based on a specific region and time?

**CREATE** **PROCEDURE** sp\_GetRAMPrice

@RegionId INT**,**

@TimeId INT

**AS**

**BEGIN**

**SELECT**

RAM**.[**RAM\_Name**],**

RAM**.[**Memory\_Type**],**

Price**.[**Price\_USD**]**

**FROM**

**[**dbo**].[**DIM\_RAM\_PROD**]** **AS** RAM

**JOIN**

**[**dbo**].[**FACT\_RAM\_PRICE**]** **AS** Price **ON** RAM**.[**Id**]** **=** Price**.[**ProdId**]**

**WHERE**

Price**.[**RegionId**]** **=** @RegionId

**AND** Price**.[**TimeId**]** **=** @TimeId**;**

**END;**

**EXECUTE** sp\_GetRAMPrice

@RegionId **=** 4**,**

@TimeId**=** 20130322**;**

* How do you execute a transaction to update new prices for CPUs and GPUs, followed by a commit or rollback?

**BEGIN** **TRANSACTION;**

**UPDATE** **[**dbo**].[**FACT\_CPU\_PRICE**]** **SET** **[**Price\_USD**]** **=** 1200 **WHERE** **[**ProdId**]** **=** 1 **AND** **[**RegionId**]** **=** 1**;**

**UPDATE** **[**dbo**].[**FACT\_GPU\_PRICE**]** **SET** **[**Price\_USD**]** **=** 800 **WHERE** **[**ProdId**]** **=** 3 **AND** **[**RegionId**]** **=** 2**;**

-- Kết thúc giao dịch, commit nếu thành công, rollback nếu có lỗi

**COMMIT;**

-- hoặc

**ROLLBACK;**

* Which CPUs have the highest prices in history?

**WITH** RankedPrices **AS** **(**

**SELECT**

Price**.[**ProdId**],**

Price**.[**TimeId**],**

Price**.[**Price\_USD**],**

**ROW\_NUMBER()** **OVER** **(PARTITION** **BY** Price**.[**ProdId**]** **ORDER** **BY** Price**.[**Price\_USD**]** **DESC)** **AS** PriceRank

**FROM**

**[**dbo**].[**FACT\_CPU\_PRICE**]** **AS** Price

**)**

**SELECT**

CPU**.\*,**

Prices**.[**TimeId**]** **AS** HighestPriceTimeId**,**

Prices**.[**Price\_USD**]** **AS** HighestPrice

**FROM**

**[**dbo**].[**DIM\_CPU\_PROD**]** **AS** CPU

**JOIN**

RankedPrices **AS** Prices **ON** CPU**.[**Id**]** **=** Prices**.[**ProdId**]**

**WHERE**

Prices**.[**PriceRank**]** **=** 1**;**

* Which GPUs have the highest prices in history?

**WITH** RankedGPUPrices **AS** **(**

**SELECT**

GPU**.[**Id**]** **AS** ProdId**,**

Price**.[**TimeId**],**

Price**.[**Price\_USD**],**

**ROW\_NUMBER()** **OVER** **(PARTITION** **BY** GPU**.[**Id**]** **ORDER** **BY** Price**.[**Price\_USD**]** **DESC)** **AS** PriceRank

**FROM**

**[**dbo**].[**DIM\_GPU\_PROD**]** **AS** GPU

**JOIN**

**[**dbo**].[**FACT\_GPU\_PRICE**]** **AS** Price **ON** GPU**.[**Id**]** **=** Price**.[**ProdId**]**

**)**

**SELECT**

'GPU' **AS** ProductType**,**

GPU**.\*,**

GPUPrices**.[**TimeId**]** **AS** HighestPriceTimeId**,**

GPUPrices**.[**Price\_USD**]** **AS** HighestPrice

**FROM**

**[**dbo**].[**DIM\_GPU\_PROD**]** **AS** GPU

**JOIN**

RankedGPUPrices **AS** GPUPrices **ON** GPU**.[**Id**]** **=** GPUPrices**.[**ProdId**]**

**WHERE**

GPUPrices**.[**PriceRank**]** **=** 1

* Which RAM has the highest price in history?

**WITH** RankedRAMPrices **AS** **(**

**SELECT**

RAM**.[**Id**]** **AS** ProdId**,**

Price**.[**TimeId**],**

Price**.[**Price\_USD**],**

**ROW\_NUMBER()** **OVER** **(PARTITION** **BY** RAM**.[**Id**]** **ORDER** **BY** Price**.[**Price\_USD**]** **DESC)** **AS** PriceRank

**FROM**

**[**dbo**].[**DIM\_RAM\_PROD**]** **AS** RAM

**JOIN**

**[**dbo**].[**FACT\_RAM\_PRICE**]** **AS** Price **ON** RAM**.[**Id**]** **=** Price**.[**ProdId**]**

**)**

**SELECT**

'RAM' **AS** ProductType**,**

RAM**.\*,**

RAMPrices**.[**TimeId**]** **AS** HighestPriceTimeId**,**

RAMPrices**.[**Price\_USD**]** **AS** HighestPrice

**FROM**

**[**dbo**].[**DIM\_RAM\_PROD**]** **AS** RAM

**JOIN**

RankedRAMPrices **AS** RAMPrices **ON** RAM**.[**Id**]** **=** RAMPrices**.[**ProdId**]**

**WHERE**

RAMPrices**.[**PriceRank**]** **=** 1**;**

* What are the details of prices and technical specifications for the CPU with the highest price of all time?
* What are the details of prices and technical specifications for the GPU with the highest price of all time?
* What are the details of prices and technical specifications for the RAM with the highest price of all time**?**

**SELECT**

T**.[**Year**],**

T**.[Month],**

T**.[**Day**],**

CPU**.[**CPU\_Name**],**

CPU**.[**Manufacturer**]** **AS** CPU\_Manufacturer**,**

GPU**.[**Processor\_Manufacturer**]** **AS** GPU\_Processor\_Manufacturer**,**

GPU**.[**Memory\_Type**]** **AS** GPU\_Memory\_Type**,**

RAM**.[**Manufacturer**]** **AS** RAM\_Manufacturer**,**

RAM**.[**Memory\_Type**]** **AS** RAM\_Memory\_Type**,**

CPU\_Price**.[**RegionId**],**

CPU\_Price**.[**Price\_USD**]** **AS** CPU\_Price**,**

GPU\_Price**.[**Price\_USD**]** **AS** GPU\_Price**,**

RAM\_Price**.[**Price\_USD**]** **AS** RAM\_Price**,**

Crypto**.[**Code**],**

CryptoRate**.[**ClosePrice**]** **AS** Crypto\_ClosePrice

**FROM**

**[**dbo**].[**DIM\_TIME**]** **AS** T

**JOIN**

**[**dbo**].[**FACT\_CPU\_PRICE**]** **AS** CPU\_Price **ON** T**.[**Id**]** **=** CPU\_Price**.[**TimeId**]**

**JOIN**

**[**dbo**].[**DIM\_CPU\_PROD**]** **AS** CPU **ON** CPU\_Price**.[**ProdId**]** **=** CPU**.[**Id**]**

**JOIN**

**[**dbo**].[**FACT\_GPU\_PRICE**]** **AS** GPU\_Price **ON** T**.[**Id**]** **=** GPU\_Price**.[**TimeId**]**

**JOIN**

**[**dbo**].[**DIM\_GPU\_PROD**]** **AS** GPU **ON** GPU\_Price**.[**ProdId**]** **=** GPU**.[**Id**]**

**JOIN**

**[**dbo**].[**FACT\_RAM\_PRICE**]** **AS** RAM\_Price **ON** T**.[**Id**]** **=** RAM\_Price**.[**TimeId**]**

**JOIN**

**[**dbo**].[**DIM\_RAM\_PROD**]** **AS** RAM **ON** RAM\_Price**.[**ProdId**]** **=** RAM**.[**Id**]**

**JOIN**

**[**dbo**].[**FACT\_CRYPTO\_RATE**]** **AS** CryptoRate **ON** T**.[**Id**]** **=** CryptoRate**.[**TimeId**]**

**JOIN**

**[**dbo**].[**DIM\_CRYPTO\_DATA**]** **AS** Crypto **ON** CryptoRate**.[**CodeId**]** **=** Crypto**.[**Id**]**

**WHERE**

CPU\_Price**.[**MerchantId**]** **=** 1 -- Thay đổi MerchantId theo điều kiện cụ thể

**AND** GPU\_Price**.[**MerchantId**]** **=** 1

**AND** RAM\_Price**.[**MerchantId**]** **=** 1**;**

# **Chapter 5. DASHBOARD REPORT**

## **5.1 Dashboard**

For a more detailed insight into the computer components market (RAM, CPU, GPU), we utilized the Power BI application to create dashboards illustrating sales results, profits, and distribution by region, time, and manufacturer.

A screenshot of a dashboard

Description automatically generated

Figure 4. Report of CPU marketprices.

A screenshot of a dashboard

Description automatically generated

Figure 5. Report of CPU maketprices.

A screenshot of a dashboard

Description automatically generated

Figure 6. Report of RAM maketprices.

The RAM, CPU, and GPU market appear to be a promising market with profit margins ranging from 6% to 14%.

However, there are also challenges, as current major distributors (1stWave Technologies, Aquila Technology) dominate the market with over 70% revenue share.

# **CONCLUSION**

Through the execution of this project, it has helped us reinforce our knowledge in the field of database systems. We can apply this knowledge to construct a database serving a specific business model. The project presented the steps for selecting, analyzing, designing, and applying SQL commands to address business questions in the computer components business model. Additionally, Power BI was utilized to create visually informative dashboard reports.

# **REFERENCES**

1. Random Access Memory(RAM) Market Size, Growth and Forecast from 2023 – 2030 (<https://www.linkedin.com/pulse/random-access-memoryram-market-size-growth-forecast-gmkzf/>)
2. Graphics Processing Unit (GPU) Market Insights 2023: Technological Advancements, and Regional Growth Strategies 2030 (<https://www.linkedin.com/pulse/graphics-processing-unit-gpu-market-insights-2023>)
3. Computer CPU Processors Market Size, Growth & Statistics to 2031 | [68 Pages](<https://www.linkedin.com/pulse/computer-cpu-processors-market-size-growth-brbre>)
4. Global PC market returns to growth in Q4 2023 (<https://www.canalys.com/newsroom/global-pc-market-Q4-2023>)
5. Ethereum Effect impact on PC parts prices (https://www.kaggle.com/datasets/raczeq/ethereum-effect-pc-parts/data?fbclid=IwAR2rMuBH2CQ3OZ02GkqYHa9qVxKy3aCrdBB96kBUDG9d0pT0bMvdFZYSwk8)