Computer Management System

Final project report

By

CMPE 226

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Application

The computer retails around the world have the demands to manage their inventory due to the complex nature of their inventory. However, they do not have the necessary skills for building an inventory. Therefore, we applied what we learnt in this class and built an application to help them manage their inventory, and also enable them to do the basic data analysis on their inventory.

We built an inventory management system for the computer retailers. The system not only is able to search the basic information for the inventory such as computer's brand, type, color, resolution, CPU and et al. In addition, the application is able to do the data warehouse that facilitate the computer retailer to do the data analysis on their complex inventory data.

Data

In our application, in order to mimic the computer retail inventory we need some data that is similar to what the computer retailer store dataset. To achieve our goal, we took advantage of dataset generating agency such as generatedata.com. These websites will auto generate the dataset based on the columns and data samples you provided. It can generate large amount of data in a short time. The generated dataset is stored in the csv file.

However, the auto generated data may have some problems since it's auto generated, and may not mimic the real dataset. Therefore, after got the auto generated data, we tailored the dataset by modifying the dataset that can mimic the real retail situation. For example, the computer with SSD usually is more expensive with the regular hard disk. But in the auto generated dataset, they are randomly generated and therefore can not depict the real data. So we tailored the dataset ourselves, and tried our best to make the dataset as real as the real dataset.

|	A	B	C	D	E	F	G	H	I
	20001	Lenovo	Laptop	Black	2016	THINKPAD X	Windows	10	C-1
	20002	Lenovo	Laptop	Black	2016	THINKPAD X	Windows	9	C-2
	20003	Lenovo	Laptop	Multi	2016	THINKPAD T	Windows	6	C-3
	20004	Lenovo	Laptop	Black	2016	THINKPAD P	Windows	7	C-4
	20005	Lenovo	Laptop	Silver	2016	THINKPAD YOG	Windows	5	C-5
	20006	Lenovo	Laptop	Black	2016	THINKPAD T	Linux	8	C-6
	20007	Lenovo	Laptop	Black	2016	THINKPAD YOG	Windows	4	C-7
	20008	Lenovo	Laptop	Silver	2016	THINKPAD P	Windows	4	C-8
	20009	Lenovo	Laptop	Black	2016	THINKPAD YOG	Windows	9	C-9
	20010	Lenovo	Laptop	Black	2016	THINKPAD X	Windows	8	C-10
	20011	Lenovo	Laptop	Black	2016	THINKPAD YOG	Windows	5	C-11
	20012	Lenovo	Laptop	White	2016	THINKPAD X	Windows	6	C-12
	20013	Asus	Laptop	Black	2016	TRANSFORMEF	Windows	4	C-13
	20014	Asus	Laptop	Black	2016	ZENBOOK	Windows	7	C-14
	20015	Asus	Laptop	Black	2016	TRANSFORMEF	Windows	6	C-15
	20016	Asus	Laptop	Red	2016	ZENBOOK	Windows	8	C-16
	20017	Asus	Laptop	Black	2016	ZENBOOK	Linux	3	C-17
	20018	Asus	Laptop	Black	2016	ZENBOOK	Linux	7	C-18

Figure 1: Sample dataset
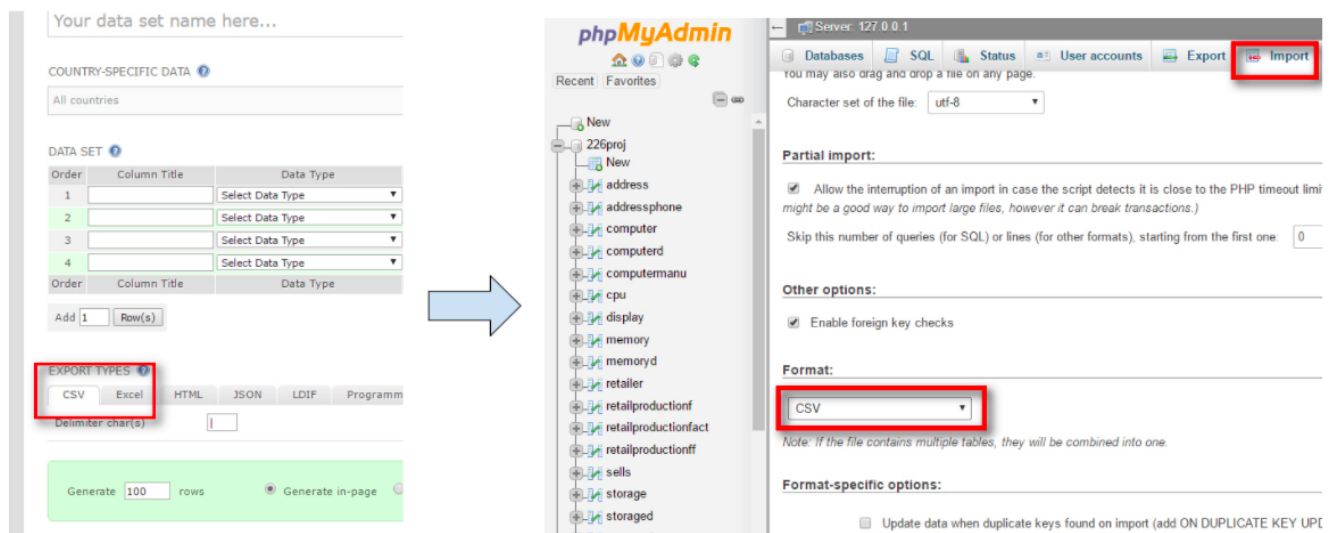
Figure2: Insert csv. files into database

ER diagram

An Entity Relationship Diagram is a typical and graphical information system representation of flowchart that illustrates how entities such as computer, retailer or manufacturer relate to each other within a logical database system. There are three main components of an ERD: entities, relationships and cardinality. According to its various popularity applications, from small to big enterprise systems, government information systems, medical system, research systems are undertaking huge quantities of database integrities by implementing the fundamental ER diagram.

ER diagram conducts a well-defined group of identical symbols with different shapes of 2D figures to express the detailed interaction and association of different entities, relationships and their respective attributes. They replica the unique structure by defining object current stabilized tense as an entity and current behavior as a type of relation. Entities represents an stablized objects with a data entry; for instance, Our ERD represents the information system of computers and retailers showing in Figure 3 below.

According to the facts of our small enterprise system, the computer entities and retailer entities are essentially the core by representing entities with respective attributes. As shown, the computer entity has diverse entities, such as Computer memory, Computer CPU, Computer display and etc. On the other hands, the retailer entities that bundled with computer through the transactions. As a matter of fact, the specific relations encounter the most challenging portion by the time to design and classify the ER Diagram. By long time struggling of team debates, we are determined to employ the relationships defined in this ERD, which is not in 3rd normal form.
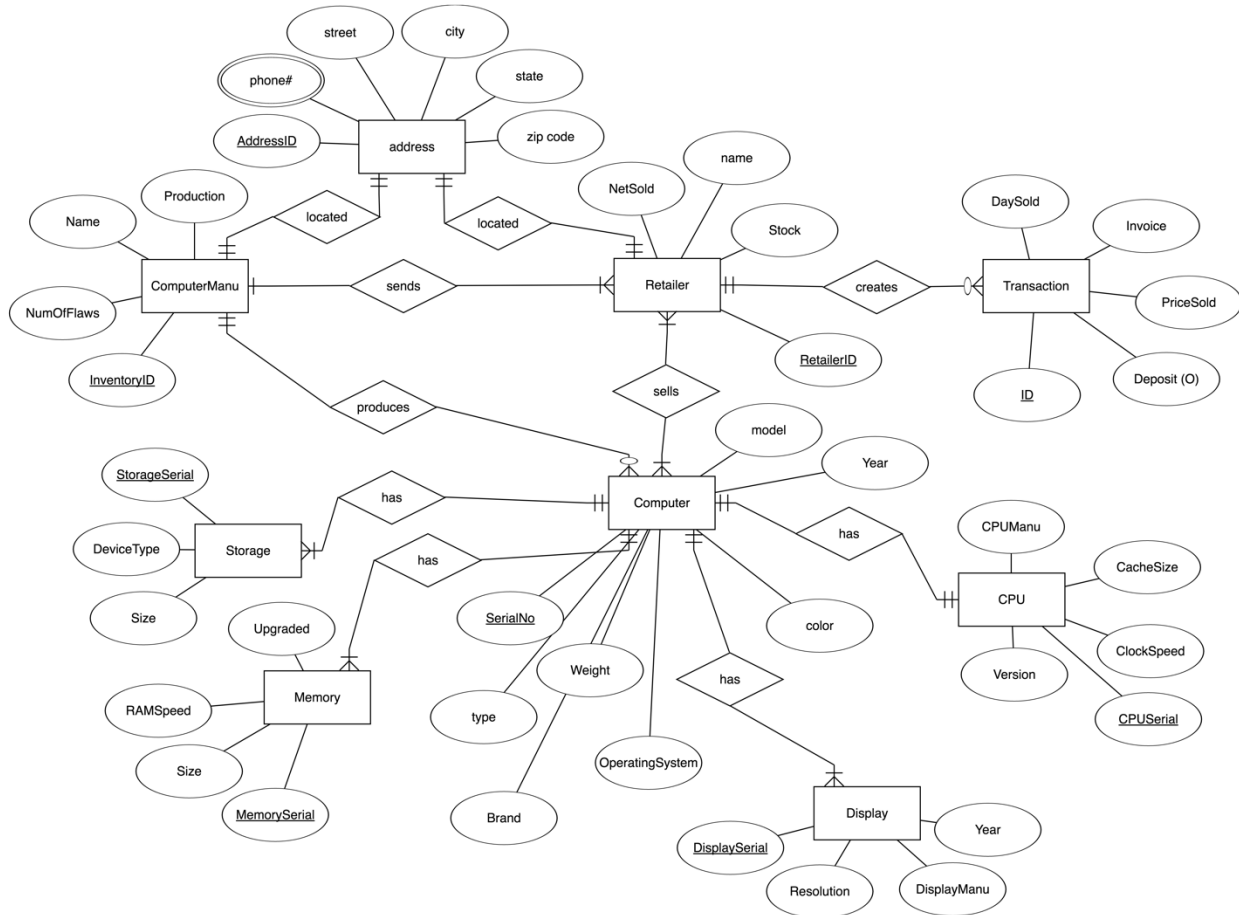
Figure 3: ER diagram

Per the general common sense, the specific computer with respective brand was identical by every single computer including laptop, desktop, or surface book; however we determined to omit the validity so as to count them as an attribute, since the targeted owner, employee, or buyer have the flexibility to query all computer brand by their willingness, even on the condition that it may or may not have been produced yet. Per the perspective of transaction entity, in order to maximize the integrity, flexibility, and performance, we determine to count it as an attribute as well with five different values. As the Figure 3 explains, it is formed as a function of computer retailer database system, as well as a system manue to provide rapid search and query for the user to get the entire inventory information.

Relational Schema

The term relational schema refers to a heading paired with a set of constraints defined in terms of that heading. A relation can thus be seen as an instantiation of a relation schema if it has the heading of that schema and it satisfies the applicable constraints. Sometimes a relation schema is taken to include a name. A relational database definition can thus be thought of as a collection of named relational schema.

The relational schema can be considered as a blueprint to facilitate the original database schema; by the transformation of another form, it will present a fully functional relational database diagram. Conceptually, the relational schema includes several portions such as: attributes, primary keys, different tables, and varieties of foreign keys. All these portions will form a database system which can be fully functionalized by MySQL.

The relational schema can be considered as the detailed translation from the ER diagram. Specifically, differing entities will be classified and distributed to present a sharp and clear overview of designated relationship. The attributes from the entity relational diagram are represented by the additional columns in each table for the relational schema. The detailed relationship among each other will be 1:1, 1:M, and M:M types. And all these relationship types can be illustrated by additional junction table in this relational schema.
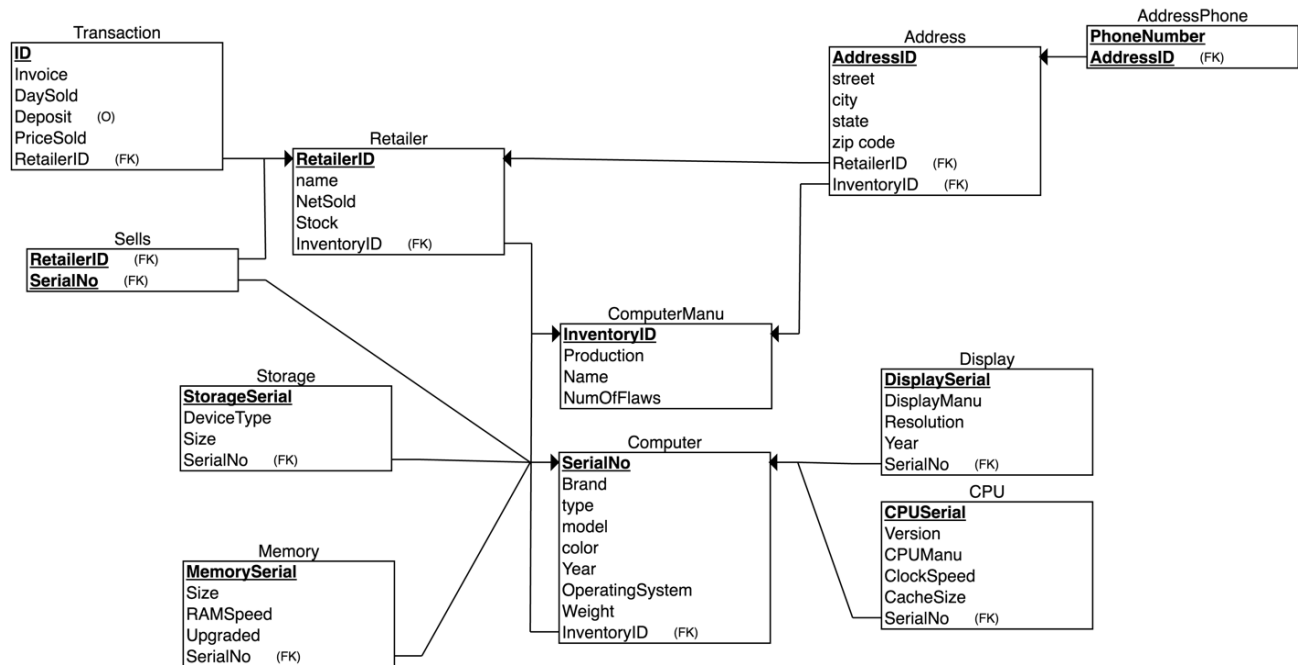
Figure 4: Relational schema

The Figure 4 presents our relational schema diagram which is bonded with our ERD diagram from Figure 3. As it is shown, the computer table stands the key part which consists of foreign keys mapping to the other tables: storage, CPU, Memory, display. Apparently, as we can see, the computer and retailer will be the major focal aspect to be analyzed or applied by the user. The computer table and retailer table represent focal points of our database design and schema as they serve as two main subjects in which to quantify data. The computer table describes the actual product that with different attributes. By all means, a specific computer can have different brand, type, model, color, year, weight, and id. Meanwhile, the main retailer will posses the inventory information for different sub-contractors.

Star Schema

The Star Schema presents the designated and decreased type of the schema. It is associated with a variety of fact tables which involves with different sections of the dimension tables. The star schema is an important special case of the snowflake schema, and is more effective for handling simpler queries. The star schema separates business process data into different facts, which hold the measurable, quantitative data about a business, and dimensions which are descriptive attributes related to fact data.

In our situation, we are seeking for the relationship from Retailer to different computer hardware information. They are not directly related from relational schema; However this star schema can present an analytical relationships to get all those parts connected. For an instance, fact table consists 4 foreign keys to connect other tables to form the system, which includes sales price, sale quantity, and time, memory, CPU, and hard disk storage.

Since our application aims for computer retailer enterprise searching computer inventory and transaction information, we used computer, transaction, retailers as our dimensional tables. With all those dimensional tables containing information about the computer's inventory, the system will be absolutely convenient to search and make the comparison with non-directly related attributes. The detailed example will be shown in Demo section of this report.

Another example is that we used memory as another related table, with some foreign keys in the retailer's production to be analyzed, as they are all measurable information. Our project is not aimed to sell computers, and it is an informative database that does not require calendar dates.
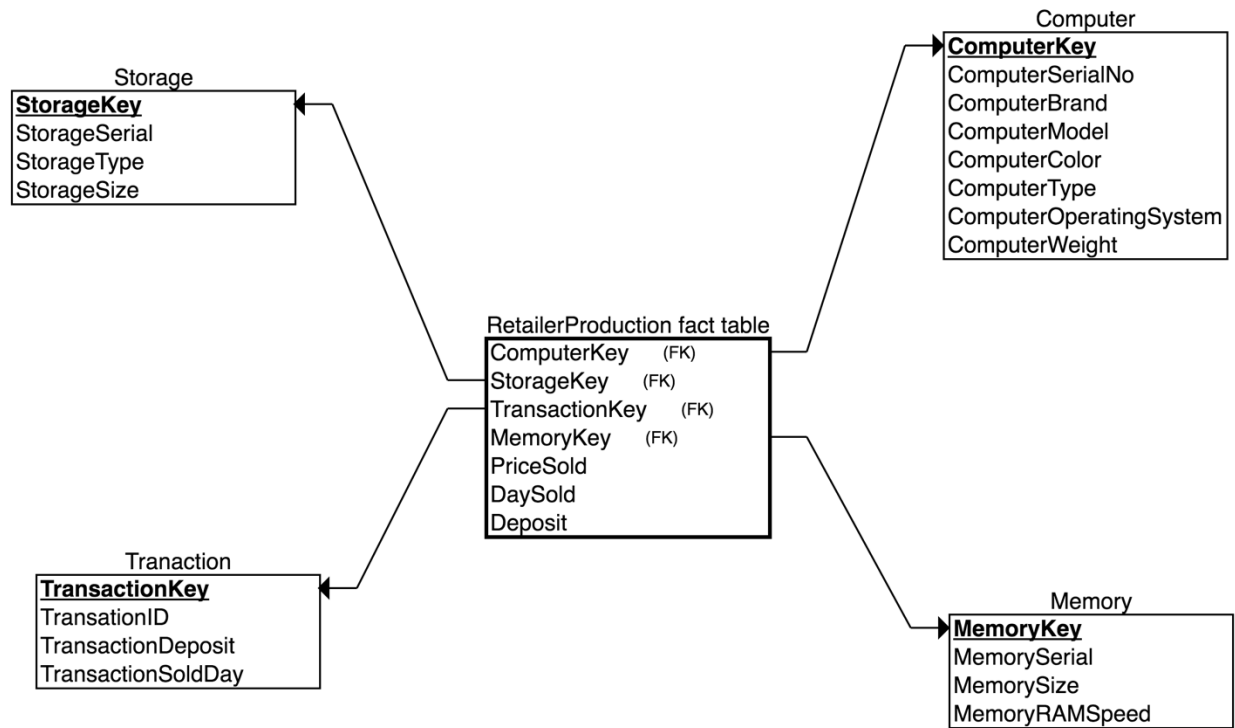
Figure 5: Star Schema

Application Screenshot and Demo

Below is the front page of our application.

Figure 6: Front Page

1. Our application is able to do the query based on the brand of the computer. You can query the inventory management system with the name of the computer brand. It will next print out all the computers with this brand in the system.

Figure 7: Query the application by brand

Figure 8: Query result from the application

2. The application can also query the phone number and address by the factory name.

Factory: Hewlett-Packard | Go! | ☑Limit Rows

Figure 9: Query the application with factory name

Factory: Hewlett-Packard Go! ☑Limit Rows
1 results found

Name	PhoneNumber	street	city	state	zip_code
Hewlett-Packard	(289) 380-3976	Ap #800-5475 Elementum, Ave	Provo	Utah	67420

Figure 10: Query result

3. Query the database by computer brand and color

Computer Brand: HP **and Color:** SILVER Go! ☑Limit Rows
5 results found

brand	type	model	color	year	weight
HP	Surface	PAVILION	Silver	2016	6
HP	Surface	ZBOOK STUDIO	Silver	2016	5
HP	Surface	ELITE	Silver	2016	4
HP	Surface	STREAM	Silver	2016	4
HP	Surface	PAVILION	Silver	2016	7

Figure 11: Query the application by computer brand and color

4. Further query the application by weight range

brand	type	model	color	year	weight
HP	Surface	PAVILION	Silver	2016	6
HP	Surface	ZBOOK STUDIO	Silver	2016	5
HP	Surface	ELITE	Silver	2016	4
HP	Surface	STREAM	Silver	2016	4
HP	Surface	PAVILION	Silver	2016	7

Computer Brand: HP   **and Color:** SILVER   Go! ☑Limit Rows
5 results found

Search Computer by Brand: HP   **and Color:** SILVER   **and Weight:** 4   To 5   Go!
3 results found

SerialNo	Brand	Type	Color	Year	Model	OperatingSystem	Weight	InventoryID
20056	HP	Surface	Silver	2016	ELITE	Unix	4	C-56
20058	HP	Surface	Silver	2016	STREAM	Linux	4	C-58
20055	HP	Surface	Silver	2016	ZBOOK STUDIO	Windows	5	C-55

Figure 12: Query the application by weight

5. Show all data based on computer type in our database

Figure 13: Query the application by computer type

Figure 14: Query result for laptop

Figure 15: query result for surface

6. Show the relational tables in our database
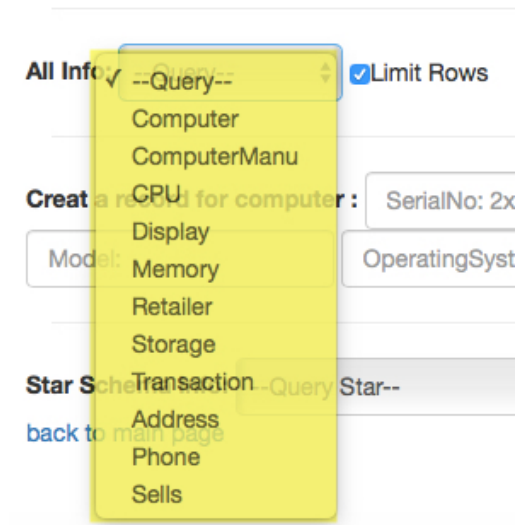
Figure 13: All the relational table in database

30 results found

Production	Name	InventoryID	NumOfFlaws
491	Apple	C-1	2
378	Chassis Plans	C-10	10
253	Chillblast	C-11	8
476	Chip PC	C-12	5
987	Clevo	C-13	5
822	Sager Notebook Computers	C-14	5
200	Cray	C-15	9
810	Crystal Group	C-16	10
630	Cybernet Computer Inc.	C-17	3
288	Compal	C-18	4
699	Cooler Master	C-19	8
231	Arnouse Digital Devices Corp (ADDC)	C-2	10
117	CyberPower PC	C-20	2
926	Cybertron PC	C-21	6
50	Dell	C-22	5

Figure 14: The information of computer menu

Computer Management System

30 results found

Version	CPUManu	ClockSpeed	CacheSize	CPUSerial	SerialNo
Vol .2	Lectus Nullam Suscipit Foundation	1587	2047	003BE2C6-BA5F-EBBA-2F7A-0BF1FBC864F5	20050
Vol. 3	Posuere Enim Inc.	795	172	010DDCDE-2946-B3FD-70AD-3D5DA7EB4965	20078
Vol .1	Erat Etiam Limited	945	1556	04D859E4-56D1-0A5B-B081-5F90890750C1	20024
Vol .1	Pharetra Nam Ac Associates	1160	4638	07A9DCBC-058B-5335-5485-DC97D0A48C49	20023
Vol .1	Eget Volutpat Ornare Corporation	205	3071	0A4CB2F6-89FE-E79C-2F88-BF671FFCF80A	20007
Vol. 3	Curabitur Dictum Industries	379	3533	0B923818-C1F2-D1C5-494C-8CDC28081798	20080
Vol. 3	Vel Sapien Imperdiet Incorporated	1856	2650	0BCDDB68-F901-73BC-D193-82200AFA85BD	20098
Vol .1	Amet Consulting	498	2728	0C4C8F74-3255-6555-74ED-7786B75B476C	20015
Vol .2	Adipiscing Inc.	551	927	0D74C84A-257B-274F-F4E0-AB5D7068BC58	20044
Vol. 3	Adipiscing Ligula Foundation	1072	1192	0F339D60-82FE-88B1-0301-3F0E11AA75A9	20075
Vol .2	Consequat Limited	554	4172	102A84E9-64CA-F1B6-05F1-B533DC84F182	20065
Vol .1	Eget Mollis LLC	1185	1524	1143D0C2-5A17-D5BD-4A25-2A25937872A3	20010
Vol. 3	Nec LLP	1883	2246	15D2F247-88F8-D306-9816-C02A91E3D991	20079
Vol .1	Malesuada Vel Limited	620	1512	1661E6C9-F181-2E1A-DDB6-6657B0C5E020	20017
Vol .2	Ac Tellus Suspendisse Industries	162	4599	1CF0742B-A491-6F2B-7E17-BCD246E322A2	20056

Figure 15: The information of CPU

7. Insertion:

We can add a new laptop with brand "Apple", model "Macbook pro" into database

Figure 16: Insertion

Figure 17: Search result

Star schema query analysis

With our dimensional model consisting of fact and dimensional tables, different queries can be executed to analyze the dataset. We created views for our fact and dimensional tables in order to easily run star schema queries.

Figure 18: Views of star schema

1. The goal of this query is to find the relation among the storage type, the size, the brand, and the price. As expected, the larger memory space and using SSD, the higher sold price for the computer is.

   Query:
   SELECT DISTINCTROW storaged.DeviceType as 'Storage Type',

storaged.Size as 'Storage Size(GB)',

retailproductionfact.PriceSold,

computerd.Brand,

computerd.model

FROM storaged, retailproductionfact, computerd

WHERE retailproductionfact.computerkey = computerd.computerkey

AND retailproductionfact.storagekey = storaged.storagekey

ORDER BY retailproductionfact.PriceSold

puter Management System

Star Schema Info: Pricesold comparision between the factors of Storage DeviceType & Brand ⇕ ☑Limit Rows
back to main page
30 results found

Storage Type	Storage Size(GB)	PriceSold	Brand	model
Regular	1024	123	Dell	ALIENWARE
Solid State	512	160	Lenovo	THINKPAD YOGA
Regular	1024	171	Dell	CHROMEBOOK
Regular	1024	234	Dell	CHROMEBOOK
Solid State	512	234	Lenovo	THINKPAD P
Regular	1024	235	Dell	CHROMEBOOK
Solid State	512	295	Lenovo	THINKPAD T
Regular	512	353	Dell	ALIENWARE
Solid State	512	355	Lenovo	THINKPAD YOGA
Regular	512	423	Dell	ALIENWARE
Regular	1024	423	Dell	CHROMEBOOK
Regular	1024	452	Dell	INSPIRON
Solid State	512	481	Lenovo	THINKPAD X

Figure 19: Query result

From the Figure 20, we can see that computers using SSD and larger storage space have higher sold price. But there is some exceptions. In the Figure 21, Dell's Alienware with regular storage type sells for $3116. It is because the original suggested price of Alienware is high.

Solid State	256	989	Lenovo	THINKPAD P
Solid State	512	994	Asus	ZENBOOK
Regular	1024	998	HP	OMEN
Solid State	256	999	Lenovo	THINKPAD X
Solid State	512	999	Dell	XPS
Solid State	512	1000	Dell	INSPIRON
Solid State	512	1034	Lenovo	THINKPAD YOGA
Regular	1024	1038	Dell	INSPIRON
Solid State	512	1074	Asus	ZENBOOK
Solid State	512	1077	Asus	ZENBOOK
Solid State	512	1094	Asus	ZENBOOK
Solid State	512	1098	Asus	ZENBOOK
Solid State	512	1098	Asus	TRANSFORMER
Solid State	512	1111	Lenovo	THINKPAD P
Solid State	512	1112	Lenovo	THINKPAD YOGA
Solid State	512	1145	Lenovo	THINKPAD X
Solid State	512	1167	Asus	TRANSFORMER
Solid State	512	1223	Lenovo	THINKPAD YOGA
Solid State	512	1234	Asus	ZENBOOK

Figure 20: Query result

Solid State	128	2098	Lenovo	THINKPAD YOGA PRO
Solid State	256	2810	Lenovo	THINKPAD P
Regular	512	3117	Dell	ALIENWARE
Solid State	512	3131	Lenovo	THINKPAD YOGA

Figure 21: Query result

2. This is the query to figure out which color of computers has the best sale amount in last year. With this analysis, retailers can have the promotion on computers of poor sales.

Query:

SELECT DISTINCTROW computerd.color,

sum(retailproductionfact.PriceSold) as 'Amount'

FROM retailproductionfact, computerd

WHERE retailproductionfact.computerkey = computerd.computerkey

GROUP BY computerd.color

ORDER BY sum(retailproductionfact.PriceSold)

Star Schema Info: | Sales Amount comparision between the factors of Computer Color & Brand ↕ | ☐Limit Rows

back to main page
6 results found

color	Amount
Green	2561
White	5550
Silver	6579
Red	9051
Multi	25748
Black	51311

Figure 22: Query result of relation between color and amount