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FINAL PROJECT

GROUP 1:

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Business Assumption

- **Business Needs:** It is considered that prior to adopting any data governance initiatives, a thorough understanding of the organization's specific business goals and objectives is gained. Identifying vital data assets, business processes, and key performance indicators (KPIs) is part of this. One business process identified was that some sales are made with a negative profit, implying sales below cost. We believe this is likely due to the company's desire to get rid of old stock, or as an occasional customer retention tactic, and possibly to undercut competitors. The customers' names and addresses are important personally identifiable information which must be treated with strict and measured security.
- **Audience and Stakeholders:** The organization is considered to understand the need to identify and engage with all important stakeholders, both internal and external. Understanding their data needs and expectations is critical for effective data governance. The reports are addressed to Operational and Executive teams which is why they have different degrees of granularity and detail. We expect Executives to require a high-level overview of the company's profitability by region, while Operations can examine various City and Branch metrics.
- **Technology Infrastructure:** A thorough examination of the existing technological infrastructure is carried out. This includes assessing the data management systems, tools, and platforms, as well as their compatibility with data governance initiatives. The primary data management tools used were MySQL Workbench and Python, and all the code is provided in the Annex section for review, verification, and replication.
- **Processes and Workflows:** It is expected that the organization understands the importance of mapping existing data processes and workflows. Understanding how data moves through the organization, who is responsible for it at each point, and where possible bottlenecks or issues may develop are all part of this. As mentioned earlier, the code is provided in the Annex section for transparency and reproducibility. Some unique Product Names were found to have duplicated Product IDs and treating them as such we defined new Product IDs. We achieved this by changing the Product ID by +1 for all applicable duplicates, which gave us a clean dataset.
- **Report Objectives:** The organization understands that reporting objectives must be clearly defined. This includes determining the types of reports needed, their frequency, the key metrics to be included, and the target audience for these reports. These reports are designed to advise Executive and Operations on metrics and KPIs, both current and historical, on appropriate time scales, to guide their decisions on improving business logic and processes.

1. Data Quality

Ensuring data accuracy, completeness, and consistency. This aspect of Data Governance is essential to the Superstore, as it ensures the metrics and progress tracked align with goals and benchmarks for employees and the whole company. Using Data Quality Principles, we can ensure customers can expect data-driven decisions from the company, such as customer segmentation, and pricing. This can increase customer loyalty, retention, and lifetime value.

1.1. Criticality Principle

Not all data is of equal importance. Focus on critical data to ensure it meets high-quality standards, which are essential for decision-making and business operations.

1.1.1. Identification Policy

Identify critical data elements that significantly impact decision-making and business operations to ensure a clear understanding of the most important data, making it a top priority for quality control and protection.

1.1.1.1. Critical Data Identification Procedure

Collaborate with stakeholders to identify critical data elements to continuously review and validate the list of critical data to ensure its relevance and accuracy.

1.1.1.2. Data Profiling and Scoring Procedure

Implement data profiling techniques and scoring systems for critical data elements to regularly assess the quality of critical data and generate operational reports highlighting data quality scores.

1.1.2. Quality Assurance Policy

Implement stringent quality control measures for critical data, ensuring it meets high-quality standards to guarantee that critical data is consistently accurate, reliable, and readily available for decision-making and operational needs.

1.1.2.1. Quality Control Framework Procedure

Establish a comprehensive quality control framework for critical data to continuously apply quality checks and audits to ensure data conforms to quality standards, generating executive reports on data quality trends.

1.1.2.2. Data Cleansing and Enrichment Procedure

Employ data cleansing and enrichment processes to enhance data quality. to regularly execute data cleansing procedures and report on the improvements in data quality achieved.

1.2. Standards-driven Principle

Consistency is key. Having well-defined standards ensures that data is consistently accurate and reliable, making it easier to maintain high data quality across the organization.

1.2.1. Standards Policy

Standardization and Documentation Procedure: Develop and document data quality standards and guidelines to ensure adherence to standards and generate operational reports highlighting instances of compliance or deviations.

1.2.1.1. Standardization and Documentation Procedure

Develop and document data quality standards and guidelines to ensure adherence to standards and generate operational reports highlighting instances of compliance or deviations.

1.2.1.2. Data Quality Training and Certification Procedure

Provide training and certification programs on data quality standards to track employee certifications and generate executive reports showcasing the level of staff compliance with data quality standards.

1.2.2. Continuous Monitoring and Adherence Policy

Ensure that data systems are compatible and interoperable across the enterprise to promote seamless data exchange and interaction between different systems, improving overall efficiency.

1.2.2.1. Continuous Monitoring Framework Procedure

implement a continuous monitoring framework for data quality to regularly assess and report on data quality deviations and areas that require corrective action.

1.2.2.2. Adherence Improvement Action Procedure

Develop action plans to address data quality deviations and non-compliance to generate operational and executive reports on the effectiveness of these actions in maintaining data quality standards.

2. Data Integration & Interoperability

Create a data integration plan to collect, transform, and load data from different sources, like sales, orders, and customer data, into the Superstore dataset. This might involve ETL processes.

1.1. Business Accountability Principle

Data integration and interoperability play essential roles in ensuring business accountability by promoting transparency, consistency, and efficiency in data management and system interactions.

2.1.1. Transparency Policy

Promote transparency in data integration processes to ensure business accountability to enable clear visibility into data integration activities, fostering trust and accountability in data management.

2.1.1.1. Data Integration Visibility Procedure

Establish data integration tracking mechanisms for transparency to generate operational reports showing the status and progress of data integration projects and their impact.

2.1.1.2. Data Interaction Documentation Procedure

Document data interactions and integrations with external systems to create executive reports showcasing the efficiency and effectiveness of data interactions with partners and external systems.

2.1.2. Consistency and Efficiency Policy

Design data integration processes for consistency and efficiency to support business accountability to streamline data integration to ensure that data flows smoothly and consistently, enhancing overall accountability.

2.1.2.1. Data Integration Efficiency Procedure

Optimize data integration processes for consistency and efficiency to monitor and report on the efficiency gains achieved through process optimization.

2.1.2.2. Data Consistency Validation Procedure

Develop data consistency validation checks during integration to generate operational reports on the number of data consistency checks performed and the outcomes.

1.2. Enterprise Perspective Principle

Design with an enterprise mindset to guarantee future scalability and extensibility.

2.2.1. Scalability and Extensibility Policy

Develop data integration solutions with an enterprise perspective, considering future scalability and extensibility to ensure that data integration solutions can adapt and grow with the organization's needs, minimizing disruptions.

2.2.1.1. Scalability Assessment Procedure

Periodically assess the scalability of data integration solutions to generate executive reports on the readiness and adaptability of data integration solutions to future business needs.

2.2.1.2. Extensibility Planning Procedure

Create plans for extending data integration solutions to generate operational reports on the progress of extending data integration capabilities and their impact.

2.2.2. Compatibility and Interoperability Policy

Ensure that data systems are compatible and interoperable across the enterprise to promote seamless data exchange and interaction between different systems, improving overall efficiency.

2.2.2.1. Interoperability Testing Procedure

Conduct regular interoperability testing with external systems to generate operational reports on the results of interoperability testing and any issues encountered.

2.2.2.2. Compatibility Compliance Procedure

Ensure data systems adhere to compatibility standards to generate executive reports on the compatibility of data systems and any required actions to maintain interoperability.

3. Data Security

Protecting data from unauthorized access and breaches.

2.1. Proactive Management Principle

Anticipate and address security risks before they become threats. Regularly assess and enhance security measures to protect data.

3.1.1. Risk Assessment and Mitigation Policy

Conduct regular risk assessments and proactively mitigate security risks to identify and address potential security threats before they can harm data integrity.

3.1.1.1. Security Risk Assessment Procedure

Perform regular risk assessments to identify potential security threats to generate operational reports highlighting identified risks and potential mitigation strategies.

3.1.1.2. Risk Mitigation Action Procedure

Implement actions to mitigate identified security risks to generate executive reports on the effectiveness of mitigation efforts and any remaining risks.

3.1.2. Security Enhancement and Maintenance Policy

Continuously enhance and maintain security measures to protect data to ensure that security measures remain effective and up-to-date, safeguarding data from evolving threats.

3.1.2.1. Security Enhancement Planning Procedure

Develop plans for enhancing data security measures to generate operational reports on the progress of security enhancement projects and their impact.

3.1.2.2. Security Maintenance and Patching Procedure

Regularly maintain and update security measures to generate executive reports on the maintenance activities performed and their impact on the overall security posture.

2.2. Clear Accountability Principle

Ensure that individuals or teams have specific roles and are held accountable for safeguarding data.

3.2.1. Roles and Responsibilities Policy

Define clear roles and responsibilities for individuals or teams responsible for data security to ensure that specific entities are accountable for safeguarding data and understand their responsibilities.

3.2.1.1. Role-Based Access Control Procedure

Implement role-based access control for data and systems to generate operational reports on user access patterns and permissions compliance.

3.2.1.2. Access Review and Audit Procedure

Conduct regular access reviews and security audits to generate executive reports summarizing access review findings and audit results, along with recommendations for improvements.

3.2.2. Security Compliance and Oversight Policy

Establish a compliance and oversight framework to monitor and enforce data security practices to enforce security practices consistently and transparently while complying with relevant regulations and standards.

3.2.2.1. Security Compliance Monitoring Procedure

Monitor and ensure compliance with security policies and regulations to generate operational reports on the level of compliance and areas requiring attention or improvement.

3.2.2.2. Security Oversight Reporting Procedure

Provide oversight reports to management and stakeholders to generate executive reports on the state of security compliance and measures taken to address any non-compliance issues.

Lab Exercise 3's Operational Report

Operational Report.csv

Region	State	City	SubCatego	ProductNam	Quantity	Sales	Profit
Central	Illinois	Arlington	Art	Newell 332	6	14.11	1.23
Central	Illinois	Arlington	Art	**Sub-Total**	6	14.11	1.23
Central	Illinois	Arlington	**Sub-Total**		6	14.11	1.23
Central	Illinois	Aurora	Accessori	Kingston Di	7	50.12	-0.63
Central	Illinois	Aurora	Accessori	**Sub-Total**	7	50.12	-0.63
Central	Illinois	Aurora	Appliance	Tripp Lite Is	5	70.97	-191.62
Central	Illinois	Aurora	Appliance	**Sub-Total**	5	70.97	-191.62
Central	Illinois	Aurora	Art	Boston KS N	2	36.78	3.68
Central	Illinois	Aurora	Art	Quartet Ome	2	9.34	3.15
Central	Illinois	Aurora	Art	**Sub-Total**	4	46.12	6.83
Central	Illinois	Aurora	Binders	Acco D-Rin	7	29.93	-46.39
Central	Illinois	Aurora	Binders	Avery Bindi	2	2.31	-3.46
Central	Illinois	Aurora	Binders	Avery Poly	4	2.86	-4.58
Central	Illinois	Aurora	Binders	Catalog Bin	7	94.19	-164.84
Central	Illinois	Aurora	Binders	**Sub-Total**	20	129.29	-219.27
Central	Illinois	Aurora	Chairs	Global Arm	3	128.06	-23.78
Central	Illinois	Aurora	Chairs	Global Ergo	2	253.37	-14.48
Central	Illinois	Aurora	Chairs	Global Troy	2	701.37	-50.1
Central	Illinois	Aurora	Chairs	GuestStacke	2	520.46	-14.87
Central	Illinois	Aurora	Chairs	Hon Comfor	3	239.36	-47.87
Central	Illinois	Aurora	Chairs	**Sub-Total**	12	1842.62	-151.1
Central	Illinois	Aurora	Envelopes	Airmail Env	4	268.58	90.64
Central	Illinois	Aurora	Envelopes	**Sub-Total**	4	268.58	90.64
Central	Illinois	Aurora	Fasteners	Acco Hot Cl	1	2.63	0.82
Central	Illinois	Aurora	Fasteners	**Sub-Total**	1	2.63	0.82
Central	Illinois	Aurora	Furnishing	Electrix Hal	1	77.72	-66.06

Region	State	City	SubCateg	ProductNam	Quantity	Sales	Profit
Central	Illinois	Arlington	Art	Newell 332	6	14.11	1.23
Central	Illinois	Arlington	Art	**Sub-Total**	6	14.11	1.23
Central	Illinois	Arlington	**Sub-Total**		6	14.11	1.23
Central	Illinois	**Total**			1845	60185.77	-8537.52
Central	**Total**				8780	302911.4	32100.7
East	Connectic	Bristol	Appliance	Holmes Rep	2	137.62	60.55

The operational report shows the sales data broken down by Region, State, City, Sub-Category, Product Name.

The first few rows provide data for the Central region, specifically Illinois and Arlington. The Sub-Category is Art, and the Product Name is Newell 332. The Quantity sold was 6, resulting in Sales of $14.11 and a Profit of $1.23.

There are also Sub-Total rows for the Art category in Arlington, Illinois. The Quantity sold was 6, resulting in Sales of $14.11 and a Profit of $1.23.

The third row provides a Sub-total for Arlington, Illinois with a total Quantity of 6, Sales of $14.11 and a Profit of $1.23.

The fourth row provides a total for Illinois with a total Quantity of 1845, Sales of 60185.77, but a negative Profit of -8537.52. This indicates a loss.

The final row provides a total for the Central region with a Quantity of 8780, Sales of $302,911.4 and a Profit of $32,100.7.

Lab Exercise 3's Executive Report

Executive Report.csv

			Category / Region (%		Category/National (%)			Sales (%)					
	Region	Category	Sales	Profit	Sales	Profit	Profit Mar	Q1 2019 v	Q1 vs. Q2	Q1 2020 v	Q1 vs. Q2	Q1 2021 v	Q1 vs. Q2 2021
0	Central	Office Sup	33.32	22.36	7.27	3.1	5.32	-0.26	4.04	2.19	0.52	1.89	-0.32
1	Central	Furniture	32.68	-7.23	7.13	-1	-1.75	0.36	0.07	0.48	0	0.16	0.03
2	Central	Technolog	34	84.87	7.42	11.77	19.77	1.48	1.14	0.37	0.48	1.5	-0.6
	Total		100	100	21.82	13.86							
3	East	Office Sup	30.28	44.81	8.95	14.32	19.96	5.39	0.25	0.02	0.86	-0.15	0.9
4	East	Furniture	30.69	3.33	9.07	1.06	1.46	-0.04	0.45	0.62	0.07	-0.35	1.19
5	East	Technolog	39.04	51.86	11.53	16.57	17.91	4.69	0.34	0.95	2.04	-0.31	0.29
	Total		100	100	29.55	31.96							
6	South	Office Sup	32.08	42.75	5.47	6.98	15.91	1.66	-0.47	-0.25	-0.3	-0.45	1.28
7	South	Furniture	29.94	14.48	5.11	2.36	5.77	-0.25	0.06	-0.52	1.06	-0.46	6.52
8	South	Technolog	37.98	42.76	6.48	6.98	13.44	-0.98	7.01	23.53	-0.48	-0.41	0
	Total		100	100	17.05	16.32							
9	West	Office Sup	30.44	48.52	9.61	18.37	23.82	-0.48	1.13	1.21	-0.32	0.83	-0.21
10	West	Furniture	34.82	10.61	11	4.02	4.55	1.02	-0.24	-0.52	2.6	0.33	0.72
11	West	Technolog	34.74	40.86	10.97	15.47	17.58	2.46	0.11	0.19	0.44	1.65	-0.26
	Total		100	100	31.58	37.86							
					100	100							

The executive report depicts the sales performance of three main categories in various regions during the second quarter of 2021.

Our goods are divided into three categories: "Office Supplier", "Furniture", and "Technology". The superstore is also divided into four regions, which are "Central", "East", "South", and "West".

The report has three primary sections: categorical sales performance by region and national, categorical profit margins, and a categorical sales ratio comparison of Q1 and Q2 performance in the last several years.

For the first section, there are sales and profit comparisons between three categories in one region and all regions at the same time.

To determine which category is the greatest seller in a region, the sums of all percentages of sales or profit must be 100% in one region.

To demonstrate which category in which area is the greatest seller, summaries of all percentages of sales or profit must be 100% for all regions.

The second section displays the profit margin ratios of the various categories. The equation is (Profit/Sales)x100%. It measures a company's ability to manage its costs in relation to its income. It is stated as a percentage, with larger percentages signifying more profit.

The last section displays the categorical sales ratios for the first quarters of 2019, 2020, and 2021, as well as a comparison between the first and second quarters of that year. It might illustrate the annual or seasonal selling pattern of several categories, whether it is decreasing or increasing.

Annex

Lab Exercise 1- Submission A

Data Analysis

Completeness

We identified a completeness issue in the dataset. Specifically, the Postal Code column contained 11 missing entries (Figure 1).

Row ID	Order ID	Order Date	Ship Date	Ship Mode	Custor	Custor	Segme	Counti	City	State	Postal Code	Region
2235	CA-2021-104066	2021-12-05	2021-12-10	Standard Class	QJ-19255	Quincy Jo	Corporate	United Sta	Burlingtor	Vermont		East
9147	US-2020-165505	2020-01-23	2020-01-27	Standard Class	CB-12535	Claudia Be	Corporate	United Sta	Burlingtor	Vermont		East
9389	US-2021-127292	2021-01-19	2021-01-23	Standard Class	RM-19375	Raymond	Consumei	United Sta	Burlingtor	Vermont		East
9148	US-2020-165505	2020-01-23	2020-01-27	Standard Class	CB-12535	Claudia Be	Corporate	United Sta	Burlingtor	Vermont		East
9742	CA-2019-117086	2019-11-08	2019-11-12	Standard Class	QJ-19255	Quincy Jo	Corporate	United Sta	Burlingtor	Vermont		East
5275	CA-2019-162887	2019-11-07	2019-11-09	Second Class	SV-20785	Stewart Vi	Consumei	United Sta	Burlingtor	Vermont		East
9390	US-2021-127292	2021-01-19	2021-01-23	Standard Class	RM-19375	Raymond	Consumei	United Sta	Burlingtor	Vermont		East
9387	US-2021-127292	2021-01-19	2021-01-23	Standard Class	RM-19375	Raymond	Consumei	United Sta	Burlingtor	Vermont		East
9388	US-2021-127292	2021-01-19	2021-01-23	Standard Class	RM-19375	Raymond	Consumei	United Sta	Burlingtor	Vermont		East
8799	US-2020-150140	2020-04-06	2020-04-10	Standard Class	VM-21685	Valerie Mi	Home Off	United Sta	Burlingtor	Vermont		East
9149	US-2020-165505	2020-01-23	2020-01-27	Standard Class	CB-12535	Claudia Be	Corporate	United Sta	Burlingtor	Vermont		East

Figure 1: Missing Values (Postal Codes)

Consistency

We discovered an inconsistency related to the format of Postal Codes. While examining the dataset, we observed that some Postal Code entries contained only four digits (Figure 2). Further investigation revealed that these entries should have included five digits, with a leading zero. Unfortunately, this leading zero was dropped during the conversion of the dataset to a .csv file.

Order ID	Order Date	Ship Date	Ship M	Custom	Custom	Segmer	Countr	City	State	Postal (	Region
CA-2019-146087	2019-07-06	2019-07-11	Standard	PP-18955	Paul Prost	Home Offi	United Sta	Holyoke	Massachu	1040	East
CA-2019-117961	2019-11-26	2019-11-30	Standard	GP-14740	Guy Phon	Corporate	United Sta	Leominste	Massachu	1453	East
CA-2019-117961	2019-11-26	2019-11-30	Standard	GP-14740	Guy Phon	Corporate	United Sta	Leominste	Massachu	1453	East
CA-2020-154998	2020-04-07	2020-04-09	First Class	ES-14080	Erin Smith	Corporate	United Sta	Lakewood	New Jerse	8701	East
CA-2021-166499	2021-03-19	2021-03-20	First Class	VG-21805	Vivek Grac	Corporate	United Sta	Lakewood	New Jerse	8701	East
CA-2019-152611	2019-02-20	2019-02-23	Second Cl	KA-16525	Kelly Andr	Consumer	United Sta	Perth Amb	New Jerse	8861	East
CA-2021-132647	2021-02-17	2021-02-23	Standard	GH-14410	Gary Hans	Home Offi	United Sta	Perth Amb	New Jerse	8861	East
CA-2021-132647	2021-02-17	2021-02-23	Standard	GH-14410	Gary Hans	Home Offi	United Sta	Perth Amb	New Jerse	8861	East
CA-2021-161984	2021-04-10	2021-04-15	Standard	SJ-20125	Sanjit Jacc	Home Offi	United Sta	New Brun	New Jerse	8901	East
CA-2021-161984	2021-04-10	2021-04-15	Standard	SJ-20125	Sanjit Jacc	Home Offi	United Sta	New Brun	New Jerse	8901	East
CA-2020-106075	2020-09-18	2020-09-23	Standard	HM-14980	Henry Ma	Consumer	United Sta	New York	New York	10009	East
CA-2021-161018	2021-11-09	2021-11-11	Second Cl	PN-18775	Parhena N	Home Offi	United Sta	New York	New York	10009	East
CA-2019-137225	2019-12-15	2019-12-19	Standard	JK-15640	Jim Kriz	Home Offi	United Sta	New York	New York	10009	East

Figure 2: Examples of 4 digits Postal Codes

Apart from the Postal Codes format issue, our analysis did not uncover any other inconsistencies within the dataset. The data appears to be consistent in terms of formatting, units, and other key attributes.

Redundancies

Our assessment did not reveal any instances of redundant data.

Duplicates

We identified a case of duplicate data, where the same order was recorded twice (Figure 3).

Row ID	Order ID	Order Date	Ship Date	Ship Mode	Custor	Custor	Postal C	Produc	Categc	Sub-C	Product Name	Sales	Quanti	Discou	Profit
3406	US-2018-150119	2018-04-23	2018-04-27	Standard Class	LB-16795	Laurel Bell	43229	FUR-CH-1	Furniture	Chairs	Global Leather Highback Executive Chair with Pı	281.372	2	0.3	-12.0588
3407	US-2018-150119	2018-04-23	2018-04-27	Standard Class	LB-16795	Laurel Bell	43229	FUR-CH-1	Furniture	Chairs	Global Leather Highback Executive Chair with Pı	281.372	2	0.3	-12.0588
3408	US-2018-150119	2018-04-23	2018-04-27	Standard Class	LB-16795	Laurel Bell	43229	OFF-BI-10	Office Sup	Binders	Zipper Ring Binder Pockets	7.488	8	0.7	-5.2416
3409	US-2018-150119	2018-04-23	2018-04-27	Standard Class	LB-16795	Laurel Bell	43229	FUR-FU-1(	Furniture	Furnishing	G.E. Halogen Desk Lamp Bulbs	22.336	4	0.2	7.8176

Figure 3: Duplicate Data

Target Audience

Operational Report

The operational report is primarily designed for the Sales Team. This report serves as a crucial resource for the dedicated members of the Sales Team, who are responsible for overseeing sales performance within their respective state in regional offices. Its primary objective is to facilitate efficient monitoring and control of sales activities. By providing key performance metrics and insights over a monthly timeframe, it empowers the Sales Team to ensure that sales targets are consistently met and that business processes run smoothly within the context of the defined period.

Executive Report

The executive report is directed towards Regional Managers. This specialized report caters to the informational needs of Regional Managers, who hold a pivotal role in strategic decision-making. By offering comprehensive insights into sales performance, profitability, and areas requiring improvement, such as returns, this report equips Regional Managers with the data required to make informed and impactful decisions. It serves as a valuable resource for enhancing overall sales operations and profitability, aligning the organization's goals with strategic actions at the regional level.

Context and Additional Assumptions

- High-level management will consult executive reports when making strategic decisions.
- Employees immediately involved in sales and order processing will use operational reports.
- Executive and operational reports will be created for each designated region.
- The profits for some orders were negative because of the discounts on the products.
- Both reports will be produced on a regular basis, either monthly or quarterly.
- The data in the Sample Superstore spreadsheet is taken to be an accurate representation of the sales data for the business.
- Reports will be kept up to date with recent information on a regular basis.

Operational and Executive Reports

Operational Report

The operational report is designed to provide a comprehensive overview of sales activities during the specified report period. The report format includes the following key elements:

- Report Period: The operational report captures data over a defined period (monthly), allowing frequent assessment of sales performance.
- Region, State, City, Sub-category, and Item Name: These categorical elements serve as the basis for a detailed breakdown of sales data, enabling a thorough analysis of product performance across different dimensions.
- Previous Sales ($): This column represents the total sales amount of the item in the state for the previous period (month).
- Current Sales ($): This column represents the total sales amount of the item in the state for the current period (month).
- Quantity: This column represents total item sold in the state in the current period (month)
- Profit ($): This column represents the financial outcome of each sale, accounting for expenses and discounts.
- Sales Growth Rate (%): This column calculates the percentage change in sales between the previous and current month, aiding in performance evaluation.
  *Sales Growth Rate (%) = (Current Sales – Previous Sales / Previous Sales) *100*
- Sub-Total Rows: Sub-total rows are included for each sub-category and item name, presenting aggregated figures for a quick summary of performance within specific product categories and items.
- Total Row: The total row displays cumulative figures for the entire report period, offering a holistic view of selected sales performance.

Executive Report

The executive report is focused on presenting quarterly gross sales data. The report structure encompasses the following elements:

- Region: The region section specifies the geographic scope of the report.
- State: This column represents insights into sales at the state level.
- Sales by Quarter ($): These columns represent the sales figures for the previous quarter, the current quarter, and the corresponding percentage change. Additionally, it presents sales figures for the same quarter in the previous year and the percentage change.
- Net Profit Margin Ratio (%): This column represents the percentage of profit earned from each dollar of sales. It is a key financial metric that measures the profitability of a business by indicating how much profit is generated for each dollar of sales.
  *Net Profit Margin Ratio = (Net Profit/Total Sales) * 100*
- Discount Effective Rate (%): This column represents the percentage of the total sales revenue that is attributed to discounts. It helps measure the impact of discounts on the overall sales revenue as a percentage.
  *Discount Effective Rate = ((Total Sales with Discount - Total Sales without Discount) / Total Sales without Discount) * 100*

Empty Templates for Reports

Operational Report

Sales Team Operations by Monthly

Report Period: 03/01/2020 - 03/31/2020 {start date - end date}

Region	State	City	Sub-category	Item Name	Previous Sales ($)	Current Sales ($)	Quantity	Profit ($)	Sales Growth Rate (%)
			Sub-total						
			Sub-total						
		Sub-total							
			Sub-total						
			Sub-total						
		Sub-total							
	Total								
Total									

Sales Team Quarterly Executive Report

Region: East {Selected Region}

State	Sales Q1-2020 {previous quarter} ($)	Sales Q2-2020 {current quarter} ($)	Sales Comparison Q2-2020 vs. Q1-2020 (%)	Sales Q2-2019 {previous year} ($)	Sales Comparison Q2-2020 {current year} vs. Q2-2019 (%)	Net Profit Margin Ratio (%)	Discount Effective Rate (%)
Total							

Lab Exercise 2- Submission B

Analysis

Entities

Entities include:

- Customers
- Products
- Regional Managers
- Addresses
- Orders (invoices for example)

Attributes

Attributes are:

- Orders: Order ID (PK), Order Date, Ship Date, Ship Mode
- Customers: Customer ID (PK), Customer Name, Segment
- Addresses: City, State, Postal Code (PK), Region
- Products: Product ID (PK), Category, Sub-Category, Product Name
- Sales: Order No (PK), Sales, Quantity, Discount, Profit, Price
- Order Records: Order No (PK), Order ID, Customer ID, Product ID

Domains

Domains are:

- Order No – unique integer – VARCHAR(4)
- Order ID – Fixed length alphanumeric ID AA-YYYY-###### - VARCHAR(15)
- Order Date – Date DD/M/YYYY - TEXT
- Ship Date – Date DD/M/YYYY - TEXT
- Ship Mode – First Class, Second Class, Standard Class ONLY - TEXT
- Customer ID – Alphanumeric - Customer Initials (2)-5-digit ID AA-##### - VARCHAR(8)
- Customer Name – Character string: First Name + Last Name - TEXT
- Segment – Consumer, Home Office, Corporate ONLY - TEXT
- Country/Region - US ONLY - TEXT
- City – Valid US City ONLY - TEXT
- State – Valid State ONLY - TEXT
- Postal Code – 5 digits ##### ONLY - VARCHAR(5)
- Region - East, South, West, Central ONLY - TEXT
- Product ID – 3 char category + 2 char subcategory + 8-digit unique - VARCHAR(15)
- Category Furniture Office Supplies Technology ONLY - TEXT
- Sub-Category - TEXT
    - If Furniture: Bookcases Chairs Tables Furnishings ONLY
    - If Office Supplies: Appliances Art Binders Envelopes Fasteners Labels Paper Storage Supplies ONLY
    - If Technology: Accessories Copiers Machines Phones ONLY
- Product Name: Unique String - TEXT

- Sales: $ amount - TEXT
- Quantity: Integer - INT
- Discount: Decimal/fraction - DOUBLE
- Profit: $ value – TEXT

The referential integrity is maintained by holding the Primary Keys of each table in the Order Records Table as Foreign Keys. The Row No. is renamed Order No.

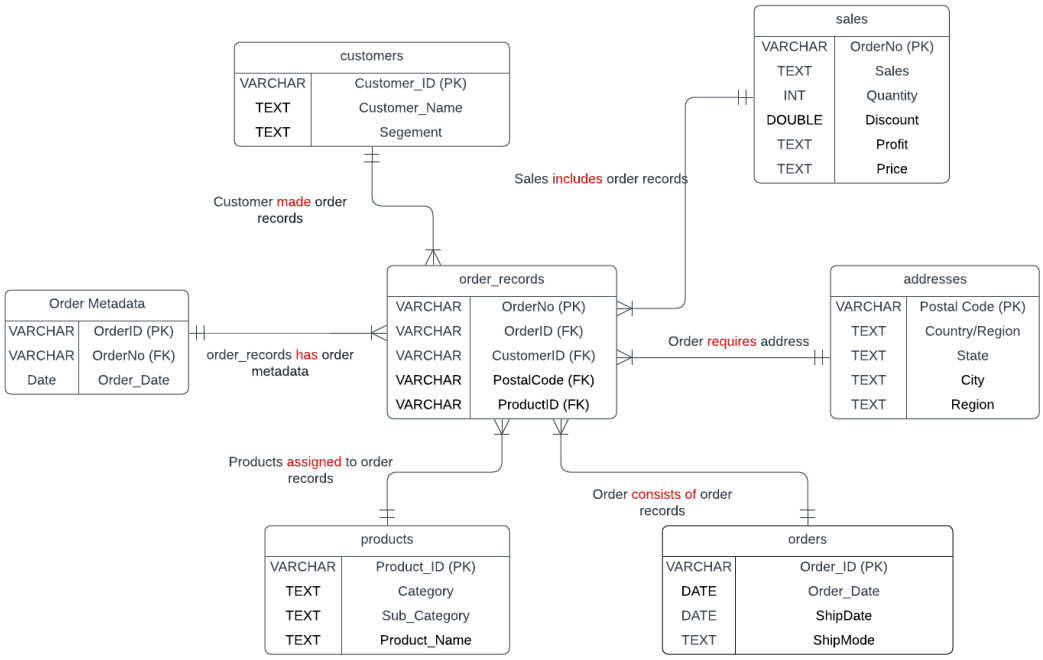
Order Records contains:

- Order No (PK) - This is the primary key for this table
- Order ID – This is a Foreign Key for this table, and Primary Key for Orders table
- Customer ID – This is a Foreign Key for this table, and Primary Key for Customers table
- Product ID - This is a Foreign Key for this table, and Primary Key for Products table

Data Cleansing

- Rounded up Sales/Profit to 2 decimal places.
- Fixed Product IDs with multiple products
- Turning all postal codes to US Postal Code format which contains 5 digits.
- Fixed Postal Codes with multiple cities

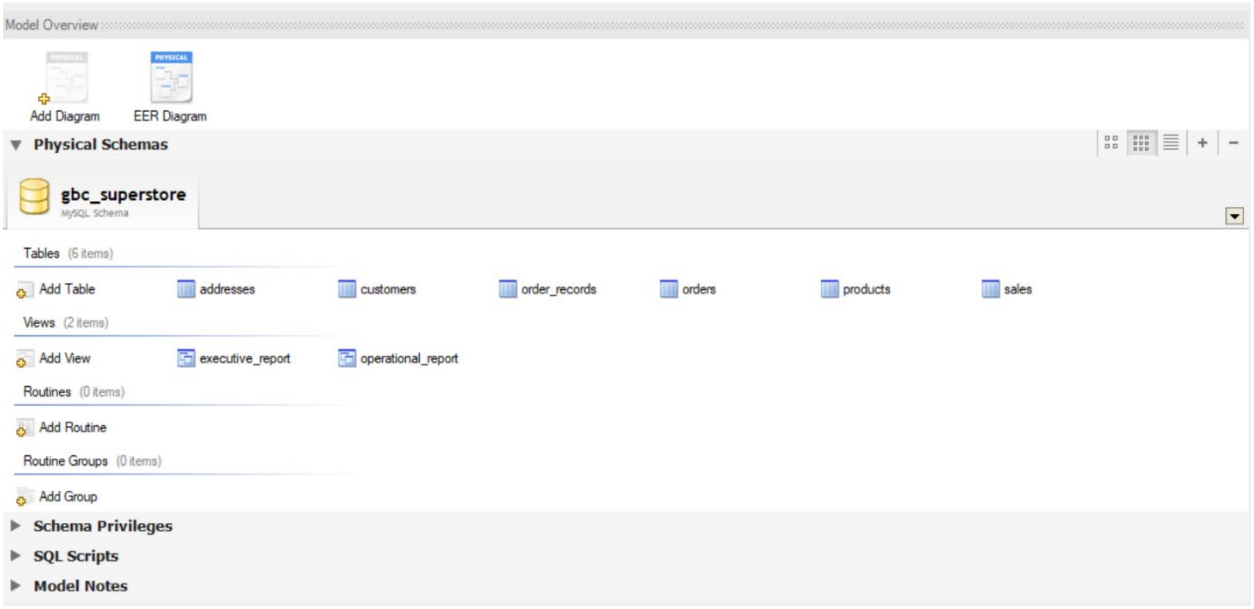
Logical-level ERD

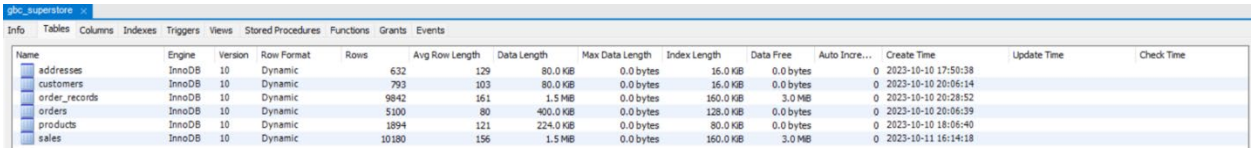


Data Flow


Diagram Key
Customer
Sales
Payment Gateway
Shipping department
Data Flow Diagram
Group 01 | October 11, 2023
Customer
Sales
Payment Geteway
Shipping Department
Product Details
Customer create orders
Shopping Cart
Customer enter customer details
Customer details
Order Details
Checkout Order
Sales not approved
Sales approved
Sales Details
No
Yes
Payment confirmation
Payment confirmed?
Address Details
Confirm shipping methods
Delivered to customer
Returned Product
Yes
Order Returned
No
Order Delivered

Database Schema





gbc_superstore

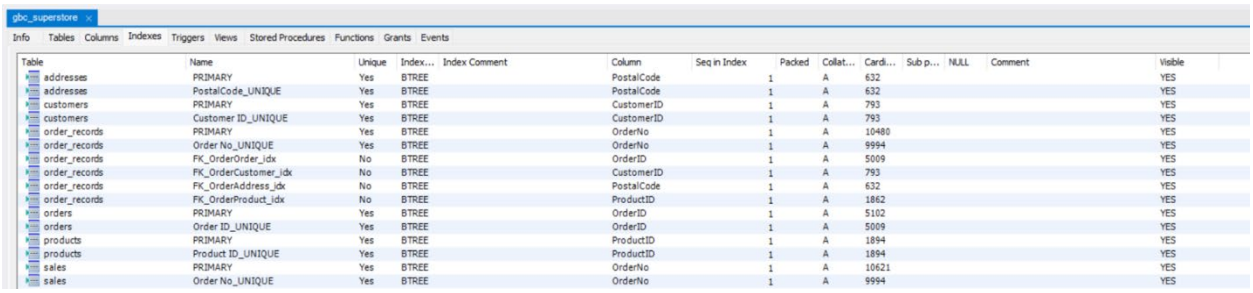
Info | Tables | Columns | Indexes | Triggers | Views | Stored Procedures | Functions | Grants | Events

Name	Engine	Version	Row Format	Rows	Avg Row Length	Data Length	Max Data Length	Index Length	Data Free	Auto Incre...	Create Time	Update Time	Check Time
addresses	InnoDB	10	Dynamic	632	129	80.0 KiB	0.0 bytes	16.0 KiB	0.0 bytes	0	2023-10-10 17:50:38		
customers	InnoDB	10	Dynamic	793	103	80.0 KiB	0.0 bytes	16.0 KiB	0.0 bytes	0	2023-10-10 20:06:14		
order_records	InnoDB	10	Dynamic	9842	161	1.5 MiB	0.0 bytes	160.0 KiB	3.0 MiB	0	2023-10-10 20:28:52		
orders	InnoDB	10	Dynamic	5100	80	400.0 KiB	0.0 bytes	128.0 KiB	0.0 bytes	0	2023-10-10 20:06:39		
products	InnoDB	10	Dynamic	1894	121	224.0 KiB	0.0 bytes	80.0 KiB	0.0 bytes	0	2023-10-10 18:06:40		
sales	InnoDB	10	Dynamic	10180	156	1.5 MiB	0.0 bytes	160.0 KiB	3.0 MiB	0	2023-10-11 16:14:18		

gbc_superstore

Info | Tables | Columns | Indexes | Triggers | Views | Stored Procedures | Functions | Grants | Events

Table	Column	Type	Default Value	Nullable	Character Set	Collation	Privileges
addresses	PostalCode	varchar(5)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
addresses	Country/Region	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
addresses	State	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
addresses	City	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
addresses	Region	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
customers	CustomerID	varchar(8)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
customers	CustomerName	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
customers	Segment	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
executive_report	State	mediumtext		YES	utf8mb4	utf8mb4_0900_...	select,insert,update,references
executive_report	Sales Current Quarter($)	double		YES			select,insert,update,references
executive_report	Sales Last Quarter($)	double		YES			select,insert,update,references
executive_report	Sales Comparison Last...	double		YES			select,insert,update,references
executive_report	Sales Same Quarter La...	double		YES			select,insert,update,references
executive_report	Sales Comparison Last...	double		YES			select,insert,update,references
executive_report	KPI: Net Profit Margin...	double		YES			select,insert,update,references
executive_report	KPI: Discount Effective...	double		YES			select,insert,update,references
operational_report	Region	mediumtext		YES	utf8mb4	utf8mb4_0900_...	select,insert,update,references
operational_report	State	mediumtext		YES	utf8mb4	utf8mb4_0900_...	select,insert,update,references
operational_report	City	mediumtext		YES	utf8mb4	utf8mb4_0900_...	select,insert,update,references
operational_report	SubCategory	mediumtext		YES	utf8mb4	utf8mb4_0900_...	select,insert,update,references
operational_report	ProductName	mediumtext		YES	utf8mb4	utf8mb4_0900_...	select,insert,update,references
operational_report	Quantity	decimal(32,0)		YES			select,insert,update,references
operational_report	Sales	double		YES			select,insert,update,references
operational_report	Profit	double		YES			select,insert,update,references
order_records	OrderNo	varchar(4)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
order_records	OrderID	varchar(15)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
order_records	CustomerID	varchar(8)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
order_records	PostalCode	varchar(5)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
order_records	ProductID	varchar(15)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
orders	OrderID	varchar(15)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
orders	OrderDate	date		NO			select,insert,update,references
orders	ShipDate	date		NO			select,insert,update,references
orders	ShipMode	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
products	ProductID	varchar(15)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
products	Category	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
products	SubCategory	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
products	ProductName	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
sales	OrderNo	varchar(4)		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
sales	Sales	text		NO	utf8mb4	utf8mb4_0900_...	select,insert,update,references
sales	Quantity	int		NO			select,insert,update,references
sales	Discount	double		NO			select,insert,update,references


gbc_superstore

Info | Tables | Columns | Indexes | Triggers | Views | Stored Procedures | Functions | Grants | Events

Table	Name	Unique	Index...	Index Comment	Column	Seq in Index	Packed	Collat...	Cardi...	Sub p...	NULL	Comment	Visible
addresses	PRIMARY	Yes	BTREE		PostalCode	1		A	632				YES
addresses	PostalCode_UNIQUE	Yes	BTREE		PostalCode	1		A	632				YES
customers	PRIMARY	Yes	BTREE		CustomerID	1		A	793				YES
customers	Customer ID_UNIQUE	Yes	BTREE		CustomerID	1		A	793				YES
order_records	PRIMARY	Yes	BTREE		OrderNo	1		A	10480				YES
order_records	Order No_UNIQUE	Yes	BTREE		OrderNo	1		A	9994				YES
order_records	FK_OrderOrder_idx	No	BTREE		OrderID	1		A	5009				YES
order_records	FK_OrderCustomer_idx	No	BTREE		CustomerID	1		A	793				YES
order_records	FK_OrderAddress_idx	No	BTREE		PostalCode	1		A	632				YES
order_records	FK_OrderProduct_idx	No	BTREE		ProductID	1		A	1862				YES
orders	PRIMARY	Yes	BTREE		OrderID	1		A	5102				YES
orders	Order ID_UNIQUE	Yes	BTREE		OrderID	1		A	5009				YES
products	PRIMARY	Yes	BTREE		ProductID	1		A	1894				YES
products	Product ID_UNIQUE	Yes	BTREE		ProductID	1		A	1894				YES
sales	PRIMARY	Yes	BTREE		OrderNo	1		A	10621				YES
sales	Order No_UNIQUE	Yes	BTREE		OrderNo	1		A	9994				YES

SQL Scripts

Process	Code
Create Database	CREATE DATABASE GBC_Superstore;

Create Tables	USE GBC_Superstore;
	
	CREATE TABLE `order_records` (
	  `OrderNo` varchar(4) NOT NULL,
	  `OrderID` varchar(15) NOT NULL,
	  `CustomerID` varchar(8) NOT NULL,
	  `PostalCode` varchar(5) NOT NULL,
	  `ProductID` varchar(15) NOT NULL,
	  PRIMARY KEY (`OrderNo`),
	  UNIQUE KEY `Order No_UNIQUE` (`OrderNo`)
	) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;
	
	CREATE TABLE `customers` (
	  `Customer ID` varchar(8) NOT NULL,
	  `Customer Name` text NOT NULL,
	  `Segment` text NOT NULL,
	  PRIMARY KEY (`Customer ID`),
	  UNIQUE KEY `Customer ID_UNIQUE` (`Customer ID`)
	) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;
	
	CREATE TABLE `addresses` (
	  `PostalCode` varchar(5) NOT NULL,
	  `Country/Region` text NOT NULL,
	  `State` text NOT NULL,
	  `City` text NOT NULL,
	  `Region` text NOT NULL,
	  PRIMARY KEY (`PostalCode`),
	  UNIQUE KEY `PostalCode_UNIQUE` (`PostalCode`)
	) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;
	
	CREATE TABLE `orders` (
	  `Order ID` varchar(15) NOT NULL,
	  `Order Date` DATE NOT NULL,
	  `Ship Date` DATE NOT NULL,
	  `Ship Mode` text NOT NULL,
	  PRIMARY KEY (`Order ID`),
	  UNIQUE KEY `Order ID_UNIQUE` (`Order ID`)
	) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;
	
	CREATE TABLE `products` (
	  `ProductID` varchar(15) NOT NULL,
	  `Category` text NOT NULL,
	  `SubCategory` text NOT NULL,

	`ProductName` text NOT NULL, PRIMARY KEY (`ProductID`), UNIQUE KEY `Product ID_UNIQUE` (`ProductID`)) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci; CREATE TABLE `sales` (`Order No` varchar(4) NOT NULL, `Sales` text NOT NULL, `Quantity` int NOT NULL, `Discount` double NOT NULL, `Profit` text NOT NULL, `Price` text NOT NULL, PRIMARY KEY (`Order No`), UNIQUE KEY `Order No_UNIQUE` (`Order No`)) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;

ETL Process

Process	Code

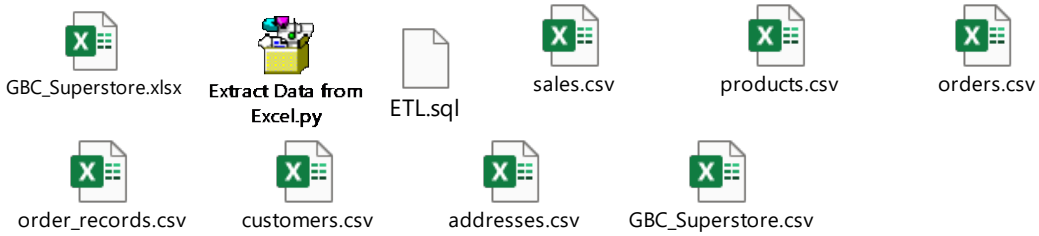
Generate and export CSV file	`import pandas as pd`
	
	`# Read Excel file`
	`xlsx = pd.ExcelFile('GBC_Superstore.xlsx')`
	`# Get a list of sheet names`
	`sheet_names = xlsx.sheet_names`
	
	`# Iterate through each sheet and save it as a CSV file`
	`for sheet_name in sheet_names:`
	`  df = pd.read_excel(xlsx, sheet_name)  # Read the sheet into a DataFrame`
	`  df.to_csv(f'{sheet_name}.csv', index=False)  # Save as a CSV file`

Load CSV files into MySQL tables	LOAD DATA INFILE 'C:\Users\yatch\Desktop\Foundation of Data Management\Ass 2\orders.csv' INTO TABLE orders FIELDS TERMINATED BY ';' ENCLOSED BY '"' LINES TERMINATED BY '\r\n' IGNORE 1 ROWS; LOAD DATA INFILE 'C:\Users\yatch\Desktop\Foundation of Data Management\Ass 2\addresses.csv' INTO TABLE addresses FIELDS TERMINATED BY ';'ENCLOSED BY '"' LINES TERMINATED BY '\r\n' IGNORE 1 ROWS; ALTER TABLE products MODIFY COLUMN ProductName VARCHAR(250) CHARACTER SET latin1; SET NAMES utf8; -- or SET NAMES latin1; or the appropriate character set LOAD DATA INFILE 'C:\Users\yatch\Desktop\Foundation of Data Management\Ass 2\products.csv' INTO TABLE products FIELDS TERMINATED BY ';'ENCLOSED BY '"' LINES TERMINATED BY '\r\n' IGNORE 1 ROWS; LOAD DATA INFILE 'C:\Users\yatch\Desktop\Foundation of Data Management\Ass 2\customers.csv' INTO TABLE customers FIELDS TERMINATED BY ';'ENCLOSED BY '"' LINES TERMINATED BY '\r\n' IGNORE 1 ROWS;

	LOAD DATA INFILE 'C:\Users\yatch\Desktop\Foundation of Data Management\Ass 2\sales.csv' INTO TABLE sales FIELDS TERMINATED BY ';'ENCLOSED BY '"' LINES TERMINATED BY '\r\n' IGNORE 1 ROWS; LOAD DATA INFILE 'C:\Users\yatch\Desktop\Foundation of Data Management\Ass 2\order_records.csv' INTO TABLE order_records FIELDS TERMINATED BY ';'ENCLOSED BY '"' LINES TERMINATED BY '\r\n' IGNORE 1 ROWS;
Verify data completeness, data integrity and referential integrity	SELECT COUNT(*) FROM order_records; SELECT * FROM order_records WHERE OrderNo NOT IN (SELECT OrderNo FROM sales); SELECT * FROM order_records WHERE CustomerID NOT IN (SELECT CustomerID FROM customers); SELECT * FROM order_records WHERE OrderID NOT IN (SELECT OrderID FROM orders); SELECT * FROM order_records WHERE ProductID NOT IN (SELECT ProductID FROM products); SELECT * FROM order_records WHERE PostalCode NOT IN (SELECT PostalCode FROM addresses); SELECT COUNT(*) FROM customers; SELECT * FROM customer WHERE CustomerID IS NULL; SELECT * FROM customer WHERE CustomerID NOT IN (SELECT CustomerID FROM order_records); SELECT COUNT(*) FROM addresses; SELECT * FROM addresses WHERE PostalCode IS NULL; SELECT * FROM addresses WHERE PostalCode NOT IN (SELECT PostalCode FROM order_records); SELECT COUNT(*) FROM products; SELECT * FROM product WHERE ProductID IS NULL; SELECT * FROM product WHERE ProductID NOT IN (SELECT ProductID FROM order_records); SELECT COUNT(*) FROM sales; SELECT * FROM sales WHERE OrderNo IS NULL; SELECT * FROM sales WHERE OrderNo NOT IN (SELECT OrderNo FROM order_records); SELECT COUNT(*) FROM orders; SELECT * FROM orders WHERE OrderID IS NULL; SELECT * FROM orders WHERE OrderID NOT IN (SELECT OrderID FROM order_records);
Create Foreign keys to	ALTER TABLE `gbc_superstore`.`order_records` ADD INDEX `FK_OrderOrder_idx` (`OrderID` ASC) VISIBLE, ADD INDEX `FK_OrderCustomer_idx` (`CustomerID` ASC) VISIBLE,

relate different tables	ADD INDEX `FK_OrderAddress_idx` (`PostalCode` ASC) VISIBLE, ADD INDEX `FK_OrderProduct_idx` (`ProductID` ASC) VISIBLE; ; ALTER TABLE `gbc_superstore`.`order_records` ADD CONSTRAINT `FK_OrderOrder` FOREIGN KEY (`OrderID`) REFERENCES `gbc_superstore`.`orders` (`OrderID`) ON DELETE NO ACTION ON UPDATE NO ACTION, ADD CONSTRAINT `FK_OrderSales` FOREIGN KEY (`OrderNo`) REFERENCES `gbc_superstore`.`sales` (`OrderNo`) ON DELETE NO ACTION ON UPDATE NO ACTION, ADD CONSTRAINT `FK_OrderCustomer` FOREIGN KEY (`CustomerID`) REFERENCES `gbc_superstore`.`customers` (`CustomerID`) ON DELETE NO ACTION ON UPDATE NO ACTION, ADD CONSTRAINT `FK_OrderAddress` FOREIGN KEY (`PostalCode`) REFERENCES `gbc_superstore`.`addresses` (`PostalCode`) ON DELETE NO ACTION ON UPDATE NO ACTION, ADD CONSTRAINT `FK_OrderProduct` FOREIGN KEY (`ProductID`) REFERENCES `gbc_superstore`.`products` (`ProductID`) ON DELETE NO ACTION ON UPDATE NO ACTION;

Files



Lab Exercise 3- Submission C

Operational Report

Region	State	City	SubCatego	ProductNa	Quantity	Sales	Profit
Central	Illinois	Arlington H	Art	Newell 33	6	14.11	1.23
Central	Illinois	Arlington H	Art	NULL	6	14.11	1.23
Central	Illinois	Arlington H	NULL	NULL	6	14.11	1.23
Central	Illinois	Aurora	Accessorie	Kingston D	7	50.12	-0.63
Central	Illinois	Aurora	Accessorie	NULL	7	50.12	-0.63
Central	Illinois	Aurora	Appliances	Tripp Lite I	5	70.97	-191.62
Central	Illinois	Aurora	Appliances	NULL	5	70.97	-191.62
Central	Illinois	Aurora	Art	Boston KS	2	36.78	3.68
Central	Illinois	Aurora	Art	Quartet Or	2	9.34	3.15
Central	Illinois	Aurora	Art	NULL	4	46.12	6.83
Central	Illinois	Aurora	Binders	Acco D-Rir	7	29.93	-46.39
Central	Illinois	Aurora	Binders	Avery Bind	2	2.31	-3.46
Central	Illinois	Aurora	Binders	Avery Poly	4	2.86	-4.58
Central	Illinois	Aurora	Binders	Catalog Bi	7	94.19	-164.84
Central	Illinois	Aurora	Binders	NULL	20	129.29	-219.27
Central	Illinois	Aurora	Chairs	Global Arn	3	128.06	-23.78
Central	Illinois	Aurora	Chairs	Global Erg	2	253.37	-14.48
Central	Illinois	Aurora	Chairs	Global Tro	2	701.37	-50.1
Central	Illinois	Aurora	Chairs	GuestStacl	2	520.46	-14.87
Central	Illinois	Aurora	Chairs	Hon Comf	3	239.36	-47.87
Central	Illinois	Aurora	Chairs	NULL	12	1842.62	-151.1
Central	Illinois	Aurora	Envelopes	Airmail Env	4	268.58	90.64
Central	Illinois	Aurora	Envelopes	NULL	4	268.58	90.64
Central	Illinois	Aurora	Fasteners	Acco Hot (	1	2.63	0.82
Central	Illinois	Aurora	Fasteners	NULL	1	2.63	0.82

Executive Report

			Category / Region (%		Category/National (%)			Sales (%)					
	Region	Category	Sales	Profit	Sales	Profit	Profit Mar	Q1 2019 v	Q1 vs. Q2	Q1 2020 v	Q1 vs. Q2	Q1 2021 v	Q1 vs. Q2 2021
0	Central	Office Sup	33.32	22.36	7.27	3.1	5.32	-0.26	4.04	2.19	0.52	1.89	-0.32
1	Central	Furniture	32.68	-7.23	7.13	-1	-1.75	0.36	0.07	0.48	0	0.16	0.03
2	Central	Technolog	34	84.87	7.42	11.77	19.77	1.48	1.14	0.37	0.48	1.5	-0.6
	Total		100	100	21.82	13.86							
3	East	Office Sup	30.28	44.81	8.95	14.32	19.96	5.39	0.25	0.02	0.86	-0.15	0.9
4	East	Furniture	30.69	3.33	9.07	1.06	1.46	-0.04	0.45	0.62	0.07	-0.35	1.19
5	East	Technolog	39.04	51.86	11.53	16.57	17.91	4.69	0.34	0.95	2.04	-0.31	0.29
	Total		100	100	29.55	31.96							
6	South	Office Sup	32.08	42.75	5.47	6.98	15.91	1.66	-0.47	-0.25	-0.3	-0.45	1.28
7	South	Furniture	29.94	14.48	5.11	2.36	5.77	-0.25	0.06	-0.52	1.06	-0.46	6.52
8	South	Technolog	37.98	42.76	6.48	6.98	13.44	-0.98	7.01	23.53	-0.48	-0.41	0
	Total		100	100	17.05	16.32							
9	West	Office Sup	30.44	48.52	9.61	18.37	23.82	-0.48	1.13	1.21	-0.32	0.83	-0.21
10	West	Furniture	34.82	10.61	11	4.02	4.55	1.02	-0.24	-0.52	2.6	0.33	0.72
11	West	Technolog	34.74	40.86	10.97	15.47	17.58	2.46	0.11	0.19	0.44	1.65	-0.26
	Total		100	100	31.58	37.86							
					100	100							

Files


Operational Report.csv


Executive Report.csv


Operational report.sql


Executive Report.ipynb