

ECOMMERCE FRAUDULENT TRANSACTION

BY - JITHIN JAYACHANDRAN

INTRODUCTION

E-COMMERCE HAS REVOLUTIONIZED THE WAY WE SHOP, OFFERING CONVENIENCE AND ACCESSIBILITY LIKE NEVER BEFORE. HOWEVER, WITH THIS CONVENIENCE COMES THE RISK OF FRAUDULENT TRANSACTIONS. E-COMMERCE FRAUDULENT TRANSACTIONS REFER TO UNAUTHORIZED OR DECEITFUL ACTIVITIES CONDUCTED ONLINE, AIMED AT OBTAINING GOODS OR SERVICES THROUGH ILLEGITIMATE MEANS. THESE TRANSACTIONS POSE A SIGNIFICANT THREAT TO BOTH CONSUMERS AND BUSINESSES, LEADING TO FINANCIAL LOSSES AND EROSION OF TRUST IN ONLINE PLATFORMS.

IN RESPONSE TO THIS CHALLENGE, BUSINESSES DEPLOY VARIOUS STRATEGIES TO DETECT AND PREVENT FRAUDULENT ACTIVITIES. ONE POWERFUL TOOL IN THEIR ARSENAL IS DATA ANALYSIS, PARTICULARLY LEVERAGING SQL (STRUCTURED QUERY LANGUAGE) TO ANALYZE TRANSACTION DATA. SQL ENABLES BUSINESSES TO SHIFT THROUGH VAST AMOUNTS OF TRANSACTIONAL DATA, IDENTIFY PATTERNS, AND UNCOVER ANOMALIES INDICATIVE OF FRAUDULENT BEHAVIOR.

ANALYZING DATA USING SQL

SQL IS A VERSATILE AND POWERFUL LANGUAGE FOR MANAGING AND ANALYZING RELATIONAL DATABASES, MAKING IT AN INVALUABLE TOOL FOR FRAUD DETECTION IN E-COMMERCE. BY QUERYING TRANSACTIONAL DATABASES, BUSINESSES CAN GAIN INSIGHTS INTO CUSTOMER BEHAVIOR, IDENTIFY SUSPICIOUS PATTERNS, AND FLAG POTENTIALLY FRAUDULENT ACTIVITIES.

THROUGH SQL QUERIES, BUSINESSES CAN PERFORM A RANGE OF ANALYSES, INCLUDING:

1. TRANSACTION MONITORING: SQL QUERIES CAN BE USED TO MONITOR TRANSACTIONAL DATA IN REAL-TIME OR RETROSPECTIVELY. BY EXAMINING TRANSACTIONAL ATTRIBUTES SUCH AS TRANSACTION AMOUNT, FREQUENCY, AND LOCATION, BUSINESSES CAN IDENTIFY TRANSACTIONS THAT DEVIATE FROM TYPICAL PATTERNS, POTENTIALLY INDICATING FRAUD.
2. PATTERN RECOGNITION: SQL ALLOWS BUSINESSES TO IDENTIFY COMMON PATTERNS ASSOCIATED WITH FRAUDULENT TRANSACTIONS. BY ANALYZING HISTORICAL DATA, BUSINESSES CAN DETECT RECURRING PATTERNS SUCH AS UNUSUALLY HIGH-VALUE TRANSACTIONS, FREQUENT PURCHASES FROM NEW ACCOUNTS, OR PURCHASES MADE FROM SUSPICIOUS LOCATIONS.
3. BEHAVIORAL ANALYSIS: SQL QUERIES CAN HELP BUSINESSES PROFILE CUSTOMER BEHAVIOR AND ESTABLISH BASELINE PATTERNS FOR LEGITIMATE TRANSACTIONS. DEVIATIONS FROM THESE PATTERNS, SUCH AS SUDDEN CHANGES IN PURCHASING BEHAVIOR OR TRANSACTIONS OCCURRING OUTSIDE USUAL BUSINESS HOURS, CAN BE FLAGGED FOR FURTHER INVESTIGATION.
4. RISK SCORING: BY APPLYING STATISTICAL MODELS AND ALGORITHMS WITHIN SQL QUERIES, BUSINESSES CAN ASSIGN RISK SCORES TO INDIVIDUAL TRANSACTIONS OR CUSTOMERS. THESE RISK SCORES PROVIDE A QUANTITATIVE MEASURE OF THE LIKELIHOOD OF FRAUD, ENABLING BUSINESSES TO PRIORITIZE THEIR FRAUD PREVENTION EFFORTS.

PREVENTING FUTURE FRAUD

ANALYZING DATA WITH SQL NOT ONLY HELPS DETECT AND MITIGATE EXISTING FRAUD BUT ALSO INFORMS THE DEVELOPMENT OF ROBUST PREVENTION STRATEGIES. BY UNDERSTANDING THE CHARACTERISTICS OF FRAUDULENT TRANSACTIONS, BUSINESSES CAN IMPLEMENT TARGETED INTERVENTIONS, STAYING AHEAD OF FRAUDSTERS AND SAFEGUARDING THE E-COMMERCE ECOSYSTEM'S INTEGRITY.

WE HAVE TO START WITH CREATING
A DATABASE & IMPORTING DATA

-- CREATE DATABASE ECOMMERCE
CREATE DATABASE ECOMMERCE;

-- USE DATABASE ECOMMERCE
USE ECOMMERCE;

-- CREATE TABLE CUSTOMERS
CREATE TABLE CUSTOMERS
(
 CUSTOMER_ID INT PRIMARY KEY,
 FIRST_NAME VARCHAR(50),
 LAST_NAME VARCHAR(50),
 CUSTOMER_AGE INT,
 CUSTOMER_LOCATION VARCHAR(100),
 SHIPPING_ADDRESS VARCHAR(255),
 BILLING_ADDRESS VARCHAR(255),
 ACCOUNT_AGE_DAYS INT
);

/* SELECT ALL RECORDS FROM THE
CUSTOMERS TABLE */
SELECT * FROM CUSTOMERS;

	Customer_ID	First_Name	Last_Name	Customer_Age	Customer_Location	Shipping_Address	Billing_Address	Account_Age_Days
▶	100	Emily	Johnson	17	Amandaborough	Unit 8934 Box 0058 DPO AA 05437	Unit 8934 Box 0058 DPO AA 05437	30
	101	Benjamin	Smith	40	East Timothy	634 May Keys Port Cherylview, NV 75063	634 May Keys Port Cherylview, NV 75063	72
	102	Olivia	Williams	22	Davismouth	16282 Dana Falls Suite 790 Rothhaven, IL 15564	16282 Dana Falls Suite 790 Rothhaven, IL 15564	63
	103	Ethan	Brown	31	Lynnberg	828 Strong Loaf Apt. 646 New Joshua, UT 84798	828 Strong Loaf Apt. 646 New Joshua, UT 84798	124
	104	Ava	Jones	51	South Nicole	29799 Jason Hills Apt. 439 West Richardtown, ...	29799 Jason Hills Apt. 439 West Richardtown, ...	158
	105	Jacob	Davis	34	Herreremouth	5699 Brittany Villages Suite 903 Lake Tim, MD 4...	120 Krist Dale Port Meganshire, GU 03060	38
	106	Mia	Taylor	14	Ramosfort	727 Gibson Islands Apt. 279 New Davidbury, M...	727 Gibson Islands Apt. 279 New Davidbury, M...	119
	107	William	Miller	42	Port Emily	3914 Davis Union Brownchester, IN 07744	3914 Davis Union Brownchester, IN 07744	251
	108	Sophia	Wilson	38	Carneyfurt	47893 Maldonado Stream Suite 443 Brownshire,...	47893 Maldonado Stream Suite 443 Brownshire,...	190
	109	Alexander	Anderson	39	Brockburgh	2334 Briana Centers Suite 576 Archershire, NM ...	2334 Briana Centers Suite 576 Archershire, NM ...	343
	110	Charlotte	Martinez	20	Craneport	Unit 7360 Box 5180 DPO AP 84328	55423 Henry Haven Wesleychester, WI 59138	285
	111	Michael	Taylor	35	West Michael	3684 Morris Inlet Suite 155 Chandlerville, NJ 01...	3684 Morris Inlet Suite 155 Chandlerville, NJ 01...	259
	112	Isabella	Jackson	45	Melindafurt	4197 Lewis Way Mariachester, NC 04968	075 Monroe Court Davismouth, WA 67522	307
	113	Matthew	White	27	Deniseburgh	298 Taylor Canyon South Megan, GA 73219	298 Taylor Canyon South Megan, GA 73219	200
	114	Harper	Harris	51	Danielmouth	32232 Omar Glens Kleintown, OK 77994	32232 Omar Glens Kleintown, OK 77994	22
	115	James	Thompson	54	Lamburgh	Unit 4478 Box 3826 DPO AA 96936	Unit 4478 Box 3826 DPO AA 96936	60
	116	Amelia	Thomas	20	West Melissashire	1117 Braun Courts Suite 910 West Johnmouth, ...	1117 Braun Courts Suite 910 West Johnmouth, ...	238
	117	Daniel	Lee	41	Port Rebecca	1228 Torres Squares Suite 099 Cookville, ID 69...	1228 Torres Squares Suite 099 Cookville, ID 69...	264
	118	Evelyn	Garcia	30	East Jonathan	12872 Kevin Creek Thompsonburgh, KY 81553	12872 Kevin Creek Thompsonburgh, KY 81553	159
	119	Christopher	Martin	29	Muellerstad	3496 Jason Ports New Amanda, MD 97636	3496 Jason Ports New Amanda, MD 97636	143
	120	Abigail	Perez	35	Lake Elizabeth	635 Danielle Parks Suite 501 Hilltown, WY 74884	635 Danielle Parks Suite 501 Hilltown, WY 74884	315
	121	Joseph	Robinson	33	Jennifershire	5430 Lee Dale Rogersburgh, ID 45469	5430 Lee Dale Rogersburgh, ID 45469	150
	122	David	Hall	35	Port Christopher	5146 Desiree Ridge Steeleburgh, MH 56289	5146 Desiree Ridge Steeleburgh, MH 56289	20
	123	Scarlett	Allen	49	Maloneshire	3469 Coleman Station Suite 668 North David, P...	3469 Coleman Station Suite 668 North David, P...	316
	124	John	Young	18	North Jacobmouth	768 Amanda Plain Suite 208 Taylorland, RI 13951	7045 Jones Bridge Apt. 061 Fosterview, MH 75...	214
	125	Madison	Clark	45	Murrayton	5137 Rebecca Rest New Nicolefort, NE 46498	5137 Rebecca Rest New Nicolefort, NE 46498	189
	126	Andrew	King	48	Popefort	0720 Holmes Garden South Kristinmouth, GU 63...	0720 Holmes Garden South Kristinmouth, GU 63...	364
	127	Grace	Rodriguez	49	Barronview	838 Ross Square Thompsonfurt, WI 01015	838 Ross Square Thompsonfurt, WI 01015	223
	128	Joshua	Scott	30	Jasonberg	501 Calderon Underpass New Glennhaven, SC ...	501 Calderon Underpass New Glennhaven, SC ...	79
	129	Chloe	Walker	13	West Amy	37175 Christopher Locks Lake Janice, PW 37512	37175 Christopher Locks Lake Janice, PW 37512	39
	130	Samuel	Wright	27	Ramoston	0554 Stephen Radial New Courteyport, TN 97...	0554 Stephen Radial New Courteyport, TN 97...	177
	131	Zoey	Hill	46	West Richardbury	935 Aaron Corners North Cindy, PR 64380	935 Aaron Corners North Cindy, PR 64380	238
	132	Ryan	Green	32	Lake Jimmyfurt	68408 Vanessa Passage Sydneyhaven, IN 94142	68408 Vanessa Passage Sydneyhaven, IN 94142	147
	133	Victoria	Baker	32	Robbinsport	642 Moss Wall Suite 362 Port Toddstad, VT 92434	642 Moss Wall Suite 362 Port Toddstad, VT 92434	334
	134	Nathan	Adams	45	Morenostad	509 James Well Suite 617 Dianehaven, MD 54931	509 James Well Suite 617 Dianehaven, MD 54931	148
	135	Natalie	Rivera	22	West Kevin	1832 Greer Trail West Alvin, UT 76928	1832 Greer Trail West Alvin, UT 76928	213
	136	Jack	Nelson	33	Lake Robertchester	213 Rivera Stravenue Suite 074 North Eric, NC ...	213 Rivera Stravenue Suite 074 North Eric, NC ...	139
	137	Aria	Campbell	38	Howardborough	6499 Lee Flat Apt. 243 Amandachester, HI 39213	78577 Dylan Throughway Tinamouth, IN 74602	198
	138	Luke	Carter	45	Brookeborough	PSC 8417, Box 4835 APO AA 35537	PSC 8417, Box 4835 APO AA 35537	273
	139	Lillian	Mitchell	48	West Kevin	35727 Perez Landing Suite 952 Millerport, MN 6...	35727 Perez Landing Suite 952 Millerport, MN 6...	173
	140	Owen	Perez	37	Medinafort	624 Schultz Spurs Apt. 863 Alyssaborough, OH ...	624 Schultz Spurs Apt. 863 Alyssaborough, OH ...	80

-- CREATE TABLE TRANSACTION

USE ECOMMERCE;

CREATE TABLE TRANSACTIONS

```

(
TRANSACTION_ID VARCHAR(50) PRIMARY KEY,
TRANSACTION_AMOUNT DECIMAL(10, 2),
TRANSACTION_DATE DATE,
TRANSACTION_TIME TIME,
PAYMENT_METHOD VARCHAR(50),
DEVICE_USED VARCHAR(100),
IP_ADDRESS VARCHAR(50),
IS_FRAUDULENT INT,
PRODUCT_ID INT,
CUSTOMER_ID INT
);

```

SELECT * FROM TRANSACTIONS;

	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id
▶	15d2e141-8735-46fc-9e02-80b472b2580f	58.09	2020-02-20	05:58:41	bank transfer	tablet	212.195.49.198	0	10101	100
	0bfee1a0-6d5e-40da-a446-d04e73b1b177	389.96	2025-02-20	08:09:45	debit card	desktop	208.106.249.121	0	10201	101
	e588eef4-b754-468e-9d90-d0e0abfc1af0	134.19	2018-03-20	03:42:55	PayPal	tablet	76.63.88.212	0	10301	102
	4de46e52-60c3-49d9-be39-636681009789	226.17	2016-03-20	20:41:31	bank transfer	desktop	207.208.171.73	0	10401	103
	074a76de-fe2d-443e-a00c-f044cd5b68e21	121.53	2015-01-20	05:08:17	bank transfer	tablet	190.172.14.169	0	10501	104
	4e707452-7c8a-4cbd-b0c1-2aeaa35c5e88	166.41	1930-01-20	10:55:14	bank transfer	tablet	202.237.29.55	0	10601	105
	7ed952fe-8ae1-4f11-8cc5-6607060240d8	92.88	2004-02-20	19:59:10	PayPal	tablet	13.45.27.192	0	10701	106
	0b2fb5aa-7171-472f-8269-371094608a07	318.14	2020-02-20	13:30:29	credit card	desktop	131.141.230.185	0	10801	107
	1f52366c-7f40-4397-885f-3856b6ee6531c	47.92	2003-03-20	19:44:00	bank transfer	desktop	210.148.17.240	0	10901	108
	3f10dfde-9c4c-4085-9872-4f6b39502ffb	121.78	2016-01-20	21:19:39	bank transfer	mobile	174.32.252.238	0	11001	109
	75f19b14-516c-4f1c-a99e-f1c456453b55	633.39	2020-01-20	22:11:22	PayPal	tablet	201.188.209.214	0	11101	110
	0dae14e6-ac5-48b4-8853-51188d3e9d9c	56.31	2016-02-20	21:08:15	PayPal	tablet	81.95.103.200	0	11201	111
	fb09ac9b-8c76-4caf-9973-c79563a186c2	275.87	2015-02-20	11:45:52	credit card	mobile	105.173.82.111	0	11301	112
	3a25fa55-ec25-4b47-bb3a-21fd7b2a4833	178.94	2029-01-20	15:55:08	debit card	mobile	211.46.251.245	0	11401	113
	c696ffee-f01d-4447-b0d4-45fcba65d13	374.04	2014-02-20	13:31:00	bank transfer	tablet	25.126.229.2	0	11501	114
	e3ac696e-978c-43c9-a659-6e1a93289b28	169.04	2004-03-20	10:10:58	debit card	tablet	1.199.155.117	0	11601	115
	e3c1a8ee-6455-4a39-a4b0-6f3be08c56a8	254.48	2008-01-20	08:26:25	bank transfer	desktop	52.160.5.136	0	11701	116
	08ded43b-24bf-4001-925e-fd7ce210bba8	266.06	2026-01-20	14:29:25	debit card	tablet	194.26.237.2	0	11801	117
	0c0345fa-406b-4064-e57-750ea3b0ea41	263.28	2007-03-20	22:58:45	debit card	tablet	166.131.101.195	0	11901	118
	8501d4c2-10e4-4aea-88bc-10b2a168cb28	475.76	2017-01-20	10:58:52	PayPal	mobile	196.101.90.48	0	12001	119
	4b798a5c-8400-439f-8e2c-491902645751	89.38	2007-02-20	02:13:55	credit card	mobile	82.111.15.220	0	12101	120
	0293493e-7c4f-4b2e-bcb0-838f380e9321	264.24	2016-01-20	07:04:42	credit card	mobile	201.24.228.3	0	12201	121
	402da312-6957-47a7-b513-40eb4a1c614e	123.35	2002-04-20	19:54:47	debit card	desktop	199.73.51.223	0	12301	122
	77f985cd-261c-40c9-a2f9-b107491cddc9	199.02	2027-01-20	02:56:50	debit card	tablet	165.239.47.50	0	12401	123
	bf43217a-c0d3-4e77-bb23-7eb77c44d1b9	675.74	2016-03-20	10:22:06	bank transfer	desktop	40.225.6.79	0	12501	124
	b4c3e417-6627-449d-9923-8e554060a164	352.67	2012-01-20	23:25:02	bank transfer	mobile	132.248.133.78	0	12601	125
	0b5286d8-853b-4276-b3b5-7b20c309c2e3	53.73	2015-03-20	14:11:33	bank transfer	mobile	103.23.100.105	0	12701	126
	39b77e1a-f7aa-4281-b04c-8c401dc1b2b3	21.24	2013-01-20	19:36:49	debit card	desktop	89.25.29.96	0	12801	127
	66eecfd6-fa41-4c3b-bab3-07c6ad7d798	118.83	2006-02-20	22:06:46	debit card	mobile	66.205.254.110	0	12901	128
	1b46cabd-fa15-47b7-91aa-f61e7c2724c1	267.12	2009-03-20	00:04:37	credit card	tablet	123.118.78.180	0	13001	129
	74118581-84a5-477e-80de-4c795dc8af25	153.05	1931-01-20	03:10:38	debit card	mobile	94.151.244.55	0	13101	130
	bb26a794-4d18-4ef4-9010-b26dc36f9ad0	615.52	2009-02-20	16:59:12	credit card	mobile	190.153.209.188	0	13201	131
	0a5ba20d-69d5-4ff7-bb88-50f6d402dabe	31.08	2017-01-20	13:18:27	PayPal	tablet	78.50.82.205	1	13301	132
	4fe0df1-e9d7-41b8-b4ca-88f60632b729	141.89	2029-03-20	04:57:16	debit card	mobile	206.94.162.125	0	13401	133
	636856f2-8760-4f7a-a0d9-3176d3326c18	355.32	2018-01-20	20:26:43	debit card	desktop	15.50.77.94	0	13501	134
	8e3efc28-4aa3-4df8-85f2-c5acea728490	16.05	2017-03-20	01:27:50	credit card	mobile	116.65.177.140	0	13601	135
	5433bc54-bd96-47c6-b9fa-c5e677155c9b	112.27	2004-03-20	00:33:27	credit card	desktop	194.90.197.59	0	13701	136
	247de335-896b-4171-960e-fdb0e92524c4	56.33	2004-02-20	07:53:00	bank transfer	desktop	118.118.247.178	0	13801	137
	d9726a32-b097-48dd-9803-37ee6d1b8201	183.16	2006-03-20	08:31:04	PayPal	mobile	27.246.31.121	0	13901	138
	2a62cfca-59f6-476b-bae3-e01cf013915d	295.28	2012-03-20	07:28:28	bank transfer	mobile	106.33.166.228	0	14001	139
	aa4c8ef8-1e0a-4657-92fd-659a1c22253c	71.57	2017-02-20	21:28:09	bank transfer	tablet	90.75.141.52	0	14101	140

```
-- CREATE A TABLE PRODUCTS
```

```
CREATE TABLE PRODUCTS
(
    PRODUCT_ID INT PRIMARY KEY,
    PRODUCT_CATEGORY VARCHAR(255),
    PRODUCT_QUANTITY INT
);
```

```
SELECT * FROM PRODUCTS;
```

```
SELECT COUNT(*) FROM CUSTOMERS;
```

```
SELECT COUNT(*) FROM TRANSACTIONS;
```

```
SELECT COUNT(*) FROM PRODUCTS;
```

	count(*)
▶	501

	Customer_ID	Transaction_ID	IP_Address
▶	903	ef48g469-5fe2-4345-b9o8-24451e535c04	192.168.0.1

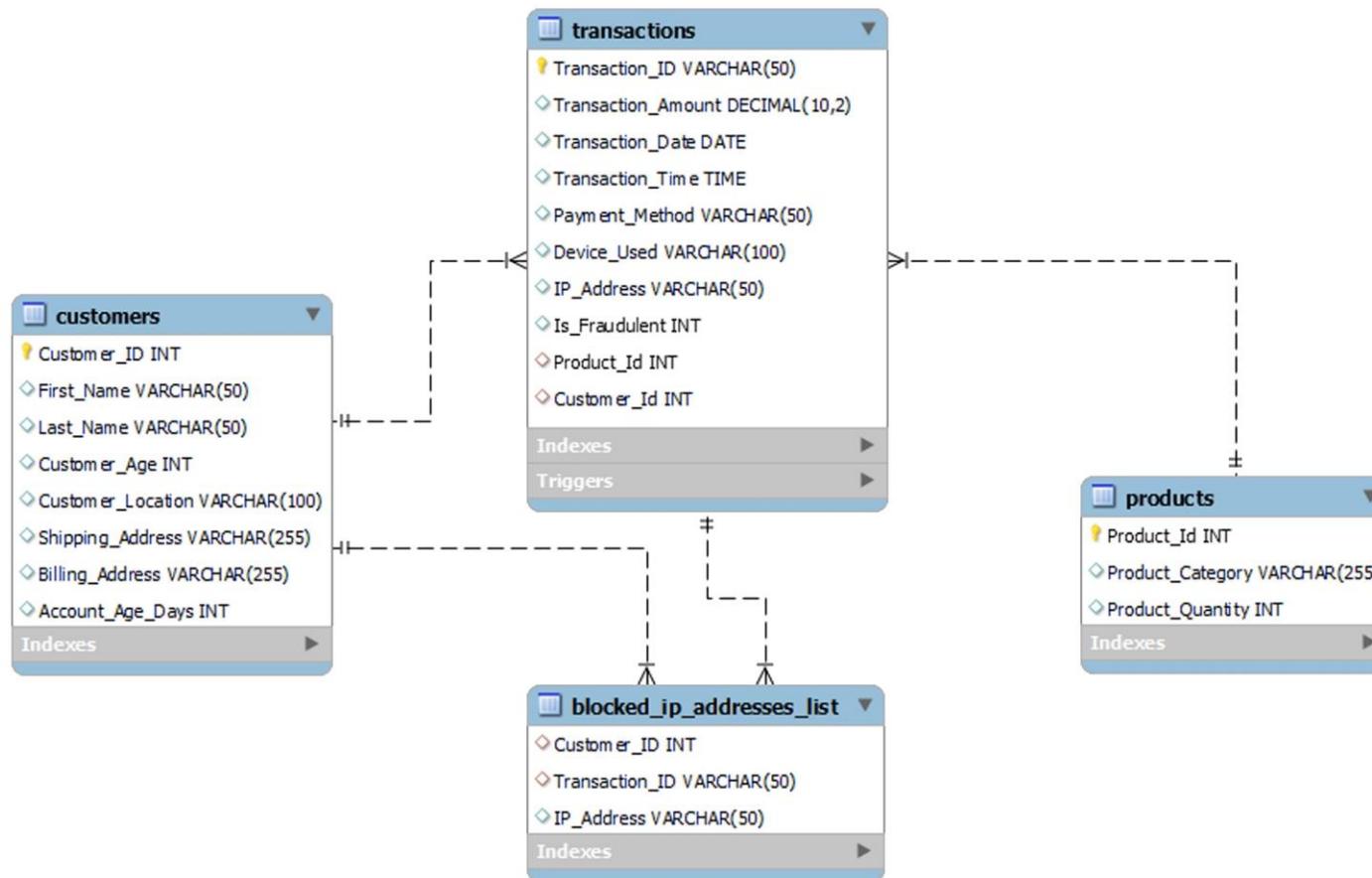
```
-- CREATING A TABLE FOR TRIGGER
```

```
CREATE TABLE BLOCKED_IP_ADDRESSES_LIST
(
    CUSTOMER_ID INT,
    TRANSACTION_ID VARCHAR(50),
    IP_ADDRESS VARCHAR(50),
    FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMERS(CUSTOMER_ID),
    FOREIGN KEY (TRANSACTION_ID) REFERENCES TRANSACTIONS(TRANSACTION_ID)
);
```

	Product_Id	Product_Category	Product_Quantity
	10101	electronics	1
	10201	electronics	2
	10301	home & garden	2
	10401	clothing	5
	10501	clothing	2
	10601	toys & games	2
	10701	toys & games	2
	10801	health & beauty	4
	10901	home & garden	4
	11001	health & beauty	4
	11101	toys & games	5
	11201	home & garden	3
	11301	home & garden	5
	11401	clothing	4
	11501	home & garden	5
	11601	home & garden	1
	11701	electronics	4
	11801	electronics	1
	11901	toys & games	3
	12001	clothing	2
	12101	health & beauty	4
	12201	toys & games	3
	12301	toys & games	1
	12401	toys & games	4
	12501	clothing	4
	12601	health & beauty	1

ENTITY RELATIONSHIP DIAGRAM

ENTITY-RELATIONSHIP DIAGRAM, IN SQL IS A VISUAL REPRESENTATION THAT ILLUSTRATES THE RELATIONSHIPS BETWEEN DIFFERENT ENTITIES (TABLES) IN A DATABASE SCHEMA



DATA MANIPULATION LANGUAGE

SELECT STATEMENT

-- DATA RETRIEVAL (SELECT STATEMENTS):

-- LIST ALL TRANSACTIONS MADE WITHIN A BETWEEN SPECIFIC DATES (20 JAN 2023) TO (20 FEB 2024)

SELECT * FROM TRANSACTIONS WHERE TRANSACTION_DATE >= '2023-01-20' AND TRANSACTION_DATE <= '2024-02-20';

	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id
▶	080c09a0-105c-48f8-9eeb-f99a2dfe0979	428.52	2024-02-20	14:32:15	PayPal	tablet	119.237.136.240	0	38401	383
	0e31c433-5dcc-46d8-a7da-b3dfb7e7e74a	379.43	2024-01-20	14:49:15	PayPal	tablet	163.233.133.53	0	28001	279
	13dd0ce0-a201-4685-95b6-e28ece0f9f8f	14.34	2023-02-20	22:45:53	credit card	tablet	28.74.187.170	0	21601	215
	27bd2a81-af40-4ea5-ae5d-0db561f51eeb	79.03	2024-01-20	22:24:33	PayPal	tablet	106.28.106.5	0	53701	536
	2896025b-4f9d-4132-93e5-337e1fc544d5	661.66	2024-02-20	06:55:12	bank transfer	mobile	47.166.238.118	0	49201	491
	44bf8193-de47-480d-85f2-16ff1fd099e9	230.64	2023-02-20	05:59:31	bank transfer	desktop	43.5.49.69	0	38301	382
	4a2bbfa3-877f-4bd0-a825-a8222bbf5a2e	34.24	2024-01-20	09:50:05	bank transfer	mobile	181.224.183.69	0	21901	218
	4c85b673-eea0-43c4-a6cb-ec4715d7b677	73.30	2023-02-20	22:59:01	credit card	mobile	77.50.41.160	0	21301	212
	4e2be07c-59dc-4929-be53-47b316c07146	463.35	2023-01-20	05:22:54	credit card	tablet	33.197.200.157	0	30001	299
	5103641f-e01f-48cf-a592-43781c08261d	251.05	2023-03-20	22:59:08	credit card	tablet	25.176.170.209	0	18201	181

-- LIST ALL TRANSACTIONS MADE DURING MIDNIGHT TO EARLY MORNING

SELECT * FROM TRANSACTIONS WHERE TRANSACTION_TIME >= '00:00:00' AND TRANSACTION_TIME < '06:00:00';

	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id
▶	074a76de-fe2d-443e-a00c-f044cdb68e21	121.53	2015-01-20	05:08:17	bank transfer	tablet	190.172.14.169	0	10501	104
	08909998-ae8f-4dcf-ad2e-40a855373ec1	49.59	2004-03-20	04:58:50	credit card	desktop	112.35.124.123	0	30501	304
	0b861420-a883-4f93-9d21-afb299038d2e	63.15	2003-02-20	02:39:01	credit card	desktop	158.169.135.20	0	17001	169
	0a2ec6c1-3a07-4cd3-9fe3-ac3ff8ef1573	682.10	2014-02-20	01:02:45	debit card	tablet	117.164.33.66	0	52201	521
	0cd8d53c-251f-4136-940c-2a87687d14f5	1118.63	2003-04-20	01:52:51	debit card	tablet	152.214.163.223	0	27901	278
	10aee7e0-d1ff-4be8-88d2-1ac3f771f3f5	66.93	2007-03-20	01:27:34	PayPal	mobile	63.108.158.201	0	30101	300
	15d2e414-8735-46fc-9e02-80b472b2580f	58.09	2020-02-20	05:58:41	bank transfer	tablet	212.195.49.198	0	10101	100
	15f4fd8e-a13f-4d7c-8317-d58b3ee64def	106.77	2002-04-20	00:50:19	credit card	desktop	193.0.14.118	0	42601	425
	1ac39f8c-b3b4-4dc5-8df0-bd57f609663d	106.72	2017-02-20	04:00:28	credit card	mobile	223.133.208.242	0	16601	165
	1b46cabd-fa15-47b7-91aa-f61e7c2724c1	267.12	2009-03-20	00:04:37	credit card	tablet	123.118.78.180	0	13001	129

-- DATA RETRIEVAL (SELECT STATEMENTS):

-- FIND TRANSACTIONS WHERE THE BILLING AND SHIPPING ADDRESSES DIFFER.

SELECT * FROM CUSTOMERS WHERE BILLING_ADDRESS <> SHIPPING_ADDRESS;

	Customer_ID	First_Name	Last_Name	Customer_Age	Customer_Location	Shipping_Address	Billing_Address	Account_Age_Days
▶	105	Jacob	Davis	34	Herreremouth	5699 Brittany Villages Suite 903 Lake Tim, MD 4...	120 Kristi Dale Port Meganshire, GU 03060	38
	110	Charlotte	Martinez	20	Craneport	Unit 7360 Box 5180 DPO AP 84328	55423 Henry Haven Wesleychester, WI 59138	285
	112	Isabella	Jackson	45	Melindafurt	4197 Lewis Way Mariachester, NC 04968	075 Monroe Court Davismouth, WA 67522	307
	124	John	Young	18	North Jacobmouth	768 Amanda Plain Suite 208 Taylorland, RI 13951	7045 Jones Bridge Apt. 061 Fosterview, MH 75...	214
	137	Aria	Campbell	38	Howardborough	6499 Lee Flat Apt. 243 Amandachester, HI 39213	78577 Dylan Throughway Tinamouth, IN 74602	198
	142	Gabriel	Edwards	43	West Jamieland	5829 Zachary Drive Hayleyville, NM 74902	0943 Christopher Haven West Robinville, OK 27...	119
	162	Audrey	Evans	27	New Jacksonton	66360 Thomas Unions Suite 424 Harrisside, MS ...	48098 Dana Views Melissashire, MI 62140	347
	163	Dominic	Collins	55	East Mark	913 Peter Hollow North Danielfurt, MT 46944	8677 Elizabeth Loaf Apt. 057 North Meganboro...	60
	186	Clara	Coleman	32	Marymouth	68763 Bryant Points Suite 057 Guzmanfort, ME ...	139 Lopez Neck Carterview, DE 85571	131
	193	Taylor	James	30	New Julialand	2947 Tim Glens Apt. 283 Edwardsport, TN 82116	21098 Alexandra Island Port Eric, MA 49423	163
	222	Dominic	Scott	33	Martinland	858 Miguel Pine North Samanthaside, VA 05243	1520 Cynthia Oval South Michaelberg, WY 87622	264
	242	Jonathan	Perez	43	Thomasmouth	5705 Johnson Shoal Mercedestown, MD 80532	PSC 1092, Box 0373 APO AE 35669	290
	252	Aidan	Richardson	26	Richardton	466 Stephanie Cliffs Suite 875 Port Mariastad, ...	41943 Ray Squares Apt. 071 South Gregory, L...	69
	258	Cole	Foster	31	East Alan	38513 Cheryl Motorway Apt. 890 Johnland, WA...	1597 Grant Walk Suite 553 West Michelle, MO 7...	103

-- DETERMINE THE COUNT OF FRAUDULENT TRANSACTIONS BY PAYMENT METHOD.

SELECT PAYMENT_METHOD, COUNT(*) AS FRAUDULENT_TRANSACTION_COUNT

FROM TRANSACTIONS WHERE IS_FRAUDULENT = 1 GROUP BY PAYMENT_METHOD;

	Payment_Method	Fraudulent_Transaction_Count
▶	bank transfer	5
	PayPal	7
	debit card	7
	credit card	5

DATA MANIPULATION LANGUAGE

INSERT, UPDATE, DELETE

-- DATA MANIPULATION (INSERT, UPDATE, DELETE):

-- INSERT A NEW RECORD INTO THE DATABASE.

-- INSERT NEW CUSTOMER DETAILS

```
INSERT INTO CUSTOMERS (CUSTOMER_ID, FIRST_NAME, LAST_NAME, CUSTOMER_AGE, CUSTOMER_LOCATION,
SHIPPING_ADDRESS, BILLING_ADDRESS, ACCOUNT_AGE_DAYS)
VALUES (903, 'JOHN', 'DOE', 30, 'NEW YORK', '123 MAIN ST', '456 ELM ST', 365);
```

-- INSERT NEW PRODUCT DETAILS

```
INSERT INTO PRODUCTS (PRODUCT_ID, PRODUCT_CATEGORY, PRODUCT_QUANTITY)
VALUES (9003, 'ELECTRONICS', 1);
```

-- INSERT NEW TRANSACTION DETAILS

```
INSERT INTO TRANSACTIONS (TRANSACTION_ID, TRANSACTION_AMOUNT, TRANSACTION_DATE, TRANSACTION_TIME,
PAYMENT_METHOD, DEVICE_USED, IP_ADDRESS, IS_FRAUDULENT, PRODUCT_ID, CUSTOMER_ID)
VALUES ('EF48G469-5FE2-4345-B908-24451E535C04', 100.00, '2024-04-09', '12:00:00', 'CREDIT CARD', 'DESKTOP', '192.168.0.1', 1, 9003, 903);
```

-- UPDATE THE STATUS OF A TRANSACTION TO 'FRAUDULENT'.

```
UPDATE TRANSACTIONS SET IS_FRAUDULENT = 1 WHERE CUSTOMER_ID = 700;
```

-- DELETE TRANSACTIONS ASSOCIATED WITH THE PRODUCT

```
DELETE FROM TRANSACTIONS WHERE PRODUCT_ID = 9003;
```

-- DELETE THE PRODUCT

```
DELETE FROM PRODUCTS WHERE PRODUCT_ID = 9003;
```

-- DELETE THE CUSTOMER

```
DELETE FROM CUSTOMERS WHERE CUSTOMER_ID = 903;
```

	Customer_ID	First_Name	Last_Name	Customer_Age	Customer_Location	Shipping_Address	Billing_Address	Account_Age_Days
▶	903	John	Doe	30	New York	123 Main St	456 Elm St	365

	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id
▶	ef48g469-5fe2-4345-b908-24451e535c04	100.00	2024-04-09	12:00:00	Credit Card	Desktop	192.168.0.1	1	9003	903

	Product_Id	Product_Category	Product_Quantity
▶	9003	Electronics	1

GROUP BY, HAVING CLAUSE

-- GROUP BY

-- COUNT THE NUMBER OF TRANSACTIONS FOR EACH CUSTOMER.

```
SELECT CUSTOMER_ID, COUNT(*) AS TRANSACTION_COUNT  
FROM TRANSACTIONS GROUP BY CUSTOMER_ID;
```

	Customer_Id	Transaction_Count
▶	100	1
	101	1
	102	1
	103	1
	104	1
	105	1

-- HAVING CLAUSE

-- SQL QUERY TO RETRIEVE PRODUCT CATEGORIES THAT CONTAIN MORE THAN FIVE UNIQUE PRODUCTS?

```
SELECT PRODUCT_CATEGORY, COUNT(DISTINCT PRODUCT_ID) AS UNIQUE_PRODUCTS  
FROM PRODUCTS  
GROUP BY PRODUCT_CATEGORY  
HAVING COUNT(DISTINCT PRODUCT_ID) > 5;
```

	Product_Category	Unique_Products
▶	clothing	105
	electronics	109
	health & beauty	100
	home & garden	88
	toys & games	100

GROUP BY

HAVING CLAUSE

AGGREGATE FUNCTION

AN AGGREGATE FUNCTION IN SQL COMPUTES A SINGLE RESULT FROM MULTIPLE ROWS, SUCH AS SUM, AVG, MIN, MAX, OR COUNT.

-- CALCULATE THE TOTAL AMOUNT SPENT BY EACH USER IN THE DATABASE USING AGGREGATE FUNCTIONS.

```
SELECT CUSTOMER_ID, SUM(TRANSACTION_AMOUNT) AS TOTAL_AMOUNT_SPENT FROM TRANSACTIONS GROUP BY CUSTOMER_ID;
```

	Customer_Id	Total_Amount_Spent
▶	100	58.09
	101	389.96
	102	134.19
	103	226.17
	104	121.53
	105	166.41

SUM

-- FIND OUT THE NUMBER OF TRANSACTIONS MADE FROM EACH CITY

```
SELECT CUSTOMER_LOCATION, COUNT(*) AS NUM_TRANSACTIONS FROM CUSTOMERS GROUP BY CUSTOMER_LOCATION;
```

	Customer_Location	Num_Transactions
▶	Amandaborough	1
	East Timothy	1
	Davismouth	2
	Lynnberg	1
	South Nicole	1
	Herrera mouth	1
	Ramosfort	1
	Port Emily	1

COUNT

```

START TRANSACTION;

-- INSERTING A NEW CUSTOMER
INSERT INTO CUSTOMERS (CUSTOMER_ID, FIRST_NAME, LAST_NAME, CUSTOMER_AGE,
CUSTOMER_LOCATION, SHIPPING_ADDRESS, BILLING_ADDRESS, ACCOUNT_AGE_DAYS)
VALUES (700, 'ALICE', 'SMITH', 25, 'LOS ANGELES', '123 MAIN ST', '456 ELM ST', 180);

SAVEPOINT CUSTOMER_INSERTED;

-- INSERTING IN PRODUCTS TABLE
INSERT INTO PRODUCTS (PRODUCT_ID, PRODUCT_CATEGORY, PRODUCT_QUANTITY)
VALUES (70000, 'ELECTRONICS', 10);

SAVEPOINT PRODUCT_INSERTED;

-- INSERTING A NEW TRANSACTION FOR THE CUSTOMER
INSERT INTO TRANSACTIONS (TRANSACTION_ID, TRANSACTION_AMOUNT, TRANSACTION_DATE, TRANSACTION_TIME,
PAYMENT_METHOD, DEVICE_USED, IP_ADDRESS, IS_FRAUDULENT, PRODUCT_ID, CUSTOMER_ID)
VALUES ('977c0a6f-f7dc-4ed1-a646-83d41a8cdfb2', 75.00, '2024-04-12', '10:30:00', 'CREDIT CARD', 'DESKTOP', '192.168.1.2', 0, 70000, 700);

SAVEPOINT TRANSACTION_INSERTED;

-- UPDATING THE PRODUCT QUANTITY AFTER THE TRANSACTION
UPDATE PRODUCTS
SET PRODUCT_QUANTITY = PRODUCT_QUANTITY - 1
WHERE PRODUCT_ID = 70000;

SAVEPOINT PRODUCT_UPDATED;

-- CHECKING IF THE TRANSACTION IS FRAUDULENT
-- IN THIS EXAMPLE, LET'S ASSUME IT'S NOT FRAUDULENT
-- IF IT IS FRAUDULENT, ROLLBACK TO THE PRODUCT_UPDATED SAVEPOINT
-- IF NOT, YOU CAN COMMIT
-- FOR DEMONSTRATION PURPOSES, LET'S SIMULATE AN ERROR

ROLLBACK TO SAVEPOINT TRANSACTION_INSERTED;

-- IF THE ROLLBACK WAS SUCCESSFUL AND NO FURTHER ERRORS OCCURRED, YOU CAN COMMIT THE TRANSACTION
COMMIT;

-- END OF TRANSACTION

```

TRANSACTION CONTROL LANGUAGE

SAVEPOINT
A NAMED MARKER WITHIN A TRANSACTION TO WHICH YOU CAN ROLLBACK.

ROLLBACK
REVERTS CHANGES MADE WITHIN A TRANSACTION TO A SAVEPOINT

COMMIT
MAKES CHANGES AND FINALIZES THE TRANSACTION.

Customer_ID	First_Name	Last_Name	Customer_Age	Customer_Location	Shipping_Address	Billing_Address	Account_Age_Days		
700	Alice	Smith	25	Los Angeles	123 Main St	456 Elm St	180		
Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id
977c0a6f-f7dc-4ed1-a646-83d41a8cdfb2	75.00	2024-04-12	10:30:00	Credit Card	Desktop	192.168.1.2	0	70000	700

Product_Id	Product_Category	Product_Quantity
70000	Electronics	9

JOINS

JOINS IN SQL COMBINE ROWS FROM TWO OR MORE TABLES BASED ON A RELATED COLUMN BETWEEN THEM, PRODUCING A SINGLE RESULT SET CONTAINING FIELDS FROM BOTH TABLES. THEY'RE FUNDAMENTAL FOR QUERYING DATA FROM MULTIPLE TABLES SIMULTANEOUSLY.

-- INNER JOIN

-- RETRIEVE ALL TRANSACTIONS ALONG WITH CUSTOMER DETAILS AND PRODUCT DETAILS, BUT ONLY FOR TRANSACTIONS ABOVE A CERTAIN AMOUNT:

```
SELECT * FROM TRANSACTIONS T
INNER JOIN CUSTOMERS C ON T.CUSTOMER_ID = C.CUSTOMER_ID
INNER JOIN PRODUCTS P ON T.PRODUCT_ID = P.PRODUCT_ID
AND T.TRANSACTION_AMOUNT >1000;
```

Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id	Customer_ID	First_Name	Last_Name	Customer_Age	Customer_Location	Shipping_Address	Billing_Address	Account_Age_Days	Product_Id	Product_Category	Product_Quantity
► 0cd8d53c-251f-4136-940c-2a87687d14f5	1118.63	2003-04-20	01:52:51	debit card	tablet	152.214.163.223	0	27901	278	278	Colton	Butler	35	South Christopher	66374 Robert Drive Port Philip, MN 73264	66374 Robert Drive Port Philip, MN 73264	285	27901	electronics	1
1a3af4d5-b1fb-4225-8438-a638544f399	2104.55	2024-03-20	15:50:20	debit card	tablet	166.133.224.120	1	41901	418	418	Paidley	Turner	45	North Madisonz	Unit 3175 Box 1469 DPO AP 09850	Unit 3175 Box 1469 DPO AP 09850	254	41901	toys & games	2
3c803665-55a4-405f-a90-02118212d03	2359.35	2010-02-20	02:22:52	debit card	tablet	126.22.145.28	1	59901	598	598	Eloven	Turner	45	Dianeshire	USCGC Medina FPO AA 86844	USCGC Medina FPO AA 86844	156	59901	health & beauty	1
5a32b073-6200-46f-aa72-df40f3e3b9ef	2392.00	2006-02-20	02:51:11	bank transfer	mobile	108.128.142.186	1	42501	424	424	Naomi	Turner	34	Watersmouth	445 Jeremy Union Huntertown, MN 71668	445 Jeremy Union Huntertown, MN 71668	4	42501	home & garden	3
5ad73336-170f-4a8f-b337-9ee872dc08c6	2038.00	1930-01-20	17:40:15	credit card	mobile	54.172.17.233	0	29201	291	291	Bailey	Foster	32	Stricklandview	USS Ramirez FPO AE 75810	42574 Katherine Ferry Apt. 656 South Jamiepor...	9	29201	health & beauty	1
600abec7-94f4-4cc5-9523-3ae952e449b	1408.75	2026-01-20	20:30:11	PayPal	mobile	12.250.243.91	1	51401	513	513	Kellan	Turner	37	New Ivan	35432 Andrew Junction Apt. 460 Adamberg, W...	35432 Andrew Junction Apt. 460 Adamberg, W...	29	51401	clothing	5
aef59543-8730-462e-8d05-7734b10191a	1161.64	2014-02-20	14:16:32	debit card	mobile	197.148.88.121	0	17401	173	173	Aaliyah	Hughes	36	Joshuaview	80612 Sweeney Run New Jacob, CA 86710	80612 Sweeney Run New Jacob, CA 86710	146	17401	health & beauty	5
ba63eb43-bdf9-4e68-8872-2ad2ce5de12	1213.67	2005-02-20	07:35:36	credit card	desktop	13.72.40.114	0	17501	174	174	Grayson	Washington	23	Thomasmouth	Unit 6143 Box 6613 DPO AA 99913	Unit 6143 Box 6613 DPO AA 99913	90	17501	clothing	3
dd2afa43-9d75-46e3-be81-6453ab695c0b	1741.55	2010-01-20	04:42:55	PayPal	tablet	142.73.216.218	1	55401	553	553	Zane	Turner	23	East Jacqueline	0209 Richard Island Apt. 487 Smithburgh, WV 8...	0209 Richard Island Apt. 487 Smithburgh, WV 8...	362	55401	electronics	4

-- RETRIEVE THE TOTAL REVENUE GENERATED BY EACH PRODUCT CATEGORY:

```
SELECT P.PRODUCT_CATEGORY, SUM(T.TRANSACTION_AMOUNT) AS TOTAL_REVENUE
FROM TRANSACTIONS T
JOIN PRODUCTS P ON T.PRODUCT_ID = P.PRODUCT_ID
GROUP BY P.PRODUCT_CATEGORY;
```

	Product_Category	Total_Revenue
► Electronics	22521.43	
home & garden	21368.65	
clothing	24506.35	
toys & games	21182.77	
health & beauty	25501.75	

NULL VALUES

-- IS NULL

-- FIND ALL CUSTOMERS WHOSE FRAUDULENT_ID ARE MISSING FROM THE DATABASE.

SELECT * FROM TRANSACTIONS WHERE IS_FRAUDULENT IS NULL;

	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id
▶	3be568c2-406f-4ac6-a396-b6b0bdaf9641	270.55	2014-03-20	22:15:42	credit card	desktop	74.38.252.185	NULL	31901	318

-- IS NOT NULL

-- LIST TRANSACTIONS WHERE THE PAYMENT METHOD IS SPECIFIED.

SELECT * FROM TRANSACTIONS WHERE PAYMENT_METHOD IS NOT NULL;

	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id
▶	001588cf-5c96-45ac-8bc7-29c064a06d33	56.83	2028-01-20	15:36:10	debit card	tablet	134.165.126.136	0	16001	159
	0293493e-7c4f-4b2e-bcb0-838f380e9321	264.24	2016-01-20	07:04:42	credit card	mobile	201.24.228.3	0	12201	121
	0445dad3-bc7b-4d94-b3d0-299a9095ed23	839.30	2019-03-20	17:10:23	bank transfer	mobile	65.77.31.204	1	16901	168

-- COALESCE

-- IN THIS EXAMPLE: COALESCE WILL RETURN THE VALUE OF FRAUDULENT_ID IF IT IS NOT NULL.

-- IF FRAUDULENT_ID IS NULL FOR A PARTICULAR USER, IT WILL RETURN 'NO FRAUDULENT ID' INSTEAD.

SELECT COALESCE(IS_FRAUDULENT, 'NO FRAUDULENT ID') AS NO_FRAUDULENT_ID
FROM TRANSACTIONS;

No_Fraudulent_ID
0
1
0
No Fraudulent ID
0
0
1

COALESCE

SUBQUERY

A SUBQUERY IS A QUERY NESTED WITHIN ANOTHER QUERY, USED TO RETRIEVE DATA BASED ON CONDITIONS DEFINED IN THE OUTER QUERY.

-- SELECT ALL TRANSACTIONS FROM THE TRANSACTIONS TABLE WHERE THE CUSTOMER_LOCATION MATCHES A SPECIFIED REGION IN THE CUSTOMERS TABLE.
SELECT * FROM TRANSACTIONS WHERE CUSTOMER_ID IN (SELECT CUSTOMER_ID FROM CUSTOMERS WHERE CUSTOMER_LOCATION = 'WEST KEVIN');

	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id
▶	8e3efc28-4aa3-4df8-85f2-c5acea728490	16.05	2017-03-20	01:27:50	credit card	mobile	116.65.177.140	0	13601	135
	2a62cfca-59f6-476b-bae3-e01cf013915d	295.28	2012-03-20	07:28:28	bank transfer	mobile	106.33.166.228	0	14001	139
	71d54b02-052d-4456-a892-c1bab11004cd	325.10	1930-01-20	08:35:33	credit card	tablet	98.174.1.36	0	45301	452

-- SELECT ALL THE NAMES, TRANSACTION IDS, AND AMOUNTS FOR CUSTOMERS WHOSE TRANSACTIONS EXCEED THE AVERAGE TRANSACTION AMOUNT.

SELECT C.CUSTOMER_ID, C.FIRST_NAME, C.LAST_NAME, T.TRANSACTION_ID, T.TRANSACTION_AMOUNT
FROM CUSTOMERS C
JOIN TRANSACTIONS T ON C.CUSTOMER_ID = T.CUSTOMER_ID
WHERE T.TRANSACTION_AMOUNT > (SELECT AVG(TRANSACTION_AMOUNT) FROM TRANSACTIONS);

	Customer_ID	First_Name	Last_Name	Transaction_ID	Transaction_Amount
▶	121	Joseph	Robinson	0293493e-7c4f-4b2e-bcb0-838f380e9321	264.24
	168	Ellie	Turner	0445dad3-bc7b-4d94-b3d0-299a9095ed23	839.30
	471	Paxton	Roberts	066d045c-c8e7-4048-8344-ebb007f442e0	401.15
	383	Parker	Hernandez	080c09a0-105c-48f8-9eeb-f99a2dfe0979	428.52
	582	Adeline	Parker	08de0284-a060-47bc-a576-401eda65961b	414.95
	117	Daniel	Lee	08ded43b-24bf-4001-925e-fd7ce210baa8	266.06
	544	Leilani	Bennett	09f7c7c5-3431-4b4f-a612-27ba750d0db6	245.84
	521	Xander	Hayes	0a2ec6c1-3a07-4cd3-9fe3-ac3ff8ef1573	682.10
	107	William	Miller	0b2fb5aa-7171-472f-8269-371094608a07	318.14
	345	Brandon	Harris	0b89a68c-414c-4da0-b5f8-c514ccb8951c	344.57
	101	Benjamin	Smith	0bfee1a0-6d5e-40da-a446-d04e73b1b177	389.96
	118	Evelyn	Garcia	0c0345fa-406b-4064-8e57-750ea3b0ea41	263.28
	312	Jocelyn	Flores	0c726f23-8af8-4656-8746-f77a0578bb12	293.20
	278	Colton	Butler	0cd8d53c-251f-4136-940c-2a87687d14f5	1118.63

WINDOW FUNCTION

-- RANK

-- RANK CUSTOMERS BASED ON TRANSACTION AMOUNT ORDER BY TRANSACTION AMOUNT DESCENDING
SELECT CUSTOMER_ID, TRANSACTION_AMOUNT,
RANK() OVER (ORDER BY TRANSACTION_AMOUNT DESC) AS TRANSACTION_AMOUNT_RANK
FROM TRANSACTIONS ORDER BY TRANSACTION_AMOUNT DESC;

	Customer_ID	Transaction_Amount	Transaction_Amount_Rank
▶	424	2392.00	1
	598	2359.35	2
	418	2104.55	3
	291	2038.00	4
	553	1741.55	5

-- DENSE RANK

-- USING DENSE RANK TO ANALYZE TRANSACTION FREQUENCIES AMONG DIFFERENT CUSTOMER AGE GROUPS
SELECT DENSE_RANK() OVER (ORDER BY COUNT(*) DESC) AS AGE_GROUP_TRANSACTION_RANK,
CASE
WHEN CUSTOMER_AGE BETWEEN 18 AND 25 THEN '18-25'
WHEN CUSTOMER_AGE BETWEEN 26 AND 35 THEN '26-35'
WHEN CUSTOMER_AGE BETWEEN 36 AND 45 THEN '36-45'
WHEN CUSTOMER_AGE BETWEEN 46 AND 55 THEN '46-55'
ELSE '56+'
END AS CUSTOMER_AGE_GROUP,
COUNT(*) AS TRANSACTION_FREQUENCY FROM TRANSACTIONS
INNER JOIN CUSTOMERS ON TRANSACTIONS.CUSTOMER_ID = CUSTOMERS.CUSTOMER_ID
GROUP BY CUSTOMER_AGE_GROUP ORDER BY TRANSACTION_FREQUENCY DESC;

	Age_Group_Transaction_Rank	Customer_Age_Group	Transaction_Frequency
▶	1	26-35	200
	2	36-45	154
	3	46-55	68
	4	18-25	55
	5	56+	25

RANK

DENSE RANK

STRING FUNCTIONS

-- CREATE A QUERY SHOWCASING THE EFFECTS OF UPPER AND LOWER FUNCTIONS ON CUSTOMER NAMES IN THE CUSTOMERS TABLE.

```
SELECT UPPER(FIRST_NAME) AS UPPER_FIRST_NAME, LOWER(LAST_NAME) AS LOWER_LAST_NAME  
FROM CUSTOMERS;
```

	Upper_First_Name	Lower_Last_Name
▶	EMILY	johson
	BENJAMIN	smith
	OLIVIA	williams
	ETHAN	brown
	AVA	jones
	JACOB	davis
	MIA	taylor
	WILLIAM	miller
	SOPHIA	wilson
	ALEXANDER	anderson

UPPER
LOWER

-- CREATE A QUERY DEMONSTRATING INSIGHTS GAINED FROM LEFT AND RIGHT FUNCTIONS APPLIED TO ADDRESSES IN THE CUSTOMERS TABLE.

```
SELECT LEFT(SHIPPING_ADDRESS, 20) AS LEFT_SHIPPING_ADDRESS, RIGHT(BILLING_ADDRESS, 15) AS RIGHT_BILLING_ADDRESS  
FROM CUSTOMERS;
```

	Left_Shipping_Address	Right_Billing_Address
▶	Unit 8934 Box 0058 D	58 DPO AA 05437
	634 May Keys Port Ch	lview, NV 75063
	16282 Dana Falls Sui	haven, IL 15564
	828 Strong Loaf Apt.	oshua, UT 84798
	29799 Jason Hills Ap	dtown, OH 36093
	5699 Brittany Villag	shire, GU 03060
	727 Gibson Islands A	dbury, ME 43104
	3914 Davis Union Bro	ester, IN 07744
	47893 Maldonado Stre	shire, MO 48487
	2334 Briana Centers	shire, NM 45210
	Unit 7360 Box 5180 D	ester, WI 59138
	3684 Morris Inlet Su	ville, NJ 01086

LEFT
RIGHT

NUMERIC FUNCTIONS

-- USE NUMERIC FUNCTIONS SUCH AS ABS, CEILING, FLOOR, ROUND, AND SQRT TO ANALYZE OR MANIPULATE TRANSACTION AMOUNTS EFFECTIVELY

```
SELECT TRANSACTION_AMOUNT,  
       ABS(TRANSACTION_AMOUNT) AS ABSOLUTE_AMOUNT,  
       CEILING(TRANSACTION_AMOUNT) AS ROUNDED_UP_AMOUNT,  
       FLOOR(TRANSACTION_AMOUNT) AS ROUNDED_DOWN_AMOUNT,  
       ROUND(TRANSACTION_AMOUNT, 2) AS ROUNDED_TO_2_DECIMALS,  
       SQRT(TRANSACTION_AMOUNT) AS SQUARE_ROOT_AMOUNT  
FROM TRANSACTIONS;
```

	Transaction_Amount	Absolute_Amount	Rounded_Up_Amount	Rounded_Down_Amount	Rounded_To_2_Decimals	Square_Root_Amount
▶	56.83	56.83	57	56	56.83	7.538567503179898
	264.24	264.24	265	264	264.24	16.25546062097288
	839.30	839.30	840	839	839.30	28.970674828177543
	66.14	66.14	67	66	66.14	8.132650244538985
	33.93	33.93	34	33	33.93	5.82494635168428
	187.94	187.94	188	187	187.94	13.709121051329294
	401.15	401.15	402	401	401.15	20.02872936558882
	215.31	215.31	216	215	215.31	14.673445403176448
	121.53	121.53	122	121	121.53	11.024064586167844
	70.88	70.88	71	70	70.88	8.419026071939674
	428.52	428.52	429	428	428.52	20.700724624998035
	49.59	49.59	50	49	49.59	7.042016756583302

DATE FUNCTIONS

-- USING DATA FUNCTIONS TO EXTRACT TEMPORAL INFORMATION FROM TRANSACTION DATES WITHIN THE 'TRANSACTIONS' TABLE

```
SELECT TRANSACTION_DATE,  
       DAYNAME(TRANSACTION_DATE) AS DAY_OF_WEEK,  
       MONTHNAME(TRANSACTION_DATE) AS MONTH_NAME,  
       YEAR(TRANSACTION_DATE) AS TRANSACTION_YEAR,  
       MONTH(TRANSACTION_DATE) AS TRANSACTION_MONTH,  
       DAY(TRANSACTION_DATE) AS TRANSACTION_DAY  
FROM TRANSACTIONS;
```

	Transaction_Date	Day_Of_Week	Month_Name	Transaction_Year	Transaction_Month	Transaction_Day
▶	2028-01-20	Thursday	January	2028	1	20
	2016-01-20	Wednesday	January	2016	1	20
	2019-03-20	Wednesday	March	2019	3	20
	2028-02-20	Sunday	February	2028	2	20
	2007-02-20	Tuesday	February	2007	2	20
	2004-03-20	Saturday	March	2004	3	20
	2005-01-20	Thursday	January	2005	1	20
	2002-03-20	Wednesday	March	2002	3	20
	2015-01-20	Tuesday	January	2015	1	20
	2021-03-20	Saturday	March	2021	3	20
	2024-02-20	Tuesday	February	2024	2	20
	2004-03-20	Saturday	March	2004	3	20
	2029-01-20	Saturday	January	2029	1	20
	2028-02-20	Sunday	February	2028	2	20
	2003-02-20	Thursday	February	2003	2	20
	2018-03-20	Tuesday	March	2018	3	20

TIME FUNCTIONS

/ HOW DO SQL TIME FUNCTIONS, SUCH AS HOUR, MINUTE, SECOND, ADDTIME, AND SUBTIME, ENABLE THE ANALYSIS AND MANIPULATION OF TRANSACTION TIMES WITHIN THE 'TRANSACTIONS' TABLE? */*

```
SELECT TRANSACTION_TIME,  
       HOUR(TRANSACTION_TIME) AS TRANSACTION_HOUR,  
       MINUTE(TRANSACTION_TIME) AS TRANSACTION_MINUTE,  
       SECOND(TRANSACTION_TIME) AS TRANSACTION_SECOND,  
       ADDTIME(TRANSACTION_TIME, '01:30:00') AS TIME_AFTER_ADDITION,  
       SUBTIME(TRANSACTION_TIME, '00:15:00') AS TIME_AFTER_SUBTRACTION  
FROM TRANSACTIONS;
```

	Transaction_Time	Transaction_Hour	Transaction_Minute	Transaction_Second	Time_After_Addition	Time_After_Subtraction
▶	15:36:10	15	36	10	17:06:10	15:21:10
	07:04:42	7	4	42	08:34:42	06:49:42
	17:10:23	17	10	23	18:40:23	16:55:23
	16:47:28	16	47	28	18:17:28	16:32:28
	16:10:56	16	10	56	17:40:56	15:55:56
	09:41:20	9	41	20	11:11:20	09:26:20
	06:00:56	6	0	56	07:30:56	05:45:56
	10:14:44	10	14	44	11:44:44	09:59:44
	05:08:17	5	8	17	06:38:17	04:53:17
	07:21:50	7	21	50	08:51:50	07:06:50
	14:32:15	14	32	15	16:02:15	14:17:15
	04:58:50	4	58	50	06:28:50	04:43:50
	23:11:40	23	11	40	24:41:40	22:56:40
	19:44:39	19	44	39	21:14:39	19:29:39
	02:39:01	2	39	1	04:09:01	02:24:01
	10:45:50	10	45	50	12:15:50	10:30:50

FUNCTION

A FUNCTION IS A NAMED, REUSABLE SET OF SQL STATEMENTS THAT CAN TAKE PARAMETERS, PERFORM COMPUTATIONS, AND RETURN A VALUE.

-- FUNCTIONS

-- CALCULATES THE AVERAGE AGE OF CUSTOMERS

```
CREATE DEFINER='ROOT'@'localhost' FUNCTION `CALCULATE_AVERAGE_CUSTOMER_AGE`() RETURNS DECIMAL(5,2)
READS SQL DATA
RETURN (
    SELECT AVG(CUSTOMER_AGE) FROM CUSTOMERS
)
```

```
SELECT CALCULATE_AVERAGE_CUSTOMER_AGE() AS AVERAGE_CUSTOMER_AGE;
```

	Average_Customer_Age
▶	35.25

COMMON TABLE EXPRESSION

A COMMON TABLE EXPRESSION (CTE) IN SQL IS LIKE A TEMPORARY TABLE THAT YOU CAN USE WITHIN A QUERY TO MAKE IT EASIER TO READ AND MAINTAIN.

```
-- COMMON TABLE EXPRESSION
-- CALCULATE THE TRANSACTION AMOUNT FOR EACH PRODUCT CATEGORY EXCLUDING ANY TRANSACTIONS MARKED AS FRAUDULENT.
-- HERE THE COMMON TABLE EXPRESSION NAME IS VALIDTRANSACTIONS

WITH VALIDTRANSACTIONS AS
(
SELECT T.TRANSACTION_ID,T.TRANSACTION_AMOUNT,T.PRODUCT_ID,P.PRODUCT_CATEGORY FROM TRANSACTIONS T
JOIN PRODUCTS P ON T.PRODUCT_ID = P.PRODUCT_ID WHERE T.IS_FRAUDULENT = 0
)

SELECT PRODUCT_CATEGORY, SUM(TRANSACTION_AMOUNT) AS TOTAL_SALES
FROM VALIDTRANSACTIONS
GROUP BY PRODUCT_CATEGORY;
```

	Product_Category	Total_Sales
▶	toys & games	19078.22
	electronics	20306.57
	clothing	21124.70
	health & beauty	19654.45
	home & garden	17757.28

VIEW

A VIEW SERVES AS A VIRTUAL TABLE, SIMPLIFYING DATA ACCESS AND ENHANCING SECURITY.

-- VIEW

-- VIEW TABLE OF TRANSACTION SUMMARY FOR VIEWER WITHOUT SENSITIVE INFORMATION

CREATE VIEW TRANSACTION_SUMMARY AS

```
SELECT T.TRANSACTION_ID,T.TRANSACTION_AMOUNT,T.TRANSACTION_DATE,T.TRANSACTION_TIME,  
T.PAYMENT_METHOD,T.DEVICE_USED,T.IS_FRAUDULENT,P.PRODUCT_CATEGORY  
FROM TRANSACTIONS T  
JOIN PRODUCTS P ON T.PRODUCT_ID = P.PRODUCT_ID;
```

SELECT * FROM TRANSACTION_SUMMARY;

	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	Is_Fraudulent	Product_Category
▶	ef48g469-5fe2-4345-b908-24451e535c04	100.00	2024-04-09	12:00:00	Credit Card	Desktop	1	Electronics
	15d2e414-8735-46fc-9e02-80b472b2580f	58.09	2020-02-20	05:58:41	bank transfer	tablet	0	electronics
	0bfee1a0-6d5e-40da-a446-d04e73b1b177	389.96	2025-02-20	08:09:45	debit card	desktop	0	electronics
	e588eef4-b754-468e-9d90-d0e0abfc1af0	134.19	2018-03-20	03:42:55	PayPal	tablet	0	home & garden
	4de46e52-60c3-49d9-be39-636681009789	226.17	2016-03-20	20:41:31	bank transfer	desktop	0	clothing
	074a76de-fe2d-443e-a00c-f044cdb68e21	121.53	2015-01-20	05:08:17	bank transfer	tablet	0	clothing
	4e707452-7c8a-4cbd-b0c1-2aeaa35c5e88	166.41	1930-01-20	10:55:14	bank transfer	tablet	0	toys & games
	7ed952fe-8ae1-4f11-8cc5-6607060240d8	92.88	2004-02-20	19:59:10	PayPal	tablet	0	toys & games
	0b2fb5aa-7171-472f-8269-371094608a07	318.14	2020-02-20	13:30:29	credit card	desktop	0	health & beauty
	1f52366c-7f40-4397-885f-3856b6e6531c	47.92	2003-03-20	19:44:00	bank transfer	desktop	0	home & garden
	3f10dfde-9c4c-4085-9872-4f6b39502ffb	121.78	2016-01-20	21:19:39	bank transfer	mobile	0	health & beauty
	75f19b14-516c-4f1c-a99e-f1c456453b55	633.39	2020-01-20	22:11:22	PayPal	tablet	0	toys & games

STORED PROCEDURE

A STORED PROCEDURE IN SQL IS A PRECOMPILED SET OF ONE OR MORE SQL STATEMENTS THAT CAN BE SAVED AND EXECUTED REPEATEDLY WITH A SINGLE COMMAND.

-- STORED PROCEDURE

-- STORED PROCEDURE TO RETRIEVE ALL RECORDS FROM DATABASE WHERE THE CUSTOMER IS FLAGGED AS FRAUDULENT.

DELIMITER //

CREATE PROCEDURE GET_FRAUDULENT_RECORDS()

BEGIN

SELECT * FROM CUSTOMERS C

INNER JOIN TRANSACTIONS T ON C.CUSTOMER_ID = T.CUSTOMER_ID

INNER JOIN PRODUCTS P ON T.PRODUCT_ID = P.PRODUCT_ID

WHERE T.IS_FRAUDULENT = 1

ORDER BY C.CUSTOMER_ID ASC;

END //

DELIMITER ;

CALL GET_FRAUDULENT_RECORDS();

Customer_ID	First_Name	Last_Name	Customer_Age	Customer_Location	Shipping_Address	Billing_Address	Account_Age_Days	Transaction_ID	Transaction_Amount	Transaction_Date	Transaction_Time	Payment_Method	Device_Used	IP_Address	Is_Fraudulent	Product_Id	Customer_Id	Product_Id	Product_Category	Product_Quantity
132	Ryan	Green	32	Lake Jimmyfurt	68408 Vanessa Passage Sydneyhaven, IN 94142	68408 Vanessa Passage Sydneyhaven, IN 94142	147	0a3ba20d-69d5-4ff7-bb89-50fd402dabe	31.08	2017-01-20	13:18:27	PayPal	tablet	78.50.82.205	1	13301	132	13301	clothing	2
168	Elle	Turner	36	South Ausbrut	5762 Joseph Corners South Michealside, NY 98...	5762 Joseph Corners South Michealside, NY 98...	65	0445dad3-bc7b-4d94-b3d0-299a9095ed23	839.30	2019-03-20	17:10:23	bank transfer	mobile	65.77.31.204	1	16901	168	16901	health & beauty	2
185	Violet	Foster	37	Christopherland	471 Mary Courts Apt. 872 Maryhaven, KS 16126	471 Mary Courts Apt. 872 Maryhaven, KS 16126	30	cb180914-6aeb-4d48-65f5-f7208ceddad	379.00	2010-01-20	20:08:38	debit card	desktop	211.189.218.190	1	18601	185	18601	home & garden	4
192	Aaron	Bryant	30	North Rhondaside	325 Daniel Mall Suite 344 New Alexanderport, P...	325 Daniel Mall Suite 344 New Alexanderport, P...	12	3f6a2da7-5cf4-4084-b727-6430229978a7	46.26	2006-01-20	10:28:06	credit card	tablet	213.226.163.230	1	19301	192	19301	clothing	2
291	Bailey	Foster	32	Stricklandview	USS Ramirez FPO AE 75810	42574 Katherine Ferry Apt. 656 South Jameipor...	9	5ad7533e-170f-4a8f-b337-9ee872dd08c6	2038.00	1930-01-20	17:40:15	credit card	mobile	54.172.17.233	1	29201	29201	29201	health & beauty	1
302	Jaxon	Mitchell	31	Lake Bobfort	2041 Frye Islands West Nicholas, NC 92400	202	2041 Frye Islands West Nicholas, NC 92400	234.73	2003-01-20	20:26:20	bank transfer	mobile	129.176.195.211	1	30301	302	30301	electronics	3	
321	Blake	Richardson	50	Barnesfort	34191 Smith Summit Suite 488 Port Kimberleyton,...	34191 Smith Summit Suite 488 Port Kimberleyton,...	218	d79acc79-3f62-4339-8a00-48331ef3400d	69.35	2004-01-20	11:49:12	debit card	mobile	148.64.174.255	1	32201	321	32201	clothing	1
354	Naomi	Carter	24	Karemouth	151 Pratt Ports Apt. 990 Tammyport, PA 69035	151 Pratt Ports Apt. 990 Tammyport, PA 69035	263	ea0df361-c451-454a-ab96-4e1ed563883	300.31	2010-01-20	23:20:37	PayPal	mobile	6.216.2.252	1	35501	354	35501	home & garden	3
361	Kaleb	Gonzalez	30	Lake Stephen	USNS Higgins FPO AA 56792	USNS Higgins FPO AA 56792	266	16b3429a-b497-41c7-b649-fe5e55f28b3	135.23	2004-01-20	20:02:48	PayPal	mobile	29.104.189.18	1	36201	361	36201	clothing	2
366	Scarlett	Adams	14	Martinberg	PSC 3458, Box 9958 APO AE 12079	064 Pineda Ville Harrelport, AR 35454	325	858d6d43-a5f4-424f-88a5-fb022a7abfb9	140.80	2001-02-20	01:27:32	debit card	tablet	125.72.131.119	1	36701	366	36701	clothing	1
373	Elias	Garca	44	Stephanefurt	6758 Richard Turnpike East Daniel, WV 06170	123 Peter Motorway Suite 620 Port Brianna, OK...	153	4ac84e12-5911-4d7e-0f8a-94396a760c1	304.17	2026-03-20	06:53:29	debit card	desktop	64.99.216.14	1	37401	373	37401	clothing	2
386	Maya	Williams	39	East Kristafurt	Unit 4387 Box 7962 DPO AE 99501	Unit 4387 Box 7962 DPO AE 99501	144	b33f1942-e454-4058-9a0c-93ee8486fd13	138.58	2010-02-20	13:55:37	bank transfer	mobile	117.102.32.216	1	38701	386	38701	electronics	1
406	Nora	Ramirez	35	North Jeffreyhaven	2214 Nicolas Grove East Cheryl, VA 75442	2214 Nicolas Grove East Cheryl, VA 75442	305	8103e5b4-12c9-4e07-b8d0-593fa0f836ed	514.15	2005-02-20	22:22:03	debit card	tablet	100.158.28.175	1	40701	406	40701	clothing	3
418	Paisley	Turner	45	North Madisonton	Unit 3175 Box 1469 DPO AP 09850	Unit 3175 Box 1469 DPO AP 09850	254	1a3af4d6-bfba-4d25-8438-a63a854f399	2104.55	2024-03-20	15:50:20	debit card	tablet	166.133.224.120	1	41901	418	41901	toys & games	2
424	Naomi	Turner	34	Watersmouth	445 Jeremy Union Huntertown, MN 71668	445 Jeremy Union Huntertown, MN 71668	4	5a32b073-6200-4b6f-aa72-df40f3e3b96f	2392.00	2006-02-20	02:51:11	bank transfer	mobile	108.128.142.186	1	42501	424	42501	home & garden	3

TRIGGERS

CREATE A TRIGGER TO STORE THE INFORMATION OF CUSTOMERS FLAGGED AS FRAUDULENT IN A DESIGNATED TABLE.

```
-- CREATING A TABLE TO STORE CUSTOMER DETAILS LIKE CUSTOMER_ID, TRANSACTION_ID, AND IP_ADDRESS
```

```
CREATE TABLE BLOCKED_IP_ADDRESSES_LIST
```

```
(  
    CUSTOMER_ID INT,  
    TRANSACTION_ID VARCHAR(50),  
    IP_ADDRESS VARCHAR(50),  
    FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMERS(CUSTOMER_ID),  
    FOREIGN KEY (TRANSACTION_ID) REFERENCES TRANSACTIONS(TRANSACTION_ID)  
);
```

```
-- CREATING THE TRIGGER
```

```
DELIMITER //
```

```
CREATE TRIGGER DETECT_NEW_FRAUDULENT_TRANSACTIONS  
AFTER INSERT ON TRANSACTIONS  
FOR EACH ROW  
BEGIN  
    IF NEW.IS_FRAUDULENT = 1 THEN  
        INSERT INTO BLOCKED_IP_ADDRESSES_LIST (CUSTOMER_ID, TRANSACTION_ID, IP_ADDRESS)  
        VALUES (NEW.CUSTOMER_ID, NEW.TRANSACTION_ID, NEW.IP_ADDRESS);  
    END IF;  
END;  
//
```

```
DELIMITER ;
```

```
SELECT * FROM BLOCKED_IP_ADDRESSES_LIST;
```

```
-- DROP TRIGGER IF EXISTS DETECT_NEW_FRAUDULENT_TRANSACTIONS;
```

```
-- DROP TABLE BLOCKED_IP_ADDRESSES_LIST;
```

	Customer_ID	Transaction_ID	IP_Address
▶	903	ef48g469-5fe2-4345-b9o8-24451e535c04	192.168.0.1

INDEX

-- INDEX TO SPEED UP THE QUERIES RELATED TO IDENTIFYING FRAUDULENT TRANSACTIONS.

```
CREATE INDEX IDX_FRAUDULENT_TRANSACTIONS ON TRANSACTIONS (IS_FRAUDULENT);
SELECT * FROM TRANSACTIONS WHERE IS_FRAUDULENT = 1;
```

DROP INDEX IDX_FRAUDULENT_TRANSACTIONS ON TRANSACTIONS;

CONCLUSION

IN CONCLUSION, THE BATTLE AGAINST E-COMMERCE FRAUD DEMANDS VIGILANCE, INNOVATION, AND COLLABORATION. BY HARNESSING THE POWER OF SQL FOR DATA ANALYSIS, WE'VE EXPLORED HOW BUSINESSES CAN DETECT, MITIGATE, AND PREVENT FRAUDULENT ACTIVITIES IN THE DYNAMIC LANDSCAPE OF ONLINE TRANSACTIONS.

THROUGH CONTINUOUS MONITORING, PATTERN RECOGNITION, AND RISK SCORING, WE'VE SEEN HOW SQL ENABLES BUSINESSES TO STAY AHEAD OF EVOLVING FRAUD TACTICS AND PROTECT BOTH THEIR FINANCIAL INTERESTS AND THE TRUST OF THEIR CUSTOMERS.

HOWEVER, OUR JOURNEY DOESN'T END HERE. AS TECHNOLOGY ADVANCES AND FRAUDSTERS ADAPT, IT'S IMPERATIVE THAT WE REMAIN PROACTIVE AND ADAPTIVE IN OUR APPROACH TO FRAUD PREVENTION.

BY LEVERAGING THE INSIGHTS GAINED FROM DATA ANALYSIS, WE CAN DEVELOP MORE ROBUST PREVENTION STRATEGIES, IMPLEMENT TARGETED INTERVENTIONS, AND STRENGTHEN THE RESILIENCE OF THE E-COMMERCE ECOSYSTEM AGAINST FRAUDULENT ACTIVITIES.

THANK YOU