

HUMBER INSTITUTE OF TECHNOLOGY
AND ADVANCED LEARNING

(HUMBER COLLEGE)

Case Study 2

Business Intelligence for BIA - BIA-5401-OLA

SUBMITTED BY: Group 5

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Database Management and Donation Analysis

Introduction

We are a group of volunteers assisting a pet rescue charity in collecting the donations. The city is divided into various donation areas, with each area encompassing approximately six postal codes. This division helps streamline the collection and recording of donations, ensuring that the charity can efficiently track and utilize the funds for the welfare of pets in need.

At the end of every week, the volunteer group leaders play crucial roles in this process. They are responsible for gathering and documenting the donation records collected in their respective areas. This organized approach ensures that the charity has up-to-date and accurate information on the donations received, allowing for better planning and allocation of the charity.

Table Creation

In order to record and manage the donation data effectively, five members of our group have successfully created four tables, including GroupLeader (5 entries), Volunteer (27 entries), Donorslist (77 entries), and DonorsAddress (77 entries).

1. GroupLeader:

Group_leaderID	First_name	Last_name	VolunteerID
GL01	Charlotte	Taylor	110
GL02	Lucy	Thomas	115
GL03	Ava	Anderson	119
GL04	Harper	Martin	130
GL05	Isabella	Hernandez	131

2. Volunteer:

VolunteerID	First_name	Last_name	Group_leaderID
110	Charlotte	Taylor	GL01
111	Noah	Moore	GL01
112	Marria	Wilson	GL01
113	Ava	Taylor	GL01
115	Lucy	Thomas	GL02
116	Zoro	Noan	GL02
117	Sanji	Vinsmoke	GL02
118	Jinbee	King	GL02
119	Ava	Anderson	GL03
120	Donna	Paulsen	GL03

3. DonorsList:

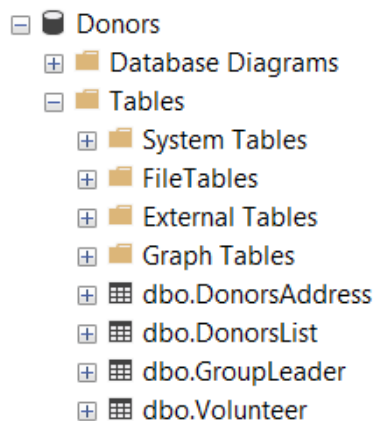
DonorID	AddressID	Address	Donor_first_name	Donor_last_name	Date	Time	Amount	Type	VolunteerID
1001	1	115-2501 Littlefield Crescent	John	Walker	12/11/2023	10:02 AM	200	Check	110
1002	2	102-2148 Arbourview Drive	Tom	Jefferson	12/11/2023	10:32 AM	10	Cash	112
1003	3	111-2060 Westmount Drive	Emily	Girard	12/11/2023	11:02 AM	50	Credit Card	112
1004	4	304-1480 Bishops Gate Road	Benjamin	Davis	12/11/2023	11:25 AM	58	Check	113
1005	5	122-2305 Kingfisher Court	Michael	Swift	12/11/2023	12:02 PM	70	Cash	113
1006	6	1597-2363 Copperwood Drive	Jane	Smith	12/11/2023	12:16 PM	165	Check	111
1007	7	330-2434 Glenhampton Road	James	Hernandez	12/11/2023	1:05 PM	30	Check	111
1008	8	771-2028 Shady Glen Road	Isabella	Smith	12/11/2023	1:38 PM	10	Cash	110
1009	9	557-527 Taplow Crescent	Sophia	Johnson	12/11/2023	2:42 PM	150	Credit Card	110
1010	10	331-362 Small Crescent	Mia	Brown	12/11/2023	2:52 PM	300	Credit Card	111
1011	11	1014-9870 West Ham Road	Ava	Martinez	12/11/2023	3:17 PM	40	Cash	112
1012	12	25-1267 Dorval Drive	Alexander	Anderson	12/11/2023	3:29 PM	180	Credit Card	112
1013	13	7609-1267 Charles Cornwall Road	Henry	Pope	12/11/2023	4:05 PM	20	Cash	110
1014	14	10-2093 Shorncliffe Boulevard	Mitchell	Blake	12/11/2023	4:53 PM	205	Credit Card	112

4. DonorsAddress:

AddressID	Unit_num	Street_num	Street_name	Street_type	Street_direction	Postal_code	City	Province
1	115	2501	Littlefield	Crescent	N	M3C 0E8	Toronto	Ontario
2	102	2148	Arbourview	Drive	S	M3C 0E8	Toronto	Ontario
3	111	2060	Westmount	Drive	W	M3C 0E8	Toronto	Ontario
4	304	1480	Bishops Gate	Road	S	M3C 2R3	Toronto	Ontario
5	122	2305	Kingfisher	Court	W	M3C 2R3	Toronto	Ontario
6	1597	2363	Copperwood	Drive	E	M3C 2R3	Toronto	Ontario
7	330	2434	Glenhampton	Road	W	M3C 2R3	Toronto	Ontario
8	771	2028	Shady Glen	Road	E	L4B CE6	Toronto	Ontario
9	557	527	Taplow	Crescent	N	L4B CE6	Toronto	Ontario
10	331	362	Small	Crescent	E	K4C 9K7	Toronto	Ontario
11	1014	9870	West Ham	Road	W	R2D 4J5	Toronto	Ontario
12	25	1267	Dorval	Drive	S	R2D 4J5	Toronto	Ontario

Database Creation

The next step was to create a Donor database using SQL Server Management Studio (SSMS) that includes all the required tables. This process involved importing the CSV data into the SQL database, ensuring that each piece of information is accurately reflected in the corresponding tables.



Dimensional Modeling

Based on the SQL database, we created a star schema for the data analysis purpose. The relationships between them are illustrated below:

Fact Table

- Donorslist

- a. DonorID (PK), 1001,1002
- b. AddressID (FK), 1,2,3
- c. Address
- d. Donor_first_name
- e. Donor_last_name
- f. Date
- g. Time
- h. Amount
- i. Type
- j. VolunteerID (FK),110, 111

Dimension Tables

- DonorsAddress

- a. AddressID (PK), 1,2,3
- b. Unit_num
- c. Street_num
- d. Street_name
- e. Street_type
- f. Street_direction
- g. Postal_code
- h. City
- i. Province

- Volunteer

- a. VolunteerID (PK),110, 111
- b. First_name
- c. Last_name
- d. Group_leaderID (FK), GL01, GL02

- GroupLeader

- a. Group_leaderID (PK), GL01, GL02
- b. First_name
- c. Last_name
- d. VolunteerID (FK),110, 111

Business Question

The first business question we answered is the average and sum of the donation by day, month, and year. To answer this question, we utilized the DATEPART function to aggregate the average and total sums of donations by day, month, and year. In 2023, the average donation was \$101.8, with December alone accounting for \$4848 in total donations. The subsequent year saw an average donation of \$85.69, with January and February's contributions amounting to \$1395 and \$1180, respectively. Specific noteworthy days included the 11th, 12th, and 13th of December 2023, which brought in totals of \$1548, \$1030, and \$2270. In the new year, the 25th and 26th of January yielded \$825 and \$570, while the 8th and 9th of February saw donations of \$730 and \$450, respectively.

	Year	Month	Day	AverageAmount	TotalAmount
1	2023	12	11	103.200000	1548.0
2	2023	12	12	68.666666	1030.0
3	2023	12	13	133.529411	2270.0
4	2024	1	25	91.666666	825.0
5	2024	1	26	95.000000	570.0
6	2024	2	8	81.111111	730.0
7	2024	2	9	75.000000	450.0

	Year	AveAmount	TotAmount
1	2023	101.798692	4848.0
2	2024	85.694444	2575.0

	Month	AveAmount	TotAmount
1	1	93.333333	1395.0
2	2	78.055555	1180.0
3	12	101.798692	4848.0

To analyze the average and sum of the donations by postal code and city in a specific month on the condition of defining the city and month as variables to allow flexibility, we first need to check and set cities and months as flexible variables, then we can query to calculate average and sum of donations by postal code and city for a specific month.

	City
1	Brampton
2	Etobicoke
3	Mississauga
4	Oakville
5	Toronto

	Year	Month
1	2023	12
2	2024	1
3	2024	2

After checking, we found five cities located in Ontario and three months, December, January, and February, respectively, ranging from 2023 to 2024. By entering various city names and months, we were able to acquire diverse data on average and total donations categorized by postal code, city, and month, as exhibited in the tables below:

	Postal_code	City	Year	Month	AverageDonation	TotalDonation
1	K4C 9K7	Oakville	2023	12	300.000000	300.0
2	L4B CE6	Oakville	2023	12	80.000000	160.0
3	M3C 0E8	Oakville	2023	12	86.666666	260.0
4	M3C 2R3	Oakville	2023	12	80.750000	323.0
5	P7E 3H2	Oakville	2023	12	132.500000	265.0
6	R2D 4J5	Oakville	2023	12	80.000000	240.0

For the city of Oakville, throughout December 2023 in Oakville, a review of donation data by postal code reveals a range of average donations, with the highest average being \$300.00 in the K4C 9K7 area, which also corresponds to the highest total donations received. Other notable postal codes include P7E 3H2 with an average donation of \$132.50, and M3C 2R3 where a total of \$323.00 was donated. The overall generosity in different parts of the city is evident, with total donations across various postal codes as high as \$300 and as low as \$160.

	Postal_code	City	Year	Month	AverageDonation	TotalDonation
1	M8Z1C5	Etobicoke	2023	12	250.000000	250.0
2	M8Z1C8	Etobicoke	2023	12	5.000000	5.0
3	M8Z1E3	Etobicoke	2023	12	52.500000	105.0
4	M8Z1G3	Etobicoke	2023	12	10.000000	20.0
5	M8Z1G4	Etobicoke	2023	12	60.000000	60.0
6	M8Z1G6	Etobicoke	2023	12	20.000000	20.0
7	M8Z1G9	Etobicoke	2023	12	70.000000	70.0
8	M8Z3R4	Etobicoke	2023	12	60.000000	60.0
9	M8Z3X9	Etobicoke	2023	12	60.000000	60.0
10	M8Z3Y6	Etobicoke	2023	12	200.000000	200.0
11	M8Z3Y7	Etobicoke	2023	12	40.000000	80.0
12	M8Z4A8	Etobicoke	2023	12	100.000000	100.0

In Etobicoke during December of 2023, donation activity exhibited a diverse range of giving, with average donation amounts varying significantly across different postal codes. The M8Z1C5 area stood out with the highest average donation of \$250.00, which was also the total donation amount for that postal code, indicating perhaps a single generous contribution. On the other end of the spectrum, the M8Z1C8 area had the smallest average donation of \$5.00. Notably, the M8Z3Y6 postal code also observed a substantial average donation of \$200.00.

	Postal_code	City	Year	Month	AverageDonation	TotalDonation
1	A5O 5O5	Mississauga	2024	1	150.000000	150.0
2	H5E 5E5	Mississauga	2024	1	80.000000	80.0
3	K4D 4D4	Mississauga	2024	1	100.000000	100.0
4	L3C 3C3	Mississauga	2024	1	150.000000	150.0
5	M3A 1A1	Mississauga	2024	1	50.000000	50.0
6	M4B 2B2	Mississauga	2024	1	70.000000	70.0
7	R6F 6F6	Mississauga	2024	1	200.000000	200.0
8	T7G 7G7	Mississauga	2024	1	30.000000	30.0
9	U9I 9I9	Mississauga	2024	1	100.000000	100.0
10	V0J 0J0	Mississauga	2024	1	40.000000	40.0
11	W1K 1K1	Mississauga	2024	1	55.000000	55.0
12	X2L 2L2	Mississauga	2024	1	200.000000	200.0
13	Y3M 3M3	Mississauga	2024	1	75.000000	75.0
14	Y8H 8H8	Mississauga	2024	1	45.000000	45.0
15	Z4N 4N4	Mississauga	2024	1	50.000000	50.0

In Mississauga, for instance, during January 2024, the donations varied across different postal codes, with the average donation aligning closely with the total collected amounts, indicating consistent giving patterns. Notably, postal code R6F 6F6 witnessed the highest average and total donation of \$200.00, suggesting a particularly generous contribution in that area. Other significant contributions include postal codes L3C 3C3 and A5O 5O5, each with an average and total donation of \$150.00.

Lastly, the table below showcases the funds gathered by payment method, which includes Cash, Credit Card, and Cheque, from cities that recorded the highest values in donations:

	TopDonation	Type	City
1	150.0	Cash	Brampton
2	90.0	Credit Card	Brampton
3	55.0	Cheque	Brampton
4	250.0	Cash	Etobicoke
5	100.0	Credit Card	Etobicoke
6	60.0	Cheque	Etobicoke
7	200.0	Cash	Mississauga
8	200.0	Cheque	Mississauga
9	100.0	Credit Card	Mississauga
10	300.0	Credit Card	Oakville
11	200.0	Cheque	Oakville
12	70.0	Cash	Oakville
13	255.0	Cheque	Toronto
14	250.0	Cash	Toronto
15	120.0	Credit Card	Toronto

In the analysis of highest values across various cities, we have identified the highest single donations made through different payment types. Brampton reported a top donation of \$150.00 via cash and \$90.00 through credit card transactions, with an additional \$55.00 being the maximum amount donated via cheque. Etobicoke's charitable contributions peaked at \$250.00 for cash, accompanied by significant credit card and cheque donations of \$100.00 and \$60.00, respectively. Mississauga's generosity displayed through a \$200.00 cheque donation and \$100.00 via credit card. Oakville presented a strong inclination towards credit card contributions with the highest donation reaching \$300.00, along with \$200.00 by cheque and a solid \$70.00 in cash. Lastly, Toronto showcased the most substantial individual donations, leading with a \$255.00 cheque and closely followed by a cash donation of \$250.00. The highest credit card donation in Toronto was \$120.00. These figures reflect the diverse giving patterns and the preferred payment methods in each city.