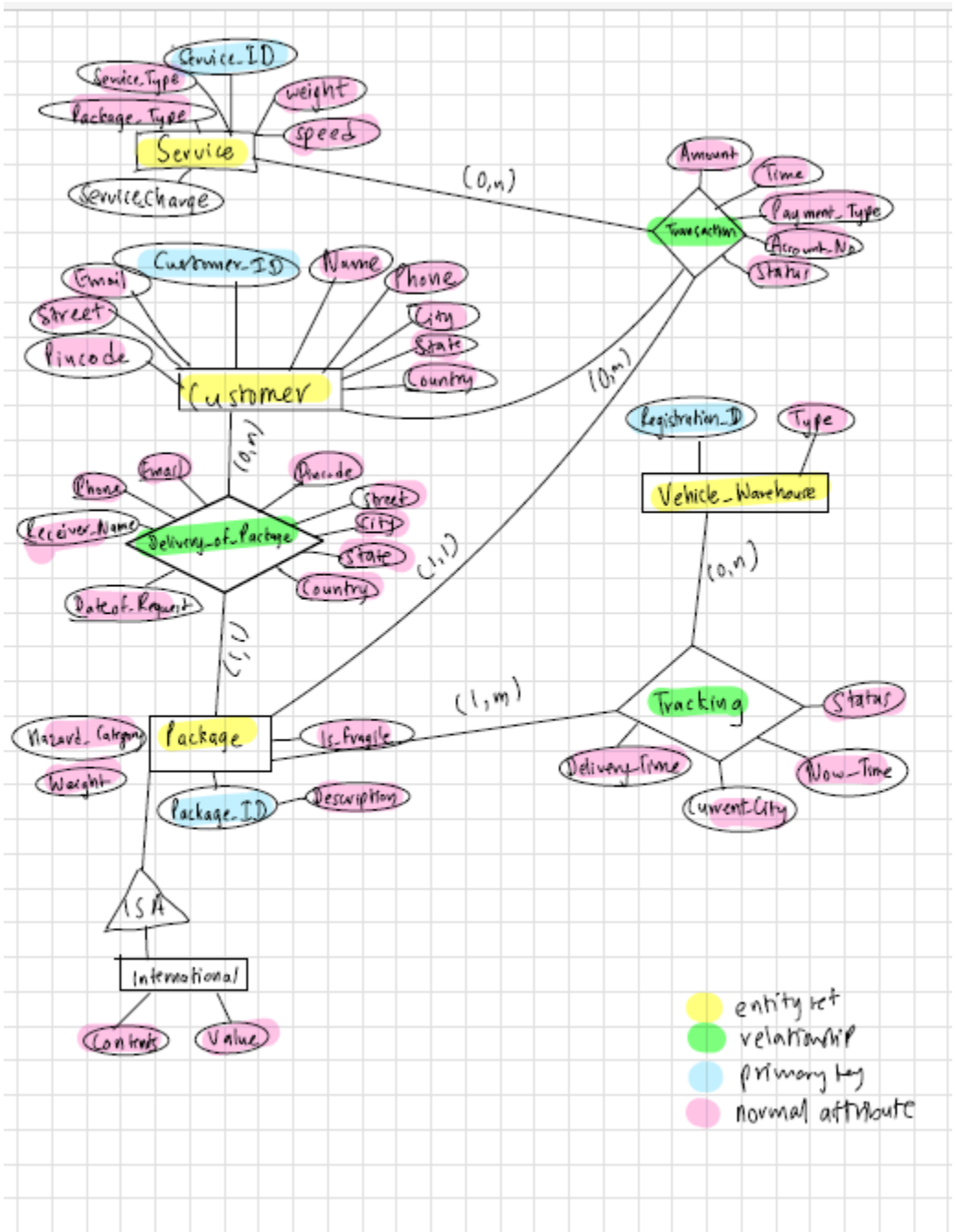
Abstract:
The Report provides a full in-depth use of Database Systems from Design to Implementation. MySQL on PHPMyAdmin, PHP and HTML on VS Code, and XAMPP Server were used to create and implement the assignment.

Problem Description

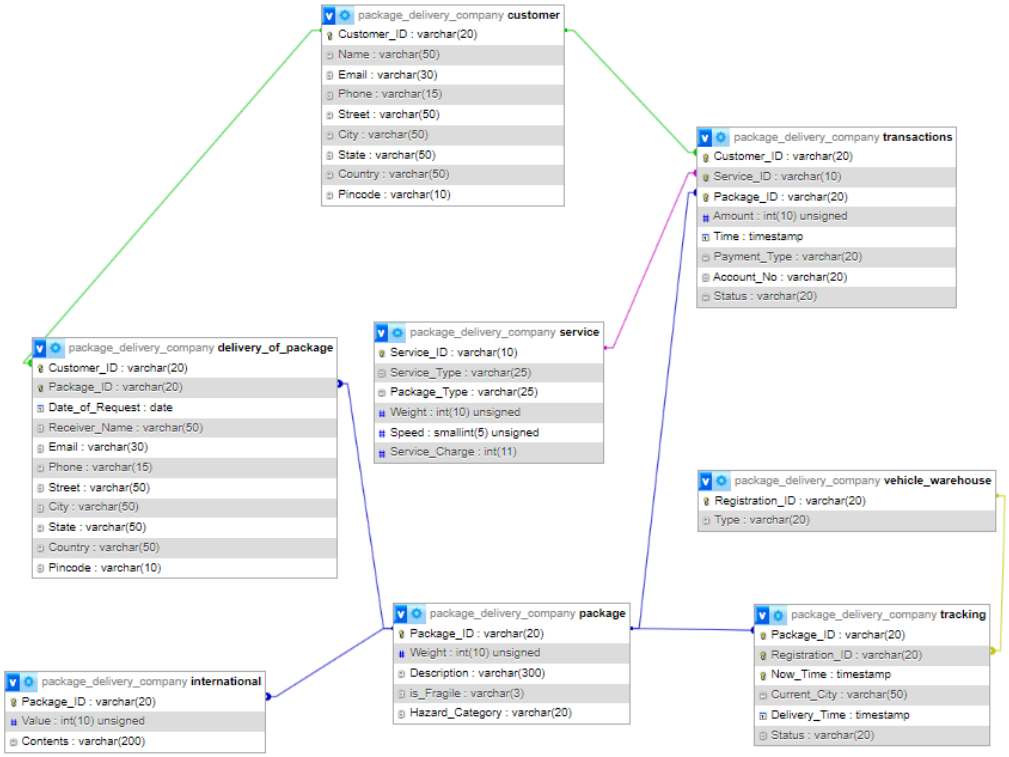
I chose Problem 4 of the option where the application is a package delivery company (similar to FedEx, UPS, DHL, the USPS, etc.). The company needs to keep track of packages shipped and their customers. To find out more about this application, think about any experiences you may have had shipping packages and receiving packages, and browse shippers' web sites. In our hypothetical company, the manager assigned to solicit database design proposals is not very computer literate and is unable to provide a very detailed specification. Here are a few points to consider: • There are different kinds of service possibly based upon the type of package (flat envelope, small box, larger boxes, etc.), the weight of the package, and the timeliness of delivery (overnight, second day, or longer). • Some customers have a contract with the shipper and bill their shipments to an account number. They are billed monthly. Other customers are infrequent customers and pay with a credit card. Certain shipments are prepaid, as is might be the case of someone is returning something that was purchased by phone or Internet (e.g. returning clothes that don't fit, or returning malfunctioning electronics). Page 2 of 5 • For the most part, the shipping company does not care what is being shipped. However, there are cases where it matters. Some examples include – hazardous materials – international shipments, for which a customs declaration stating the contents and their value is needed • The company needs to track packages from the time the customer drops it off (or it is picked up by the company) until the time it is delivered and signed for. Take a look at the online tracking offered by various shipping companies to get an idea of how this service works. If you are having something shipped to you, you'll find you can get every little detail of where the package is, where it has been, and to where it is currently headed. Beyond what the customer sees, the company itself needs to know on which truck or plane or warehouse the package is at any point in time. • Tracking is not just an "in the present" issue. The company may want to look back in time and find out where the package was yesterday, for example. It may also want to look at data from the standpoint of a truck or warehouse. • There are other aspects to the operation of the company besides package tracking such as the routing of trucks and planes, the assignment of staff to them, etc. For this assignment, we'll consider only the package handling and billing aspects of the database.

Database Design

E-R Diagram



Relational Schema

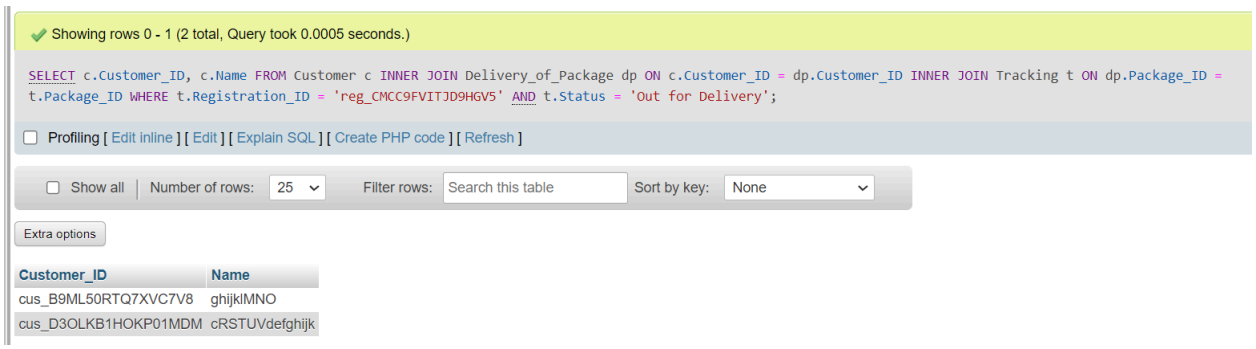


Data Population:
I created my database and all my data for the database on MySQL on phpMyAdmin for an easier connection with the back and frontend of the program. Due to time crunch and spending most of my time learning how to connect database in the front and back end, I wasn't able to populate more realistic data by hand. However, I took a more time effective and put more into learning effort by generating data using automatic procedures. All of this is documented in MySQL.

Queries:

Assume truck 1721 is destroyed in a crash. Find all customers who had a package on that truck at the time of the crash.
Using SQL:

```
SELECT c.Customer_ID, c.Name
FROM Customer c
INNER JOIN Delivery_of_Package dp ON c.Customer_ID = dp.Customer_ID
INNER JOIN Tracking t ON dp.Package_ID = t.Package_ID
WHERE t.Registration_ID = '1721' AND
      t.Status = 'Out for Delivery';
```



Find all recipients who had a package on that truck at the time of the crash.
SQL:

```
SELECT dp.Receiver_Name, dp.Email, dp.Phone
FROM Delivery_of_Package dp
INNER JOIN Tracking t ON dp.Package_ID = t.Package_ID
WHERE t.Registration_ID = '1721' AND
      t.Status = 'Out for Delivery';
```

Showing rows 0 - 1 (2 total, Query took 0.0004 seconds.)

```
SELECT dp.Receiver_Name, dp.Email, dp.Phone FROM Delivery_of_Package dp INNER JOIN Tracking t ON dp.Package_ID = t.Package_ID WHERE t.Registration_ID =
'reg_CMCC9FVITJD9HGV5' AND t.Status = 'Out for Delivery';
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

Receiver_Name	Email	Phone
RSTUVdefghijk	STUVdef@domain.com	7309091023
ghijkl	NOPQ@domain.com	6114797122

Find the last successful delivery by that truck prior to the crash.
SQL:

```
SELECT c.Customer_ID, c.Name, p.Description, t.Now_Time AS Delivery_Time
FROM Customer c
INNER JOIN Delivery_of_Package dp ON c.Customer_ID = dp.Customer_ID
INNER JOIN Package p ON dp.Package_ID = p.Package_ID
INNER JOIN Tracking t ON dp.Package_ID = t.Package_ID
WHERE t.Registration_ID = '1721' AND
      t.Status = 'Delivered'
ORDER BY t.Now_Time DESC
LIMIT 1;
```

MySQL returned an empty result set (i.e. zero rows). (Query took 0.0004 seconds.)

```
SELECT c.Customer_ID, c.Name, p.Description, t.Now_Time AS Delivery_Time FROM Customer c INNER JOIN Delivery_of_Package dp ON c.Customer_ID = dp.Customer_ID
INNER JOIN Package p ON dp.Package_ID = p.Package_ID INNER JOIN Tracking t ON dp.Package_ID = t.Package_ID WHERE t.Registration_ID = 'reg_CMCC9FVITJD9HGV5'
AND t.Status = 'Delivered' ORDER BY t.Now_Time DESC LIMIT 1;
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Customer_ID	Name	Description	Delivery_Time

Query results operations

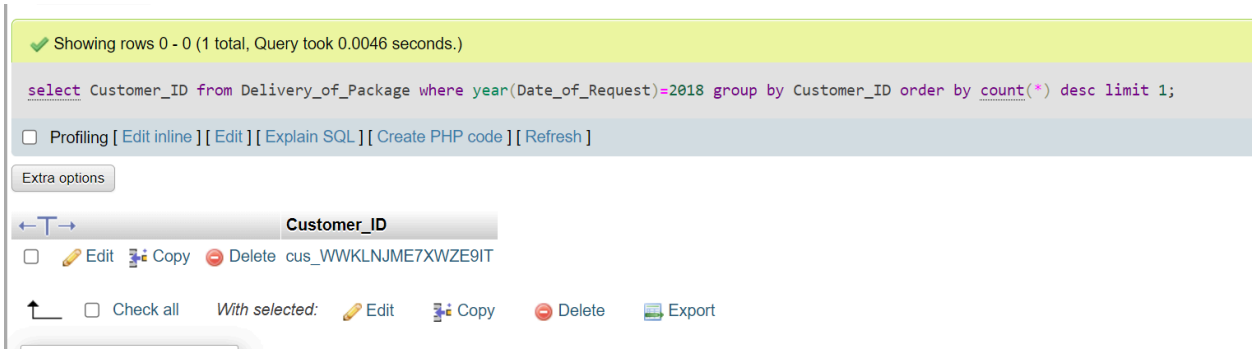
Create view

No prior delivery.

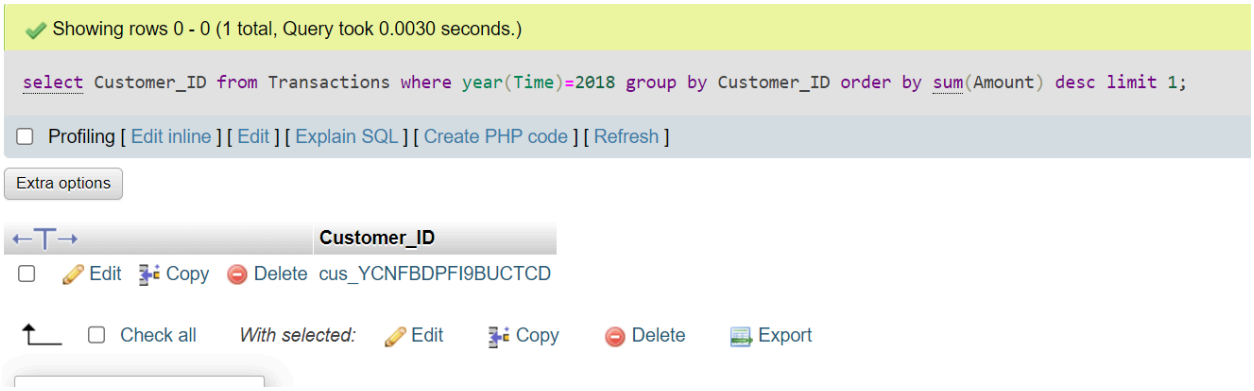
Find the customer who has shipped the most packages in the past year.

```
SELECT Customer_ID
FROM Delivery_of_Package
WHERE year(Date_of_Request) = 2018
```

GROUP BY Customer_ID
ORDER BY COUNT(*) DESC
LIMIT 1;



Find the customer who has spent the most money on shipping in the past year.
SELECT Customer_ID
FROM Transactions
WHERE year(Time) = 2018
GROUP BY Customer_ID
ORDER BY SUM(Amount) DESC
LIMIT 1;



Find the street with the most customers.
SELECT Street
FROM Customer
GROUP BY Street
ORDER BY COUNT(*) DESC
LIMIT 1;

Showing rows 0 - 0 (1 total, Query took 0.0017 seconds.)

```
select Street from Customer group by Street order by count(*) desc limit 1;
```

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Extra options

	Street
Edit Copy Delete	fgh

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Find those packages that were not delivered within the promised time.

```
SELECT *
FROM Package
WHERE Package_ID IN (
  SELECT Transactions.Package_ID
  FROM Transactions
  INNER JOIN Tracking ON Transactions.Package_ID = Tracking.Package_ID
  INNER JOIN Delivery_of_Package ON Delivery_of_Package.Package_ID =
Transactions.Package_ID
  INNER JOIN Service ON Transactions.Service_ID = Service.Service_ID
  WHERE DATE_ADD(Delivery_of_Package.Date_of_Request, INTERVAL Service.Speed
DAY) < Tracking.Now_Time
);
```

Showing rows 0 - 24 (136 total, Query took 0.0117 seconds.)

```
select * from Package where Package_ID in( select Transactions.Package_ID from Transactions, Tracking, Delivery_of_Package, Service where Transactions.Package_ID = Tracking.Package_ID and Transactions.Service_ID = Service.Service_ID and Delivery_of_Package.Package_ID = Transactions.Package_ID and
date_add(Delivery_of_Package.Date_of_Request,interval Speed day) < Tracking.Now_Time);
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

1 > >> | Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

	Package_ID	Weight	Description	is_Fragile	Hazard_Category
Edit Copy Delete	pkg_06U7IEA4NWKTLVV8	304302	desc_FGHIJKLMNO	NO	NONE
Edit Copy Delete	pkg_073V06WHTJXVIIL3	88259	desc_JKLMNOPQRS	NO	NONE
Edit Copy Delete	pkg_1LEMO8X27CAS2J1H	886788	desc_IJKLMNOPQR	NO	NONE
Edit Copy Delete	pkg_1QIZG3OO4WUUKIVM	537579	desc_CDEFGHIJKL	YES	NONE
Edit Copy Delete	pkg_1RLLQQKMNV2IMLTD	167091	desc_IJKLMNOPQR	NO	NONE
Edit Copy Delete	pkg_1T54SDABVHLRUHX1	222683	desc_EFGHIJKLMN	YES	NONE
Edit Copy Delete	pkg_1TH8HHGIC1SWDZ7U	522051	desc_GHIJKLMNOP	NO	NONE
Edit Copy Delete	pkg_1VS92LEWAWVC1KOK	358795	desc_IJKLMNOPQR	NO	NONE
Edit Copy Delete	pkg_1VSB53IIFFR96G33	987211	desc_GHIJKLMNOP	NO	NONE
Edit Copy Delete	pkg_1XUMPWJXM1ZF5NX	507508	desc_HIJKLMNOPQ	NO	NONE
Edit Copy Delete	pkg_2DLKVPUI5N8TK169	585977	desc_EFGHIJKLMN	NO	NONE
Edit Copy Delete	pkg_2IAE9HSDWUPM03JG	353928	desc_ABCDEFGHIJ	NO	NONE
Edit Copy Delete	pkg_2LQDN7LE15ST1T71	942148	desc_GHIJKLMNOP	NO	NONE
Edit Copy Delete	pkg_3OI4UBT86F0I50CLG	862274	desc_GHIJKLMNOP	NO	NONE
Edit Copy Delete	pkg_3QXLGH9C4FN9XDQV	303575	desc_BCDEFGHIJK	YES	NONE
Edit Copy Delete	pkg_3T7C3BN8LHW4JG21	668094	desc_FGHIJKLMNO	NO	NONE
Edit Copy Delete	pkg_3WNW6KP4A3W97Y0A	78310	desc_FGHIJKLMNO	NO	NONE
Edit Copy Delete	pkg_43YBUWYY1KI60L8D	875511	desc_CDEFGHIJKL	NO	NONE
Edit Copy Delete	pkg_4AKVH0L91EACJD4L	836186	desc_ABCDEFGHIJ	YES	NONE
Edit Copy Delete	pkg_4U2NOPJFW5VYXPN2	64213	desc_GHIJKLMNOP	NO	NONE
Edit Copy Delete	pkg_591WHMC0W95FYKRM	44593	desc_FGHIJKLMNO	NO	NONE
Edit Copy Delete	pkg_59OIBKV8O0X7038U	898522	desc_EFGHIJKLMN	YES	NONE
Edit Copy Delete	pkg_66CV1C8NO3RP23EQ	828530	desc_BCDEFGHIJK	NO	NONE
Edit Copy Delete	pkg_75U031VHACTAQLP5	841445	desc_DEFGHIJKLM	NO	NONE
Edit Copy Delete	pkg_75VFZ2D7J2I56XM2	51621	desc_GHIJKLMNOP	NO	NONE

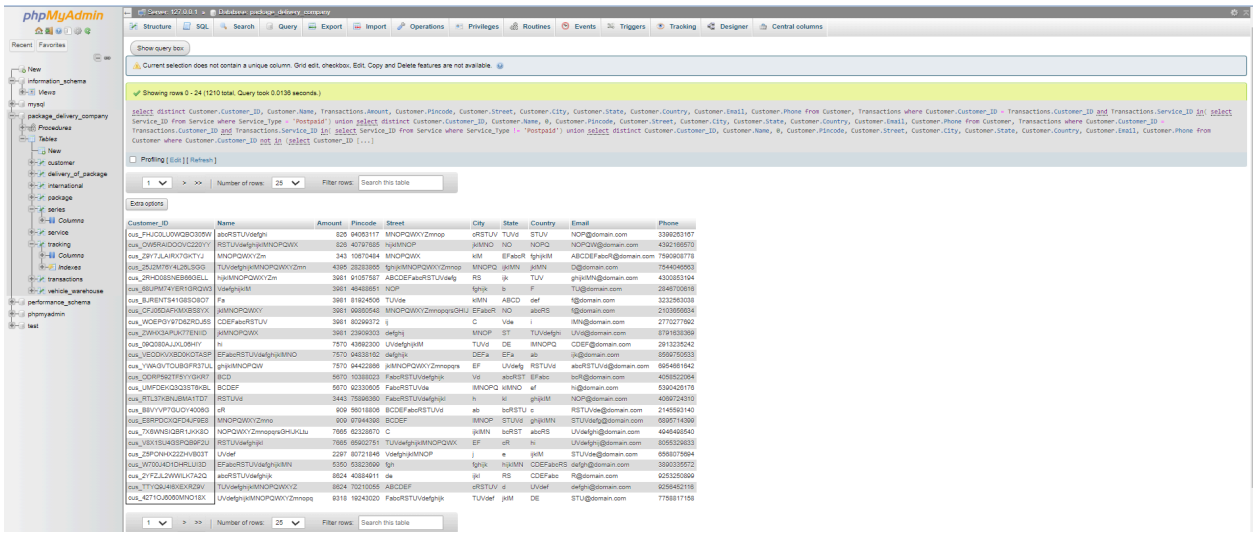
Check all *With selected:* Edit Copy Delete Export

Generate the bill for each customer for the past month. Consider creating several types of bills.

– A simple bill: customer, address, and amount owed.

```
SELECT DISTINCT Customer.Customer_ID,
            Customer.Name,
            Transactions.Amount,
            Customer.Pincode,
            Customer.Street,
            Customer.City,
            Customer.State,
            Customer.Country,
            Customer.Email,
            Customer.Phone
FROM Customer, Transactions
WHERE Customer.Customer_ID = Transactions.Customer_ID
  AND Transactions.Service_ID IN (
    SELECT Service_ID
    FROM Service
    WHERE Service_Type = 'Postpaid'
  )
UNION
SELECT DISTINCT Customer.Customer_ID,
            Customer.Name,
            0,
            Customer.Pincode,
            Customer.Street,
            Customer.City,
            Customer.State,
            Customer.Country,
            Customer.Email,
            Customer.Phone
FROM Customer, Transactions
WHERE Customer.Customer_ID = Transactions.Customer_ID
  AND Transactions.Service_ID IN (
    SELECT Service_ID
    FROM Service
    WHERE Service_Type != 'Postpaid'
  )
UNION
```

```
SELECT DISTINCT Customer.Customer_ID,
        Customer.Name,
        0,
        Customer.Pincode,
        Customer.Street,
        Customer.City,
        Customer.State,
        Customer.Country,
        Customer.Email,
        Customer.Phone
FROM Customer
WHERE Customer.Customer_ID NOT IN (SELECT Customer_ID FROM Transactions);
```



-A bill listing charges by type of service.

```
SELECT *
FROM Service;
```

Showing rows 0 - 24 (500 total, Query took 0.0004 seconds.)

```
Select * from Service;
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

1 > >> | Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

	Service_ID	Service_Type	Package_Type	Weight	Speed	Service_Charge
Edit Copy Delete	s_07WJYWKA	Postpaid	Small Box	515577	13	826
Edit Copy Delete	s_0B3GXYMI	Postpaid	Flat Envelope	115638	12	343
Edit Copy Delete	s_0CO5SUPH	Postpaid	Small Box	136129	12	4395
Edit Copy Delete	s_0EDLGI5I	Prepaid	Small Box	966800	13	1613
Edit Copy Delete	s_0ESGPCT9	Other	Large Box	84847	11	3979
Edit Copy Delete	s_0OOSNLJ7	Postpaid	Large Box	518648	7	3981
Edit Copy Delete	s_0PO5ET30	Postpaid	Small Box	462415	3	1089
Edit Copy Delete	s_0WG7FJN7	Prepaid	Large Box	866569	8	295
Edit Copy Delete	s_0WHQKRKR	Postpaid	Large Box	371898	10	7570
Edit Copy Delete	s_10W92BQR	Postpaid	Flat Envelope	413079	9	5670
Edit Copy Delete	s_155U9HC5	Other	Medium Box	268108	4	2097
Edit Copy Delete	s_16W4TLTS	Prepaid	Small Box	389604	14	2327
Edit Copy Delete	s_1919WQGA	Other	Medium Box	578138	5	8175
Edit Copy Delete	s_19TI65SV	Prepaid	Flat Envelope	476199	6	9675
Edit Copy Delete	s_1EB1T3XW	Other	Flat Envelope	460799	11	331
Edit Copy Delete	s_1GB723JK	Prepaid	Medium Box	439315	2	4839
Edit Copy Delete	s_1HB69OSH	Postpaid	Small Box	891410	1	3443
Edit Copy Delete	s_1LN81RKE	Postpaid	Large Box	454737	2	909
Edit Copy Delete	s_1N0J5DUW	Postpaid	Large Box	148330	6	7665
Edit Copy Delete	s_1PXML4Y2	Prepaid	Flat Envelope	866642	9	6383

Console

An itemize billing listing each individual shipment and the charges for it.

SELECT *
FROM Transactions;

Showing rows 0 - 24 (1000 total, Query took 0.0004 seconds.)

```
Select * from Transactions;
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

1 > >> | Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

				Customer_ID	Service_ID	Package_ID	Amount	Time	Payment_Type	Account_No	Status
Edit	Copy	Delete		cus_00MDX47MJ33TVPOY	s_7XCZ8TFI	pkg_M1QKSHZGE6481F7N	8169	2018-08-20 18:41:21	UPI	435714975	Successful
Edit	Copy	Delete		cus_02CKGAGSVX4GZ910	s_FSBAD2CS	pkg_VGOUCGESKJSYUSI2	4723	2018-02-20 18:15:58	Internet Banking	406409555	Successful
Edit	Copy	Delete		cus_02VS2ERPX54BCTJW	s_CJN8N9GD	pkg_A5CIKFMMN3RCEYDE	836	2018-12-13 13:00:05	Internet Banking	807393650	Successful
Edit	Copy	Delete		cus_03HH4D8GDTBSIT4Z	s_UY8ABRDZ	pkg_C6FGQVSPNFQKQ7KI	2173	2018-04-20 01:23:33	Internet Banking	992700338	Successful
Edit	Copy	Delete		cus_04E0DE5TO2H0C7H6	s_1GB723JK	pkg_1RLLQQKMNV2IMLTD	4839	2018-12-28 13:09:56	Internet Banking	576310439	Successful
Edit	Copy	Delete		cus_04E0DE5TO2H0C7H6	s_45NIGABF	pkg_VA09ZLVVO7L8023L	3517	2018-04-12 08:36:14	Internet Banking	450843599	Successful
Edit	Copy	Delete		cus_04E0DE5TO2H0C7H6	s_IJDJ1G1D	pkg_QIH7M7NIWSHKMXWV	6280	2018-10-23 12:49:37	Credit Card	835769492	Successful
Edit	Copy	Delete		cus_05A4JM2NTZJZ1KRB	s_NMYTTH0S	pkg_2JO2IHG739P81I7W	2153	2018-06-30 12:16:29	UPI	28489657	Successful
Edit	Copy	Delete		cus_06KF8PEQIZQPHWJH	s_CE14P85Y	pkg_CO0CZX27IW18YDMH	8114	2018-03-12 21:21:27	Credit Card	446019653	Successful
Edit	Copy	Delete		cus_08F1LTPW3LQC95UC	s_V407L7XZ	pkg_FLOYHLQZ3B704MPD	3327	2018-08-13 13:46:37	Credit Card	546405292	Successful
Edit	Copy	Delete		cus_09Q080AJJXL06HIY	s_0WHQKRKR	pkg_LQUJ49JA4HJV7D1C	7570	2018-07-29 12:16:47	UPI	574745334	Successful
Edit	Copy	Delete		cus_0ALRVNVVL8I92OEP	s_L13VCI8U	pkg_ZD0Y1QLWWFO97VCV	4276	2018-11-14 13:27:05	Debit Card	414805481	Successful
Edit	Copy	Delete		cus_0AMYERS193S80KLN	s_ULSNGUWB	pkg_UC7738NFFI9D1J0	7116	2018-11-04 22:27:25	UPI	964748719	Successful
Edit	Copy	Delete		cus_0AMYERS193S80KLN	s_XA65WFEL	pkg_OM3J4FSY8D0ROW80	225	2018-03-20 00:04:25	Internet Banking	485578925	Successful
Edit	Copy	Delete		cus_0BJ62OLEOJLPXX7U	s_IJDJ1G1D	pkg_HHDN3C7AW19PCX4B	6280	2018-12-31 15:22:58	Debit Card	76127775	Successful
Edit	Copy	Delete		cus_0CJII6FVB974FDNR	s_BKNJX6NN	pkg_QIH7M7NIWSHKMXWV	9034	2018-11-09 02:53:46	Debit Card	393587514	Successful
Edit	Copy	Delete		cus_0D0EJAQRAIO7UBDY	s_NS3A92N1	pkg_OQZXCF27HKZMSHDQ	4904	2018-05-02 14:58:01	Credit Card	932812470	Successful
Edit	Copy	Delete		cus_0GE38G9JRUS9Z147	s_7QZ3EA5J	pkg_DIXXZWW05CV2IFMX	1184	2018-11-17 03:51:44	Debit Card	611822031	Successful
Edit	Copy	Delete		cus_0JKNZL5XZQS1XCP5	s_FLLC41HY	pkg_TDS1CQJ1XDDVEB0D	176	2018-10-11 16:07:46	UPI	547030739	Successful
Edit	Copy	Delete		cus_0PLBVHWXDELTI4RS	s_MC9O0BQ5	pkg_Q0LZ8V90NW0PS5OH	7720	2018-06-22 18:36:53	Debit Card	458636169	Successful
Edit	Copy	Delete		cus_0RLAGRCVWFTOGH1L	s_Y1NZ2D22	pkg_H4JKI3OHXAQCJ0GO	8882	2018-08-01 11:30:41	Internet Banking	509586751	Successful
Edit	Copy	Delete		cus_0V44PBD1WKA771IS	s_55KJAVQ2	pkg_LFFGUB2Y05EEPXGM	9439	2018-04-10 07:53:39	Credit Card	82793569	Successful
Edit	Copy	Delete		cus_0V44PBD1WKA771IS	s_UKK42XXH	pkg_2OBUR9JX51HPIO6R	1851	2018-03-10 16:23:41	UPI	339398215	Successful
Edit	Copy	Delete		cus_0VIIUDN69NAEMQRZ	s_A33ROITK	pkg_WR091P6WGCGQZAD2	5602	2018-07-28 04:11:13	Debit Card	583544105	Successful
Edit	Copy	Delete		cus_0VIIUDN69NAEMQRZ	s_NQ4O8UOT	pkg_N3AVF0ALQFCV63L7	3314	2018-04-05 00:02:24	Internet Banking	639290473	Successful

Conclusion:

Through this project, I learned the ins and outs of database and connecting it with an application to put together a full database project. While it was extremely hard to learn it by myself, I am very proud of my self. I am confident that I can learn more in the future.