

ASSIGNMENT 1 : SQL aggregation functions for OLAP purposes

DATE : 07-09-2020

SUBMITTED BY : DWDM20G05

OBJECTIVE :

- In this lab we created a toy data warehouse and learned how to use SQL aggregation functions for OLAP purposes.

INTRODUCTION :

Online Analytical Processing (OLAP) is a category of software that allows users to analyze information from multiple database systems at the same time. It is a technology that enables analysts to extract and view business data from different points of view. Analysts frequently need to group, aggregate and join data. These operations in relational databases are resource intensive. OLAP data can be pre-calculated and pre-aggregated, making analysis faster. OLAP databases are divided into one or more cubes. The cubes are designed in such a way that creating and viewing reports become easy. Four types of analytical operations in OLAP are:

- Roll-up
- Drill-down
- Slice and dice
- Pivot (rotate)

THEORY :

ROLLUP is a type of SQL Keyword used in the statement with GROUP BY Clause that helps to create subtotals as well as grand totals for the result set of columns as a summary row. The ROLLUP operator is used with GROUP BY Statement as an extension or an advanced feature to filter the sum total for a column or a group of columns by adding additional rows.

As we know, the GROUP BY query is applied with aggregate functions like COUNT, MAX, MIN, SUM, AVG which groups the result rows by single or more columns. The ROLLUP SQL operator is an option to use GROUP BY Clause to allow you to include extra fields representing the subtotals. These subtotal rows are referred to as super-aggregate rows in combination with the grand total row. So, we can create multiple groupings of set rows by using a single query containing both the GROUP BY Clause and ROLLUP.

Syntax : *SELECT r1, r2 AggregateFunction(r3) FROM TableName GROUP BY ROLLUP (r1,r2);*

The **CUBE** is an extension of the GROUP BY clause that allows you to generate grouping sets for all possible combinations of dimensions.

Syntax : SELECT c1, c2, c3, aggregate(c4)
FROM table_name
GROUP BY CUBE(c1,c2,c3);

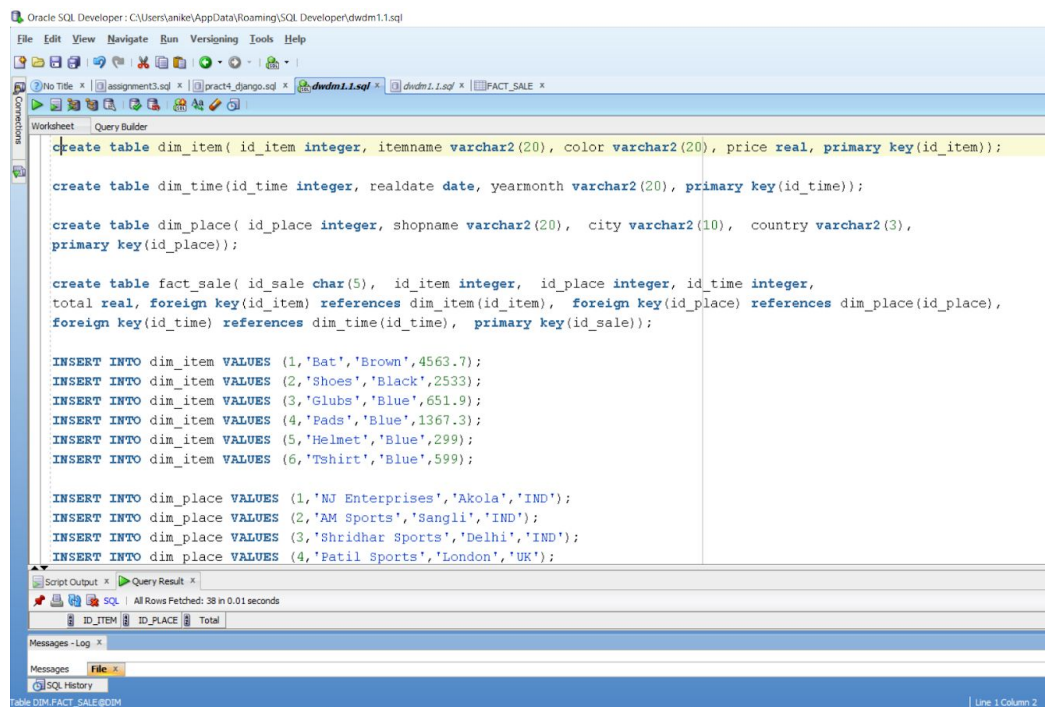
In this syntax, the c1, c2, and c3 columns are called dimensions. The result of the aggregate(c4) aggregate function is known as a fact.

Typically, a fact is a number e.g., the sales amount. A dimension gives the fact a business context. For example, the product category and customer columns are dimensions that describe the sales amount such as total sales amount by product category and total sales amount by the customer.

The CUBE generates grouping sets of all combinations of c1, c2 and c3 dimensions, which returns 8 grouping sets.

OBSERVATIONS :

Activity 1 :



```
Oracle SQL Developer : C:\Users\anike\AppData\Roaming\SQL Developer\dwdm1.1.sql
File Edit View Navigate Run Versioning Tools Help
No Title x assignment3.sql x pract4_django.sql x dwdm1.1.sql x dwdm1.1.sql x FACT_SALE x
Worksheet Query Builder
create table dim_item( id_item integer, itemname varchar2(20), color varchar2(20), price real, primary key(id_item));

create table dim_time(id_time integer, realdate date, yearmonth varchar2(20), primary key(id_time));

create table dim_place( id_place integer, shopname varchar2(20), city varchar2(10), country varchar2(3),
primary key(id_place));

create table fact_sale( id_sale char(5), id_item integer, id_place integer, id_time integer,
total real, foreign key(id_item) references dim_item(id_item), foreign key(id_place) references dim_place(id_place),
foreign key(id_time) references dim_time(id_time), primary key(id_sale));

INSERT INTO dim_item VALUES (1,'Bat','Brown',4563.7);
INSERT INTO dim_item VALUES (2,'Shoes','Black',2533);
INSERT INTO dim_item VALUES (3,'Glubs','Blue',651.9);
INSERT INTO dim_item VALUES (4,'Pads','Blue',1367.3);
INSERT INTO dim_item VALUES (5,'Helmet','Blue',299);
INSERT INTO dim_item VALUES (6,'Tshirt','Blue',599);

INSERT INTO dim_place VALUES (1,'NJ Enterprises','Akola','IND');
INSERT INTO dim_place VALUES (2,'AM Sports','Sangli','IND');
INSERT INTO dim_place VALUES (3,'Shridhar Sports','Delhi','IND');
INSERT INTO dim_place VALUES (4,'Patil Sports','London','UK');

Script Output x Query Result x
SQL All Rows Fetched: 38 in 0.01 seconds
ID_ITEM ID_PLACE Total
Messages - Log x
Messages File x
SQL History
Table DIM_FACT_SALE$CDM | Line 1 Column 2 Schema
```

creation and insertion of data

File Edit View Navigate Run Versingning Tools Help

No Title x assignment3.sql x pract4_django.sql x dwdm1.1.sql x dwdm1.1.sql x FACT_SALE x

Worksheet Query Builder

```

INSERT INTO fact_sale VALUES ('12',1,4,6,'4563.7');
INSERT INTO fact_sale VALUES ('13',2,5,6,'2533');
INSERT INTO fact_sale VALUES ('14',3,3,5,'651.9');
INSERT INTO fact_sale VALUES ('16',4,2,4,'1367.3');
INSERT INTO fact_sale VALUES ('17',5,2,1,'299');
INSERT INTO fact_sale VALUES ('18',6,6,3,'599');
INSERT INTO fact_sale VALUES ('19',6,3,2,'599');
INSERT INTO fact_sale VALUES ('2',2,3,2,'2533');
INSERT INTO fact_sale VALUES ('20',5,1,4,'299');
INSERT INTO fact_sale VALUES ('21',4,2,6,'1367.3');
INSERT INTO fact_sale VALUES ('22',3,4,5,'651.9');
INSERT INTO fact_sale VALUES ('23',2,5,6,'2533');
INSERT INTO fact_sale VALUES ('24',1,7,1,'4563.7');
INSERT INTO fact_sale VALUES ('25',1,6,1,'4563.7');
INSERT INTO fact_sale VALUES ('26',2,4,5,'2533');
INSERT INTO fact_sale VALUES ('27',3,3,4,'651.9');
INSERT INTO fact_sale VALUES ('28',4,2,6,'1367.3');
INSERT INTO fact_sale VALUES ('29',5,4,3,'299');
INSERT INTO fact_sale VALUES ('3',1,2,4,'4563.7');
INSERT INTO fact_sale VALUES ('30',6,5,3,'599');
INSERT INTO fact_sale VALUES ('31',6,5,2,'599');
INSERT INTO fact_sale VALUES ('32',5,7,2,'299');
    
```

Script Output x Query Result x

All Rows Fetched: 38 in 0.01 seconds

ID_ITEM	ID_PLACE	Total
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Messages - Log x

Messages File x

SQL History

Table DIM.FACT_SALE@DIM

Oracle SQL Developer

File Edit View Navigate Run Versigning Tools Help

Connections Reports

Columns Data Constraints Grants Statistics Triggers Flashback Dependencies Details Partitions Indexes

Sort.. Filter:

	ID_ITEM	ITEMNAME	COLOR	PRICE
1	1	Bat	Brown	4563.7
2	2	Shoes	Black	2533
3	3	Glubs	Blue	651.9
4	4	Pads	Blue	1367.3
5	5	Helmet	Blue	299
6	6	Tshirt	Blue	599

ads
aniket
Aniket
DIM
Tables (Filtered)
DIM_ITEM
DIM_PLACE
ID_PLACE
SHOPNAME
CITY
COUNTRY
DIM_TIME
ID_TIME
REALDATE
YEARMONTH
FACT_SALE
Views
Editioning Views

Oracle SQL Developer

File Edit View Navigate Run Versigning Tools Help

Connections Reports

Columns Data Constraints Grants Statistics Triggers Flashback Dependencies Details Partitions Indexes SQL

Sort.. Filter:

	ID_PLACE	SHOPNAME	CITY	COUNTRY
1	1	NJ Enterprises	Akola	IND
2	2	AM Sports	Sangli	IND
3	3	Shridhar Sports	Delhi	IND
4	4	Patil Sports	London	UK
5	5	SK Enterprises	NewYork	USA
6	6	DK Sports	Tokyo	JPN
7	7	SS Suppliers	Hiroshima	JPN

ads
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Aniket
DIM
Tables (Filtered)
DIM_ITEM
DIM_PLACE
ID_PLACE
SHOPNAME
CITY
COUNTRY
DIM_TIME
ID_TIME
REALDATE
YEARMONTH
FACT_SALE
Views

Oracle SQL Developer

File Edit View Navigate Run Versigning Tools Help

Connections Reports

Columns Data Constraints Grants Statistics Triggers Flashback Dependencies Details

Sort.. Filter:

	ID_TIME	REALDATE	YEARMONTH
1	1	01-09-20	2020-SEP
2	2	03-08-20	2020-AUG
3	3	20-07-20	2020-JUL
4	4	21-06-20	2020-JUN
5	5	09-03-20	2020-MAR
6	6	08-02-20	2020-FEB

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Aniket
DIM
Tables (Filtered)
DIM_ITEM
DIM_PLACE
ID_PLACE
SHOPNAME
CITY
COUNTRY
DIM_TIME
ID_TIME
REALDATE
YEARMONTH

File Edit View Navigate Run Versigning Tools Help

Connections Reports

Columns Data Constraints Grants Statistics Triggers Flashback Dependencies Details Partitions Indexes SQL

Sort.. Filter:

	ID_SALE	ID_ITEM	ID_PLACE	ID_TIME	TOTAL
1	1	1	1	1	4563.7
2	10	3	7	2	651.9
3	11	2	3	5	2533
4	12	1	4	6	4563.7
5	13	2	5	6	2533
6	14	3	3	5	651.9
7	16	4	2	4	1367.3
8	17	5	2	1	299
9	18	6	6	3	599
10	19	6	3	2	599
11	2	2	3	2	2533
12	20	5	1	4	299
13	21	4	2	6	1367.3
14	22	3	4	5	651.9
15	23	2	5	6	2533
16	24	1	7	1	4563.7
17	25	1	6	1	4563.7
18	26	2	4	5	2533
19	27	3	3	4	651.9
20	28	4	2	6	1367.3
21	29	5	4	3	299
22	3	1	2	4	4563.7
23	30	6	5	3	599
24	31	6	5	2	599
25	32	5	7	2	299
26	33	4	7	5	1367.3
27	34	3	1	1	651.9

Messages - Log

```
INSERT INTO "DIM"."DIM_TIME" (ID_TIME, REALDATE, YEARMONTH) VALUES ('1', TO_DATE('2020-01-09', 'DD-MM-YYYY'))
```

ORA-01861: literal does not match format string

SQL History

Table DIM.FACT_SALE@DIM

Oracle SQL Developer - C:\Users\anike\AppData\Roaming\SQL Developer\dwdm1.1.sql

File Edit View Navigate Run Versinging Tools Help

Connections x Reports x

Worksheet Query Builder

select id_item, id_place, sum(total) as "Total" from fact_sale
group by
rollup(id_item, id_place)
order by id_item, id_place;

Script Output x Query... x

All Rows Fetched: 31 in 0.007 seconds

ID_ITEM	ID_PLACE	Total
1	1	4563.7
2	1	2 4563.7
3	1	4 4563.7
4	1	6 4563.7
5	1	7 9127.4
6	1	(null) 27382.2
7	2	3 7599
8	2	4 2533
9	2	5 5066
10	2	(null) 15198
11	3	1 651.9
12	3	3 1303.8
13	3	4 651.9
14	3	7 1303.8
15	3	(null) 3911.4
16	4	2 4101.9
17	4	6 1367.3
18	4	7 1367.3

Messages - Log x

INSERT INTO "DIM"."DIM_TIME" (ID_TIME, REALDATE, YEARMONTH) VALUES ('1', TO_DATE('2020-01-09', 'DD-MM-RR'), '2020-SEP')

OS-11612: '1' is not a valid date format string

SQL History

Table DIM.FACT_SALE@DWM

Line 78 Column 1 | Insert | Modified | Windows: CR/AF | Editor

Activity 2 (Rollup Operations) :

Oracle SQL Developer: C:\Users\lanke\AppData\Roaming\SQL Developer\dwdm1.1.sql

File Edit View Navigate Run Versigning Tools Help

Worksheet Query Builder

```
select id_item, id_place, sum(total) as "Total" from fact_sale
group by
rollup(id_item, id_place)
order by id_item, id_place;
```

Script Output x Query... x

All Rows Fetched: 31 in 0.007 seconds

ID_ITEM	ID_PLACE	Total
3	1	651.9
3	3	1303.8
3	4	651.9
3	7	1303.8
3	(null)	3911.4
4	2	4101.9
4	6	1367.3
4	7	1367.3
4	(null)	6836.5
5	1	299
5	2	299
5	3	299
5	4	299
5	7	299
5	(null)	1495
6	3	599
6	4	599
6	5	1198
6	6	599
6	(null)	2995
(null)	(null)	57818.1

Messages - Log x

Messages File x

SQL History

Table DIM_FACT_SALE.00M

Oracle SQL Developer: C:\Users\lanke\AppData\Roaming\SQL Developer\dwdm1.1.sql

File Edit View Navigate Run Versigning Tools Help

Worksheet Query Builder

```
select t2.itemname, t3.shopname, sum(total) as "Total" from fact_sale t1 inner
join dim_item t2 on t1.id_item = t2.id_item inner join dim_place t3 on t1.id_place = t3.id_place
group by rollup(t2.itemname, t3.shopname);
```

Script Output x Query... x

All Rows Fetched: 31 in 0.025 seconds

ITEMNAME	SHOPNAME	Total
Glubs	Patil Sports	651.9
Glubs	SS Suppliers	1303.8
Glubs	NJ Enterprises	651.9
Glubs	Shridhar Sports	1303.8
Glubs	(null)	3911.4
Shoes	Patil Sports	2533
Shoes	SK Enterprises	5066
Shoes	Shridhar Sports	7599
Shoes	(null)	15198
Helmet	AM Sports	299
Helmet	Patil Sports	299
Helmet	SS Suppliers	299
Helmet	NJ Enterprises	299
Helmet	Shridhar Sports	299
Helmet	(null)	1495
Tshirt	DK Sports	599
Tshirt	Patil Sports	599
Tshirt	SK Enterprises	1198
Tshirt	Shridhar Sports	599
Tshirt	(null)	2995
(null)	(null)	57818.1

Messages - Log x

Messages File x

SQL History

Table DIM_FACT_SALE.00M

Oracle SQL Developer: C:\Users\anike\AppData\Roaming\SQL Developer\dwdm1.1.sql

File Edit View Navigate Run Versing Tools Help

Connections x Reports x

Tables (Filtered)

- fact_sale
- dim_item
- dim_place
- dim_time
- fact_sale
- views
- indexes
- packages
- procedures
- functions
- queues
- queues tables
- triggers
- crossed triggers
- types
- sequences
- materialized views
- synonyms
- public synonyms
- database links
- public database links
- directories
- editions
- application express
- java

Worksheet Query Builder

```
select t2.itemname,t3.city,t4.yearmonth,sum(total) as "Total" from fact_sale t1 inner
join dim_item t2 on t1.id_item = t2.id_item inner join dim_place t3 on t1.id_place = t3.id_place
inner join dim_time t4 on t1.id_time = t4.id_time
group by rollup(t2.itemname,t3.city,t4.yearmonth);
```

Script Output x Query... x

All Rows Fetched: 62 in 0.024 seconds

	ITEMNAME	CITY	YEARMONTH	Total
42	Helmet	Akolia	(null)	299
43	Helmet	Delhi	2020-FEB	299
44	Helmet	Delhi	(null)	299
45	Helmet	London	2020-JUL	299
46	Helmet	London	(null)	299
47	Helmet	Sangli	2020-SEP	299
48	Helmet	Sangli	(null)	299
49	Helmet	Hiroshima	2020-AUG	299
50	Helmet	Hiroshima	(null)	299
51	Helmet	(null)	(null)	1495
52	Tshirt	Delhi	2020-AUG	599
53	Tshirt	Delhi	(null)	599
54	Tshirt	London	2020-SEP	599
55	Tshirt	London	(null)	599
56	Tshirt	Tokyo	2020-JUL	599
57	Tshirt	Tokyo	(null)	599
58	Tshirt	NewYork	2020-AUG	599
59	Tshirt	NewYork	2020-JUL	599
60	Tshirt	NewYork	(null)	1198
61	Tshirt	(null)	(null)	2995
62	(null)	(null)	(null)	57818.1

Messages - Log x

Messages File x

SQL History

Line 98 Column 1 | Insert | Modified | Windows: CR/LF Editing

Oracle SQL Developer: C:\Users\anike\AppData\Roaming\SQL Developer\dwdm1.1.sql

File Edit View Navigate Run Versing Tools Help

Connections x Reports x

Tables (Filtered)

- fact_sale
- dim_item
- dim_place
- dim_time
- fact_sale
- views
- indexes
- packages
- procedures
- functions
- queues
- queues tables
- triggers
- crossed triggers
- types
- sequences
- materialized views
- synonyms
- public synonyms
- database links
- public database links
- directories
- editions
- application express
- java

Worksheet Query Builder

```
select t2.color,t3.country,t4.yearmonth,sum(total) as "Total" from fact_sale t1 inner
join dim_item t2 on t1.id_item = t2.id_item inner join dim_place t3 on t1.id_place = t3.id_place
inner join dim_time t4 on t1.id_time = t4.id_time
group by rollup(t2.color,t3.country,t4.yearmonth);
```

Script Output x Query... x

All Rows Fetched: 38 in 0.008 seconds

	COLOR	COUNTRY	YEARMONTH	Total
18	Blue	USA	(null)	1198
19	Blue	(null)	(null)	15237.9
20	Black	UK	2020-MAR	2533
21	Black	UK	(null)	2533
22	Black	IND	2020-AUG	2533
23	Black	IND	2020-JUN	2533
24	Black	IND	2020-MAR	2533
25	Black	IND	(null)	7599
26	Black	USA	2020-FEB	5066
27	Black	USA	(null)	5066
28	Black	(null)	(null)	15198
29	Brown	UK	2020-FEB	4563.7
30	Brown	UK	(null)	4563.7
31	Brown	IND	2020-JUN	4563.7
32	Brown	IND	2020-SEP	4563.7
33	Brown	IND	(null)	9127.4
34	Brown	JPN	2020-FEB	4563.7
35	Brown	JPN	2020-SEP	9127.4
36	Brown	JPN	(null)	13691.1
37	Brown	(null)	(null)	27382.2
38	(null)	(null)	(null)	57818.1

Messages - Log x

Messages File x

SQL History

Line 103 Column 1 | Insert | Modified | Windows: CR/LF Editing

Activity 3 (Cube Operations) :

Oracle SQL Developer : C:\Users\anike\AppData\Roaming\SQL Developer\dwdm1.1.sql

File Edit View Navigate Run Versigning Tools Help

Connections x Reports x

Tables (Filtered)

- ads
- aniket
- Aniket
- DIM
 - Tables (Filtered)
 - DIM_ITEM
 - ID_ITEM
 - ITEMNAME
 - COLOR
 - PRICE
 - DIM_PLACE
 - ID_PLACE
 - SHOPNAME
 - CITY
 - COUNTRY
 - DIM_TIME
 - ID_TIME
 - REALDATE
 - YEARMONTH
 - FACT_SALE
- Views
- Editing Views
- Indexes
- Packages
- Procedures
- Functions
- Queues
- Queues Tables
- Triggers
- Crossedition Triggers
- Types
- Sequences
- Materialized Views
- Materialized Views Logs
- Synonyms
- Public Synonyms
- Database Links
- Public Database Links

Worksheet Query Builder

```
select id_item,id_place,sum(total) as "Total" from fact_sale
group by
cube(id_item,id_place)
order by id_item,id_place;
```

Script Output x Query Result x

All Rows Fetched: 38 in 0.007 seconds

ID_ITEM	ID_PLACE	Total
19	4 (null)	6836.5
20	5 1	299
21	5 2	299
22	5 3	299
23	5 4	299
24	5 7	299
25	5 (null)	1495
26	6 3	599
27	6 4	599
28	6 5	1198
29	6 6	599
30	6 (null)	2995
31	(null) 1	5514.6
32	(null) 2	8964.6
33	(null) 3	9800.8
34	(null) 4	8646.6
35	(null) 5	6264
36	(null) 6	6530
37	(null) 7	12097.5
38	(null) (null)	57818.1

Messages - Log x

Oracle SQL Developer : C:\Users\anike\AppData\Roaming\SQL Developer\dwdm1.1.sql

File Edit View Navigate Run Versigning Tools Help

Connections x Reports x

Tables (Filtered)

- ads
- aniket
- Aniket
- DIM
 - Tables (Filtered)
 - DIM_ITEM
 - ID_ITEM
 - ITEMNAME
 - COLOR
 - PRICE
 - DIM_PLACE
 - ID_PLACE
 - SHOPNAME
 - CITY
 - COUNTRY
 - DIM_TIME
 - ID_TIME
 - REALDATE
 - YEARMONTH
 - FACT_SALE
- Views
- Editing Views
- Indexes
- Packages
- Procedures
- Functions
- Queues
- Queues Tables
- Triggers
- Crossedition Triggers
- Types
- Sequences
- Materialized Views
- Materialized Views Logs
- Synonyms
- Public Synonyms
- Database Links
- Public Database Links

Worksheet Query Builder

```
select t2.itemname,t3.shopname,sum(total) as "Total" from fact_sale t1 inner
join dim_item t2 on t1.id_item = t2.id_item inner join dim_place t3 on t1.id_place = t3.id_place
group by cube(t2.itemname,t3.shopname);
```

Script Output x Query Result x

All Rows Fetched: 38 in 0.015 seconds

ITEMNAME	SHOPNAME	Total
1 (null)	(null)	57818.1
2 (null)	AM Sports	8964.6
3 (null)	DK Sports	6530
4 (null)	Fatil Sports	8646.6
5 (null)	SS Suppliers	12097.5
6 (null)	NJ Enterprises	5514.6
7 (null)	SK Enterprises	6264
8 (null)	Shridhar Sports	9800.8
9 Bat	(null)	27382.2
10 Bat	AM Sports	4563.7
11 Bat	DK Sports	4563.7
12 Bat	Fatil Sports	4563.7
13 Bat	SS Suppliers	9127.4
14 Bat	NJ Enterprises	4563.7
15 Pads	(null)	6836.5
16 Pads	AM Sports	4101.9
17 Pads	DK Sports	1367.3
18 Pads	SS Suppliers	1367.3
19 Glubs	(null)	3911.4
20 Glubs	Fatil Sports	651.9

