Topic C

SQL QUERY 3 (Referential Constraints/Join Tables/Sub-Query/View

SQL Query 3 (Referential Constraints/Join Tables/Sub-Query/View)

CONTENT

- Referential integrity
- Referential action
- Joining tables
- Sub-Query

Referential Integrity

If a foreign key exists in a relation

- ✓ The value must **MATCH** a candidate key (usually a **primary key**) **of its own or some other relation**.
- ✓ Otherwise, the foreign key is NULL

Referential Integrity - Identify the foreign keys

Foreign key

Child relation

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on-hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S1002	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S1002	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Referencing Table

Parent relation

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Referenced Table

Primary key is one of the candidate keys

Referential Integrity - Implement the Foreign Key (Option 1)

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S1002	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S1002	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

SQL	Syntax
CREATE TABLE Product	CREATE TABLE <table name>
(Prod_code char(6) not null, Prod_Desc varchar(50) null, Unit_px decimal(5,2) null, Supplier_ID char(5) null, Qty_on_hand integer null,	(<column definition list>
PRIMARY KEY (Prod_code),	PRIMARY KEY (<column name list>),
FOREIGN KEY (Supplier_ID)	FOREIGN KEY (<foreign key attribute name list>)
REFERENCES Supplier(Supplier_ID))	REFERENCES <table name>(<primary key list>))

Referential Integrity - Implement the Foreign Key (Option 1)

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S1002	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S1002	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

SQL	Syntax
ALTER TABLE Product	ALTER TABLE <table name>
ADD FOREIGN KEY (Supplier_ID)	ADD FOREIGN KEY (<foreign key attribute name list>)
REFERENCES Supplier(Supplier_ID)	REFERENCES <table name> (<primary key list>)

This option is applied if the table has already been created

Referential Actions

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S1002	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S1002	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

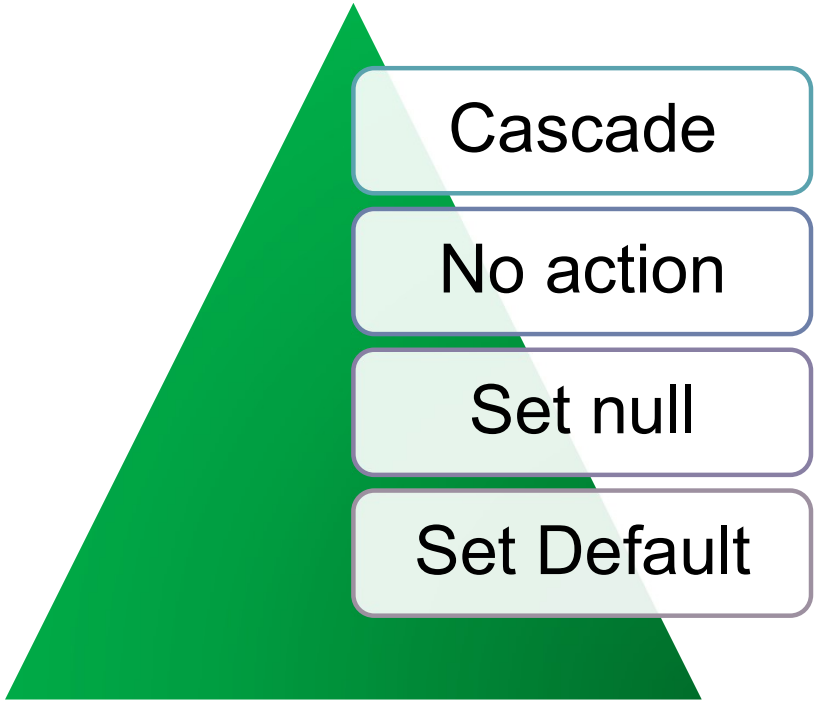
Referencing Table

Referenced Table

Delete from Supplier where supplier_ID = ‘S1002’

Specifies the actions to be taken on the referencing rows when the referenced row is deleted!

Referential Actions – Options when referenced row is deleted



Referential Action - On Delete Cascade

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
HG7166	Dress Blue	15.90	S1003	10
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier Not found

Supplier

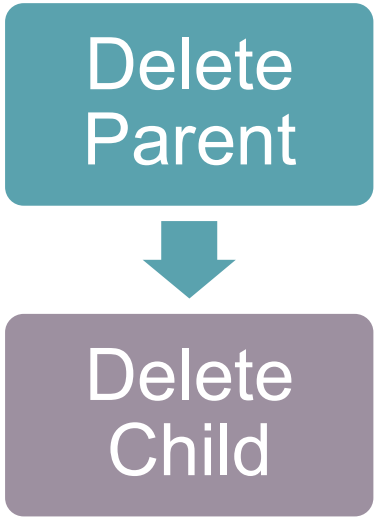
DELETE FROM SUPPLIER WHERE SUPPLIER_ID = 'S1002'

Delete row from parent relation

Delete matching rows in child relation

Referential Action - On Delete Cascade

Cascade the Delete action
FROM
Parent or Referenced relation
DOWN to the
Child or Referencing relation



Referential Action - On Delete Cascade (Option 1)

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
HG7166	Dress Blue	15.90	S1003	10
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Step 1

Step 2

SQL	Syntax
CREATE TABLE Product	CREATE TABLE <table name>
(Prod_code char(6) not null, Prod_Desc varchar(50) null, Unit_px decimal(5,2) null, Supplier_ID char(5) null, Qty_on_hand integer null,	(<column definition list>
PRIMARY KEY (Prod_code),	PRIMARY KEY <column name list>,
FOREIGN KEY (Supplier_ID)	FOREIGN KEY <foreign key attribute name list>
REFERENCES Supplier(Supplier_ID)	REFERENCES <table name>(<primary key list>)
ON DELETE CASCADE)	ON DELETE CASCADE)

Referential Action - On Delete Cascade (Option 2)

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
HG7166	Dress Blue	15.90	S1003	10
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Step 1

Step 2

SQL	Syntax
ALTER TABLE Product	ALTER TABLE <table name>
ADD FOREIGN KEY (Supplier_ID)	ADD FOREIGN KEY <foreign key attribute name list>
REFERENCES Supplier(Supplier_ID)	REFERENCES <table name>(<primary key list>)
ON DELETE CASCADE)	ON DELETE CASCADE)

Referential Action - On Delete NO ACTION

Referenced row in Parent/Referenced Relation CANNOT BE DELETED if there are referencing rows in Child/Referencing Relations

Referential Action - On Delete NO ACTION

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S1002	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S1002	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

(Delete row from parent relation)

DELETE FROM SUPPLIER WHERE SUPPLIER_ID = 'S1002'

OPERATION REJECTED!

C

Referential Action -On Delete ON ACTION

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S1002	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S1002	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

SQL	Syntax
CREATE TABLE Product	CREATE TABLE <table name>
(Prod_code char(6) not null, Prod_Desc varchar(50) null, Unit_px decimal(5,2) null, Supplier_ID char(5) null, Qty_on_hand integer null,	(<column definition list>
PRIMARY KEY (Prod_code),	PRIMARY KEY <column name list>,
FOREIGN KEY (Supplier_ID)	FOREIGN KEY <foreign key attribute name list>
REFERENCES Supplier(Supplier_ID)	REFERENCES <table name>(<primary key list>)
ON DELETE NO ACTION)	ON DELETE NO ACTION)

Referential Action - On Delete Set NULL

Delete referenced row in
Parent or Referenced relation
Set Foreign key values in
Child or Referencing relation
To NULL

Referential Action -On Delete Set NULL

	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	NULL	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	NULL	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

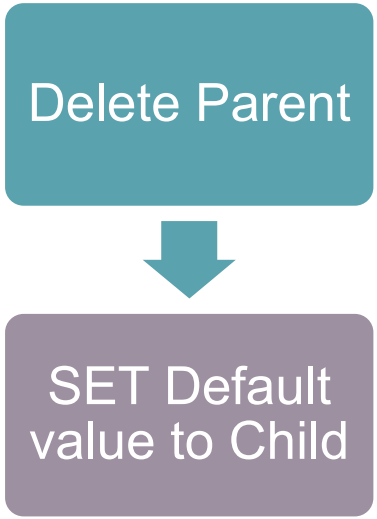
DELETE FROM SUPPLIER WHERE SUPPLIER_ID = 'S1002'

Delete row from parent relation

Set matching rows in child relation to NULL

Referential Action - On Delete Set Default

Delete referenced row in
Parent or Referenced relation
Set Foreign key values in
Child or Referencing relation
To Default value



Referential Action - On Delete Set Default

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S0000	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S0000	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Step 1

Step 2

DELETE FROM SUPPLIER WHERE SUPPLIER_ID = 'S1002'

Delete row from parent relation

Set matching rows in child relation to Default value

Referential Action – On update

- What happen when parent relation's key is updated?
  - Same four options as in deleting referenced row in parent/referenced relation
    - Cascade
    - Set NULL
    - Set Default
    - No Action

Referential Action – On update Cascade

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S1005	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S1005	40
HT5402	Pink Skirt	15.00	S1003	20

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1005	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

UPDATE SUPPLIER SET SUPPLIER_ID = 'S1005' WHERE SUPPLIER_ID = 'S1002'

SQL	Syntax
CREATE TABLE Product	CREATE TABLE <table name>
(Prod_code char(6) not null Primary Key, Prod_Desc varchar(50) null, Unit_px decimal(5,2) null, Supplier_ID char(5) null, Qty_on_hand integer null,	(<column definition list>
FOREIGN KEY (Supplier_ID)	FOREIGN KEY <foreign key attribute name list>
REFERENCES Supplier(Supplier_ID)	REFERENCES <table name>(<primary key list>)
ON DELETE CASCADE	ON DELETE CASCADE
ON UPDATE CASCADE)	ON UPDATE CASCADE)

Referential Action – On update set Null

Product

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	NULL	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	NULL	40
HT5402	Pink Skirt	15.00	S1003	20

Supplier

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1005	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

UPDATE SUPPLIER SET SUPPLIER_ID = 'S1005' WHERE SUPPLIER_ID = 'S1002'

SQL	Syntax
CREATE TABLE Product	CREATE TABLE <table name>
(Prod_code char(6) not null Primary Key, Prod_Desc varchar(50) null, Unit_px decimal(5,2) null, Supplier_ID char(5) null, Qty_on_hand integer null,	(<column definition list>
FOREIGN KEY (Supplier_ID)	FOREIGN KEY <foreign key attribute name list>
REFERENCES Supplier(Supplier_ID)	REFERENCES <table name>(<primary key list>)
ON DELETE SET NULL	ON DELETE SET NULL
ON UPDATE SET NULL)	ON UPDATE SET NULL)

C

Referential Action – On update set default

Product

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S0000	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S0000	40
HT5402	Pink Skirt	15.00	S1003	20

Supplier

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1005	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

UPDATE SUPPLIER SET SUPPLIER_ID = 'S1005' WHERE SUPPLIER_ID = 'S1002'

SQL	Syntax
CREATE TABLE Product	CREATE TABLE <table name>
(Prod_code char(6) not null Primary Key, Prod_Desc varchar(50) null, Unit_px decimal(5,2) null, Supplier_ID char(5) null default 'S0000' Qty_on_hand integer null,	(<column definition list>
FOREIGN KEY (Supplier_ID)	FOREIGN KEY <foreign key attribute name list>
REFERENCES Supplier(Supplier_ID)	REFERENCES <table name>(<primary key list>)
ON DELETE SET DEFAULT	ON DELETE SET DEFAULT
ON UPDATE SET DEFAULT)	ON UPDATE SET DEFAULT)

Referential Action – On update no action

Product

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Qty_on_hand
HG7160	Sale Dress White	15.90	S1001	30
HG9298	Sale Top + Skirt Red	19.80	S1001	20
RQ0207	Dress White	18.60	S1002	40
HG7166	Dress Blue	15.90	S1003	10
HG6159	Sale Dress Pink	15.40	S1002	40
HT5402	Pink Skirt	15.00	S1003	20

Supplier

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

UPDATE SUPPLIER SET SUPPLIER_ID = 'S1005' WHERE SUPPLIER_ID = 'S1002'

SQL	Syntax
CREATE TABLE Product	CREATE TABLE <table name>
(Prod_code char(6) not null Primary Key, Prod_Desc varchar(50) null, Unit_px decimal(5,2) null, Supplier_ID char(5) null, Qty_on_hand integer null,	(<column definition list>
FOREIGN KEY (Supplier_ID)	FOREIGN KEY <foreign key attribute name list>
REFERENCES Supplier(Supplier_ID)	REFERENCES <table name>(<primary key list>)
ON DELETE SET NO ACTION	ON DELETE SET NOT ACTION
ON UPDATE SET NO ACTION)	ON UPDATE SET NOT ACTION)

Joining tables - SQL implementation (Primary key and Foreign key)

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Customer_ID	Customer_Name
C1001	Rachel Ng
C1002	Linda Ng
C1003	David Ang

Customer

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

Let's just look at these 2 tables

Joining tables - SQL implementation (Primary key and Foreign key)

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Foreign Key

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Primary key

Supplier

Joining tables - JOIN Operation

List the Product code, product description, unit price, Supplier ID and Supplier name for each product in the stock

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Joining tables - JOIN Operation

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

SQL
SELECT *
FROM Product, Supplier
WHERE Product.Supplier_ID = Supplier.Supplier_ID

Prod_Code	Prod_Desc	Unit_px	Supplier_ID	Supplier_Name
HG6159	Sale Dress Pink	15.40	S1002	Ladies Green Pte Ltd
HG7160	Sale Dress White	15.90	S1001	King Dress Pte Ltd
HG7166	Dress Blue	15.90	S1003	Pretty Lady Pte Ltd
RQ0207	Dress White	18.60	S1002	Ladies Green Pte Ltd

Resulting Table

Joining tables - JOIN Operation use table alias as shortcuts

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

SQL
SELECT Prod_Code, Prod_Desc, Unit_px, S.Supplier_ID
FROM Product P, Supplier S
WHERE P.Supplier_ID = S.Supplier_ID

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG6159	Sale Dress Pink	15.40	S1002
HG7160	Sale Dress White	15.90	S1001
HG7166	Dress Blue	15.90	S1003
RQ0207	Dress White	18.60	S1002

Resulting Table

Joining tables - Cartesian Product

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

SQL
SELECT *
FROM Product, Supplier

C

Joining tables -How to get the Cartesian Product

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

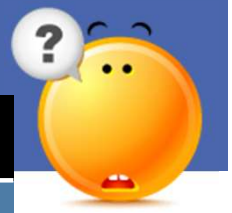
Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Product.Prod_Code	Product.Prod_Desc	Product.Unit_px	Product.Supplier_ID	Supplier.Supplier_ID	Supplier.Supplier_Name
HG7160	Sale Dress White	15.90	S1001	S1001	King Dress Pte Ltd
RQ0207	Dress White	18.60	S1002	S1001	King Dress Pte Ltd
HG7166	Dress Blue	15.90	S1003	S1001	King Dress Pte Ltd
HG6159	Sale Dress Pink	15.40	S1002	S1001	King Dress Pte Ltd

Part of Resulting Table

Joining tables -How to get the Cartesian Product



Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Product.Prod_Code	Product.Prod_Desc	Product.Unit_px	Product.Supplier_ID	Supplier.Supplier_ID	Supplier.Supplier_Name
HG7160	Sale Dress White	15.90	S1001	S1002	Ladies Green Pte Ltd
RQ0207	Dress White	18.60	S1002	S1002	Ladies Green Pte Ltd
HG7166	Dress Blue	15.90	S1003	S1002	Ladies Green Pte Ltd
HG6159	Sale Dress Pink	15.40	S1002	S1002	Ladies Green Pte Ltd

Part of Resulting Table

Joining tables -How to get the Cartesian Product

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Product.Prod_Code	Product.Prod_Desc	Product.Unit_px	Product.Supplier_ID	Supplier.Supplier_ID	Supplier.Supplier_Name
HG7160	Sale Dress White	15.90	S1001	S0000	Supplier not found
RQ0207	Dress White	18.60	S1002	S0000	Supplier not found
HG7166	Dress Blue	15.90	S1003	S0000	Supplier not found
HG6159	Sale Dress Pink	15.40	S1002	S0000	Supplier not found

Part of Resulting Table

Joining tables -Cartesian Product

Product.Prod_Code	Product.Prod_Desc	Product.Unit_px	Product.Supplier_ID	Supplier.Supplier_ID	Supplier.Supplier_Name
HG7160	Sale Dress White	15.90	S1001	S1001	King Dress Pte Ltd
RQ0207	Dress White	18.60	S1002	S1001	King Dress Pte Ltd
HG7166	Dress Blue	15.90	S1003	S1001	King Dress Pte Ltd
HG6159	Sale Dress Pink	15.40	S1002	S1001	King Dress Pte Ltd
HG7160	Sale Dress White	15.90	S1001	S1002	Ladies Green Pte Ltd
RQ0207	Dress White	18.60	S1002	S1002	Ladies Green Pte Ltd
HG7166	Dress Blue	15.90	S1003	S1002	Ladies Green Pte Ltd
HG6159	Sale Dress Pink	15.40	S1002	S1002	Ladies Green Pte Ltd
HG7160	Sale Dress White	15.90	S1001	S1003	Pretty Lady Pte Ltd
RQ0207	Dress White	18.60	S1002	S1003	Pretty Lady Pte Ltd
HG7166	Dress Blue	15.90	S1003	S1003	Pretty Lady Pte Ltd
HG6159	Sale Dress Pink	15.40	S1002	S1003	Pretty Lady Pte Ltd
HG7160	Sale Dress White	15.90	S1001	S0000	Supplier not found
RQ0207	Dress White	18.60	S1002	S0000	Supplier not found
HG7166	Dress Blue	15.90	S1003	S0000	Supplier not found
HG6159	Sale Dress Pink	15.40	S1002	S0000	Supplier not found

Resulting Table

Joining tables - Joining more than 2 tables

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Join 3 tables

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

Customer_ID	Customer_Name
C1001	Rachel Ng
C1002	Linda Ng
C1003	David Ang

Customer

Joining tables - Joining more than 2 tables

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Join 1

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

Customer

Customer_ID	Customer_Name
C1001	Rachel Ng
C1002	Linda Ng
C1003	David Ang

Join 2

SQL
SELECT P.Prod_code, Prod_desc, Customer_name, Qty, Tran_Date
FROM Product P, Sales S, Customer C
WHERE P.Prod_code = S.Prod_code
AND S.Customer_ID = C.Customer_ID

Joining tables - Joining more than 2 tables

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

SQL
SELECT P.Prod_code, Prod_desc, Customer_name, Qty, Tran_Date
FROM Product P, Sales S, Customer C
WHERE P.Prod_code = S.Prod_code
AND S.Customer_ID = C.Customer_ID

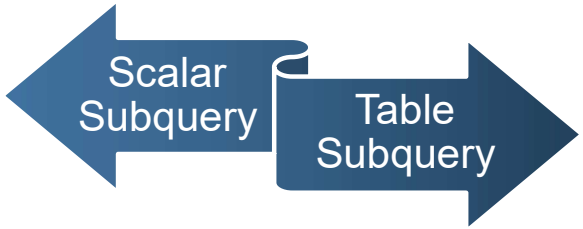
Customer_ID	Customer_Name
C1001	Rachel Ng
C1002	Linda Ng
C1003	David Ang

Customer

Resulting Table

Prod_Code	Prod_Desc	Customer_name	Qty	Tran_Date
HG7160	Sale Dress White	Rachel Ng	1	2013-12-10
RQ0207	Dress White	Rachel Ng	3	2013-12-10
HG6159	Sale Dress Pink	Linda Ng	2	2014-03-17
HG6159	Sale Dress Pink	David Ang	1	2014-04-19

Sub-Query – Scalar and Table Sub-Query



- A Scalar Subquery returns a **single row** and a **single column**
- Use with comparison operators such as =, >, <, >=, <=, <>

- A Table Subquery returns **one or more columns and multiple rows**
- Use with **IN**
- Use with **Select…From**

Sub-Query - Example of Scalar Subquery

List the Product code, product description, unit price of the product where unit price is more than the average unit price of all the products.

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Customer_ID	Customer_Name
C1001	Rachel Ng
C1002	Linda Ng
C1003	David Ang

Customer

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

Sub-Query - Example of Scalar Subquery

List the Product code, product description, unit price of the product where unit price is more than the average unit price of all the products.

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Step 2 : OUTER QUERY

SQL
SELECT Prod_code, Prod_Desc, Unit_price
FROM Product
WHERE Unit_price >
16.45

Step 1: INNER QUERY

Prod_Code	Prod_Desc	Unit_px
RQ0207	Dress White	18.60

Resulting Table

Sub-Query - Example of Table Subquery

List the Product code, product description and supplier ID for those products that are sold to the customers .

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Customer_ID	Customer_Name
C1001	Rachel Ng
C1002	Linda Ng
C1003	David Ang

Customer

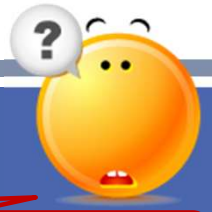
Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

Sub-Query - Example of Table Subquery



List the Product code, product description and supplier ID for those products that are sold to the customers .

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

Step 2 : OUTER QUERY

SQL
SELECT Prod_code, Prod_Desc, Supplier_ID
FROM Product
WHERE Prod_code IN
HG7160 RQ0207 HG6159

Prod_Code	Prod_Desc	Supplier_ID
HG6159	Sale Dress Pink	S1002
HG7160	Sale Dress White	S1001
RQ0207	Dress White	S1002

Resulting Table

Step 1 : INNER SUBQUERY

Sub-Query - Example of Table Subquery

List the Supplier ID and the number of products purchased by customers

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Customer_ID	Customer_Name
C1001	Rachel Ng
C1002	Linda Ng
C1003	David Ang

Customer

Supplier_ID	Supplier_Name
S1001	King Dress Pte Ltd
S1002	Ladies Green Pte Ltd
S1003	Pretty Lady Pte Ltd
S0000	Supplier not found

Supplier

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

Sub-Query - Example of Table Subquery

List the Supplier ID and the number of products purchased by customers.

Prod_Code	Prod_Desc	Unit_px	Supplier_ID
HG7160	Sale Dress White	15.90	S1001
RQ0207	Dress White	18.60	S1002
HG7166	Dress Blue	15.90	S1003
HG6159	Sale Dress Pink	15.40	S1002

Product

Customer_ID	Prod_code	Qty	Tran_date
C1001	HG7160	1	10/12/2013
C1001	RQ0207	3	10/12/2013
C1002	HG6159	2	17/3/2014
C1003	HG6159	1	19/4/2014

Sales

Step 2 : OUTER QUERY

```
SQL
SELECT Supplier_ID, count(*)
FROM
(SELECT s.Prod_code, p.Supplier_ID
FROM Sales s, Product p
WHERE s.Prod_code = p.Prod_Code)
As subquery
Group By Supplier_ID
```

Step 1 : INNER SUBQUERY

Supplier_ID	
S1001	1
S1002	3

Resulting Table