SQL 介紹與教學

Outline

資料庫介紹

SQL SERVER Management Studio 介面介紹

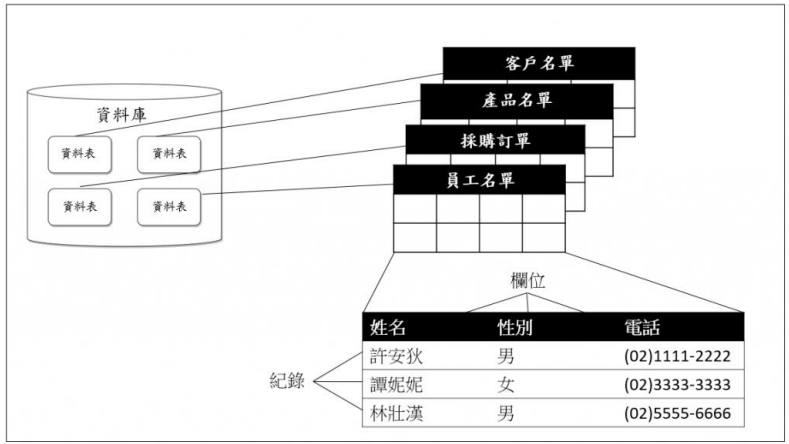
常用指令

進階指令

為什麼要有資料庫？

資料庫(Database, DB)

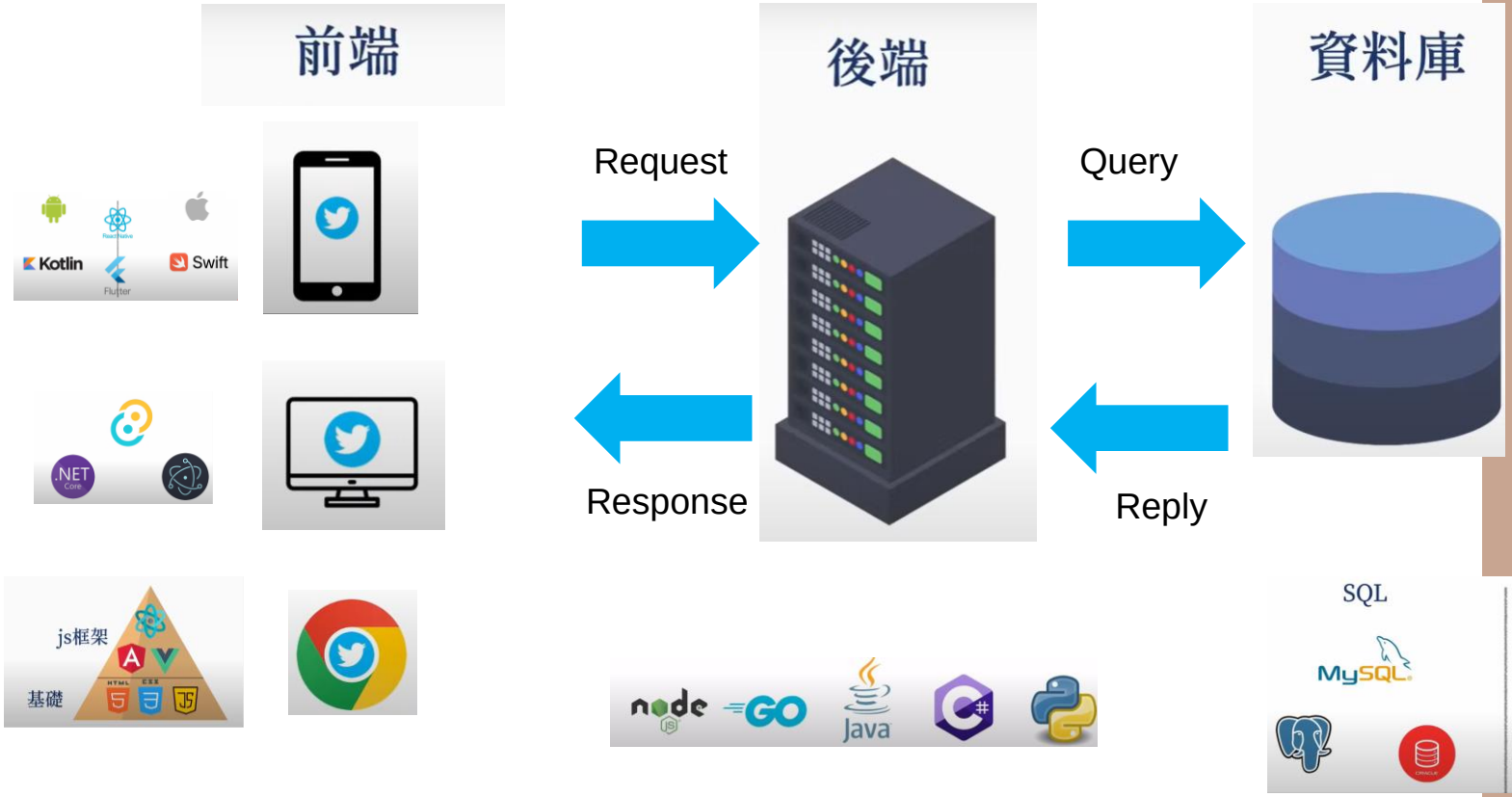
存放龐大資料的地方，裡面是由多張資料表匯集而成



資料庫管理系統(Database Management System, DBMS)

提供使用者一個環境，可以有效率且方便的對資料庫進行管理。

為什麼要有資料庫？



主鍵 - Primary KEY

(1) 用來辨識記錄的欄位, 具有唯一性不允許重複，因此不是每個欄位都適合作主鍵。

(2) 資料表不一定要有主鍵，但一般來說 99.9%都會設計成有主鍵。

(3) 通常每個資料表只有一個欄位設定為主鍵, 但有時可能沒有一個欄位具有唯一性, 此時可考慮使用兩個或多個欄位組合起來做為主鍵。

外鍵 - Foreign KEY

(1) 外鍵是用來連結其他資料表用的，資料表之間的關係是藉由外鍵所建立的。

(2) 不具唯一性。

Employee

emp_id	name	birth_date	sex	salary	branch_id	sup_id
206	小黃	1999/10/8	F	50000	1	NULL
207	小綠	1985/9/16	M	29000	2	206
208	小黑	2000/12/19	M	35000	3	206
209	小白	1997/1/22	F	39000	3	207
210	小蘭	1925/11/10	F	84000	1	207

Branch

branch_id	branch_name	manager_id
1	研發	206
2	行政	207
3	資訊	208

Client

client_id	client_name	phone
400	阿狗	254354335
401	阿貓	25633899
402	旺來	45354345
403	露西	54354365
404	艾瑞克	18783783

Works_With

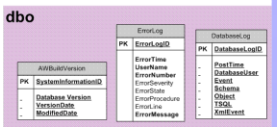
emp_id	client_id	total_sales
206	400	70000
207	401	24000
208	400	9800
208	403	24000
210	404	87940

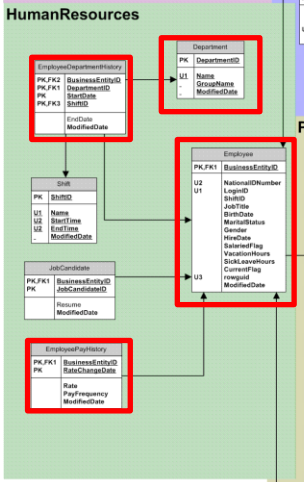
AdventureWorks 2008 OLTP Schema

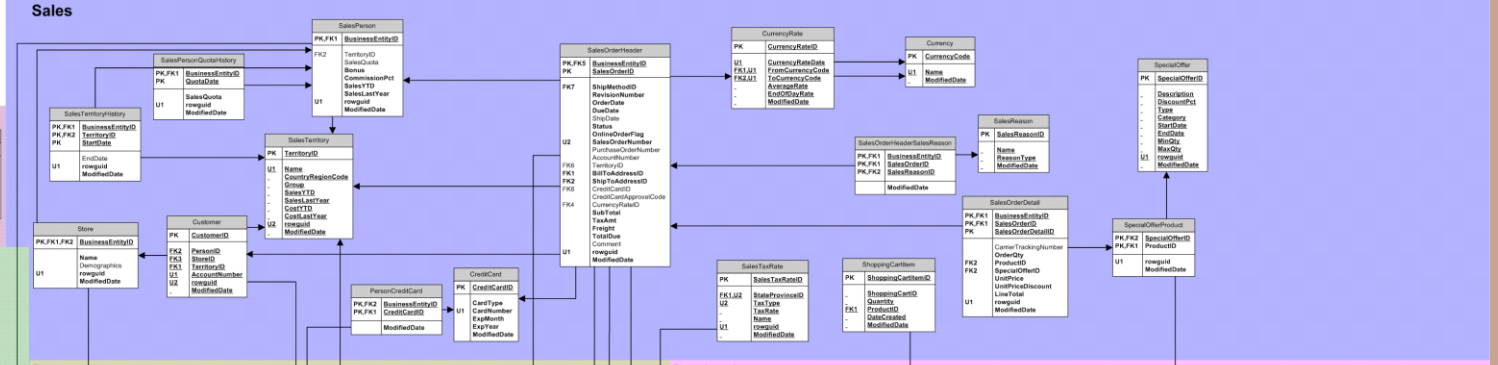
Rev 10.00.0009

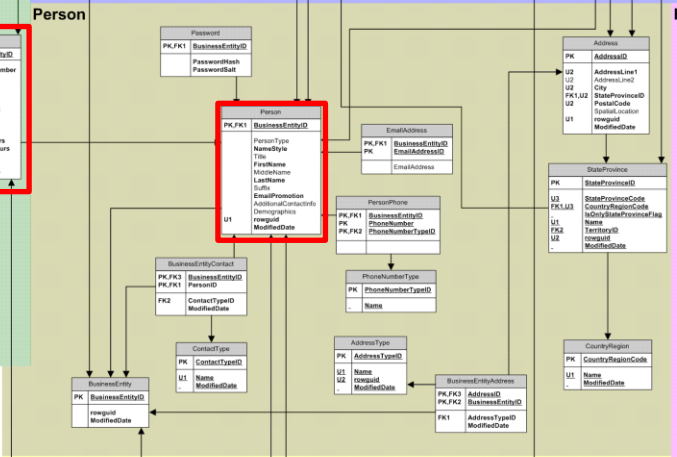
Best Print Results if:
11X17 paper
Landscape
Fit to 1 sheet

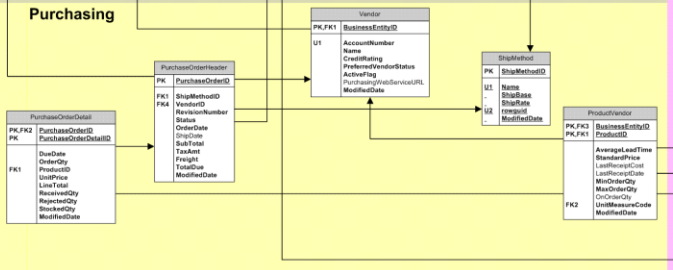
Samples and Sample Databases at
http://CodePlex.com/SqlServerSamples

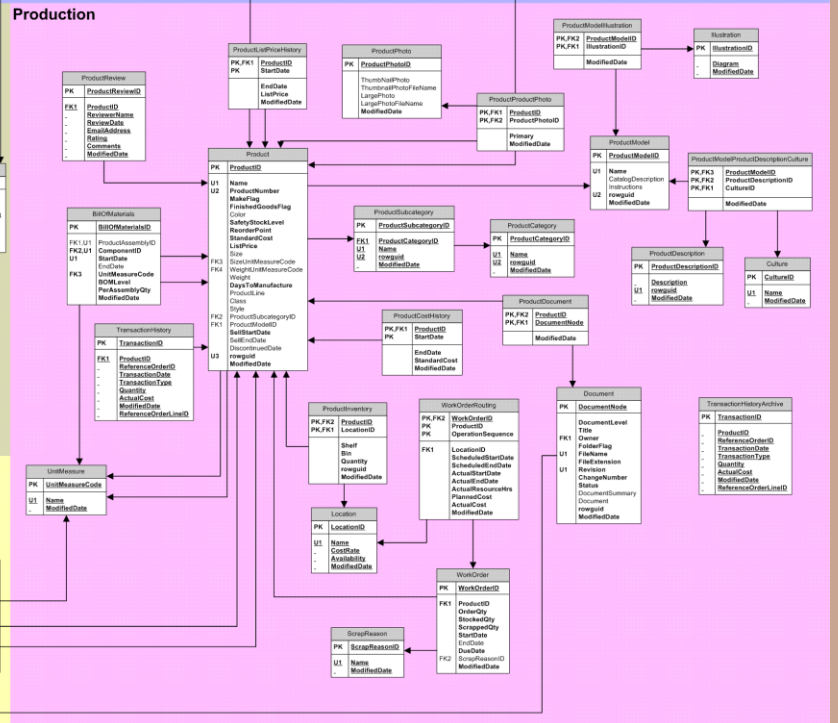






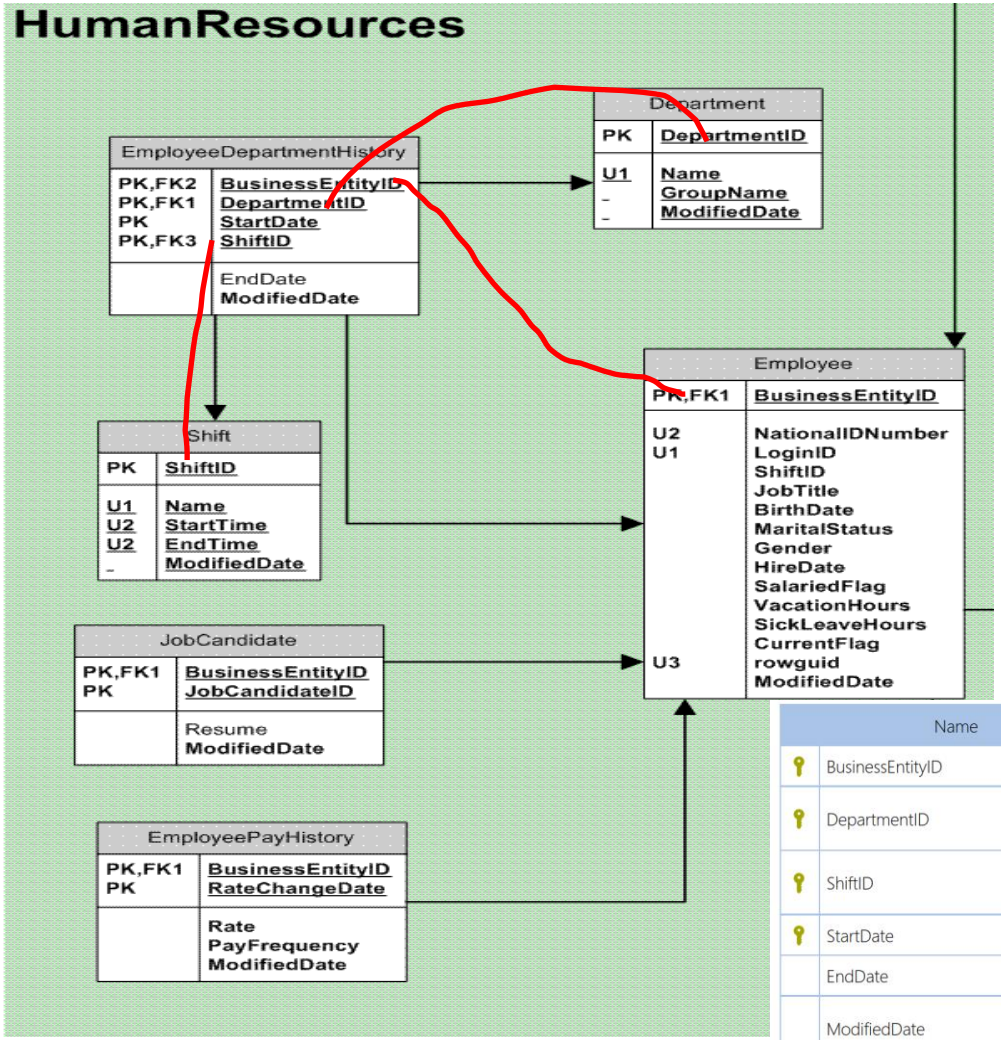






Schemas

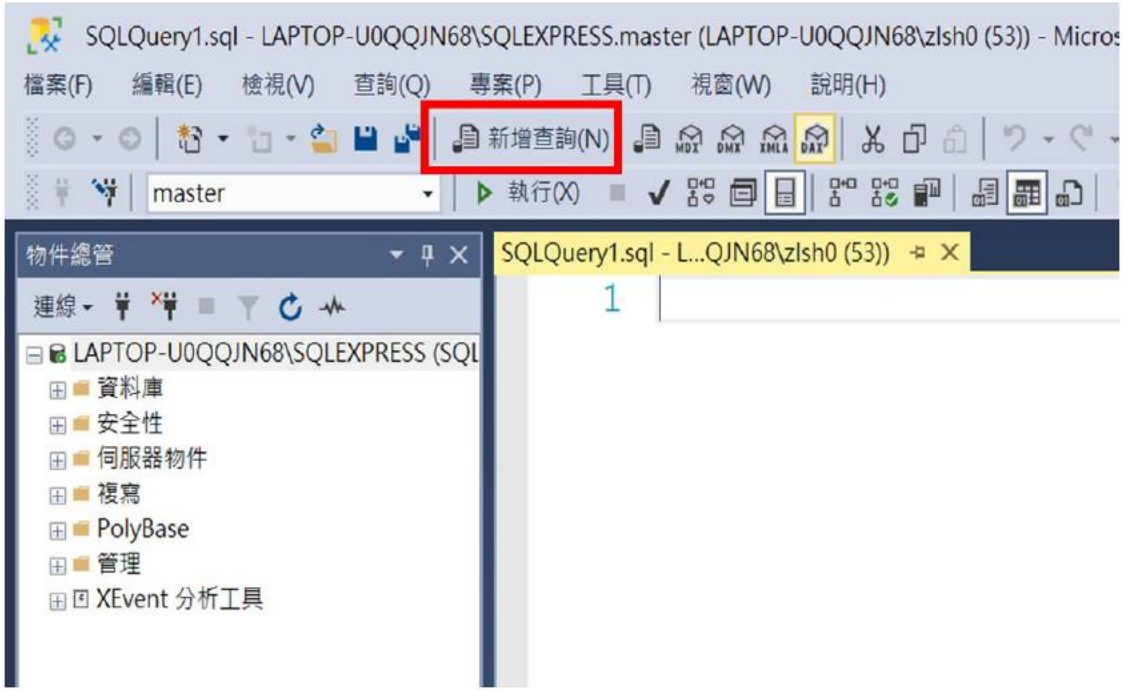
- Sales
- Purchasing
- Person
- Production
- HumanResources
- dbo



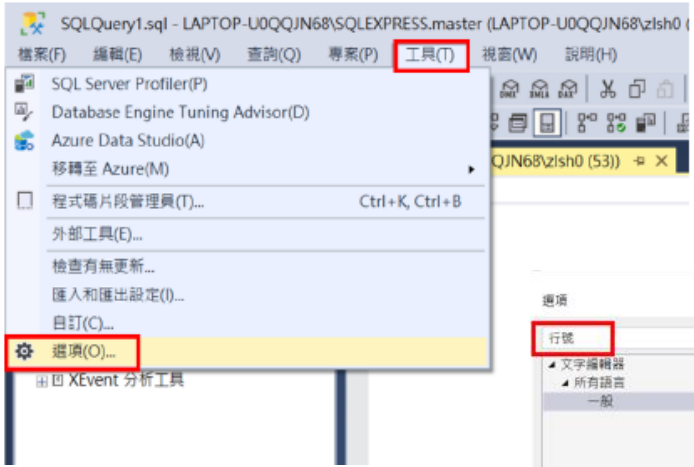
	Name	Data type	N	Description / Attributes
🔑	BusinessEntityID	int		Employee identification number. Foreign key to Employee.BusinessEntityID
🔑	DepartmentID	smallint		Department in which the employee worked including currently. Foreign key to Department.DepartmentID.
🔑	ShiftID	tinyint		Identifies which 8-hour shift the employee works. Foreign key to Shift.Shift.ID.
🔑	StartDate	date		Date the employee started work in the department.
	EndDate	date	N	Date the employee left the department. NULL = Current department.
	ModifiedDate	datetime		Date and time the record was last updated. Default: getdate()

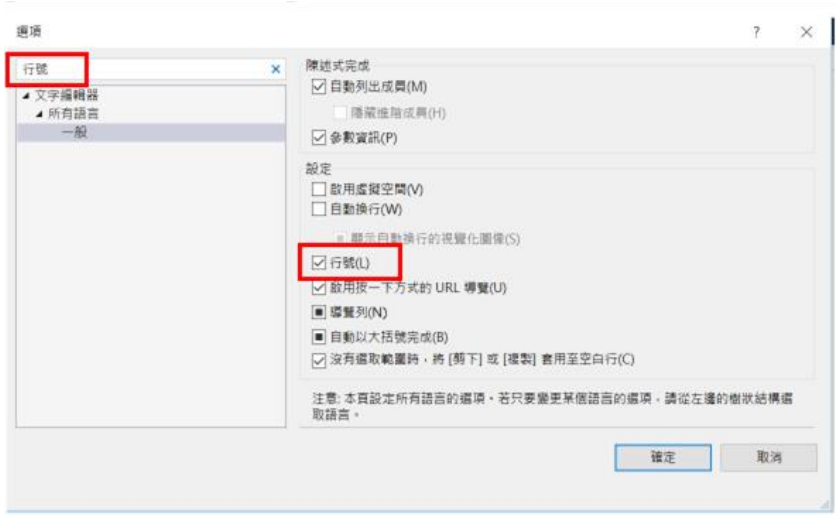
使用介面

- Ctrl + N


SQLQuery1.sql - LAPTOP-U0QQJN68\SQLEXPRESS.master (LAPTOP-U0QQJN68\zlsh0 (53)) - Micros
檔案(F)
編輯(E)
檢視(V)
查詢(Q)
專案(P)
工具(T)
視窗(W)
說明(H)
新增查詢(N)
master
執行(X)
物件總管
連線
LAPTOP-U0QQJN68\SQLEXPRESS (SQL
資料庫
安全性
伺服器物件
複寫
PolyBase
管理
XEvent 分析工具
SQLQuery1.sql - L...QJN68\zlsh0 (53))
1

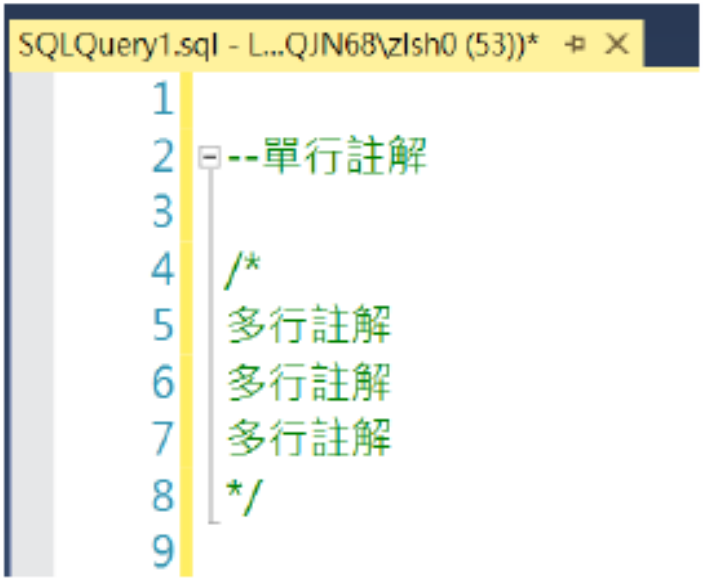
使用介面


SQLQuery1.sql - LAPTOP-U0QQJN68\SQLEXPRESS.master (LAPTOP-U0QQJN68\zlsh0
檔案(F) 編輯(E) 檢視(V) 查詢(Q) 專案(P) 工具(T) 視窗(W) 說明(H)
SQL Server Profiler(P)
Database Engine Tuning Advisor(D)
Azure Data Studio(A)
移轉至 Azure(M)
程式碼片段管理員(T)... Ctrl+K, Ctrl+B
外部工具(E)...
檢查有無更新...
匯入和匯出設定(I)...
自訂(C)...
選項(O)...
XEvent 分析工具


選項
行號
文字編輯器
所有語言
一般
陳述式完成
自動列出成員(M)
參數資訊(P)
設定
啟用虛擬空間(V)
自動換行(W)
行號(L)
啟用按一下方式的 URL 導覽(U)
導覽列(N)
自動以大括號完成(B)
確定
取消

註解寫法

- 單行註釋： --放入要註釋的內容
- 多行註釋： /*放入要註釋的內容*/



使用資料介紹常用指令

EX1：查詢HumanResources.Employee裡員工的所有職稱

```
SELECT　欄位名稱
FROM　表名
```

```
SELECT JobTitle                 /*挑選欄位*/
FROM HumanResources.Employee    /*從資料表*/
```

133 %

結果　訊息

	JobTitle
1	Chief Executive Officer
2	Vice President of Engineering
3	Engineering Manager
4	Senior Tool Designer
5	Design Engineer
6	Design Engineer
7	Research and Development Manager
8	Research and Development Engineer
9	Research and Development Engineer
10	Research and Development Manager

使用資料介紹常用指令

EX2：查詢HumanResources.Employee裡員工的所有職稱

```
SELECT   DISTINCT 欄位名稱
FROM   表名
```

```
SELECT DISTINCT JobTitle
FROM HumanResources.Employee
```

結果 訊息

	JobTitle
1	Accountant
2	Accounts Manager
3	Accounts Payable Specialist
4	Accounts Receivable Specialist
5	Application Specialist
6	Assistant to the Chief Financial Officer
7	Benefits Specialist
8	Buyer
9	Chief Executive Officer
10	Chief Financial Officer

使用資料介紹常用指令

EX3：查詢HumanResources.Employee裡的員工，**性別為女性，且職稱為Design Engineer的員工，**查詢結果要有BusinessEntityID和雇用日期HireDate。

```
SELECT   欄位名稱
FROM   表名
WHERE   條件敘述
```

```
SELECT BusinessEntityID, JobTitle, Gender, HireDate
FROM HumanResources.Employee
WHERE JobTitle='Design Engineer' AND Gender='F'
```

結果 訊息

	BusinessEntityID	JobTitle	Gender	HireDate
1	5	Design Engineer	F	2008-01-06
2	15	Design Engineer	F	2011-01-18

使用資料介紹常用指令

EX4：查詢HumanResources.Employee裡的員工，找出女生的員工，結果要顯示BusinessEntityID, Gender, HireDate, Jobtitle,並且**依照HireDate由小到大排序**

```
SELECT   欄位名稱
FROM   表名
WHERE   條件敘述
ORDER BY  欄位名稱
```

```
SELECT BusinessEntityID, Gender, HireDate, JobTitle
FROM HumanResources.Employee
WHERE Gender='F'
ORDER BY HireDate
--ORDER BY HireDate DESC
/* 預設是由小到大，可以加上 DESC 改為由大到小*/
```

結果 訊息

	BusinessEntityID	Gender	HireDate	JobTitle
1	40	F	2007-12-26	Production Supervisor - WC60
2	5	F	2008-01-06	Design Engineer
3	48	F	2008-01-06	Production Technician - WC10
4	2	F	2008-01-31	Vice President of Engineering
5	27	F	2008-02-27	Production Supervisor - WC60
6	52	F	2008-03-10	Production Technician - WC10
7	53	F	2008-03-28	Production Technician - WC10
8	235	F	2008-12-06	Human Resources Manager
9	122	F	2008-12-07	Stocker

使用資料介紹常用指令

EX5：已知行銷部門的職稱開頭都為**Marketing 開頭**，利用HumanResources.Employee 資料表中 JobTitle 欄位的查詢行銷部門的員工有誰。

```
SELECT   欄位名稱
FROM   表名
WHERE   欄位名稱 LIKE 條件
```

```
SELECT *
FROM HumanResources.Employee
WHERE JobTitle LIKE 'Marketing%'
```

	BusinessEntityID	NationalIDNumber	LoginID	OrganizationNode	OrganizationLevel	JobTitle	BirthDate	MaritalS
1	16	24756624	adventure-works\david0	0x68	1	Marketing Manager	1975-03-19	S
2	17	253022876	adventure-works\kevin0	0x6AC0	2	Marketing Assistant	1987-05-03	S
3	18	222969461	adventure-works\john5	0x6B40	2	Marketing Specialist	1978-03-06	S
4	19	52541318	adventure-works\mary2	0x6BC0	2	Marketing Assistant	1978-01-29	S
5	20	323403273	adventure-works\wanida0	0x6C20	2	Marketing Assistant	1975-03-17	M
6	21	243322160	adventure-works\terry0	0x6C60	2	Marketing Specialist	1986-02-04	M
7	22	95958330	adventure-works\sariya0	0x6CA0	2	Marketing Specialist	1987-05-21	S
8	23	767955365	adventure-works\mary0	0x6CE0	2	Marketing Specialist	1962-09-13	M
9	24	72636981	adventure-works\jill0	0x6D10	2	Marketing Specialist	1979-06-18	M

使用資料介紹常用指令

EX6 : 利用HumanResources.Employee 查詢非行銷部門的員工有誰。

```
SELECT   欄位名稱
FROM   表名
WHERE   欄位名稱 NOT LIKE 條件
```

```
SELECT *
FROM HumanResources.Employee
WHERE JobTitle NOT LIKE 'Marketing%'
```

	BusinessEntityID	NationalIDNumber	LoginID	OrganizationNode	OrganizationLevel	JobTitle
1	1	295847284	adventure-works\ken0	NULL	NULL	Chief Executive Officer
2	2	245797967	adventure-works\terri0	0x58	1	Vice President of Engineering
3	3	509647174	adventure-works\roberto0	0x5AC0	2	Engineering Manager
4	4	112457891	adventure-works\rob0	0x5AD6	3	Senior Tool Designer
5	5	695256908	adventure-works\gail0	0x5ADA	3	Design Engineer
6	6	998320692	adventure-works\jossef0	0x5ADE	3	Design Engineer
7	7	134969118	adventure-works\dylan0	0x5AE1	3	Research and Development Manager

運算子介紹

算術運算子

算數運算子			
運算子	用途	用法	結果
+	加法	1+2	3
-	減法	3-5	-2
*	乘法	6*6	36
/	商數	8/5	1.6
%	餘數	8%5	3

邏輯運算子	
運算子	語意
AND	且
OR	或
NOT	非

比較運算子			
運算子	語意	用法	結果
<	小於	3 < 5	TRUE
>	大於	8 > 1	TRUE
<=	小於等於	20 <= 10	TRUE
>=	大於等於	4 >= 6	TRUE
=	等於	2 = 2	TRUE
<>	不等於	7 < > 6	TRUE
BETWEEN	在某個範圍內		
LIKE	符合模式條件		
IN	值存在於IN集合中		

使用資料介紹常用指令

EX7 : 利用HumanResources.Employee 查詢員工 **VacationHour在 40~45 間的員工。**

```
--#1
SELECT BusinessEntityID, VacationHours
FROM HumanResources.Employee
WHERE VacationHours BETWEEN 40 AND 45
--#2
SELECT BusinessEntityID, VacationHours
FROM HumanResources.Employee
WHERE VacationHours >=40 AND VacationHours <= 45
```

結果 訊息

	BusinessEntityID	VacationHours
1	16	40
2	17	42
3	19	43
4	20	41
5	21	44
6	22	45
7	26	43
8	72	41

使用資料介紹常用指令

算術運算子+排序

EX8 : 利用HumanResources.Employee 查詢員工 VacationHour在 40~45 間的員工，並**以 VacationHour 大到小排序。**

```
SELECT BusinessEntityID, VacationHours
FROM HumanResources.Employee
WHERE VacationHours BETWEEN 40 AND 45
ORDER BY VacationHours DESC  /*加上 DESC 改為由大到小*/
```

結果 訊息

	BusinessEntityID	VacationHours
1	22	45
2	76	45
3	224	45
4	222	44
5	75	44
6	21	44
7	26	43
8	19	43

使用資料介紹進階指令

Ex9 : 利用HumanResources.Employee , EmployeeDepartmentHistory 查詢員工性別Gender、職稱JobTitle、部門代號DepartmentID

```
SELECT Gender, JobTitle, DepartmentID
FROM HumanResources.Employee , HumanResources.EmployeeDepartmentHistory
WHERE HumanResources.Employee.BusinessEntityID = HumanResources.EmployeeDepartmentHistory.BusinessEntityID


SELECT Gender, JobTitle, DepartmentID
FROM HumanResources.Employee as e , HumanResources.EmployeeDepartmentHistory as edh
WHERE e.BusinessEntityID = edh.BusinessEntityID /*將兩張表的ID合併*/
```

Ex10 : 利用HumanResources .E mployeeDepartmentHistory 和HumanResources.Department 這兩張表中的 DepartmentID ， 查詢員工隸屬在哪個部門 Name ， 和部門所屬的團隊名稱 GroupName。

```
SELECT edp.BusinessEntityID , dp.DepartmentID, dp.GroupName , dp.Name
FROM HumanResources.Department as dp, HumanResources.EmployeeDepartmentHistory as edp
WHERE dp.DepartmentID=edp.DepartmentID

--也可以不用as
SELECT edp.BusinessEntityID , dp.DepartmentID, dp.GroupName , dp.Name
FROM HumanResources.Department  dp, HumanResources.EmployeeDepartmentHistory  edp
WHERE dp.DepartmentID=edp.DepartmentID
```

Where v.s Join

```
SELECT  欄位名稱
FROM  表A, 表B
WHERE  表A.欄位名稱 = 表B.欄位名稱
```

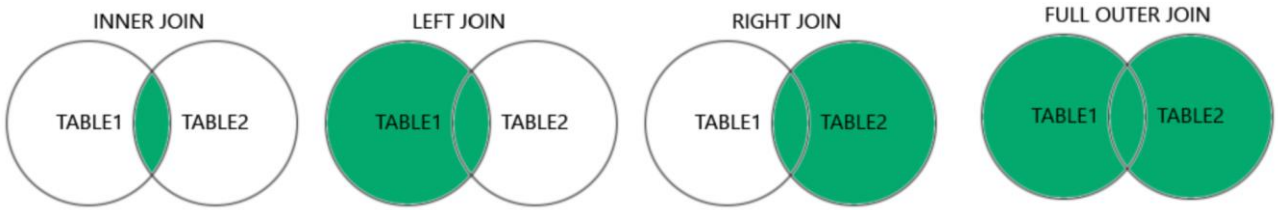
```sql
SELECT edp.BusinessEntityID , dp.DepartmentID, dp.GroupName , dp.Name
FROM HumanResources.Department  dp, HumanResources.EmployeeDepartmentHistory  edp
WHERE dp.DepartmentID=edp.DepartmentID
```

```
SELECT  欄位名稱
FROM  表A  JOIN  表B
ON  表A.欄位名稱 = 表B.欄位名稱
```

```sql
SELECT edp.BusinessEntityID , dp.DepartmentID, dp.GroupName , dp.Name
FROM HumanResources.Department  dp JOIN HumanResources.EmployeeDepartmentHistory  edp
ON dp.DepartmentID=edp.DepartmentID

-- JOIN 左右順序相反會得到同樣的結果
SELECT edp.BusinessEntityID , dp.DepartmentID, dp.GroupName , dp.Name
FROM HumanResources.EmployeeDepartmentHistory  edp  JOIN HumanResources.Department  dp
ON dp.DepartmentID=edp.DepartmentID
```

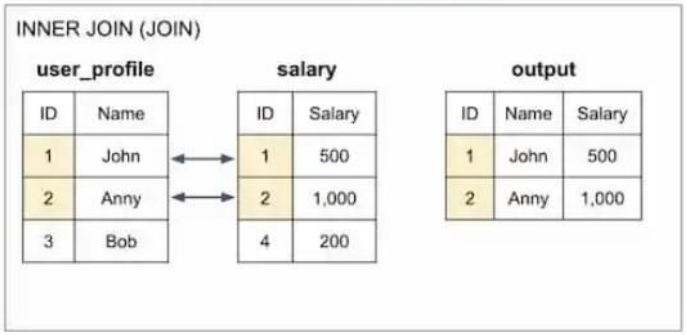
I個Select Statement - Joins

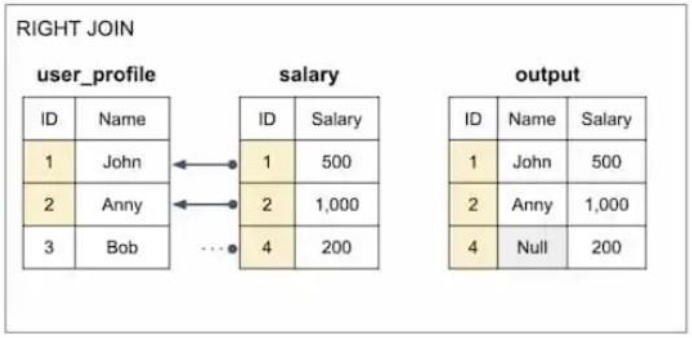


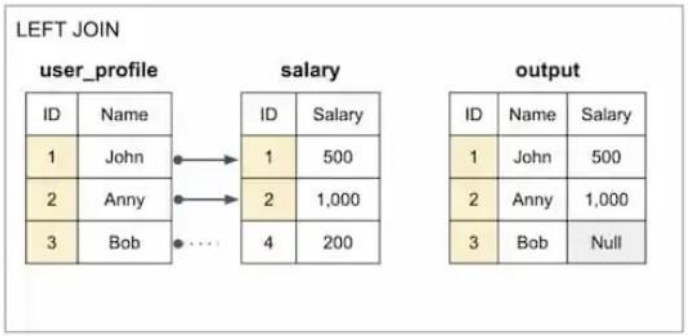
Here are the different types of the JOINs in SQL:

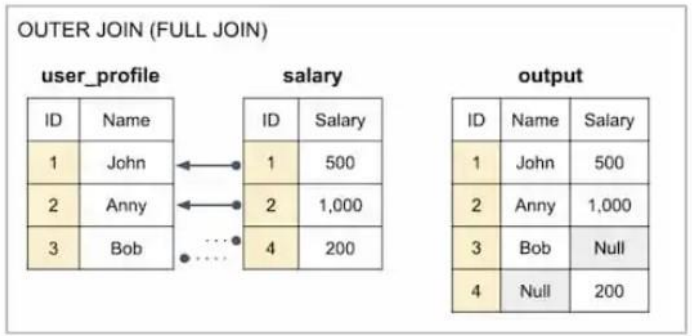
- `(INNER) JOIN`: Returns records that have matching values in both tables
- `LEFT (OUTER) JOIN`: Returns all records from the left table, and the matched records from the right table
- `RIGHT (OUTER) JOIN`: Returns all records from the right table, and the matched records from the left table
- `FULL (OUTER) JOIN`: Returns all records when there is a match in either left or right table

關於Joins


INNER JOIN (JOIN)
user_profile
ID Name
1 John
2 Anny
3 Bob
salary
ID Salary
1 500
2 1,000
4 200
output
ID Name Salary
1 John 500
2 Anny 1,000


RIGHT JOIN
user_profile
ID Name
1 John
2 Anny
3 Bob
salary
ID Salary
1 500
2 1,000
4 200
output
ID Name Salary
1 John 500
2 Anny 1,000
4 Null 200


LEFT JOIN
user_profile
ID Name
1 John
2 Anny
3 Bob
salary
ID Salary
1 500
2 1,000
4 200
output
ID Name Salary
1 John 500
2 Anny 1,000
3 Bob Null


OUTER JOIN (FULL JOIN)
user_profile
ID Name
1 John
2 Anny
3 Bob
salary
ID Salary
1 500
2 1,000
4 200
output
ID Name Salary
1 John 500
2 Anny 1,000
3 Bob Null
4 Null 200

使用資料介紹進階指令

Ex11：Person.Person 裡面有公司所有供應商、員工、客戶的自然人資料，HumanResources.Employee 只有員工，請合併兩張表並保留 Person.Person 的資訊，並查詢FirstName、 LastName 、 Gender 、 BirthDate 、 HireDate 、 JobTitle 。

```
SELECT  欄位名稱
FROM  表A  LEFT JOIN  表B     -- 表A  RIGHT JOIN  表B
ON  表A.欄位名稱 = 表B.欄位名稱
```

Person.Person

Column Name	Data Type	Allow Nulls
BusinessEntityID	int	☐
PersonType	nchar(2)	☐
NameStyle	NameStyle:bit	☐
Title	nvarchar(8)	☑
FirstName	Name:nvarchar(50)	☐
MiddleName	Name:nvarchar(50)	☑
LastName	Name:nvarchar(50)	☐
Suffix	nvarchar(10)	☑
EmailPromotion	int	☐
AdditionalContactInfo	xml(CONTENT Person...	☑
Demographics	xml(CONTENT Person...	☑
rowguid	uniqueidentifier	☐
ModifiedDate	datetime	☐
		☐

HumanResources.Employee

Column Name	Data Type	Allow Nulls
BusinessEntityID	int	☐
NationalIDNumber	nvarchar(15)	☐
LoginID	nvarchar(256)	☐
OrganizationNode	hierarchyid	☑
OrganizationLevel		☑
JobTitle	nvarchar(50)	☐
BirthDate	date	☐
MaritalStatus	nchar(1)	☐
Gender	nchar(1)	☐
HireDate	date	☐
SalariedFlag	Flag:bit	☐
VacationHours	smallint	☐
SickLeaveHours	smallint	☐
CurrentFlag	Flag:bit	☐
rowguid	uniqueidentifier	☐
ModifiedDate	datetime	☐
		☐

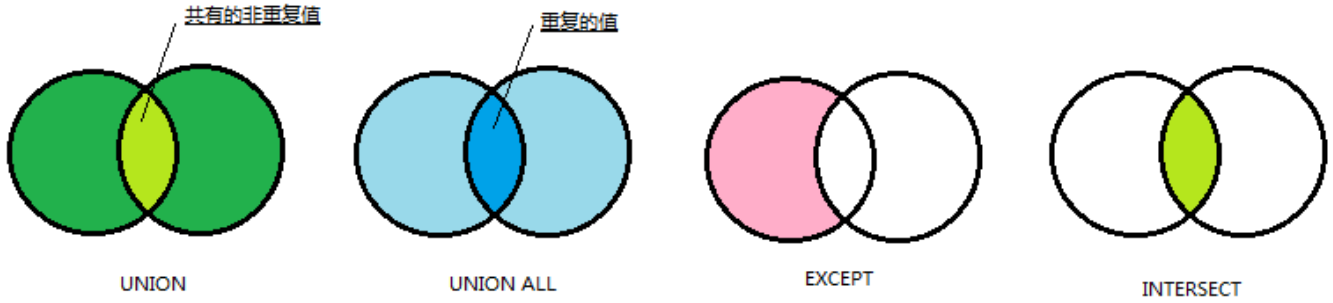
使用資料介紹進階指令

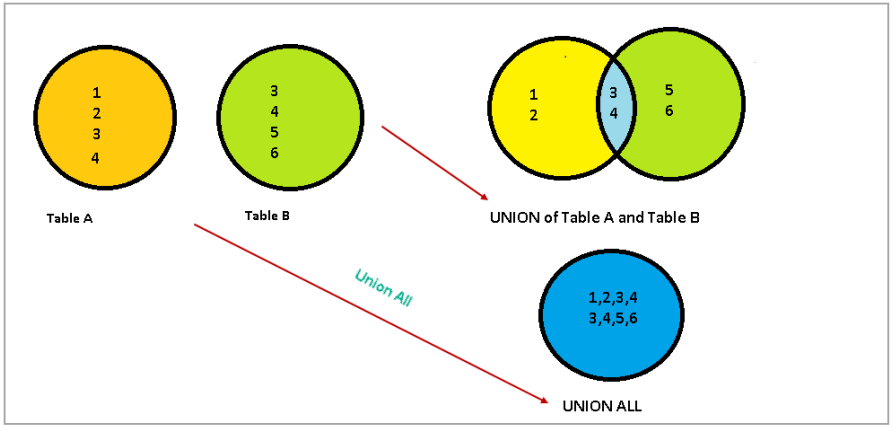
```
SELECT p.BusinessEntityID, p.FirstName, p.LastName, e.Gender,e.BirthDate, e.HireDate, e.JobTitle
FROM Person.Person p LEFT JOIN HumanResources.Employee e
ON p.BusinessEntityID=e.BusinessEntityID
```

	BusinessEntityID	FirstName	LastName	Gender	BirthDate	HireDate	JobTitle
1	285	Syed	Abbas	M	1975-01-11	2013-03-14	Pacific Sales Manager
2	293	Catherine	Abel	NULL	NULL	NULL	NULL
3	295	Kim	Abercrombie	NULL	NULL	NULL	NULL
4	2170	Kim	Abercrombie	NULL	NULL	NULL	NULL
5	38	Kim	Abercrombie	F	1966-12-14	2010-01-16	Production Technician - WC60
6	211	Hazem	Abolrous	M	1977-10-26	2009-02-28	Quality Assurance Manager
7	2357	Sam	Abolrous	NULL	NULL	NULL	NULL
8	297	Humberto	Acevedo	NULL	NULL	NULL	NULL
9	291	Gustavo	Achong	NULL	NULL	NULL	NULL
10	299	Pilar	Ackerman	NULL	NULL	NULL	NULL
11	121	Pilar	Ackerman	M	1972-09-09	2009-01-02	Shipping and Receiving Supervisor
12	16867	Aaron	Adams	NULL	NULL	NULL	NULL
13	16901	Adam	Adams	NULL	NULL	NULL	NULL

- 注意 LEFT JOIN 的語法，合併後會以哪邊的資訊為主要的資料表作保留
  (1) 如果是大 LEFT JOIN 小，會有 NULL(空值)的產生。
  (2) 如果是小 LEFT JOIN 大，則不會有上述情況。
  (3) RIGHT JOIN 就是情況反過來。

2個以上Select Statements – Union、Except、INTERSECT





使用資料介紹進階指令

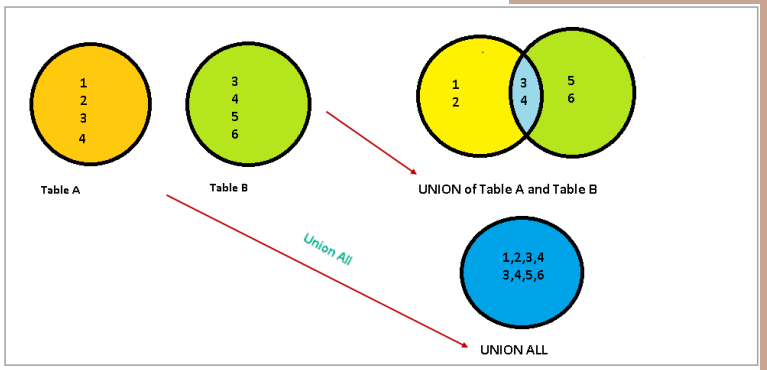
Ex12：列出HumanResources.Employee及Person.Person兩張表中，所有自然人編號。

```
SELECT BusinessEntityID
FROM HumanResources.Employee
UNION
SELECT BusinessEntityID
FROM Person.Person
```

	BusinessEntityID
19960	57
19961	205
19962	157
19963	14
19964	37
19965	137
19966	243
19967	8
19968	51
19969	151
19970	200
19971	194
19972	100

```
SELECT BusinessEntityID
FROM HumanResources.Employee
UNION ALL  /*加上ALL的話 即使重複也會被列出*/
SELECT BusinessEntityID
FROM Person.Person
```

	BusinessEntityID
20250	10345
20251	19654
20252	1857
20253	5497
20254	20526
20255	16441
20256	8952
20257	11868
20258	19884
20259	15339
20260	15308
20261	3917
20262	5869



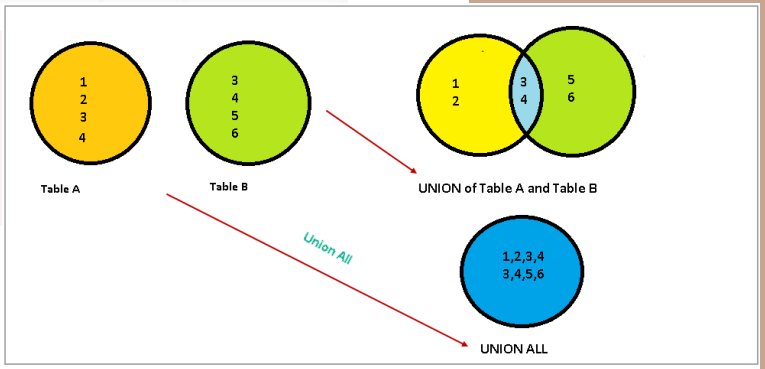
使用資料介紹進階指令

Ex13：使用HumanResources.Employee 查詢男性與SickLeaveHours大於30的員工，並將結果以SickLeaveHours排序。

```
SELECT BusinessEntityID, Gender, SickLeaveHours
FROM HumanResources.Employee
WHERE Gender='M'
UNION
SELECT BusinessEntityID, Gender, SickLeaveHours
FROM HumanResources.Employee
WHERE SickLeaveHours>30
ORDER BY SickLeaveHours
```

	BusinessEntityID	Gender	SickLeaveHours
1	95	M	20
2	97	M	20
3	139	M	20
4	141	M	20
5	3	M	21
6	14	M	21
7	99	M	21
8	101	M	21
9	143	M	21
10	98	M	22
11	136	M	22

- UNION使用注意事項
  (1) 運算資料表的欄位數量必須一致。
  (2) 對應欄位名字可以不同，但資料型別必須一致。
  (3) SELECT之後可以加入各種子句，但ORDER BY只能寫在最後一處。



彙總函數(COUNT、SUM、AVG、MAX、MIN)

EX14：利用HumanResources.Employee計算JobTitle總列數、VacationHours的平均、最小、最大值。

- 彙總函數的計算結果基本上會排除NULL，只有COUNT函數的"COUNT(*)"用法會包含NULL的紀錄筆數。

```
SELECT    COUNT(欄位名稱), SUM(欄位名稱), AVG(欄位名稱),....
FROM      表A
```

使用彙總函數搭配DISTINCT，排除重複值再彙總。

```
SELECT    COUNT(DISTINCT 欄位名稱), SUM(DISTINCT 欄位名稱), AVG(DISTINCT 欄位名稱),....
FROM      表A
```

```
SELECT COUNT(DISTINCT JobTitle), AVG(VacationHours)
FROM HumanResources.Employee
```

	(No column name)	(No column name)
1	67	50

- DISTINCT要寫在彙總函數裡面，不然會變成先彙總完再取不重複值。

GROUPING

Ex15：利用 HumanResources.Employee，計算相同職稱的人有幾個。

```
SELECT    欄位名稱, 彙總函數
FROM      表A
GROUP BY    分組欄位名稱
```

```
SELECT JobTitle, COUNT(BusinessEntityID)
FROM HumanResources.Employee
GROUP BY JobTitle
```

	JobTitle	(No column name)
1	Accountant	2
2	Accounts Manager	1
3	Accounts Payable Specialist	2
4	Accounts Receivable Specialist	3
5	Application Specialist	4
6	Assistant to the Chief Financial Officer	1
7	Benefits Specialist	1
8	Buyer	9
9	Chief Executive Officer	1
10	Chief Financial Officer	1
11	Control Specialist	2

GROUPING

Ex16：利用 HumanResources.EmployeeDepartmentHistory 和HumanResources.Department 這兩張表中的 DepartmentID，計算員工隸屬**同部門與相同團隊名稱(意即相同的 Name 和 GroupName)**的人有幾個。

```
SELECT dp.GroupName, dp.Name, COUNT(edp.BusinessEntityID) TotalNumber
FROM HumanResources.Department dp JOIN  HumanResources.EmployeeDepartmentHistory edp
ON dp.DepartmentID=edp.DepartmentID
GROUP BY dp.GroupName, dp.Name
```

	GroupName	Name	TotalNumber
1	Research and Development	Engineering	7
2	Research and Development	Tool Design	4
3	Sales and Marketing	Sales	18
4	Sales and Marketing	Marketing	10
5	Inventory Management	Purchasing	13
6	Research and Development	Research and Development	4
7	Manufacturing	Production	180
8	Manufacturing	Production Control	6
9	Executive General and Administration	Human Resources	6
10	Executive General and Administration	Finance	11
11	Executive General and Administration	Information Services	10

子查詢

Ex17：從HumanResources.EmployeePayHistory，查詢高於平均時薪的員工。

(1) 首先必須先知道平均時薪多少
(2) 再找出高於平均時薪的員工
→ 原本要分兩步驟做的事情，利用子查詢可以一次完成！

```
SELECT BusinessEntityID, Rate
FROM HumanResources.EmployeePayHistory
WHERE Rate >
  (SELECT AVG(Rate)
  FROM HumanResources.EmployeePayHistory)
```

	BusinessEntityID	Rate
1	1	125.50
2	2	63.4615
3	3	43.2692
4	4	23.72
5	4	29.8462
6	5	32.6923
7	6	32.6923
8	7	50.4808
9	8	40.8654

子查詢

Ex18：使用 HumanResources.Employee、HumanResources.Department 、HumanResources.EmployeeDepartmentHistory 這三個表，列出這些員工的工作職稱(Jobtitle)、性別(Gneder)，以及在哪些部門(DepartmentID 和 Name)。

HumanResources.EmployeeDepartmentHistory

Column Name	Data Type	Allow Nulls
BusinessEntityID	int	☐
DepartmentID	smallint	☐
ShiftID	tinyint	☐
StartDate	date	☐
EndDate	date	☑
ModifiedDate	datetime	☐
		☐

HumanResources.Employee

Column Name	Data Type	Allow Nulls
BusinessEntityID	int	☐
NationalIDNumber	nvarchar(15)	☐
LoginID	nvarchar(256)	☐
OrganizationNode	hierarchyid	☑
OrganizationLevel		☑
JobTitle	nvarchar(50)	☐
BirthDate	date	☐
MaritalStatus	nchar(1)	☐
Gender	nchar(1)	☐
HireDate	date	☐
SalariedFlag	Flag:bit	☐
VacationHours	smallint	☐
SickLeaveHours	smallint	☐
CurrentFlag	Flag:bit	☐
rowguid	uniqueidentifier	☐
ModifiedDate	datetime	☐
		☐

HumanResources.Department

Column Name	Data Type	Allow Nulls
DepartmentID	smallint	☐
Name	Name:nvarchar(50)	☐
GroupName	Name:nvarchar(50)	☐
ModifiedDate	datetime	☐
		☐

子查詢

(1) 首先必須知道每個DepartmentID對應的部門為何，稱表A
(2) 再利用表A找出HumanResources.Employee中的員工為哪個部門
→ 利用子查詢一次完成！

```
SELECT e.BusinessEntityID, e.JobTitle, e.Gender, A.DepartmentID, A.Name
FROM HumanResources.Employee e JOIN (
  SELECT edp.BusinessEntityID, dp.DepartmentID, dp.Name
  FROM HumanResources.Department dp, HumanResources.EmployeeDepartmentHistory edp
  WHERE dp.DepartmentID=edp.DepartmentID
) A
ON e.BusinessEntityID=A.BusinessEntityID
```

	BusinessEntityID	JobTitle	Gender	DepartmentID	Name
1	217	Document Control Manager	M	12	Document Control
2	218	Control Specialist	M	12	Document Control
3	219	Document Control Assistant	M	12	Document Control
4	220	Document Control Assistant	F	12	Document Control
5	221	Control Specialist	M	12	Document Control
6	2	Vice President of Engineering	F	1	Engineering
7	3	Engineering Manager	M	1	Engineering
8	4	Senior Tool Designer	M	1	Engineering
9	5	Design Engineer	F	1	Engineering
10	6	Design Engineer	M	1	Engineering
11	14	Senior Design Engineer	M	1	Engineering
12	15	Design Engineer	F	1	Engineering
13	1	Chief Executive Officer	M	16	Executive

子查詢

若要寫很多個子查詢的話，WITH ... AS ...的可讀性較高！

```
WITH A AS (
SELECT   欄位名稱
FROM     表名
....   /*任何想做的運算*/
),
WITH B AS (...)
...
```

```
WITH A AS (
SELECT edp.BusinessEntityID, dp.DepartmentID, dp.Name
FROM HumanResources.Department dp,
HumanResources.EmployeeDepartmentHistory edp
WHERE dp.DepartmentID=edp.DepartmentID
)
SELECT e.BusinessEntityID, e.JobTitle, e.Gender, A.DepartmentID, A.Name
FROM HumanResources.Employee e JOIN A
ON e.BusinessEntityID=A.BusinessEntityID
```

練習

(1) 查詢名字(FirstName)A 開頭的員工有哪些人，查詢結果要有員工的編號(BusinessEntityID)、名字(FirstName)、性別 Gender 和年齡 Age。

(2) 請求出 32 歲以上女員工 ，查詢結果要有員工編號 BussinessEntityID、年齡 Age、性別 Gender、年資(即為 2018-HireDate 的年份)、部門名稱Name 以及 Jobtitle。並將結果根據年資大到小排列。

(3) 市場部門(Name='Marketing')的員工，男女共有多少人，查詢結果要有性別(Gender)、人數。

(4) 請查詢出每個部門領 最低時薪的人以及時薪金額，查詢結果要有部門編號 DepartmentID、部門名稱 Name、員工編號 BusinessEntityID、員工名字(FirstName 與 LastName)、時薪金額(Rate)

(5)請使用EmployeePayHistory最新紀錄，和HumanResources.Employee兩張表，查詢個職位的總人數、平均休假時數(VacataionHours) 、平均時薪(Rate) ，並先以平均時薪再以平均休假時數降冪排序。

學習資源

練習題
https://www.w3schools.com/sql/sql_in.asp
影片
https://learn.microsoft.com/en-us/shows/dbfundamentals/01

Thank you for listening