

DATABASE, DATA WAREHOUSE, AND BUSINESS INTELLIGENCE

EGCO103 INFORMATION TECHNOLOGY IN THE DAILY LIFE



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WHY DO WE NEED DATABASE? (1)

- You want to store your employee phone numbers. What will you do?
- What if?
 - You have a company with 100000+ employees across the globe.
 - You want to add these information
 - Job name
 - Job description
 - Min/max salary for the job
 - Working location
 - Location telephone

WHY DO WE NEED DATABASE? (2)

- When we have more complicate question to ask.
- When there are a lot of information and there are many duplicate information.

TYPE OF DATABASE

- Three Types of Database
 - Relational
 - Multidimensional
 - NoSQL
- Relational databases is most common

BIG PLAYERS

- Oracle
 - Oracle DB = Leading in the Market.
 - MySQL = Free
- SAP
- Microsoft
 - Access = Personal/Small Data.
 - Microsoft SQL Server = Enterprise/Big Data.

RELATIONAL DATABASES

- Data in tables
- Define relation between tables.
- Primary key is unique for each record (row)

DATABASE TERMINOLOGIES

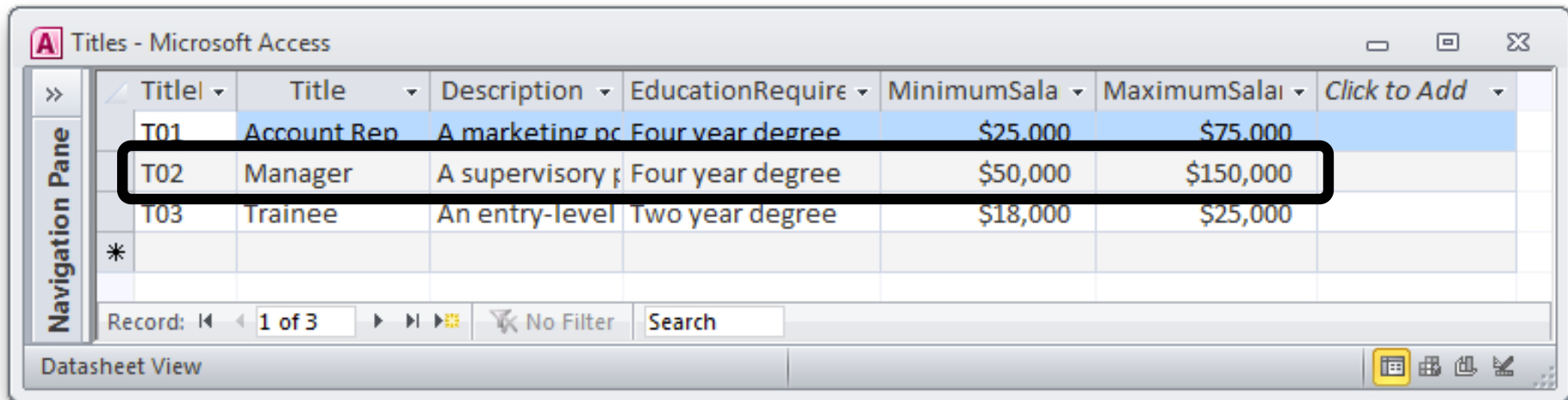
- Databases have three main components;
 - Fields
 - Store each category of information
 - Displayed in columns
 - Records
 - Group of related fields
 - Tables (or files)
 - Group of related records

FIELD (COLUMN)

The screenshot shows a Microsoft Access window titled "Titles - Microsoft Access". The window displays a table in Datasheet View. The table has the following columns: Title, Description, EducationRequire, MinimumSala, MaximumSala, and Click to Add. The data rows are T01, T02, and T03. The "Titles" column is highlighted with a black box. The status bar at the bottom indicates "Record: 1 of 3" and "No Filter".

Title	Description	EducationRequire	MinimumSala	MaximumSala	Click to Add
T01	Account Rep	A marketing pc	Four year degree	\$25,000	\$75,000
T02	Manager	A supervisory p	Four year degree	\$50,000	\$150,000
T03	Trainee	An entry-level	Two year degree	\$18,000	\$25,000

RECORD (ROW)



The screenshot shows a Microsoft Access window titled "Titles - Microsoft Access". The window displays a table with the following columns: Title, Title, Description, EducationRequire, MinimumSala, MaximumSala, and Click to Add. The table contains three records. The second record, with Title "T02" and Title "Manager", is highlighted with a black box. The status bar at the bottom indicates "Record: 1 of 3" and "No Filter".

Title	Title	Description	EducationRequire	MinimumSala	MaximumSala	Click to Add
T01	Account Rep	A marketing p	Four year degree	\$25,000	\$75,000	
T02	Manager	A supervisory p	Four year degree	\$50,000	\$150,000	
T03	Trainee	An entry-level	Two year degree	\$18,000	\$25,000	
*						

TABLE (ENTITY)

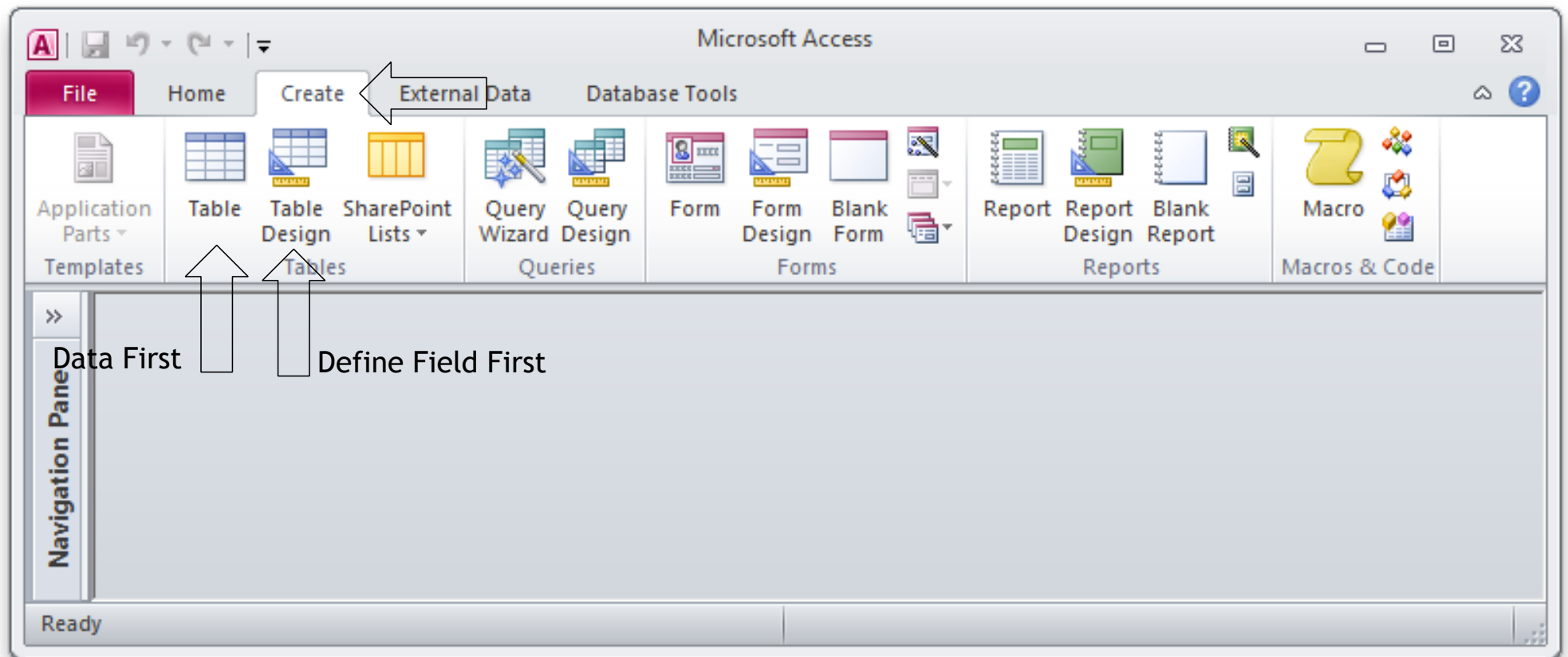
Navigation Pane

Title	Title	Description	EducationRequire	MinimumSala	MaximumSala	Click to Add
T01	Account Rep	A marketing pc	Four year degree	\$25,000	\$75,000	
T02	Manager	A supervisory p	Four year degree	\$50,000	\$150,000	
T03	Trainee	An entry-level	Two year degree	\$18,000	\$25,000	
*						

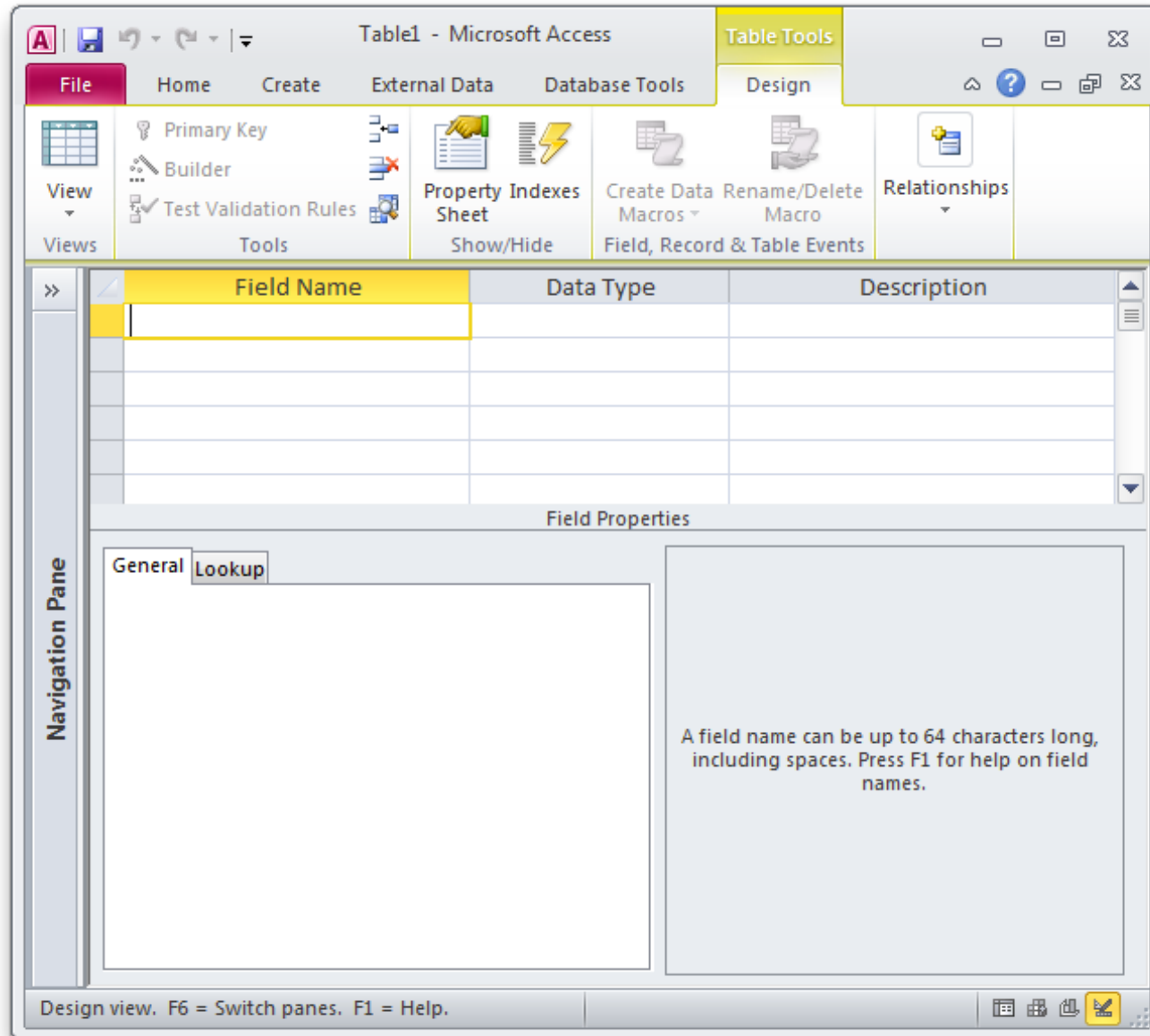
Record: 1 of 3 No Filter Search

Datasheet View









NEW TABLE IN MICROSOFT ACCESS



META DATA (MS ACCESS)



META DATA (DBEAVER)

	Column Name	#	Data Type	Length	Not Null	Auto Increment
 Columns						
 Keys	123 ID		INTEGER		[]	[v]
 Foreign Keys	A-Z Firstname		TEXT		[]	[]
 Indexes	A-Z Lastname		TEXT		[]	[]
 References	A-Z LocationID		TEXT		[]	[]
 Triggers	A-Z TitleID		TEXT		[]	[]
 DDL	123 Salary		REAL		[]	[]
 Virtual	123 Gender		INTEGER		[]	[]
	A-Z Performance		TEXT		[]	[]

COMMON DATA TYPES

Data Type	Used to Store	Examples
Text	Short text with maximum length limit	<i>John Doe</i>
Number	Numbers	<i>2901 or 3.499</i>
Yes/No	Boolean	<i>False/True or 0/1</i>
Date & Time	Dates	<i>2/21/2016</i>
Memo	Long text with no limit	<i>I want to finish this exercise so I can go home.</i>
Calculated	Formula	<i>Grade * Credit</i>
Attachment	Files	<i>Document, Picture</i>
Hyperlink	Hyperlink to a Web page	<i>Google.com</i>

SWITCH BETWEEN DESIGN AND VIEW

The image illustrates the process of switching between Datasheet View and Design View in Microsoft Access. Two screenshots of the 'Table2 - Microsoft Access' window are shown side-by-side, with curved arrows indicating the transition from the left view to the right view.

Left Screenshot (Datasheet View):

- The ribbon is set to **Table Tools** with the **Table** tab selected.
- The main area displays a data grid with the following data:

ID	LocationID	Location	Address	
5	L01	Atlanta	450 Peachtree	GA
6	L02	Boston	3 Commons Blv	MA
7	L03	Chicago	500 Loop Highv	IL
8	L04	Miami	210 Biscayne Bl	FL
*	(New)			

Right Screenshot (Design View):

- The ribbon is set to **Table Tools** with the **Design** tab selected.
- The main area displays a table structure with the following fields:

Field Name	Data Type	escriptio
ID	AutoNumber	
LocationID	Text	

Field Properties:

Property	Value
Field Size	L
New Values	Ir
Format	
Caption	
Indexed	Y
Smart Tags	
Text Align	G

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Navigation Pane: Design view. F6 = Switch panes. F1 = Help.

PRIMARY KEY (PK)

- Row must be unique!
- Database must be able to tell rows apart quickly to be fast
- Find fields (columns) that together will be unique and set them to be primary key.
- Can be set in Design mode

SET PK IN MICROSOFT ACCESS

The screenshot shows the Microsoft Access interface in Design view for a table named 'Table2'. The 'Table Tools' ribbon is active, and the 'Design' tab is selected. The 'Primary Key' button in the 'Tools' group is highlighted with a black arrow. Below the ribbon, a table structure is displayed with columns for 'Field Name', 'Data Type', and 'Description'. The 'ID' field is highlighted in yellow, and a black arrow points to its 'ID' label. The 'Field Properties' pane is visible at the bottom, showing the 'General' tab with various field settings.

Field Name	Data Type	Description
ID	AutoNumber	
LocationID	Text	
Location	Text	
Address	Text	
State	Text	

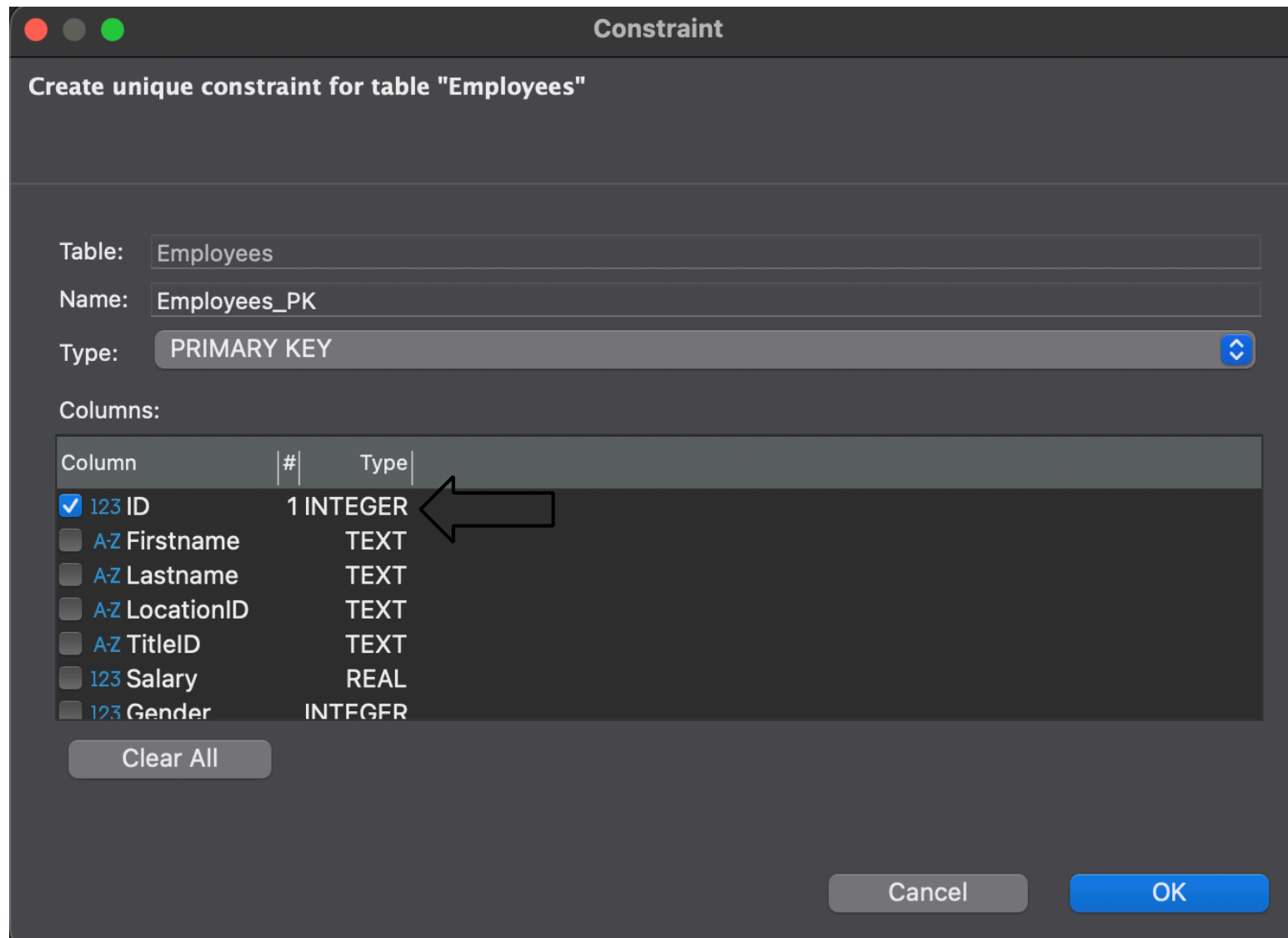
Field Properties

General	
Field Size	Long Integer
New Values	Increment
Format	
Caption	
Indexed	Yes (No Duplicates)
Smart Tags	
Text Align	General

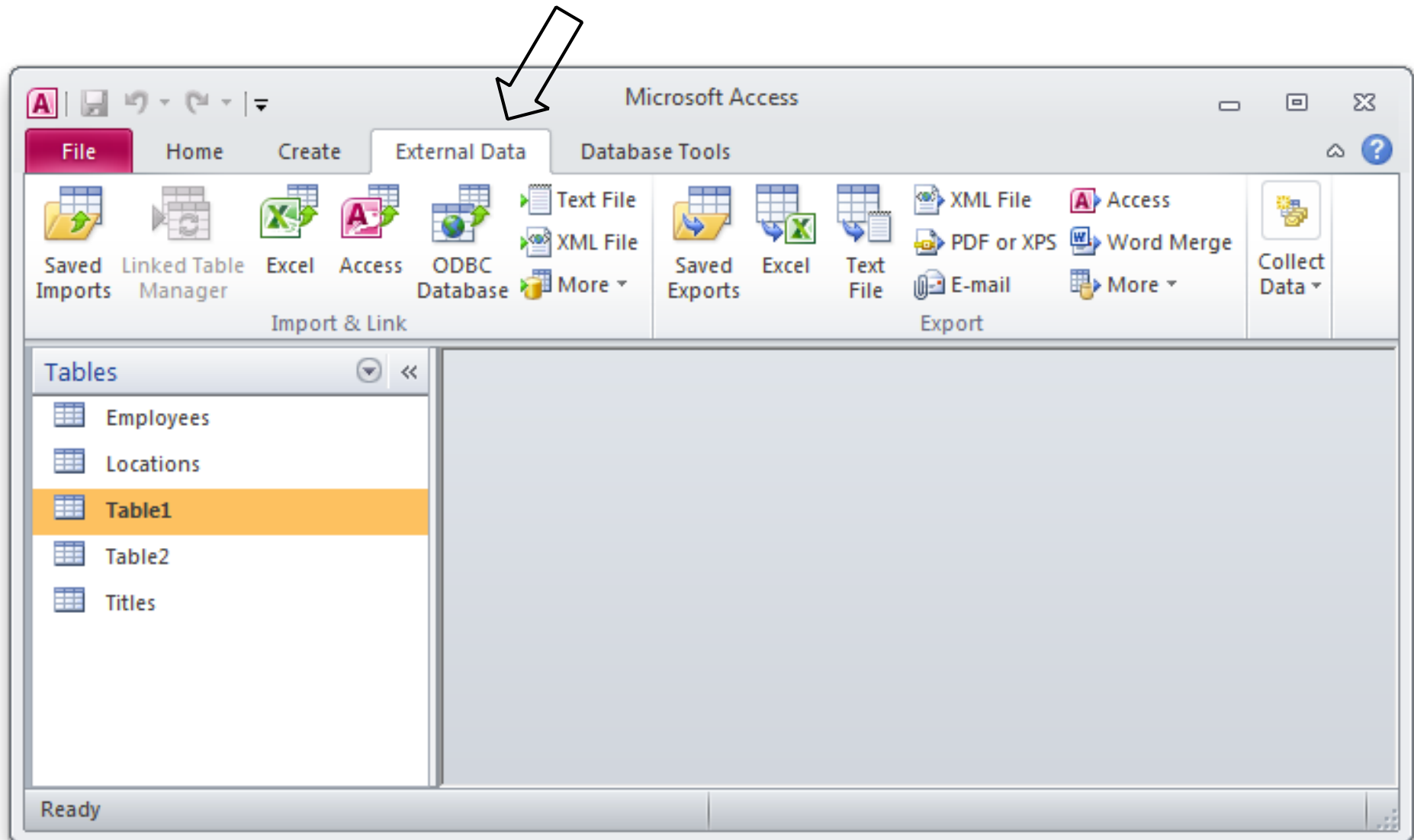
A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

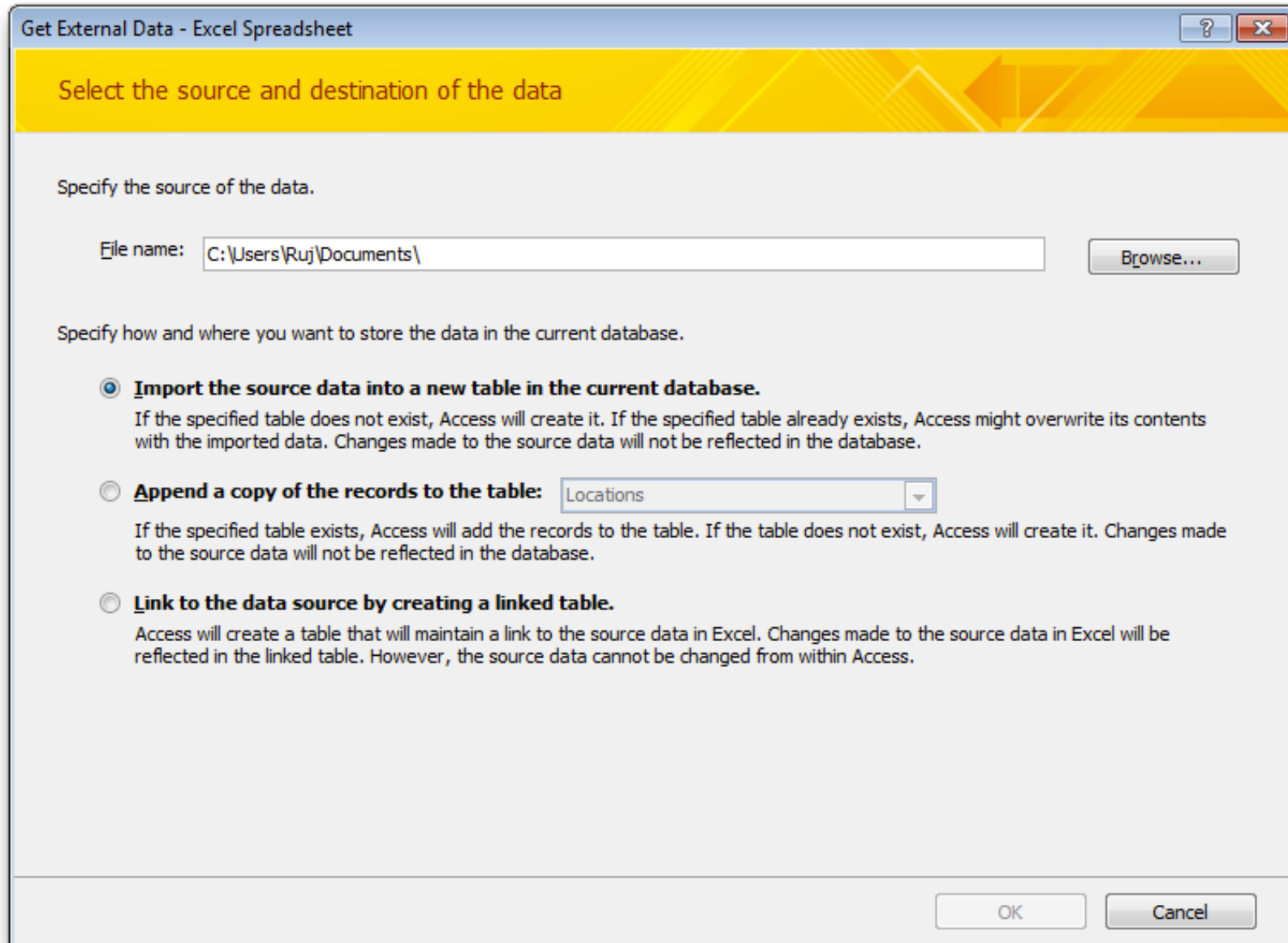
SET PK IN SQLITE (DBEAVER)



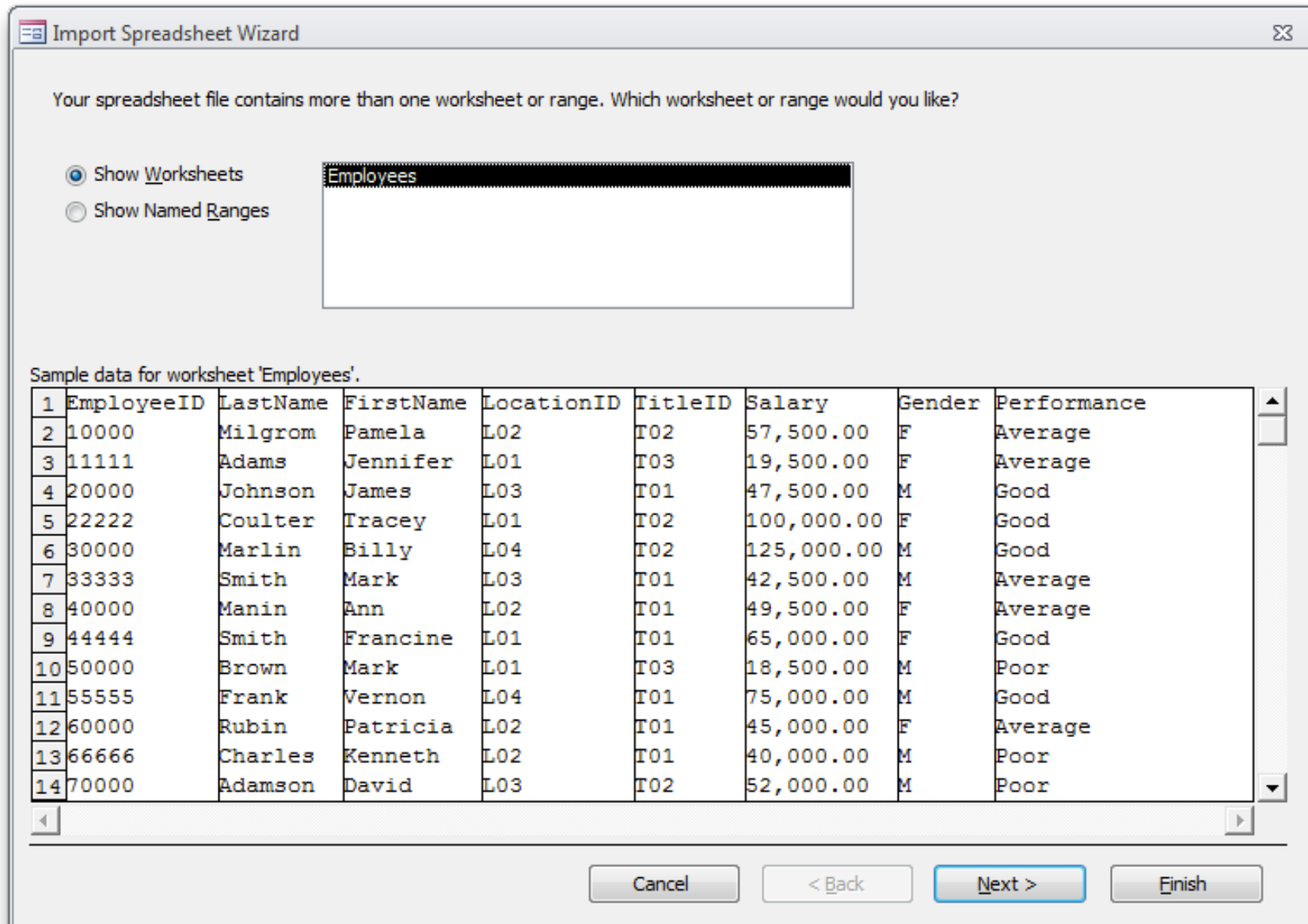
IMPORT & EXPORT DATA (1)



IMPORT & EXPORT DATA (2)



IMPORT & EXPORT DATA (3)



IMPORT & EXPORT DATA (4)

Import Spreadsheet Wizard

Microsoft Access can use your column headings as field names for your table. Does the first row specified contain column headings?

First Row Contains Column Headings

	EmployeeID	LastName	FirstName	LocationID	TitleID	Salary	Gender	Performance
1	10000	Milgrom	Pamela	L02	T02	57,500.00	F	Average
2	11111	Adams	Jennifer	L01	T03	19,500.00	F	Average
3	20000	Johnson	James	L03	T01	47,500.00	M	Good
4	22222	Coulter	Tracey	L01	T02	100,000.00	F	Good
5	30000	Marlin	Billy	L04	T02	125,000.00	M	Good
6	33333	Smith	Mark	L03	T01	42,500.00	M	Average
7	40000	Manin	Ann	L02	T01	49,500.00	F	Average
8	44444	Smith	Francine	L01	T01	65,000.00	F	Good
9	50000	Brown	Mark	L01	T03	18,500.00	M	Poor
10	55555	Frank	Vernon	L04	T01	75,000.00	M	Good
11	60000	Rubin	Patricia	L02	T01	45,000.00	F	Average
12	66666	Charles	Kenneth	L02	T01	40,000.00	M	Poor
13	70000	Adamson	David	L03	T02	52,000.00	M	Poor
14	77777	Marder	Kelly	L03	T01	38,500.00	F	Average

Cancel < Back Next > Finish

IMPORT & EXPORT DATA (5)

Import Spreadsheet Wizard

You can specify information about each of the fields you are importing. Select fields in the area below. You can then modify field information in the 'Field Options' area.

Field Options

Field Name: Data Type:

Indexed: Do not import field (Skip)

	EmployeeID	LastName	FirstName	LocationID	TitleID	Salary	Gender	Performance
1	10000	Milgrom	Pamela	L02	T02	57,500.00	F	Average
2	11111	Adams	Jennifer	L01	T03	19,500.00	F	Average
3	20000	Johnson	James	L03	T01	47,500.00	M	Good
4	22222	Coulter	Tracey	L01	T02	100,000.00	F	Good
5	30000	Marlin	Billy	L04	T02	125,000.00	M	Good
6	33333	Smith	Mark	L03	T01	42,500.00	M	Average
7	40000	Manin	Ann	L02	T01	49,500.00	F	Average
8	44444	Smith	Francine	L01	T01	65,000.00	F	Good
9	50000	Brown	Mark	L01	T03	18,500.00	M	Poor
10	55555	Frank	Vernon	L04	T01	75,000.00	M	Good
11	60000	Rubin	Patricia	L02	T01	45,000.00	F	Average
12	66666	Charles	Kenneth	L02	T01	40,000.00	M	Poor
13	70000	Adamson	David	L03	T02	52,000.00	M	Poor
14	77777	Marder	Kelly	L03	T01	38,500.00	F	Average

Cancel < Back Next > Finish

IMPORT & EXPORT DATA (6)

Import Spreadsheet Wizard

Microsoft Access recommends that you define a primary key for your new table. A primary key is used to uniquely identify each record in your table. It allows you to retrieve data more quickly.

Let Access add primary key.

Choose my own primary key. EmployeeID

No primary key.

	EmployeeID	LastName	FirstName	LocationID	TitleID	Salary	Gender	Performance
1	10000	Milgrom	Pamela	L02	T02	57,500.00	F	Average
2	11111	Adams	Jennifer	L01	T03	19,500.00	F	Average
3	20000	Johnson	James	L03	T01	47,500.00	M	Good
4	22222	Coulter	Tracey	L01	T02	100,000.00	F	Good
5	30000	Marlin	Billy	L04	T02	125,000.00	M	Good
6	33333	Smith	Mark	L03	T01	42,500.00	M	Average
7	40000	Manin	Ann	L02	T01	49,500.00	F	Average
8	44444	Smith	Francine	L01	T01	65,000.00	F	Good
9	50000	Brown	Mark	L01	T03	18,500.00	M	Poor
10	55555	Frank	Vernon	L04	T01	75,000.00	M	Good
11	60000	Rubin	Patricia	L02	T01	45,000.00	F	Average
12	66666	Charles	Kenneth	L02	T01	40,000.00	M	Poor
13	70000	Adamson	David	L03	T02	52,000.00	M	Poor
14	77777	Marder	Kelly	L03	T01	38,500.00	F	Average

Cancel < Back Next > Finish

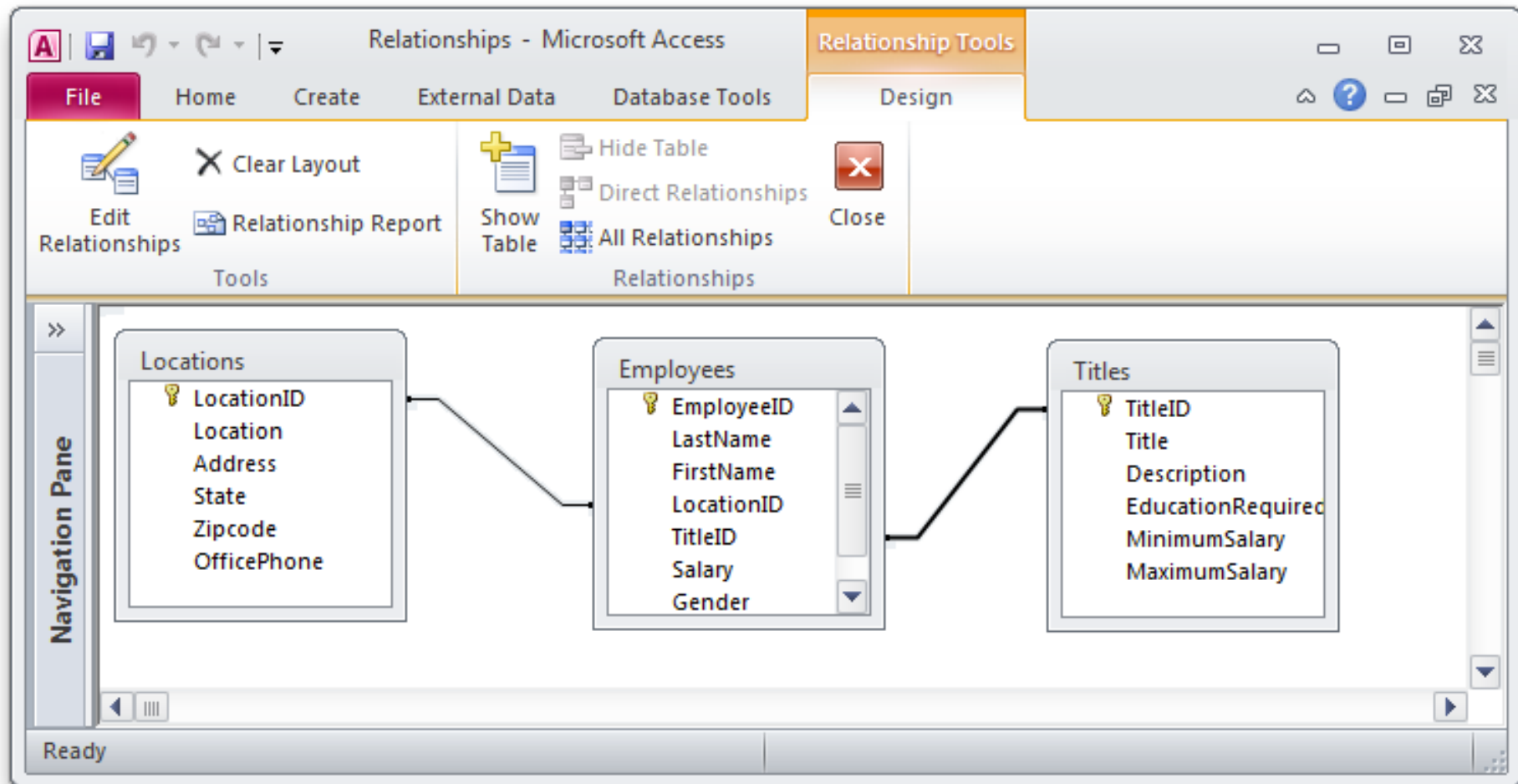
RELATIONSHIP

- Define relationship to make querying easier
- Tell how database can look up more info from other tables

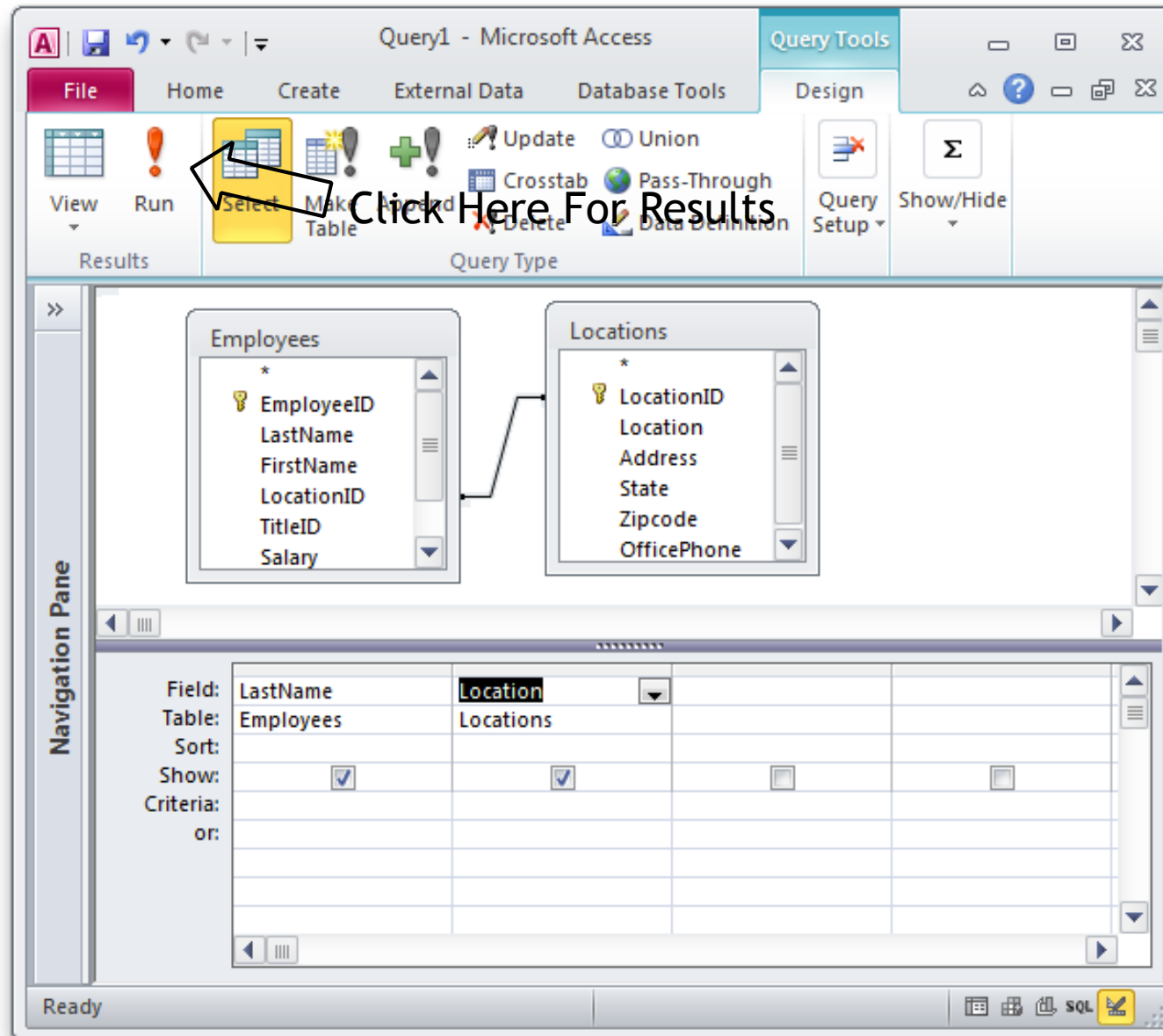
TYPE OF RELATIONSHIPS

- One-to-one
 - For each record in a table, there is only one corresponding record in a related table
- One-to-many
 - Only one instance of a record in one table; many instances in a related table
- Many-to-many
 - Records in one table related to multiple records in another

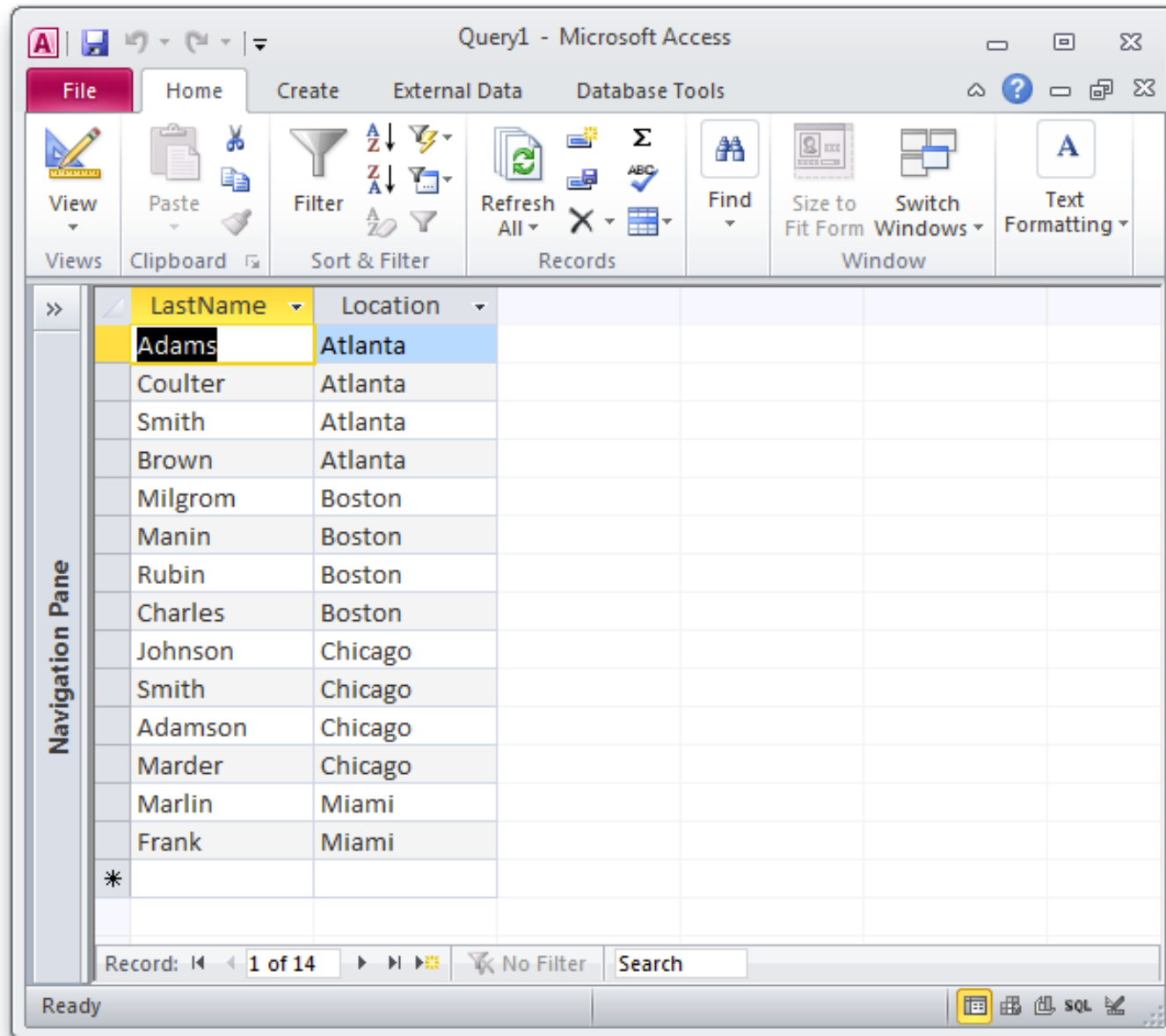
DEFINE RELATIONSHIP



QUERYING (1)



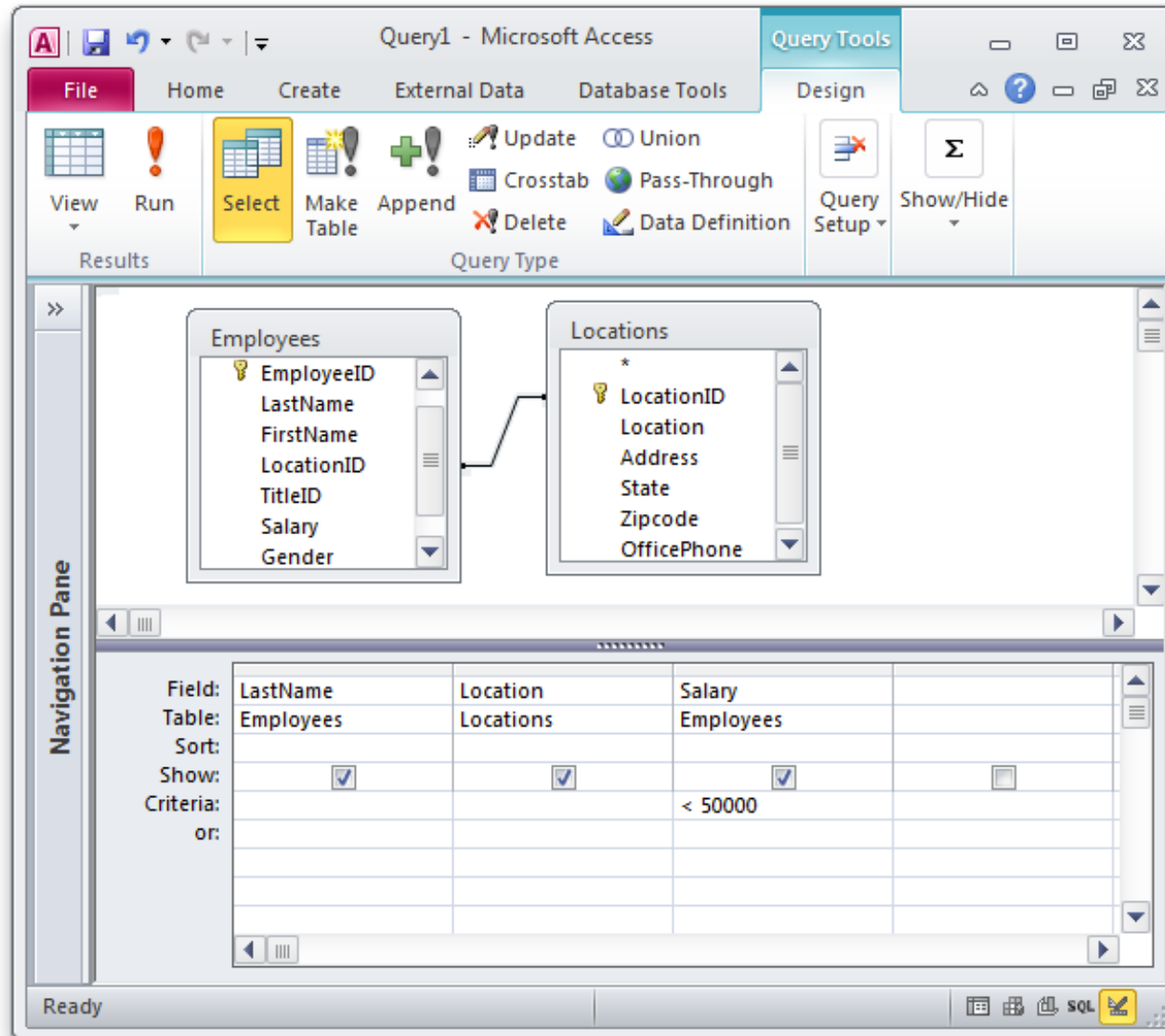
QUERYING (2)



QUERYING (3)

- You can set condition
 - *Salary < 50,000*
- Same row means "and"
- Different row means "or"
- Try putting "Boston" into different rows

QUERYING (4)



QUERYING (5)

- Using SQL command for querying data.

```
SELECT Lastname, Locaton, Salary  
FROM Employees JOIN Locations  
ON Employees.LocatonID = Locations.LocationID  
WHERE Salary < 50000
```

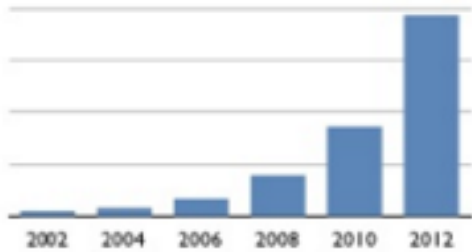
N O S Q L

- NoSQL (Not Only SQL) is a non-relational database system designed to handle large volumes of unstructured or semi-structured data with high scalability and flexibility.
- Unlike traditional relational databases, NoSQL databases do not rely on fixed schemas or SQL-based table relationships.

WHY NOSQL?

New Trends

Clip slide



Big data



Connectivity



P2P Knowledge



Concurrency



Diversity



Cloud-Grid

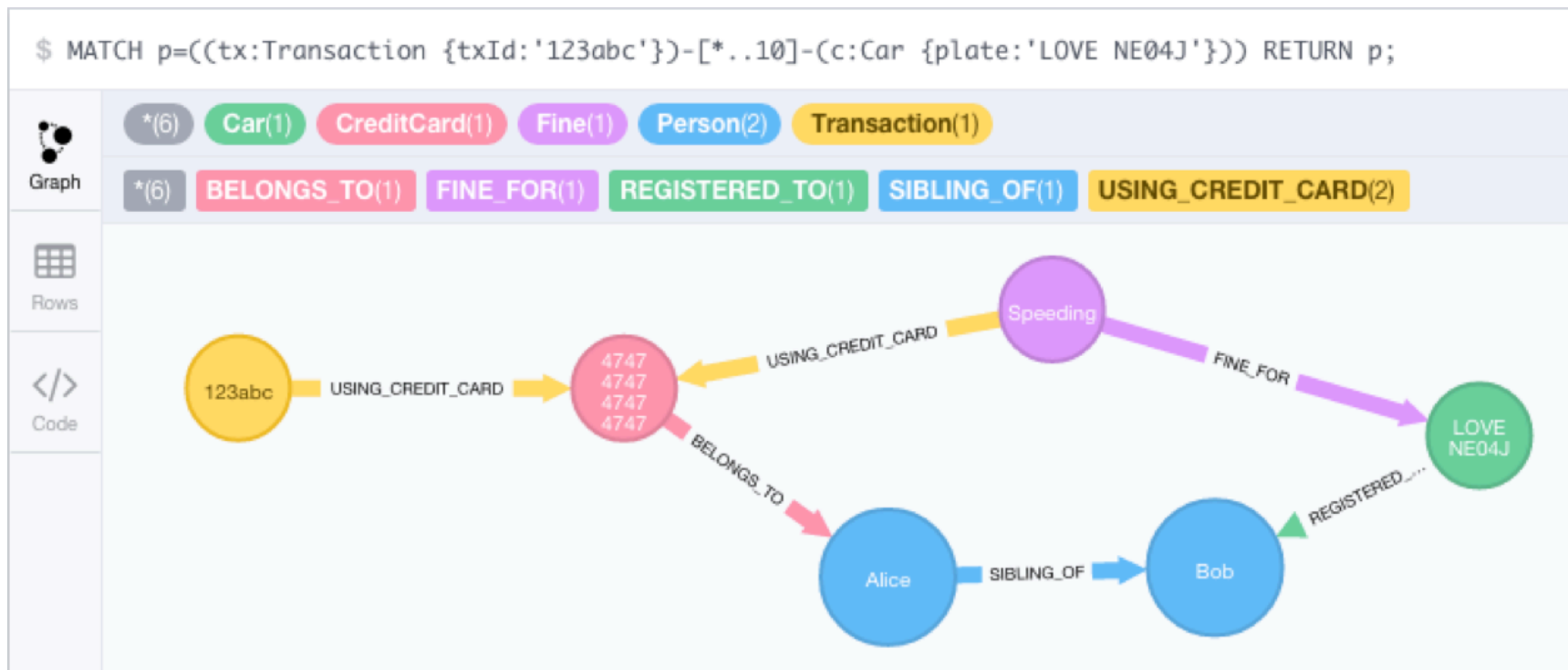
WHERE NOSQL IS USED?

- Google (BigTable, LevelDB)
- LinkedIn (Voldemort)
- Facebook (Cassandra)
- Twitter (Hadoop/Hbase, FlockDB, Cassandra)
- Netflix (SimpleDB, Hadoop/HBase, Cassandra)
- CERN (CouchDB)



EXAMPLE OF NOSQL

- Neo4j (Graph Database)



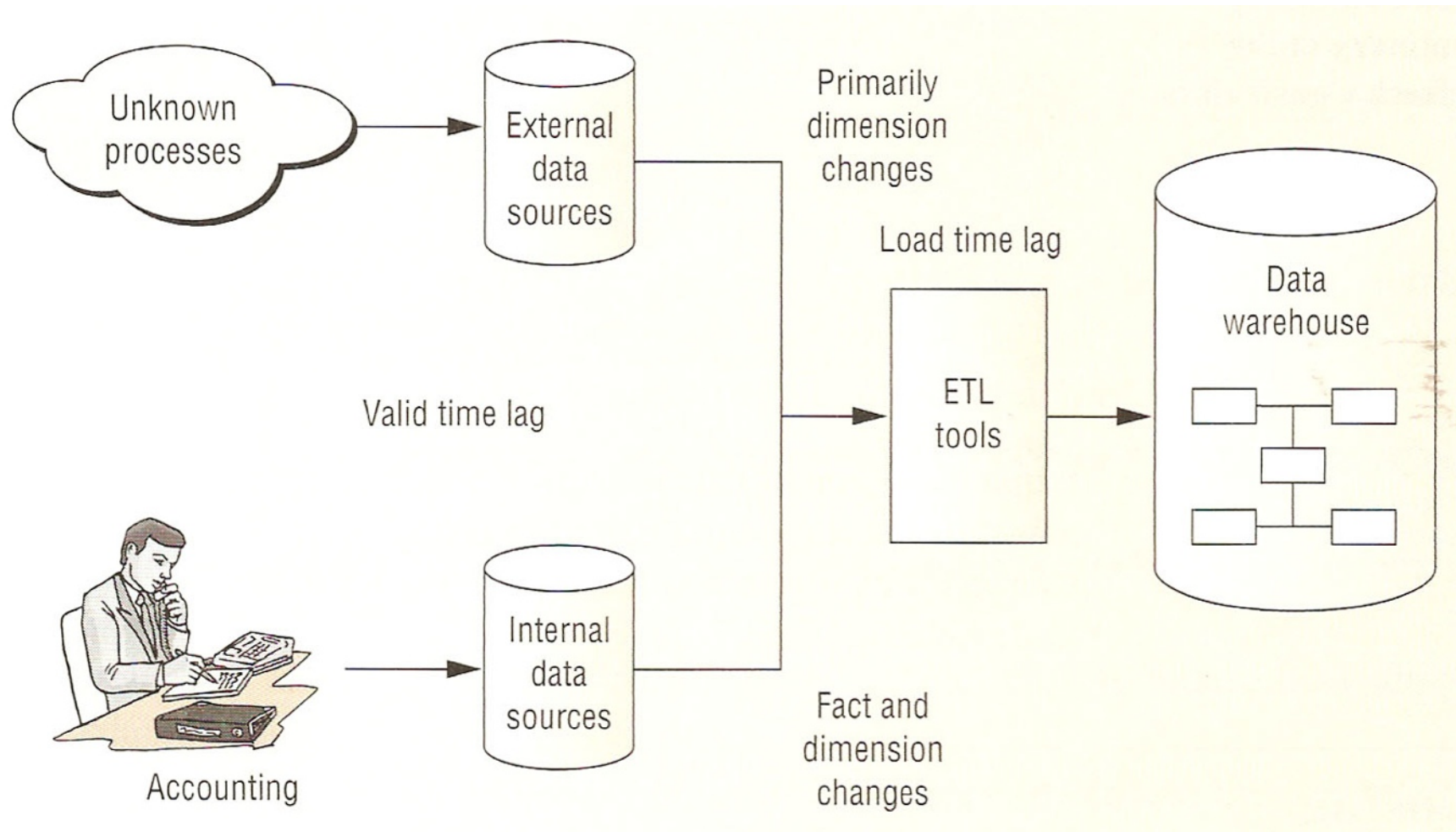
DATA WAREHOUSE

- Data warehouse is a central repository for summarized and integrated data from operational databases and external data sources.
- The processing requirement of decision support applications have led to four distinguishing characteristics for data warehouses, as described in the following:
 - Subject-Oriented
 - Integrated
 - Time-Variant
 - Nonvolatile

COMPARISON OF OPERATIONAL DATABASES AND DATA WAREHOUSES

Characteristic	Operational Database	Data Warehouse
Currency	Current	Historical
Detail level	Individual	Individual and summary
Orientation	Process orientation	Subject orientation
Number of records processed	Few	Thousands
Normalization level	Mostly normalized	Frequent violations of BCNF
Update level	Volatile	Nonvolatile (refreshed)
Data model	Relational	Relational model with star schemas and multidimensional model with data cubes

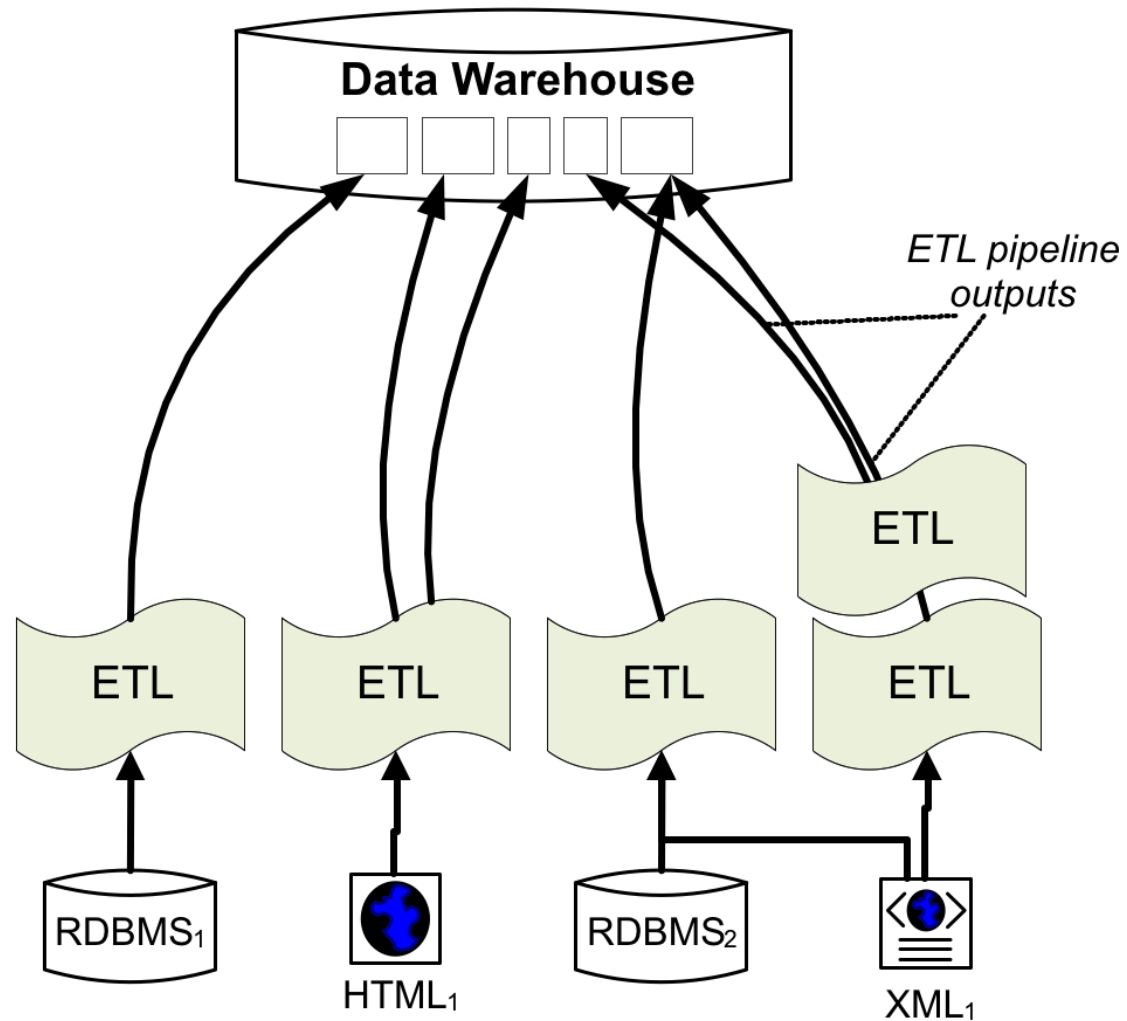
OVERVIEW OF THE DATA WAREHOUSE REFRESH PROCESS



ETL TOOLS (1)

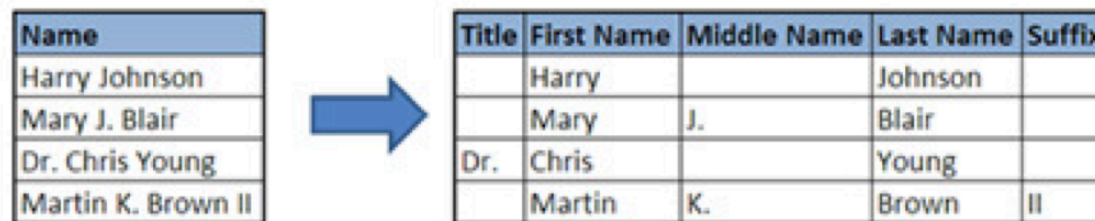
- To support complexity of data warehouse maintenance, software product known as Extraction, Transformation, and Load (ETL) tools have been developed.
- ETL tools are software tools for extraction, transformation, and loading of change data from data sources to a data warehouse.
- ETL tools eliminate the need to write custom coding for many data warehouse maintenance tasks.

ETL TOOLS (2)



EXAMPLE OF ETL (1)

- Parsing: locates and identifies individual data elements in the source file and then isolates these data elements in the target files.

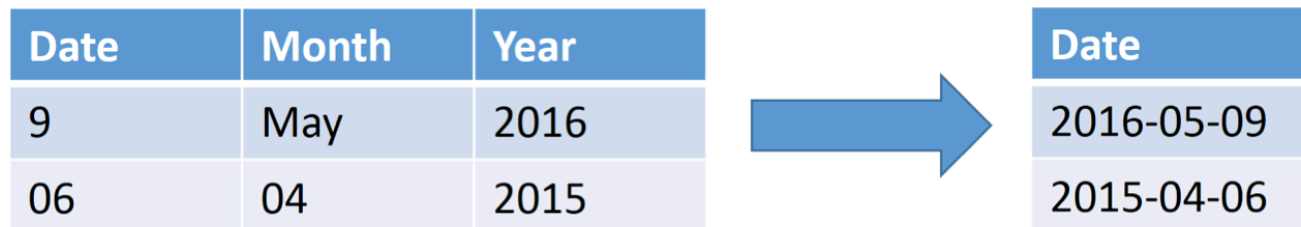


A diagram illustrating the parsing process. On the left, a table with a single column 'Name' contains four entries: 'Harry Johnson', 'Mary J. Blair', 'Dr. Chris Young', and 'Martin K. Brown II'. A blue arrow points to the right, where a table with five columns: 'Title', 'First Name', 'Middle Name', 'Last Name', and 'Suffix' is shown. The data from the source table is distributed into these columns: 'Harry Johnson' is split into 'Harry' (First Name) and 'Johnson' (Last Name); 'Mary J. Blair' is split into 'Mary' (First Name), 'J.' (Middle Name), and 'Blair' (Last Name); 'Dr. Chris Young' is split into 'Dr.' (Title), 'Chris' (First Name), and 'Young' (Last Name); 'Martin K. Brown II' is split into 'Martin' (First Name), 'K.' (Middle Name), 'Brown' (Last Name), and 'II' (Suffix).

Name
Harry Johnson
Mary J. Blair
Dr. Chris Young
Martin K. Brown II

Title	First Name	Middle Name	Last Name	Suffix
	Harry		Johnson	
	Mary	J.	Blair	
Dr.	Chris		Young	
	Martin	K.	Brown	II

- Combing: locates and identifies individual data elements in the source file and then combines these data elements in the target files.



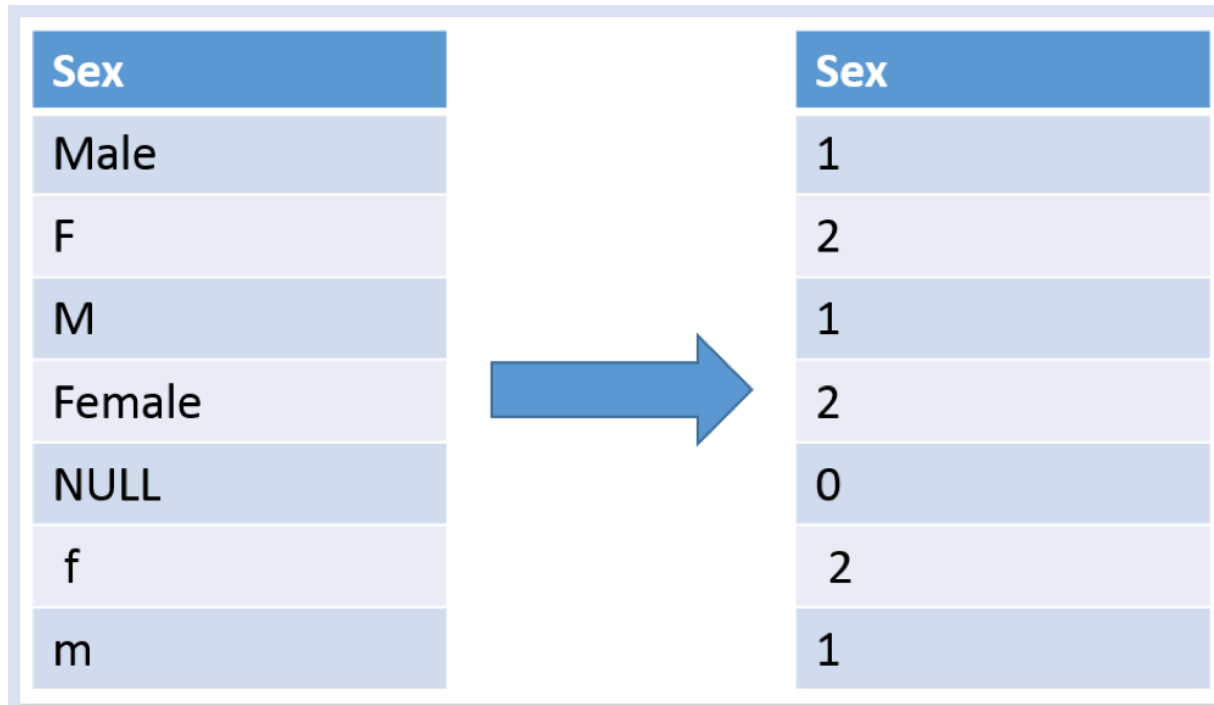
A diagram illustrating the combining process. On the left, a table with three columns: 'Date', 'Month', and 'Year' contains two rows of data: '9', 'May', '2016' and '06', '04', '2015'. A blue arrow points to the right, where a table with a single column 'Date' contains two rows of data: '2016-05-09' and '2015-04-06', representing the combined date format.

Date	Month	Year
9	May	2016
06	04	2015

Date
2016-05-09
2015-04-06

EXAMPLE OF ETL (2)

- Standardizing: applies conversion routines to transform data into its preferred (and consistent) format using standard and custom data rules.



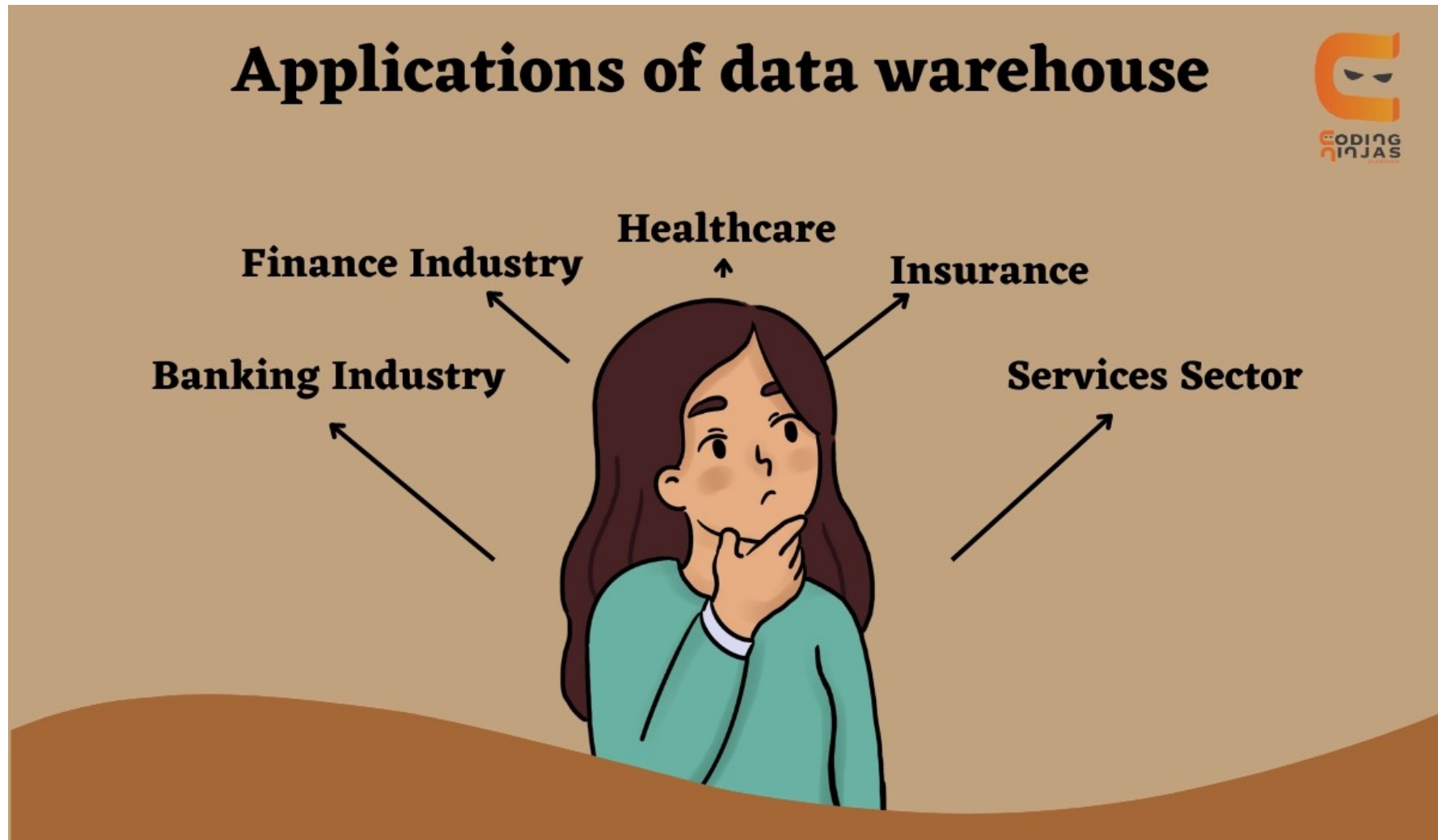
The diagram illustrates the standardization of sex data. It shows two tables connected by a blue arrow pointing from left to right. The left table lists various text-based representations of sex, and the right table shows their corresponding numerical codes.

Sex	Sex
Male	1
F	2
M	1
Female	2
NULL	0
f	2
m	1

DATA MART

- Data mart is a subset or view of a data warehouse, typically at a department or functional level, that contains all data required for decision support tasks of that department.

APPLICATION OF DATA WAREHOUSES



MULTIDIMENSIONAL DATA

- The multidimensional data model supports data representation and operations specifically tailored for decision support processing in data warehouses.

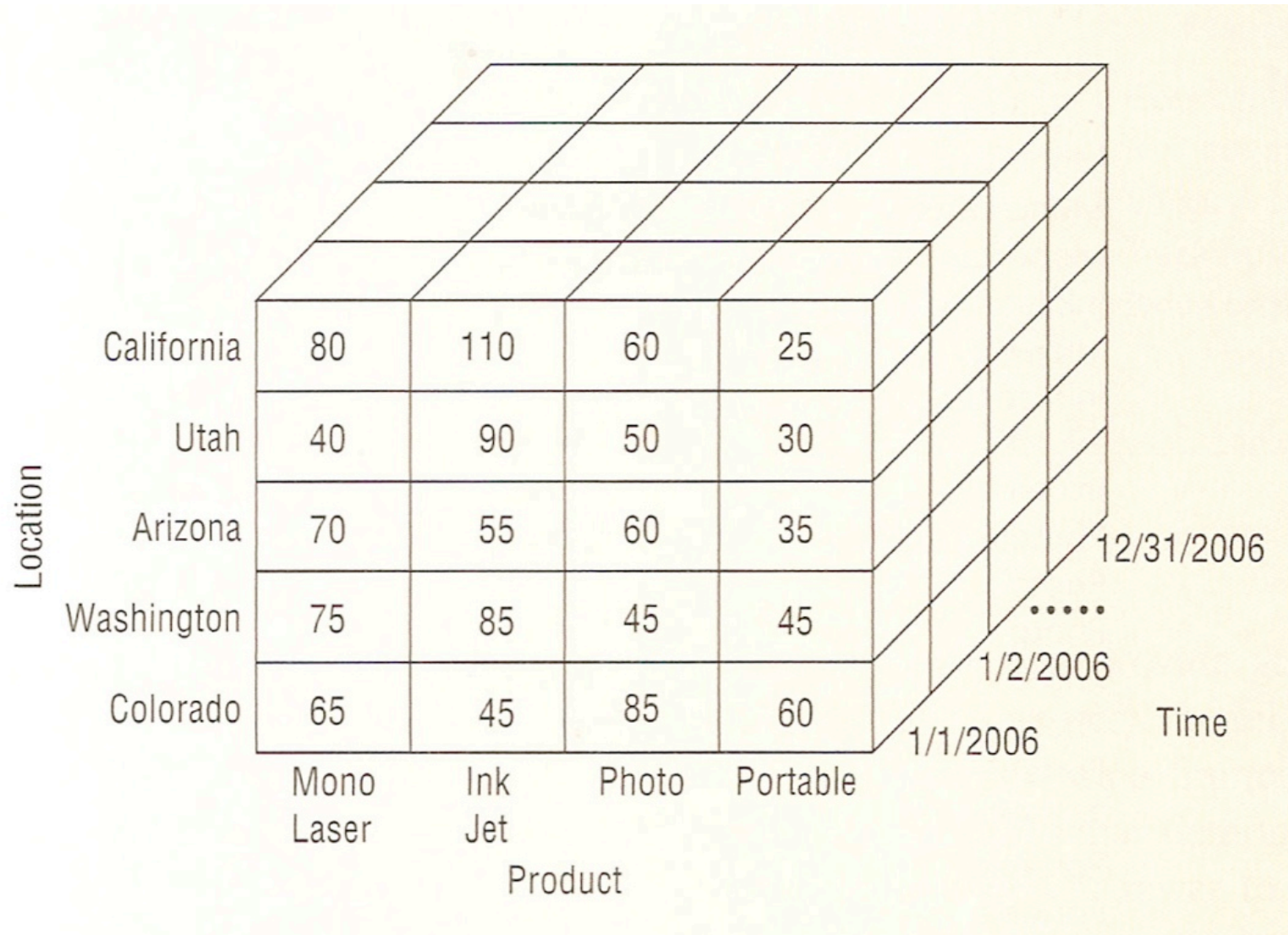
RELATIONAL REPRESENTATION OF SALES DATA

Product	Location	Sales
Mono Laser	California	80
Mono Laser	Utah	40
Mono Laser	Arizona	70
Mono Laser	Washington	75
Mono Laser	Colorado	65
Ink Jet	California	110
Ink Jet	Utah	90
Ink Jet	Arizona	55
Ink Jet	Washington	85
Ink Jet	Colorado	45
Photo	California	60
Photo	Utah	50
Photo	Arizona	60
Photo	Washington	45
Photo	Colorado	85
Portable	California	25
Portable	Utah	30
Portable	Arizona	35
Portable	Washington	45
Portable	Colorado	60

MULTIDIMENSIONAL REPRESENTATION OF SALES DATA

Location	Product			
	Mono Laser	Ink Jet	Photo	Portable
California	80	110	60	25
Utah	40	90	50	30
Arizona	70	55	60	35
Washington	75	85	45	45
Colorado	65	45	85	60

A THREE-DIMENSIONAL DATA CUBE



MULTIDIMENSIONAL REPRESENTATION OF SALES DATA WITH ROW TOTALS

Location	Product				Totals
	Mono Laser	Ink Jet	Photo	Portable	
California	80	110	60	25	275
Utah	40	90	50	30	210
Arizona	70	55	60	35	220
Washington	75	85	45	45	250
Colorado	65	45	85	60	255

DATA CUBE

- Data cube is a multidimensional format in which cells contain numeric data called measures organised by subjects called dimensions.
- A data cube is sometimes known as a hypercube because conceptually it can have an unlimited number of dimensions.

DATA CUBE OPERATIONS (1)

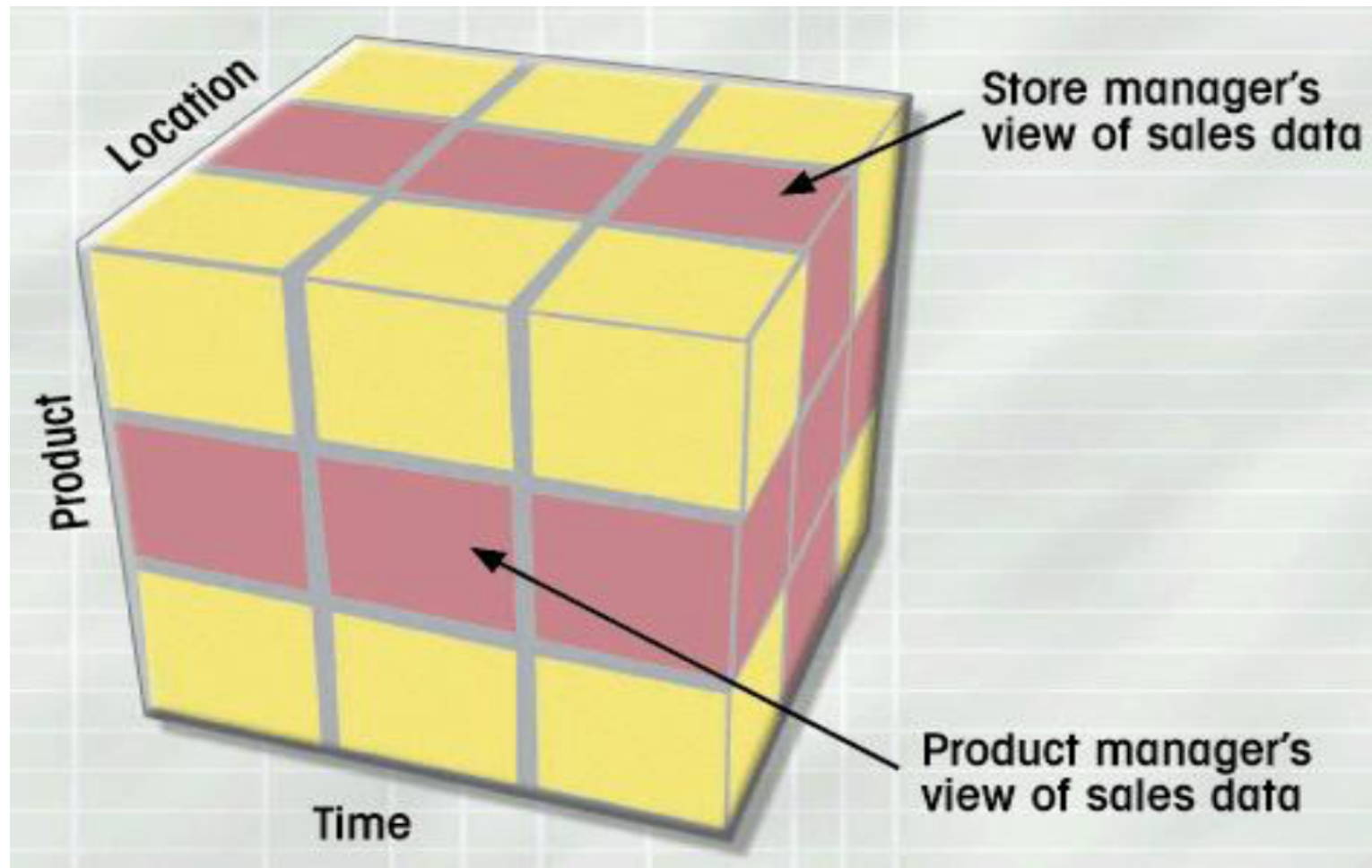
- **Slice**

Because a data cube can contain a large number of dimensions, users often need to focus on a subset of the dimensions to gain insights.

- **Dice**

Because individual dimensions can contain a large number of members, users need to focus on a subset of members to gain insights.

DATA CUBE OPERATIONS (2)



DATA CUBE OPERATIONS (3)

- **Drill-Down**

Users often want to navigate among the levels of hierarchical dimensions. The drill-down operator allows users to navigate from a more general level to a more specific level.

- **Roll-Up**

Roll-up (also called drill-up) is the opposite of drill-down. Roll-up involves moving from a specific level to a more general level of a hierarchical dimension.

- **Pivot**

The pivot operator supports rearrangement of the dimensions in a data cube.

EXAMPLE SLICE AND DICE OPERATION

Location	Product			
	Mono Laser	Ink Jet	Photo	Portable
California	80	110	60	25
Utah	40	90	50	30
Arizona	70	55	60	35
Washington	75	85	45	45
Colorado	65	45	85	60

Location	Time			Total Sales
	1/1/2006	1/2/2006	...	
California	400	670	...	16,250
Utah	340	190	...	11,107
Arizona	270	255	...	21,500
Washington	175	285	...	20,900
Colorado	165	245	...	21,336

Location	Utah	40	90	50	30
		Mono Laser	Ink Jet	Photo	Portable

DRILL-DOWN OPERATION FOR THE STATE OF UTAH

Location	Product			
	Mono Laser	Ink Jet	Photo	Portable
California + Utah	80	110	60	25
Salt Lake	20	20	10	15
Park City	5	30	10	5
Ogden	15	40	30	10
Arizona	70	55	60	35
Washington	75	85	45	45
Colorado	65	45	85	60

SUMMARY OF THE DATA CUBE OPERATIONS

Operator	Purpose	Description
Slice	Focus attention on a subset of dimensions	Replace a dimension with a single member value or with a summary of its measure values
Dice	Focus attention on a subset of member values	Replace a dimension with a subset of members
Drill-down	Obtain more detail about a dimension	Navigate from a more general level to a more specific level of a hierarchical dimension
Roll-up	Summarize details about a dimension	Navigate from a more specific level to a more general level of a hierarchical dimension
Pivot	Allow a data cube to be presented in a visually appealing order	Rearrange the dimensions in a data cube

BUSINESS INTELLIGENCE (1)

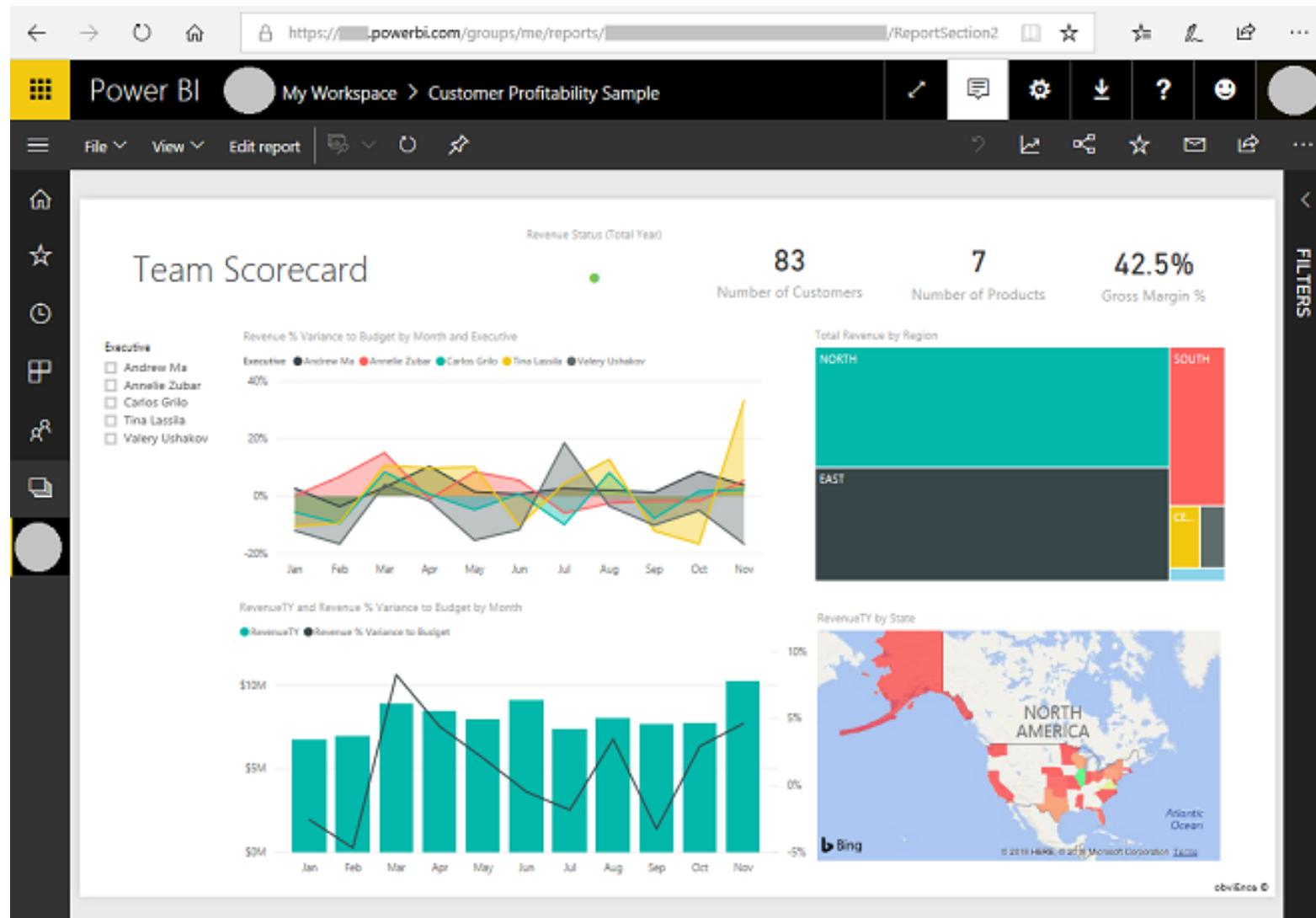
"BI results when organizational culture, business processes and technologies are designed and implemented with the goal of improving the strategic and operational decision-making capabilities of a wide range of internal and external stakeholders."

International Data Corporation (IDC)

BUSINESS INTELLIGENCE (2)

Culture, processes and technologies to improve decision making for stakeholders.

MICROSOFT POWER BI



<https://powerbi.microsoft.com/en-au/getting-started-with-power-bi/>

TYPE OF POWER BI

- Microsoft offers three types of Power BI platforms:
 - Power BI Desktop (Desktop Application)
 - Power BI Service (Software as a Service)
 - Power BI Mobile (For iOS and Android devices)

EXAMPLE OF BI

- SmartMedSupply for COVID-19
- <http://smartmedsupply.moph.go.th/newhomepage>

ระบบบริหารโลจิสติกส์เวชภัณฑ์

หน้าหลัก | เกี่ยวกับเรา | ขั้นตอนการทำงาน | เวชภัณฑ์ที่ต้องการ | [บริจาค](#)

Last updated :26 Oct 2020

จำนวนหน่วยบริการที่ขาดแคลน: 1169 | จำนวนจังหวัด: 77

ร้อยละปริมาณความต้องการเวชภัณฑ์รายจังหวัด

ร้อยละจำนวนหน่วยบริการจำแนกตามระดับความขาดแคลน

เพียงพอก่อนใช้

- มากกว่า 30 วัน
- ระหว่าง 15-30 วัน
- น้อยกว่า 15 วัน

ร้อยละปริมาณความต้องการเวชภัณฑ์รายจังหวัด

อานาจเจริญ 2.4%

ร้อยเอ็ด 2.6%

นครราชสีมา 44.4%

นครศรีธรรมราช 2.9%

กาฬสินธุ์ 3.1%

ขอนแก่น 3.4%

เพชรบูรณ์ 5.5%

ตรัง 22.2%

comcharts

ปริมาณความต้องการเวชภัณฑ์ จำแนกรายรายการ

Product name	ปริมาณที่ต้องการ	สต็อก	จำนวนวันที่เพียงพอ
Surgical gown, ชั้น	114,312	211,950	31.00
Alcohol Gel, ลีटर	4,777,832	9,709,445	37.12
Hood covers, ชั้น	81,381	246,032	44.03
N95 Respirator medical grade, ชั้น	80,382	483,654	59.94
Shoe covers, คู่	44,832	243,680	66.98
Alcohol 70% , ลีटर	3,068,300	23,212,028	85.60
Non-sterile powder gloves, คู่	59,162	721,978	88.59
Protective overall, ชั้น	24,818	293,979	89.14
Face shield, ชั้น	151,727	1,211,705	93.69
Protective overall Industrial grade, ชั้น	11,614	125,796	98.74
Surgical mask ชั้น	962,038	674,797	117.77

รายการเวชภัณฑ์ที่ต้องการมากที่สุด

Product name	ปริมาณที่ต้องการ
Alcohol Gel, ลีटर	4,777,832
Alcohol 70% , ลีटर	3,068,300
Surgical mask, ชั้น	962,038
Face shield, ชั้น	151,727
Surgical gown, ชั้น	114,312
Alcohol 95% , ลีटर	94,398

ความต้องการ ใช้เวชภัณฑ์เฉลี่ย (ต่อวัน)

Product name	Average_daily_usage
Surgical mask, ชั้น	449,368
Alcohol 70% , ลีटर	271,167
Alcohol Gel, ลีटर	261,535
Alcohol 95% , ลีटर	45,573
Face shield, ชั้น	12,933
Non-sterile powder glov...	8,150

ระดับความขาดแคลนเวชภัณฑ์จำแนกรายจังหวัด

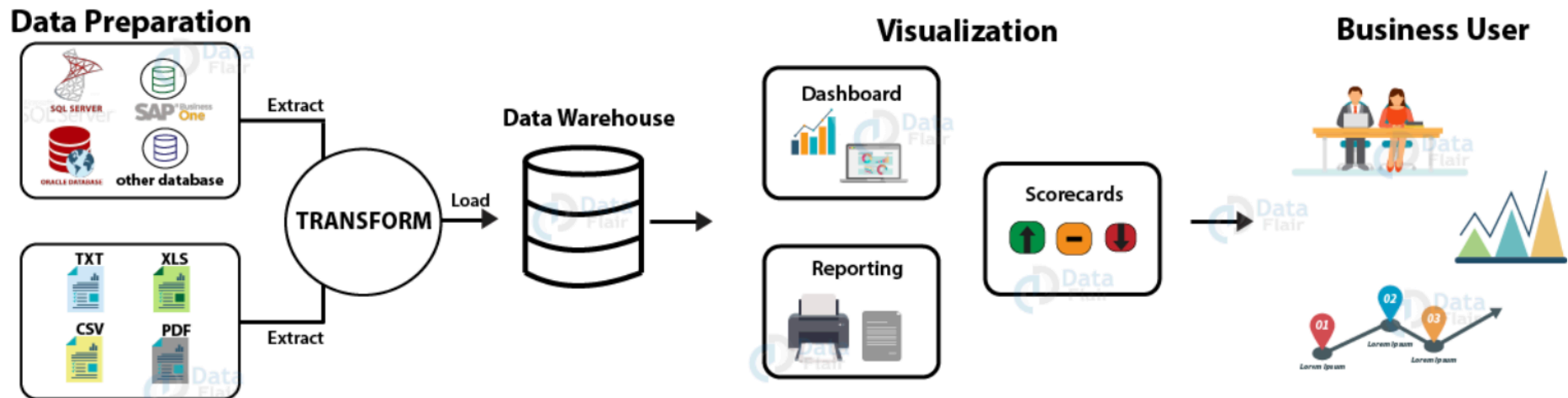
รายละเอียดความต้องการเวชภัณฑ์จำแนกรายสถานพยาบาล

Product name	ปริมาณที่ต้องการ	สต็อก	Alcohol 70% , ลีटर	ปริมาณการใช้ต่อเดือน	ปริมาณ
(01) เขต 1 เชียงใหม่	3,642	3,637,937	405,973	1	
เชียงใหม่	178	22,445	9,675		
10713-โรงพยาบาลนครพิงค์					
11119-โรงพยาบาลจอนทอง					
11120-โรงพยาบาลเทพรัตนราชานุกูล เฉลิมพระเกียรติ ๖๐ พรรษา	0	180	5		
11121-โรงพยาบาลเชียงดาว					
11122-โรงพยาบาลดอยสะเก็ด					
11123-โรงพยาบาลแม่แตง					
11124-โรงพยาบาลสะเมิง					
11125-โรงพยาบาลฝาง	72	288	360		
11126-โรงพยาบาลแม่ออน	20	180	200		
11127-โรงพยาบาลพร้าว	0	283	113		
11128-โรงพยาบาลสันป่าตอง					
11129-โรงพยาบาลสันกำแพง	36	14	50		
11130-โรงพยาบาลสันทราย					
11131-โรงพยาบาลหางดง	4	148	152		

087-8214076, 085-8195219, 081-9385343

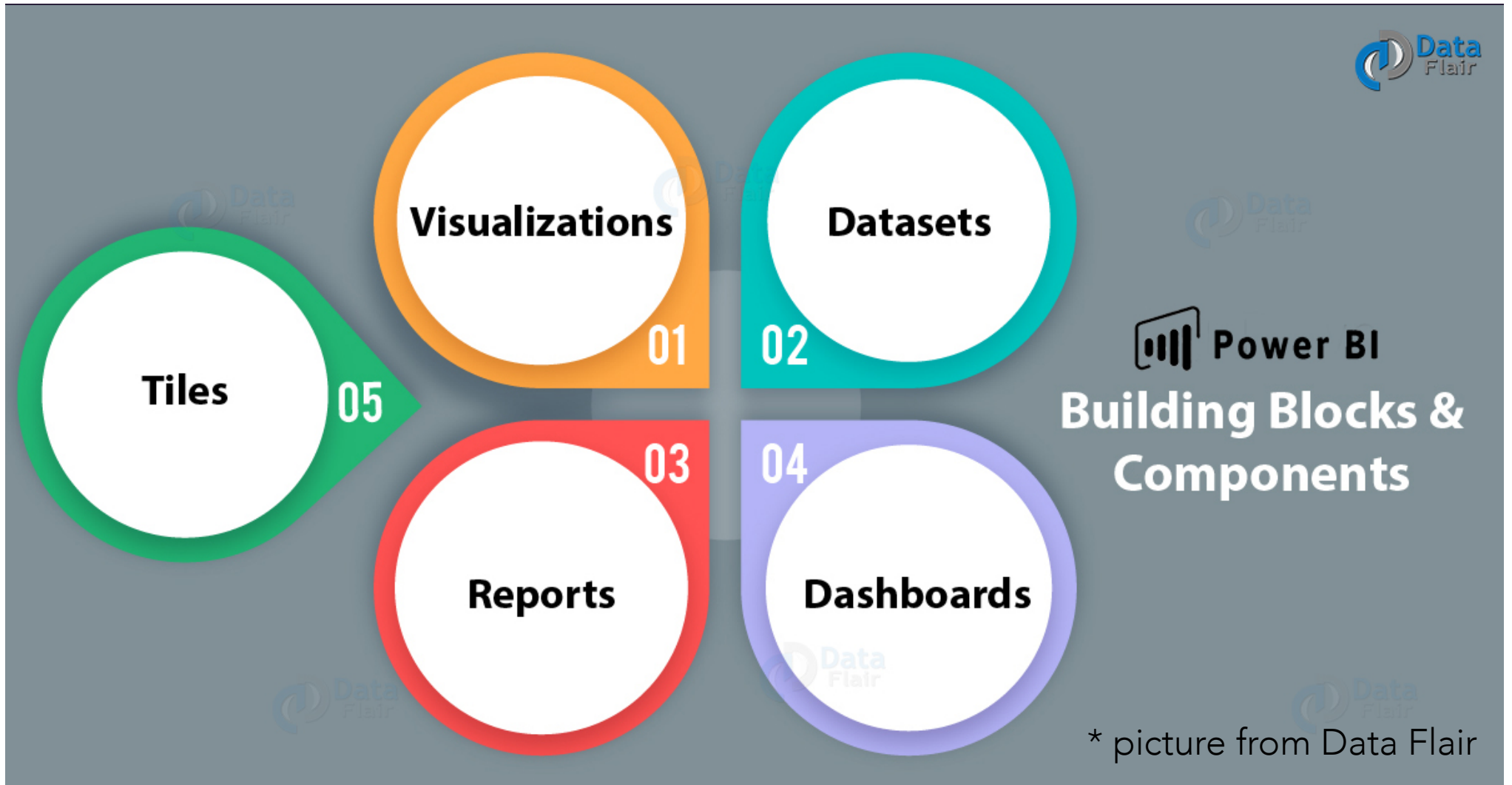
LogCOV Powered by คณะวิศวกรรมศาสตร์ มหาวิทยาลัยมหิดล และศูนย์เทคโนโลยีสารสนเทศและการสื่อสาร สำนักปลัดกระทรวงสาธารณสุข

POWER BI ARCHITECTURE

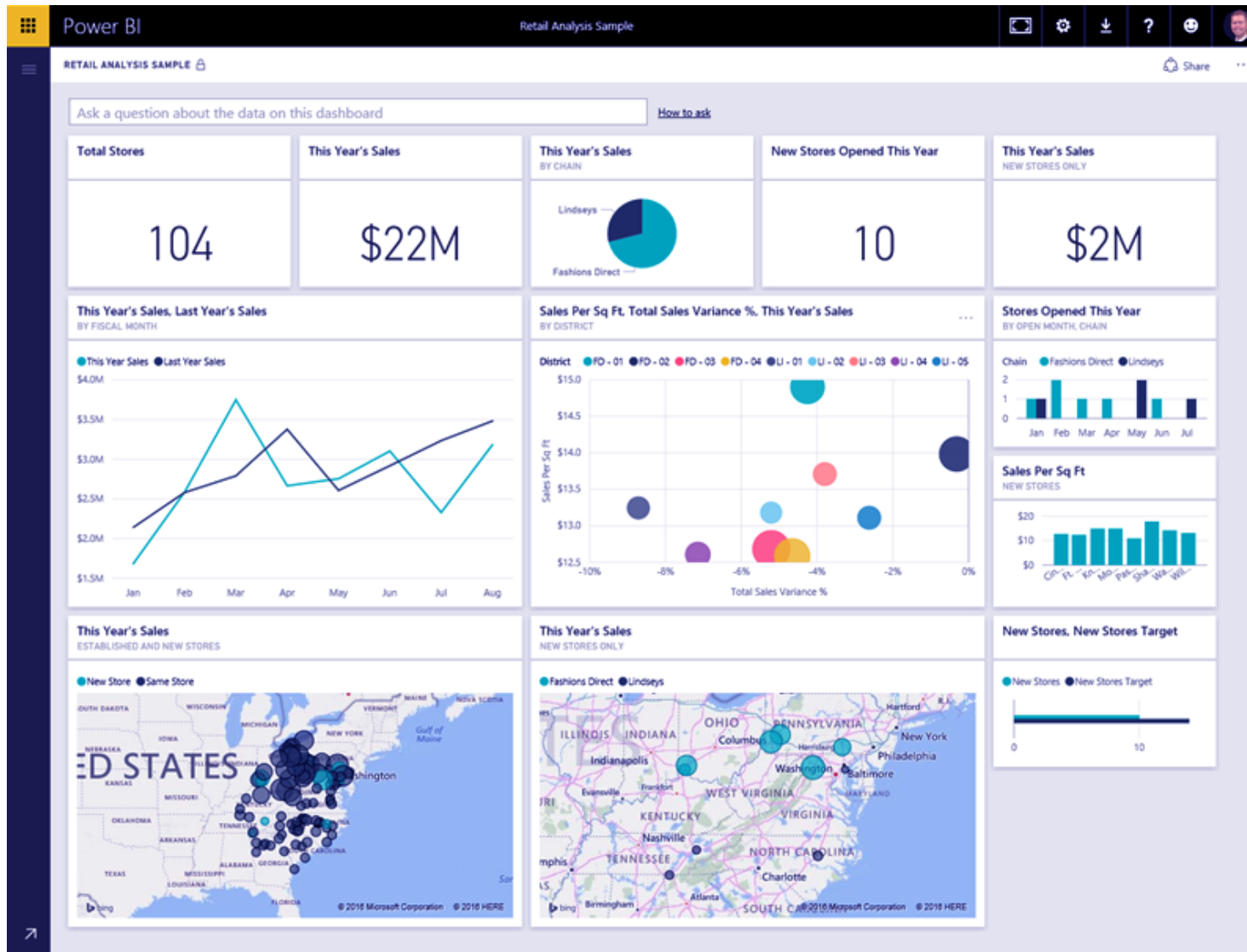


* picture from Data Flair

POWER BI BUILDING BLOCKS



VISUALISATION



DATASETS

	B	C	D	E	F	G	H
1	Year	Month	Month Name	Calendar Month	Births	Births Per Day	Births (Normalized)
2119	2004	1	January	1/1/2004	2,937	94.7	2842
2120	2004	2	February	2/1/2004	2,824	97.4	2921
2121	2004	3	March	3/1/2004	3,128	100.9	3027
2122	2004	4	April	4/1/2004	2,896	96.5	2896
2123	2004	5	May	5/1/2004	3,008	97.0	2911
2124	2004	6	June	6/1/2004	3,047	101.6	3047
2125	2004	7	July	7/1/2004	2,981	96.2	2885
2126	2004	8	August	8/1/2004	3,079	99.3	2980
2127	2004	9	September	9/1/2004	3,219	107.3	3219
2128	2004	10	October	10/1/2004	3,547	114.4	3433
2129	2004	11	November	11/1/2004	3,365	112.2	3365
2130	2004	12	December	12/1/2004	3,143	101.4	3042
2131	2005	1	January	1/1/2005	2,921	94.2	2827
2132	2005	2	February	2/1/2005	2,699	96.4	2892
2133	2005	3	March	3/1/2005	3,024	97.5	2926
2134	2005	4	April	4/1/2005	3,037	101.2	3037
2135	2005	5	May	5/1/2005	3,231	104.2	3127
2136	2005	6	June	6/1/2005	3,163	105.4	3163
2137	2005	7	July	7/1/2005	3,119	100.6	3018
2138	2005	8	August	8/1/2005	3,156	101.8	3054
2139	2005	9	September	9/1/2005	3,439	114.6	3439

REPORTS

Getting Started Guide - Power BI Desktop

File Home

Paste Cut Copy Format Painter Get Data Recent Sources Enter Data Edit Queries Refresh New Page New Visual Image Shapes Edit Interactions Arrange Alignment Distribute Page View Manage Relationships New Measure Publish

Clipboard External Data Insert Visuals View Relationships Calculations Share

Community well-being by State

Community well-being, Crime rate and Health care quality b...

Community well-being, Health care quality and Overall rank by State Code ...

Visualizations

Fields

Search

RetirementStats

StateCodes

Values

Drag data fields here

Filters

Page level filters

Community well-being is less than 16

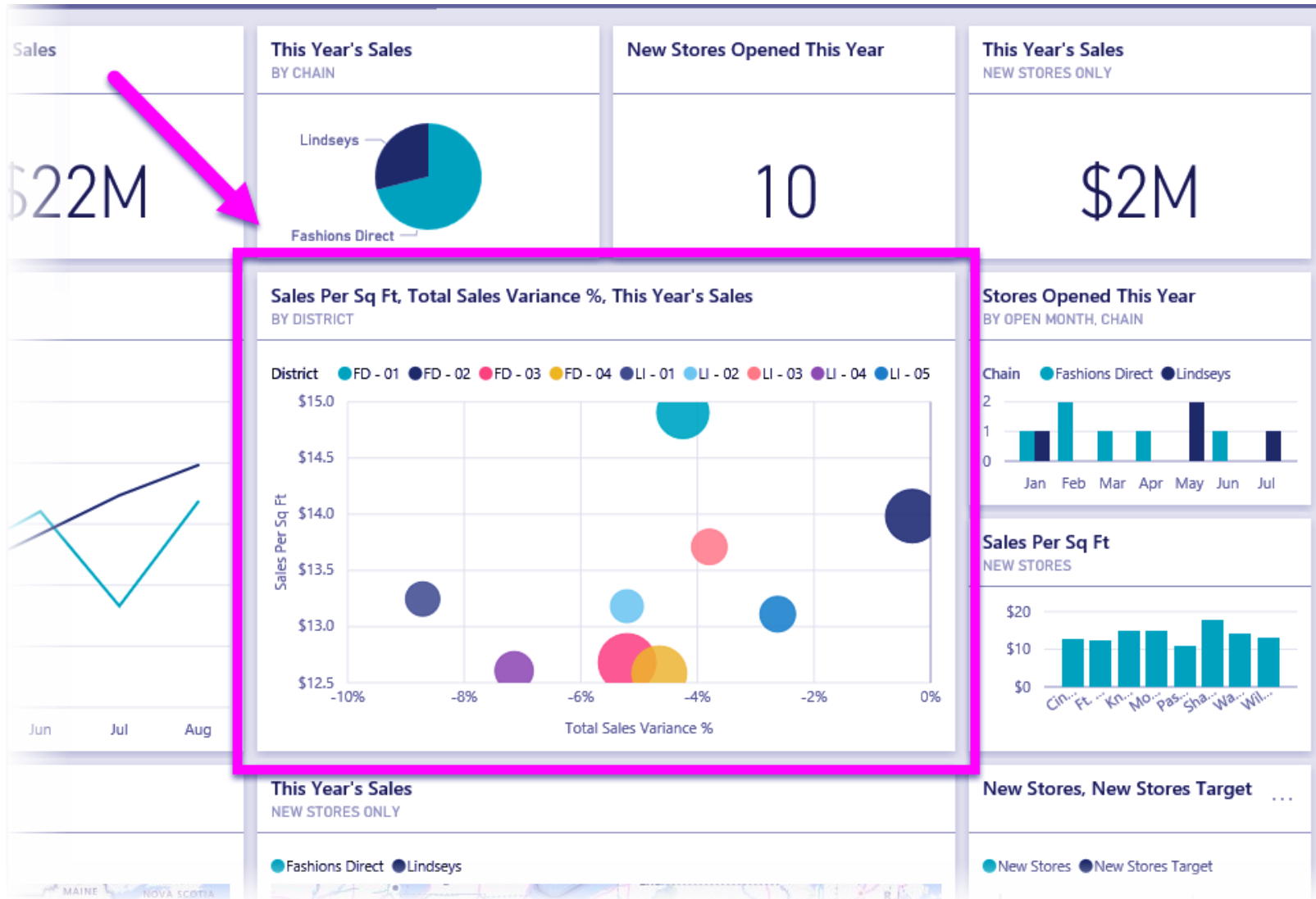
Report level filters

Drag data fields here

Page 1 Page 2 Page 3 Page 4 Page 5 Page 6

PAGE 5 OF 6

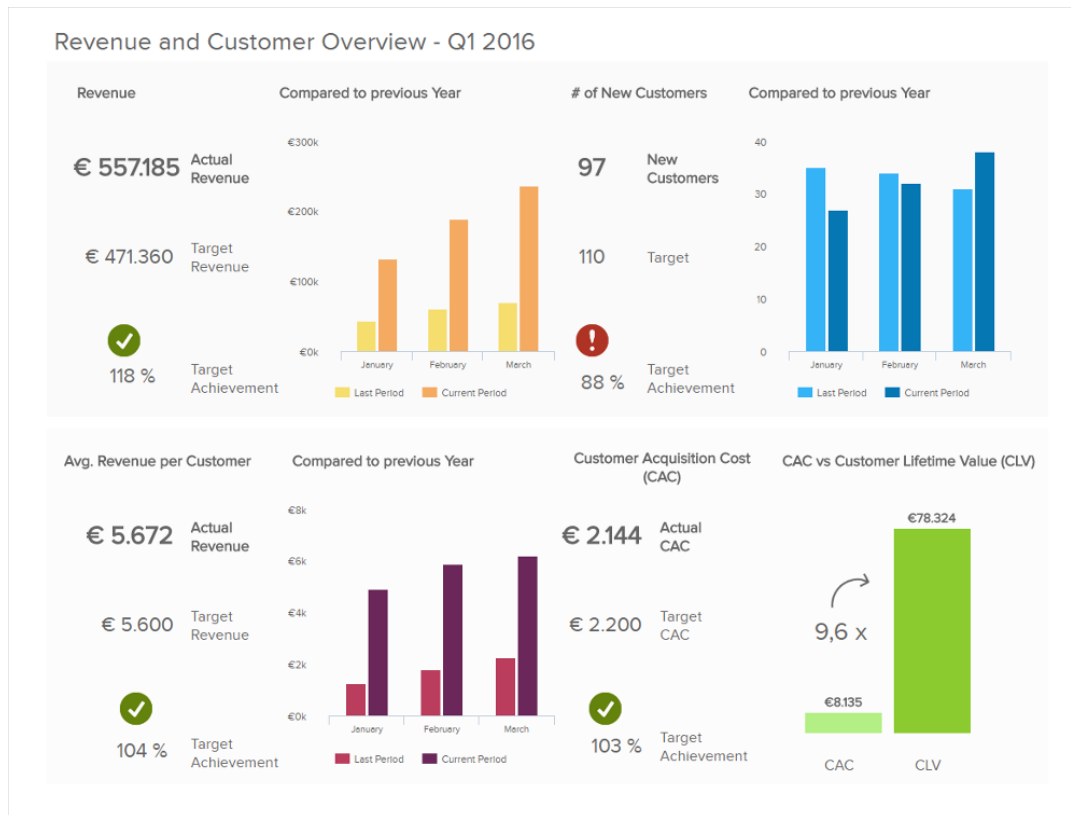
TILES



DASHBOARDS

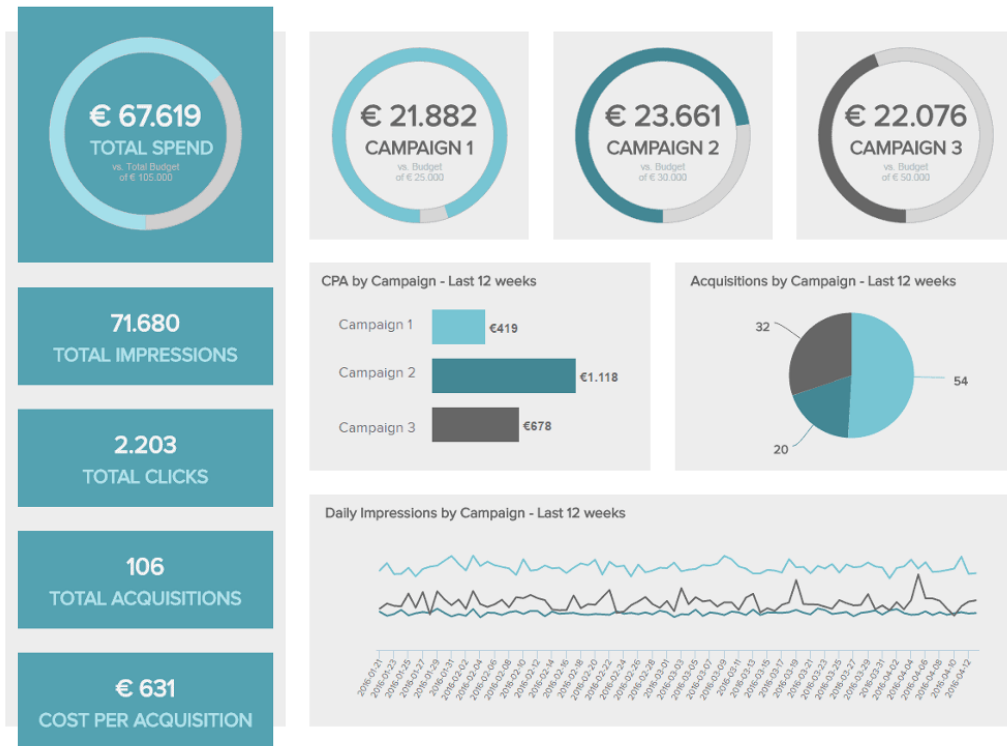
- Power BI dashboard is a gathering of visuals from a solitary page that you can impart to others. Frequently, it's a chosen gathering of visuals that give snappy understanding into the information or story you are attempting to exhibit.
- Dashboard needs to fit on a solitary page, frequently called a canvas. Consider it like the canvas that a craftsman or painter utilizes.

STRATEGIC DASHBOARD



- Dashboard for strategic planning
- Decision making at all levels.
- Focuses on displaying key organizational indicators or KPIs, making it easy to understand and see the organization's overall performance.

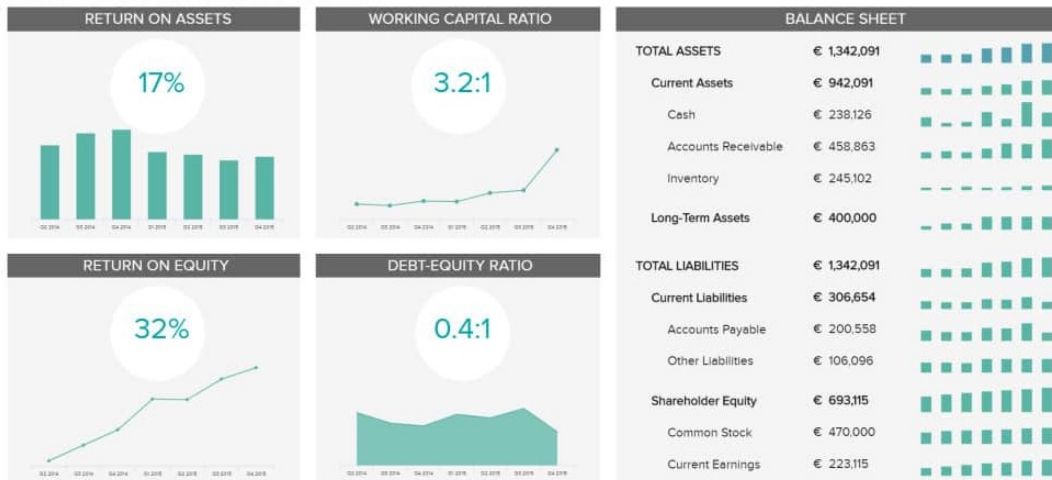
OPERATIONAL DASHBOARD



- Dashboard for management and team lead level.
- Monitors and controls task progress.
- Displays a current overview of an area or product line, and shows real-time results when issues arise.
- Typically, detailed data drilling is not required.

ANALYTICAL DASHBOARD

FINANCIAL PERFORMANCE DASHBOARD



- Dashboard for analysis.
- Provides data from multiple perspectives, often without specific indicators.
- It includes a variety of data, such as historical data that can be filtered and compared, and emphasizes viewing the data from different analytical perspectives

BI PROCESS

- Connect to Data Source (Get Data)
- Clean Up (ETL: Power Query)
- Import
- Report (Visualization)
- Publish & Share

GETTING DATA

- Power BI can connect to wide variety of data sources, including on-premises databases, Azure storage, Excel worksheets and a large number of 3rd party services.
 - Clean and transform data with the Query Editor
 - Connect to advanced data sources and create transformations
 - “Massage” irregularly formatted data

POWER QUERY (1)

- Power Query is a data transformation and preparation tool (ETL) available in Microsoft Excel and Power BI.
- It allows users to connect to various data sources, clean, transform, and reshape data before analysis.
- Power Query is designed to automate repetitive tasks, such as data extraction, filtering, merging, and sorting, without needing advanced programming skills.
- In Excel, go to the Data tab and select "Get Data" (Power Query) to open Power Query.

POWER QUERY (2)

The screenshot displays the Power Query Editor interface. At the top, there is a ribbon with tabs: Home, Transform, Add column, View, and Help. The Home tab is active, showing various icons for data operations like 'Close & load', 'Get data', 'Enter data', 'Options', 'Manage parameters', 'Refresh', 'Advanced editor', 'Manage', 'Choose columns', 'Remove columns', 'Keep rows', 'Remove rows', 'Filter rows', 'Sort', 'Transform', and 'Combine'.

Below the ribbon, the 'Queries [1]' pane on the left shows a single query named 'country_vaccinations_b...'. The main workspace displays a data table with the following columns: 'locat...', 'd...', 'vaccine', and 'total_vaccinati...'. The table contains 22 rows of data for Argentina, with dates ranging from 12/29/2020 to 1/3/2021 and various vaccine types like Moderna, Oxford/AstraZen..., Sinopharm/Beijing, and Sputnik V.

On the right side, the 'Query settings' pane is open, showing the 'Properties' section with the query name 'country_vaccinations_...' and the 'Applied steps' section, which includes 'Source', 'Promoted head...', and 'Changed colum...'. The status bar at the bottom indicates 'Completed (0.13 s) Columns: 4 Rows: 99+'.

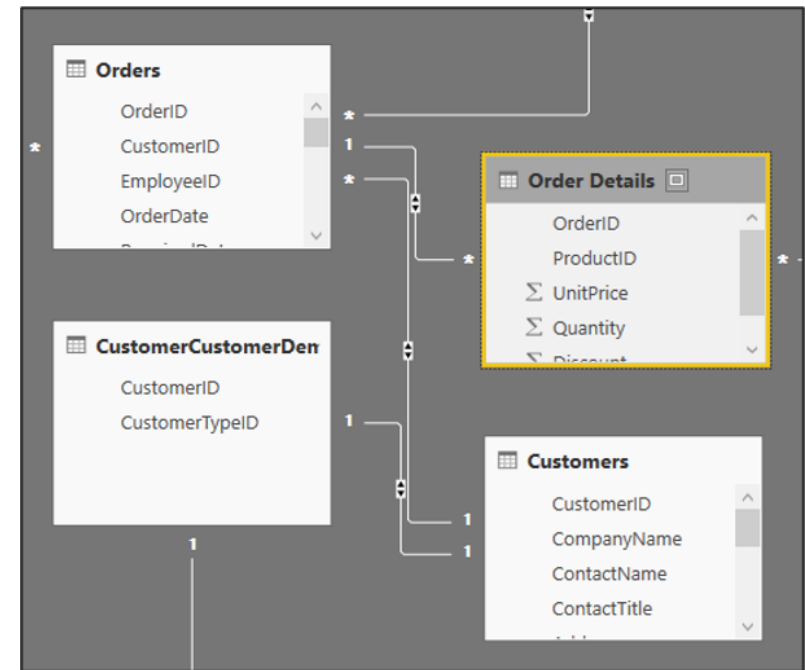
	locat...	d...	vaccine	total_vaccinati...
1	Argentina	12/29/20...	Moderna	2
2	Argentina	12/29/20...	Oxford/AstraZen...	3
3	Argentina	12/29/20...	Sinopharm/Beijing	1
4	Argentina	12/29/20...	Sputnik V	20481
5	Argentina	12/30/20...	Moderna	2
6	Argentina	12/30/20...	Oxford/AstraZen...	3
7	Argentina	12/30/20...	Sinopharm/Beijing	1
8	Argentina	12/30/20...	Sputnik V	40583
9	Argentina	12/31/2020	Moderna	2
10	Argentina	12/31/2020	Oxford/AstraZen...	3
11	Argentina	12/31/2020	Sinopharm/Beijing	1
12	Argentina	12/31/2020	Sputnik V	43388
13	Argentina	1/1/2021	Moderna	2
14	Argentina	1/1/2021	Oxford/AstraZen...	5
15	Argentina	1/1/2021	Sinopharm/Beijing	1
16	Argentina	1/1/2021	Sputnik V	43513
17	Argentina	1/2/2021	Moderna	2
18	Argentina	1/2/2021	Oxford/AstraZen...	6
19	Argentina	1/2/2021	Sinopharm/Beijing	1
20	Argentina	1/2/2021	Sputnik V	46824
21	Argentina	1/3/2021	Moderna	2
22	Argentina	1/3/2021	Oxford/AstraZen...	6

ONELAKE DATA HUB

- Data Lake in Power BI typically refers to integrating Power BI with a data lake storage, commonly using Azure Data Lake Storage (ADLS).
- This allows users to centralize large datasets from multiple sources into a single, scalable storage.
- By connecting Power BI with a data lake, users gain robust capabilities to explore, transform, and visualize massive datasets without the need to import all data directly into Power BI.

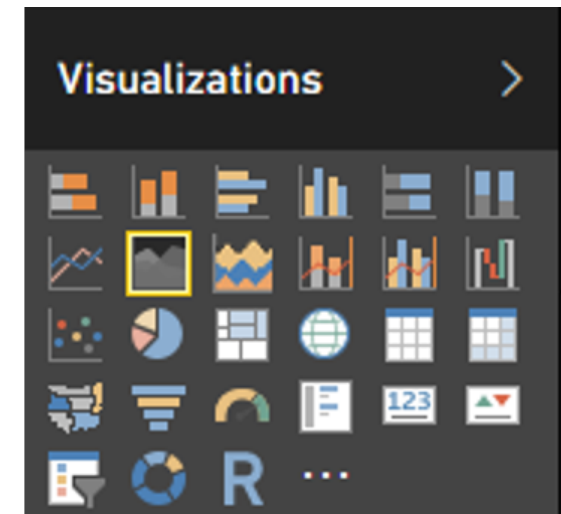
DATA MODELING

- Modeling is the technique of creating a logical connections and relationships between data sources.
- Create Calculated Columns
- Optimize data models for better visuals
- Create Measures and work with time-based functions
- Create Calculated Tables



VISUALISATION

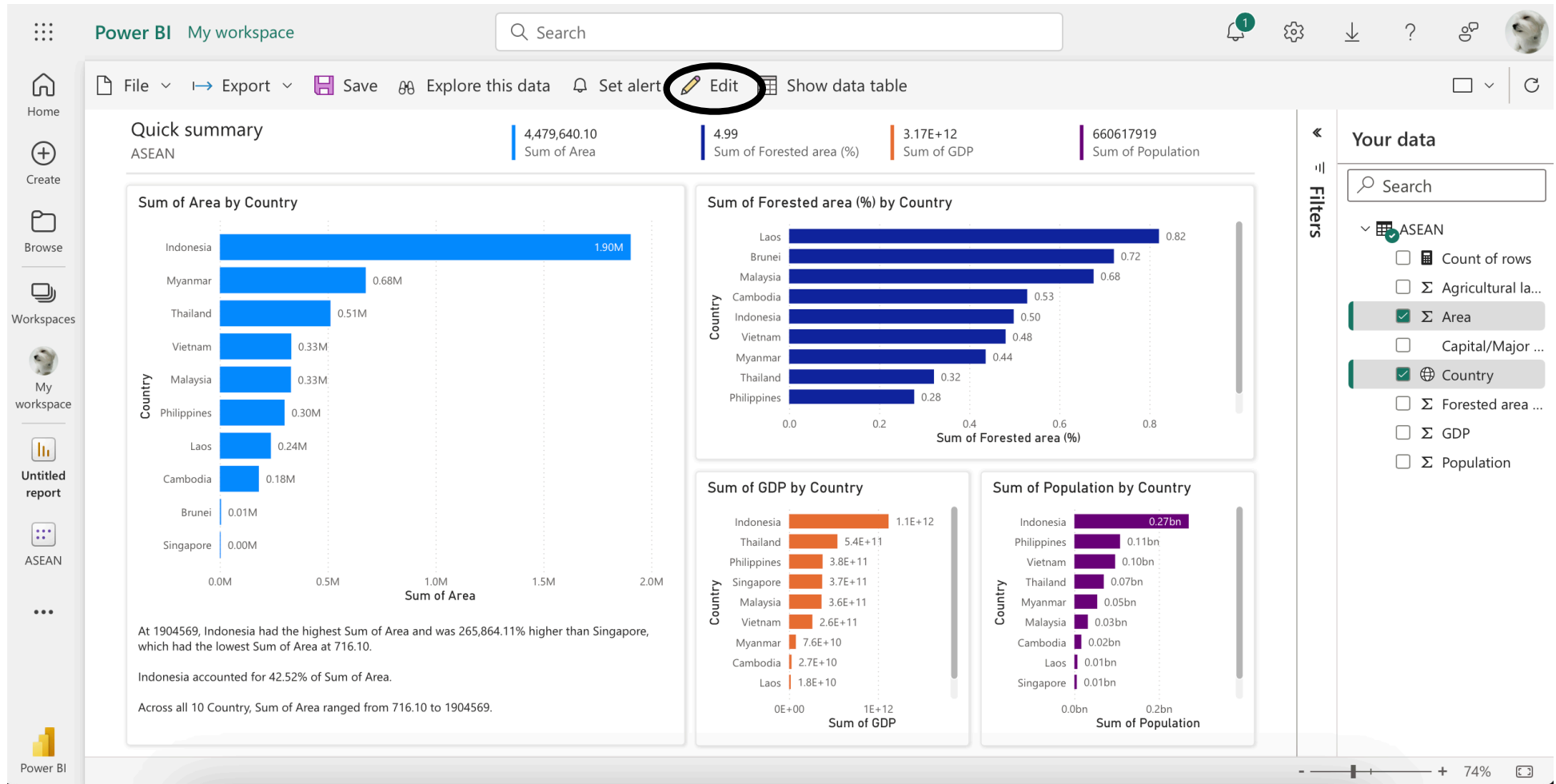
- A visualization is a visual representation of data, such as a chart, graph, map, or other “visual” representations of data.
 - Line, bar, pie, stacked
 - Matrix/pivots
 - Key performance
 - Tree maps
 - Geo and filled maps
 - Slicers/filters
 - Custom visualizations



DATA ANALYSIS EXPRESSIONS

- DAX is a collection of functions, operators, and constants that can be used in a formula, or expression, to calculate and return one or more values.
 - **Measure**
Calculation on a collection of rows AFTER aggregation.
 - **Calculated Column**
Calculation on each individual row BEFORE aggregation.

VISUALIZE DATA



CREATE PIVOT (MATRIX) TABLE

OneLake data hub



Pick a semantic model to use in your report

All

My data

Endorsed in your org

Filter by keyword

Name	Owner	Refreshed	Location	Enc
ASEAN	Kanat Poolsawasd	24/10/21, 20:46:09	My Workspace	—
UnivDB	Kanat Poolsawasd	05/11/24, 23:13:24	My Workspace	—
country_vaccinations_by_manufact...	Kanat Poolsawasd	04/11/24, 15:57:28	My Workspace	—
SalesData	Kanat Poolsawasd	05/11/23, 18:48:30	My Workspace	—
Covid-19 timeSerie	SUPHAVIT NORKAEW	22/04/20, 07:19:40	BI project	—
COVID-Vaccination	Kanat Poolsawasd	15/11/23, 08:52:12	My Workspace	—
Population_Example	Kanat Poolsawasd	21/11/21, 22:15:04	My Workspace	—
ASEAN	Kanat Poolsawasd	05/11/23, 14:10		—

Auto-create report

Create a blank report

Auto-create report

Cancel

CREATE PIVOT (MATRIX) TABLE

The image shows the Microsoft Power BI workspace interface. At the top, there is a search bar and navigation icons. Below that, a menu bar includes 'File', 'View', 'Reading view', 'Mobile layout', and 'Open data model'. The main workspace area contains a central canvas with the text 'Build visuals with your data' and a small diagram showing data fields being dragged onto a canvas. To the right of the canvas are three panes: 'Filters', 'Visualizations', and 'Data'. The 'Filters' pane has two sections: 'Filters on this page' and 'Filters on all pages', each with an 'Add data fields here' button. The 'Visualizations' pane has a 'Build visual' section with a search bar and a grid of visualization icons. A black circle highlights the 'Pivot table' icon in this grid. Below the icons are sections for 'Values' and 'Drill through' with 'Add data fields here' and 'Add drill-through fields here' buttons. The 'Data' pane shows a search bar and a list of data sources, including 'SalesData'. The bottom of the interface shows a 'Page 1' indicator and a green '+' button.

CREATE PIVOT (MATRIX) TABLE

The screenshot displays the Microsoft Power BI interface. The main area shows a Pivot Table with the following data:

Product	Sum of Sales
Ink Jet	385
Arizona	55
California	110
Colorado	45
Utah	90
Washington	85
Mono Laser	330
Photo	300
Portable	195
Total	1210

The interface includes several panels:

- Filters:** Shows filters for this visual (Location is (All), Product is (All), Sum of Sales is (All)) and filters for this page.
- Visualizations:** Shows the 'Build visual' section with a grid icon selected, indicating the Pivot Table visualization type.
- Data:** Shows the 'SalesData' table with fields Location, Product, and Sales selected.

The left sidebar contains navigation options: Home, Create, Browse, OneLake data hub, Workspaces, My workspace, SalesData, and Power BI.

POWER BI - REPORT

The screenshot displays a Power BI report titled "ASEAN Report" with data updated on 12/6/20. The report is viewed in "Reading view" and includes a navigation pane on the left with options like Home, Favorites, Recent, Apps, Shared with me, Learn, Workspaces, My workspace, Dashboards, ASEAN.xlsx, Reports, ASEAN Report, Workbooks, Datasets, and Get data. The main content area features a map of Southeast Asia, a population pyramid, and a data table. The population pyramid shows the population of Indonesia (660.62M), Area (4.48M), and Forested area (4.99%). The data table provides detailed statistics for each country in the ASEAN region.

Country	Population	Area	Forested area (%)
Indonesia	270625568	1,904,569.00	0.50
Myanmar	54045420	676,578.00	0.44
Thailand	69625582	513,120.00	0.32
Vietnam	96462106	331,210.00	0.48
Malaysia	31949777	329,847.00	0.68
Philippines	108116615	300,000.00	0.28
Laos	7169455	236,800.00	0.82
Cambodia	16486542	181,035.00	0.59
Brunei	433285	5,765.00	0.72
Singapore	5703569	716.10	0.23
Total	660617919	4,479,640.10	4.99

The right-hand pane contains a "Filters" section with a search bar and a filter for "Country is (All)". Below this are sections for "Filters on this page" and "Filters on all pages", each with an "Add data fields here" button. The "Visualizations" pane shows various chart options, and the "Fields" pane lists fields from the "ASEAN" dataset, including "Country" (checked), "Agricultural...", "Area", "Capital/Maj...", "Forested ar...", "GDP", and "Population".

PUBLISHING & SHARING

Success! Your report is ready to share

Link you can send in email

<https://app.powerbi.com/view?r=eyJrljoiYz>

Copy

HTML you can paste into a website

`<iframe title="ASEAN" width="600" height`

Copy

Size 600 x 373.5 px

Placeholder image



Upload

Delete

Default Page

Default

The screenshot displays a Power BI report interface. At the top, there are two map visualizations labeled 'Country'. The left map shows Southeast Asian countries with labels: Singapore, Philippines, Malaysia, Vietnam, Indonesia, Brunei, Thailand, Myanmar, Laos, and Cambodia. Below the maps is a treemap chart titled 'Population by Country' with three main categories: Population (660.62M), Area (4.48M), and Forested area (%). To the right of the treemap is a data table with columns for Country, Capital/Major City, and Area. The table lists data for Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam, with a total area of 4,479,640.10. The report footer includes the Microsoft Power BI logo and a 'Close' button.

Country	Capital/Major City	Area
Brunei	Bandar Seri Begawan	5,765.00
Cambodia	Phnom Penh	181,035.00
Indonesia	Jakarta	1,904,569.00
Laos	Vientiane	236,800.00
Malaysia	Kuala Lumpur	329,847.00
Myanmar	Naypyidaw	676,578.00
Philippines	Manila	300,000.00
Singapore	Singapore	716.10
Thailand	Bangkok	513,120.00
Vietnam	Hanoi	331,210.00
Total		4,479,640.10

EXPORT REPORT (1)

The screenshot shows the Microsoft Power BI interface. At the top, the browser address bar displays 'app.powerbi.com'. The main header includes 'ASEAN Country' and 'Data updated 24/10/21'. A search bar is present. Below the header, a menu bar contains 'File', 'Export', 'Save', 'Share', 'Chat in Teams', 'Explore this data', 'Get insights', 'Set alert', 'Edit', 'Show data table', 'Copilot', and a refresh icon. The 'Export' menu is open, with 'Analyze in Excel', 'PowerPoint', and 'PDF' options circled in black. The main dashboard features four charts:

- Sum of Area by Country:** A horizontal bar chart showing the sum of area for 10 countries. Indonesia has the highest value at 1.90M.
- Sum of Agricultural land (%) by Country:** A horizontal bar chart showing the percentage of agricultural land for 10 countries. Philippines has the highest percentage at 0.42.
- Sum of Population by Country:** A horizontal bar chart showing the sum of population for 10 countries. Indonesia has the highest population at 0.27bn.
- Sum of GDP by Country:** A horizontal bar chart showing the sum of GDP for 10 countries. Indonesia has the highest GDP at 1.1E+12.

The 'Your data' pane on the right shows filters for 'ASEAN', 'Area', and 'Country'. The 'Area' and 'Country' filters are checked. The bottom right corner shows a zoom level of 78%.

Country	Sum of Area
Indonesia	1.90M
Myanmar	0.68M
Thailand	0.51M
Vietnam	0.33M
Malaysia	0.33M
Philippines	0.30M
Laos	0.24M
Cambodia	0.18M
Brunei	0.01M
Singapore	0.00M

Country	Sum of Agricultural land (%)
Philippines	0.42
Vietnam	0.39
Indonesia	0.31
Cambodia	0.31
Malaysia	0.26
Myanmar	0.20
Laos	0.10
Brunei	0.03
Singapore	0.01

Country	Sum of Population
Indonesia	0.27bn
Philippines	0.11bn
Vietnam	0.10bn
Thailand	0.07bn
Myanmar	0.05bn
Malaysia	0.03bn
Cambodia	0.02bn
Laos	0.01bn
Singapore	0.01bn

Country	Sum of GDP
Indonesia	1.1E+12
Thailand	5.4E+11
Philippines	3.8E+11
Singapore	3.7E+11
Malaysia	3.6E+11
Vietnam	2.6E+11
Myanmar	7.6E+10
Cambodia	2.7E+10
Laos	1.8E+10

EXPORT REPORT (2)

Personal

app.powerbi.com

ASEAN Country | Data updated 24/10/21

File | Export | Save | Share | Chat in Teams | Explore this data | Get insights | Set alert | Edit | Show data table | Copilot

Quick summary

ASEAN

4,479,640.10 Sum of Area | 2.46 Sum of Agricultural land ... | 660617919 Sum of Population | 3.17E+12 Sum of GDP

Sum of Area by Country

Country	Sum of Area
Indonesia	0.68M
Myanmar	0.51M
Thailand	0.33M
Vietnam	0.33M
Malaysia	0.30M
Philippines	0.24M
Laos	0.18M
Cambodia	0.01M
Brunei	0.00M
Singapore	0.00M

At 1904569, Indonesia had the highest Sum of Area and was 20,304.1% higher than Singapore, which had the lowest Sum of Area at 716.10.

Indonesia accounted for 42.52% of Sum of Area.

Across all 10 Country, Sum of Area ranged from 716.10 to 1904569.

Sum of Population

Country	Sum of Population
Cambodia	0.02bn
Laos	0.01bn
Singapore	0.01bn

Sum of GDP

Country	Sum of GDP
Myanmar	7.6E+10
Cambodia	2.7E+10
Laos	1.8E+10

Export to PowerPoint

Choose how to export:

Embed live data

Copy the report URL and paste it into your existing presentation or select Open in PowerPoint to create a new presentation.

Embed report with the data filters you selected

Report page link:

<https://app.powerbi.com/groups/me/reports/a447fcda-6295-4...> Copy

Open in PowerPoint Cancel

Filters

ASEAN

- Count of rows
- Agricultural la...
- Area
- Capital/Major ...
- Country
- Forested area ...
- GDP
- Population

Power BI

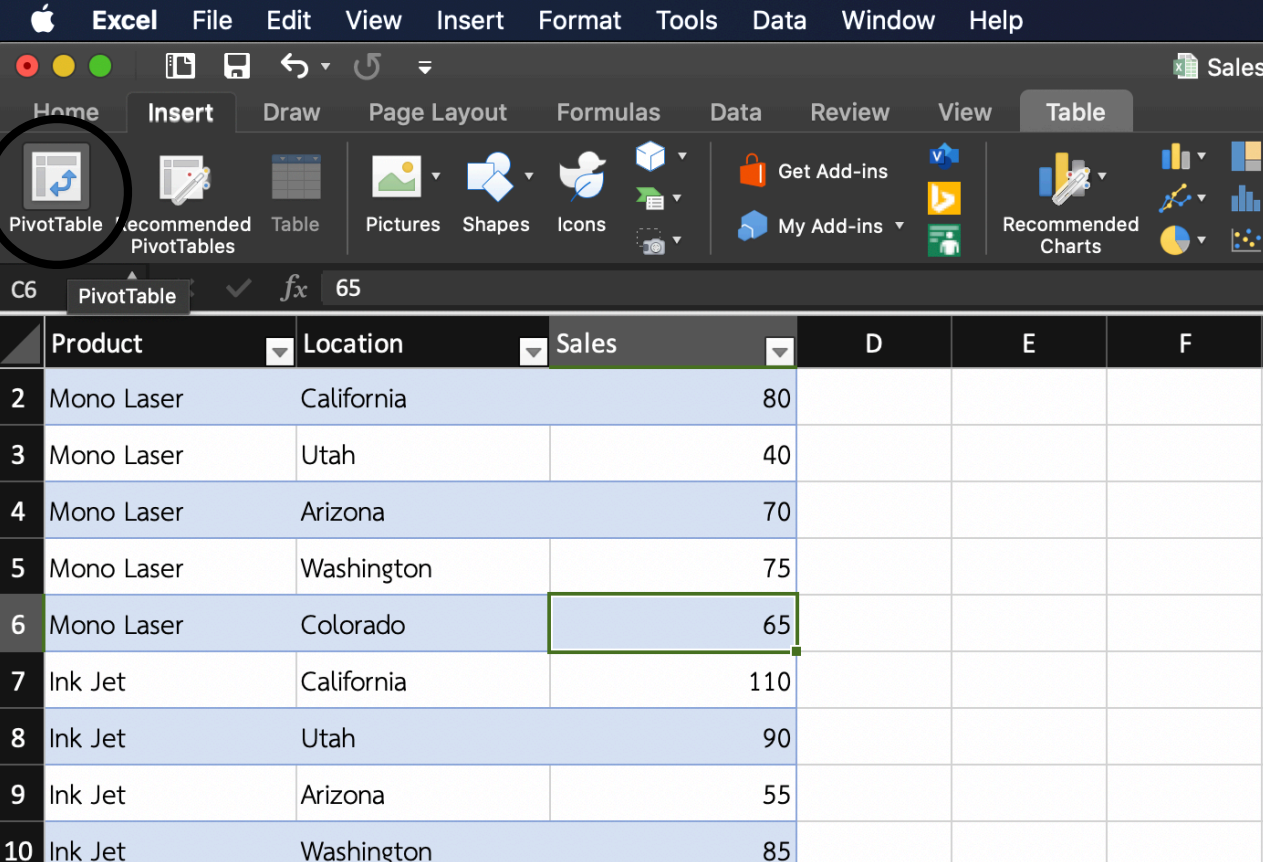
78%

PIVOT TABLES IN EXCEL (1)

- Pivot tables are one of Excel's most powerful features. A pivot table allows you to extract the significance from a large, detailed data set.

PIVOT TABLES IN EXCEL (2)

- Click any single cell inside the data set.
- On the Insert tab, in the Tables group, click PivotTable.

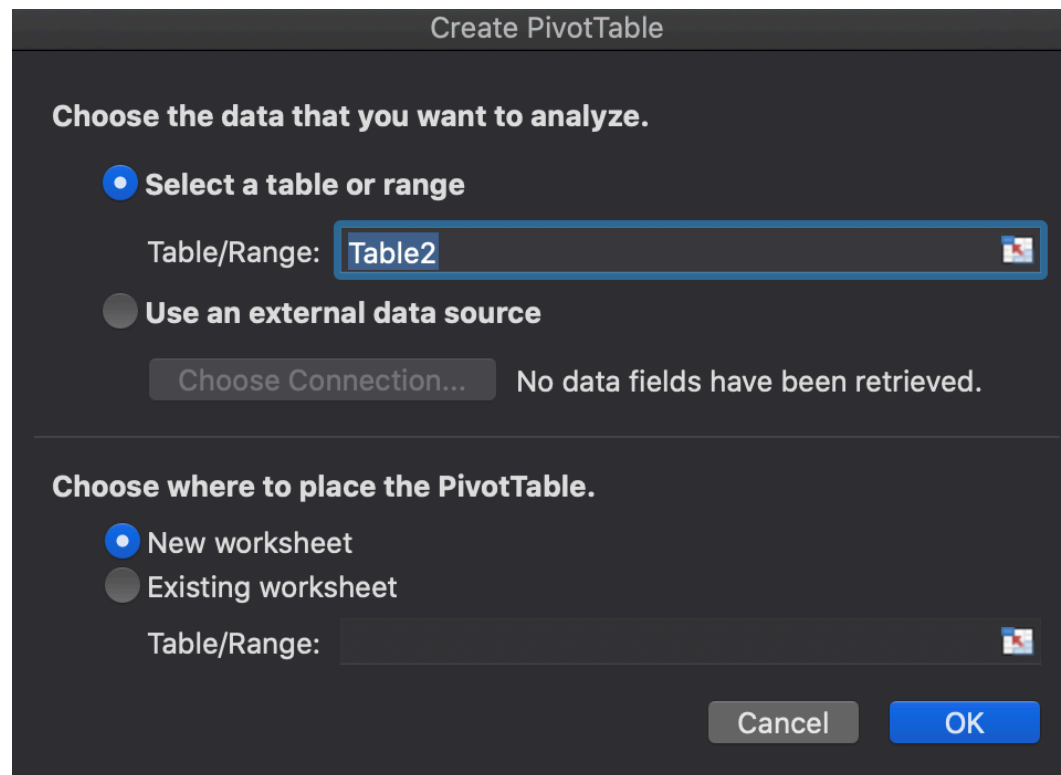


The screenshot shows the Microsoft Excel interface. The 'Insert' tab is active, and the 'PivotTable' button in the 'Tables' group is circled. Below the ribbon, a data table is visible with the following content:

	Product	Location	Sales	D	E	F
2	Mono Laser	California	80			
3	Mono Laser	Utah	40			
4	Mono Laser	Arizona	70			
5	Mono Laser	Washington	75			
6	Mono Laser	Colorado	65			
7	Ink Jet	California	110			
8	Ink Jet	Utah	90			
9	Ink Jet	Arizona	55			
10	Ink Jet	Washington	85			

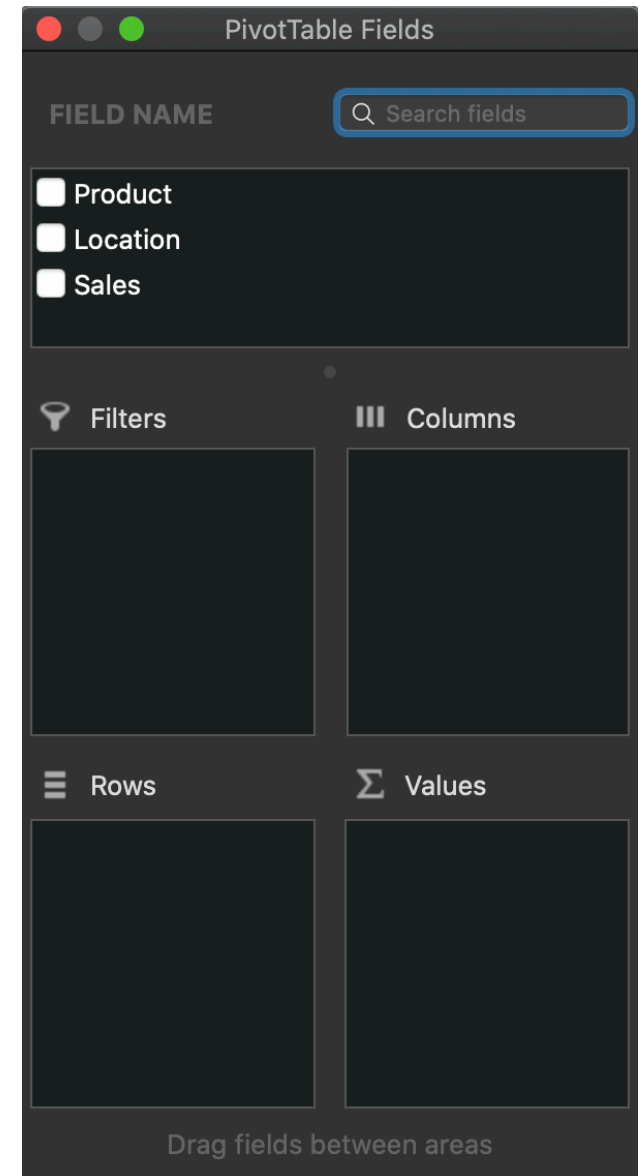
PIVOT TABLES IN EXCEL (3)

- The following dialog box appears. Excel automatically selects the data for you. The default location for a new pivot table is New Worksheet, and click OK



PIVOT TABLES IN EXCEL (4)

- The PivotTable Fields pane appears. To get the total amount exported of each product, drag the following fields to the different areas.



PIVOT TABLES IN EXCEL (5)

The screenshot displays the Microsoft Excel interface with a PivotTable and the PivotTable Fields task pane. The PivotTable is located in the range G3:K9 and shows the sum of sales for various products across different locations. The PivotTable Fields task pane is open on the right, showing the fields Product, Location, and Sales. The PivotTable is configured with Product in the Rows area, Location in the Columns area, and Sum of Sales in the Values area. The PivotTable Fields task pane also shows the Filters area, which is currently empty.

Row Labels	Arizona	California	Colorado	Utah	Washington	Grand Total
Ink Jet	55	110	45	90	85	385
Mono Laser	70	80	65	40	75	330
Photo	60	60	85	50	45	300
Portable	35	25	60	30	45	195
Grand Total	220	275	255	210	250	1210

The PivotTable Fields task pane shows the following configuration:

- FIELD NAME:** Search fields
- Product:**
- Location:**
- Sales:**
- Filters:** (Empty)
- Columns:** Location
- Rows:** Product
- Values:** Sum of Sales

Drag fields between areas

PIVOT TABLES IN EXCEL (6)

The screenshot displays the Microsoft Excel interface with a PivotTable and a PivotChart. The PivotTable is located in the range A3:G9, and the PivotChart is located in the range H3:K11. The PivotChart Fields task pane is open on the right side of the screen.

PivotTable Data:

Sum of Sales	Column Labels	Arizona	California	Colorado	Utah	Washington	Grand Total
Row Labels	Arizona						
Ink Jet		55	110	45	90	85	385
Mono Laser		70	80	65	40	75	330
Photo		60	70	85	50	45	310
Portable		35	25	60	30	45	195
Grand Total		220	290	245	210	250	1215

PivotChart Data:

Product	Arizona	California	Colorado	Utah	Washington
Ink Jet	55	110	45	90	85
Mono Laser	70	80	65	40	75
Photo	60	70	85	50	45
Portable	35	25	60	30	45

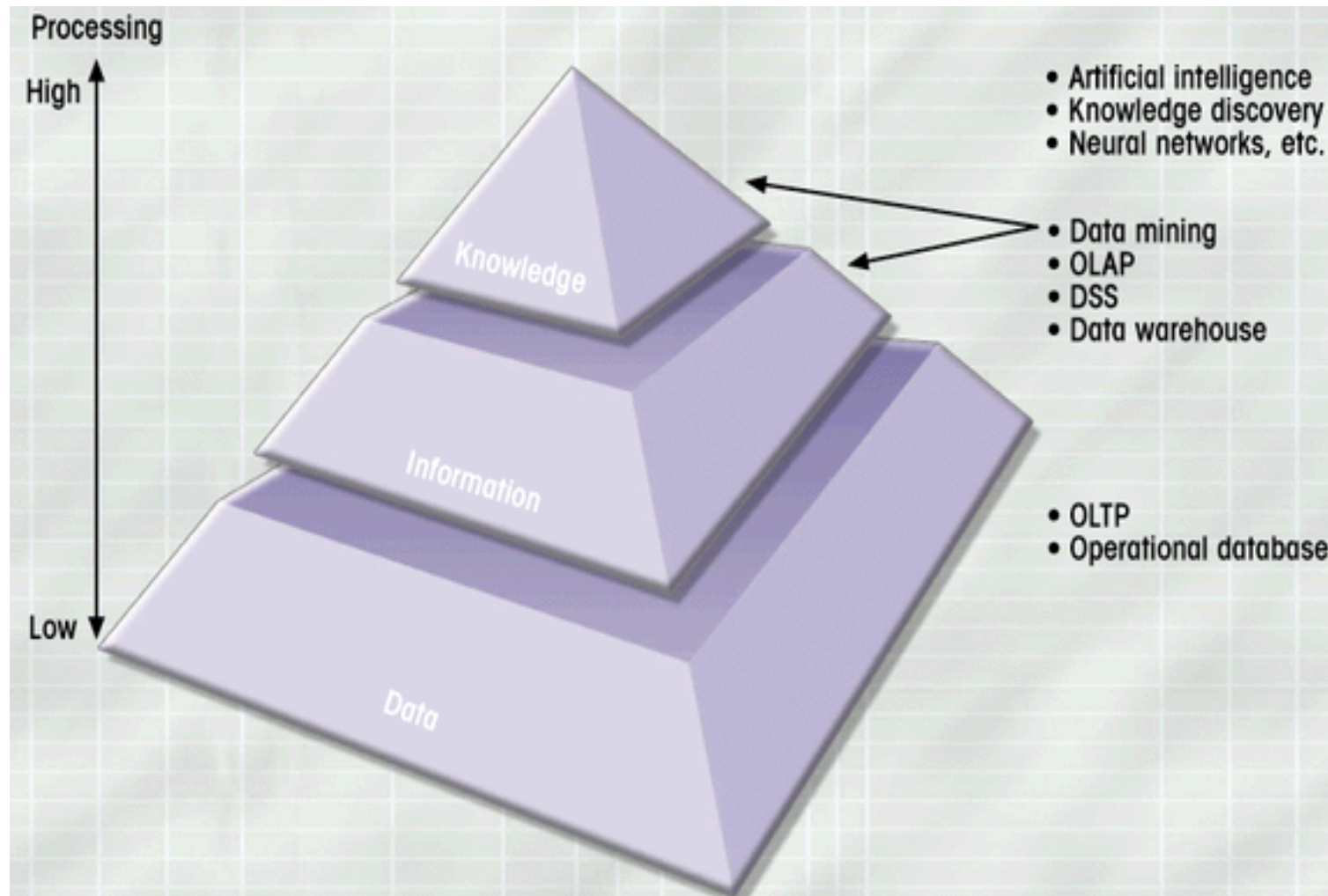
PivotChart Fields Task Pane:

- FIELD NAME: Search fields
- Product:
- Location:
- Sales:
- Filters: Location
- Legend (Series): Location
- Axis (Categories): Product
- Values: Sum of Sales

DATA MINING

- Seeks to discover unknown data characteristics
- Automatically searches data for anomalies and relationships
- Data mining tools
 - Analyse data
 - Uncover problems or opportunities
 - Form computer models based on findings
 - Predict business behaviour with models
 - Require minimal end-user intervention

EXTRACTION OF KNOWLEDGE FROM DATA



ASSIGNMENT 7

- ดาวน์โหลดไฟล์ **SampleData.xlsx** เพื่อใช้เป็นข้อมูลในการตอบคำถามต่อไปนี้
 - ถ้าบริษัทต้องการที่จะ **“ปิดสาขา”** เพื่อลดค่าใช้จ่าย คิดว่าควรปิดสาขาในภูมิภาค (Region) ไດ
 - ถ้าบริษัทต้องการ **“ปิดสายการผลิต”** คิดว่าควรปิดสายการผลิตสินค้า สี (Color) อะไร
 - **ไตรมาสไหนที่มียอดขายต่ำสุด** และถ้าต้องการเพิ่มยอดขายในไตรมาสนั้น คิดว่าควรทำ **โปรโมชั่นที่สินค้าสี (Color) อะไร**
- ตอบคำถามพร้อมส่งไฟล์ SampleData.xlsx ที่สร้าง Pivot Table สำหรับตอบคำถามข้างต้น พร้อมพิมพ์คำตอบลงในไฟล์ Excel