



# Applied Databases Normalisation

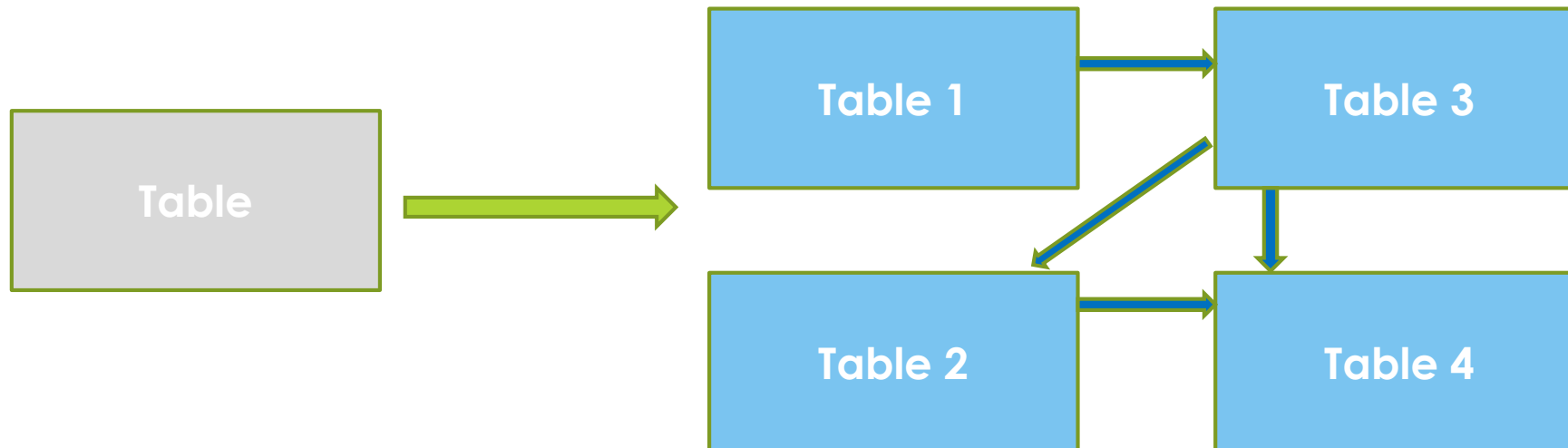
HIGHER DIPLOMA IN DATA ANALYTICS



# Normalisation



- Normalization is the process of organizing the columns (attributes) and tables (relations) of a relational database to minimize data redundancy.



# Normalisation



## Hospital

**PPSN** varchar(10)  
Primary Key

**First\_Name** varchar(50)

**Surname** varchar(50)

**Address** varchar(200)

**Doctor** varchar(50)

**Doctor\_Phone** integer

Hospital					
PPSN*	First_Name	Surname	Address	Doctor	Doctor_Phone
7629913X	John	Smyth	Athlone	Dr. Jones	12345
9893333F	Alan	Mulligan	Galway	Dr. Murphy	88335
9898823W	Fred	Collins	Castlebar	Dr. Jones	12345
NULL	NULL	NULL	NULL	Dr. Rice	88788



# Normalisation

Patient\_Table

**PPSN** varchar(10)  
Primary Key

**First\_Name** varchar(50)

**Surname** varchar(50)

**Address** varchar(200)

**DoctorID** integer

Doctor\_Table

**DoctorID** integer  
Primary Key

**Name** varchar(50)

**Phone** integer

Patient_Table				
PPSN*	First_Name	Surname	Address	DoctorID
7629913X	John	Smyth	Athlone	101
9893333F	Alan	Mulligan	Galway	101
9898823W	Fred	Collins	Castlebar	NULL

Doctor_Table		
DoctorID*	Name	Phone
100	Dr. Jones	12345
101	Dr. Murphy	88335
102	Dr. Rice	88788

# Normalisation



## Patient\_Table

**PPSN** varchar(10)  
Primary Key

**First\_Name** varchar(50)

**Surname** varchar(50)

**Address** varchar(200)

**DoctorID** integer

FOREIGN KEY REFERENCES doctor\_table(DoctorID)

## Doctor\_Table

**DoctorID** integer  
Primary Key

**Name** varchar(50)

**Phone** integer

Patient_Table				
PPSN*	First_Name	Surname	Address	DoctorID
7629913X	John	Smyth	Athlone	100
9893333F	Alan	Mulligan	Galway	101
9898823W	Fred	Collins	Castlebar	100
12345F	Alan	Mulligan	Mayo	102

Doctor_Table		
DoctorID*	Name	Phone
100	Dr. Jones	12345
101	Dr. Murphy	88335
999	Dr. Rice	9898



# SHOW CREATE TABLE



## Patient\_Table

**PPSN** varchar(10)  
Primary Key

**First\_Name** varchar(50)

**Surname** varchar(50)

**Address** varchar(200)

**DoctorID** integer

FOREIGN KEY REFERENCES doctor\_table(DoctorID)

## Doctor\_Table

**DoctorID** integer  
Primary Key

**Name** varchar(50)

**Phone** integer

```
mysql> SHOW CREATE TABLE patient_table;
```

```
| patient_table | CREATE TABLE 'patient_table' (  
  'ppsn' varchar(10) NOT NULL,  
  'first_name' varchar(50) DEFAULT NULL,  
  'surname' varchar(50) DEFAULT NULL,  
  'address' varchar(200) DEFAULT NULL,  
  'doctorID' int(11) DEFAULT NULL,  
  PRIMARY KEY ('ppsn'),  
  KEY 'doctorID' ('doctorID'),  
  CONSTRAINT 'patient_table_ibfk_1' FOREIGN KEY ('doctorID') REFERENCES 'doctor_table' ('doctorID')  
) ENGINE=InnoDB DEFAULT CHARSET=latin1 |
```



# Getting information from multiple tables



Patient_Table					Doctor_Table			
PPSN*	First_Name	Surname	Address	DoctorID		DoctorID*	Name	Phone
7629913X	John	Smyth	Athlone	100		100	Dr. Jones	12345
9893333F	Alan	Mulligan	Galway	101		101	Dr. Murphy	88335
9898823W	Fred	Collins	Castlebar	100				

Patient & Doctor Information			
PPSN*	First_Name	Name	Phone
7629913X	John	Dr. Jones	12345
9893333F	Alan	Dr. Murphy	88335
9898823W	Fred	Dr. Jones	12345



# Getting information from multiple tables



Patient_Table				
PPSN*	First_Name	Surname	Address	DoctorID
7629913X	John	Smyth	Athlone	100
9893333F	Alan	Mulligan	Galway	101
9898823W	Fred	Collins	Castlebar	100

Doctor_Table		
DoctorID*	Name	Phone
100	Dr. Jones	12345
101	Dr. Murphy	88335

```
SELECT patient_table.ppsn, patient_table.first_name,  
       doctor_table.name, doctor_table.phone  
FROM patient_table  
INNER JOIN doctor_table  
       on patient_table.doctorID = doctor_table.doctorID;
```





# Getting information from multiple tables



Patient_Table				
PPSN*	First_Name	Surname	Address	DoctorID
7629913X	John	Smyth	Athlone	100
9893333F	Alan	Mulligan	Galway	101
9898823W	Fred	Collins	Castlebar	100

Doctor_Table		
DoctorID*	Name	Phone
100	Dr. Jones	12345
101	Dr. Murphy	88335

```

SELECT patient_table.ppsn, patient_table.first_name,
       doctor_table.name, doctor_table.phone
FROM patient_table pt
INNER JOIN doctor_table dt
    on patient_table.doctorID=dt.doctorID;
  
```

```

mysql> SELECT name as doc
       -> FROM doctor_table;
+-----+
| doc  |
+-----+
| Dr. Jones |
| Dr. Murphy |
+-----+
2 rows in set (0.00 sec)
  
```



# Getting information from multiple tables



Patient_Table				
PPSN*	First_Name	Surname	Address	DoctorID
7629913X	John	Smyth	Athlone	100
9893333F	Alan	Mulligan	Galway	101
9898823W	Fred	Collins	Castlebar	100
2344234S	Mary	Burke	Galway	NULL

Doctor_Table		
DoctorID*	Name	Phone
100	Dr. Jones	12345
101	Dr. Murphy	88335

```
mysql> SELECT pt.ppsn, pt.first_name, dt.name
-> FROM patient_table pt
-> INNER JOIN doctor_table dt
-> on pt.doctorID = dt.doctorID;
+-----+-----+-----+
| ppsn   | first_name | name      |
+-----+-----+-----+
| 7629913X | John      | Dr. Jones |
| 9898823W | Fred      | Dr. Jones |
| 9893333F | Alan      | Dr. Murphy |
+-----+-----+-----+
3 rows in set (0.00 sec)
```



# INNER JOIN v LEFT JOIN



INNER JOIN	LEFT JOIN
Returns rows from two tables only when the JOIN condition is met.  If JOIN condition is NOT met, nothing is returned from either table	Returns rows from two tables when the JOIN condition is met.  If JOIN condition is NOT met, rows from the first (LEFT) table are returned and NULL is returned instead of rows from the second table.



# INNER JOIN v LEFT JOIN



Patient\_Table

PPSN*	First_Name	Surname	Address	DoctorID
7629913X	John	Smyth	Athlone	100
9893333F	Alan	Mulligan	Galway	101
9898823W	Fred	Collins	Castlebar	100
2344234S	Mary	Burke	Galway	NULL

Doctor\_Table

DoctorID*	Name	Phone
100	Dr. Jones	12345
101	Dr. Murphy	88335

```
mysql> SELECT pt.ppsn, pt.first_name, dt.name
-> FROM patient_table pt
-> INNER JOIN doctor_table dt
-> on pt.doctorID = dt.doctorID;
```

ppsn	first_name	name
7629913X	John	Dr. Jones
9898823W	Fred	Dr. Jones
989333F	Alan	Dr. Murphy

3 rows in set (0.00 sec)

```
mysql> SELECT pt.ppsn, pt.first_name, dt.name
-> FROM patient_table pt
-> LEFT JOIN doctor_table dt
-> on pt.doctorID = dt.doctorID;
```

ppsn	first_name	name
7629913X	John	Dr. Jones
9898823W	Fred	Dr. Jones
989333F	Alan	Dr. Murphy
2344234S	Mary	NULL

4 rows in set (0.02 sec)

```
mysql> SELECT pt.ppsn, pt.first_name, dt.name
-> FROM doctor_table dt
-> LEFT JOIN patient_table pt
-> on dt.doctorID = pt.doctorID;
```

ppsn	first_name	name
7629913X	John	Dr. Jones
9898823W	Fred	Dr. Jones
989333F	Alan	Dr. Murphy

3 rows in set (0.00 sec)

