1 | Introduction to Databases

Database Nomenclature

Files	Databases
File	Table
Records	Tuples / Records
Fields	Attributes
Data Items	Values
Key Field	Primary Key

Filing systems

Consider the existence of two files:

- **Employee File**

  This would contain items such as ID number, name, surname, address, email and date of birth.

- **Salary File**

  This would contain items such as hours worked, rates of pay, overtime done, sick leave periods and vacation hours.

To obtain a link between these two files (*i.e binding a salary file to an employee file*) one must repeat all the data manually creating redundancies, duplications, inconsistencies, losses of data integrity, decentralization and, loss of security.

2 | Database systems

To completely omit filing systems, database systems are used instead. These avoid data duplication, redundancy, inconsistency, loss of integrity, insecurity and decentralization.

The *IDE* of databases are called **DBMS**[1].The various types of databases are:

- Flat File

[1]Data base management system

- Relational
- Hierarchical
- Network
- Object Oriented

Flat File Database

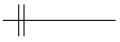
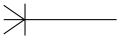
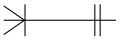
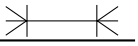
Below you can find the `CSV` version of a flat file database and its visual representation.

```
Order, AccountNumber, Name, Address, OrderDate, ItemName, ItemQty, ItemPrice, OrderTotal
12, 3, Peppi, B'kara, 10/2/2021, Pizza, 7, 4.20, 29.40
12, 3, Peppi, B'kara, 10/2/2021, Pasta, 1, 6.90, 6.90
13, 4, Cikku, B'bugia, 11/3/2021, Pomodoro, 3, 1.00, 3.00
```

Order	A/C no.	Name	City	Date	Item	Quantity	Price E.A	Total
12	3	Peppi	B'kara	10/2/2021	Pizza	7	€4.20	€29.40
12	3	Peppi	B'kara	10/2/2021	Pasta	1	€6.90	€6.90
13	4	Cikku	B'bugia	11/3/2021	Pomodoro	3	€1.00	€3.00

Relational Database

The three types of relations can be denoted with the notation that is referred to as *Crow's Foot* notation. Edgar F. Codd invented a set of related tables using normalization rules which include 3 forms: 1st, 2nd and 3rd normal forms.

Jargon	Notation
one to none	
one to many	
many to none	
many to one	
many to many	

Crow's foot notation.

First normal form

In this form, the multi-variable categories should be exported in another, separate table.

order_id	ac_no	name	city	date	item	quantity	item_price	total_price
12	3	Peppi	B'kara	10/2/2021	Pizza	7	€4.20	€29.40
12	3	Peppi	B'kara	10/2/2021	Pasta	1	€6.90	€6.90
13	4	Cikku	B'bugia	11/3/2021	Pomodoro	3	€1.00	€3.00

Second normal form

All the attributes in the table should be **functionally dependent** on the *primary key*.
$\phi(a)\phi(b) = \phi(ab)$