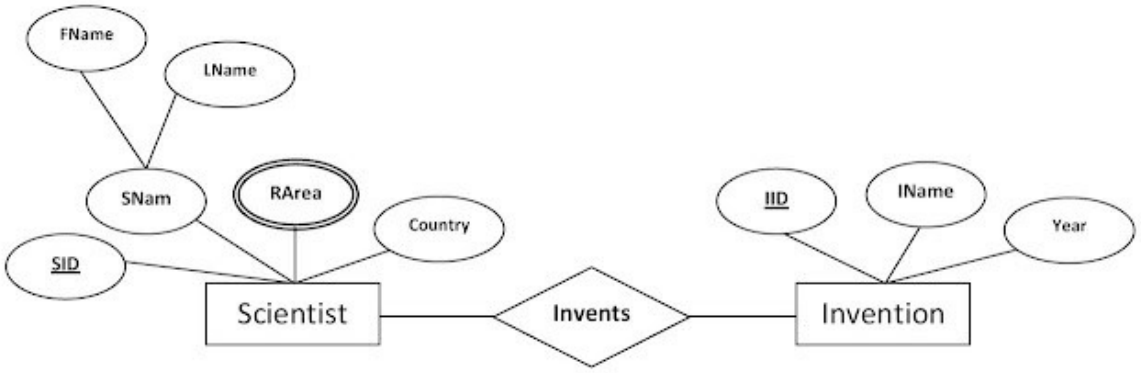
# Sistema Scientist - Inventions

## Diagrama E/R del sistema




**Conversió a model relacional / Diagrama E/R (amb atributs multivalor)**

Les entitats del model E/R i les relacions M..N es converteixen en entitats (taules) en el model relacional.

| ***Name*** | ***Entity set / Relationship set*** | ***Type*** |
|---|---|---|
| ***Scientist*** | Entity set | Strong entity set |
| ***Invention*** | Entity set | Strong entity set |
| ***Invents*** | Relationship set | Many-to-Many relationship |

**Entity - *Scientist***

| ***Attributes*** | ***Attribute Type*** | ***Description*** |
|---|---|---|
| SID | Simple and Primary key | Scientist ID |
| FName | Composite attribute Sname, is divided into 2 simple attibutes | Scientist Name |
| LName | | |
| RArea | Multi-valued | Research Area |
| Country | Simple | Country |

**Entity - *Invention***

| ***Attributes*** | ***Attribute Type*** | ***Description*** |
|---|---|---|
| IID | Simple and Primary key | Invention ID |
| IName | Simple | Name of the invention |
| Year | Simple | Year of invention |

**Entity - *Scientist_Invention***

| ***Attributes*** | ***Attribute Type*** | ***Description*** |
|---|---|---|
| SID | ***SID** i **IID** són claus foranes i formen conjuntament la clau primària de la taula Scientist_Invention.* | Scientist ID |
| IID | | Invention ID |

## Atributs multivaluats:

Al nostre diagrama ER, RArea és un atribut multivalor. Això vol dir que un científic pot tenir una o més àrees com a àrees de recerca.
Per traduir un atribut multivalor en un esquema relacional, hem de crear una taula separada per aquest atribut.

**Entity - *Scientist_RArea***

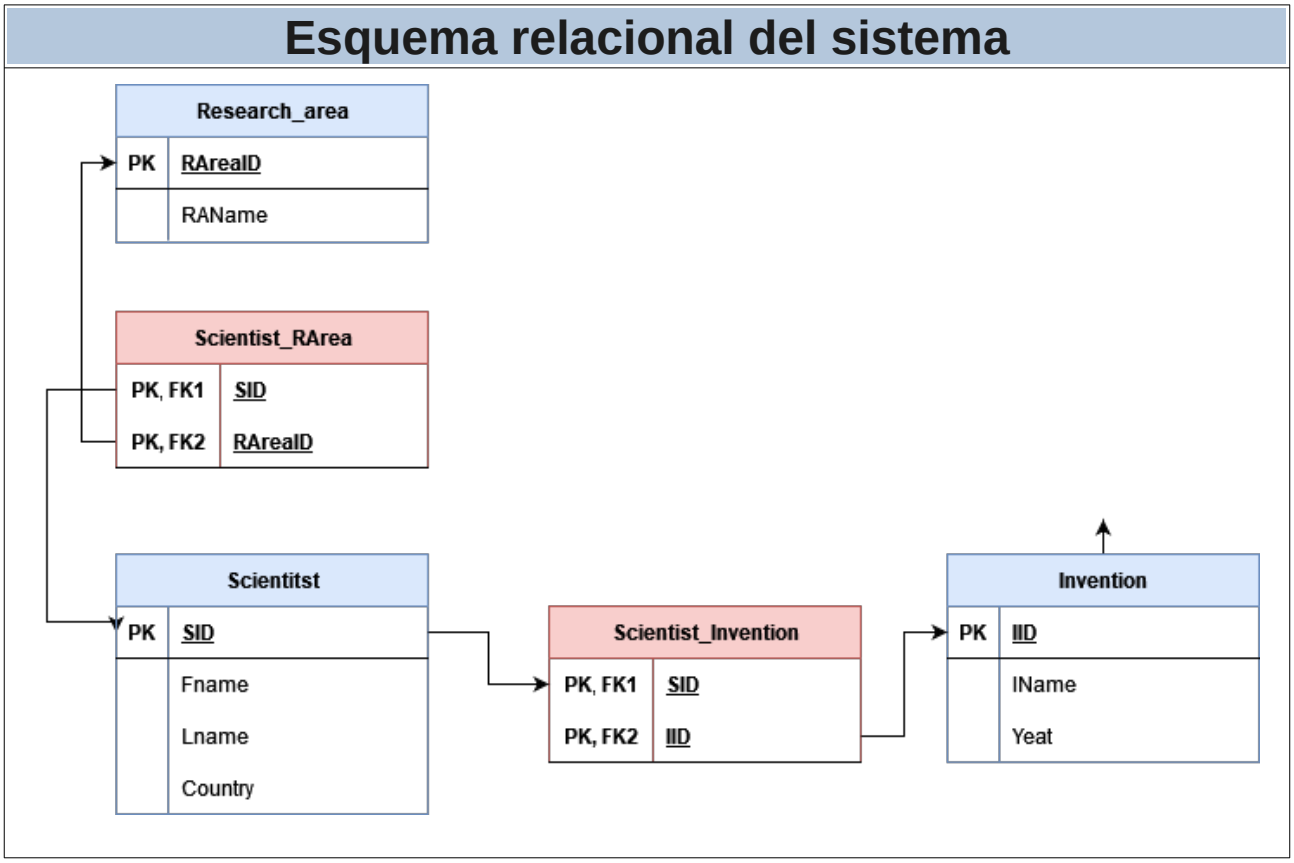
| *Attributes* | *Attribute Type* | *Description* |
|---|---|---|
| SID | Composite Primary key | Scientist ID |
| RAreaID | | Research Area ID |

***Aquí, SID i RAreaID són claus foranes i formen conjuntament la clau primària de la taula Scentist_RArea.***

Les àrees de recerca les hem convertides en una entitat, per així facilitar establir la relació entre científics i àrees de recerca.

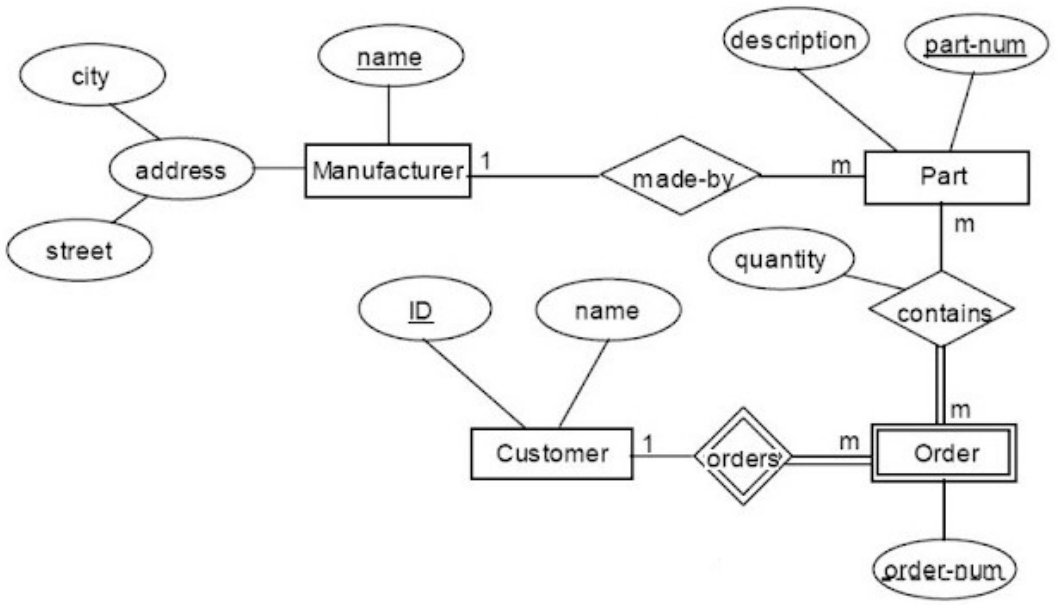
**Entity - *Research_Area***

| *Attributes* | *Attribute Type* | *Description* |
|---|---|---|
| RAreaID | Simple and Primary key | Research Area ID |
| RAName | Simple | Name of the research area |



# Sistema Manufacturer - Customer

## Diagrama E/R del sistema




**Conversió a model relacional / Diagrama E/R (amb entitats dèbils)**

Al diagrama E/R hi ha les següents entitats i relacions:

| ***Name*** | ***Entity set / Relationship set*** | ***Type*** |
|---|---|---|
| ***Manufacturer*** | Entity set | Strong entity set |
| ***Part*** | Entity set | Strong entity set |
| ***Order*** | Entity set | Weak entity set |
| ***Customer*** | Entity set | Strong entity set |
| ***made-by*** | Relationship set | One-to-Many from ***Manufacturer*** to ***Part*** |
| ***contains*** | Relationship set | Many-to-Many between ***Order*** and ***Part*** with **descriptive attribute Quantity** |
| ***orders*** | Weak Relationship set | One-to-Many from ***Customer*** to ***Order*** |

A la següent taula s'explica com s'ha convertit el model E/R a esquema relacional.

Cada component, com ara conjunts d'entitats, conjunts de relacions, atributs compostos, etc., es converteixen en els elements relacionals adequats i la quarta columna mostra els canvis en l'esquema en cada etapa. L'esquema relacional final d'un conjunt d'entitats es ressalta en color verd i les claus foranes en color blau.

| ER Component | Type | Reduction Rule | Relational schema after reduction |
|---|---|---|---|
| **Manufacturer** | Strong Entity Set | *Name of the entity set as name of the relation schema and attributes of entity set as attributes of relation schema* | **Manufacturer (name, address)** |
| **address** | Composite attribute of Manufacturer | *Include the component attributes to the relation schema, and remove the composite attributes* | **Manufacturer (name, street, city)** |
| | | | |
| **Part** | Strong Entity Set | *Refer above* | Part (part_num, description) |
| **made-by** | One-to-many relationship | *Include the primary key of one side as the foreign key of the other side* | Hence, the many side relation schema Part becomes as follows; **Part (part_num, description, manu_name)** Here, manu_name is the foreign key and refers Manufacturer. |
| | | | |
| **Customer** | Strong entity set | *Refer above.* | **Customer (ID, Name)** |
| | | | |
| **Order** | Weak entity set | *Relation schema for a weak entity set is created by including the primary key of strong entity set on which it depends.* | Order depends on Customer. Hence, primary key of customer has to be included as the foreign key in Order as follow; **Order (order_num, cust_ID)** Here, cust_ID is foreign key and (order_num, cust_ID) is the primary key. |
| | | | |
| **Contains** | Many-to-many relationship between Part and Order. | *For a many-to-many relationship, the relationship will be converted as a table with the primary keys of all participating entity sets as attributes.* | **Order_Part (order_num, part_num, cust_ID)** |
| **Quantity** | Descriptive attribute of the relationship Contains | *Descriptive attributes will become the part of the relationship table.* | Hence, Contains become; **Order_Part (order_num, part_num, cust_ID , quantity)** |

# Esquema relacional del sistema