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Goal:

The objective is to build a database management system to maintain details of various inventions and the related details of that invention.

Overview:

With the required information, we started by creating different entities and established various relationships between them like one to one, many to one, many to many, unary, aggregation, total participation, partial participation.

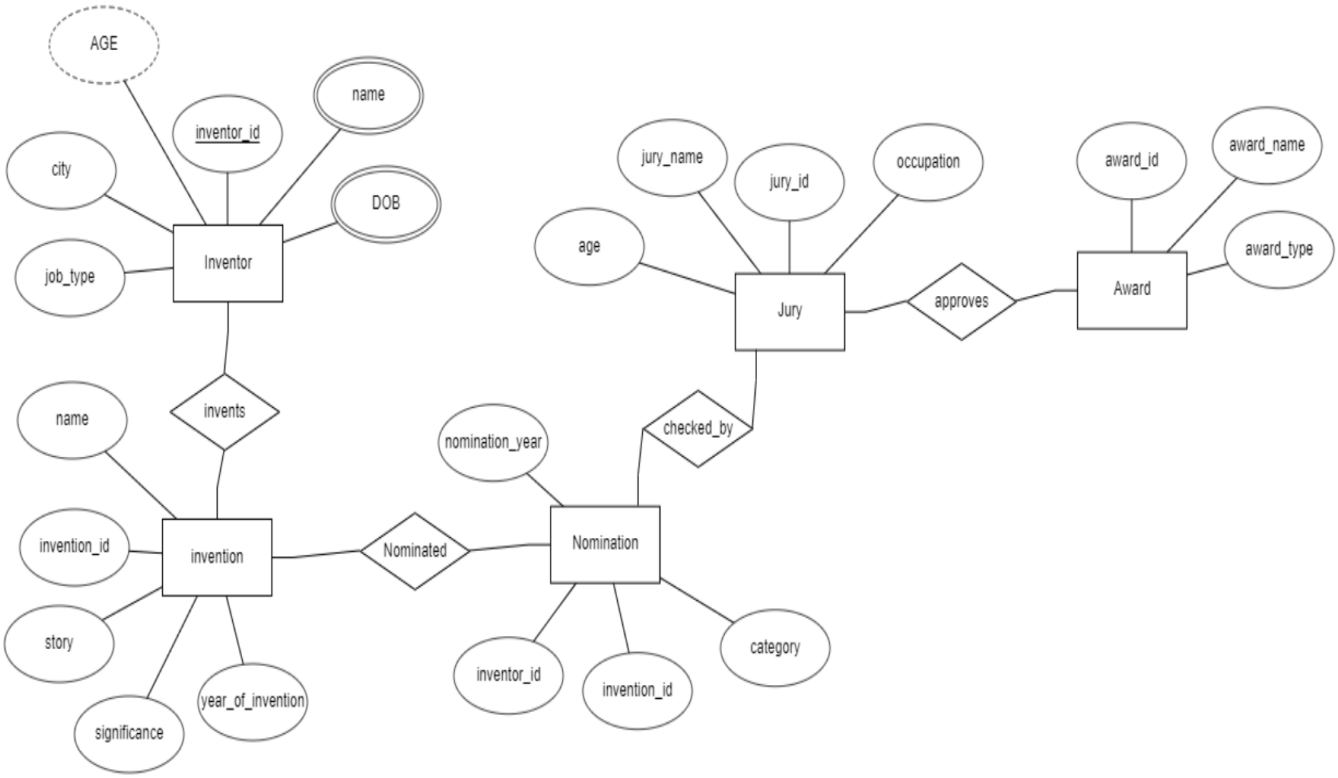
Specification:

We started by creating the Invention entity set which has details of the various invention(s). Next, we created the Inventor entity set with the details of the inventor(s) and these two entity sets are in many-to-many relation with total participation. Next, we created an entity set for Awards with details of all the awards and it has a multi-valued attribute, Category. The award is a unary relation which can be National or International. A many-to-many relationship is established between Awards and Invention with a total participation of Awards to store the details of various nominations for each award and different nomination for the given invention. This entire relationship is aggregated and has a one-to-one relationship with Panel who decides the winner for each award by considering the different nominations for the award. The Panel maintains one-to-many relation with the Jury. We are considering the case that an award can get nominated in its year of invention.

Out of space:

An Award cannot be nominated after it's the year of invention. We are also neglecting the case where there is no award that can declare a winner without the panel's decision.

ER Diagram

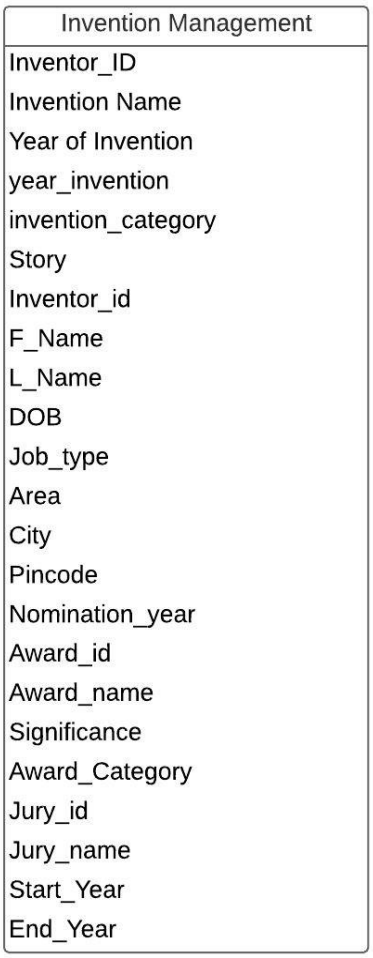


The initial table contains the following attributes:

invention_id,invention_name, year_invention, story,invention_category, invertor_id, inventor_name, DOB, Job_type, Address, nomination_year, Award_id, Award_name, Significance, Award_Category, Jury_id, Jury_name, Span)

The Relation is defined by

Invention_Management(invention_id, invention_name, year_invention, story,invention_category, invertor_id, inventor_name, DOB, Job_type, Address, nomination_year,
Award_id, Award_name, Significance, Award_Category, Jury_id, Jury_name, Span)



The attributes are defined as follows:

invention_id : used to identify the invention details

invention_name : Name of the invention

year_invention : Year of the invention.

story : The story behind the invention.

invertor_id : Used to identify inventors details

inventor_name : Name of the inventor, contains the First name and the Last name

Age : Age of inventor

Job_type : Job of the inventor

Address : Address of inventor, contains Area, City, Pincode

Award_id : Used to identify all the awards uniquely

Award_name : Name of the award

Award_Category : The category to which this award belongs to

Jury_id : Used to identify jury

Jury_name : Name of the Jury

invention_id	invention_name	year_invention	invention_category	story	inventor_id	inventor_name	job_type	age
1	autonomous cars	2017-03-16	automated system	abc	I1,I2	ahnaan,nishant	student,student	17,17
2	automatic web design	2016-07-03	automated system	def	I3	vijay S	student	16
3	text processing	2019-08-26	AI	dd	I4	anshul	student	20
4	sales prediction	2020-03-06	ML	aeec	I5	arham	scientist	29
5	facial recognition	2021-11-29	DL	ac	I6	manan	professor	31
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

award_id	award_name	jury_id	jury_name
101	best tech	J1	dr suresh patel
102	best tool for development	J2	dr kritika singh
103	best potention student	J3	mike rooney
104	future tech	J4	dr siba panda
105	best tech	J4	david malan
NULL	NULL	NULL	NULL

Applying Normal Forms

In 1NF, each tuple will have only single-valued attributes i.e, they should be atomic.
All the multi-valued attributes will be split into individual tuples.

Now by applying First Normal Form (1NF) :

1. Invention_name is split into (F_name, L_name)
2. An invention can have multiple inventors, so each of the inventor details for a specific invention will be shown in separate tuples.

Rules of 1st Normal Form:

- There are only Single Valued Attributes.
- Attribute Domain does not change.
- There is a Unique namefor every Attribute/Column.

Invention Management
Inventor_ID
Invention Name
Year of Invention
year_invention
invention_category
Story
Inventor_id
F_Name
L_Name
DOB
Job_type
Area
City
Pincode
Nomination_year
Award_id
Award_name
Significance
Award_Category
Jury_id
Jury_name
Start_Year
End_Year

invention_id	invention_name	year_invention	invention_category	story	inventor_id	inventor_name	job_type	age
1	autonomous cars	2017-03-16	automated system	abc	I1	ahnaan	student	17
1	autonomous cars	2017-03-16	automated system	abc	I2	nishant	student	17
2	automatic web design	2016-07-03	automated system	def	I3	vijay S	student	16
3	text processing	2019-08-26	AI	dd	I4	anshul	student	20
4	sales prediction	2020-03-06	ML	aeec	I5	arham	scientist	29
5	facial recognition	2021-11-29	DL	ac	I6	manan	professor	31
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

award_id	award_name	jury_id	jury_name
101	best tech	J1	dr suresh patel
101	best tech	J1	dr suresh patel
102	best tool for development	J2	dr kritika singh
103	best potention student	J3	mike rooney
104	future tech	J4	dr siba panda
105	best tech	J4	david malan
NULL	NULL	NULL	NULL

2nd NORMAL FORM

Rules for 2nd Normal Form

- Be in 1NF.
- Single Column Primary Key

invention_id	invention_name	invention_category	story	year_invention
1	autonomous cars	automated system	abc	2017-03-16
2	automatic web design	automated system	def	2016-07-03
3	text processing	AI	dd	2019-08-26
4	sales prediction	ML	aeecc	2020-03-06
5	facial recognition	DL	ac	2021-11-29
NULL	NULL	NULL	NULL	NULL

inventor_id	inventor_name	age	job_type	city
I1	ahnaan	17	student	mumbai
I2	nishant	17	student	mumbai
I3	vijay s	16	student	mumbai
I4	anshul	20	student	rajkot
I5	arham	29	scientist	jammu
I6	manan	31	professor	mumbai
NULL	NULL	NULL	NULL	NULL

Result Grid | Filter Rows: | Edit:

award_id	award_name	jury_id	jury_name
101	best tech	J1	dr suresh patel
102	best tool for development	J2	dr kritika singh
103	best potention student	J3	mike rooney
104	future tech	J4	dr siba panda
105	best tech	J4	david malan
NULL	NULL	NULL	NULL

	invention_id	award_id	nomination_year
▶	1	101	2013
	2	102	20119
	3	103	2020
	4	104	2020
	5	105	2020

In 3NF, we eliminate all transitive dependencies. Transitive dependencies mean that a non-prime attribute is dependent on another attribute which is not a part of the candidate key but is dependent on candidate key.

After applying 3NF:

- Invention(invention_id, invention_name, year_invention, story)
- Inventor(inventor_id, inventor_name, DOB, Job_type, City)
- Award(Award_id, Award_name ,jury_name,jury_id)
- Award_Nomination(invention_id, Award_id, nomination_year)
- Jury(jury_id,jury_name)

	invention_id	invention_name	invention_category	story	year_invention
▶	1	autonomous cars	automated system	abc	2017-03-16
	2	automatic web design	automated system	def	2016-07-03
	3	text processing	AI	dd	2019-08-26
	4	sales prediction	ML	aeecc	2020-03-06
	5	facial recognition	DL	ac	2021-11-29
*	NULL	NULL	NULL	NULL	NULL

	inventor_id	inventor_name	age	job_type	city
▶	I1	ahnaan	17	student	mumbai
	I2	nishant	17	student	mumbai
	I3	vijay s	16	student	mumbai
	I4	anshul	20	student	rajkot
	I5	arham	29	scientist	jammu
	I6	manan	31	professor	mumbai
*	NULL	NULL	NULL	NULL	NULL

Result Grid | Filter Rows: | Edit:

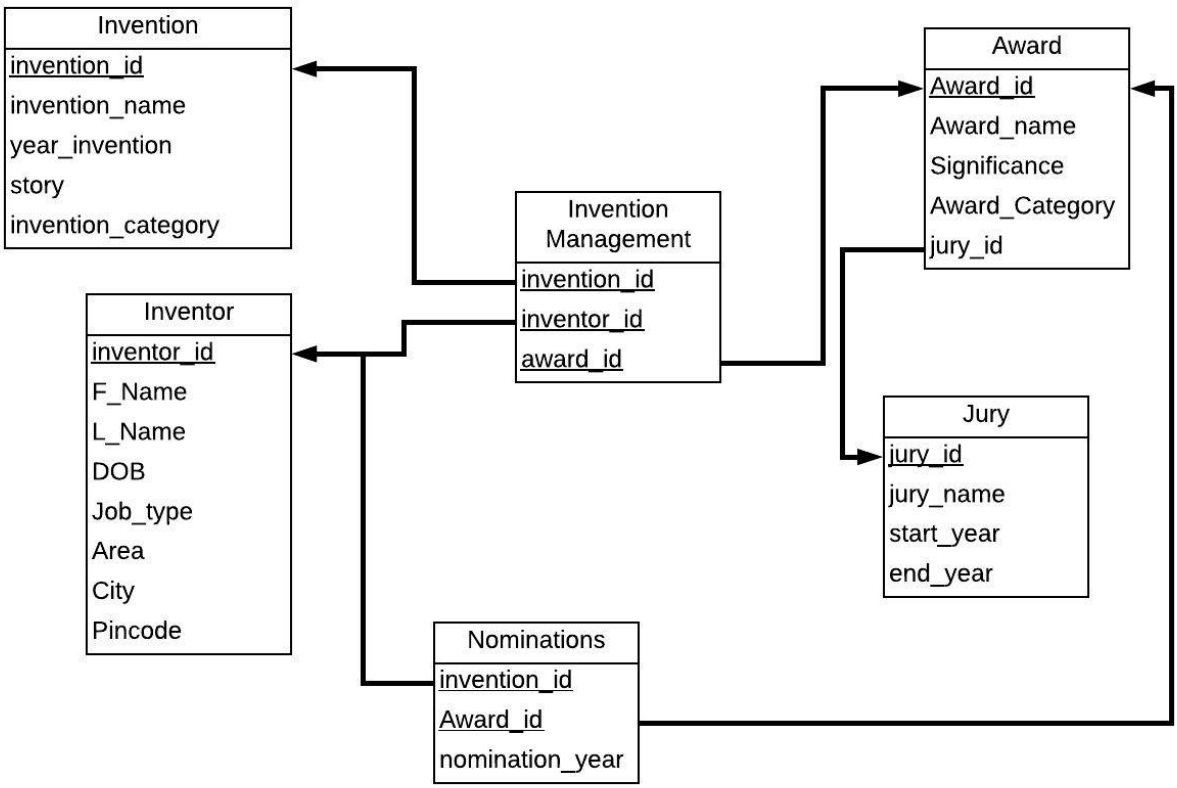
	award_id	award_name	jury_id	jury_name
▶	101	best tech	J1	dr suresh patel
	102	best tool for development	J2	dr kritika singh
	103	best potention student	J3	mike rooney
	104	future tech	J4	dr siba panda
	105	best tech	J4	david malan
*	NULL	NULL	NULL	NULL

	invention_id	award_id	nomination_year
▶	1	101	2013
	2	102	20119
	3	103	2020
	4	104	2020
	5	105	2020

	jury_id	jury_name
▶	J1	dr suresh patel
	J2	dr kritika singh
	J3	mike rooney
	J4	dr siba panda
	J5	david malan
*	NULL	NULL

	invention_id	inventor_id	award_id
▶	1	I1	101
	1	I2	101
	2	I3	102
	3	I4	103
	4	I5	104
	5	I6	105
*	NULL	NULL	NULL

Schema diagram



Differences between the ER model and Normalization_Model

1. Before applying the normalization the tables were defined based on the ER diagram. By doing so, there is a possibility for data redundancy and inconsistency. In order to avoid that, we applied normalization on the complete table.

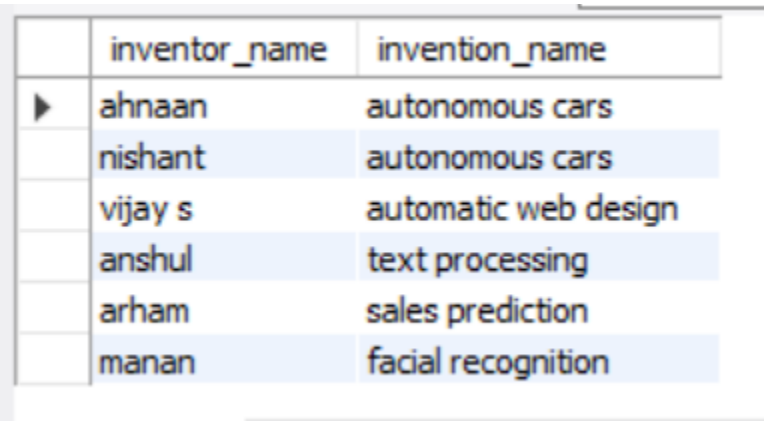
2. From the table defined from the ER model, we neglect some of the cases like an invention can get an award after many years of invention, in other words, an invention will get nominated for an award only in its year of invention. However, from the table, we got after normalization, resolves this issue.
3. Unnecessary data usage is also reduced by removing unnecessary attributes.
4. The number of tables of the final model is also reduced.

Questions

To select inventor name and his/her invention

create view temp as select inventor.inventor_name , invention_managmentt.invention_id from inventor inner join invention_managmentt on inventor.inventor_id = invention_managmentt.inventor_id;

selecttemp.inventor_name , invention.invention_name from temp inner join invention on temp.invention_id=invention.invention_id;



inventor_name	invention_name
ahnaan	autonomous cars
nishant	autonomous cars
vijay s	automatic web design
anshul	text processing
arham	sales prediction
manan	facial recognition

To select nominated invention

selectinvention_id from invention where invention.invention_id in (select nomination.invention_id from nomination);

	invention_id
▶	1
	2
	3
	4
	5
*	NULL

To cocatinventor_name and city for some use

selectconcat_ws(', ' , inventor_name , city) as text from inventor;

▶ ahnaan, mumbai
nishant, mumbai
vijay s, mumbai
anshul, rajkot
arham, jammu
manan, mumbai

To print name and invention of those inventors who are student

create view temp2 as select inventor.inventor_name , inventor.inventor_id from inventor where inventor.job_type = 'student';

create view temp3 as select temp2.inventor_name , temp2.inventor_id , invention_managmentt.invention_id from temp2 inner join invention_managmentt on temp2.inventor_id=invention_managmentt.inventor_id;

select temp3.inventor_name , temp3.invention_id , invention.invention_name from temp3 inner join invention on invention.invention_id = temp3.invention_id;

	inventor_name	invention_id	invention_name
▶	ahnaan	1	autonomous cars
	nishant	1	autonomous cars
	vijay s	2	automatic web design
	anshul	3	text processing

Invention Management

By- Anshul S

ArhamL (captain)

Ahnaan M (VC)

Nishant (Pp)

MiitM (sub)