Databases Computer Engineering

Online Game Shop Database: "Game" store.

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A)Data Requirements

- Assignment 3

Context of the problem:

Our database is related to an online video game shop such as Game.es, of which we want to store information about all the activities which are carried out in it. Our online shop is one of the most important game and merchandising shops among the whole world, it receives customers from different nationalities and with different ranks, they can be partners or simply common users. It provides many kind of services, like the rental and the sales service (The people can buy or hire different products such as video games for different platforms, mobile phones, computers and computer peripherals, films... or even selling their own products to the shop). This means that the shop need to store information about all the products, inventory and sales and the different services that are given. The shop has also some physical stores in which you can choose to pick your product or buy products as well.

Furthermore, our shop will need to include information about all the employees working in the web and shops(their ranks, salaries, holidays, work off periods...) and about the clients that visit the online shop (if they are partners or common clients, the points accumulated...).

Data requirements

- The Products (Sara):

  In relation to the products we must store all the necessary information associated below which will be updated due to its subsequent changes in the database. First of all, the abundant information of the product itself: its UPC, the country of origin from which it comes, the related guarantee and possible discounts, the prices either online or physical and the release date (including the day month and

year).We also have stored the information of the arrival points related to each (by the sending time) product where we included the APID, the shopping center (if it the user selects to collect it on his nearer shop) and in the country where it arrives, is also specified the door number with the general address (with its street zip and city). We also have stored the individual information of each package directly related to the product identifier, we describe the size of the package, the color of the same, the associated material and the security of each one.

We must also catalog and differentiate the different types of products that are in our stores both online and physical: we find different types of devices such as peripherals (including types of computers and their accessories like speakers, mice and screens), all consoles available in the market, a wide variety of movies that can be rented as purchased, and finally the selection of video games. These product branches are directly related to suppliers that also have a clear differentiation between them, some are international and others are national. The two branches of video games and movies are related to national suppliers, while the branch of peripherals and consoles is related to international suppliers.

In addition to this the products also relate to customers in two ways, by purchasing them or by renting available online.

- The Clients:

For the clients it is needed to know if they are partners of the shop or just common clients. It is as well important to store information comprising if they are registered in the web page, requiring the name, the age and the DNI to verificate the identity in order to accumulate discounts or other special privileges.

Also it will be needed to be store information about the birthdates and ages of the clients (no matter if they are partners or not) to know which is the age of the clients who buy what things in the store to improve it, it is need to store as well for both of them the identification number (ID), which is created when they buy in the shop.

The store need to keep records of the full name of the clients which are partners, it includes the first name and the last name and the amount of point they have reach at the store with every time they have buy something in the store. If the client is not a partner it is stored if is his first time at the shop for some statistics and the general attributes.

The clients can leave a feedback, a suggestion entity set, about the products, services and employees with a little description about their experience and a rating of stars (1-5) with the product the bought and the date.

The clients can buy online, but first they need to register in the page, so for this, it's needed a form of payment, the name, the age and the address.

For the common clients, it is only required to store what they buy and the amount of money they spend, there’s no need of any more information for this kind of sales.

- The Employees (Mario):

  For each employee of our store we need to store information such as they Social Security Number (SSN) for identification purposes, the DNI, the full name (Name and Surname), the age and the birthday date, so that the database can automatically calculate the age of the employee and it is not required to update it each year, the gender of the employee (which can be M for Male, F for Female and O for other), the hiring date of the employee in order to keep record of the antiquity (which will be automatically updated as well by the database) and the address (comprising Street, Zip and City). Furthermore, we will need to store the allergies and EmpDiseases of each employee and their EmpEmails and EmPhoneNumbers (their personal, home and corporative ones that we provide them).

  The employees will be divided into 6 types. For the AccountManagers we will need to store the universityTitles and they will be in charge of managing the different expenses. DeliveryMans will drive vehicles, we just hire an employee for each vehicle we have, we need to store the driving license to give the correct vehicle and to store all the information of the vehicle. Software Engineers (University tittle and how many programming languages they know) that we have hired in our shop will manage and update webpages. In the database we store as well the different webpages (we have several, in diferent languages for the different countries in which we operate and we store the urls, countries they serve, languages…). For the SupportMans we will just store the language level and the Salesmans will process and carry out rents and sales (between each client and product). Finally, the SecurityMans (we´ll need to store in which cybercriminals are they specialised, if they are in any , such as crackers, spammers… or if they are not specialised and they are regular security mans of our physical stores). They will be in charge of capturing possible thieves and hackers (and if they can neutralize them, we store the hour and date), and for the Hackers/thieves we will keep record of their personal data (nationality, haircolour...) as well as an image and an attibute which indicates if they are dangerous or not (yes/no).

  The holidays and work off periods for each employee have to be stored, including the starting and ending dates so that the database will calculate the amount of days automatically, and specific information such as the wop reason, holiday season… for furthering knowledge.

Each employee´s individual monthly salary is stored as well, including the bankAccount to make the domiciliation and the typeNumber, type and amount. The typeNumber can be 1 or 2 so that we can select the type of salary (and take record of it) that each employee receives each month: regular salary (1) or an extraSalary (2), which will be the double of the regular one and the total amount that we need to pay will be stored as well.

- Assignment 4

Identifying entities, attributes and relationships

A) ENTITY SETS

1º PARTE PRODUCTS:

- Products: **UPC**, Origin country, Discount, Warranty, Online price, Physical price, Guide language, Release Date(Day+Month+Year).
- Arrival Points: **APID**, Shopping centre, Country, Door#, Type, Adress(Zip+Street+City).
- Packaging: **UPC**, **Type**, Size(Height+Width), Colour, Material, Security.
- Suppliers: **SuppliersId**, Company name, Fax, Phone#, E-mail.
- Inheritance (Suppliers):
  - Nationals
  - International
- Inheritance (Products):
  - Peripherals: Type.
  - Consoles: Name, Brand.
  - Films: Genre, Title.
  - Games: Plataform, Type.

2º PARTE EMPLOYEES (MARIO):

- EMPLOYEES (**SocialSecurityNumber(SSN)**[1], *DNI*, Allergies, EmpDiseases, EmpEmails, EmpPhoneNumbers, FullName(Name+Surname), Adress(Street+Zip+City), Gender, Age, BirthdayDate, HiringDate, Antiquity).

- SALARIES (**Month_Name**, **SocialSecurityNumber(SSN)**, TypeNumber, BankAccount, Type, Amount).

- HOLIDAYS (**HolidayID**, StartDate, EndDate, Season, TotalDays)

- WORKOFFPERIODS (**WopID**, BeginingDate, EndingDate, Reason, TotalDays)

- THIEVES (**ThieveID**, *Picture*, Nationality, HairColour, Gender, Dangerous)

- WEBPAGES (**URL**[3], Domain, Language, Country, Visits, SecurityProtocol)

- VEHICLES (**VehicleID**, *LicensePlate*, FuelConsumption, TypeOfVehicle, FuelType)

- EXPENSES (**Expense#**, Amount, ExpensesDate, Description, Paid)

INHERITANCE (type & Disjoint):

  - Salesmans
  - Supportmans (LanguageLevel)
  - Securitymans (Specialisation)
  - SoftwareEngineers (UniversityTitle, #ProgrammingLanguages)
  - Deliverymans (DrivingLicence)
  - Accountmanagers (UniversityTitle)

3º PARTE CLIENTS:

- CLIENTS: (**ClientID**, DNI, DateOfService, Gender, BirthdayDate, MoneySpent).

- SUGGESTIONS: (**Suggestion#**, Description, Date, Product, Rate).

- EVENTS: (Date (Month, Year, Day), Location, Hour, Price, **EventID**).

- OFFERS: (OfferCode, Type, RequiredPoints, Percentage, Description).

  Inheritance (CLIENTS)

  - Partners: (FullName, PartnerID, Address, AmountOfPurchases, Age, Birthday,)
  - NonPartners:(FirstTimeAtShop)

B) RELATIONSHIP SETS.

1º PARTE PRODUCTS:

- ProArr [Products-ArrivalPoints] (Sending Time) (One to Many).
- ProPac [Products-Packaging] (One to Many).
- EmPro [Employees-Products] (Many to Many).
- Buy [Clients-Products] (Date,Hour) (Many to Many).
- Rent [Clients-Products] (Date,Hour) (Many to Many).
- NatGa [National-Games] (Price) (Many to Many).
- NatFil [National-Films] (Price) (Many to Many).
- IntCon [Internationals-Consoles] (Price) (Many to Many).
- IntPer [Internationals-Peripherals] (Price) (Many to Many).
- ThiPro [Thieves-Products] (One to Many).

2º PARTE EMPLOYEES (Mario):

- EmPro [Employees with Products] (Many-to-Many)
- ThiPro [Thieves with Products] (One-to-Many)

- EmpHol [Employees with Holidays] (Many-to-Many)
- EmpSal [Employees with Salaries] (One-to-Many)
- EmpWof [Employees with WorkOffPeriods] (Many-to-Many)
- AccExp [AccountManagers with Expenses] (Many-to-Many)
- DelVeh [DeliveryMans with Vehicles] (One-to-One)
- SofWeb [SoftwareEngineers with Webpages] (Many-to-Many)
- SecThi [SecurityMans with Thieves] (Hour, Date) (One-to-Many)

3º PARTE CLIENTS:

- ImpCli [Clients with Suggestion] (One-to-Mamy)
- EveCli [Clients with Events] (Many-to-Many)
- ParOff [Partners with Offers] (One-to-Many)
- Buy [Clients-Products] (Date,Hour) (Many to Many)
- Rent [Clients-Products] (Date,Hour) (Many to Many)

C) SPECIAL ATTRIBUTES:

Composite Attributes:

Mario

- **"Address"** (EXAMPLES: C/ Obispo Cuadrillero, 10, 3ºB 24007, León; Av/ Padre Isla, 5, 7ºA, 24010, León; C/ Santos Ovejero, 2, 6ºB, 24008, León) (Entity: Employees), It is composed because it includes Street, Zip and City.
- **"FullName"** (EXAMPLES: Petra Pérez, Luis González, Ana Gómez) (Entity: Employees), It is composed because it includes Name and Surname.

Sara

- **"RealiseDate"** (20/10/2018, 13/05/2019,...) ((Entity: Products), It is composed because it includes Day, Month and Year.
- **"Size"** (50x20, 35x15) (Entity: Packagins), It is composed because it includes Height and Width.

- **“Adress”** (Example: C/ Fonte da Corte, 15, 6ºD 32006, Lugo) (Entity: ArrivalPoints), It is composed because it includes Zip, Street and City.

Sergio

- **“FullName”** (Example: Sergio Diez) (Entity: Partners) It is composed because it includes Name and Surname.

Multivalued Attributes:

Mario

-**”Allergies”** (EXAMPLES: plastic, latex, rubber) (Entity: Employees), It is multivalued because an Employee could have more than one Allergy.

- **“EmpDiseases”** (EXAMPLES: myopia, presbyopia, Crohn) (Entity: Employees), It is multivalued because an Employee can have more than one Disease.

- **“EmpEmails”** (EXAMPLES: youremail@hotmail.com, asdf@terra.es, Luis.Gnzl@SeSaMa.com) (Entity: Employees), It is multivalued because each Employee can have more than one Email, they are provided one corporative one plus the personal ones that they could have.

- **“EmpPhoneNumbers”** (EXAMPLES: 987878787, 601234567, 679007432) (Entity: Employees), It is multivalued because an Employee can have several Phone Numbers, one corporative one plus the home one, or the mobile personal ones.

Sara

- **“GuideLanguage”** (English, Spanish) (Entity: Products), It is multivalued because a Product needs to have a specific language for the manual or the origin packaging.

- **“Phone#”** (665 788 343, 568 234 677) (Entity: Suppliers), It is multivalued because a Supplier can have several Phone Numbers including personal and business telephone numbers, among others.

- **“E-mail”** (Example:youremail@hotmail.com carm.sol@gmail.com...)(Entity: Suppliers); It is multivalued because a Supplier can have more than one associated email either personal or corporate.

Sergio

- **“Disabilities”** (Examples: WheelChair) (Entity: Clients) It is multivalued because a Client can have many disabilities.

- **“Diseases”** (Example: Headache) (Entity: Clients) It is multivalued can have many diseases.

Null Attributes:

Mario

- **“FuelConsumption”** (EXAMPLES: 9l/100km, 22l/100km, 2l/100km, null, 7’5l/100km) (Entity: Vehicles), it can be null if the vehicle is new and there is no record on the average consumptions that it is making or if it has been bought but it is not used yet.

-**”City”** (EXAMPLES: Lisbon, London, Eastbourne, Brighton, null) (Entity: Employees), it is not compulsory to store the Employee´s City of residence, but it can be held as additional information.

-**”ZipNumber”** (EXAMPLES: 24009, 29040 , 33205, null) (Entity: Employees), it is not compulsory to store the Employee´s ZipNumber, but it can be held as additional information.

-**”Street”** (EXAMPLES: C/ Obispo Cuadrillero, 10, 3ºB 24007, León; Av/ Padre Isla, 5, 7ºA, 24010, León; C/ Santos Ovejero, 2, 6ºB, 24008, León, null) (Entity: Employees), it is not compulsory to store the Employee´s Street of residence, but it can be held as additional information.

-**”Gender”** (EXAMPLES: M for Male, F for Female, O for Other, null) (Entity: Employees), it is not compulsory to store the Employee´s Gender, but it can be held as additional information.

-**"SecurityProtocol"** (EXAMPLES: Https, DNS, FTP, null) (Entity: Webpages), It can be null if the webpage has no security protocol.

-**"Nationality"** (EXAMPLES: Kosovar Albanian, Spanish, Romanian, French, null) (Entity: Thieves),It can be difficult to determine the nationality of the thieve, but if it is known or the police tell us we will include it.

-**"HairColour"** (EXAMPLES: blonde, brown, blue, null) (Entity: Thieves), it can be null if the hair was not seen or the police have not provided us information about it

Sara

- **"Discount"** (Example: 10%, 40%, null, 25%) (Entity: Products), this can be null because a Product can have a 0% discount.

-**"Fax"** (Examples: 0129 30449, 5600 54959) (Entity:Suppliers), this can be null because a Supplier can have 0 new faxes.

- **"Security"** (Example: Fragile Security) (Entity: Packagings), this can be null because the security of the package could be removed.

-**"Shopping Centre"** (Examples: Espacio León, León Plaza, Ponte Vella) (Entity: Arrivalpoints), this can be null because the customer may prefer send his packages to the shopping centre of his city.

Sergio

- **"RequiredPoints"** (0, 10, 5) (Entity: Offers) It can be null because there are offers for everyone without points.
- **"Disabilities"** (WheelChair) (Entity: Clients) It can be null because there are clients without disabilities.
- **"Diseases"** (Headache) (Entity: Clients) It can be null because there are clients without diseases.
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Derived Attributes:

Mario

- **“Age”** (EXAMPLES: 20, 54, 65) (Entity: Employees), it is derived because it is calculated with the actual date minus the attribute BirthdayDate, which has the Employee´s birthday date.

- **“Antiquity”** (EXAMPLES: 0, 10, 20) (Entity: Employees), it is derived because it is calculated by operating the HiringDate minus the actual date.

- **“TotalDays”** (EXAMPLES: 10, 15, 20, 30) (Entity: Holidays), it is derived because it is calculated by taking the atributes StartDate minus EndDate.

- **“TotalDays”** (EXAMPLES: 30, 31, 28, 61) (Entity: WorkOffPeriods), it is derived because it is calculated by taking the atributes BeginningDate minus EndingDate.

- **“Amount”** (EXAMPLES: 2000, 4000, 1000) (Entity: Salaries), it is derived because it is automatically introduced by the database depending on the type, if the type is regular the salary would be 2000 where as if it is extrasalary the amount will be 2000*2.

- **“Type”** (EXAMPLES: 1,2, 0) (Entity: Salaries), it is derived because it is automatically inserted depending on the attribute TypeNumber, if a 1 is introduced, the type will be regular, whereas if a 2 is introduced we will have extrapay in this attribute.

Sara

- **“Country”** (Spain, France, Germany) (Entity: ArrivalPoints), it is derived because it is calculated by taking the atribute City.

- **“GuideLanguage”** (English, Spanish) (Entity: Products), it is derived because it is calculated by taking the atribute Origin Country.

Sergio

- **“Country”** (25, 50) (Entity: Offers), it is derived because it is calculated by the points of the client.

- **“Age”** (10, 23) (Entity: Clients), it is derived because it is calculated with the actual date minus the attribute BirthdayDate, which has the Clients´s birthday date.

Attributes With Binary Domain:

Mario

- **“Paid”** (YES/NO) (Entity: Expenses), it is derived because an expense can be paid, or not be paid and we keep record of it to have everything ordered in our business.

- **“Dangerous”** (YES/NO) (Entity: Thieves) , it is derived because a thieve can be dangerous or not, depending of his modus operandi, they could just steal products by hiding them on his jacket if is in the store, through online by hacking or using fake accounts or they could take a weapon and be violent.

Sara

- **“ Shopping Centre”** ((YES/NO) (Entity:ArrivalPoints), it is derived because a Shopping Centre can be one or not, depending on the size or who many stores it had.

Ternary Relation

- CarryOut [Relation Buy-Salesmans] (One to Many).
- Manage [Relation Rent-Salesmans] (One to Many).

Weak Entities

- **Salaries** is a weak entity set because if our shop in any moment has not got employees the salaries wouldn´t exist. It it a weak entity set with identity dependence, because each salary does not have a unique identifier by itself and it needs the employee to be identified (e.g. In january there could be 2 salaries with the same amount but they are not from the same employee so they need to be differenced using ssn+month).
- **Packagings** is a weak entity because without the product there couldn't be packaging and consequently none of its types or characteristics, due to this it it a weak entity set with identity dependence, it needs the UPC from Products to be identified because by itself doesn't have a unique

identifier. (e.g Maybe can be two products with the same type of packaging but for two totally different products).

- **Suggestions** is a weak entity because without Client there're not Suggestions.

International

Our database is international because our stores are not only in Spain but also all around the world. In addition, in each country the website is modified to access the corresponding language and products found in nearby stores. We also have distributors and suppliers all over the world in case any store runs out of any product .

But there are products from each country that cannot be purchased online from another country, for that you have to go to the physical store and expressly order the product there so it can be sent to your trusted store.

SocialSecurityNumber(SSN): The Social Security number identifies the citizen in their relations with Social Security. Its importance? Without it, it will not be included in the system and, for the time being, we cannot begin to work. And if it works, it is doing it illegally. Nor can you request inclusion in the health system, unless you do so as a beneficiary of the number of another holder (a child with respect to a father or mother, for example).

Universal Product Code(UPC): consists of 12 numeric digits that are uniquely assigned to each trade item. Along with the related EAN barcode, the UPC is

the barcode mainly used for scanning of trade items at the point of sale, per GS1 specifications.

Uniform Resource Locator(URL): is a reference to a web resource that specifies its location on a computer network and a mechanism for retrieving it. A URL is a specific type of Uniform Resource Identifier (URI), although many people use the two terms interchangeably. URLs occur most commonly to reference web pages (http), but are also used for file transfer (ftp), email (mailto), database access (JDBC), and many other applications.