

Documentation of Database Design

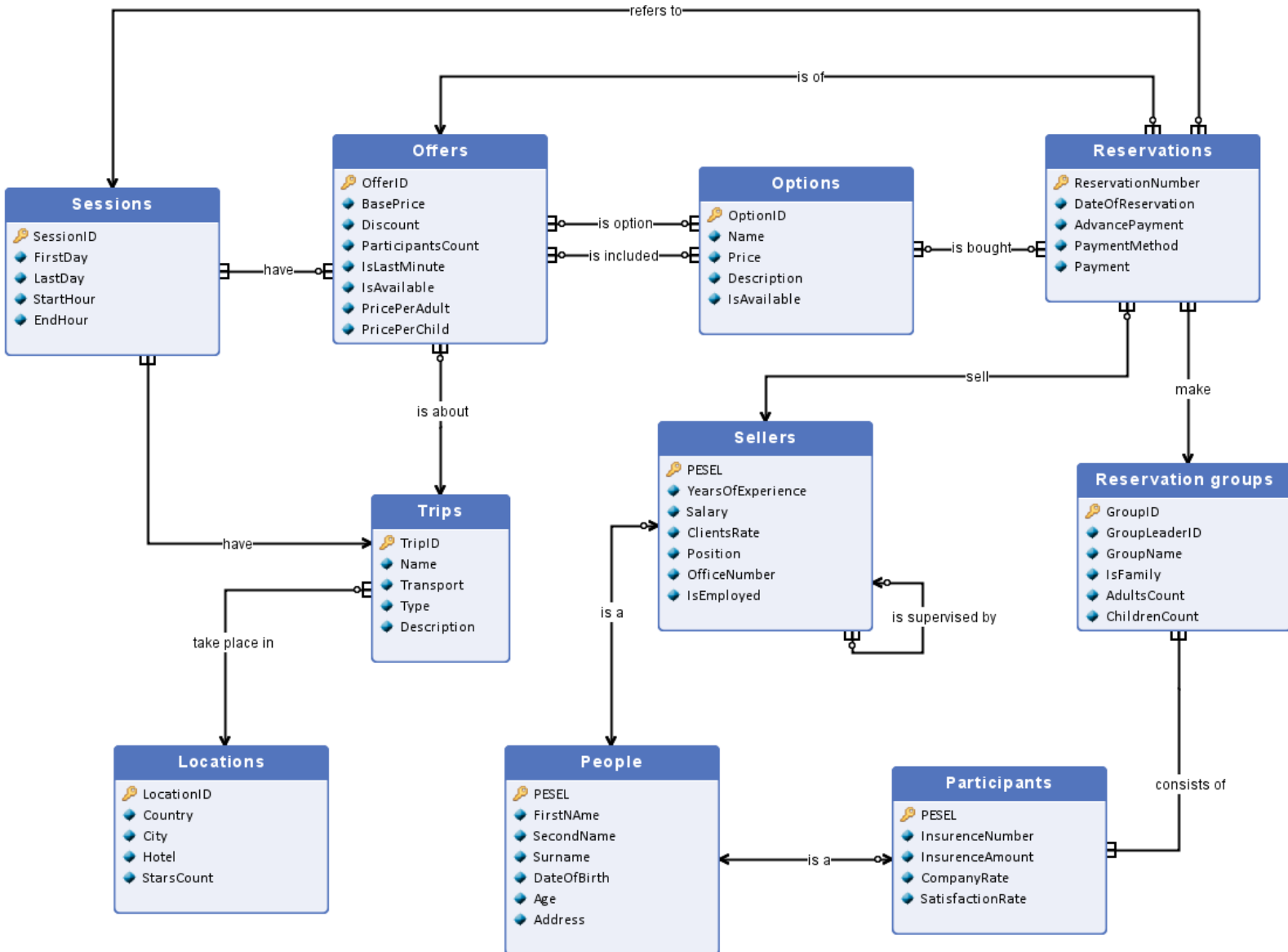
Travel agency: planning trips, locations, attractions, pilots, participants.

1. Task analysis

- **Customer** - Travel Agency
- **Users** - Analysts, heads of departments, office workers (financial, promotion, organizational, ... departments), travels' sellers, customers.
- Purpose of the Database - Storing and searching data about travels (including records of particular clients, their destinations, prices, etc.) offered by the customer as well as complex data analysis conducted to optimize service and further sales.
- Possible scenarios:
 - ◆ A seller provides to the client information about the most occupied terms of trips to Egypt.
 - ◆ An Analyst checks the mean price of the trip to Spain in particular months, to optimize the offer.
 - ◆ Promotion department worker searches for the least popular destinations to put more effort into their advertisement.
 - ◆ The seller wants to confirm the personal data of the participants.
 - ◆ The Analyst wants to check the most common sizes of the reservations groups to adjust the offer.
 - ◆ CFO sums up the company's annual revenue.
 - ◆ Seller lists the options included in a certain offer to attract hesitant clients.
 - ◆ The trip organizer checks which options have been bought by which customers to grant them.
- Assumptions and limitations of the designed database:
 - ◆ Pilots and attractions have been removed from the scope of the database.
 - ◆ The Agency has only 1 office which is located in Gdańsk.
 - ◆ Database stores data from the last 5 years period of the agency's functioning.
 - ◆ During any trip, participants cannot move between hotels.
 - ◆ All the trips started and ended successfully.
 - ◆ The shortest trip last always more than 1 day.
 - ◆ A structure of the company states that each employee may have only one boss.
 - ◆ Spendings of the travel agency are not included in the database.
- Inquiries to the database:
 - ◆ How many reservations actually take place on 04.10.2021?
 - ◆ Which seller supervises the biggest amount of people?
 - ◆ List name of hotels in Spain that have 5 stars.
 - ◆ Which seller earns the most?
 - ◆ How many reservation groups are families?
 - ◆ How many sessions are provided for the trips in London, which transport is the plane?
 - ◆ List options names that are included in all last-minute offers.

- ◆ Count which country provides the most trips.
- ◆ Count how many reservation groups consist of 3 people.
- ◆ What is the mean amount of options that are included in all offers?

2. ERD diagram



3. Description of ERD diagram

→ Definition of entities.

| Entity | Definition |
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| Reservations | Set of past and current transactions that refer to the specific offer of the trip. The entry is added when a customer purchases a trip and may be deleted at least 5 years after the reservation date. ~10000 entries. |

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| Offers | Set of specific offers made based on trips that take place in the specified time interval, that can be purchased by participants of the trips. It consists of past, current, and future records. The entry is added when a new configuration of a trip and its terms appears available on the market, to be sold, and can be deleted only if, after the trip, there are no reservations of this offer archived. ~5000 entries. |
| Options | Set of additional, general amenities that may be available for participants during the trips. Some of them are included in the offers, while the rest have to be additionally purchased. The entry is added when an agency introduces a new option to their offer and deleted when an option is no longer offered by the agency and there are no past reservations and offers that had one. ~30 entries. |
| Sessions | Set of dates and hours intervals in which offers of trips are provided. The entry is added each time, there appears a new possible term of the offered trip. The entry is deleted when there are no more archived reservations on a particular session and they are no longer offered. ~50 entries. |
| Trips | Set of general ideas of trips organized in a particular destination. They do not stand as a specified offer. Entry is added when a new trip theme is added to the agency's offer and may be deleted only when there are no archived offers of a particular trip and it is not offered anymore. ~200 entries. |
| Locations | Set of specific destinations where the trips take place (mainly hotels) and where the place of participants' residence is. Entry is added when a particular destination agrees with the agency to be offered as a trip's accommodation and may be deleted only when there are no archived trips in that place and a particular destination is no longer offered. ~1000 |
| People | Set of general pieces of information about any people that appear in the agency's database (sellers and participants). Entry is added/deleted each time when the entry of "sellers" or "participants" entity is added/deleted. ~10000 entries. |
| Sellers | Set of the employees that are involved in the process of proposing offers and supervising reservations for participants. Entry is added when a new seller is employed and may be deleted when an employee is fired and there are no archived reservations in which a particular employee was involved. ~200 entries. |
| Participants | Set of trips participants that may form reservation groups. Entry is added when a particular participant makes a reservation of an offer of the trip for the first time. Entry may be deleted when a participant is not a member of any reservation group. ~9800 entries |
| Reservation Groups | Set of participants that are formed into reservation groups. Groups may consist of a minimum of 1 person. Reservations are made for these reservations groups, not for particular participants. Entry is added when a unique combination of participants wants to make a reservation. Entry may be deleted if a group has no reservations assigned anymore. ~5000 entries. |

→ Explanation of attributes with the definition of formats.

| Entity | Attributes with definitions |
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| Reservations | <ul style="list-style-type: none">• ReservationNumber - An unique identifier of the particular reservation in the format: [4 positive integers][/][2 integers corresponding to the number of the month of the reservation][last 2 numbers of the year of the reservation], f.e. 0014/1021.• DateOfReservation - Date when the reservation has been made by the reservation group in the format: DD/MM/YYYY.• AdvancePayment - Non-negative amount of money (in PLN) that was paid in advance, while making a reservation by a customer.• PaymentMethod - One of three acceptable methods of payment (cash, credit card, or voucher).• Payment - Non-negative, total amount of money already paid (in PLN) by the customer. |
| Offers | <ul style="list-style-type: none">• OfferID - An unique identifier of the particular offer that consists of 4 non-negative integers.• BasicPrice - The default, non-negative price set for the particular offer which does not include any discounts (in PLN)• Discount - Non-negative amount of money granted to the customer as a discount (in PLN). The total amount to be paid is equal to the BasicPrice - Discount.• ParticipantsCount - Non-negative number of participants that the offer is prescribed for.• IsLastMinute - Boolean value which states whether the offer is the "Last minute" one.• isAvailable - Boolean value which states whether the offer is available for the clients (f. e. archived offers are not available for the clients).• PricePerAdult - The default, non-negative price of the offer for one adult person (in PLN)• PricePerChild - The default, non-negative price of the offer for one child (in PLN) |
| Options | <ul style="list-style-type: none">• OptionID - Unique identifier, two, non-negative integers that represents the number of each option.• Name - A text of length between 2 and 20 that consists of only lowercase and uppercase letters. It represents the name of the particular option.• Price - A non-negative amount of money (in PLN) that a customer |

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| | <p>has to pay to get a particular option if it is not included in the offer.</p> <ul style="list-style-type: none"> • Description - Short text (between 20 and 50 letters) that describe benefits that come from a purchase of the particular option. It consists of only lowercase and uppercase letters and punctuation marks. • IsAvailable - Boolean value which states whether the option is available for the clients (f. e. options of archived offers which are no longer offered will have value 0). |
| Sessions | <ul style="list-style-type: none"> • SessionID - An unique identifier of the particular trip session in the format of 3 non-negative integers. • FirstDay - A date of departure of the particular session of the trip in the format: DD/MM/YYYY. It must be bigger than the date of return. • LastDay - A date of return of the particular session of the trip in the format: DD/MM/YYYY. It must be smaller than the date of departure. • StartHour - An hour of departure of the particular session of the trip in the format: HH:MM. • EndHour - An hour of the return of the particular session of the trip in the format: HH:MM. |
| Trips | <ul style="list-style-type: none"> • TripID - An unique identifier of the particular trip in the format of 4 non-negative integers. • Name - A name of the trip in the format of the text (length between 2 and 20 letters, only lowercase and uppercase letter + spaces). • Transport - One of two types of transport (Plane or bus). • Type - Type of the trip in the format of text (length between 2 and 20 letters, only lowercase, and uppercase letter + spaces). F.e. sightseeing, adventurous or recreational. • Description - Short text (between 20 and 50 letters) that briefly describe the main topic and attractions in a particular trip. |
| Locations | <ul style="list-style-type: none"> • LocationID - An unique identifier of the particular location in the format of 5 non-negative integers. • Country - Name of the location's country. Only lowercase or uppercase letters and spaces. • City - Name of the location's city. Only lowercase or uppercase letters and spaces. • Hotel - Name of the particular, location's hotel. Text between 2 and 20 letters. Only lowercase or uppercase letters and spaces. • StarsCount - Integer between 1 and 5 (inclusive), that represents |

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| | <p>numbers of starts owned by each location.</p> |
| People | <ul style="list-style-type: none"> • PESEL - A polish identity number, unique identifier, consisting of 11 integers, out of which the first 6 represent the birth date. • FirstName - First name of the person. Only lowercase or uppercase letters and spaces. • SecondName - Optional attribute (may be NULL). The second name of the person. Only lowercase or uppercase letters and spaces. • Surname - The surname of the person. Only lowercase or uppercase letters and spaces and dashes. • DateOfBirth - Person's date of birth in the format: DD/MM/YYYY. • Age - Person's age (only positive integers). • Address - Person's domicile in the form of the text of length between 10 and 50 signs. |
| Sellers | <ul style="list-style-type: none"> • PESEL - An unique identifier, foreign key from the "People" entity. • YearsOfExperience - Number of years that particular seller work in the agency in the format of non-negative integers. • Salary - Amount of money received by the seller monthly, with taxes included (in PLN). • ClientsRate - An integer between 1 and 10 (inclusive) that represents the mean of all rates given by volunteer participants. • Position - Specified, occupied profession in the agency. Text between 2 and 20 signs. • OfficeNumber - Number of the room in the office that the seller works in (3 non-negative integers). • IsEmployed - A boolean value which states whether a seller is employed or not. Sellers that are not working in the agency anymore but are related to the reservations that are still in the database will have the value 0. |
| Participants | <ul style="list-style-type: none"> • PESEL - An unique identifier, foreign key from the "People" entity. • InsuranceNumber - The insurance policy number of a particular participant. The format of the entry: [8 non-negative integers][/][9 non-negative integers]. • InsuranceAmount - The amount of money (in PLN) the participant is insured for. • CompanyRate - Optional attribute (may be NULL if no rates were given). An integer between 1 and 10 (inclusive) that represents the |

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| | <p>mean of rates given by the agency's workers of a particular participant. It influences the amount and probability of getting a discount.</p> <ul style="list-style-type: none"> • SatisfactionRate - Optional attribute (may be NULL if no rates were given). An integer between 1 and 10 (inclusive) that represents the mean of rates given by the participant about the general thoughts associated with the agency. |
| Reservation Groups | <ul style="list-style-type: none"> • GroupID - An unique identifier of a particular reservation group in the format of 5 non-negative integers. • GroupLeaderID - an attribute "ParticipantID" from the "Participants" entity referring to the leading participant of the group which is older than 18 years old. • GroupName - A name of the reservation group. A text between 2 and 20 signs that consist of lowercase or uppercase letter and spaces. • IsFamily - a boolean value which states whether the particular reservation group is the family. • AdultsCount - Non-negative integer which gives information about the number of adults (age ≥ 18) that are members of the particular reservation group. • ChildrenCount - Non-negative integer which gives information about the number of children (age < 18) that are members of the particular reservation group. |

→ Definition of relationships between entities.

| relationship | entities | justification |
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| refers to | Reservations - Sessions | Represents the session that the reservations are referring to. Each reservation refers to exactly one session (since a single reservation cannot happen at two different times and need to have a session). Each session may refer to zero or many reservations (since they may be not reservations in particular sessions, but also many reservations may refer to the same time interval). |
| is of | Reservations - Offers | Refers to the process of making reservations about a particular offer. Each reservation is about only one offer because there cannot be many offers included in one reservation. However, a reservation needs to refer to some offer. Each Offer may be a part of many (or zero) reservations since many people may want to purchase some offer or there may be no customers for a particular offer at all. |

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| have | Offers - Sessions | Represents sessions of particular offers. There may be many offers in many sessions, since a specific offer may be executed in many terms (at least 1 - offer needs to have a specified term), and also a single session may be included in many offers. However, a session may also not correspond to any offer. |
| is option | Offers - Options | Represents options that may be additionally purchased by a customer in a particular offer. The relationship is "many-to-many" (with possible zeros in both cases) since an offer may have many options and an option may be available in many offers. However, there may be offers with no options available and options that do not correspond to any offer. |
| is included | Offers - Options | Represents additional options that are included in a particular offer. The relationship is "many-to-many" (with possible zeros in both cases) since an offer may have many options and an option may be included in many offers. However, there may be offers with no options included and options that are not included in any offer. |
| is bought | Reservations - Options | Represents additional options that are actually purchased by the customer while making a reservation. The relationship is "many-to-many" (with possible zeros in both cases) since a reservation may have many options and an option may be bought in many reservations. However, there may be reservations with no options included and options that are not bought in any reservation. |
| is about | Offers - Trips | Represent creation of offers that are based on particular trips. Each offer is about exactly one trip, since many trips cannot be offered at once but at least one trip must be offered. Nevertheless, there may be both many or no offers created based on one trip. Therefore the relationship is zero or many to one. |
| take place in | Trips - Locations | Represents an assignment of the specified places of residence to the trips. Each trip has exactly one location since participants cannot stay in two different hotels at the same time but also have to stay somewhere. Each location may be assigned to zero or many trips since a hotel can provide accommodation for participants of more than one trip or may have no trips at all. |
| sell | Sellers - Reservations | Represents the process of supervising a sale of a reservation by a seller. Each seller may sell none or many reservations since there are many reservations that need to be handled by a limited amount of sellers. However, a seller may have no reservations sold at all. Each reservation is handled by exactly one seller since a single reservation cannot have many supervisors but need to have one. |
| is | Sellers - | Represents a fact of supervision of sellers by themselves. A |

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| supervised by | Sellers | seller can be supervised by only one seller or may have no supervisor since in the company each employee has exactly one or no boss. Each seller may also supervise many people at once or do not supervise anyone since heads of particular sellers' teams manage many people while sellers that just start their job do not supervise anyone. |
| is a | Sellers - People | Represents a fact that sellers belong also to the more general group of people with its data. It is a "one-to-one" relationship since a single seller is exactly one person and a person may be only one seller. However, a person may not be a seller at all. |
| is a | Participants - People | Represents a fact that participants belong also to the more general group of people with its data. It is a "one-to-one" relationship since a single participant is exactly one person and a person may be only one participant. However, a person may not be a participant at all. |
| make | Reservations - Reservation Groups | Represents a process of making reservations for reservation groups that consists of participants. Each reservation is made by only one reservation group since many groups cannot make the same reservation. Each reservation group can make many reservations because people may for example want to go for a trip many times in the same group, so the same reservation group will make many reservations. |
| consist of | Reservation Groups - Participants | Represents the fact that participants form groups for which reservations are made. The relationship is "many-to-many" (without zero) since a reservation group may consist of many participants and can not be empty. Moreover, a participant may be a member of many reservation groups, which differ from each other by size and particular members. A participant to make a reservation had to be a member of any reservation group, so there is no participant that does not belong to any reservation group. |
| have | Trips - Sessions | Represents sessions of particular trips. Each session can refer to only one trip, since a specific trip may be executed at only one time when starting and ending hours are included. However, a trip needs to have at least one session but due to the fact that there can be many different offers of the same trip, there may be many sessions of the same trip. |

4. Relational database schema

Reservations(**ReservationNumber**, DateOfReservation, AdvancePayment, PaymentMethod, Payment, SessionID REF Sessions, OfferID REF Offers, GroupID REF Reservation groups, PESEL REF Sellers)

PurchasedOptions(**ReservationNumber** REF Reservations, **OptionID** REF Options)

Options(**OptionID**, Name, Price, Description, IsAvailable)

Offers(**OfferID**, BasicPrice, Discount, ParticipantsCount, IsLastMinute, IsAvailable, PricePerAdult, PricePerChild, TripID REF Trips)

OfferedOptions(**OfferID** REF Offers, **OfferedOptionID** REF Options)

IncludedOptions(**OfferID** REF Offers, **IncludedOptionID** REF Options)

SessionsOfOffers(**OfferID** REF Offers, **SessionID** REF Sessions)

Sessions(**SessionID**, FirstDay, LastDay, StartHour, EndHour, TripID REF Trips)

Trips(**TripID**, Name, Transport, Type, Description, LocationID REF Locations)

Locations(**LocationID**, Country, City, Hotel, StarsCount)

People(**PESEL**, FirstName, SecondName, Surname, DateOfBirth, Age, Address)

Sellers(**PESEL REF People**, YearsOfExperience, Salary, ClientsRate, Position, OfficeNumber, IsEmployed, SupervisorPESEL REF Sellers)

Participants(**PESEL REF People**, InsuranceNumber, InsuranceAmount, CompanyRate, SatisfactionRate)

ReservationGroups(**GroupID**, GroupLeaderID, GroupName, IsFamily, AdultsCount, ChildrenCount)

ParticipantsInGroups(**GroupID** REF ReservationsGroups, **PESEL** REF Participants)