**МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИИ**

**ФГБОУ ВПО “Пензенский государственный университет”**

**Кафедра “Математическое обеспечение и применение ЭВМ”**

Кафедра **«**МатематическоеобеспечениеиприменениеЭВМ**»**

**ОТЧЕТ**

по лабораторной работе № 5

«Построение физической модели базы данных в среде CA Erwin Data Modeler»

Выполнили: ст. гр. 17ВИ1

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Лабораторная работа № 5

***Цель лабораторной работы:*** Изучение приемов и приобретение практических навыков построения физической модели базы данных в среде CA Erwin Data Modeler.

***Содержание отчета:***

- полная атрибутивная физическая модель базы данных (с учетом возможностей целевой СУБД, с именами отношений, атрибутов отношений и ограничений на английском языке) в нотации IDEF1X, построенная в среде ErWin Data Modeler с указанием отношений, относящихся к конкретному приложению;

- отчет (набор отчетов) в табличном виде, построенный (-ые) в среде ErWin Data Modeler, описывающий (-ие) отношения, атрибуты отношений и ограничения в терминах модели данных целевой СУБД;

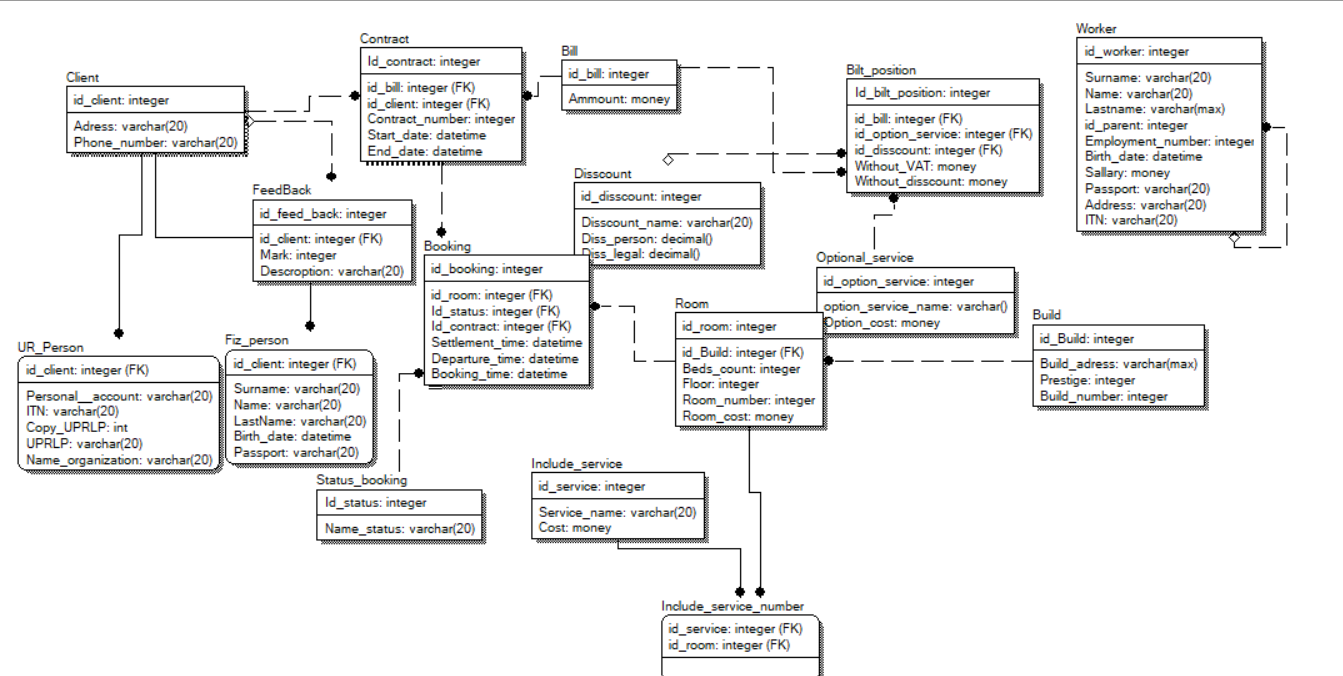
- скрипт для создания базы данных на языке обработки данных *;*

*в среде ErWin Data Modeler.*

***Ход работы:***

Физическая модель БД представлена на рисунке 1

| **Main Subject Area/Display1** |
| --- |



| **Attribute** |
| --- |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Attribute | | | | | | |
| Name | Basename | Datatype | Required | Logical Only | Is PK | Is FK |
| Id\_contract | Id\_contract | integer | Yes | No | Yes | No |
| Contract\_number | Contract\_number | integer | Yes | No | No | No |
| Start\_date | Start\_date | datetime | Yes | No | No | No |
| End\_date | End\_date | datetime | Yes | No | No | No |
| id\_client | id\_client | integer | Yes | No | No | Yes |
| id\_bill | id\_bill | integer | Yes | No | No | Yes |
| id\_bill | id\_bill | integer | Yes | No | Yes | No |
| Ammount | Ammount | money | Yes | No | No | No |
| Id\_bilt\_position | Id\_bilt\_position | integer | Yes | No | Yes | No |
| Without\_VAT | Without\_VAT | money | Yes | No | No | No |
| Without\_disscount | Without\_disscount | money | Yes | No | No | No |
| id\_disscount | id\_disscount | integer | Yes | No | No | Yes |
| id\_option\_service | id\_option\_service | integer | Yes | No | No | Yes |
| id\_bill | id\_bill | integer | Yes | No | No | Yes |
| id\_option\_service | id\_option\_service | integer | Yes | No | Yes | No |
| option\_service\_name | option\_service\_name | varchar() | Yes | No | No | No |
| Option\_cost | Option\_cost | money | Yes | No | No | No |
| id\_disscount | id\_disscount | integer | Yes | No | Yes | No |
| Disscount\_name | Disscount\_name | varchar(20) | Yes | No | No | No |
| Diss\_person | Diss\_person | decimal() | No | No | No | No |
| Diss\_legal | Diss\_legal | decimal() | No | No | No | No |
| id\_client | id\_client | integer | Yes | No | Yes | No |
| Adress | Adress | varchar(20) | Yes | No | No | No |
| Phone\_number | Phone\_number | varchar(20) | Yes | No | No | No |
| Personal\_\_account | Personal\_\_account | varchar(20) | No | No | No | No |
| ITN | ITN | varchar(20) | Yes | No | No | No |
| Copy\_UPRLP | Copy\_UPRLP | int | Yes | No | No | No |
| UPRLP | UPRLP | varchar(20) | Yes | No | No | No |
| id\_client | id\_client | integer | Yes | No | Yes | Yes |
| Name\_organization | Name\_organization | varchar(20) | Yes | No | No | No |
| Surname | Surname | varchar(20) | Yes | No | No | No |
| Name | Name | varchar(20) | Yes | No | No | No |
| LastName | LastName | varchar(20) | Yes | No | No | No |
| Birth\_date | Birth\_date | datetime | Yes | No | No | No |
| Passport | Passport | varchar(20) | Yes | No | No | No |
| id\_client | id\_client | integer | Yes | No | Yes | Yes |
| id\_feed\_back | id\_feed\_back | integer | Yes | No | Yes | No |
| id\_client | id\_client | integer | No | No | No | Yes |
| Mark | Mark | integer | No | No | No | No |
| Descroption | Descroption | varchar(20) | No | No | No | No |
| id\_booking | id\_booking | integer | Yes | No | Yes | No |
| Id\_contract | Id\_contract | integer | Yes | No | No | Yes |
| Id\_status | Id\_status | integer | Yes | No | No | Yes |
| Settlement\_time | Settlement\_time | datetime | Yes | No | No | No |
| Departure\_time | Departure\_time | datetime | Yes | No | No | No |
| Booking\_time | Booking\_time | datetime | Yes | No | No | No |
| id\_room | id\_room | integer | Yes | No | No | Yes |
| Name\_status | Name\_status | varchar(20) | Yes | No | No | No |
| Id\_status | Id\_status | integer | Yes | No | Yes | No |
| Beds\_count | Beds\_count | integer | Yes | No | No | No |
| Floor | Floor | integer | Yes | No | No | No |
| Room\_number | Room\_number | integer | Yes | No | No | No |
| Room\_cost | Room\_cost | money | Yes | No | No | No |
| id\_room | id\_room | integer | Yes | No | Yes | No |
| id\_Build | id\_Build | integer | Yes | No | No | Yes |
| Service\_name | Service\_name | varchar(20) | Yes | No | No | No |
| id\_service | id\_service | integer | Yes | No | Yes | No |
| Cost | Cost | money | Yes | No | No | No |
| id\_Build | id\_Build | integer | Yes | No | Yes | No |
| Build\_adress | Build\_adress | varchar(max) | Yes | No | No | No |
| Prestige | Prestige | integer | Yes | No | No | No |
| Build\_number | Build\_number | integer | Yes | No | No | No |
| Surname | Surname | varchar(20) | Yes | No | No | No |
| Name | Name | varchar(20) | Yes | No | No | No |
| Lastname | Lastname | varchar(max) | No | No | No | No |
| id\_parent | id\_parent | integer | Yes | No | No | No |
| id\_worker | id\_worker | integer | Yes | No | Yes | No |
| Employment\_number | Employment\_number | integer | Yes | No | No | No |
| Birth\_date | Birth\_date | datetime | Yes | No | No | No |
| Sallary | Sallary | money | Yes | No | No | No |
| Passport | Passport | varchar(20) | Yes | No | No | No |
| Address | Address | varchar(20) | Yes | No | No | No |
| ITN | ITN | varchar(20) | Yes | No | No | No |
| id\_worker | id\_worker | integer | Yes | No | No | Yes |
| id\_service | id\_service | integer | Yes | No | Yes | Yes |
| id\_room | id\_room | integer | Yes | No | Yes | Yes |

| **Relationship** |
| --- |

| **Relationship** | | | |
| --- | --- | --- | --- |
| **Null Option** | **Parent to Child Rule** | **Type** | **Name** |
| Nulls Allowed | A Bill is associated with zero, one or more Contracts. | Non-identifying | R\_33 |
|  | A Bill is associated with zero, one or more Bilt\_positions. | Identifying | R\_7 |
|  | A Build is associated with zero, one or more Rooms. | Identifying | R\_29 |
| Nulls Allowed | A Client is associated with zero, one or more FeedBacks. | Non-identifying | R\_16 |
|  | A Client is associated with zero, one or more Contracts. | Identifying | R\_10 |
|  | A Client is associated with zero or one UR\_Persons. | Identifying | is\_a |
|  | A Client is associated with zero or one Fiz\_persons. | Identifying | is\_a |
|  | A Contract is associated with zero, one or more Bookings. | Identifying | R\_18 |
| Nulls Allowed | A Disscount is associated with zero, one or more Bilt\_positions. | Non-identifying | R\_4 |
|  | An Include\_service is associated with zero, one or more Include\_service\_numbers. | Identifying | R\_28 |
|  | An Optional\_service is associated with zero, one or more Bilt\_positions. | Identifying | R\_5 |
|  | A Room is associated with zero, one or more Include\_service\_numbers. | Identifying | R/18 |
|  | A Room is associated with zero, one or more Bookings. | Identifying | R\_26 |
|  | A Status\_booking is associated with zero, one or more Bookings. | Identifying | R\_24 |
| Nulls Allowed | A Worker is associated with zero or one Workers. | Non-identifying | R\_30 |

| **Entity** |
| --- |

| **Entity** | | | |
| --- | --- | --- | --- |
| **Name** | **Type** | **History Event** | **History Event Description** |
| Bill | Independent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:16:32 | Derived from model Model\_1 |
| Bilt\_position | Dependent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:18:56 | Derived from model Model\_1 |
| Booking | Dependent | Derived 18.11.2019 23:03:15  Created 11.11.2019 0:00:40 | Derived from model Model\_1 |
| Build | Independent | Derived 18.11.2019 23:03:15  Created 11.11.2019 0:45:26 | Derived from model Model\_1 |
| Client | Independent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:40:14 | Derived from model Model\_1 |
| Contract | Dependent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:07:35 | Derived from model Model\_1 |
| Disscount | Independent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:26:14 | Derived from model Model\_1 |
| FeedBack | Independent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:54:32 | Derived from model Model\_1 |
| Fiz\_person | Dependent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:46:42 | Derived from model Model\_1 |
| Include\_service | Independent | Derived 18.11.2019 23:03:15  Created 11.11.2019 0:42:40 | Derived from model Model\_1 |
| Include\_service\_number | Dependent | Transformed 18.11.2019 23:03:16 | Transformed by R\_28\_Many-to-Many Transform from R\_28 |
| Optional\_service | Independent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:22:50 | Derived from model Model\_1 |
| Room | Dependent | Derived 18.11.2019 23:03:15  Created 11.11.2019 0:32:44 | Derived from model Model\_1 |
| Status\_booking | Independent | Derived 18.11.2019 23:03:15  Created 11.11.2019 0:18:00 | Derived from model Model\_1 |
| UR\_Person | Dependent | Derived 18.11.2019 23:03:15  Created 10.11.2019 23:46:32 | Derived from model Model\_1 |
| Worker | Independent | Derived 18.11.2019 23:03:15  Created 11.11.2019 0:51:31 | Derived from model Model\_1 |

**Код базы данных**

CREATE TABLE Bill

(

id\_bill integer NOT NULL ,

Ammount money NOT NULL

)

go

ALTER TABLE Bill

ADD CONSTRAINT XPKBill PRIMARY KEY CLUSTERED (id\_bill ASC)

go

CREATE TABLE Bilt\_position

(

Id\_bilt\_position integer IDENTITY ( 1,1 ) ,

id\_bill integer NOT NULL ,

id\_disscount integer NOT NULL ,

id\_option\_service integer NOT NULL ,

Without\_VAT money NOT NULL ,

Without\_disscount money NOT NULL

)

go

ALTER TABLE Bilt\_position

ADD CONSTRAINT XPKBilt\_position PRIMARY KEY CLUSTERED (Id\_bilt\_position ASC)

go

CREATE TABLE Booking

(

id\_booking integer IDENTITY ( 1,1 ) ,

Id\_contract integer NOT NULL ,

Id\_status integer NOT NULL ,

Settlement\_time datetime NOT NULL ,

Departure\_time datetime NOT NULL ,

Booking\_time datetime NOT NULL ,

id\_room integer NOT NULL

)

go

ALTER TABLE Booking

ADD CONSTRAINT XPKBooking PRIMARY KEY CLUSTERED (id\_booking ASC)

go

CREATE TABLE Build

(

id\_Build integer IDENTITY ( 1,1 ) ,

Build\_adress varchar(max) NOT NULL ,

Prestige integer NOT NULL ,

Build\_number integer NOT NULL

)

go

ALTER TABLE Build

ADD CONSTRAINT XPKBuild PRIMARY KEY CLUSTERED (id\_Build ASC)

go

CREATE TABLE Client

(

id\_client integer IDENTITY ( 1,1 ) ,

Adress varchar(20) NOT NULL ,

Phone\_number varchar(20) NOT NULL

)

go

ALTER TABLE Client

ADD CONSTRAINT XPKClient PRIMARY KEY CLUSTERED (id\_client ASC)

go

CREATE TABLE Contract

(

Id\_contract integer IDENTITY ( 1,1 ) ,

Contract\_number integer NOT NULL ,

Start\_date datetime NOT NULL ,

End\_date datetime NOT NULL ,

id\_client integer NOT NULL ,

id\_bill integer NOT NULL

)

go

ALTER TABLE Contract

ADD CONSTRAINT XPKContract PRIMARY KEY CLUSTERED (Id\_contract ASC)

go

CREATE TABLE Disscount

(

id\_disscount integer IDENTITY ( 1,1 ) ,

Disscount\_name varchar(20) NOT NULL ,

Diss\_person decimal NULL ,

Diss\_legal decimal NULL

)

go

ALTER TABLE Disscount

ADD CONSTRAINT XPKDisscount PRIMARY KEY CLUSTERED (id\_disscount ASC)

go

CREATE TABLE FeedBack

(

id\_feed\_back integer IDENTITY ( 1,1 ) ,

id\_client integer NULL ,

Mark integer NULL ,

Descroption varchar(20) NULL

)

go

ALTER TABLE FeedBack

ADD CONSTRAINT XPKFeedBack PRIMARY KEY CLUSTERED (id\_feed\_back ASC)

go

CREATE TABLE Fiz\_person

(

id\_client integer IDENTITY ( 1,1 ) ,

Surname varchar(20) NOT NULL ,

Name varchar(20) NOT NULL ,

LastName varchar(20) NOT NULL ,

Birth\_date datetime NOT NULL ,

Passport varchar(20) NOT NULL

)

go

ALTER TABLE Fiz\_person

ADD CONSTRAINT XPKFiz\_person PRIMARY KEY CLUSTERED (id\_client ASC)

go

CREATE TABLE Include\_service

(

id\_service integer IDENTITY ( 1,1 ) ,

Service\_name varchar(20) NOT NULL ,

Cost money NOT NULL

)

go

ALTER TABLE Include\_service

ADD CONSTRAINT XPKInclude\_service PRIMARY KEY CLUSTERED (id\_service ASC)

go

CREATE TABLE Include\_service\_number

(

id\_service integer NOT NULL ,

id\_room integer NOT NULL

)

go

ALTER TABLE Include\_service\_number

ADD CONSTRAINT XPKInclude\_service\_number PRIMARY KEY CLUSTERED (id\_service ASC,id\_room ASC)

go

CREATE TABLE Optional\_service

(

id\_option\_service integer IDENTITY ( 1,1 ) ,

option\_service\_name varchar(20) NOT NULL ,

Option\_cost money NOT NULL

)

go

ALTER TABLE Optional\_service

ADD CONSTRAINT XPKOptional\_service PRIMARY KEY CLUSTERED (id\_option\_service ASC)

go

CREATE TABLE Room

(

id\_room integer NOT NULL ,

Beds\_count integer NOT NULL ,

Floor integer NOT NULL ,

Room\_number integer NOT NULL ,

Room\_cost money NOT NULL ,

id\_Build integer NOT NULL

)

go

ALTER TABLE Room

ADD CONSTRAINT XPKRoom PRIMARY KEY CLUSTERED (id\_room ASC)

go

CREATE TABLE Status\_booking

(

Id\_status integer IDENTITY ( 1,1 ) ,

Name\_status varchar(20) NOT NULL

)

go

ALTER TABLE Status\_booking

ADD CONSTRAINT XPKStatus\_booking PRIMARY KEY CLUSTERED (Id\_status ASC)

go

CREATE TABLE UR\_Person

(

id\_client integer NOT NULL ,

Personal\_\_account varchar(20) NULL ,

ITN varchar(20) NOT NULL ,

Copy\_UPRLP int NOT NULL ,

UPRLP varchar(20) NOT NULL ,

Name\_organization varchar(20) NOT NULL

)

go

ALTER TABLE UR\_Person

ADD CONSTRAINT XPKUR\_Person PRIMARY KEY CLUSTERED (id\_client ASC)

go

CREATE TABLE Worker

(

id\_worker integer IDENTITY ( 1,1 ) ,

Surname varchar(20) NOT NULL ,

Name varchar(20) NOT NULL ,

Lastname varchar(max) NULL ,

id\_parent integer NOT NULL ,

Employment\_number integer NOT NULL ,

Birth\_date datetime NOT NULL ,

Sallary money NOT NULL ,

Passport varchar(20) NOT NULL ,

Address varchar(20) NOT NULL ,

ITN varchar(20) NOT NULL

)

go

ALTER TABLE Worker

ADD CONSTRAINT XPKWorker PRIMARY KEY CLUSTERED (id\_worker ASC)

go

ALTER TABLE Bilt\_position

ADD CONSTRAINT R\_4 FOREIGN KEY (id\_disscount) REFERENCES Disscount(id\_disscount)

go

ALTER TABLE Bilt\_position

ADD CONSTRAINT R\_5 FOREIGN KEY (id\_option\_service) REFERENCES Optional\_service(id\_option\_service)

go

ALTER TABLE Bilt\_position

ADD CONSTRAINT R\_7 FOREIGN KEY (id\_bill) REFERENCES Bill(id\_bill)

go

ALTER TABLE Booking

ADD CONSTRAINT R\_18 FOREIGN KEY (Id\_contract) REFERENCES Contract(Id\_contract)

go

ALTER TABLE Booking

ADD CONSTRAINT R\_24 FOREIGN KEY (Id\_status) REFERENCES Status\_booking(Id\_status)

go

ALTER TABLE Booking

ADD CONSTRAINT R\_26 FOREIGN KEY (id\_room) REFERENCES Room(id\_room)

go

ALTER TABLE Contract WITH CHECK

ADD CONSTRAINT R\_10 FOREIGN KEY (id\_client) REFERENCES Client(id\_client)

go

ALTER TABLE Contract

ADD CONSTRAINT R\_33 FOREIGN KEY (id\_bill) REFERENCES Bill(id\_bill)

go

ALTER TABLE FeedBack

ADD CONSTRAINT R\_16 FOREIGN KEY (id\_client) REFERENCES Client(id\_client)

go

ALTER TABLE Fiz\_person

ADD CONSTRAINT is\_a FOREIGN KEY (id\_client) REFERENCES Client(id\_client)

go

ALTER TABLE Include\_service\_number

ADD CONSTRAINT R\_28 FOREIGN KEY (id\_service) REFERENCES Include\_service(id\_service)

go

ALTER TABLE Include\_service\_number

ADD CONSTRAINT R\_18\_9 FOREIGN KEY (id\_room) REFERENCES Room(id\_room)

go

ALTER TABLE Room

ADD CONSTRAINT R\_29 FOREIGN KEY (id\_Build) REFERENCES Build(id\_Build)

go

go

ALTER TABLE UR\_Person

ADD CONSTRAINT R\_20\_1 FOREIGN KEY (id\_client) REFERENCES Client(id\_client)

go

ALTER TABLE Worker

ADD CONSTRAINT R\_30 FOREIGN KEY (id\_worker) REFERENCES Worker(id\_worker)

go

**Вывод:** В ходе лабораторной работы изучили приемы и приобрели практические навыки построения физической модели базы данных в среде CA Erwin Data Modeler.