

Санкт-Петербургский политехнический университет Петра Великого
Институт компьютерных наук и технологий
Кафедра компьютерных систем и программных технологий

Отчёт

По лабораторной работе №3

Дисциплина: базы данных

Тема: язык SQL-DDL

Выполнил студент группы 43501/1:

Проверил преподаватель:

Евсеев Е.П.

Мяснов А.В.

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Цели работы

Познакомиться с языком описания сущностей и ограничений БД SQL-DDL.

Программа работы

1. Создать скрипт БД в соответствии со схемой из лабораторной работы №2
2. Создать скрипт, заполняющий все таблицы БД данными
3. Продемонстрировать работу SQL-запросы, изменяющие схему БД по заданию
4. Получить ER-диаграмму созданной БД
5. Автоматически сгенерировать данные при помощи IBExpert

Ход работы

Язык SQL (Structured Query Language) - язык структурированных запросов. Он позволяет формировать весьма сложные запросы к базам данных. В SQL определены два подмножества языка:

- SQL-DDL (Data Definition Language) - язык определения структур и ограничений целостности баз данных. Сюда относятся команды создания и удаления баз данных; создания, изменения и удаления таблиц; управления пользователями и т.д.
- SQL-DML (Data Manipulation Language) - язык манипулирования данными: добавление, изменение, удаление и извлечение данных, управления транзакциями

Скрипт БД

```
create database 'D:/DB/SERVICE.FDB' user 'SYSDBA' password 'masterkey';

create table CLIENTS(
    ID_CLIENT int primary key,
    FULL_NAME varchar(50) not null,
    PHONE varchar(10) not null
);

create table CARS(
    ID_CAR varchar(9) primary key,
    ID_CLIENT int not null references CLIENTS(ID_CLIENT),
    MARK varchar(30) not null,
    MODEL varchar(30) not null,
    COLOR varchar(20) not null,
    YEAR_OF_ISSUE varchar(4) not null
);

create table ORDERS(
    ID_ORDER int primary key,
    ID_CAR varchar(9) not null references CARS(ID_CAR),
    BEGIN_AT date,
    END_AT date
);

create table TYPES_OF_REPAIR(
    ID_TYPE int primary key,
    NAME varchar(70) not null,
    PRICE decimal(8) not null
);
```

```

create table MANUFACTURERS(
    ID_MANUFACTURER int primary key,
    NAME varchar(20) not null,
    SITE varchar(30) not null,
    PHONE varchar(10) not null
);

create table DETAILS_CATALOG(
    ID_DETAIL int primary key,
    NAME varchar(20) not null,
    COST decimal(8) not null,
    EXISTENCE_Y_or_N char(1) not null,
    AMOUNT int not null,
    ID_MANUFACTURER int not null references MANUFACTURERS(ID_MANUFACTURER)
);

create table ORDERS_SOA(
    ID_ORDER_SOA int primary key,
    ID_DETAIL int not null references DETAILS_CATALOG(ID_DETAIL),
    AMOUNT int not null
);

create table REPAIR(
    ID_REPAIR int primary key,
    ID_TYPE int not null references TYPES_OF_REPAIR(ID_TYPE),
    NAME varchar(50) not null,
    ID_ORDER_SOA int not null references ORDERS_SOA(ID_ORDER_SOA)
);

create table WORKERS(
    ID_WORKER int primary key,
    FULL_NAME varchar(50) not null,
    SPECIALTY varchar(20) not null,
    PHONE varchar(10) not null,
    PASSPORT varchar(11) not null
);

create table REPAIR_ORDERS(
    ID_REPAIR_ORDER int primary key,
    ID_REPAIR int not null references REPAIR(ID_REPAIR),
    ID_ORDER int not null references ORDERS(ID_ORDER),
    ID_WORKER int not null references WORKERS(ID_WORKER)
);

show tables;

```

Результат:

```

ISQL Version: WI-U2.5.6.27020 Firebird 2.5
Use CONNECT or CREATE DATABASE to specify a database
SQL> input D:/DB/dbj.sql;
Server version:
WI-U2.5.6.27020 Firebird 2.5
WI-U2.5.6.27020 Firebird 2.5/XNet <ASUSPC>/P12
WI-U2.5.6.27020 Firebird 2.5/XNet <ASUSPC>/P12
    CARS
    DETAILS_CATALOG
    ORDERS
    REPAIR
    TYPES_OF_REPAIR
    CLIENTS
    MANUFACTURERS
    ORDERS_SOA
    REPAIR_ORDERS
    WORKERS

```

Скрипт, заполняющий таблицы БД данными

```
connect 'D:/DB/SERVICE.FDB' user 'SYSDBA' password 'masterkey';
commit;

-- -- TABLE CLIENTS --
insert into CLIENTS values (1, 'TONY STARK', '4024864932');
insert into CLIENTS values (2, 'CAPTAIN AMERICA', '4012863920');
insert into CLIENTS values (3, 'ANT MAN', '4073920184');
insert into CLIENTS values (4, 'SPIDER MAN', '4072849014');
insert into CLIENTS values (5, 'BLACK WIDOW', '4092846710');
insert into CLIENTS values (6, 'INCREDIBLE HULK', '4001468242');
insert into CLIENTS values (7, 'HOWK EYE', '4081947436');
insert into CLIENTS values (8, 'RED WITCH', '4081394302');
insert into CLIENTS values (9, 'WINTER SOLDIER', '4001394824');
insert into CLIENTS values (10, 'THOR THE SON OF ODIN', '4001847334');

-- -- TABLE CARS --
insert into CARS values ('nf74n8fnv', 1, 'skoda', 'octavia', 'grey', '2014');
insert into CARS values ('nf7jfsdg9', 2, 'toyota', 'rav4', 'grey', '2006');
insert into CARS values ('nf74n8sdf', 6, 'mersedes-benz', 'maybach', 'black', '2016');
insert into CARS values ('nf74n8fkg', 3, 'ford', 'focus', 'grey', '2008');
insert into CARS values ('nf74ngfsd', 5, 'mitsubisi', 'lancer', 'red', '2009');
insert into CARS values ('3434dfdfg', 7, 'mitsubisi', 'ASX', 'blue', '2011');
insert into CARS values ('nf74ef344', 8, 'volkswagen', 'polo', 'white', '2012');
insert into CARS values ('nf74124df', 9, 'volkswagen', 'golf GTR', 'mixed', '2007');
insert into CARS values ('nf7cvcvbr', 10, 'skoda', 'kodiaq', 'green', '2017');
insert into CARS values ('nf74n8f42', 4, 'land rover', 'range rover sport', 'white', '2013');

-- -- TABLE ORDERS --
insert into ORDERS values (1, 'nf74n8fnv', '13.02.2012', '13.03.2012');
insert into ORDERS values (2, 'nf7jfsdg9', '14.04.2012', '16.04.2012');
insert into ORDERS values (3, 'nf74n8sdf', '14.03.2014', '13.03.2014');
insert into ORDERS values (4, 'nf74n8fkg', '18.04.2015', '20.04.2015');
insert into ORDERS values (5, 'nf74ngfsd', '30.05.2016', '31.05.2016');
insert into ORDERS values (6, '3434dfdfg', '15.06.2016', '30.06.2016');
insert into ORDERS values (7, 'nf74ef344', '13.02.2015', '21.02.2015');
insert into ORDERS values (8, 'nf74124df', '11.07.2013', '14.07.2013');
insert into ORDERS values (9, 'nf7cvcvbr', '15.03.2013', '17.03.2013');
insert into ORDERS values (10, 'nf74n8f42', '21.05.2016', '13.06.2016');

-- -- TABLE TYPES_OF_REPAIR --
insert into TYPES_OF_REPAIR values (1, 'work', 1500);
insert into TYPES_OF_REPAIR values (2, 'work2', 300);

-- -- TABLE MANUFACTURERS --
insert into MANUFACTURERS values (345, 'EUROAUTO', 'www.euroauto.ru', '435456');
insert into MANUFACTURERS values (123, 'BP', 'www.bp.com', '56794536');
insert into MANUFACTURERS values (32, 'WAG', 'www.wag.de', '3475897345');

-- -- TABLE DETAILS_CATALOG --
insert into DETAILS_CATALOG values (456, 'PRUZG', 1400, 'Y', 1, 345);
insert into DETAILS_CATALOG values (231, 'BAK', 1010, 'Y', 1, 345);
insert into DETAILS_CATALOG values (228, 'FARA', 34400, 'N', 4, 345);
insert into DETAILS_CATALOG values (322, 'WINDOW', 32345, 'N', 2, 123);
insert into DETAILS_CATALOG values (567, 'MIRROW', 132, 'Y', 2, 32);
```

```

-- -- TABLE ORDERS_SOA --
insert into ORDERS_SOA values (1, 456, 1);
insert into ORDERS_SOA values (2, 231, 1);
insert into ORDERS_SOA values (3, 228, 1);
insert into ORDERS_SOA values (4, 322, 3);
insert into ORDERS_SOA values (5, 567, 1);

-- -- TABLE REPAIR --
insert into REPAIR values (1, 1, 'complex', 1);
insert into REPAIR values (2, 2, 'paint', 2);
insert into REPAIR values (3, 2, 'tuning', 3);
insert into REPAIR values (4, 2, 'engine', 4);
insert into REPAIR values (5, 2, 'suspension', 5);
insert into REPAIR values (6, 1, 'cleaning', 5);

-- -- TABLE WORKERS --
insert into WORKERS values (1, 'Ivan', 'mech1', '5830495864', '34534634341');
insert into WORKERS values (2, 'Petr', 'mech2', '3468945764', '34543903943');
insert into WORKERS values (3, 'Konstantin', 'paint', '3845769080', '23787563453');
insert into WORKERS values (4, 'Sergey', 'gear', '8908837495', '23489734895');
insert into WORKERS values (5, 'Vladimir', 'assistent', '8349572146', '23849573984');

-- -- TABLE REPAIR_ORDERS --
insert into REPAIR_ORDERS values (1, 1, 3, 5);
insert into REPAIR_ORDERS values (2, 2, 1, 1);
insert into REPAIR_ORDERS values (3, 3, 2, 3);
insert into REPAIR_ORDERS values (4, 4, 5, 4);
insert into REPAIR_ORDERS values (5, 5, 4, 2);
insert into REPAIR_ORDERS values (6, 6, 6, 1);
insert into REPAIR_ORDERS values (7, 2, 7, 4);
insert into REPAIR_ORDERS values (8, 3, 8, 5);
insert into REPAIR_ORDERS values (9, 5, 10, 2);
insert into REPAIR_ORDERS values (10, 1, 9, 5);

commit;
select * from CLIENTS;
select * from CARS;
select * from ORDERS;
select * from REPAIR_ORDERS;
select * from WORKERS;
select * from REPAIR;
select * from TYPES_OF_REPAIR;
select * from ORDERS_SOA;
select * from DETAILS_CATALOG;
select * from MANUFACTURERS;

```

Результат:

```

SQL> input D:/DB/dataj.sql;
Rolling back work.
Server version:
WI-U2.5.6.27020 Firebird 2.5
WI-U2.5.6.27020 Firebird 2.5/XNet (ASUSPC)/P12
WI-U2.5.6.27020 Firebird 2.5/XNet (ASUSPC)/P12
Database: 'D:/DB/SERVICE.FDB', User: SYSDBA

```

Таблица CLIENTS

ID_CLIENT	FULL_NAME	PHONE
1	TONY STARK	4024864932
2	CAPTAIN AMERICA	4012863920
3	ANT MAN	4073920184
4	SPIDER MAN	4072849014
5	BLACK WIDOW	4092846710
6	INCREDIBLE HULK	4001468242
7	HOWK EYE	4081947436
8	RED WITCH	4081394302
9	WINTER SOLDIER	4001394824
10	THOR THE SON OF ODIN	4001847334

Таблица CARS

ID_CAR	ID_CLIENT	MARK	MODEL	COLOR	YEAR_OF_ISSUE
nf74n8fuv	1	skoda	octavia	grey	2014
nf7jfsdg9	2	toyota	rav4	grey	2006
nf74n8sdf	6	mercedes-benz	maybach	black	2016
nf74n8fkg	3	ford	focus	grey	2008
nf74ngfsd	5	mitsubisi	lancer	red	2009
3434dfdfg	7	mitsubisi	ASX	blue	2011
nf74ef344	8	volkswagen	polo	white	2012
nf74124df	9	volkswagen	golf GTR	mixed	2007
nf7cvcvbr	10	skoda	kodiat	green	2017
nf74n8f42	4	land rover	range rover sport	white	2013

Таблица ORDERS

ID_ORDER	ID_CAR	BEGIN_AT	END_AT
1	nf74n8fuv	2012-02-13	2012-03-13
2	nf7jfsdg9	2012-04-14	2012-04-16
3	nf74n8sdf	2014-03-14	2014-03-13
4	nf74n8fkg	2015-04-18	2015-04-20
5	nf74ngfsd	2016-05-30	2016-05-31
6	3434dfdfg	2016-06-15	2016-06-30
7	nf74ef344	2015-02-13	2015-02-21
8	nf74124df	2013-07-11	2013-07-14
9	nf7cvcvbr	2013-03-15	2013-03-17
10	nf74n8f42	2016-05-21	2016-06-13

Таблица REPAIR_ORDERS

ID_REPAIR_ORDER	ID_REPAIR	ID_ORDER	ID_WORKER
1	1	3	5
2	2	1	1
3	3	2	3
4	4	5	4
5	5	4	2
6	6	6	1
7	2	7	4
8	3	8	5
9	5	10	2
10	1	9	5

Таблица REPAIR

ID_REPAIR	ID_TYPE	NAME	ID_ORDER_SOA
1	1	complex	1
2	2	paint	2
3	2	tuning	3
4	2	engine	4
5	2	suspension	5
6	1	cleaning	5

Таблица ORDERS_SOA

ID_ORDER_SOA	ID_DETAIL	AMOUNT
1	456	1
2	231	1
3	228	1
4	322	3
5	567	1

Таблица DETAILS_CATALOG

ID_DETAIL	NAME	COST	EXISTENCE_Y_OR_N	AMOUNT	ID_MANUFACTURER
456	PRUZG	1400	Y	1	345
231	BAK	1010	Y	1	345
228	FARA	34400	N	4	345
322	WINDOW	32345	N	2	123
567	MIRROW	132	Y	2	32

Таблица MANUFACTURERS

ID_MANUFACTURER	NAME	SITE	PHONE
345	EUROAUTO	www.euroauto.ru	435456
123	BP	www.bp.com	56794536
32	WAG	www.wag.de	3475897345

Таблица TYPES_OF_REPAIR

ID_TYPE	NAME	PRICE
1	work	1500
2	work2	300

Таблица WORKERS

ID_WORKER	FULL_NAME	SPECIALTY	PHONE	PASSPORT
1	Ivan	mech1	5830495864	34534634341
2	Petr	mech2	3468945764	34543903943
3	Konstantin	paint	3845769080	23787563453
4	Sergey	gear	8908837495	23489734895
5	Vladimir	assistent	8349572146	23849573984

SQL-запросы, изменяющие схему БД по заданию

1. Реализовать учет аналогов запчастей и возможность выбора их при производстве работ.

Создадим дополнительную таблицу DETAILS, в которой будут пронумерованы обобщенные названия запчастей.

В таблицу DETAILS_CATALOG добавим поле VIN (идентификационный номер ТС) и поле DETAIL_NAME.

В таблицу CARS добавим поле VIN.

Скрипт:

```
connect 'D:/DB/SERVICE.FDB' user 'SYSDBA' password 'masterkey';
commit;

create table DETAILS(
    ID_NAME int PRIMARY KEY,
    DETAIL_NAME varchar(20)
);

alter table DETAILS_CATALOG add ID_DETAIL_NAME int;

alter table DETAILS_CATALOG add ORIGINAL varchar(7);

alter table DETAILS_CATALOG add VIN varchar(17);

alter table DETAILS_CATALOG add constraint FK_CONTRACTS_FK1 foreign key (ID_DETAIL_NAME)
references DETAILS(ID_NAME);

alter table CARS add VIN varchar(17);

insert into DETAILS values ('1', 'window right');
insert into DETAILS values ('2', 'window left');
insert into DETAILS values ('3', 'front spring');
insert into DETAILS values ('4', 'rear spring');
insert into DETAILS values ('5', 'bak');
insert into DETAILS values ('6', 'front damper');
insert into DETAILS values ('7', 'rear damper');
insert into DETAILS values ('8', 'front left fara');
insert into DETAILS values ('9', 'left mirrow');
insert into DETAILS values ('10', 'oil filter');

update DETAILS_CATALOG set ID_DETAIL_NAME='3',ORIGINAL='n',VIN='YRIWBFJDISOWTHDIN' where
ID_DETAIL='456';
update DETAILS_CATALOG set ID_DETAIL_NAME='5',ORIGINAL='y',VIN='QEICJFNYGNCNUASDCM' where
ID_DETAIL='231';
update DETAILS_CATALOG set ID_DETAIL_NAME='8',ORIGINAL='n',VIN='YRIWBFJDISOWTHDIN' where
ID_DETAIL='228';
update DETAILS_CATALOG set ID_DETAIL_NAME='1',ORIGINAL='n',VIN='EGGNEAVIUERHVNJLI' where
ID_DETAIL='322';
update DETAILS_CATALOG set ID_DETAIL_NAME='9',ORIGINAL='n',VIN='WRIJVGHEVCBUEECVM' where
ID_DETAIL='567';
insert into DETAILS_CATALOG values
('232','BAK','500','Y','4','32','5','n','QEICJFNYGNCNUASDCM');
```



```

update CARS set VIN='YRIWBFJDISOWTHDIN' where ID_CLIENT='1';
update CARS set VIN='JFCUIEBVCJASKCNDI' where ID_CLIENT='2';
update CARS set VIN='FQIERFHUIADSCFBRF' where ID_CLIENT='3';
update CARS set VIN='QEICJFNYGCUASDCM' where ID_CLIENT='4';
update CARS set VIN='QEIFUHUWYFGNCUASK' where ID_CLIENT='5';
update CARS set VIN='UXISCNFEYGFCMCOIS' where ID_CLIENT='6';
update CARS set VIN='QWEOFDIHIOOIRGMFC' where ID_CLIENT='7';
update CARS set VIN='PQWJDFUNGCBUDUSCM' where ID_CLIENT='8';
update CARS set VIN='PACEYBXWYCMEWIUFF' where ID_CLIENT='9';
update CARS set VIN='QEFUMQEG3HFYUOQWS' where ID_CLIENT='10';

commit;
select * from DETAILS;
select * from DETAILS_CATALOG;
select * from CARS;

```

Результат:

ID_NAME	DETAIL_NAME							
	1 window right							
	2 window left							
	3 front spring							
	4 rear spring							
	5 bak							
	6 front damper							
	7 rear damper							
	8 front left fara							
	9 left mirrow							
	10 oil filter							
ID_DETAIL	NAME	COST	EXISTENCE_Y_OR_N	AMOUNT	ID_MANUFACTURER	ID_DETAIL_NAME	ORIGINAL	UIN
456	PRUZG	1400	Y	1	345	3 n		YRIWBFJDISOWTHDIN
231	BAK	1010	Y	1	345	5 y		QEICJFNYGCUASDCM
228	PARA	34400	N	4	345	8 n		YRIWBFJDISOWTHDIN
322	WINDOW	32345	N	2	123	1 n		EGGNEAVIUERHUNJLI
567	MIRROW	132	Y	2	32	9 n		WRIJUGHUEUCBUECUM
232	BAK	500	Y	4	32	5 n		QEICJFNYGCUASDCM
ID_CAR	ID_CLIENT	MARK	MODEL		COLOR	YEAR_OF_ISSUE	UIN	
nf74n8fnv	1	skoda	octavia		grey	2014	YRIWBFJDISOWTHDIN	
nf7jfsdg9	2	toyota	rav4		grey	2006	JFCUIEBUCJASKCNDI	
nf74n8sdf	6	mercedes-benz	maybach		black	2016	UXISCNFEYGFCMCOIS	
nf74n8fkg	3	ford	focus		grey	2008	FQIERFHUIADSCFBRF	
nf74ngfsd	5	mitsubisi	lancer		red	2009	QEIFUHUWYFGNCUASK	
3434dfdfg	7	mitsubisi	ASX		blue	2011	QWEOFDIHIOOIRGMFC	
nf74ef344	8	volkswagen	polo		white	2012	PQWJDFUNGCVBDUSCM	
nf74124df	9	volkswagen	golf GTR		mixed	2007	PACEYBXWYCMEWIUFF	
nf7cucubr	10	skoda	kodiaq		green	2017	QEFUMQEG3HFYUOQWS	
nf74n8f42	4	land rover	range rover sport		white	2013	QEICJFNYGCUASDCM	

Для того, чтобы определить аналоги, необходимо сделать поиск деталей в таблице DETAILS_CATALOG с фильтром (вид детали и VIN TC) при помощи следующей команды:

```
select * from DETAILS_CATALOG where ID_DETAIL_NAME='3' and VIN='YRIWBFJDISOWTHDIN';
```

2. Реализовать учет обращений по гарантии.

Создадим таблицу WARRANTY, в которой будет содержаться номер запроса по гарантии, дата обращения и номер гарантийного заказа.

В таблице ORDERS добавим графу ID_WARRANTY, в которой будет указан либо <null> (обычный заказ), либо номер запроса по гарантии.

В таблице TYPES_OF_REPAIR добавим графу WARRANTY, где будет содержаться количество дней, в течении которых можно обратиться по гарантии в сервис.

Скрипт:

```
connect 'D:/DB/SERVICE.FDB' user 'SYSDBA' password 'masterkey';
commit;

create table WARRANTYS(
    ID_WARRANTY int PRIMARY KEY,
    DATE_APP date,
    ID_ORDER int not null references ORDERS(ID_ORDER)
);

alter table ORDERS add ID_WARRANTY int;

alter table ORDERS add constraint FK_ORDERS_FK1 foreign key (ID_WARRANTY) references
WARRANTYS(ID_WARRANTY);

alter table TYPES_OF_REPAIR add WARRANTY varchar(10);

insert into WARRANTYS values ('1','2013-03-25','9');
insert into WARRANTYS values ('2','2016-06-12','5');
insert into WARRANTYS values ('3','2016-06-30','10');

update ORDERS set ID_WARRANTY='1' where ID_ORDER='9';
update ORDERS set ID_WARRANTY='2' where ID_ORDER='5';
update ORDERS set ID_WARRANTY='3' where ID_ORDER='10';

update TYPES_OF_REPAIR set WARRANTY='2 weeks' where ID_TYPE='2';

commit;
select * from ORDERS;
select * from TYPES_OF_REPAIR;
select * from WARRANTYS;
```

Результат:

ID_ORDER	ID_CAR	BEGIN_AT	END_AT	ID_WARRANTY
1	nf74n8fny	2012-02-13	2012-03-13	<null>
2	nf7jfsdg9	2012-04-14	2012-04-16	<null>
3	nf74n8sdf	2014-03-14	2014-03-13	<null>
4	nf74n8fkg	2015-04-18	2015-04-20	<null>
5	nf74ngfsd	2016-05-30	2016-05-31	2
6	3434ddfdg	2016-06-15	2016-06-30	<null>
7	nf74ef344	2015-02-13	2015-02-21	<null>
8	nf74124df	2013-07-11	2013-07-14	<null>
9	nf7cvcvbr	2013-03-15	2013-03-17	1
10	nf74n8f42	2016-05-21	2016-06-13	3

ID_TYPE	NAME	PRICE	WARRANTY
1	work	1500	<null>
2	work2	300	2 weeks

ID_WARRANTY	DATE_APP	ID_ORDER
1	2013-03-25	9
2	2016-06-12	5
3	2016-06-30	10

3. Реализовать учет стоимости закупки и продажи запчастей.

Создадим таблицу PURCHASE, в которой будет содержаться информация о закупках деталей.

Скрипт:

```
connect 'D:/DB/SERVICE.FDB' user 'SYSDBA' password 'masterkey';
commit;

create table PURCHASE(
    ID_PURCHASE int PRIMARY KEY,
    ID_DETAIL int not null references DETAILS_CATALOG(ID_DETAIL),
    PURCHASE_PRICE decimal(8) not null
);

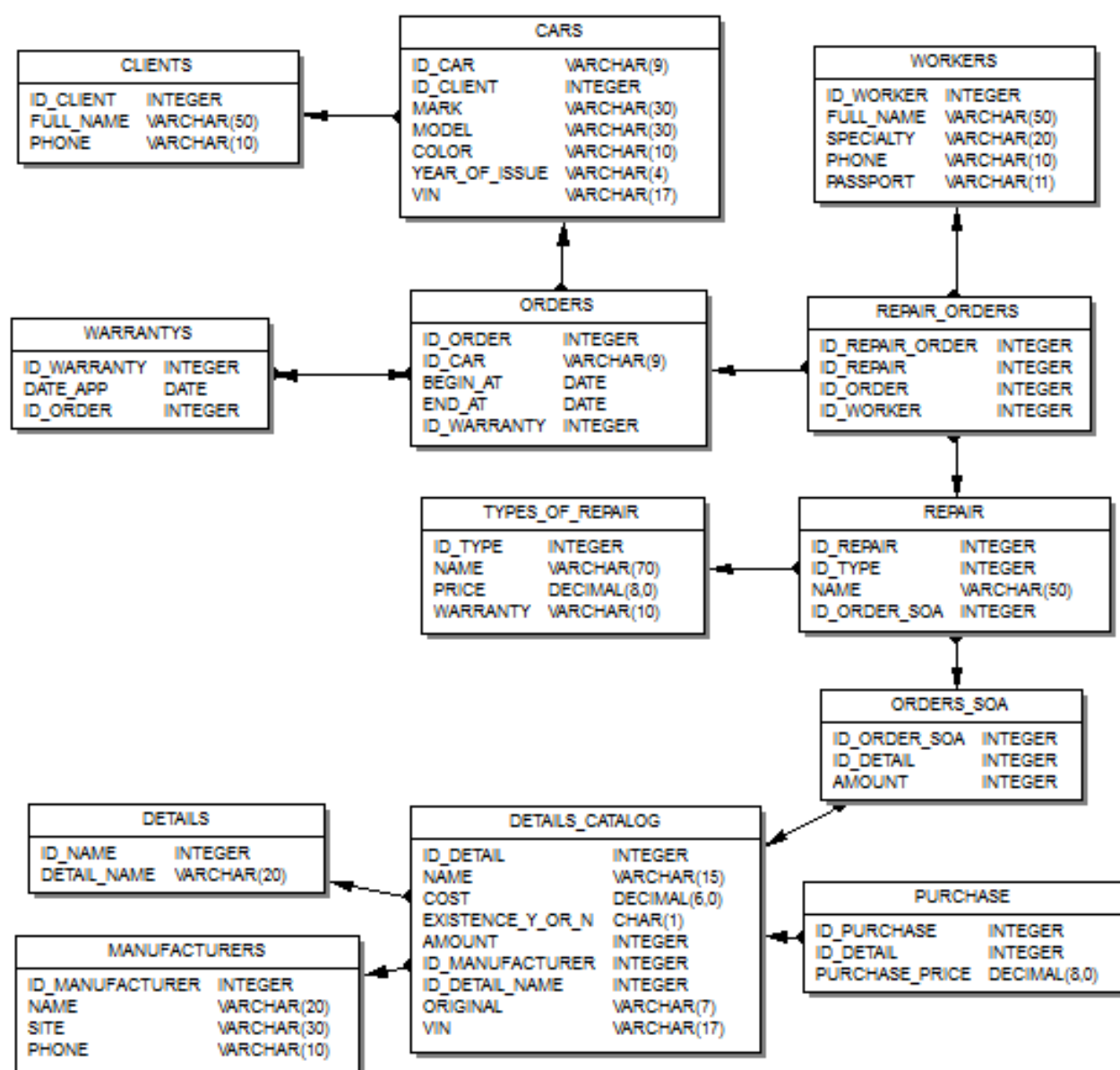
insert into PURCHASE values ('1','456','1300');
insert into PURCHASE values ('2','231','1000');
insert into PURCHASE values ('3','228','34000');
insert into PURCHASE values ('4','322','32000');
insert into PURCHASE values ('5','567','100');
insert into PURCHASE values ('6','232','400');

commit;
select * from PURCHASE;
```

Результат:

ID_PURCHASE	ID_DETAIL	PURCHASE_PRICE
1	456	1300
2	231	1000
3	228	34000
4	322	32000
5	567	100
6	232	400

ER-диаграмма БД



Автоматически сгенерировать данные при помощи IVExpert

1. Для таблицы CLIENTS

D:\DB\SERVICE.FDB Table CLIENTS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input type="checkbox"/> FULL_NAME	VARCHAR(50)
<input type="checkbox"/> PHONE	VARCHAR(10)

Data Generation Type

☐ Generate randomly

☐ Get from another table

☐ Get from list

☒ Autoincrement

Autoincrement

Initial Value 11 Step 1

D:\DB\SERVICE.FDB Table CLIENTS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input checked="" type="checkbox"/> FULL_NAME	VARCHAR(50)
<input type="checkbox"/> PHONE	VARCHAR(10)

Data Generation Type

☐ Generate randomly

☐ Get from another table

☒ Get from list

Get From List

УСТИНОВ
Вишняков
Евсеев
Лаврентьев
Брагин
Константинов
Корнилов
Авдеев

D:\DB\SERVICE.FDB Table CLIENTS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input checked="" type="checkbox"/> FULL_NAME	VARCHAR(50)
<input checked="" type="checkbox"/> PHONE	VARCHAR(10)

Data Generation Type

☒ Generate randomly

☐ Get from another table

☐ Get from list

String Constraints

Min Length 10 Max Length 10

Start Char 0 (48)

End Char 9 (57)

Результат:

Таблица Количество записей CLIENTS

Поля Ограничения Индексы Зависимости Триггеры Данные Master/Detail View Описание Скрипт Права Протокол Comparison To-do

Запись №: 10006

10010 records fetched

ID_CLIENT	FULL_NAME	PHONE
9 983	Мухин	8246986413
9 984	Колесников	1792351728
9 985	Гордеев	8043783588
9 986	Давыдов	1851947766
9 987	Носов	6047030373
9 988	Осипов	9784513494
9 989	Лыткин	1569235434
9 990	Белоус	1896146770

2. Для таблицы CARS

D:\DB\SERVICE.FDB Table CARS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CAR	VARCHAR(9)
<input type="checkbox"/> ID_CLIENT	INTEGER
<input type="checkbox"/> MARK	VARCHAR(30)
<input type="checkbox"/> MODEL	VARCHAR(30)
<input type="checkbox"/> COLOR	VARCHAR(10)
<input type="checkbox"/> YEAR_OF_ISSUE	VARCHAR(4)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☒ Generate randomly
☐ Get from another table
☐ Get from list

String Constraints
 Min Length 6 Max Length 9
 Start Char 0 (48) End Char Z (90)

D:\DB\SERVICE.FDB Table CARS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CAR	VARCHAR(9)
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input type="checkbox"/> MARK	VARCHAR(30)
<input type="checkbox"/> MODEL	VARCHAR(30)
<input type="checkbox"/> COLOR	VARCHAR(10)
<input type="checkbox"/> YEAR_OF_ISSUE	VARCHAR(4)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☐ Generate randomly
☒ Get from another table
☐ Get from list
☐ Autoincrement

Get from table
 Table CLIENTS Field ID_CLIENT Number of records 10000

D:\DB\SERVICE.FDB Table CARS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CAR	VARCHAR(9)
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input checked="" type="checkbox"/> MARK	VARCHAR(30)
<input type="checkbox"/> MODEL	VARCHAR(30)
<input type="checkbox"/> COLOR	VARCHAR(10)
<input type="checkbox"/> YEAR_OF_ISSUE	VARCHAR(4)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☐ Generate randomly
☐ Get from another table
☒ Get from list

Get From List
 TVR Vauxhall Vector Venturi Volkswagen Volvo Vortex

D:\DB\SERVICE.FDB Table CARS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CAR	VARCHAR(9)
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input checked="" type="checkbox"/> MARK	VARCHAR(30)
<input checked="" type="checkbox"/> MODEL	VARCHAR(30)
<input type="checkbox"/> COLOR	VARCHAR(10)
<input type="checkbox"/> YEAR_OF_ISSUE	VARCHAR(4)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☒ Generate randomly
☐ Get from another table
☐ Get from list

String Constraints
 Min Length 5 Max Length 30
 Start Char 0 (48) End Char Z (90)

D:\DB\SERVICE.FDB Table CARS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CAR	VARCHAR(9)
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input checked="" type="checkbox"/> MARK	VARCHAR(30)
<input checked="" type="checkbox"/> MODEL	VARCHAR(30)
<input checked="" type="checkbox"/> COLOR	VARCHAR(10)
<input type="checkbox"/> YEAR_OF_ISSUE	VARCHAR(4)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☐ Generate randomly
☐ Get from another table
☒ Get from list

Get From List
 tomato Ultramarine United Nations Blue Ubuntu orange Vanilla Vermilion Violet Violet-eggplant

D:\DB\SERVICE.FDB Table CARS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CAR	VARCHAR(9)
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input checked="" type="checkbox"/> MARK	VARCHAR(30)
<input checked="" type="checkbox"/> MODEL	VARCHAR(30)
<input checked="" type="checkbox"/> COLOR	VARCHAR(10)
<input checked="" type="checkbox"/> YEAR_OF_ISSUE	VARCHAR(4)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☐ Generate randomly
☐ Get from another table
☒ Get from list

Get From List
 1997 1998 1999 2000 2001 2002 2003

D:\DB\SERVICE.FDB Table CARS Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_CAR	VARCHAR(9)
<input checked="" type="checkbox"/> ID_CLIENT	INTEGER
<input checked="" type="checkbox"/> MARK	VARCHAR(30)
<input checked="" type="checkbox"/> MODEL	VARCHAR(30)
<input checked="" type="checkbox"/> COLOR	VARCHAR(10)
<input checked="" type="checkbox"/> YEAR_OF_ISSUE	VARCHAR(4)
<input checked="" type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type

☒ Generate randomly

☐ Get from another table

☐ Get from list

String Constraints

Min Length 17 Max Length 17

Start Char A (65)

End Char Z (90)

Результат:

Таблица CARS Количество записей 10000

Поля Ограничения Индексы Зависимости Триггеры Данные Master/Detail View Описание Скрипт Права Протокол Comparison

ID_CAR	ID_CLIENT	MARK	MODEL	COLOR	YEAR_OF_ISSUE	VIN
UX6<:IDZ?	4 905	Dacia	879ZW>3Q7<:Z?MZBTD?OBLF0	Malachite	1995	VDYKZHVBXJUVWIEYI
UX>J>CW:	2 319	Mazda	?D15H8	Fire brick	2006	NEYZGFLTFLVFKPZMQI
UXD4;CXD	6 917	Austin	LQ4WU::N7P9KXJI>@REWC2E	Pale pink	1999	WQFVFAGCEKFBVJXC
UXO<9X	6 057	SEAT	KA16EB	Malachite	2007	CJWJGBALQWZXIFRL
UXT=KM	165	Land Rover	TZKYDXRLVYQ;FFLZ5>AD7GL:	Fuchsia	2009	XQUAKLIZUKVQPZBM
IUYF<X5	8 174	Pontiac	GWTG56WIIQF=5:W7>1	Aquamarine	1996	ITVGYOI XKQOYH1QM

3. Для таблицы DETAILS_CATALOG

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input type="checkbox"/> NAME	VARCHAR(15)
<input type="checkbox"/> COST	DECIMAL(6,0)
<input type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input type="checkbox"/> AMOUNT	INTEGER
<input type="checkbox"/> ID_MANUFACTURER	INTEGER
<input type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input type="checkbox"/> ORIGINAL	VARCHAR(7)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☐ Generate randomly
☐ Get from another table
☐ Get from list
☒ Autoincrement
 Autoincrement Initial Value 1 Step 1

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 100

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input checked="" type="checkbox"/> NAME	VARCHAR(15)
<input type="checkbox"/> COST	DECIMAL(6,0)
<input type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input type="checkbox"/> AMOUNT	INTEGER
<input type="checkbox"/> ID_MANUFACTURER	INTEGER
<input type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input type="checkbox"/> ORIGINAL	VARCHAR(7)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☒ Generate randomly
☐ Get from another table
☐ Get from list
 String Constraints Min Length 6 Max Length 15
 Start Char a (97) End Char z (122)

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input checked="" type="checkbox"/> NAME	VARCHAR(15)
<input checked="" type="checkbox"/> COST	DECIMAL(6,0)
<input type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input type="checkbox"/> AMOUNT	INTEGER
<input type="checkbox"/> ID_MANUFACTURER	INTEGER
<input type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input type="checkbox"/> ORIGINAL	VARCHAR(7)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☒ Generate randomly
☐ Get from another table
☐ Get from list
☐ Autoincrement
 Integer Constraints Min Value 500 Max Value 100000

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input checked="" type="checkbox"/> NAME	VARCHAR(15)
<input checked="" type="checkbox"/> COST	DECIMAL(6,0)
<input checked="" type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input type="checkbox"/> AMOUNT	INTEGER
<input type="checkbox"/> ID_MANUFACTURER	INTEGER
<input type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input type="checkbox"/> ORIGINAL	VARCHAR(7)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☐ Generate randomly
☐ Get from another table
☒ Get from list
 Get From List
 Y
 N

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input checked="" type="checkbox"/> NAME	VARCHAR(15)
<input checked="" type="checkbox"/> COST	DECIMAL(6,0)
<input checked="" type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input checked="" type="checkbox"/> AMOUNT	INTEGER
<input type="checkbox"/> ID_MANUFACTURER	INTEGER
<input type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input type="checkbox"/> ORIGINAL	VARCHAR(7)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☒ Generate randomly
☐ Get from another table
☐ Get from list
☐ Autoincrement
 Integer Constraints Min Value 0 Max Value 10

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input checked="" type="checkbox"/> NAME	VARCHAR(15)
<input checked="" type="checkbox"/> COST	DECIMAL(6,0)
<input checked="" type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input checked="" type="checkbox"/> AMOUNT	INTEGER
<input checked="" type="checkbox"/> ID_MANUFACTURER	INTEGER
<input type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input type="checkbox"/> ORIGINAL	VARCHAR(7)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☐ Generate randomly
☒ Get from another table
☐ Get from list
☐ Autoincrement
 Get from table Table MANUFACTURERS Field ID_MANUFACTURER Number of records 3

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input checked="" type="checkbox"/> NAME	VARCHAR(15)
<input checked="" type="checkbox"/> COST	DECIMAL(6,0)
<input checked="" type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input checked="" type="checkbox"/> AMOUNT	INTEGER
<input checked="" type="checkbox"/> ID_MANUFACTURER	INTEGER
<input checked="" type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input type="checkbox"/> ORIGINAL	VARCHAR(7)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type
☐ Generate randomly
☒ Get from another table
☐ Get from list
☐ Autoincrement
 Get from table Table DETAILS Field ID_NAME Number of records 46

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input checked="" type="checkbox"/> NAME	VARCHAR(15)
<input checked="" type="checkbox"/> COST	DECIMAL(6,0)
<input checked="" type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input checked="" type="checkbox"/> AMOUNT	INTEGER
<input checked="" type="checkbox"/> ID_MANUFACTURER	INTEGER
<input checked="" type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input checked="" type="checkbox"/> ORIGINAL	VARCHAR(7)
<input type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type

☐ Generate randomly

☐ Get from another table

☒ Get from list

Get From List

y
n

D:\DB\SERVICE.FDB Table DETAILS_CATALOG Records to be generated 10000

Name	Type
<input checked="" type="checkbox"/> ID_DETAIL	INTEGER
<input checked="" type="checkbox"/> NAME	VARCHAR(15)
<input checked="" type="checkbox"/> COST	DECIMAL(6,0)
<input checked="" type="checkbox"/> EXISTENCE_Y_OR_N	CHAR(1)
<input checked="" type="checkbox"/> AMOUNT	INTEGER
<input checked="" type="checkbox"/> ID_MANUFACTURER	INTEGER
<input checked="" type="checkbox"/> ID_DETAIL_NAME	INTEGER
<input checked="" type="checkbox"/> ORIGINAL	VARCHAR(7)
<input checked="" type="checkbox"/> VIN	VARCHAR(17)

Data Generation Type

☒ Generate randomly

☐ Get from another table

☐ Get from list

String Constraints

Min Length 17 Max Length 17

Start Char A (65)

End Char Z (90)

Результат:

Таблица Таблица Количество записей DETAILS_CATALOG

Поля Ограничения Индексы Зависимости Триггеры Данные Master/Detail View Описание Скрипт Права Протокол Comparison To

Запись №: 10001

ID_DETA...	NAME	COST	EXISTENCE_Y_O...	AMOUNT	ID_MANUFACTU...	VIN	ID_DETAIL_NAME	ORIGINAL
9 998	diyjobzwvh	34 717	Y	1	32	MXCRNHMBLIRHVJXI	9	y
9 999	imxkav	44 388	Y	0	345	NRKSBFKAIHRWQET	24	n
10 000	hwiaiyorzj	2 805	Y	0	123	NPZBVFZKUNLYZLTTC	16	y
10 001	pdikht	48 827	N	3	32	RNXLIBMKMSKWRIFYZ	47	n

Выводы

В ходе данной работы были разработаны коды, которые создают определенную базу данных, заполняют ее данными, а также вносят дополнительные изменения в структуру БД.

Так же ознакомились с программой IVExpert, с ее возможностями автоматического генерирования схемы программы и автогенерируемыми данными с заданными параметрами.

Таким образом, мы ознакомились с языком описания сущностей и ограничений БД SQL-DDL.