

Московский авиационный институт  
(Национальный исследовательский университет)  
Факультет прикладной математики и физики  
Кафедра вычислительной математики и программирования

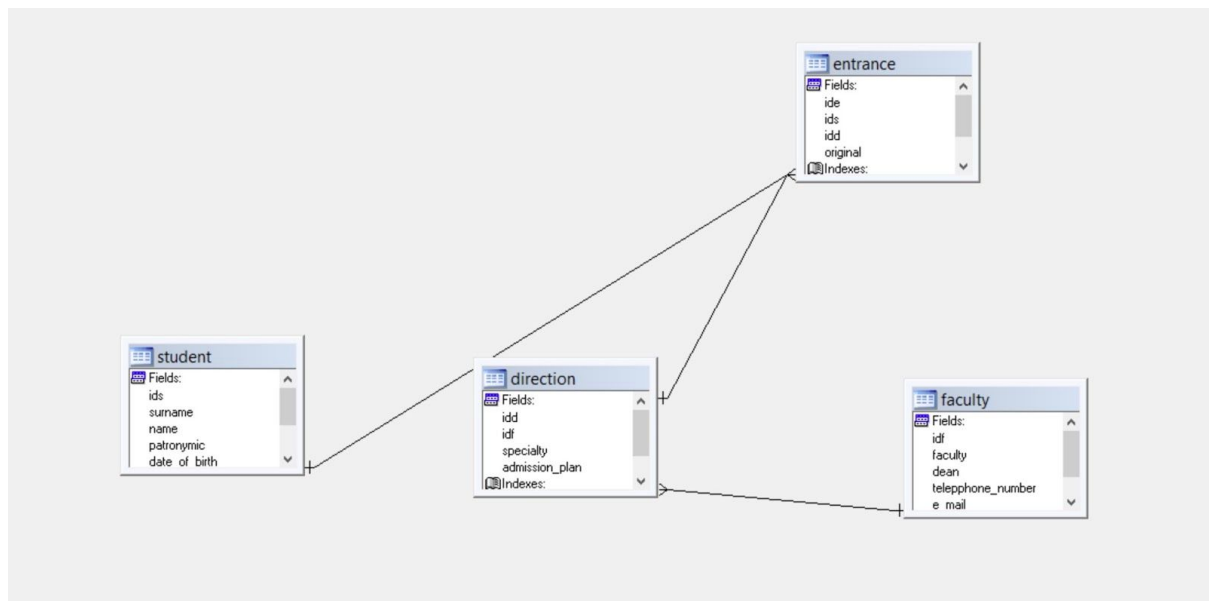
## Лабораторная работа 1-3 по курсу «Базы данных»

Студенты: Макаренкова В.М.,  
Вахрамьян К.О.  
Группа: 80-306Б-18  
Преподаватель: Кузнецова Е.В.  
Оценка:

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## Задание: БД приемной комиссии ВУЗа

### База данных в FoxPro



- 1) Таблица анкет абитуриентов : id, ФИО, дата рождения, гражданство, сумма баллов

Ids	Surname	Name	Patronymic	Date_of_birth	Citizenship	Sum_of_points
1	Ageeva	Ada	Vladimirovna	09/30/00	Russia	263
2	Nikitin	Stepan	Vitallevich	03/15/00	Russia	180
3	Fikhtengoltz	Yriy	Genadevich	08/08/01	Russia	250
4	Bortakovsky	Muhammed	Aslanovich	11/07/95	Russia	199
5	Kim	Nikita	Ivanovich	02/03/00	Ukraine	205
6	Holod	Varvara	Arsenevna	08/15/00	Belarus	206
7	Andreev	Ismail	Ivanovich	05/05/00	Russia	150
8	Kek	Tatyana	Mihalovna	02/10/99	Ukraine	200
9	Baretsky	Stanislav	Andreevich	12/09/02	Uzbekistan	123
10	Pehotka	Varvara	Vasilevna	01/01/00	Russia	205
11	Kto	Kirill	Olegovich	01/31/00	Russia	240
12	Obyhov	Vladislav	Nikolaevich	04/02/00	Ukraine	200
13	Agaev	Ilkin	Farhatovich	05/02/00	Azerbaijan	245
14	Bymagin	Vasily	Ivanovich	02/03/00	Russia	120
15	Artemev	Dmitriy	Vasilevich	01/01/99	Russia	300
16	Mazurenko	Vera	Mihailovna	02/29/00	Russia	255
17	Ivanov	Ivan	Ivanovich	01/01/00	Russia	299
18	Petrov	Vasily	Aslanovich	02/14/00	Uzbekistan	100
19	Haski	Ilya	Davidovich	12/31/99	Russia	280
20	Pharaonov	Gleb	Ivanovich	01/01/02	Russia	215
21	Kibzun	Lev	Protiv	01/02/00	Russia	188
22	Serpantinov	Gleb	Ivanovich	01/01/00	Russia	215
23	Smusenko	Valery	Albertovich	10/01/65	Ukraine	300
24	Vasilev	Aleksandr	Vladimirovich	09/05/00	Russia	200
25	Habesky	Konstantin	Ivanovich	09/09/99	Russia	242

- 2) Таблица факультетов ВУЗа: id, название, декан, телефон, почта

Idf	Faculty	Dean	Telephone_number	E_mail
1	Aviation Equipment	D. S. Dolgov	+7 499 158-43-22	aviatechmai@gmail.com
2	Rocket Engine	V. P. Monakova	+7 499 158-27-31	dekan2@mai.ru
3	Control System	Y. G. Sledkov	+7 925 168-88-64	mai-dep3@yandex.ru
4	Radionics	V. V. Kirdyashkin	+7 499 158-15-73	dean4@mai.ru
5	Engineering Economy	S. V. Novikov	+7 499 158-19-53	docentkvon@yandex.ru
6	Aerospace	O. V. Tushavina	+7 499 158-47-37	600@mai.ru
7	Robotic System	A. V. Krivlev	+7 499 158-58-68	700@mai.ru
8	Information Technology	S. S. Krilov	+7 499 158-09-06	krylov@mai.ru

3) Таблица направлений : id, id факультета, название, план приема(количество мест)

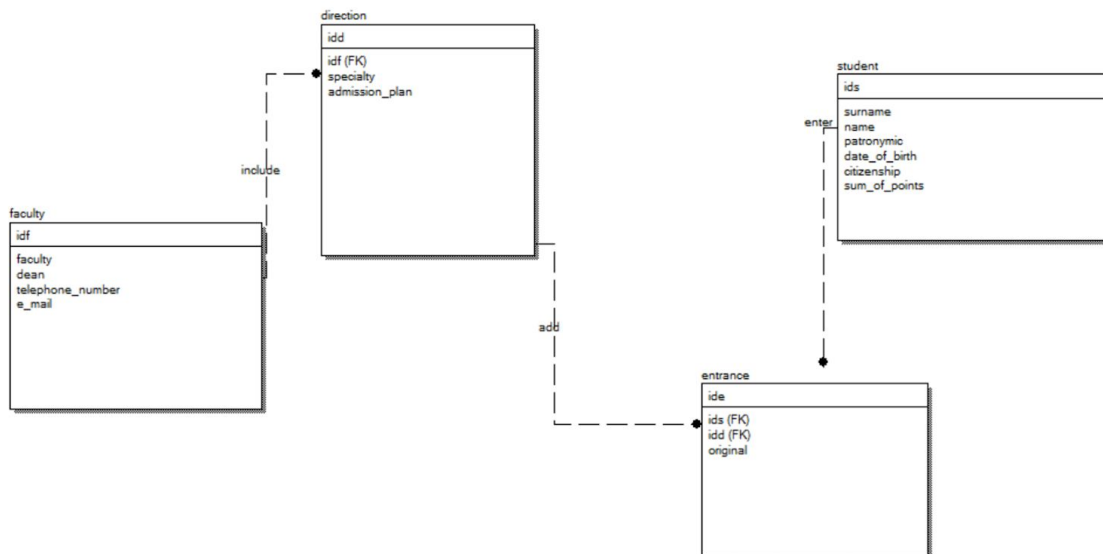
Idd	Idf	Specialty	Admission_plan
101	1	Design and certification of aviation equipment	5
102	1	Helicopter design	2
105	1	Aerodynamics of aircraft	3
201	2	Theory of air-jet engines	2
202	2	Rocket engines	3
205	2	Technology of production of aircraft engines	1
301	3	Automatic and intelligent control systems	5
304	3	Computers, systems, and networks	1
310	3	Electrical power, Electromechanical systems	2
311	3	Applied software and mathematical methods	3
402	4	Radio systems and control systems	2
404	4	Design and manufacture radio-electronic equipment	2
405	4	Theoretical radio engineering	2
502	5	Industrial economics	1
509	5	Economy of the aerospace industry	3
601	6	Space systems and rocket science	2
602	6	Design of aircraft,rocket and space products	1
609	6	Applied informatics	3
701	7	Aviation robotic systems	2
702	7	Robotic and intelligent systems	1
704	7	Information and control systems of aircraft	2
801	8	physics	2
805	8	mathematical cybernetics	5
806	8	computational mathematics and programming	4

4) Таблица подачи документов абитуриентов на специальности: id, id студента, id специальности, подан ли оригинал аттестата

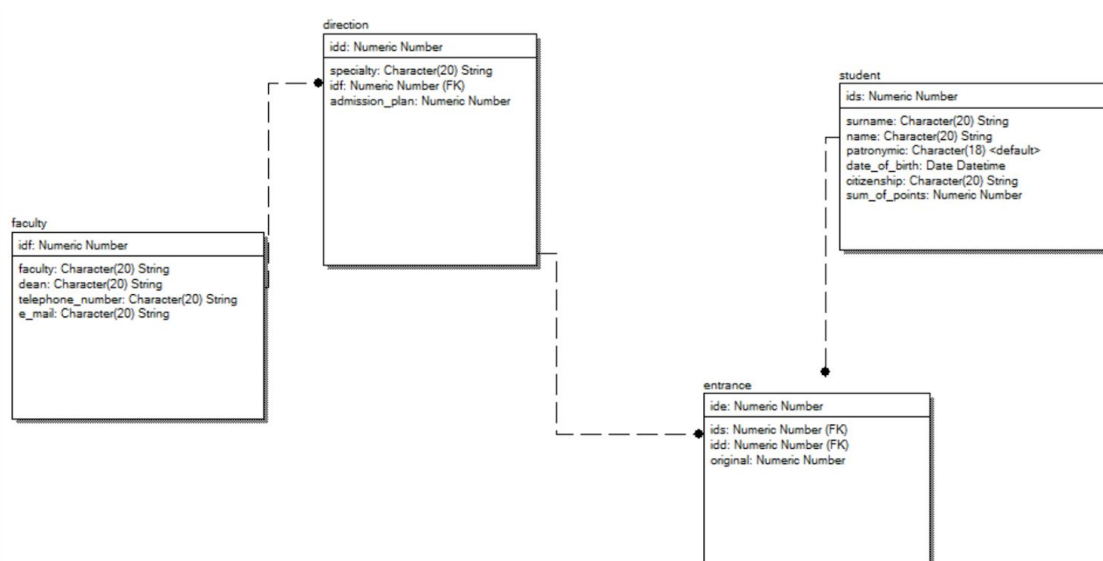
Ide	Ids	Idd	Original
1	9	205	F
2	9	609	T
3	9	202	F
4	1	102	T
5	1	310	F
6	1	806	F
7	2	806	T
8	2	704	F
9	2	311	F
10	3	806	T
11	4	205	T
12	4	202	F
13	5	205	T
14	5	101	F
15	5	301	F
16	6	806	T
17	6	805	F
18	6	304	F
19	7	310	T
20	7	304	F
21	8	806	T
22	8	805	F
23	8	404	F
24	10	404	T
25	10	806	F
26	10	509	F
27	11	404	T
28	11	502	F
29	12	404	T
30	13	404	T
31	13	405	F
32	14	404	T
33	14	405	F
34	14	701	F
35	15	304	T
36	15	806	F
37	16	502	T
38	16	806	F
39	17	805	T

# Модель ErWin

## 1) Логическая модель



## 2) Физическая модель



```

CREATE TABLE direction
(
    idd          Numeric NOT NULL,
    specialty    Character(20) NOT NULL,
    idf          Numeric NOT NULL,
    admission_plan Numeric NOT NULL
);

CREATE TABLE entrance
(
    ide          Numeric NOT NULL,
    ids          Numeric NOT NULL,
    idd          Numeric NOT NULL,
    original     Numeric NOT NULL
);

CREATE TABLE faculty
(
    idf          Numeric NOT NULL,
    faculty      Character(20) NOT NULL,
    dean         Character(20) NOT NULL,
    telephone_number Character(20) NOT NULL,
    e_mail       Character(20) NOT NULL
);

CREATE TABLE student
(
    ids          Numeric NOT NULL,
    surname      Character(20) NOT NULL,
    name         Character(20) NOT NULL,
    patronymic   Character(18) NOT NULL,
    date_of_birth Date NOT NULL,
    citizenship   Character(20) NOT NULL,
    sum_of_points Numeric NOT NULL
);

```

## Сложные запросы

- 1) Пары студентов одного направления для студентов заданного года рождения.

```
SELECT student.ids, student.surname, student.date_of_birth, entrance.idd;
FROM student, entrance INTO CURSOR tmp;
where student.ids = entrance.ids
```

```
SELECT a.ids as ids1, a.surname as surname1, b.ids as ids2, b.surname as
surname2, a.idd;
FROM tmp as a, tmp as b;
where(((a.date_of_birth between {^2000/01/01} AND {^2000/12/31}));
AND b.date_of_birth between {^2000/01/01} AND {^2000/12/31}));
AND a.ids < b.ids AND a.idd=b.idd)
```

Ids1	Surname1	Ids2	Surname2	Idd
1	Ageeva	2	Nikitin	806
1	Ageeva	6	Holod	806
2	Nikitin	6	Holod	806
1	Ageeva	7	Andreev	310
6	Holod	7	Andreev	304
1	Ageeva	10	Pehotka	806
6	Holod	10	Pehotka	806
2	Nikitin	10	Pehotka	806
10	Pehotka	11	Kto	404
10	Pehotka	12	Obyhov	404
11	Kto	12	Obyhov	404
10	Pehotka	13	Agaeв	404
12	Obyhov	13	Agaeв	404
11	Kto	13	Agaeв	404
10	Pehotka	14	Bymagin	404
12	Obyhov	14	Bymagin	404
13	Agaeв	14	Bymagin	404
11	Kto	14	Bymagin	404
13	Agaeв	14	Bymagin	405
11	Kto	16	Mazurenko	502
10	Pehotka	16	Mazurenko	806
1	Ageeva	16	Mazurenko	806
2	Nikitin	16	Mazurenko	806
6	Holod	16	Mazurenko	806
6	Holod	17	Ivanov	805
1	Ageeva	17	Ivanov	102
2	Nikitin	18	Petrov	311
5	Kim	18	Petrov	101



- 2) Кто из студентов заданного года рождения не подавал документы на заданное направление.

```
select ids, surname from student;  
where (date_of_birth between {'2000/01/01'} AND {'2000/12/31'});  
and ids not in (select ids from entrance where idd = 806)
```

Ids	Surname
5	Kim
7	Andreev
11	Kto
12	Obyhov
13	Agæev
14	Bymagin
17	Ivanov
18	Petrov
21	Kibzun
22	Serpantinov
24	Vaslev

- 3) Определить факультет, на которое подано максимальное количество док-тов в оригинале.

```
SELECT direction.idf, faculty.faculty, COUNT(entrance.original) as orig;  
FROM direction, entrance, faculty INTO CURSOR tmp;  
WHERE entrance.idd= direction.idd AND entrance.original = .T. and  
direction.idf = faculty.idf;  
group BY direction.idf, faculty.faculty
```

```
SELECT tmp.idf, tmp.faculty, tmp.orig FROM tmp;  
where orig = (select MAX(orig) FROM tmp)
```

Idf	Faculty	Orig
8	Information Technology	6



**4) Определить направление, на котором абитуриентов заданного возраста выше среднего**

```
select entrance.idd, direction.specialty;  
FROM student, entrance, direction INTO CURSOR tmp;  
where student.ids = entrance.ids and entrance.idd = direction.idd and  
YEAR(DATE()) - year(date_of_birth) = 20
```

```
SELECT idd, specialty, COUNT(specialty) FROM tmp;  
into CURSOR tmp2;  
group BY idd, specialty
```

```
SELECT * FROM tmp2;  
where cnt_specialty > (SELECT AVG(tmp2.cnt_specialty) FROM tmp2)
```

Idd	Specialty	Cnt_specialty
404	Design and manufacture radio-electronic equipment	5
806	computational mathematics and programming	5

- 5) Определить для каждого направления каждого факультета количество студентов, набравших баллов выше среднего.

```

SELECT direction.idf, faculty.faculty, entrance.idd, entrance.ids,
direction.specialty, student.sum_of_points;
FROM direction, entrance, student, faculty;
INTO CURSOR tmp;
where direction.idd = entrance.idd ;
      AND entrance.ids = student.ids ;
      and direction.idf = faculty.idf ;
      and entrance.idd = direction.idd

SELECT idf , faculty, idd, specialty, COUNT(tmp.ids) as qnt_of_student;
FROM tmp;
WHERE tmp.sum_of_points > (SELECT AVG(tmp.sum_of_points) FROM tmp
);
GROUP BY idf , faculty, idd, specialty

```

Idf	Faculty	Idd	Specialty	Qnt_of_student
1	Aviation Equipment	101	Design and certification of aviation equipment	2
1	Aviation Equipment	102	Helicopter design	3
2	Rocket Engine	205	Technology of production of aircraft engines	2
3	Control System	301	Automatic and intelligent control systems	1
3	Control System	304	Computers, systems, and networks	2
3	Control System	310	Electrical power, Electromechanical systems	1
4	Radionics	404	Design and manufacture radio-electronic equipment	3
4	Radionics	405	Theoretical radio engineering	1
5	Engineering Economy	502	Industrial economics	2
5	Engineering Economy	509	Economy of the aerospace industry	1
8	Information Technology	805	mathematical cybernetics	2
8	Information Technology	806	computational mathematics and programming	6

- 6) Определить для заданного фак-тета заданного направления проходной балл в текущем году.

```
SELECT direction.idf, faculty.faculty, entrance.idd, direction.specialty,  
student.sum_of_points, student.surname;  
FROM student, entrance, direction, faculty;  
into CURSOR tmp;  
where entrance.idd = 404 and direction.idf = 4 and faculty.idf = 4 and  
direction.idd = 404 AND entrance.original = .T. and entrance.ids =  
student.ids;  
order BY student.sum_of_points DESC
```

```
SELECT RECNO() as idt, * FROM tmp;  
into CURSOR tmp
```

```
select * from tmp;  
into cursor tmp;  
where idt <= (select direction.admission_plan from direction;  
              where idd = 404)
```

```
select idf, faculty, idd, specialty, sum_of_points, surname from (select *, ;  
                        (select count(*) from tmp as t2 where t2.sum_of_points <=  
t1.sum_of_points) as num;  
from tmp as t1) tmp;  
where num = 1
```

Idf	Faculty	Idd	Specialty	Sum_of_points	Surname
4	Radionics	404	Design and manufacture radio-electronic equipment	240	Kto

7) Придумать и реализовать запрос на предикаты All, Any, Exist.

**Предикат ALL**

Выбрать всех студентов, набравших баллов больше, чем любой студент из Узбекистана.

```
select * from student;
where student.sum_of_points > ALL(select student.sum_of_points from
student;

                                where student.citizenship = 'Uzbekistan')
```

Ids	Surname	Name	Patronymic	Date_of_birth	Citizenship	Sum_of_points
1	Ageeva	Ada	Vladimirovna	09/30/00	Russia	263
2	Nikitin	Stepan	Vitallevich	03/15/00	Russia	180
3	Fikhtengoltz	Yriy	Genadevich	08/08/01	Russia	250
4	Bortakovsky	Muhamed	Aslanovich	11/07/95	Russia	199
5	Kim	Nikita	Ivanovich	02/03/00	Ukraine	205
6	Holod	Varvara	Arsenevna	08/15/00	Belarus	206
7	Andreev	Ismail	Ivanovich	05/05/00	Russia	150
8	Kek	Tatyana	Mihalovna	02/10/99	Ukraine	200
10	Pehotka	Varvara	Vasilevna	01/01/00	Russia	205
11	Kto	Kirill	Olegovich	01/31/00	Russia	240
12	Obyhov	Vladislav	Nikolaevich	04/02/00	Ukraine	200
13	Agaev	Ilkin	Farhatovich	05/02/00	Azerbaijan	245
15	Aritev	Dmitriy	Vasilevich	01/01/99	Russia	300
16	Mazurenko	Vera	Mihailovna	02/29/00	Russia	255
17	Ivanov	Ivan	Ivanovich	01/01/00	Russia	299
19	Haski	Ilya	Davidovich	12/31/99	Russia	280
20	Pharaonov	Gleb	Ivanovich	01/01/02	Russia	215
21	Kibzun	Lev	Protiv	01/02/00	Russia	188
22	Serpantinov	Gleb	Ivanovich	01/01/00	Russia	215
23	Smusenko	Valery	Albertovich	10/01/66	Ukraine	300
24	Vasilev	Aleksandr	Vladimirovich	09/05/00	Russia	200
25	Habesky	Konstantin	Ivanovich	09/09/99	Russia	242

**предикат EXISTS**

Выбрать студентов, подавших заявление на 806 кафедру.

```
select * from student;
where exists(select entrance.ids from entrance;
            where student.ids = entrance.ids and entrance.idd = 806)
```

Ids	Surname	Name	Patronymic	Date_of_birth	Citizenship	Sum_of_points
1	Ageeva	Ada	Vladimirovna	09/30/00	Russia	263
2	Nikitin	Stepan	Vitalievich	03/15/00	Russia	180
3	Fikhtengoltz	Yriy	Genadevich	08/08/01	Russia	250
6	Holod	Varvara	Arsenevna	08/15/00	Belarus	206
8	Kek	Tatyana	Mihalovna	02/10/99	Ukraine	200
10	Pehotka	Varvara	Vasilevna	01/01/00	Russia	205
15	Artemev	Dmitriy	Vasilevich	01/01/99	Russia	300
16	Mazurenko	Vera	Mihailovna	02/29/00	Russia	255

### предикат ANY

Аналогичный запрос с предикатом ANY

```
select * from student;
where student.ids = ANY(select entrance.ids from entrance where
entrance.idd = 806)
```

Ids	Surname	Name	Patronymic	Date_of_birth	Citizenship	Sum_of_points
1	Ageeva	Ada	Vladimirovna	09/30/00	Russia	263
2	Nikitin	Stepan	Vitalievich	03/15/00	Russia	180
3	Fikhtengoltz	Yriy	Genadevich	08/08/01	Russia	250
6	Holod	Varvara	Arsenevna	08/15/00	Belarus	206
8	Kek	Tatyana	Mihalovna	02/10/99	Ukraine	200
10	Pehotka	Varvara	Vasilevna	01/01/00	Russia	205
15	Artemev	Dmitriy	Vasilevich	01/01/99	Russia	300
16	Mazurenko	Vera	Mihailovna	02/29/00	Russia	255