

Курсов проект бази данни Музей

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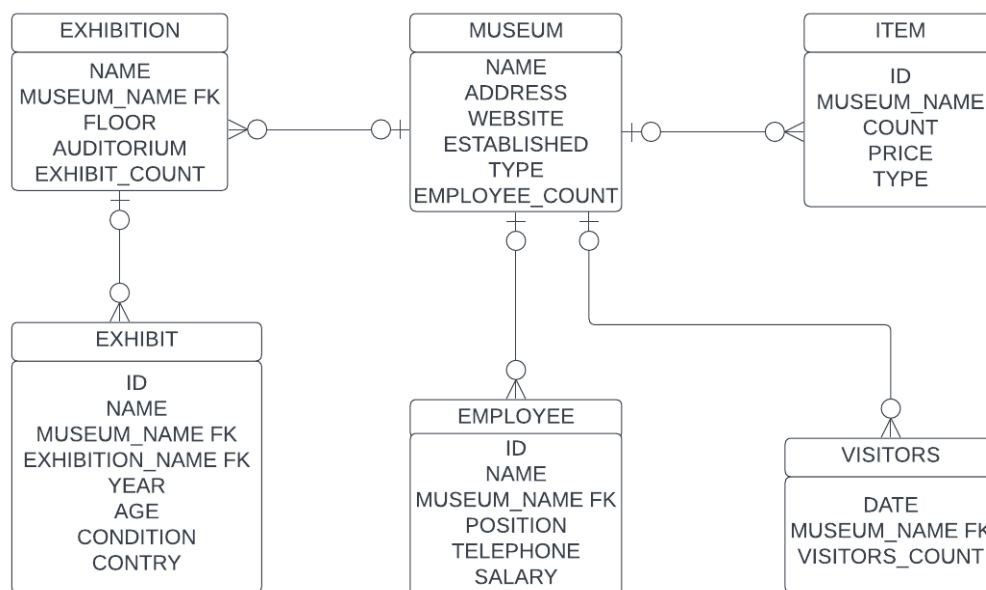
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Разпределение на работата по проекта:

Задача	Фак. №
1. Създаване на схемите и релациите	62594
2. Добавяне на съдържание	62594
3. Примерни прости заявки и заявки върху две и повече релации	62568
4. Примери с подзаявки	62585
5. Примери със съединения	62568
6. Примери с групиране и агрегация	62564
7. Примери с ограничения	62568
8. Примери с изгледи и индекси	62594
9. Примери с тригери	62564
10. Подготовка на презентацията	62585

Схема на базата от данни:



Описание на базата от данни:

Таблица MUSEUM

NAME - име, първичен ключ

ADDRESS - адрес

WEBSITE - уебсайт

ESTABLISHED - година на основаване

TYPE - вид

EMPLOYEE_COUNT - брой на персонала

Таблица EXHIBITION - NAME и MUSEUM_NAME образуват първичен ключ

NAME - име

MUSEUM_NAME - име на музея, външен ключ към NAME.MUSEUM

FLOOR - етаж

AUDITORIUM - зала

EXHIBIT_COUNT - брой на експонатите

Таблица EXHIBIT

ID - идентификационен номер, първичен ключ

NAME - име

MUSEUM_NAME - име на музея, външен ключ към NAME.MUSEUM

EXHIBITION_NAME - име на изложбата, външен ключ към NAME.EXHIBITION

YEAR - датира от

AGE - епоха ('BC'-преди христа, 'AC'-след христа)

CONDITION - състояние (от 1 до 5; 1-много добро, 5-много лошо)

COUNTRY - държава

Таблица EMPLOYEE

ID - идентификационен номер, първичен ключ

NAME - име

MUSEUM_NAME - име на музея, външен ключ към NAME.MUSEUM

POSITION - длъжност

TELEPHONE - телефонен номер

SALARY - месечна заплата

Таблицата VISITORS - DATE и MUSEUM_NAME образуват първичен ключ

DATE - месец и година

MUSEUM_NAME - име на музея, външен ключ към NAME.MUSEUM

VISITORS_COUNT - брой на посетителите за месеца

Таблицата ITEM

ID - идентификационен номер, първичен ключ

MUSEUM_NAME - име на музея, външен ключ към NAME.MUSEUM

COUNT - брой на атрибутите за месеца

PRICE - цена

TYPE - вид

Тема 3: Примери с прости заявки и заявки върху две и повече релации

--3.1. Show the address of the museums with type art, historic

```
select m.ADDRESS
from MUSEUM m
where m.type='art, historic'
```

	ADDRESS
1	Great Russell Street, London
2	Musee du Louvre, 75001 Paris

--3.2. Show the directors of the museums and the names of the museums

```
select e.NAME, e.MUSEUM_NAME
from EMPLOYEE e
where e.POSITION='Director'
```

	NAME	MUSEUM_NAME
1	Jean-Luc Martinez	Louvre
2	Hartwig Fischer	British Museum
3	Max Hollein	Metropolitan Museum of Art
4	Mikhail Piotrovsky	Hermitage Museum

--3.3. Show the ID and type of the items which count is bigger than 600 and price less than 10

```
select i.ID, i.TYPE
from ITEM i
where i.COUNT>600
      and i.PRICE<10
```

	ID	TYPE
1	1	audio guide
2	3	souvenir
3	4	map
4	7	souvenir
5	8	audio guide
6	9	audio guide
7	11	souvenir
8	14	postcard

--3.4. Show the type and museums which address is ending on London or York and aren't historic

```
select m.NAME, m.TYPE
from MUSEUM m
where m.type!='art, historic'
      and m.ADDRESS like '%London'
      or m.ADDRESS like '% New York'
```

	NAME	TYPE
1	Metropolitan Museum of Art	art

--3.5. Show the id and the country of the exhibits which year is 2600, condition is bigger than 1 and the country doesn't start with G

```
select ex.ID, ex.COUNTRY
from EXHIBIT ex
where ex.year = 2600 and ex.CONDITION>1
      and ex.COUNTRY not like 'G%'
```

	ID	COUNTRY
1	3	Ancient Egypt

--3.6. Show the names of museums and types of items which at least 2 of them are with the same count and price, ordered by the names of the museums

```
select distinct i1.MUSEUM_NAME, i1.TYPE
from ITEM i1, ITEM i2
where i1.COUNT=i2.COUNT
      and i1.PRICE=i2.PRICE
order by 1,2
```

	MUSEUM_NAME	TYPE
1	British Museum	audio guide
2	British Museum	souvenir
3	Hermitage Museum	postcard
4	Louvre	audio guide
5	Louvre	map
6	Louvre	souvenir
7	Metropolitan Museum of Art	audio guide
8	Metropolitan Museum of Art	souvenir

--3.7. Show the name of the exhibitions, museums in which the name of exhibition is Russian art and the number of visitors is bigger than 500

```
select distinct ex. NAME, m.Name
from MUSEUM m, VISITORS v, EXHIBITION ex
where ex.MUSEUM_NAME=m.NAME and m.NAME=v.MUSEUM_NAME
      and ex.NAME='Russian art'
      and v.VISITORS_COUNT>500
```

	NAME	Name
1	Russian art	Hermitage Museum

--3.8. Show directors of the museums without audio guide but with the best condition of exhibits

```
select em.NAME, em.MUSEUM_NAME
from EMPLOYEE em, EXHIBIT e
where em.position='Director' and e.MUSEUM_NAME=em.MUSEUM_NAME
      and e.CONDITION=1
except
select em.Name, em.MUSEUM_NAME
from EMPLOYEE em, ITEM i
where i.MUSEUM_NAME=em.MUSEUM_NAME
      and i.TYPE='audio guide'
order by 2
```

	NAME	MUSEUM_NAME
1	Mikhail Piotrovsky	Hermitage Museum

--3.9. Show the directors of the museums with at least 2 exhibitions with the same exhibit count

```
select em.salary, em.NAME
from MUSEUM m, EXHIBITION ex1, EXHIBITION ex2, EMPLOYEE em
```

where ex1.exhibit_count=ex2.exhibit_count
 and ex1.NAME!=ex2.NAME
 and ex1.MUSEUM_NAME=m.NAME and ex2.MUSEUM_NAME=m.NAME and
 m.NAME=em.MUSEUM_NAME and em.position='Director'

	salary	NAME
1	17480	Max Hollein
2	17480	Max Hollein
3	18660	Hartwig Fischer
4	18660	Hartwig Fischer

--3.10.Show the websites of all museums in New York and all museums with the salary of employees = 8960

```
select m.website
from MUSEUM m, EMPLOYEE em
where m.NAME=em.MUSEUM_NAME
      and em.SALARY=8960
union
select m.website
from MUSEUM m
where m.ADDRESS like '%New York%'
```

	website
1	www.metmuseum.org

Тема 4: Примери с подзаявки

--4 Subqueries

--1 Извежда име на музей, година на основаване и адрес на музея, където е експонатът Мона Лиза на Леонардо Да Винчи

```
SELECT M.NAME Museum, M.ESTABLISHED Established, M.ADDRESS Address
FROM MUSEUM M
WHERE NAME = (SELECT E.MUSEUM_NAME
               FROM EXHIBIT E
               WHERE E.NAME = "Mona Lisa" by Leonardo da Vinci);
```

--2 Извежда името, уебсайта и броя работници на музеите, датиращи преди Лувъра

```
SELECT M.NAME Name, M.WEBSITE Website, M.EMPLOYEE Employee
FROM MUSEUM M
WHERE M.ESTABLISHED < ANY(SELECT E.YEAR
                           FROM EXHIBIT E
                           WHERE E.MUSEUM_NAME = 'Louvre');
```

--3 Извежда цялата информация за изложбата, в която има експонат от 1300г.

```
SELECT *
FROM EXHIBITION E
WHERE E.NAME = (SELECT EX.EXHIBITION_NAME
                FROM EXHIBIT EX
                WHERE EX.YEAR = 1300);
```

--4 Извежда всичката информация за изложбата, която се намира в “Metropolitan Museum of Art”

```
SELECT *
FROM EXHIBIT E
WHERE E.MUSEUM_NAME = (SELECT M.NAME
                       FROM MUSEUM M
                       WHERE M.NAME = 'Metropolitan Museum of Art');
```

--5 Извежда име, уебсайт и брой работници на музей, където броят на работниците е по-голям от всички музеи с повече от 100 работници

```
SELECT M.NAME Name, M.WEBSITE Website, M.EMPLOYEE Employee
FROM MUSEUM M
WHERE M.EMPLOYEE > ANY(SELECT MU.EMPLOYEE
                        FROM MUSEUM MU
                        WHERE MU.EMPLOYEE >= 100)
ORDER BY EMPLOYEE DESC
```

Резултат от изпълнение на заявките:

Results Messages

Museum	Established	Address	
1 Louvre	1793	Musee du Louvre, 75001 Paris	

Name	WEBSITE	EMPLOYEE
1 British Museum	www.britishmuseum.org	1000
2 Hermitage Museum	www.britishmuseum.org	444
3 Louvre	www.louvre.fr	2200
4 Metropolitan Muse...	www.metmuseum.org	1600

NAME	MUSEUM_NAME	FLOOR	AUDITORIUM	EXHIBIT_COUNT
1 Islamic art	Louvre	0	72B	7500

ID	NAME	MUSEUM_NAME	EXHIBITION_NAME	YEAR	AGE	CONDITION	COUNTRY
1 27	Benin ivory mask	Metropolitan Museum of Art	Arts of Africa, Oceania, and the Americas	1500	AD	2	Nigeria
2 28	Lord Neminatha	Metropolitan Museum of Art	Asian art	600	AD	2	India
3 29	Bronze Chola ...	Metropolitan Museum of Art	Asian art	1000	AD	1	India
4 30	Vishnu	Metropolitan Museum of Art	Asian art	950	AD	2	India
5 31	Celestial dance...	Metropolitan Museum of Art	Asian art	1100	AD	4	India
6 32	Robe ? la fran?...	Metropolitan Museum of Art	Costume Institute	1740	AD	3	France
7 33	A Givenchy dra...	Metropolitan Museum of Art	Costume Institute	2015	AD	1	France
8 34	Rainbow cape ...	Metropolitan Museum of Art	Costume Institute	2019	AD	1	Britain

Name	Website	Employee
1 Louvre	www.louvre.fr	2200
2 Metropolitan Museum of Art	www.metmuseum.org	1600
3 British Museum	www.britishmuseum...	1000

Тема 5: Примери със съединения

--5.1. Show the names and conditions of the exhibits in the museums with most visitors

```
select e.NAME, e.CONDITION
from VISITORS v
      join MUSEUM m on m.NAME=v.MUSEUM_NAME
      join EXHIBITION ex on m.NAME=ex.MUSEUM_NAME
      join EXHIBIT e on ex.MUSEUM_NAME= e.MUSEUM_NAME
where v.VISITORS_COUNT>=ALL(select VISITORS_COUNT
                             from VISITORS)

order by 2
```

	NAME	CONDITION
1	"Mona Lisa" by Leonardo da Vinci	1
2	The Pyxis of al-Mughira	1
3	"Diana after the Bath" by Francois Boucher	1
4	"Mona Lisa" by Leonardo da Vinci	1
5	The Pyxis of al-Mughira	1
6	"Diana after the Bath" by Francois Boucher	1
7	"Mona Lisa" by Leonardo da Vinci	1
8	"Diana after the Bath" by Francois Boucher	1

--5.2. Show the name, address and type of the museum with no visitors or without any souvenirs

```
select m.NAME, m.ADDRESS, m.TYPE
from MUSEUM m
left join (select v.VISITORS_COUNT, v.MUSEUM_NAME
           from VISITORS v
          union all
           select i.COUNT, i.MUSEUM_NAME
           from ITEM i
           where i.TYPE='souvenir')without
on without.MUSEUM_NAME=m.NAME
where without.VISITORS_COUNT is null
```

	NAME	ADDRESS	TYPE
1	Hermitage Museum	34 Palace Embankment, Dvortsovy Municipal Okrug, ...	art

--5.3. Show the count of visitors if it is bigger than the number of audio guides in the museum

```
select v.VISITORS_COUNT, v.MUSEUM_NAME, i.PRICE, i.COUNT
from VISITORS v
    inner join item i
    on v.VISITORS_COUNT>=i.COUNT
    and i.MUSEUM_NAME=v.MUSEUM_NAME
    and i.TYPE='audio guide'
order by 3, 4
```

	VISITORS_COUNT	MUSEUM_NAME	PRICE	COUNT
1	833951	Louvre	5	10000
2	860881	Louvre	5	10000
3	810784	Louvre	5	10000
4	856321	Louvre	5	10000
5	875221	Louvre	5	10000
6	583147	Metropolitan Museum of Art	5	12000
7	503987	Metropolitan Museum of Art	5	12000
8	489698	Metropolitan Museum of Art	5	12000

--5.4. Show the name, website and type of the museums which is not historic are established before 1880, the count of exhibits is less than 10

```
select distinct t1.NAME, t1.WEBSITE, t1.TYPE
from (select m.NAME, m.ESTABLISHED, m.WEBSITE, m.TYPE
    from EXHIBITION ex cross join MUSEUM m
    where ex.EXHIBIT_COUNT>=5000 and ex.MUSEUM_NAME=m.NAME
)t1
    inner join(select m.ESTABLISHED
        from MUSEUM m
        where m.ESTABLISHED<=1880) t2
    on t1.ESTABLISHED=t2.ESTABLISHED
where t1.TYPE ='art'
order by 1
```

	NAME	WEBSITE	TYPE
1	Hermitage Museum	www.hermitagemuseum.org	art
2	Metropolitan Museum of Art	www.metmuseum.org	art

--5.5. Show the age and condition which are the same in at least 2 of the exhibits

```
select distinct e1.AGE, e1.CONDITION
from EXHIBIT e1
```

join EXHIBIT e2 on e1.AGE=e2.AGE
and e1.CONDITION=e2.CONDITION
and e1.ID!=e2.ID

	AGE	CONDITION
1	AD	1
2	AD	2
3	AD	3
4	AD	4
5	BC	2
6	BC	3
7	BC	4
8	BC	5

Тема 6: Примери с групиране и агрегация:

--1 Извежда интернет страницата на музеите, посещавани от над половин милион души средно на ден

```
select m.WEBSITE, AVG(v.VISITORS_COUNT) AvgVisitors
from VISITORS v
join MUSEUM m on m.NAME = v.MUSEUM_NAME
group by m.WEBSITE
having AVG(v.VISITORS_COUNT) > 500000
```

--2 Извежда имената на музеите, които съхраняват експонати от преди Христа

```
select m.NAME
from EXHIBIT e
join MUSEUM m on m.NAME = e.MUSEUM_NAME
where e.AGE = 'BC'
group by m.NAME
```

--3 Извежда имената на музеите, които съхраняват поне 5 експоната от Средновековието

```
select m.NAME
from EXHIBIT e
join MUSEUM m on m.NAME = e.MUSEUM_NAME
where e.YEAR > 395 and e.YEAR < 1453
group by m.NAME
having count(e.NAME) >= 5
```

--4 Извежда броя и общата им цена на всички продукти и услуги, които посетител може да си купи от съответния музей

```
select m.name, count(i.PRICE) as NumOfProducts, SUM(i.PRICE) as SumOfAllProducts
from ITEM i
join MUSEUM m on i.MUSEUM_NAME = m.NAME
group by m.NAME
```

--5 Извежда държавите с над 5 експоната

```

select e.COUNTRY
from EXHIBIT e
join MUSEUM m on m.NAME = e.MUSEUM_NAME
group by e.COUNTRY
having count(m.NAME) > 5

```

--6 Извежда имената на изложбите, които са били посещавани общо от над 3 000 000 посетители

```

select e.NAME
from EXHIBITION e join (select m.NAME
                        from MUSEUM m JOIN VISITORS v on m.NAME =
                        group by m.NAME
                        having SUM(v.VISITORS_COUNT) > 3000000) m
on m.NAME = e.MUSEUM_NAME
group by e.NAME

```

--7 Извежда продуктите и услугите на музея, чиито служители взимат най-голяма средна заплата

```

select i.TYPE, i.MUSEUM_NAME
from ITEM i join
    (select e1.MUSEUM_NAME, AVG(e1.SALARY) avg_salary
    from EMPLOYEE e1
    group by e1.MUSEUM_NAME
    ) e on i.MUSEUM_NAME = e.MUSEUM_NAME
where e.avg_salary =
(select MAX (t.avg_salary)
from
    ( select m.NAME, AVG (e.SALARY) avg_salary
    from MUSEUM m join EMPLOYEE e on m.NAME = e.MUSEUM_NAME
    group by m.NAME
    ) t
)

```

Резултат от изпълнение на заявките:

	WEBSITE	AvgVisitors
1	www.britishmuseum.org	506265
2	www.louvre.fr	847431
3	www.metmuseum.org	540138

	NAME
1	British Museum
2	Louvre

	NAME
1	British Museum
2	Louvre

	name	NumOfProducts	SumOfAllProducts
1	British Museum	4	50
2	Hermitage Museum	4	33
3	Louvre	4	31
4	Metropolitan Muse...	3	37

	COUNTRY
1	Ancient Egypt
2	Ancient Greece
3	France
4	Russia

	NAME
1	Egyptian antiquities
2	Greek, Etruscan, and Roman
3	Islamic art
4	Painting

	TYPE	MUSEUM_NAME
1	audio guide	Metropolitan Museum of Art
2	ticket	Metropolitan Museum of Art
3	souvenir	Metropolitan Museum of Art

Тема 8 Индекси:

```
CREATE INDEX IDX_EXHIBIT  
ON EXHIBIT (MUSEUM_NAME, EXHIBITION_NAME);
```

```
CREATE INDEX IDX_EMPLOYEE  
ON EMPLOYEE (POSITION);
```

Изгледи:

1. Create a view showing name, museum name and position of all directors, ordered by museum name.

```
CREATE VIEW V_EMPLOYEE_PARTIAL_INFO  
(NAME, MUSEUM, POSITION)  
AS  
SELECT E.NAME, E.MUSEUM_NAME AS MUSEUM, E.POSITION  
FROM EMPLOYEE E  
WHERE POSITION='Director'  
ORDER BY MUSEUM;
```

2. Create a view showing name, museum name, exhibition name, address of museum, floor, auditorium and condition of all exhibits, ordered by exhibit name.

```
CREATE VIEW V_EXHIBIT_TRANSPORT_INFO  
(NAME, MUSEUM, EXHIBITION, ADDRESS, FLOOR, AUDITORIUM, CONDITION)  
AS  
SELECT E.NAME AS EXHIBIT, M.NAME AS MUSEUM, EXH.NAME AS EXHIBITION,  
M.ADDRESS, EXH.FLOOR, EXH.AUDITORIUM, E.CONDITION  
FROM MUSEUM M JOIN EXHIBITION EXH on  
M.NAME=EXH.MUSEUM_NAME JOIN  
EXHIBIT E ON EXH.NAME=E.EXHIBITION_NAME  
ORDER BY E.NAME;
```

3. Create a view showing name, price of tickets, total visitors and total income from tickets for all museums.

```
CREATE VIEW V_TICKET_INCOME  
(NAME, TICKET_PRICE, VISITORS, TOTAL)  
AS  
SELECT V.MUSEUM_NAME AS MUSEUM, I.PRICE, SUM(V.VISITORS_COUNT) AS  
VISITORS, SUM(V.VISITORS_COUNT)*I.PRICE AS TOTAL  
FROM ITEM I JOIN VISITORS V ON  
I.MUSEUM_NAME = V.MUSEUM_NAME AND I.TYPE = 'ticket'  
GROUP BY V.MUSEUM_NAME, I.PRICE;
```

4. Create a view showing name, sum of the number of exhibits of all exhibitions and number of employees for all museums

```
CREATE VIEW V_MUSEUM_STATISTIC  
(NAME, EXHIBIT_COUNT, EMPLOYEE_COUNT)  
AS  
SELECT M.NAME, SUM(E.EXHIBIT_COUNT) AS EXHIBIT_COUNT, M.EMPLOYEE AS  
EMPLOYEE_COUNT  
FROM MUSEUM M JOIN EXHIBITION E ON  
M.NAME = E.MUSEUM_NAME  
GROUP BY M.NAME, M.EMPLOYEE;
```

5. Create a view showing name of museum, address, max salary and position for all positions in every museum in descending order

```
CREATE VIEW V_MAX_PAID_EMPLOYEE  
(NAME, ADDRESS, SALARY, POSITION)  
AS  
SELECT M.NAME, M.ADDRESS, MAX(E.SALARY) AS MAX_SALARY, POSITION  
FROM MUSEUM M JOIN EMPLOYEE E ON  
M.NAME = E.MUSEUM_NAME  
GROUP BY M.NAME, M.ADDRESS, POSITION  
ORDER BY MAX(SALARY) DESC;
```

	WEBSITE	AvgVisitors
1	www.britishmuseum.org	506265
2	www.louvre.fr	847431
3	www.metmuseum.org	540138

	NAME
1	British Museum
2	Louvre

	NAME
1	British Museum
2	Louvre

	name	NumOfProducts	SumOfAllProducts
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	COUNTRY
1	Ancient Egypt
2	Ancient Greece
3	France
4	Russia

	NAME
1	Egyptian antiquities
2	Greek, Etruscan, and Roman
3	Islamic art
4	Painting

	TYPE	MUSEUM_NAME
1	audio guide	Metropolitan Museum of Art
2	ticket	Metropolitan Museum of Art
3	souvenir	Metropolitan Museum of Art

Тема 9 Тригъри:

--Уголемяване на буквите за по-добра четимост след въвеждане в таблицата

```
if exists (select 1
            from sys.objects
            where type = 'TR'
                  and name = 'exhibit_up_name')
    drop trigger exhibit_up_name;
GO
```

```
CREATE TRIGGER exhibit_up_name ON exhibit AFTER INSERT AS
BEGIN
    UPDATE EXHIBIT SET NAME = UPPER(NAME);
    UPDATE EXHIBIT SET MUSEUM_NAME = UPPER(MUSEUM_NAME);
    UPDATE EXHIBIT SET EXHIBITION_NAME = UPPER(EXHIBITION_NAME);
    UPDATE EXHIBIT SET COUNTRY = UPPER(COUNTRY);
END
```

--Показва имената на изтритите експонати и музеите, в които са били съхранявани

```
if exists (select 1
            from sys.objects
            where type = 'TR'
                  and name = 'delete_exhibit_name')
    drop trigger delete_exhibit_name;
GO
```

```
CREATE TRIGGER delete_exhibit_name ON EXHIBIT FOR DELETE AS
BEGIN
    select NAME, MUSEUM_NAME
    from deleted;
END;
```

--Проверка на телефонните номера на служителите дали са валидни при промяна

```
if exists (select 1
            from sys.objects
            where type = 'TR'
                  and name = 'check_data_employee')
    drop trigger check_data_employee;
GO
```

```
CREATE TRIGGER check_data_employee ON EMPLOYEE FOR UPDATE AS
```

```

BEGIN
    declare @new_telnumber as CHAR(10);
    select @new_telnumber = TELEPHONE from inserted;
    IF ( PATINDEX ('%[^0-9]%', @new_telnumber) > 0 )
    BEGIN
        PRINT 'Incorrect telephone number!';
        Rollback;
    END
END;

```

--Проверка на данните при експонатите дали са валидни при промяна

```

if exists (select 1
            from sys.objects
            where type = 'TR'
            and name = 'check_data')
    drop trigger check_data;
GO

```

```

CREATE TRIGGER check_data ON EXHIBIT FOR UPDATE AS
BEGIN

```

```

    declare @new_condition as INT;
    select @new_condition = CONDITION from inserted;

```

```

    declare @new_age as char(2);
    select @new_age = AGE from inserted;

```

```

    declare @new_year as INT;
    select @new_year = YEAR from inserted;

```

```

    if (@new_condition < 1 or @new_condition > 5)
    begin
        print 'New condition is out of range (1-5)!';
        Rollback;
    end;

```

```

    if (@new_age != 'AD' and @new_age != 'BC')
    begin
        print 'New age is incorrect! There are two correct values: AD or BC';
        Rollback;
    end;

```

```

    if (@new_year > 2022 and @new_age = 'AD')
    begin

```

```
        print 'New year is incorrect!';
        Rollback;
    end;
END;
```