Project Laboratory in Database Programming
Task List No. 1

Task 0. Below is a brief narrative outlining a specific fragment of a fictional reality:

*After many years of independence, male and female cats hunting in the village of Wólka Mała decided to organize themselves. As a result, a clan was formed, led by the most outstanding mouse hunter, known by the nickname **Tygrys**. Within the clan, under the leadership of Tygrys, an informal hierarchy of cats naturally emerged—each cat knew to whom it was subordinate.*

The clan was also divided administratively into several groups (called bandy), each with a unique number and name. Every banda was commanded by a skilled mouse hunter appointed by Tygrys. Each group was assigned a separate territory where its members could organize hunts.

Tygrys and his inner circle of trusted cats (members of his banda) were granted the exclusive privilege of hunting across all territories controlled by the clan, due to the offices they held.

For identification purposes, each cat was required to choose a unique nickname (pseudonim). Additionally, every cat had to have a given name. It was established that each clan member would be compensated monthly with a ration of mice for their contribution to maintaining the clan. This allocation would depend on the role the cat played in the feline society. Each role would be associated with fixed minimum and maximum limits for the monthly mouse ration. Regardless of the regular ration amount, Tygrys had the right to assign an additional bonus ration of mice to any cat, at his sole discretion, for exceptional achievements.

The cats happily hunted in their assigned areas; however, from time to time, incidents with individuals of other species occurred. These non-feline individuals, identified by name, became personal enemies of the cats they had harmed. The cats carefully recorded the enemy's species and the degree of hostility determined by the affected cat. All such incidents were documented—including their date—as a warning to other cats and to bring shame to the enemies.

Assuming that a true hunter avoids known threats, only the first incident between a cat and a specific enemy was recorded. Over time, the cats realized that certain "gratifications" could reduce an enemy's vigilance. Therefore, each enemy's preferred type of gratyfikacja was also recorded.

As a result of analyzing this scenario, the following database schema was designed, consisting of five relations: **Bandy**, **Funkcje**, **Kocury**, **Wrogowie**, and **Wrogowie_kocurów**:

```
Bandy:
nr_bandy              NUMBER(2)          PRIMARY KEY
nazwa                 VARCHAR2(20)       NOT NULL
teren                 VARCHAR2(15)       UNIQUE
szef_bandy            VARCHAR2(15)       FOREIGN KEY Kocury(pseudo)


Funkcje:
funkcja               VARCHAR2(10)       PRIMARY KEY
min_myszy             NUMBER(3)          CHECK value > 5
max_myszy             NUMBER(3)          CHECK 200 > value >= min_myszy


Wrogowie:
imie_wroga            VARCHAR2(15)       PRIMARY KEY
stopien_wrogosci      NUMBER(2)          CHECK value BETWEE1 and 10
```

```
gatunek                VARCHAR2(15)
lapowka                VARCHAR2(20)
```

Kocury:
```
imie             VARCHAR2(15)        NOT NULL
plec             VARCHAR2(1)         CHECK values possible: 'M' & 'D'
pseudo           VARCHAR2(15)        PRIMARY KEY
funkcja          VARCHAR2(10)        FOREIGN KEY Funkcje(funkcja)
szef             VARCHAR2(15)        FOREIGN KEY Kocury (pseudo)
w_stadku_od      DATE                DEFAULT SYSDATE
przydzial_myszy  NUMBER(3)
myszy_extra      NUMBER(3)
nr_bandy         NUMBER(2)           FOREIGN KEY Bandy(nr_bandy)
```

Wrogowie_kocurow:
```
pseudo           VARCHAR2(15)        PRIMARY KEY1, FOREIGN KEY
                                             Kocury(pseudo)
imie_wroga       VARCHAR2(15)        PRIMARY KEY2, FOREIGN KEY
                                            Wrogowie(imie_wroga)
data_incydentu   DATE                NOT NULL
opis_incydentu   VARCHAR2(50)
```

Meaning of the attributes in relations:

Bandy (cat packs):
```
nr_bandy           Number of the pack
nazwa              Name of the pack
teren              Name of the terrain where the pack hunts
szef_bandy         Name of the boss of the pack
```

Funkcje (performed functions):
```
funkcja            Name of the function
min_myszy          Minimum number of mouses that a function can have
                   assigned
max_myszy          Maximum number of mouses that a function can have
                   assigned
```

Wrogowie (enemies):
```
imie_wroga         Name of the enemy
stopien_wrogosci   Level of hostility
gatunek            Species of the enemy
lapowka            Bribe (what is the bribe)
```

Kocury (cats):

imie	Name of the cat
plec	Gender
pseudo	Nickname
funkcja	Function performed
szef	Nickname of the cat's boss
w_stadku_od	Date when the cat joined the clan
przydzial_myszy	Mouse allocation
myszy_extra	Additional mouse allocation (bonus)
nr_bandy	Number of the pack that the cat belongs to

Wrogowie_kocurow (enemies of the cats):

pseudo	Name of the cat
imie_wroga	Name of the enemy
data_incydentu	Date of the incident
opis_incydentu	Description of the incident (what happened)

Please write a script that creates the above-mentioned relations in the database.

If no information is provided about an attribute's nullability, it should be treated as optional by default.

All applicable column-level constraints must be defined as column-level constraints.

Definitions of all constraints must be included within the CREATE TABLE statements (do not use the ALTER TABLE statement, except in the one case where it is the only possible solution to a given issue).

Once the script is prepared, please run it (after connecting to the Oracle server) using the SQL Developer application.

Next, create a script that inserts the data presented below into the relations, and execute this script as well using SQL Developer.

If you do not have access to an Oracle server, you may use the free online tool Oracle Live SQL, available at https://livesql.oracle.com, after registering for an account.

Kocury(imie,plec,pseudo,funkcja,szef,w_stadku_od,przydzial_myszy,myszy_extra,nr_bandy)

```
'JACEK','M','PLACEK','LOWCZY','LYSY','2008-12-01',67,NULL,2
'BARI','M','RURA','LAPACZ','LYSY','2009-09-01',56,NULL,2
'MICKA','D','LOLA','MILUSIA','TYGRYS','2009-10-14',25,47,1
'LUCEK','M','ZERO','KOT','KURKA','2010-03-01',43,NULL,3
'SONIA','D','PUSZYSTA','MILUSIA','ZOMBI','2010-11-18',20,35,3
'LATKA','D','UCHO','KOT','RAFA','2011-01-01',40,NULL,4
'DUDEK','M','MALY','KOT','RAFA','2011-05-15',40,NULL,4
'MRUCZEK','M','TYGRYS','SZEFUNIO',NULL,'2002-01-01',103,33,1
'CHYTRY','M','BOLEK','DZIELCZY','TYGRYS','2002-05-05',50,NULL,1
'KOREK','M','ZOMBI','BANDZIOR','TYGRYS','2004-03-16',75,13,3
'BOLEK','M','LYSY','BANDZIOR','TYGRYS','2006-08-15',72,21,2
'ZUZIA','D','SZYBKA','LOWCZY','LYSY','2006-07-21',65,NULL,2
'RUDA','D','MALA','MILUSIA','TYGRYS','2006-09-17',22,42,1
'PUCEK','M','RAFA','LOWCZY','TYGRYS','2006-10-15',65,NULL,4
'PUNIA','D','KURKA','LOWCZY','ZOMBI','2008-01-01',61,NULL,3
'BELA','D','LASKA','MILUSIA','LYSY','2008-02-01',24,28,2
'KSAWERY','M','MAN','LAPACZ','RAFA','2008-07-12',51,NULL,4
'MELA','D','DAMA','LAPACZ','RAFA','2008-11-01',51,NULL,4
```

Bandy(nr_bandy,nazwa,teren,szef_bandy)

```
1,'SZEFOSTWO','CALOSC','TYGRYS'
2,'CZARNI RYCERZE','POLE','LYSY'
3,'BIALI LOWCY','SAD','ZOMBI'
4,'LACIACI MYSLIWI','GORKA','RAFA'
```

```
5,'ROCKERSI','ZAGRODA',NULL
```

Funkcje(funkcja,min_myszy,max_myszy)

```
'SZEFUNIO',90,110
'BANDZIOR',70,90
'LOWCZY',60,70
'LAPACZ',50,60
'KOT',40,50
'MILUSIA',20,30
'DZIELCZY',45,55
'HONOROWA',6,25
```

Wrogowie(imie_wroga,stopien_wrogosci,gatunek,lapowka)

```
'KAZIO',10,'CZLOWIEK','FLASZKA'
'GLUPIA ZOSKA',1,'CZLOWIEK','KORALIK'
'SWAWOLNY DYZIO',7,'CZLOWIEK','GUMA DO ZUCIA'
'BUREK',4,'PIES','KOSC'
'DZIKI BILL',10,'PIES',NULL
'REKSIO',2,'PIES','KOSC'
'BETHOVEN',1,'PIES','PEDIGRIPALL'
'CHYTRUSEK',5,'LIS','KURCZAK'
'SMUKLA',1,'SOSNA',NULL
'BAZYLI',3,'KOGUT','KURA DO STADA'
```

Wrogowie_kocurow(pseudo,imie_wroga,data_incydentu,opis_incydentu)

```
'TYGRYS','KAZIO','2004-10-13','USILOWAL NABIC NA WIDLY'
'ZOMBI','SWAWOLNY DYZIO','2005-03-07','WYBIL OKO Z PROCY'
'BOLEK','KAZIO','2005-03-29','POSZCZUL BURKIEM'
'SZYBKA','GLUPIA ZOSKA','2006-09-12','UZYLA KOTA JAKO SCIERKI'
'MALA','CHYTRUSEK','2007-03-07','ZALECAL SIE'
'TYGRYS','DZIKI BILL','2007-06-12','USILOWAL POZBAWIC ZYCIA'
'BOLEK','DZIKI BILL','2007-11-10','ODGRYZL UCHO'
'LASKA','DZIKI BILL','2008-12-12','POGRYZL ZE LEDWO SIE WYLIZALA'
'LASKA','KAZIO','2009-01-07','ZLAPAL ZA OGON I ZROBIL WIATRAK'
'DAMA','KAZIO','2009-02-07','CHCIAL OBEDRZEC ZE SKORY'
'MAN','REKSIO','2009-04-14','WYJATKOWO NIEGRZECZNIE OBSZCZEKAL'
'LYSY','BETHOVEN','2009-05-11','NIE PODZIELIL SIE SWOJA KASZA'
'RURA','DZIKI BILL','2009-09-03','ODGRYZL OGON'
'PLACEK','BAZYLI','2010-07-12','DZIOBIAC UNIEMOZLIWIL PODEBRANIE KURCZAKA'
'PUSZYSTA','SMUKLA','2010-11-19','OBRZUCILA SZYSZKAMI'
'KURKA','BUREK','2010-12-14','POGONIL'
'MALY','CHYTRUSEK','2011-07-13','PODEBRAL PODEBRANE JAJKA'
'UCHO','SWAWOLNY DYZIO','2011-07-14','OBRZUCIL KAMIENIAMI'
```

The database describing the cat population will serve as the foundation for all tasks in the assignment lists, as well as for examples presented during the lectures.

In solving the tasks below, you should use—where appropriate—only the following mechanisms:

- SELECT statements **without** subqueries or joins
- Oracle SQL functions
- Grouping
- Hierarchical query mechanism.

Task 1. Find the names of enemies who were involved in incidents in the year 2009.

```
WROG            PRZEWINA
--------------- ---------------------------------------
DZIKI BILL      ODGRYZL OGON
KAZIO           ZLAPAL ZA OGON I ZROBIL WIATRAK
REKSIO          WYJATKOWO NIEGRZECZNIE OBSZCZEKAL
BETHOVEN        NIE PODZIELIL SIE SWOJA KASZA
KAZIO           CHCIAL OBEDRZEC ZE SKORY
```

Task 2. Find all female cats (kotki) who joined the clan between September 1, 2005 and July 31, 2007.

```
IMIE            FUNKCJA    Z NAMI OD
--------------- ---------- ----------
ZUZIA           LOWCZY     2006-07-21
RUDA            MILUSIA    2006-09-17
```

Task 3. Display the names, species, and hostility levels of unbribed enemies. The results should be sorted in ascending order by hostility level.

```
WROG            GATUNEK         STOPIEN WROGOSCI
--------------- --------------- ----------------
SMUKLA          SOSNA                          1
DZIKI BILL      PIES                          10
```

Task 4. Display data for male cats, collected in a single column in the following format:

```
JACEK zwany PLACEK (fun. LOWCZY) lowi myszki w bandzie2 od 2008-12-01
```

The results should be sorted in descending order by the date they joined the clan. In the case of the same joining date, the results should be sorted alphabetically by nickname.

```
WSZYSTKO O KOCURACH
-------------------------------------------------------------------------
DUDEK zwany MALY (fun. KOT) lowi myszki w bandzie 4 od 2011-05-15
LUCEK zwany ZERO (fun. KOT) lowi myszki w bandzie 3 od 2010-03-01
BARI zwany RURA (fun. LAPACZ) lowi myszki w bandzie 2 od 2009-09-01
JACEK zwany PLACEK (fun. LOWCZY) lowi myszki w bandzie 2 od 2008-12-01
KSAWERY zwany MAN (fun. LAPACZ) lowi myszki w bandzie 4 od 2008-07-12
PUCEK zwany RAFA (fun. LOWCZY) lowi myszki w bandzie 4 od 2006-10-15
BOLEK zwany LYSY (fun. BANDZIOR) lowi myszki w bandzie 2 od 2006-08-15
KOREK zwany ZOMBI (fun. BANDZIOR) lowi myszki w bandzie 3 od 2004-03-16
CHYTRY zwany BOLEK (fun. DZIELCZY) lowi myszki w bandzie 1 od 2002-05-05
MRUCZEK zwany TYGRYS (fun. SZEFUNIO) lowi myszki w bandzie 1 od 2002-01-01
```

Task 5. Find the first occurrence of the letter 'A' and the first occurrence of the letter 'L' in each nickname, and then replace the found letters with '#' and '%' respectively. Use string functions for this task. Only consider nicknames that contain both letters.

```
PSEUDO          Po wymianie A na # oraz L na %
--------------- --------------------------------
LASKA           %#SKA
LOLA            %OL#
MALA            M#%A
MALY            M#%Y
PLACEK          P%#CEK
```

Task 6. Display the names of cats with at least fourteen years of service (who also joined the clan between March 1 and September 30), their joining dates, initial mouse allocation (the current allocation is 10% higher due to a raise after six months of membership), the date of the 10% raise, and the current mouse allocation. Use appropriate date functions. In the solution below, the current date is June 29, 2023.

```
IMIE            W stadku    Zjadal Podwyzka     Zjada
--------------- ---------- ---------- ---------- ----------
KOREK           2004-03-16         68 2004-09-16         75
BOLEK           2006-08-15         65 2007-02-15         72
ZUZIA           2006-07-21         59 2007-01-21         65
KSAWERY         2008-07-12         46 2009-01-12         51
CHYTRY          2002-05-05         45 2002-11-05         50
RUDA            2006-09-17         20 2007-03-17         22
```

Task 7. Display the names, quarterly mouse allocations, and additional quarterly allocations for all cats whose mouse allocation is greater than twice the additional allocation but no less than 55.

```
IMIE            MYSZY KWRTALNIE KWARTALNE DODATKI
--------------- --------------- -----------------
MRUCZEK                     309                99
KOREK                       225                39
BOLEK                       216                63
JACEK                       201                 0
PUCEK                       195                 0
ZUZIA                       195                 0
PUNIA                       183                 0
BARI                        168                 0
```

Task 8. Display the following information about each cat's total annual mouse consumption (name): the total consumption value if it exceeds 660, 'Limit' if it is equal to 660, and 'Ponizej 660' if it is less than 660. Do not use set operators (UNION, INTERSECT, MINUS).

```
IMIE            Zjada rocznie
--------------- ---------------
BARI            672
BELA            Ponizej 660
BOLEK           1116
CHYTRY          Ponizej 660
DUDEK           Ponizej 660
JACEK           804
KOREK           1056
KSAWERY         Ponizej 660
LATKA           Ponizej 660
LUCEK           Ponizej 660
MELA            Ponizej 660
MICKA           864
MRUCZEK         1632
PUCEK           780
PUNIA           732
RUDA            768
SONIA           Limit
ZUZIA           780
```

Task 9. After several months of freezing the mouse allocations due to the crisis, Tygrys has resumed the allocations as of the current date, following the rule that cats who joined the clan in the first half of the month (including the 15th) will receive their first mouse allocation after the break on the last Wednesday of the current month. Cats that joined the clan after the 15th will receive their first mouse allocation after the break on the last Wednesday of the following month. In the subsequent months, mice will be distributed to all cats on the last Wednesday of each month. Display each cat's nickname, joining date, and the date of the first mouse allocation after the break, assuming that the current date is October 24 and 26, 2023.

October 24

```
PSEUDO          W STADKU                   WYPLATA
--------------- -------------------------- --------------------------
TYGRYS          2002-01-01                 2023-10-25
BOLEK           2002-05-05                 2023-10-25
ZOMBI           2004-03-16                 2023-11-29
SZYBKA          2006-07-21                 2023-11-29
LYSY            2006-08-15                 2023-10-25
MALA            2006-09-17                 2023-11-29
RAFA            2006-10-15                 2023-10-25
KURKA           2008-01-01                 2023-10-25
LASKA           2008-02-01                 2023-10-25
MAN             2008-07-12                 2023-10-25
DAMA            2008-11-01                 2023-10-25
PLACEK          2008-12-01                 2023-10-25
RURA            2009-09-01                 2023-10-25
LOLA            2009-10-14                 2023-10-25
ZERO            2010-03-01                 2023-10-25
PUSZYSTA        2010-11-18                 2023-11-29
UCHO            2011-01-01                 2023-10-25
MALY            2011-05-15                 2023-10-25
```

October 26

```
PSEUDO           W STADKU                   WYPLATA
---------------  -------------------------  -------------------------
TYGRYS           2002-01-01                 2023-11-29
BOLEK            2002-05-05                 2023-11-29
ZOMBI            2004-03-16                 2023-11-29
SZYBKA           2006-07-21                 2023-11-29
LYSY             2006-08-15                 2023-11-29
MALA             2006-09-17                 2023-11-29
RAFA             2006-10-15                 2023-11-29
KURKA            2008-01-01                 2023-11-29
LASKA            2008-02-01                 2023-11-29
MAN              2008-07-12                 2023-11-29
DAMA             2008-11-01                 2023-11-29
PLACEK           2008-12-01                 2023-11-29
RURA             2009-09-01                 2023-11-29
LOLA             2009-10-14                 2023-11-29
ZERO             2010-03-01                 2023-11-29
PUSZYSTA         2010-11-18                 2023-11-29
UCHO             2011-01-01                 2023-11-29
MALY             2011-05-15                 2023-11-29
```

Task 10. The pseudo attribute in the Kocury table is the primary key of this table. Check if all the pseudos are indeed distinct. Do the same for the szef attribute.

```
Unikalnosc atr. PSEUDO
----------------------
    BOLEK - Unikalny
     DAMA - Unikalny
    KURKA - Unikalny
    LASKA - Unikalny
     LOLA - Unikalny
     LYSY - Unikalny
     MALA - Unikalny
     MALY - Unikalny
      MAN - Unikalny
   PLACEK - Unikalny
 PUSZYSTA - Unikalny
     RAFA - Unikalny
     RURA - Unikalny
   SZYBKA - Unikalny
   TYGRYS - Unikalny
     UCHO - Unikalny
     ZERO - Unikalny
    ZOMBI - Unikalny

Unikalnosc atr. SZEF
----------------------
    KURKA - Unikalny
     LYSY - nieunikalny
     RAFA - nieunikalny
   TYGRYS - nieunikalny
    ZOMBI - nieunikalny
```

Task 11. Find the pseudos of cats that have at least two enemies.

```
Pseudonim       Liczba wrogow
--------------- -------------
BOLEK                       2
LASKA                       2
TYGRYS                      2
```

Task 12. Find the maximum total mouse allocation for all functional groups (excluding SZEFUNIO and male cats) with an average total allocation (including additional allocations – myszy_extra) greater than 50.

```
------------- -- --------- ---------- ----------- ------ ----------------
Liczba kotow= 1 lowi jako LAPACZ     i zjada max. 51.00 myszy miesiecznie
Liczba kotow= 2 lowi jako LOWCZY     i zjada max. 65.00 myszy miesiecznie
Liczba kotow= 4 lowi jako MILUSIA    i zjada max. 72.00 myszy miesiecznie
```

Task 13. Display the minimum mouse allocation in each band, broken down by gender.

```
  Nr bandy Plec Minimalny przydzial
---------- ---- -------------------
         3 M                     43
         2 D                     24
         4 D                     40
         4 M                     40
         1 M                     50
         1 D                     22
         3 D                     20
         2 M                     56
```

Task 14. Display information about male cats (gender: male) who have a male superior in the hierarchy holding the BANDZIOR position (also display the data of this superior). The data of cats subordinate to a specific superior should be displayed according to their position in the hierarchy of subordination.

```
Poziom Pseudonim       Funkcja    Nr bandy
------ --------------- ---------- ---------
   1   LYSY            BANDZIOR           2
   2   PLACEK          LOWCZY             2
   2   RURA            LAPACZ             2
   1   ZOMBI           BANDZIOR           3
   3   ZERO            KOT                3
```

Task 15. Display information about the subordination of cats that have an additional mouse allocation, so that the name of the cat at the top of the hierarchy is displayed with the smallest indentation, and the names of the others with indentation corresponding to their position in the hierarchy.

```
Hierarchia                          Pseudo szefa      Funkcja
----------------------------------- ----------------- ----------
0               MRUCZEK             Sam sobie panem   SZEFUNIO
===>1             MICKA             TYGRYS            MILUSIA
===>1             BOLEK             TYGRYS            BANDZIOR
===>===>2           BELA            LYSY              MILUSIA
===>1             RUDA              TYGRYS            MILUSIA
===>1             KOREK             TYGRYS            BANDZIOR
===>===>2           SONIA           ZOMBI             MILUSIA
```

Task 16. Display the specified chain of command by pseudos (through all subsequent superiors to the main superior) of male cats with more than fourteen years of service (in the solution below, the current date is June 29, 2023) who do not have an additional mouse allocation.

```
Droga sluzbowa
------------------------
BOLEK
    TYGRYS
MAN
    RAFA
        TYGRYS
PLACEK
    LYSY
        TYGRYS
RAFA
    TYGRYS
```

Termin oddania listy – grupa poniedziałkowa: 23.10.2023
                     – grupy wtorkowe: 17.10.2023

Wrocław 28.09.2023   *Zbigniew Staszak*