

МИНИСТЕРСТВО ЦИФРОВОГО РАЗВИТИЯ, СВЯЗИ И МАССОВЫХ КОММУНИКАЦИЙ
РОССИЙСКОЙ ФЕДЕРАЦИИ

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ
ВЫСШЕГО ОБРАЗОВАНИЯ
«САНКТ-ПЕТЕРБУРГСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ ТЕЛЕКОММУНИКАЦИЙ ИМ.
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Лабораторная работа №5-6
по курсу
«Логическое и функциональное
программирование»

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Цель работы

Разработать базу данных на языке Turbo Prolog, которая хранит вентиляторы для автомобиля Peugeot 408 с двигателем TU5JP5.

Описание программы

Программа может открывать и сохранять базы данных в формате csv и с помощью файла с предикатами.

Имеются функции редактирования отдельных строк, их добавления и удаления.

Поиск по строкам осуществляется по трем параметрам: по уникальному номеру строки, по совпадению в номере детали или в имени детали.

Используемые предикаты

`clear_database()` - отчищает динамическую базу данных

`choose(integer)` — считывает число из консоли и обрабатывает ошибку ввода

`menu()` - предикат выводит пункты меню

`process(integer)` — выполняет опред. Функцию в зависимости от числа

`search(integer)` — выполняет поиск по параметрам в зависимости от числа

`newLastId(integer)` — обновляет глобальную переменную, отвечающую за уникальный индекс новой строки

`incrementLastId(integer)` — прибавляет 1 к глобальной переменной

`getLastId()` - просматривая всю бд, обновляет глобальную переменную

`readRows()` - построчно считывает базу данных из файла csv, и после обработки `readValues`, заносит новый факт в бд

`readValue(string,string,string)` - разбивают строку на отдельные поля

`writeCsv()` - записывает базу данных в файл csv

`page(integer)` — выводит по 6 строк на экран

`printRows()` - выводит строки

`printRow(integer)` — выводит одну строку

`printLegend()` - печатает названия колонок

page() - выводит строки пока кол-во строк влезает на экран

desicion() - считает кол-во выведенных строк на экран

substr(string, string) — проверяет является ли строка подстрокой в строке

searchName(string) — выводит строки удовлетворяющие поиску по имени

searchPartNumber(string) — выводит строки удовлетворяющие поиску по номеру детали

getCountry(string, string) — отображает страну производителя

pretty(string,string,string,string,string,string,string) - промежуточный предикат для красивого вывода строки

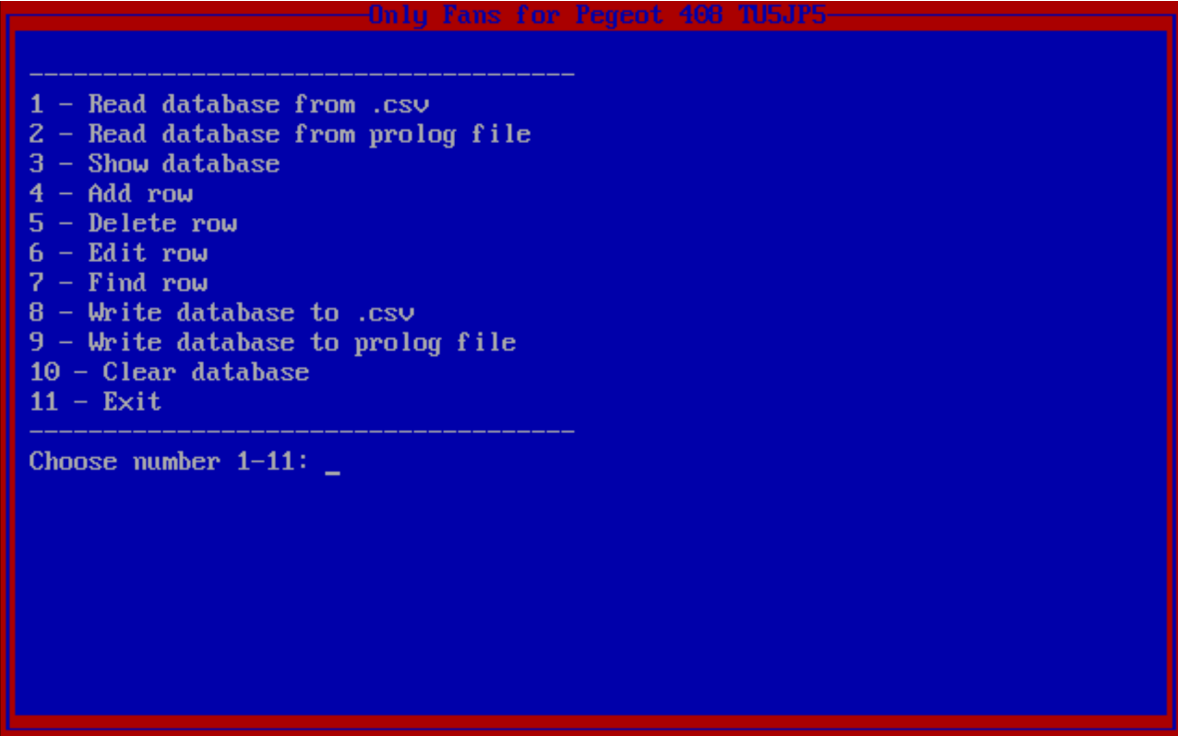
checkLen(integer, string,string,string) — делит строку на до и после введенного индекса

writeSpaces(integer) — выводит введенное кол-во пробелов

specialWrite(integer, string) — выводит строку, плюс дополняет пробелами кол-во знаков до введенного числа.

Тестирование

1)Главное меню



```
-----Only Fans For Project 468 TUSJPS-----
-----
1 - Read database from .csv
2 - Read database from prolog file
3 - Show database
4 - Add row
5 - Delete row
6 - Edit row
7 - Find row
8 - Write database to .csv
9 - Write database to prolog file
10 - Clear database
11 - Exit
-----
Choose number 1-11: _
```

2)Добавление нового вентилятора

Fill next fields:

Manufacturer: Kortex

Part number: AAA

Product name: Peugeot

Count in stock: 3

Price: 2024

Entry successfully added to database

Press any key..._

3)Изменение строки

Input Id of row: 1

Id	Manifac turer	Country	Part_Num ber	Product_Name	Count	Price
1	Kortex	South Korea	AAA	Peugeot	3	2024

Fill next fields:

Manufacturer: DEQST

Part number: AAA

Product name: Peugeot

Count in stock: 3

Price: 2024

4)Просмотр всей бд

Id	Manifac turer	Country	Part_Num ber	Product_Name	Count	Price
1	B/U zap chasti	-	BU6A616289	B/U 7934C2 Zamok kapota Peugeot 807 (2002-2010)	1	909
2	B/U zap chasti	-	BY7C199145	B/U 6441Z7 Motorchik pechki Peugeot 308 2010 , Proiz-1' - Peugeot-Citroen, otopitelya, Pezho 308	1	1314
3	B/U zap chasti	-	BY7A300726	B/U 6441Z7 Motorchik otopitelya PEUGEOT 308 I 2007-2015	1	1661
4	B/U zap chasti	-	BU6A1420722	B/U 6441Z7 Motorchik pechki (ventilyator otopitelya) Peugeot 308 (2007-2015) Angliya	1	2953
5	B/U zap chasti	-	BU6A032515	B/U 6441Z7 Motorchik pechki (ventilyator otopitelya) Citroen C3 Picasso (2009-2017) Angliya UALEO	1	2953
6	B/U zap chasti	-	BU6A1723660	B/U 6441Z7 Motorchik pechki (ventilyator otopitelya) Peugeot 308 (2007-2015) Europa	1	2953

5)Удаление строки

Input Id of row: 3

Id	Manifac turer	Country	Part_Num ber	Product_Name	Count	Price
3	B/U zap chasti	-	BY7A300726	B/U 6441Z7 Motorchik otopitelya PEUGEOT 308 I 2007-2015	1	1661

This row was deleted

Press any key...

6)Выбор критерия поиска

Find Fan

1 - By id
2 - By Part Number
3 - By Product name
4 - Exit

Choose number 1-4: 1

7)Поиск по уникальному номеру

Find fan

Input Id of row: 2

Id	Manifac turer	Country	Part_Num ber	Product_Name	Count	Price
2	B/U zap chasti	-	BY7C199145	B/U 6441Z7 Motorchik pechki Peugeot 308 2010 , Proiz-1' - Peugeot-Citroen, otopitelya, Pezho 308	1	1314

Press any key...

8)Чтение из csv файла

Only Fans For Peugeot 400 1050PS

1 - Read database from .csv
2 - Read database from prolog
3 - Show database
4 - Add row
5 - Delete row
6 - Edit row
7 - Find row
8 - Write database to .csv
9 - Write database to prolog
10 - Clear database
11 - Exit

Choose number 1-11: 1

Input file name: bd.csv

DB successfully read from file.

Press any key..._

9)Отчистка базы данных из памяти

Only Fans For Peugeot 400 1050PS

1 - Read database from .csv
2 - Read database from prolog file
3 - Show database
4 - Add row
5 - Delete row
6 - Edit row
7 - Find row
8 - Write database to .csv
9 - Write database to prolog file
10 - Clear database
11 - Exit

Choose number 1-11: 10

Clear database

Done

Press any key..._

Выводы

В ходе проведенной лабораторной работы я разработал программу на языке Turbo Prolog для хранения базы данных вентиляторов на автомобиль Peugeot 408. Было проведено тестирование отдельных предикатов и всей программы в целом. Программа полностью удовлетворяет заданным требованиям.

Исходный код программы

```
FIVE.PRO:
domains
    manufacturer, country, part_number, name = string
    id, count = integer
    price = real
    file = datafile
    arr = string*
    integers = integer*
database
    only_fans(id, manufacturer, part_number, name, count, price)
    last_id(integer)
    rowCount(integer)
predicates
    clear_database()
    clear_vars()
    choose(integer)
    menu()
    process(integer)
    search(integer)
    newLastId(integer)
    incrementLastId(integer)
    getLastId()

    readRows()
    readValue(string,string,string)
    writeCsv()

    printRows()
    printRow(integer, integer)
    printLegend()
    page(integer)
    decision(integer)

    substr(string, string)
    substr(string,string,string,string)
    comparison(string,string,integer)
    searchName(string)
    searchPartNumber(string)

    getCountry(string, string)
    pretty(string,string,string,string,string,string,string,integer)
    checkLen(integer, string,string,string)
    writeSpaces(integer)
    specialWrite(integer, string)
clauses
    getCountry("Luzar", "Russia").
    getCountry("Kortex", "South Korea").
    getCountry("Nty", "Poland").
    getCountry("DEQST", "China").
    getCountry("Kale", "Turkish").
    getCountry("Magneti Marelli", "Italy").
    getCountry("Nissens", "Denmark").
    getCountry("Nrf", "Netherlands").
    getCountry("Nrf", "Netherlands").
    getCountry("Stron", "Korea").
    getCountry("Tuc", "Taiwan").
    getCountry("Valeo", "France").
    getCountry("Valeo", "France").
    getCountry("B/U zapchasti", "-").
    getCountry(_, "-").

    substr(_, "") :-!.
    substr("", _) :-!, fail.
    substr(S, SS) :-
        frontchar(S, SC, S_),
        frontchar(SS, SC, SS_),
        substr(S_, SS_),!.
    substr(S, SS) :-
        frontchar(S, _, S_),
        substr(S_, SS),!.

    substr(_, "", R, R) :-!.
    substr("", _, _, "") :-!.
    substr(S, SS, RT, R) :-
        frontchar(S, SC, S_),
        frontchar(SS, SC, SS_),
        substr(S_, SS_, RT, R),!.
    substr(S, SS, _, R) :-
        frontchar(S, _, S_),
        substr(S_, SS, S_, R),!.
```

```

comparison("", "", 0):-!.
comparison(_, "", 1):-!.
comparison("", _, -1):-!.
comparison(S1, S2, R):-
    frontchar(S1, C, S1_),
    frontchar(S2, C, S2_),
    comparison(S1_, S2_, R);
    frontchar(S1, C1, _),
    frontchar(S2, C2, _),
    C1 < C2, R = -1, !;
    R = 1, !.

choose(X) :-
    readint(X);
    write("Wrong number"), readchar(_), X = 0,
    removewindow, menu.

clear_vars() :-
    retract(rowCount(_)),
    retract(last_id(_)),
    fail.
clear_vars() :-!.

clear_database:-
    retract(only_fans(_, _, _, _, _)),
    fail.
clear_database:-clear_vars(),!.

incrementLastId(X) :-
    retract(last_id(Id)),
    X = Id + 1,
    assert(last_id(X));
    X = 1,
    assert(last_id(X)).

newLastId(X) :-
    last_id(Last), Last < X,
    retract(last_id(_)),
    assert(last_id(X)),!.
newLastId(X) :-
    assert(last_id(X)).

decision(Height) :-
    not(rowCount(_)), assert(rowCount(5)),fail;
    rowCount(Cnt), Height + Cnt > 22,
    retract(rowCount(Cnt)), assert(rowCount(0));
    rowCount(Cnt), retract(rowCount(Cnt)),
    NewCnt = Height + Cnt, assert(rowCount(NewCnt)),fail,!.

page(Height) :-
    decision(Height),
    readchar(A), clearwindow,
    A = 27.

printRows() :-
    only_fans(X1, _, _, _, _),
    printRow(X1, Height),
    page(Height).
printRows().

printLegend() :-
    write("Id  Manufac  Country  Part_Num  Product_Name          Count  Price"),nl,
    write("      turer          ber"),nl,
    write("-----").

printRow(Id, Height) :-
    only_fans(Id, X2, X3, X4, X5, X6),
    str_int(IdString, Id), str_int(CountString, X5), str_real(PriceString, X6),
    getCountry(X2, Country),
    pretty(IdString, X2, Country, X3, X4, CountString, PriceString, Height),!.

specialWrite(Len, String) :-
    str_len(String, StrLen),
    StrLen = Len, write(String),!;

    str_len(String, StrLen),
    SUB = Len - StrLen,
    write(String), writeSpaces(SUB).

writeSpaces(0).
writeSpaces(X) :-
    New = X - 1, write(" "),
    writeSpaces(New).

checkLen(Len, String, A, B) :-
    str_len(String, StrLen),
    StrLen <= Len,
    A = String, B = "",!;
    frontstr(Len, String, A, B),!.

pretty("", "", "", "", "", "", "", Height) :- Height = 0.
pretty(X1, X2, X3, X4, X5, X6, X7, Height) :-
    checkLen(3, X1, X11, X12), specialWrite(3, X11), write(" "),
    checkLen(7, X2, X21, X22), specialWrite(7, X21), write(" "),
    checkLen(7, X3, X31, X32), specialWrite(7, X31), write(" "),
    checkLen(8, X4, X41, X42), specialWrite(8, X41), write(" "),
    checkLen(31, X5, X51, X52), specialWrite(31, X51), write(" "),
    checkLen(5, X6, X61, X62), specialWrite(5, X61), write(" "),
    checkLen(5, X7, X71, X72), specialWrite(5, X71),
    pretty(X12, X22, X32, X42, X52, X62, X72, New),
    Height = New + 1.

writeCsv() :-

```

```

    only_fans(X1,X2,X3,X4,X5,X6),
    writef("%d;%s;%s;%s;%d;%f\n",X1,X2,X3,X4,X5,X6), fail.
writeCsv().

readRows() :-
    readln(Line),
    readValue(Line, X1, Tail1), str_int(X1, Id),
    readValue(Tail1, X2, Tail2),
    readValue(Tail2, X3, Tail3),
    readValue(Tail3, X4, Tail4),
    readValue(Tail4, X5, Tail5), str_int(X5, Count),
    readValue(Tail5, X6, _), str_real(X6, Price),
    assertz(only_fans(Id, X2, X3, X4, Count, Price)), newLastId(Id), !,
    readRows();

    not(eof(datafile)), !,
    write(" Reading error"),nl,
    write(" Only some data opened"),nl;

    !.

getLastId() :-
    not(last_id(_)), assert(last_id(0)),fail.
getLastId() :-
    only_fans(Id,_,_,_,_,_),
    newLastId(Id),fail.
getLastId() :- !.

readValue("", "", "") :- !.
readValue(Line, X, Tail) :-
    frontchar(Line, LineH, LineT),
    LineH = ';', !,
    X = "", Tail = LineT;

    frontchar(Line, LineH, LineT),
    LineH <> ';',
    readValue(LineT, T, Tail),
    str_char(LineHS, LineH),
    concat(LineHS, T, X).

menu :-
    makewindow(1,23,65, "Only Fans for Peugeot 408 TU5JP5",0, 0,25,80),
    clearwindow,nl,
    write(" ----- ") ,nl,
    write(" 1 - Read database from .csv"), nl,
    write(" 2 - Read database from prolog file"), nl,
    write(" 3 - Show database"), nl,
    write(" 4 - Add row "), nl,
    write(" 5 - Delete row "), nl,
    write(" 6 - Edit row"), nl,
    write(" 7 - Find row"), nl,
    write(" 8 - Write database to .csv"), nl,
    write(" 9 - Write database to prolog file"), nl,
    write(" 10 - Clear database"), nl,
    write(" 11 - Exit"), nl,
    write(" ----- ") ,nl,
    write(" Choose number 1-11: "),
    choose(X), nl, process(X).

process(1) :-
    makewindow(2,23,65, "Read database from .csv", 2, 30, 15, 40),
    write(" Input file name: "), readln(FileName),
    concat("C:/LABS/L5/", FileName, File),
    existfile(File), clear_database,
    openread(datafile, File), readdevice(datafile),
    readRows(),
    closefile(datafile), readdevice(keyboard),
    write(" DB successfully read from file."), nl, !,
    write(" Press any key..."), readchar(_),
    removewindow, clearwindow, menu;

    write(" Error reading file!"), nl, !,
    write(" Press any key..."), readchar(_),
    removewindow, clearwindow, menu, fail.

process(2) :-
    makewindow(3,23,65, "Read database from prolog file", 2, 30, 15, 40),
    write(" Input file name: "), readln(FileName),
    concat("C:/LABS/L5/", FileName, File),
    existfile(File), clear_database,
    consult(File),
    getLastId(),
    write(" DB successfully read from file."), nl, !,
    write(" Press any key..."), readchar(_),
    removewindow, clearwindow, menu;

    write(" Error reading file!"), nl, !,
    write(" Press any key..."), readchar(_),
    removewindow, clearwindow, menu, fail.

process(3) :-
    makewindow(4,23,65, " All database ",0, 0,25,80), shiftwindow(4),
    printLegend(), printRows(),
    write(" Press any key..."), readchar(_),
    removewindow, clearwindow, menu;

    write(" Press any key..."), readchar(_),
    removewindow, clearwindow, menu.

process(4) :-
    makewindow(5,23,65, " Add fan ", 0,0, 20,80), shiftwindow(5),
    write(" Fill next fields:"),nl,
    write(" Manufacturer: "), readln(Manufacturer),nl,
    write(" Part number: "), readln(PartNumber),nl,
    write(" Product name: "), readln(Name),nl,

```

```

write(" Count in stock: "), readint(Count), Count >= 0, nl,
write(" Price: "), readreal(Price), Price >= 0, nl,
incrementLastId(Id),
assertz(only_fans(Id, Manufacturer, PartNumber, Name, Count, Price)),
write(" Entry successfully added to database"),nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu;

write(" Something went wrong"),nl,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu, fail.

process(5) :-
makewindow(6,23,65, " Delete fan " ,0,0,20,80), shiftwindow(6),
write(" Input Id of row: "), readint(Id),nl,
printLegend(), printRow(Id,_),
retract(only_fans(Id,_,_,_,_)),
write(" This row was deleted"),nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu;

write(" No data"), nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu, fail.

process(6) :-
makewindow(7,23,65, " Edit fan " ,0,0,20,80), shiftwindow(7),
write(" Input Id of row: "), readint(Id),
printLegend(), printRow(Id,_), nl,
write(" Fill next fields:"),nl,
write(" Manufacturer: "), readln(Manufacturer),nl,
write(" Part number: "), readln(PartNumber),nl,
write(" Product name: "), readln(Name),nl,
write(" Count in stock: "), readint(Count), Count >= 0, nl,
write(" Price: "), readreal(Price), Price >= 0, nl,
retract(only_fans(Id,_,_,_,_)),
assertz(only_fans(Id, Manufacturer, PartNumber, Name, Count, Price)),
write(" Row was successfully modified"),nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu;

write(" Wrong input"), nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu, fail.

process(7) :-
makewindow(8,23,65, " Find fan ",0, 0,25,80), shiftwindow(8),
clearwindow,nl,
write(" 1 - By id"), nl,
write(" 2 - By Part Number"), nl,
write(" 3 - By Product name"), nl,
write(" 4 - Exit"), nl,
write(" Choose number 1-4: "),
choose(X), clearwindow,
search(X),!,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu;

write(" Wrong input"), nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu, fail.

process(8) :-
makewindow(9,23,65, "Write database to .csv", 2, 30, 15, 40), shiftwindow(9),
write("Input file name: "), readln(FileName),
concat("C:/LABS/L5/", FileName, File),
openwrite(datafile, File), writedev(device(datafile),
writeCsv(),
closefile(datafile), writedev(device(screen),
write(" DB successfully saved to file."), nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu;

write(" Error writing database!"), nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu, fail.

process(9) :-
makewindow(10,23,65, "Write database to prolog file", 2, 30, 15, 40), shiftwindow(10),
write("Input file name: "), readln(FileName),
concat("C:/LABS/L5/", FileName, File),
save(File),
write(" DB successfully saved to file."), nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu;

write(" Error writing database!"), nl, !,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu, fail.

process(10) :-
makewindow(11,23,65, " Clear database " ,7,40,10,30), shiftwindow(11),
clear_database,
write(" Done "), nl,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu;

write(" Error while delete db "), nl,
write(" Press any key..."), readchar(_),
removewindow, clearwindow, menu, fail.

process(11) :-
write("See you again! "),readchar(_),exit.

search(1) :-

```



```

        write(" Input Id of row: "), readint(Id),
        printLegend(), printRow(Id,_),nl,!;

        write(" No entries found"),nl,!;
        write(" Press any key..."), readchar(_),
        removewindow, clearwindow, process(7), fail.

search(2) :-
    write(" Input part number: "), readln(Line),
    clearwindow,write(" Press any key to see next result or ESC to finish..."), nl,
    printLegend(),
    searchPartNumber(Line),!;

    write(" No entries found"),nl,
    write(" Press any key..."), readchar(_),
    removewindow, clearwindow, process(7), fail.

search(3) :-
    write(" Input product name: "), readln(Line), nl,
    clearwindow,write(" Press any key to see next result or ESC to finish..."), nl,
    printLegend(),
    searchName(Line),!;

    write(" No entries found"),nl,
    write(" Press any key..."), readchar(_),
    removewindow, clearwindow, process(7), fail.

search(4) :-
    removewindow, clearwindow, menu.

searchName(Line) :-
    only_fans(Id,_,Name,_,_), substr(Name, Line),
    printRow(Id,_),
    readchar(A), A = 27,
    removewindow, clearwindow, menu.

searchPartNumber(Line) :-
    only_fans(Id,_,PartNumber,_,_), substr(PartNumber, Line),
    printRow(Id,_),
    readchar(A), A = 27,
    removewindow, clearwindow, menu.

goal
menu.

```