

CS301 Database Management Systems

Fall 2022

Final Exam Project

Project Overview: In this project, you will be asked to implement a simplified SELECT statement to retrieve the information from an MLS (multi-level security) relation (i.e. table). In an MLS relation, there is an additional attribute named “TC” to indicate the classification of each tuple (i.e. row). The “TC” attribute can have four (4) possible values: 4 (TS-Top Secret), 3 (S-Secret), 2 (C-Confidential), and 1 (U-unclassified). The syntax of the SELECT statement is shown below. It consists of SELECT, FROM, WHERE and ORDERBY clauses, and ends with a semicolon.

```
SELECT <columns>
FROM <table>
WHERE <conditions>
ORDERBY <sorting criteria>;
```

The SELECT and FROM clauses are required. For simplicity, the FROM clause will take only one table. The <columns> of the SELECT clause could be * (to include all the columns including TC in the table) or a list to either include or exclude one or more columns. To include a column, use <column>:1, and to exclude a column, use <column>:0. The list cannot have both inclusion and exclusion specifications. It means the list must be either an inclusion list or an exclusion list. If the list contains multiple columns, they are separated by commas. Please see the examples below for example.

The WHERE and ORDERBY clauses are optional. The <conditions> of the WHERE clause can have one or more conditions. If there are multiple conditions, commas will be used to sperate them. A comma also represents the conjunction (i.e. AND). Each condition is always of <column><op><ref_value> format. <op> is one of the six relational operators (=, <>, >=, <=, >, and <). The left side is always a column name, and the right side is a reference value that could be a string or a number, depending on the date type of the column. The <sorting criteria> could one criterion or multiple criteria separated by commas. Each criterion consists of a column name followed by :1 (for ascending order) or :-1 (for descending order). The column to be used for sorting must be an output column.

All the keywords, table names and column names will be in uppercase. The following are some examples of the SELECT statement.

- SELECT * FROM EMPLOYEE;
- SELECT LNAME:1,FNAME:1,SALARY:1 FROM EMPLOYEE;
- SELECT TC:0 FROM EMPLOYEE;
- SELECT SALARY:0, TC:0 FROM EMPLOYEE;
- SELECT * FROM EMPLOYEE WHERE TC>=3;
- SELECT * FROM EMPLOYEE WHERE SALARY>=30000;
- SELECT * FROM EMPLOYEE WHERE TC<3, SALARY>=30000;
- SELECT * FROM EMPLOYEE ORDERBY SALARY:-1;
- SELECT * FROM EMPLOYEE ORDERBY SALARY:-1, LNAME:1;
- SELECT LNAME:1,FNAME:1,SALARY:1 FROM EMPLOYEE WHERE SALARY >= 30000 ORDERBY SALARY:1;
- SELECT * FROM EMPLOYEE ORDERBY TC:-1, SALARY:-1, LNAME:1;
- SELECT * FROM EMPLOYEE WHERE LNAME >= K ORDERBY LNAME:1;
- SELECT * FROM EMPLOYEE ORDERBY SEX:1, SALARY:-1, LNAME:1;
- SELECT TC:0 FROM EMPLOYEE ORDERBY SUPERSSN:1, SSN:1;

A table named X will be stored as a file named X.csv in the CSV (comma-separated values) format. For example, the Table EMPLOYEE will be stored in the file named EMPLOYEE.csv as shown below. Note the table below is the same EMPLOYEE table as we know except the last column. The last column below is the “TC” column.

John, B, Smith, 123456789, 1965-01-09, 731 Fondren, Houston, TX, M, 30000, 333445555, 1
 Franklin, T, Wong, 333445555, 1955-12-08, 638 Voss, Houston, TX, M, 40000, 888665555, 3
 Alicia, J, Zelaya, 999887777, 1968-01-19, 3321 Castle, Spring, TX, F, 25000, 987654321, 2
 Jennifer, S, Wallace, 987654321, 1941-06-20, 291 Berry, Bellaire, TX, F, 43000, 888665555, 3
 Ramesh, K, Narayan, 666884444, 1962-09-15, 975 Fire Oak, Humble, TX, M, 38000, 333445555, 1
 Joyce, A, English, 453453453, 1972-07-31, 5631 Rice, Houston, TX, F, 25000, 333445555, 1
 Ahmad, V, Jabbar, 987987987, 1969-03-29, 980 Dallas, Houston, TX, M, 25000, 987654321, 2
 James, E, Borg, 888665555, 1937-11-10, 450 Stone, Houston, TX, M, 55000, , 4

You can download this file from Blackboard. If you view the file using Microsoft Excel, it will look like this.

John	B	Smith	123456789	1965-01-09	731 Fondren	Houston	TX	M	30000	333445555	1
Franklin	T	Wong	333445555	1955-12-08	638 Voss	Houston	TX	M	40000	888665555	3
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle	Spring	TX	F	25000	987654321	2
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry	Bellaire	TX	F	43000	888665555	3
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak	Humble	TX	M	38000	333445555	1
Joyce	A	English	453453453	1972-07-31	5631 Rice	Houston	TX	F	25000	333445555	1
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas	Houston	TX	M	25000	987654321	2
James	E	Borg	888665555	1937-11-10	450 Stone	Houston	TX	M	55000		4

The schema for each table will be stored in a system table named TAB_COLUMNS (in the file named TAB_COLUMNS.csv) to simulate the table user_tab_columns in ORACLE. The following TAB_COLUMNS shows the schema for three tables: EMPLOYEE, PROJECT and WORKS_ON.

WORKS_ON,TC,INT,4	WORKS_ON	TC	INT	4
WORKS_ON,HOURS,FLOAT,3	WORKS_ON	HOURS	FLOAT	3
WORKS_ON,PNO,INT,2	WORKS_ON	PNO	INT	2
WORKS_ON,ESSN,INT,1	WORKS_ON	ESSN	INT	1
PROJECT,TC,INT,4	PROJECT	TC	INT	4
PROJECT,PLOCATION,STRING,3	PROJECT	PLOCATION	STRING	3
PROJECT,PNUMBER,INT,2	PROJECT	PNUMBER	INT	2
PROJECT,PNAME,STRING,1	PROJECT	PNAME	STRING	1
EMPLOYEE,TC,INT,12	EMPLOYEE	TC	INT	12
EMPLOYEE,SUPERSSN,INT,11	EMPLOYEE	SUPERSSN	INT	11
EMPLOYEE,SALARY,FLOAT,10	EMPLOYEE	SALARY	FLOAT	10
EMPLOYEE,SEX,CHAR,9	EMPLOYEE	SEX	CHAR	9
EMPLOYEE,STATE,STRING,8	EMPLOYEE	STATE	STRING	8
EMPLOYEE,CITY,STRING,7	EMPLOYEE	CITY	STRING	7
EMPLOYEE,ADDRESS,STRING,6	EMPLOYEE	ADDRESS	STRING	6
EMPLOYEE,BDATE,STRING,5	EMPLOYEE	BDATE	STRING	5
EMPLOYEE,SSN,INT,4	EMPLOYEE	SSN	INT	4
EMPLOYEE,LNAME,STRING,3	EMPLOYEE	LNAME	STRING	3
EMPLOYEE,MINIT,CHAR,2	EMPLOYEE	MINIT	CHAR	2
EMPLOYEE,FNAME,STRING,1	EMPLOYEE	FNAME	STRING	1

TAB_COLUMNS always has four columns in the following order: table name, column name, column data type, and column id. For this project, there are four (4) possible column data types (STRING, CHAR, INT, FLOAT). The column id is 1-based, and it is the position of the column in the corresponding csv table. For example, SALARY of EMPLOYEE has a column id of 10, and it tells you that the SALARY column is the 10th column of the EMPLOYEE.csv file.

You will write a program in C or C++ to process the SELECT statement and output the result on the screen. The output will also be in the csv format, but make sure to include the column names as the first row of the output. Please see a few sample executions of the program at the end. Your program needs to take an integer (1-4) as the only command line argument to indicate the security clearance of the user (1: Unclassified, 2: Confidential, 3: Secret, and 4: Top Secret). Please remember a user cannot read up. For example, a user with the Secret (3) security clearance is not able to retrieve a row with its TC > 3. You can assume the user will enter the SELECT statement correctly and in one single line. The user can enter multiple SELECT statements and enter the EXIT command to exit your program.

In C, you can use the `fgets` function to read a line. However, a line could be terminated by a single character <LF> or two characters <CR><LF>. Make sure you can handle both cases. The following C functions, `strsep`, `strstr`, `strchr`, `strncpy`, `sprintf`, and `scanf`, could be useful when you try to separate the fields and extract field values. Please note comma, colon, and one of the six relational operators(=, <>, >=, <=, >, <) can also be used as a separator, but a user can still enter some spaces (or white spaces such as tabs) before or after the separator. After extracting a field value, it is a good idea to remove any leading and trailing spaces (or white spaces) if the value is a string.

What You Need To Do

- Create a directory named **cs301project** on your machine. Download **TAB_COLUMNS.csv**, **EMPLOYEE.csv**, and **PROJECT.csv**.
- Solve the problem in C (using gcc compiler) or C++(using g++compiler). Make sure your program works on Cygwin or Mac Terminal.
- Create a **makefile** that supports the commands "make" to produce **a.out**, and "make clean" to remove **a.out** and any object files. Your **makefile** will be used to compile your program and to produce **a.out**. **a.out** will be used to test your program.
- When you are ready to submit your project, compress your **cs301project** directory into a single (compressed) zip file, **cs301project.zip**.
- Once you have a compressed zip file named **cs301project.zip**, submit that file to Blackboard.

This project is due by 5:00pm on Friday, December 9. Late projects are not accepted.

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such as chegg.com without prior written authorization.**

**A project shall be completed individually, with no sharing of code or solutions.
All submissions will go through MOSS (Measure Of Software Similarity) for similarity check.
The University of Alabama's Code of Academic Conduct will be rigorously enforced.**

Sample executions of the program

./a.out 1

```
MLS> SELECT * FROM EMPLOYEE;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555,1
```

MLS> EXIT

./a.out 2

```
MLS> SELECT * FROM EMPLOYEE;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321,2
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555,1
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321,2
```

MLS> EXIT

./a.out 3

```
MLS> SELECT * FROM EMPLOYEE;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321,2
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555,1
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321,2
```

MLS> EXIT

./a.out 4

```
MLS> SELECT * FROM EMPLOYEE;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321,2
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555,1
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321,2
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,,4
```

MLS> SELECT LNAME:1,FNAME:1,SALARY:1 FROM EMPLOYEE;

```
LNAME,FNAME,SALARY
Smith,John,30000
Wong,Franklin,40000
Zelaya,Alicia,25000
Wallace,Jennifer,43000
Narayan,Ramesh,38000
English,Joyce,25000
Jabbar,Ahmad,25000
Borg,James,55000
```

MLS> SELECT TC:0 FROM EMPLOYEE;

```
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,
```

```

MLS> SELECT SALARY:0, TC:0 FROM EMPLOYEE;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SUPERSSN
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,333445555
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,888665555
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,987654321
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,888665555
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,333445555
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,333445555
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,987654321
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,

```

```

MLS> SELECT * FROM EMPLOYEE WHERE TC>=3;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,,4

```

```

MLS> SELECT * FROM EMPLOYEE WHERE SALARY>=30000;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,,4

```

```

MLS> SELECT * FROM EMPLOYEE WHERE TC<3, SALARY>=30000;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1

```

```

MLS> SELECT * FROM EMPLOYEE ORDERBY SALARY:-1;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,,4
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555,1
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321,2
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321,2

```

```

MLS> SELECT * FROM EMPLOYEE ORDERBY SALARY:-1, LNAME:1;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,,4
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555,1
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321,2
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321,2

```

```

MLS> SELECT LNAME:1,FNAME:1,SALARY:1 FROM EMPLOYEE WHERE SALARY >= 30000 ORDERBY SALARY:1;
LNAME,FNAME,SALARY
Smith,John,30000
Narayan,Ramesh,38000
Wong,Franklin,40000
Wallace,Jennifer,43000
Borg,James,55000

```

```

MLS> SELECT * FROM EMPLOYEE ORDERBY TC:-1, SALARY:-1, LNAME:1;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,,4
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321,2
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321,2
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555,1

```

```

MLS> SELECT * FROM EMPLOYEE WHERE LNAME >= K ORDERBY LNAME:1;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321,2

```

```
MLS> SELECT * FROM EMPLOYEE ORDERBY SEX:1, SALARY:-1, LNAME:1;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN,TC
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555,3
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555,1
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321,2
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,,4
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555,3
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555,1
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555,1
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321,2
```

```
MLS> SELECT TC:0 FROM EMPLOYEE ORDERBY SUPERSSN:1, SSN:1;
FNAME,MINIT,LNAME,SSN,BDATE,ADDRESS,CITY,STATE,SEX,SALARY,SUPERSSN
John,B,Smith,123456789,1965-01-09,731 Fondren,Houston,TX,M,30000,333445555
Joyce,A,English,453453453,1972-07-31,5631 Rice,Houston,TX,F,25000,333445555
Ramesh,K,Narayan,666884444,1962-09-15,975 Fire Oak,Humble,TX,M,38000,333445555
Franklin,T,Wong,333445555,1955-12-08,638 Voss,Houston,TX,M,40000,888665555
Jennifer,S,Wallace,987654321,1941-06-20,291 Berry,Bellaire,TX,F,43000,888665555
Ahmad,V,Jabbar,987987987,1969-03-29,980 Dallas,Houston,TX,M,25000,987654321
Alicia,J,Zelaya,999887777,1968-01-19,3321 Castle,Spring,TX,F,25000,987654321
James,E,Borg,888665555,1937-11-10,450 Stone,Houston,TX,M,55000,
```

```
MLS> EXIT
```