

```

1 #include "stdafx.h"
2 #include <iostream>
3 #include <windows.h>
4 #include <vector>
5 #include <mutex>
6 #include <thread>
7
8 using namespace std;
9
10 struct Line
11 {
12     Line(char* name, char* surname, int year) :
13         name(name),
14         surname(surname),
15         year(year)
16     {}
17     char* name;
18     char* surname;
19     int year;
20 };
21
22 void foo(vector<Line>& db, mutex& mtx)
23 {
24     while (1)
25     {
26         //lock_guard<mutex> lock (mtx);
27         //Transactions beginning
28         mtx.lock();
29
30         db.at(0).year = 2000;
31         db.at(1).year = 2000;
32         db.at(2).year = 2000;
33         db.at(3).year = 2000;
34         db.at(4).year = 2000;
35
36         //The end of the transaction
37         mtx.unlock();
38     }
39 }
40
41 void bar(vector<Line>& db, mutex& mtx)
42 {
43     while (1)
44     {
45         //lock_guard<mutex> lock (mtx);
46         //Transactions beginning
47         mtx.lock();
48
49         db.at(0).year = 1856;
50         db.at(1).year = 1879;
51         db.at(2).year = 1955;
52         db.at(3).year = 1955;
53         db.at(4).year = 1984;
54
55         //The end of the transaction
56         mtx.unlock();
57     }
58 }
59
60 void view(vector<Line>& db, mutex& mtx)
61 {
62     while (1)
63     {
64         lock_guard<mutex> lock(mtx);
65

```

```

66         cout << "View: " << endl;
67         for (auto row : db)
68         {
69             cout << row.name<< " " << row.surname << " " << row.year << ", ";
70         } cout << endl;
71         Sleep(100);
72     }
73 }
74
75
76
77
78 /* If you do not use a mutex displaying and modifying the data will not be correct
79 *  ????? ? ? ?????????????????? ?????????? ?????????????????? ? ?????????????????? ??
80
81
82
83 int main()
84 {
85
86     vector<Line> db;
87     db.push_back(Line("Nikola", "Tesla", 1856));
88     db.push_back(Line("Albert", "Einstein", 1879));
89     db.push_back(Line("Bill", "Gates", 1955));
90     db.push_back(Line("Stive", "Jobs", 1955));
91     db.push_back(Line("Mark", "Zuckerberg", 1984));
92
93     cout << "Hardware concurrency: " << thread::hardware_concurrency() << endl;
94     mutex mtx;
95
96
97     thread t1(foo, ref(db), ref(mtx));
98     thread t2(bar, ref(db), ref(mtx));
99     thread t3(viev, ref(db), ref(mtx));
100
101     t1.detach();
102     t2.detach();
103     t3.join();
104 }

```