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| TERM | COURSE NAME | | COURSE CODE | VERSION |
| Fall-2019-Quiz-10 | | Object-Oriented Software Development using C++ | OOP345 | A |

Code 1.0

#include <iostream>

#include <vector>

#include <utility>

#include <thread>

using namespace std;

class Records {

const char\* name;

unsigned int id;

unsigned int salary;

public:

Records(const char\* t, unsigned int x, unsigned int y ) : name(t), id(x), salary(y) {}

void display() const {

cout <<" user\_name = " << name << ", id = "<< id << " Salary = " << salary << endl;

}

};

ostream& operator<<(ostream& os, const Records& p) {

p.display();

return os;

}

thread\_local int baseSalary = 1000;

thread\_local vector<Records> users;

void AddAccount(vector<Records>& vec, int num) {

if( num == 0)

{

users.push\_back(Records("David", 9090, baseSalary++ ));

users.push\_back(Records("Issac", 8080, baseSalary++ ));

users.push\_back(Records("Sara", 5050, baseSalary++ ));

vec = users;

vector<Records> newUsers(move(users));

}

if( num == 1)

{

vec.push\_back(Records("Joseph", 300500, baseSalary++));

vec.push\_back(Records("Jane", 456700, baseSalary++));

vec.push\_back(Records("John", 38943, baseSalary++));

vec.push\_back(Records("Marry", 29890,baseSalary++));

users = vec;

}

if( num == 2)

{

users = move(vec);

}

thread t0(AddAccount, std::ref(users), 0);

t0.join();

for (auto& it : users)

cout <<"[Main-first-Run]" << it;

thread t1(AddAccount, std::ref(users), 1);

t1.join();

for (auto& it : users)

cout <<"[Main-second-Run]" << it;

thread t2(AddAccount, std::ref(users), 2);

t2.join();

for (auto& it : users)

cout <<"[Main-Third-Run]" << it;

}

for (auto& it : users)

cout <<"[WorkerThread num = " << num << " ]" << it;

}

int main() {

thread t0(AddAccount, std::ref(users), 0);

t0.join();

for (auto& it : users)

cout <<"[Main-first-Run]" << it;

thread t1(AddAccount, std::ref(users), 1);

t1.join();

for (auto& it : users)

cout <<"[Main-second-Run]" << it;

thread t2(AddAccount, std::ref(users), 2);

t2.join();

for (auto& it : users)

cout <<"[Main-Third-Run]" << it;

}

**Answer the following Questions using Code 1.0**

1. The output of the above program is:

**[Main-first-Run]** user\_name = David, id = 9090 Salary = 1000

[**Main-first-Run]** user\_name = Issac, id = 8080 Salary = 1001

[**Main-first-Run]** user\_name = Sara, id = 5050 Salary = 1002

**[WorkerThread num = 1 ]** user\_name = David, id = 9090 Salary = 1000

**[WorkerThread num = 1 ]** user\_name = Issac, id = 8080 Salary = 1001

**[WorkerThread num = 1 ]** user\_name = Sara, id = 5050 Salary = 1002

**[WorkerThread num = 1 ]** user\_name = Joseph, id = 300500 Salary = 1000

**[WorkerThread num = 1 ]** user\_name = Jane, id = 456700 Salary = 1001

**[WorkerThread num = 1 ]** user\_name = John, id = 38943 Salary = 1002

**[WorkerThread num = 1 ]** user\_name = Marry, id = 29890 Salary = 1003

**[Main-second-Run]** user\_name = David, id = 9090 Salary = 1000

**[Main-second-Run]** user\_name = Issac, id = 8080 Salary = 1001

**[Main-second-Run]** user\_name = Sara, id = 5050 Salary = 1002

**[Main-second-Run]** user\_name **= Joseph,** id = 300500 Salary = 1003

**[Main-second-Run]** user\_name = Jane, id = 456700 Salary = 1004

**[Main-second-Run]** user\_name = John, id = 38943 Salary = 1005

**[Main-second-Run]** user\_name = Marry, id = 29890 Salary = 1006

**[WorkerThread num = 2 ]** user\_name = David, id = 9090 Salary = 1000

**[WorkerThread num = 2 ]** user\_name = Issac, id = 8080 Salary = 1001

**[WorkerThread num = 2 ]** user\_name = Sara, id = 5050 Salary = 1002

**[WorkerThread num = 2 ]** user\_name = Joseph, id = 300500 Salary = 1000

**[WorkerThread num = 2 ]** user\_name = Jane, id = 456700 Salary = 1001

**[WorkerThread num = 2 ]** user\_name = John, id = 38943 Salary = 1002

**[WorkerThread num = 2 ]** user\_name = Marry, id = 29890 Salary = 1003

**[Main-first-Run]** user\_name = David, id = 9090 Salary = 1000

[**Main-first-Run]** user\_name = Issac, id = 8080 Salary = 1001

[**Main-first-Run]** user\_name = Sara, id = 5050 Salary = 1002

**[WorkerThread num = 1 ]** user\_name = David, id = 9090 Salary = 1000

**[WorkerThread num = 1 ]** user\_name = Issac, id = 8080 Salary = 1001

**[WorkerThread num = 1 ]** user\_name = Sara, id = 5050 Salary = 1002

**[WorkerThread num = 1 ]** user\_name = Joseph, id = 300500 Salary = 1000

**[WorkerThread num = 1 ]** user\_name = Jane, id = 456700 Salary = 1001

**[WorkerThread num = 1 ]** user\_name = John, id = 38943 Salary = 1002

**[WorkerThread num = 1 ]** user\_name = Marry, id = 29890 Salary = 1003

**[Main-second-Run]** user\_name = David, id = 9090 Salary = 1000

**[Main-second-Run]** user\_name = Issac, id = 8080 Salary = 1001

**[Main-second-Run]** user\_name = Sara, id = 5050 Salary = 1002

**[Main-second-Run]** user\_name = **Joseph**, id = 300500 Salary = 1000

**[Main-second-Run]** user\_name = Jane, id = 456700 Salary = 1001

**[Main-second-Run]** user\_name = John, id = 38943 Salary = 1002

**[Main-second-Run]** user\_name = Marry, id = 29890 Salary = 1003

**[WorkerThread num = 2 ]** user\_name = David, id = 9090 Salary = 1000

**[WorkerThread num = 2 ]** user\_name = Issac, id = 8080 Salary = 1001

**[WorkerThread num = 2 ]** user\_name = Sara, id = 5050 Salary = 1002

**[WorkerThread num = 2 ]** user\_name = Joseph, id = 300500 Salary = 1000

**[WorkerThread num = 2 ]** user\_name = Jane, id = 456700 Salary = 1001

**[WorkerThread num = 2 ]** user\_name = John, id = 38943 Salary = 1002

**[WorkerThread num = 2 ]** user\_name = Marry, id = 29890 Salary = 1003

* 1. ..

**[Main-first-Run]** user\_name = David, id = 9090 Salary = 1000

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**[WorkerThread num = 1 ]** user\_name = Issac, id = 8080 Salary = 1001

**[WorkerThread num = 1 ]** user\_name = Sara, id = 5050 Salary = 1002

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**[WorkerThread num = 1 ]** user\_name = Jane, id = 456700 Salary = 1001

**[WorkerThread num = 1 ]** user\_name = John, id = 38943 Salary = 1002

**[WorkerThread num = 1 ]** user\_name = Marry, id = 29890 Salary = 1003

**[Main-second-Run]** user\_name = **Joseph**, id = 300500 Salary = 1000

**[Main-second-Run]** user\_name = Jane, id = 456700 Salary = 1001

**[Main-second-Run]** user\_name = John, id = 38943 Salary = 1002

**[Main-second-Run]** user\_name = Marry, id = 29890 Salary = 1003

**[WorkerThread num = 2 ]** user\_name = David, id = 9090 Salary = 1000

**[WorkerThread num = 2 ]** user\_name = Issac, id = 8080 Salary = 1001

**[WorkerThread num = 2 ]** user\_name = Sara, id = 5050 Salary = 1002

**[WorkerThread num = 2 ]** user\_name = Joseph, id = 300500 Salary = 1000

**[WorkerThread num = 2 ]** user\_name = Jane, id = 456700 Salary = 1001

**[WorkerThread num = 2 ]** user\_name = John, id = 38943 Salary = 1002

**[WorkerThread num = 2 ]** user\_name = Marry, id = 29890 Salary = 1003