- Exercise

In this lesson, there is some fun 'try it outs' for you to develop a better understanding of mutexes.

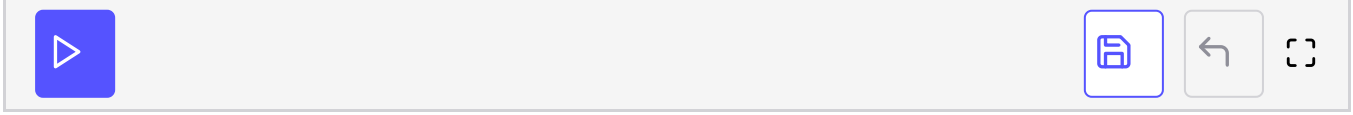
WE'LL COVER THE FOLLOWING

Try It Out! - No Synchronization

Let the program below *write* to `std::cout` without synchronization and observe its output.

```
//mutex.cpp
#include <chrono>
#include <iostream>
#include <mutex>
#include <string>
#include <thread>

std::mutex coutMutex;

class Worker{
public:
  explicit Worker(const std::string& n):name(n){};

    void operator() (){
      for (int i= 1; i <= 3; ++i){
            // begin work
            std::this_thread::sleep_for(std::chrono::milliseconds(200));
            // end work
            //coutMutex.lock();
            std::cout << name << ": " << "Work " << i << " done !!!" << std::endl;
            //coutMutex.unlock();
      }
        }
private:
  std::string name;
};


int main(){
```

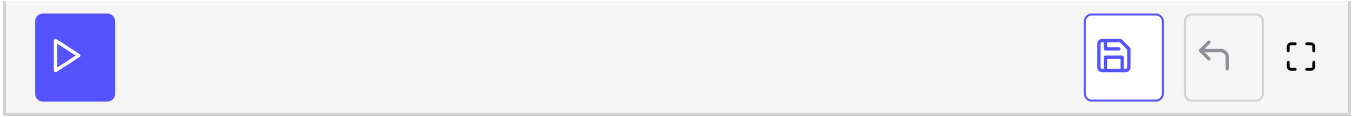
```
  std::cout << std::endl;

  std::cout << "Boss: Let's start working." << "\n\n";


  std::thread herb= std::thread(Worker("Herb"));
  std::thread andrei= std::thread(Worker("  Andrei"));
  std::thread scott= std::thread(Worker("    Scott"));
  std::thread bjarne= std::thread(Worker("      Bjarne"));
  std::thread andrew= std::thread(Worker("        Andrew"));
  std::thread david= std::thread(Worker("          David"));

  herb.join();
  andrei.join();
  scott.join();
  bjarne.join();
  andrew.join();
  david.join();

  std::cout << "\n" << "Boss: Let's go home." << std::endl;

  std::cout << std::endl;

}
```



Try it Out! - How Smart is Your C++ Runtime?

Locking a non-recursive mutex more than once is undefined behavior. Run the code in the example below to see how this works.

```
#include <mutex>
#include <thread>

int main(){
  std::mutex m;

  m.lock();
  m.lock();

}
```



For further information, see the following:

- std::mutex

- std::timed_mutex
- std::recursive_mutex
- std::recursive_timed_mutex
- std::shared_timed_mutex

In the next lesson, we will learn about locks in modern C++.