Shuffle Ranges

Rearrange the values in a range randomly, using std::random_shuffle and std::shuffle.

WE'LL COVER THE FOLLOWING

- `std::random_shuffle`
- `std::shuffle`

We can randomly shuffle ranges with `std::random_shuffle` and `std::shuffle`.

`std::random_shuffle`

Randomly shuffles the elements in a range.

```
void random_shuffle(RanIt first, RanIt last)
```

Randomly shuffles the elements in the range, by using the random number generator `gen`.

```
void random_shuffle(RanIt first, RanIt last, RanNumGen&& gen)
```

`std::shuffle`

Randomly shuffles the elements in a range, using the uniform random number generator `gen`.

```
void shuffle(RanIt first, RanIt last, URNG&& gen)
```

The algorithms need random access iterators. `RanNumGen&& gen` has to be a callable, taking an argument and returning a value within its arguments. `URNG&& gen` has to be a *uniform random number generator*.

> 🔧 **Prefer `std::shuffle`**
>
> Use `std::shuffle` instead of `std::random_shuffle`. `std::random_shuffle` has been *deprecated* since C++14 and removed in C++17, because it uses the C function `rand` internally.

```
#include <algorithm>
#include <chrono>
#include <iostream>
#include <random>
#include <vector>


int main(){

  std::cout << std::endl;

  std::vector<int> vec1{0, 1, 2, 3, 4, 5, 6, 7, 8, 9};
  std::vector<int> vec2(vec1);

  for (auto v:  vec1) std::cout << v << " ";

  std::cout << std::endl;

  unsigned seed= std::chrono::system_clock::now().time_since_epoch().count();

  std::cout << std::endl;

  std::random_shuffle(vec1.begin(), vec1.end());
  for (auto v:  vec1) std::cout << v << " ";

  std::cout << std::endl;

  std::shuffle(vec2.begin(), vec2.end(), std::default_random_engine(seed));
  for (auto v: vec2) std::cout <<  v << " ";

  std::cout << "\n\n";

}
```

Randomly shuffle algorithms

`seed` initialises the random number generator.

In the next lesson, we'll study ways to make sure each element in our range is unique.