The min, max and minmax functions

This family of functions allows us to find the minimum and maximum in a set of data. Let's find out how.

WE'LL COVER THE FOLLOWING

Required Headers

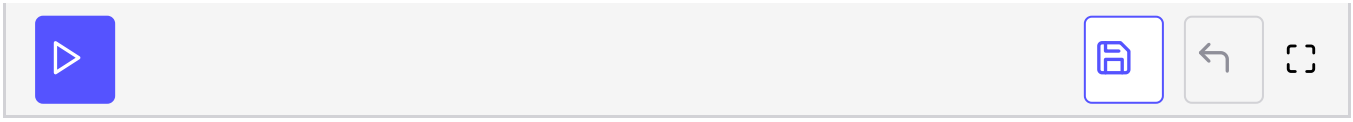
The many variations of the `min`, `max` and `minmax` functions apply to values and initializer lists. These functions need the header `<algorithm>`. Nearly the same holds for the functions `std::move`, `std::forward` and `std::swap`. You can apply them to arbitrary values. These three functions are defined in the header `<utility>`.

std::min, std::max and std::minmax

The functions std::min, std::max and std::minmax, defined in the header `<algorithm>`, act on values and initialiser lists and give you the requested value back as result. In the case of `std::minmax`, you get an `std::pair`. The first element of the pair is the minimum, the second the maximum of the values. By default, the less operator (`<`) is used, but you can specify your comparison operator. This function needs two arguments and returns a boolean. Functions that either return true or false are called predicates.

```
// minMax.cpp
#include <iostream>
#include <algorithm>
//...
using std::cout;
//...
int main(){
  cout << "std::min(2011, 2014):\t\t\t ";
  cout << std::min(2011, 2014)<<"\n";                              // 2011

  cout << "std::min({3, 1, 2011, 2014, -5}):\t";
```

```
  cout << std::min({3, 1, 2011, 2014, -5})<<"\n";               // -5

  cout << "std::min(-10, -5, [](...) {...}):\t\t";

  cout << std::min(-10, -5, [](int a, int b)
               { return std::abs(a) < std::abs(b); })<<"\n\n"; // -5

  std::pair<int, int> pairInt= std::minmax(2011, 2014);
  auto pairSeq= std::minmax({3, 1, 2011, 2014, -5});
  auto pairAbs= std::minmax({3, 1, 2011, 2014, -5}, [](int a, int b)
                      { return std::abs(a) < std::abs(b); });

  cout << "pairInt.first, pairInt.second:\t\t";
  cout << pairInt.first << ", " << pairInt.second << "\n"; // 2011,2014

  cout << "pairSeq.first, pairSeq.second:\t\t";
  cout << pairSeq.first << ", " << pairSeq.second << "\n";  // -5,2014

  cout << "pairAbs.first, pairAbs.second:\t\t ";
  cout << pairAbs.first << ", " << pairAbs.second << "\n";  // 1,2014

  return 0;
}
```



The functions `std::min`, `std::max`, and `std::minmax`

The table provides an overview of the functions `std::min`, `std::max` and `std::minmax`

Function	Description
`min(a, b)`	Returns the minimal value of `a` and `b`.
`min(a, b, comp)`	Returns the minimal value of `a` and `b` according to the predicate `comp`.
`min(initializer list)`	Returns the minimal value of the initializer list.
`min(initializer list, comp)`	Returns the minimal value of the initializer list according to the predicate `comp`.

`max(a, b)`	Returns the maximal value of `a` and `b`.
`max(a, b, comp)`	Returns the maximal value of `a` and `b` according to the predicate `comp`.
`max(initializer list)`	Returns the maximal value of the initializer list.
`max(initializer list, comp)`	Returns the maximal value of the initializer list according to the predicate `comp`.
`minmax(a, b)`	Returns the minimal and maximal value of `a` and `b`.
`minmax(a, b, comp)`	Returns the minimal and maximal value of `a` and `b` according to the predicate `comp` according to the predicate `comp`.
`minmax(initializer list)`	Returns the minimal and maximal value of the initializer list.
`minmax(initializer list, comp)`	Returns the minimal and maximal value of the initializer list according to the predicate `comp`.

The variations of `std::min`, `std::max` and `std::minmax`

Now, let's talk about another useful function the `std::move`.