

Informatik für Mathematiker und Physiker HS14

Exercise Sheet 7

Submission deadline: 15:15 - Tuesday 4th November, 2014
Course URL: <http://lec.inf.ethz.ch/ifmp/2014/>

Assignment 1 – Skript-Aufgabe 94 (4 points)

Consider the following family of functions:

```
T foo (S i) { return ++i; }
```

with T being one of the types `int`, `int&` and `const int&`, and S being one of the types `int`, `const int`, `int&` and `const int&`. This defines 12 different functions, and all of those combinations are syntactically correct.

- Find the combinations of T and S for which the resulting function definition is semantically valid, meaning, for example, that the constness of variables and references is respected. Semantical correctness also means that the compiler will accept the code, because we have already established syntactical correctness. Explain your answer.
- Among the combinations found in a), find the combinations of T and S for which the resulting function definition is also valid during runtime, meaning that function calls always have well-defined value and effect; explain your answer.
- For all combinations found in b), give precise postconditions for the corresponding function `foo`.

Assignment 2 (4 points)

- Write a function `sort` which takes two arguments as references and stores the smaller value in the first argument and the larger value in the second argument. For example:

```
int a = 3; int b = 5; sort(a, b); // Afterwards: a == 3 and b == 5
int c = 8; int d = 2; sort(c, d); // Afterwards: c == 2 and d == 8
```

- Write a program `sort_array.cpp` which reads 7 numbers of type `int` from `std::cin` into an array of length 7, then uses your function `sort` from part a) to sort the array into increasing order, and finally outputs the sorted array.
- Use `std::vector<int>` to improve your program so that it can sort inputs of arbitrary length. (The user should pass the length of the vector as the first input.) For example:

```
Input:  5 3 1 2 1 -2
Output: -2 1 1 2 3
```

Have a look at the programming project!