

Automatic Return Type

In this lesson, we'll look at the technique that deduces return type automatically.

WE'LL COVER THE FOLLOWING ^

- Automatic Return Type
- Automatic Return Type: C++14

Automatic Return Type

A function template is automatically able to deduce their return type.

```
template <typename T1, typename T2>
auto add(T1 fir, T2 sec) -> decltype( fir + sec ) {
    return fir + sec;
}
```

The automatic return type deduction is typically used for function templates but can also be applied to non-template functions.

Rules:

- **auto**: introduces the syntax for the delayed return type
- **auto**: **auto** type deduction is based on the function template argument deduction. Function template argument deduction ([decays](#)). So it means **auto** does not return the exact type but a decayed type such as for [template argument deduction](#)
- **decltype**: declares the return type
- The alternative function syntax is obligatory

The C++11 syntax for automatically deducing the return type breaks the crucial principle of software development: DRY. DRY stands for **Don't Repeat Yourself**.

Automatic Return Type: C++14

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```
template <typename T1, typename T2>
auto add(T1 fir, T2 sec){
    return fir + sec;
}
```

Rules

- **auto**: introduces the syntax for the delayed return type
- **decltype**: declares the return type
- ~~The alternative function syntax is obligatory.~~

With the expression **decltype(auto)**, **auto** uses the same rules to determine the type as **decltype**. This means, in particular, no **decay** takes place.

- Both declarations are identical.

```
decltype(expr) v= expr;
decltype(auto) v= expr;
```

- The syntax also applies for the automatic return type of a function template.

```
template <typename T1, typename T2>
decltype(auto) add(T1 fir, T2 sec){
    return fir + sec;
}
```

When a function template has more than one return statements, all return statements must have the same type.

In the next lesson, we'll study an example of automatic return type deduction.