

# Advanced Topics in Programming Language - Julia

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## Contents

<b>1</b>	<b>Type checking: recall</b>	<b>1</b>
1.1	Example: type inference vs. dynamic typing . . . . .	2

## List of Tables

## List of Figures

## 1 Type checking: recall

**Type checking** is the process of verifying and enforces the typing rules of a language. In other words the **type checker** (the type checking algorithm of the language ) is used to prove the **type safety** of a program.

It may occur either at:

1. compile time (**Static**);
2. run time (**Dynamic**).

Let's see in details what's the difference:

- **Static type checking:** is the process of verifying the type safety of a program based on the analysis of a program text. If a program passes a static type checker, then the program is guaranteed to satisfy some set of type safety properties for all possible inputs.
- **Dynamic type checking:** is the process of verifying the type safety of a program at runtime. It may cause a program to fail at runtime.

There are also two different ways to classify the type check:

- **Explicitly typed:** each variables is annotated in source code with type's information. In this case the *type check is simple but the language is more difficult* (from the programmers point of view).
- **Implicitly typed:** the data types of source code are automatically detected. It is also rederrred as **type inference**. The language *is easier but the type check algorithm is far more complex*.

## 1.1 Example: type inference vs. dynamic typing

These two kind of typings could be confused. Here an example to clarify the differences:

```
var1 = 10
var2 = "astring"
var3 = var1 + var2
```

1. In **dynamically typed** language this code run without errors: at runtime the *var1* is forced to be a string and the result is *"10astring"*;
2. By the other side, in **inferred type language** the compiler *throw an error*.