

Introduction to Functional Programming in *OCaml*

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Week 5 - Sequence 2: Getting information in and out



Back to the toplevel

We have been using *OCaml*'s toplevel extensively up to now.

- ▶ it *reads* our program, *incrementally*
 - ▶ it *prints* the result of the execution
- ... we could do without input/output operations!

For real programs, *OCaml* offers a rich set of I/O primitives.
We will now look at some of them.

But let's first meet the `unit` type.

The unit type

```
# ();;
```

```
- : unit = ()
```

The unit type

- ▶ the typical input or result type of a function **with side effects**
- ▶ has only one value
- ▶ also called *unit*
- ▶ written `()`
- ▶ why this syntax? will be clear in a few slides

Simple output

Printing an integer

```
# print_int;;
```

```
- : int -> unit = <fun>
```

This function

- ▶ takes an integer
- ▶ prints the integer on *standard output*
- ▶ returns the value () of the unit type

Simple output

Printing an integer

```
# print_int 12345;;
```

```
12345- : unit = ()
```

What happens

- ▶ 12345 is printed on *standard output*
- ▶ the *toplevel* prints its message, which says
 - ▶ the evaluation returns the value `()`
 - ▶ of the `unit` type
 - ▶ there is no identifier bound to it - :

Simple input

Reading a line

```
# read_line;;
```

```
— : unit -> string = <fun>
```

This function

- ▶ takes as input the value () of the `unit` type
- ▶ reads a line of characters from *standard input* as a string

Simple input

Reading a line

```
# read_line();;
```

some text

```
- : string = "some_text"
```

What happens

- ▶ `read_line` receives the argument `()`
- ▶ it starts reading from *standard input*
- ▶ we type some text and hit return
- ▶ the *oplevel* prints its message, which says
 - ▶ the evaluation returns the value `"some text"`
 - ▶ of the `string` type
 - ▶ there is no identifier bound to it `- :`

About the syntax

See why `()` for the unique value of the `unit` type?

```
read_line()
```

This looks like *a function with no argument* in other languages.
It's more familiar for outsiders!

Remember, it really is:

```
read_line ()
```

Simple input and output

Printing other base types

```
print_char : char -> unit  
print_string : string -> unit  
print_float : float -> unit
```

Flushing and newline

```
val print_newline : unit -> unit
```

Print a newline and flush standard output.

Simple input and output

There is much more

- ▶ *standard input, standard output and standard error*
- ▶ create, open and close *files*
- ▶ read and write on *channels*
- ▶ sophisticated parsing, like `scanf`, *well typed!*
- ▶ *see the manual section on Pervasives*

Notice: some of these functions are **not implemented** in the toplevel running in your browser.

Summary

Unit type, Input and Output

- ▶ The `unit` type is often used with functions **with side effects**, like `print_int : int -> unit`
- ▶ `read_line()` is really `read_line` applied to `()`
- ▶ We now know how to perform basic input/output
- ▶ *OCaml* has many more sophisticated input/output functions, look at the reference manual to know more