Introduction to Functional Programming in *OCaml*

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Week 1 - Sequence 3: Definitions

Global Definitions

- give names to values
- global: effective for the rest of the toplevel session
- syntax: `let` *name* = *expression*
- there is no separate declaration of identifiers
- once set, the value of an identifier never changes
- once defined, an identifier can be used in expressions

Global Definition Examples I

```
let x = 2+3;;
# val x : int = 5

let y = 2*x;;
# val y : int = 10

let x = 42;;
# val x : int = 42

y;;
# - : int = 10

x;;
# - : int = 42
```

Local Definitions

- Naming with a delimited scope
- Syntax: `let` *name* = *exp1* in *exp2*
- Here, the *scope* of *name* is *exp2*
- A local definition may temporarily hide a more global one.

Local Definition Examples I

```
let x = 4+5 in 2*x;;
# - : int = 18
x;;
# Characters 0-1:
  x;;
  ^
Error: Unbound value x
let x = 17;;
# val x : int = 17
x;;
# - : int = 17
let y = x+1 in y/3;;
# - : int = 6
```

Local Definition Examples II

```
let x = 4 in
let y = x+1 in
let x = 2*y in x;;
# - : int = 10

let x = 4 in
(let x = 17 in x+1) + x;;
# - : int = 22
```

Visibility of Definitions

```
let x = 1;;
⋮                    }x = 1
let x = 2 in
  ⋮                  }x = 2
  let x = 3 in
    ⋮                }x = 3
  ⋮                  }x = 2
⋮                    }x = 1
```

Local definitions hide more global definitions

Simultaneous Definitions

- `let x = e :`
  e is evaluated w.r.t. the value bindings before the let
- `let x1 = e1 and x2 = e2 :`
  both expressions are evaluated w.r.t. the value bindings before the let
- Same effect as `let x2 = e2 and x1 = e1`
- Works both with global and local definitions

Simultaneous Definitions Examples I

```
let x = 1;;
# val x : int = 1

(* sequential   definitions  *)
let x = 2 in
    let y = x + 1 in (* y = 2+1 *)
    x*y;;           (* 2*3 *)
# - : int = 6

(* simultaneous  definition  *)
let x = 2
  and y = x+1 in (* y = 1+1 *)
    x*y;;        (* 2*2 *)
# - : int = 4
```