OCaml Functional language

opam switch + packages → installs → **dune** dune-project, dune files → compiles → **ocamlfind / ocamlopt** native or bytecode → produces → **Executable** _build/default

CONCEPTS

Everything is an expression and values are immutable by default; reach for ref or mutable fields only when needed.

Operators differ per type: + is int, +. is float, ^ joins strings, @ joins lists.

VALUES & FUNCTIONS

`let x = 42`
Bind a name to a value

`let x = 1 in x + 1`
Local binding in an expression

`let add a b = a + b`
Define a function

`let sq = fun x → x * x`
Anonymous function

`let rec fact n = if n ⩽ 1 then 1 else n * fact (n - 1)`
Recursive function

`x ▷ f ▷ g`
Pipe a value through functions

`let x = ref 0 in x := !x + 1`
Mutable reference

VALUES & FUNCTIONS (cont.)

`if c then a else b`
Conditional expression

`print_endline "hi"`
Print a line

`Printf.printf "%d %s\n" n s`
Formatted output

TYPES & PATTERN MATCHING

`type t = Red | Green | Blue of int`
Variant type

`type p = { name : string; age : int }`
Record type

`{ p with age = 31 }`
Copy a record with a change

`type 'a tree = Leaf | Node of 'a tree * 'a * 'a tree`
Recursive polymorphic type

`match v with | A → 1 | B n → n`
Match a variant

`| x :: rest → ... | [] → ...`
Match list head and tail

TYPES & PATTERN MATCHING (cont.)

`| Some x → x | None → d`
Match an option

`let p = { name = "Ann"; age = 30 }`
Build a record

`try f () with Not_found → d`
Catch an exception

OPTION & RESULT

`Some x / None`
Optional value

`Option.map f o`
Map over a present value

`Option.value o ~default:d`
Unwrap with a default

`Ok v / Error e`
Result values

LISTS & ARRAYS

`[1; 2; 3]`
List literal (semicolons)

`x :: xs`
Prepend to a list

`a @ b`
Concatenate lists

LISTS & ARRAYS (cont.)

`List.map f l`
Transform each element

`List.filter p l`
Keep matching elements

`List.fold_left f acc l`
Reduce from the left

`List.iter f l`
Run for side effects

`List.length l`
Number of elements

`List.rev l`
Reverse a list

`List.find_opt p l`
First match as option

`List.sort compare l`
Sort a list

`[| 1; 2; 3 |]`
Array literal

`a.(i) / a.(i) ← v`
Read / write array element

`Array.make n 0`
Array of n copies

STRINGS & I/O

`"ab" ^ "cd"`
Concatenate strings

`String.length s`
String length

MODULES

`module M = struct ... end`
Define a module

`module type S = sig ... end`
Declare a signature

`file.ml / file.mli`
Implementation and interface

DUNE

`dune init project <name>`
Create a project

`dune build`
Build everything

`dune exec <name>`
Build and run an executable

`dune test`
Run tests

OPAM & TOOLCHAIN

`opam install <pkg>`
Install a package

TOPLEVEL & COMPILER

`utop`
Interactive toplevel with history