

OCaml Static Semantics Cheat Sheet

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1 Notation

Recall that $e : t$ means that e has type t . We'll use t (as well as variants like t_1, t_2, t' , etc.) to mean arbitrary types. We'll write rules like this:

$$\frac{\text{Premise \#1} \quad \text{Premise \#2} \quad \dots}{\text{Conclusion}}$$

to mean that if the premises (everything above the line) hold, then the conclusion holds. We'll write this with nothing above the line if the conclusion is always true. We'll write $x : t \Rightarrow e : t'$ to mean that e has type t' assuming x is a variable of type t .

2 Values

2.1 Base Values

Types	Examples
Integers	$1 : \text{int}, 2 : \text{int}, \dots$
FLOATS	$1.0 : \text{float}, 2.0 : \text{float}, 3.14 : \text{float}, \dots$
BOOLEANS	$\text{true} : \text{bool}, \text{false} : \text{bool}$
STRINGS	$\text{"Hello"} : \text{string}$
CHARACTERS	$\text{'a'} : \text{char}$
UNIT	$() : \text{unit}$

2.2 Tuples

$$\frac{v_1 : t_1 \quad v_2 : t_2 \quad \dots \quad v_n : t_n}{(v_1, v_2, \dots, v_n) : t_1 * t_2 * \dots * t_n}$$

2.3 Anonymous Functions

$$\frac{x : t \Rightarrow e : t'}{\text{fun } x -> e : t -> t'}$$

3 Operators

3.1 Integer Operators

$$\frac{e_1 : \text{int} \quad e_2 : \text{int}}{e_1 + e_2 : \text{int}} \quad \frac{e_1 : \text{int} \quad e_2 : \text{int}}{e_1 - e_2 : \text{int}} \quad \frac{e_1 : \text{int} \quad e_2 : \text{int}}{e_1 * e_2 : \text{int}} \quad \frac{e_1 : \text{int} \quad e_2 : \text{int}}{e_1 / e_2 : \text{int}}$$

3.2 Float Operators

$$\frac{e_1 : \text{int} \quad e_2 : \text{int}}{e_1 +. e_2 : \text{int}} \quad \frac{e_1 : \text{int} \quad e_2 : \text{int}}{e_1 -. e_2 : \text{int}} \quad \frac{e_1 : \text{int} \quad e_2 : \text{int}}{e_1 *. e_2 : \text{int}} \quad \frac{e_1 : \text{int} \quad e_2 : \text{int}}{e_1 /. e_2 : \text{int}}$$

3.3 String Concatenation

$$\frac{e_1 : \text{string} \quad e_2 : \text{string}}{e_1 \wedge e_2 : \text{string}}$$

4 Other Expressions

4.1 If

$$\frac{e_1 : \text{bool} \quad e_2 : t \quad e_3 : t}{\text{if } e_1 \text{ then } e_2 \text{ else } e_3 : t}$$

4.2 Let

$$\frac{x : t \Rightarrow e_2 : t' \quad e_1 : t}{\text{let } x = e_1 \text{ in } e_2 : t'}$$

4.3 Function Application

$$\frac{e_1 : t -> t' \quad e_2 : t}{e_1 \ e_2 : t'}$$

4.4 Type Annotations

$$\frac{e : t}{(e : t) : t}$$