Tipos

Manejo de memoria: ¿Que número de bits necesito para almacenar la información?

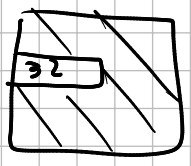
Número --> 32 bits (integer)
--> 64 bits (long)
--> 128 bits (long long)
Double --> 32 bits (float)
--> 64 (double)
--> 128 (double de doble precisión)

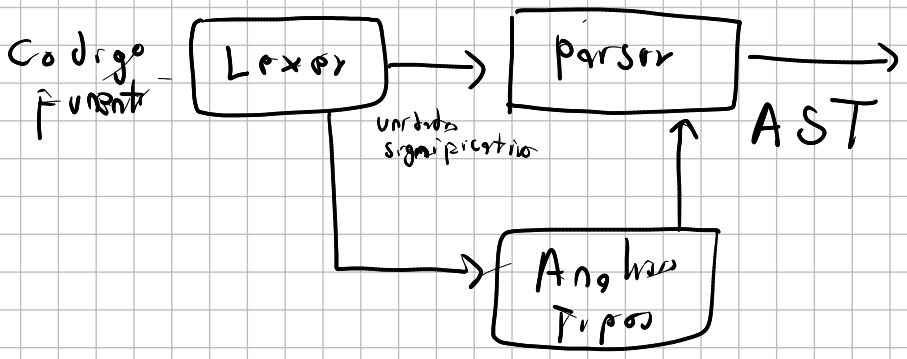
} Ejemplos

Tipado ≠ Compilado → más rápido { C++ Java

var a = 8;
a = "HolaF"
↓
8

} 32 bits
40 bits





Reglas Tipos

primitivo { + , > ✓

int * int → int and bool ∨ bool → bool
int * int → bool

condicional { if <test-exp>
then <true-exp>
<test-exp> := bool
<true-exp> = <false-exp>
false <false-exp>

proc $\begin{cases} t_1 * t_2 * t_3 * \dots * t_n \to t \\ \text{proc}(\underbrace{\quad\quad}_{n \text{ variables}}) \end{cases}$

app-exp $\begin{cases} (f\ \overbrace{t_1' \dots t_2'}) \\ t_f = t_1 * t_2 * t_3 * \dots * t_n \to t \\ \dfrac{t_1 = t_1' \quad t_2 = t_2' \quad t_n = t_n'}{t} \end{cases}$

```
let
  f = proc (int n, int m)
        if >(n, m)
        then +(n, m)
        else -(n, m)
  in
    (f 2 3)
```

$t_f = int * int \to int$

$(f\ 2\ 3)$

$t_f = int * int \to int$

$2 = int$ $\quad$ $3 = int$

$\dfrac{}{int}$

basicos $\begin{cases} \langle int \rangle = int \\ \langle bool \rangle = bool \end{cases}$

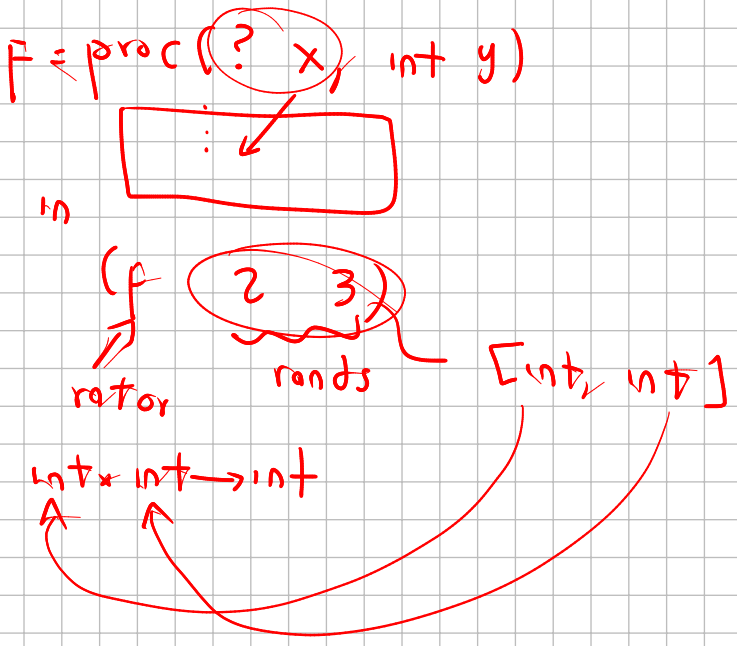
let $\begin{cases} \text{let} \\ | \\ \text{in} \ \langle exp \rangle \end{cases}$ $\quad \langle exp \rangle \to Texp$

let
f = proc (x y)
if >(x, y)
then x else y
in
(f 2 3)

Inferencia de tipos

Chequeo de tipos

let
f = proc (int x, int y)
if >(x, y)
then x else y
in (f 2 3)



1. Realice chequeo de tipos en la siguiente expresión:

```
let
    j = proc(int x, (int->bool) y)
        if (y 2) then +(x,2) else -(x,3)
    t = proc(int*int->bool k, int a, int b, int c)
        (k +(a,b) c)
    s = proc(int w) >(w,0)
    in
      let
          p = proc(int->(bool->int)*int*int->int) m , int->(bool->int) n)
              (m n 1 3 s)
          in
            (p t j)
```

$t_j = int * (int \to bool) \to int$

$t_t = (int*int \to bool) * int*int*int \to bool$

$t_s = int \to bool$

$t_p = int \to (bool \to int) * int*int \to int$
$* int \to (bool \to int) \to int$

Verifique esta expresión, si hay errores de tipo indique cuales son.

2. Escriba expresiones de tipo que cumplan:

- `(int * (int ->bool) * (int ->(bool ->int)) ->(int ->bool)`
- `(int * bool *(int->int) * int ->(bool->int)) ->(int ->(bool->int))`
- `(int * (bool->bool) * (int ->(bool->int)))->(bool->int)`

t_p $int*int \to bool$

t_t $int \to (bool \to int)$

2. Escriba expresiones de tipo que cumplan:

- `(int * (int ->bool) * (int ->(bool ->int)) ->(int ->bool)`
- `(int * bool *(int->int) * (int ->(bool->int)) ->(int ->(bool->int))`
- `(int * (bool->bool) * (int ->(bool->int)))->(bool->int)`