

# Introducción a Haskell

Ignacio Ballesteros  
Luis Eduardo Bueso

[https://github.com/edububa/haskell\\_course](https://github.com/edububa/haskell_course)

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# Índice

## Introducción

Instalación

Introducción Histórica

¿Qué es Haskell?

## Primeros Pasos

GHCi

Primeras funciones

Listas

Tuplas

## Tipos y Typeclasses

## Sintaxis en funciones

Pattern matching

Guards

where

let

Case Expressions

## Recursión



# Introducción

## Instalación

- ▶ Con gestores de paquetes
  - ▶ Debian/Ubuntu

```
sudo apt-get update  
sudo apt-get install ghc
```

- ▶ Arch

```
sudo pacman -S ghc
```

- ▶ macOS

```
brew install ghc
```

- ▶ Desde la web

<https://www.haskell.org/platform/mac.html>

<https://www.haskell.org/platform/windows.html>

<https://www.haskell.org/downloads/linux>

# Introducción

## Introducción Histórica



# Introducción

¿Qué es Haskell?



# Primeros pasos

## GHCi

- ▶ Así abrimos el intérprete de Haskell

```
> ghci
GHCi, version 8.0.2: http://www.haskell.org/ghc/
:? for help
Prelude>
```

- ▶ Podemos escribir expresiones aritméticas y lógicas:

```
Prelude> 2 + 2
4
Prelude> True && False
False
```

# Primeros pasos

## GHCi

- Podemos llamar a funciones

```
Prelude> 2 + 2
4
Prelude> True && False
False
```

- Errores

```
Prelude> 2 + "hola"

<interactive>:6:1: error:
• No instance for (Num [Char]) arising from a use
  of '+'
• In the expression: 2 + "hola"
In an equation for 'it': it = 2 + "hola"
```

# Primeros pasos

## GHCi

- Expresiones útiles:

```
Prelude> :t 5
```

```
5 :: Num t => t
```

```
Prelude> :t 2
```

```
2 :: Num t => t
```

```
Prelude> :t "hola"
```

```
"hola" :: [Char]
```

```
Prelude> :l introduccion.hs
```

```
[1 of 1] Compiling Main
```

```
( introduccion.hs, interpreted )
```

```
Ok, modules loaded: Main.
```

```
*Main>
```



# Primeros pasos

## Primeras funciones

Ejemplos:

```
doubleMe x = x + x
```

```
doubleUs x y = doubleMe x + doubleMe y
```

```
doubleSmallNumber x = (if x > 100 then x else x*2) + 1
```

# Primeros pasos

## Listas

Creando listas en un fichero .hs:

```
list = [1,2,3,4,5]  
list' = [1..5]
```

Ejemplos de listas en el GHCi

```
Prelude> let list = [1,2,3,4,5]  
Prelude> let list1 = [1..5]  
Prelude> list == list1  
list == list1  
True  
Prelude>
```

# Primeros pasos

## Listas

Las listas pueden concatenarse con el operador ++ y construirse con el operador :

```
Prelude> [1..9] ++ [10..19]
[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19]
Prelude> "hello " ++ "world!"
"hello world!"
Prelude> 1:[2..5]
1:[2..5]
[1,2,3,4,5]
Prelude> 'h':"ello"
"hello"
Prelude> 1:text [1]
```

# Primeros pasos

## Listas

Las operaciones básicas en las listas son:

► head:

```
Prelude> head [1..10]  
1
```

► tail:

```
Prelude> tail [1..10]  
[2,3,4,5,6,7,8,9,10]
```

► last:

```
Prelude> last [1..10]  
10
```

# Primeros pasos

## Listas

- ▶ length:

```
Prelude> length [1..10]  
10
```

- ▶ reverse:

```
Prelude> reverse [1..10]  
[10,9,8,7,6,5,4,3,2,1]
```

- ▶ take:

```
Prelude> take 4 [1..10]  
[1,2,3,4]
```

# Primeros pasos

## Tuplas

```
tuple = (1, False)
```

Las operaciones básicas en las tuplas son:

► `fst`

```
Prelude> let tuple = (1, False)
Prelude> fst tuple
1
```

► `snd`

```
Prelude> let tuple = (1, False)
Prelude> snd tuple
False
Prelude>
```

# Tipos y *Typeclasses*

## Tipos

```
doubleMe :: Int -> Int
```

```
doubleMe x = x + x
```

```
doubleMe :: Int -> Int -> Int
```

```
doubleUs x y = doubleMe x + doubleMe y
```

```
doubleSmallNumber :: Int -> Int
```

```
doubleSmallNumber x = (if x > 100 then x else x*2) + 1
```

# Tipos y *Typeclasses*

## *Typeclasses*

```
doubleMe :: (Num a) => a -> a
```

```
doubleMe x = x + x
```

```
doubleMe :: (Num a) => a -> a -> a
```

```
doubleUs x y = doubleMe x + doubleMe y
```

```
doubleMe :: (Num a) => a -> a
```

```
doubleSmallNumber x = (if x > 100 then x else x*2) + 1
```



# Sintaxis en funciones

## *Pattern matching*

```
sayMe :: (Integral a) => a -> String
sayMe 1 = "One!"
sayMe 2 = "Two!"
sayMe 3 = "Three!"
sayMe 4 = "Four!"
sayMe 5 = "Five!"
sayMe x = "Not between 1 and 5"
```

```
Prelude> :l introduccion.hs
[1 of 1] Compiling Main
( introduccion.hs, interpreted )
Ok, modules loaded: Main.
*Main> sayMe 5
"Five!"
```

# Sintaxis en funciones

## *Guards*

```
compare :: (Ord a) => a -> a -> Ordering
a `compare` b
| a > b      = GT
| a == b     = EQ
| otherwise = LT
```

```
Prelude> :l introduccion.hs
[1 of 1] Compiling Main
( introduccion.hs, interpreted )
Ok, modules loaded: Main.
*Main> 1 `myCompare` 2
LT
*Main> 1 `myCompare` 0.5
GT
```

# Sintaxis en funciones

*where*

```
initials :: String -> String -> String
initials firstname lastname = [f] ++ ". " ++ [l] ++ "."
    where (f:_) = firstname
          (l:_) = lastname
```

# Sintaxis en funciones

*let*

```
cylinder :: (RealFloat a) => a -> a -> a
cylinder r h =
    let sideArea = 2 * pi * r * h
        topArea = pi * r ^2
    in sideArea + 2 * topArea
```

# Sintaxis en funciones

## *Case Expressions*

```
describeList :: [a] -> String
describeList xs = "The list is " ++
  case xs of [] -> "empty."
             [x] -> "a singleton list."
             xs -> "a longer list."
```

# Recursión

```
factorial :: Num a => a -> a  
factorial 0 = 1  
factorial n = n * factorial (n - 1)
```

# Recursión

```
duplicar :: Num a => [a] -> [a]
duplicar []      = []
duplicar [x]     = [x*2]
duplicar (x:xs)  = (x*2):(duplicar xs)
```

```
duplicar :: Num a => [a] -> [a]
duplicar []      = []
duplicar [x]     = [x*2]
duplicar (x:xs)  = (x*2):(duplicar xs)
```

# Aclaraciones

