

```
ouzo2:code$ ghci 3pIntro.hs
GHCi, version 8.2.2: http://www.haskell.org/ghc/  :? for help
Loaded GHCi configuration from /Users/hallgren/.ghci
[1 of 1] Compiling Main          ( 3pIntro.hs, interpreted )
Ok, one module loaded.
*Main> main
Listening on http://127.0.0.1:8023
^CForeign.JavaScript: Browser window disconnected.

Shutting down..
Interrupted.
*Main> :r
[1 of 1] Compiling Main          ( 3pIntro.hs, interpreted )
Ok, one module loaded.
*Main> main
Listening on http://127.0.0.1:8023
^CForeign.JavaScript: Browser window disconnected.

Shutting down..
Interrupted.
*Main> :r
[1 of 1] Compiling Main          ( 3pIntro.hs, interpreted )
Ok, one module loaded.
*Main> main
Listening on http://127.0.0.1:8023
^CForeign.JavaScript: Browser window disconnected.

Shutting down..
Interrupted.
*Main> :t event

<interactive>:1:1: error:
  • Variable not in scope: event
  • Perhaps you meant 'even' (imported from Prelude)
*Main> :t click
click :: Element -> Event ()
*Main> :t on
on :: (element -> Event a) -> element -> (a -> UI void) -> UI ()
*Main> :r
[1 of 1] Compiling Main          ( 3pIntro.hs, interpreted )
Ok, one module loaded.
*Main> main
Listening on http://127.0.0.1:8023
Foreign.JavaScript: Browser window disconnected.
Foreign.JavaScript: Browser window disconnected.
^CForeign.JavaScript: Browser window disconnected.

Shutting down..
Interrupted.
*Main> :r
[1 of 1] Compiling Main          ( 3pIntro.hs, interpreted )
Ok, one module loaded.
*Main> main
Listening on http://127.0.0.1:8023
```

^CForeign.JavaScript: Browser window disconnected.

Shutting down..

Interrupted.

**\*Main>** :r

[1 of 1] Compiling Main ( 3pIntro.hs, interpreted )

**3pIntro.hs:26:24: error:**

- Variable not in scope: up :: Element
- Perhaps you meant one of these:
  - 'p' (imported from Graphics.UI.Threepenny),
  - 'sup' (imported from Graphics.UI.Threepenny),
  - 'ul' (imported from Graphics.UI.Threepenny)

```
26 |           on click up (\ _ -> do s <- get value disp
    |                               ^^
```

Failed, no modules loaded.

**Prelude>** :r

[1 of 1] Compiling Main ( 3pIntro.hs, interpreted )

Ok, one module loaded.

**\*Main>** main

Listening on http://127.0.0.1:8023

^CForeign.JavaScript: Browser window disconnected.

Shutting down..

Interrupted.

**\*Main>** :r

[1 of 1] Compiling Main ( 3pIntro.hs, interpreted )

Ok, one module loaded.

**\*Main>** main

Listening on http://127.0.0.1:8023

^CForeign.JavaScript: Browser window disconnected.

Shutting down..

Interrupted.

**\*Main>** :l 3p

3pFudgetsIntro.hs 3pIntro.hs

**\*Main>** :l 3pFudgetsIntro.hs

[1 of 2] Compiling ThreepennyFudgets ( ThreepennyFudgets.hs, interpreted )

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main>** main

Listening on http://127.0.0.1:8023

127.0.0.1 -- [10/Dec/2018:13:51:38 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:13:51:38 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:13:51:38 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:13:51:38 +0100] "GET /static/css/demo.css HTTP/1.1" 200 183 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2)"

```
AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
^CForeign.JavaScript: Browser window disconnected.
thread killed
```

Shutting down..

Interrupted.

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main> main
```

```
Listening on http://127.0.0.1:8023
```

```
127.0.0.1 -- [10/Dec/2018:13:53:03 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:13:53:03 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:13:53:03 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:13:53:03 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
^CForeign.JavaScript: Browser window disconnected.
```

```
thread killed
```

Shutting down..

Interrupted.

```
*Main> :r
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```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
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Ok, two modules loaded.
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Listening on http://127.0.0.1:8023
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```
127.0.0.1 -- [10/Dec/2018:13:54:24 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:13:54:24 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
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```
127.0.0.1 -- [10/Dec/2018:13:54:24 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:13:54:24 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
^CForeign.JavaScript: Browser window disconnected.
```

```
thread killed
```

Shutting down..

Interrupted.

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main> main
```

```
Listening on http://127.0.0.1:8023
127.0.0.1 - - [10/Dec/2018:13:55:49 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5
.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko)
Version/12.0.2 Safari/605.1.15"
127.0.0.1 - - [10/Dec/2018:13:55:49 +0100] "GET /haskell.css HTTP/1.1" 200 80 "h
ttp://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWeb
Kit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 - - [10/Dec/2018:13:55:49 +0100] "GET /haskell.js HTTP/1.1" 200 100857
"http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) Apple
WebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 - - [10/Dec/2018:13:55:49 +0100] "GET /static/css/demo.css HTTP/1.1" 3
04 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) A
ppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
^CForeign.JavaScript: Browser window disconnected.
thread killed
```

Shutting down..

Interrupted.

**\*Main>** :r

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main>** main

```
Listening on http://127.0.0.1:8023
127.0.0.1 - - [10/Dec/2018:13:58:30 +0100] "GET /haskell.css HTTP/1.1" 200 80 "h
ttp://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWeb
Kit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 - - [10/Dec/2018:13:58:30 +0100] "GET /haskell.js HTTP/1.1" 200 100857
"http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) Apple
WebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 - - [10/Dec/2018:13:58:30 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5
.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko)
Version/12.0.2 Safari/605.1.15"
127.0.0.1 - - [10/Dec/2018:13:58:30 +0100] "GET /static/css/demo.css HTTP/1.1" 3
04 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) A
ppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
^CForeign.JavaScript: Browser window disconnected.
thread killed
```

Shutting down..

Interrupted.

**\*Main>** :r

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main>** main

```
Listening on http://127.0.0.1:8023
127.0.0.1 - - [10/Dec/2018:13:58:42 +0100] "GET /haskell.css HTTP/1.1" 200 80 "h
ttp://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWeb
Kit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 - - [10/Dec/2018:13:58:42 +0100] "GET /haskell.js HTTP/1.1" 200 100857
"http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) Apple
WebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 - - [10/Dec/2018:13:58:42 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5
.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko)
Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:13:58:42 +0100] "GET /static/css/demo.css HTTP/1.1" 3
04 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) A
ppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
^CForeign.JavaScript: Browser window disconnected.
thread killed
```

Shutting down..

Interrupted.

**\*Main> :r**

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main> main**

Listening on http://127.0.0.1:8023

```
127.0.0.1 - - [10/Dec/2018:14:00:14 +0100] "GET /haskell.css HTTP/1.1" 200 80 "h
ttp://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWeb
Kit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:00:14 +0100] "GET /haskell.js HTTP/1.1" 200 100857
"http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) Apple
WebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:00:14 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5
.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko)
Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:00:14 +0100] "GET /static/css/demo.css HTTP/1.1" 3
04 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) A
ppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

^CForeign.JavaScript: Browser window disconnected.

thread killed

Shutting down..

Interrupted.

**\*Main> :t listF**

listF :: Eq a => [(a, F hi b)] -> F (a, hi) (a, b)

**\*Main> :R**

unknown command ':R'

use :? for help.

**\*Main> :r**

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

**3pFudgetsIntro.hs:62:36: error:**

- Couldn't match expected type 'F hi2 (CounterButton, b0)'  
with actual type '[(CounterButton, F Click Click)]'
- In the second argument of '(=<=)', namely 'counterButtonsF'  
In the second argument of '(=<=)', namely  
'stateF count 0 =<= counterButtonsF'  
In the expression: showF =<= stateF count 0 =<= counterButtonsF
- Relevant bindings include  
ex4 :: F hi2 ho (bound at 3pFudgetsIntro.hs:62:1)

```
62 | ex4 = showF =<= stateF count 0 =<= counterButtonsF
    | ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

Failed, one module loaded.

**\*ThreepennyFudgets> :r**

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main>** main

Listening on http://127.0.0.1:8023

127.0.0.1 -- [10/Dec/2018:14:03:25 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:03:25 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:03:25 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:03:25 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

^CForeign.JavaScript: Browser window disconnected.

thread killed

Shutting down..

Interrupted.

**\*Main>** :r

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main>** main

Listening on http://127.0.0.1:8023

127.0.0.1 -- [10/Dec/2018:14:20:13 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:20:13 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:20:13 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:20:13 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

^CForeign.JavaScript: Browser window disconnected.

thread killed

Shutting down..

Interrupted.

**\*Main>** :r

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main>** main

Listening on http://127.0.0.1:8023

127.0.0.1 -- [10/Dec/2018:14:20:25 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:20:25 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:20:25 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) A



```
ppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 -- [10/Dec/2018:14:20:25 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5
.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko)
Version/12.0.2 Safari/605.1.15"
^CForeign.JavaScript: Browser window disconnected.
thread killed
```

Shutting down..

Interrupted.

```
*Main> :R
```

```
unknown command ':R'
```

```
use :? for help.
```

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

**3pFudgetsIntro.hs:84:26: error:**

- Couldn't match expected type '(Int, Integer) -> F hi b' with actual type 'F Click Click'
- The function 'squareF' is applied to one argument, but its type 'F Click Click' has none  
In the expression: squareF (x, y)  
In the expression: ((x, y), squareF (x, y))
- Relevant bindings include  
squaresF :: F ((Int, Integer), hi) ((Int, Integer), b)  
(bound at 3pFudgetsIntro.hs:84:1)

```
84 | squaresF = listF [((x,y), squareF (x,y)) | y<-[1..height], x<-[1..width]]
      ^^^^^^^^^^^^^^^^^
```

Failed, one module loaded.

```
*ThreepennyFudgets> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main> main
```

```
Listening on http://127.0.0.1:8023
```

```
127.0.0.1 -- [10/Dec/2018:14:25:13 +0100] "GET /haskell.css HTTP/1.1" 200 80 "h
ttp://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWeb
Kit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:25:13 +0100] "GET /haskell.js HTTP/1.1" 200 100857
"http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) Apple
WebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:25:13 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5
.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko)
Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:25:13 +0100] "GET /static/css/demo.css HTTP/1.1" 3
04 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) A
ppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
^CForeign.JavaScript: Browser window disconnected.
```

```
thread killed
```

Shutting down..

Interrupted.

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main> main
Listening on http://127.0.0.1:8023
127.0.0.1 -- [10/Dec/2018:14:26:24 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 -- [10/Dec/2018:14:26:24 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 -- [10/Dec/2018:14:26:24 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 -- [10/Dec/2018:14:26:24 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
^CForeign.JavaScript: Browser window disconnected.
thread killed
```

Shutting down..

Interrupted.

```
*Main> :t withF
```

```
withF :: F hi ho -> [Attribute] -> F hi ho
```

```
*Main> :r
```

```
:reload :reload! :run
```

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main> main
```

```
Listening on http://127.0.0.1:8023
```

```
127.0.0.1 -- [10/Dec/2018:14:28:19 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:28:19 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:28:19 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:28:19 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
^CForeign.JavaScript: Browser window disconnected.
```

```
thread killed
```

Shutting down..

Interrupted.

```
*Main> :t buttonGroupF
```

```
buttonGroupF :: F hi ho -> F (Click + hi) (Click + ho)
```

```
*Main> :t str
```

```
string stringDisplayF stringF strokePath
```

```
*Main> :t stringDisplayF
```

```
stringDisplayF :: F String ho
```

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```



**\*Main>** main

Listening on http://127.0.0.1:8023

127.0.0.1 -- [10/Dec/2018:14:29:28 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:29:28 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:29:28 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

127.0.0.1 -- [10/Dec/2018:14:29:28 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_14\_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"

^CForeign.JavaScript: Browser window disconnected.

thread killed

Shutting down..

Interrupted.

**\*Main>** :r

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

**3pFudgetsIntro.hs:82:7: error:**

- Ambiguous type variable 'ho0' arising from a use of 'showF' prevents the constraint '(Show ho0)' from being solved. Probable fix: use a type annotation to specify what 'ho0' should be.

These potential instances exist:

instance (Show b, Show a) => Show (Either a b)  
-- Defined in 'Data.Either'

instance Show Ordering -- Defined in 'GHC.Show'

instance Show Integer -- Defined in 'GHC.Show'

...plus 30 others

...plus 96 instances involving out-of-scope types

(use -fprint-potential-instances to see them all)

- In the first argument of '(=)', namely 'showF'  
In the expression: showF = tableF width squaresF `classF` "board"  
In an equation for 'ex6':

ex6 = showF = tableF width squaresF `classF` "board"

82 | ex6 = showF = tableF width squaresF `classF` "board"  
    | ^^^^^

Failed, one module loaded.

**\*ThreepennyFudgets>** :r

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main>** :t tableF

tableF :: Int -> F hi ho -> F hi ho

**\*Main>** :t ex6

ex6

:: F ((Int, Integer), Click + String) ((Int, Integer), Click + ho)

**\*Main>** :r

[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )

Ok, two modules loaded.

**\*Main>** :t ex6

```
ex6 :: F ((Int, Integer), Click + String) ((Int, Integer), Click)
```

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main> main
```

```
Listening on http://127.0.0.1:8023
```

```
127.0.0.1 - - [10/Dec/2018:14:31:33 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:31:33 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:31:33 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:31:33 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
^CForeign.JavaScript: Browser window disconnected.
```

```
thread killed
```

```
Shutting down..
```

```
Interrupted.
```

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main> main
```

```
Listening on http://127.0.0.1:8023
```

```
127.0.0.1 - - [10/Dec/2018:14:33:05 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:33:05 +0100] "GET /haskell.js HTTP/1.1" 200 100857 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:33:05 +0100] "GET /static/css/demo.css HTTP/1.1" 304 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:33:05 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
^CForeign.JavaScript: Browser window disconnected.
```

```
thread killed
```

```
Shutting down..
```

```
Interrupted.
```

```
*Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main> main
```

```
Listening on http://127.0.0.1:8023
```

```
127.0.0.1 - - [10/Dec/2018:14:34:05 +0100] "GET /haskell.css HTTP/1.1" 200 80 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 - - [10/Dec/2018:14:34:05 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5
```

```
.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko)
Version/12.0.2 Safari/605.1.15"
127.0.0.1 -- [10/Dec/2018:14:34:05 +0100] "GET /haskell.js HTTP/1.1" 200 100857
"http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) Apple
WebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
127.0.0.1 -- [10/Dec/2018:14:34:05 +0100] "GET /static/css/demo.css HTTP/1.1" 3
04 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) A
ppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
^CForeign.JavaScript: Browser window disconnected.
thread killed
```

Shutting down..

Interrupted.

```
*Main> :m Data.IORef
```

```
Prelude Data.IORef> :browse
```

```
atomicModifyIORef :: IORef a -> (a -> (a, b)) -> IO b
```

```
atomicModifyIORef' :: IORef a -> (a -> (a, b)) -> IO b
```

```
atomicWriteIORef :: IORef a -> a -> IO ()
```

```
mkWeakIORef :: IORef a -> IO () -> IO (GHC.Weak.Weak (IORef a))
```

```
modifyIORef :: IORef a -> (a -> a) -> IO ()
```

```
modifyIORef' :: IORef a -> (a -> a) -> IO ()
```

```
newtype IORef a
```

```
  = GHC.IORef.IORef (GHC.STRef.STRef GHC.Prim.RealWorld a)
```

```
newIORef :: a -> IO (IORef a)
```

```
readIORef :: IORef a -> IO a
```

```
writeIORef :: IORef a -> a -> IO ()
```

```
Prelude Data.IORef> :m Main
```

```
Prelude Main> :R
```

```
unknown command ':R'
```

```
use :? for help.
```

```
Prelude Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main Main> :r
```

```
[2 of 2] Compiling Main ( 3pFudgetsIntro.hs, interpreted )
```

```
Ok, two modules loaded.
```

```
*Main Main> main
```

```
Listening on http://127.0.0.1:8023
```

```
127.0.0.1 -- [10/Dec/2018:14:38:41 +0100] "GET /haskell.css HTTP/1.1" 200 80 "h
ttp://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWeb
Kit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:38:41 +0100] "GET /haskell.js HTTP/1.1" 200 100857
"http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) Apple
WebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:38:41 +0100] "GET / HTTP/1.1" 200 369 - "Mozilla/5
.0 (Macintosh; Intel Mac OS X 10_14_2) AppleWebKit/605.1.15 (KHTML, like Gecko)
Version/12.0.2 Safari/605.1.15"
```

```
127.0.0.1 -- [10/Dec/2018:14:38:41 +0100] "GET /static/css/demo.css HTTP/1.1" 3
04 0 "http://127.0.0.1:8023/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_2) A
ppleWebKit/605.1.15 (KHTML, like Gecko) Version/12.0.2 Safari/605.1.15"
```

```
^CForeign.JavaScript: Browser window disconnected.
```

```
thread killed
```

Shutting down..

```
Interrupted.
*Main Main> :t imgF
imgF :: URL -> F URL o
*Main Main> :t imgF
imgF  imgF'
*Main Main> UI.i
UI.id_      UI.img      UI.interval  UI.italics
UI.image    UI.input    UI.ismap
*Main Main> UI.im
UI.image    UI.img
*Main Main> :t UI.image
UI.image :: UI Element
*Main Main>
Leaving GHCi.
ouzo2:code$
ouzo2:code$
```