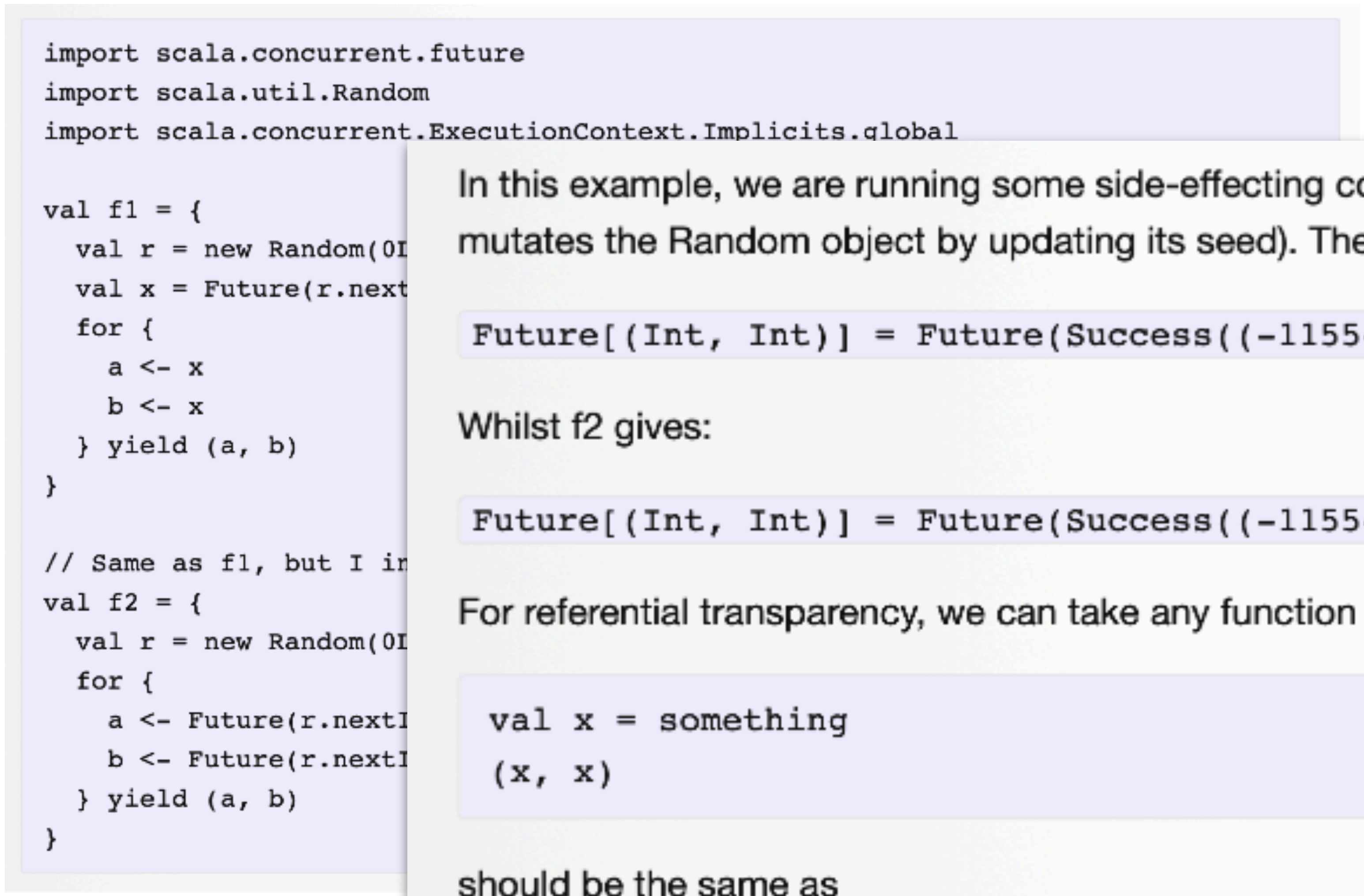
IO Monad - Future

Future is not a Monad **Future execution is eager**

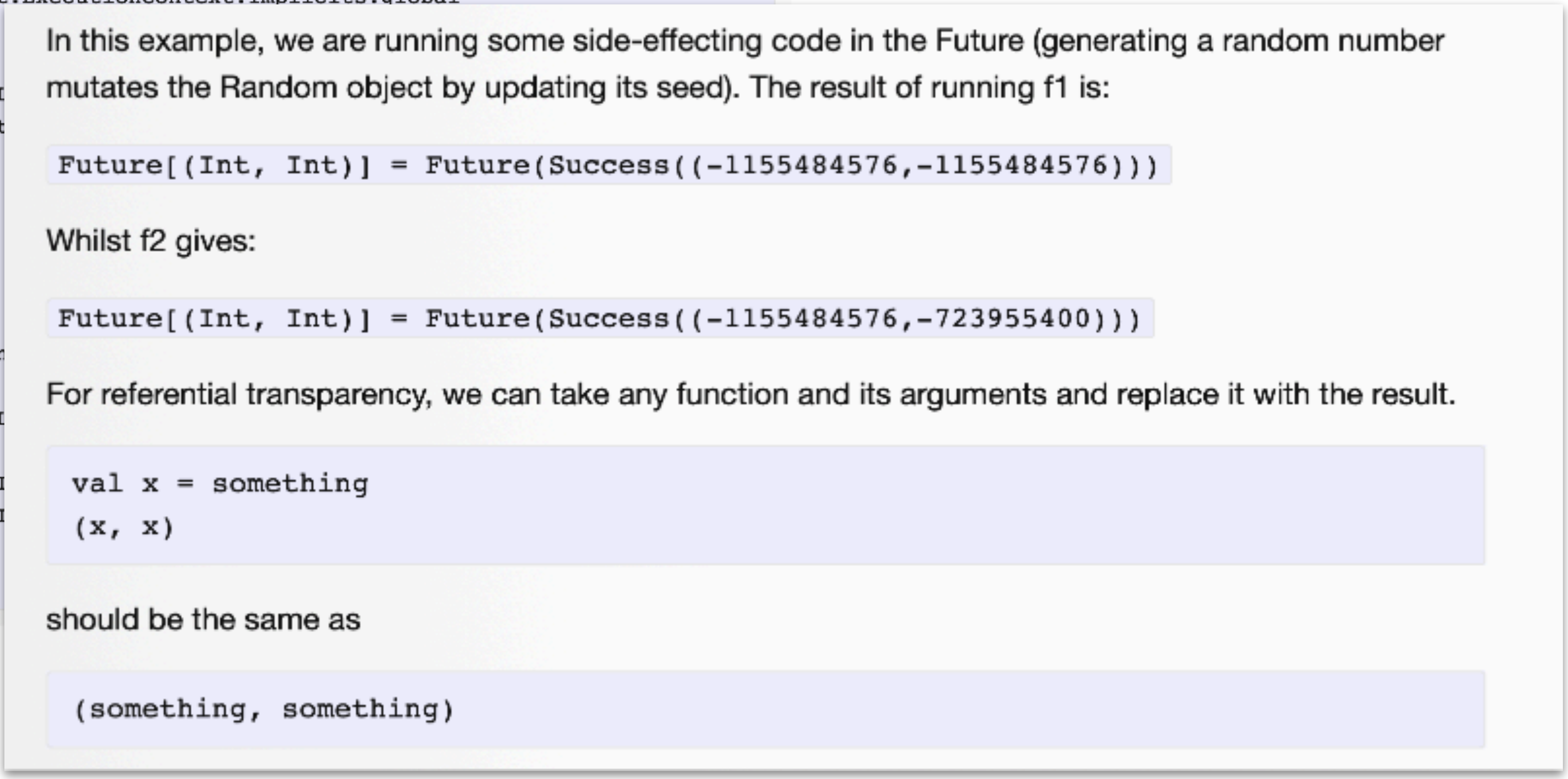
http://justinhj.github.io/2018/05/05/hacker-news-api-4.html



```
import scala.concurrent.future
import scala.util.Random
import scala.concurrent.ExecutionContext.Implicits.global

val f1 = {
  val r = new Random(0I
  val x = Future(r.next
  for {
    a <- x
    b <- x
  } yield (a, b)
}

// Same as f1, but I in
val f2 = {
  val r = new Random(0I
  for {
    a <- Future(r.nextI
    b <- Future(r.nextI
  } yield (a, b)
}
```



In this example, we are running some side-effecting code in the Future (generating a random number mutates the Random object by updating its seed). The result of running f1 is:

```
Future[(Int, Int)] = Future(Success((-1155484576,-1155484576)))
```

Whilst f2 gives:

```
Future[(Int, Int)] = Future(Success((-1155484576,-723955400)))
```

For referential transparency, we can take any function and its arguments and replace it with the result.

```
val x = something
(x, x)
```

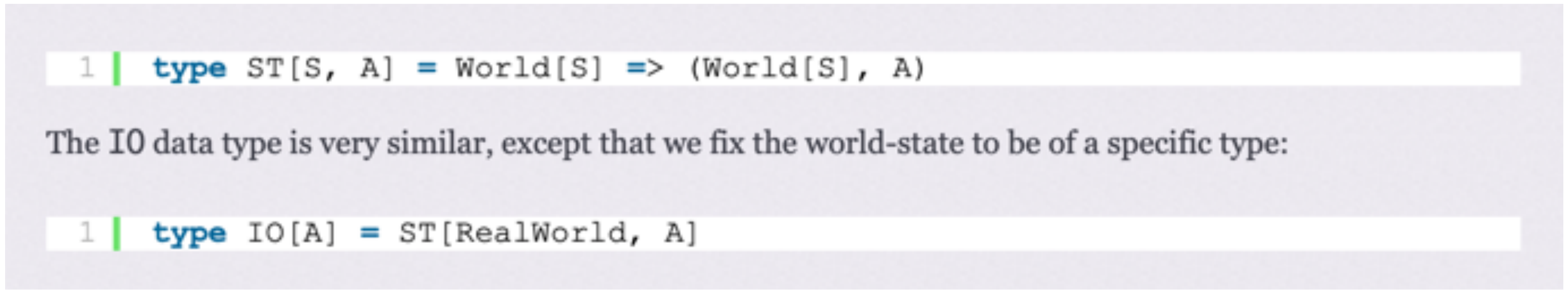
should be the same as

```
(something, something)
```

IO Monad - Scalaz

https://apocalisp.wordpress.com/2011/12/19/towards-an-effect-system-in-scala-part-2-io-monad/

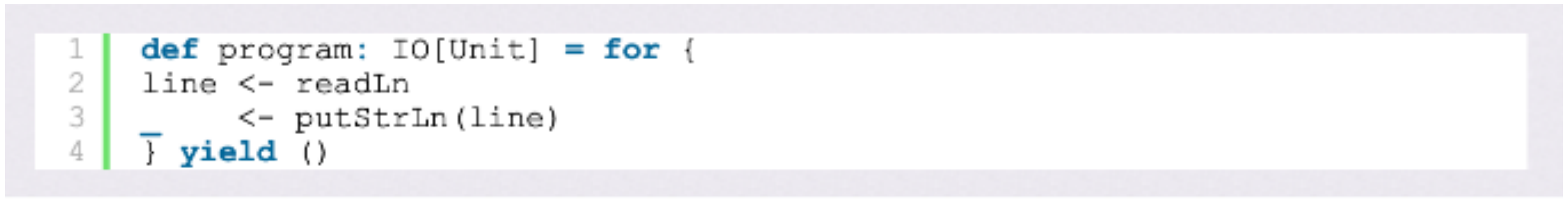
Runar Bjarnason



```scala
type ST[S, A] = World[S] => (World[S], A)
```

The IO data type is very similar, except that we fix the world-state to be of a specific type:

```scala
type IO[A] = ST[RealWorld, A]
```



```scala
def program: IO[Unit] = for {
line <- readLn
_      <- putStrLn(line)
} yield ()
```

Direct conversion from Haskell