Scala Taiwan

ZIO Ecosystem

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February 21, 2023

Scala Taiwan Meetup, Taipei

Jiří Jakeš

- Fan of Scala since 2009
- Also Haskell, Rust, Bitcoin

ZIO Review

```
ZIO[R, E, A]

ZStream[R, E, A]
```

ZIO AWS

ZIO AWS S3

```scala
val prg: ZIO[S3, AwsError, Unit] =
  for
    buckets <- S3.listBuckets().flatMap(_.getBuckets)
    firstBucket <- buckets.head.getName // Don't do it

    res <- S3.getObject(
      GetObjectRequest(
        bucket = firstBucket,
        key = ObjectKey("object")
      )
    )

    contentType <- res.response.getContentType
    bytes <- res.output.runCollect
    ...
  yield ()
```

ZIO AWS S3

```scala
import zio.*
import zio.aws.core.AwsError
import zio.aws.core.config.AwsConfig
import zio.aws.netty.NettyHttpClient
import zio.aws.s3.S3

object AwsS3App extends ZIOAppDefault:

  val prg: ZIO[S3, AwsError, Unit] = ...

  def run =
    prg.provide(
      AwsConfig.default,
      NettyHttpClient.default,
      S3.live
    )
```

ZIO Prelude

Prelude

- conceptually similar to Cats
- abstractions: `Equal`, `Ord`, `Hash`, `Debug`, `Associative`, `Commutative`, `Identity`, `Inverse`, `ForEach`, ...
- data types: `NonEmptyList`, `Validation`, `ZSet`, `These`, `ZPure`
- newtypes

Prelude abstractions

```
trait Associative[A]:
  def combine(l: ⇒ A, r: ⇒ A): A

trait Identity[A] extends Associative[A]:
  def identity: A

// myValue.debug.render
trait Debug[A]:
  def debug(a: A): Debug.Repr
```

ZPure

Live code!

Newtypes

```
type Amount = Amount.Type
object Amount extends Newtype[Int]:
  override inline def assertion =
    greaterThanOrEqualTo(0)

val ok = Amount(100)

// Assertion Failed
// -10 did not satisfy greaterThanOrEqualTo(0)
val bad = Amount(-10)

// Failure(-10 did not
// satisfy greaterThanOrEqualTo(0))
val bad: Validation[String, Amount] =
  Amount.make(-10)
```

ZIO JSON

ZIO JSON

```scala
@jsonMemberNames(SnakeCase)
case class Person(
    fullName: String,
    @jsonField("number_of_years")
    age: Int
) derives JsonCodec

@jsonDiscriminator("type")
enum Message derives JsonCodec:
  case Init(id: String)
  case SendConfig(num: Int, timeout: Int)
  case Start(name: String)

println(Person("John", 43).toJsonPretty)
```

ZIO HTTP

HTTP server

```scala
object HttpServer extends ZIOAppDefault:

  val app: HttpApp[Any, Nothing] =
    Http.collect[Request] {
      case Method.GET -> !! / "hello" ⇒
        Response.text("Hi, how are you?")
    }

  def run = Server.serve(app).provide(Server.default)
```

HTTP client

```scala
object HttpClient extends ZIOAppDefault:

  val app = Client
    .request(
     "https://raw.githubusercontent.com/zio/zio-http/"
       "main/zio-http-example/src/main/scala/example/"
       "AuthenticationClient.scala"
    )
    .flatMap(_.body.asString)
    .flatMap(s => Console.printLine(s))

  def run = app.provide(Client.default)
```

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Caliban

Caliban server

Live code!

Rezilience

- policies for making asynchronous systems resilient to failures
- circuit breaker
- rate limiter
- bulkhead
- retry
- timeout

Rezilience: Circuit Breaker

```
 val circuitBreaker = CircuitBreaker.make(
    trippingStrategy =
      TrippingStrategy.failureCount(maxFailures = 10),
    resetPolicy =
      Retry.Schedules.exponentialBackoff(
        min = 1.second,
        max = 1.minute
      )
  )

ZIO.scoped {
  circuitBreaker.flatMap { cb ⇒
    val result: IO[CircuitBreakerCallError[E], A] =
      cb(callExternalSystem("some input"))
   …
}
```

The rest

The rest

1. zio-aws*
2. zio-actors*
3. zio-akka-cluster*
4. zio-cli*
5. zio-cache*
6. zio-config*
7. zio-connect*
8. zio-constraintless*
9. zio-crypto*
10. zio-deriving*
11. zio-direct*
12. zio-dynamodb*

The rest

13. zio-ftp*
14. zio-flow*
15. zio-insight*
16. zio-interop-{guava, monix, reactive, scalaz, twitter, cats}*
17. zio-jdbc*
18. zio-json*
19. zio-kafka*
20. zio-keeper*
21. zio-lambda*
22. zio-logging*
23. zio-memberlist*
24. zio-meta*

The rest

25. zio-mock*
26. zio-nio*
27. zio-optics*
28. zio-parser*
29. zio-prelude*
30. zio-process*
31. zio-profiling*
32. zio-query*
33. zio-quill*
34. zio-redis*
35. zio-rocksdb*
36. zio-s3*

The rest

37. zio-sql*
38. zio-sqs*
39. zio-schema*
40. zio-telemetry*
41. zio-webhooks*
42. caliban
43. distage
44. logstage
45. munit-zio
46. quill
47. rezilience
48. tamer

The rest

49. tofu-logging
50. tranzactio
51. zio-amqp
52. zio-arrow
53. zio-aws-s3
54. zio-grpc
55. zio-http
56. zio-k8s
57. zio-kinesis
58. zio-pulsar
59. zio-saga
60. zio-interop-slick

The rest

61. zio-backtask
62. zio-elasticsearch
63. zio-openai*

Thank you for attention