Criteria4s

Filtros, filtros everywhere

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Hello folks! 👋

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Release	1994
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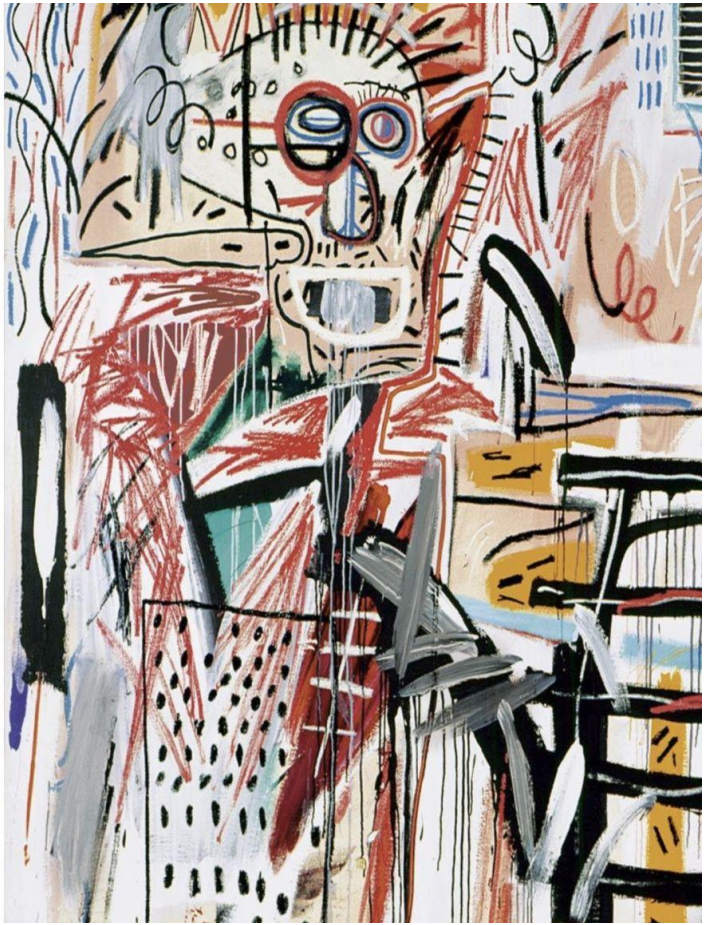
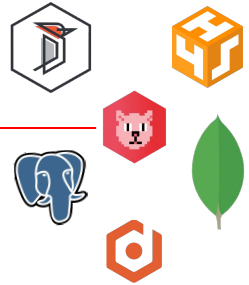
Criteria4s	github.com/rafafrdz/criteria4s
Presentation	github.com/rafafrdz/criteria4s-presentation



Contexto - **Inicios**

¿Cómo empezó todo?

Inquietud por nuevas tecnologías



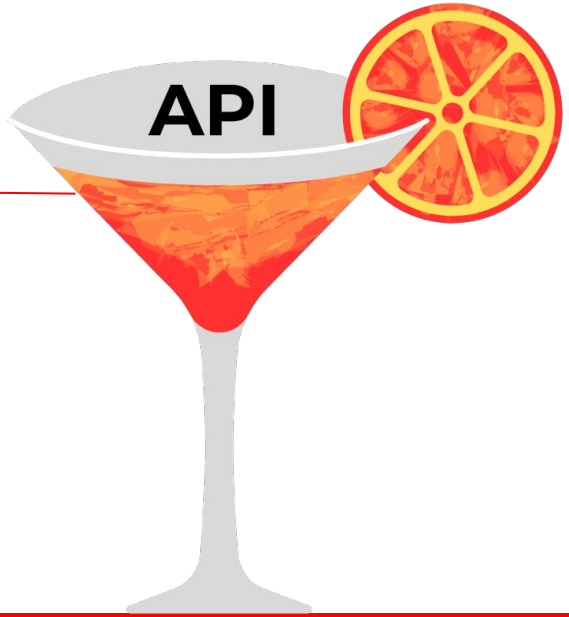
+

Usando del Scala

Scala

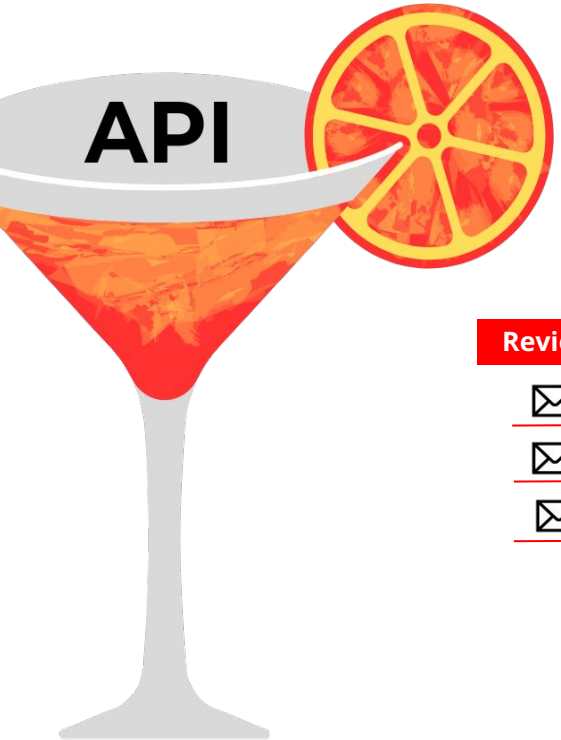
↓

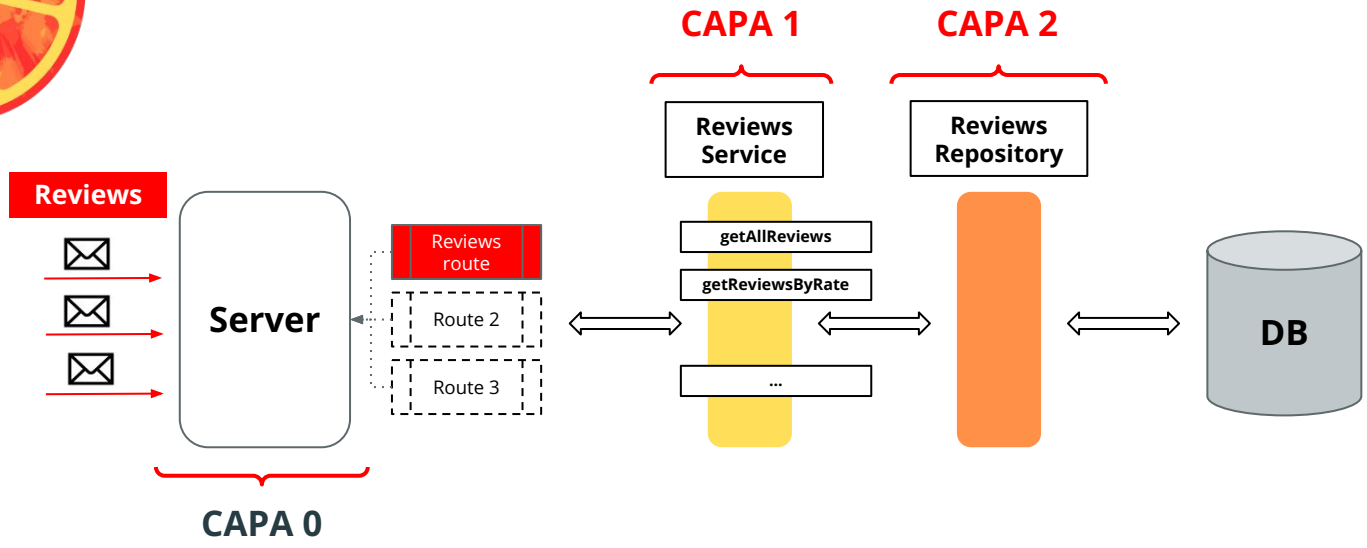
EL RESULTADO; Algo palpable



Contexto - **API**

¿Cómo funciona? Y ¿Cómo es su estructura?





Contexto - **Viaje entre capas**

Planteamiento problema

¿Qué vemos?

→ Mapeo 1-1

→ Un criterio = un método en ambas capas

CAPA 1

Reviews Service

getAllReviews

getReviewsByRate

CAPA 2

Reviews Repository

```
trait ReviewServices[F[_]] {

  def getAllReviews: F[Seq[Review]]

  def getReviewBy(owner: String): F[Seq[Review]]

  def getReviewBy(rate: Double): F[Seq[Review]]

  def getReviewBy(owner: String, rate: Double): F[Seq[Review]]

}
```

```
trait ReviewRepository[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewByOwner(owner: String): F[Seq[Review]]

  def getReviewByRate(rate: Double): F[Seq[Review]]

  def getReviewByOwnerAndRate(owner: String, rate: Double): F[Seq[Review]]

}
```

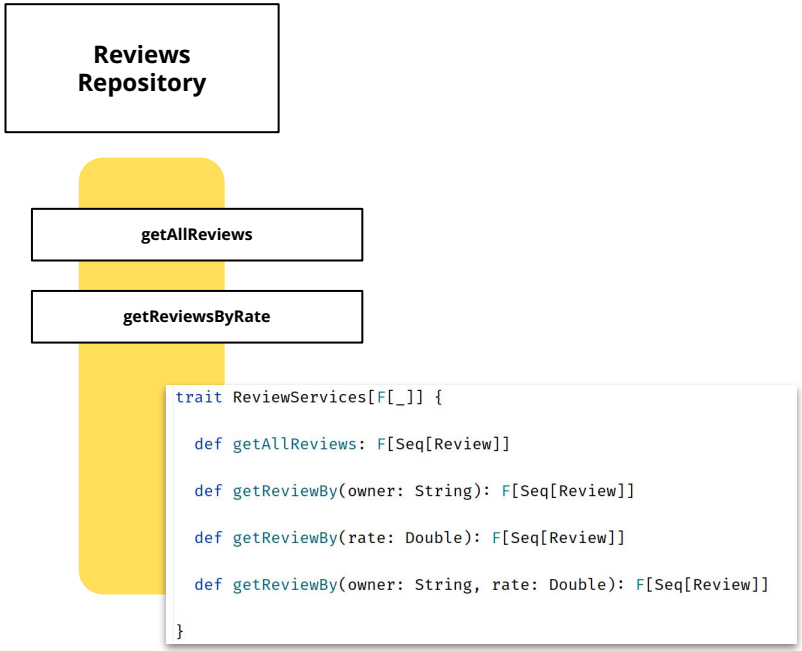
Contexto - **Viendo cada capa**

Implementación de **CAPA 1 = Service**

¿Qué vemos?

→ Depende de la capa 2 = repository

→ Agnóstico a la DB




```scala
trait ReviewServices[F[_]] {

  def getAllReviews: F[Seq[Review]]

  def getReviewBy(owner: String): F[Seq[Review]]

  def getReviewBy(rate: Double): F[Seq[Review]]

  def getReviewBy(owner: String, rate: Double): F[Seq[Review]]

}
```

Ejemplo:

```scala
/** Generic ReviewServices implementation */
def build[F[_]: Async: Logger](
    rep: ReviewRepository_[F]
): ReviewServices[F] =
  new ReviewServices[F] {

    override def getAllReviews: F[Seq[Review]] =
      Logger[F].info("Getting all reviews") *> rep.getReviews

    override def getReviewBy(owner: String): F[Seq[Review]] =
      Logger[F].info(s"Getting reviews by owner: $owner") *>
        rep.getReviewByOwner(owner)

    override def getReviewBy(rate: Double): F[Seq[Review]] =
      Logger[F].info(s"Getting reviews by rate: $rate") *>
        rep.getReviewByRate(rate)

    override def getReviewBy(owner: String, rate: Double): F[Seq[Review]] =
      Logger[F].info(s"Getting reviews by owner: $owner and rate: $rate") *>
        rep.getReviewByOwnerAndRate(owner, rate)
  }
```

Contexto - **Viendo cada capa**

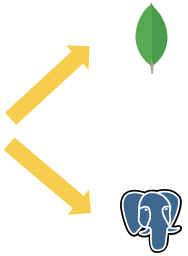
Implementación de **CAPA 2 = Repository**

Reviews Repository

¿Qué vemos?

→ Dependiente a la DB

→ Diferentes expresiones de criterios



```scala
trait ReviewRepository[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewByOwner(owner: String): F[Seq[Review]]

  def getReviewByRate(rate: Double): F[Seq[Review]]

  def getReviewByOwnerAndRate(owner: String, rate: Double): F[Seq[Review]]

}
```

Ejemplos:

```scala
/** MongoDB ReviewRepository implementation */
def using[F[_]: Async: Logger](mongo: MongoClient): ReviewRepository[F] =
  new ReviewRepository[F] {

    def db: MongoDatabase                       = mongo.getDatabase(Airbnb)
    def collection: MongoCollection[Document] = db.getCollection(Reviews)

    override def getReviewBy(owner: String): F[Seq[Review]] =
      for {
        docs ← Async[F].fromFuture(
          collection.find(Document(s"""{ owner: { $$eq: "$owner" } }""")).toFuture().pure[F])
        reviews = docs.map(documentToReview)
      } yield reviews

    override def getReviewBy(rate: Double): F[Seq[Review]] =
      for {
        docs ← Async[F].fromFuture(
          collection.find(Document(s"""{ rate: { $$gt: $rate }""")).toFuture().pure[F])
        reviews = docs.map(documentToReview)
      } yield reviews

    override def getReviewBy(owner: String, rate: Double): F[Seq[Review]] =
      for {
        docs ← Async[F].fromFuture(
          collection.find(
            Document(
            s"""{ $$and: [ { owner: { $$eq: "$owner" } }, { rate: { $$gt: $rate } } ] }"""
            )
          ).toFuture().pure[F]
        )
        reviews = docs.map(documentToReview)
      } yield reviews
```

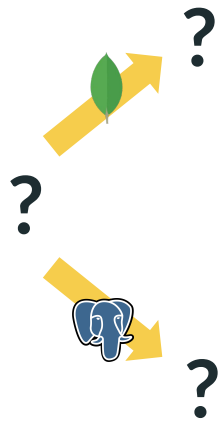
```scala
/** JDBC ReviewRepository implementation */
def using[F[_]: Async: Logger](jdbc: Connection): ReviewRepository[F] =
  new ReviewRepository[F] {

    override def getReviewBy(owner: String): F[Seq[Review]] =
      execute(jdbc, s"SELECT * FROM $Airbnb.$Reviews WHERE owner = '$owner'") { rs ⇒
        resultSetToReview(rs)
      }

    override def getReviewBy(rate: Double): F[Seq[Review]] =
      execute(jdbc, s"SELECT * FROM $Airbnb.$Reviews WHERE rate > '$rate'") { rs ⇒
        resultSetToReview(rs)
      }

    override def getReviewBy(owner: String, rate: Double): F[Seq[Review]] =
        execute(jdbc, s"SELECT * FROM $Airbnb.$Reviews WHERE (owner = '$owner') AND (rate > '$rate')") { rs ⇒
          resultSetToReview(rs)
        }
  }
```

Contexto - **Viendo cada capa**

Experimentando con la **CAPA 2 = Repository (II)**

Y si...

```scala
trait ReviewRepository_[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewByOwner(owner: String): F[Seq[Review]]

  def getReviewByRate(rate: Double): F[Seq[Review]]

  def getReviewByOwnerAndRate(owner: String, rate: Double): F[Seq[Review]]

  def getReviewByAddress(address: String): F[Seq[Review]]

  def getReviewByRateAndAddress(rate: Double, address: String): F[Seq[Review]]

  def getReviewByOwnerAndAddress(owner: String, address: String): F[Seq[Review]]

  def getReviewByOwnerRateAndAddress(owner: String, rate: Double, address: String): F[Seq[Review]]

  def getReviewByComment(comment: String): F[Seq[Review]]

  def getReviewByRateAndComment(rate: Double, comment: String): F[Seq[Review]]

  def getReviewByOwnerAndComment(owner: String, comment: String): F[Seq[Review]]

  def getReviewByOwnerRateAndComment(owner: String, rate: Double, comment: String): F[Seq[Review]]

  def getReviewByAddressAndComment(address: String, comment: String): F[Seq[Review]]

}
```



¿Qué hacemos?

→ Aumentan los criterios

→ Diferentes DB

¿Qué vemos? - RESULTADO

→ Producto cartesiano implementaciones

→ No escala

Contexto - **Viendo cada capa**

Experimentando con la **CAPA 2 = Repository (III)**

Y si...

```scala
trait ReviewRepository_[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewByOwner(owner: String): F[Seq[Review]]

  def getReviewByRate(rate: Double): F[Seq[Review]]

  def getReviewByOwnerAndRate(owner: String, rate: Double): F[Seq[Review]]

  def getReviewByAddress(address: String): F[Seq[Review]]

  def getReviewByRateAndAddress(rate: Double, address: String): F[Seq[Review]]

  def getReviewByOwnerAndAddress(owner: String, address: String): F[Seq[Review]]

  def getReviewByOwnerRateAndAddress(owner: String, rate: Double, address: String): F[Seq[Review]]

  def getReviewByComment(comment: String): F[Seq[Review]]

  def getReviewByRateAndComment(rate: Double, comment: String): F[Seq[Review]]

  def getReviewByOwnerAndComment(owner: String, comment: String): F[Seq[Review]]

  def getReviewByOwnerRateAndComment(owner: String, rate: Double, comment: String): F[Seq[Review]]

  def getReviewByAddressAndComment(address: String, comment: String): F[Seq[Review]]

}
```

¿Qué hacemos?

→ Generalizar / unificar el criterio

→ ¿Cómo se va a expresar?

→ ¿Qué forma va a tener? *(String, ADT, etc.)*

```scala
trait ReviewRepository[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewBy(criteria: String): F[Seq[Review]]

}
```

```scala
trait ReviewRepository[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewBy(criteria: Criteria): F[Seq[Review]]

}
```

Planteamiento inicial - **¿Qué es un criterio?**

CONCEPTO

Es una expresión que cumple una condición o predicado

Ejemplos:

→ **True** / **False** *(valores)*
→ **4 > 0** *(expresión simple)*
→ **(x > 0 and x <= 10) or (x > 20)** *(expresión compleja)*
→ **`USER_ID` = '07715cee-5d87'** *(expresión DB)*

OPERACIONES

Encontramos:

- Operan con expresiones Booleanas
  → **AND** / **OR**

- Generan expresiones Booleanas
  → **>** *(mayor que)*
  → **==** *(igual que)*
  → **isNull** *(el valor es un valor null)*

Planteamiento inicial - **¿Qué es un criterio?**

REPRESENTACIÓN

Diferentes formas de representar una expresión

- (x > 0 && x <= 10) || (x > 20)
- (('x' > 0) AND ('x' <= 10)) OR ('x' > 20)
- ```
  {
    opt: OR,
    left: {
            opt: AND,
            left:    { left: x, opt: >,    right: 0 },
            right: { left: x, opt: <=, right: 10 }
          },
    right: { left: x, opt: >, right: 20 }
  }
  ```

Una única **semántica**

Dado un x, queremos aquellos valores de x donde la condición (x > 0 /\ x <=10) \/ (x > 20) se cumpla
  ```

Nuestro objetivo - **¿Qué buscamos?**

Tres puntos claves para construir ese “algo”

01 Única **Expresión canónica** que represente una condición booleana

02 **Mecanismo** de **representación** para cualquiera de sus variaciones

03 **Sintaxis *friendly* e idiomática**

Preparando ese “algo” -
¿Cómo lo hacemos?

DSL

Receta

Conceptos previos

Primer ingrediente - **Gramática**

→ Conjunto de palabras / expresiones únicas
→ Reglas para componer esas expresiones
→ Cerrado, es decir, no admite expresiones fuera de la gramática

Ejemplos:
Sea ***Bar*** la gramática de las acciones de ***Beber*** en un bar

```
Bar    := Beber <Bebida> | Y <Bar> <Bar>
Bebida := Agua  | Zumo | Refresco | Cocktail ...

=>

expr1 := Beber Agua
expr2 := Beber Zumo
expr3 := Y (Beber Cocktail) (Beber Refresco)
```

DSL

Receta

Conceptos previos

Segundo ingrediente - **Semántica**

→ Interpretaciones de las expresiones de la gramática
→ Diferente semántica, diferente interpretación
→ Aporta significado a nuestras expresiones

Ejemplos:
En nuestro bar están nuestros amigos *Andrea*, *David* y *Miguel*, cada uno quiere una cosa diferente...

```
A (Semántica Andrea)
D (Semántica David)
M (Semántica Miguel)

A(Beber Refresco) => beber A(Refresco) => beber Coca Cola
A(Beber Cocktail) => beber A(Cocktail) => beber Bloody Mary

D(Beber Refresco) => beber D(Refresco) => beber Fanta naranja
D(Beber Cocktail) => beber D(Cocktail) => beber Margarita

M(Beber Refresco) => beber M(Refresco) => beber Tónica
M(Beber Cocktail) => beber M(Cocktail) => beber Cosmopolitan
```

Criteria4s - **Gramática + Semántica**

Nuestra mezcla perfecta

→ Gramática de expresiones booleanas y predicados
→ **Unicidad** en las expresiones *(expresión canónica)*
→ Diferente semántica, diferente interpretación, es decir, diferente **representación**

```
Criteria    :=  <Conjuction> <Criteria> <Criteria> | <Predicate> <Ref> <Ref> | Value<Boolean>
Conjuction  :=  AND | OR
Predicate   :=  EQ | NEQ | GT | LT | GEQ | LEQ | IN | LIKE | IS_NULL | IS_NOT_NULL ...
Ref         :=  Value<T> | Col
```

```
OR (AND (GT x 0) (LEQ x 10)) (GT x 20)
// 1: - (('x' > 0) AND ('x' <= 10)) OR ('x' > 20)
// 2: - { ope: `OR`, left: { ope: `AND`, left: { ope: `gt`,
//        left: `x`, right: '0'}, right: { ope: `leq`, left: `x`,
//        right: '10'}}, right: { ope: `gt`, left: `x`, right: '20'}}
```

Criteria4s - **Primer intento**

PLANTEAMIENTO

→ Usando tipos String
→ Usando trait
→ Usando singleton

```
trait Criteria {
  def and(x: String, y: String): String
  def or(x: String, y: String): String
  def leq(x: String, y: String): String
  def gt(x: String, y: String): String
}
```

```
object Criteria {
  def and(x: String, y: String): String = s"($x AND $y)"
  def or(x: String, y: String): String  = s"($x OR $y)"
  def leq(x: String, y: String): String = s"$x ⩽ $y"
  def gt(x: String, y: String): String  = s"$x > $y"
}
```

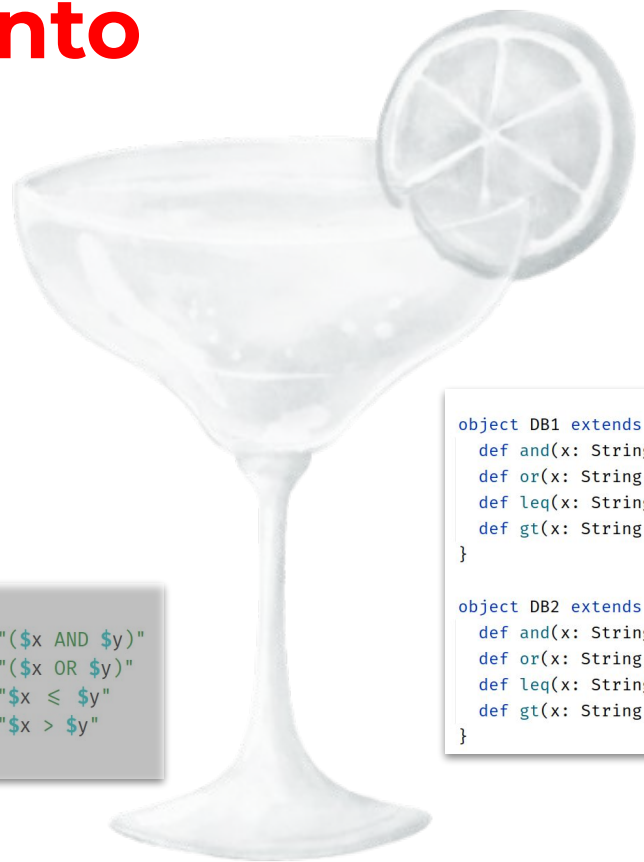
Criteria4s - **Primer intento**

PLANTEAMIENTO

→ Usando tipos String
→ Usando trait
→ Usando singleton

```
trait Criteria {
  def and(x: String, y: String): String
  def or(x: String, y: String): String
  def leq(x: String, y: String): String
  def gt(x: String, y: String): String
}
```

```
object Criteria {
  def and(x: String, y: String): String = s"($x AND $y)"
  def or(x: String, y: String): String  = s"($x OR $y)"
  def leq(x: String, y: String): String = s"$x ⩽ $y"
  def gt(x: String, y: String): String  = s"$x > $y"
}
```



RESULTADOS

✖ Múltiple intérpretes

```
object DB1 extends Criteria {
  def and(x: String, y: String): String = s"($x AND $y)"
  def or(x: String, y: String): String  = s"($x OR $y)"
  def leq(x: String, y: String): String = s"$x ⩽ $y"
  def gt(x: String, y: String): String  = s"$x > $y"
}

object DB2 extends Criteria {
  def and(x: String, y: String): String = s"{ ope: `AND`, left: $x, right: $y}"
  def or(x: String, y: String): String  = s"{ ope: `OR`, left: $x, right: $y}"
  def leq(x: String, y: String): String = s"{ ope: `leq`, left: $x, right: $y}"
  def gt(x: String, y: String): String  = s"{ ope: `gt`, left: $x, right: $y}"
}
```

Criteria4s - **Primer intento**

PLANTEAMIENTO

→ Usando tipos String
→ Usando trait
→ Usando singleton

```
trait Criteria {
  def and(x: String, y: String): String
  def or(x: String, y: String): String
  def leq(x: String, y: String): String
  def gt(x: String, y: String): String
}
```

```
object Criteria {
  def and(x: String, y: String): String = s"($x AND $y)"
  def or(x: String, y: String): String  = s"($x OR $y)"
  def leq(x: String, y: String): String = s"$x ⩽ $y"
  def gt(x: String, y: String): String  = s"$x > $y"
}
```

RESULTADOS

✖ Múltiple intérpretes

✖ Cualquier String en sus parámetros
Expresiones inválidas
Error runtime!

```
import Interpreters.DB1._

val expr1: String =
  or(and(gt("x", "0"), leq("x", "10")), gt("x", "20")) // (x > 0 AND x ⩽ 10) OR x > 20

val expr2: String =
  or(
    and(
      gt("x > 0", "x ⩽ 10"),
      leq(
        "Lorem ipsum dolor sit amet ... ",
        "En un lugar de la Mancha ... "
      )
    ),
    "x + & * //"
  ) // ((x > 0 > x ⩽ 10 AND Lorem ipsum dolor sit amet ...  ⩽ En un lugar de la Mancha ... ) OR x + & * //)
```

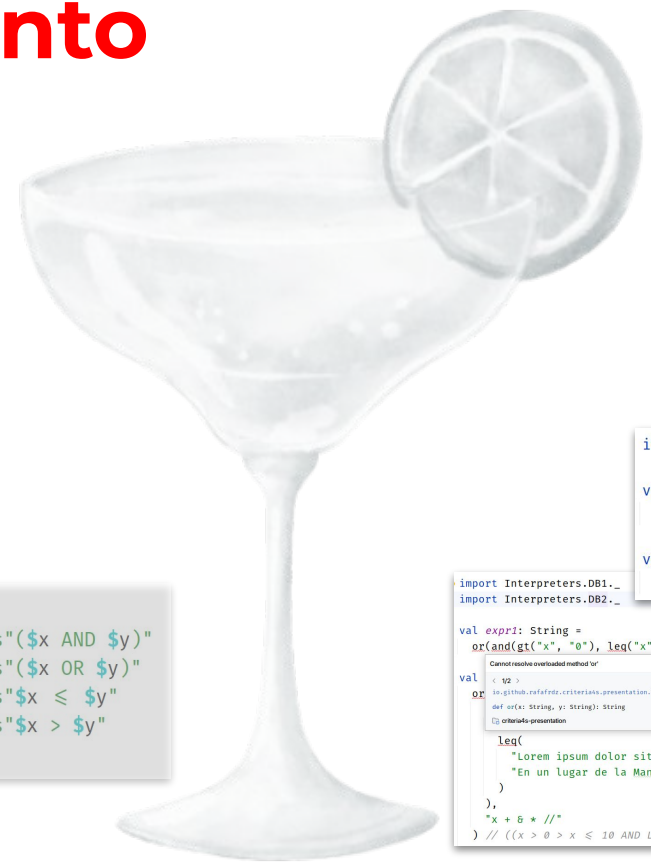
Criteria4s - **Primer intento**

PLANTEAMIENTO

→ Usando tipos String
→ Usando trait
→ Usando singleton

```
trait Criteria {
  def and(x: String, y: String): String
  def or(x: String, y: String): String
  def leq(x: String, y: String): String
  def gt(x: String, y: String): String
}
```

```
object Criteria {
  def and(x: String, y: String): String = s"($x AND $y)"
  def or(x: String, y: String): String  = s"($x OR $y)"
  def leq(x: String, y: String): String = s"$x ⩽ $y"
  def gt(x: String, y: String): String  = s"$x > $y"
}
```



RESULTADOS

✖ Múltiple intérpretes

✖ Cualquier String en sus parámetros
Expresiones inválidas
Error runtime!

✖ Convivencia
→ Gramática y semántica
→ DB1.or =/= DB2.or

```
import Interpreters._

val exprDB1: String =
  DB1.or(DB1.and(DB1.gt("x", "0"), DB1.leq("x", "10")), DB1.gt("x", "20"))

val exprDB2: String =
  DB2.or(DB2.and(DB2.gt("x", "0"), DB2.leq("x", "10")), DB2.gt("x", "20"))
```

```
import Interpreters.DB1._
import Interpreters.DB2._

val expr1: String =
  or(and(gt("x", "0"), leq("x", "10")), gt("x", "20")) // (x > 0 AND x ⩽ 10) OR x > 20

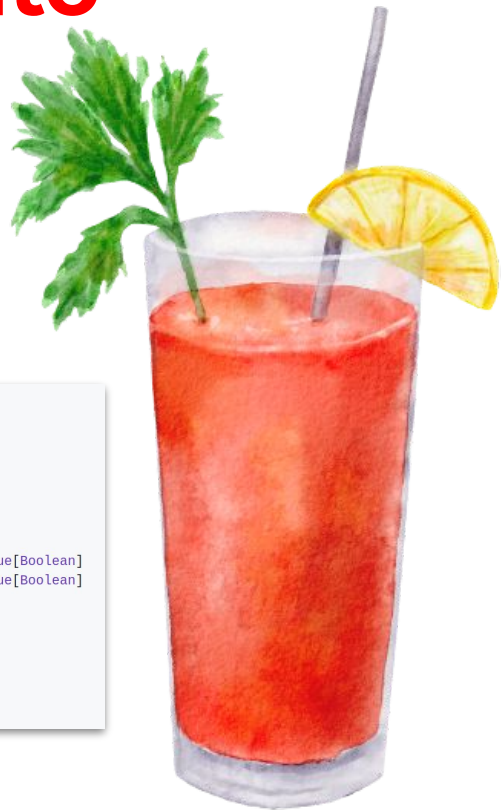
val
  or
    leq(
      "Lorem ipsum dolor sit amet ...",
      "En un lugar de la Mancha ..."
    )
  ),
  "x + 6 * //"
) // ((x > 0 > x ⩽ 10 AND Lorem ipsum dolor sit amet ... ⩽ En un lugar de la Mancha ... ) OR x + 6 * //)
```

Cannot resolve overloaded method 'or'
1/2
io.github.rafafrdz.criteria4s.presentation.firstapproach.Interpreters.DB1
def or(x: String, y: String): String
criteria4s-presentation

Criteria4s -
Segundo intento

PLANTEAMIENTO

→ Usando ADTs



```
sealed trait Criteria
  sealed trait Conjunction extends Criteria
  sealed trait Predicate   extends Criteria

  sealed trait Reference
  case class Column(name: String)                  extends Reference
  sealed trait Value[T]                            extends Reference
  case class Literal[T](value: T)                  extends Value[T]
  case object True                                 extends Reference with Value[Boolean]
  case object False                                extends Reference with Value[Boolean]
  case class And(left: Criteria, right: Criteria)  extends Conjunction
  case class Or(left: Criteria, right: Criteria)   extends Conjunction
  case class Leq(left: Reference, right: Reference) extends Predicate
  case class Gt(left: Reference, right: Reference) extends Predicate
  case class Eq(left: Reference, right: Reference) extends Predicate
  case class IsNull(ref: Reference)                extends Predicate
```

Criteria4s - **Segundo intento**

PLANTEAMIENTO

→ Usando ADTs

```
sealed trait Criteria
  sealed trait Conjunction extends Criteria
  sealed trait Predicate   extends Criteria

  sealed trait Reference
  case class Column(name: String)                  extends Reference
  sealed trait Value[T]                            extends Reference
  case class Literal[T](value: T)                  extends Value[T]
  case object True                                 extends Reference with Value[Boolean]
  case object False                                extends Reference with Value[Boolean]
  case class And(left: Criteria, right: Criteria)  extends Conjunction
  case class Or(left: Criteria, right: Criteria)   extends Conjunction
  case class Leq(left: Reference, right: Reference) extends Predicate
  case class Gt(left: Reference, right: Reference) extends Predicate
  case class Eq(left: Reference, right: Reference) extends Predicate
  case class IsNull(ref: Reference)                extends Predicate
```

RESULTADOS

✓ Múltiple intérpretes

```
/** DB1 */
object DB1 {
  private def evalR(r: Reference): String = r match {
    case Column(name) => s"`$name`"
    case Literal(v)   => s"'$v'"
    case True         => "true"
    case False        => "false"
  }
  def eval(c: Criteria): String = c match {
    case And(l, r) => s"(${eval(l)} AND ${eval(r)})"
    case Or(l, r)  => s"(${eval(l)} OR ${eval(r)})"
    case Leq(l, r) => s"${evalR(l)} <= ${evalR(r)}"
    case Gt(l, r)  => s"${evalR(l)} > ${evalR(r)}"
    case Eq(l, r)  => s"${evalR(l)} = ${evalR(r)}"
    case IsNull(r) => s"${evalR(r)} IS NULL"
  }
```

```
/** DB2 */
object DB2 {
  private def evalR(r: Reference): String = r match {
    case Column(name) => s"`$name`"
    case Literal(v)   => s"'$v'"
    case True         => "true"
    case False        => "false"
  }
  def eval(c: Criteria): String = c match {
    case And(l, r) => s"{ ope: `AND`, left: ${eval(l)}, right: ${eval(r)}}"
    case Or(l, r)  => s"{ ope: `OR`, left: ${eval(l)}, right: ${eval(r)}}"
    case Leq(l, r) => s"{ ope: `leq`, left: ${evalR(l)}, right: ${evalR(r)}}"
    case Gt(l, r)  => s"{ ope: `gt`, left: ${evalR(l)}, right: ${evalR(r)}}"
    case Eq(l, r)  => s"{ ope: `eq`, left: ${evalR(l)}, right: ${evalR(r)}}"
  }
```

Criteria4s - **Segundo intento**

PLANTEAMIENTO

→ Usando ADTs

```
sealed trait Criteria
  sealed trait Conjunction extends Criteria
  sealed trait Predicate   extends Criteria

  sealed trait Reference
  case class Column(name: String)                   extends Reference
  sealed trait Value[T]                             extends Reference
  case class Literal[T](value: T)                   extends Value[T]
  case object True                                  extends Reference with Value[Boolean]
  case object False                                 extends Reference with Value[Boolean]
  case class And(left: Criteria, right: Criteria)   extends Conjunction
  case class Or(left: Criteria, right: Criteria)    extends Conjunction
  case class Leq(left: Reference, right: Reference) extends Predicate
  case class Gt(left: Reference, right: Reference)  extends Predicate
  case class Eq(left: Reference, right: Reference)  extends Predicate
  case class IsNull(ref: Reference)                 extends Predicate
```

RESULTADOS

✓ Múltiple intérpretes

✓ Sólo se puede usar ADTs
Expresiones válidas
Gramática cerrada

```
val expr: Criteria =
  Or(
    And(
      Gt(Column("x"), Literal(0)),
      Leq(Column("x"), Literal(10))
    ),
    Gt(Column("x"), Literal(20))
  )
```

```
val expr2: Criteria =
  Or(
    And(
      Gt(Column("x"), Literal(0)),
      Leq(Column("x"), Literal(10))
    ),
    Eq(Column("user"), Literal("07715cee-5d87-427d-99a7-cc03f2b5ef4a"))
  )
```

```
val expr3: Criteria =
  And(
    IsNull(Column("user")),
    Eq(Column("user"), Literal("07715cee-5d87-427d-99a7-cc03f2b5ef4a"))
  )
```

Criteria4s - **Segundo intento**

PLANTEAMIENTO

→ Usando ADTs

```
sealed trait Criteria
  sealed trait Conjunction extends Criteria
  sealed trait Predicate   extends Criteria

  sealed trait Reference
  case class Column(name: String)                  extends Reference
  sealed trait Value[T]                            extends Reference
  case class Literal[T](value: T)                  extends Value[T]
  case object True                                 extends Reference with Value[Boolean]
  case object False                                extends Reference with Value[Boolean]
  case class And(left: Criteria, right: Criteria)  extends Conjunction
  case class Or(left: Criteria, right: Criteria)   extends Conjunction
  case class Leq(left: Reference, right: Reference) extends Predicate
  case class Gt(left: Reference, right: Reference)  extends Predicate
  case class Eq(left: Reference, right: Reference)  extends Predicate
  case class IsNull(ref: Reference)                extends Predicate
```

RESULTADOS

✖ *Expression problem*
Añadir nueva expresión
→ *Between*
→ *IsIn*
→ ...

```
case class Eq(left: Reference, right: Reference)       extends Predicate
case class IsNull(ref: Reference)                      extends Predicate
/** ... */
case class IsIn(left: Reference, right: Reference)     extends Predicate
case class Between(left: Reference, right: Reference)  extends Predicate
```

```
object DB1 {
  def eval(c: Criteria): String = c match {
    /** ... */
    case Eq(l, r)       => s"${evalR(l)} = ${evalR(r)}"
    /** ... */
    case IsIn(l, r)     => s"${evalR(l)} isin ${evalR(r)}"
    case Between(l, r)  => s"${evalR(l)} between ${evalR(r)}"
  }
}
```

```
object DB2 {
  def eval(c: Criteria): String = c match {
    /** ... */
    case Eq(l, r)       => s"{ ope: `eq`, left: ${evalR(l)}, right: ${evalR(r)}}"
    /** ... */
    case IsIn(l, r)     => s"{ ope: `isin`, left: ${evalR(l)}, right: ${evalR(r)}}"
    case Between(l, r)  => s"{ ope: `between`, left: ${evalR(l)}, right: ${evalR(r)}}"
  }
}
```

```
object DB3 {
  def eval(c: Criteria): String = c match {
    /** ... */
    case Eq(l, r)       => /** implemented */
    /** ... */
    case IsIn(l, r)     => /** implemented */
    case Between(l, r)  => /** implemented */
  }
}
```

Criteria4s - **Segundo intento**

PLANTEAMIENTO

→ Usando ADTs

```scala
sealed trait Criteria
  sealed trait Conjunction extends Criteria
  sealed trait Predicate   extends Criteria

  sealed trait Reference
  case class Column(name: String)                  extends Reference
  sealed trait Value[T]                            extends Reference
  case class Literal[T](value: T)                  extends Value[T]
  case object True                                 extends Reference with Value[Boolean]
  case object False                                extends Reference with Value[Boolean]
  case class And(left: Criteria, right: Criteria)  extends Conjunction
  case class Or(left: Criteria, right: Criteria)   extends Conjunction
  case class Leq(left: Reference, right: Reference) extends Predicate
  case class Gt(left: Reference, right: Reference) extends Predicate
  case class Eq(left: Reference, right: Reference) extends Predicate
  case class IsNull(ref: Reference)                extends Predicate
```

RESULTADOS

✖ *Expression problem*
Añadir nueva expresión
→ *Between*
→ *IsIn*
→ ...

✖ Expresión que no se usa en un datastore
Error en runtime!

```scala
val expr3: Criteria =
  And(
    IsNull(Column("user")),
    Eq(Column("user"), Literal("07715cee-5d87-427d-99a7-cc03f2b5ef4a"))
  )
```

```scala
  /** DB2.2 */
object DB22 {
   /** ... */
  def eval(c: Criteria): String = c match {
    case And(l, r) => s"{ ope: `AND`, left: ${eval(l)}, right: ${eval(r)}}"
    case Or(l, r)  => s"{ ope: `OR`, left: ${eval(l)}, right: ${eval(r)}}"
    case Leq(l, r) => s"{ ope: `leq`, left: ${evalR(l)}, right: ${evalR(r)}}"
    case Gt(l, r)  => s"{ ope: `gt`, left: ${evalR(l)}, right: ${evalR(r)}}"
    case Eq(l, r)  => s"{ ope: `eq`, left: ${evalR(l)}, right: ${evalR(r)}}"
    case _ => ??? // Exception? None? Either?
  }
```

```scala
/** Expr 3 */
DB1.eval(expr3)
// (`user` IS NULL AND `user` = '07715cee-5d87-427d-99a7-cc03f2b5ef4a')

DB2.eval(expr3)
// This will fail because IsNull is not implemented in DB2 interpreter!
```

Criteria4s - **Segundo intento**

PLANTEAMIENTO

→ Usando ADTs

```
sealed trait Criteria
  sealed trait Conjunction extends Criteria
  sealed trait Predicate   extends Criteria

  sealed trait Reference
  case class Column(name: String)                  extends Reference
  sealed trait Value[T]                            extends Reference
  case class Literal[T](value: T)                  extends Value[T]
  case object True                                 extends Reference with Value[Boolean]
  case object False                                extends Reference with Value[Boolean]
  case class And(left: Criteria, right: Criteria)  extends Conjunction
  case class Or(left: Criteria, right: Criteria)   extends Conjunction
  case class Leq(left: Reference, right: Reference) extends Predicate
  case class Gt(left: Reference, right: Reference) extends Predicate
  case class Eq(left: Reference, right: Reference) extends Predicate
  case class IsNull(ref: Reference)                extends Predicate
```

RESULTADOS

✖ *Expression problem*
Añadir nueva expresión
→ *Between*
→ *IsIn*
→ ...

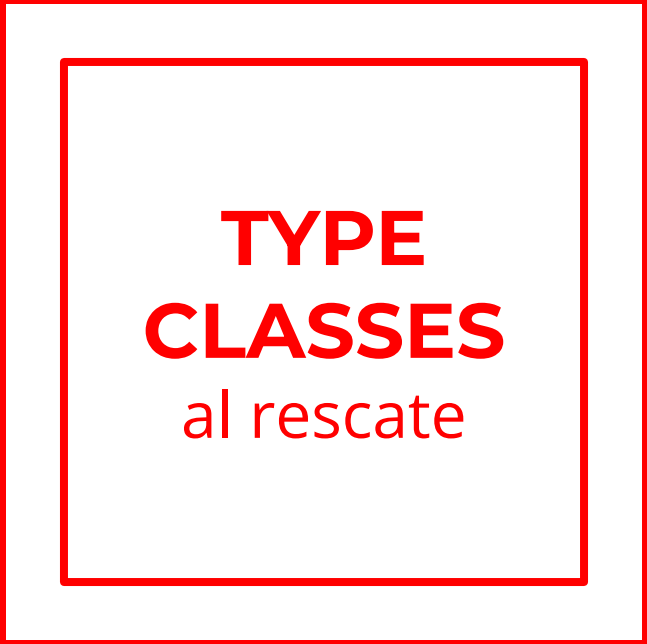
✖ Expresión que no se usa en un datastore
Error en runtime!

✖ Convivencia
→ Gramática
→ Semántica

```
import DB1._
import DB2._

val expr: Criteria =
  Or(
    And(
      Gt(Column("x"), Literal(0)),
      Leq(Column("x"), Literal(10))
    ),
    Gt(Column("x"), Literal(20))
  )

eval(expr)

eval(expr)
```

```
val expr: Criteria =
  Or(
    And(
      Gt(Column("x"), Literal(0)),
      Leq(Column("x"), Literal(10))
    ),
    Gt(Column("x"), Literal(20))
  )

DB1.eval(expr)

DB2.eval(expr)
```

El ingrediente secreto -
La solución



Criteria4s -
Intento final - *Type classes*

PLANTEAMIENTO

```
trait Criteria[D] {
  def value: String
}
trait Conjuction[D] {
  def eval(cr1: Criteria[D], cr2: Criteria[D]): Criteria[D]
}
trait OR[D] extends Conjuction[D]
trait AND[D] extends Conjuction[D]
trait Predicate[D]
trait PredicateBinary[D] extends Predicate[D] {
  def eval(cr1: Reference[D], cr2: Reference[D]): Criteria[D]
}
trait PredicateUnary[D] extends Predicate[D] {
  def eval(cr: Reference[D]): Criteria[D]
}
trait Gt[D] extends PredicateBinary[D]
trait Leq[D] extends PredicateBinary[D]
trait Eq[D] extends PredicateBinary[D]
trait IsNull[D] extends PredicateUnary[D]

trait Reference[D] {
  def value: String
}
trait Column[D] extends Reference[D]
trait Value[D, V] extends Reference[D]
```

Criteria4s - **Intento final:** *Type classes*

PLANTEAMIENTO

```
trait Criteria[D] {
  def value: String
}
trait Conjuction[D] {
  def eval(cr1: Criteria[D], cr2: Criteria[D]): Criteria[D]
}
trait OR[D] extends Conjuction[D]
trait AND[D] extends Conjuction[D]
trait Predicate[D]
trait PredicateBinary[D] extends Predicate[D] {
  def eval(cr1: Reference[D], cr2: Reference[D]): Criteria[D]
}
trait PredicateUnary[D] extends Predicate[D] {
  def eval(cr: Reference[D]): Criteria[D]
}
trait Gt[D] extends PredicateBinary[D]
trait Leq[D] extends PredicateBinary[D]
trait Eq[D] extends PredicateBinary[D]
trait IsNull[D] extends PredicateUnary[D]

trait Reference[D] {
  def value: String
}
trait Column[D] extends Reference[D]
trait Value[D, V] extends Reference[D]
```

RESULTADOS

✓ Múltiple intérpretes

```
trait DB1 // DB1 type

object DB1 {
  implicit val orDB1: OR[DB1] = new OR[DB1] {
    override def eval(cr1: Criteria[DB1], cr2: Criteria[DB1]): Criteria[DB1] =
      Criteria.pure(s"(${cr1.value} OR ${cr2.value})")
  }
  implicit val andDB1: AND[DB1] = new AND[DB1] {
    override def eval(cr1: Criteria[DB1], cr2: Criteria[DB1]): Criteria[DB1] =
      Criteria.pure(s"(${cr1.value} AND ${cr2.value})")
  }
  implicit val gtDB1: Gt[DB1] = new Gt[DB1] {
    override def eval(cr1: Reference[DB1], cr2: Reference[DB1]): Criteria[DB1] =
      Criteria.pure(s"${cr1.value} > ${cr2.value}")
  }
  implicit val leqDB1: Leq[DB1] = new Leq[DB1] {
    override def eval(cr1: Reference[DB1], cr2: Reference[DB1]): Criteria[DB1] =
      Criteria.pure(s"${cr1.value} <= ${cr2.value}")
  }
  implicit val eqDB1: Eq[DB1] = new Eq[DB1] {
    override def eval(cr1: Reference[DB1], cr2: Reference[DB1]): Criteria[DB1] =
      Criteria.pure(s"${cr1.value} = ${cr2.value}")
  }
  implicit val isNullDB1: IsNull[DB1] = new IsNull[DB1] {
    override def eval(cr: Reference[DB1]): Criteria[DB1] = Criteria.pure(s"${cr.value} IS NULL")
  }

}
```

```
trait DB2 // DB2 type

object DB2 {
  implicit val orDB2: OR[DB2] = new OR[DB2] {
    override def eval(cr1: Criteria[DB2], cr2: Criteria[DB2]): Criteria[DB2] =
      Criteria.pure(s"(${cr1.value} OR ${cr2.value})")
  }
  implicit val andDB2: AND[DB2] = new AND[DB2] {
    override def eval(cr1: Criteria[DB2], cr2: Criteria[DB2]): Criteria[DB2] =
      Criteria.pure(s"(${cr1.value} AND ${cr2.value})")
  }
  implicit val gtDB2: Gt[DB2] = new Gt[DB2] {
    override def eval(cr1: Reference[DB2], cr2: Reference[DB2]): Criteria[DB2] =
      Criteria.pure(s"${cr1.value} > ${cr2.value}")
  }
  implicit val leqDB2: Leq[DB2] = new Leq[DB2] {
    override def eval(cr1: Reference[DB2], cr2: Reference[DB2]): Criteria[DB2] =
      Criteria.pure(s"${cr1.value} <= ${cr2.value}")
  }
  implicit val eqDB2: Eq[DB2] = new Eq[DB2] {
    override def eval(cr1: Reference[DB2], cr2: Reference[DB2]): Criteria[DB2] =
      Criteria.pure(s"${cr1.value} = ${cr2.value}")
  }

}
```

Criteria4s - **Intento final:** *Type classes*

PLANTEAMIENTO

```
trait Criteria[D] {
  def value: String
}
trait Conjuction[D] {
  def eval(cr1: Criteria[D], cr2: Criteria[D]): Criteria[D]
}
trait OR[D] extends Conjuction[D]
trait AND[D] extends Conjuction[D]
trait Predicate[D]
trait PredicateBinary[D] extends Predicate[D] {
  def eval(cr1: Reference[D], cr2: Reference[D]): Criteria[D]
}
trait PredicateUnary[D] extends Predicate[D] {
  def eval(cr: Reference[D]): Criteria[D]
}
trait Gt[D] extends PredicateBinary[D]
trait Leq[D] extends PredicateBinary[D]
trait Eq[D] extends PredicateBinary[D]
trait IsNull[D] extends PredicateUnary[D]

trait Reference[D] {
  def value: String
}
trait Column[D] extends Reference[D]
trait Value[D, V] extends Reference[D]
```

RESULTADOS

- ✓ Múltiple intérpretes
- ✓ Sólo se puede usar si es tipo de la Type Class
  Expresiones válidas
  Gramática cerrada

```
val expr2: Criteria =
  Or(
    And(
      Gt(Column("x"), Literal(0)),
      Leq(Column("x"), Literal(10))
    ),
    Eq(Column("user"), Literal("07715cee-5d87-427d-99a7-cc03f2b5ef4a"))
  )
```

```
val expr3: Criteria =
  And(
    IsNull(Column("user")),
    Eq(Column("user"), Literal("07715cee-5d87-427d-99a7-cc03f2b5ef4a"))
  )
```

```
/** Examples */
def expr[D: Gt: Leq: AND: OR]: Criteria[D] =
  ((col[D]("x") :> lit(0)) and (col[D]("x") :<= lit(10))) or
    (col[D]("x") :> lit(20))

def exprIsNull[D: IsNull: OR: Eq]: Criteria[D] =
  col[D]("user").isNull or
    (col[D]("user") :== lit("07715cee-5d87-427d-99a7-cc03f2b5ef4a"))
```

Criteria4s - **Intento final:** *Type classes*

PLANTEAMIENTO

```
trait Criteria[D] {
  def value: String
}
trait Conjuction[D] {
  def eval(cr1: Criteria[D], cr2: Criteria[D]): Criteria[D]
}
trait OR[D] extends Conjuction[D]
trait AND[D] extends Conjuction[D]
trait Predicate[D]
trait PredicateBinary[D] extends Predicate[D] {
  def eval(cr1: Reference[D], cr2: Reference[D]): Criteria[D]
}
trait PredicateUnary[D] extends Predicate[D] {
  def eval(cr: Reference[D]): Criteria[D]
}
trait Gt[D] extends PredicateBinary[D]
trait Leq[D] extends PredicateBinary[D]
trait Eq[D] extends PredicateBinary[D]
trait IsNull[D] extends PredicateUnary[D]

trait Reference[D] {
  def value: String
}
trait Column[D] extends Reference[D]
trait Value[D, V] extends Reference[D]
```

RESULTADOS

- ✓ Múltiple intérpretes
- ✓ Sólo se puede usar ADTs
  Expresiones válidas
  Gramática cerrada
- ✓ No hay *expression problem*
  Expresión que no se usa en un datastore
  Error en compilación!

Criteria4s - **Intento final:** *Type classes*

PLANTEAMIENTO

```
trait Criteria[D] {
  def value: String
}
trait Conjuction[D] {
  def eval(cr1: Criteria[D], cr2: Criteria[D]): Criteria[D]
}
trait OR[D] extends Conjuction[D]
trait AND[D] extends Conjuction[D]
trait Predicate[D]
trait PredicateBinary[D] extends Predicate[D] {
  def eval(cr1: Reference[D], cr2: Reference[D]): Criteria[D]
}
trait PredicateUnary[D] extends Predicate[D] {
  def eval(cr: Reference[D]): Criteria[D]
}
trait Gt[D] extends PredicateBinary[D]
trait Leq[D] extends PredicateBinary[D]
trait Eq[D] extends PredicateBinary[D]
trait IsNull[D] extends PredicateUnary[D]

trait Reference[D] {
  def value: String
}
trait Column[D] extends Reference[D]
trait Value[D, V] extends Reference[D]
```

RESULTADOS

- ✓ Múltiple intérpretes
- ✓ Sólo se puede usar ADTs
  Expresiones válidas
  Gramática cerrada
- ✓ No hay *expression problem*
  Expresión que no se usa en un datastore
  Error en compilación!
- ✓ Convivencia

```
import Interpreters._

/** Examples */
def expr[D: Gt: Leq: AND: OR]: Criteria[D] =
  ((col[D]("x") :> lit(0)) and (col[D]("x") :<= lit(10))) or
    (col[D]("x") :> lit(20))

val expr1: Criteria[DB1] = expr[DB1]

val expr2: Criteria[DB2] = expr[DB2]

val exprInline: Criteria[DB1] =
  ((col[DB1]("x") :> lit(0)) and (col[DB1]("x") :<= lit(10))) or
    (col[DB1]("x") :> lit(20))
```

Criteria4s -
Intento final: *Type classes +* Tag

PLANTEAMIENTO

```
trait Criteria[D] {
  def value: String
}
trait Conjuction[D] {
  def eval(cr1: Criteria[D], cr2: Criteria[D]): Criteria[D]
}
trait OR[D] extends Conjuction[D]
trait AND[D] extends Conjuction[D]
trait Predicate[D]
trait PredicateBinary[D] extends Predicate[D] {
  def eval(cr1: Reference[D], cr2: Reference[D]): Criteria[D]
}
trait PredicateUnary[D] extends Predicate[D] {
  def eval(cr: Reference[D]): Criteria[D]
}
trait Gt[D] extends PredicateBinary[D]
trait Leq[D] extends PredicateBinary[D]
trait Eq[D] extends PredicateBinary[D]
trait IsNull[D] extends PredicateUnary[D]

trait Reference[D] {
  def value: String
}
trait Column[D] extends Reference[D]
trait Value[D, V] extends Reference[D]
```

RESULTADOS

→ Criteria[DB1]

✖
→ Criteria[Boolean]
→ Criteria[Option[Int]]
→ Criteria[List[List[Int]]]
→ Criteria[Any]
→ ...

✓ Tag
→ DB1 <: Tag => Criteria[DB1]
→ DB2 <: Tag => Criteria[DB2]
→ ...

Criteria4s -
Intento final: *Type classes +* Tag

PLANTEAMIENTO

```
trait Criteria[D] {
  def value: String
}
trait Conjuction[D] {
  def eval(cr1: Criteria[D], cr2: Criteria[D]): Criteria[D]
}
trait OR[D] extends Conjuction[D]
trait AND[D] extends Conjuction[D]
trait Predicate[D]
trait PredicateBinary[D] extends Predicate[D] {
  def eval(cr1: Reference[D], cr2: Reference[D]): Criteria[D]
}
trait PredicateUnary[D] extends Predicate[D] {
  def eval(cr: Reference[D]): Criteria[D]
}
trait Gt[D] extends PredicateBinary[D]
trait Leq[D] extends PredicateBinary[D]
trait Eq[D] extends PredicateBinary[D]
trait IsNull[D] extends PredicateUnary[D]

trait Reference[D] {
  def value: String
}
trait Column[D] extends Reference[D]
trait Value[D, V] extends Reference[D]
```

RESULTADOS *(ilustrativos)*

✖

```
/** These expressions are too confusing */
val exprString: Criteria[String] =
  ((col[String]("x") :> lit(0)) and (col[String]("x") :<= lit(10))) or
    (col[String]("x") :> lit(20))

val exprOptionInt: Criteria[Option[Int]] =
  ((col[Option[Int]]("x") :> lit(0)) and (col[Option[Int]]("x") :<= lit(10))) or
    (col[Option[Int]]("x") :> lit(20))
```

✓

```
/** Examples */
def expr[D <: CriteriaTag: Gt: Leq: AND: OR]: Criteria[D] =
  ((col[D]("x") :> lit(0)) and (col[D]("x") :<= lit(10))) or
    (col[D]("x") :> lit(20))

def exprIsNull[D <: CriteriaTag: IsNull: OR: Eq]: Criteria[D] =
  col[D]("user").isNull or
    (col[D]("user") :== lit("07715cee-5d87-427d-99a7-cc03f2b5ef4a"))
```

La bebida perfecta -
El resultado

MOMENTO POC

Criteria4s - **Resultados**

¿Cómo funciona?

Requisitos

→ Expresión del DSL

→ Intérprete de la DB

```
(col[MongoDB]("owner") === lit("owner")) and (col[MongoDB]("rate") gt lit(4.5))

(col[Postgres]("owner") === lit("owner")) and (col[Postgres]("rate") gt lit(4.5))
```

```
def criteria[D <: CriteriaTag: EQ: GT: Sym: AND](owner: String, rate: Double): Criteria[D] =
  (col[D]("owner") === lit(owner)) and (col[D]("rate") gt lit(rate))

criteria[MongoDB]("owner", 4.5)

criteria[Postgres]("owner", 4.5)
```

RESULTADOS

→ Criterio

```
{ $and: [ { owner: { $eq: "owner" } }, { rate: { $gt: 4.5 } } ] }
(owner = 'owner') AND (rate > '4.5')
```

Criteria4s - **Resultados**

Respondiendo a **CAPA 2 = Repository (III)**

PROBLEMA

→ Generalizar / unificar el criterio

→ ¿Cómo se va a expresar?

→ ¿Qué forma va a tener? *(String, ADT, etc.)*

```
trait ReviewRepository[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewBy(criteria: String): F[Seq[Review]]

}
```

```
trait ReviewRepository[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewBy(criteria: Criteria): F[Seq[Review]]

}
```

RESULTADOS

→ Criteria4s

→ DSL que generaliza criterios

→ Type classes

```
trait ReviewRepository[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewBy[D <: CriteriaTag](criteria: Criteria[D]): F[Seq[Review]]

}
```

Criteria4s - **Resultados**

Respondiendo a **CAPA 2 = Repository (II)**

PROBLEMA

→ Aumentan los criterios

→ Diferentes DB

→ Diferentes expresiones de criterios

```
override def getReviewBy(rate: Double): F[Seq[Review]] =
  execute(jdbc, s"SELECT * FROM $Airbnb.$Reviews WHERE rate > '$rate'") { rs ⇒
    resultSetToReview(rs)
  }

override def getReviewBy(owner: String, rate: Double): F[Seq[Review]] =
    execute(jdbc, s"SELECT * FROM $Airbnb.$Reviews WHERE (owner = '$owner') AND (rate > '$rate')") { rs ⇒
      resultSetToReview(rs)
    }
```

```
override def getReviewBy(rate: Double): F[Seq[Review]] =
  for {
    docs ← Async[F].fromFuture(
      collection.find(Document(s"""{ rate: { $$gt: $rate }}""")).toFuture().pure[F])
    reviews = docs.map(documentToReview)
  } yield reviews

override def getReviewBy(owner: String, rate: Double): F[Seq[Review]] =
  for {
    docs ← Async[F].fromFuture(
      collection.find(
        Document(
        s"""{ $$and: [ { owner: { $$eq: "$owner" } }, { rate: { $$gt: $rate } } ] }"""
        )
      ).toFuture().pure[F]
    )
    reviews = docs.map(documentToReview)
  } yield reviews
```

RESULTADOS

→ Agnóstico a la DB

→ Parametrizado por un criterio

```
/** MongoDB ReviewRepository implementation */
def using[F[_]: Async: Logger](mongo: MongoClient): ReviewRepository[F] =
  new ReviewRepository[F] {

    def db: MongoDatabase                      = mongo.getDatabase(Airbnb)
    def collection: MongoCollection[Document] = db.getCollection(Reviews)

    override def getReviews: F[Seq[Review]] =
      for {
        docs ← Async[F].fromFuture(collection.find().toFuture().pure[F])
        reviews = docs.map(documentToReview)
      } yield reviews

    override def getReviewBy[D <: CriteriaTag](criteria: Criteria[D]): F[Seq[Review]] =
      for {
        _ ← Logger[F].info(s"Searching $Reviews by criteria: $criteria")
        docs ← Async[F].fromFuture(
          collection.find(Document(criteria.toString())).toFuture().pure[F]
        )
        reviews = docs.map(documentToReview)
      } yield reviews
  }
```

```
/** JDBC ReviewRepository implementation */
def using[F[_]: Async: Logger](jdbc: Connection): ReviewRepository[F] =
  new ReviewRepository[F] {

    override def getReviews: F[Seq[Review]] =
      execute(jdbc, s"SELECT * FROM $Airbnb.$Reviews") { rs ⇒
        resultSetToReview(rs)
      }

    override def getReviewBy[D <: CriteriaTag](criteria: Criteria[D]): F[Seq[Review]] =
      Logger[F].info(s"Searching $Reviews by criteria: $criteria") >>
        execute(jdbc, s"SELECT * FROM $Airbnb.$Reviews WHERE $criteria") { rs ⇒
          resultSetToReview(rs)
        }
  }
```

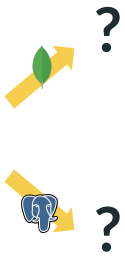
Criteria4s - **Resultados**

Respondiendo a **CAPA 2 = Repository (II)**

PROBLEMA

→ No escala

```scala
trait ReviewRepository_[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewByOwner(owner: String): F[Seq[Review]]

  def getReviewByRate(rate: Double): F[Seq[Review]]

  def getReviewByOwnerAndRate(owner: String, rate: Double): F[Seq[Review]]

  def getReviewByAddress(address: String): F[Seq[Review]]

  def getReviewByRateAndAddress(rate: Double, address: String): F[Seq[Review]]

  def getReviewByOwnerAndAddress(owner: String, address: String): F[Seq[Review]]

  def getReviewByOwnerRateAndAddress(owner: String, rate: Double, address: String): F[Seq[Review]]

  def getReviewByComment(comment: String): F[Seq[Review]]

  def getReviewByRateAndComment(rate: Double, comment: String): F[Seq[Review]]

  def getReviewByOwnerAndComment(owner: String, comment: String): F[Seq[Review]]

  def getReviewByOwnerRateAndComment(owner: String, rate: Double, comment: String): F[Seq[Review]]

  def getReviewByAddressAndComment(address: String, comment: String): F[Seq[Review]]

}
```



RESULTADOS

→ Escala

→ Mantenemos lógica de negocio

```scala
private def ownerCriteria[D <: CriteriaTag: EQ: Sym](owner: String): Criteria[D] =
  col[D]("owner") === lit(owner)

private def rateCriteria[D <: CriteriaTag: GT: Sym](rate: Double): Criteria[D] =
  col[D]("rate") gt lit(rate)
```

```scala
/** Generic ReviewServices implementation */
def build[F[_]: Async: Logger, D <: CriteriaTag: EQ: GT: Sym: AND](
    rep: ReviewRepository[F]
): ReviewServices[F] =
  new ReviewServices[F] {

    override def getAllReviews: F[Seq[Review]] =
      Logger[F].info("Getting all reviews") *> rep.getReviews

    override def getReviewBy(owner: String): F[Seq[Review]] =
      Logger[F].info(s"Getting reviews by owner: $owner") *>
        rep.getReviewBy(ownerCriteria(owner))

    override def getReviewBy(rate: Double): F[Seq[Review]] =
      Logger[F].info(s"Getting reviews by rate: $rate") *>
        rep.getReviewBy(rateCriteria(rate))

    override def getReviewBy(owner: String, rate: Double): F[Seq[Review]] =
      Logger[F].info(s"Getting reviews by owner: $owner and rate: $rate") *>
        rep.getReviewBy(ownerCriteria(owner) and rateCriteria(rate))
  }
```

```scala
/** MongoDB ReviewServices implementation */
def using[F[_]: Async: Logger](mongo: MongoClient): ReviewServices[F] =
  build[F, MongoDB](ReviewRepository.using(mongo))

/** JDBC-PostgreSQL ReviewServices implementation */
def using[F[_]: Async: Logger](jdbc: Connection): ReviewServices[F] =
  build[F, Postgres](ReviewRepository.using(jdbc))
```

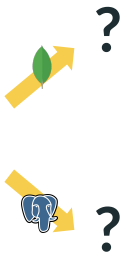
Criteria4s - **Resultados**

Respondiendo a **CAPA 2 = Repository (II)**

PROBLEMA

→ No escala

```
trait ReviewRepository_[F[_]] {

  def getReviews: F[Seq[Review]]

  def getReviewByOwner(owner: String): F[Seq[Review]]

  def getReviewByRate(rate: Double): F[Seq[Review]]

  def getReviewByOwnerAndRate(owner: String, rate: Double): F[Seq[Review]]

  def getReviewByAddress(address: String): F[Seq[Review]]

  def getReviewByRateAndAddress(rate: Double, address: String): F[Seq[Review]]

  def getReviewByOwnerAndAddress(owner: String, address: String): F[Seq[Review]]

  def getReviewByOwnerRateAndAddress(owner: String, rate: Double, address: String): F[Seq[Review]]

  def getReviewByComment(comment: String): F[Seq[Review]]

  def getReviewByRateAndComment(rate: Double, comment: String): F[Seq[Review]]

  def getReviewByOwnerAndComment(owner: String, comment: String): F[Seq[Review]]

  def getReviewByOwnerRateAndComment(owner: String, rate: Double, comment: String): F[Seq[Review]]

  def getReviewByAddressAndComment(address: String, comment: String): F[Seq[Review]]

}
```



RESULTADOS

→ Escala

→ Mantenemos lógica de negocio

→ Prever lógica problemática

```
def otherCriteria[D <: CriteriaTag: GT: Sym: ISNOTNULL: AND](rate: Double): Criteria[D] =
  col[D]("rate") gt lit(rate) and col[D]("owner").isNotNull
```

```
/** Generic ReviewServices implementation */
def build[F[_]: Async: Logger, D <: CriteriaTag: EQ: GT: Sym: AND: ISNOTNULL](
    rep: ReviewRepository[F]
): ReviewServices[F] =
  new ReviewServices[F] {

    /** ... */

    override def getReviewBy(rate: Double): F[Seq[Review]] =
      Logger[F].info(s"Getting reviews by rate: $rate") >>
        rep.getReviewBy(otherCriteria(rate))
  }
```

```
/** MongoDB ReviewServices implementation */
def using[F[_]: Async: Logger](mongo: MongoClient) =
  build[F, MongoDB](ReviewRepository.using(mongo))(...)

/** JDBC-PostgreSQL ReviewServices implementation */
def using[F[_]: Async: Logger](jdbc: Connection): ReviewServices[F] =
  build[F, Postgres](ReviewRepository.using(jdbc))
```

```
No implicits found for parameter ISNOTNULL$0$4: ISNOTNULL[MongoDB]
```

Criteria4s

Ahora

Nuestra carta de bebidas

Lo que tenemos - **Release 0.8+**

→ Soporte para colecciones
→ Soporte para rangos
→ Uso de type class **SHOW** para la representación *(antes **Sym**)*

```
trait Collection[D <: CriteriaTag, +V] extends Ref[D, Seq[V]]
trait Range[D <: CriteriaTag, +V]      extends Ref[D, (V, V)]
```

```
trait Show[-V, D <: CriteriaTag] {
  def show(v: V): String
}
```

```
implicit val showColumn: Show[Column, Postgres] = Show.create(col ⇒ s"`${col.colName}`")

implicit def showValue[V]: Show[V, Postgres]    = Show.create(v ⇒ s"'$v'")

implicit def showSeq[T](implicit show: Show[T, Postgres]): Show[Seq[T], Postgres] =
  Show.create(_.map(show.show).mkString("(", ", ", ")"))

implicit def betweenShow[T](implicit show: Show[T, Postgres]): Show[(T, T), Postgres] =
  Show.create { case (l, r) ⇒ s"${show.show(l)} TO ${show.show(r)}" }
```

Criteria4s

Ahora

Nuestra carta de bebidas

Lo que tenemos - **Release 0.8+**

→ Soporte para colecciones
→ Soporte para rangos
→ Uso de type class **SHOW** para la representación *(antes **Sym**)*
→ Uso **Kind Projection** para simplificar *type lambdas expressions*
→ Bug fixing para **BETWEEN** y **NOTBETWEEN**

```
def boilerplatedExpr[T <: CriteriaTag: BETWEEN:
({ type A[D <: CriteriaTag] = Show[Column, D] })#A:
({ type A[D <: CriteriaTag] = Show[(Int, Int), D] })#A]: Criteria[T] =
  col[T]("column") between range(100, 150)

def expr[T <: CriteriaTag: BETWEEN: Show[Column, *]: Show[(Int, Int), *]]: Criteria[T] =
  col[T]("column") between range(100, 150)
```

```
col[Postgres]("a") in array(1, 2, 3)
```

```
`a` IN ('1', '2', '3')
```

```
col[Postgres]("b") notBetween range("A", "Z")
```

```
`b` NOT BETWEEN 'A' TO 'Z'
```

Criteria4s

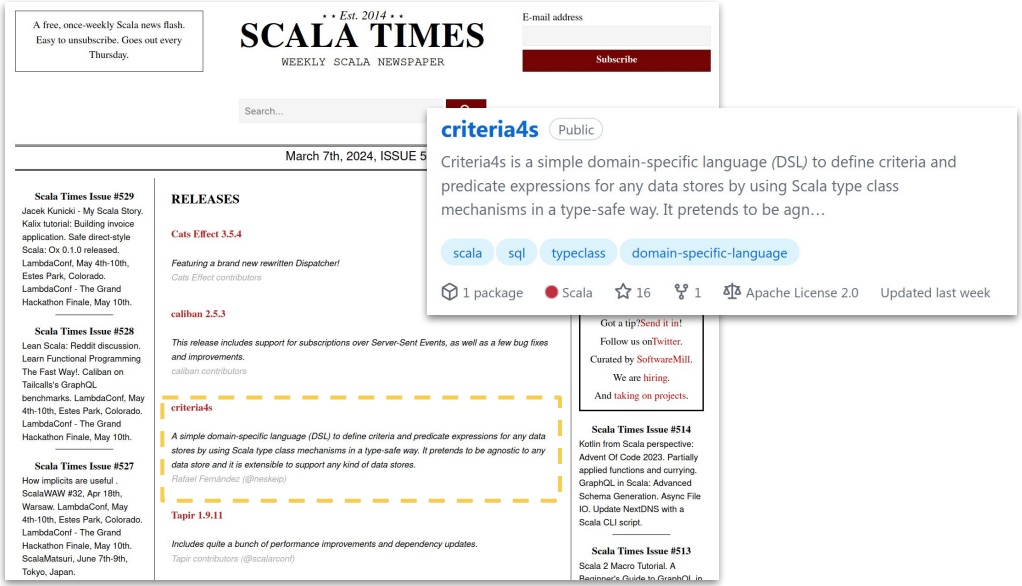
Ahora

Nuestra carta de bebidas

Lo que tenemos - **Release 0.8+**

→ 📢 Publicación en ***ScalaTimes***

→ 16 🌟 + 1 👋 contributor + 1 🍴 *fork* + 1 🎯 *pull request*



Criteria4s

Futuro

Próximas mezclas

Hacía dónde vamos - **Under construction**

→ **Issue #8** - Complete extensions of predicate functions by using boolean symbols
→ **Issue # 7** - Complete SQL predicate expression
→ **Issue # 18** - Add Spark SQL expression interpreter
→ **Issue # 19** - LIMIT and OFFSET criteria expressions (API)

→ Type checker para operaciones entre valores:

3 > “hola”

⇒ 3 >[Int] 4

⇒ 3 >[Any] “hola”

4.contains(1,2,3,4)

¿Qué hacemos con las columnas?

→ Añadir más intérpretes para SQL / NoSQL

→ **Issue # 14** - Add MongoDB expression interpreter
→ **Issue # 21** - Add Elasticsearch expression interpreter
→ **Issue # 20** - Add PostgreSQL expression interpreter

Preguntas

Referencias

→ **Types and programming languages.** *Benjamin C. Pierce*

→ **Typed Tagless Final Interpreters.** *Oleg Kiselyov* (Paper)

→ **Tagless-final o la abstracción sin culpa.** *Habla* (Yotube).

→ **Semantics with Applications.** *Hanne Riis Nielson, Flemming Nielson.*

Criteria4s

Filtros, filtros everywhere

Rafael Fernández Ortiz

Mayo 2024