

More ergonomic union types

28 maj 2023

Outline

- ▶ Brief summary of this long thread
 - ▶ <https://contributors.scala-lang.org/t/making-union-types-even-more-useful/4927>
- ▶ Next steps?

These slides are here:

<https://github.com/bjornregnell/scala-sip-notes>

Better type inference for union types

Improvements since 3.1.x

- ▶ More precise types in 3.2.1 for some cases:
 - ▶ <https://github.com/lampepfl/dotty/issues/11449>
- ▶ But some problems remains:
 - ▶ <https://github.com/lampepfl/dotty/issues/14642>
- ▶ "De-duplication" of union types:
 - ▶ <https://github.com/lampepfl/dotty/issues/10693>

Lagom widening

```
scala> var p = true  
var p: Boolean = true
```

```
scala> val x = if p then 42 else "hello"  
val x: Matchable = 42
```

```
// why not infer the more precise Int | String ?
```

Scrap boilerplate by generating match on unions

```
scala> class A(val x: Int)

scala> class B(val x: Int)

scala> val ab: A | B = A(42)

scala> ab.x
-- [E008] Not Found Error: -----
1 |ab.x
   ^^^^
value x is not a member of A | B
```

- ▶ You can fix this with match boilerplate:

```
scala> ab match
  case a: A => a.x
  case b: B => b.x
```

- ▶ But the compiler knows statically that both A and B has x
- ▶ Proposal: make the compiler synthesize the match

Discussions on member selection

- ▶ *Martin Odersky*: One problem here is that union types are supposed to be commutative, but the match is order-dependent, unless we can prove somehow that all alternatives are disjoint.
- ▶ *...after some discussions...*
- ▶ *Martin Odersky*: Yes, I think you are right, as long as we restrict our focus to member selection. If there is an overlap then dynamic dispatch will provide the right method.

```
scala> extension (x: Int) def size = x  
def size(x: Int): Int
```

```
scala> List[Int|String](42,"fortytwo").map(_.size)  
// value size is not a member of Int | String
```

- ▶ *Sébastien Doeraene*: Including extension methods of individual components of the unions is an even bigger can of worms...

Notes from SIP meeting discussions

- ▶ More precise type inference is being worked on and some things have already improved
- ▶ Generating a match for common members in a union is against the nominal typing philosophy of Scala (as opposed to the structural typing of e.g. typescript)
- ▶ There are workarounds, e.g. creating extensions methods on the union to make it more convenient
- ▶ Automatic match could be done with macros but it is still dubious in terms of nominal typing
- ▶ **Decision:** *We will not work on a SIP proposal related to structural member selection for unions*