The SlickChair Conference Management System

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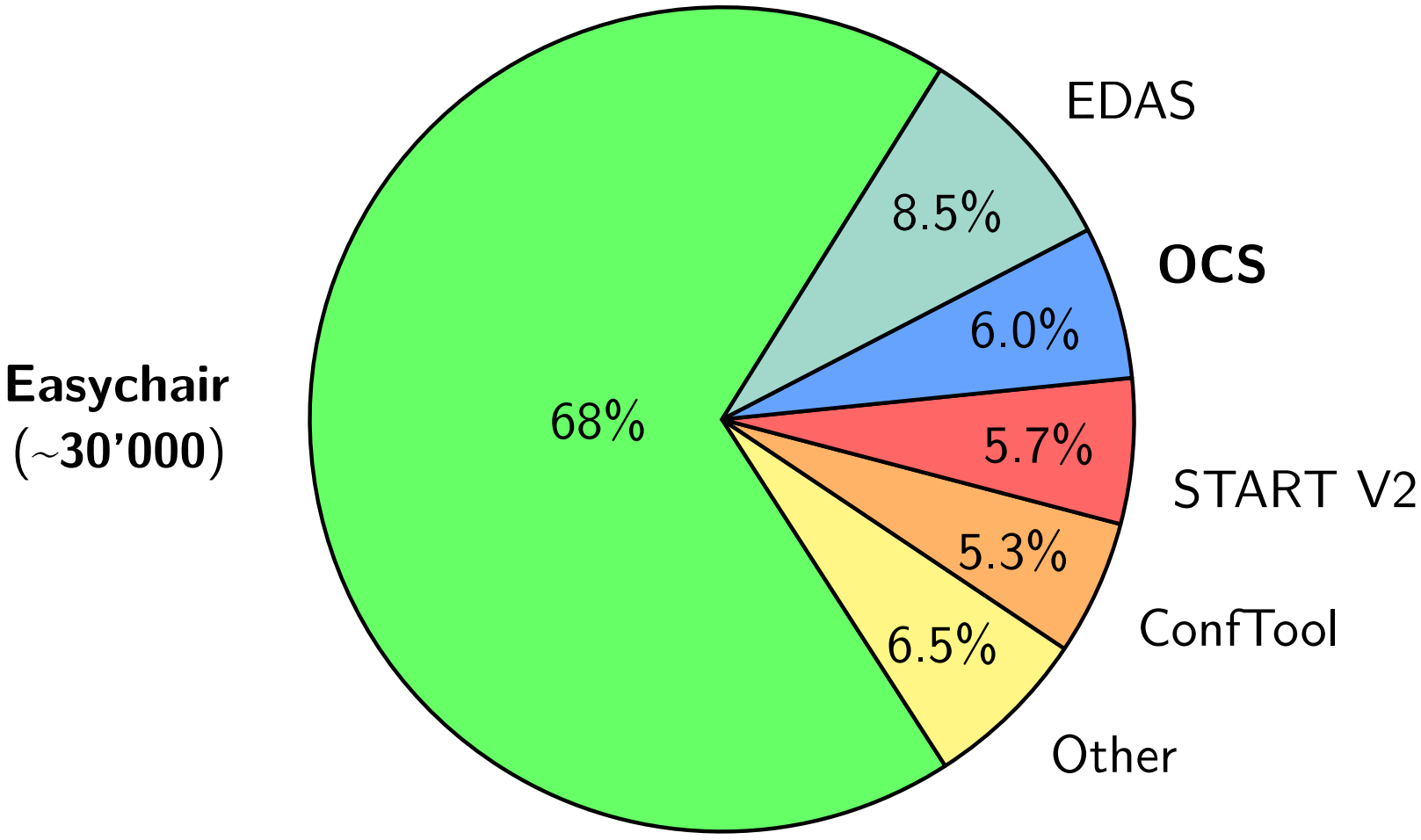
Market share per number of hosted conferences, 2013



SlickChair Technologie Stack

Demo

It's demo time!

Workflow

```
case class Configuration(
  name: String,
  authorCanMakeNewSubmissions: Boolean = false,
  authorCanEditSubmissions: Boolean = false,
  pcmemberCanBid: Boolean = false,
  ...
)

case class Phase(
  configuration: Configuration,
  emails: Database => List[Email],
  warning: Database => Option[String]
)

val workflow: List[Phase] = List(
  ...
)
```

Reminder for late reviewers

```
Phase(

  Configuration("Review Reminder",
    pcmemberCanReview=true,
    pcmemberCanComment=true,
    chairCanDecideOnAcceptance=true),

  { db => Email(
    lateReviewerEmails(db),
    "Reminder: review deadline",
    "Dear Program Committee Member, ...")},

  { _ => None }

)
```

Slick Query example

```
def lateReviewerEmails(db: Database): List[String] = {

  val assignmentPairs = db.assignments
    .filter(_.value)
    .map(a => (a.personId, a.paperId))

  val reviewsPairs = db.reviews
    .map(r => (r.personId, r.paperId))

  (assignmentPairs diff reviewsPairs)
    .join(db.persons).on(_._1 is _.id)
    .map(_._2.email).list(db.s)

}
```

Vertioned data and immutable database

Requirement: log all actions and events

Writing logs in text files?

- Ok for debugging
- Bad to present in a UI
- Bad to query
- Forget about rollbacks

Why do we even U and D in CRUD persistent storage?

Idea: version everything in the database!

Vertioned data and immutable database: DSL

```
case class Database(f: TemporalFilter, s: Session) {
  val persons = table[Person]
  val papers = table[Paper]
  val paperAuthors = table[PaperAuthor]
  ...

  def asOf(date: DateTime): Database
  def since(date: DateTime): Database
  def until(date: DateTime): Database
}

case class Connection(s: Session) {
  def currentDatabase(): Database
  def insert(x: List[Model[_]]): (Database, Database)
}
```

Vertioned data and immutable database: Implementation

All case classes must have a *updatedAt* field

Updates are just appends with a newer timestamp

- Multiple records per natural key
- No additional tables

Database objects have a *TemporalFilter* injected in queries

- Database are values
- Queries are pure functions
- Everything group of *inserts* is atomic

Downside: cannot express transactions

Automatic Paper-Reviewer assignment

Inputs of the problem:

- Set of *papers*
- Set of *reviewers*
- Matrix of *preferences*
- List of *conflicts*
- $n \in \mathbb{N}$

Looking for the *best* assignment without conflicts such each papers is reviewed exactly n times.

- It's NP-Complete :(
- No *practical* approximation algorithm
- From here it's either brute-force or heuristics

Implementation with OscaR

```
val m = makeMatrix(nReviewers, nPapers, 0 to 1)

m.columns foreach { c => add(sum(c) == nReviewPerReviewer) }
m.rows foreach { r => add(sum(r) == nReviewPerPaper) }
conflicts foreach { c => add(m(c._1, c._2) == 0) }

maximize(weightedSum(preferences, m)) search {
  binaryMaxDegree(m.flatten.toSeq)
}
onSolution { return m } start()
```

Conclusion and future work

My personal takeaways:

- I'm never writing another line of SQL
- Who needs test when you have type-checking?
- Agile development worked very well in this project

Future work:

- PDF metadata extraction, Co-authorship, Plagiarism
- Turn the vertioned data DSL into proper a library
- Scala.js

Thank you for your attention!

Questions?

Slick Query example, compiled SQL

```
SELECT x2.x3 FROM
  (SELECT x4.x5 AS x6 FROM
     (SELECT x7."PERSONID" AS x5, x7."PAPERID" AS x8
      FROM "ASSIGNMENT" x7,
        (SELECT x9."ID" AS x10, max(x9."UPDATEDAT") AS x11
         FROM "ASSIGNMENT" x9 GROUP BY x9."ID") x12
      WHERE ((x7."ID" = x12.x10)
        AND (x7."UPDATEDAT" = x12.x11)) AND x7."VALUE"
      EXCEPT SELECT x13."PERSONID" AS x5, x13."PAPERID" AS x8
      FROM "REVIEW" x13,
        (SELECT x14."ID" AS x15, max(x14."UPDATEDAT") AS x16
         FROM "REVIEW" x14 GROUP BY x14."ID") x17
      WHERE (x13."ID" = x17.x15)
        AND (x13."UPDATEDAT" = x17.x16)) x4) x18
INNER JOIN
  (SELECT x19."ID" AS x20, x19."EMAIL" AS x3
   FROM "PERSON" x19,
     (SELECT x21."ID" AS x22, max(x21."UPDATEDAT") AS x23
      FROM "PERSON" x21 GROUP BY x21."ID") x24
   WHERE (x19."ID" = x24.x22)
     AND (x19."UPDATEDAT" = x24.x23)) x2 ON x18.x6 = x2.x20
```