

GHC status report

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What's new in GHC?

- A remarkable amount of activity
- Lots of contributors:

Mark Lentczner, Dan Knapp, Johan Tibell, PHO, Greg Wright, Thorkil Naur and William Knop, Karel Gardas Christian Maeder, Sergei Trofimovich, Marco Silva, Erik de Castro Lopo, Austin Seipp, Orphi, Matthias Kilian, Daniel Peebles, Vivian McPhail, Boris Lykah, Pepe Iborra, David Terei, George Giorgidze, Torsten Grust, Nils Schweinsberg, Jeroen Weijers, Pedro Magalhães, Max Bolingbroke, Reiner Pope, Jeff Epstein, Julien Cretin and more

Type re-engineering

- Completely new constraint solver for type inference
- In the intermediate language, coercions are terms
- Result: solid internal foundations
- Small user-visible consequences (many buglets fixed, local lets not generalised, H' pattern bindings)
- Modest overhaul of Typeable: hashes instead of unique-id counter

Generic programming (Pedro)

- A combination of two separately-useful features:

- Default signatures

```
class C a where
  op :: a -> a -> Bool
  default op :: Ord a => a -> a -> Bool
  op x y = x >= y
```

- deriving(Generic)

```
data T = T1 | T2 Int deriving( Generic )
```

- Replaces "derivable type classes" (Hinze/PJ)

Kinds

- A proper kind system at last! (Julien)

```
data Nat = Z | S Nat
```

```
data Vec (n::Nat) where  
  Vnil :: Vec Z  
  VCons :: Int -> Vec n -> Vec (S n)
```

- Kind Constraint (Max, Dominic)

```
class Collection c where  
  type X c a :: Constraint  
  insert :: (X c a) => c a -> a -> c a
```

```
instance Collection Tree where  
  type X Tree a = Ord a  
  insert = ..tree insert..
```

More language extensions

- Data Parallel Haskell: GHC 7.4 will (for the first time) have realistically-usable DPH.
- Safe Haskell (David Terei, David Maziers)
 - Web server can download Haskell source code, compile and run it, without leaving security holes
- Monad comprehensions (George Giorgidze, Torsten Grust, Nils Schweinsberg and Jeroen Weijers).
- Type and class declarations in GHCi

Internals and runtime system

- Chunked stacks (SimonM)
- New inner-loop primops (Johan)
 - popcount#
 - array copying
- Better support for cross compilation
- Interruptible FFI (Edward)
- Compiler plugins (Max)
- Local GC (SimonM) [ISMM'11, not in HEAD]
- The Long March to the Fantastic New Code Generator continues (Edward, Simons)

Profiling

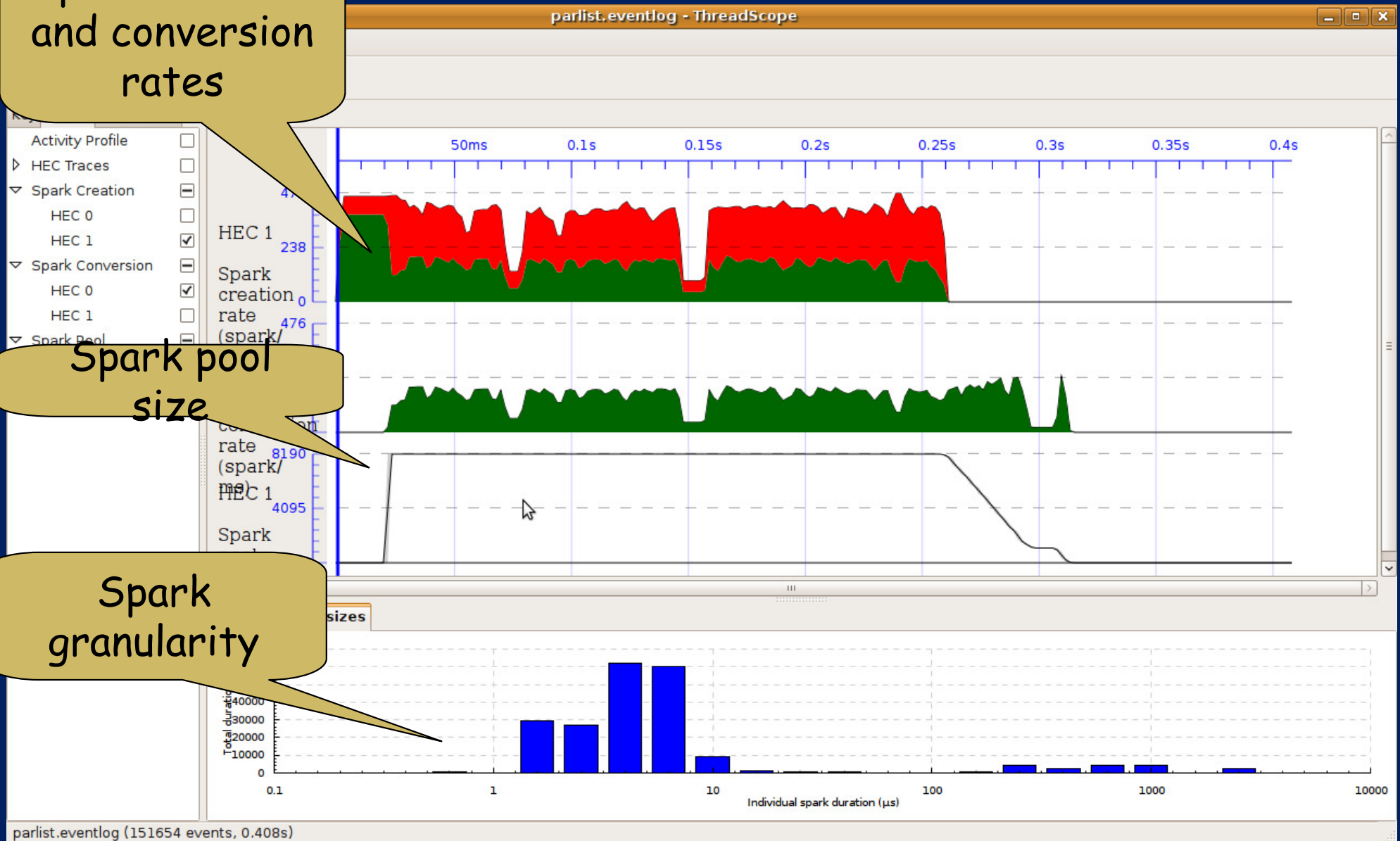
- New profiling infrastructure (SimonM), unifies
 - profiling
 - coverage (HPC)
 - breakpoints
- ThreadScope developments (Duncan), esp spark profiles

Threadscope

Spark creation and conversion rates

Spark pool size

Spark granularity



GHC is (still) hot

- Lots going on. Lots. Really a lot. 200 commits/month.
- We are having way to much fun
- You should join in

- ▣ - DPH support

- ▣ Other ongoing projects:

- ▣

- ▣ New CodeGen

- ▣ - Edward Yang's work

- ▣ - Simon & Simon refactoring

- ▣