

Timings of common tasks using the **data.table** package in R

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(A later revision may be available on the [homepage](#))

* WORK IN PROGRESS *

This document contains a series of tests, followed by a summary table of various timings and comparisons. Please go straight to the summary table first [<here>](#) in which each row has a link back to the test.

This document is reproducible. Simply run the .Rnw file yourself in your environment to confirm the results. Also see `?vignette`, which says that `edit(vignette("datatable-timings"))` will extract the code from this document so you can easily work with it.

The .Rnw included in the package has $N=10,000,000$. This is a small number so that 'R CMD build' completes in a reasonable time (about 5 minutes). We don't want the nightly builds on R-Forge and CRAN to slow down just to run long timing comparisons. We have increased this to $N=100,000,000$ ourselves, and included the output on the [datatable homepage](#) ([<link>](#)).

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1 Timing tests

1.1 Extraction

This is a repeat of the test in section 1 of the Introduction vignette. The syntax is explained there. This demonstrates the large difference in speed between vector scans and binary search. Therefore, please avoid using `==` in the `i` expression.

```
> n = ceiling(1e7/26^2) # 10 million rows
> DF = data.frame(x=rep(LETTERS,each=26*n),
+               y=rep(letters,each=n),
+               v=rnorm(n*26^2))
> DT = data.table(DF,key="x,y")
> tables()
```

```
      NAME      NROW MB COLS KEY
[1,] DT    10,000,068 153 x,y,v x,y
Total: 153MB
```

```
> tt=system.time(ans1 <- DF[DF$x=="R" & DF$y=="h",]); tt
```

```

      user  system elapsed
12.529    0.900   13.465

> head(ans1)

      x y          v
6642058 R h -1.29302045
6642059 R h  0.86216395
6642060 R h  0.50771490
6642061 R h  0.97645499
6642062 R h -0.11269992
6642063 R h -0.07885278

> dim(ans1)

[1] 14793      3

> ss=system.time(ans2 <- DT[J("R","h")]); ss

      user  system elapsed
0.024    0.004   0.025

> head(ans2)

      x y          v
[1,] R h -1.29302045
[2,] R h  0.86216395
[3,] R h  0.50771490
[4,] R h  0.97645499
[5,] R h -0.11269992
[6,] R h -0.07885278

> dim(ans2)

[1] 14793      3

> identical(ans1$v,ans2$v)

[1] TRUE

```

1.2 Grouping

This is a repeat of the test in section 2 of the Introduction vignette. The syntax is explained there.

```

> ttt=system.time(ans1 <- tapply(DF$v,DF$x,sum)); ttt

      user  system elapsed
17.421    0.925   18.389

> head(ans1)

      A          B          C          D          E          F
18.12853 349.50815 -161.44847 -635.71288  91.13526 -32.25419

> sss=system.time(ans2 <- DT[,sum(v),by=x]); sss

      user  system elapsed
0.420    0.156   0.582

> head(ans2)

```

```

      x      V1
[1,] A   18.12853
[2,] B  349.50815
[3,] C -161.44847
[4,] D -635.71288
[5,] E   91.13526
[6,] F  -32.25419

```

```
> identical(as.vector(ans1), ans2$V1)
```

```
[1] TRUE
```

1.3 Test 3

1.4 Test 4

1.5 Test 5

2 Summary table

```
> ans
```

	base	data.table	times	faster
==	13.465	0.025	538	
tapply	18.389	0.582	31	

```
> toLatex(sessionInfo())
```

- R version 2.14.1 (2011-12-22), i686-pc-linux-gnu
- Locale: LC_CTYPE=en_GB.UTF-8, LC_NUMERIC=C, LC_TIME=en_GB.UTF-8, LC_COLLATE=C, LC_MONETARY=en_GB.UTF-8, LC_MESSAGES=en_GB.UTF-8, LC_PAPER=C, LC_NAME=C, LC_ADDRESS=C, LC_TELEPHONE=C, LC_MEASUREMENT=en_GB.UTF-8, LC_IDENTIFICATION=C
- Base packages: base, datasets, grDevices, graphics, methods, stats, utils
- Other packages: data.table~1.7.10
- Loaded via a namespace (and not attached): tools~2.14.1