

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

Matthew Dowle

September 11, 2010

(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 \(<link>\)](#).

## Contents

<b>1</b>	<b>Timing tests</b>	<b>1</b>
1.1	Extraction	1
1.2	Grouping	2
1.3	Test 3	2
1.4	Test 4	2
1.5	Test 5	2
<b>2</b>	<b>Summary table</b>	<b>2</b>

## 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
4.172   0.980   5.240

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

      user  system elapsed
0.008   0.004   0.014

> mapply(identical,ans1,ans2)

      x    y    v
TRUE TRUE 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
9.065   0.940  10.369

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

      user  system elapsed
0.528   0.192   0.734

> 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
==      5.240      0.014      374
tapply 10.369      0.734      14

> toLatex(sessionInfo())

• R version 2.11.1 (2010-05-31), i486-pc-linux-gnu

• Locale: LC_CTYPE=en_GB.utf8, LC_NUMERIC=C, LC_TIME=en_GB.utf8,
  LC_COLLATE=en_GB.utf8, LC_MONETARY=C, LC_MESSAGES=en_GB.utf8,
  LC_PAPER=en_GB.utf8, LC_NAME=C, LC_ADDRESS=C, LC_TELEPHONE=C,
  LC_MEASUREMENT=en_GB.utf8, LC_IDENTIFICATION=C

• Base packages: base, datasets, graphics, grDevices, methods, stats, tools, utils

• Other packages: data.table~1.5

```