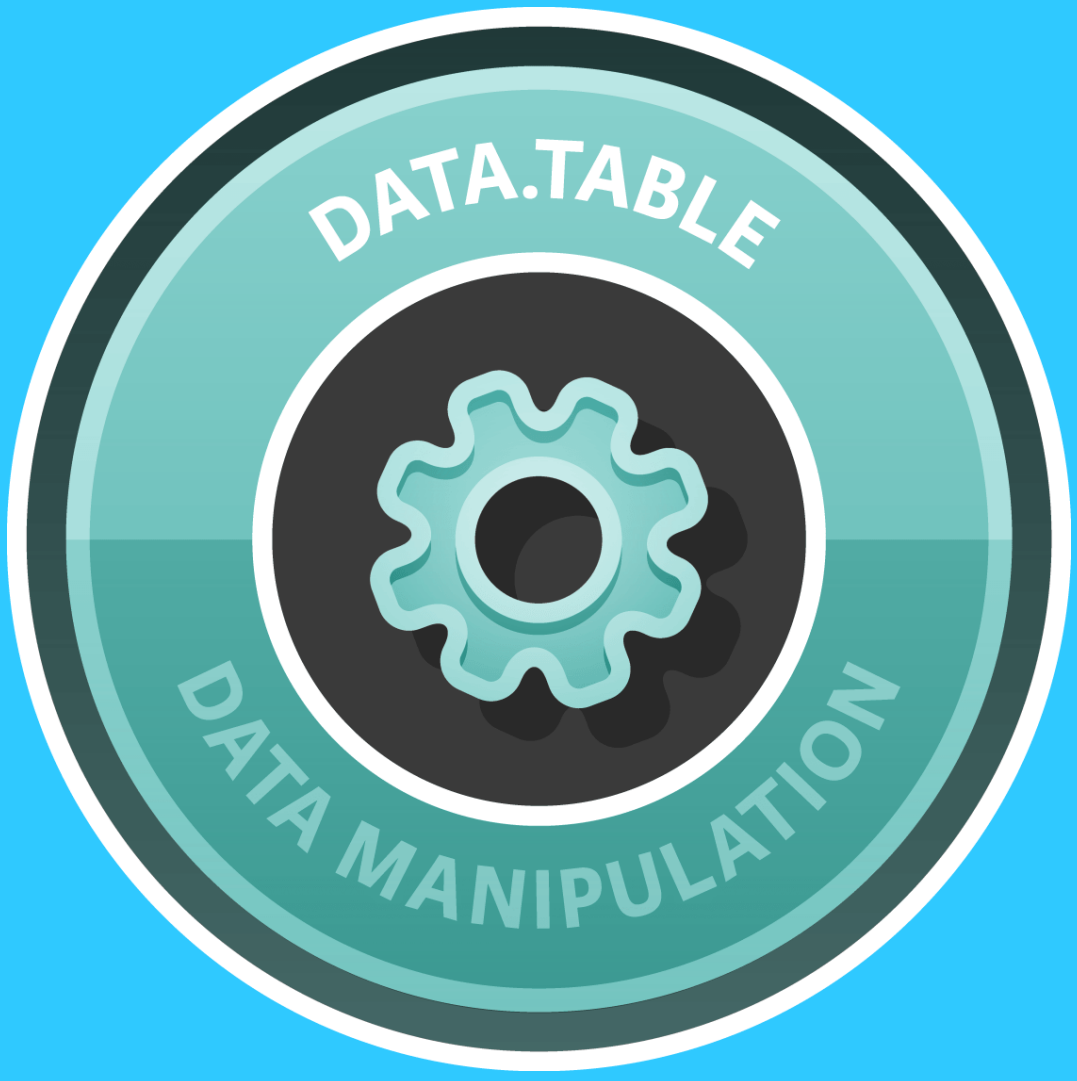

DATA.TABLE: R - DOCUMENTATION

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1. Overview:

- It belongs to family of data frames.
- It avoids allocating memory to the intermediate steps such as filtering.
- It creates **shallow** copies (i.e. data is not physically copied in systems memory). It's just a copy of column pointers.
- It enhanced the speed of indexing, rolling ordered joins, overlapping range joins, assignment, grouping and listing columns.
- It uses **radix sort** to do the sorting.
- Almost all the operations are **20x faster** than **dplyr** (the fastest library till date).
- Syntax like SQL

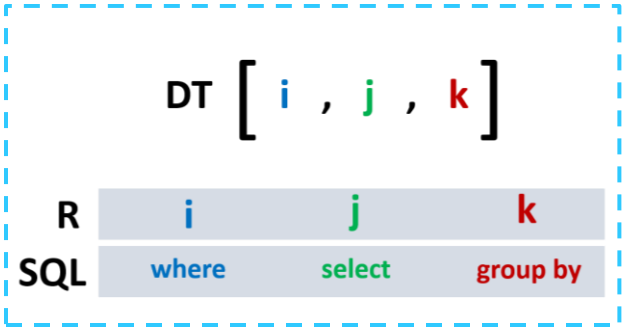
2. Beginner Course:

```
https://www.datacamp.com/courses/data-table-data-manipulation-r-tutorial
```

3. Installation:

```
install.packages('data.table')
```

4. Syntax:



where,

- DT = a sample data.table
- i = similar to '**where**' in SQL
- j = similar to '**select**' in SQL
- k = similar to '**group by**' in SQL

Ex:

- `DT [c1 > 5, sum(c2), by = c3]`
- Fetches all rows with c1 > 5 and then groups by c3 and calculates sum of c2 and returns sum(c2)

5. Basic commands:

```
library(data.table)

dt = data.table(a = runif(100), b = runif(100), c = runif(100), d = sample(letters, 100, replace = T), e = sample(letters, 100, replace = T))

ddt = fread(file.choose())

fwrite(dt, 'file-name.csv')
```

6. Check the data.tables in environment

```
tables()
```

7. Playing with i in DT Syntax:

```
dt[a > 0.5]

dt[a > 0.5 & b > 0.5]
```

8. Playing with j in DT Syntax:

```
dt[, b]
```

∠ Returns only 'b' column

```
dt[, .(b, c)]
```

∠ Returns b, c columns

∠ **.(b, c)** is similar to **list('b', 'c')**

9. Playing with i, j together in DT Syntax:

```
dt[a > 0.5, .(b, c)]

dt[a > 0.5 & d %in% c('a', 'b'), .(b, c)]
```

10. Playing with j, k together in DT Syntax:

```
dt[, sum(a), by = d]
```

∠ same as 'select sum(a) from dt group by d'

```
dt[, .(sum(a), sum(b)), by = d]
```

∠ same as 'select sum(a), sum(b) from dt group by d'

```
dt[, sum(a), by = .(d, e)]
```

∠ same as 'select sum(a) from dt group by d, e'

11. Filtering using key

- ***Note:*** *Twice faster than normal filtering in data.table*

```
setkey(dt, d)

dt[c('a', 'b')]
```

∠ same as dt[d %in% c('a', 'b')]

```
setkey(dt, d, e)

dt[.('a', 'b')]
```

∠ returns a row where d == 'a' and e == 'b'.. i.e. same as **dt [d == 'a' & e == 'b']**

12. Ordering/Sorting

```
setorder(dt, c)
```

∠ ascending

```
setorder(dt , -c)
```

∠ descending

```
setorder(dt, a, -c)
```

∠ multiple columns sorting

13. Adding columns

```
dt[, f := runif(100)]
```

∠ adds a column

```
dt[, c('f', 'g') := list(runif(100), runif(100))]
```

∠ Adds multiple columns at a time

14. Summarizing

```
dt[, .(mean = mean(a), median = median(a))]
```

```
dt[, .(b, c, mean = mean(a))]
```

∠ since mean(a) returns only one value it recycles the value of mean(a) and appends it to all the rows.

15. .SD = Subset of Data

```
dt[, lapply(.SD, mean), .SDcols = c("a", "b", "c")]
```

∠ apply the mean for subset of columns.

```
dt[, lapply(.SD, mean)]
```

∠ summarizes all columns - in this case it returns NA for d, e columns (as they are character type)

```
dt[, sapply(.SD, function(x) c(mean=mean(x), median=median(x))), .SDcols = c('a', 'b', 'c')]
```

∠ multiple statistics on subset of columns.

16. .N = Number of rows/Count

```
dt[.N]
```

∠ fetches last row

```
dt[, .N]
```

∠ fetches number of rows

```
dt[, .N, by = e]
```

∠ same as 'select count(*) from dt group by e'

17. Aggregation - very powerful

```
dt[, mean(a), by = e]
```

∠ default column name for mean(a) will be V1

```
dt[, .(mean(a), mean(b)), by = d]
```

∠ default column names for mean(a), mean(b) will be V1, V2

```
dt[, .(mean = mean(a)), by = e]
```

∠ renames mean(a) from V1 to mean

```
dt[, .(mean_a = mean(a), mean_b = mean(b)), by = d]
```

∠ default column names will be V1, V2

```
dt[, lapply(.SD, mean, na.rm = TRUE), .SDcols = c("a", "b"), by = d]
```

∠ renames to a, b directly

18. Remove duplicates

```
setkey(dt, NULL)
```

∠ removes set keys

```
unique(dt)
```

∠ removes duplicates in the entire data.table

```
setkey(dt, e)
```

∠ key value = e

```
unique(dt)
```

∠ remove duplicates in e

19. Extract selected values in group

```
dt[, .SD[1:2], by = e]
```

∠ selects top two rows for every level in e

```
dt[, SD[.N], by = e]
```

∠ selects last row for every level in e

20. frank – same as rank function in base R

```
dt[, .(rank = frank(a, ties.method = "min")), by = e]
```

∠ assigns 1 for the minimum value of a in each level of e, 2 for the 2nd min value ... etc.

```
dt[, .(rank = frank(-a, ties.method = "min")), by = e]
```

∠ same as above but 1 for max value (observe the - sign for a)

21. like (works more like grep), between

```
dt[, a %between% c(0.3, 0.5)]

dt[, e %like% c('a', 'e')]
```

22. Joins

```
dt1 = data.table(a1 = runif(26), b = sample(letters))

dt2 = data.table(a2 = runif(26), b = sample(letters))

setkey(dt1, b)

setkey(dt2, b)

merge(dt1, dt2, by = 'b')
```

∠ uses the merge in data.table instead of base package !! - faster!!

23. melt, dcast

∠ same syntax as dply

∠ faster in data.table than dplyr package !!

24. Conversions

```
setDF(dt)
```

∠ converts data.table to data.frame

```
setDT(dt)
```

∠ converts data.frame to data.table