CWI
Centrum Wiskunde & Informatica

R as a Query Language?

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- Observation A: *Nobody* loves SQL
- Observation B: *Everybody* loves R / Python / Matlab
- Observation C: People still do the same things
  - Native plus specialised packages,
    eg. `data.table` / `dplyr` / NumPy / Pandas / …

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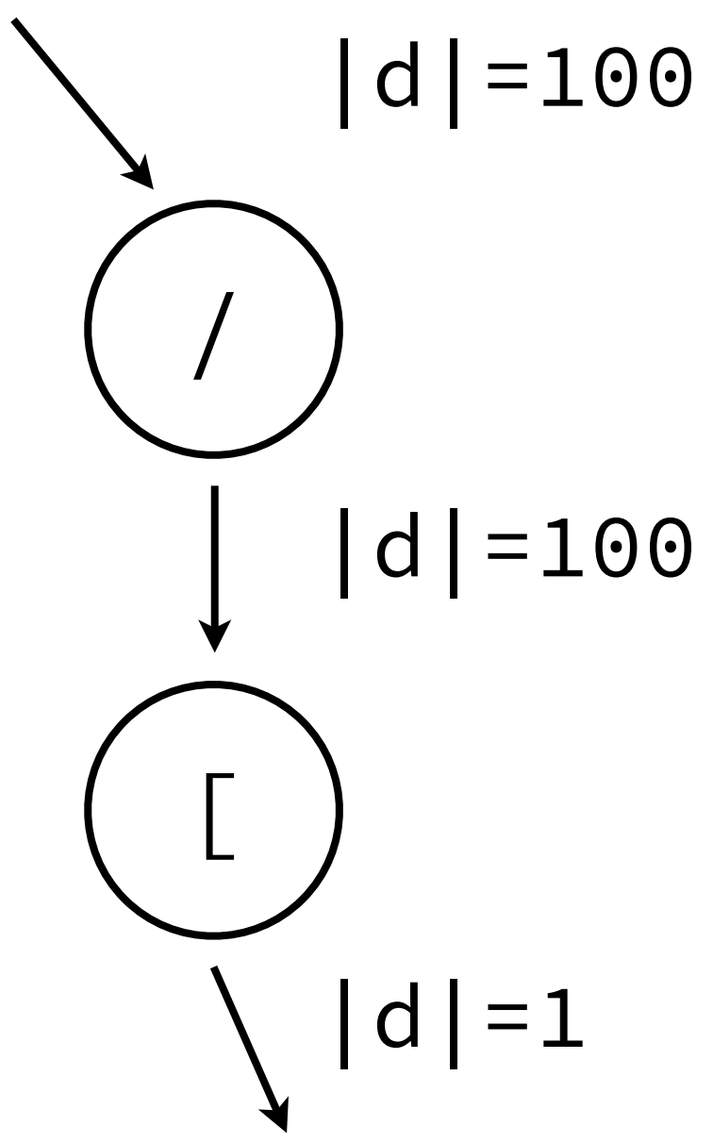
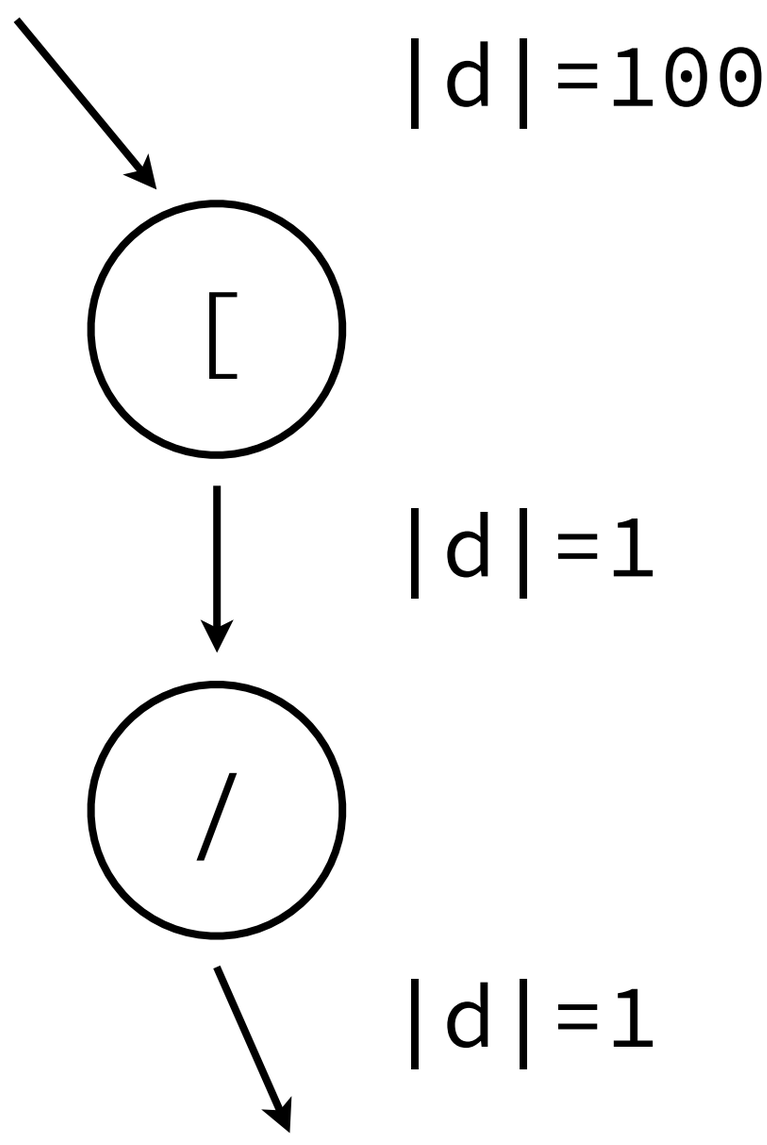
- Let's bring some relational know-how to the party
- Interpret a imperative analysis script as a *declaration of intent*
- Then, apply standard DB query optimisations
  - and possibly use optimised operators as well

- Pushdown of point/range selections, projections
- Detection of common subexpressions
  - Copy-paste “pattern”
  - Caching
- Rescheduling
  - Minimise variable life time
  - Parallelisation of independent flows
- Join ordering

```r
d <- data.frame(a=seq(100), b=runif(100))

d$b <- d$b/2
d <- d[d$a == 50,]
```






```
SELECT b/2 FROM d WHERE a = 50;
```

- Apply default DB rule-based query optimisations
- Implementation: renjin
  - R on the JVM, including some C translation
    - Uses promises/deferred executions
- Use case: Survey analysis (`survey` package for R)
  - Complex calculations
  - Large datasets

$$\overline{age} = \frac{\sum (age \times w)}{\sum w}$$

$$SE(\overline{age}) = \sqrt{\frac{4}{80} \sum_{r=1}^{80} (w_r - \overline{age})^2}$$

```r
svydsgn <- svrepdesign(
        weight = ~pwgtp ,
        repweights = 'pwgtp[1-9]' ,
        scale = 4 / 80 ,
        rscales = rep( 1 , 80 ) ,
        mse = TRUE ,
        data = svydata)

svytotal(~I(relp %in% 0:15), svydsgn),
svytotal(~I(relp %in% 0:15), svydsgn),
svytotal(~I(relp %in% 16:17), svydsgn),
svytotal(~I(relp == 16), svydsgn),
svytotal(~I(relp == 17), svydsgn),
tt <- svytotal(~sex, svydsgn) ,
svytotal(~I(agep %in% 0:4) + I(agep %in% 5:9) + I(agep %in% 10:14) +
    I(agep %in% 15:19), svydsgn),
svytotal(~I(agep %in% 20:24) + I(agep %in% 25:34) + I(agep %in% 35:44) +
    I(agep %in% 45:54), svydsgn),
svytotal(~I(agep %in% 55:59) + I(agep %in% 60:64) + I(agep %in% 65:74) +
    I(agep %in% 75:84) + I(agep > 84), svydsgn)
```

Thank you.
Questions?

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