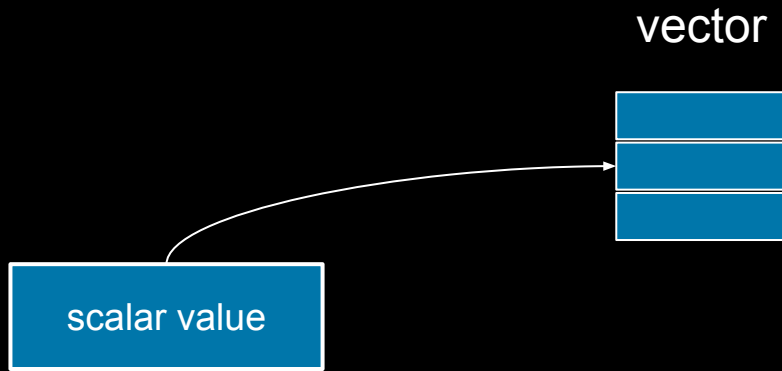
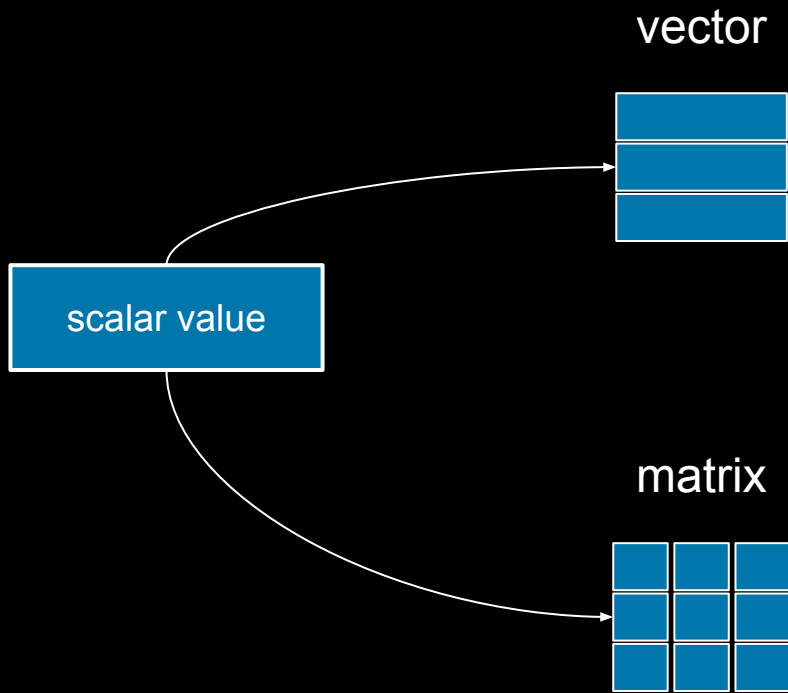
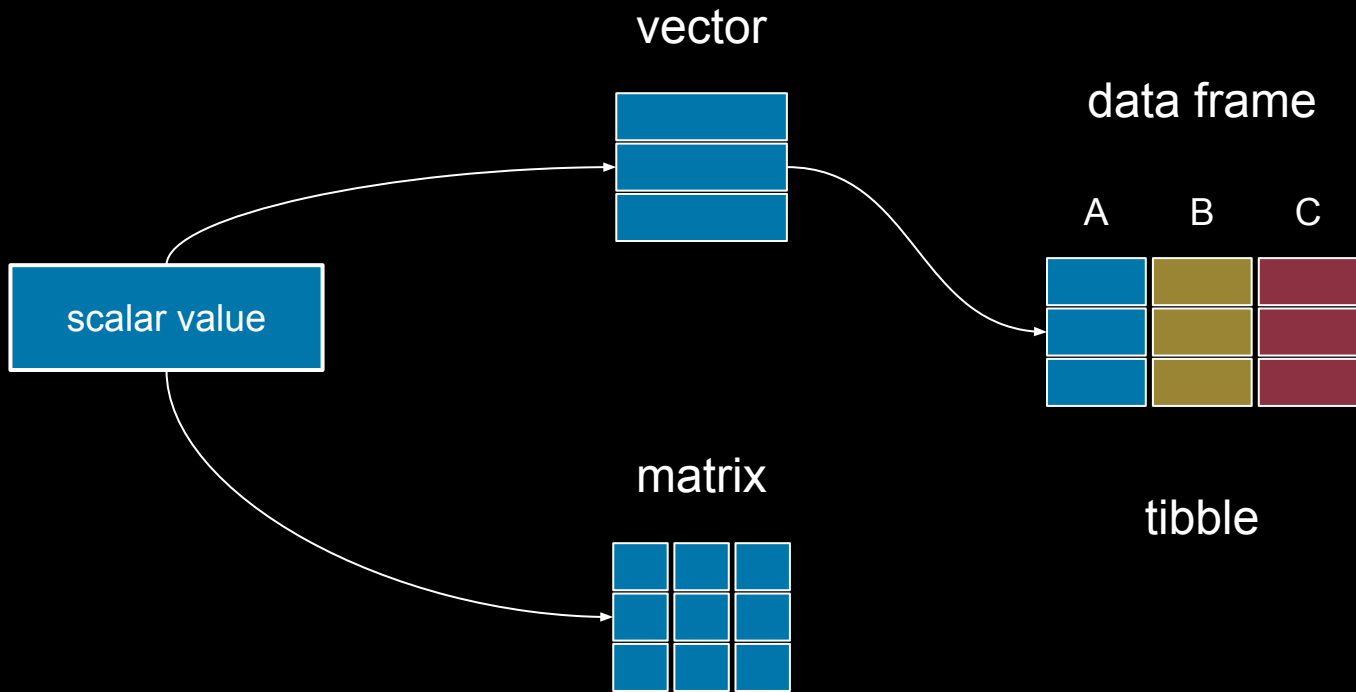


# DATA REPRESENTATION

scalar value







# VECTORS

apple
pear
orange

list of values with  
the same storage mode



list of values with  
the same storage mode

character  
double  
integer  
logical

```
v <- c("apple", "pear", "orange")
```

v[1]

apple
pear
orange

v[2]

apple
pear
orange

v[3]

apple
pear
orange

```
weight <- c(91, 75.5, 61, 88.5, 120)
```

```
weight <- c(91, 75.5, 61, 88.5, 120)  
mean(weight)
```



sum	length
mean	sort
median	cumsum
sd	prod
var	quantile
min	abs
max	range

91
75.5
61
88.5
120

```
weight_after_diet <-  
  c(89.5, 75, 56, 96.5, 115)
```

weight

weight\_after\_diet

91
75.5
61
88.5
120

—

89.5
75
56
96.5
115

weight

91
75.5
61
88.5
120

weight\_after\_diet

89.5
75
56
96.5
115

weight\_loss

1.5
0.5
5
-8
5

—

=

```
weight_loss <-  
  weight - weight_after_diet
```

subsetting vectors

weight[1]

weight[1]

weight[-1]



```
weight[1]
```

```
weight[-1]
```

```
weight[2:5]
```

```
weight[1]
```

```
weight[-1]
```

```
weight[2:5]
```

```
weight[1:length(weight)-1]
```

```
weight[1]
```

```
weight[-1]
```

```
weight[2:5]
```

```
weight[1:length(weight)-1]
```

```
weight[c(TRUE, FALSE, TRUE, TRUE, FALSE)]
```

```
weight[1]
```

```
weight[-1]
```

```
weight[2:5]
```

```
weight[1:length(weight)-1]
```

```
weight[c(TRUE, FALSE, TRUE, TRUE, FALSE)]
```

```
weight[weight > 80]
```

```
weight[1]
```

```
weight[-1]
```

```
weight[2:5]
```

```
weight[1:length(weight)-1]
```

```
weight[c(TRUE, FALSE, TRUE, TRUE, FALSE)]
```

```
weight[weight > 80]
```

```
weight[weight > 80 & weight < 100]
```

special values

NA

NULL

NaN

Inf

-Inf

factors



```
category <- factor(c("heavy", "medium", "light", "medium", "heavy"))
```

```
category <- factor(c("heavy", "medium", "light", "medium", "heavy"))
```

```
levels(weight_category)
```

```
category <- factor(c("heavy", "medium", "light", "medium", "heavy"))
```

```
levels(weight_category)
```

```
category_reordered <- factor(category,  
                               levels = c("light", "medium", "heavy"))
```

```
category <- factor(c("heavy", "medium", "light", "medium", "heavy"))
```

```
levels(weight_category)
```

```
category_reordered <- factor(category,  
                              levels = c("light", "medium", "heavy"))
```

```
category_ordered <- factor(category,  
                             levels = c("light", "medium", "heavy"),  
                             ordered = TRUE)
```

{{ forcats }}

`as_factor()`

fct\_reorder  
fct\_relevel  
fct\_infreq  
fct\_rev  
fct\_lump

# DATA FRAMES



"apple"

"pear"

"orange"

"apple"	TRUE
"pear"	TRUE
"orange"	FALSE

"apple"	TRUE	10.0
"pear"	TRUE	16.5
"orange"	FALSE	14.0

fruit

"apple"	TRUE	10.0
"pear"	TRUE	16.5
"orange"	FALSE	14.0

fruit	domestic	
"apple"	TRUE	10.0
"pear"	TRUE	16.5
"orange"	FALSE	14.0

fruit	domestic	sugar
"apple"	TRUE	10.0
"pear"	TRUE	16.5
"orange"	FALSE	14.0

fruit	domestic	sugar
"apple"	TRUE	10.0
"pear"	TRUE	16.5
"orange"	FALSE	14.0

data frame "fruits"

fruit	domestic	sugar
"apple"	TRUE	10.0
"pear"	TRUE	16.5
"orange"	FALSE	14.0



creating data frames

```
data.frame()  
read.csv()
```

comma separated values (CSV)

data frame meta data

```
ncol()  
nrow()  
dim()  
colnames()
```

accessing data frames

accessing data frames  
accessing columns

```
monty$prize_door  
monty$contestant_choice  
monty$decision
```



```
monty$prize_door  
monty$contestant_choice  
monty$decision
```



return a vector

```
monty["prize_door"]  
monty["contestant_choice"]  
monty["decision"]
```

```
monty["prize_door"]  
monty["contestant_choice"]  
monty["decision"]
```



return a data  
frame

```
# multiple columns by name  
monty(c("prize_door", "contestant_choice"))
```

```
monty[, 1]           # first column  
monty[, 1:2]         # first two columns  
monty[, ncol(monty)] # last column
```

accessing data frames  
accessing rows

```
monty[1,]           # first row  
monty[1:10,]        # first 10 rows  
monty[nrow(monty),] # last row
```

changing columns



```
monty$decision <- as.factor(monty$decision)
```

adding columns

```
monty$correct_guess <-  
  monty$contestant_choice == monty$prize_door
```

rename columns

```
colnames(monty)[2] <- "choice"
```

subsetting data frames

```
switched <-  
  monty[monty_hall$decision == "switch, ]
```

```
switched <-  
  monty[  
    monty_hall$decision == "switch &  
    monty$won == TRUE, ]
```



`subset()`

```
subset(monty, decision == "switch")
```

```
subset(  
    monty,  
    decision == "switch" & won == TRUE  
)
```

sorting rows

```
monty[order(monty$prize_door),]
```

```
monty[order(monty$prize_door),]
```

```
monty[order(  
    monty$prize_door,  
    decreasing = TRUE  
),]
```

saving data frames

```
write.csv()
```



tibbles

{{ tibble }}

data frame "fruits"

fruit	domestic	sugar
"apple"	TRUE	10.0
"pear"	TRUE	16.5
"orange"	FALSE	14.0

*some sugar*

data frame "fruits"

fruit	domestic	sugar
"apple"	TRUE	10.0
"pear"	TRUE	16.5
"orange"	FALSE	14.0

tibble "tbl\_fruits"

```
as_tibble()
```

*some sugar*

better printing

subsets stay tibbles

better data type guessing

support for extended data types

...