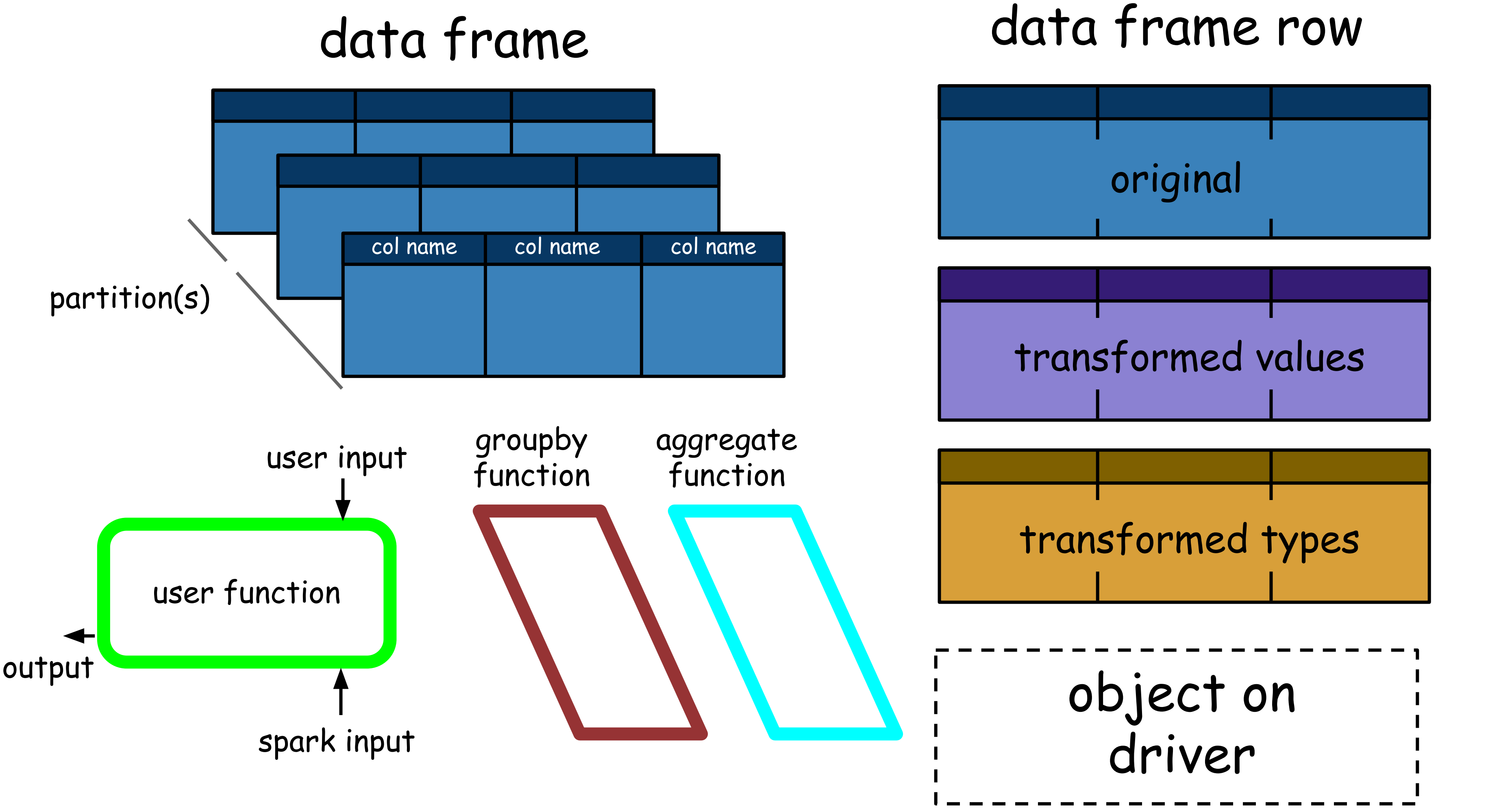
pyspark-pictures data frames

Learn the pyspark API through pictures and simple examples

https://github.com/jkthompson/pyspark-pictures



data frame

col name

col name

col name

partition(s)

data frame row

original

transformed values

transformed types

object on driver

user input

user function

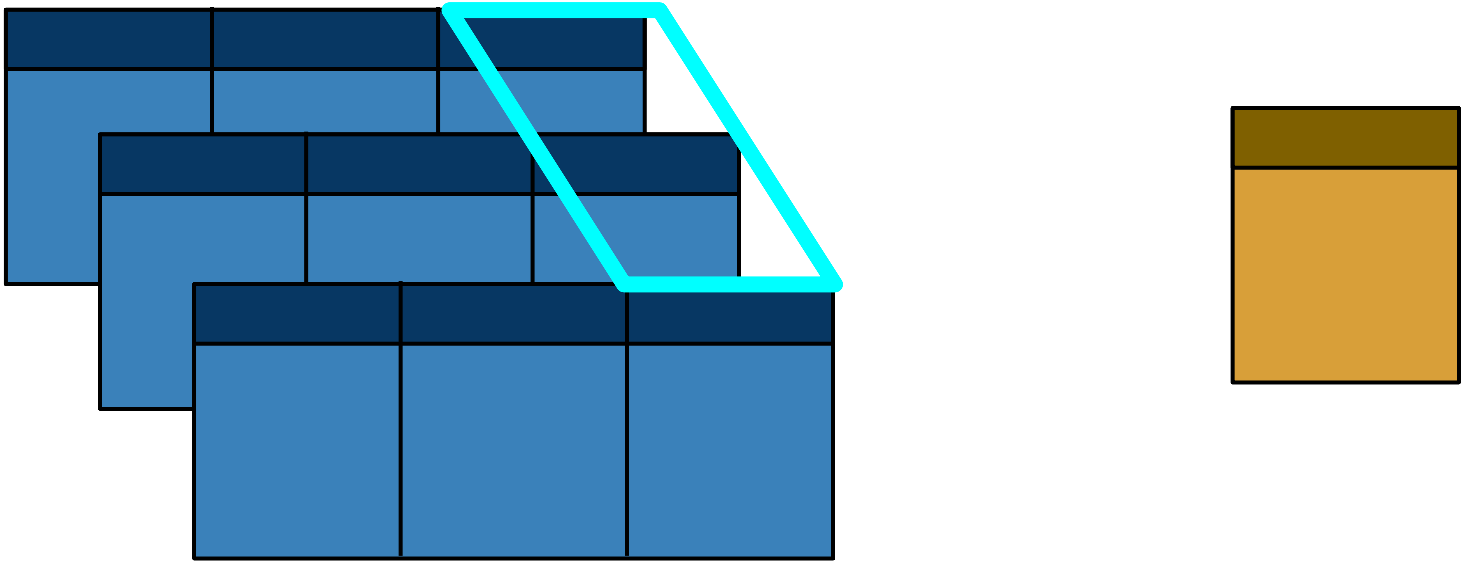
output

spark input

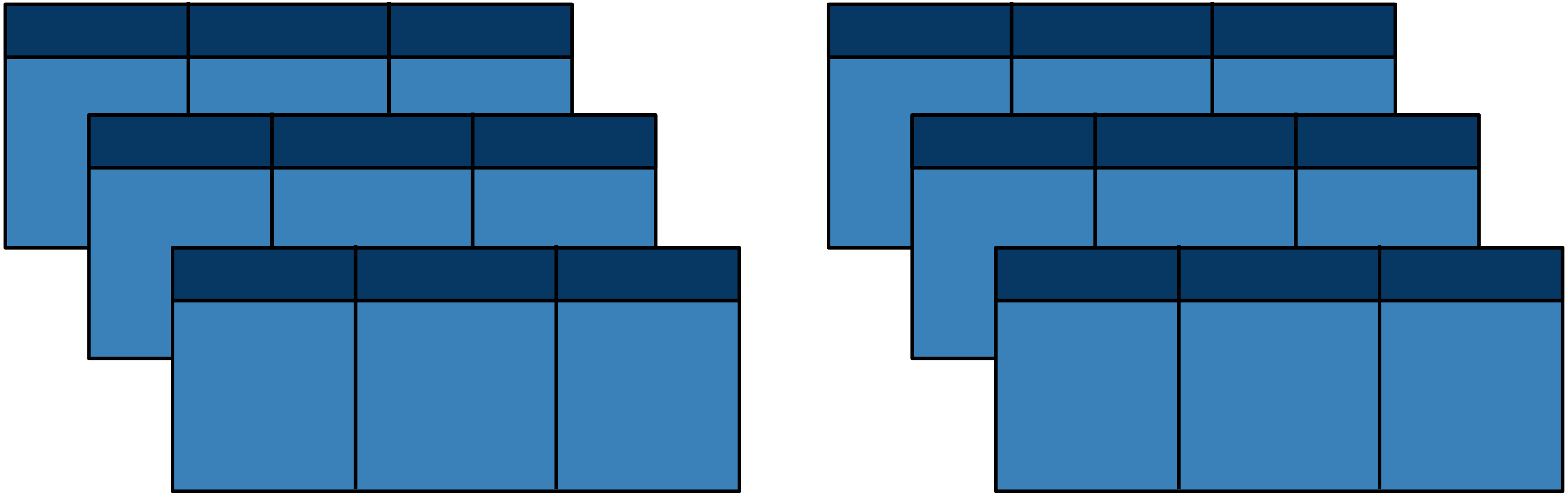
groupby function

aggregate function

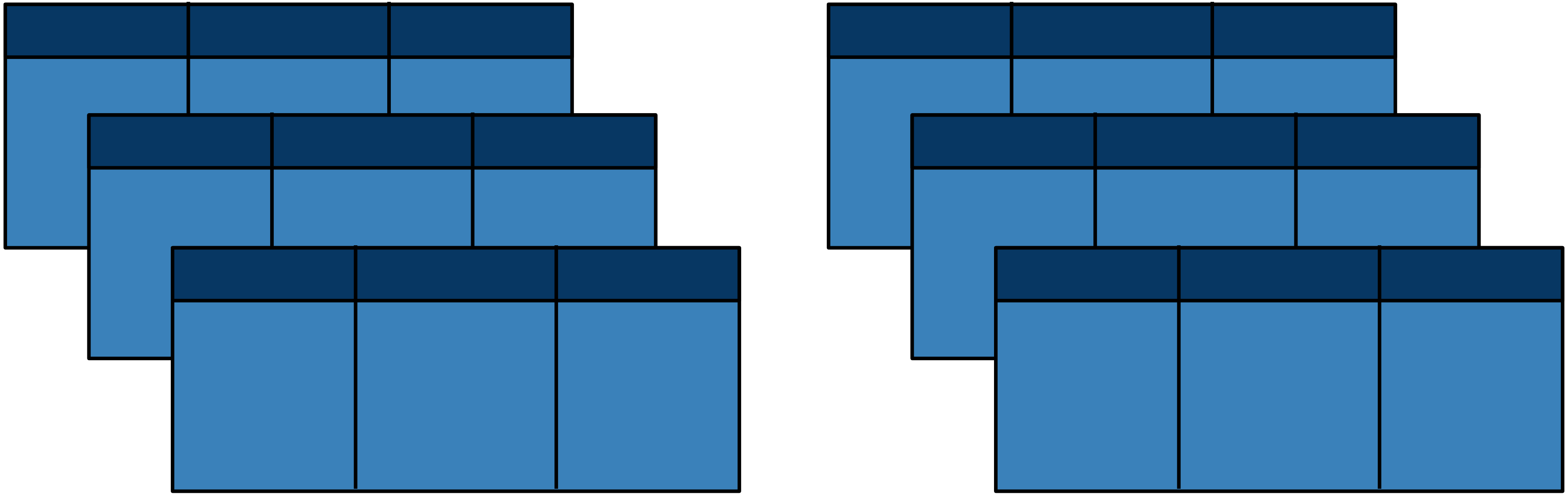
agg



alias

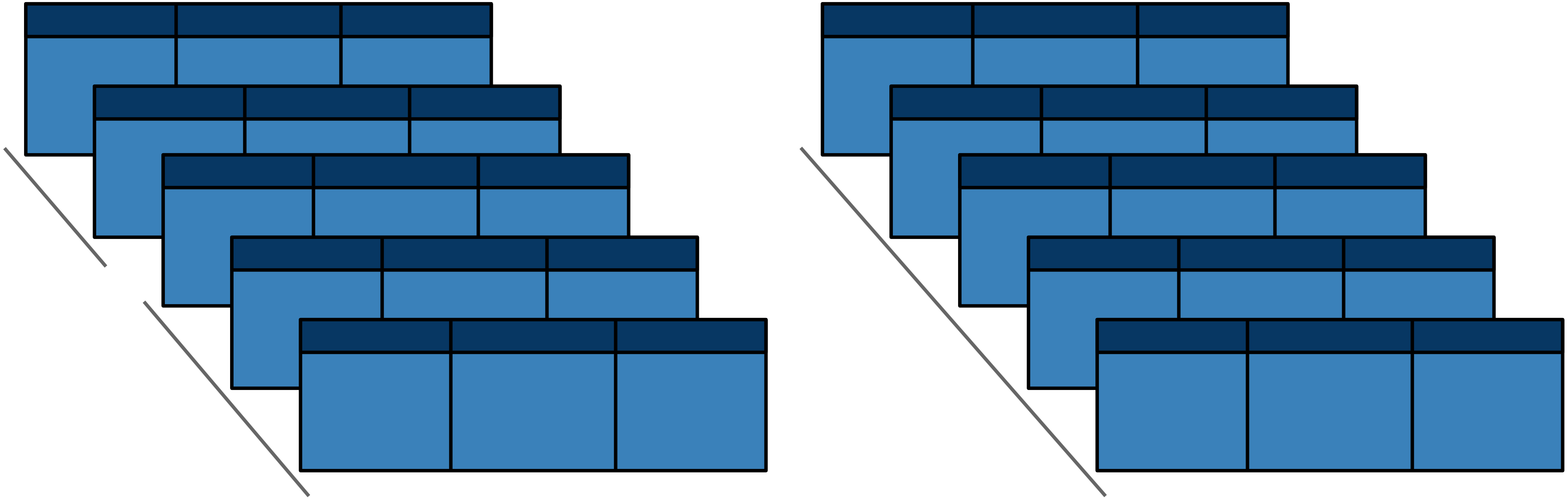


cache

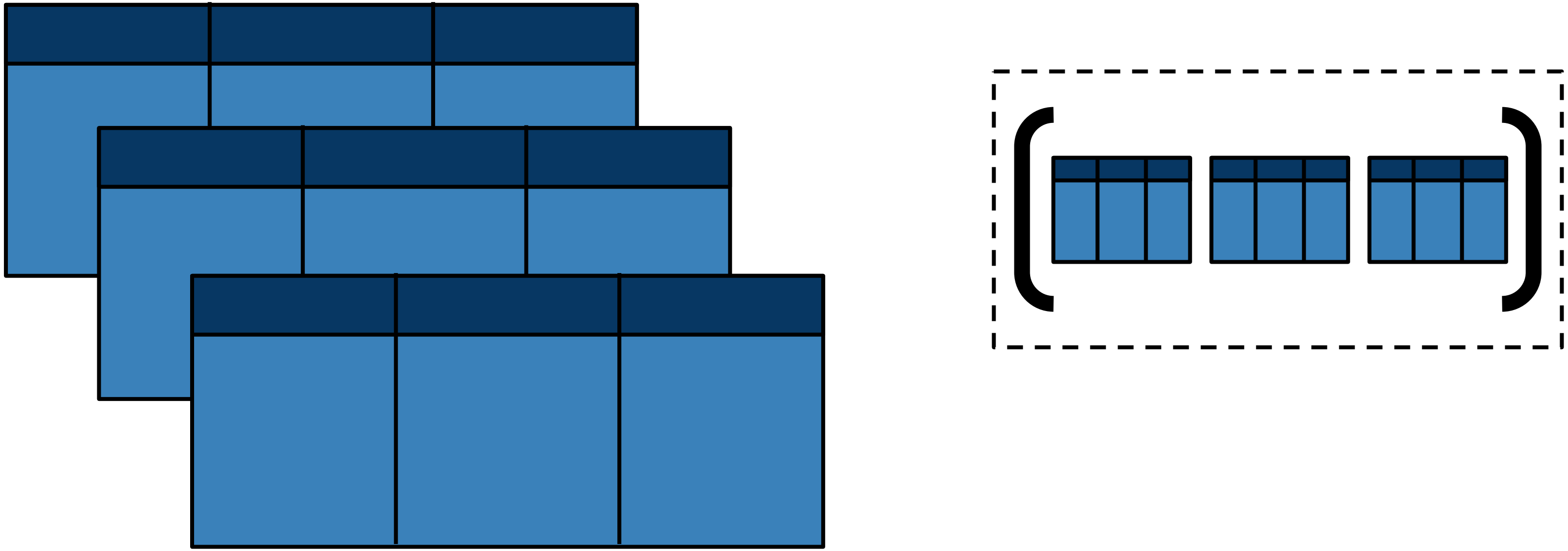


coalesce

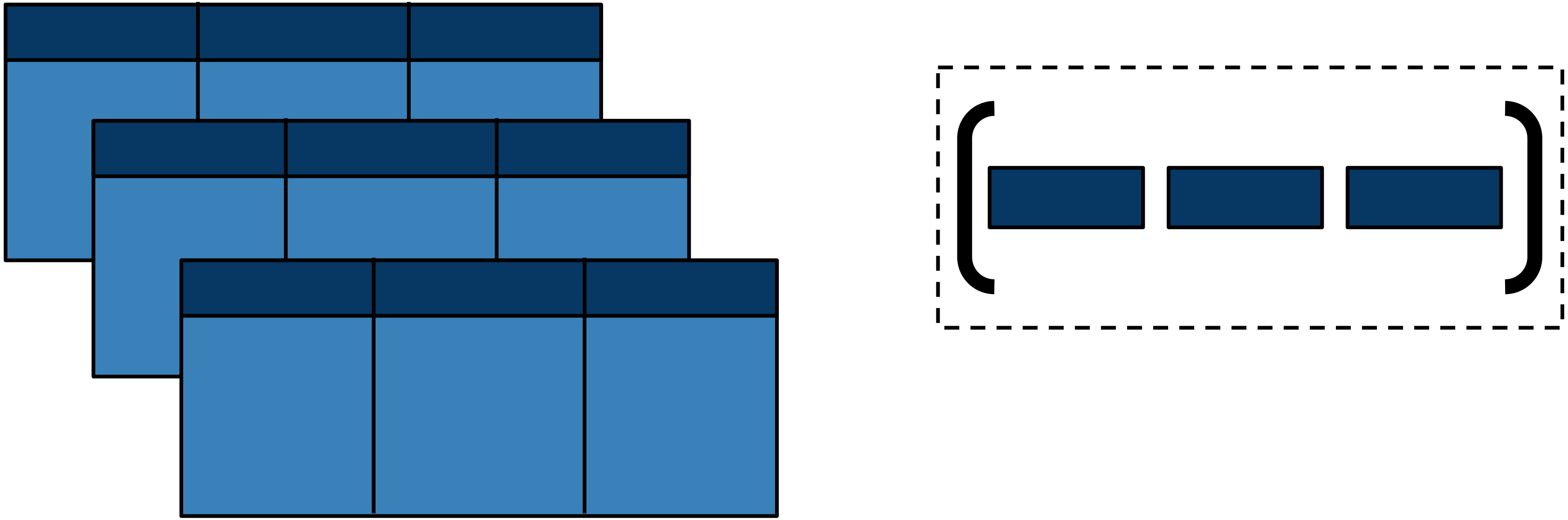
numPartitions = 1



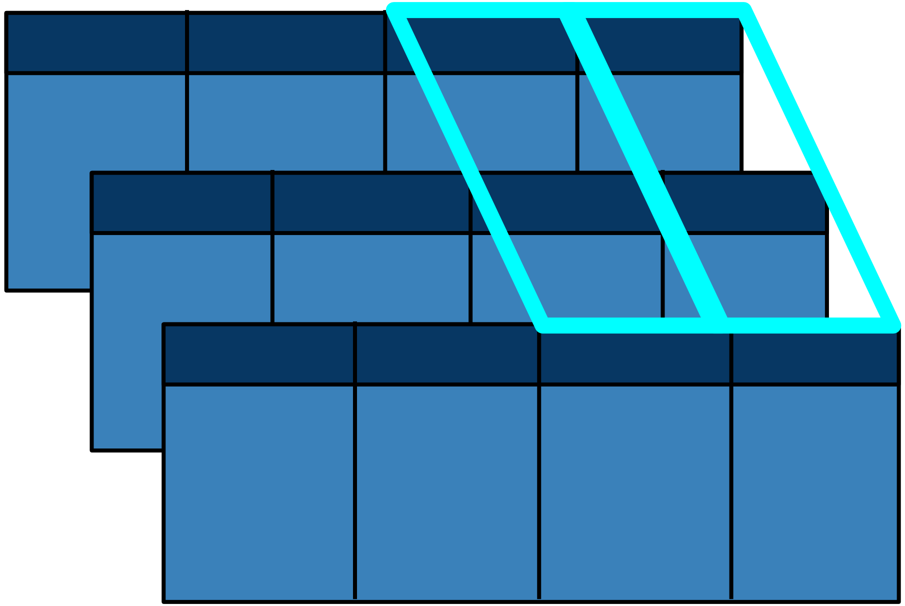
collect



columns



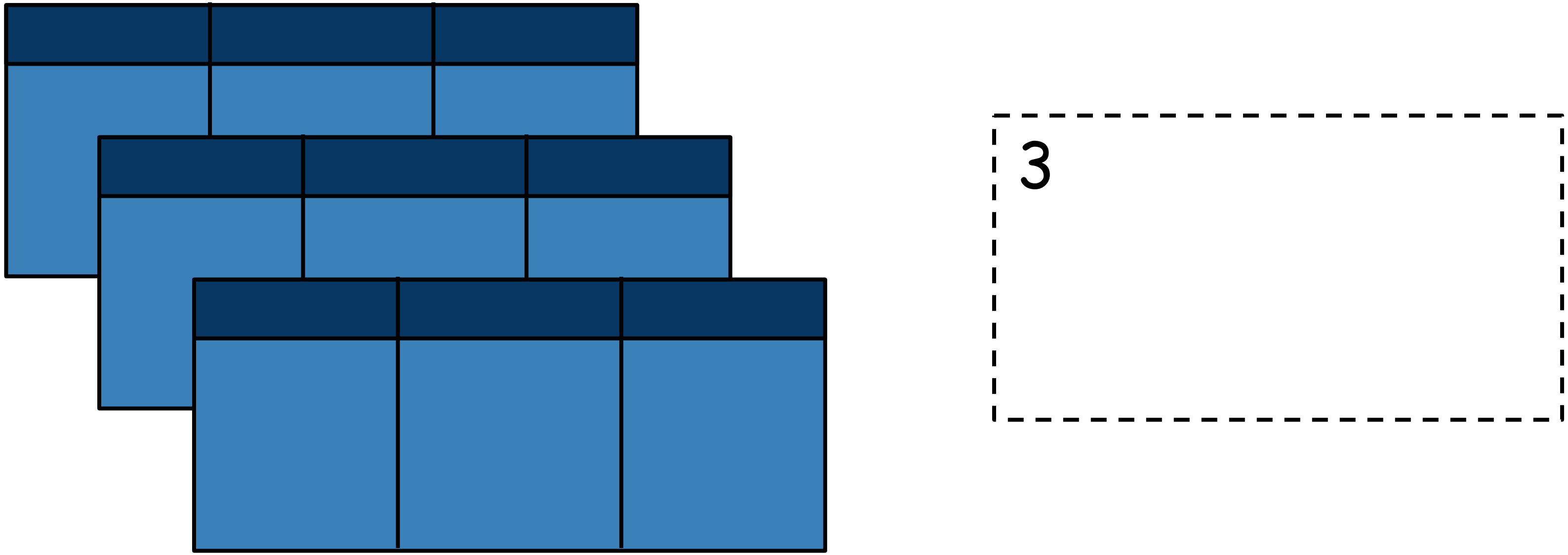
corr



Pearson's r

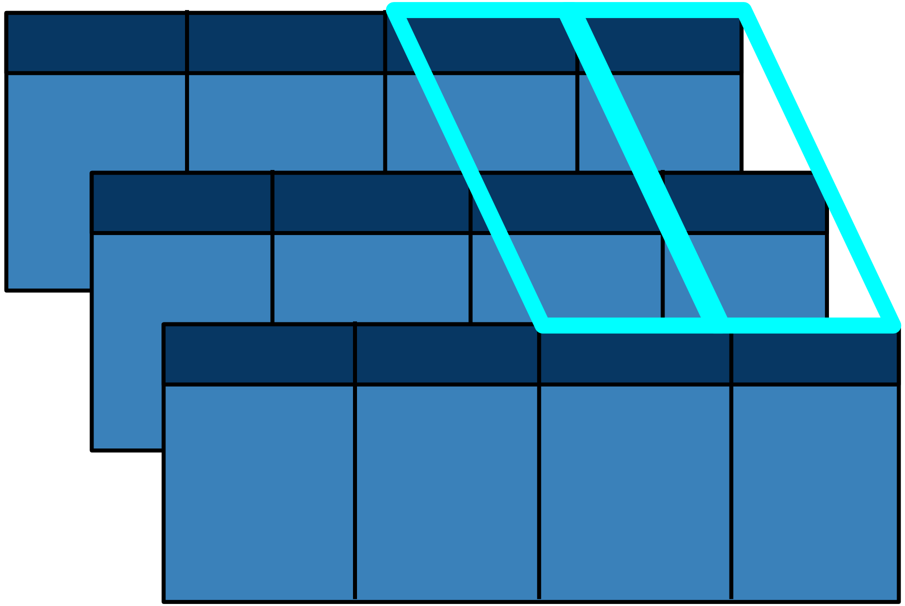
$$r = \frac{\sum_i (A_i - \bar{A})(C_i - \bar{C})}{\sqrt{\sum_i (A_i - \bar{A})^2}\sqrt{\sum_i (C_i - \bar{C})^2}}$$

count



3

cov

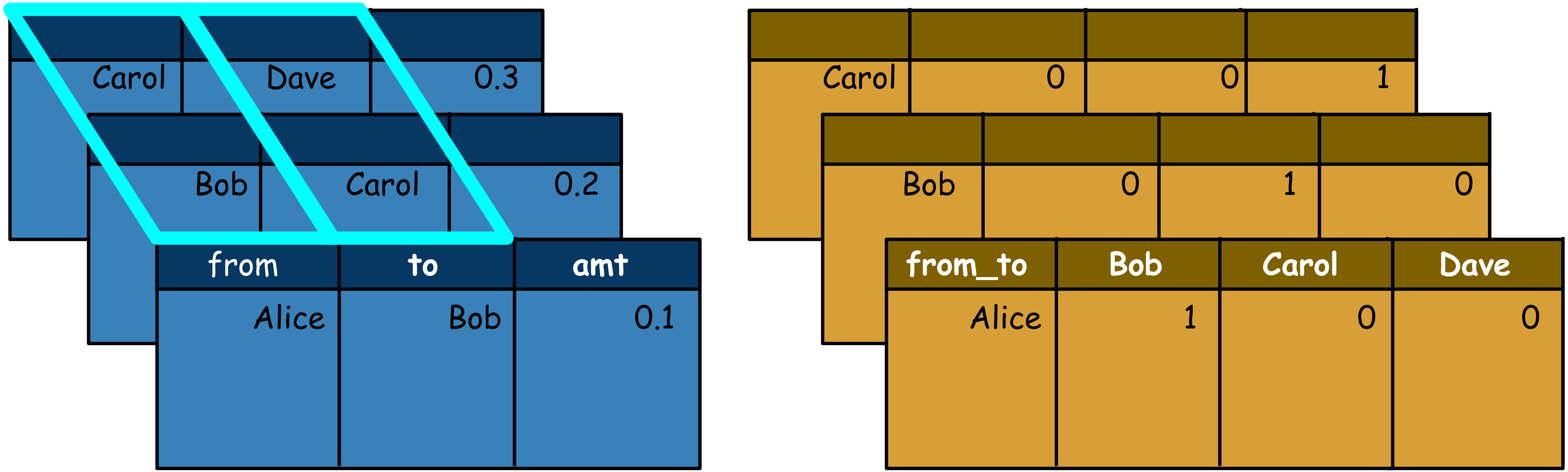


Sample Covariance

$$\frac{1}{N-1}\sum_i (A_i - \bar{A})(C_i - \bar{C})$$

crosstab

col1 = 'from'   col2 = 'to'

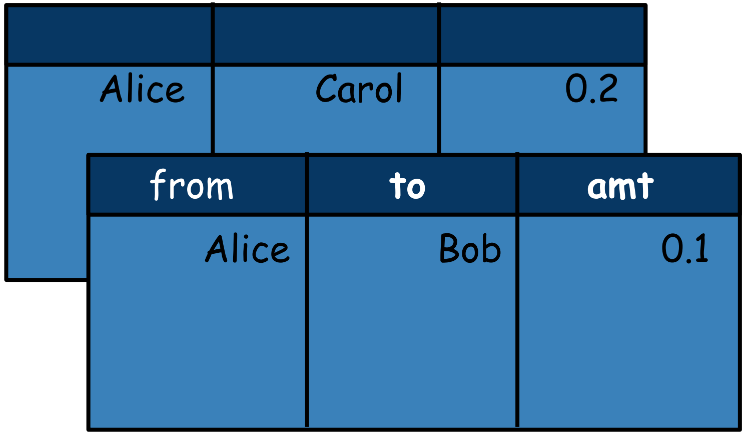


from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

from_to	Bob	Carol	Dave
Alice	1	0	0
Bob	0	1	0
Carol	0	0	1

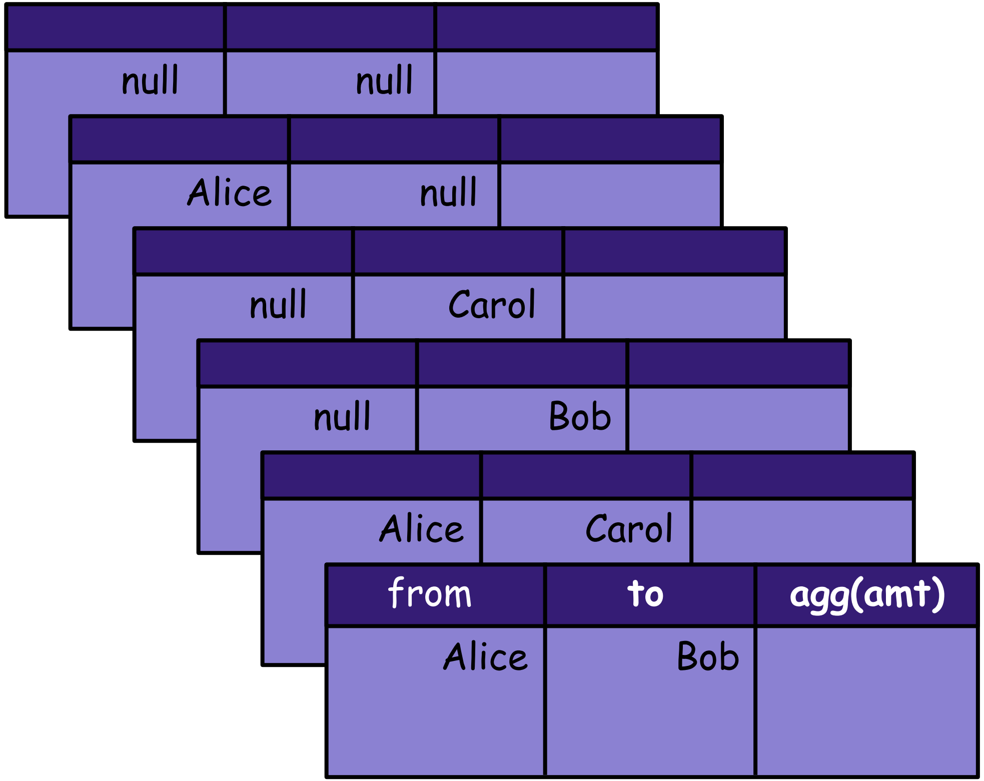
cube

*cols = 'from', 'to'



Alice	Carol	0.2

from	to	amt
Alice	Bob	0.1



null	null	

Alice	null	

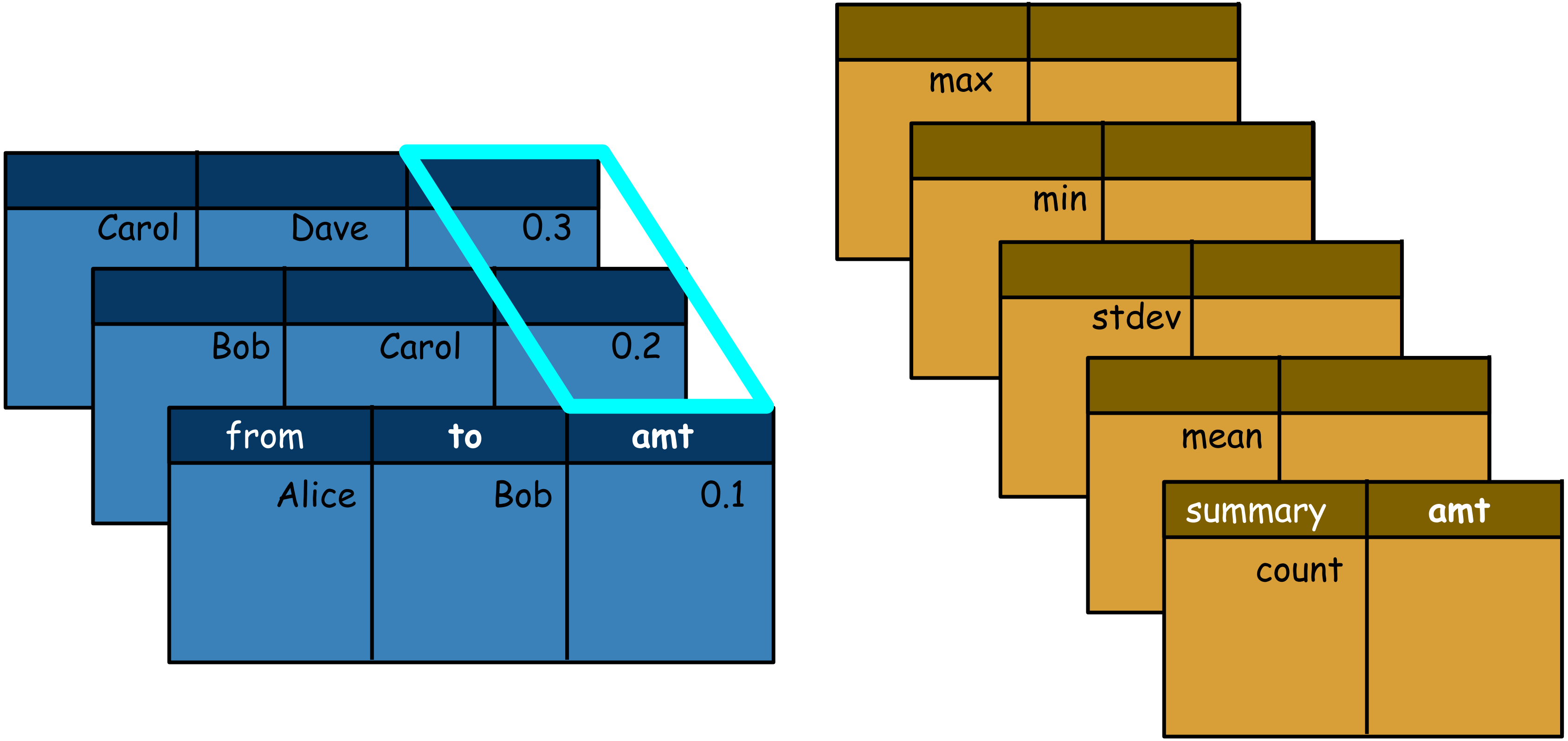
null	Carol	

null	Bob	

Alice	Carol	

from	to	agg(amt)
Alice	Bob	

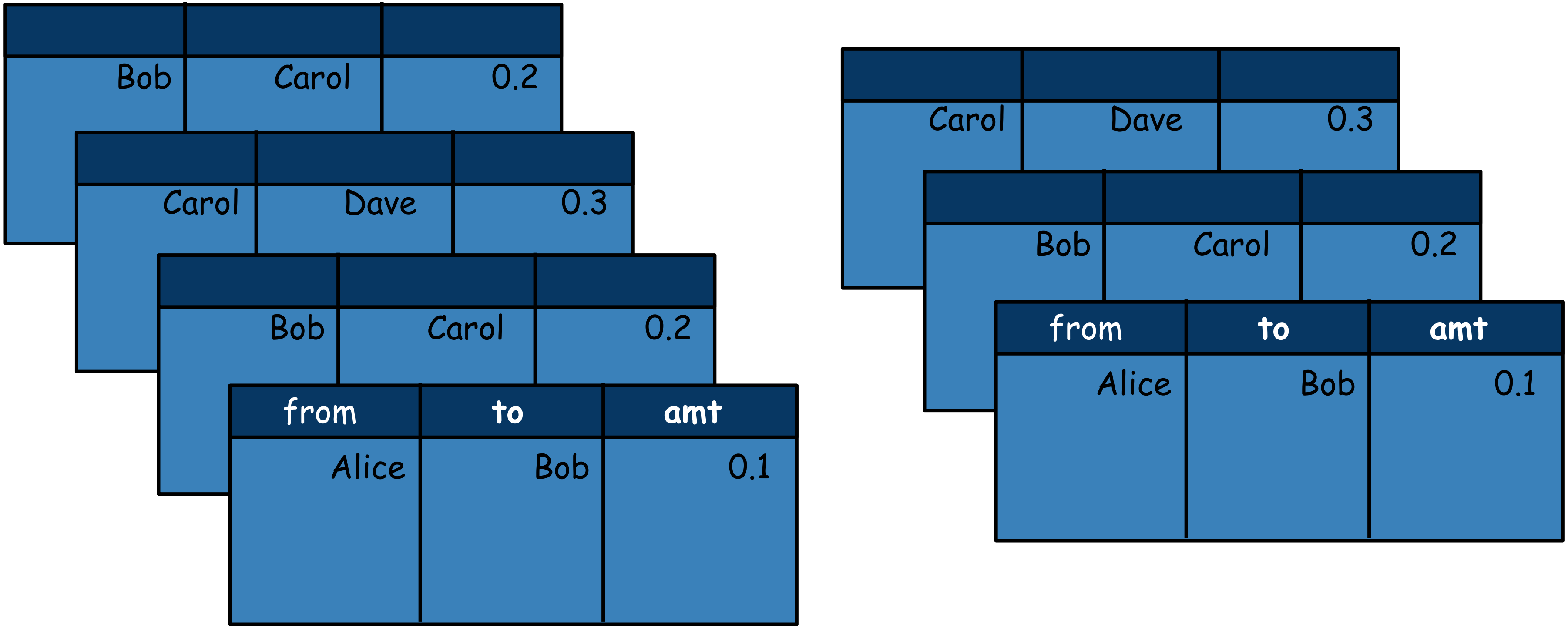
describe



from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

summary	amt
count	
mean	
stdev	
min	
max	

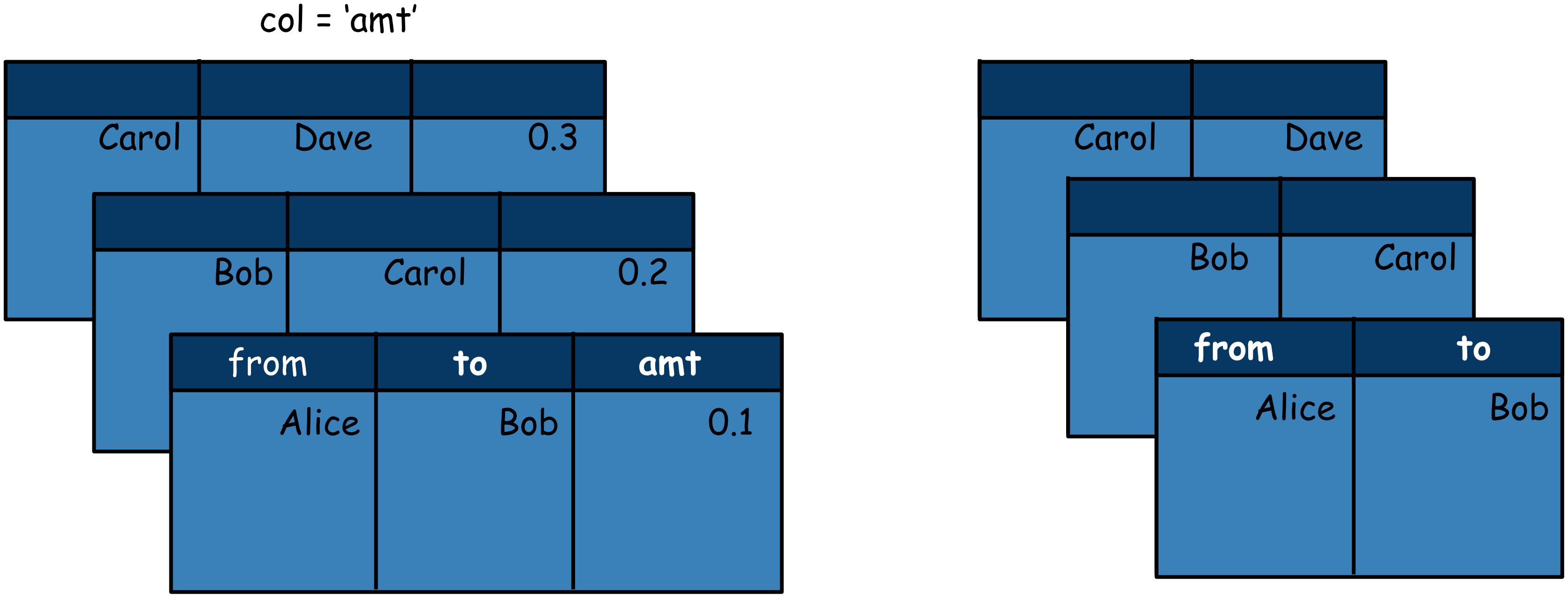
distinct



from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3
Bob	Carol	0.2

from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

drop



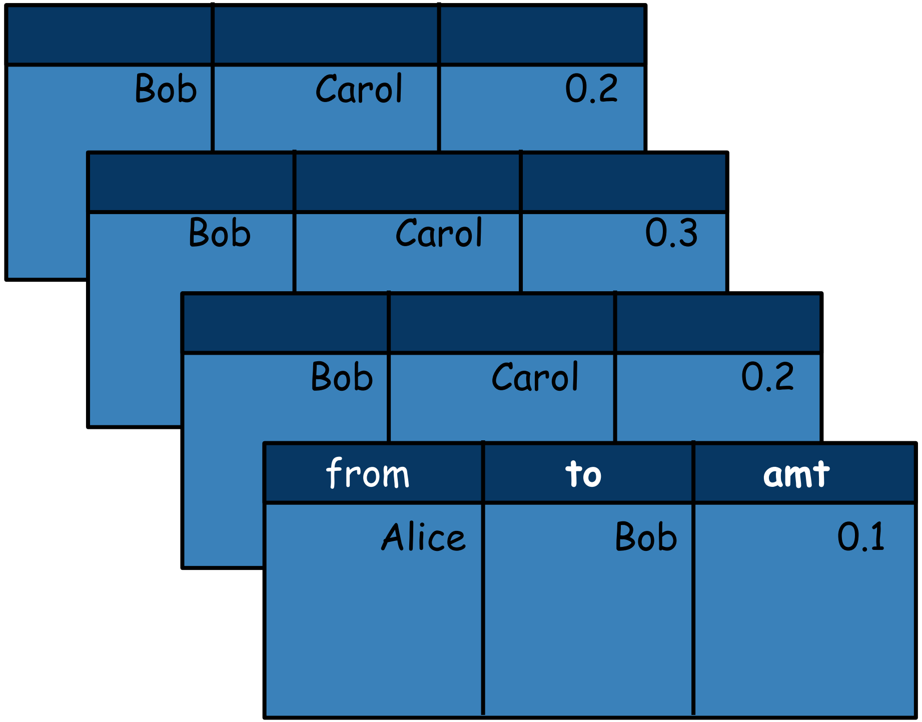
col = 'amt'

from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

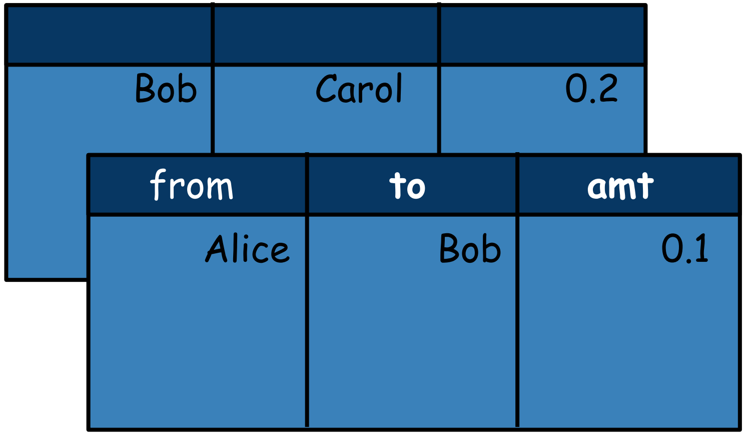
from	to
Alice	Bob
Bob	Carol
Carol	Dave

dropDuplicates

subset = ['from','to']



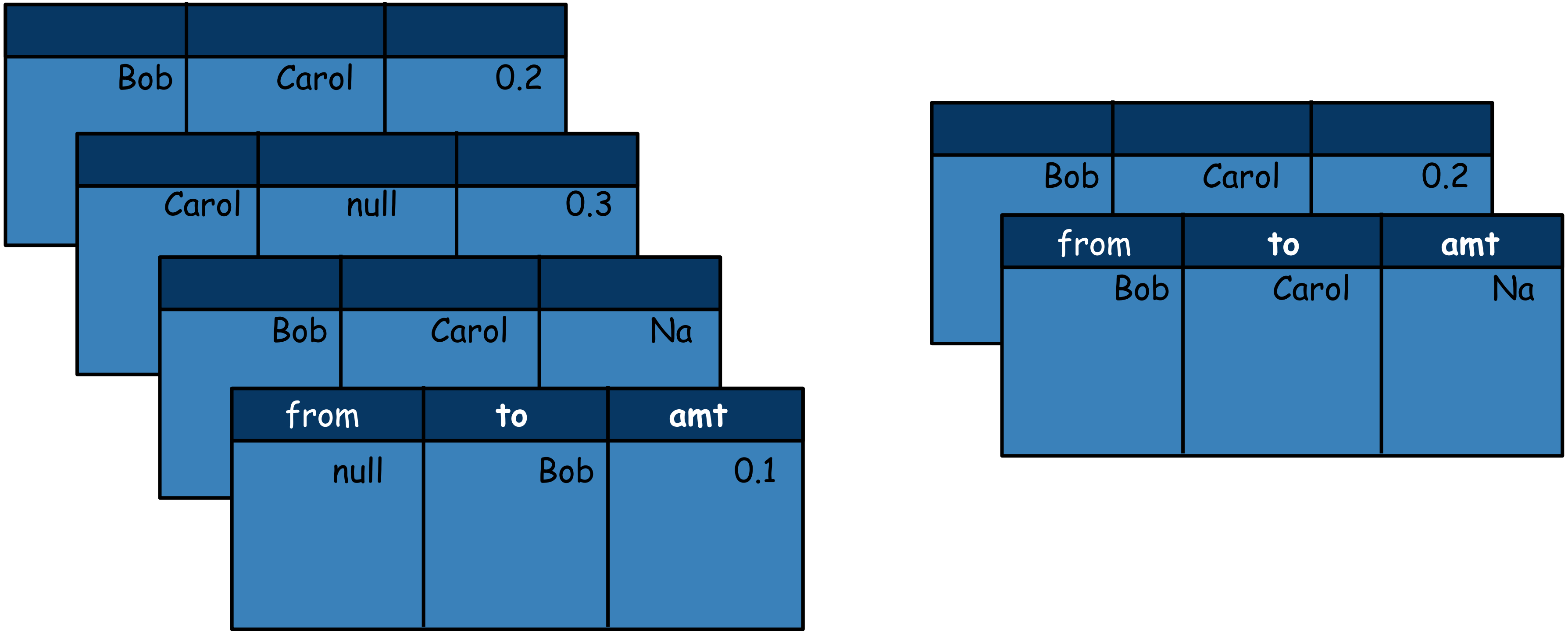
from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Bob	Carol	0.3
Bob	Carol	0.2



from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2

dropna

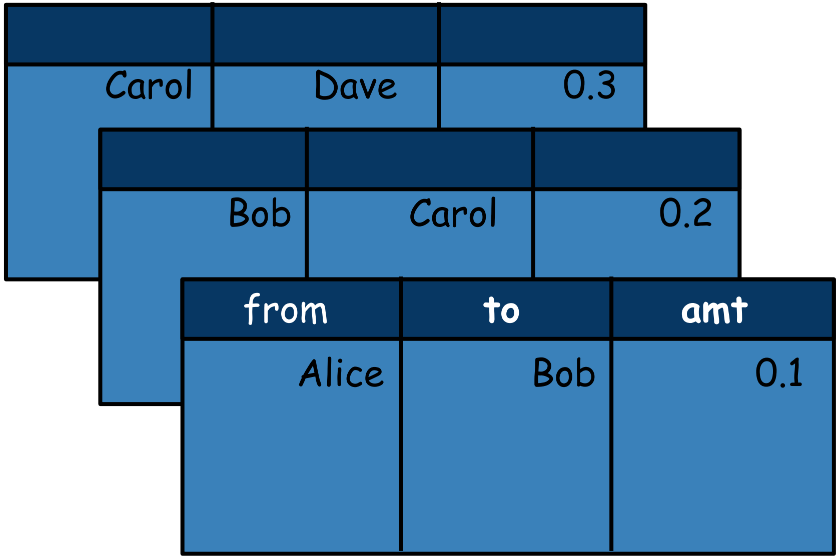
how = 'any' subset = ['from', 'to']



from	to	amt
Bob	Carol	0.2
Carol	null	0.3
Bob	Carol	Na
null	Bob	0.1

from	to	amt
Bob	Carol	0.2
Bob	Carol	Na

dtypes



Carol	Dave	0.3

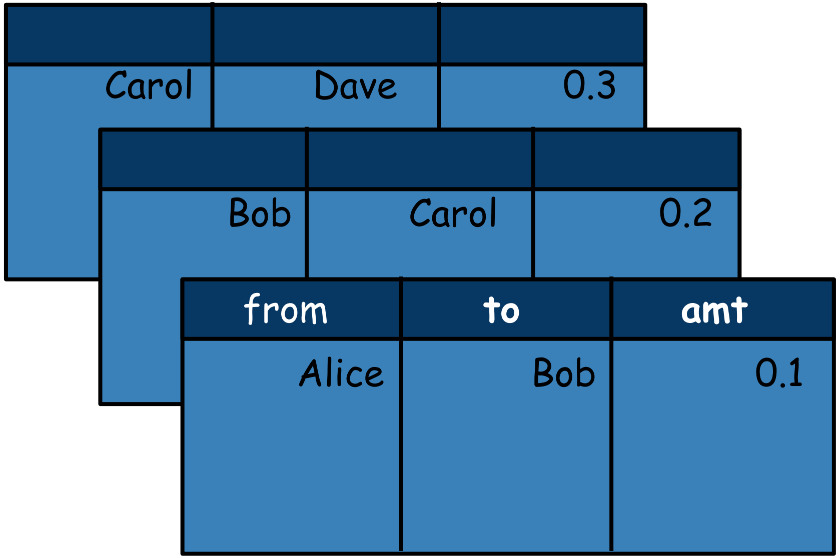
Bob	Carol	0.2

from	to	amt
Alice	Bob	0.1

[(‘from’,’string’), (‘to’, ‘string’), (‘amt’, ‘double’)]

explain

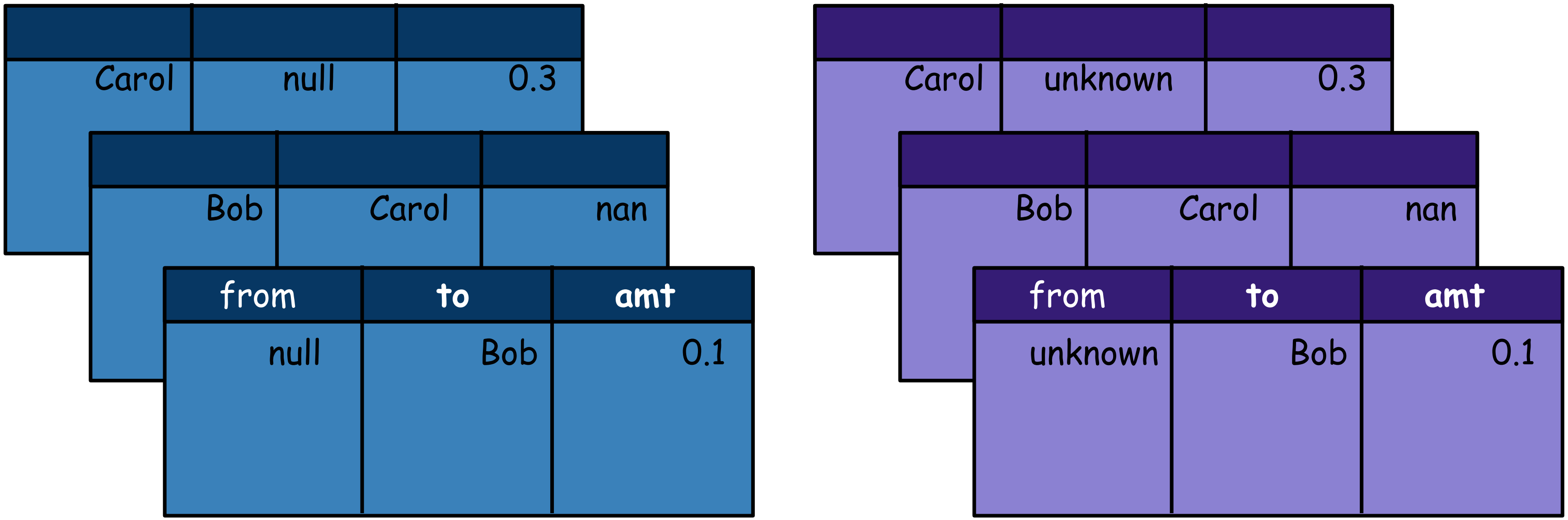
extended = True



```
== Parsed Logical Plan ==
...
== Analyzed Logical Plan ==
...
== Optimized Logical Plan ==
...
== Physical Plan ==
...
== RDD ==
```

fillna

value = ‘unknown” subset = [‘from’, ‘to’]

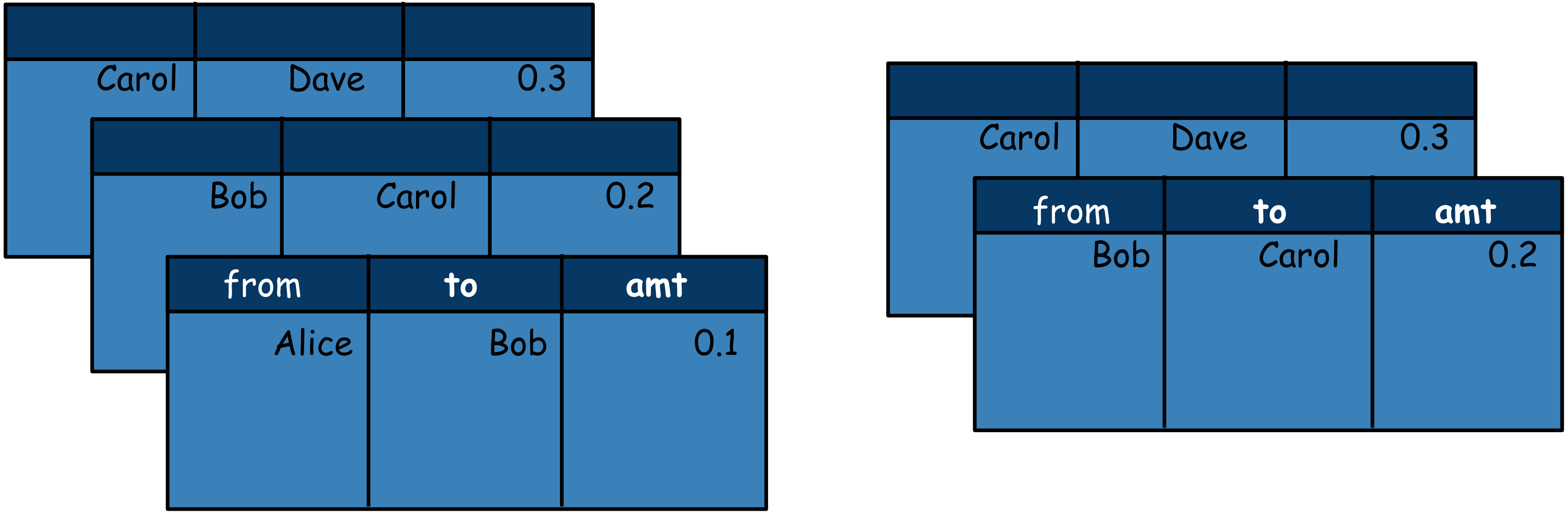


from	to	amt
Carol	null	0.3
Bob	Carol	nan
null	Bob	0.1

from	to	amt
Carol	unknown	0.3
Bob	Carol	nan
unknown	Bob	0.1

filter

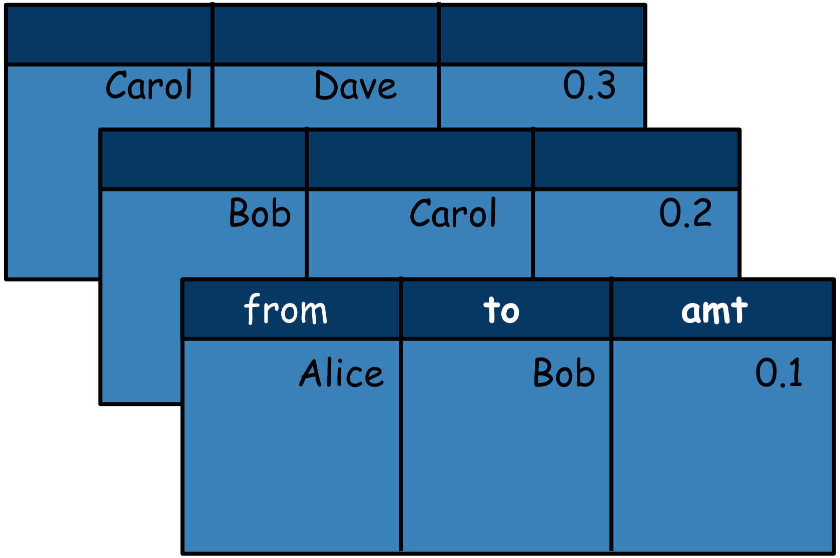
condition = “amt > 0.1”



from	to	amt
Carol	Dave	0.3
Bob	Carol	0.2
Alice	Bob	0.1

from	to	amt
Carol	Dave	0.3
Bob	Carol	0.2

first



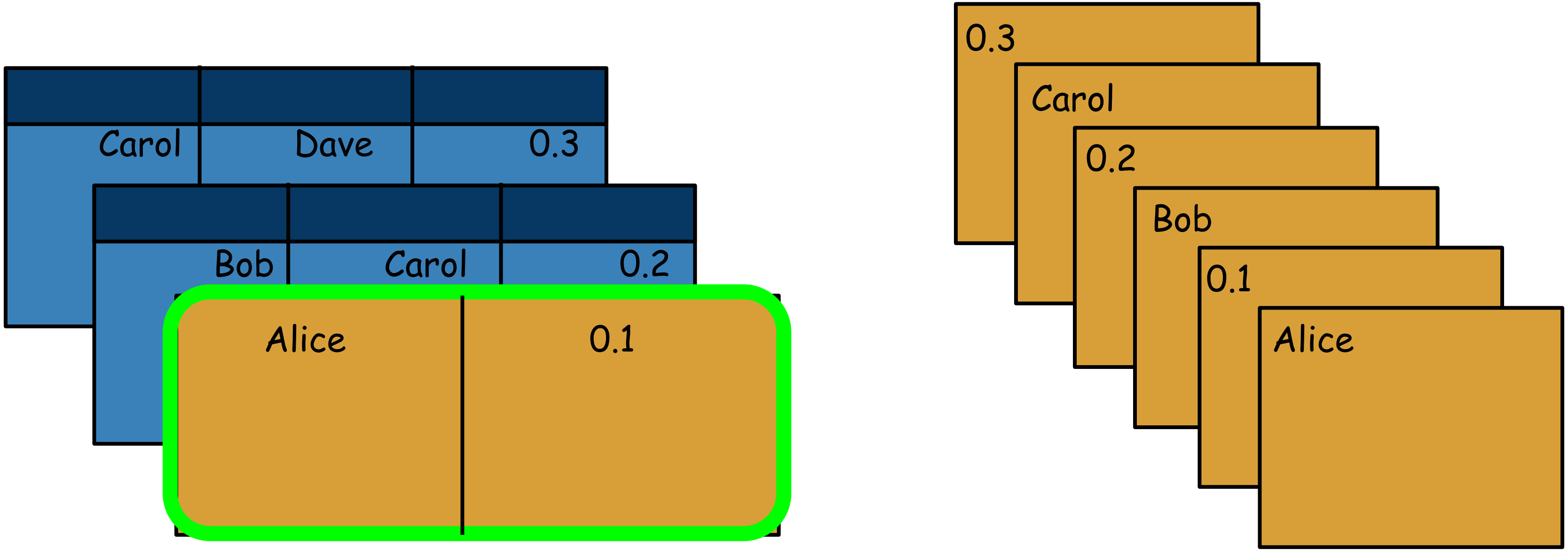
from	to	amt
Alice	Bob	0.1

Bob	Carol	0.2

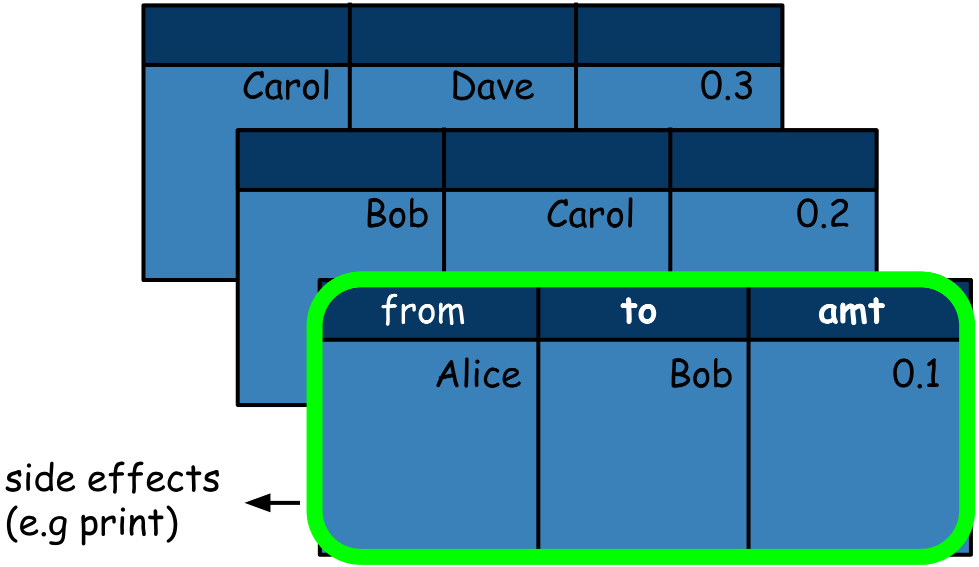
Carol	Dave	0.3

```
Row(from='Alice', to='Bob', amt=0.1)
```

flatMap



foreach

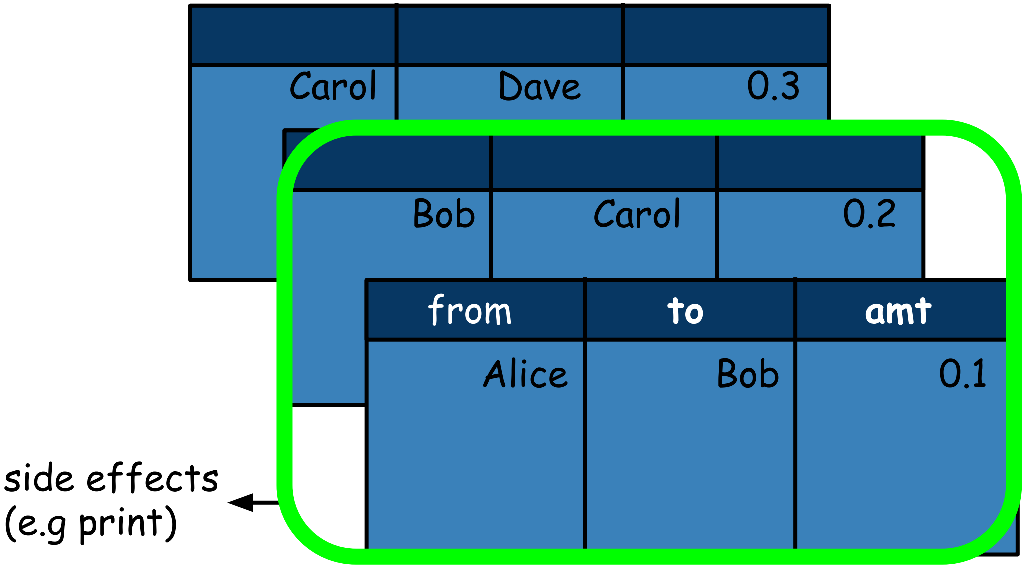


from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

side effects
(e.g print)

*no return value, original DataFrame unchanged

foreachPartition



Carol	Dave	0.3

Bob	Carol	0.2

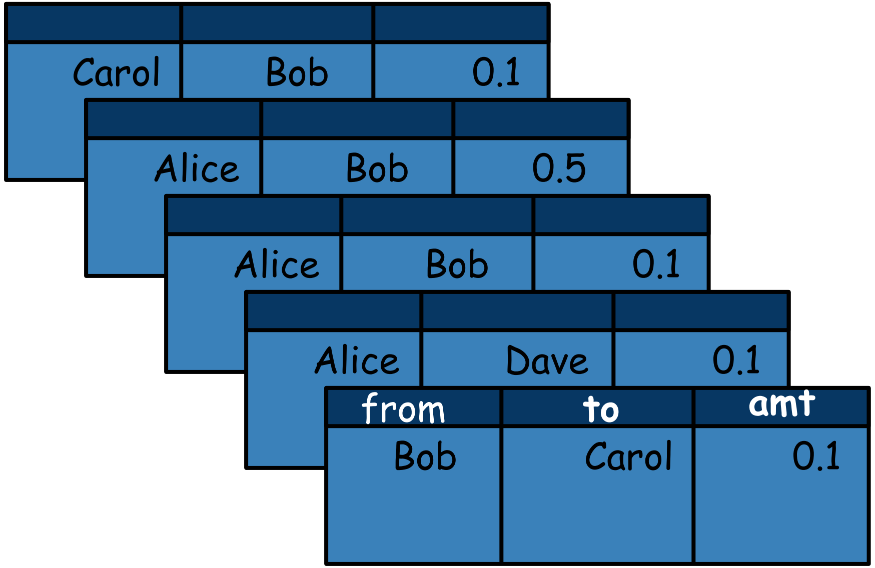
from	to	amt
Alice	Bob	0.1

side effects
(e.g print)

*no return value, original DataFrame unchanged

freqItems

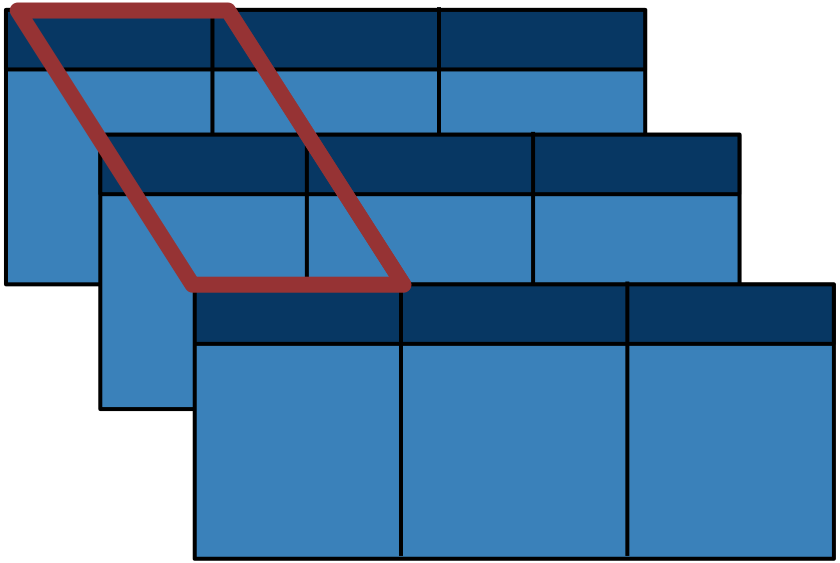
cols = ['from', 'amt'] support = 0.8



from	to	amt
Bob	Carol	0.1
Alice	Dave	0.1
Alice	Bob	0.1
Alice	Bob	0.5
Carol	Bob	0.1

from_freqItems	amt_freqItems
[Alice]	[0.1]

groupBy (groupby)

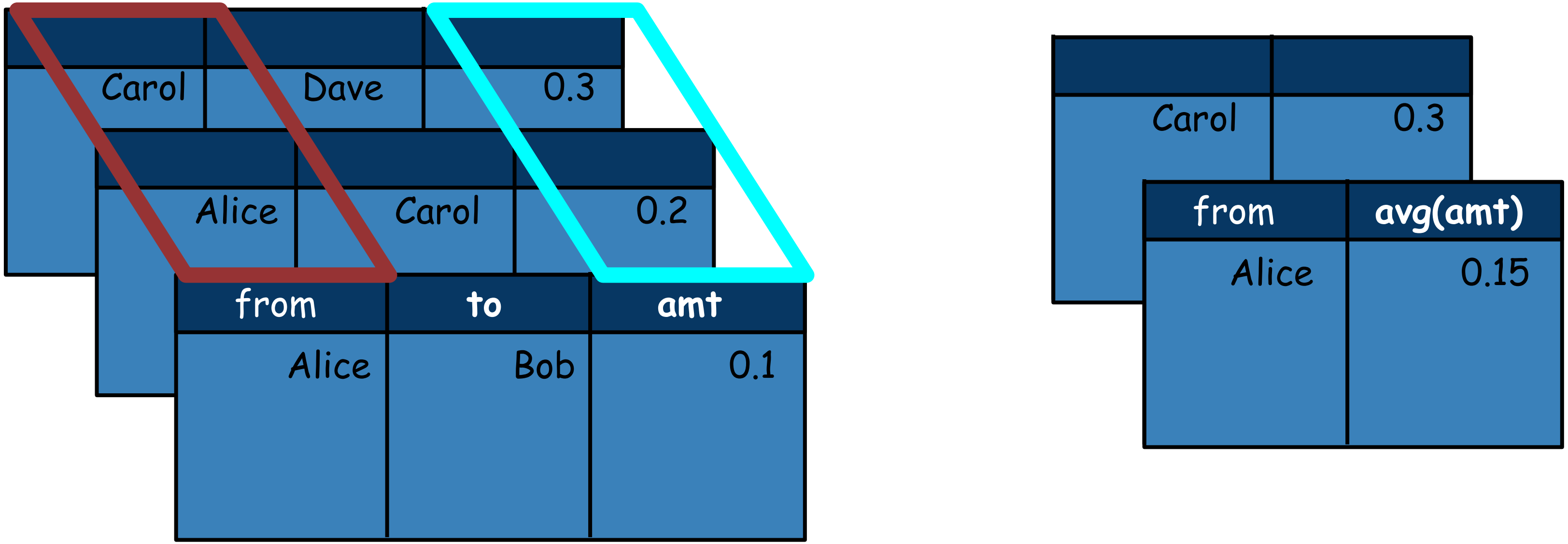


GroupedData Object

with methods: agg, avg, count, max, mean, min, pivot, sum

groupBy(col1).avg(col2)

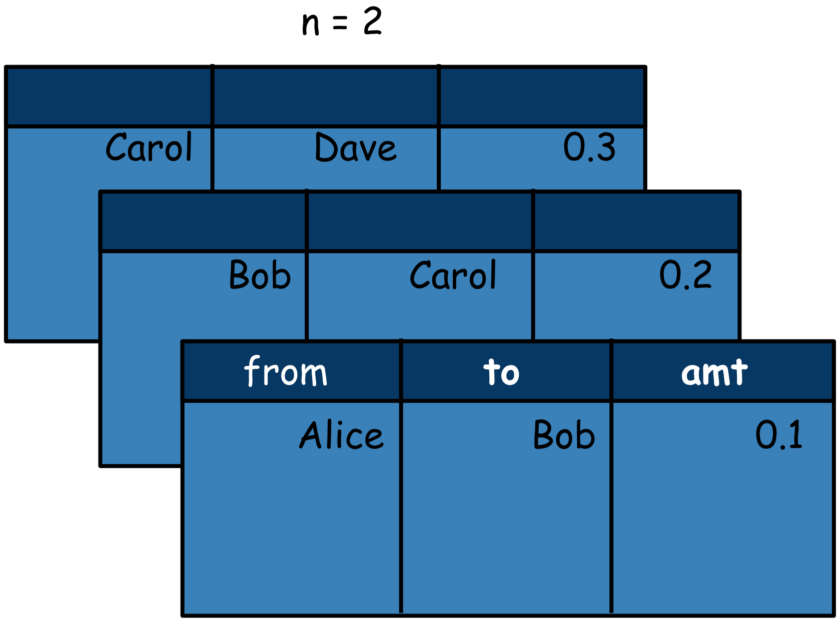
col1 = 'from' col2 = 'amt'



from	to	amt
Alice	Bob	0.1
Alice	Carol	0.2
Carol	Dave	0.3

from	avg(amt)
Alice	0.15
Carol	0.3

head

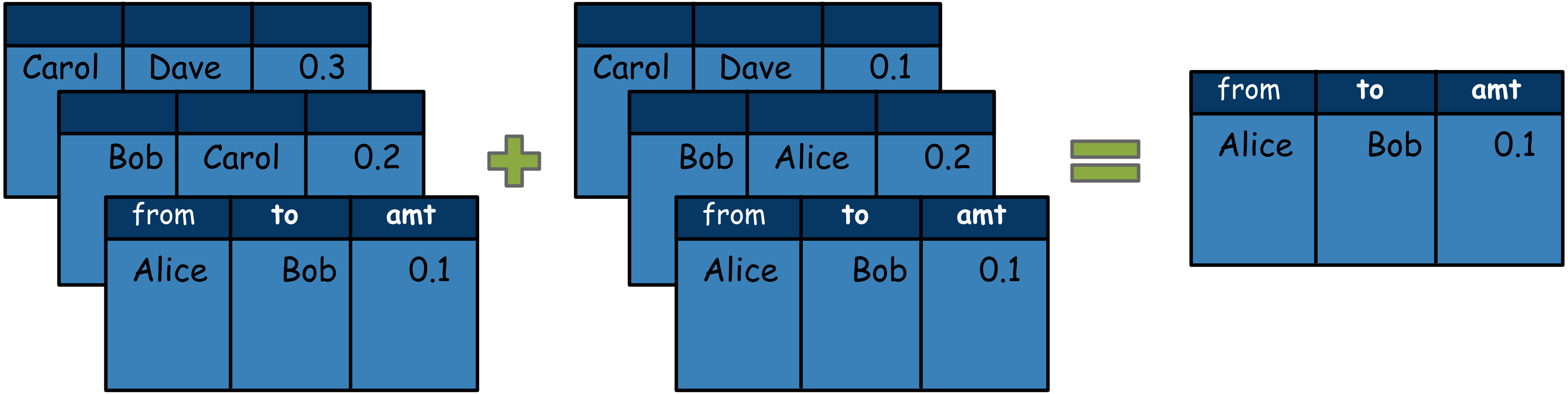


n = 2

from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

```
[Row(from=u'Alice', to=u'Bob', amt=0.1),
Row(from=u'Bob', to=u'Carol', amt=0.2)]
```

intersect



Carol	Dave	0.3

Bob	Carol	0.2

from	to	amt
Alice	Bob	0.1

+

Carol	Dave	0.1

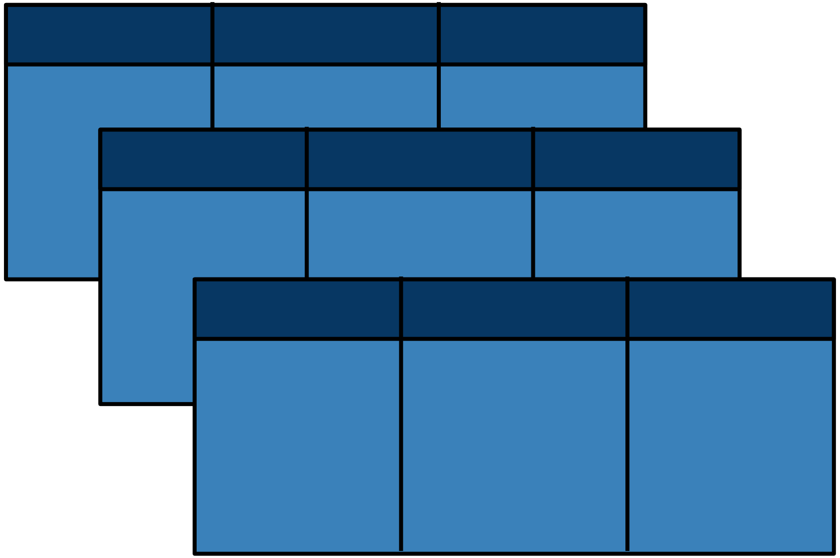
Bob	Alice	0.2

from	to	amt
Alice	Bob	0.1

=

from	to	amt
Alice	Bob	0.1

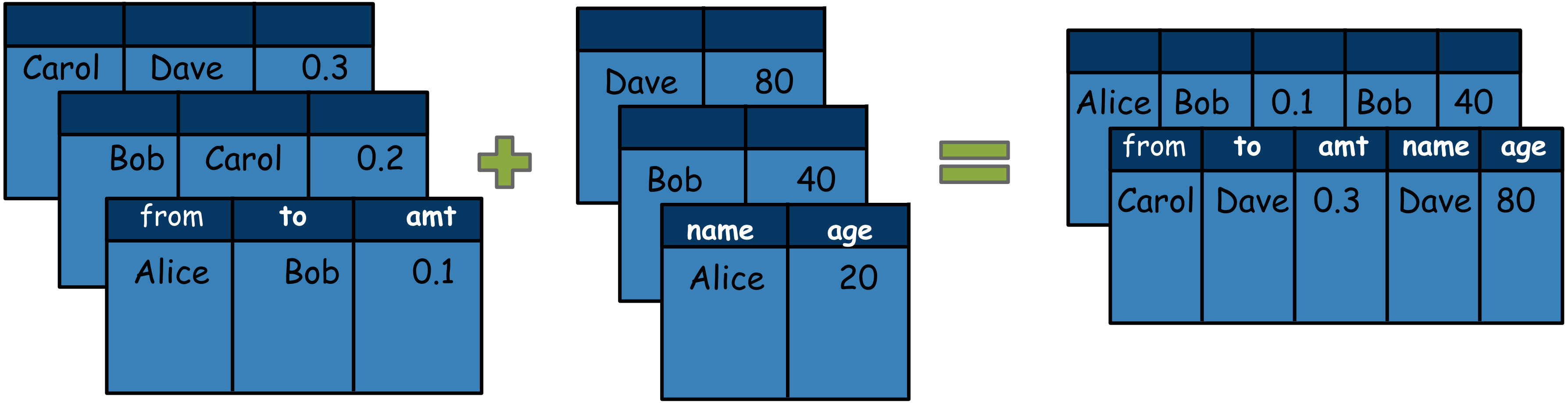
isLocal



False

join

joinExprs = x.to==y.name
joinType = 'inner'



from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

➕

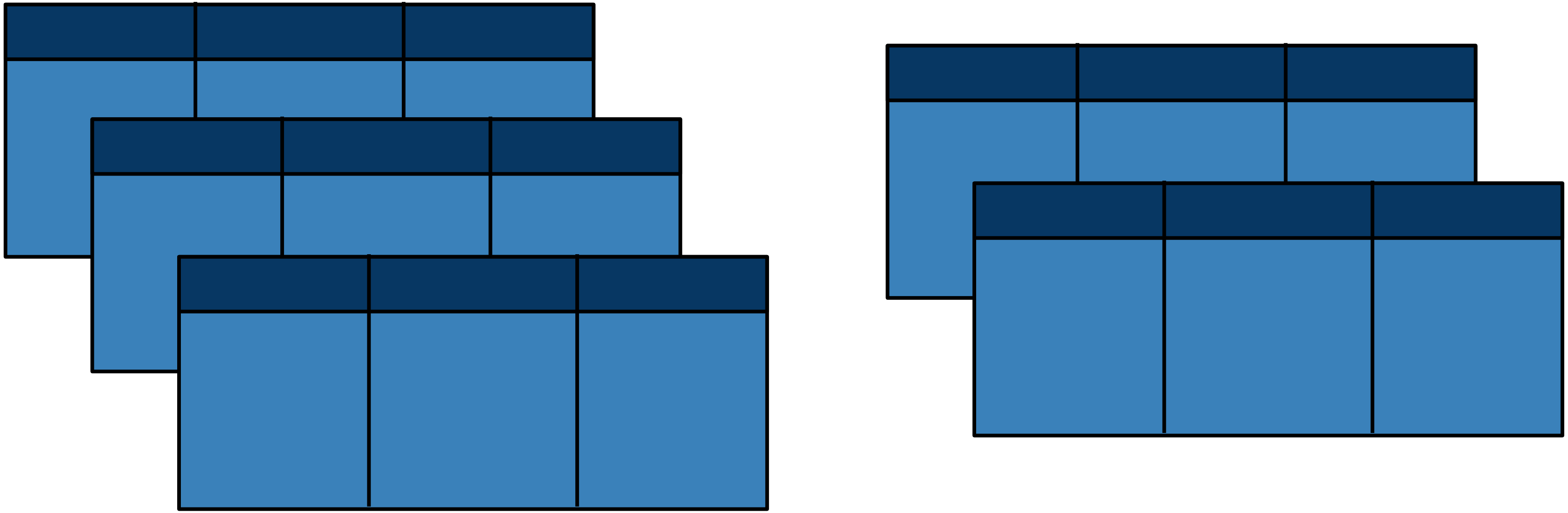
name	age
Alice	20
Bob	40
Dave	80

🟰

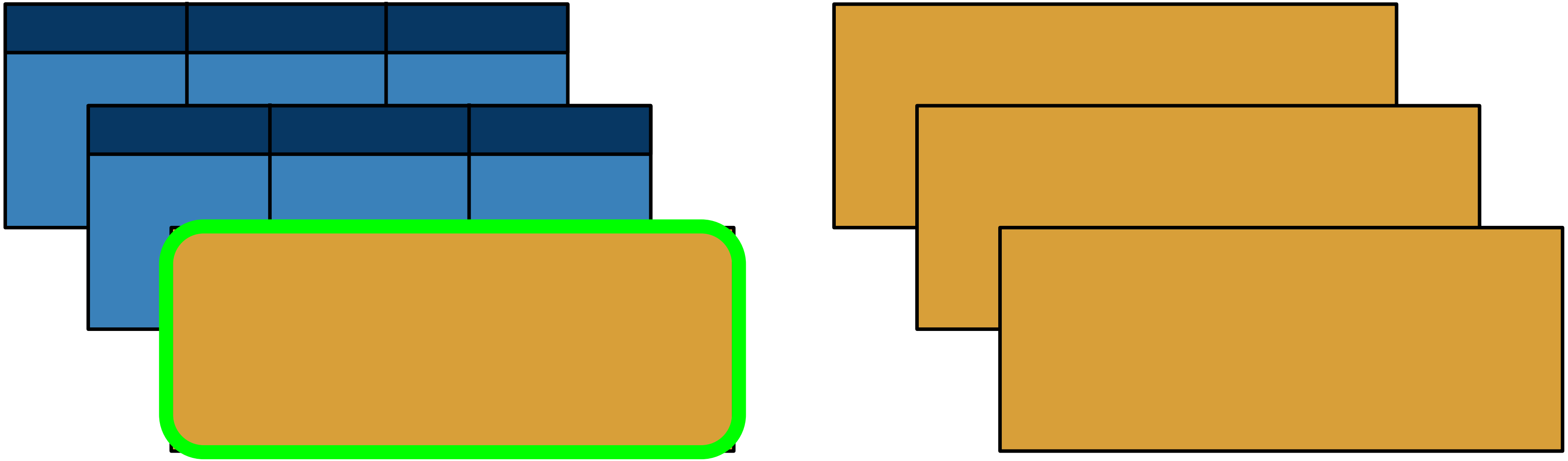
from	to	amt	name	age
Carol	Dave	0.3	Dave	80
Alice	Bob	0.1	Bob	40

limit

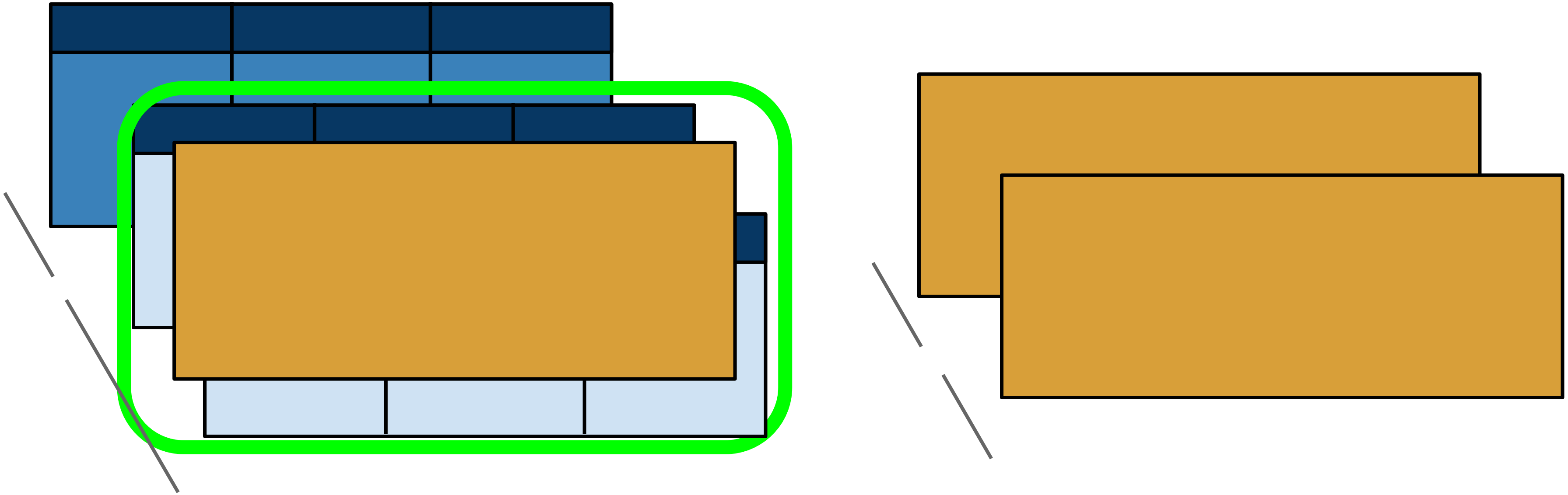
num = 2



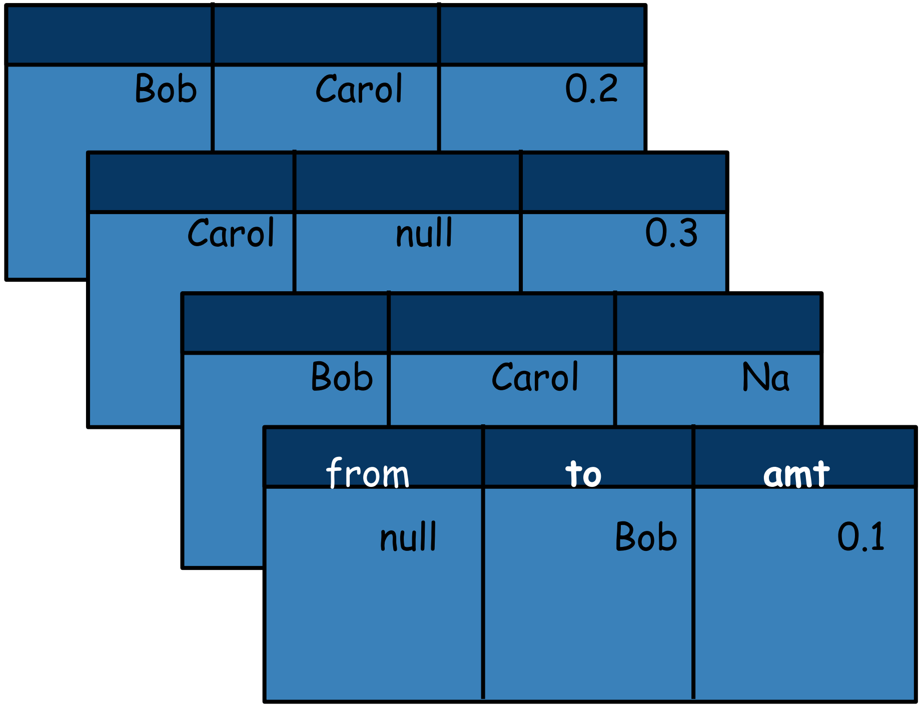
map



mapPartitions

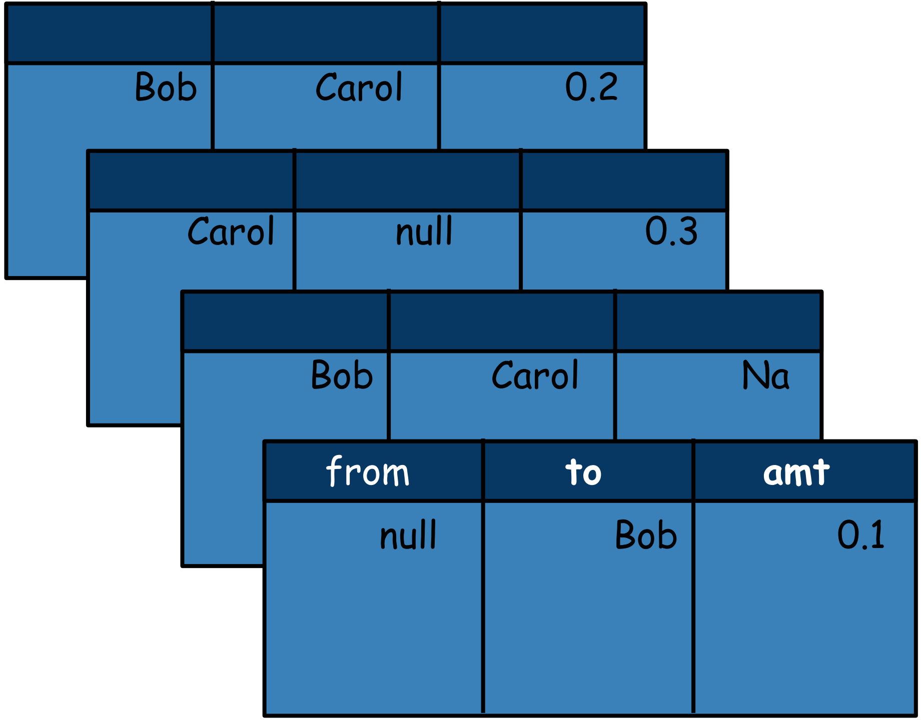


na



from	to	amt
Bob	Carol	0.2
Carol	null	0.3
Bob	Carol	Na
null	Bob	0.1

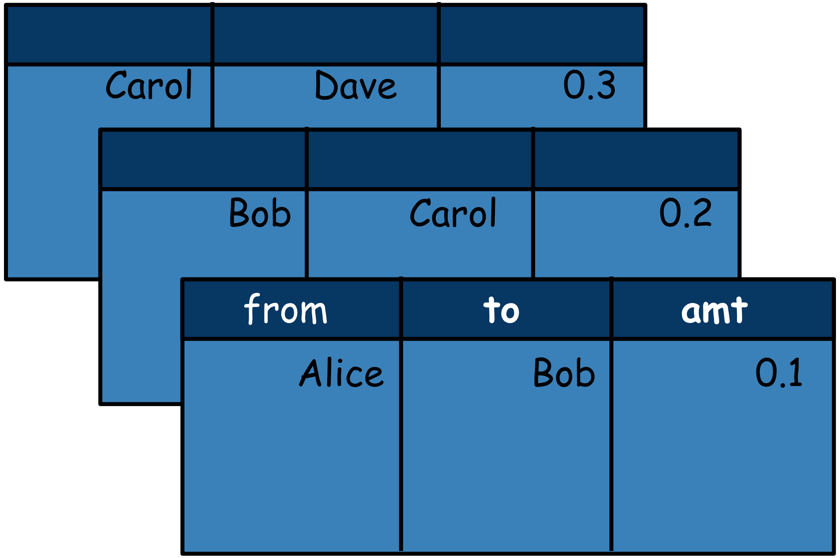
DataFrameNaFunctions



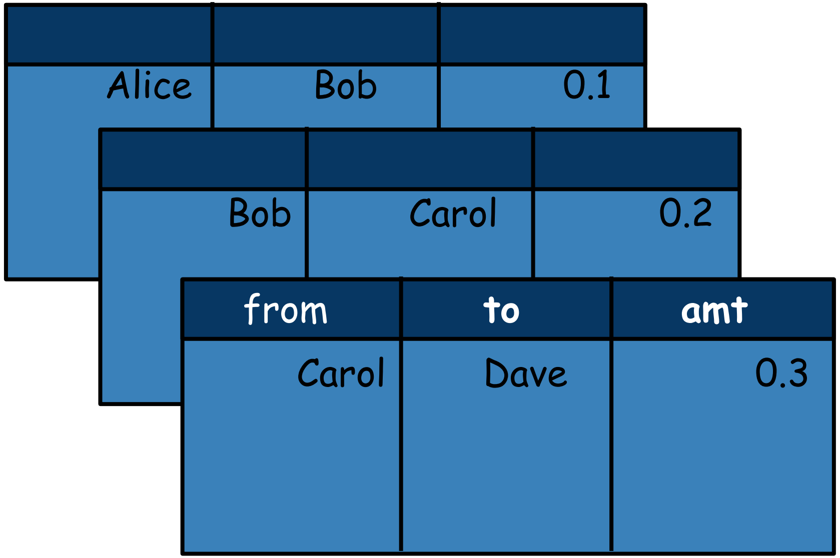
from	to	amt
Bob	Carol	0.2
Carol	null	0.3
Bob	Carol	Na
null	Bob	0.1

orderBy

cols = ['from'], ascending = [False]



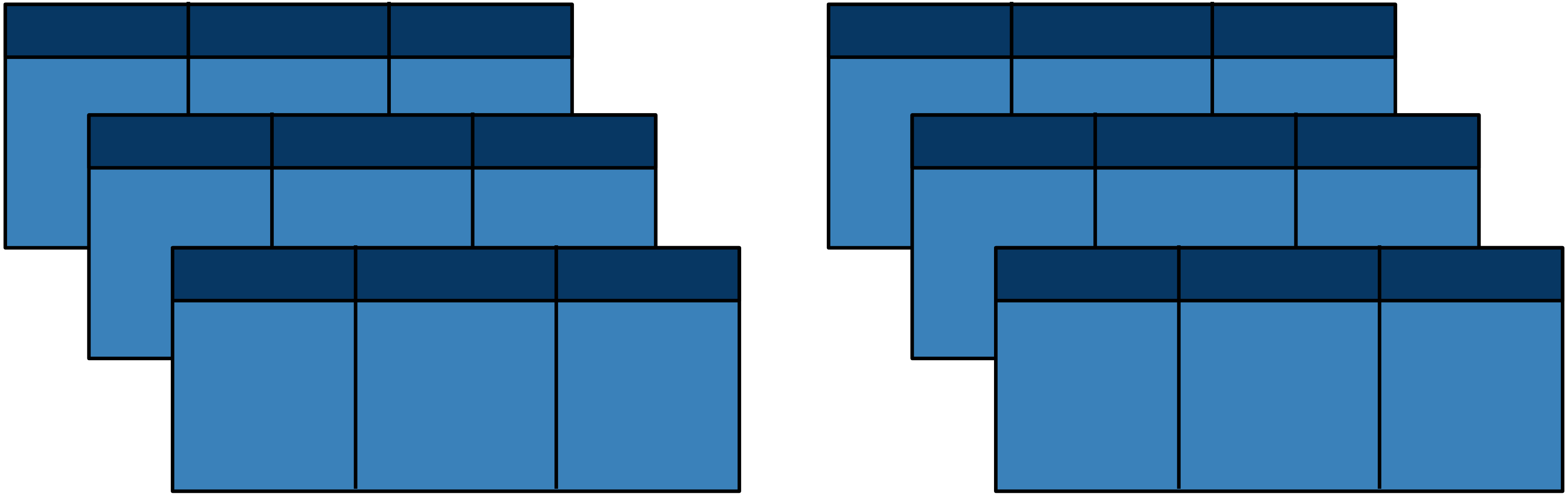
from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3



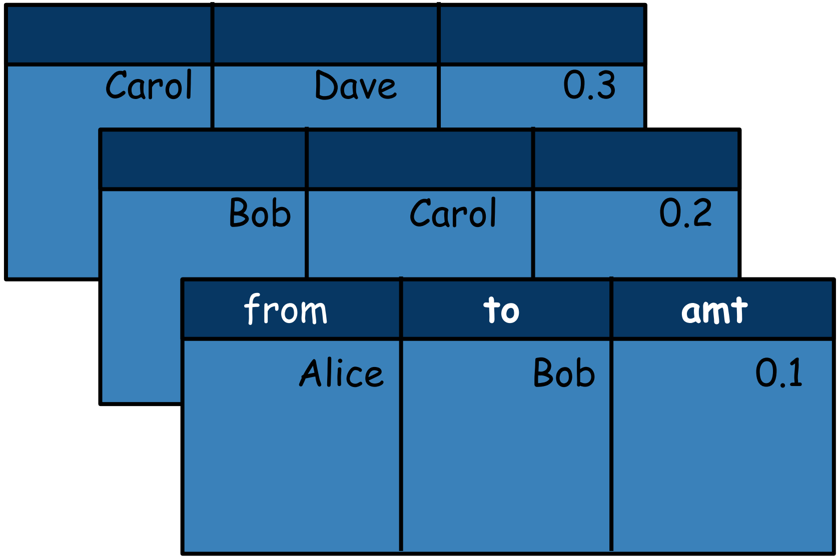
from	to	amt
Carol	Dave	0.3
Bob	Carol	0.2
Alice	Bob	0.1

persist

```
strorageLevel =
StorageLevel(MEMORY_ONLY_SER)
```



printSchema



Carol	Dave	0.3

Bob	Carol	0.2

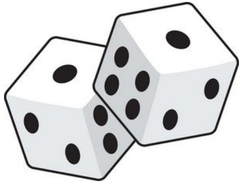
from	to	amt
Alice	Bob	0.1

stdout

```
root
 |-- from: string (nullable = true)
 |-- to: string (nullable = true)
 |-- amt: double (nullable = true)
```

randomSplit

weights = [0.5,0.5]



Carol	Dave	0.3

Bob	Carol	0.2

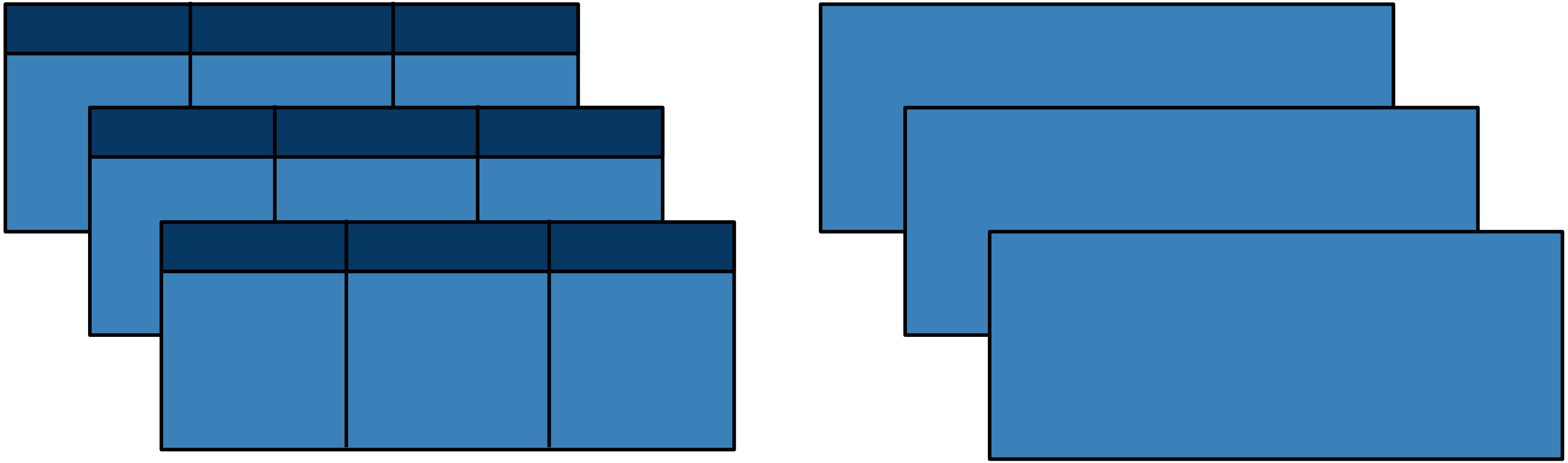
from	to	amt
Alice	Bob	0.1

Carol	Dave	0.3

from	to	amt
Bob	Carol	0.2

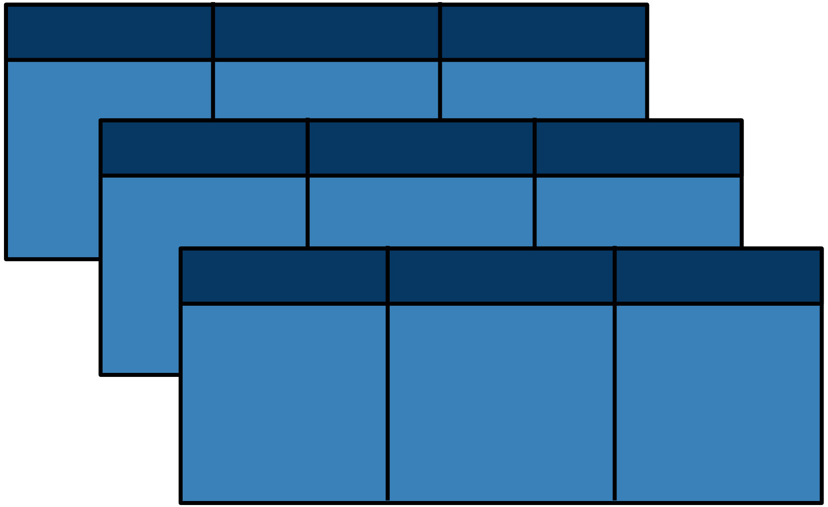
from	to	amt
Alice	Bob	0.1

rdd

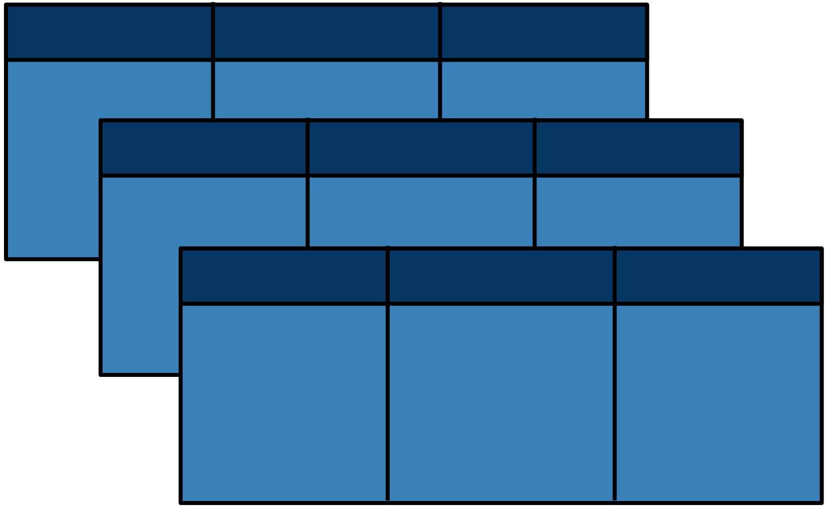


registerTempTable

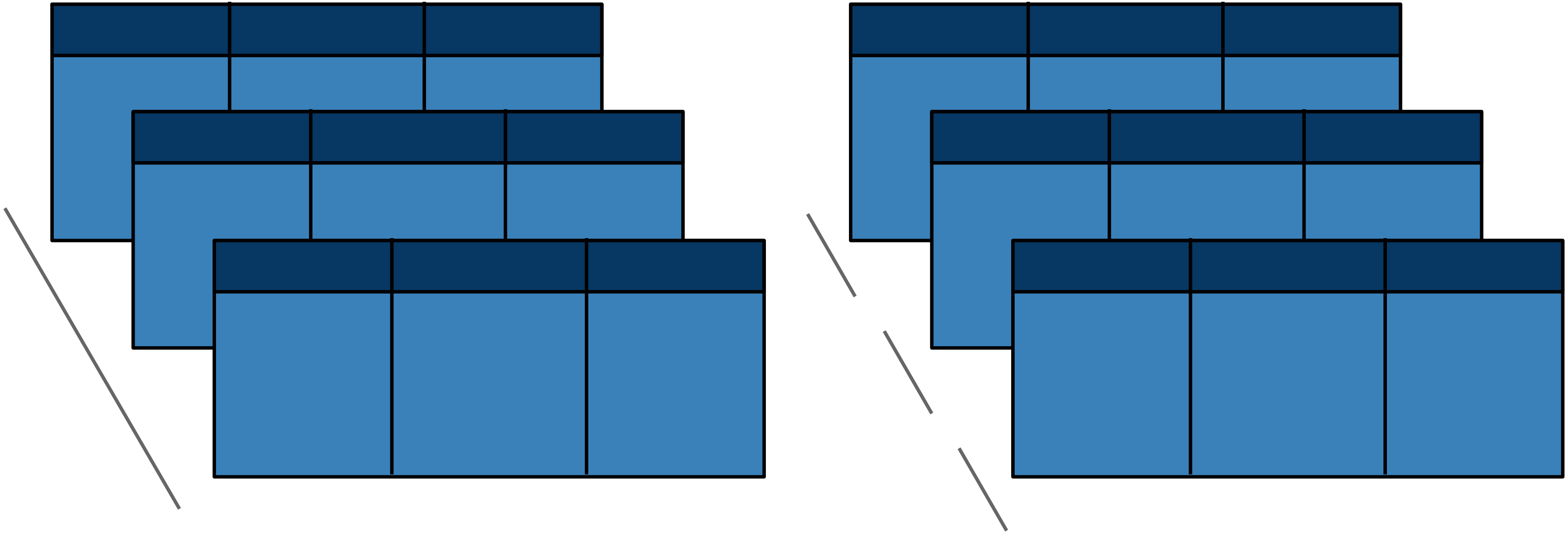
name = "TRANSACTIONS"



TRANSACTIONS

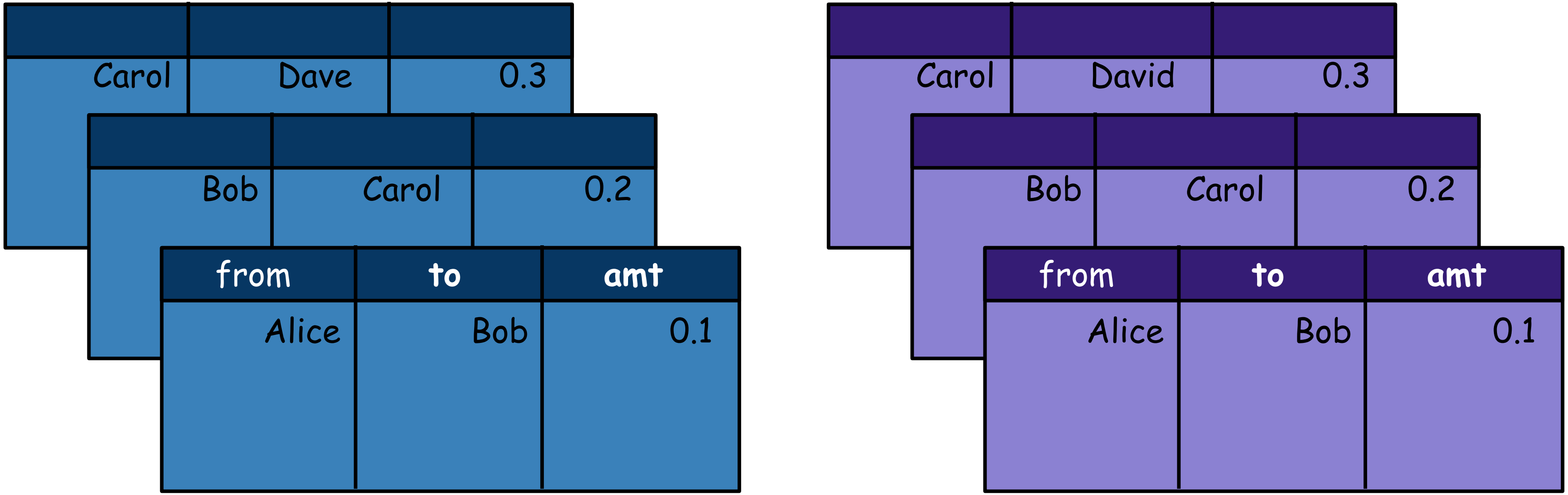


repartition



replace

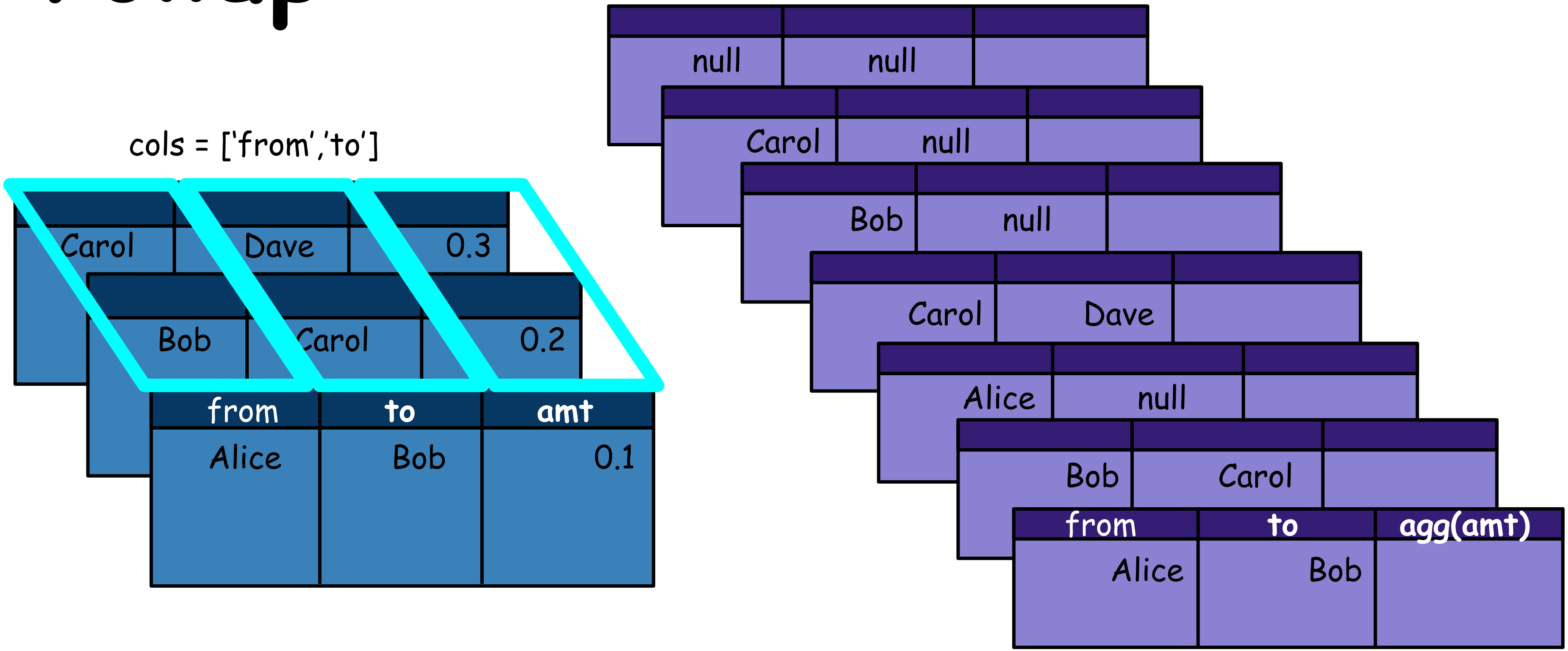
to_replace = 'Dave' value = 'David'



from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	David	0.3

rollup

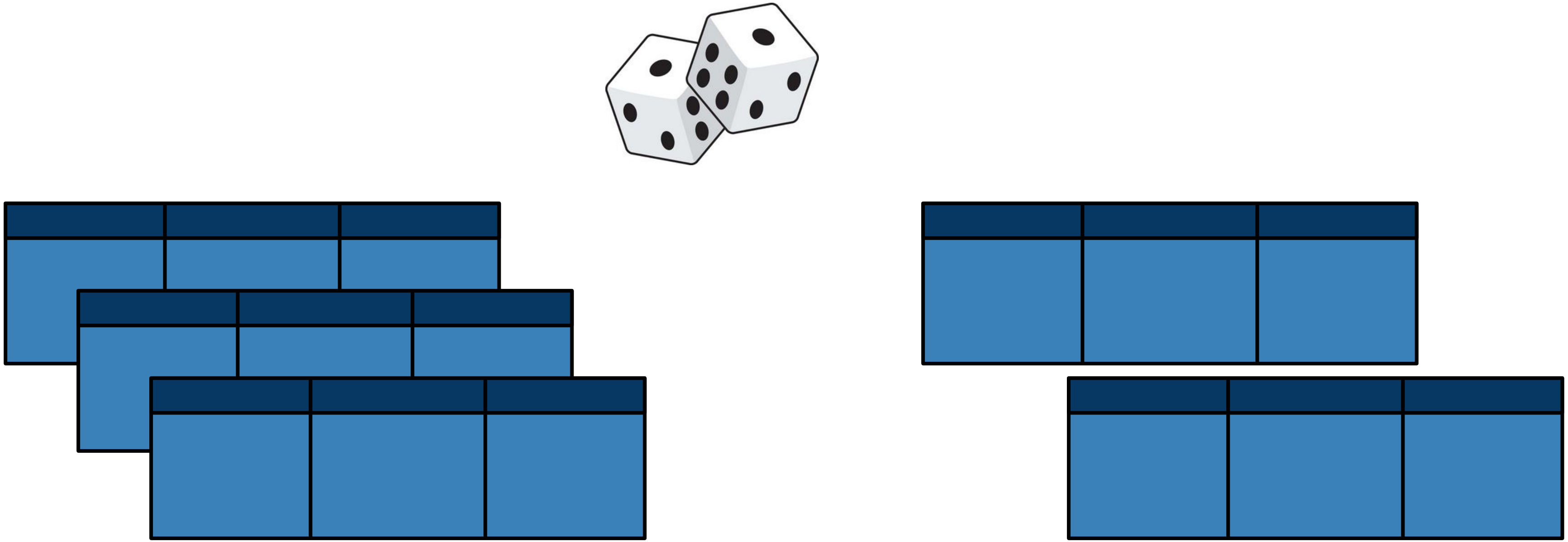


cols = ['from','to']

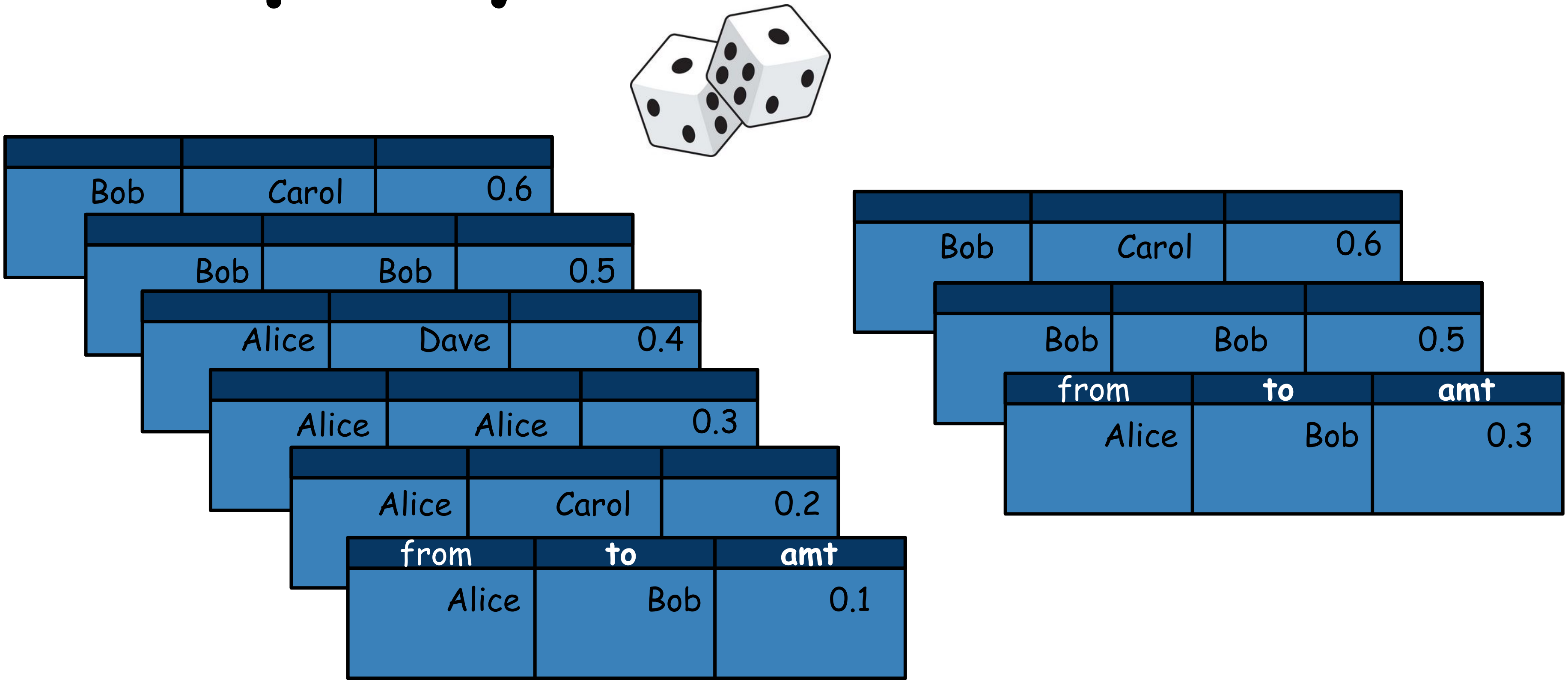
from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

from	to	agg(amt)
Alice	Bob	
Bob	Carol	
Alice	null	
Carol	Dave	
Bob	null	
Carol	null	
null	null	

sample



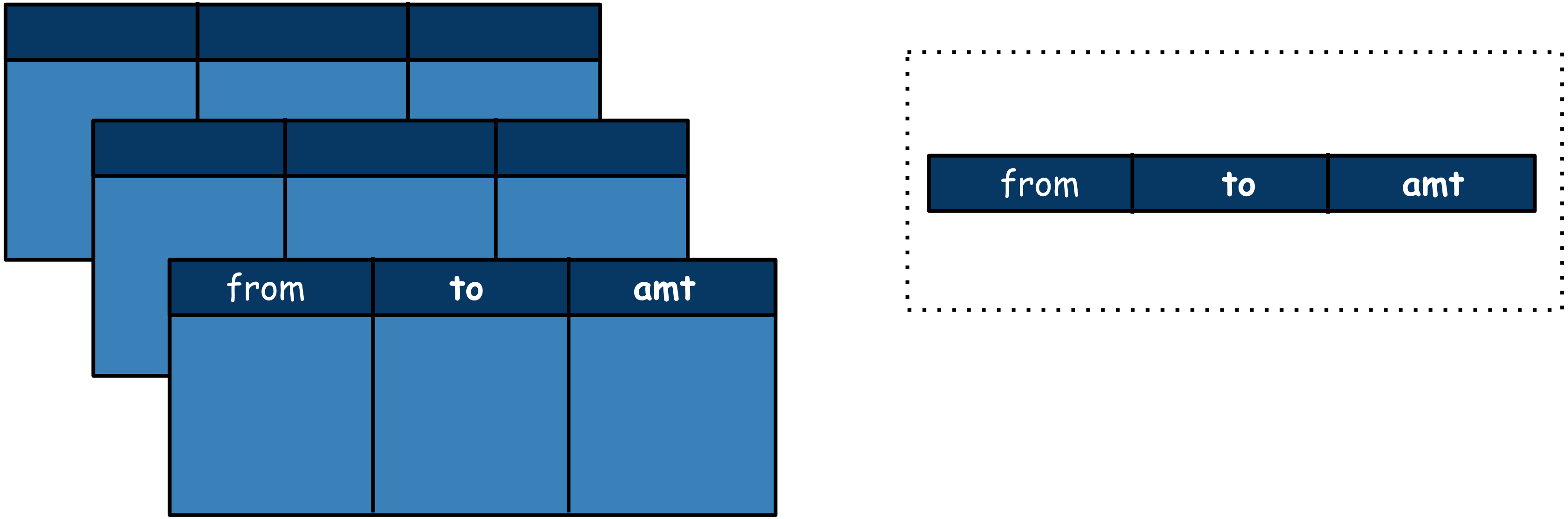
sampleBy



from	to	amt
Alice	Bob	0.1
Alice	Carol	0.2
Alice	Alice	0.3
Alice	Dave	0.4
Bob	Bob	0.5
Bob	Carol	0.6

from	to	amt
Alice	Bob	0.3
Bob	Bob	0.5
Bob	Carol	0.6

schema

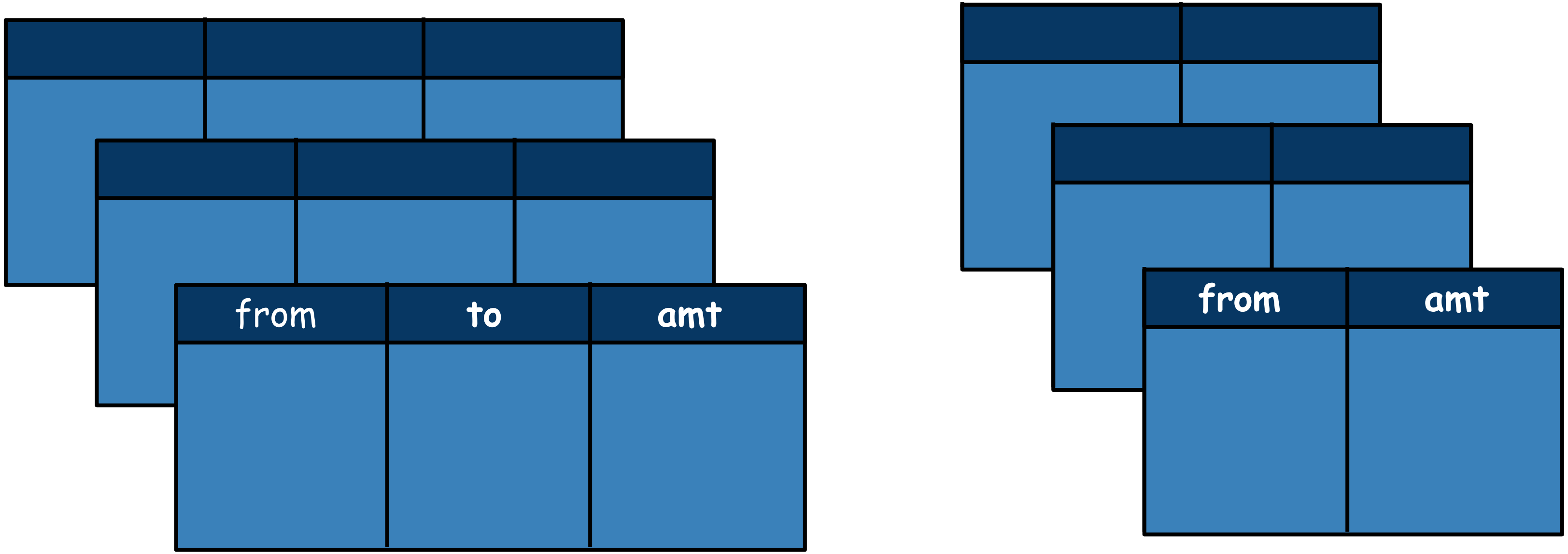


from	to	amt

from	to	amt

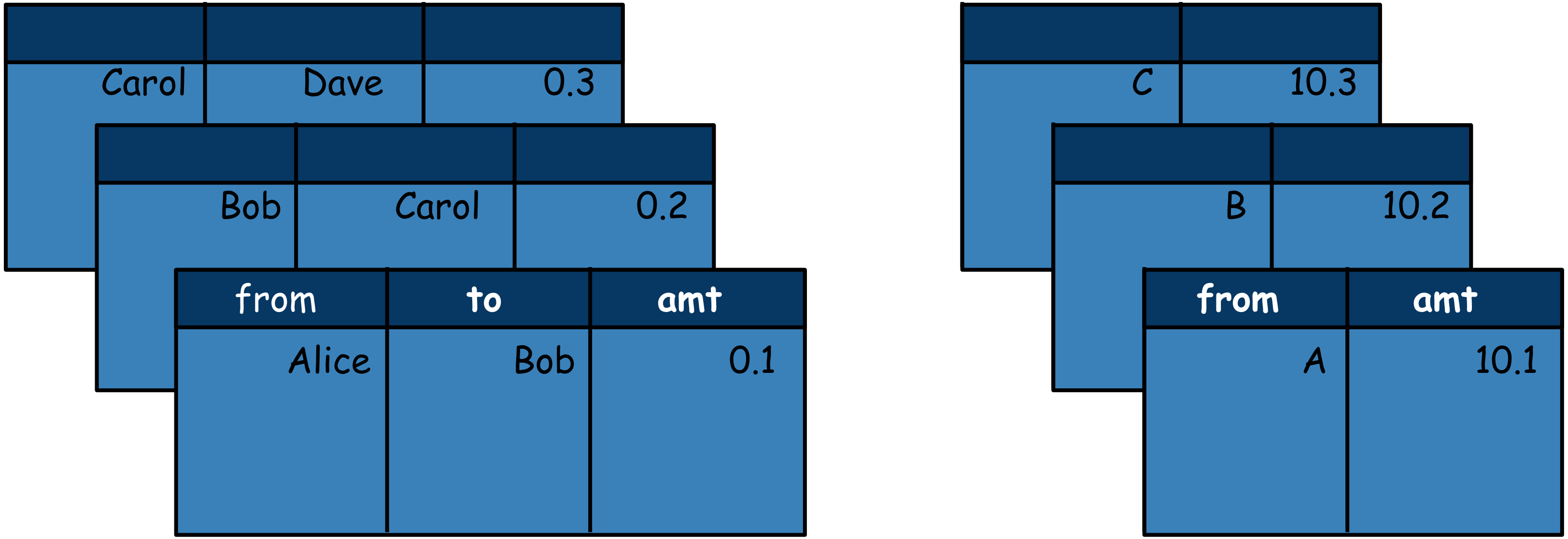
select

cols = ['from', 'amt']



selectExpr

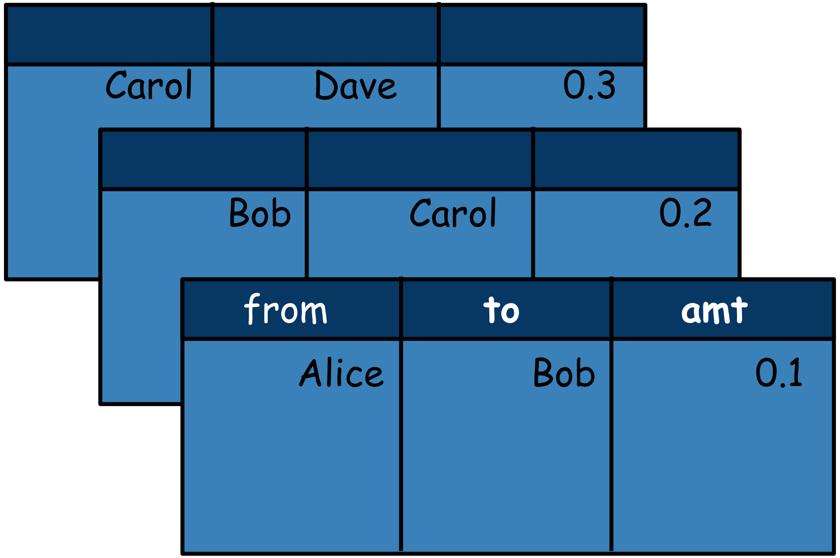
expr = [“substr(from,1,1)”, “amt + 10”]



from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Dave	0.3

from	amt
A	10.1
B	10.2
C	10.3

show



Carol	Dave	0.3

Bob	Carol	0.2

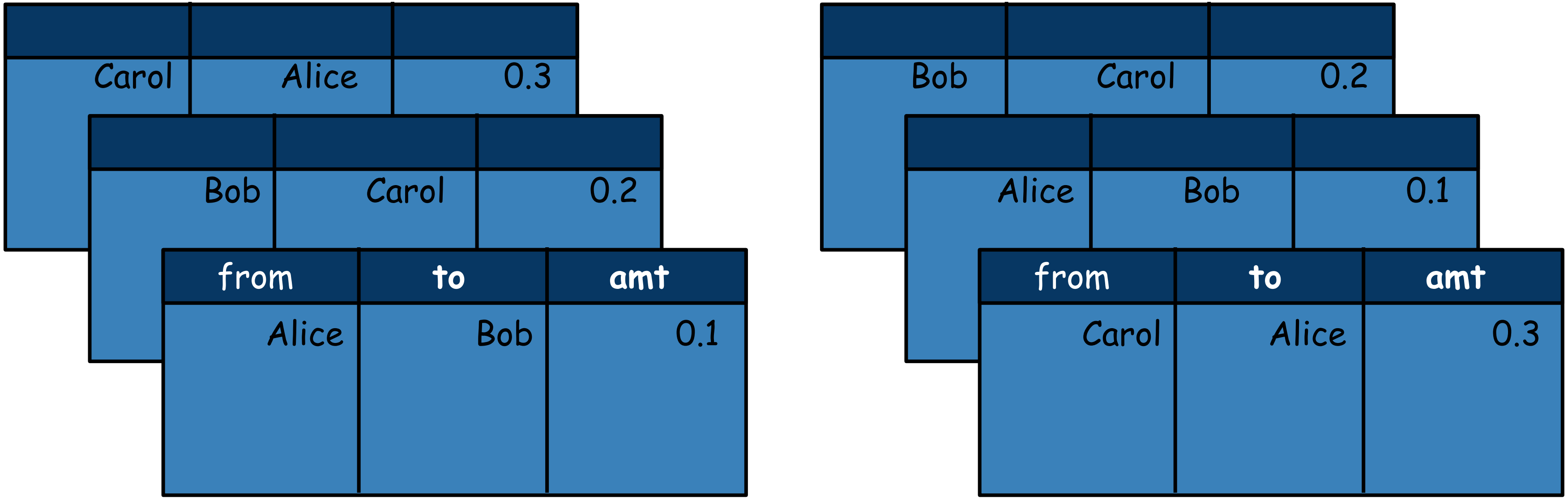
from	to	amt
Alice	Bob	0.1

stdout

```
+-----+-----+---+
| from|   to|amt|
+-----+-----+---+
|Alice|  Bob|0.1|
|  Bob|Carol|0.2|
|Carol| Dave|0.3|
+-----+-----+---+
```

sort

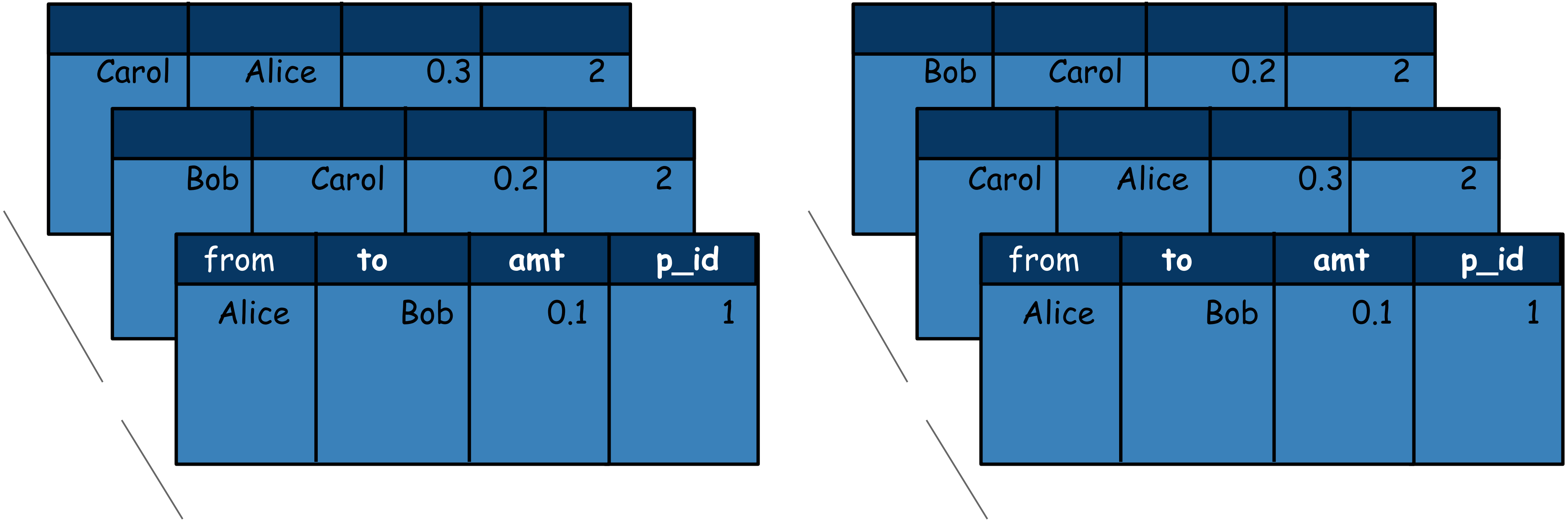
cols = ['to']



from	to	amt
Alice	Bob	0.1
Bob	Carol	0.2
Carol	Alice	0.3

from	to	amt
Carol	Alice	0.3
Alice	Bob	0.1
Bob	Carol	0.2

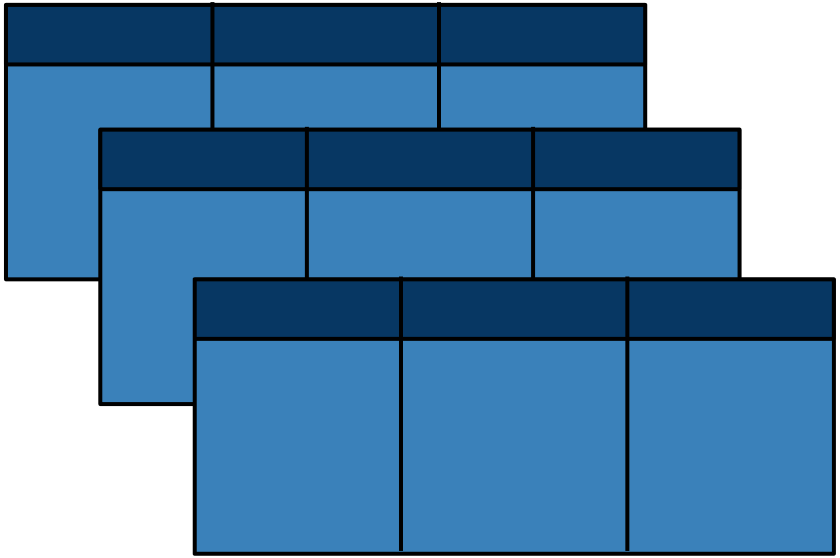
sortWithinPartitions



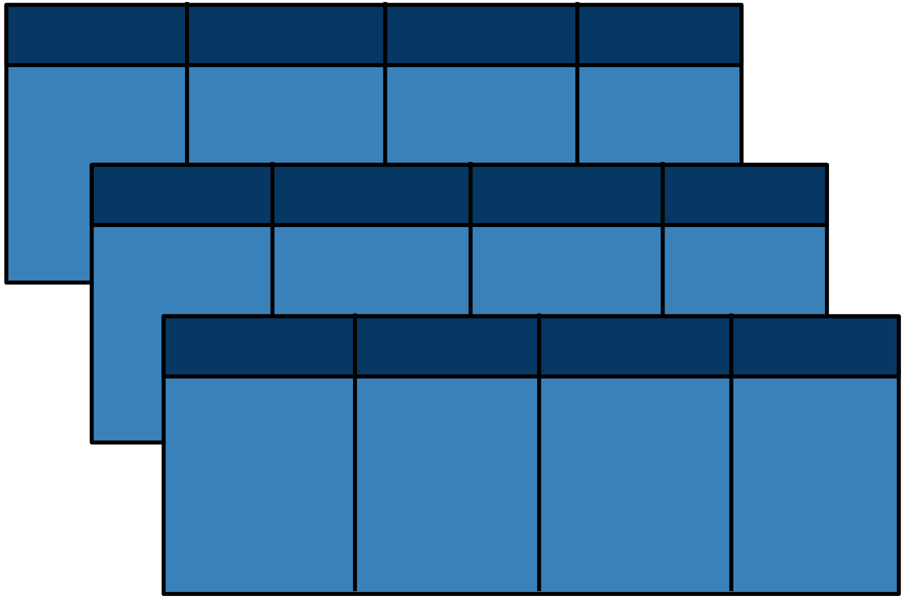
from	to	amt	p_id
Alice	Bob	0.1	1
Bob	Carol	0.2	2
Carol	Alice	0.3	2

from	to	amt	p_id
Alice	Bob	0.1	1
Carol	Alice	0.3	2
Bob	Carol	0.2	2

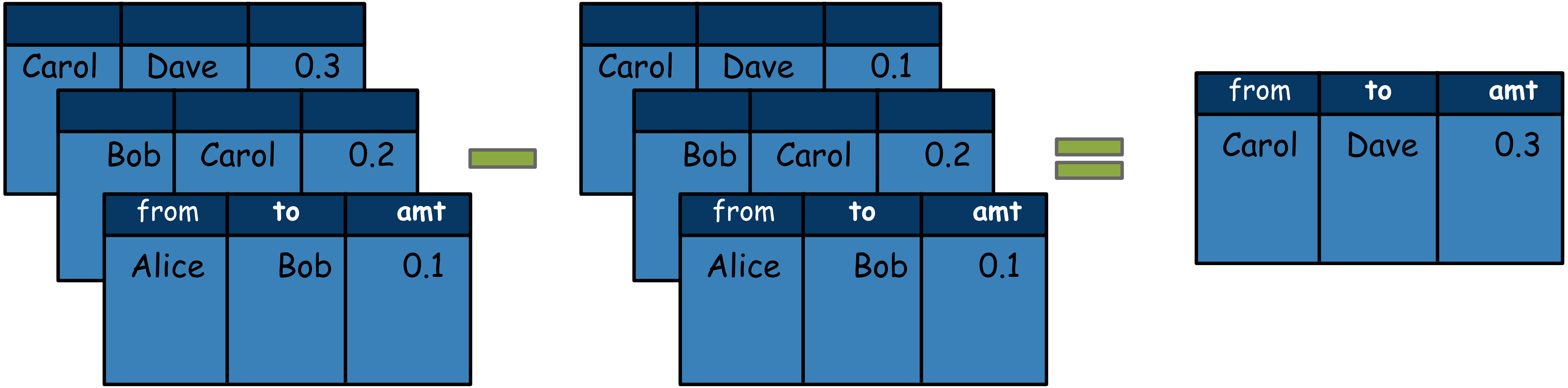
stat



stat



subtract



from	to	amt
Carol	Dave	0.3
Bob	Carol	0.2
Alice	Bob	0.1

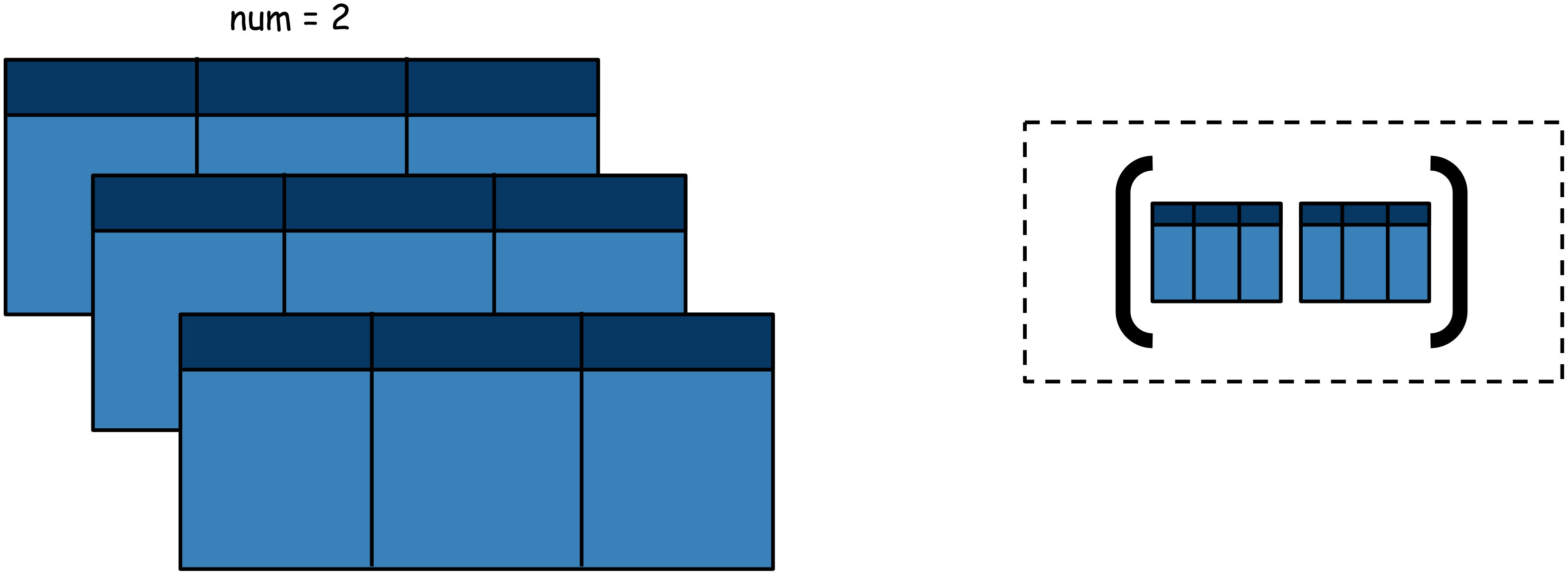
−

from	to	amt
Carol	Dave	0.1
Bob	Carol	0.2
Alice	Bob	0.1

=

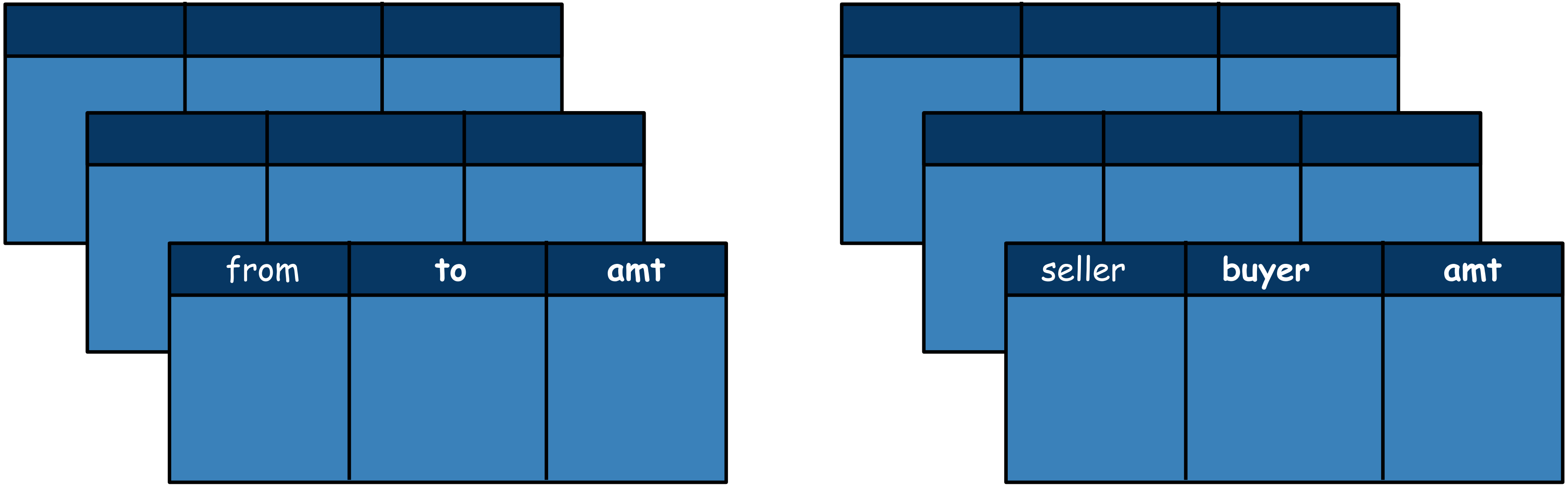
from	to	amt
Carol	Dave	0.3

take



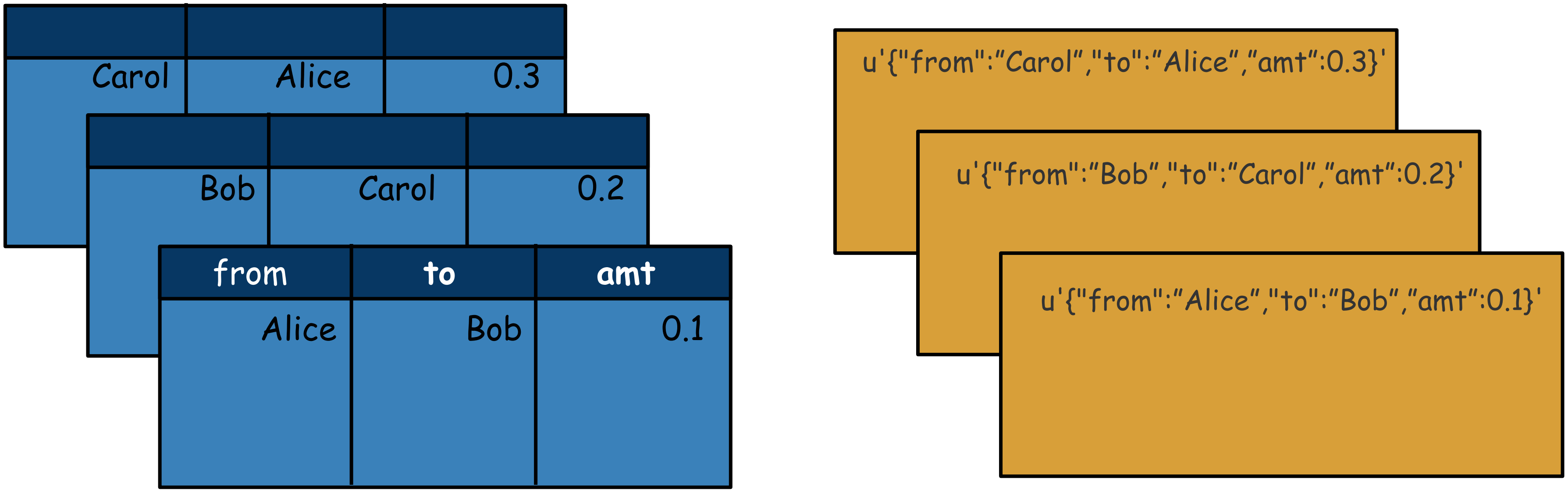
toDF

```
cols = ["seller", "buyer"]
```



toJSON

cols = [‘to’]



Carol	Alice	0.3

Bob	Carol	0.2

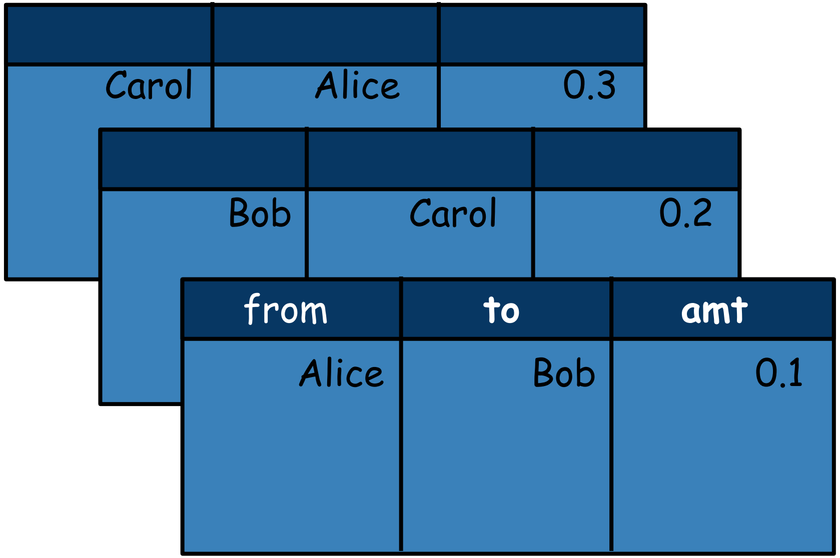
from	to	amt
Alice	Bob	0.1

u'{"from":“Carol”,"to":“Alice”,“amt”:0.3}'

u'{"from":“Bob”,"to":“Carol”,“amt”:0.2}'

u'{"from":“Alice”,"to":"Bob","amt":0.1}'

toPandas



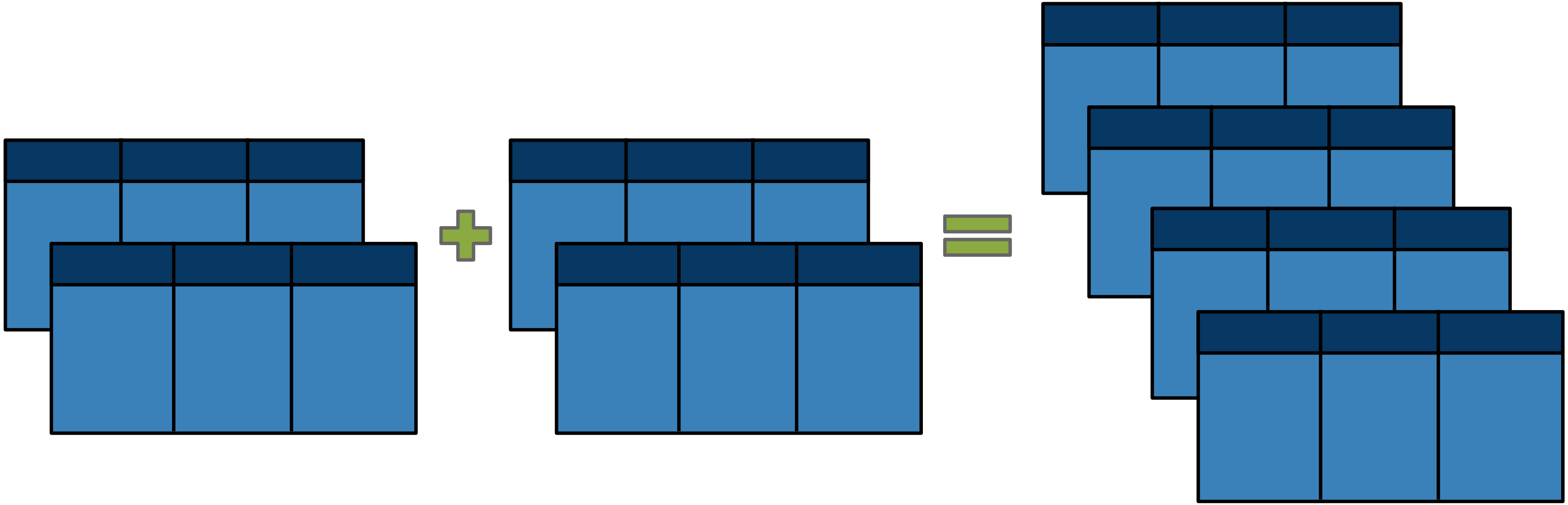
Carol	Alice	0.3

Bob	Carol	0.2

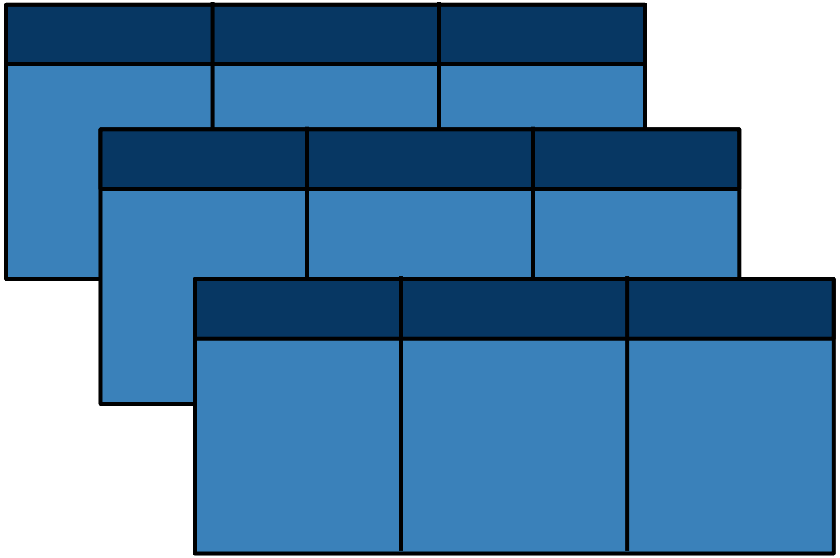
from	to	amt
Alice	Bob	0.1

```
    from  to   amt
0  Alice  Bob  0.1
1  Bob  Carol  0.2
2  Carol  Alice  0.3
```

unionAll

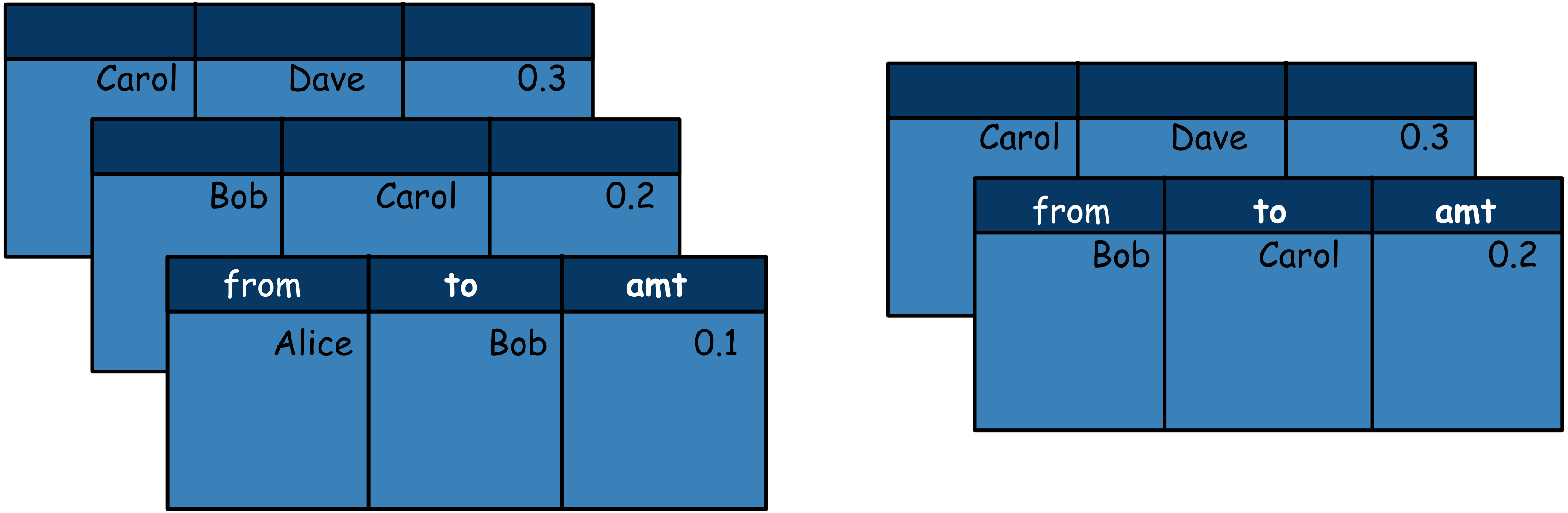


unpersist



where (filter)

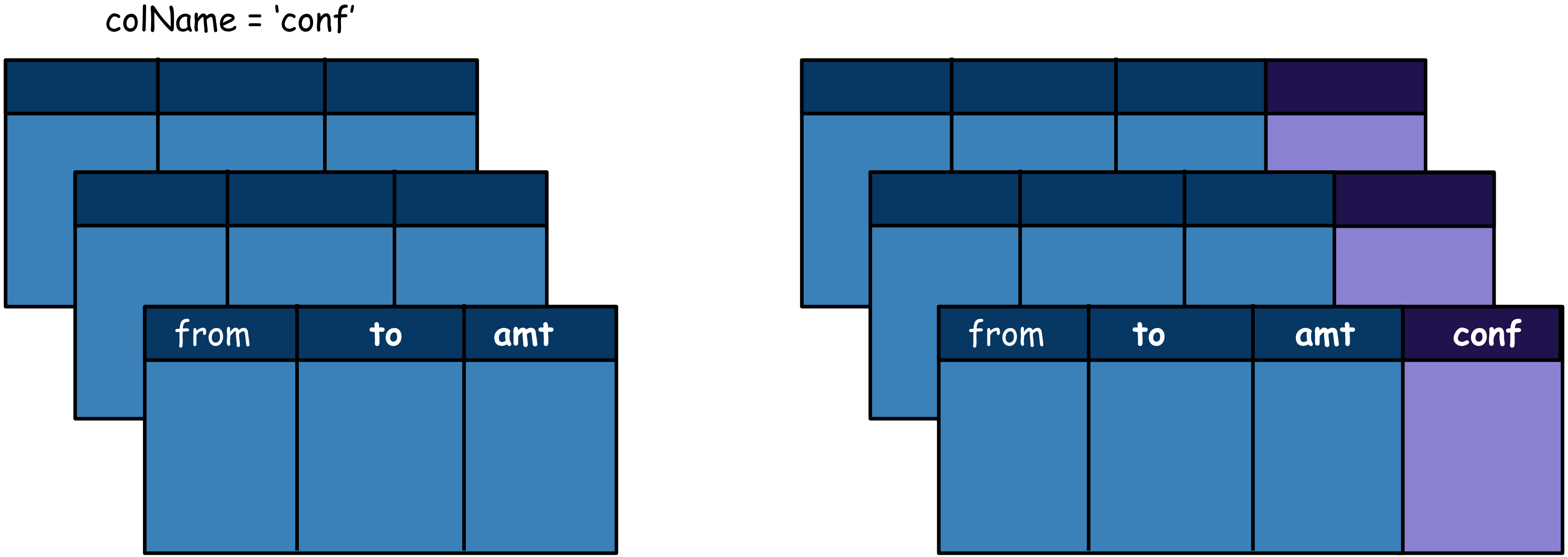
condition = “amt > 0.1”



from	to	amt
Carol	Dave	0.3
Bob	Carol	0.2
Alice	Bob	0.1

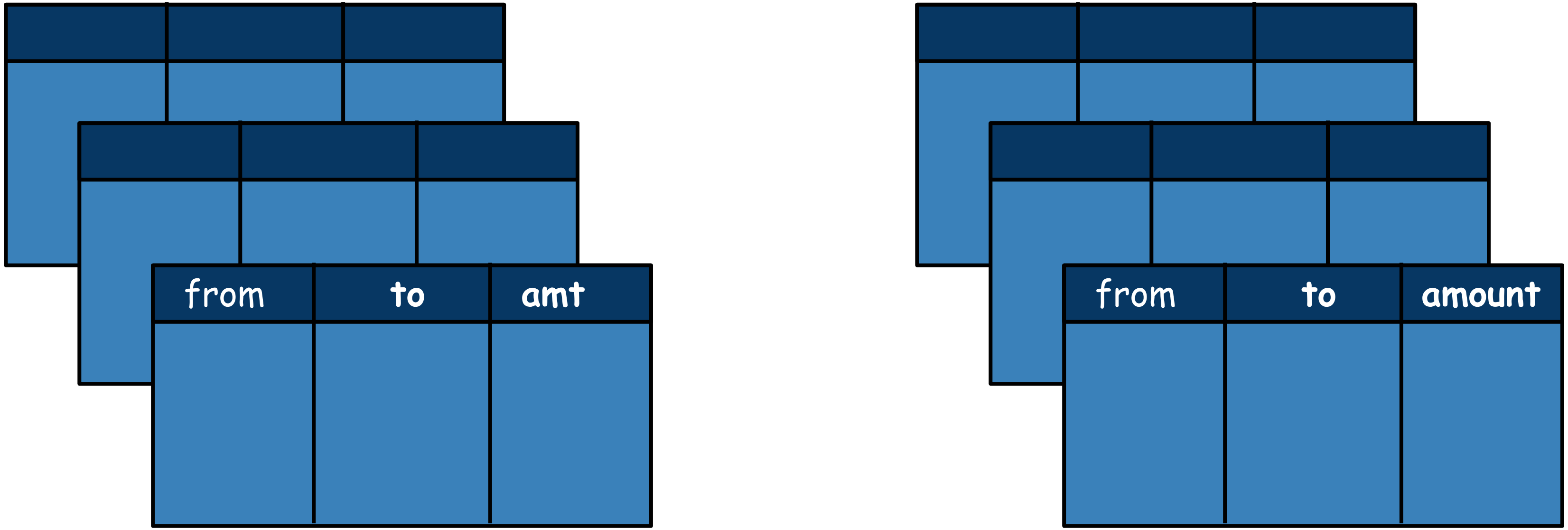
from	to	amt
Carol	Dave	0.3
Bob	Carol	0.2

withColumn



withColumnRenamed

existing = 'amt' col = 'amount'



from	to	amt

from	to	amount

write