Structured Variables in FileMaker

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On the menu this morning

1. Demo of an Encapsulated FileMaker Solution

2. What is structured variables
   list, dictionary and matrix

3. Build structured variable with CLOB

4. What is an *objectoid* module

5. What are Persistent variables

6. *Demo of the Ephemeral Matrix*

Why structured variables

Résumé

Matrix of 13 columns x 56 lines

Each of the 728 cells can contain 4 informations

<table>
<tr><td colspan="2">Balise</td></tr>
<tr><td>Test positiv</td><td>Test done</td></tr>
<tr><td colspan="2">Notes</td></tr>
</table>

56 x 13 x 4 = 2912 informations

Evolution of a solution

Architecture : Relationships graph

Version 0 : La base

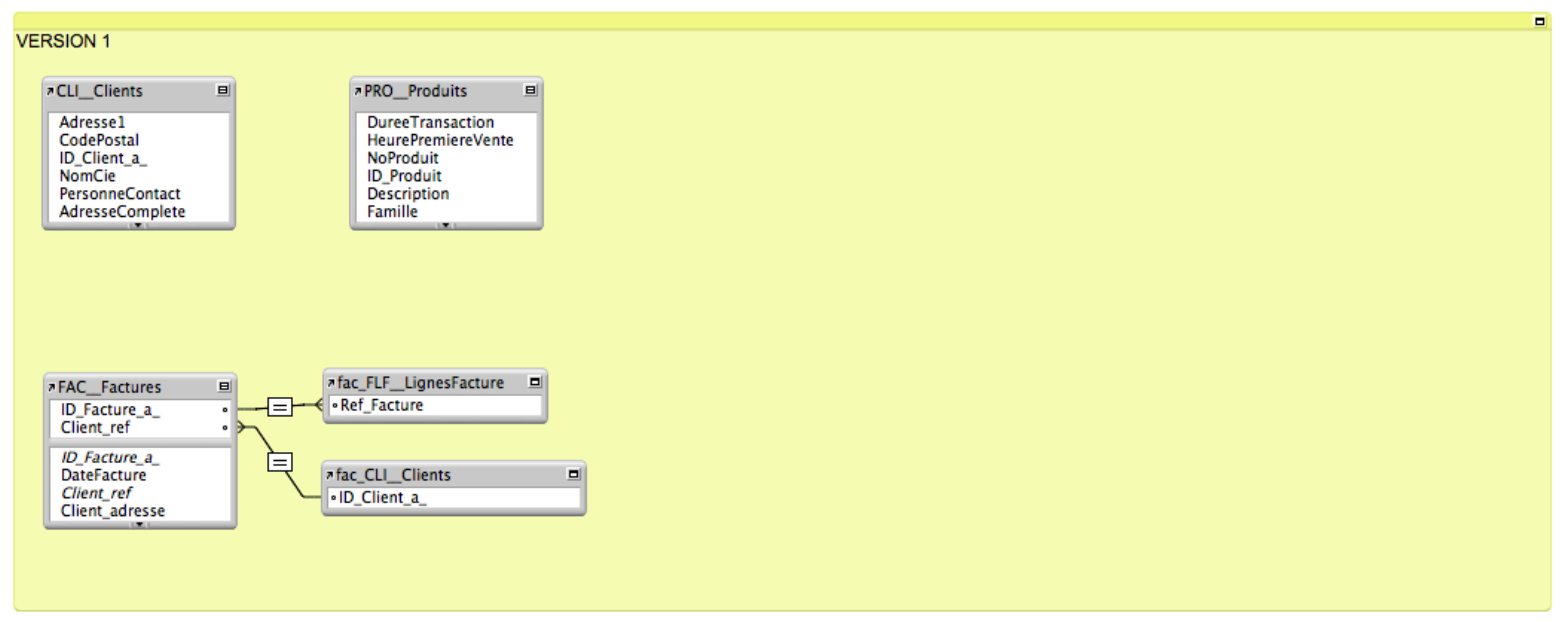
VERSION 0
CLI__Clients
Adresse1
CodePostal
ID_Client_a_
NomCie
PersonneContact
AdresseComplete
PRO__Produits
DureeTransaction
HeurePremiereVente
NoProduit
ID_Produit
Description
Famille
FAC__Factures
ID_Facture_a_
Client_ref
Client_adresse
SousTotalAvantTaxes
TaxeTPS
TaxeTVH
=
fac_FLF__LignesFac...
Ref_Facture

To do

Write in a new invoice

1. Customer name
2. Customer address
3. Contact name
4. Telephone number

Itération 1



VERSION 1

CLI__Clients
- Adresse1
- CodePostal
- ID_Client_a_
- NomCie
- PersonneContact
- AdresseComplete

PRO__Produits
- DureeTransaction
- HeurePremiereVente
- NoProduit
- ID_Produit
- Description
- Famille

FAC__Factures
- ID_Facture_a_
- Client_ref
- *ID_Facture_a_*
- DateFacture
- *Client_ref*
- Client_adresse

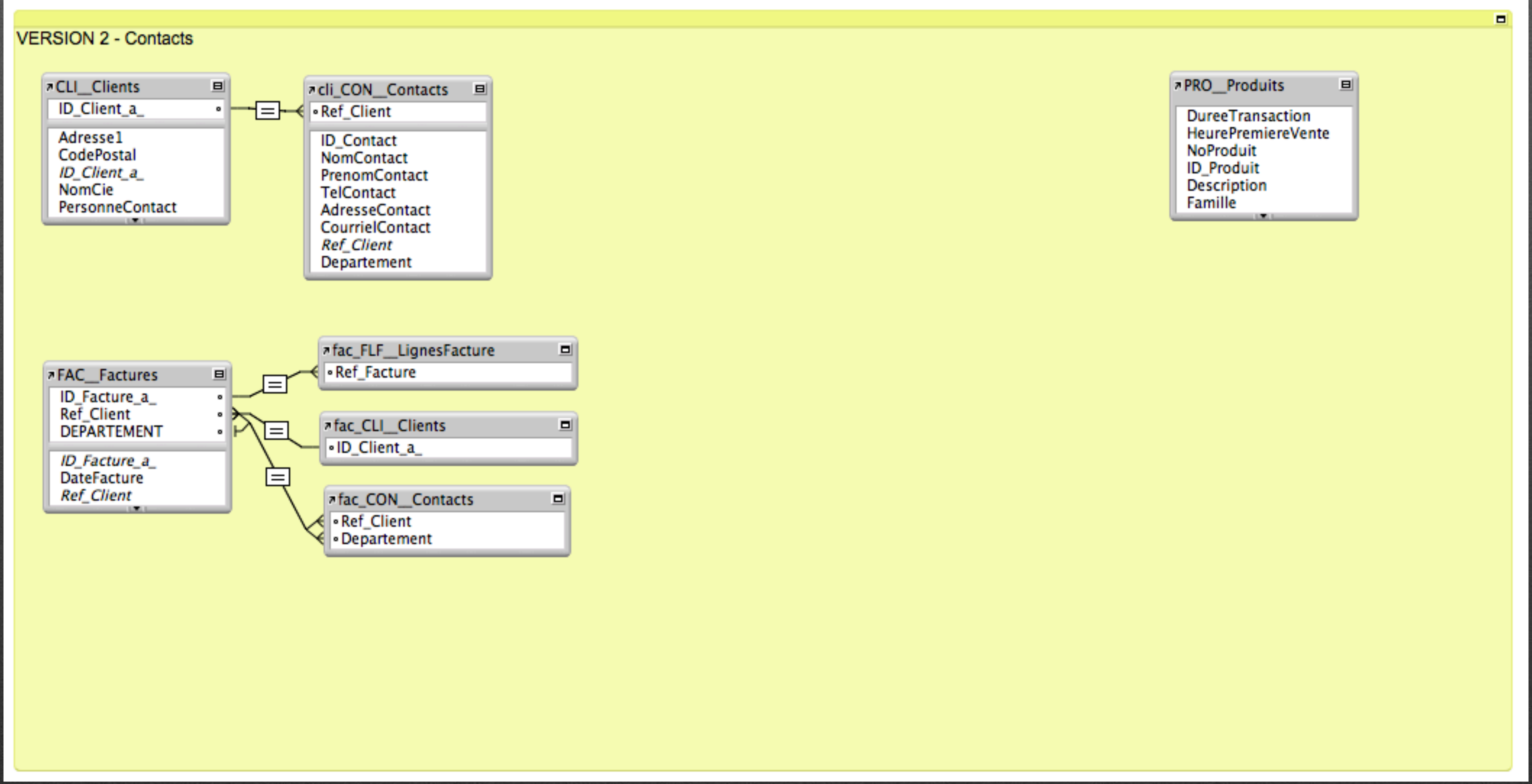
fac_FLF__LignesFacture
- Ref_Facture

fac_CLI__Clients
- ID_Client_a_

Modification 1

- Some Customer have department
- Add to module a «Contact» table

Itération 2



VERSION 2 - Contacts

CLI__Clients
ID_Client_a_
Adresse1
CodePostal
*ID_Client_a_*
NomCie
PersonneContact

cli_CON__Contacts
Ref_Client
ID_Contact
NomContact
PrenomContact
TelContact
AdresseContact
CourrielContact
Ref_Client
Departement

PRO__Produits
DureeTransaction
HeurePremiereVente
NoProduit
ID_Produit
Description
Famille

FAC__Factures
ID_Facture_a_
Ref_Client
DEPARTEMENT
*ID_Facture_a_*
DateFacture
Ref_Client

fac_FLF__LignesFacture
Ref_Facture

fac_CLI__Clients
ID_Client_a_

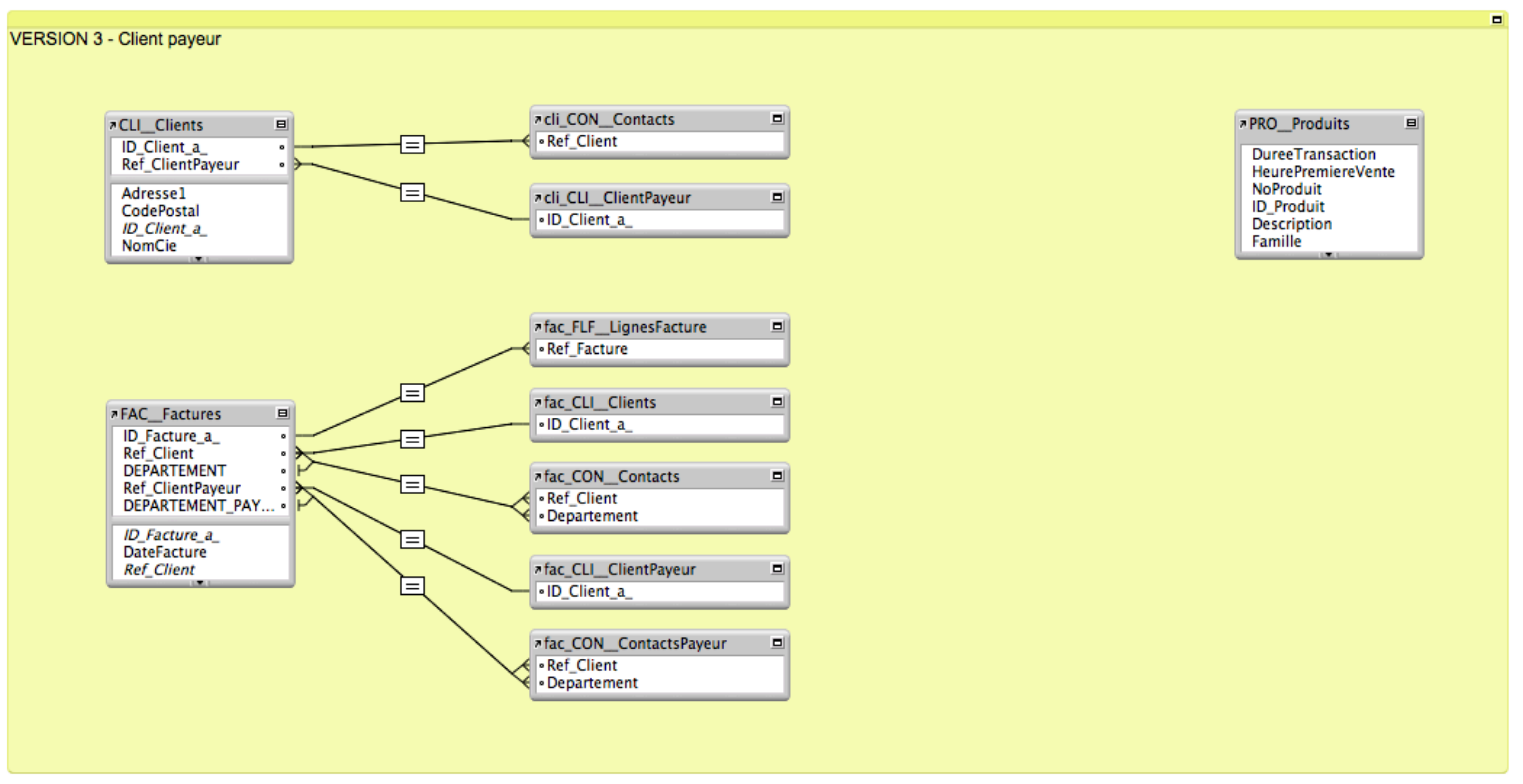
fac_CON__Contacts
Ref_Client
Departement

Modification 2

- Some Customers can make a command but the invoice will be paid by other (Paying Customer)

- Add a table occurrence

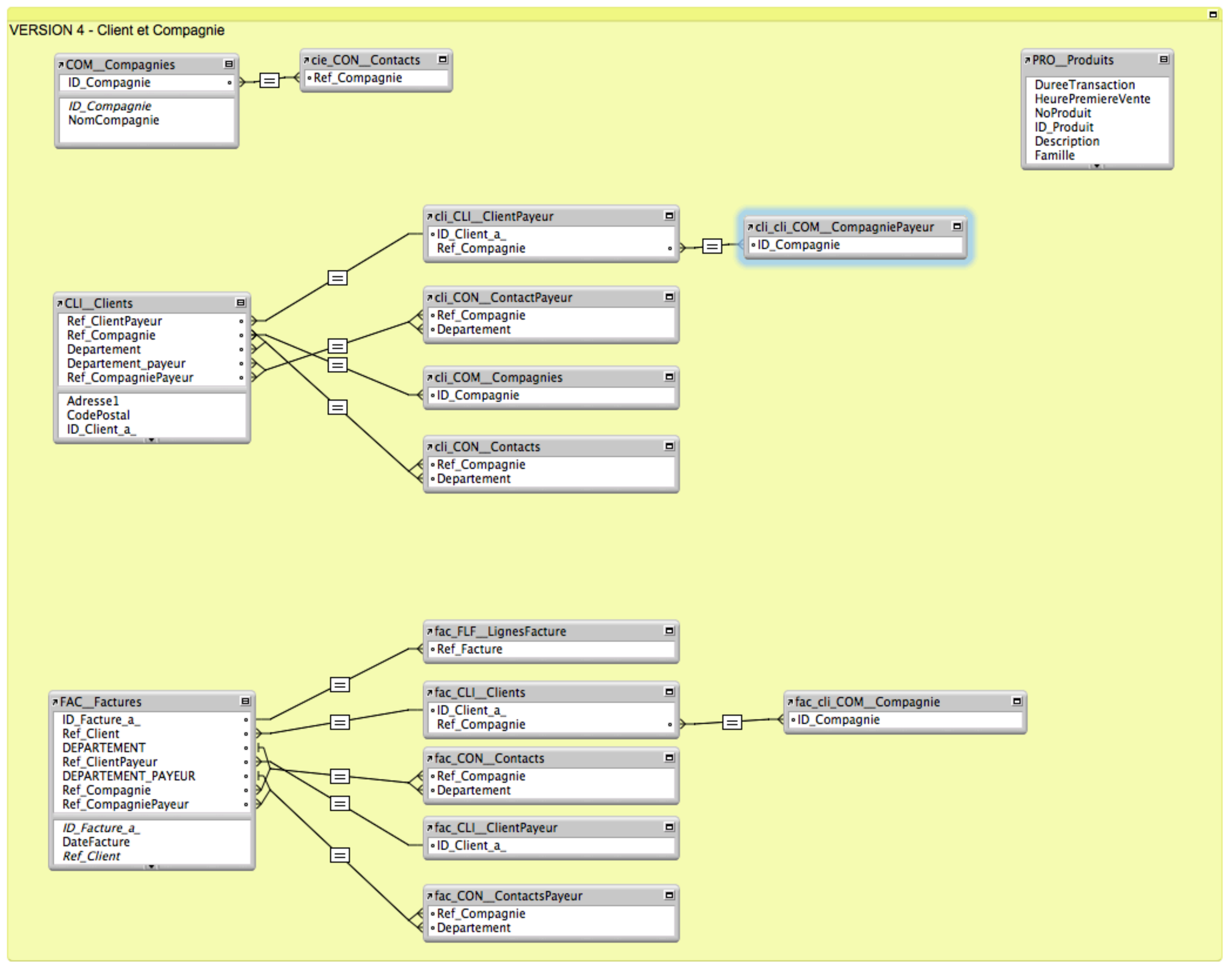
Itération 3



VERSION 3 - Client payeur

Modification 3

- Some Customers are Provider too
- Add Company table and make a link whit «Customers» and «Provider»



VERSION 4 - Client et Compagnie

COM__Compagnies
ID_Compagnie
ID_Compagnie
NomCompagnie

cie_CON__Contacts
Ref_Compagnie

PRO__Produits
DureeTransaction
HeurePremiereVente
NoProduit
ID_Produit
Description
Famille

CLI__Clients
Ref_ClientPayeur
Ref_Compagnie
Departement
Departement_payeur
Ref_CompagniePayeur
Adresse1
CodePostal
ID_Client_a_

cli_CLI__ClientPayeur
ID_Client_a_
Ref_Compagnie

cli_cli_COM__CompagniePayeur
ID_Compagnie

cli_CON__ContactPayeur
Ref_Compagnie
Departement

cli_COM__Compagnies
ID_Compagnie

cli_CON__Contacts
Ref_Compagnie
Departement

FAC__Factures
ID_Facture_a_
Ref_Client
DEPARTEMENT
Ref_ClientPayeur
DEPARTEMENT_PAYEUR
Ref_Compagnie
Ref_CompagniePayeur
*ID_Facture_a_*
DateFacture
Ref_Client

fac_FLF__LignesFacture
Ref_Facture

fac_CLI__Clients
ID_Client_a_
Ref_Compagnie

fac_cli_COM__Compagnie
ID_Compagnie

fac_CON__Contacts
Ref_Compagnie
Departement

fac_CLI__ClientPayeur
ID_Client_a_

fac_CON__ContactsPayeur
Ref_Compagnie
Departement

Software Object

1. Software objects are conceptually similar to real-world objects: they too consist of state and related behavior.

2. An object stores its state in fields (variables in some programming languages) and exposes its behavior through methods (functions in some programming languages).

3. Methods operate on an object's internal state and serve as the primary mechanism for object-to-object communication.

4. Hiding internal state and requiring all interaction to be performed through an object's methods is known as data encapsulation — a fundamental principle of object-oriented programming.

5. We have a «Solid» object if the interface is independent of the implementation.

What are structured variables?

Variable

$myVariable
$$myVariable
~myVariable

Variable in FileMaker

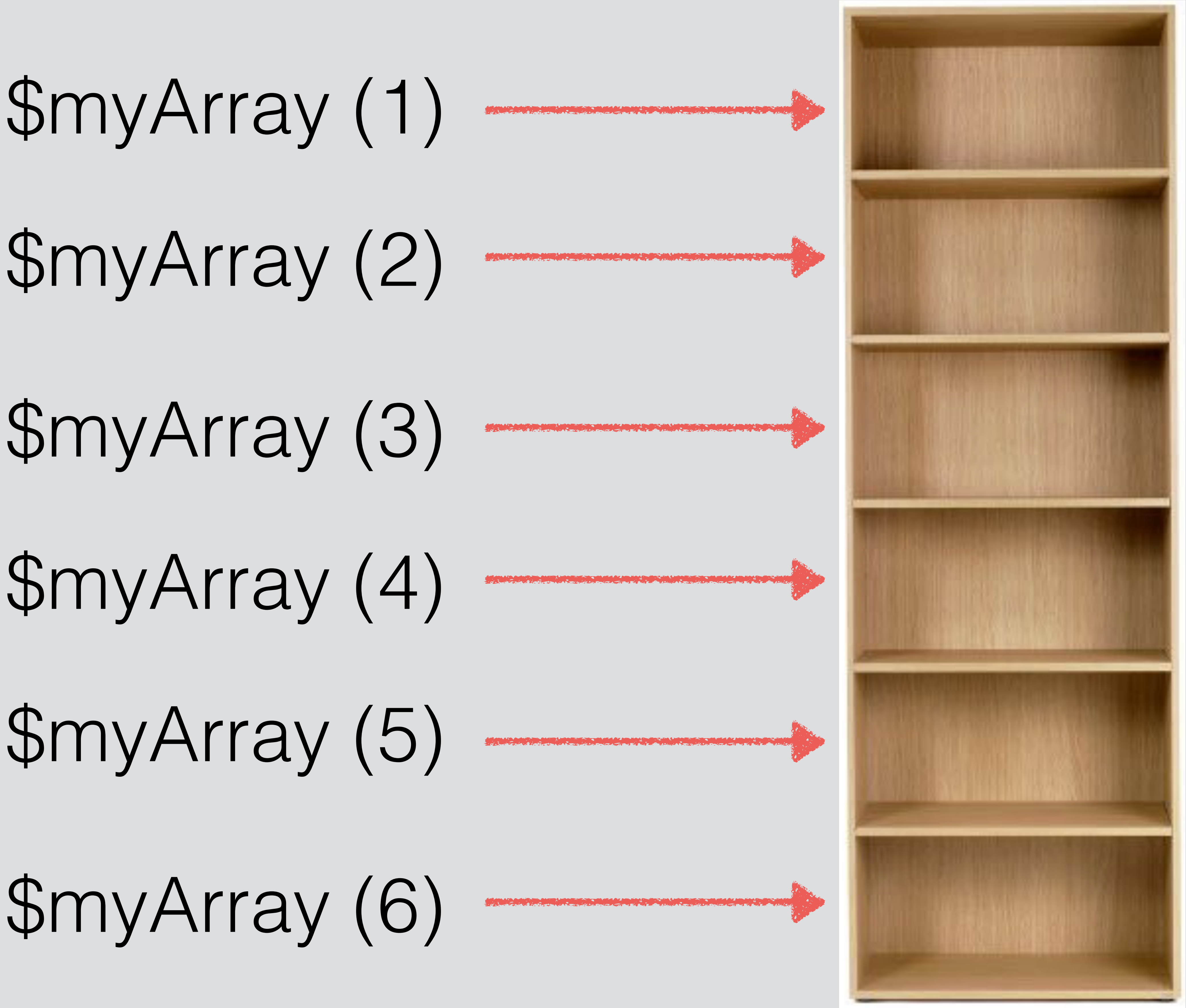
- FileMaker :«The data type of a variable is determined dynamically based on the assigned data.» If not specified the type will be deducted by FileMaker to the best of its knowledge.

- 90% of the structured variables must be serialized. The type of the variable will probably be lost. An encapsulated module ignores the calling context. It is necessary to consider all the variables received as text and to convert them to the reception.

Array

$myArray

Array



$myArray (1)

$myArray (2)

$myArray (3)

$myArray (4)

$myArray (5)

$myArray (6)

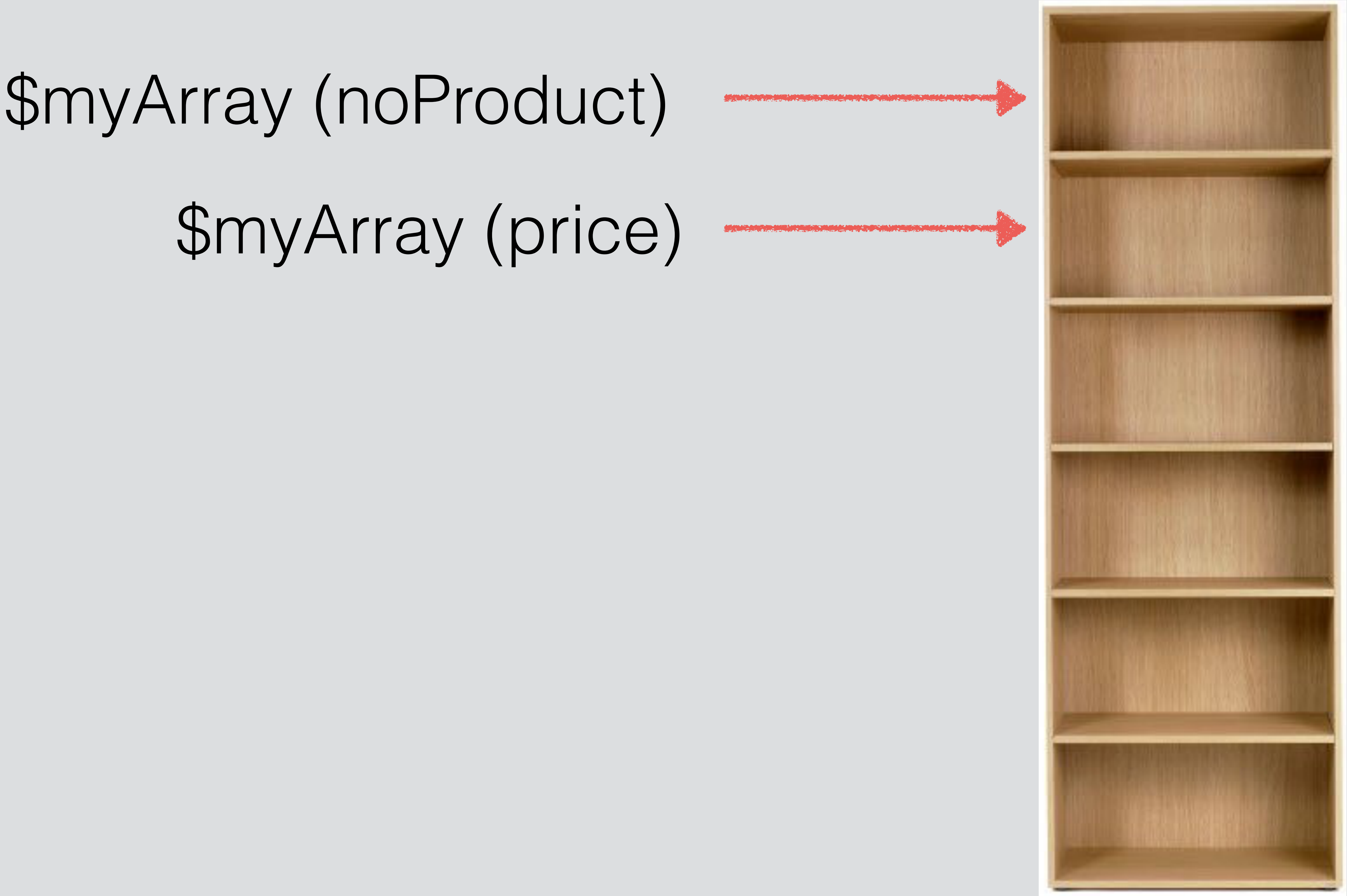
$myArray

Dictionary (indexed array)

Dictionary (indexed array)

$myArray (noProduct)

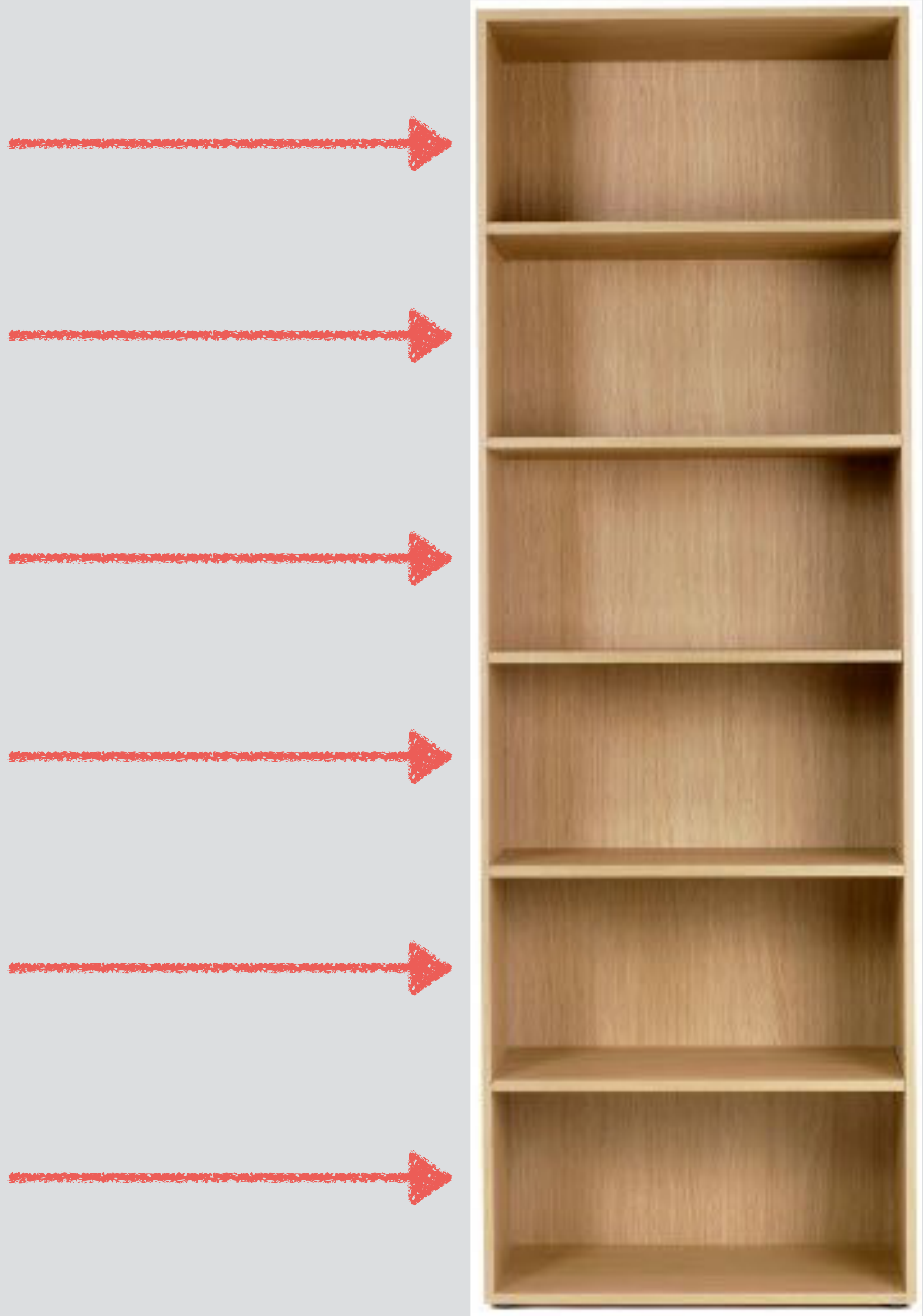
Dictionary (indexed array)



$myArray (noProduct)

$myArray (price)

Dictionary (indexed array)



$myArray (noProduct)

$myArray (price)

$myArray (height)

$myArray (width)

$myArray (weight)

$myArray (name)

Matrix (two-dimensional array)

$myMatrix

A structured variable

$myStructuredVariable

A structured variable

$myStructuredVariable

Structured variables

- Array (list separated by ¶ or a list of words)
- Dictionary (SFR or similar)
- Matrix or two dimensional array (CLOB or similar)
- A Structured variables who contain any combination of array, dictionary, matrix and even structured variable.

A structured variable is first a **structure of information** then it is a technique.

Information to be structured

The Smith Family

Dad	1	Bob
Mom	2	Emma
Pet(s)	3	
Son	4	Luc
Daughter	5	Nancy

The position of the information gives the type of information.

The Davis Family

Dad	1	Paul ¶ Marc
Mom	2	Lucie
Pet(s)	3	Diesel ¶ Gasoline
Son	4	
Daughter	5	Mary

The position of the information gives the type of information.

A matrix of families

	Smith	**Davis**
Dad	Bob	Paul ¶ Marc
Mom	Emma	Lucie
Pet(s)		Diesel ¶ Gasoline
Son	Luc	
Daughter	Nancy	Mary

Smith family in a FileMaker LIST

Bob¶Emma¶¶Luc¶Nancy

Good

Dad	Bob
Mom	Emma
Pet(s)	
Son	Luc
Daughter	Nancy

Davis family in a FileMaker LIST

Paul¶Marc¶Lucie¶Diesel¶Gasoline¶¶Mary

Failed

Dad	Paul
Mom	Marc
Pet(s)	Lucie
Son	Diesel
Daughter	Gasoline

Because the data separator is used in the data.

List

- A list must be filtered or escaped (replace ¶ by something)
- A list can be sorted by native function (v16) but the sort could be altered by escaping char
- It is impossible to pass 2 lists to a script (parameter). You must serialize them beforehand

Smith family in a DICTIONARY as list (SFR)

<::=Bob:><::=Emma:><::=:><::=Luc:><::=Nancy:>

Good

Dad	Bob
Mom	Emma
Pet(s)	
Son	Luc
Daughter	Nancy

The position gives the type of information.

Davis family in a DICTIONARY as list (SFR)

```
<::=Paul¶Marc:><::=Lucie:><::=Diesel¶Gasoline:>
<::=:><::=Mary:>
```

Good

Dad	Paul¶Marc
Mom	Lucie
Pet(s)	Disel¶Gasoline
Son	
Daughter	Mary

The position gives the type of information.

Smith family in a DICTIONARY (SFR)

<:Dad:=Bob:><:Mom:=Emma:><:Pet:=:><:Son:=Luc:><:Daughter:=Nancy:>

Good

Dad	Bob
Mom	Emma
Pet(s)	
Son	Luc
Daughter	Nancy

The key value gives the type of information.

Davis family in a DICTIONARY (SFR)

<:Dad:=Paul¶Marc:><:Mom:=Lucie:><:Pet:=Diesel¶Gasoline:>
<:Son:=:><:Daughter:=Mary:>

Good

Dad	Paul¶Marc
Mom	Lucie
Pet(s)	Disel¶Gasoline
Son	
Daughter	Mary

The key value gives the type of information.

Dictionary

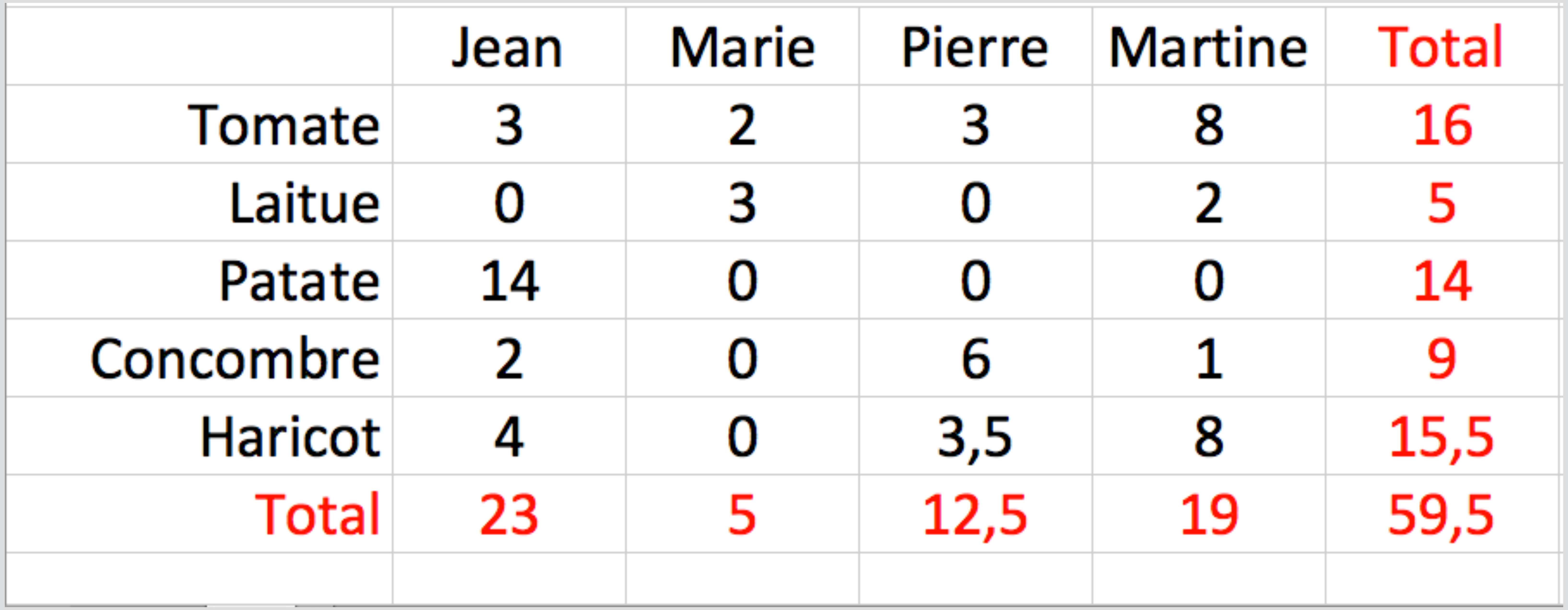
- A dictionary must be escaped
- A dictionary cannot be sorted by native function (Anyway who wants to sort a dictionary !)
- A list in a Dictionary cannot be sorted
- It is dangerous (unpredictable) to pass 2 dictionary to a script (as parameters). You must serialize them beforehand

Families in a MATRIX

Families in a MATRIX

What the … is a matrix?

A Matrix



	Jean	Marie	Pierre	Martine	Total
Tomate	3	2	3	8	16
Laitue	0	3	0	2	5
Patate	14	0	0	0	14
Concombre	2	0	6	1	9
Haricot	4	0	3,5	8	15,5
Total	23	5	12,5	19	59,5

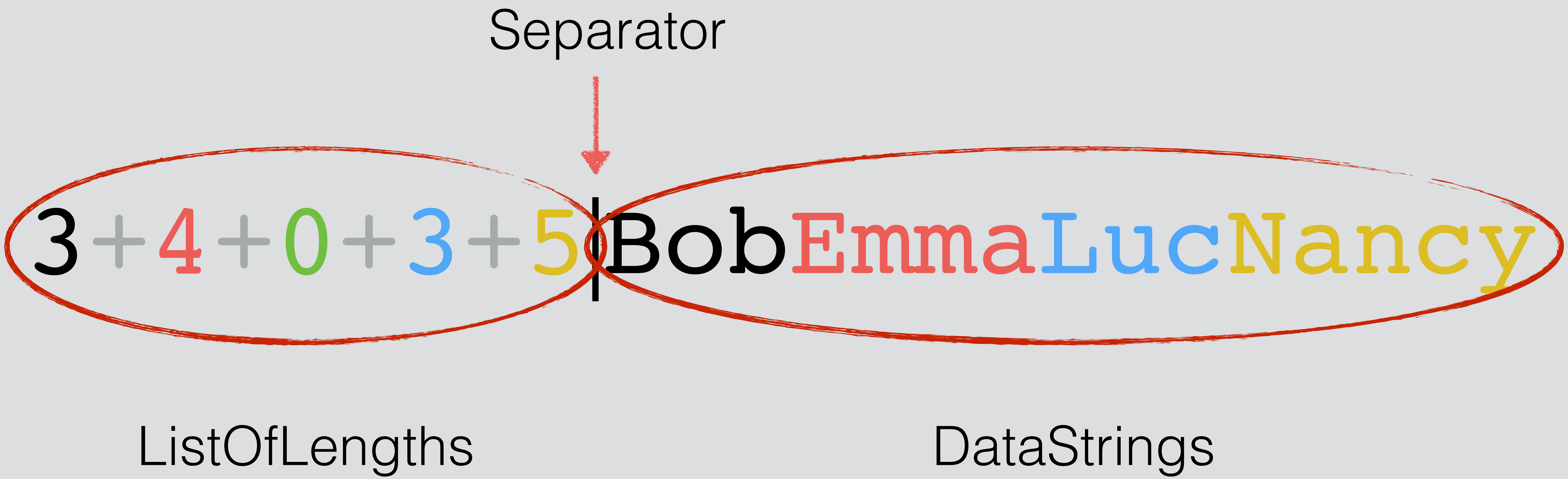
Matrix

- There is no matrix in FileMaker
- A CSV character string can be used but must be escaped beforehand
- It is impossible to pass 2 CSV to a script (as parameters). You must serialize them beforehand.

Build structured variables with CLOB

CLOB

3+4+0+3+5|BobEmmaLucNancy

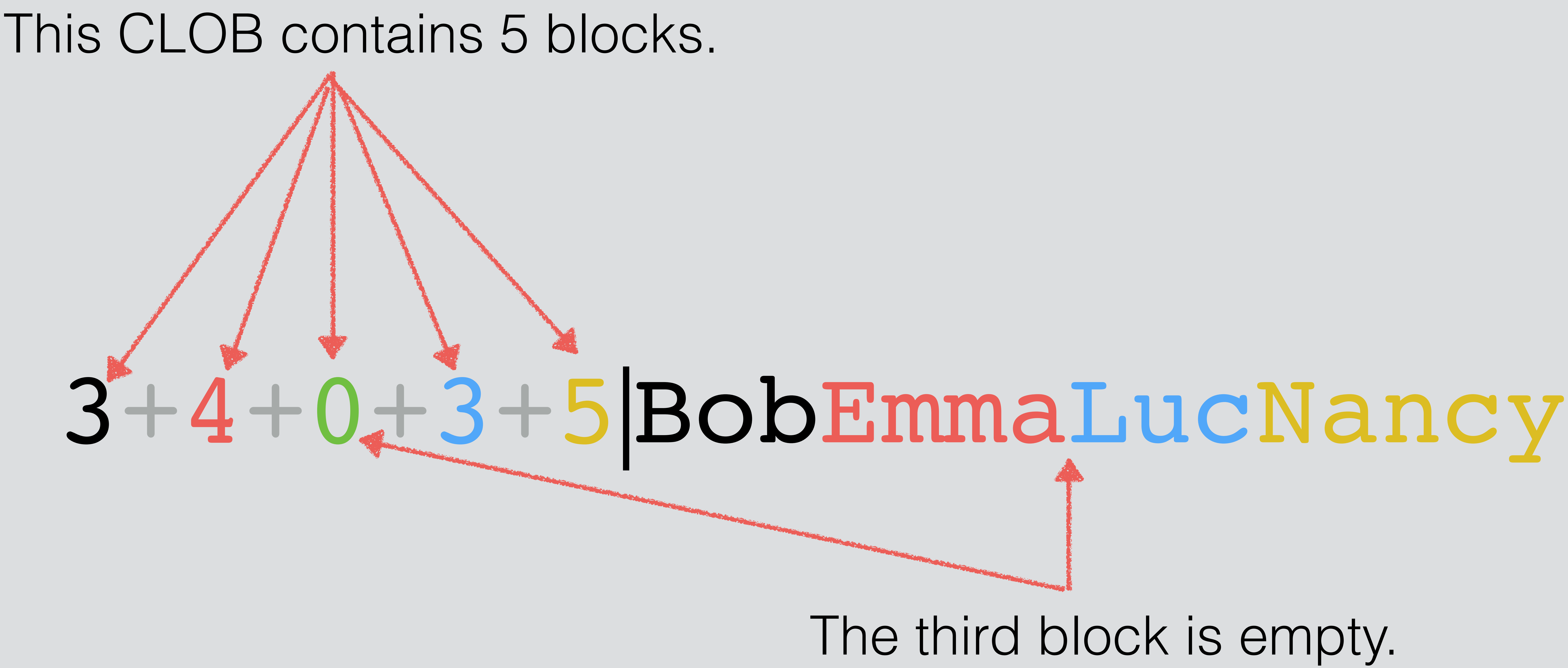


Separator

3+4+0+3+5|BobEmmaLucNancy

ListOfLengths

DataStrings



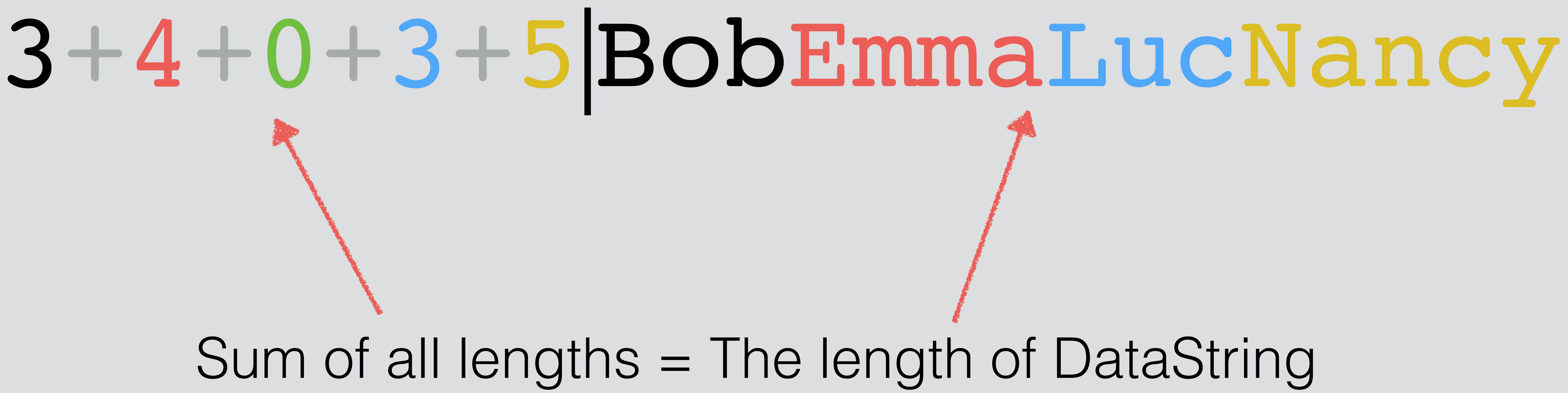
This CLOB contains 5 blocks.

3+4+0+3+5|BobEmmaLucNancy

The third block is empty.

Position of the length = position of the block

The integrity of a CLOB can be verified.



3+4+0+3+5|BobEmmaLucNancy

Sum of all lengths = The length of DataString

26 | How to add value to a CLOB

ClobAddValue (clob;value)

ClobAddValue (""; "Bob")

ClobAddValue (clob;value)

ClobAddValue (""; "Bob")

```
3|Bob
```

ClobAddValue (clob;value)

```
ClobAddValue ("3|Bob"; "Emma" )
```

ClobAddValue (clob;value)

ClobAddValue ("3|Bob"; "Emma")

3+4|BobEmma

ClobAddValue (clob;value)

ClobAddValue ("3+4|BobEmma" ; "")

ClobAddValue (clob;value)

ClobAddValue ("3+4|BobEmma" ; "")

3+4+0|BobEmma

ClobAddValue (clob;value)

```
ClobAddValue ("3+4+0|BobEmma" ; "Luc" )
```

ClobAddValue (clob;value)

ClobAddValue ("3+4+0|BobEmma" ; "Luc")

```
3+4+0+3|BobEmmaLuc
```

ClobAddValue (clob;value)

ClobAddValue ("3+4+0+3|BobEmmaLuc" ; "Nancy")

ClobAddValue (clob;value)

ClobAddValue ("3+4+0+3|BobEmmaLuc" ; "Nancy")

3+4+0+3+5|BobEmmaLucNancy

28 | How to «set value» in a CLOB

ClobSetValue (clob;value;index)

```
ClobSetValue ( "" ; "Emma" ; 2 )
```

ClobSetValue (clob;value;index)

ClobSetValue ("" ; "Emma" ; 2)

0+4|Emma

ClobSetValue (clob;value;index)

```
ClobSetValue ( "0+4|Emma"; "Nancy" ; 5 )
```

ClobSetValue (clob;value;index)

ClobSetValue ("0+4|Emma"; "Nancy" ; 5)

```
0+4+0+0+5|EmmaNancy
```

ClobSetValue (clob;value;index)

ClobSetValue ("" ; "" ; 3)

ClobSetValue (clob;value;index)

ClobSetValue ("" ; "" ; 3)

0+0+0|

28 | How to get value from a CLOB

To get the nth value of a CLOB

```
3+4+0+3+5|BobEmmaLucNancy
```

To get the nth value of a CLOB

Middle (text;start;numberOfCharacters)

```
3+4+0+3+5|BobEmmaLucNancy
```

To get the nth value of a CLOB

Middle (text;start;numberOfCharacters)

3+4+0+3+5|BobEmmaLucNancy

DataStrings

To get the nth value of a CLOB

Middle (text;start;numberOfCharacters)

```
3+4+0+3+5|BobEmmaLucNancy
```

ListOfLengths

nth word = nth length

To get the nth value of a CLOB

Middle (text;start;numberOfCharacters)

`3+4+0+3+5|BobEmmaLucNancy`

Start of the nth value = (Sum of the previous lengths) + 1

Position of the 4° value in CLOB

```
3+4+0+3+5|BobEmmaLucNancy
```

Position of the 4° value in CLOB

```
3+4+0+3+5|BobEmmaLucNancy
```

```
Evaluate ( LeftWords ( "3+4+0+3+5" ; n - 1 ) ) + 1
```

Position of the 4° value in CLOB

```
3+4+0+3+5|BobEmmaLucNancy
```

```
Evaluate ( LeftWords ( "3+4+0+3+5" ; n - 1 ) ) + 1
```

```
Evaluate("3+4+0")+1 = 8
```

Position of the 4° value in CLOB

3+4+0+3+5|BobEmmaLucNancy

```
Evaluate ( LeftWords ( "3+4+0+3+5" ; n - 1 ) ) + 1
```

```
Evaluate("3+4+0")+1 = 8
```

30 | How to replace a value in a CLOB

Replace a value in a CLOB

1. Replace the value in DataStrings
2. Replace the value in ListOfLengths

To replace the nth value in DataStrings

```
3+4+0+3+5|BobEmmaLucNancy
```

To replace the nth value in DataStrings

Replace(text;start;numberOfCharacters;replacementText)

```
3+4+0+3+5|BobEmmaLucNancy
```

To replace the nth value in DataStrings

Replace(text;start;numberOfCharacters;replacementText)

```
3+4+0+3+5|BobEmmaLucNancy
```

To replace the nth value in DataStrings

Replace(text;start;numberOfCharacters;replacementText)

```
3+4+0+3+5|BobEmmaLucNancy
```

Evaluate (LeftWords (listOfLengths ; n - 1)) + 1

To replace the nth value in DataStrings

Replace(text;start;numberOfCharacters;replacementText)

```
3+4+0+3+5|BobEmmaLucNancy
```

ListOfLengths

nth word = nth length

To replace the nth value in DataStrings

Replace(text;start;numberOfCharacters;replacementText)

```
3+4+0+3+5|BobEmmaLucNancy
```

myNewValue

To replace the nth value in ListOfLengths

LeftWords(text;numberOfWords)

```
3+4+0+3+5|BobEmmaLucNancy
```

To replace the nth value in ListOfLengths

LeftWords(text;numberOfWords)

```
3+4+0+3+5|BobEmmaLucNancy
```

To replace the nth value in ListOfLengths

LeftWords(text;numberOfWords)

`3+4+0+3+5|BobEmmaLucNancy`

n-1

To replace the nth value in ListOfLengths

RightWords(text;numberOfWords)

3+4+0+3+5|BobEmmaLucNancy

To replace the nth value in ListOfLengths

RightWords(text;numberOfWords)

```
3+4+0+3+5|BobEmmaLucNancy
```

ValueCount(ListOfLengths) - n

Assemble everything and return any postage paid

31|How to insert a value in a CLOB

To insert a value in the DataString

```
3+4+0+3+5|BobEmmaLucNancy
```

To insert a value in the DataString

Replace(text;start;numberOfCharacters;replacementText)

```
3+4+0+3+5|BobEmmaLucNancy
```

To insert a value in the DataString

Replace(text;start;numberOfCharacters;replacementText)

```
3+4+0+3+5|BobEmmaLucNancy
```

If numberOfCharacters is = 0
the replacementText will be inserted

To insert a value in the DataString

Replace(text;start;numberOfCharacters;replacementText)

```
3+4+0+3+5|BobEmmaLucNancy
```

If start is = 0

the replacementText will be inserted at the beginning

To insert a value in the DataString

Replace(text;start;numberOfCharacters;replacementText)

3+4+0+3+5|BobEmmaLucNancy

If start is > Length(DataStrings)
the replacementText will be inserted at the end

23 | How to search in a CLOB

Where is papa?

Where is papa?

A simple example

Where is papa?

A simple example

1	pa
2	papapa
3	papa
4	papapapa
5	pap

Where is papa?

A simple example

papa is in third position

1	pa
2	papapa
3	papa
4	papapapa
5	pap

Where is papa?

A simple example

papa is in third position

1	pa
2	papapa
3	papa
4	papapapa
5	pap

Where is papa?

1	pa
2	papapa
3	papa
4	papapapa
5	pap

= 2+6+4+8+3|papapapapapapapapapapap

Where is papa?

2+6+4+8+3 | papapapapapapapapapapapap

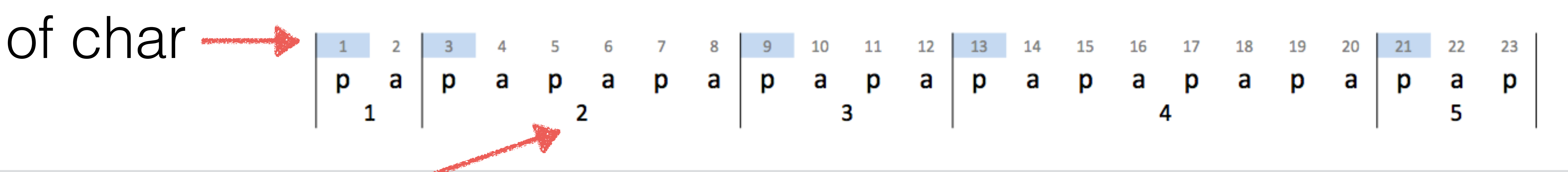
$listOfLengths	$listOfPositions
2	1
6	3
4	9
8	13
3	21

$DataStrings

papapapapapapapapapapapap

Block value = Searched string

Position of char

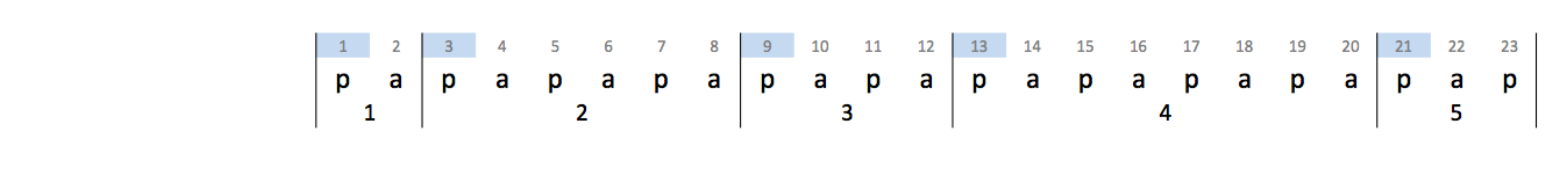


1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p
1		2						3				4								5		

Block number

$listOfLengths	$listOfPositions
2	1
6	3
4	9
8	13
3	21

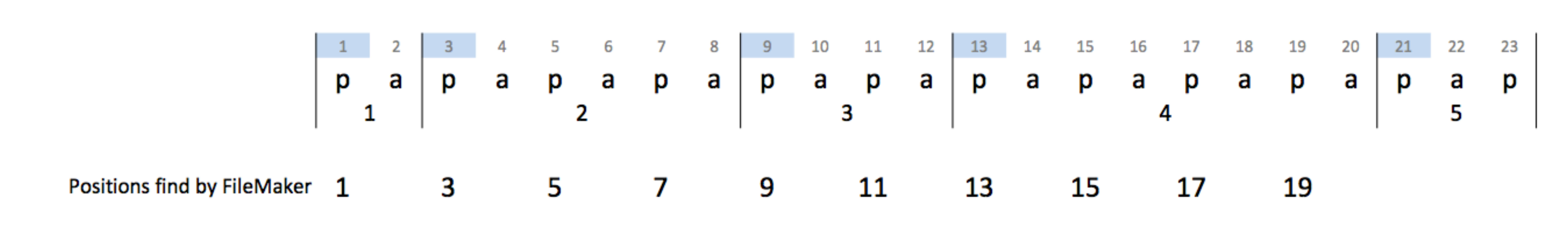
Block value = Searched string



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p
1				2					3						4						5	

$listOfLengths	$listOfPositions
2	1
6	3
4	9
8	13
3	21

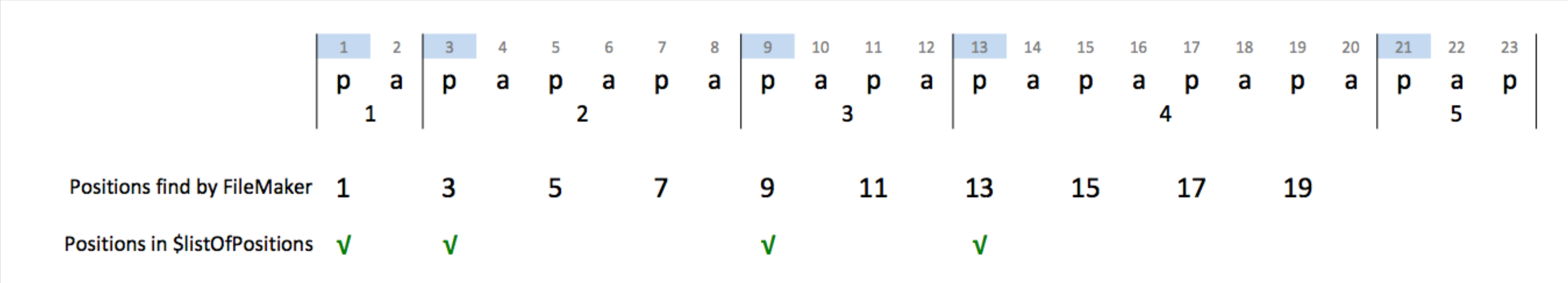
Block value = Searched string



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p
	1				2					3						4						5	
Positions find by FileMaker	1		3		5		7		9		11		13		15		17		19				

$listOfLengths	$listOfPositions
2	1
6	3
4	9
8	13
3	21

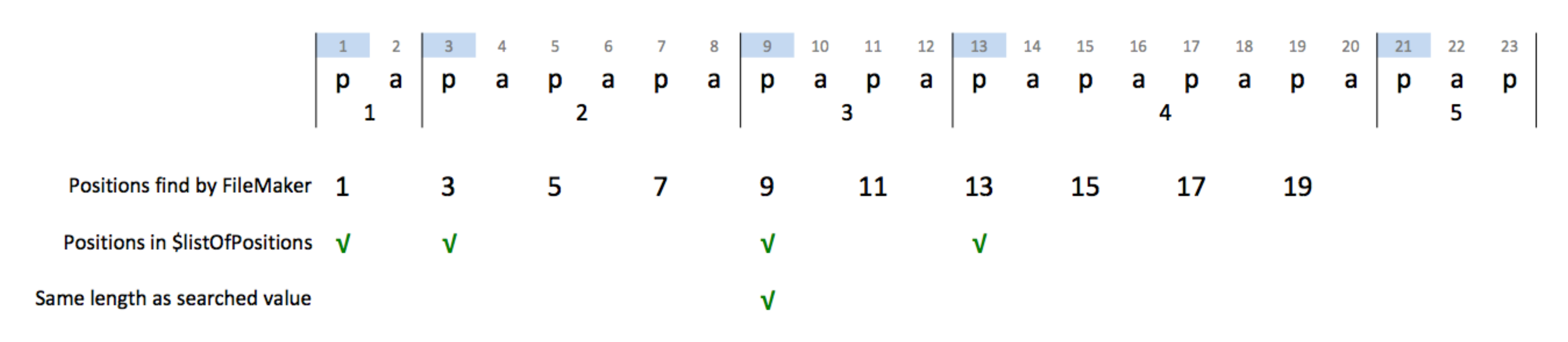
Block value = Searched string



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p
	1		2						3				4								5		
Positions find by FileMaker	1		3		5		7		9		11		13		15		17		19				
Positions in $listOfPositions	√		√						√				√										

$listOfLengths	$listOfPositions
2	1
6	3
4	9
8	13
3	21

Block value = Searched string



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p	a	p
	1		2						3				4								5		
Positions find by FileMaker	1		3		5		7		9		11		13		15		17		19				
Positions in $listOfPositions	√		√						√				√										
Same length as searched value									√														

$listOfLengths	$listOfPositions
2	1
6	3
4	9
8	13
3	21

third position = 4

9 = third position = third block

A block is «equal» to the value if

- The position found is a starting position of a block
- And the length of the found block is equal to the length of the searched value.

A block is «containing» value if

- The start position and the end position of the found value are in the same block.

What is the name of your papa?

In a dictionary build with a CLOB

Key	Value
Papi	Papap
Grand-papa	APapap
Papa	Ti-papa
Beau-Papa	Papipa

What is the name of your papa?

In a dictionary

4+6+4+6|Key1Value1Key2Value2….

Same search rules as before.
Except that the key blocks number are even
and the value blocks number are odd.

CLOB

11+0+0+0+0|As a matrix

Tournament 2017	Smith	Davis	Brown
VolleyBall	12	9	11
SoftBall	5	6	3
Pocket	21	21	18
Total	**38**	**36**	**32**

A matrix build inside a CLOB is a convention and mathematics.

Array 4 lines x 3 columns

L1C1	L1C2	L1C3
L2C1	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

A matrix build inside a CLOB is a convention and mathematics.

Array 4 lines x 3 columns

L2C1	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

L1C1	L1C2	L1C3

A matrix build inside a CLOB is a convention and mathematics.

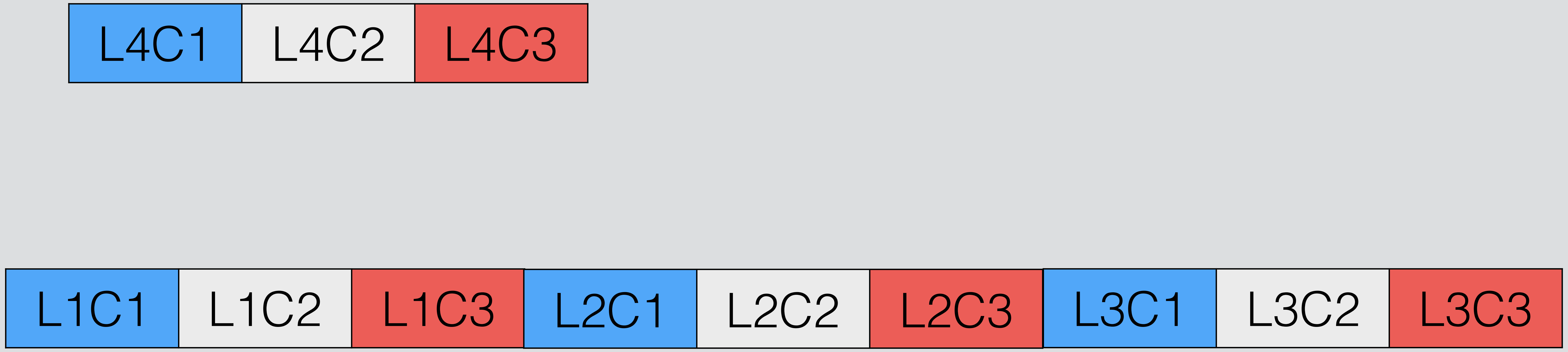
Array 4 lines x 3 columns

L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

L1C1	L1C2	L1C3	L2C1	L2C2	L2C3

A matrix build inside a CLOB is a convention and mathematics.

Array 4 lines x 3 columns



L4C1 L4C2 L4C3

L1C1 L1C2 L1C3 L2C1 L2C2 L2C3 L3C1 L3C2 L3C3

A matrix build inside a CLOB is a convention and mathematics.

Array 4 lines x 3 columns

L1C1	L1C2	L1C3	L2C1	L2C2	L2C3	L3C1	L3C2	L3C3	L4C1	L4C2	L4C3

Array 4 lines x 3 columns

L1C1	L1C2	L1C3
L2C1	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

A matrix can be represented linearly.

1	2	3	4	5	6	7	8	9	10	11	12
L1C1	L1C2	L1C3	L2C1	L2C2	L2C3	L3C1	L3C2	L3C3	L4C1	L4C2	L4C3

Find the position of the cell inside a matrix.

Array 4 lines x 3 columns

L1C1	L1C2	L1C3
L2C1	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

Position of the cell = ((line number - 1) * columns count) + column number.

L2C3 = ((2 - 1) * 3) + 3 = 6

L4C2 = ((4 - 1) * 3) + 2 = 11

L1C1 = ((1 - 1) * 3) + 1 = 1

1	2	3	4	5	6	7	8	9	10	11	12
L1C1	L1C2	L1C3	L2C1	L2C2	L2C3	L3C1	L3C2	L3C3	L4C1	L4C2	L4C3

Array with named column and line

Array 4 lines x 3 columns

L1C1	L1C2	L1C3
L2C1	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

Array with named column and line

Array 4 lines x 3 columns

L1C1	L1C2	L1C3
L2C1	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

Array 5 lines x 3 columns

	C1	C2	C3	C4
L1				
L2				
L3				
L4				
L5				

Array with named column and line

Array 4 lines x 3 columns

L1C1	L1C2	L1C3
L2C2	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

Array 5 lines x 3 columns

	C1	C2	C3	C4
L1				
L2		L1C1	L1C2	L1C3
L3		L2C1	L2C2	L2C3
L4		L3C1	L3C2	L3C3
L5		L4C1	L4C2	L4C3

Array with named column and line

Array 4 lines x 3 columns

L1C1	L1C2	L1C3
L2C2	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

Array 5 lines x 3 columns

	C1	C2	C3	C4
L1		Smith	Davis	Brown
L2		L1C1	L1C2	L1C3
L3		L2C1	L2C2	L2C3
L4		L3C1	L3C2	L3C3
L5		L4C1	L4C2	L4C3

Array with named column and line

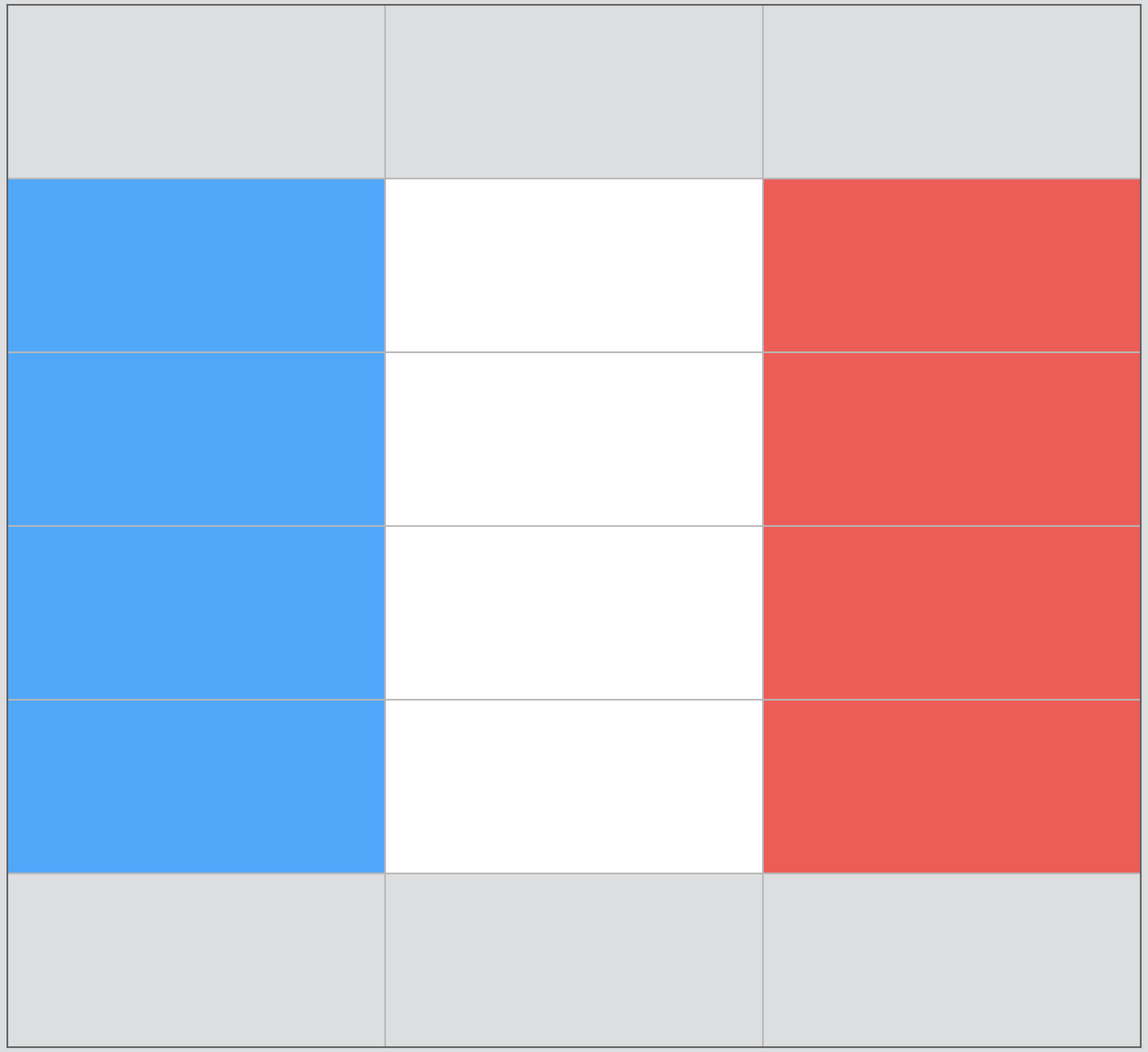
Array 4 lines x 3 columns

L1C1	L1C2	L1C3
L2C2	L2C2	L2C3
L3C1	L3C2	L3C3
L4C1	L4C2	L4C3

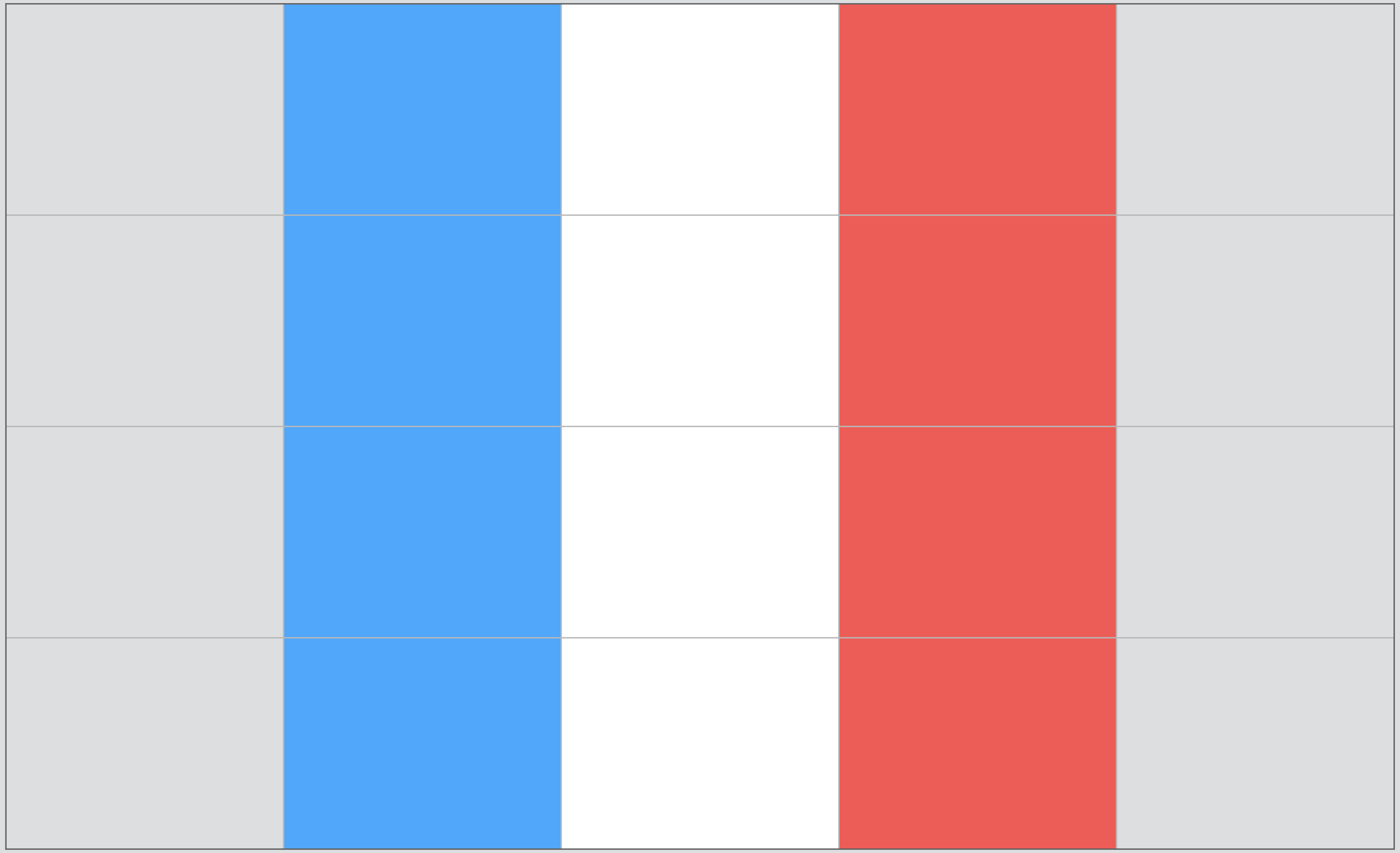
Array 5 lines x 3 columns

	C1	C2	C3	C4
L1		Smith	Davis	Brown
L2	Volley	L1C1	L1C2	L1C3
L3	SoftBall	L2C1	L2C2	L2C3
L4	Pocket	L3C1	L3C2	L3C3
L5	Total	L4C1	L4C2	L4C3

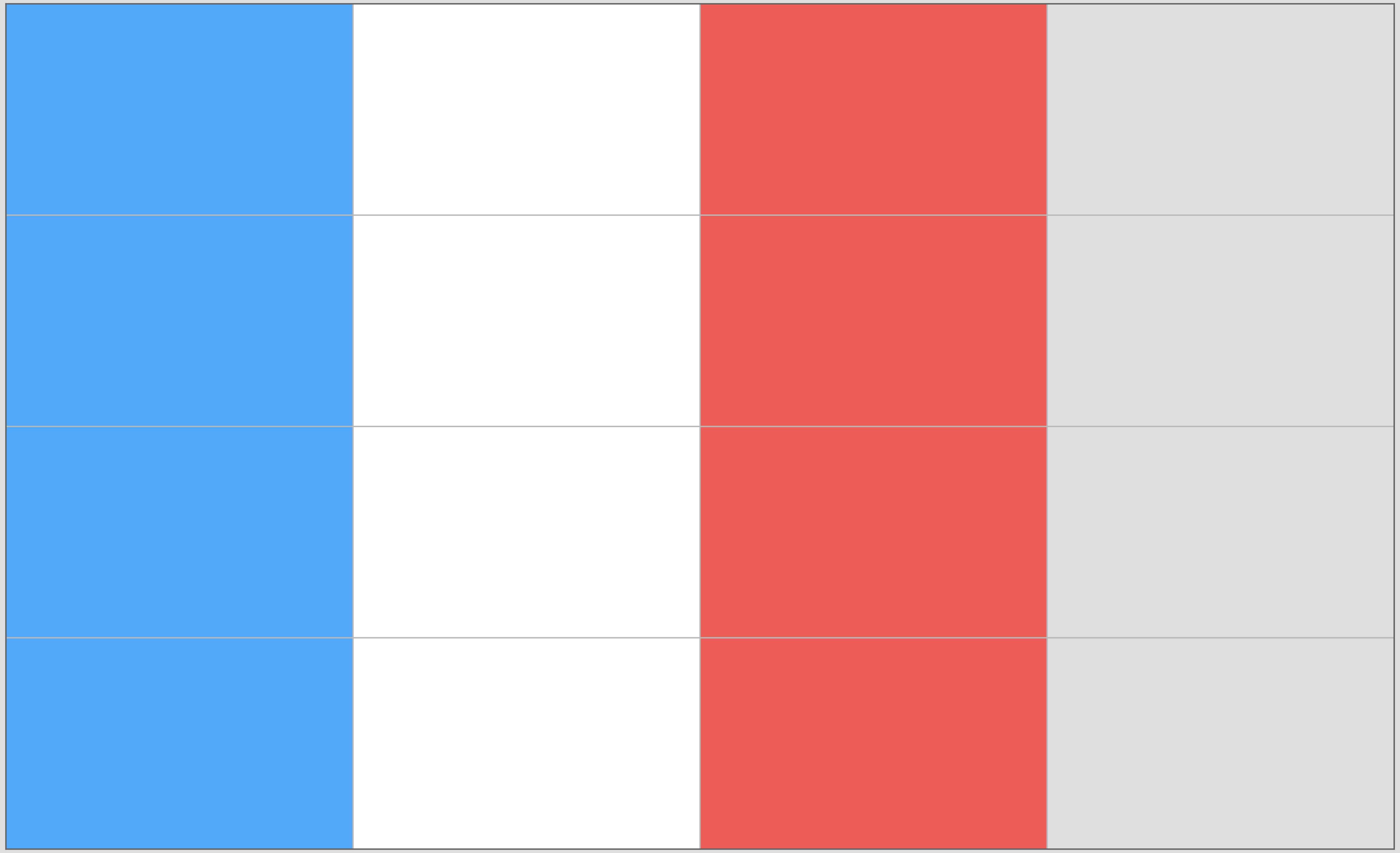
ID	FirstName	LastName
🟦	⬜	🟥
🟦	⬜	🟥
🟦	⬜	🟥
🟦	⬜	🟥

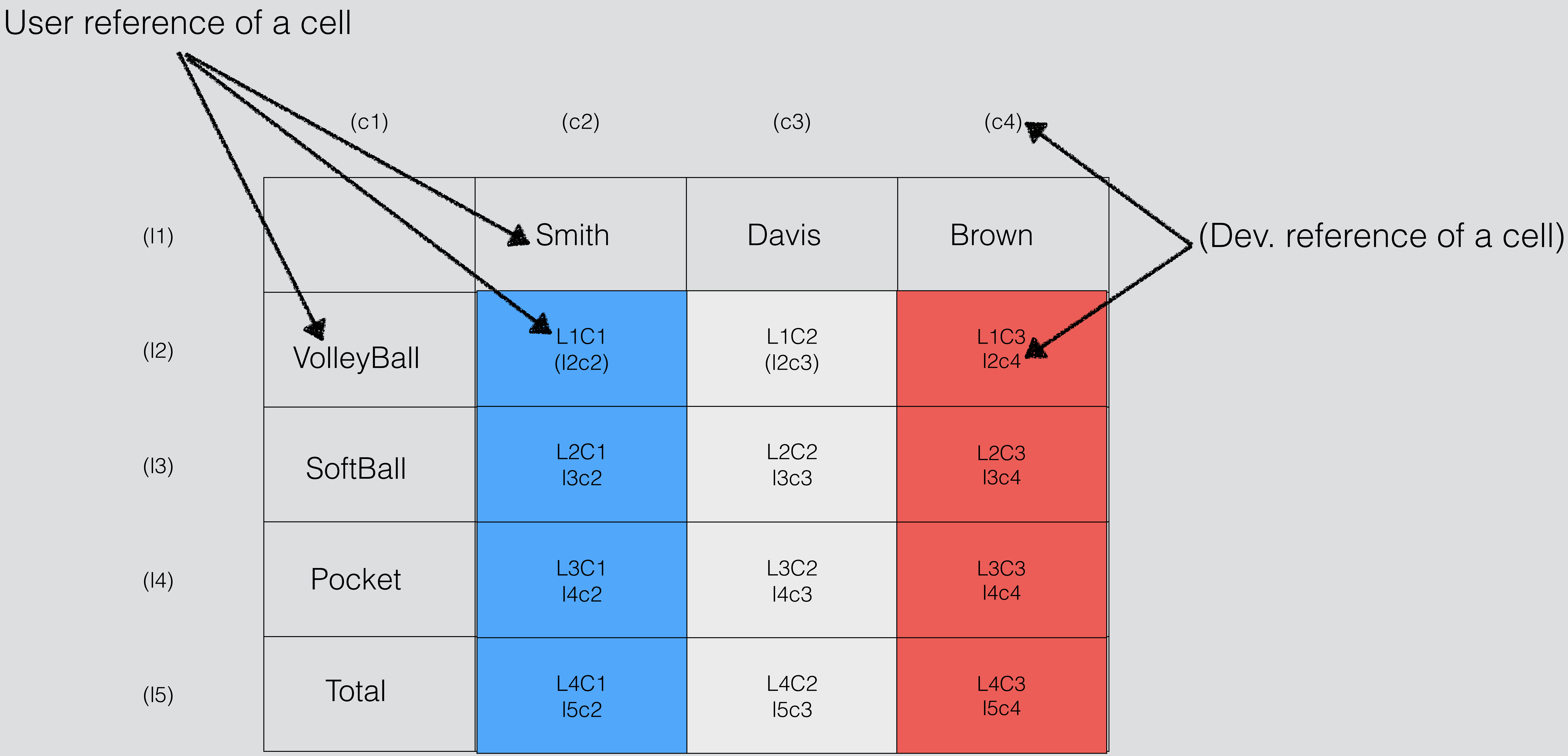


	🟦	⬜	🟥	
	🟦	⬜	🟥	
	🟦	⬜	🟥	
	🟦	⬜	🟥	



	🟦	⬜	🟥
	🟦	⬜	🟥
	🟦	⬜	🟥
	🟦	⬜	🟥



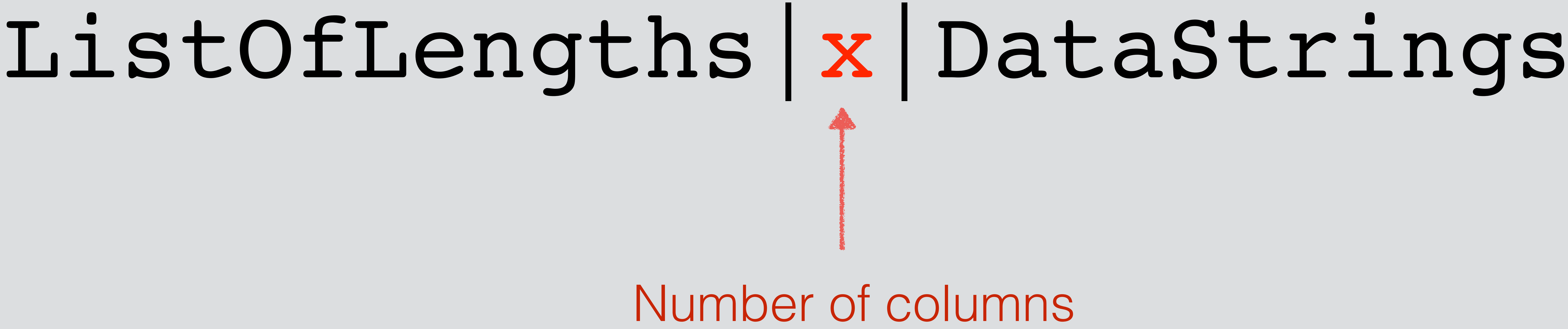


User reference of a cell

(Dev. reference of a cell)

	(c1)	(c2)	(c3)	(c4)
(l1)		Smith	Davis	Brown
(l2)	VolleyBall	L1C1 (l2c2)	L1C2 (l2c3)	L1C3 l2c4
(l3)	SoftBall	L2C1 l3c2	L2C2 l3c3	L2C3 l3c4
(l4)	Pocket	L3C1 l4c2	L3C2 l4c3	L3C3 l4c4
(l5)	Total	L4C1 l5c2	L4C2 l5c3	L4C3 l5c4

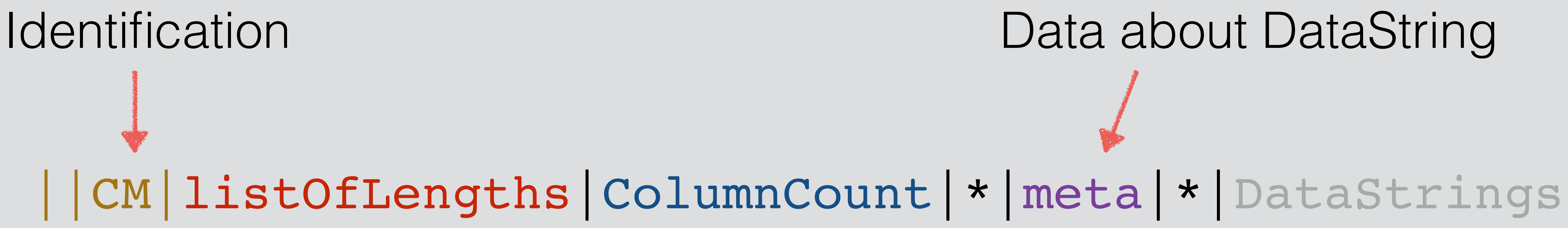
CLOB as a matrix



```
ListOfLengths|x|DataStrings
```

Number of columns

CLOB in everyday life



Identification

Data about DataString

```
||CM|listOfLengths|ColumnCount|*|meta|*|DataStrings
```

* = Future needs

16+0+0+0+0|CLOB as a matrix

5+2+3+6+0|CLOB as a matrix

To which block does the spaces belong?

4+3+2+7+0|CLOB as a matrix

53|You are on track if you saw that the titles were CLOB

CLOB's truck

CLOB

```
3+3+0+0+0|TheEnd
```