# Specification Table Schema

## Relationship property

Proposal

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# 1 – Requirement

- **Specify the relationship between two fields**
  - Three main link categories (see right):
    - derived, coupled, crossed

- **Example :**
  - The Field « quarter » and « month » are derived
  - The Field « name » and « nickname » are coupled
  - The Field « year » and « semester » are crossed

- **Validation :**
  - Simple function (see below)
  - Requires all data
  - Test possible with additional data (but not enough)

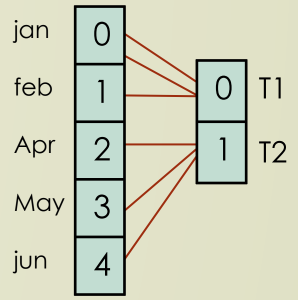
How to measure the link (see implementation example in last slide) ?

The evaluation is made by calculating **dist = len(set(zip(a,b)))** where a and b are array of the two fields *(python language)*

```
dist   >=    max(len(set(a)), len(set(b)))
dist   <=    len(set(a)) *  len(set(b))
```

**Quarter : [ T1, T2, T2, T1, T2, T1 ] (a)**
**Month : [ jan, apr, jun, feb, may, jan] (b)**

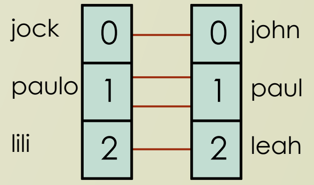
*derived*



```
if       dist == len(set(b))
and dist  >  len(set(a))
```

**Name : [ john, paul, leah, paul ] (a)**
**Nickname : [ jock, paulo, lili, paulo ] (b)**

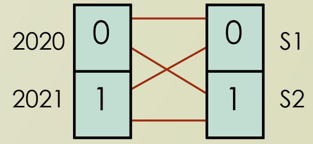
*coupled*



```
If       dist == len(set(b))
and  dist == len(set(a))
```

**Year : [ 2020, 2020, 2021, 2021 ] (a)**
**Semester : [ S1, S2, S1, S2 ] (b)**

*crossed*



```
If dist ==  len(set(a)) *  len(set(b))
```

# 2 – Implementation (three options)

- **1 – New Field descriptor**

```
« name »: « quarter »
« relationship » : {
        « field » : « month »,
        « link » : « derived »
        }
```

- **Pros**
  - No mixing with other descriptors
  - Consistent with a field view
- **Cons**
  - New descriptor

- **2 – New Constraints descriptor**

```
« name »: « quarter »
« constraints » : {
        « relationship » : {
                « field » : « month »,
                « link » : « derived »
        }
}
```

- **Pros**
  - The « constraints » property is consistent with the point
- **Cons**
  - The « crossed » link can't be validate at the data entry
  - Need to add a level in the properties tree

- **3 – New Table descriptor (other properties)**

```
« relationship » : [
        {
                « fields »: [ « quarter », « month » ]
                « link » : « derived »
        } …
]
```

- **Pros**
  - New independant descriptor
- **Cons**
  - Relationships are described field by field

**Option 1 or 3 seems to be the most suitable**

# 3 – Text Proposal

**Relationship**

The relationship property MAY be used to define the dependency between two fields. The relationship descriptor, if present, MUST be a JSON object and MUST contain two properties :

- fields : the property name of the fields linked
- link : the nature of the relationship between them

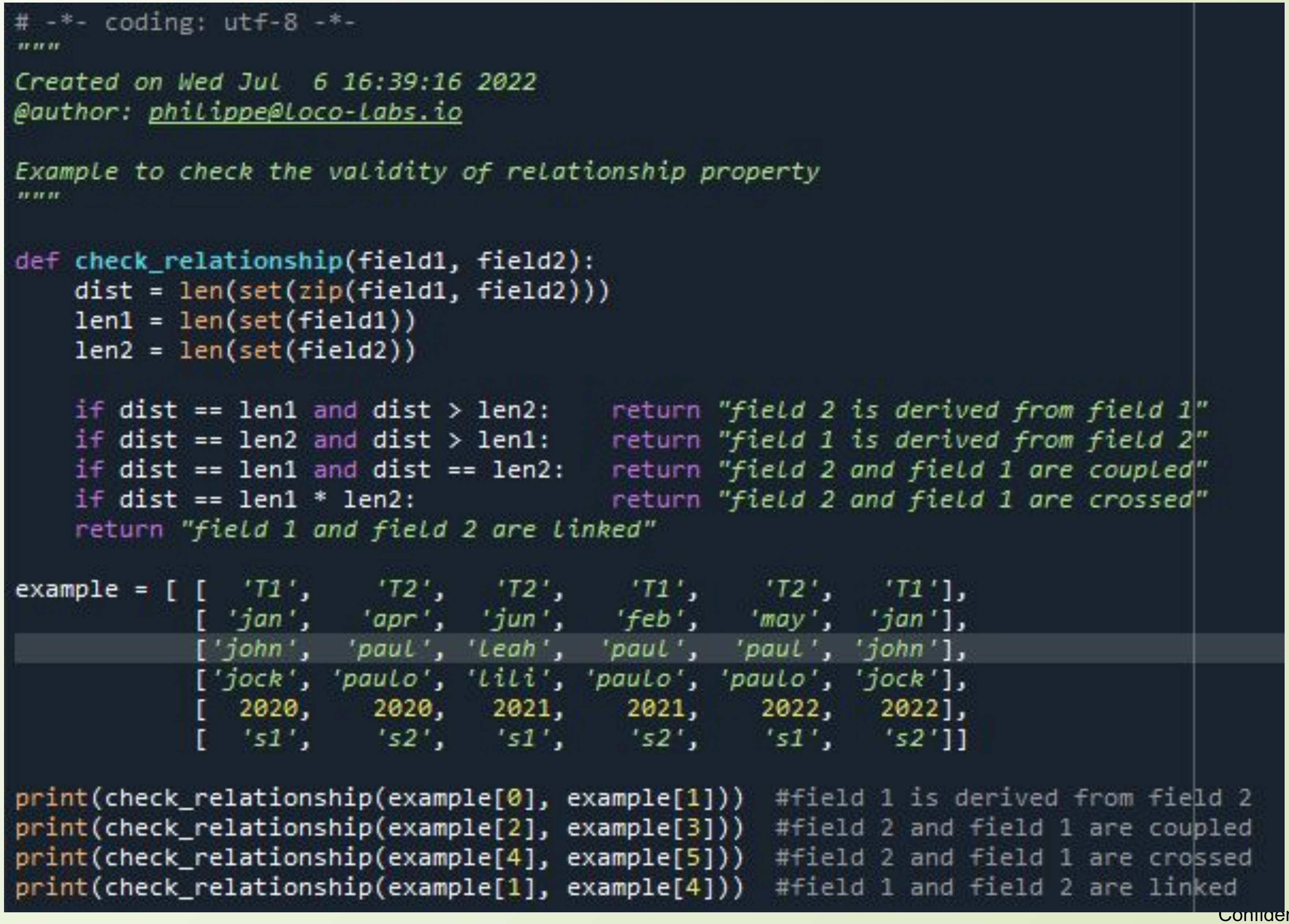
The link property value MUST be one of the three following :

- derived :
  - The values of the child field are dependant on the values of parent field (a value in the parent field is associated with a single value in the child field).
  - E.g. The « Quarter » field [ T1, T2, T2, T1, T2, T1 ] and « month » field [ jan, apr, jun, feb, may, jan] are derived,
  - i.e. if a new entry "jun" is added, the corresponding « quarter » value must be 'T2'.

- coupled :
  - The values of one field are associated to the values of the other field.
  - E.g. The « Nickname" field [ jock, paulo, lili, paulo ]and the "name" field [ john, paul, leah, paul ] are coupled,
  - i.e. if a new entry 'lili' is added, the corresponding « Name » value must be 'leah' just as if a new entry 'leah' is added, the corresponding « nickname » value must be 'lili'.

- crossed :
  - This relationship means that all the different values of one field are associated with all the different values of the another field.
  - E.g. the "Year" Field [ 2020, 2020, 2021, 2021] and the "Semester" Field [ S1, S2, S1, S2 ] are crossed
  - i.e the year 2020 is associated to semesters "s1" and "s2", just as the semester "s" is associated with years 2020 and 2021

## 4 - Check implementation Example



```
# -*- coding: utf-8 -*-
"""
Created on Wed Jul  6 16:39:16 2022
@author: philippe@loco-labs.io

Example to check the validity of relationship property
"""


def check_relationship(field1, field2):
    dist = len(set(zip(field1, field2)))
    len1 = len(set(field1))
    len2 = len(set(field2))

    if dist == len1 and dist > len2:    return "field 2 is derived from field 1"
    if dist == len2 and dist > len1:    return "field 1 is derived from field 2"
    if dist == len1 and dist == len2:   return "field 2 and field 1 are coupled"
    if dist == len1 * len2:             return "field 2 and field 1 are crossed"
    return "field 1 and field 2 are linked"

example = [ [  'T1',    'T2',   'T2',    'T1',    'T2',   'T1'],
            [ 'jan',   'apr',  'jun',   'feb',   'may',  'jan'],
            ['john',  'paul', 'leah',  'paul',  'paul', 'john'],
            ['jock', 'paulo', 'lili', 'paulo', 'paulo', 'jock'],
            [  2020,    2020,   2021,    2021,    2022,   2022],
            [  's1',    's2',   's1',    's2',    's1',   's2']]

print(check_relationship(example[0], example[1]))  #field 1 is derived from field 2
print(check_relationship(example[2], example[3]))  #field 2 and field 1 are coupled
print(check_relationship(example[4], example[5]))  #field 2 and field 1 are crossed
print(check_relationship(example[1], example[4]))  #field 1 and field 2 are linked
```

# Appendix – Tabular analysis

https://github.com/loco-philippe/tab-analysis/blob/main/docs/tabular_analysis.pdf

https://github.com/loco-philippe/Environmental-Sensing/blob/main/property_relationship/relationship_property.pdf

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