JSON or relational
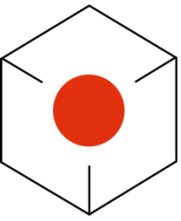## how flexible are Duality Views?

how flexible are Duality Views?

Dr. Andrea Kennel

InfoPunkt Kennel GmbH

Dübendorf - Switzerland

October 2024

Dr. Andrea Kennel

Consultant

Lecturer for Databases

Coach for Project Management

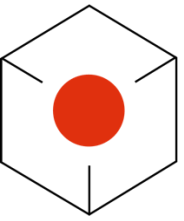University of Applied Sciences
Northwestern Switzerland

Brugg/Windisch, Switzerland

andrea.kennel@fhnw.ch
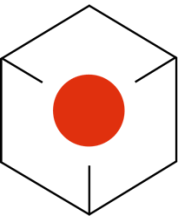andrea@infokennel.ch
www.infokennel.ch

Starting position

A new start-up wants to set up a **web store** for **network devices**. We are responsible for the database where the data is stored.

The web store is programmed with Java script and the data on the network devices is supplied to us as **JSON**.
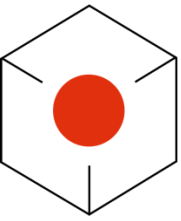
The use of Duality Views is therefore obvious.
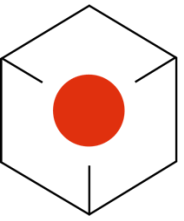
We analyze the JSON

```
{
    "type": "network switch",
    "name": "Fritz A16",
    "description": "unmanaged 16 port network switch",
    "manufacturer": "ABC",
    "price": 100,
    "port_group": [
        {
            "amount": 16,
            "type": "RJ45",
            "speeds": "10/100/1000"
        }
    ]
}
```

What do the devices look like?
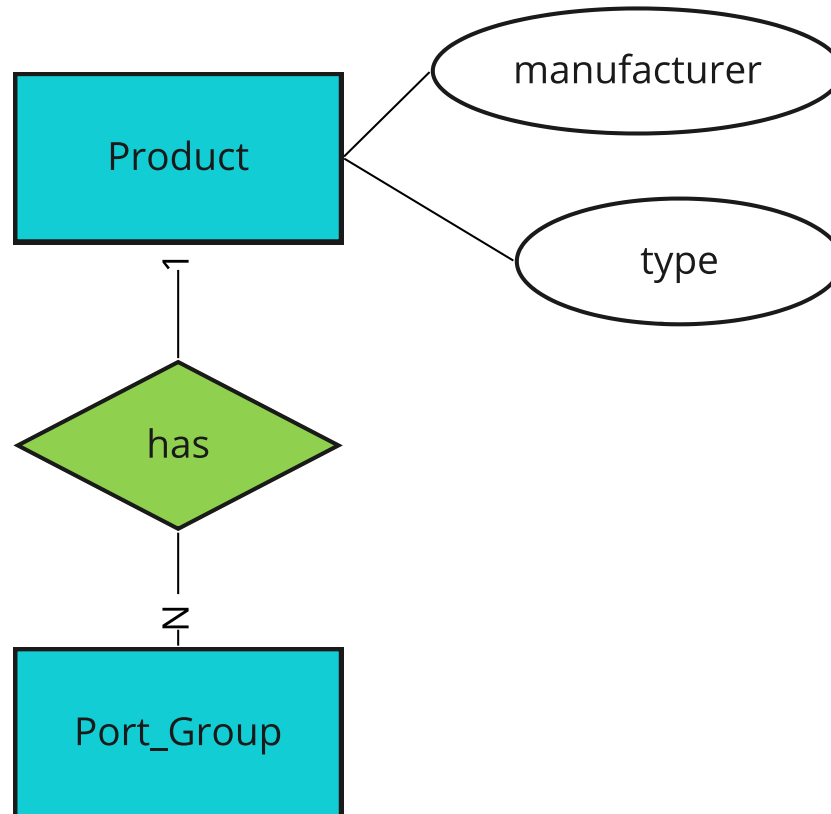
```
{    "type": "network switch",
     "name": "Fritz A16",
     "description": "unmanaged 16 port network switch",
     "manufacturer": "ABC",
     "price": 100,
     "port_group": [
        {
           "amount": 16,
           "type": "RJ45",
           "speeds": "10/100/1000"
        }
     ]
}
```
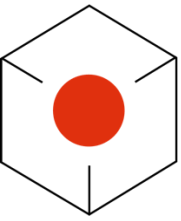
The database model

For a web store that sells network devices, the data on the network devices must be stored in a database.
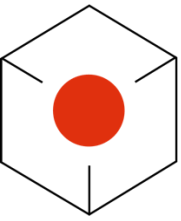
The data is available as
JSON, the model
Is relatively simple:

Product

manufacturer

type

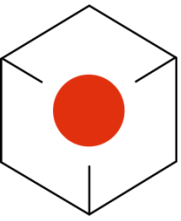has

Port_Group

JSON

DEMO 1

- Script 01

We have more data

```
Worksheet    Query Builder

INSERT INTO product_dv d (data)
VALUES ('
{
        "type": "network switch",
        "name": "Fritz B24",
        "description": "unmanaged 24 port 10gbit/s network switch",
        "manufacturer": "ABC",
        "price": 250,
        "port_group": [
            {
                "amount": 24,
                "type": "RJ45",
                "speeds": "10/100/1000/2500/5000/10000"
            }
        ]
}');
```
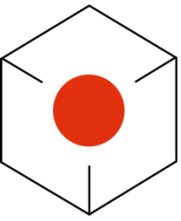
We have more data


```
              manufacturer : ABC ,
              "price": 1000,
              "port_group": [
                  {   "amount": 4,
                      "type": "RJ45",
                      "speeds": "100/1000/10000"
                  },
                  {   "amount": 2,
                      "type": "SFP+",
                      "speeds": "1000/40000/100000"
                  },
                  {   "amount": 2,
                      "type": "SFP",
                      "speeds": "1000/10000"
                  } ],
              "routing": {
                  "protocols": "static, RIP, OSPF, BGP",
                  "table_size": 10
              }
          }');

Error report -
ORA-40944: Cannot insert into JSON Relational Duality View 'PRODUCT_DV': The input JSON
JZN-00651: field 'routing' is unknown or undefined
```
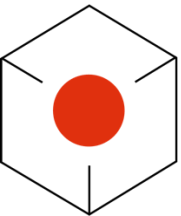
ORA-40944: Cannot insert into JSON Relational Duality View 'PRODUCT_DV': The input JSON document is invalid.
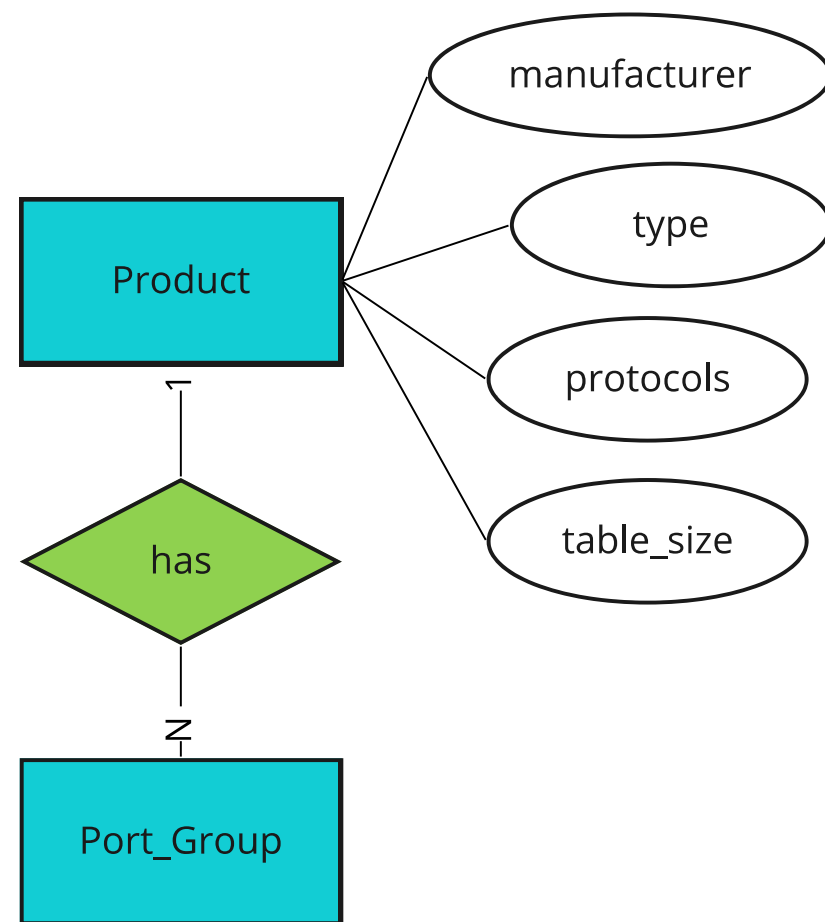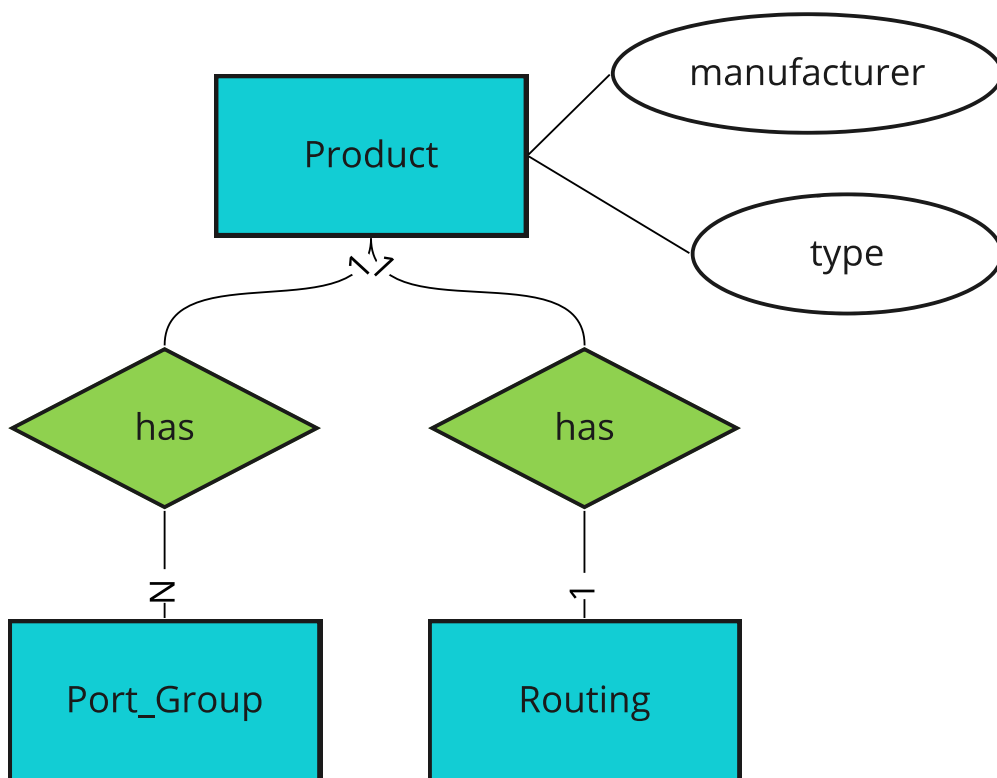
We have a new device

- {   "type": "router",
- "name": "Hans B4",
- "description": "4 port router",
- "manufacturer": "XYZ",
- "price": 800,
- "port_group": [
- { "amount": 4,
- "type": "RJ45",
- "speeds": "100/1000"
- },

- { "amount": 2,
- "type": "SFP",
- "speeds": "1000/10000"
- }
-],
- "routing": {
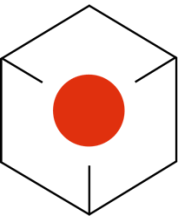- "protocols": "static OSPF",
- "table_size": 5
- }
- }

Extend data model

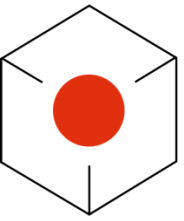We also need a routing:
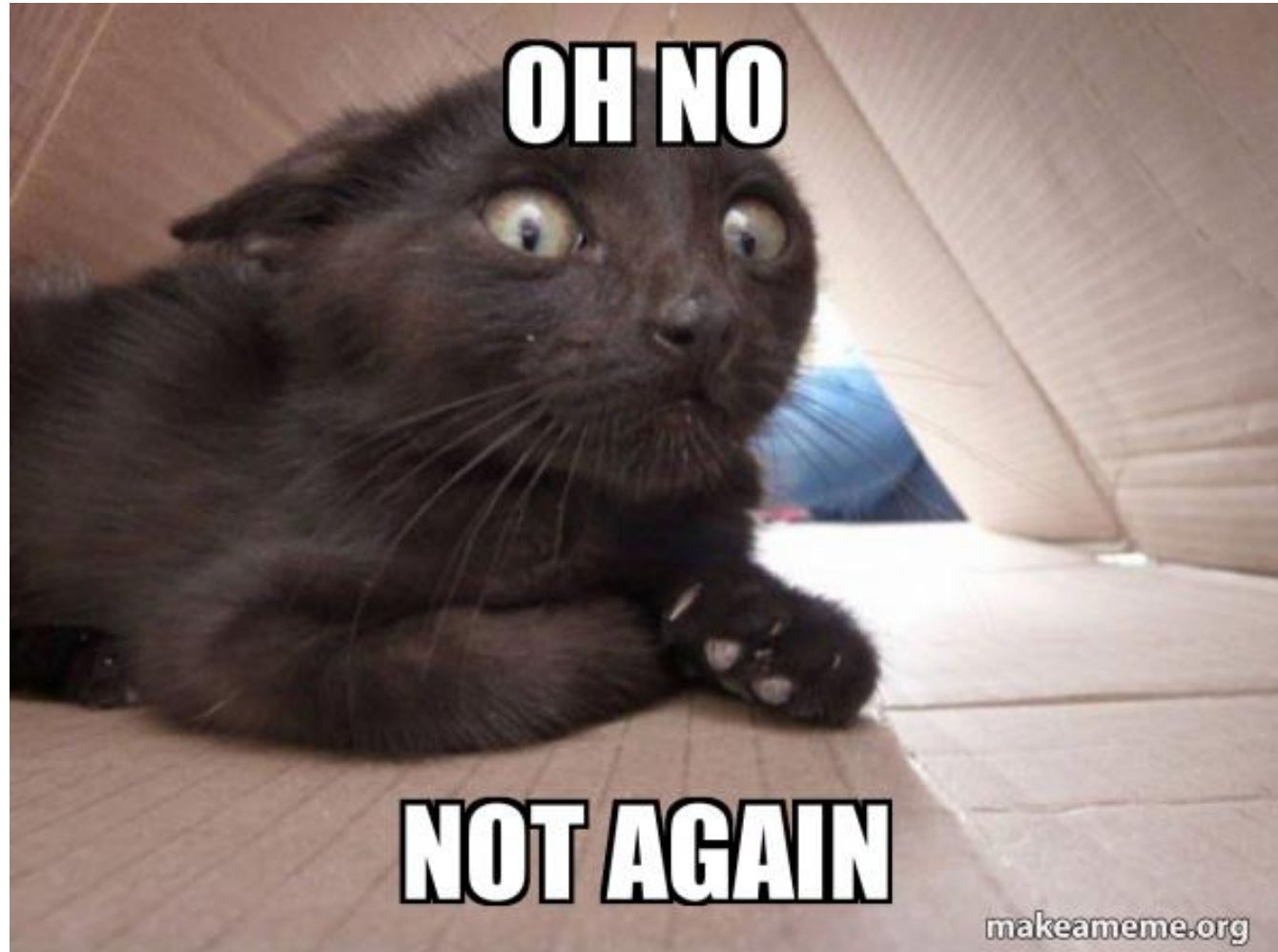2 possible solutions

Additional attributes are easier

DEMO 2

- Script 02

We have another new device
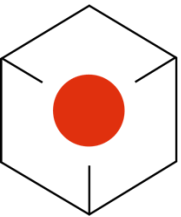
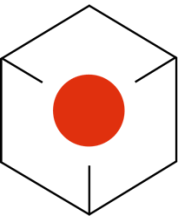https://makeameme.org/meme/oh-no-not-6bc4c7

We have another new device

- { "type": "network switch/layer3 switch",
- "name": "Fritz C16",
- "description": "16 port PoE layer 3 network switch",
- "manufacturer": "ABC",
- "price": 500,
- "port_group": [
- { "amount": 16,
- "type": "RJ45",
- "speeds": "10/100/1000",
- "poe": {"modes": ["active", "passive"],
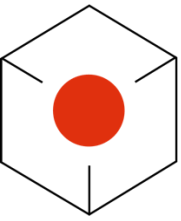- "volt": [24, 48]}
- }
-],
- …

- "feature": [
- { "name": "VLAN",
- "amount": 4094},
- { "name": "QoS",
- "amount": 8},
- { "name": "network access control",
- "type": "MAC based authentication",
- "vlan_support": true},
- { "name": "routing",
- "protocols": "static, RIP, OSPF, BGP",
- "table_size": 10}
-]
- }

We then have to adapt the data structure

- Detail table for port group and

- Feature as generalization with several specializations

- We don't know what else is coming and summarize all attributes in the generalization.

- The Duality View must be expanded accordingly
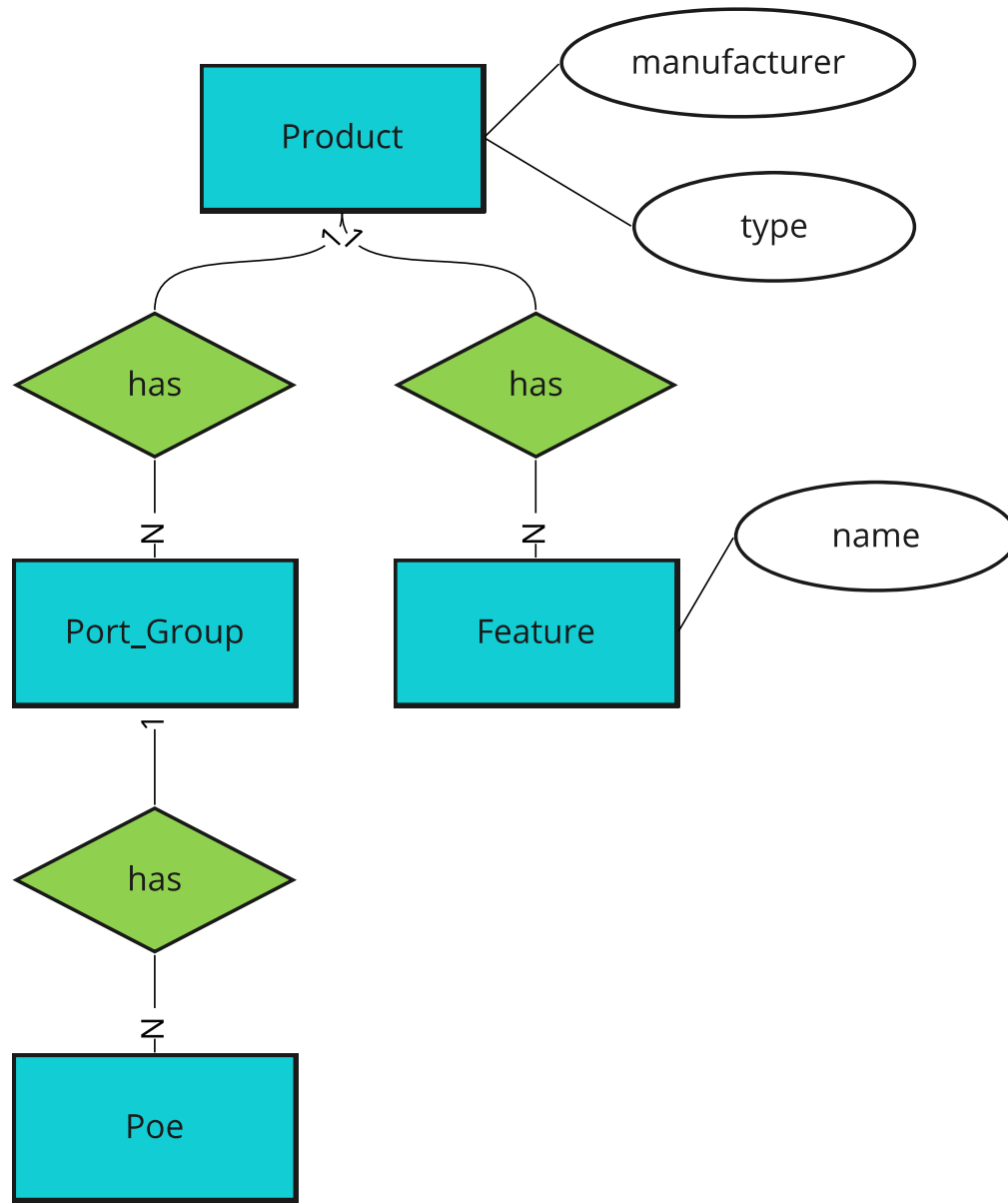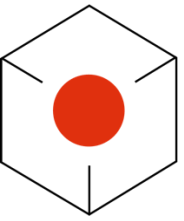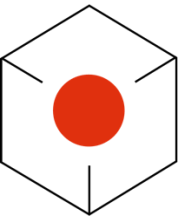
New data structure

- Does the tool fit the problem?

- Duality Views
- The same data in JSON and in tables

- JSON as a flexible data structure

Would a document DB not be better?

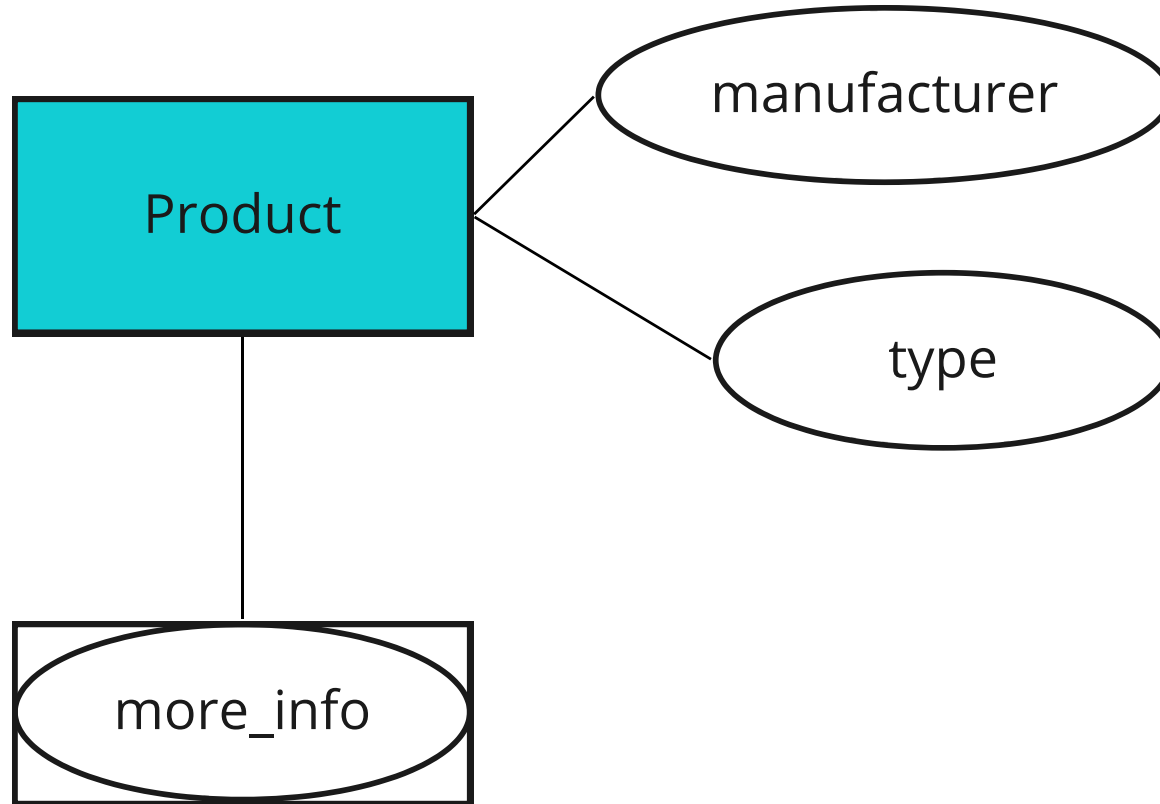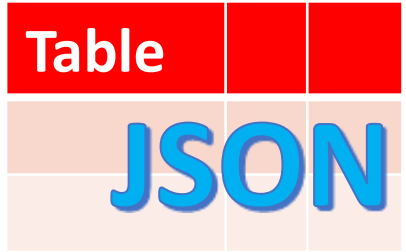- Why not simply store all data as JSON?

- Then we have full flexibility

DEMO 3

**Problem,
if JSON has a
spelling mistake**

- Script 03, 04, 05
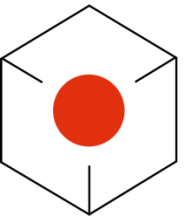
Are there any other solutions?

Table
JSON

DEMO 4

Problem:
Interface must be
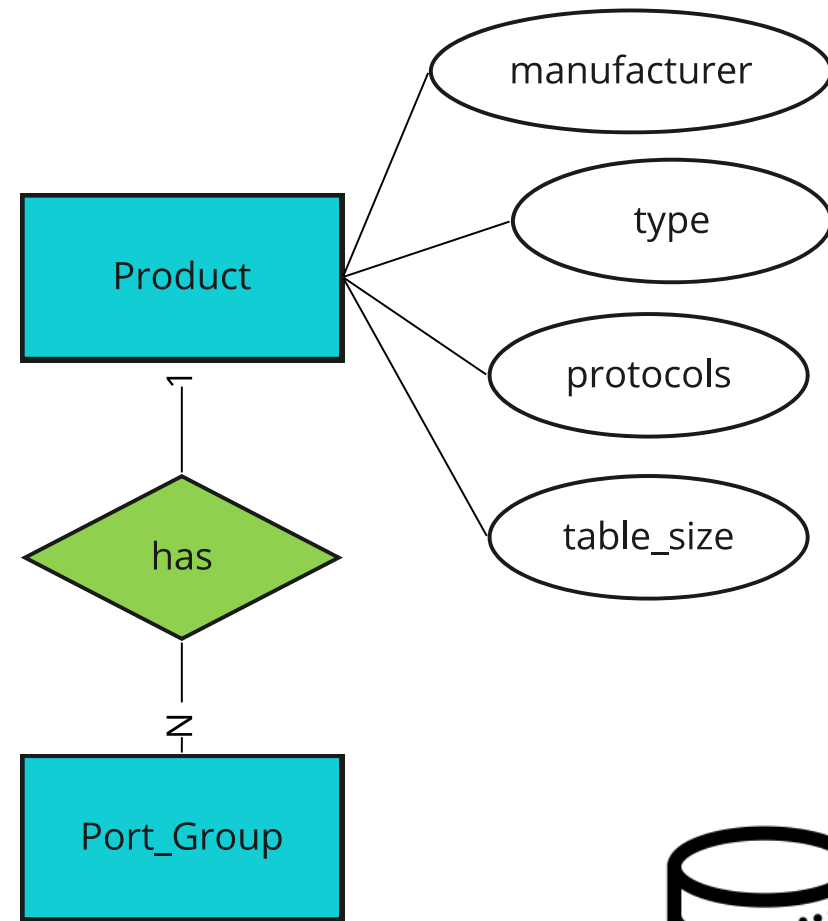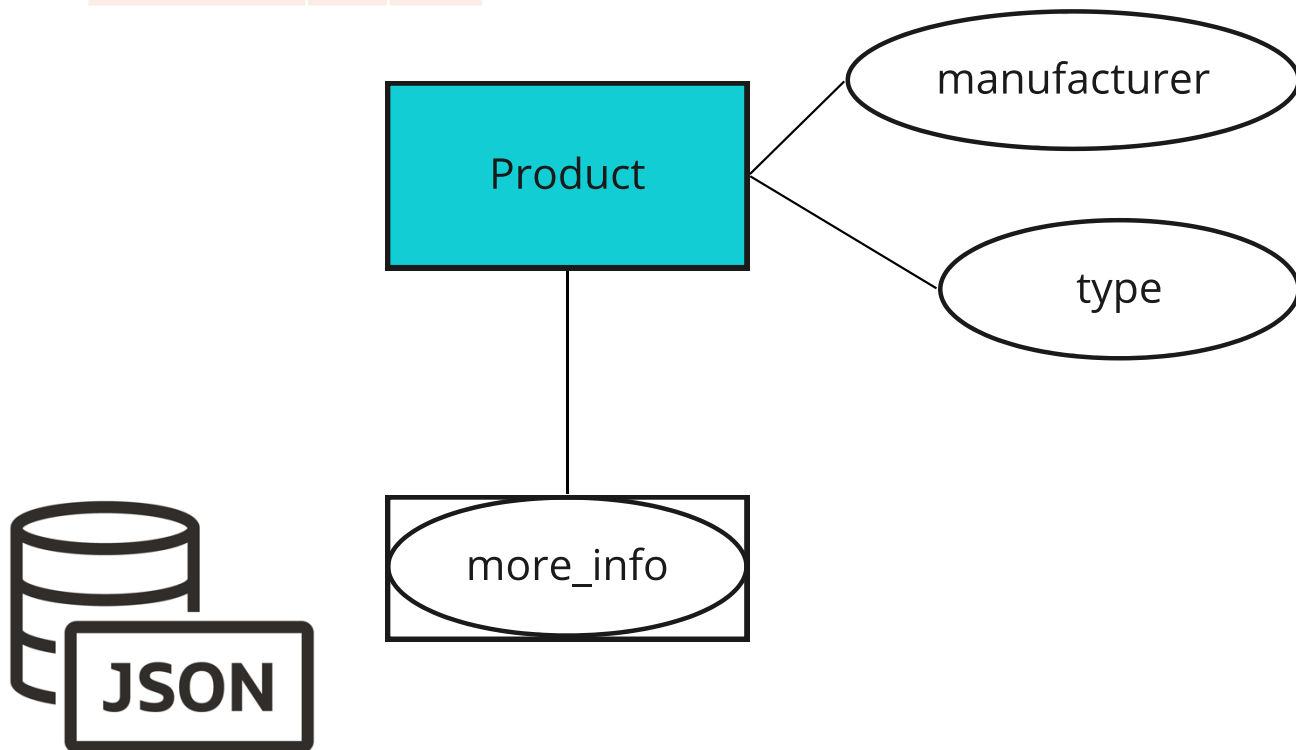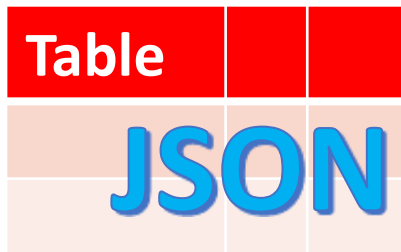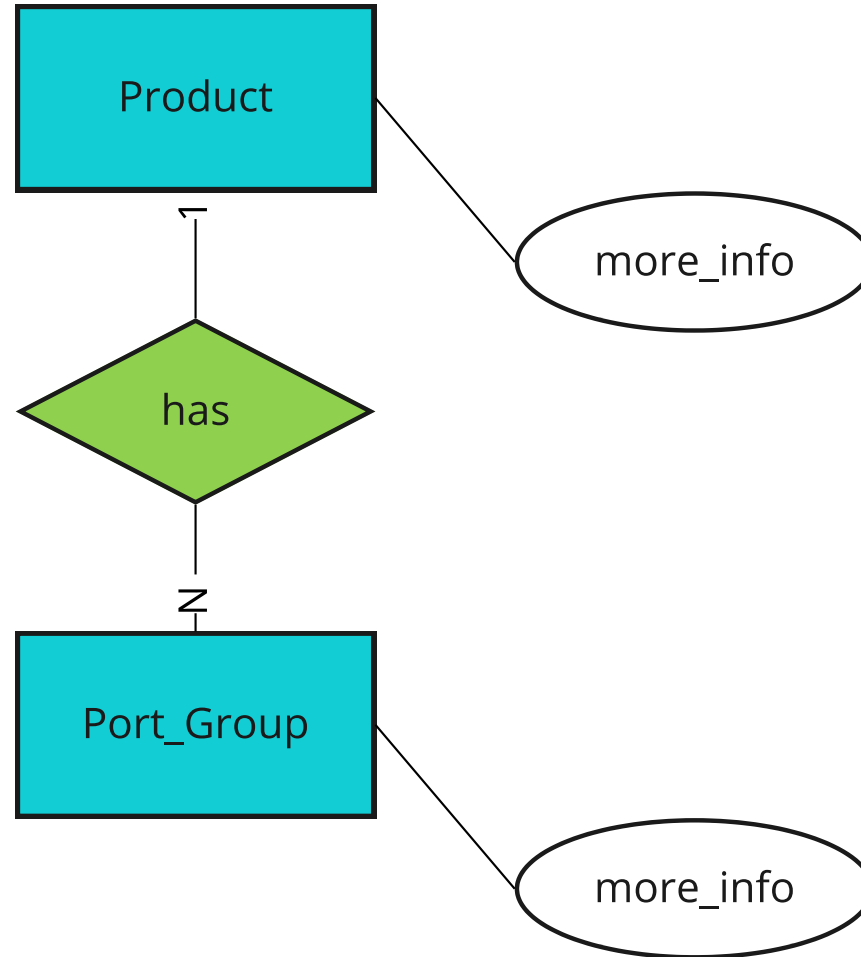redefined

Script 06
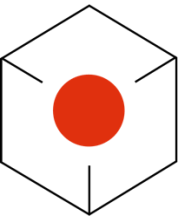
I wish I could combine the two worlds

I wish I could combine the two worlds

Product

more_info

has

Port_Group
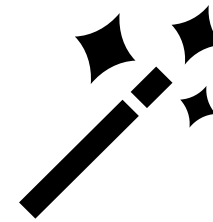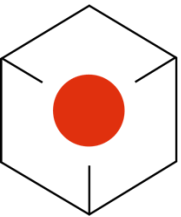
more_info
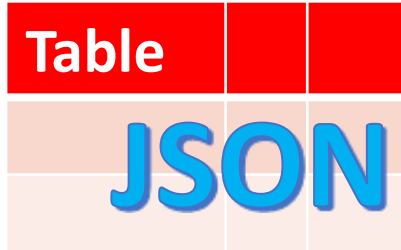
I wish that additional attributes were automatically saved in the correct table as a JSON attribute.

We have another new device

- { "type": "network switch/layer3 switch",
-    "name": "Fritz C16",
-    "description": "16 port PoE layer 3 network switch",
-    "manufacturer": "ABC",
-    "price": 500,
-    "port_group": [
-      { "amount": 16,
-       "type": "RJ45",
-       "speeds": "10/100/1000",
-       "poe": {"modes": ["active", "passive"],
-        "volt": [24, 48]}
-     }
-    ],
- …

- "feature": [
-     { "name": "VLAN",
-      "amount": 4094},
-     { "name": "QoS",
-      "amount": 8},
-     { "name": "network access control",
-      "type": "MAC based authentication",
-      "vlan_support": true},
-     { "name": "routing",
-      "protocols": "static, RIP, OSPF, BGP",
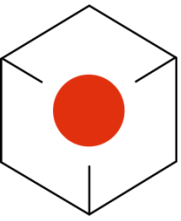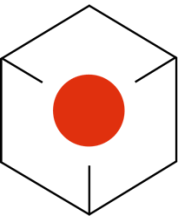-   "table_size": 10}
-    ]
- }

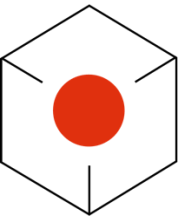**DEMO 5**

Table
JSON

Script 07

Best solution:
Duality View with @flex for "Overflow"

Ideal for any data structure that is written and read both as JSON and as a table.
Thanks to a fixed and flexible part.

From version 23.3
And in OCI

Dr. Andrea Kennel

Consultant

Dozentin für Datenbanken

Coach für Project Management

Fachhochschule Nordwestschweiz

Brugg/Windisch, Schweiz

andrea.kennel@fhnw.ch
andrea@infokennel.ch
www.infokennel.ch