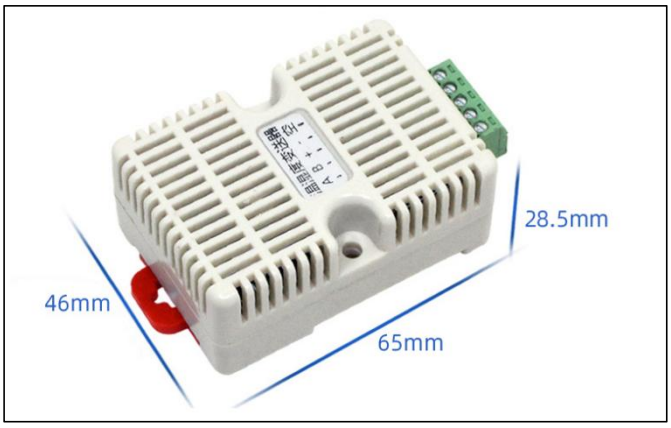
TDEngine 和物模型整合

TDEngine 的超级表附带了物模型的特性，因此可以用超级表来实现产品的物模型。下面以两个案例来展示 TDEngine 和物模型的关联关系。

TH485

本产品是个温湿度传感器，能采集环境的温度、湿度参数。其外观如下：



该设备的物模型关键字段如下：

字段名	类型	说明
temp	float	温度
humi	float	湿度

对 TDEngine 进行映射建表,需要注意的是，每个属性一个超级表，也就是说一个设备的温度和湿度需要保存在 2 张表里面：

```
CREATE STABLE IF NOT EXISTS th_485_temp(ts TIMESTAMP, t FLOAT) TAGS (
    device_id BINARY(64),
    device_name BINARY(128)
);
CREATE STABLE IF NOT EXISTS th_485_humi(ts TIMESTAMP, h FLOAT) TAGS (
    device_id BINARY(64),
    device_name BINARY(128)
);
```

控制台查看如下：

```
taos>
taos> CREATE STABLE IF NOT EXISTS th_485_temp(ts TIMESTAMP, t FLOAT) TAGS (
   ->     device_id BINARY(64),
   ->     device_name BINARY(128)
   -> );
Query OK, 0 of 0 row(s) in database (0.016987s)

taos> CREATE STABLE IF NOT EXISTS th_485_humi(ts TIMESTAMP, h FLOAT) TAGS (
   ->     device_id BINARY(64),
   ->     device_name BINARY(128)
   -> );
Query OK, 0 of 0 row(s) in database (0.004115s)
```

```
taos> show stables;
             name              |      created_time       | columns |  tags  |   tables    |
============================================================================================
 th_485_temp                   | 2022-07-18 15:37:35.402 |       2 |      2 |           0 |
 th_485_humi                   | 2022-07-18 15:37:40.923 |       2 |      2 |           0 |
Query OK, 2 row(s) in set (0.001618s)
```

设备【sn00000001】数据上来以后，我们要将其打好 Tag 插入到数据库，此时需要我们学会超级表字表自动创建表的功能：

```
INSERT INTO th_485_sn00000001_temp USING th_485_temp TAGS ('sn00000001', "市民中心东门温度")
VALUES (NOW(), 29.5);
INSERT INTO th_485_sn00000001_humi USING th_485_humi TAGS ('sn00000001', "市民中心东门湿度")
VALUES (NOW(), 66.4);
```

控制台查看如下：

```
taos> show tables;
          table_name          |      created_time       | columns |          stable_name          |         uid          |    tid    |    vgId     |
================================================================================================================================================
 th_485_sn00000001_humi        | 2022-07-18 15:38:52.474 |       2 | th_485_humi                   |     7881299386268881 |         2 |          28 |
 th_485_sn00000001_temp        | 2022-07-18 15:38:51.859 |       2 | th_485_temp                   |     7881299369491381 |         1 |          28 |
Query OK, 2 row(s) in set (0.007814s)
```

```
taos> select * from `th_485_sn00000001_humi`;
           ts            |           h            |
=========================================================
 2022-07-18 15:38:52.482 |             66.40000 |
Query OK, 1 row(s) in set (0.000829s)

taos> select * from `th_485_sn00000001_temp`;
           ts            |           t            |
=========================================================
 2022-07-18 15:38:51.864 |             29.50000 |
Query OK, 1 row(s) in set (0.000887s)
```

我们看下超级表的内容:

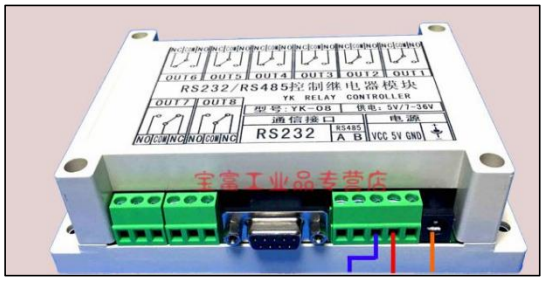
```
taos> select* from th_485_temp;
          ts           |         t          |          device_id           |         device_name          |
=================================================================================================================
 2022-07-18 15:38:51.864 |           29.50000 | sn00000001                   | 市民中心东门温度             |
Query OK, 1 row(s) in set (0.001399s)

taos> select* from th_485_humi;
          ts           |         h          |          device_id           |         device_name          |
=================================================================================================================
 2022-07-18 15:38:52.482 |           66.40000 | sn00000001                   | 市民中心东门湿度             |
Query OK, 1 row(s) in set (0.001183s)
```

设备数据已经被打好标签保存到了数据库里面。

YK08

YK08 是一个轻量级国产 PLC 控制器，其价格便宜，经济适用，很适合在简单场景下控制设备，其外观如下：



该继电器有 8 个 IO 口，可以同时控制 8 个开关量。
该设备的物模型关键字段如下：

字段名	类型	说明
sw1	bool	1 号开关位
sw2	bool	2 号开关位
sw3	bool	3 号开关位
sw4	bool	4 号开关位
sw5	bool	5 号开关位
sw6	bool	6 号开关位
sw7	bool	7 号开关位
sw8	bool	8 号开关位

对物模型进行建表映射:

```
CREATE STABLE IF NOT EXISTS yk08(
    ts TIMESTAMP,
    sw1 BOOL,
    sw2 BOOL,
    sw3 BOOL,
    sw4 BOOL,
    sw5 BOOL,
    sw6 BOOL,
    sw7 BOOL,
    sw8 BOOL
) TAGS (device_id BINARY(64), device_name BINARY(128));
```

控制台查看：

```
taos> CREATE STABLE IF NOT EXISTS yk08(
   ->     ts TIMESTAMP,
   ->     sw1 BOOL,
   ->     sw2 BOOL,
   ->     sw3 BOOL,
   ->     sw4 BOOL,
   ->     sw5 BOOL,
   ->     sw6 BOOL,
   ->     sw7 BOOL,
   ->     sw8 BOOL
   -> ) TAGS (device_id BINARY(64), device_name BINARY(128));
Query OK, 0 of 0 row(s) in database (0.008920s)

taos> show stables;
             name              |      created_time       | columns |  tags  |   tables    |
================================================================================================
 th_485_temp                   | 2022-07-18 15:37:35.402 |       2 |      2 |           1 |
 yk08                          | 2022-07-18 15:51:32.503 |       9 |      2 |           0 |
 th_485_humi                   | 2022-07-18 15:37:40.923 |       2 |      2 |           1 |
Query OK, 3 row(s) in set (0.001527s)
```

设备【sn00000001】数据上来以后，我们要将其打好 Tag 插入到数据库，此时需要我们学会超级表字表自动创建表的功能：

```
INSERT INTO yk08_sn00000001 USING yk08 TAGS ('sn00000001', "总控开关")
VALUES (NOW(), 1, 1, 1, 1, 1, 1, 1, 1);
INSERT INTO yk08_sn00000001 USING yk08 TAGS ('sn00000001', "总控开关")
VALUES (NOW(), 1, 0, 1, 1, 1, 1, 1, 0);
```

```
taos> show stables;
             name              |      created_time       | columns |  tags  |   tables    |
================================================================================================
 th_485_temp                   | 2022-07-18 15:37:35.402 |       2 |      2 |           1 |
 yk08                          | 2022-07-18 15:51:32.503 |       9 |      2 |           1 |
 th_485_humi                   | 2022-07-18 15:37:40.923 |       2 |      2 |           1 |
Query OK, 3 row(s) in set (0.001579s)
```

```
taos> show tables;
          table_name           |      created_time       | columns |          stable_name          |         uid          |   tid    |   vgId    |
================================================================================================================================================
 yk08_sn00000001               | 2022-07-18 15:53:39.908 |       9 | yk08                          |     7881299403046673 |        3 |        28 |
 th_485_sn00000001_humi        | 2022-07-18 15:38:52.474 |       2 | th_485_humi                   |     7881299386268881 |        2 |        28 |
 th_485_sn00000001_temp        | 2022-07-18 15:38:51.859 |       2 | th_485_temp                   |     7881299369491381 |        1 |        28 |
Query OK, 3 row(s) in set (0.007772s)
```

查看数据：

```
taos> select * from `yk08`;
           ts           |  sw1  |  sw2  |  sw3  |  sw4  |  sw5  |  sw6  |  sw7  |  sw8  |          device_id           |         device_name          |
================================================================================================================================================
 2022-07-18 15:53:39.921 |  true |  true |  true |  true |  true |  true |  true |  true | sn00000001                   | 总控开关                     |
 2022-07-18 15:53:40.647 |  true | false |  true |  true |  true |  true |  true | false | sn00000001                   | 总控开关                     |
Query OK, 2 row(s) in set (0.001156s)
```

```
taos> select * from `yk08_sn00000001`;
           ts           |  sw1  |  sw2  |  sw3  |  sw4  |  sw5  |  sw6  |  sw7  |  sw8  |
================================================================================================
 2022-07-18 15:53:39.921 |  true |  true |  true |  true |  true |  true |  true |  true |
 2022-07-18 15:53:40.647 |  true | false |  true |  true |  true |  true |  true | false |
Query OK, 2 row(s) in set (0.000948s)
```

设备数据已经被打好标签保存到了数据库里面。

总结

上面是 2 个简单案例来展示 TDEngine 在 iothub 中的应用。得益于 TDEngine 天生自带的海量物联网数据处理特性，后期需要熟练掌握，作为基础技术栈来使用。