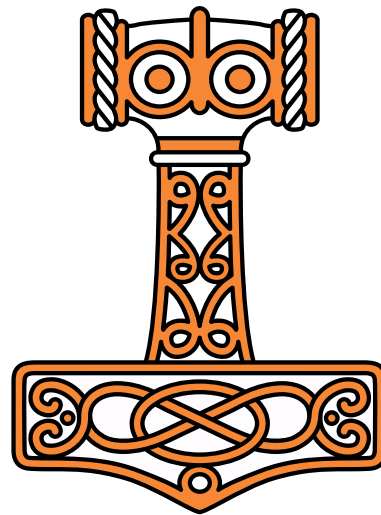




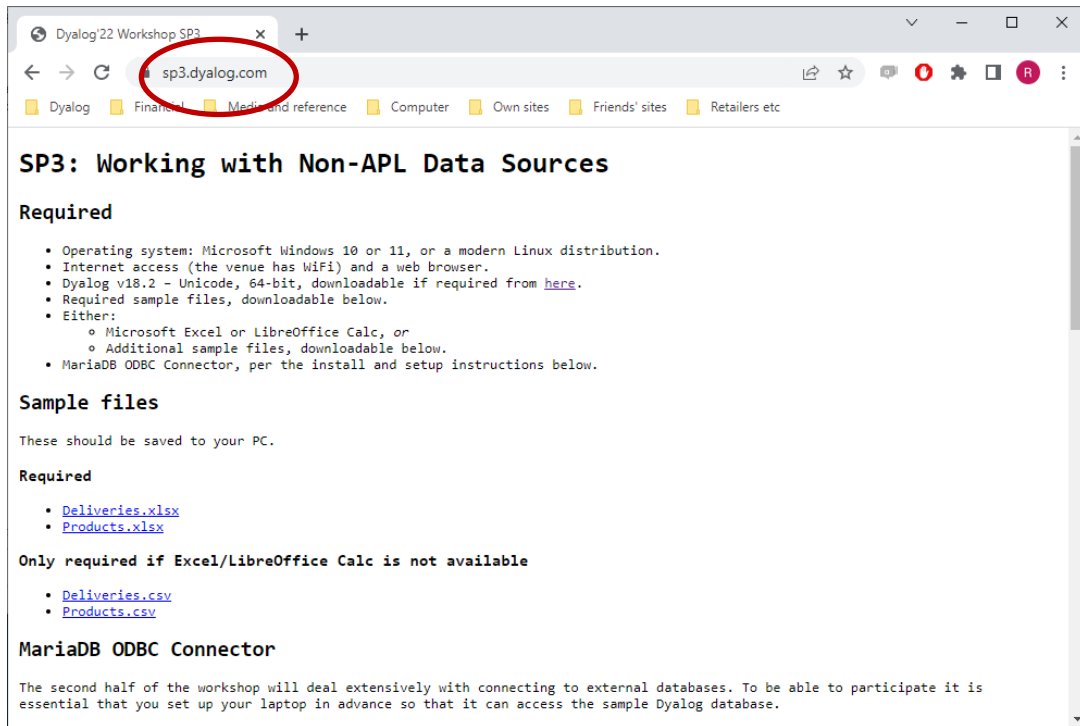
Olhão 2022

Workshop SP3: Working with Non-APL Data Sources

Richard Smith and Bjørn Christensen



Pre-requisites



Dyalog'22 Workshop SP3

sp3.dyalog.com

Dyalog Financials Medical and reference Computer Own sites Friends' sites Retailers etc

SP3: Working with Non-APL Data Sources

Required

- Operating system: Microsoft Windows 10 or 11, or a modern Linux distribution.
- Internet access (the venue has WiFi) and a web browser.
- Dyalog v18.2 - Unicode, 64-bit, downloadable if required from [here](#).
- Required sample files, downloadable below.
- Either:
 - Microsoft Excel or LibreOffice Calc, or
 - Additional sample files, downloadable below.
- MariaDB ODBC Connector, per the install and setup instructions below.

Sample files

These should be saved to your PC.

Required

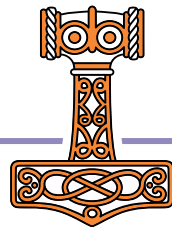
- [Deliveries.xlsx](#)
- [Products.xlsx](#)

Only required if Excel/LibreOffice Calc is not available

- [Deliveries.csv](#)
- [Products.csv](#)

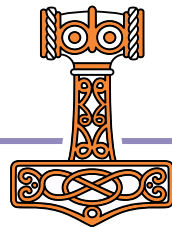
MariaDB ODBC Connector

The second half of the workshop will deal extensively with connecting to external databases. To be able to participate it is essential that you set up your laptop in advance so that it can access the sample Dyalog database.



Introduction

- Simple database, in two spreadsheets
- Various ways of importing the data
- A “Quick and dirty” way is to convert to CSV files
- Will use the CSV files throughout the day
- Let us know if you do not have Excel or Calc



Getting started



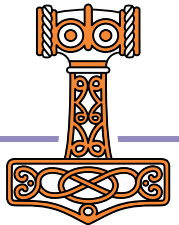
Excel

- Open Products.xlsx
- File → Export
- Change file type to CSV
- Name the new file Products.csv
- Repeat for Deliveries.xlsx

Calc

- Open Products.xlsx
- File → Save As
- Change format to “Text CSV”
- Accept default properties
- Repeat for Deliveries.xlsx

Demonstration



```

]box on -style=min
Was OFF -style=min
rootdir
C:\Users\richard\Documents\Conferences\2022-10 User Meeting\Workshop\
fn_products←rootdir,'Products.csv'
t←fn_products⊞NTIE 0
⊞NREAD t 80 ~1 0 A Watch out on Classic!
Code;Description;Cost
FFM;Pasteurised milk 1pt;0,94
SSM;Semi-skimmed milk 1pt;0,92
SKM;Skimmed milk 1pt;0,91
EGG;Half-dozen eggs;1,89

```

```

⊞UCS ⊞NREAD t 80 ~1 0
67 111 100 101 59 68 101 115 99 114 105 112 116 105 111 110 59 67 111 115 116 13 10 70 70 77 59 80 97 115 116 101 117 114
105 115 101 100 32 109 105 108 107 32 49 112 116 59 48 44 57 52 13 10 83 83 77 59 83 101 109 105 45 115 107 105 109
109 101 100 32 109 105 108 107 32 49 112 116 59 48 44 57 50 13 10 83 75 77 59 83 107 105 109 109 101 100 32 109 105
108 107 32 49 112 116 59 48 44 57 49 13 10 69 71 71 59 72 97 108 102 45 100 111 122 101 110 32 101 103 103 115 59 49
44 56 57 13 10
(⊞UCS 13)(≠⊞)⊞NREAD t 80 ~1 0

```

Code;Description;Cost	FFM;Pasteurised milk 1pt;0,94	SSM;Semi-skimmed milk 1pt;0,92	SKM;Skimmed milk 1pt;0,91	EGG;Half-dozen eggs;1,89
-----------------------	-------------------------------	--------------------------------	---------------------------	--------------------------

```
en eggs;1,89
```

```
~1⊞(⊞UCS 13)(≠⊞)⊞NREAD t 80 ~1 0
```

Code;Description;Cost	FFM;Pasteurised milk 1pt;0,94	SSM;Semi-skimmed milk 1pt;0,92	SKM;Skimmed milk 1pt;0,91	EGG;Half-dozen eggs;1,89
-----------------------	-------------------------------	--------------------------------	---------------------------	--------------------------

```
en eggs;1,89
```

```
(⊞UCS 10)~""~1⊞(⊞UCS 13)(≠⊞)⊞NREAD t 80 ~1 0
```

Code;Description;Cost	FFM;Pasteurised milk 1pt;0,94	SSM;Semi-skimmed milk 1pt;0,92	SKM;Skimmed milk 1pt;0,91	EGG;Half-dozen eggs;1,89
-----------------------	-------------------------------	--------------------------------	---------------------------	--------------------------

```
en eggs;1,89
```

```

⊞NUNTIE t
readfile←{t←⊞NTIE 0 ⊞ r←(⊞UCS 10)~""~1⊞(⊞UCS 13)(≠⊞)⊞NREAD t 80 ~1 0 ⊞ _←⊞NUNTIE t ⊞ r}
readfile fn_products

```

Code;Description;Cost	FFM;Pasteurised milk 1pt;0,94	SSM;Semi-skimmed milk 1pt;0,92	SKM;Skimmed milk 1pt;0,91	EGG;Half-dozen eggs;1,89
-----------------------	-------------------------------	--------------------------------	---------------------------	--------------------------

```
en eggs;1,89
```

```

treadfile fn_products
Code;Description;Cost
FFM;Pasteurised milk 1pt;0,94
SSM;Semi-skimmed milk 1pt;0,92
SKM;Skimmed milk 1pt;0,91
EGG;Half-dozen eggs;1,89
'ASCII'⊞NGET fn_products

```

Code;Description;Cost	ASCII	13 10
FFM;Pasteurised milk 1pt;0,94		
SSM;Semi-skimmed milk 1pt;0,92		
SKM;Skimmed milk 1pt;0,91		
EGG;Half-dozen eggs;1,89		

```
''⊞NGET fn_products
```

Code;Description;Cost	UTF-8-NOBOM	13 10
FFM;Pasteurised milk 1pt;0,94		
SSM;Semi-skimmed milk 1pt;0,92		
SKM;Skimmed milk 1pt;0,91		
EGG;Half-dozen eggs;1,89		

```

⊞UCS=⊞NGET fn_products
67 111 100 101 59 68 101 115 99 114 105 112 116 105 111 110 59 67 111 115 116 10 70 70 77 59 80 97 115 116 101 117 114 105
115 101 100 32 109 105 108 107 32 49 112 116 59 48 44 57 52 10 83 83 77 59 83 101 109 105 45 115 107 105 109 109 10
1 100 32 109 105 108 107 32 49 112 116 59 48 44 57 50 10 83 75 77 59 83 107 105 109 109 101 100 32 109 105 108 107 3
2 49 112 116 59 48 44 57 49 10 69 71 71 59 72 97 108 102 45 100 111 122 101 110 32 101 103 103 115 59 49 44 56 57 10
⊞NGET fn_products 1

```

Code;Description;Cost	FFM;Pasteurised milk 1pt;0,94	SSM;Semi-skimmed milk 1pt;0,92	SKM;Skimmed milk 1pt;0,91	EGG;Half-dozen eggs;1,89
-----------------------	-------------------------------	--------------------------------	---------------------------	--------------------------

```
en eggs;1,89
```

␣NGET rootdir,'Discontent.txt'

Now is the winter of our discontent Made glorious summer by this sun of York; And all the clouds that lour'd upon our house In the deep bosom of the ocean buried.	UTF-8-NOBOM	13 10
---	-------------	-------

treadfile rootdir,'Discontent.txt'

Now is the winter of our discontent
Made glorious summer by this sun of York;
And all the clouds that lour'd upon our house
␣NGET rootdir,'Discontent2.txt'

Now is the winter of our discontent Made glorious summer by this sun of York; And all the clouds that lour'd upon our house In the deep bosom of the ocean buried.	UTF-8-NOBOM	10
---	-------------	----

treadfile rootdir,'Discontent2.txt'
␣NGET rootdir,'Discontent3.txt'

Now is the winter of our discontent Made glorious summer by this sun of York; And all the clouds that lour'd upon our house In the deep bosom of the ocean buried.	Windows-1252	13 10
---	--------------	-------

treadfile rootdir,'Discontent3.txt'

Now is the winter of our discontent
Made glorious summer by this sun of York;
And all the clouds that lour'd upon our house
In the deep bosom of the ocean buried.
x*␣NGET rootdir,'Discontent3.txt'
x[2 3]

Windows-1252	13 10
--------------	-------

x[2 3]*'UTF-16' 10
x ␣NPUT rootdir,'Discontent4.txt'
t*(rootdir,'Discontent4.txt')␣NTIE 0 ♦ ␣NREAD t 83 ~1 0 ♦ ␣NUNTIE t
~1 ~2 78 0 111 0 119 0 32 0 105 0 115 0 32 0 116 0 104 0 101 0 32 0 119 0 105 0 110 0 116 0 101 0 114 0 32 0 111 0 102 0 3
2 0 111 0 117 0 114 0 32 0 100 0 105 0 115 0 99 0 111 0 110 0 116 0 101 0 110 0 116 0 10 0 77 0 97 0 100 0 101 0 32
0 103 0 108 0 111 0 114 0 105 0 111 0 117 0 115 0 32 0 115 0 117 0 109 0 109 0 101 0 114 0 32 0 98 0 121 0 32 0 116
0 104 0 105 0 115 0 32 0 115 0 117 0 110 0 32 0 111 0 102 0 32 0 89 0 111 0 114 0 107 0 59 0 10 0 65 0 110 0 100 0 3
2 0 97 0 108 0 108 0 32 0 116 0 104 0 101 0 32 0 99 0 108 0 111 0 117 0 100 0 115 0 32 0 116 0 104 0 97 0 116 0 32 0
108 0 111 0 117 0 114 0 25 32 100 0 32 0 117 0 112 0 111 0 110 0 32 0 111 0 117 0 114 0 32 0 104 0 111 0 117 0 115
0 101 0 10 0 73 0 110 0 32 0 116 0 104 0 101 0 32 0 100 0 101 0 101 0 112 0 32 0 98 0 111 0 115 0 111 0 109 0 32 0 1
11 0 102 0 32 0 116 0 104 0 101 0 32 0 111 0 99 0 101 0 97 0 110 0 32 0 98 0 117 0 114 0 105 0 101 0 100 0 46 0 10 0
␣NGET rootdir,'Discontent4.txt'

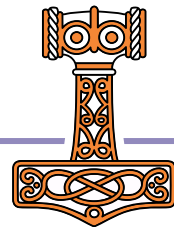
Now is the winter of our discontent Made glorious summer by this sun of York; And all the clouds that lour'd upon our house In the deep bosom of the ocean buried.	UTF-16LE-BOM	10
---	--------------	----

Getting started



```
]box on  
rootdir←'set the correct location here/'  
□NGET rootdir,'Products.csv'
```

Code,Description,Cost	UTF-8-NOBOM	13	10
FFM,Pasteurised milk 1pt,0.94			
SSM,Semi-skimmed milk 1pt,0.92			
SKM,Skimmed milk 1pt,0.91			
EGG,Half-dozen eggs,1.89			



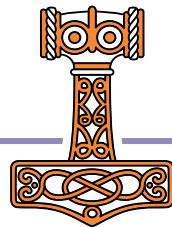
□ CSV: ~~Comma~~ Separated Values

- Text file containing records split into fields, using a comma as a field separator

```
Hats,1.2  
Scarves,1234
```

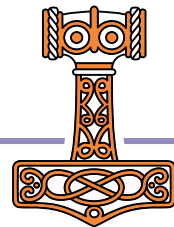
- Other delimiters are used – e.g. in Europe a semicolon is more usual

```
Hats;1,2  
Scarves;1234
```



□CSV has *lots* of config options

Field separator characters, escape mechanism, decimal separator characters, thousands separator characters, redundant whitespace trimming, even or uneven length records, fixed or variable-width fields, quotation mark characters, output matrix format, specification of column datatypes, handling of missing fields, input source specification, separation of header record.



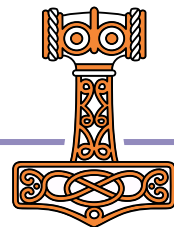
The “database”

Products

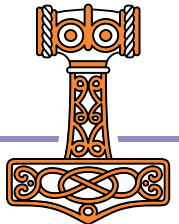
Code	Description	Cost
FFM	Pasteurised milk 1pt	0.94
SSM	Semi-skimmed milk 1pt	0.92
SKM	Skimmed milk 1pt	0.91
EGG	Half-dozen eggs	1.89

Deliveries

Date	Code	Quantity
2022-06-18 02:23:00	SSM	7
2022-06-18 02:23:00	SKM	4
2022-06-25 03:40:00	SSM	7
2022-06-25 03:40:00	SKM	4
2022-07-02 02:50:10	SSM	8
2022-07-02 02:50:10	SKM	3
2022-07-09 05:20:00	SSM	5
2022-07-09 05:20:00	SKM	1
2022-07-16 03:27:34	SSM	6
2022-07-16 03:27:34	SKM	2
2022-07-23 04:18:44	SSM	8
2022-07-23 04:18:44	SKM	4
2022-07-30 01:58:10	SSM	8
2022-07-30 01:58:10	SKM	3
2022-08-06 03:29:39	SSM	4
2022-08-06 03:29:39	SKM	1



Demonstration



```

]box on -style=min
Was ON -style=min
fn_deliveries+rootdir,'Deliveries.csv'
fn_products+rootdir,'Products.csv'
=>NGET fn_deliveries
Date;Code;Quantity
2022-06-18 02:23:00;SSM;7
2022-06-18 02:23:00;SKM;4
2022-06-25 03:40:00;SSM;7
2022-06-25 03:40:00;SKM;4
2022-07-02 02:50:10;SSM;8
2022-07-02 02:50:10;SKM;3
2022-07-09 05:20:00;SSM;5
2022-07-09 05:20:00;SKM;1
2022-07-16 03:27:34;SSM;6
2022-07-16 03:27:34;SKM;2
2022-07-23 04:18:44;SSM;8
2022-07-23 04:18:44;SKM;4
2022-07-30 01:58:10;SSM;8
2022-07-30 01:58:10;SKM;3
2022-08-06 03:29:39;SSM;4
2022-08-06 03:29:39;SKM;1

```

```

=>NGET fn_products
Code;Description;Cost
FFM;Pasteurised milk 1pt;0,94
SSM;Semi-skimmed milk 1pt;0,92
SKM;Skimmed milk 1pt;0,91
EGG;Half-dozen eggs;1,89

```

```

A CSV fn_products 'ASCII'
CSV fn_products
DOMAIN ERROR: Invalid number of fields in record 2 (IO=1)
CSV fn_products
^
(CSV 'Separator' ';') fn_products

```

Code	Description	Cost
FFM	Pasteurised milk 1pt	0,94
SSM	Semi-skimmed milk 1pt	0,92
SKM	Skimmed milk 1pt	0,91
EGG	Half-dozen eggs	1,89

```

DR"(CSV 'Separator' ';') fn_products
80 80 80
80 80 80
80 80 80
80 80 80
80 80 80

```

```

csv+(CSV('Separator' ';')('Decimal' ','))
csv fn_products '' 4

```

Code	Description	Cost
FFM	Pasteurised milk 1pt	0,94
SSM	Semi-skimmed milk 1pt	0.92
SKM	Skimmed milk 1pt	0.91
EGG	Half-dozen eggs	1.89

```

DR"csv fn_products '' 4
80 80 80
80 80 645
80 80 645
80 80 645
80 80 645

```

```

(csv 'Invert' 1) fn_products

```

Code	Description	Cost
FFM	Pasteurised milk 1pt	0,94
SSM	Semi-skimmed milk 1pt	0,92
SKM	Skimmed milk 1pt	0,91
EGG	Half-dozen eggs	1,89

```

(csv 'Invert' 1) fn_products '' (1 1 2) 1

```

FFM	Pasteurised milk 1pt	0.94	0.92	0.91	1.89
SSM	Semi-skimmed milk 1pt				
SKM	Skimmed milk 1pt				
EGG	Half-dozen eggs				

Code	Description	Cost
------	-------------	------

```
>(csv$'Invert' 1) fn_products '' (1 1 2) 1
```

FFM	Pasteurised milk 1pt	0.94	0.92	0.91	1.89
SSM	Semi-skimmed milk 1pt				
SKM	Skimmed milk 1pt				
EGG	Half-dozen eggs				

```
(csv$'Invert' 2) fn_products
```

Code	FFM	SSM	SKM	EGG	Description	Pasteurised milk 1pt	Semi-skimmed milk 1pt	Skimmed milk 1pt	Half-dozen eggs	Cost	0,
------	-----	-----	-----	-----	-------------	----------------------	-----------------------	------------------	-----------------	------	----

94	0,92	0,91	1,89
----	------	------	------

```
>(csv$'Invert' 2) fn_products '' (1 1 2) 1
```

FFM	SSM	SKM	EGG	Pasteurised milk 1pt	Semi-skimmed milk 1pt	Skimmed milk 1pt	Half-dozen eggs	0.94	0.92	0.91	1.89
-----	-----	-----	-----	----------------------	-----------------------	------------------	-----------------	------	------	------	------

```
R [CSV <f1>
]open https://help.dyalog.com
```

Exercise

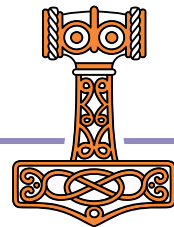


Using the data in Deliveries.csv and Products.csv:

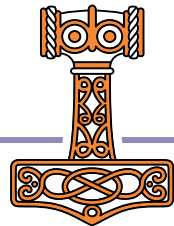
How much did I spend?

How much did I spend in July 2022?

<https://sp3.dyalog.com/milk.html>



Exercise walk-through and an aside




```
]box on -style=min
Was ON -style=min
>(csv⌵'Invert' 2) fn_products '' (1 1 2) 1
```

FFM	SSM	SKM	EGG	Pasteurised milk 1pt	Semi-skimmed milk 1pt	Skimmed milk 1pt	Half-dozen eggs	0.94 0.92 0.91 1.89
-----	-----	-----	-----	----------------------	-----------------------	------------------	-----------------	---------------------

```
product_code desc cost>(csv⌵'Invert' 2) fn_products '' (1 1 2) 1
product_code
```

FFM	SSM	SKM	EGG
-----	-----	-----	-----

desc

Pasteurised milk 1pt	Semi-skimmed milk 1pt	Skimmed milk 1pt	Half-dozen eggs
----------------------	-----------------------	------------------	-----------------

cost

0.94 0.92 0.91 1.89

```
date delivery_code qty>(csv⌵'Invert' 2) fn_deliveries '' (1 1 2) 1
date
```

2022-06-18 02:23:00	2022-06-18 02:23:00	2022-06-25 03:40:00	2022-06-25 03:40:00	2022-07-02 02:50:10	2022-07-02 02:50:10	2
---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---

022-07-09 05:20:00	2022-07-09 05:20:00	2022-07-16 03:27:34	2022-07-16 03:27:34	2022-07-23 04:18:44	2022-07-23 04:18:
--------------------	---------------------	---------------------	---------------------	---------------------	-------------------

44	2022-07-30 01:58:10	2022-07-30 01:58:10	2022-08-06 03:29:39	2022-08-06 03:29:39
----	---------------------	---------------------	---------------------	---------------------

delivery_code

SSM	SKM	SSM	SKM	SSM	SKM	SSM	SKM	SSM	SKM	SSM	SKM	SSM	SKM	SSM	SKM
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

qty

7 4 7 4 8 3 5 1 6 2 8 4 8 3 4 1

product_code Ⓡ delivery_code

2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3

cost[product_code Ⓡ delivery_code]

0.92 0.91 0.92 0.91 0.92 0.91 0.92 0.91 0.92 0.91 0.92 0.91 0.92 0.91 0.92 0.91

cost[product_code Ⓡ delivery_code]*qty

6.44 3.64 6.44 3.64 7.36 2.73 4.6 0.91 5.52 1.82 7.36 3.64 7.36 2.73 3.68 0.91

+/cost[product_code Ⓡ delivery_code]*qty

68.78

date

2022-06-18 02:23:00	2022-06-18 02:23:00	2022-06-25 03:40:00	2022-06-25 03:40:00	2022-07-02 02:50:10	2022-07-02 02:50:10	2
---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---

022-07-09 05:20:00	2022-07-09 05:20:00	2022-07-16 03:27:34	2022-07-16 03:27:34	2022-07-23 04:18:44	2022-07-23 04:18:
--------------------	---------------------	---------------------	---------------------	---------------------	-------------------

44	2022-07-30 01:58:10	2022-07-30 01:58:10	2022-08-06 03:29:39	2022-08-06 03:29:39
----	---------------------	---------------------	---------------------	---------------------

'7'=7⌵''date

0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0

('7'=7⌵''date)/date

2022-07-02 02:50:10	2022-07-02 02:50:10	2022-07-09 05:20:00	2022-07-09 05:20:00	2022-07-16 03:27:34	2022-07-16 03:27:34	2
---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---

022-07-23 04:18:44	2022-07-23 04:18:44	2022-07-30 01:58:10	2022-07-30 01:58:10
--------------------	---------------------	---------------------	---------------------

{2>' -:'⌵VFI ω}''date

2022 6 18 2 23 0	2022 6 18 2 23 0	2022 6 25 3 40 0	2022 6 25 3 40 0	2022 7 2 2 50 10	2022 7 2 2 50 10	2022 7 9 5 20 0	202
------------------	------------------	------------------	------------------	------------------	------------------	-----------------	-----

2 7 9 5 20 0	2022 7 16 3 27 34	2022 7 16 3 27 34	2022 7 23 4 18 44	2022 7 23 4 18 44	2022 7 30 1 58 10	2022 7 30 1 5
--------------	-------------------	-------------------	-------------------	-------------------	-------------------	---------------

8 10	2022 8 6 3 29 39	2022 8 6 3 29 39
------	------------------	------------------

dn+⌵+1⌵DT{2>' -:'⌵VFI ω}''date

44729.09931 44729.09931 44736.15278 44736.15278 44743.11817 44743.11817 44750.22222 44750.22222 44757.14414 44757.14414 44764.17968 44764.17968 44771.08206 44771.08206 44778.14559 44778.14559

(dn≥1⌵DT<2022 7 1)^(dn<1⌵DT<2022 8 1)

0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0

mask+(dn≥1⌵DT<2022 7 1)^(dn<1⌵DT<2022 8 1)

mask/date

2022-07-02 02:50:10	2022-07-02 02:50:10	2022-07-09 05:20:00	2022-07-09 05:20:00	2022-07-16 03:27:34	2022-07-16 03:27:34	2
---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---

022-07-23 04:18:44	2022-07-23 04:18:44	2022-07-30 01:58:10	2022-07-30 01:58:10
--------------------	---------------------	---------------------	---------------------

mask/delivery_code

SSM	SKM	SSM	SKM	SSM	SKM	SSM	SKM	SSM	SKM
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

mask/qty

8 3 5 1 6 2 8 4 8 3

+ /cost[product_code t mask/delivery_code]*mask/qty

44.03

Interlude 1 - [NINFO

1 [ninfo fn_products

2

2 [ninfo fn_products

139

3 [ninfo fn_products

2022	10	5	16	53	26	254
------	----	---	----	----	----	-----

'Dddd, Doo Mmmm YYYY "at" t:mmpp'(1200t)1 [DT 3 [NINFO fn_products

Wednesday, 5th October 2022 at 4:53pm

5 [ninfo fn_products

DYALOG\richard

t>([NINFO[1)rootdir,'*.csv'

C:/Users/richard/Documents/Conferences/2022-10 User Meeting/Workshop/Deliveries.csv

C:/Users/richard/Documents/Conferences/2022-10 User Meeting/Workshop/Products.csv

t←fn_products[NUNTIE 0

1 2 3 5[NINFO t

2	139	2022	10	5	16	53	26	254	DYALOG\richard
---	-----	------	----	---	----	----	----	-----	----------------

0 [NINFO t

C:/Users/richard/Documents/Conferences/2022-10 User Meeting/Workshop/Products.csv

8 [NINFO t

0

[NREAD t 80 10

Code;Descr

8 [NINFO t

10

[NUNTIE t

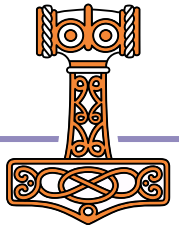
t←'tempfile'([NCREATE[Unique' 1)0

0 [NINFO t

tempfile1srqQq

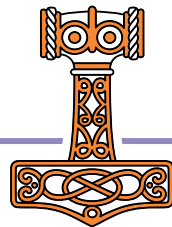
(>0 [NINFO t)[NERASE t

Quick break?

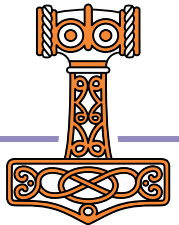


JSON

- Text containing structured data:
 - Numbers
 - Strings (character arrays)
 - Objects (namespaces)
 - Vectors
- JavaScript Object Notation



Demonstration



```

]box on -style=min
Was ON -style=min
  jsontext
{
  "a": 1,
  "b": [
    2,
    "Hello"
  ],
  "c": {
    "x": 4
  },
  "d-e": 5
}
  v←⎕+⎕JSON jsontext
#. [JSON object]
  v.b


|   |       |
|---|-------|
| 2 | Hello |
|---|-------|


  v.c
#. [JSON object].[JSON object]
  v.c.x
4
  ⎕JSON v
{"a":1,"b":[2,"Hello"],"c":{"x":4},"d-e":5}
  (⎕JSON⎕'Compact' 0) v
{
  "a": 1,
  "b": [
    2,
    "Hello"
  ],
  "c": {
    "x": 4
  },
  "d-e": 5
}
  v.⎕NL-19


|   |   |   |         |
|---|---|---|---------|
| a | b | c | ΔdΔ45Δe |
|---|---|---|---------|


  1(7162I)``v.⎕NL-19


|   |   |   |     |
|---|---|---|-----|
| a | b | c | d-e |
|---|---|---|-----|


  0 (7162I)``'a' 'b' 'c' 'd-e'


|   |   |   |         |
|---|---|---|---------|
| a | b | c | ΔdΔ45Δe |
|---|---|---|---------|


  ⌘'v.',0 (7162I) 'd-e'
5
  json5←⎕JSON⎕'Dialect' 'JSON5'
  (json5⎕'Compact' 0) v
{
  a: 1,
  b: [
    2,
    "Hello",
  ],
  c: {
    x: 4,
  },
  "d-e": 5,
}
  json5 (json5⎕'Compact' 0) v
#. [JSON object]
  ⎕JSON 2 2 p 1
DOMAIN ERROR: JSON export: the right argument cannot be converted
  ⎕JSON 2 2p1
  ^
  ⎕JSON csv fn_products
DOMAIN ERROR: JSON export: the right argument cannot be converted
  ⎕JSON csv fn_products
  ^

```

Exercise



Convert the “Products” table to JSON

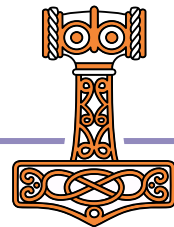
JSON can't describe a matrix!

❑ JSON csv fn_products ❌

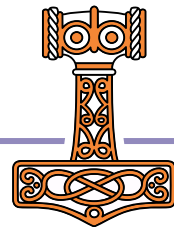
- Explore which of the ❑ CSV import formats can be converted

<https://sp3.dyalog.com/milk.html>

- Explore ways of transforming the matrix



Exercise walk-through




```

]box on -style=min
Was ON -style=min
[]JSON csv fn_products
DOMAIN ERROR: JSON export: the right argument cannot be converted
[]JSON csv fn_products
^
(csv[]'Invert' 2) fn_products '' (1 1 2) 1

```

FFM	SSM	SKM	EGG	Pasteurised milk 1pt	Semi-skimmed milk 1pt	Skimmed milk 1pt	Half-dozen eggs	0.94 0.92 0.91 1.89	Co
-----	-----	-----	-----	----------------------	-----------------------	------------------	-----------------	---------------------	----

de	Description	Cost
----	-------------	------

```

[]JSON (csv[]'Invert' 2) fn_products '' (1 1 2) 1
[[["FFM","SSM","SKM","EGG"],["Pasteurised milk 1pt","Semi-skimmed milk 1pt","Skimmed milk 1pt","Half-dozen eggs"],[0.94,0.92,0.91,1.89]],["Code","Description","Cost"]]
↑csv fn_products

```

Code	Description	Cost	FFM	Pasteurised milk 1pt	0,94	SSM	Semi-skimmed milk 1pt	0,92	SKM	Skimmed milk 1pt	0,91	EGG
------	-------------	------	-----	----------------------	------	-----	-----------------------	------	-----	------------------	------	-----

Half-dozen eggs	1,89
-----------------	------

```

[]JSON (↑csv fn_products
[["Code","Description","Cost"],["FFM","Pasteurised milk 1pt","0,94"],["SSM","Semi-skimmed milk 1pt","0,92"],["SKM","Skimmed milk 1pt","0,91"],["EGG","Half-dozen eggs","1,89"]]
[]JSON []JSON ↑csv fn_products

```

Code	Description	Cost	FFM	Pasteurised milk 1pt	0,94	SSM	Semi-skimmed milk 1pt	0,92	SKM	Skimmed milk 1pt	0,91	EGG
------	-------------	------	-----	----------------------	------	-----	-----------------------	------	-----	------------------	------	-----

Half-dozen eggs	1,89
-----------------	------

```

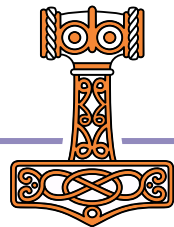
([]JSON[]'HighRank' 'Split')csv fn_products
[["Code","Description","Cost"],["FFM","Pasteurised milk 1pt","0,94"],["SSM","Semi-skimmed milk 1pt","0,92"],["SKM","Skimmed milk 1pt","0,91"],["EGG","Half-dozen eggs","1,89"]]

```

Note: there was insufficient time to conclude part 1 of the workshop. The material between here and the start of part 2 was not used.

JSON

- Text containing structured data:
 - Numbers
 - Strings (character arrays)
 - Objects (namespaces)
 - Vectors
 - Booleans, null
 - Infinity, NaN



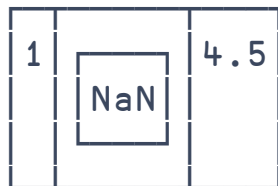
JSON types without APL equivalents

json5 'NaN'



"Wrapper"

json5 '[1, NaN, 4.5]'



1 json5 1 (⊢'NaN') 4.5

Explicitly

"Wrapper type 1"

[1,NaN,4.5]

1 json5 1 (⊢1 'NaN') 4.5

[1,NaN,4.5]

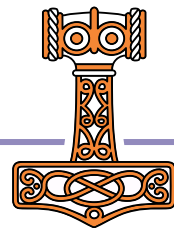
⊢JSON 'null'



(⊢JSON⊢'Null' ⊢NULL) 'null'

[Null]

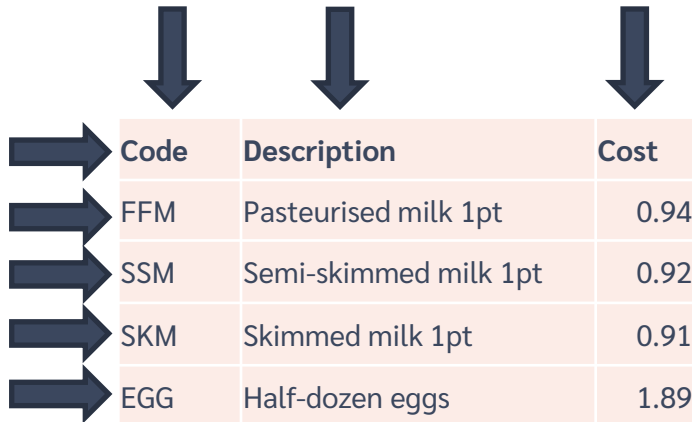
<https://help.dyalog.com/>



Another form for JSON tables

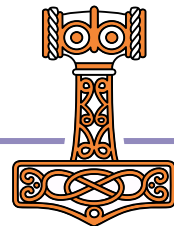
- Specifically, tables with:

- Some columns
- One header row
- Some rows of data



A diagram illustrating the structure of a JSON table. Three large dark blue arrows point downwards to the column headers: 'Code', 'Description', and 'Cost'. Five large dark blue arrows point from the left towards the rows of the table, highlighting the header row and the four data rows.

Code	Description	Cost
FFM	Pasteurised milk 1pt	0.94
SSM	Semi-skimmed milk 1pt	0.92
SKM	Skimmed milk 1pt	0.91
EGG	Half-dozen eggs	1.89



Another form for JSON tables

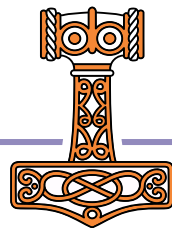
A table with c columns, 1 header row and r rows of data can be represented as:

An array of r objects, where each object consists of:

c items, where each item's name is what is in the column's header

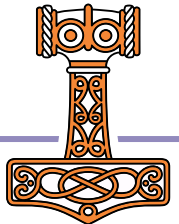
And each item's value is the cell content

For example ...



Code	Description	Cost
FFM	Pasteurised milk 1pt	0.94
SSM	Semi-skimmed milk 1pt	0.92
SKM	Skimmed milk 1pt	0.91
EGG	Half-dozen eggs	1.89

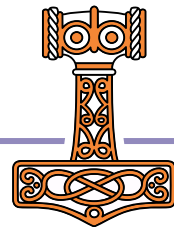
```
[
  {
    "Code": "FFM",
    "Description": "Pasteurised milk 1pt",
    "Cost": 0.94
  },
  {
    "Code": "SSM",
    "Description": "Semi-skimmed milk 1pt",
    "Cost": 0.92
  },
  {
    "Code": "SKM",
    "Description": "Skimmed milk 1pt",
    "Cost": 0.91
  },
  {
    "Code": "EGG",
    "Description": "Half-dozen eggs",
    "Cost": 1.89
  }
]
```



Exercise



Convert the “Products” table to a JSON array of objects

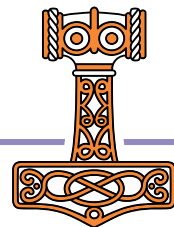


Code	Description	Cost
FFM	Pasteurised milk 1pt	0.94
SSM	Semi-skimmed milk 1pt	0.92
SKM	Skimmed milk 1pt	0.91
EGG	Half-dozen eggs	1.89

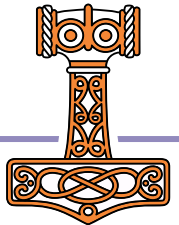
```
[
  {
    "Code": "FFM",
    "Description": "Pasteurised milk 1pt",
    "Cost": 0.94
  },
  {
    "Code": "SSM",
    "Description": "Semi-skimmed milk 1pt",
    "Cost": 0.92
  },
  {
    "Code": "SKM",
    "Description": "Skimmed milk 1pt",
    "Cost": 0.91
  },
  {
    "Code": "EGG",
    "Description": "Half-dozen eggs",
    "Cost": 1.89
  }
]
```



<https://help.dyalog.com/>



Exercise walk-through



```
]box on -style=min
Was ON -style=min
[]+d+csv fn_products '' 4
```

Code	Description	Cost
FFM	Pasteurised milk 1pt	0.94
SSM	Semi-skimmed milk 1pt	0.92
SKM	Skimmed milk 1pt	0.91
EGG	Half-dozen eggs	1.89

```
[]JSON d
DOMAIN ERROR: JSON export: the right argument cannot be converted
>[]JSON d
^
([]JSON[]'Compact' 0) (<2 d)
```

```
[
{
  "Code": "FFM",
  "Description": "Pasteurised milk 1pt",
  "Cost": 0.94
},
{
  "Code": "SSM",
  "Description": "Semi-skimmed milk 1pt",
  "Cost": 0.92
},
{
  "Code": "SKM",
  "Description": "Skimmed milk 1pt",
  "Cost": 0.91
},
{
  "Code": "EGG",
  "Description": "Half-dozen eggs",
  "Cost": 1.89
}
]
```

```
[]+d+csv fn_products '' (1 1 2) 1
```

FFM	Pasteurised milk 1pt	0.94
SSM	Semi-skimmed milk 1pt	0.92
SKM	Skimmed milk 1pt	0.91
EGG	Half-dozen eggs	1.89

Code	Description	Cost
------	-------------	------

```
[]JSON (<3 d)
[{"Code": "FFM", "Description": "Pasteurised milk 1pt", "Cost": 0.94}, {"Code": "SSM", "Description": "Semi-skimmed milk 1pt", "Cost": 0.92}, {"Code": "SKM", "Description": "Skimmed milk 1pt", "Cost": 0.91}, {"Code": "EGG", "Description": "Half-dozen eggs", "Cost": 1.89}]
[]+d+(csv[]'Invert' 2)fn_products''(1 1 2)1
```

FFM	SSM	SKM	EGG	Pasteurised milk 1pt	Semi-skimmed milk 1pt	Skimmed milk 1pt	Half-dozen eggs	0.94 0.92 0.91 1.89	Co
-----	-----	-----	-----	----------------------	-----------------------	------------------	-----------------	---------------------	----

de	Description	Cost
----	-------------	------

```
[]JSON (<4 d)
[{"Code": "FFM", "Description": "Pasteurised milk 1pt", "Cost": 0.94}, {"Code": "SSM", "Description": "Semi-skimmed milk 1pt", "Cost": 0.92}, {"Code": "SKM", "Description": "Skimmed milk 1pt", "Cost": 0.91}, {"Code": "EGG", "Description": "Half-dozen eggs", "Cost": 1.89}]
```

End of part 1

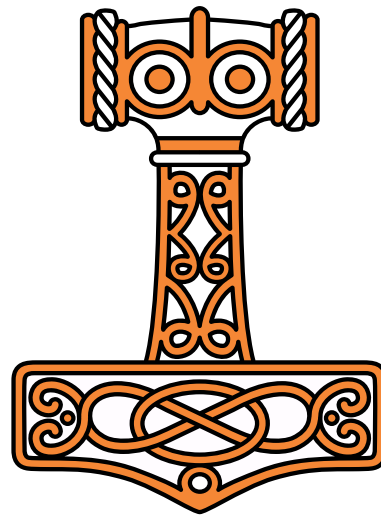




Olhão 2022

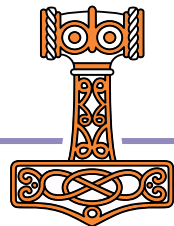
Workshop SP3: Working with Non-APL Data Sources

Richard Smith and Bjørn Christensen



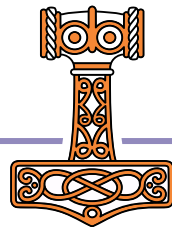
Introduction

- ✧ SQL servers and OData
- ✧ Active backends
- ✧ Strict schemas
- ✧ Multi users



Objectives

- ✧ Connect to a MariaDB database
- ✧ Calculate cost of deliveries in July
- ✧ Work with an OData data source
- ✧ Calculate turnover July 1997 (new data)



Connecting to MariaDB

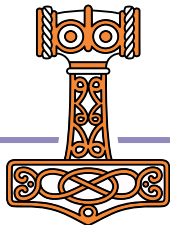


- Windows

- Odbc adm 64

- Linux

- Edit /etc/odbc.ini



Datasource

[workshop]

Description = Describe your database setup here

Driver = MariaDB ODBC 3.1 Driver

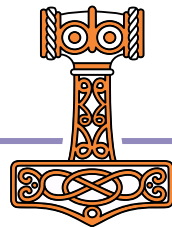
SERVER = sp3-mariadb.dyalog.com

PORT = 3306

USER = <user meeting registration email>

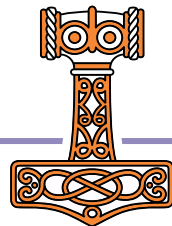
PASSWORD = dyalog

DATABASE = workshop



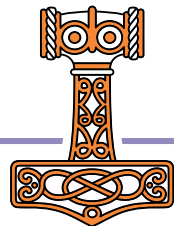
Structured Query Language

- ✧ **Select** to get data
- ✧ **Update, insert and delete**
- ✧ **From**
- ✧ **Where** to filter and join
- ✧ **Group by** to aggregate data



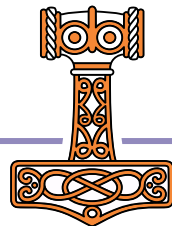
SQAPL

- ❖ `)copy sqapl`
- ❖ `SQA.Init "`
- ❖ `SQA.Connect 'C1' 'workshop' 'pass' 'user'`
- ❖ `SQA.Do 'C1' 'select * from products'`
- ❖ `SQA.Do 'C1' 'select * from deliveries'`



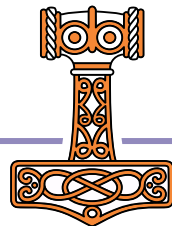
SQAPL

- ❖ SQA.Do 'con' 'sql statement'
- ❖ SQA.Prepare 'con.cursor' 'sql statement'
- ❖ SQA.Exec 'con.cursor'
- ❖ SQA.Fetch 'con.cursor'
- ❖ SQA.Close 'con.cursor'



Exercise walk-through

❖ `SQA.Do 'C1' 'select year(Delivered),
month(Delivered),
sum(d.Quantity*p.Cost)
from products p, deliveries d
where d.Code=p.Code
and month(Delivered) =:m<I:
group by year(Delivered), month(Delivered) '`



```

)clear
clear ws
)load sqapl
C:\apps\dyalog182U64\ws\sqapl.dws saved Tue Mar  8 14:28:04 2022
SQA.Init ''
0  SQAPL loaded from: C:\apps\dyalog182U64\cwlya64u64w.dll Using default translation no aplunibd.ini present
SQA.Connect 'C1' 'workshop' '***' 'bhc@insight.dk' ('Wide' 1)

```

```
0  SQA.Tables 'C1' '' 'TABLE'
```

TABLE_CAT	TABLE_SCHEM	TABLE_NAME	TABLE_TYPE	REMARKS	
workshop		deliveries	TABLE		6
workshop		products	TABLE		

```
0  SQA.Columns 'C1'
```

TABLE_CAT	TABLE_SCHEM	TABLE_NAME	COLUMN_NAME	DATA_TYPE	TYPE_NAME	COLUMN_SIZE	BUFFER_LENGTH	DECIMAL_DIGITS	NUM_PREC_RADIX	NULLABLE	REMARKS	...
workshop		deliveries	Delivered	93	DATETIME	19	16	0	10	1		...
workshop		deliveries	Code	1	CHAR	3	12	0	0	1		...
workshop		deliveries	Quantity	4	INT	10	4	0	10	1		...
workshop		deliveries	CBy	12	VARCHAR	60	240	0	0	0		...
workshop		products	Code	1	CHAR	3	12	0	0			...
workshop		products	Description	12	VARCHAR	200	800	0	0	1		...
workshop		products	Cost	3	DECIMAL	8	10	2	10	1		...
workshop		products	CBy	12	VARCHAR	60	240	0	0	0		...

```

SQA.Do 'C1' 'Select Code,Description,Cost from products'
0  C1.s1  EGG Half-dozen eggs 1.89 6
      FFM Pasteurised milk 1pt 0.94
      SKM Skimmed milk 1pt 0.91
      SSM Semi-skimmed milk 1pt 0.92

```

```

SQA.Do 'C1' 'select Code,Delivered,Quantity from deliveries'
0  C1.s1  SSM 2022-06-18 02:23:00 7 6
      SKM 2022-06-18 02:23:00 4
      SSM 2022-06-25 03:40:00 7
      SKM 2022-06-25 03:40:00 4
      SSM 2022-07-02 02:50:10 8
      SKM 2022-07-02 02:50:10 3
      SSM 2022-07-09 05:20:00 5
      SKM 2022-07-09 05:20:00 1
      SSM 2022-07-16 03:27:34 6
      SKM 2022-07-16 03:27:34 2
      SSM 2022-07-23 04:18:44 8
      SKM 2022-07-23 04:18:44 4
      SSM 2022-07-30 01:58:10 8
      SKM 2022-07-30 01:58:10 3
      SSM 2022-08-06 03:29:39 4
      SKM 2022-08-06 03:29:39 1
      FFM 2022-10-05 10:21:26 2

```

```
]box on
```

```
Was OFF
```

```

res=SQA.Do 'C1' 'Select Code,Description,Cost from products'
res A How is the result formed?

```

0	C1.s1		6												
		<table><tr><td>EGG</td><td>Half-dozen eggs</td><td>1.89</td></tr><tr><td>FFM</td><td>Pasteurised milk 1pt</td><td>0.94</td></tr><tr><td>SKM</td><td>Skimmed milk 1pt</td><td>0.91</td></tr><tr><td>SSM</td><td>Semi-skimmed milk 1pt</td><td>0.92</td></tr></table>	EGG	Half-dozen eggs	1.89	FFM	Pasteurised milk 1pt	0.94	SKM	Skimmed milk 1pt	0.91	SSM	Semi-skimmed milk 1pt	0.92	
EGG	Half-dozen eggs	1.89													
FFM	Pasteurised milk 1pt	0.94													
SKM	Skimmed milk 1pt	0.91													
SSM	Semi-skimmed milk 1pt	0.92													

SQA.Prepare 'C1.S1' 'Select Code,Description, Cost from products where Code like :codeC30:,Cost from products'

0

SQA.Exec 'C1.S1'

0 4

res← SQA.Fetch 'C1.S1' ('Columnwise' 1)
p'' 2>res

4	3	4	30	4
---	---	---	----	---

2>res

EGG	Half-dozen eggs	1.89	0.94	0.91	0.92
FFM	Pasteurised milk 1pt				
SKM	Skimmed milk 1pt				
SSM	Semi-skimmed milk 1pt				

SQA.Close 'C1.S1'

0

]box off

Was ON

SQA.Do 'C1' 'select Code,Description,Cost,Code,Delivered,Quantity from products ,deliveries '

4 23000 1052 [ma-3.1.17][10.9.3-MariaDB-1:10.9.3+maria-ubu2204]Column 'Code' in field list is ambiguous 0
SqlStmt←'select p.Code,Description,Cost,d.Code,Delivered,Quantity from products p ,deliveries d'

SQA.Do 'C1' SqlStmt

0	C1.s1	EGG	Half-dozen eggs	1.89	SSM	2022-06-18 02:23:00	7	6
		FFM	Pasteurised milk 1pt	0.94	SSM	2022-06-18 02:23:00	7	
		SKM	Skimmed milk 1pt	0.91	SSM	2022-06-18 02:23:00	7	
		SSM	Semi-skimmed milk 1pt	0.92	SSM	2022-06-18 02:23:00	7	
		EGG	Half-dozen eggs	1.89	SKM	2022-06-18 02:23:00	4	
		FFM	Pasteurised milk 1pt	0.94	SKM	2022-06-18 02:23:00	4	
		SKM	Skimmed milk 1pt	0.91	SKM	2022-06-18 02:23:00	4	
		SSM	Semi-skimmed milk 1pt	0.92	SKM	2022-06-18 02:23:00	4	
		EGG	Half-dozen eggs	1.89	SSM	2022-06-25 03:40:00	7	
		FFM	Pasteurised milk 1pt	0.94	SSM	2022-06-25 03:40:00	7	
		SKM	Skimmed milk 1pt	0.91	SSM	2022-06-25 03:40:00	7	
		SSM	Semi-skimmed milk 1pt	0.92	SSM	2022-06-25 03:40:00	7	
		EGG	Half-dozen eggs	1.89	SKM	2022-06-25 03:40:00	4	
		FFM	Pasteurised milk 1pt	0.94	SKM	2022-06-25 03:40:00	4	
		SKM	Skimmed milk 1pt	0.91	SKM	2022-06-25 03:40:00	4	
		SSM	Semi-skimmed milk 1pt	0.92	SKM	2022-06-25 03:40:00	4	
		EGG	Half-dozen eggs	1.89	SSM	2022-07-02 02:50:10	8	
		FFM	Pasteurised milk 1pt	0.94	SSM	2022-07-02 02:50:10	8	

SKM	Skimmed milk 1pt	0.91	SSM	2022-07-02 02:50:10	8
SSM	Semi-skimmed milk 1pt	0.92	SSM	2022-07-02 02:50:10	8
EGG	Half-dozen eggs	1.89	SKM	2022-07-02 02:50:10	3
FFM	Pasteurised milk 1pt	0.94	SKM	2022-07-02 02:50:10	3
SKM	Skimmed milk 1pt	0.91	SKM	2022-07-02 02:50:10	3
SSM	Semi-skimmed milk 1pt	0.92	SKM	2022-07-02 02:50:10	3
EGG	Half-dozen eggs	1.89	SSM	2022-07-09 05:20:00	5
FFM	Pasteurised milk 1pt	0.94	SSM	2022-07-09 05:20:00	5
SKM	Skimmed milk 1pt	0.91	SSM	2022-07-09 05:20:00	5
SSM	Semi-skimmed milk 1pt	0.92	SSM	2022-07-09 05:20:00	5
EGG	Half-dozen eggs	1.89	SKM	2022-07-09 05:20:00	1
FFM	Pasteurised milk 1pt	0.94	SKM	2022-07-09 05:20:00	1
SKM	Skimmed milk 1pt	0.91	SKM	2022-07-09 05:20:00	1
SSM	Semi-skimmed milk 1pt	0.92	SKM	2022-07-09 05:20:00	1
EGG	Half-dozen eggs	1.89	SSM	2022-07-16 03:27:34	6
FFM	Pasteurised milk 1pt	0.94	SSM	2022-07-16 03:27:34	6
SKM	Skimmed milk 1pt	0.91	SSM	2022-07-16 03:27:34	6
SSM	Semi-skimmed milk 1pt	0.92	SSM	2022-07-16 03:27:34	6
EGG	Half-dozen eggs	1.89	SKM	2022-07-16 03:27:34	2
FFM	Pasteurised milk 1pt	0.94	SKM	2022-07-16 03:27:34	2
SKM	Skimmed milk 1pt	0.91	SKM	2022-07-16 03:27:34	2
SSM	Semi-skimmed milk 1pt	0.92	SKM	2022-07-16 03:27:34	2
EGG	Half-dozen eggs	1.89	SSM	2022-07-23 04:18:44	8
FFM	Pasteurised milk 1pt	0.94	SSM	2022-07-23 04:18:44	8
SKM	Skimmed milk 1pt	0.91	SSM	2022-07-23 04:18:44	8
SSM	Semi-skimmed milk 1pt	0.92	SSM	2022-07-23 04:18:44	8
EGG	Half-dozen eggs	1.89	SKM	2022-07-23 04:18:44	4
FFM	Pasteurised milk 1pt	0.94	SKM	2022-07-23 04:18:44	4
SKM	Skimmed milk 1pt	0.91	SKM	2022-07-23 04:18:44	4
SSM	Semi-skimmed milk 1pt	0.92	SKM	2022-07-23 04:18:44	4
EGG	Half-dozen eggs	1.89	SSM	2022-07-30 01:58:10	8
FFM	Pasteurised milk 1pt	0.94	SSM	2022-07-30 01:58:10	8
SKM	Skimmed milk 1pt	0.91	SSM	2022-07-30 01:58:10	8
SSM	Semi-skimmed milk 1pt	0.92	SSM	2022-07-30 01:58:10	8
EGG	Half-dozen eggs	1.89	SKM	2022-07-30 01:58:10	3
FFM	Pasteurised milk 1pt	0.94	SKM	2022-07-30 01:58:10	3
SKM	Skimmed milk 1pt	0.91	SKM	2022-07-30 01:58:10	3
SSM	Semi-skimmed milk 1pt	0.92	SKM	2022-07-30 01:58:10	3
EGG	Half-dozen eggs	1.89	SSM	2022-08-06 03:29:39	4
FFM	Pasteurised milk 1pt	0.94	SSM	2022-08-06 03:29:39	4
SKM	Skimmed milk 1pt	0.91	SSM	2022-08-06 03:29:39	4
SSM	Semi-skimmed milk 1pt	0.92	SSM	2022-08-06 03:29:39	4
EGG	Half-dozen eggs	1.89	SKM	2022-08-06 03:29:39	1
FFM	Pasteurised milk 1pt	0.94	SKM	2022-08-06 03:29:39	1
SKM	Skimmed milk 1pt	0.91	SKM	2022-08-06 03:29:39	1
SSM	Semi-skimmed milk 1pt	0.92	SKM	2022-08-06 03:29:39	1
EGG	Half-dozen eggs	1.89	FFM	2022-10-05 10:21:26	2
FFM	Pasteurised milk 1pt	0.94	FFM	2022-10-05 10:21:26	2
SKM	Skimmed milk 1pt	0.91	FFM	2022-10-05 10:21:26	2
SSM	Semi-skimmed milk 1pt	0.92	FFM	2022-10-05 10:21:26	2

SqlStmt, '+' where p.Code=d.Code'

ShowSql←{t(>v/'select' 'from' 'where' 'group' 's'(<ω))<ω}

ShowSql SqlStmt

```
select p.Code,Description,Cost,d.Code,Delivered,Quantity
from products p ,deliveries d
where p.Code=d.Code
```



```

SQA.Do 'C1' SqlStmt
0 C1.s1 SSM Semi-skimmed milk 1pt 0.92 SSM 2022-06-18 02:23:00 7 6
        SKM Skimmed milk 1pt 0.91 SKM 2022-06-18 02:23:00 4
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-06-25 03:40:00 7
        SKM Skimmed milk 1pt 0.91 SKM 2022-06-25 03:40:00 4
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-02 02:50:10 8
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-02 02:50:10 3
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-09 05:20:00 5
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-09 05:20:00 1
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-16 03:27:34 6
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-16 03:27:34 2
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-23 04:18:44 8
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-23 04:18:44 4
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-30 01:58:10 8
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-30 01:58:10 3
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-08-06 03:29:39 4
        SKM Skimmed milk 1pt 0.91 SKM 2022-08-06 03:29:39 1
        FFM Pasteurised milk 1pt 0.94 FFM 2022-10-05 10:21:26 2
SqlStmt,+= ' and Delivered >= ''2022-07-01'' and Delivered < ''2022-08-01'' '
ShowSql SqlStmt
select p.Code,Description,Cost,d.Code,Delivered,Quantity
from products p ,deliveries d
where p.Code=d.Code and Delivered >= '2022-07-01' and Delivered < '2022-08-01'
SQA.Do 'C1' SqlStmt
0 C1.s1 SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-02 02:50:10 8 6
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-02 02:50:10 3
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-09 05:20:00 5
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-09 05:20:00 1
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-16 03:27:34 6
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-16 03:27:34 2
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-23 04:18:44 8
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-23 04:18:44 4
        SSM Semi-skimmed milk 1pt 0.92 SSM 2022-07-30 01:58:10 8
        SKM Skimmed milk 1pt 0.91 SKM 2022-07-30 01:58:10 3
SqlStmt+= 'select p.Code,Description,Cost,Delivered,Quantity,Cost*Quantity from products p ,deliveries d '
SqlStmt,+= ' where p.Code=d.Code '
SqlStmt,+= ' and month(Delivered)=7 '
ShowSql SqlStmt
select p.Code,Description,Cost,Delivered,Quantity,Cost*Quantity
from products p ,deliveries d
where p.Code=d.Code and month(Delivered)=7
SQA.Do 'C1' SqlStmt
0 C1.s1 SSM Semi-skimmed milk 1pt 0.92 2022-07-02 02:50:10 8 7.36 6
        SKM Skimmed milk 1pt 0.91 2022-07-02 02:50:10 3 2.73
        SSM Semi-skimmed milk 1pt 0.92 2022-07-09 05:20:00 5 4.6
        SKM Skimmed milk 1pt 0.91 2022-07-09 05:20:00 1 0.91
        SSM Semi-skimmed milk 1pt 0.92 2022-07-16 03:27:34 6 5.52
        SKM Skimmed milk 1pt 0.91 2022-07-16 03:27:34 2 1.82
        SSM Semi-skimmed milk 1pt 0.92 2022-07-23 04:18:44 8 7.36
        SKM Skimmed milk 1pt 0.91 2022-07-23 04:18:44 4 3.64
        SSM Semi-skimmed milk 1pt 0.92 2022-07-30 01:58:10 8 7.36
        SKM Skimmed milk 1pt 0.91 2022-07-30 01:58:10 3 2.73
SqlStmt+= 'select year(Delivered),month(Delivered),sum(Cost*Quantity) from products p ,deliveries d '
SqlStmt,+= ' where p.Code=d.Code and month(Delivered)=7 '
SqlStmt,+= ' group by 1,2 '
ShowSql SqlStmt

```

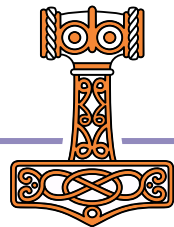
```

select year(Delivered),month(Delivered),sum(Cost*Quantity)
from products p ,deliveries d
where p.Code=d.Code and month(Delivered)=7
group by 1,2
      SQA.Do 'C1' SqlStmt
0  C1.s1    2022 7 44.03      6
      SqlStmt+='select year(Delivered),month(Delivered),sum(Cost*Quantity) from products p ,deliveries d '
      SqlStmt,+=' where p.Code=d.Code and year(Delivered)=:year

```

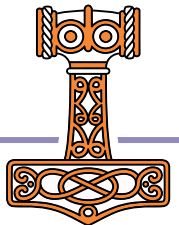
Exercise

- ✧ Calculate the cost of deliveries for July
- ✧ <https://sp3.dyalog.com/SCS.html>



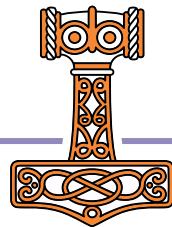
OData

- ⬢ HttpCommand
- ⬢ Conga
- ⬢ <https://services.odata.org/V4/Northwind/Northwind.svc>
- ⬢ CRUD (Create Read Update Delete)
- ⬢ Http Commands POST,GET,PUT and DELETE



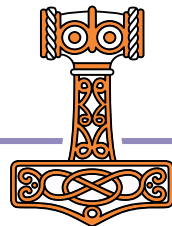
Exercise walk-through

- ⬢ `HttpCommand.Get`
- ⬢ `(service,'/Orders')`
- ⬢ `(' $select' 'OrderID,ShippedDate'`
- ⬢ `' $filter' 'month(ShippedDate) eq 7 and
year(ShippedDate) eq 1997 '`
- ⬢ `' $expand' 'Order_Details')`



Exercise

- <https://www.odata.org/>
- Calculate the sum of orders in July 1997
- <https://services.odata.org/V4/Northwind/Northwind.svc>
- Start by Order_Details instead of Orders
- <https://sp3.dyalog.com/OCS.html>



```

)clear
clear ws
)copy conga Conga
C:\apps\dyalog182U64\ws\conga.dws saved Tue Mar 8 14:28:06 2022
i-Conga.Init ''
)load HttpCommand
#.HttpCommand
service='https://services.odata.org/V4/Northwind/Northwind.svc'
└res=HttpCommand.Get service
[rc: 0 | msg: | HTTP Status: 200 "OK" | pData: 2016]
200;res.Data
{"@odata.context":"https://services.odata.org/V4/Northwind/Northwind.svc/$metadata","value":[{"name":"Categories","kind":"EntitySet","url":"Categories"}, {"name":"CustomerDemographics","kind":"EntitySe
jres=└json res.Data
jres.└nl -2 9
value ΔΔ64ΔodataΔ46Δcontext
jres.value
#. [JSON object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON
object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON
object] #. [JSON object]. [JSON object] #. [JSON
object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON
object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON
object] #. [JSON object]. [JSON object] #. [JSON o
bject]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON
object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON object] #. [JSON object]. [JSON
object] #. [JSON object]. [JSON object] #. [JSON obj
ect]. [JSON object] #. [JSON object]. [JSON object]
jres.value[1].└nl -2 9
kind name url
└jres.value.(kind url)
EntitySet Categories
EntitySet CustomerDemographics
EntitySet Customers
EntitySet Employees
EntitySet Order_Details
EntitySet Orders
EntitySet Products
EntitySet Regions
EntitySet Shippers
EntitySet Suppliers
EntitySet Territories
EntitySet Alphabetical_list_of_products
EntitySet Category_Sales_for_1997
EntitySet Current_Product_Lists
EntitySet Customer_and_Suppliers_by_Cities
EntitySet Invoices
EntitySet Order_Details_Extendeds
EntitySet Order_Subtotals
EntitySet Orders_Qries
EntitySet Product_Sales_for_1997
EntitySet Products_Above_Average_Prices
EntitySet Products_by_Categories
EntitySet Sales_by_Categories
EntitySet Sales_Totals_by_Amounts
EntitySet Summary_of_Sales_by_Quarters
EntitySet Summary_of_Sales_by_Years
jres.ΔΔ64ΔodataΔ46Δcontext
https://services.odata.org/V4/Northwind/Northwind.svc/$metadata
@ ctrl+click on the link
ObjIn={ (Δω).└NL-2 9}
└orders=HttpCommand.Get service,'/Orders'
[rc: 0 | msg: | HTTP Status: 200 "OK" | pData: 70806]
jorders=└json orders.Data
ObjIn jorders
value ΔΔ64ΔodataΔ46Δcontext ΔΔ64ΔodataΔ46ΔnextLink
ObjIn jorders.value
CustomerID EmployeeID Freight OrderDate OrderID RequiredDate ShipAddress ShipCity ShipCountry
ShipName ShipPostalCode ShipRegion ShipVia ShippedDate
└jorders.value.ShippedDate
200
10;└jorders.value.ShippedDate
1996-07-16T00:00:00Z 1996-07-10T00:00:00Z 1996-07-12T00:00:00Z 1996-07-15T00:00:00Z 1996-07-
11T00:00:00Z 1996-07-16T00:00:00Z 1996-07-23T00:00:00Z 1996-07-15T00:00:00Z 1996-07-17T00:00:00Z 1996-
07-22T00:00:00Z
jorders.ΔΔ64ΔodataΔ46ΔnextLink
Orders?$skiptoken=10447
└orders2=HttpCommand.Get service,'/',jorders.ΔΔ64ΔodataΔ46ΔnextLink
[rc: 0 | msg: | HTTP Status: 200 "OK" | pData: 71078]
jo2=└json orders2.Data
└jo2.value
200
└t=HttpCommand.Get service,'/Orders/$count'
[rc: 0 | msg: | HTTP Status: 200 "OK" | pData: 3]
t.Data
830

```

```

        params←1 2p '$select' 'OrderID,ShippedDate'
        params← '$filter' 'ShippedDate ge 1997-07-01 and ShippedDate lt 1997-08-01'
        ⚡←july97←HttpCommand.Get (service,'/Orders') (params)
[rc: 0 | msg: | HTTP Status: 200 "OK" | pData: 1827]
        jjuly97←⚡.json july97.Data
        ObjIn jjuly97
value  ⚡⚡64⚡odata⚡46⚡context
        ObjIn jjuly97.value
        OrderID ShippedDate
        pjuly97.value
31
        jjuly97.value.ShippedDate
        1997-07-09T00:00:00Z 1997-07-11T00:00:00Z 1997-07-04T00:00:00Z 1997-07-25T00:00:00Z 1997-07-
04T00:00:00Z 1997-07-01T00:00:00Z 1997-07-02T00:00:00Z 1997-07-14T00:00:00Z 1997-07-04T00:00:00Z 1997-
07-04T00:00:00Z 1997-07-10T00:00:00Z 1997-07-09T00
:00:00Z 1997-07-09T00:00:00Z 1997-07-10T00:00:00Z 1997-07-14T00:00:00Z 1997-07-14T00:00:00Z
1997-07-16T00:00:00Z 1997-07-16T00:00:00Z 1997-07-16T00:00:00Z 1997-07-14T00:00:00Z 1997-07-
18T00:00:00Z 1997-07-18T00:00:00Z 1997-07-21T00:00:00Z
1997-07-21T00:00:00Z 1997-07-22T00:00:00Z 1997-07-22T00:00:00Z 1997-07-29T00:00:00Z 1997-07-
29T00:00:00Z 1997-07-31T00:00:00Z 1997-07-25T00:00:00Z 1997-07-30T00:00:00Z
        1 HttpCommand.Get (service,'/Orders') (params)
GET /V4/Northwind/Northwind.svc/Orders?$24select=OrderID%2CShippedDate&%24filter=ShippedDate%20ge%201997-
07-01%20and%20ShippedDate%20lt%201997-08-01 HTTP/1.1

Host: services.odata.org

User-Agent: Dyalog/HttpCommand

Accept: */*

```

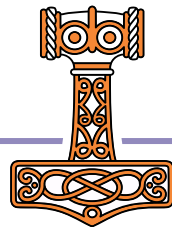
```

        params←1 2p '$select' 'OrderID,ShippedDate'
        params← '$filter' 'month(ShippedDate) eq 7 and year(ShippedDate) eq 1997'
        params← '$expand' 'Order_Details'
        ⚡←t ←HttpCommand.Get (service,'/Orders') (params)
[rc: 0 | msg: | HTTP Status: 200 "OK" | pData: 7814]
        jt←⚡.json t.Data
        pj.t.value
31
        ObjIn jt.value
        OrderID Order_Details ShippedDate
        ObjIn jt.value.Order_Details
        Discount OrderID ProductID Quantity UnitPrice
        params← '$compute' 'Order_Details/Quantity mul Order_Details/UnitPrice as Amount'
        ⚡←t ←HttpCommand.Get (service,'/Orders') (params)
[rc: 0 | msg: | HTTP Status: 400 "Bad Request" | pData: 131]
        t.Data
{"error":{"code":"","message":"The query parameter '$compute' begins with a system-reserved '$' character
but is not recognized."}}
        params←1,params
        ⚡←t ←HttpCommand.Get (service,'/Orders') (params)
[rc: 0 | msg: | HTTP Status: 200 "OK" | pData: 7814]
        jt←⚡.json t.Data
        jt.value.Order_Details.(Quantity×(1-Discount)×UnitPrice)
155 350 540 217.3875 333.2 360 117 155 162.75 331.3125 82.5075 599.925 310 78 252 1237.9 693.6 306
593.75 142.5 23.8 187.38 360 260 2000 1120 72 360 741 140 300 372.5 368.125 148.3425 168 397.5
405 2565 1755 126 390 202.08 2195 193.5
493 29.8 450 360 1925 48.75 68.85 162 497.325 1045 2261 306.375 352 384 394.4 1350 3900 35
772.8 417.6 54 310 60
        p←jt.value.Order_Details.(Quantity×(1-Discount)×UnitPrice)
1 2 2 2 2 3 1 2 3 1 1 1 3 2 1 2 3 2 2 3 3 2 1 2 2 1 2 4 3 5 3
+/,/,jt.value.Order_Details.(Quantity×(1-Discount)×UnitPrice)
37544.96
Ⓜ exercise

```


Exercise walk-through

- ⬢ `HttpCommand.Get`
- ⬢ `(service,'/Order_Details')`
- ⬢ `('$expand' 'Order')`
- ⬢ `'$filter' 'month(Order/ShippedDate) eq 7 and year(Order/ShippedDate) eq 1997')`
- ⬢ `+/jt.value.((1-Discount)×Quantity×UnitPrice)`



End of part 2

