Subclassing the ooRexx dateTime class
History

• 2001 – Using ooRexx with APS Paypoint 6 till

• Dates in the format dd/mm/yyyy
  – Wrote a function to convert them to standard date, probably:
    – `return changeStr('/', translate('1234567890', arg(1), '9087651234'), '-')`

• Later: dateTime class was added to ooRexx
dateTime class

• Represents a point in time
• Can be created from the standard rexx date and time string representations
• Can present itself as the standard rexx date and time string representations
• Is immutable
• Can take part in date/time arithmetic
Subclassing

• Primarily thought of as way to specialise
• Allows use of all methods of superclass
• Allows over-riding for specialisation
• Allows adding new methods to extend

```/* ------------------------------------------------------- */
::class datetimes subclass datetime public
/* ------------------------------------------------------- */
```

• datetimes is a sub-class of datetime
Adding a constructor for european4date

- Constructor is a class method for creating an instance

```plaintext
/* ---------------------------------------- */
::method fromEuropean4Date class
/* ---------------------------------------- */
/* european4dates are like dd/mm/yyyy */
use arg euro4Date, separator = '/', offset=(time('O')/60000000)
RETURN self~fromStandardDate('7890645312'~translate(euro4Date,'1234567890')
    , separator
    , offset
)
```

- myDatetimes = .datetimes~fromEuropean4date('22/09/2019')
Providing a toString method for european4date

- This is an instance method for creating a string representation

```plaintext
/* ------------------------------------------------------------- */
::method european4Date
/* ------------------------------------------------------------- */
/* european4Date are like dd/mm/yyyy */
use arg separator = ''/
return '9086751234'~translate(self~standardDate(separator), '1234567890')
```

- That’s it – 3 directives & 4 lines of code and datetime is extended to handle a new format.
Immutability and the subclass

```plaintext
a = .datetime~new
b = .datetimes~new

c = a~addDays(1)
d = b~addDays(1)  -- addDays is a method of the superclass

say 'c is an instance of' c~class  -- c is an instance of The DateTime class
say 'd is an instance of' d~class  -- d is an instance of The DATETIMES class

::requires 'datetimes.cls'
```
Converting a datetime to a datetimes instance

• Datetimes has access to all methods of datetime, but not vica versa
• fromDateTime allows one to create a datetimes from a datetime

```rexx
a = .datetime~fromstandardDate('2019-01-01','-')
b = .datetimes~fromDateTime(a)
say b~class b~ european4Date
    -- returns The DATETIMES class 01/01/2019

::requires 'datetimes.cls'
```
Now we see how easy it is...

- datetime is specific about how an ISO datetime should be formatted, so is MySql
  - yyyy-mm-ddThh:mm:ss.uuuuuuu
  - yyyy-mm-dd hh:mm:ss

- USA date and Ordered date
Now let’s generalise it

• Imagine a universal constructor method ‘from’ that you told what format to accept
• And a universal toString method ‘to’ that would build the output to your format
Format strings

• ooDialog already has a class that uses date/time format strings as defined by Microsoft

• For our purposes we need some new ones...
Format strings not included in ooDialog documentation

<table>
<thead>
<tr>
<th>Format string</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>The day followed by suffix - ie 9th</td>
</tr>
<tr>
<td>q</td>
<td>The quarter number (1 – 4)</td>
</tr>
<tr>
<td>s</td>
<td>The one- or two-digit seconds *</td>
</tr>
<tr>
<td>ss</td>
<td>The two-digit seconds *</td>
</tr>
<tr>
<td>f</td>
<td>Fraction of a second (symbol chosen by Rick McGuire)</td>
</tr>
</tbody>
</table>

* | Not documented in ooDialog but used in underlying control

Full list of format strings in help document
Escape characters

• Literals (for example separators) may be included in the format string

• Where a literal is used that is defined as a format string – it must be escaped

• The escape character is chosen by programmer to be unique within the format string
Some Examples
Period start and finish

• Reporting often requires date/time calculations to find start and end of periods
• Add ‘startOf’ and ‘endOf’ methods
• Period may be offset from current period

<table>
<thead>
<tr>
<th>Minute</th>
<th>Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>Week</td>
</tr>
<tr>
<td>Month</td>
<td>Quarter</td>
</tr>
<tr>
<td>Year</td>
<td>Decade</td>
</tr>
<tr>
<td>Century</td>
<td>Millennium</td>
</tr>
</tbody>
</table>
Some Examples
Coordinated Universal Time

• UTC (Coordinated Universal Time) recognises time zones
• Times include an offset of hours and minutes from GMT
• FromUTCdate constructor accepts an offset yyyy-mm-ddThh:mm:ss.uuuuuu+hhmm
• All other datetime (and datetimes) constructors can accept an offset in minutes
Summertime Blues

- `dateTime` provides a method `toLocalTime` which returns an instance representing the local time
- BUT it doesn’t work across daylight savings boundaries
- The EU provide an algorithm for DS boundary dates (US does too, but it is different)
- `toLocalTimeEU` works across DS boundaries
An example
A Bonus

• Working out daylight savings boundaries required finding the last Sunday in the month

• I provided a general method nthWeekdayOfMonth to work out 1\textsuperscript{st}, 2\textsuperscript{nd}, last... Occurrence of a particular day in the month referred to be a datetimes instance
Where can I get this?

- Datetimes.cls is in my sandbox on the ooRexx site
- ...BUT...
- Since I started work on this Rick has built much of the new functionality shown here into the language. Coding is done, but not yet documentation.
Subclassing the ooRexx dateTime class

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The End