Rich Text Dialect

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1. Overview

Rich-Text is text that supports formatting. Different graphic styles can be applied to text or to segments of text.

The Rich-Text API has three different levels, from simplest to most optimized:

- Using RTD (from VID, or when manually constructing the face).
- A low-level rich styling dialect for one text string (for fast performance).
- Multiple rich text paragraphs in a single face (for complex layouts).

2. High-level Rich-Text Dialect (RTD)

Grammar

```
nested: [ahead block! into rtd]
color:  [
    s: tuple!   (v: s/1)                            ;-- color as R.G.B tuple
    | issue!    (v: hex-to-rgb s/1)                 ;-- color as #rgb or #rrggbb hex
value
    | word!     if (tuple? attempt [v: get s/1])
]
f-args: [
    ahead block! into [integer! string! | string! integer!]
    | integer!
    | string!
]
style!: make typeset! [word! tag! tuple! path!]
style: [ahead style! [
      ['b | 'bold      | <b>] (push 'b)   [nested | rtd [/b | /bold      | </b>]] (pop
'b)
    | ['i | 'italic    | <i>] (push 'i)   [nested | rtd [/i | /italic    | </i>]] (pop
'i)
    | ['u | 'underline | <u>] (push 'u)   [nested | rtd [/u | /underline | </u>]] (pop
'u)
    | ['s | 'strike    | <s>] (push 's)   [nested | rtd [/s | /strike    | </s>]] (pop
's)
    | ['f | 'font      | <font>]
        s: f-args (push either block? s/1 [head insert copy s/1 'f][reduce ['f s/1]])
        [nested | rtd [/f | /font | </font>]]
        (pop 'f)
    | ['bg | <bg>] color (push reduce ['bg v]) [nested | rtd [/bg | </bg>]] (pop 'bg)
    | color (push-color v) opt [nested (pop-color)]
    | ahead path!
      into [
        (col: 0 insert/only mark tail stack) some [                 ;@@ implement any-
single
            (v: none)
            s: ['b | 'i | 'u | 's | word! if (tuple? attempt [v: get s/1])]
            (either v [col: col + 1 push-color v][push s/1])
        ](insert cols col)
      ]
    nested (pop-all take mark)
]]
rtd: [some [pos: style | s: [string! | char!] (append text s/1 s-idx: tail-idx?)]]
```

NOTE	The path syntax allows to combine several styles together to be applied on the block following the path. Mixed usage of delimiters and blocks for different styles is allowed.

Usage

RTD input is processed by a specific `rtd-layout` function that will return a single-box rich-text face, where the RTD code will be compiled to a single text string (stored in /text facet) and a low-level

styling description (stored in /data facet).

The full specification of the function is:

```
rtd-layout func [
        "Returns a rich-text face from a RTD source code"
        spec [block!]   "RTD source code"
        /only           "Returns only [text data] facets"
        /with           "Populate an existing face object"
            face [object!] "Face object to populate"
        return: [object! block!]
]
```

Example:

```
rt: rtd-layout [<i> <b> "Hello" </b> <font> 24 red " Red " </font> blue "World!" </i>]

view [rich-text with [text: rt/text data: rt/data]]
```

RTD may be directly provided in VID for the rich-text `data` facet.

Examples:

```
view compose [rich-text 200x100 data [i b "Hello" /b font 24 red " Red " /font blue
"World!" /i]]

view compose [rich-text 200x100 data [i [b ["Hello"] red font 24 [" Red "] blue
"World!"]]]

view compose [rich-text 200x100 data [i/b/u/red ["Hello" font 32 " Red " /font blue
"World!"]]]

view compose [rich-text 200x100 data [i/blue ["Hello " b/u/red [font [32 "Arial"] "Red
" /font] "World!"]]]
```

3. Low-level Styling Dialect

This dialect describes a list of styles to be applied on the string referred by /text facet in a rich-text face. The purpose of this dialect is to provide a solution for dynamic changes and info querying that performs as fast as possible. This also maps well with the underlying hardware-accelerated APIs (it relies on Direct2D on Windows).

Usage

The dialect grammar is a simple list of text segments (defined using a starting position and a length combined in a pair! value) followed by a list of styles. So, the typical structure is:

```
[
    <range1> style1 style2 ...        ;-- range1: start1 x length1
    <range2> style1 style2 ...        ;-- range2: start2 x length2
    ...
]
```

Styles can overlap, and later styles have higher priority (cascading styles).

The following styles are supported:

```
[
      tuple!                              ;-- text color
    | backdrop tuple!                     ;-- background color
    | bold                                ;-- bold font
    | italic
    | underline tuple! (color)  lit-word! ('dash, 'double, 'triple) ;@@ color and type
are not supported yet
    | strike tuple! (color) lit-word! ('wave, 'double)              ;@@ color and type
are not supported yet
    | border tuple! (color) lit-word! ('dash, 'wave)                ;@@ not
implemented
    | integer!                            ;-- new font size
    | string!                             ;-- new font name
]
```

NOTE	Text's color should not follow immediately after `strike` or `underline`. Color and type for `strike` and `underline` will modify their line styles, not text. As they are not yet implemented, specifying color (or type) after these keywords will have no effect.

4. Rich text face type

A new native rich-text face type supports rich text features with underlying hardware-acceleration. The face has two modes for displaying rich text.

4.1. Single-box mode

The whole face area is used for displaying the rich text, starting at upper left corner, using the following specific facets:

- /data (block!): a block of low-level styling dialect instructions to be applied on text facet.
- /text (string!): a text string to be displayed using the /data facet styles description.

Draw facet can still be used and it will be rendered on top of the rich text display.

Examples:

```
view [
    rich-text with [
        text: "Hello Red World!"
        data: [1x17 0.0.255 italic 7x3 255.0.0 bold 24 underline]
    ]
]
view [
    rich-text "Hello Red World!"
    with [data: [1x17 0.0.255 italic 7x3 255.0.0 bold 24 underline]]
]
```

4.2. Multi-box mode

In this mode, an arbitrary number of rich text areas can be displayed inside the same rich-text face. In order to achieve that, each rich text area is specified using the text keyword in Draw dialect.

Specific facets:

- /draw (block!): a block of text instructions, eventually mixed with regular Draw instructions.
- /text (none!): this facet must be set to none in order to enable this mode.

Draw extension

```
text <pos> <text>

<pos>  : a pair! value indicating the upper left corner of the text-box.
<text> : a string, or a rich-text face object with a rich-text description in single-
box
```

Example:

```
view compose/deep [
    rich-text 200x200 draw [
        text 10x10 (rt1: rtd-layout ["Some^/" b "text^/" /b "here"] rt1/size: 50x80
rt1)
        text 100x90 (rt2: rtd-layout [red "Other^/" b "text^/" /b "there"] rt1/size:
50x80 rt2)
        pen gold box 90x80 160x180
    ]
]
```

5. Info querying functions

The following functions are provided to query information about the content of a rich-text face. These functions can be used to easily implement:

- cursor navigation
- hit testing

From the default context `system/words`:

```
caret-to-offset: function [
    "Given a text position, returns the corresponding coordinate relative to the top-
left of the layout box"
    face    [object!]
    pos     [integer!]
    return: [pair!]
]

offset-to-caret: function [
    "Given a coordinate, returns the corresponding text position"
    face    [object!]
    pt      [pair!]
    return: [integer!]
]

size-text: function [
    "Returns the area size of the text in a face"
    face [object!]
    /with                   ;-- unused for rich-text
        text [string!]
    return: [pair! none!]
]
```

From the rich-text context:

```
line-height?: function [
    "Given a text position, returns the corresponding line's height"
    face    [object!]
    pos     [integer!]
    return: [integer!]
]

line-count?: function [
    "number of lines (> 1 if line wrapped)"
    face    [object!]
    return: [integer!]
]
```

Examples:

```
view [
    rich-text data [font 16 "Select some text with your mouse" /font]
    on-down [
        bkg: reduce [ ; Background for selected text
            as-pair caret: offset-to-caret face event/offset 0
            'backdrop sky
        ]
        either 2 = length? face/data [ ; On first selection
            pos: tail face/data
            append face/data bkg
        ][ ; Changing starting pos on subsequent selections
            change pos bkg/1
        ]
    ] all-over
    on-over [
        if event/down? [ ; On dragging change only length
            pos/1/2: (offset-to-caret face event/offset) - caret
        ]
    ]
]
```

```
view compose/deep [
    rich-text draw [
        text 10x10 (rt: rtd-layout [i/blue ["Hello " red/b [font 24 "Red " /font]
"World!"]])
        line-width 5 pen gold
        line ; Let's draw line under words using a pair of above helper functions
            (as-pair 10 h: 10 + rich-text/line-height? rt 1) ; Starting-point y -> 10
+ line-height
            (as-pair 10 + pick size-text rt 1 h) ; End-point x -> 10 + length-of-text-
size
    ]
]
```