DYALOG

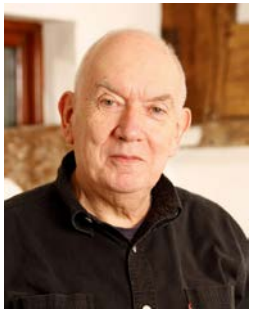
2021

The Road Ahead

Morten Kromberg
CTO, Dyalog Ltd.

[Re]Building the Team

- Lost some Giants



John Scholes (1948-2019)

Roger Hui (1953-2021)

- Rising Stars
- Hope to hire
  1 or 2 more in 2022

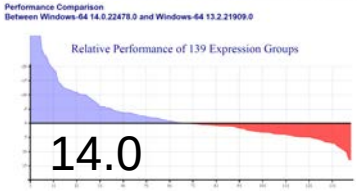
Shuhao Yang
C Developer

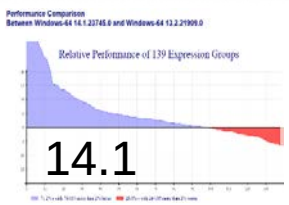
Rodrigo Girão Serrão
APL Dev + Training

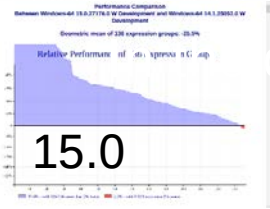
Karta Kooner
C Developer

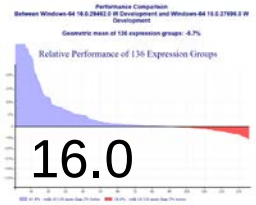
Performance and Quality

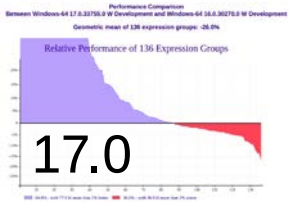
Performance Improvements (Windows)

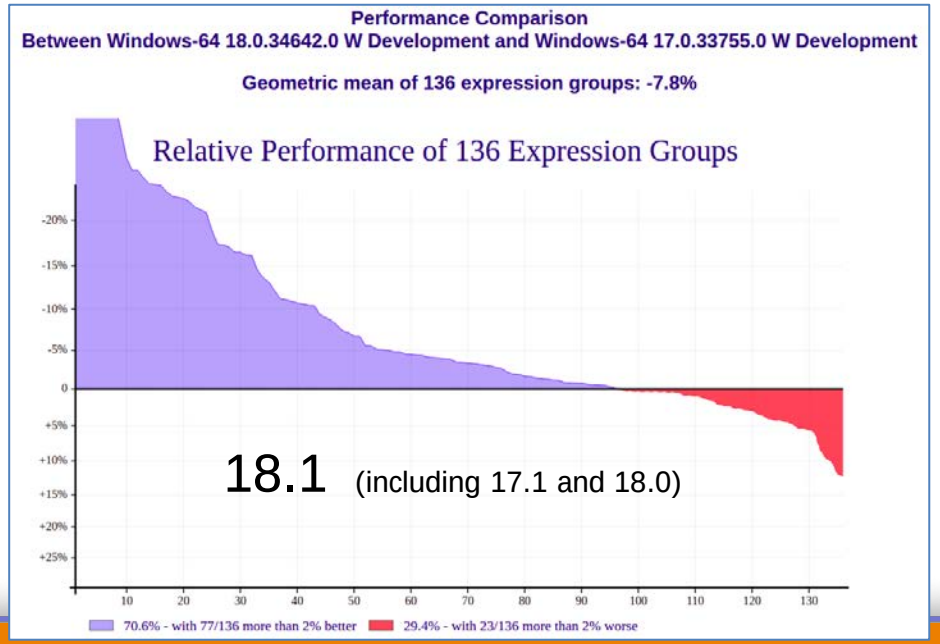












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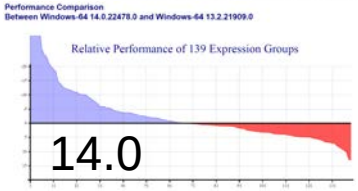

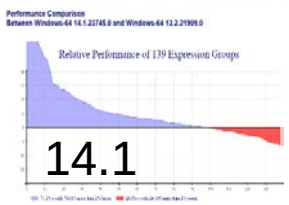

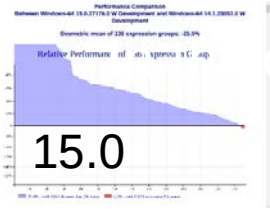

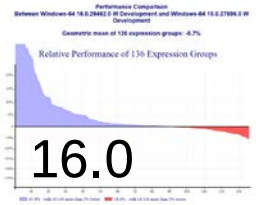

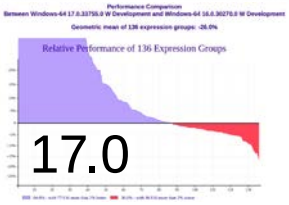

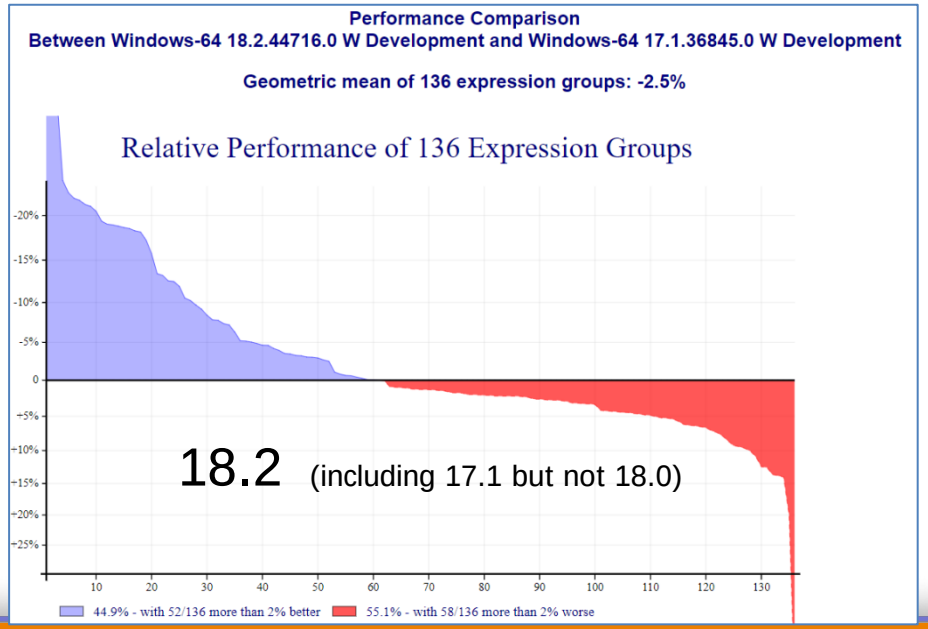

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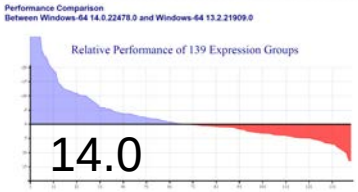
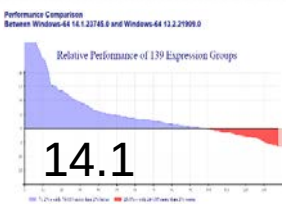
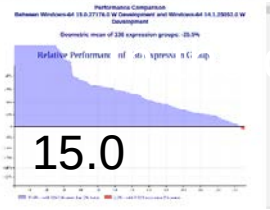
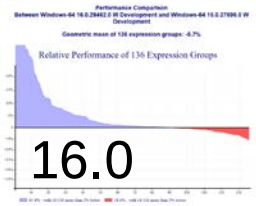
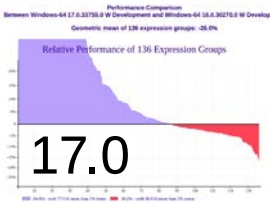
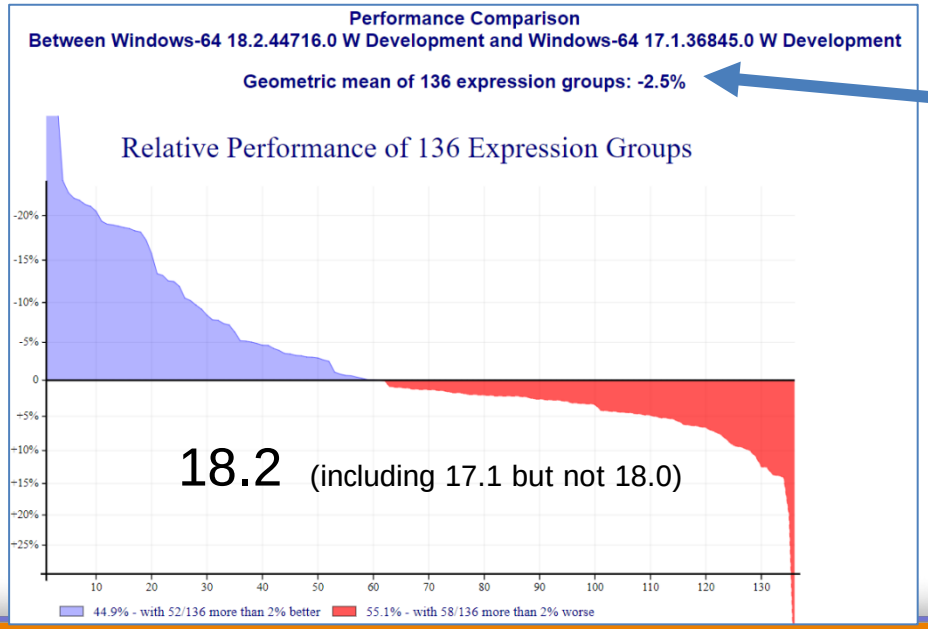












18.2 ≈ 17.1

Performance AND Quality

- Require formal risk assessment before changes to existing primitives

- Increase (automated) testing
  - Unit Tests
  - Code Coverage
  - APL Tool "Continuous Integration" testing

Security AND Correctness

BSIMM

Building Security in Maturity Model

- Compare own routines to industry practices
- Implement and continuously review practices that reduce security risk
  - Dyalog's processes will treat potential **computational errors** in the same way as **classical security threats**
- Hope to publish an Audit Report in 2022

Improving Training Materials

- mastering.dyalog.com
  Rodrigo Girão Serrao

- course.dyalog.com
  Rich Park

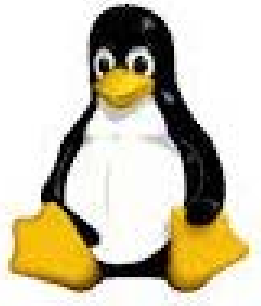
- xpqz.github.io/learnapl
  Stefan Kruger (IBM)

Adam Brudzewsky

APLCart
APL Orchard
… and much more

Improving Linux Support

- Linux has become the dominant platform for cloud deployment
- Fortunately, Dyalog APL was born under UNIX (1983)
  - In 1990-2005 most IDE+GUI development focused on Microsoft Windows



Improving I

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  for cloud dep
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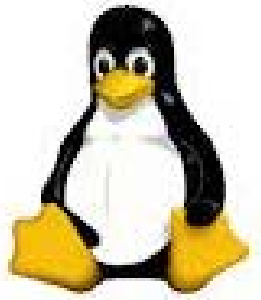
  - In 1990-20
    focused on

DYALOG

2. New Platforms

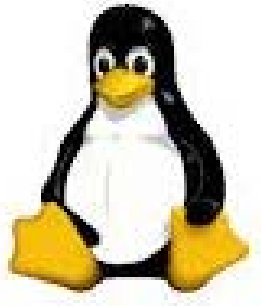
- UNIX variants
  - ARM Linux (Raspberry Pi),
    Apple OSX, Android
- Windows variants without Win32
  - **Universal Windows Platform (UWP),**
    New Servers, Windows for ARM
- Our new tools are designed to be cross-platform
  - RIDE, MiServer, SAWS, R-Connect, DyaCrypt
  - Some old ones too: Conga, SQAPL, …
- Our goal is to allow future apps to be developed on (any) one platform and deployed on (any) other

#dyalog14 APL



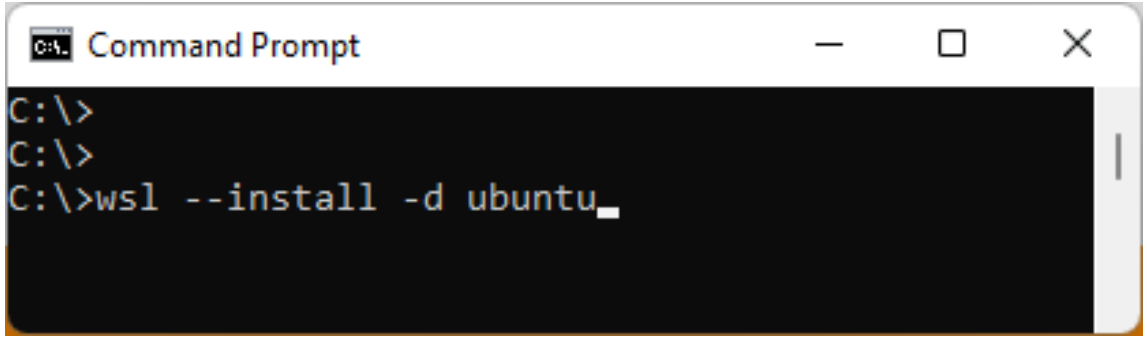
Improving Linux Support

- Linux has become the dominant platform for cloud deployment
- Fortunately, Dyalog APL was born under UNIX (1983)
  - In 1990-2005 most IDE+GUI development focused on Microsoft Windows
- We still have much to do



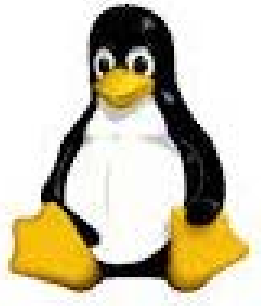
Linux is Everywhere…

- (macOS and Android are Linux too)
- Windows now includes Linux (WSL)
- … and soon Android too (WSA)



18.2 Features driven by Linux

- Remote Integrated Development Environment, aka. RIDE – version 4.4
- “shebang” (#!) scripting
  - Multi-line input
- Improved support for "headless" use (machines with no desktop)
  - More usable docker containers



Mostly, Linux ≡ "Cross Platform"

- .Net 5.0 (aka "Core")
- Configuration Files

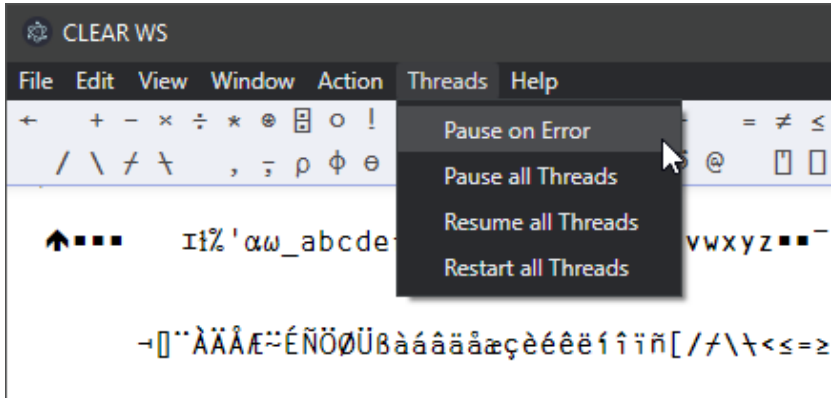
- All recently developed tools are designed to work under Windows, Linux, macOS

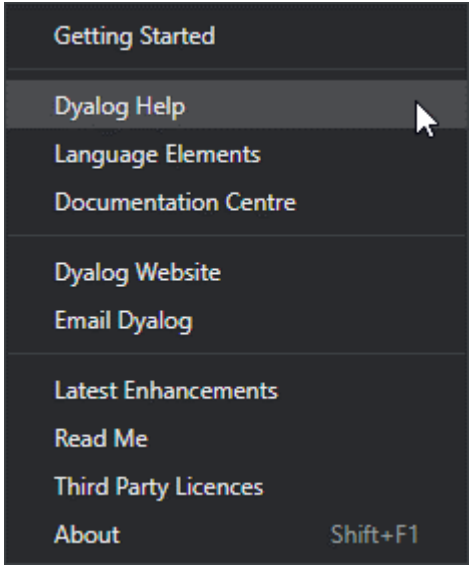
Align with Industry Practices

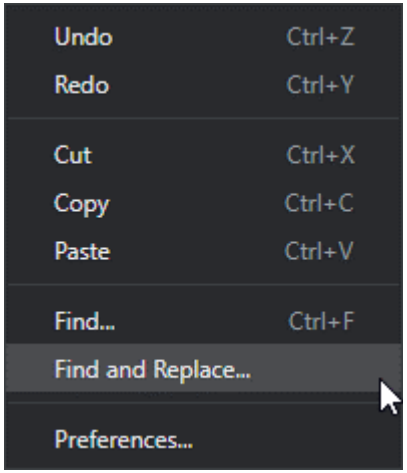
- Shell scripts 18.2
- Public docker containers 18.2
- Review keyboarding on all platforms 19.0

- Support for external editors
  - (Link, VS Code plugins, etc)

RIDE 4.4 Highlights







18.2

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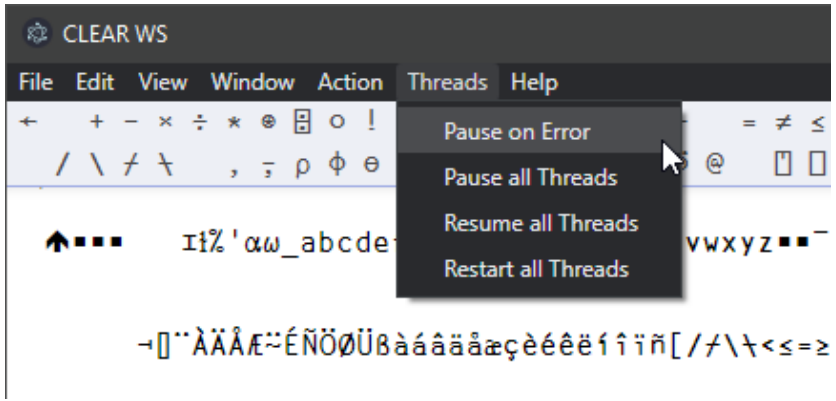

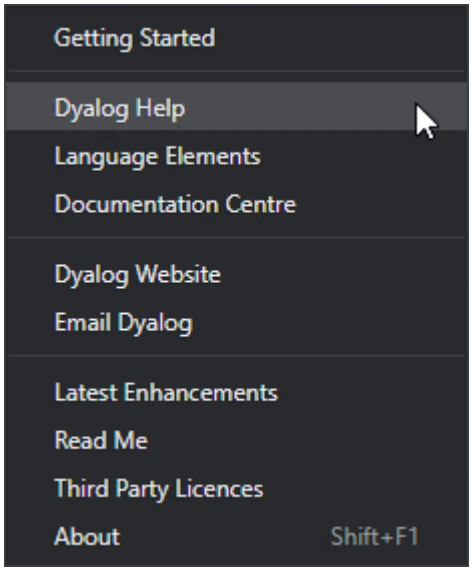

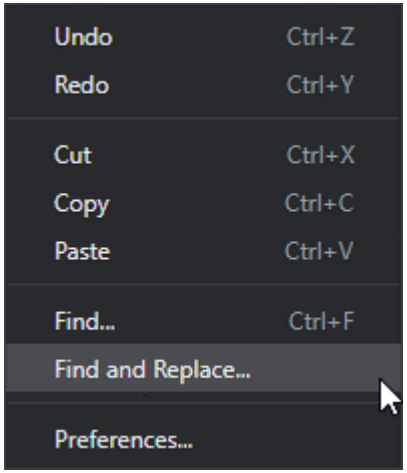

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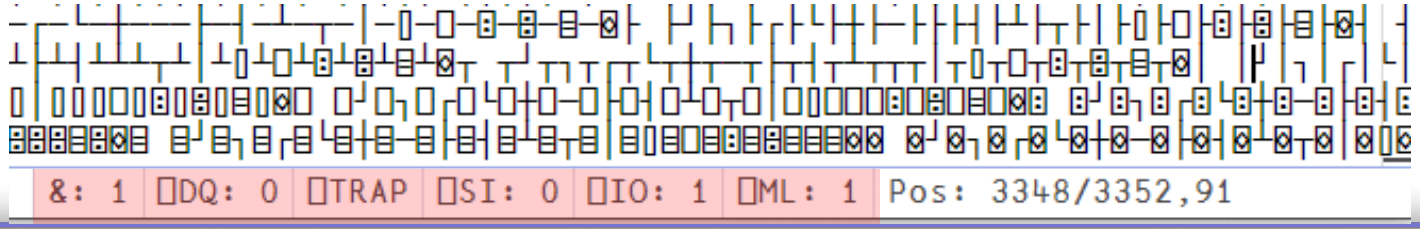

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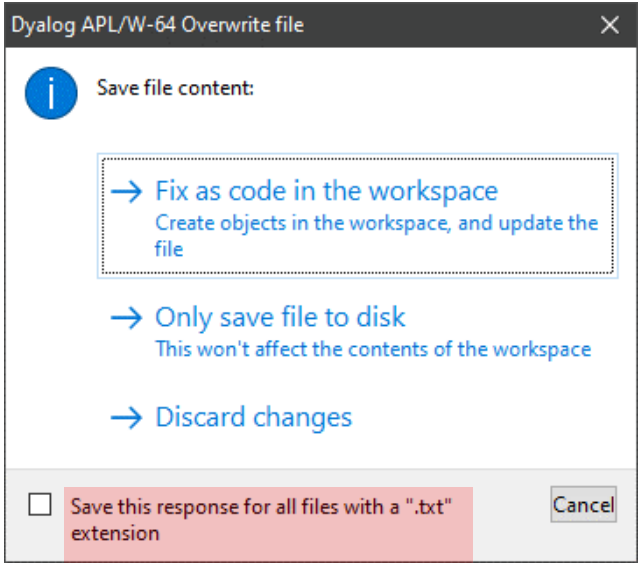
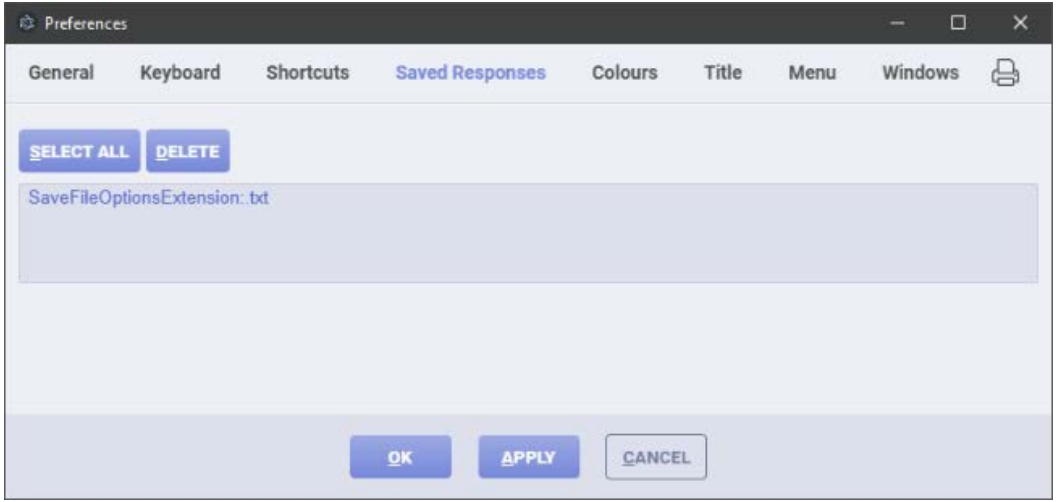
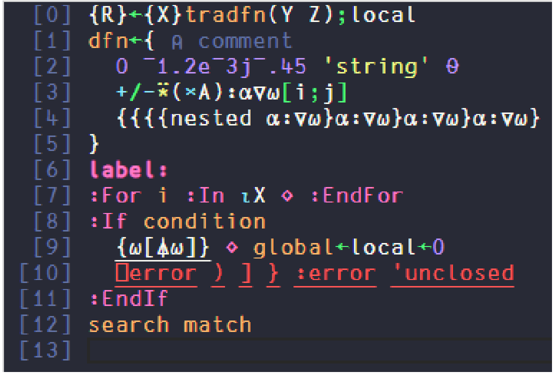


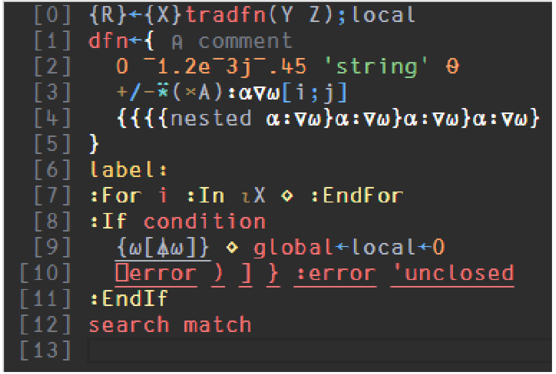


RIDE 4.4 Highlights

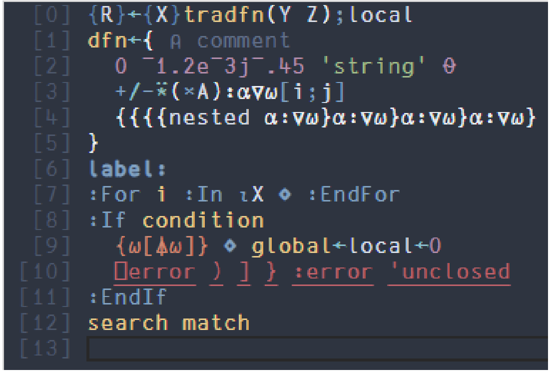
18.2



Dracula

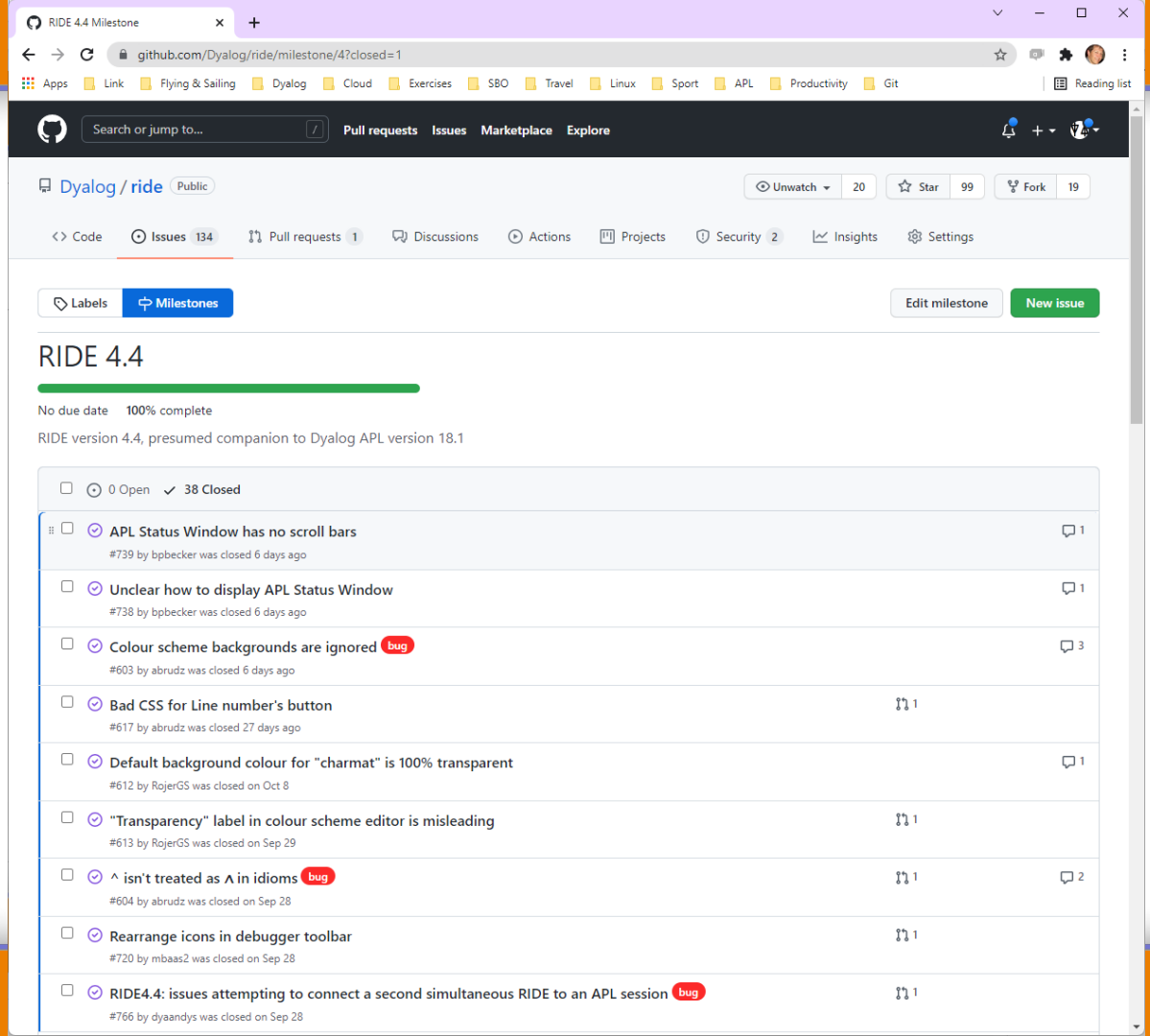


New Moon



Nord

RIDE 4.4


RIDE 4.4 Milestone
github.com/Dyalog/ride/milestone/4?closed=1
Search or jump to...
Pull requests
Issues
Marketplace
Explore
Dyalog / ride
Public
Unwatch 20
Star 99
Fork 19
Code
Issues 134
Pull requests 1
Discussions
Actions
Projects
Security 2
Insights
Settings
Labels
Milestones
Edit milestone
New issue
RIDE 4.4
No due date
100% complete
RIDE version 4.4, presumed companion to Dyalog APL version 18.1
0 Open
38 Closed
APL Status Window has no scroll bars
#739 by bpbecker was closed 6 days ago
Unclear how to display APL Status Window
#738 by bpbecker was closed 6 days ago
Colour scheme backgrounds are ignored
bug
#603 by abrudz was closed 6 days ago
Bad CSS for Line number's button
#617 by abrudz was closed 27 days ago
Default background colour for "charmat" is 100% transparent
#612 by RojerGS was closed on Oct 8
"Transparency" label in colour scheme editor is misleading
#613 by RojerGS was closed on Sep 29
^ isn't treated as ∧ in idioms
bug
#604 by abrudz was closed on Sep 28
Rearrange icons in debugger toolbar
#720 by mbaas2 was closed on Sep 28
RIDE4.4: issues attempting to connect a second simultaneous RIDE to an APL session
bug
#766 by dyaandys was closed on Sep 28

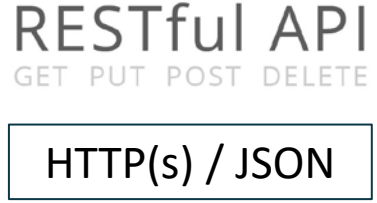
Service Orientation

A rapidly increasing proportion of new APL code is delivered as services

- ***Jarvis*** wraps APL code as HTTP/JSON or RESTful services on any platform
  - https://github.com/dyalog/jarvis
- Version 18.2 is easier to deploy and debug as a "headless" service
  - Allows improved docker containers

18.2

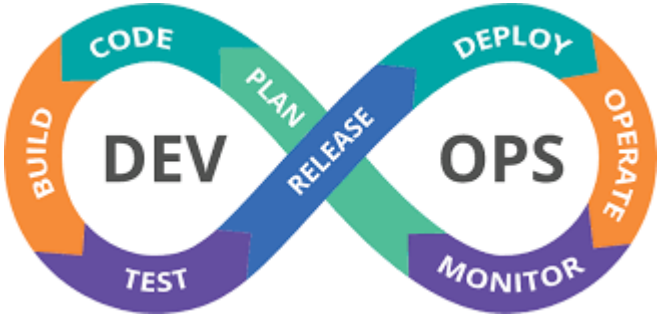
18.2



Development Operations (DevOps)

A set of practices intended to reduce the time between committing a change to a system and the change being placed into normal production, while ensuring high quality.

(Len Bass, Ingo Weber, Liming Zhu)



DevOps Support

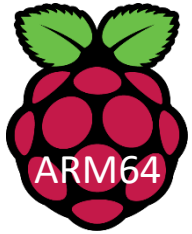
- Link 3.0 enables use of source code management systems (Git, SVN, ...)
- Tatin package manager to manage dependencies
- Shebang scripting simplifies automation

Internal use at Dyalog (pilot projects):

- Continuous Integration of APL Tools on GitHub
- Automatic deployment of updates to TryAPL

Support New Platforms

19.0



- ARM64 chip has arrived
  - v19.0: Raspbery Pi & “M1” Macs
  - Experimental Android and Windows
- For v19.0 we will review compilers & runtimes used on all platforms
- In v18.2 we resolved issues building & signing HTMLRenderer on new macOS
  - (v18.2 will require Big Sur 11.6.1)

18.2

Reducing Cost of Ownership

- Improve Quality

  - Increase Testing (with every release)
  - New process governing changes to primitive functions
- Microsoft Patch Files

  - Now able to update all components of a Windows installation with a single MSP
  - Already the case for AIX, Linux and macOS

Improve Productivity

- RIDE 4.4
- New/Updated System Functions in v18.2
  - ⎕JSON adds support for “tables”
  - ⎕ATX provides metadata about names
  - 16808⌶ generates non-linear distributions
  - New Win32 GUI (⎕WC) features!!!
    - CornerTitleBCol on Grid
    - FireOnce on Timer

Improve Productivity

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```
f.g.CornerTitleBCol←⊂255 0 0
```

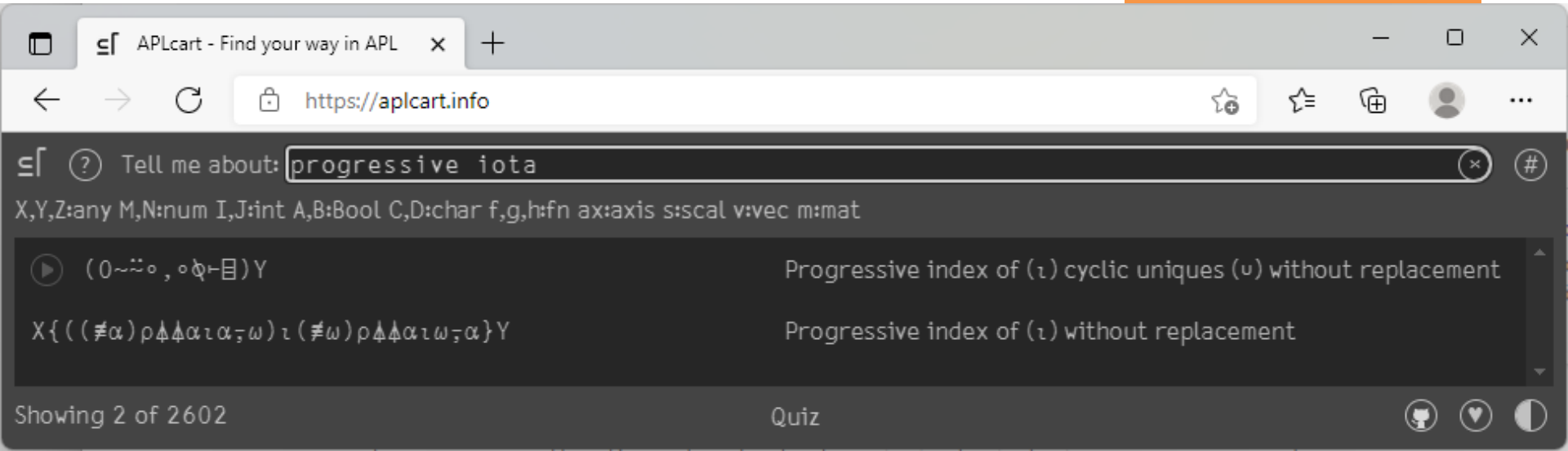
1	A
2	K
3	U

Improve Productivity

18.2

New User Commands & Utilities

```
]APLCart
]Get
]Repr
]View
```



Improve Productivity

18.2

New User Commands & Utilities

```
]APLCart
]Get
]Repr
]View
```

```
      ]aplcart progressive iota

X,Y,Z:any M,N:num I,J:int A,B:Bool C,D:char f,g,h:fn ax:axis s:scal v:vec m:mat
────────────────────────────────────────────────────────────────────────────────
(0~⍨∘,∘⍉⊢⌸)Y                     Progressive index of (⍳) cyclic uniques (∪) without replacement
X{((≢⍺)⍴⍋⍋⍺⍳⍺⍪⍵)⍳(≢⍵)⍴⍋⍋⍺⍳⍵⍪⍺}Y  Progressive index of (⍳) without replacement
────────────────────────────────────────────────────────────────────────────────
Showing 2 of 2 matches
```

Enhancing APL Language: Array Notation

```
['Jan'              'Feb'              'Mar'
 (101 102 103 104) (201 202 203 204) (301 302 303 304)]
```

19.0

Final review of spec

Enhancing APL Language: Under ⍢⃛

20.0?

Computational Under: Mathematical definition

```
      α f⍢⃛g ω     ↔      (g⍣¯1) (g α) f (g ω)

      2 3 4 +⍢⃛⊛ 2
4 6 8
```

Structural Under: Less strict, but "more useful"

```
      1 ⎕C⍢⃛(⊃¨) 'adam' 'karta' 'shuhao'
 Adam  Karta  Shuhao
```

Also to come...

Obverse: `FFT⍨⃛IFT`
(declared inverse)

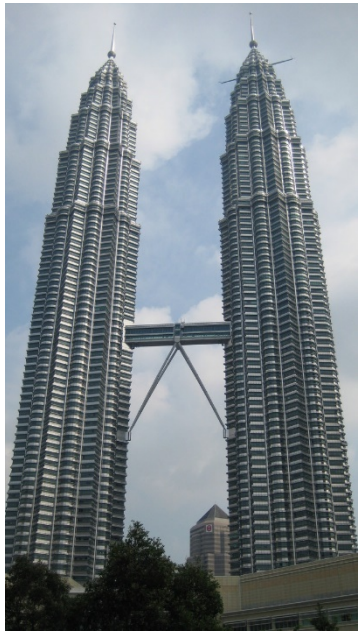
Depth: `f⍤n`
(f on depth-n sub-arrays)

Enhancing APL: Multiple Towers

Goals:

- Better control of DECIMAL data type
- Accommodate INT64 and RATIONAL types

20.0?



Model: Three Towers, selectable **per array**

- Fast: BOOL, INT 8-16-32, DOUBLE, COMPLEX
- Decimal: BOOL, INT 8-16-32-64, DECF
- Unlimited: RATIONAL

Significant design remains to be done on rules for comparison and promotion.

Watch this space!

Quest for the Holy Grail

Simple Cross-Platform User Interfaces

```
'hr' ⎕WC 'HTMLRenderer' 'Hello <b>World</b>'
```

Simple Cross-Platform User Interfaces

```
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  - Our "DUI" has not yet caught on
- Perhaps the community can help?

GitHub: the-carlisle-group / Abacus

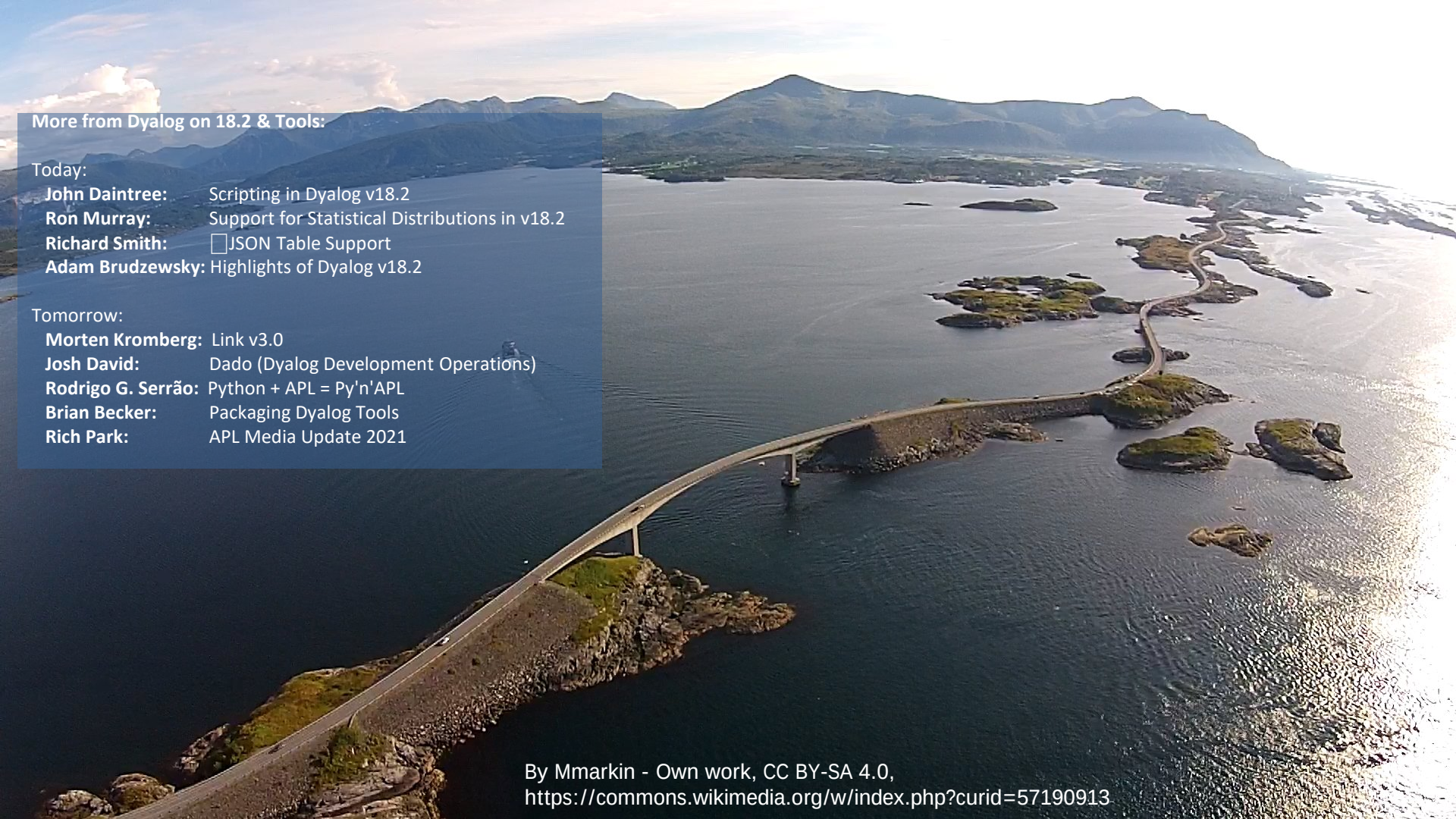
- Project to generate HTML from simple APL code

```
Run←{
    ⎕THIS.H←##.Main
    p←⎕NS''
    p.Caption←'Sample Form'
    p.Title←'A Sample Dialog Box'
    p.Subtitle←'This is a resizable, modal dialog box.'
    p.OnOK←'OnOK'
    p.OnCancel←'OnCancel'
    p.Content←##.Grid.New GridDataLarge 0
    ##.DialogBox.Run p
}
```

Release Schedule

in Beta, release before end 2021

content & timing not decided



More from Dyalog on 18.2 & Tools:

Today:

- **John Daintree:** Scripting in Dyalog v18.2
- **Ron Murray:** Support for Statistical Distributions in v18.2
- **Richard Smith:** JSON Table Support
- **Adam Brudzewsky:** Highlights of Dyalog v18.2

Tomorrow:

- **Morten Kromberg:** Link v3.0
- **Josh David:** Dado (Dyalog Development Operations)
- **Rodrigo G. Serrão:** Python + APL = Py'n'APL
- **Brian Becker:** Packaging Dyalog Tools
- **Rich Park:** APL Media Update 2021