



Converting to Dyalog APL Lessons Learned

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Acknowledgements & Introduction

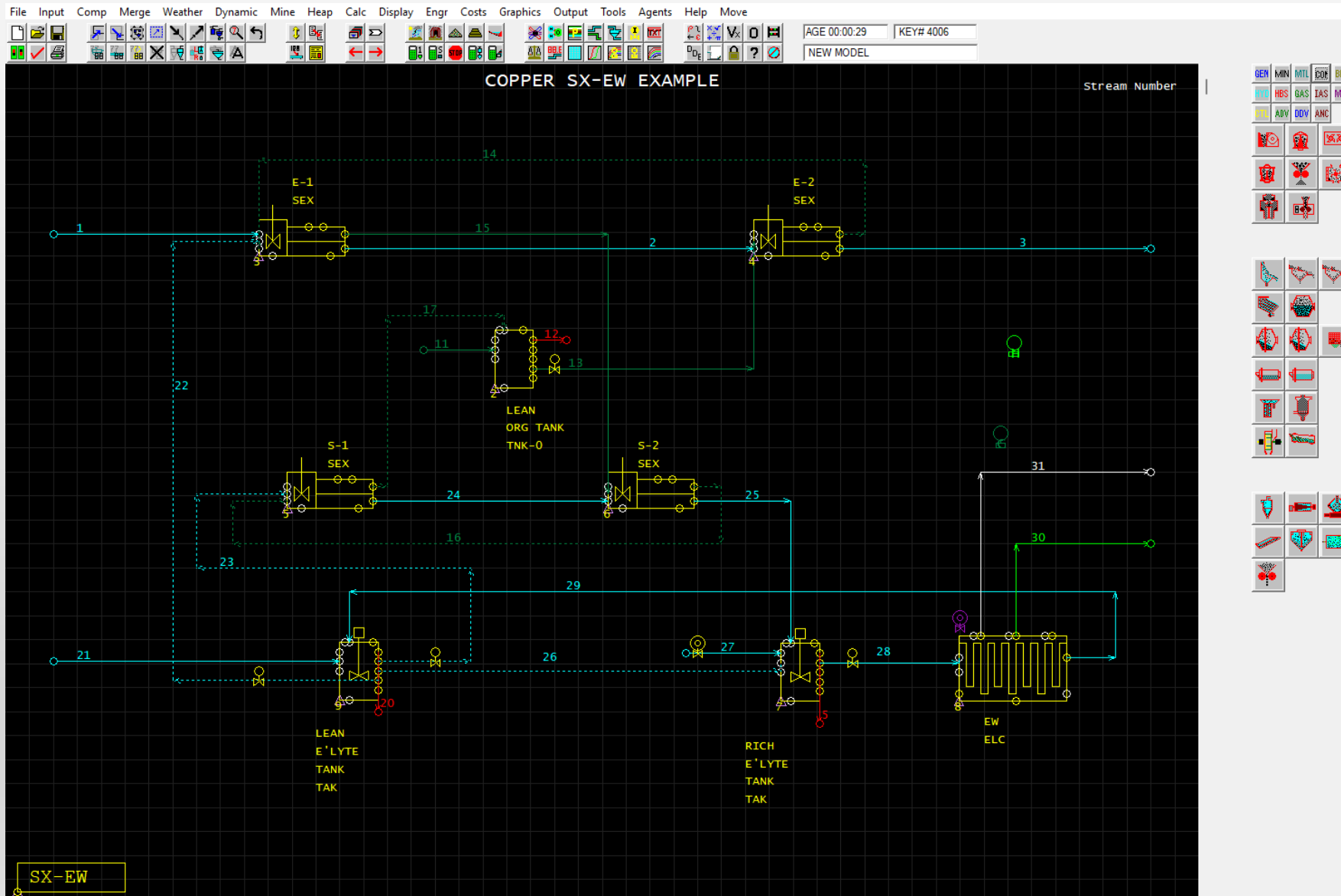


Brief History of METSIM®

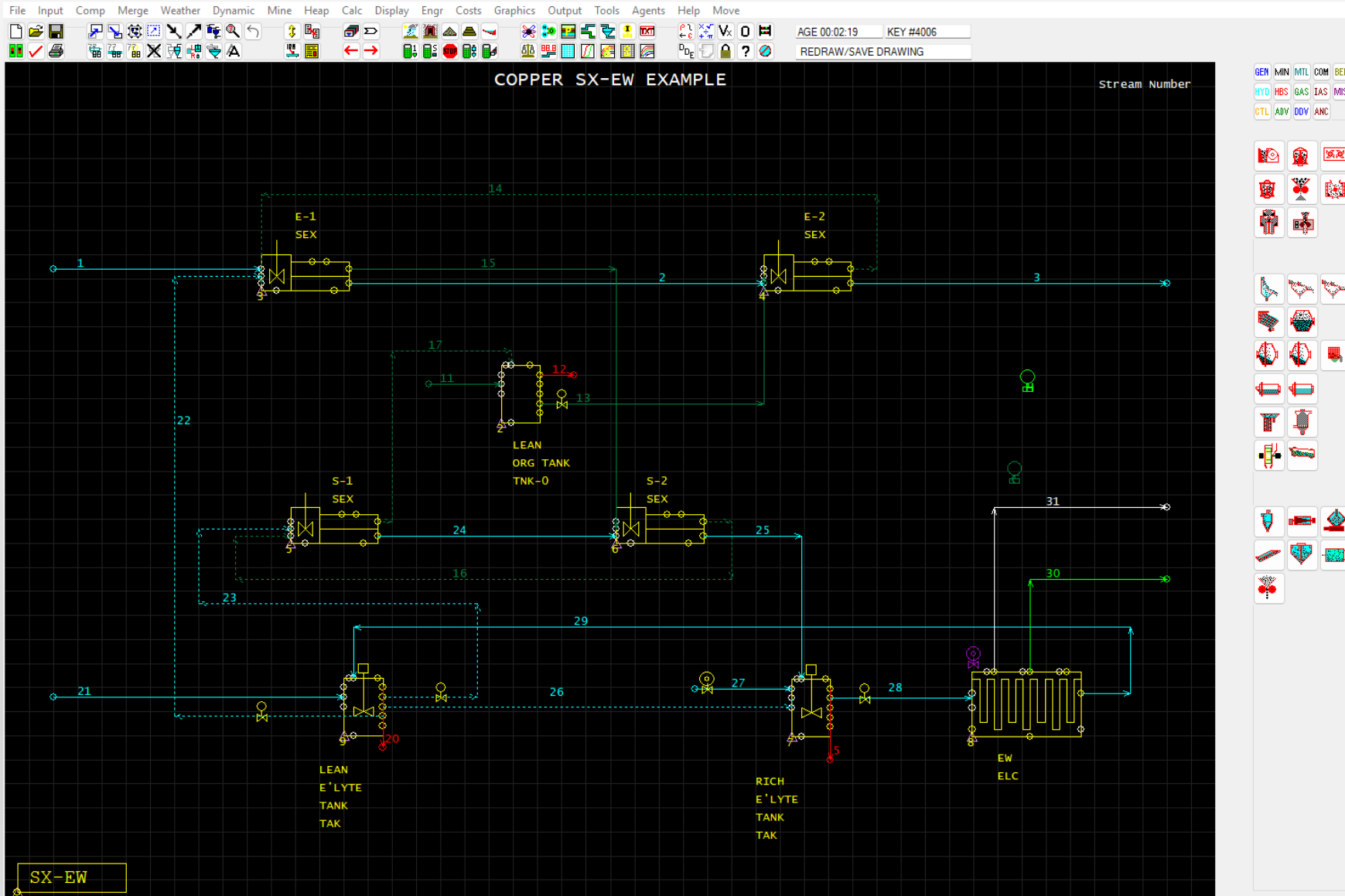
- Started in the late 1970's by John Bartlett to serve as a mass balancing tool mineral processing engineering
- First registered as a commercial product in 1982
- Conversion to a graphical interface in the late 1990's to all for process flowsheet development
- Licensed to over 700 companies and 250 universities worldwide
- Converted from APL+Win to Dyalog APL in 2025



METSIM® GUI – APL+Win



METSIM® GUI – Dyalog APL



18 Months for Conversion Project

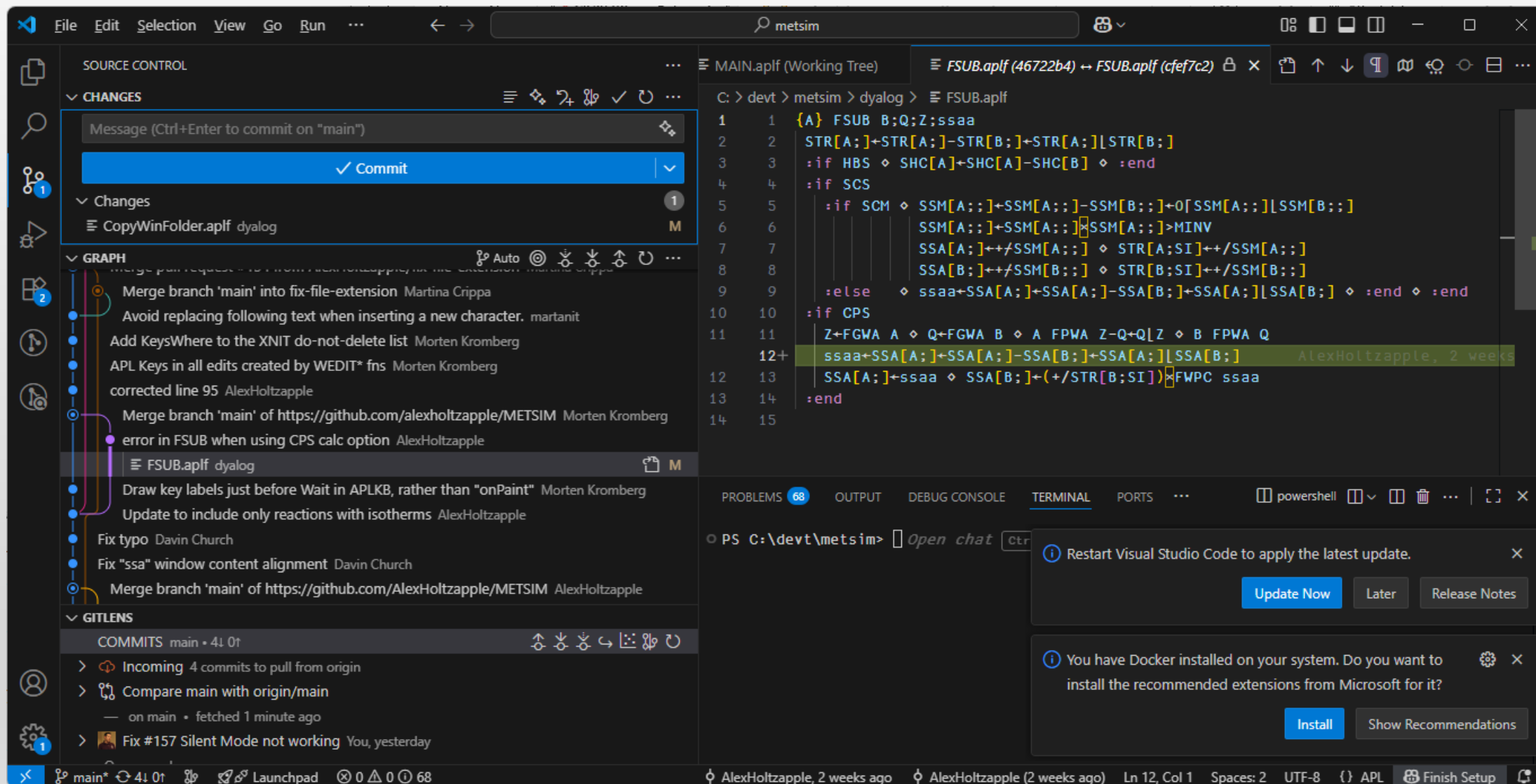
- MSI contracted Dyalog APL directly to manage conversion of 100% of METSIM® source code in February 2024
- Established an online repository utilizing GitHub
 - Created by Dyalog team
 - MSI uploaded all associated workspaces and component files
 - Allowed for cross-team collaboration and easy “check system”
- Dyalog team got to work...
 - Direct conversion (easy)
 - Dyalog emulators for APL+Win (less easy)
 - Where improvements could be made, they were (very easy)
- MSI included throughout the entire process

Comparable?

```
[0] XFCOM dd;dn;z;vn;Z;i;q;z;n;v;xx;f;fn;ft;zz;qq;t;it;tm;ni;res;Q;vntext
[1] :IF 1<dd A File Read
[2] InTagNames<-CΔB
[3] :For i :In 1 FIND FCOM[:3]
[4] vn<-FCOM[i;2] ♦ t<-FCOM[i;4] ♦ f<-FCOM[i;5]
[5] z+1 FAFR f
[6] :if z=0
[7] Wmsg ('File ',(f), ' Not Read; Close File and Ensure Path') 16
[8] →0
[9] :end
[10] :if 0≡pz ♦ →0 ♦ :end
[11] temp+,z
[12] :if '-'<temp
[13] temp[1 FIND "-" = temp]< '-'
[14] z+(pz)ρtemp
[15] :end
[16] :if t=2 ♦ InTagNames<InTagNames,cz[1;] ♦ z+(1 0)↓z
[17] :else ♦ InTagNames<InTagNames,cFDTB FDLB ϕ(ρz)ρ<'Value'
[18] :end
[19] q+(ρz)[1]
[20] :if z[q;]≡(ρz)[2]ρΔB ♦ q←q-1 ♦ z+(-1 0)↓z ♦ :end
[21] :if q>1 ♦ n←ρz[1;] ♦ v+(0,n)ρ0
[22] :if 'csv'≡-3↑f ♦ q←q-1 ♦ :end
[23] :for r :in lq
[24] z[r;1 FIND '-' = z[r;]]< '-'
[25] xx←nt(ϕz[r;]),100ρ0
[26] v+v;xx
[27] :endfor
[28] :else ♦ v←ϕz
[29] :end
[30] Z←(88,i) FEEXE vn,'+v'
[31] :Endfor
[32] :END
```

```
[0] XFCOM dd;dn;z;vn;Z;i;q;z;n;v;xx;f;fn;ft;zz;qq;t;it;tm;ni;res;Q;vntext
[1] :IF 1<dd A File Read
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[25] xx←nt(ϕz[r;]),100ρ0
[26] v+v;xx
[27] :endfor
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[29] :end
[30] Z←(88,i) FEEXE vn,'+v'
[31] :Endfor
[32] :END
```

Visual Studio Code (part of the workflow)



The screenshot displays the Visual Studio Code interface with the following components:

- Source Control Panel (Left):** Shows a list of changes and a commit message input field. The commit message is "Message (Ctrl+Enter to commit on 'main')". The changes list includes "Merge branch 'main' into fix-file-extension" and "Avoid replacing following text when inserting a new character".
- Code Editor (Center):** Displays the file `FSUB.aplf` with the following code:

```
1 1 {A} FSUB B;Q;Z:ssaa
2 2 STR[A;]+STR[A;]-STR[B;]+STR[A;][STR[B;]
3 3 :if HBS ◇ SHC[A;]+SHC[A;]-SHC[B] ◇ :end
4 4 :if SCS
5 5 :if SCM ◇ SSM[A;;]+SSM[A;;]-SSM[B;;]+0[SSM[A;;][SSM[B;;]
6 6 SSM[A;;]+SSM[A;;]SSM[A;;]>MINV
7 7 SSA[A;]+/SSM[A;;] ◇ STR[A;SI]++/SSM[A;;]
8 8 SSA[B;]+/SSM[B;;] ◇ STR[B;SI]++/SSM[B;;]
9 9 :else ◇ ssaa+SSA[A;]+SSA[A;]-SSA[B;]+SSA[A;][SSA[B;] ◇ :end ◇ :end
10 10 :if CPS
11 11 Z+FGWA A ◇ Q+FGWA B ◇ A FPWA Z-Q+Q[Z ◇ B FPWA Q
12+ ssaa+SSA[A;]+SSA[A;]-SSA[B;]+SSA[A;][SSA[B;] AlexHoltzaple, 2 weeks
12 13 SSA[A;]+ssaa ◇ SSA[B;]+(+/STR[B;SI])FWPC ssaa
13 14 :end
14 15
```
- Terminal (Bottom):** Shows the command prompt `PS C:\dev\metSim>` and a notification to restart Visual Studio Code to apply the latest update.

Dyalog Emulators for Windows

METSIM® has relied on several APL+Windows commands for functionality over the years, limiting its ability to run on other operating systems.

No more...

Why?

MSI exists in the mining sector, but is a technology and software provider so must stay current:

- *APIs with external systems*
- *Calculation speeds*
- *Program development techniques*

Directly working with Dyalog APL team ensures latest tools and techniques are included within METSIM®

Thank You

