Rebuilding a production APL environment using Dyalog

Dyalog ’22 – 10/10/2022

Mark I.Wolfson

BIG

Summary

- Who is BIG and why is it a perfect use-case for APL
- Old: Middleware environment with awkward links into the production .Net environment and web application
- New: Seamless integration using existing tools and structures.

BIG

Big Business – Disrupting the Jewelry Industry

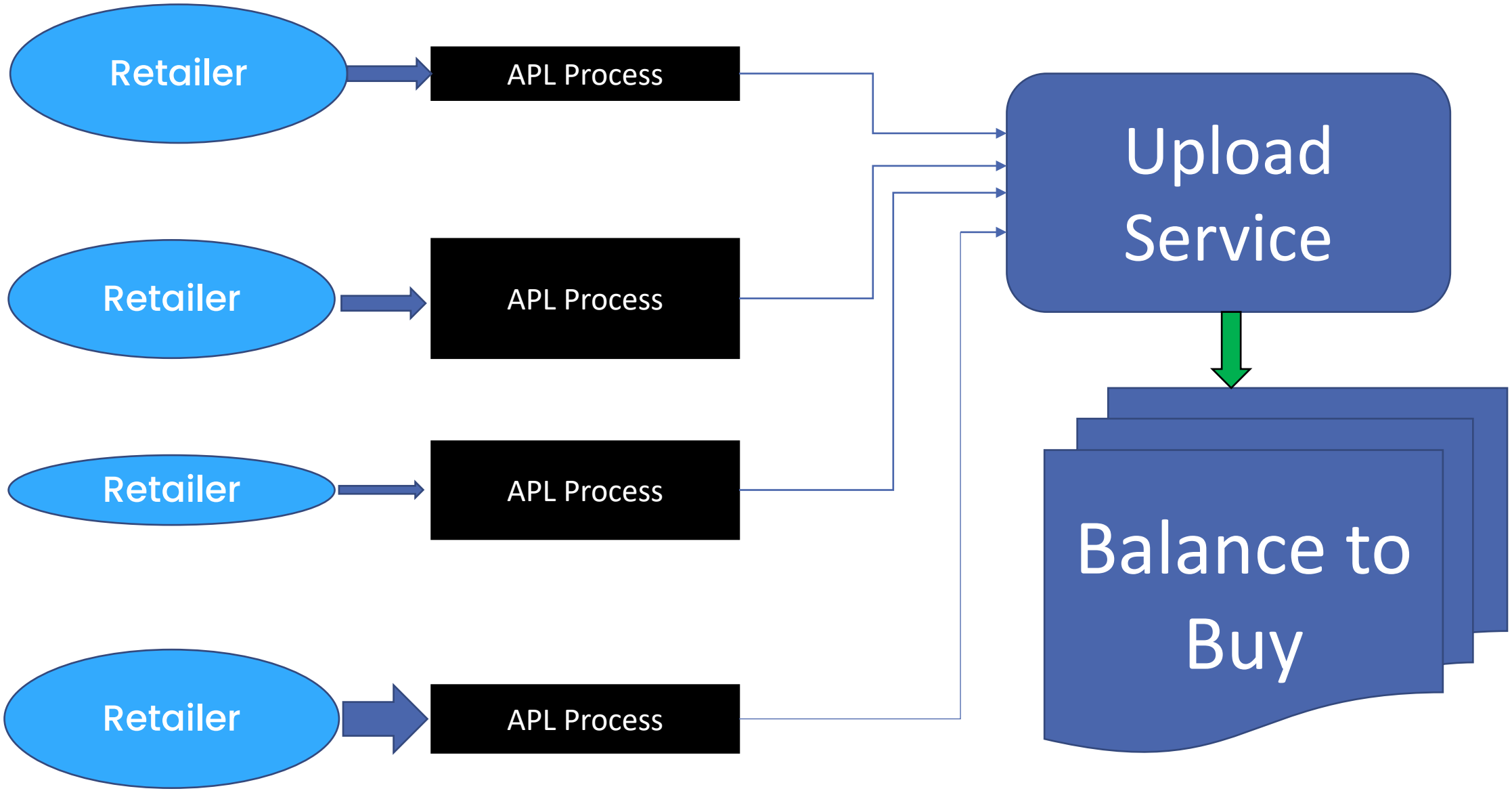
- Prior to BIG - 2005
  - Independent Jewelers – family-owned businesses
  - No POS/Inventory Management
    - Wrong inventory mix
    - Too much non-performing inventory
- Balance to Buy - 2007
  - Improve performance by using data
    - Analyze prior consumer behavior
    - Strategies to reduce aged inventory
    - Budget/Plan/Buy/Manage

How to get data from retailers?

- Retailers with no technical capabilities
  - Direct user upload
  - Emailed reports
  - Monthly data
- Direct POS Integration
  - Daily transmissions
  - With and without cooperation from software companies
  - The Applet – a big ask

Retailer Data – A HOT MESS

- Integration with dozens of systems
  - Varying number of files even for the same system
  - Different formats
    - Flavors of CSV
    - Text files
    - Excel
    - XML
    - JSON
  - Different content
    - Variations in content between retailers using the same system
    - Variations within a retailer depending on who's entering the data
    - Changes over time


Retailer
Retailer
Retailer
Retailer
APL Process
APL Process
APL Process
APL Process
Upload Service
Balance to Buy

Building a monster – the APL2 Solution

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APL2 Production Environment

- One workspace – 1500 functions
  - Old, new, unused
  - 100 Launch functions
    - Check for data, find filenames
    - Error handling
    - Notifications
  - Special-use functions, variations of functions
  - Multiple versions for variations in data
- Mish-mash of workarounds
  - Reading different file formats
    - Excel as data converter
    - Powershell as data converter
    - Ad-hoc converters
  - Kludges to communicate with Production DB
    - Scheduled queries

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APL2 Production Environment

- Data expected at a certain time
- Windows scheduled tasks
- .bat files

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Dyalog to the RESCUE!

- First impulse: Use Dyalog but keep the same execution structure.
- Better: create new production environment around all the new tools in Dyalog!

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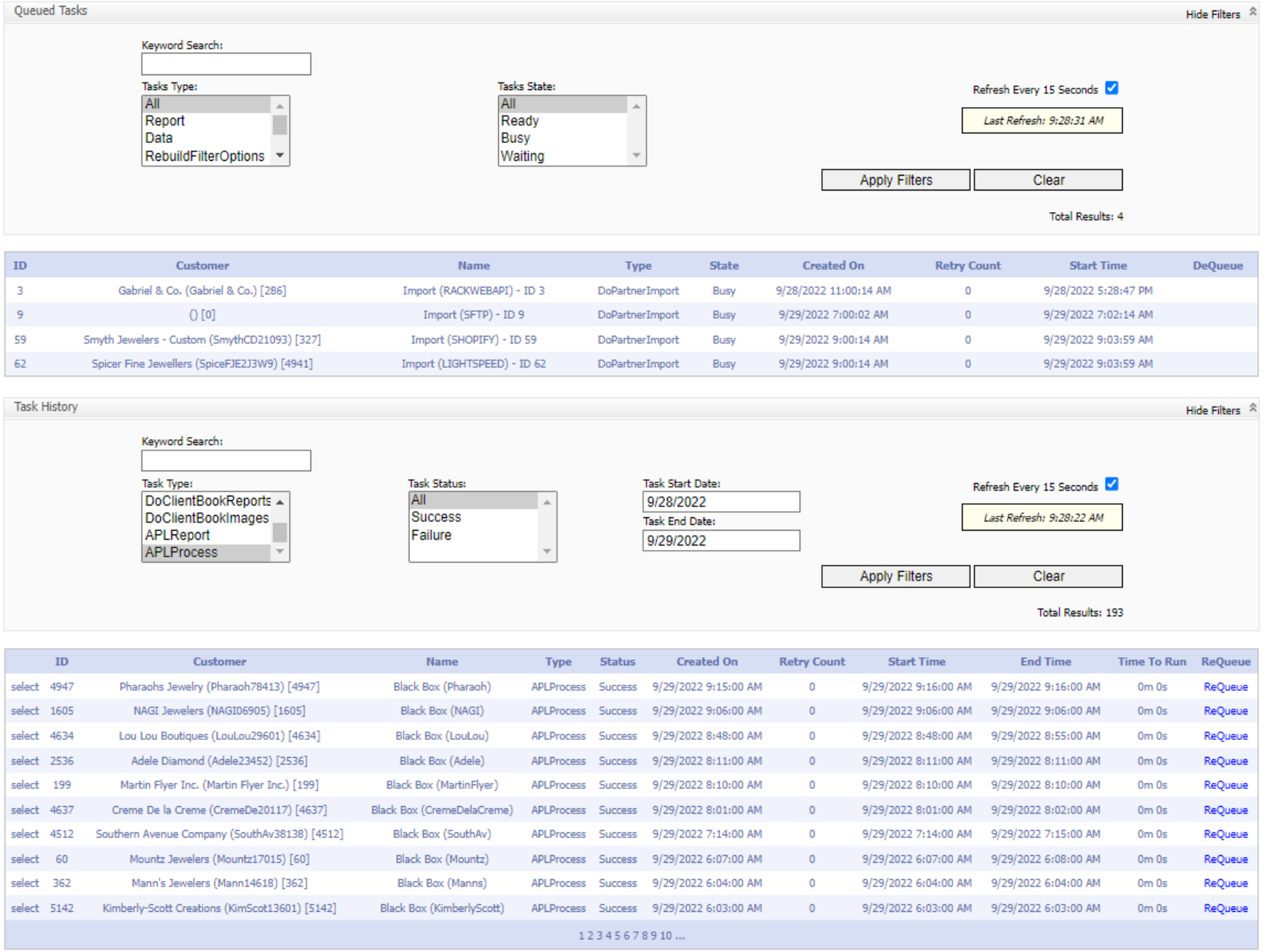
New Production Environment

- Windows Service
- Code in text files
- Restructure data directories
- Single unified Launch function
- Global file handling
- Global error handling

BIG

Queue Manager



Queued Tasks

Hide Filters

Keyword Search:

Tasks Type: All, Report, Data, RebuildFilterOptions

Tasks State: All, Ready, Busy, Waiting

Refresh Every 15 Seconds

Last Refresh: 9:28:31 AM

Apply Filters | Clear

Total Results: 4

ID	Customer	Name	Type	State	Created On	Retry Count	Start Time	DeQueue
3	Gabriel & Co. (Gabriel & Co.) [286]	Import (RACKWEBAPI) - ID 3	DoPartnerImport	Busy	9/28/2022 11:00:14 AM	0	9/28/2022 5:28:47 PM	
9	() [0]	Import (SFTP) - ID 9	DoPartnerImport	Busy	9/29/2022 7:00:02 AM	0	9/29/2022 7:02:14 AM	
59	Smyth Jewelers - Custom (SmythCD21093) [327]	Import (SHOPIFY) - ID 59	DoPartnerImport	Busy	9/29/2022 9:00:14 AM	0	9/29/2022 9:03:59 AM	
62	Spicer Fine Jewellers (SpiceFJE2J3W9) [4941]	Import (LIGHTSPEED) - ID 62	DoPartnerImport	Busy	9/29/2022 9:00:14 AM	0	9/29/2022 9:03:59 AM	

Task History

Hide Filters

Keyword Search:

Task Type: DoClientBookReports, DoClientBookImages, APLReport, APLProcess

Task Status: All, Success, Failure

Task Start Date: 9/28/2022

Task End Date: 9/29/2022

Refresh Every 15 Seconds

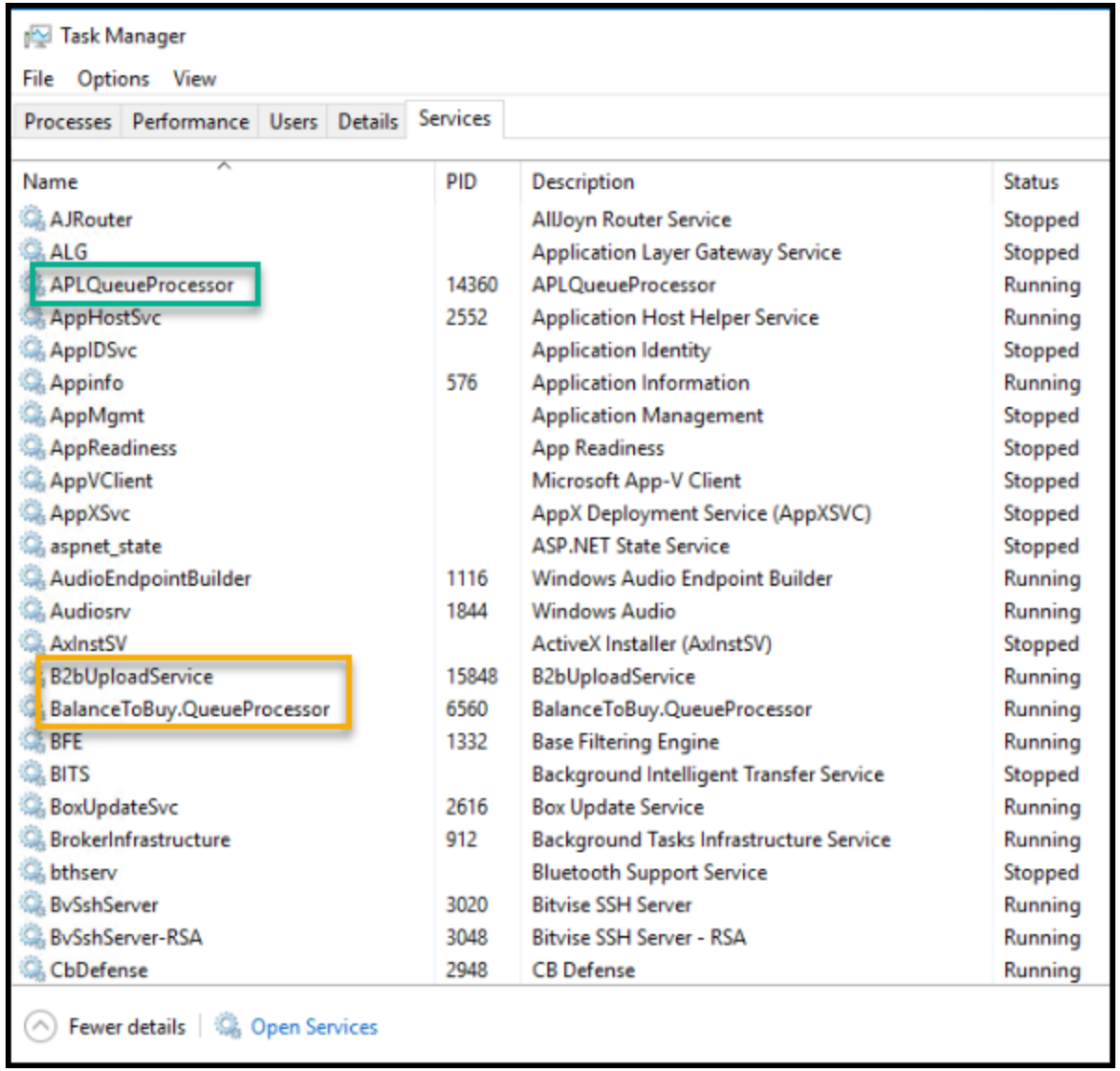
Last Refresh: 9:28:22 AM

Apply Filters | Clear

Total Results: 193

	ID	Customer	Name	Type	Status	Created On	Retry Count	Start Time	End Time	Time To Run	ReQueue
select	4947	Pharaohs Jewelry (Pharaoh78413) [4947]	Black Box (Pharaoh)	APLProcess	Success	9/29/2022 9:15:00 AM	0	9/29/2022 9:16:00 AM	9/29/2022 9:16:00 AM	0m 0s	ReQueue
select	1605	NAGI Jewelers (NAGI06905) [1605]	Black Box (NAGI)	APLProcess	Success	9/29/2022 9:06:00 AM	0	9/29/2022 9:06:00 AM	9/29/2022 9:06:00 AM	0m 0s	ReQueue
select	4634	Lou Lou Boutiques (LouLou29601) [4634]	Black Box (LouLou)	APLProcess	Success	9/29/2022 8:48:00 AM	0	9/29/2022 8:48:00 AM	9/29/2022 8:55:00 AM	0m 0s	ReQueue
select	2536	Adele Diamond (Adele23452) [2536]	Black Box (Adele)	APLProcess	Success	9/29/2022 8:11:00 AM	0	9/29/2022 8:11:00 AM	9/29/2022 8:11:00 AM	0m 0s	ReQueue
select	199	Martin Flyer Inc. (Martin Flyer Inc.) [199]	Black Box (MartinFlyer)	APLProcess	Success	9/29/2022 8:10:00 AM	0	9/29/2022 8:10:00 AM	9/29/2022 8:10:00 AM	0m 0s	ReQueue
select	4637	Creme De la Creme (CremeDe20117) [4637]	Black Box (CremeDelaCreme)	APLProcess	Success	9/29/2022 8:01:00 AM	0	9/29/2022 8:01:00 AM	9/29/2022 8:02:00 AM	0m 0s	ReQueue
select	4512	Southern Avenue Company (SouthAv38138) [4512]	Black Box (SouthAv)	APLProcess	Success	9/29/2022 7:14:00 AM	0	9/29/2022 7:14:00 AM	9/29/2022 7:15:00 AM	0m 0s	ReQueue
select	60	Mountz Jewelers (Mountz17015) [60]	Black Box (Mountz)	APLProcess	Success	9/29/2022 6:07:00 AM	0	9/29/2022 6:07:00 AM	9/29/2022 6:08:00 AM	0m 0s	ReQueue
select	362	Mann's Jewelers (Mann14618) [362]	Black Box (Manns)	APLProcess	Success	9/29/2022 6:04:00 AM	0	9/29/2022 6:04:00 AM	9/29/2022 6:04:00 AM	0m 0s	ReQueue
select	5142	Kimberly-Scott Creations (KimScot13601) [5142]	Black Box (KimberlyScott)	APLProcess	Success	9/29/2022 6:03:00 AM	0	9/29/2022 6:03:00 AM	9/29/2022 6:03:00 AM	0m 0s	ReQueue

1 2 3 4 5 6 7 8 9 10 ...


Task Manager
File Options View
Processes Performance Users Details Services
Name PID Description Status
AJRouter AllJoyn Router Service Stopped
ALG Application Layer Gateway Service Stopped
APLQueueProcessor 14360 APLQueueProcessor Running
AppHostSvc 2552 Application Host Helper Service Running
AppIDSvc Application Identity Stopped
Appinfo 576 Application Information Running
AppMgmt Application Management Stopped
AppReadiness App Readiness Stopped
AppVClient Microsoft App-V Client Stopped
AppXSvc AppX Deployment Service (AppXSVC) Stopped
aspnet_state ASP.NET State Service Stopped
AudioEndpointBuilder 1116 Windows Audio Endpoint Builder Running
Audiosrv 1844 Windows Audio Running
AxInstSV ActiveX Installer (AxInstSV) Stopped
B2bUploadService 15848 B2bUploadService Running
BalanceToBuy.QueueProcessor 6560 BalanceToBuy.QueueProcessor Running
BFE 1332 Base Filtering Engine Running
BITS Background Intelligent Transfer Service Stopped
BoxUpdateSvc 2616 Box Update Service Running
BrokerInfrastructure 912 Background Tasks Infrastructure Service Running
bthserv Bluetooth Support Service Stopped
BvSshServer 3020 Bitvise SSH Server Running
BvSshServer-RSA 3048 Bitvise SSH Server - RSA Running
CbDefense 2948 CB Defense Running
Fewer details
Open Services

New Production Environment

- Windows Service
  - Spawn APL Session to look for new data to process, then queue task
  - Look for task
  - Spawn APL Session to process task
  - Repeat

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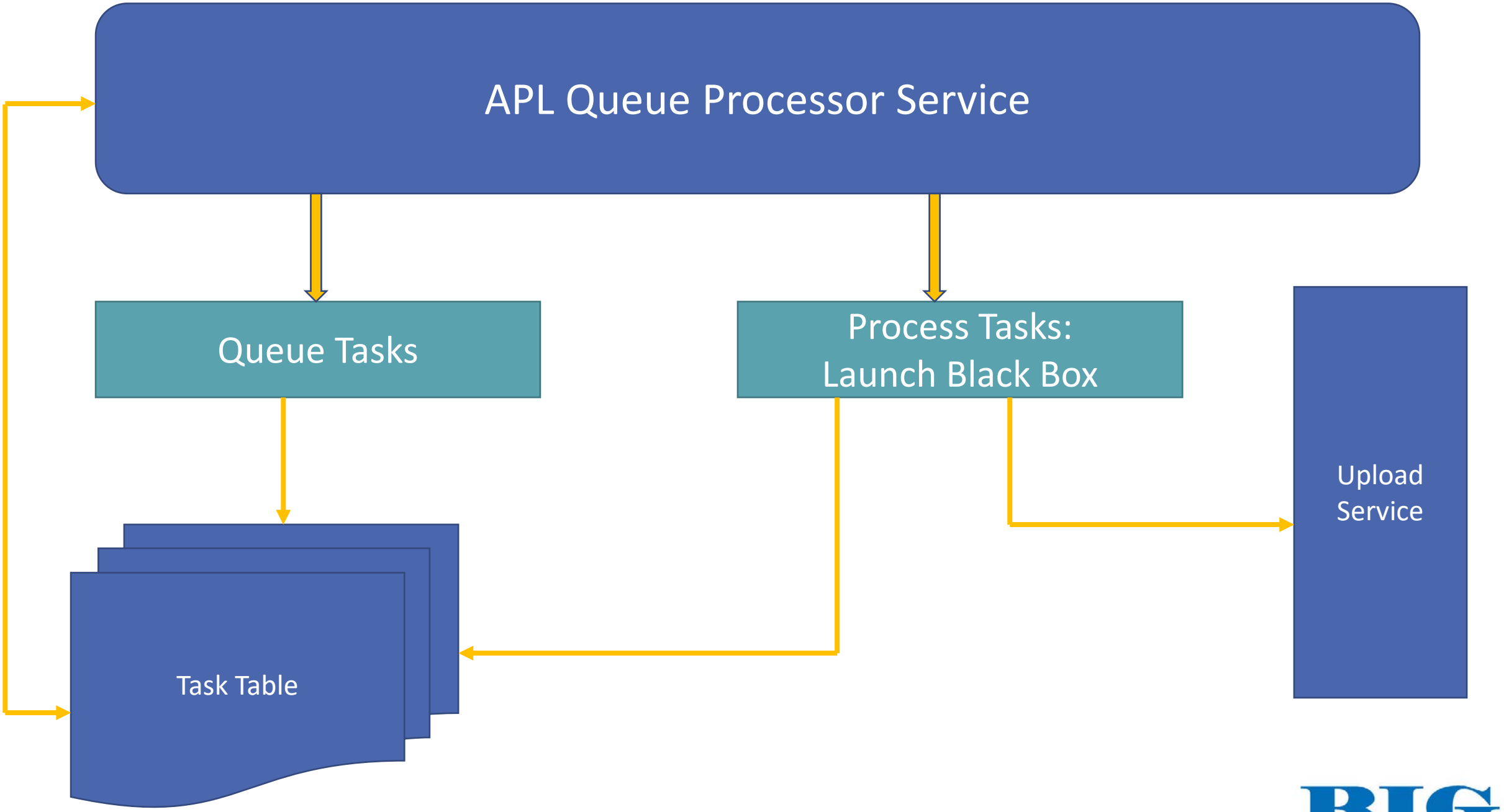
APL Queue Processor Service
Queue Tasks
Process Tasks:
Launch Black Box
Upload
Service
Task Table

APL Service

Main

File Edit Syntax Refactor View

Search...

```
[0]     Main arg;nid;log;LogFile;path;file;TaskId;Task;Cust;MaxProcs;p
[1]     log←{(((⍕⎕TS),' ',⍵,⎕UCS 13 10)⎕NAPPEND ⍺}
[2]     path←'c:\APLSource\'
[3]     LogFile←path,'APLServiceLog.txt'
[4]     :Trap 22
[5]         nid←LogFile ⎕NCREATE 0
[6]     :Else
[7]         :Trap 22
[8]             nid←LogFile ⎕NTIE 0
[9]             0 ⎕NRESIZE nid
[10]        :Else
[11]            'Log Creation Failed'⎕FV'c:\APLSource\ServiceTest.txt' ⍝ ⎕←'Unable to tie or create logfile'
[12]        :EndTrap
[13]    :EndTrap
[14]    nid log'Starting' ⋄ p←1 ⋄ i←0 ⋄ MaxProcs←3
[15]    :While ServiceState≠SERVICE_STOPPED
[16]        :If ServiceControl≠0 ⋄ nid log'ServiceControl=',⍕ServiceControl ⋄ :EndIf
[17]        :If ServiceState=SERVICE_RUNNING
[18]            ⍝ application code
[19]    L0:     ConnectBTB ⋄ TaskId←,⊃⎕=#.SQA.Do'BTB' 'Select Top 1 Id from Tasks where TypeId=19 and StateId=1' ⋄ CloseBTB
[20]            →(0≠⊃TaskId)↑L1 ⋄ 'No Tasks, waiting...' ⋄ ⎕DL 30
[21]            ProcU←⎕NEW APLProcess('c:\APLSource\Prod.dws'('MAXWS=4G session_file=c:\APLSource\APLProcess.dse RUN="Utils.QueueUploads" CUST="Queue"')0 'Serve:*:4550')
[22]            ⎕DL 5 ⋄ →L0
[23]    L1:     ConnectBTB ⋄ Task←,⊃⎕=#.SQA.Do'BTB'('Select * from Tasks where Id=',⍕TaskId) ⋄ Cust←GetBTBShortName 2⊃Task ⋄ CloseBTB
[24]    P1:     →(0=⎕NC('Proc',⍕p))↑P1A ⋄ →(0=⍎'Proc',(⍕p),'.HasExited')↑P2
[25]    P1A:    nid log('Spawning Proc',(⍕p),' for ',Cust)
[26]            ⍎'Proc',(⍕p),'←⎕NEW APLProcess (''c:\APLSource\Prod.dws''(''MAXWS=4G session_file=c:\APLSource\APLProcess.dse RUN="Utils.QueueProcessBBTasks '',(⍕TaskId),''" CUST="'',Cust,''"'')0 (''Serve:*:'',⍕4501+p))'
[27]            ⎕DL 3 ⋄ →L0
[28]    P2:     :If p<MaxProcs ⋄ p←p+1 ⋄ →P1 ⋄ :Else ⋄ WaitforFinish←⎕DL 5 ⋄ p←1 ⋄ →P1 ⋄ :EndIf
[29]        :ElseIf ServiceState=SERVICE_PAUSED
[30]            ⍝  Pause application
[31]        :EndIf
[32]        ServiceControl←0 ⍝ Reset (we only want to log changes)
[33]        ⎕DL 10 ⍝ Just to prevent busy loop
[34]    :EndWhile
[35]    ⎕NUNTIE nid
[36]    ⎕OFF 0
```

Function | Last saved by: Mark: Thursday, February 24, 2022 9:24 AM | Pos: 0/37,1

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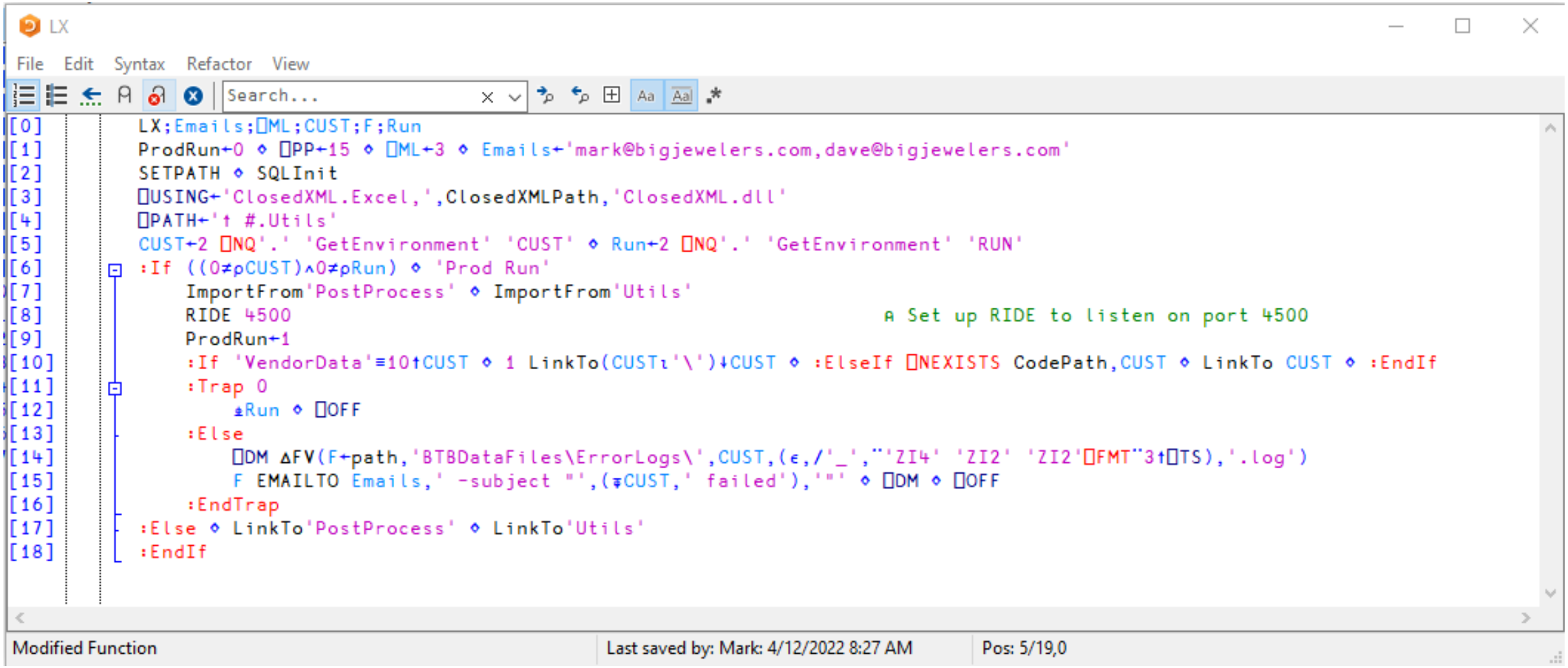
New Production Environment

- All code in text files, except lean Prod workspace
  - LX
    - Initialize SQL
    - SETPATH – for localized paths
    - ClosedXML
    - □Path
    - Check for Prod run
    - Bring in Utils and PostProcess code
    - Set RIDE
    - Set global Error Handling

⎕LX


LX
File Edit Syntax Refactor View
Search...
[0] LX;Emails;⎕ML;CUST;F;Run
[1] ProdRun←0 ⋄ ⎕PP←15 ⋄ ⎕ML←3 ⋄ Emails←'mark@bigjewelers.com,dave@bigjewelers.com'
[2] SETPATH ⋄ SQLInit
[3] ⎕USING←'ClosedXML.Excel,',ClosedXMLPath,'ClosedXML.dll'
[4] ⎕PATH←'↑ #.Utils'
[5] CUST←2 ⎕NQ'.' 'GetEnvironment' 'CUST' ⋄ Run←2 ⎕NQ'.' 'GetEnvironment' 'RUN'
[6] :If ((0≠⍴CUST)∧0≠⍴Run) ⋄ 'Prod Run'
[7] ImportFrom'PostProcess' ⋄ ImportFrom'Utils'
[8] RIDE 4500 ⍝ Set up RIDE to listen on port 4500
[9] ProdRun←1
[10] :If 'VendorData'≡10↑CUST ⋄ 1 LinkTo(CUST⍳'\')↓CUST ⋄ :ElseIf ⎕NEXISTS CodePath,CUST ⋄ LinkTo CUST ⋄ :EndIf
[11] :Trap 0
[12] ⍎Run ⋄ ⎕OFF
[13] :Else
[14] ⎕DM ⍙FV(F←path,'BTBDataFiles\ErrorLogs\',CUST,(⍕,/'_',¨'ZI4' 'ZI2' 'ZI2'⎕FMT¨3↑⎕TS),'.log')
[15] F EMAILTO Emails,' -subject "',(⍕CUST,' failed'),'"' ⋄ ⎕DM ⋄ ⎕OFF
[16] :EndTrap
[17] :Else ⋄ LinkTo'PostProcess' ⋄ LinkTo'Utils'
[18] :EndIf
Modified Function
Last saved by: Mark: 4/12/2022 8:27 AM
Pos: 5/19,0

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New Production Environment

- Restructure data directories
  - Incoming data
  - Pending folder
  - Processed folder
- Single unified Launch function
  - Check for production run
  - Look up details of task: retailer, files
  - Move files to Pending
  - Set error handling and notifications
  - Call needed code
  - Move processed files to Processed

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Launch

Launch

File Edit Syntax Refactor View

Search...

```
[0]     Result←{Task}Launch Cust;BTBID;Folder;Args;F;AddDate;Files;CodeFolder;f;d;C;Limit
[1]   ⍝ Launch function for all retailer (non-Edge).
[2]   ⍝ 1. Find which files to pull for Cust, if Cust is numeric, use BTBID, if char, use ShortName
[3]   ⍝ 2. Move most recent files to Pending folder; Process files; move to Processed foler
[4]     Limit←3 ⋄ C←0 ⋄ (Folder Cust BTBID)←GetBTBNameID Cust ⋄ CodeFolder←Folder
[5]     →(⎕NEXISTS CodePath,CodeFolder)↑L00 ⋄ CodeFolder←∊GetPOS BTBID
[6]   L00:AddDate←2⊃GetArgs CodeFolder ⋄ →(0=⎕NC'Task')↑L0
[7]     ConnectBTB ⋄ F←↑↑3⊃#.SQA.Do'BTB'('Select Criteria from Tasks where TypeId=19 and TaskId=',⍕Task) ⋄ CloseBTB ⋄ Files←(';'≠F)⊂F ⋄ →L1
[8]   L0:(Args AddDate)←GetArgs CodeFolder ⋄ Files←GETLATESTFILENAME¨(⊂path),¨(⊂Folder),¨'\',¨Args~¨'[' ⋄ →(~0∊≠¨(~'['∊¨Args)/Files)↑L1 ⋄ Result←1 ⋄ →0
[9]   L1:→((⊂Cust~' ')∊⎕NL ¯9)↑L2 ⋄ ⎕SE.Link.Import((Cust~' ')(CodePath,CodeFolder))
[10]  L2:Files←(0≠≢¨Files)/Files    ⍝ Allow 2 5-minute wait times, then bomb
[11]    :Trap 19 22
[12]        (path,Folder,'\Pending')⎕NMOVE Files ⋄ ⊃Files←(⊂path,Folder,'\Pending\'),¨(+/¨∨\¨'/'=⌽¨Files)↓¨Files
[13]    :Else
[14]        ⎕DL 300 ⋄ →(Limit≥C←C+1)↑L2 ⋄ →0 ⋄ ⎕OFF ⍝ QueueMoveTaskToHistory(2 Task) ⋄ ⎕OFF
[15]    :EndTrap
[16]    Result←⍪(Cust~' '),'.Run_',((11×'VendorData\'≡11↑CodeFolder)↓CodeFolder~' '),' Files' ⋄ →(0.5=Result)↑0 ⋄ →AddDate↓L3 ⋄ Files←AddFileDate¨Files
[17]  L3:(path,Folder,'\Processed')⎕NMOVE Files ⋄ →(0=⎕NC'Task')↑0 ⋄ ⎕EX Cust
```

Function | Last saved by: mark: Tuesday, September 27, 2022 9:22 AM | Pos: 0/18,1

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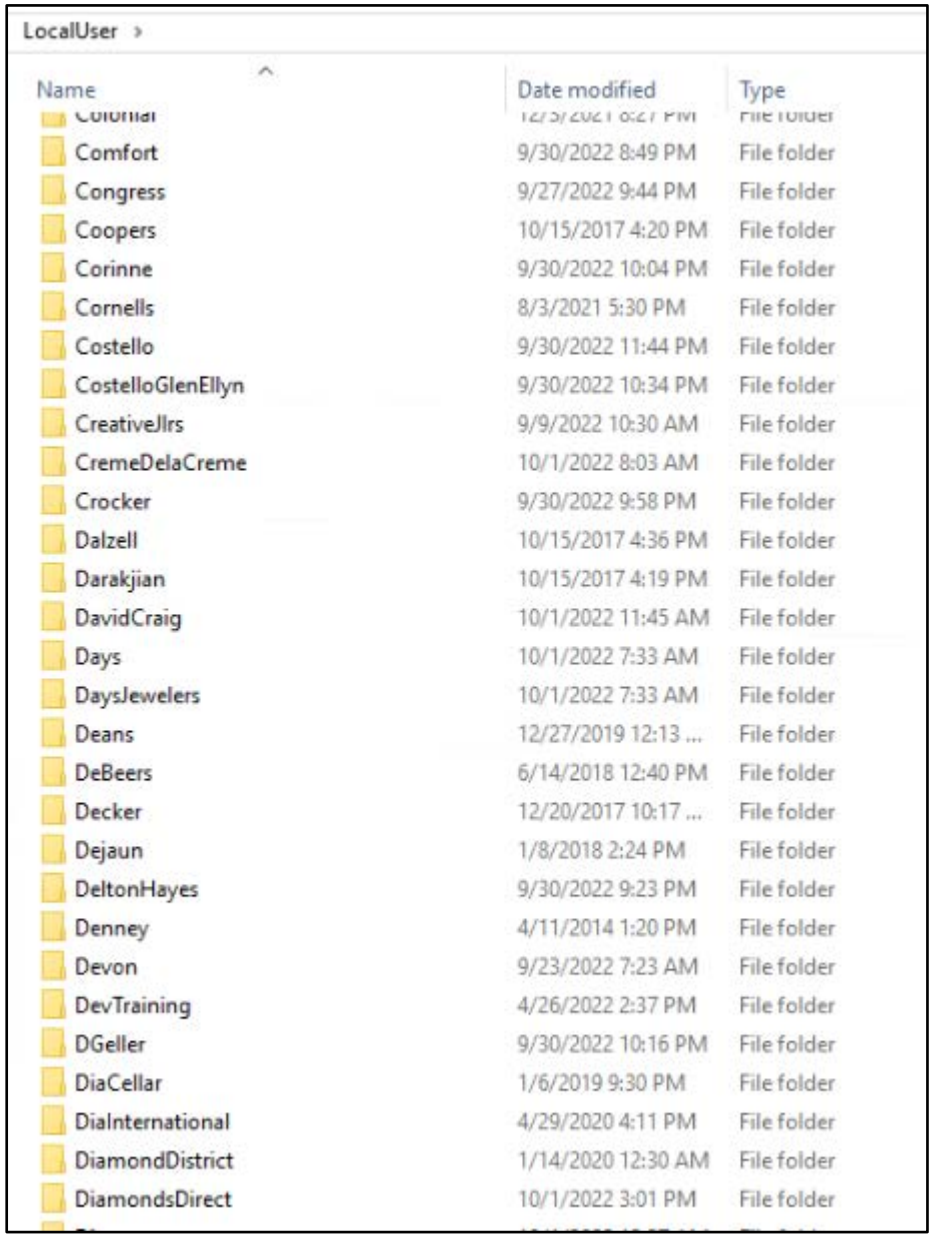
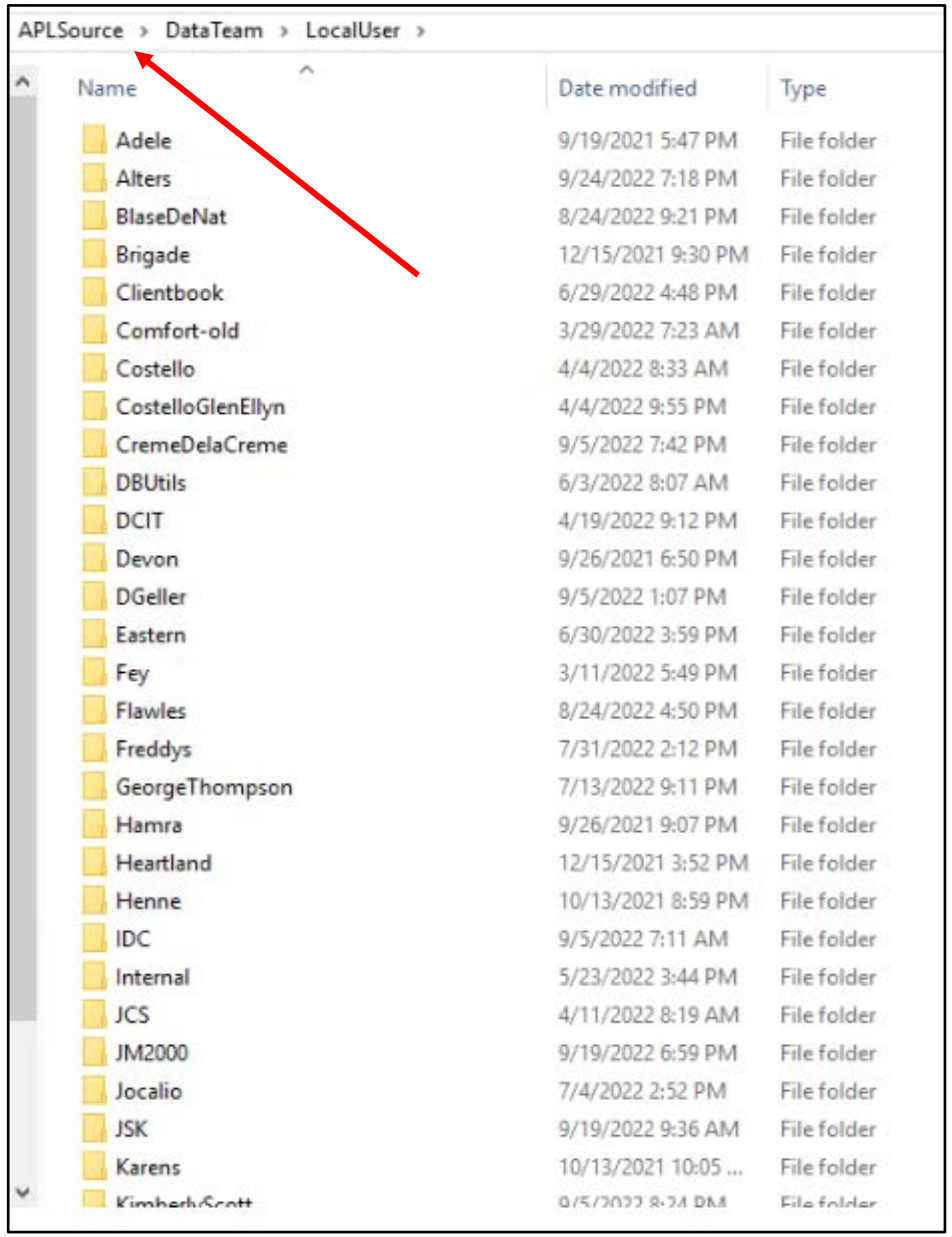
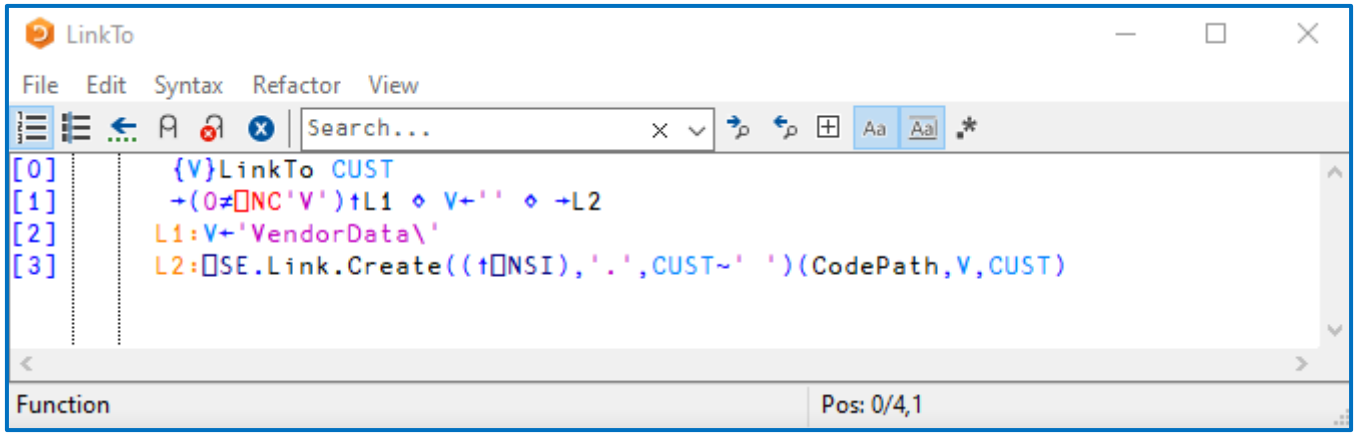
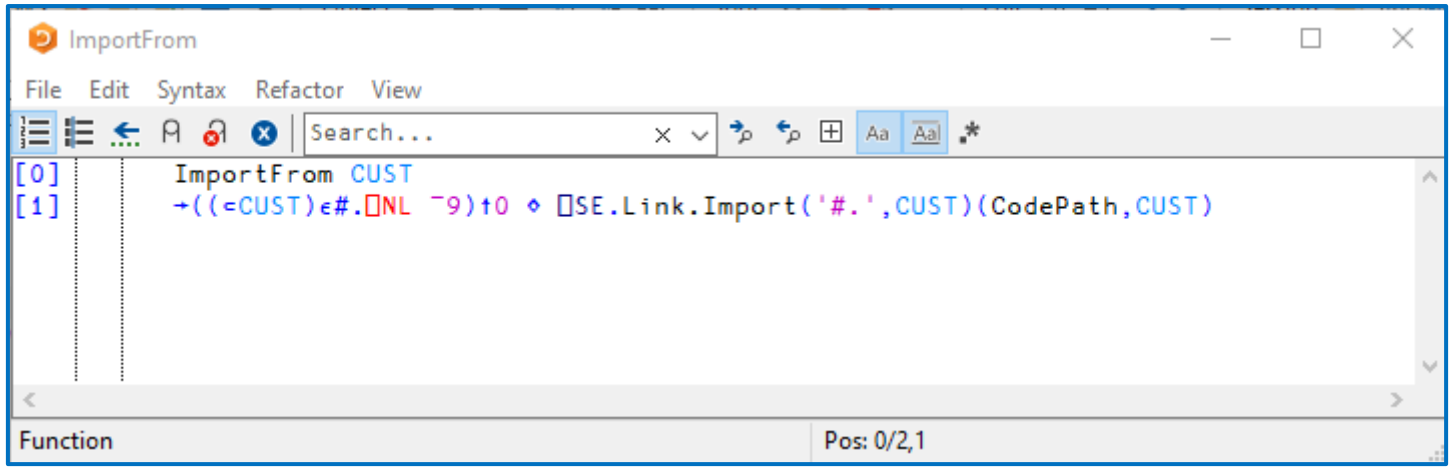
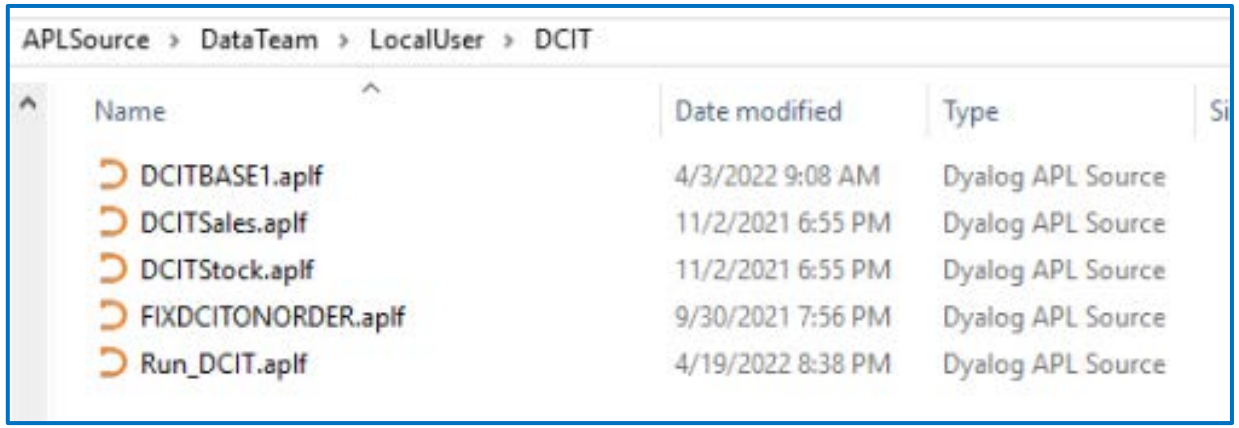

LocalUser
Name
Date modified
Type
Comfort 9/30/2022 8:49 PM File folder
Congress 9/27/2022 9:44 PM File folder
Coopers 10/15/2017 4:20 PM File folder
Corinne 9/30/2022 10:04 PM File folder
Cornells 8/3/2021 5:30 PM File folder
Costello 9/30/2022 11:44 PM File folder
CostelloGlenEllyn 9/30/2022 10:34 PM File folder
CreativeJlrs 9/9/2022 10:30 AM File folder
CremeDelaCreme 10/1/2022 8:03 AM File folder
Crocker 9/30/2022 9:58 PM File folder
Dalzell 10/15/2017 4:36 PM File folder
Darakjian 10/15/2017 4:19 PM File folder
DavidCraig 10/1/2022 11:45 AM File folder
Days 10/1/2022 7:33 AM File folder
DaysJewelers 10/1/2022 7:33 AM File folder
Deans 12/27/2019 12:13 ... File folder
DeBeers 6/14/2018 12:40 PM File folder
Decker 12/20/2017 10:17 ... File folder
Dejaun 1/8/2018 2:24 PM File folder
DeltonHayes 9/30/2022 9:23 PM File folder
Denney 4/11/2014 1:20 PM File folder
Devon 9/23/2022 7:23 AM File folder
DevTraining 4/26/2022 2:37 PM File folder
DGeller 9/30/2022 10:16 PM File folder
DiaCellar 1/6/2019 9:30 PM File folder
DiaInternational 4/29/2020 4:11 PM File folder
DiamondDistrict 1/14/2020 12:30 AM File folder
DiamondsDirect 10/1/2022 3:01 PM File folder

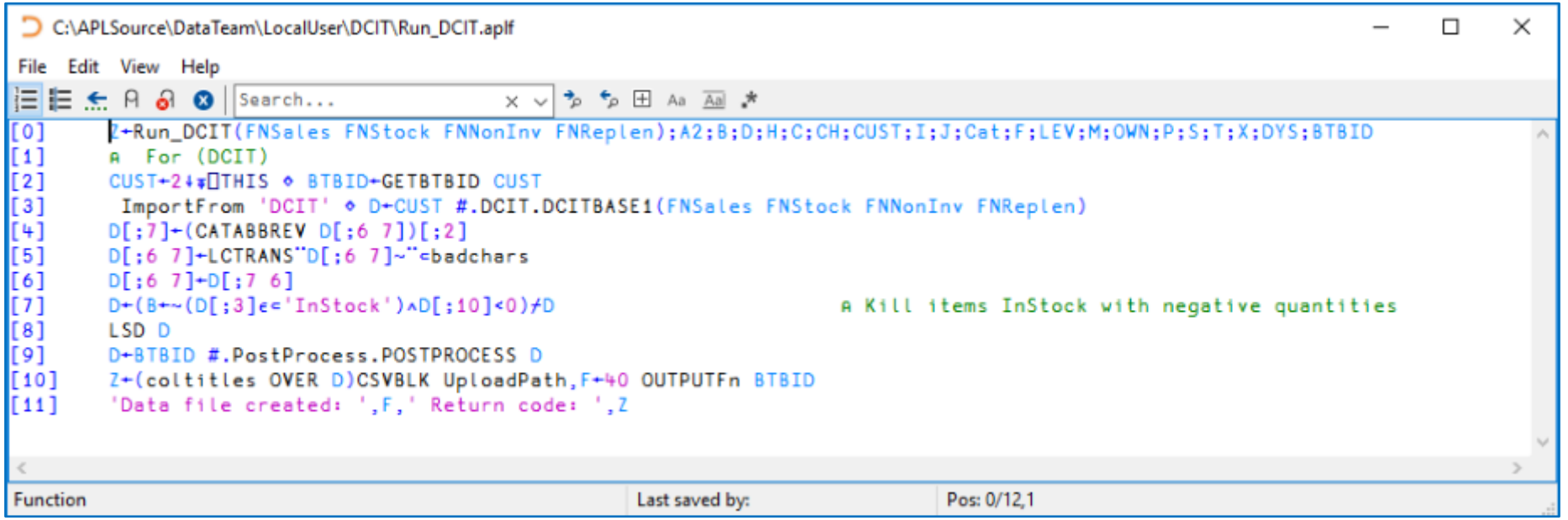

APLSource › DataTeam › LocalUser ›
Name
Date modified
Type
Adele 9/19/2021 5:47 PM File folder
Alters 9/24/2022 7:18 PM File folder
BlaseDeNat 8/24/2022 9:21 PM File folder
Brigade 12/15/2021 9:30 PM File folder
Clientbook 6/29/2022 4:48 PM File folder
Comfort-old 3/29/2022 7:23 AM File folder
Costello 4/4/2022 8:33 AM File folder
CostelloGlenEllyn 4/4/2022 9:55 PM File folder
CremeDelaCreme 9/5/2022 7:42 PM File folder
DBUtils 6/3/2022 8:07 AM File folder
DCIT 4/19/2022 9:12 PM File folder
Devon 9/26/2021 6:50 PM File folder
DGeller 9/5/2022 1:07 PM File folder
Eastern 6/30/2022 3:59 PM File folder
Fey 3/11/2022 5:49 PM File folder
Flawles 8/24/2022 4:50 PM File folder
Freddys 7/31/2022 2:12 PM File folder
GeorgeThompson 7/13/2022 9:11 PM File folder
Hamra 9/26/2021 9:07 PM File folder
Heartland 12/15/2021 3:52 PM File folder
Henne 10/13/2021 8:59 PM File folder
IDC 9/5/2022 7:11 AM File folder
Internal 5/23/2022 3:44 PM File folder
JCS 4/11/2022 8:19 AM File folder
JM2000 9/19/2022 6:59 PM File folder
Jocalio 7/4/2022 2:52 PM File folder
JSK 9/19/2022 9:36 AM File folder
Karens 10/13/2021 10:05 ... File folder


LinkTo
File Edit Syntax Refactor View
Search...
[0] {V}LinkTo CUST
[1] →(0≠⎕NC'V')↑L1 ⋄ V←'' ⋄ →L2
[2] L1:V←'VendorData\'
[3] L2:⎕SE.Link.Create((↑⎕NSI),'.',CUST~' ')(CodePath,V,CUST)
Function
Pos: 0/4,1


ImportFrom
File Edit Syntax Refactor View
Search...
[0] ImportFrom CUST
[1] →((⊂CUST)∊#.⎕NL ¯9)↑0 ⋄ ⎕SE.Link.Import('#.',CUST)(CodePath,CUST)
Function
Pos: 0/2,1

BIG


APLSource › DataTeam › LocalUser › DCIT
Name
Date modified
Type
DCITBASE1.aplf
4/3/2022 9:08 AM
Dyalog APL Source
DCITSales.aplf
11/2/2021 6:55 PM
Dyalog APL Source
DCITStock.aplf
11/2/2021 6:55 PM
Dyalog APL Source
FIXDCITONORDER.aplf
9/30/2021 7:56 PM
Dyalog APL Source
Run_DCIT.aplf
4/19/2022 8:38 PM
Dyalog APL Source


C:\APLSource\DataTeam\LocalUser\DCIT\Run_DCIT.aplf
File Edit View Help
Search...
[0] Z←Run_DCIT(FNSales FNStock FNNonInv FNReplen);A2;B;D;H;C;CH;CUST;I;J;Cat;F;LEV;M;OWN;P;S;T;X;DYS;BTBID
[1] ⍝ For (DCIT)
[2] CUST←2↓⍕⎕THIS ⋄ BTBID←GETBTBID CUST
[3] ImportFrom 'DCIT' ⋄ D←CUST #.DCIT.DCITBASE1(FNSales FNStock FNNonInv FNReplen)
[4] D[;7]←(CATABBREV D[;6 7])[;2]
[5] D[;6 7]←LCTRANS¨D[;6 7]~¨<badchars
[6] D[;6 7]←D[;7 6]
[7] D←(B←~(D[;3]∈⊂'InStock')∧D[;10]<0)≠D ⍝ Kill items InStock with negative quantities
[8] LSD D
[9] D←BTBID #.PostProcess.POSTPROCESS D
[10] Z←(coltitles OVER D)CSVBLK UploadPath,F←40 OUTPUTFn BTBID
[11] 'Data file created: ',F,' Return code: ',Z
Function
Last saved by:
Pos: 0/12,1

BIG

Thank you!

Dyalog ’22 – 10/10/2022

Mark I.Wolfson

BIG