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Dyalog APL Workspace Transfer Guide Version 15.0

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Contents

Contents	iii
Workspace Transfer	1
Introduction	1
General Techniques	2
Methods used.....	2
Exporting	5
Using the user command JOUT	5
The XFRCODE workspace	5
Using the user command JOUT	6
Importing	8
The ATFIN Workspace	8
Using the user command JIN.....	9
The XFRCODE workspace	10
Using the user command JIN.....	11
Problems Transferring Workspaces and files	12
Examples of transferring workspace from other vendors	14
Importing IBM APL2 Workspaces.....	14
Importing APLX Workspaces	15
Importing APL+Win Workspaces	16

Workspace Transfer

Introduction

It is often necessary to either transfer Dyalog APL workspaces from one machine to another, or to transfer workspaces created by another version of APL to Dyalog APL.

Since the internal structure of an APL workspace is dependent upon the architecture of the machine on which it was created, and the version of APL that was used to create it, it is not always possible to transfer a workspace directly. It must first be transformed into a format that is common to both source and target environments. This can then be transferred, and used to create a workspace on the target machine.

The following sections describe the steps that are involved in moving workspaces between machines and different versions of any APL. APL component files are transferred in a similar way to workspaces; each component is read into an APL variable which is then transferred.

The subsequent sections describe specific examples of this process. The basic technique is the same in most cases. Doubtless better techniques can be used, but the following examples are useful as a basis from which to work.

The problems of conversion from one version of APL to Dyalog APL are not discussed in this section. Nor are the procedures for transferring from Dyalog APL to other APLs. However, using the techniques discussed in this section, it is a simple (if tedious) matter to produce software that will transfer in the opposite sections.

Where possible, the tools required to transfer to Dyalog APL are supplied with the product. Where this is impractical, listings of the appropriate software is given or the location where they can be found.

General Techniques

Create an Export File and Read it back

If we can produce a text file on the source machine that contains all of the statements necessary to recreate the workspace, we could execute each line of this file on the target machine using Dyalog APL, thereby recreating the workspace in the correct format. The process of creating the file is called EXPORT and the process of reading it is called IMPORT.

How do we transform a workspace into a text format? Functions are easy as we can just produce a listing of them. Variables are more difficult; we must produce lines of text that when executed, recreate the variables with the correct contents, type, shape and depth.

Any APL programmer should be capable of writing a simple APL program required to perform both of these tasks; however, Dyalog provides methods to do this on the Dyalog side.

Transfer to Target Machine

Once this export file has been created, it should be transferred from the source to the target machine by whatever means.

However the transfer is done, the file should arrive on the target machine EXACTLY as it left the source machine; i.e. the transfer mechanism should not perform any conversion or translation. Note that such files produced by are raw text file and may contain any characters in the range 0 to 255; some network transfer packages react badly to characters in the range 0 to 31 unless you ask that the file is transferred in transparent mode.

Methods used

Dyalog provides methods to *export* a workspace by creating a file from looking at it and other methods to *import* a workspace from reading the same kind of file. There are several ways to do this. One of these methods is built on an 80 column punched card format that APL2 came up with in the 1980s. Because one of the designs created a file with an ATF extension (for **A**PL **T**ransfer **F**ile) this format is sometimes known as the ATF format.

Other APL vendors have adopted these formats and it is common for those vendors to offer a method of exporting a workspace using that ATF format (although they may be more flexible and forego the ATF extension for example).

There are restrictions with these formats as it wasn't made for the new objects Dyalog APL now uses like Namespaces and Classes. Since the objects the ATF format supports is a close subset of what Dyalog supports it is usually not a major problem to import other vendors' workspaces. The problem is when one wants to export a Dyalog workspace containing newer objects and recreate it even on Dyalog APL itself (e.g. on an earlier version)

To circumvent this problem Dyalog also offers its own extended version which allows to export, still with restrictions (no GUI object can be exported for example), Dyalog workspaces and component files.

Technicalities

Dyalog supplies 1 workspace to deal with the ATF files (*in* only) and 1 workspace to deal with the extended format.

It also supplies 2 user commands (both *in* and *out*) for the ATF files and the extended format.

All will be discussed here.

Create an export file from a workspace or APL component file

Using the ATF format

Each object's canonical representation is sent one by one, untranslated, to an export file. The only way to do this is to use the `JOUT` user command.

Using the extended Dyalog format

Each object's canonical representation is sent one by one, untranslated, to an export file. To do this you can use the `XFRCODE` workspace or the `JOUT` user command.

Import a workspace or APL component file by reading an export file

Using the ATF format

Each object's definition is read, one by one, and recreated in the workspace. To do this you can use the `ATFIN` workspace or the `JIN` user command.

Using the extended Dyalog format

Each object's definition is read, one by one, and recreated in the workspace. To do this you can use the `XFRCODE` workspace or the `JIN` user command.

Exporting

There are essentially two ways to export code: using a workspace or using a user command. The user command is basically a cover for the workspaces. In each case there are also two alternatives: one dealing with older (pre-namespaces) versions of Dyalog APL and one dealing with newer versions. All are described here.

Other APL vendors have different methods of exporting workspaces. Some vendors of APL provide a workspace named DWSOUT or a system function to do the work or, as in APL2000's case, a user command.

Using the user command]OUT

Under Dyalog and APLPLUS you can also use the user command OUT to export workspaces only. This may be simpler. The syntax is different:

```
]OUT filename -obj=a,b,c...
```

If the filename's extension is *'atf'* or if the switch **-atf** has been supplied the format used will be ATF. This will only work if the workspace or the objects mentioned do not contain any exotic objects like classes or namespaces.

Otherwise, if the extension is NOT *'atf'* then the file **filename.dxw**¹ will contain a complete representation of the current workspace in extended format unless **-obj** is used to specify the objects to transfer.

The XFRCODE workspace

If the workspace to export contains more exotic objects like namespaces you can use this workspace to export code.

This workspace only exists in Dyalog. Older versions of this workspace exist for other APLs and they are doing essentially the same thing: export all the objects in the workspace to a native file. Those workspaces are not supplied with Dyalog APL but can be found on the Internet²

Exporting a Workspace

Under Dyalog APL the function to call is

¹ The extension 'xdw' will always be added even if there is one already.

```
xfr.Δxfrto2 '\tohost\filename [switches]'
```

The argument is a string specifying the name of the file to produce followed optionally by some switches:

```
-q      do not display banner
-obj=   objects to transfer (default all)
```

The extension XDW will be added to the filename even if one already exists.

Example:

```
      )xload YOURWS
      )copy XFRCODE
      xfr.Δxfrto '\tmp\dbutil'
* XFR version 3.7
17 objects transferred
```

Exporting a component file

Component files can also be exported.

Use the same function with the same syntax and the following switches:

```
-file[=]      use the APL file named
-range=n1[,n2] transfer components n1 to n2
-lock=       file lock to use for reading the file, if any
```

Example:

```
      )copy XFRCODE
      xfr.Δxfrto '\tohost\DOSfilename -file=MyFile'
```

Using the user command]OUT

You can also use this command to export workspaces and component files. The syntax is:

² Under other APLs like APLX the workspace name is XFRPC and the function **Δxfrto** resides in the workspace as there are no namespaces in those APLs. The syntax is the same but the switches start with a / instead of a – and the filename extension varies from one APL to another. See [HTTP://www.milinta.com/xfrpc.htm](http://www.milinta.com/xfrpc.htm) for details.

```
]OUT \path\to\file [switches]
```

where switches is the same as above:

-q	do not display banner
-obj=	workspace objects to transfer (default all)
-file[=]	use the APL file named instead of the workspace
-range=n1[,n2]	transfer components <i>n1</i> to <i>n2</i>
-lock=	file lock to use

If the export is done for a workspace the filename's extension will be **xdw**. If it is done for a file the extension will be **xdf**.

Example:

Export objects **A**, **BC** and **Def** in the current workspace to file **\tmp\myws.xdw**:

```
]out \tmp\myws -obj=A BC Def
```

The command is smart enough to export *included* namespaces and *Based* classes first in order to be able to recreate them properly when reading back the file.

If you use **-obj** to specify the objects to export make sure you list all the objects needed in the proper order otherwise recreating them may not be possible.

Example:

Export quietly components 10 to 20 of APL file **MyFile** to native file **\temp\MF.xdf** :

```
]out \temp\MF -q -range=10 20 -file=MyFile
```

Importing

There are essentially two ways to import code: using a workspace or using a user command. The user command is basically a cover for the workspaces. In each case there are also two alternatives: one dealing with older (pre-namespaces) version of Dyalog APL and one dealing with newer version. All are described here.

The ATFIN Workspace

This workspace is used to import workspaces created by other APLs in ATF format. Other vendors have been using this format but have not always kept a consistent format. The ATFIN workspace supplied only accepts ATF files of a specific record length. The user command `JIN` is a bit more permissive and should detect the record length.

Importing a Workspace

ATFIN contains function `△△atfin` that can process files produced by different APLs. The syntax of the function call is:

```
△△atfin filename
```

`filename` is a simple character vector containing the name of the file to be processed. Note that the extension `ATF` must be appended to the given file name as it is not automatically supplied.

`△△atfin` reads the file, applying the relevant translation from the source APL to Dyalog APL, to recreate the objects.

If an object cannot be recreated because of badly formed lines in the file, then that object is ignored and a warning message printed. The names of such objects are held in variable `△△_problems`.

Example

Create a Dyalog APL workspace from the file `\tmp\dbutil`, which was created by APL2000

```
)LOAD ATFIN
saved ...

△△atfin '\tmp\dbutil.atf'
...Processing script
Variable : a
```

```

Fn/Op      : cut
Cannot form variable □PR
Variable : □LX
... Finished
To remove △△APL2IN and associated objects, execute the
following line
□EX △△_names
↑△△quadthings to see the systems variables reset
△△_problems contains unfixed objects

```

At this point you should save your workspace if satisfied.

Using the user command]IN

Under Dyalog you can also use the user command IN to import workspaces and files in ATF format. This may be simpler. The syntax is:

```
]IN filename -fliplu -apl=...
```

If the extension of the file is **atf** or if the **-atf** switch is supplied then it must be a file containing a complete representation of objects created by some other APL system in ATF format.

You can specify which APL version the file came from. There are 8 acceptable cases: APL2PC, APLX, APLC, APL2MF, DYALOG, APLPLUS, VSAPL and STSCMF. If you do not specify which APL vendor this file came from the command will try to guess but there is no guarantee this will work.

Because some APL vendors use a different convention for upper and lower case alphabets you might have to use the **-fibliu** switch to reverse the cases. This is often the case for APLX and APL2000 for example.

Example

Import a workspace from the file `\tmp\dbutil.atf`, which was created by APL+.

```

)CLEAR
]IN \tmp\dbutil.atf
...Processing script
Variable : Á
Fn/Op    : ÁþÝ
Variable : □PP
Variable : □IO
Variable : □CT
...
Cannot form variable □PR
Variable : □LX
... Finished
)save \tmp\dbutil.atf

```

*** ΔPROBLEMS contains unfixed objects

Because APL+ uses a different convention for upper and lowercase the variable names are mangled (APL+ does not have variable names like **ǺǻǾ**). If you see this happen use the **-fliplu** switch to solve it.

Example

Import a workspace from the file `\tmp\abc.def`, which was created by APLX. Flip the lower/upper alphabet cases.

```

)CLEAR
]IN \tmp\abc.def -fliplu -apl=APLX -atf
...Processing script
Variable : bar
Fn/Op    : foo
Fn/Op    : xyz
...
Variable : □PP
Variable : □IO
Variable : □CT
Variable : □LX
... Finished
)save \mypath\abc.def

```

The XFRCODE workspace

If the exported code was produced by **Δxfrto** or if the file contains a NARS2000 workspace, you must use this method to import it. The function to use is **xfr.Δxfrfrom** which takes a filename as argument and accepts a series of switches to alter its behaviour:

```
xfr.Δxfrfrom 'tohost\filename [switches]'
```

The switches are (these do not apply when importing a NARS2000 workspace):

- q do not display banner
- apl= specify which APL vendor produced this file
This can usually be deduced by the file extension. Valid values are SAM (Sharp APL MF), SAX (Sharp APL Unix), A2K (APL+ family), APX (APLX), AP2 (APL2), DYW (Dyalog)
- file[=] filename of component file to recreate (for a component file)
- list to not bring objects in, simply list the object names to be defined
- noam do not bring the access matrix (for component files)
- obj= only bring the objects listed
- range= only define the range of components listed (for component files)

-replace overwrite already defined objects
 -trans[=] 1 2 1 means translate code to fit Dyalog code and 2 means add code to
 simulate missing elements

Code translation (e.g. □ELX vs □SIGNAL) is possible but unlikely to work. See the variable **Describe** in the workspace for details.

Example

Import a workspace from the file `\tmp\dbutil.xsw`, which was created by APL+.

```

)load xfrcode
Saved ...
xfr.Δxfrfrom'\tmp\util.xsw'
* XFR version 3.7
A2K3.08 20090824 224036; WS=C:\APLWIN50\XUTIL
* "#.□lx:C" not redefined
* "#.□pw:N" not redefined
* "#.□io:N" not redefined
* "#.□ct:N" not redefined
13 objects defined

```

The output shows this version is 3.7, the file was produced by APL+ (A2K) ver 3.08 on 2009/8/24 at 22:40:36H from workspace C:\aplwin50\xutil. Four objects were not redefined because they already existed and the switch **-replace** was not specified. In total 13 objects were defined in the workspace.

Using the user command]IN

Under Dyalog you can also use the user command IN to import workspaces and files in extended format. The syntax is:

```
]IN filename [switches]
```

It accepts the same switches as **xfr.Δxfrfrom** and performs the same function.

Example

Import a workspace from the file `\tmp\dbutil.xuw`, which was created by Sharp APL under Unix:

```

)CLEAR
]in \tmp\dbutil.xuw -replace
* XFR version 3.7
SAX3.08 20090714 123016; WS=/home/db/dbutil

```

`17 objects defined`

JIN will also import NARS2000 workspaces if the file name ends with `.nars` but in that case none of the switches apply.

Problems Transferring Workspaces and files

Dyalog APL workspaces and component files are binary compatible across machines with similar architectures. For example, workspaces created under Dyalog APL for Windows® can be used immediately by Dyalog APL under Linux, as long as both environments are running the same version of Dyalog APL. However, if you are not running the same VERSION (e.g. ver 13 vs ver 14), it is best to transfer workspaces of the higher version using XFRCODE or the equivalent user command JOUT and then to use JIN to recreate them by the lower version³.

The XFRCODE workspace for Dyalog APL copes with nested arrays, defined functions and operators, assigned functions, □OR of objects and component files. However, the following restrictions apply:

- Arrays containing the □OR of an assigned function cannot be transferred.
- Locked functions cannot be transferred.
- Functions such as SUM←+ / cannot be transferred.

Importing other APL Workspaces

Workspaces from other APL usually cannot be imported perfectly as there are a number of incompatibilities (most often system functions) that get in the way. Sometimes those will even prevent functions to fix in the workspace, for example if the offending code is in the header.

The XFRCODE workspace (and the JIN user command) allows you to perform some translation of the code, as it is brought in, in order to solve some of these problems.

If the code imported contains a lot of □AV[...] you should use the `-translate=2` switch to translate the code and import a global variable ΔAV which will be used

³ however there is no guarantee the code will run as the new version may contain features that do not exist in the older one

instead of `⊠AV` all over the code. Read the **Describe** variable in the XFRCODE workspace or see `J?IN` for details.

Examples of transferring workspace from other vendors

Here are a few examples of how to export workspaces from other vendors to Dyalog APL.

Importing IBM APL2 Workspaces

IBM APL2 has a system function `)OUT` which produces a text file that represents the workspace. This file must be transferred and decoded line by line on the target machine. This decoding is performed by the user command `]IN`.

Create a script file

Load your workspace in APL2, and use `)OUT` to create a file.

Transfer to target machine

Move file to target machine; no translation should be performed.

Create Dyalog APL workspace

Use the user command `]IN` to process the script file. This command takes the name of the script file as argument. Once the file has been processed, you must save the resulting workspace.

Example

a) On APL2/PC:

```
)LOAD MYWS
saved ...

)OUT 'c:\tmp\apl2.atf'
```

b) Transfer file to target machine, with NO translation

c) On target machine where Dyalog resides:

```
)CLEAR

]IN "c:\tmp\apl2.atf"
```

```
)SAVE newname
```

NOTES:

1. APL2 may allow to use ANY filename with)OUT. Depending on the APL2 system you use (mainframe or PC) you may have to use quotes around the name and/or to specify the extension.]IN supposes the file has an ATF extension. To avoid ambiguities you should always specify the full pathname.

Importing APLX Workspaces

The procedure is similar to APL2 workspaces (see above).

Create a script file

Load your workspace in APLX, and use)OUT to create a file.

Transfer to target machine

Move file to target machine; no translation should be performed.

Create Dyalog APL workspace

Use the user command]IN to process the script file. This command takes the name of the script file as argument. Once the file has been processed, you must save the resulting workspace.

Example

- a) In APLX:

```
)LOAD MYWS
saved ...
)OUT myaplxfile.atf
```

- b) Transfer file to target machine, with NO translation

- c) On target machine where Dyalog resides:

```
)CLEAR
]IN myaplxfile.atf
```

```
)SAVE newname
```

NOTES:

1. APLX allows to use ANY filename with)OUT.]IN supposes the file has an ATF extension. To avoid ambiguities you should always specify the full pathname
2. APLX alphabet mapping is the reverse of Dyalog. You may have to use the **-fliplu** switch to flip the alphabet casing if unusual names are being defined instead of proper names.

Importing APL+Win Workspaces

The procedure is similar to APL2 workspaces (see above). APL+Win uses User Command]OUT to do the work.

Create a script file

Load your workspace in APL+, and use]OUT to create a file.

Transfer to target machine

Move file to target machine; no translation should be performed.

Create Dyalog APL workspace

Use the user command]IN to process the script file. This command takes the name of the script file as argument. Once the file has been processed, you must save the resulting workspace.

Example

- a) In APL+:

```
)LOAD MYWS
saved ...
]OUT myapl+file.atf
```

- b) Transfer file to target machine, with NO translation
- c) On target machine where Dyalog resides:

```
)CLEAR  
  
]IN myapl+file.atf  
  
)SAVE newname
```

NOTES:

1. APL+ allows to use ANY filename with)OUT.]IN supposes the file has an ATF extension. To avoid ambiguities you should always specify the full pathname
2. APL+ alphabet mapping is the reverse of Dyalog. You may have to use the **-fliplu** switch to flip the alphabet casing if unusual names are being defined instead of proper names.