



GNU APL

on Macintosh

A brief installation guide

by

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Introduction

For a long time I've been looking for a way to run APL on my Mac. There were and are a number of implementations, both commercial and free, but the ones I tried didn't satisfy me. Not their fault - just my pickiness.

In the last little while I had a programming problem that was going to be easily solved using APL as opposed to C++, C, or Obj-C. So I revisited what solutions there might be for APL. Like so much in life, timing is important and this time I lucked out by finding GNU APL at <http://www.gnu.org/software/apl/>.

Dr Jürgen Sauermann has made a recent implementation of the ISO standard 13751 [*aka. Programming Language APL, Extended*]. By recent I mean October 10 2013, the earliest date shown on the above website. It only took me a few scattered hours, over a couple of days, to get it installed and working like a charm. And it's scriptable!!!

Essentially there were only 2 issues - *building and installing it* and *setting up the keyboard*. Below are instructions based on my experience. YMMV.

Building & Installing

For those familiar with using Xcode and Terminal for developing on the Mac, go to the section [Quick Start](#) on page 4 for the steps I used to successfully build and install everything. For a more detailed approach please go to the [Detailed Build](#) section on page 5.

Quick Start

(0) Download the current release, `apl-1.2.tar.gz` dated 2014-01-13 6:53:00 from <ftp://ftp.gnu.org/gnu/apl/> (which is linked from the home site).

Optionally also download the `apl-1.2.tar.gz.sig` and verify that the download has not been corrupted - a wise thing to do IMHO.

(1) Use Terminal to unzip and decompress the tar.

(2) My current environment is OS X Mountain Lion 10.8.5 and Xcode 5.0.2. When I installed Xcode I didn't bother with the Command Line Tools. You need to install them if you haven't already done so. See [Obtaining the Xcode Command Line Tools](#) on page 8.

Incidentally I was also able to build and install in OS X Lion 10.7.6 which is how I discovered the need to install the CL tools. In Lion GCC was installed as part of Xcode. Not so in ML - see this note in the "What's New in Xcode" document - "NOTE: LLVM_GCC is not included in Xcode 5."

(3) Assuming you are already in the correct directory perform the classic build steps: `./configure`, `make`, `[make check]`, `make install`, `[make installcheck]`. If all this worked for you go to the [Keyboard Setup](#) section on page 10.

Detailed build

This section assumes you are a somewhat experienced programmer but are new to Macintosh and OS X.¹ If you are an experienced Unix or Linux user then there won't be much of a learning curve because OS X is a *nix OS based on XNU.²

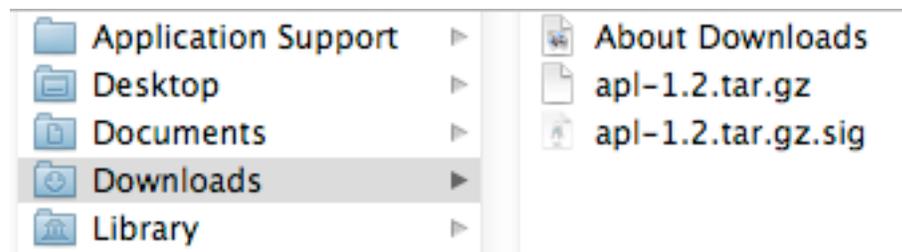
If you are coming from a Windows environment you will have quite a bit more to understand and this section only gives you the barest outlines. So lets get started.

(0) Download *It's up to you where you choose to put these files.*³ Your browser, by default, is usually configured to place downloads in your Home directory in the Downloads folder [see Finder Go menu]

You need to download the latest stable release, which at the date of writing was `apl-1.2.tar.gz` dated 2014-01-13 6:53:00 from <ftp://ftp.gnu.org/gnu/apl/>

Optionally also download the `apl-1.2.tar.gz.sig` file and verify that the download has not been corrupted - a wise thing to do IMHO.⁴

Navigate to your Downloads folder by selecting it from the Finder Go menu. If you've done this correctly you'll see something like this:



¹Otherwise why would you want an interpreter for A Programming Language?

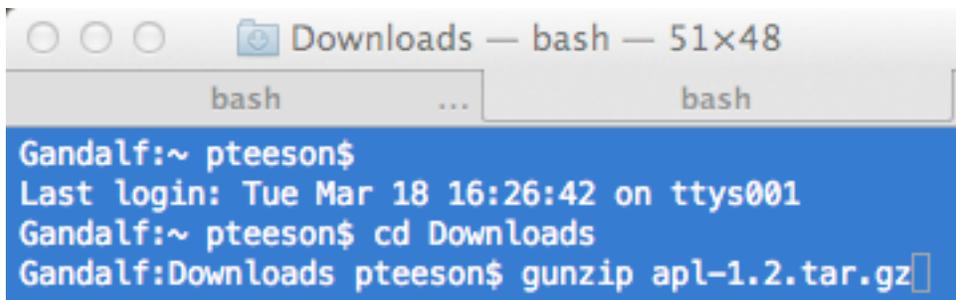
²<http://en.wikipedia.org/wiki/XNU>

³My code is on a separate drive and available to all releases of OS X.

⁴ If you don't know how to do this on Mac go to <https://gpgtools.org/gpgsuite.html> as a starting point.

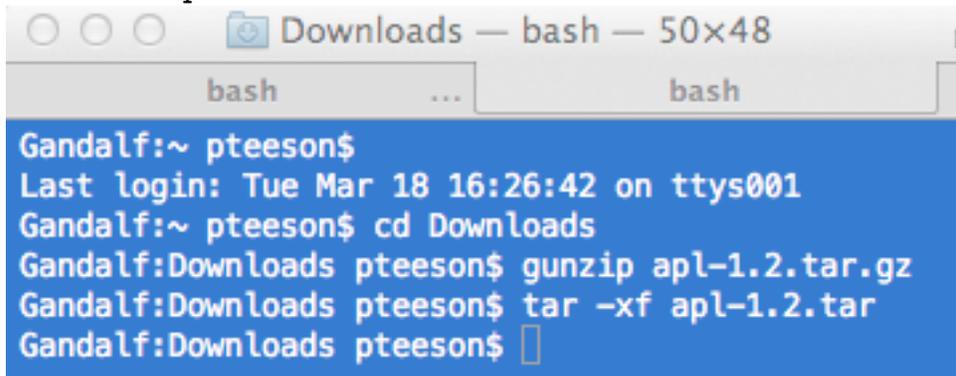
(1) Terminal Now we have the files we can open a Terminal window because we want to unzip the file and decompress the tar. It's located in the Utilities folder [see Finder Go menu]. Double click on it to launch it. Note the ~ because by default Terminal will open a window on your Home directory.

We actually want the Downloads directory where the files are, so type `cd Downloads` and press enter. Now type `gunzip apl-1.2.tar.gz` and press enter. If you've done it correctly you will see something similar to this:

A screenshot of a macOS Terminal window titled "Downloads — bash — 51x48". The window has a blue background. The text inside shows the user "Gandalf" at the prompt "~ pteeson\$". The user enters "cd Downloads" and then "gunzip apl-1.2.tar.gz". The cursor is at the end of the second command.

```
Gandalf:~ pteeson$  
Last login: Tue Mar 18 16:26:42 on ttys001  
Gandalf:~ pteeson$ cd Downloads  
Gandalf:Downloads pteeson$ gunzip apl-1.2.tar.gz
```

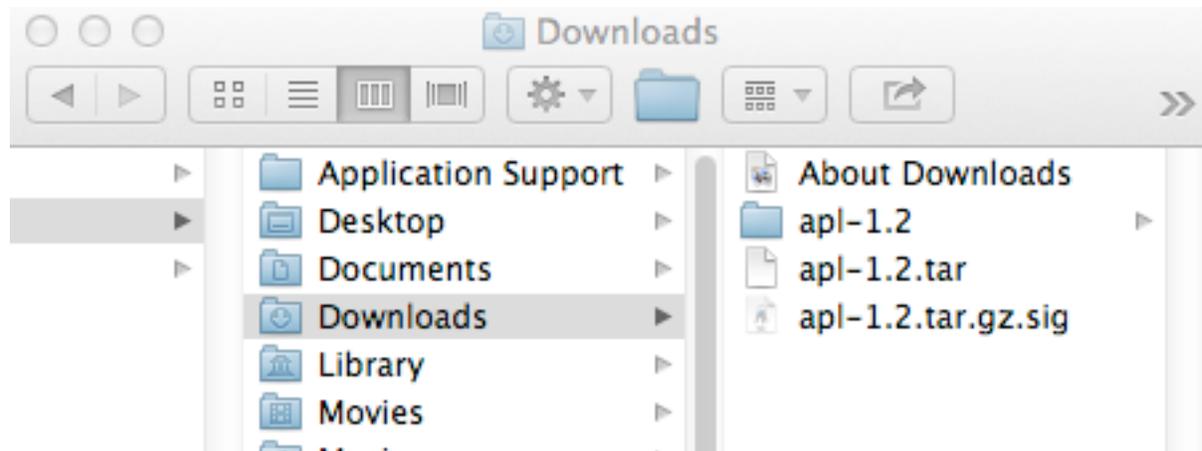
Press the enter key to unzip the file. Then type `tar -xf apl-1.2.tar`. You should now see this in Terminal:

A screenshot of a macOS Terminal window titled "Downloads — bash — 50x48". The window has a blue background. The text inside shows the user "Gandalf" at the prompt "~ pteeson\$". The user enters "cd Downloads", then "gunzip apl-1.2.tar.gz", and finally "tar -xf apl-1.2.tar". The cursor is at the end of the last command.

```
Gandalf:~ pteeson$  
Last login: Tue Mar 18 16:26:42 on ttys001  
Gandalf:~ pteeson$ cd Downloads  
Gandalf:Downloads pteeson$ gunzip apl-1.2.tar.gz  
Gandalf:Downloads pteeson$ tar -xf apl-1.2.tar  
Gandalf:Downloads pteeson$
```

Again click in the Finder and from the Go menu choose Downloads.

Note that the .tar file no longer has the .gz extension. Also note the new folder labelled apl-1.2.



Now we are ready to build but we need Apple's Xcode Command Line Tools.⁵

⁵It's the easiest way to proceed. If you don't want to use them you're on your own

(2) Obtaining and installing the Xcode Command Line Tools

To do this you need to have an AppleID. If you have more than one any one of them should work. In your browser go to <https://developer.apple.com/downloads/index.action>. You will be presented with a login window. If you already have an ID just login. Otherwise register for one.

The image shows a screenshot of the Apple Developer login page. At the top, there is the Apple logo followed by the word "Developer". Below this, there is a light gray rounded rectangle containing two input fields: "Apple ID" and "Password". Underneath the input fields are two buttons: a white "Register" button and a blue "Sign In" button. At the bottom of the gray rectangle, the text "Forgot ID or Password?" is displayed.

You should then be at the download page which looks like this:

Downloads for Apple Developers

The screenshot shows the Apple Developer Downloads interface. On the left, there is a search bar and a 'Categories' list with checkboxes for Applications (12), Developer Tools (184), iOS (12), OS X (62), OS X Server (9), and Safari (1). The main content area shows '1 - 20 of 212' items. The selected item is 'Safari 7.0.3 and 6.1.3 Seed 1'. The description states: 'This is a pre-release version of Safari 7.0.3 for OS X Mountain Lion and OS X Server. Safari 6.1.3 for OS X Mountain Lion and OS X Server is also included.' A dashed box highlights an important note: 'Important: Pre-release software, including pre-release software, is Apple Confidential.'

Uncheck all the Categories in the left hand pane except Developer Tools. Select the most recent version of the Command Line Tools *for your version of OS X*, scrolling down if necessary, and download them.

The screenshot shows the Apple Developer Downloads interface for Xcode 5.1. The 'Description' column contains the text: 'The is the release version of the complete Xcode developer toolset for Mac, iPhone, iPod touch, and iPad. It includes the iOS 7.1 SDK, OS X 10.9 SDK and OS X 10.8 SDK. Xcode 5.1 requires OS X Mavericks or OS X Mountain Lion.' The 'Release Date' column shows 'Mar 10, 2014'. Below the description, there is a download link for 'Xcode 5.1 .dmg(2.13 GB)'. At the bottom, there are two links for 'Command Line Tools (OS X Mountain Lion) for Xcode - March' and 'Command Line Tools (OS X Mavericks) for Xcode - March 2014', both dated 'Mar 10, 2014'.

In your Downloads folder you should see a file named like this:
commandline_tools_os_x_mountain_lion_for_xcode__march_2014.dmg

Double click on the file to mount it and on the .mpkg file to launch the installer and press the **Continue** button. Assuming everything was installed you are now ready to build GNU APL.

Click on the Terminal window because we want to type these commands, in sequence, pressing enter after each one. The ones in brackets are optional but recommended.

```
./configure  
make  
[make check]  
make install  
[make installcheck]
```

If everything has worked we can check it by typing `apl` or `APL`. You should see a welcome screen. Type `)off` or `)OFF` to exit the interpreter. This completes the Build & Install phase. We now need to setup the keyboard for APL.

Keyboard Setup

To make the keyboard work correctly with the APL interpreter we need two things - a correct APL Font and a mapping of the keyboard key codes. Fortunately these are both available. The ones I used are from <http://www.dyalog.com/resources>. Here is a quote from that page:

```
"This page contains downloadable resources which are believed  
to be of general interest to the APL community."
```

Indeed they are and we applaud their generosity in making them available.

Before doing anything else you should download the Dyalog APL for UNIX Apple Macintosh Supplement pdf. It has excellent instructions on how to proceed.

(1) Installing the APL Fonts. Their instructions are crystal clear. Download the APL385 font, and also APL333 if you want a proportional version. For OS X they suggest installing it in `/Library/Fonts/` which makes it available to all Accounts on this computer. In my case I placed it in my user account at `~/Library/Fonts/` instead. That was easy.

(2) Terminal Settings The supplement gives instructions for these. However you might not want to use those for your default Terminal use. My personal preference is to make a new Tab or Window from the `Shell` menu by selecting `New Tab` or `New Window` and then choosing `APL_Dyalog.alt.kb`.

(3) A keyboard layout. This is also available on the same web page. However trying to download it with your browser will probably fail, as of March 2014, because it's an XML file. The browser will try to interpret it, which it can't do. So you will probably see a page something like this:

```
XML Parsing Error: reference to invalid character number
Location: http://www.dyalog.com/resources/downloads/DyalogAlt.keylayout
Line Number 96, Column 36:   <key code="51" output="&#x0008;" />
-----^
```

Contacted Dyalog Support by email and they were kind enough to send me a reply with the file as an attachment. This quote is from an email to me

```
I'm sure it's fine that you pass the XML file to your friends
--it's freely available on our website. Once you have the
layout file, follow their instructions in the Supplement to install it. I
placed it in my ~/Library/Keyboard Layouts/
```

(4) Using Terminal with APL Start a Terminal window and, from the Input Source (a.k.a. Language) menu, *top right on the Menu Bar*, select **Dyalog Alt**. Also select **Show Keyboard Viewer** from the same menu. Now you can see the key mappings; press the alt key and voila your familiar APL symbols. Try Shift+Alt to get the rest. Type `apl` in the terminal window and enjoy.