The APLer's Quickstart Guide to the Raspberry Pi

Introduction

The Raspberry Pi is cheap to buy, fun to explore, and a very practical platform for APL. If you know APL, this document will help you to get going with the Pi as quickly as possible.

Who should read this guide

This guide has been sponsored by Dyalog Limited as a resource for current or veteran APLers who want to experiment with Dyalog's free APL for the Raspberry Pi.

The APL is freely available on the Pi for non-commercial use. Commercial licensing is also available: contact sales@dyalog.com

Getting started with the Pi

Many APLers are familiar with Microsoft Windows running on Intel platforms and with Mac OS. Some are familiar with running Linux on desktop machines.

The Raspberry Pi is different, and the differences can be a bit daunting.

This guide aims to de-mystify the process of getting started with the Raspberry Pi as an APL development platform.

What's covered

The guide covers what to buy, where to get it, how to set it up and how to install Dyalog APL.

What's not covered

The guide assumes you are familiar with APL. It does not cover how to use Dyalog's wonderful RIDE (Remote IDE), as Dyalog already provide documentation on-line. I may do an introductory RIDE video if there is enough interest.

It does not cover Linux, though there is a link to some relevant learning resources at the end of the document.

Nor does it cover Physical Computing with the Pi (controlling lights and motors, reading buttons and potentiometers etc). I'm planning a separate guide for that.

The 5 minute summary

This section contains the bare minimum of advice you need to get started quickly, but offers no explanation or discussion of alternative approaches.

If you're happy with that just do what I suggest :)

Most APLers don't just blindly follow the herd - that's why they are APLers! If you want to know the assumptions behind my advice and the alternatives available, read the whole document.

If you just want to get going, here's the 5-minute version:

1. Buy a Raspberry Pi Starter Kit and make sure you have the other hardware you'll need
2. Connect the contents and boot it up
3. Install Dyalog APL

Details of each are given below.

Buy a Raspberry Pi 3 starter kit

Raspberry Pi 3 starter kits are widely available in the UK, Europe and the USA.

Look for one which has the following components:

- Raspberry Pi model 3
- 5v 2.5A Power supply which you can plug into your mains supply
- 8Gb SD card with NOOBS or Raspbian Pixel pre-loaded

You'll also need a USB mouse, a USB keyboard (the Dyalog APL keyboard works best but any keyboard will do), a monitor or TV with HDMI support and an HDMI cable to connect it to the Pi.

You may also want to get a case. Some starter kits will include one.

You'll need WiFi or a wired connection in order to install and update the Pi's software.

The Raspberry Pi 3 has built-in WiFi which you can configure once the Pi has booted up. (If you're using an earlier model you can use wired ethernet or get a USB WEiFi dongle). If you decide to use a wired ethernet connection you will also need an ethernet cable.

Some starter kits include a keyboard and mouse; some don't. Check carefully and decide which one to get.

The supplier I normally buy from is a UK company called Pimoroni. If you're based outside the UK Pimoroni ship overseas but a local supplier may be faster and cheaper.

Pimoroni sell a starter kit for £85 (including mouse and keyboard) and an essentials kit (without mouse or keyboard) for £55.

Connect the hardware

There's a great guide to setting up your Pi on the Raspberry Pi website. I won't try to reproduce it; just follow their super-clear instructions.

When you're done, come back here.

Install Dyalog following these instructions

Dyalog installation on the Pi is covered here.

Now skip on to the section 'What Next?' at the end of this document.

The alternatives

You don't *have* to get a Raspberry Pi model 3.

You can use a Raspberry Pi Model 1 or 2 but they are not much cheaper and are much less powerful. In particular, the Raspberry Pi model 3 has 4 cores and APL can use them all! They may still be a good solution if you have one lying around. Setup and installation are the same as for the Pi 3.

The only sensible alternative to buying a Pi 3 is the Pi zero.

It's much cheaper: £4 + Postage. If you're willing to hack around a bit you can even power it, and connect to it, using just a USB lead and a laptop or desktop computer. You'll need to use `ssh`to configure it, and then use `VNC` to access the Pi desktop. If those terms mean nothing this is probably not the option for you.

There is a half-way house. You can get a Raspberry Pi zero starter kit for about £24 and you will also want a suitable USB hub.

You'll still need a monitor, HDMI cable, mouse and keyboard. The total cost will be a little lower than getting a Pi 3 and the zero is slower, has just one core and has much less memory.

I would only recommend the zero if you are building a robot or an embedded application where space and power consumption are critical, in which case you probably don't need this guide :)

APL

Linux

Physical computing

GPIO

Audience

Familiar with APL

Less familiar (or a novice) with the Pi

Assumptions

Simplest setup rather than lowest cost

Cost saving alternatives in appendix A.

Headless working

Using latest (PIXEL) version of the Rapberry Pi OS

Existing monitor

What to buy

Pi

Raspberry Pi 3

Raspberry Pi zero

with Pi 3

Power supply (2.5 A)

HDMI cable to connect to monitor

USB keyboard

Mouse

assume you have Wifi network and/or ethernet cable

SD card

NOOBS or Raspbian

with Pi zero

USB hub

Power supply (2 A)

HDMI cable and adaptor

USB keyboard

Mouse

Pi compute module

Where to get it

Pi zero

Setup

(Flashing an SD card - see appendix A)

First boot

Update/Upgrade

Subsequent use

APL

RIDE

On Laptop/desktop

On Pi

TTY mode

Linux

Pi mouse, keyboard, screen

SSH

VNC

VNC connect

What next?

Other resources

Use the slack channel

Join the email list

Physical computing

I hope you'll have as much fun with the Pi as I do! # Licence