

IRAF for Amateur Spectroscopy

Introduction

The aim of these notes is to help amateurs use the professional software IRAF to process their data. It is aimed at Window users.

While there are many excellent free Windows packages available they are reliant on the goodwill and well being of their creators. I have uses and continue to use ISIS by C Buil and BASS by J Paraskeva both are very capable and widely used in the amateur arena. I also use the commercial package Rspec from Field Tested Systems.

It is not my intention to challenge their use but to help provide an alternative.

Linux

The major challenges to using IRAF are it is only available on a Linux platform and is command line driven.

There are three options for getting a suitable Linux environment.

- Create a Virtual Machine within a Windows environment to host Linux
- Dedicate a PC to Linux
- Create a duel boot system which can run Windows or Linux.

I will only cover the first as I have not tried the dedicated PC or duel boot option and the latter is not generally recommended. The big advantage of the virtual machine VM is that if you make a mistake you can delete it (along with its data files) and start again. This proved very helpful while I was learning how to install IRAF.

There are many flavours of Linux and the one I landed upon was Ubuntu. It is well regarded and well documented. It is available here:

<https://www.ubuntu.com/desktop>

It is available free or you can make a contribution as you download. The only issue is to choose the right version for your computer 32 or 64 bit and to choose the LTS (long term support) version.

Currently the standard version is a 64 bit LTS but others are available via the alternative downloads. The alternative downloads are by BitTorrent so you will need to download and install it if you need the 32 bit version.

<http://www.bittorrent.com>

However, this guide focuses on machines with 64 bit architecture.

Virtual Machine

To run Ubuntu on my Windows 7 & 8 PCs I needed a package to provide the VM environment. I found two commonly used packages and tried them both.

Firstly, Oracle's Virtual Box

<https://www.virtualbox.org>

and secondly vmware's workstation

<http://www.vmware.com>

The non commercial use version is free version is not obvious but I found it here

<http://www.vmware.com/products/player/playerpro-evaluation.html>

Getting Ubuntu up and running

The basic steps are:

- Download and install the virtual machine
- Download the Ubuntu .ISO file (ISO is a CD/DVD image you can boot from)
- Create a virtual machine in the VM and install Ubuntu.

All the steps are well documented on the sites and in the help documentation. There are also YouTube videos taking you through the process.

You will need to know about your PC. These include is it 32 or 64 bit, the number of processors and also how much RAM and free disk space you have.

It is not complicated I found allocating 2048 MB of RAM and 30G of disk worked OK but it will depend on your machine. Other than that I accepted the defaults

You will need to set a password in Ubuntu and it is vital you don't forget it! You will need it to log on and when using super user power in Ubuntu to install IRAF.

You will want to set up a shared file between the host Windows and the VM, again see the internet, or you will have to use a pen drive to get your files on to the system.

Installing IRAF

This was by far the hardest task. The web is littered with how to guides and YouTube videos most of which led to dead ends. They rely to a greater or lesser degree on libraries that are no longer distributed or available.

In the end I concluded the best idea was to follow the most basic approach based on the official documentation. As I am not an expert it required some trial and error!

Not understanding what is going on was an obstacle for me so I have commented the steps to help using a # before it. Please don't try to input them! If you want to know more just google them.

To input these steps you need to open a Terminal in Ubuntu. Right Click anywhere on the main window and select Open Terminal.

This opens a terminal in which you type commands. If you are old like me and remember DOS this is not such an issue!

Basically you type a <command> plus any parameters and press enter. You can get back to the last line (say if it had a typo and failed) with the up arrow key. The left and right arrow keys allow you to move along the line and edit it. Note if a command fails it is often due to a typo as it has to be precise and it is case sensitive. Also watch out for Inux!

The step by step guide for 64 bit Ubuntu.

```
# Get and install tcsh command line interpreter. ( I am not sure this is necessary but does  
# no harm)
```

```
# Some commands must be done as a supper user (sudo)
```

```
sudo apt-get install tcsh
```

```
# Get the IRAF package from http://iraf.noao.edu
```

```
wget ftp://iraf.noao.edu/iraf/v216/PCIX/iraf.linux.x86_64.tar.gz
```

```
# Now create the directories to put it in
```

```
sudo mkdir /iraf
```

```
sudo mkdir /iraf/iraf
```

```
#Move the package to the directory, unpack it, remove it and  
#Install IRAF.
```

```
sudo mv iraf.linux.x86_64.tar.gz /iraf/iraf/.
```

```
cd /iraf/iraf
```

```
sudo tar -zxf iraf.linux.x86_64.tar.gz
```

```
sudo rm iraf.linux.x86_64.tar.gz
```

```
sudo ./install
```

```
# During the install keep pressing return to accept the defaults.
```

```
# Go to your home directory
```

```
cd
```

```
#Now we get some additional tools, make them executable and move them to where they  
#are needed. These replace the “missing” libraries and are provided by noao.
```

```
wget ftp://iraf.noao.edu/pub/fitz/xgterm.STATIC
```

```
sudo chmod 755 xgterm.STATIC

sudo mv xgterm.STATIC /usr/local/bin/xgterm

wget ftp://iraf.noao.edu/pub/fitz/ximtool.STATIC

sudo chmod 755 ximtool.STATIC

sudo mv ximtool.STATIC /usr/local/bin/ximtool

# We also need to get SAOImage DS9 from http://ds9.si.edu/site/Home.html

wget http://ds9.si.edu/download/ubuntu16/ds9.ubuntu16.7.5.tar.gz

sudo tar -zxf ds9.ubuntu16.7.5.tar.gz

sudo rm ds9.ubuntu16.7.5.tar.gz

sudo mv ds9 /usr/local/bin/.

# We create an IRAF directory and initialise IRAF!

cd

mkdir IRAF

cd IRAF

mkiraf

# Accept the default terminal xgterm.

#To launch iraf from an xgterm window from a unix terminal window type

xgterm

# In the xgterm window

cd ~/iraf

cl
```

If you have problems finding a file it may have been updated. Try the home site or google search. If you download using the web browser drag it from "Downloads" into "Home" then continue with the commands after the wget.

32 Bit Ubuntu

If you only have a 32 bit architecture machine I got these instruction by - Rubab Khan to work.

http://www.astronomy.ohio-state.edu/~khan/iraf/iraf_step_by_step_installation

I left out these Ohio specific bits.

```
wget http://www.astronomy.ohio-state.edu/~khan/iraf/iraf
```

```
sudo chmod u=rwx iraf
```

It may fail on one or more of the libraries. In which case try that one again. E.g. if # libXmu6:i386 fails use `sudo apt-get install libXmu6:i386` or do them one by one.

Using IRAF.

I am following this tutorial.

<http://www.twilightlandscapes.com/IRAFtutorial>

NB if you use C Buil's numbering system e.g. star-1.fit you will need to change as the “-” may get interpreted as a subtraction of one image from another! Use an “_” instead.

Good Luck

Andrew Smith

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