

# **Virtual HIPE Quick Start Guide**

## **HIPE 15.0**

### **(Herschel Legacy Version)**

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## 1. Who is this guide for?

This guide is intended for new users of Herschel archival data, who have very limited or minimal knowledge of HIPE – the Herschel Interactive Processing Environment – for working with Herschel data and who need to learn everything from documentation as they will have only very limited user support available. The aim is to take as a starting point the excellent Quick Start Guide to HIPE that is a basic tutorial for starting to use HIPE and expand it to Virtual HIPE showing, step-by-step, the things that a user needs to know – and that most documentation assumes that a user **does** already know! - to be able to start to analyse and process data in HIPE.

## 2. Why should I still use HIPE?

HIPE's greatest benefit for users are the many useful tools that it offers to analyse Herschel data sets. In other words, in a world after the official retirement of Herschel, HIPE is seen as a valuable analysis tool, rather than its focus during Flight Operations and the early part of post-Operations as a tool for data processing. However, there are some types of data, particularly the most complicated observing modes, for which re-processing by hand can sometimes improve the result, as it is almost impossible to give a single recipe for automatic processing that gives the best result in all cases. A lot of these observations will be made available to users as Highly Processed Data Products (HPDPs) although, in most observing modes the pipeline products produced by automatic bulk re-processing with the final HIPE user release (and, indeed, even with previous releases) give as good a result as it is humanly possible to obtain (SPIRE photometry and small PACS maps are examples of pipelines that have been stable for several HIPE releases).

## 3. Validity of this version of HIPE

### 3.1 Virtual HIPE v Classic HIPE

Here we refer to the standard HIPE 15.0.1 release as “Classic HIPE”: the standalone version of HIPE 15.1.1. At the time of virtualisation this version was fully functional and we expect it to function correctly with any currently foreseeable future OS/Platform combination.

Virtual HIPE is an attempt to futureproof Herschel Interactive data Processing Environment (HIPE) for future users. It takes a HIPE installation that is known to work well and virtualises it so that it can be run on any future OS/Platform combination. For Virtual HIPE, as for [Virtual HSpot](#), the guest OS is Debian Linux with the LXDE desktop. Again, we choose it because it is a well-known and well-understood platform on which HIPE works correctly.

Virtual HIPE uses the HIPE 15.0.1 build. This is the final Herschel Legacy version of HIPE.

### 2.2 Caveats

At present, there are no issues running HIPE on standard OS/Platform combinations. However, as HIPE will now no longer be maintained, we can offer no guarantee that options will not start to fail progressively in the future due to errors produced by changes in infrastructure, failure of servers, etc. Nor can we predict what problems HIPE may have with future Operating System/Platform combinations. In other words, although there is, at time of writing, there is no reason why a user should use Virtual HIPE

instead of Classic HIPE, we foresee that there will be a gradual drift to requiring Virtual HIPE in the coming years until, at some unforeseeable moment after the Herschel mission has finished at the end of 2017, only Virtual HIPE will be operational.

### **3.2 System Requirements**

HIPE is memory hungry. Please note that the minimum shown below is strictly a minimum and if you try to run virtual HIPE with it you may find that system response is very slow even without trying to use memory-intensive functions. If you have an 8 GB machine and are also working in the background, it is likely that you will have memory issues. With memory for HIPE the rule of thumb is that “the more, the merrier”.

- 8 GB (minimum), 16 GB (recommended) RAM (you may need to make some configuration changes to increase the available memory, explained below)
- 15 GB (or more) free disk space
- For querying the Herschel Science Archive and data retrieval, a fast Internet connection is recommended strongly.

## **4. Before Anything Else: Downloading Virtual Box**

The VM and full instructions are available at the following link:

[http://archives.esac.esa.int/hsa/legacy/software/hipe\\_vm/](http://archives.esac.esa.int/hsa/legacy/software/hipe_vm/)


It is strongly advised that you read the information on this page carefully BEFORE installing.

### **4.1 Installing VirtualBox**

Before doing anything else, you should install [VirtualBox](#). Go to:

<https://www.virtualbox.org/>

This link will list the operating systems compatible with VirtualBox. You should see a screen like this:



# VirtualBox

## Welcome to VirtualBox.org!

VirtualBox is a powerful x86 and AMD64/Intel64 virtualization product for enterprise as well as home use. Not only is VirtualBox an extremely feature rich, high performance product for enterprise customers, it is also the only professional solution that is freely available as Open Source Software under the terms of the GNU General Public License (GPL) version 2. See "About VirtualBox" for an introduction.

Presently, VirtualBox runs on Windows, Linux, Macintosh, and Solaris hosts and supports a large number of guest operating systems including but not limited to Windows (NT 4.0, 2000, XP, Server 2003, Vista, Windows 7, Windows 8, Windows 10), DOS/Windows 3.x, Linux (2.4, 2.6, 3.x and 4.x), Solaris and OpenSolaris, OS/2, and OpenBSD.

VirtualBox is being actively developed with frequent releases and has an ever growing list of features, supported guest operating systems and platforms it runs on. VirtualBox is a community effort backed by a dedicated company: everyone is encouraged to contribute while Oracle ensures the product always meets professional quality criteria.

## Download VirtualBox 5.1

**Hot picks:**

- Pre-built virtual machines for developers at [Oracle Tech Network](#)
- **Hyperbox** Open-source Virtual Infrastructure Manager [project site](#)
- **phpVirtualBox** AJAX web interface [project site](#)
- **IQEmu** automated Windows VM creation, application integration <http://mirage335-site.member.hacdc.org:6380/wiki/Category:IQEmu>

Click on the download link and select the appropriate version for your platform from the list offered:

# VirtualBox

## Download VirtualBox

Here, you will find links to VirtualBox binaries and its source code.

### VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

- **VirtualBox 5.1.22 platform packages.** The binaries are released under the terms of the GPL version 2.
  - [Windows hosts](#)
  - [OS X hosts](#)
  - [Linux distributions](#)
  - [Solaris hosts](#)

For Windows and Mac you should see a pop-up like the following appear:



Click on Run to install.

## 4.2 Installing on Linux

As for HSpot, Linux installation of VirtualBox is quite different to Windows or Mac. For Linux you have to select the version that matches your Linux kernel architecture. VirtualBox will present you with options for different platforms. Note that some Linux platforms are **not** supported:

## VirtualBox 5.1.22 for Linux

**Note:** The package architecture has to match the Linux kernel architecture, that is, if you are running a 64-bit kernel, install the appropriate AMD64 package (it does not matter if you have an Intel or an AMD CPU). Mixed installations (e.g. Debian/Lenny ships an AMD64 kernel with 32-bit packages) are not supported. To install VirtualBox anyway you need to setup a 64-bit chroot environment.

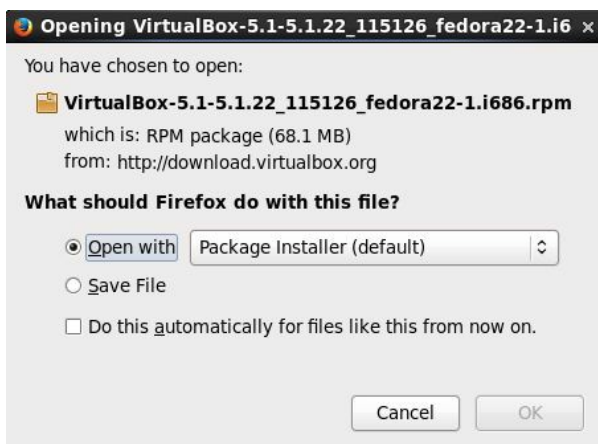
The VirtualBox base package binaries are released under the terms of the GPL version 2.

Please choose the appropriate package for your Linux distribution:

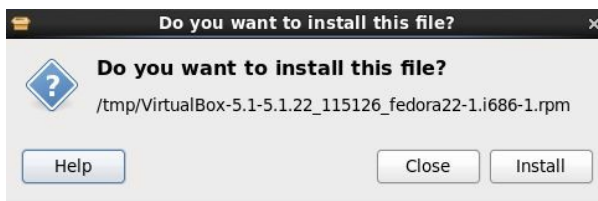
- Ubuntu 17.04 ("Zesty") ⇨ i386 | ⇨ AMD64
- Ubuntu 16.10 ("Yakkety") ⇨ i386 | ⇨ AMD64
- Ubuntu 16.04 ("Xenial") ⇨ i386 | ⇨ AMD64
- Ubuntu 15.10 ("Wily") ⇨ i386 | ⇨ AMD64
- Ubuntu 14.04 ("Trusty") / 14.10 ("Utopic") / 15.04 ("Vivid") ⇨ i386 | ⇨ AMD64
- Ubuntu 12.04 LTS ("Precise") ⇨ i386 | ⇨ AMD64
- Debian 9 ("Stretch") ⇨ i386 | ⇨ AMD64
- Debian 8 ("Jessie") ⇨ i386 | ⇨ AMD64
- Debian 7 ("Wheezy") ⇨ i386 | ⇨ AMD64
- openSUSE 13.2 ("Harlequin") / Leap 42.1 ("Malachite") ⇨ i386 | ⇨ AMD64
- Fedora 25 ⇨ i386 | ⇨ AMD64
- Fedora 24 ⇨ i386 | ⇨ AMD64
- Fedora 22 / 23 ⇨ i386 | ⇨ AMD64
- Oracle Linux 7 ("OL7") / Red Hat Enterprise Linux 7 ("RHEL7") / CentOS 7 ⇨ AMD64
- Oracle Linux 6 ("OL6") / Red Hat Enterprise Linux 6 ("RHEL6") / CentOS 6 ⇨ i386 | ⇨ AMD64
- Oracle Linux 5 ("OL5") / Red Hat Enterprise Linux 5 ("RHEL5") / CentOS 5 ⇨ i386 | ⇨ AMD64
- All distributions (built on EL5 and therefore do not require recent system libraries) ⇨ i386 | ⇨ AMD64

You might want to compare the SHA256 checksum or the MD5 checksum to verify the integrity of downloaded packages. *The SHA256 checksums should be favored as the MD5 algorithm must be treated as insecure!*

Click on the appropriate installer to download it. A pop-up like the one below will appear, asking you what you want to do with the file. Click on OK to continue with installation.



You will then be asked to confirm installation, as below. Check that you have the correct version and click on Install:



You will require Administrator privileges on your PC to do this.

## 5. Downloading the HIPE Virtual Installer

Go to the following link:

[http://archives.esac.esa.int/hsa/legacy/software/hipe\\_vm/](http://archives.esac.esa.int/hsa/legacy/software/hipe_vm/)

Click on the HIPE Virtual installer: [HIPE-15.0.1\\_1.ova](#) and save it.

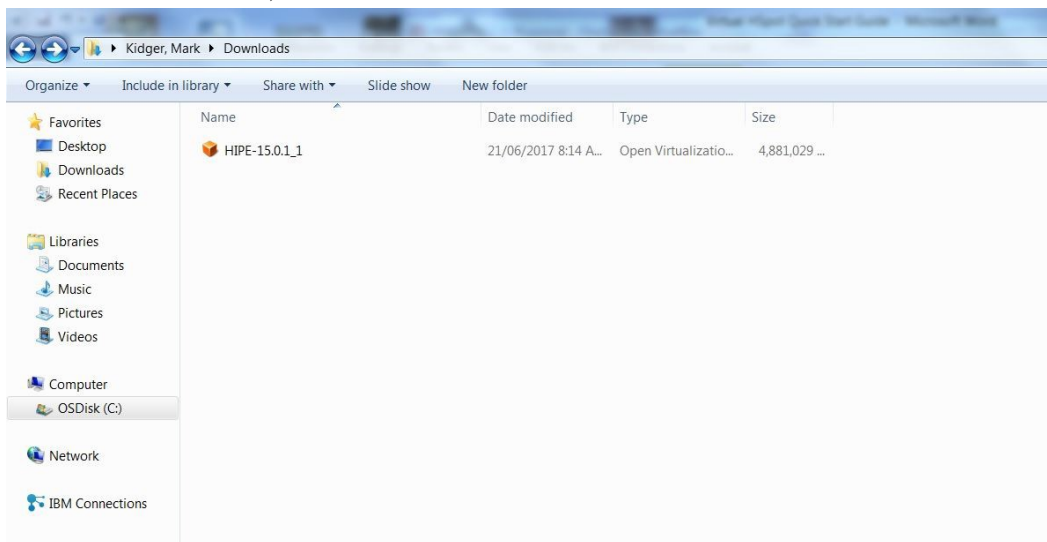
The file will save to your Downloads folder.

On Windows, it is C:\Users\Username\Downloads.

On Linux, it is: /home/User/Downloads

The file that is downloaded is 4.7Gb, so it may take a little while to complete the download, even over a LAN.

You should see something like the following figure (obviously, the File Manager will look slightly different on Linux and on Mac).



## 6. Installation

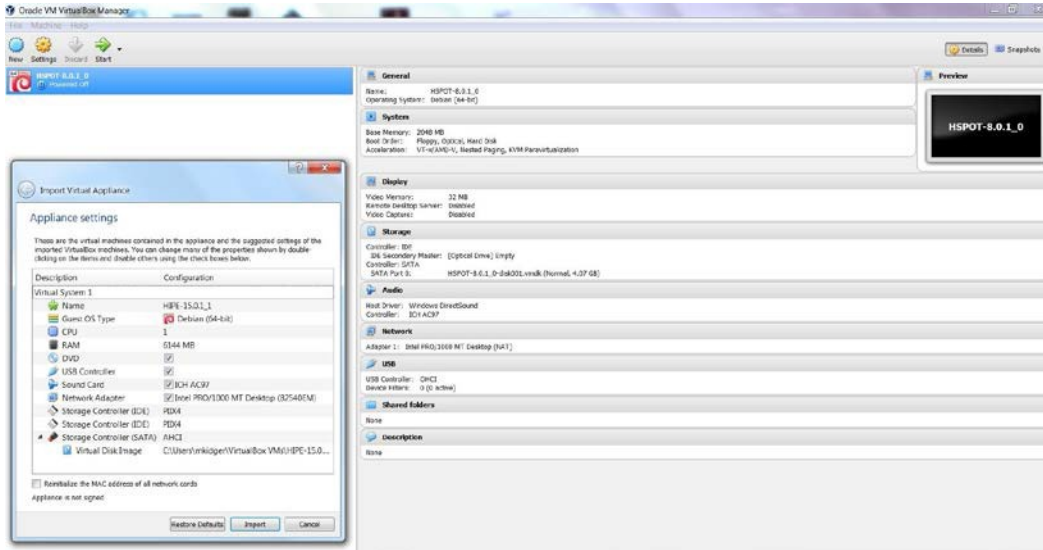
### 5.1 Associating Virtual HIPE with VirtualBox

When you open VirtualBox for the first time or after upgrading to a new version, you may see the following warning appear to alert you to the fact that you may be disconnected briefly from the Internet when you complete installation. If you are doing something critical in the background that requires a continuous internet connection, you should be aware that it may be interrupted.



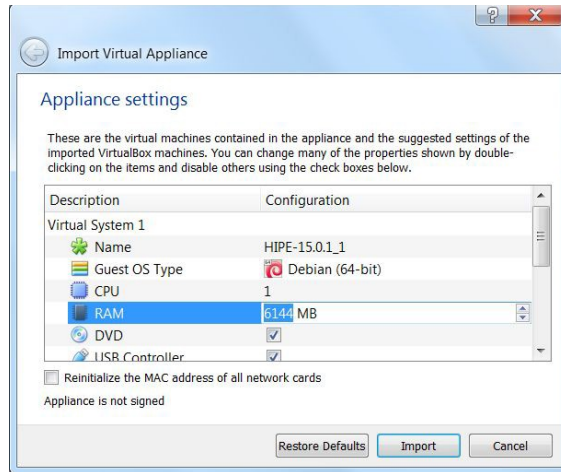
Before you can run Virtual HIPE you must add it as an option to VirtualBox. The simplest way to do this is directly from the installer. When you double-click on the \*.OVA file that you have downloaded it will open VirtualBox as shown below: in this instance Virtual HSpot was already associated with the VirtualBox and so VirtualBox shows Virtual HIPE as the active program on opening the HIPE Virtual Machine. You can switch between Virtual HIPE and Virtual HSpot at will.

When VirtualBox opens, the pop-up will show you the VirtualBox configuration that is set up for Virtual HIPE. In most cases you can just confirm these settings. However, if you look at the default RAM setting below, it is well below the recommended minimum for the installation, so we should modify it.

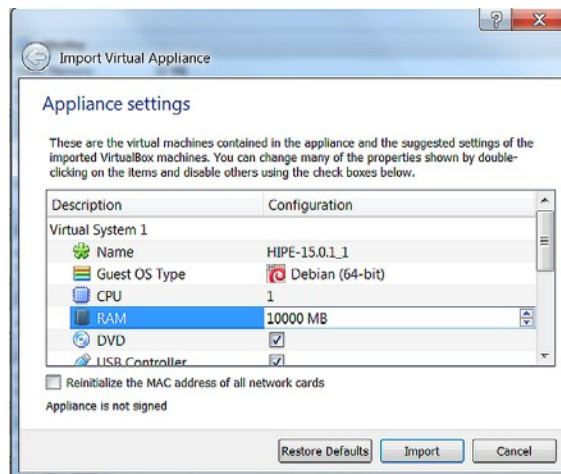


Doing this is simple. Click on the RAM cell to activate it:



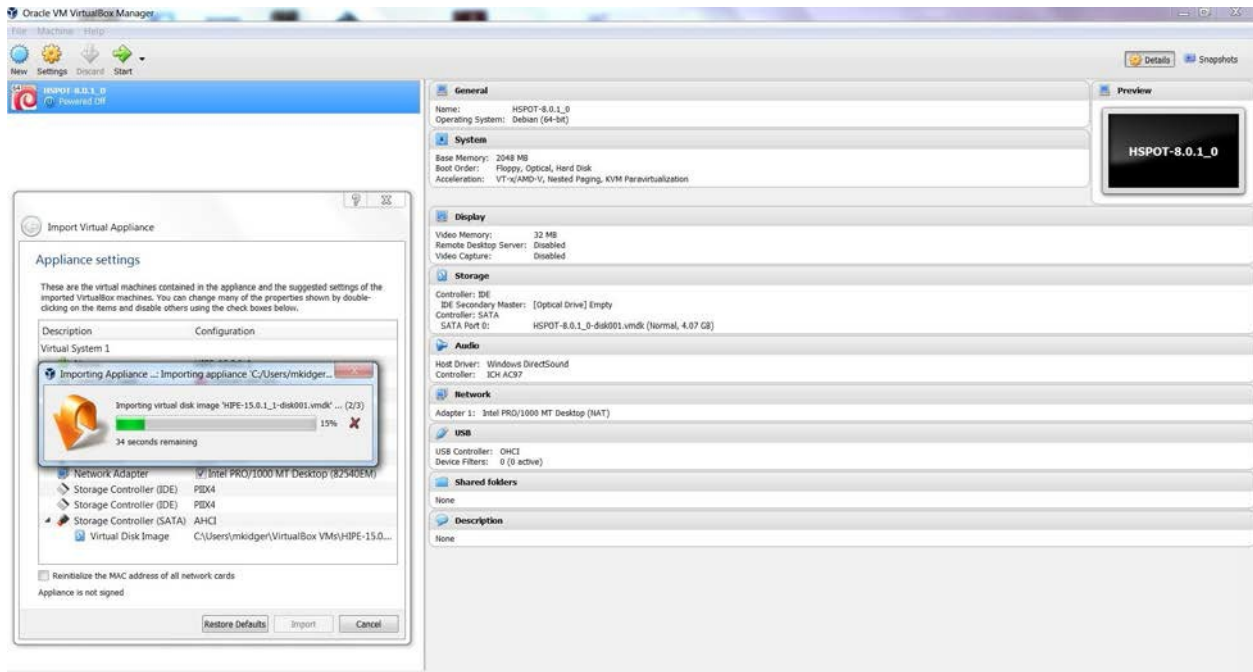


And now put in the value that you wish to assign for the RAM:

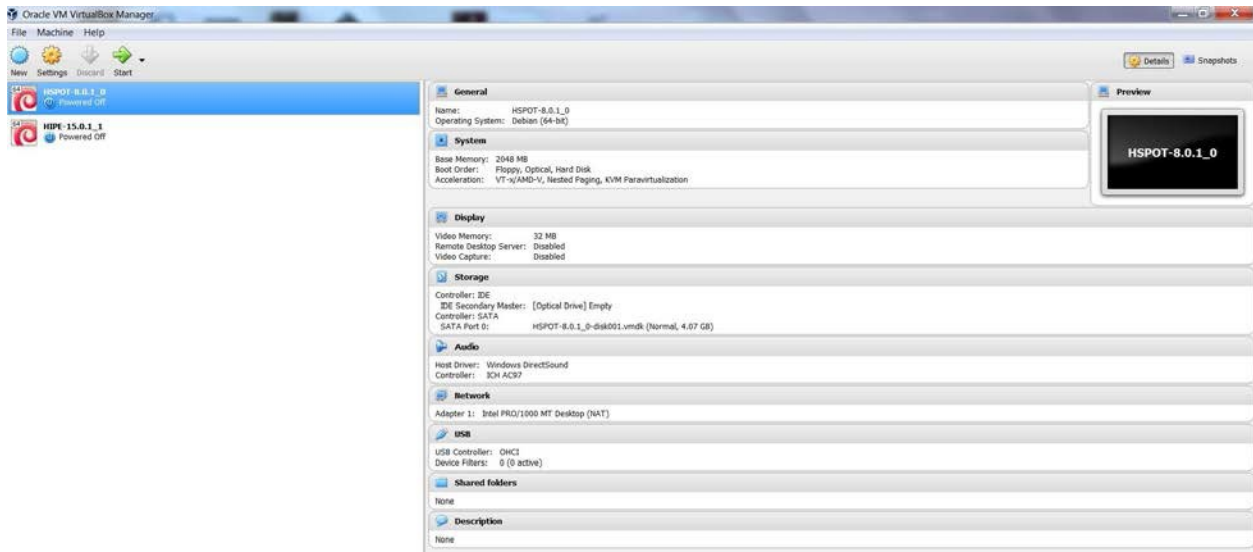


Now press “Import” to import HIPE into VirtualBox.

When you do this, import will start. This may take a minute or two. A pop-up will appear confirming that import is in progress:

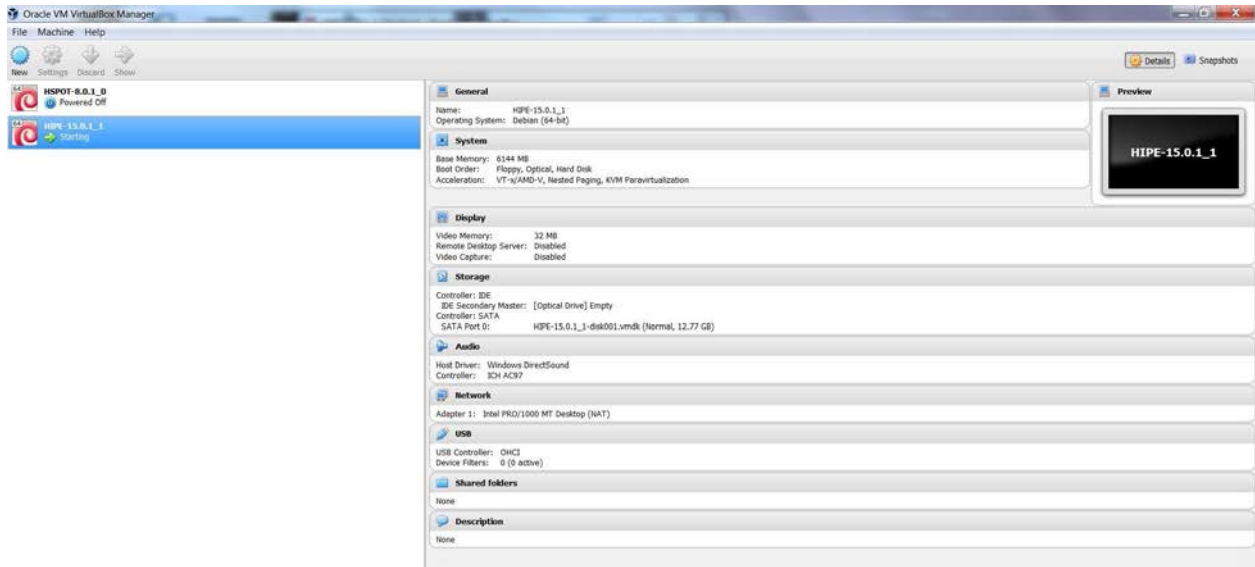


Once import is complete, you will see the new software linked in the top left corner in a Powered Off state.

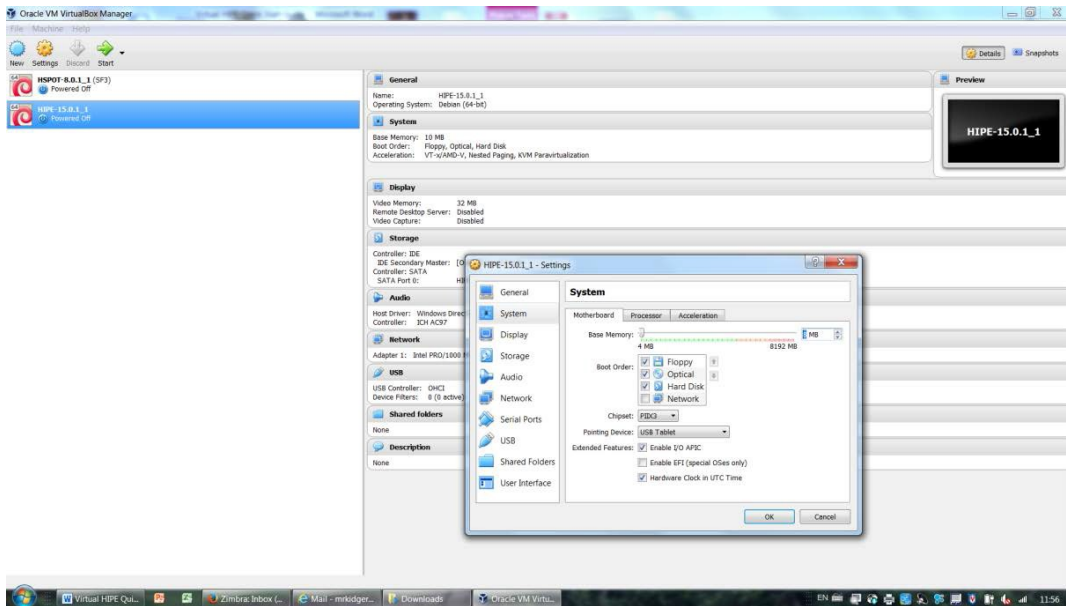


## 5.2 Powering Up

Running HIPE in VirtualBox is trivial. Click on the HIPE-15.0.1\_1 icon and you will see it turn green and advise you that it is starting.



If you have assigned inadvertently a value for the RAM that is larger than your computer has available to assign, the Virtual Machine will fail to power up. You will receive an error message that you have to load the kernel first and the power-up will stop. If this happens, click on “System”, after which this pop-up will appear:



The slider shows you how much RAM you have available. You will see that the slider has a green range and a red one, if you go into the red part of the slider you will have almost all available RAM assigned to the Virtual Machine, leaving very little for other processes such as the computer’s own operating system.

The rule of thumb is to move the slider to the end of the green part of the bar.

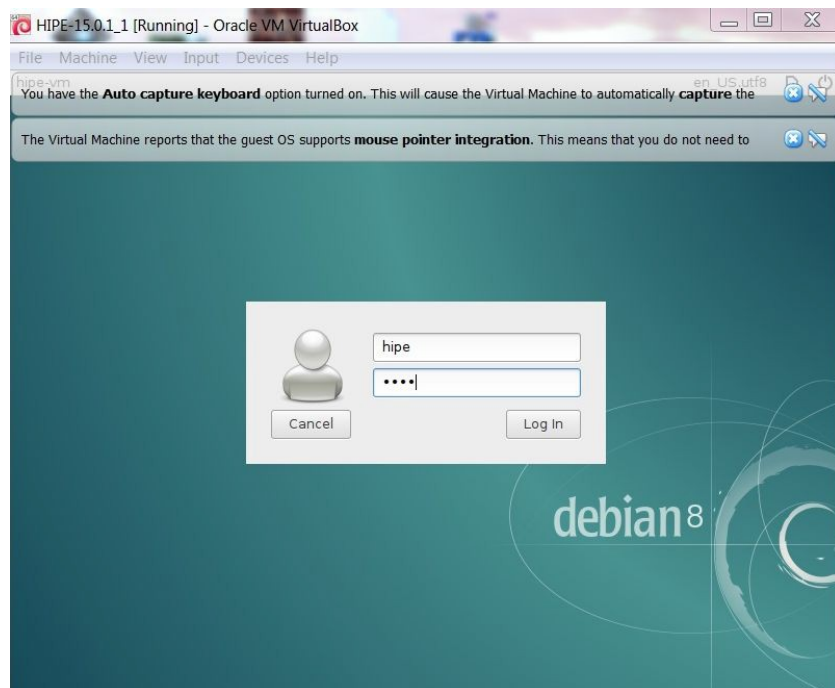
If you have to change the memory setting during power-up, you will need to shut down VirtualBox and re-start it for the new settings to take.

Powering up will run through multiple screens. You do not need to do anything while it is loading, until you reach the log on screen. Just sit back patiently and watch.

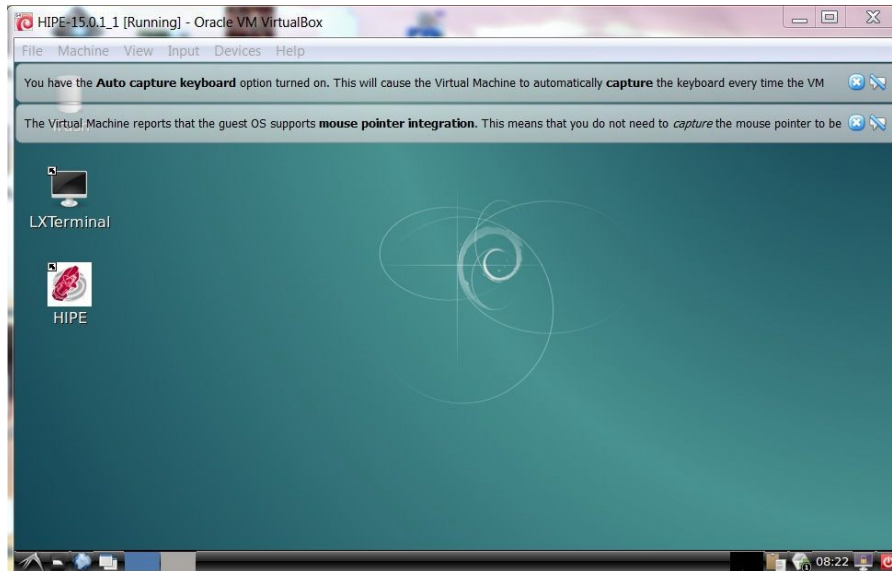
### 5.3 Logging On

Once you have reached the screen below, you are ready to log on. Note that VirtualBox is likely to give you several information messages at the top of the screen. These you can dismiss, if you wish, to save screen space just by clicking on the cross.

To log on, give the Username as “hipe” and the password as “hipe” too. This is CASE SENSITIVE! If you use “HIPE” (upper case), or “Hipe” (sentence case), it will not work.



Once you are logged on, you will get to the screen below. Just double-click on the HIPE icon to execute it in the virtual terminal.



This gets you into the HIPE welcome screen below, although opening HIPE may take several minutes! You can re-size this window, as required. HIPE will now run as normal.



## 5.4 VirtualBox Updates

### 5.4.1 Dealing with VirtualBox updates

It may happen that when you open VirtualBox you are offered an update to the software. To install it you click on the link but, before starting the installation process for the update, you must first shut down and close your VirtualBox session, as the update of the VirtualBox version requires access to files that are in use when you have a session open. It may take a minute or so for all the associated processes to close down, even when the VirtualBox window is closed.

The process of updating will disconnect you briefly from the Internet, so be aware that anything that you are doing in the background that requires uninterrupted Internet access will fail. When you have completed installation of the update, you should be able to power-up your HIPE session as normal.

### 5.4.2 What if power-up fails after a VirtualBox update?

It has been observed that, sometimes, after a VirtualBox update, if the total amount of memory on the computer is relatively small and a relatively large amount has been assigned to VirtualBox, a session that worked prior to update may fail afterwards with an error that the host machine does not have enough memory available. When this happens, the VM session goes into hold and the screen greys-out. The only remedy that has been found to work if this happens is to shut down the session, de-install HIPE, modify the memory allocation and then re-install.

This should not happen on computers that have a large amount of memory.

## 6.5 Powering Down Virtual HIPE safely

To close and power down your session, go to the red button in the bottom right-hand corner of your screen for a safe shutdown:



When you press this button a shutdown menu will appear:



Select “Shutdown” to do a controlled shutdown of the Virtual Machine.

If, instead, you go to the “Machine” option in the top menu and, in the dropdown, select “ACPI Shutdown” you *will* shut down your session, but it is the equivalent to pulling out the power cable in your computer to close down a session: **DO NOT DO THIS.**


Once your HIPE session has shut down, go to the File option in the top menu and select “Exit” to shut down VirtualBox.

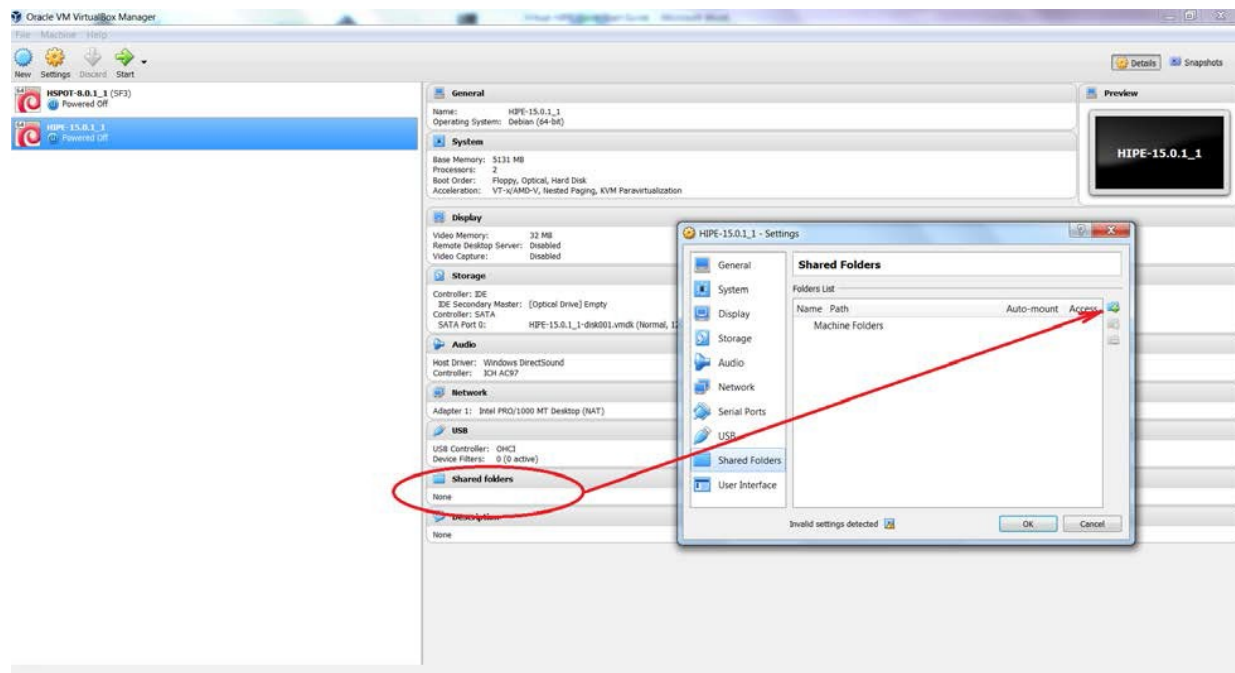
## 6. Sharing folders between your local disk and Virtual HIPE

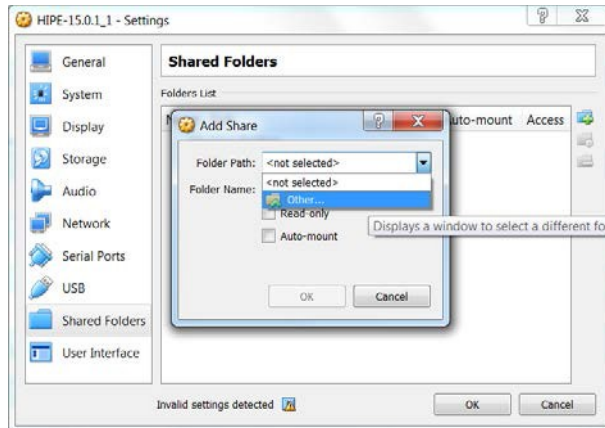
There is one fundamental difference between the standard or Classic HIPE and the Virtual HIPE. Classic HIPE can see any internal or external directory or unit on your computer. In contrast, Virtual HIPE is a world within your computer, effectively it is a private area of the disk for a separate user. Virtual HIPE can access the Internet, but it cannot see local directories on your computer unless you specifically give it access by previously *sharing the folder* or, alternatively, by specifically enabling *cut and paste operations* between your computer and the VM. These are the two simplest options for users to transfer files and data between their local disk and the VM. These options are described below.

One important item to note is that our version of Virtual HIPE has disabled access to USB2 and USB3. During testing we found significant issues on some OS/platform combinations when USB2/3 access was enabled, due to the requirement to install the VirtualBox extension package first and the additional steps and issues that it implied for users. Unless you have an old USB1 memory stick, USB access is effectively disabled.

### 6.1 Defining a shared folder

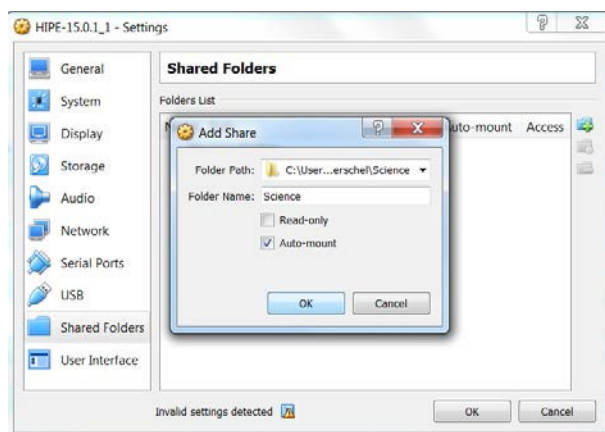
This is a simple option that allows the VM to access any file within a particular folder. When you have opened the VM, click on Shared Folders before powering-up HIPE. A pop-up will appear, as shown below. Click on the green  symbol and then on “Folder Path” and select “Other”:






This will open your File Manager to allow you to navigate through your directory structure and to select a directory, to share with your Virtual Machine, as shown below. When you have the correct directory, click on “Select Folder”:

The VM will confirm the directory structure and the folder. Select the “Auto-mount” option to mount this directory so the VM will have access to it every time that it opens. You can also protect the contents of the folder from being overwritten by making it “read-only”. Click on “OK” to select.

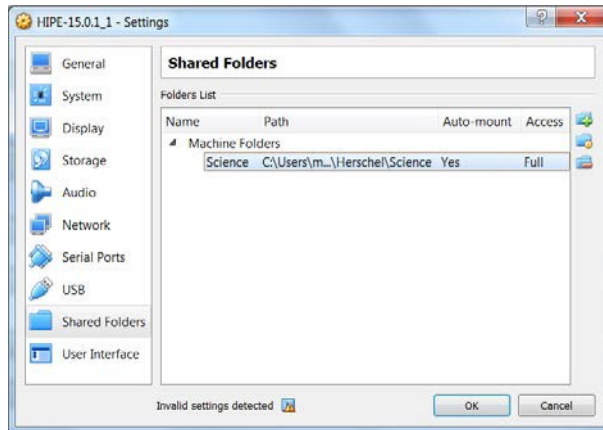


If you have HIPE powered-up when you do this (*not recommended*) you should see a third option in the pop-up “Make-permanent”. Unless you tick this box the VM will forget your changes as soon as you exit your session.

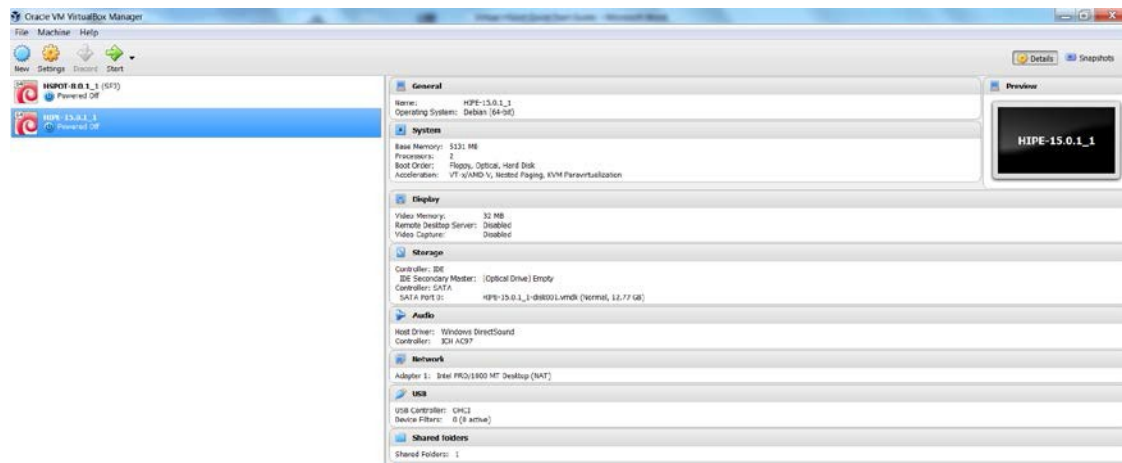
As shown below, the VM will confirm your choice and activate two additional control buttons at the right, under the  button. The middle button allows you to modify the selected folder (e.g. change it for another). The bottom button allows the shared folder to be deleted. You can add as many additional shared folders as you wish. When you have completed the process, click on “OK” to confirm your choice(s).

Within the VM, the shared folder will appear with the prefix “sf\_” (for “shared folder”). So, in this case, my folder “29P” will be found in the VM as “sf\_29P”.



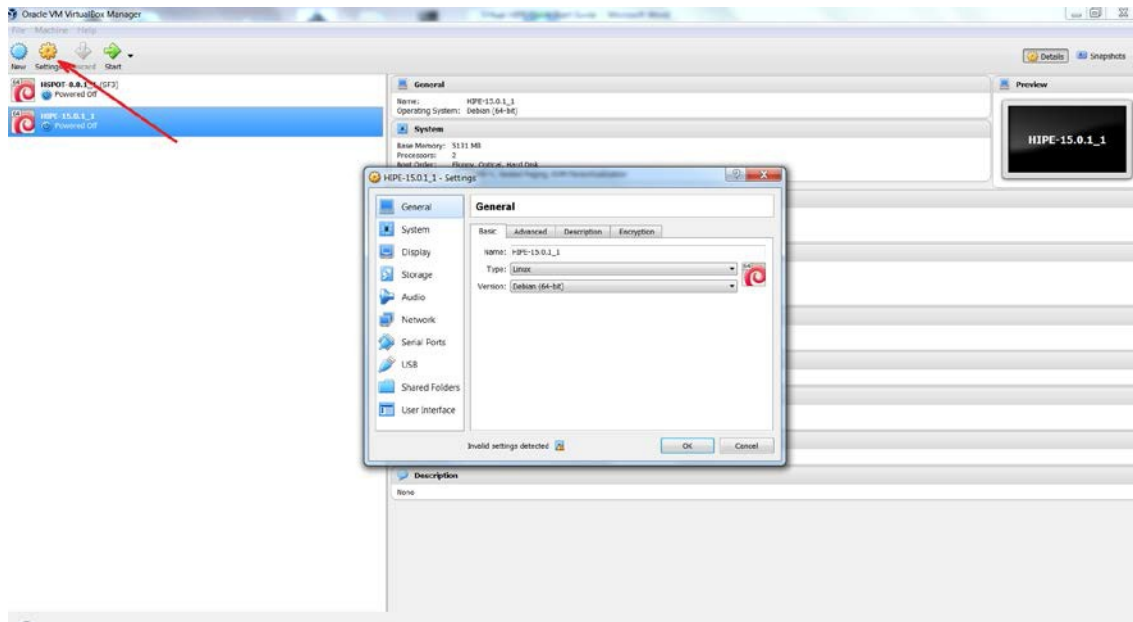


The VM will show the number of shared folders that you have defined. You can now power-up HIPE and start to use them:

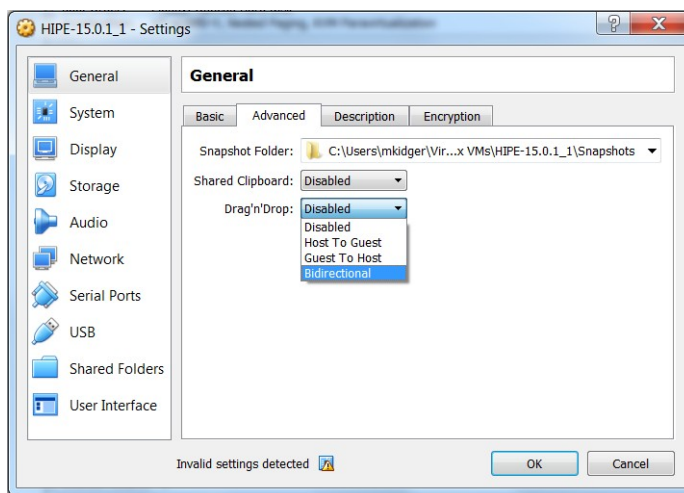


## 6.2 Enabling drag and drop and cut and paste of text

As the VM is isolated from your local disk you cannot drag and drop a file from your local disk to the VM, or cut and paste text from one file management system to the other unless this option is specifically enabled. To do this, click on the “Machine” drop-down in the top menu. You will see a pop-up window appear, like the one below. Select the “Advanced” tab.



The advanced tab will offer various configuration options. Probably you will wish to enable two-way transfer, as below.

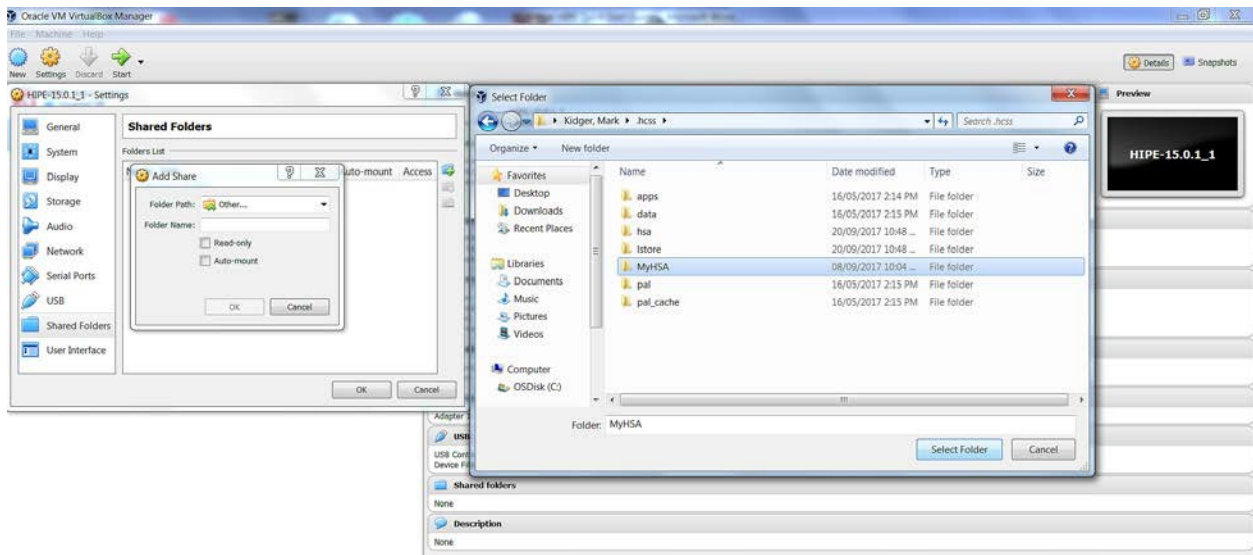


If you have an HIPE session running already when you do this, you will need to shut down HIPE and re-start it (see: 5.5, Powering Down Virtual HIPE safely) for the change in configuration to take effect. It is not possible to Cut and Paste or Copy and Paste files between the VM and Windows (use Drag and Drop instead) as this protocol is not supported by VirtualBox, but the Cut and Paste option allows text to be transferred between the VM and the host computer.

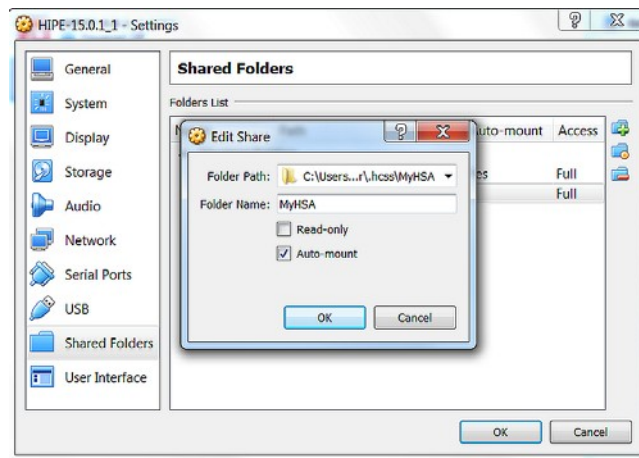
### 6.3 Sharing the MyHSA and Istore folders

Apart from being able to share folders, an essential for users when using HIPE is to be able to share pools and the local store between their hard disk and the Virtual Machine as this is where Herschel data will mostly be stored. To do this you need first to use the “Defining a shared folder” option, as described in Section 6.1 to share these two system folders.

MyHSA and lstore are both system folders that, by default, are within the `.hcss` folder on your computer, although more advanced users may wish to move them to another location. To be able to see them you must first follow the instructions for your Operating System for making them visible to you. Mac users may find that it is impossible to make system folders visible and that they have to enter the directory paths by hand. Follow the steps defined in Section 6.1 to share a folder. To find the `.hcss` folder, you will need some variant of the Windows procedure: go to your OSDisk directory – in this case C: - select “Users” and then “your username” and then “.hcss”. This should give you the directory listing below.



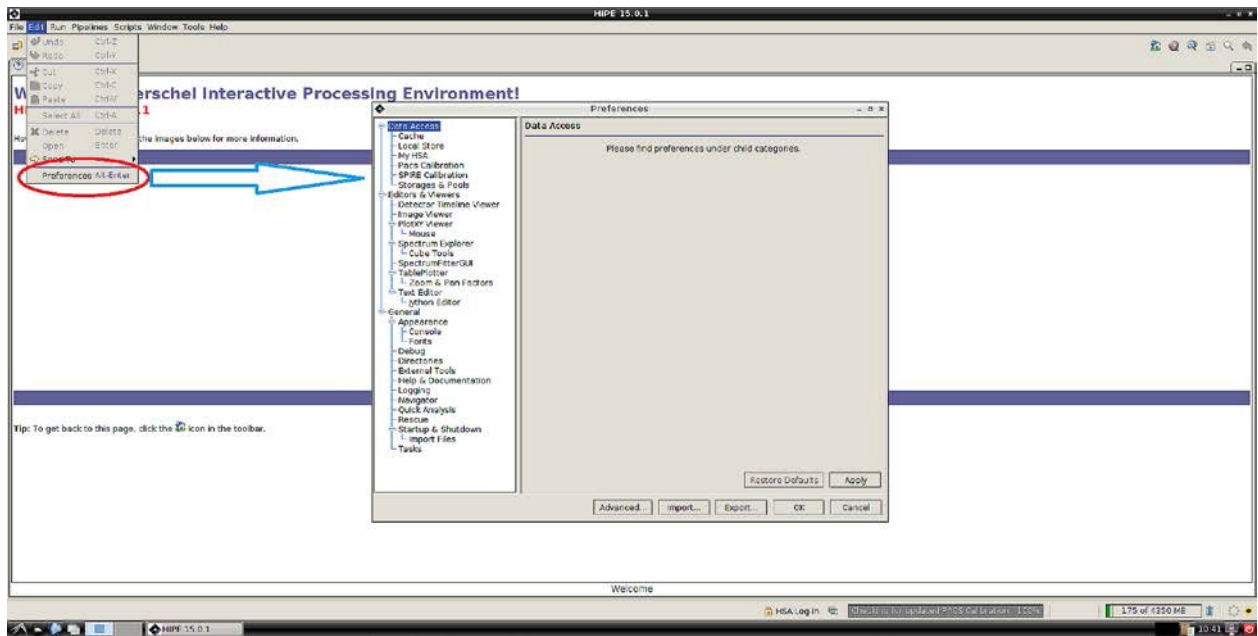
Select the MyHSA directory and share it, as below.



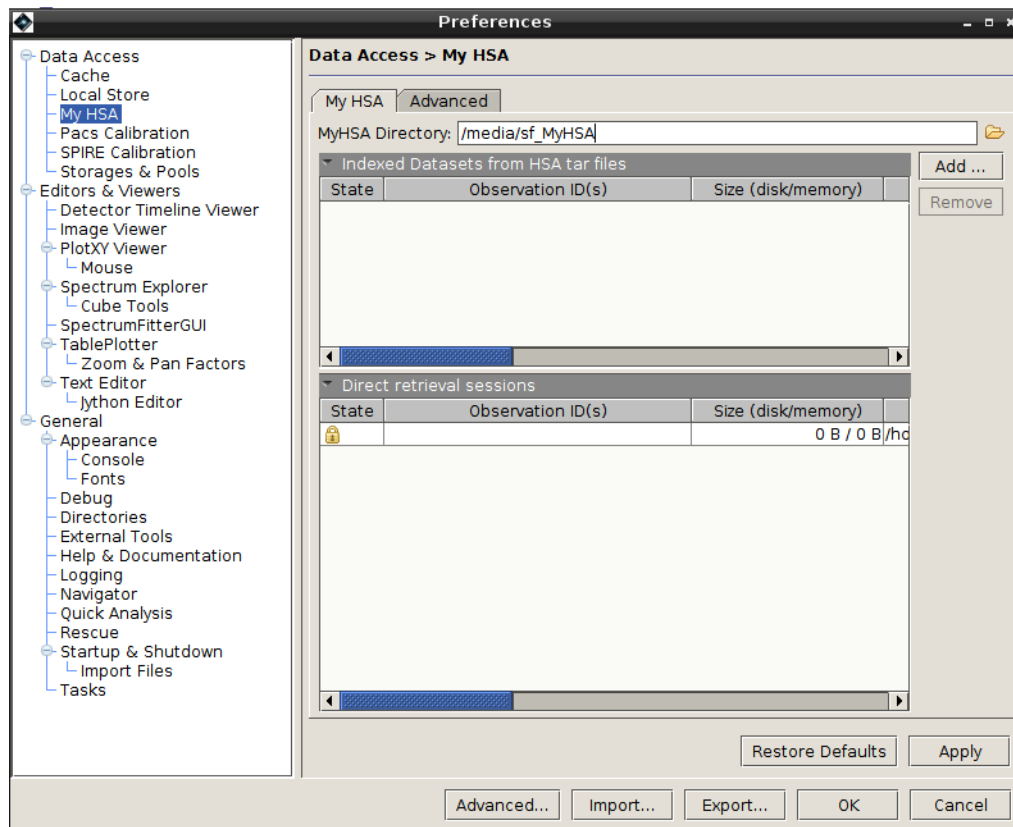
Then, add the “lstore” folder in the same way.

### 6.3.1 Share the host machine MyHSA folder

Within HIPE, go to the “Edit” menu and select “Preferences”. A pop-up will open, as shown below:



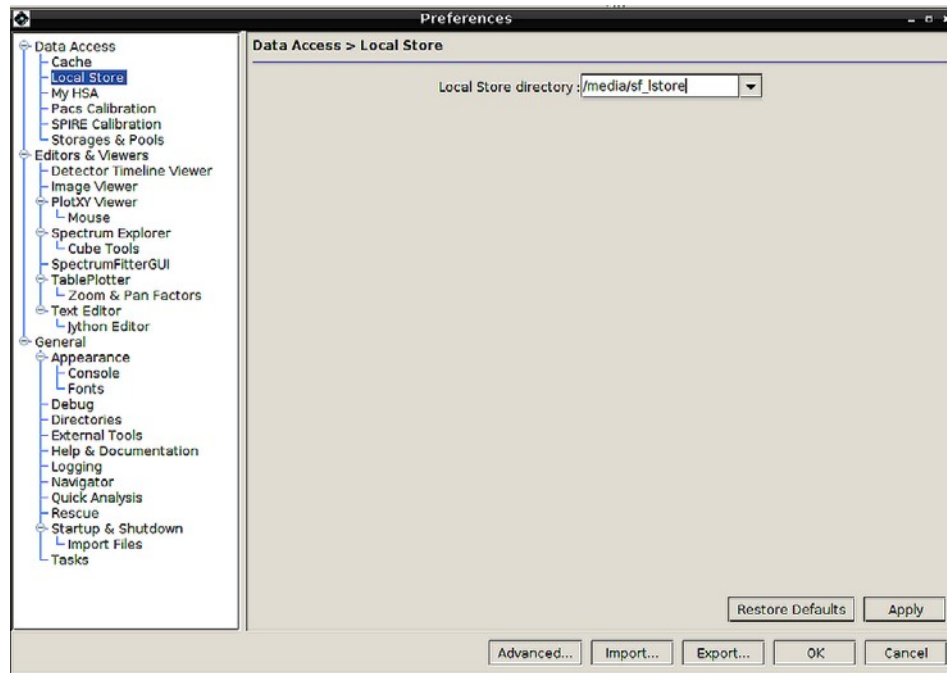
Select “MyHSA” in the pop-up and, at the top, where it says “MyHSA directory:” define the path to be “/media/sf\_MyHSA”, as below:



Click on “Apply” and then on “OK” to save your choice. This choice will be remembered when you close down Virtual HIPE and start a new session later.

### 6.3.2 share the host machine lstore

The procedure is identical to the procedure to share the host machine MyHSA folder. In this case you select the local store option and change the directory to “/media/sf\_lstore”:



Again, apply the change and then press “OK”.

## 7. Getting started with HIPE

When you open HIPE you will get welcome window shown in the previous image. This is your starting point. If you are an expert user of HIPE you can now continue as usual. Everything should be the same as in a normal HIPE session.

If you are a new user a great place to start is the [HIPE Quick Start Guide](#).

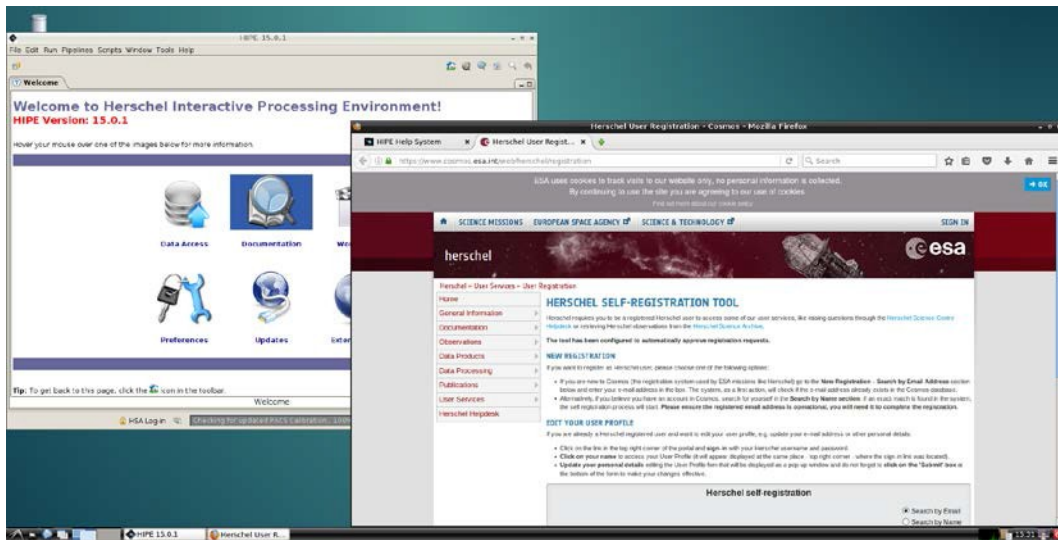
You can get to it by clicking on Documentation in the HIPE welcome screen and then clicking either on the baby bottle icon (!) or selecting the quick start guide from the list of available documentation in the left pane.

When you enter HIPE, you should log in to the HSA (the Herschel Science Archive). This will allow you access to data.

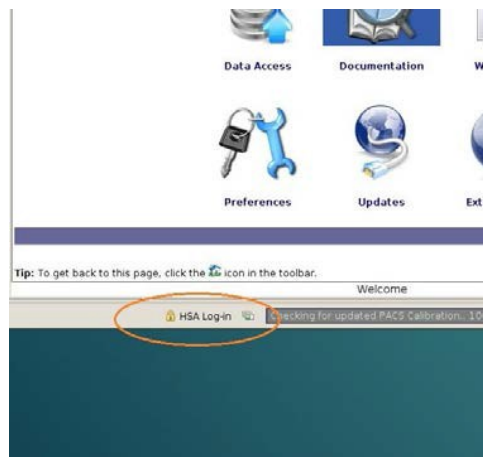
To do this, you must be a registered Herschel user. If you are not, you need to follow the link in the HIPE Quick Start Guide (below). Right click on “[Herschel Registration Page](#)” and select “Open in new tab” (if you try to open it in the same tab as the Quick Start Guide it will fail):



This will lead you to the following page:



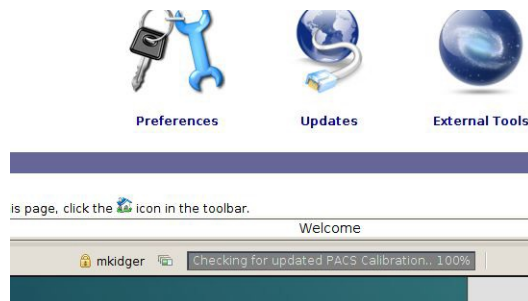
When registered, double-click on the HSA login icon:



Give your registered username and password.

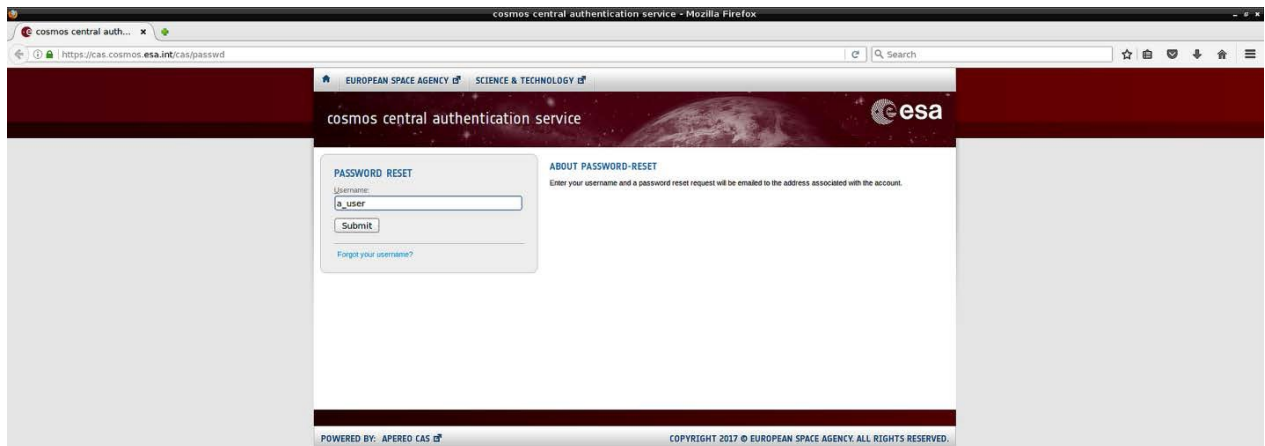


And you will see that, if your credentials are accepted, HSA will show you as logged-in.



You can now access Herschel data from the Herschel Science Archive (HSA).

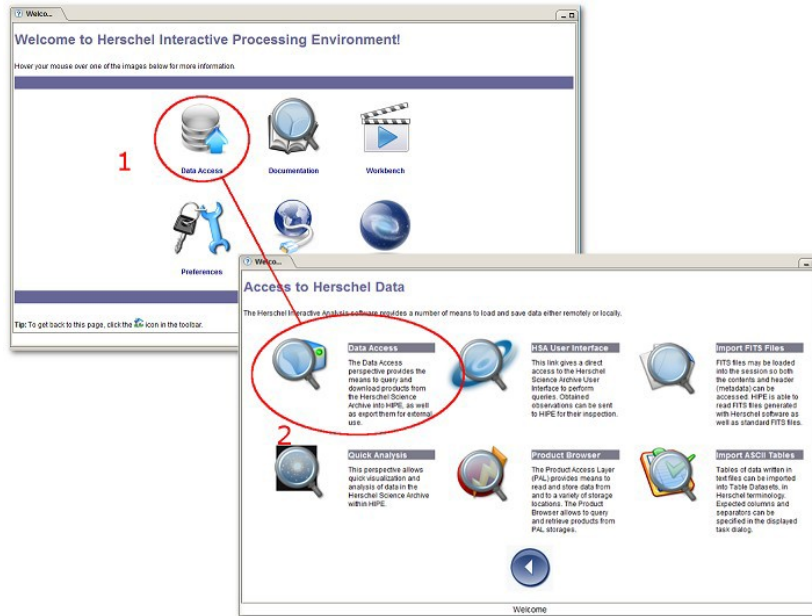
If you cannot remember your password, or your password does not work for some reason, you must click on the “Lost password” button, which will open the following screen for you.



Give your registered username. You will receive an e-mail, normally within a few seconds, in the account that you associated with your registration, with instructions how to re-set your password. If your e-mail address has changed since you first registered you must update your registration details first in order to receive the e-mail.

## 8. Data Access

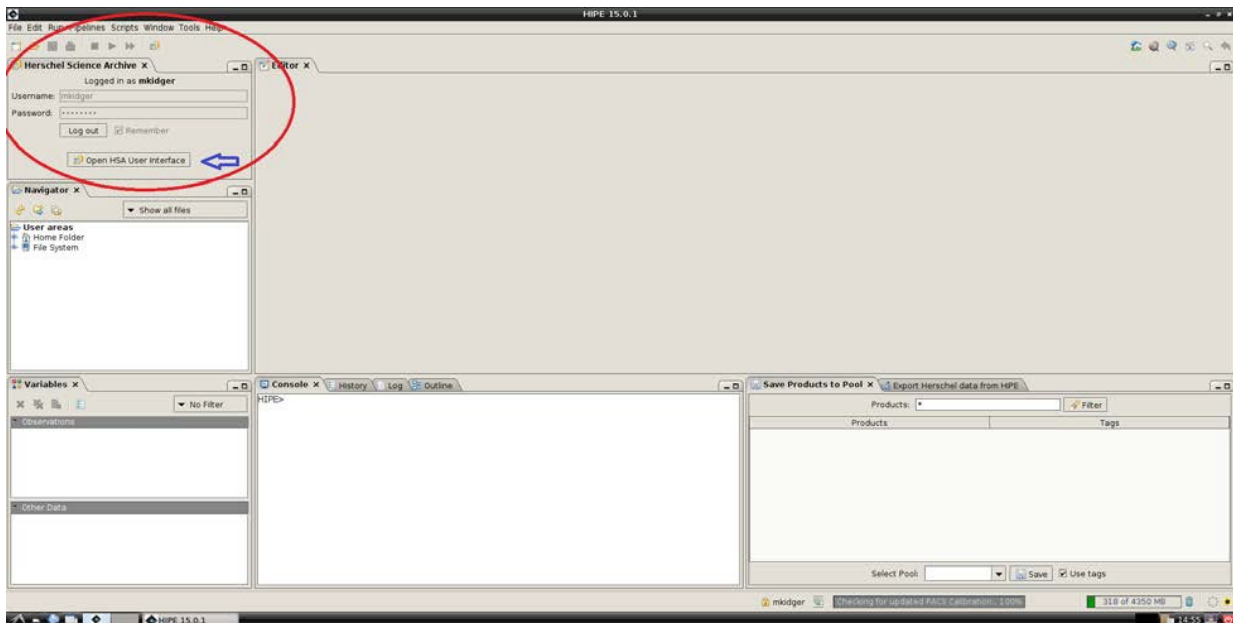
From the Welcome screen, you can access the HSA and retrieve Herschel data. Click on Data Access, as below to open the Data Access screen – the Data Access Perspective.



From here on, Virtual HIPE and HIPE are identical.

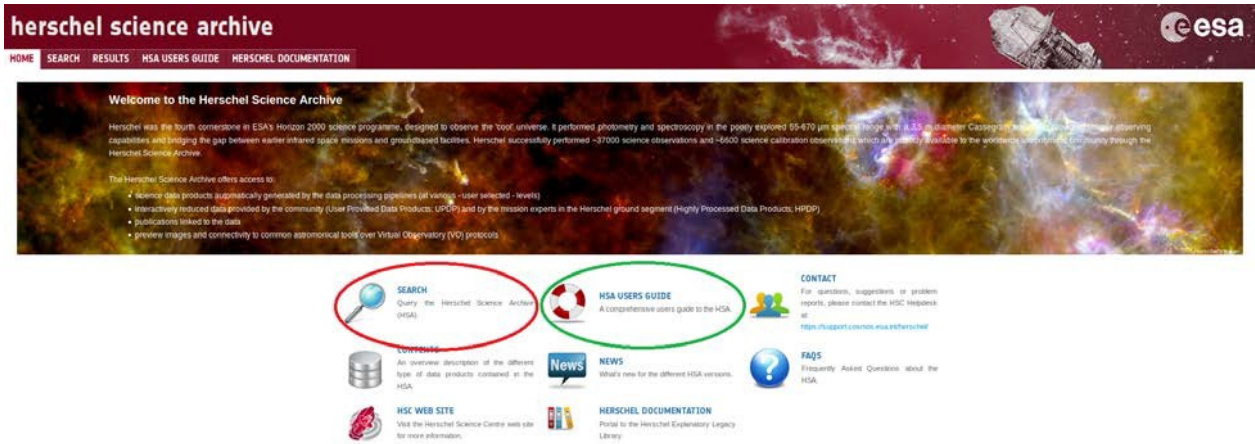
### 8.1 Looking for data in the Herschel Science Archive (HSA)

Click on Data Access to open the data access window, as below. Here you will find the access to the HSA User Interface. If you are already logged-in, you will see your credentials, as below. Click on the button marked “Open HSA User Interface”





This opens the window below



For the inexpert, first-time user, the best place to start is the **Search facility**. When you click on this option a new view will open, providing you with many different options for data search.

Another particularly useful option is the **HSA Users Guide**.

## 8.2 Downloading Data

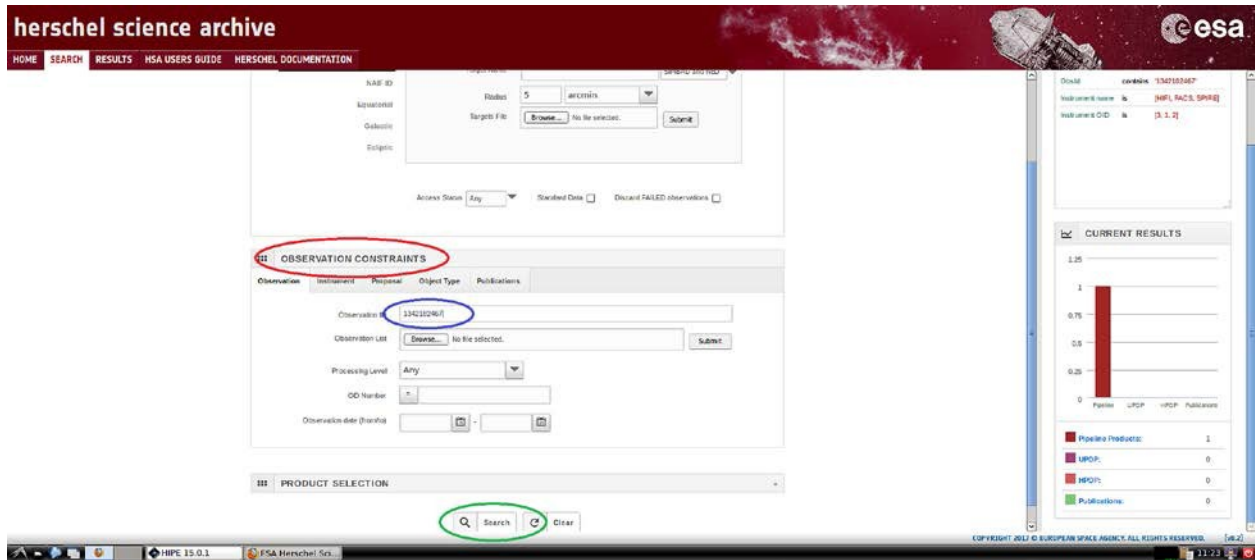
What you do now will depend totally the type of observations that you are interested in and whether you want to access a known observation, or to search for data of interest on a particular object or objects. In either case you will wish to download data.

The HSA can serve you data in two ways:

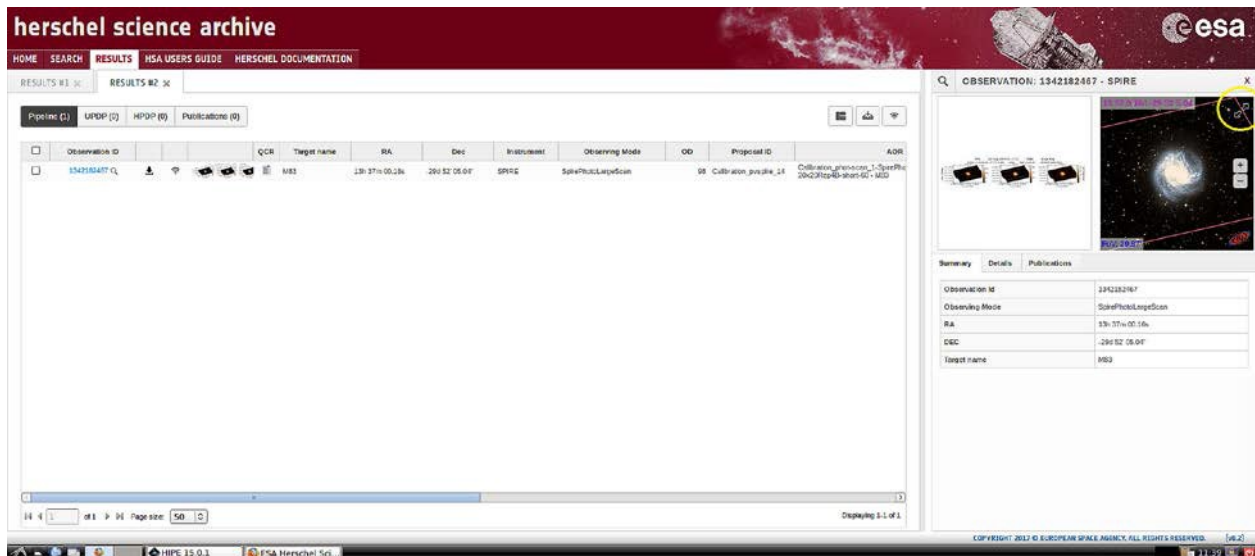
- For simple observing modes, in particular point source photometry from small maps, the products in the HSA are the best ones that can be derived. In the case of SPIRE or PACS point source photometry, it is extremely unlikely that re-reduction of the data can better the product that is already available given that the pipeline has been stable for numerous versions of HIPE, so there is nothing to be gained by trying to re-reduce the observations.
- For more complicated observing modes or observations, you may wish to backtrack and re-reduce data manually, tweaking the different parameters to see how it affects the result. Frequently there is not a single correct answer as to the best way to reduce these data. The HSA can serve you data with different levels of processed data from the raw, or almost raw instrument output, to the final processing stage applied, so that you may elect your starting point for re-reduction. Before you do that though, look to see if the observation(s) has/have already been provided as a Highly Processed Data Product (HPDP) that has been optimally processed by an instrument expert.

You may either enter an ObsID – which is a unique identifier for each observation in the HSA – if you know which particular observation you are interested in, or make a search on a parameter such as target name.

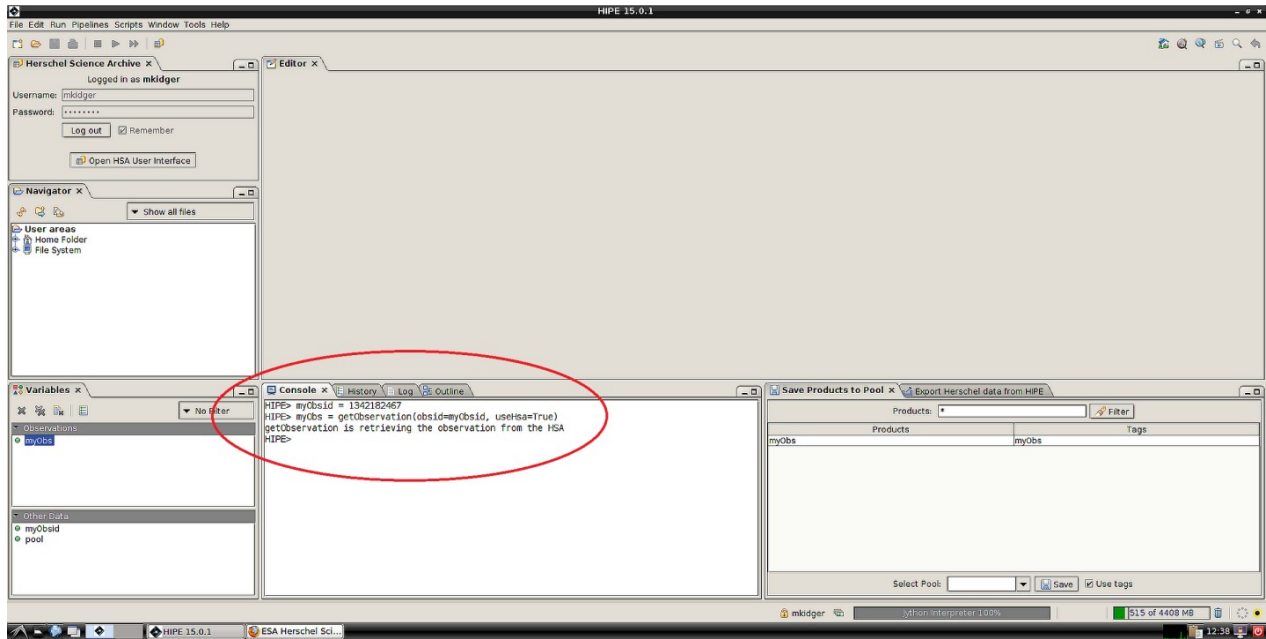
If you know the ObsID that you want to examine, open the **observation constraints** menu by clicking on it, as below and enter the ObsID: in this case **1342182467**. As you type in the ObsID the HSA will show you matches. Press “**Search**” at the bottom of the screen.



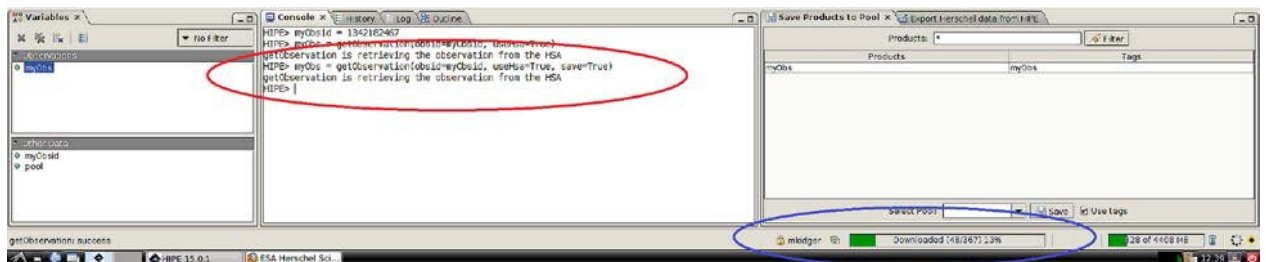
This will return a results screen, as below, with a single result as only a single ObsID has been defined. Click on the ObsID in the table to see the right panel with the postcards and footprint.



To get data into your Virtual HIPE session you have two options once logged-in to the HSA. Going to the Console window of your Virtual HIPE session, as shown below, first you define the ObsID that you are interested in defining as a variable (here we use *myObsid* for simplicity, but it could be anything), then you load the observation using *myObs = ...* as shown below.

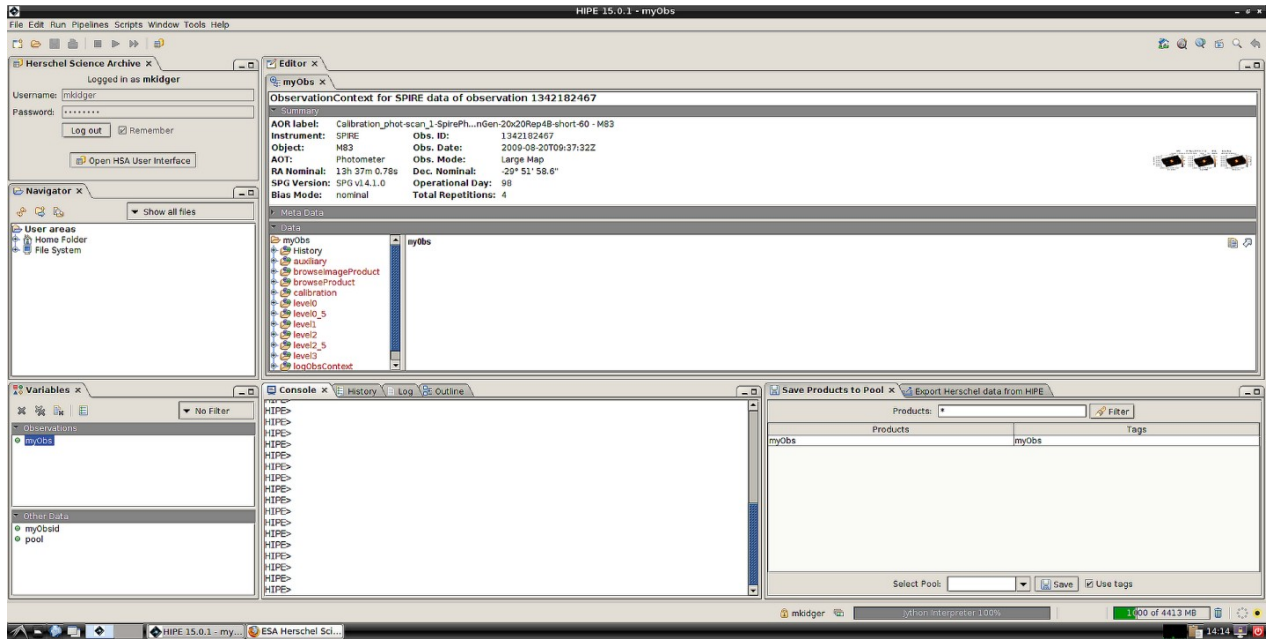


In the Variables panel to the left you will see “myObs” appear to tell you that the data are loaded. This will store the observatory in temporary storage or, by adding “save=True” to the command, as shown below, you can download it and save it to your virtual machine. The green progress bar at the bottom right shows the progress of the download.

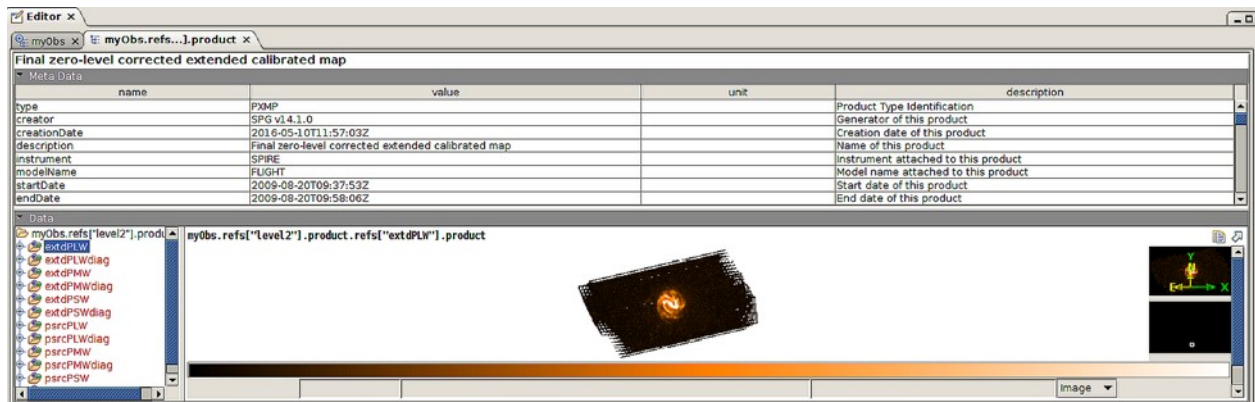


### 8.3 Looking at the Contents of the Data

If you double-click on *myObs* in the variables pane, you will open up the ObservationContext for the ObsID that you have selected, as below.



The basic details for the observation appear in the top panel, the data tree below it. Click on Level 2 to see the contents of the SPIRE Level 2 product and the relevant information about it:



If you click on the top item in the Level 2 tree (*extdPLW*, the extended data processing Long Wavelength – i.e. 500  $\mu\text{m}$  – SPIRE Photometer map) you will see a browse image of the final map from extended calibration with the zero level corrected against Planck maps. Double-click on this to see the image in full screen mode. If a double-click does not give the correct view by default, try right-clicking on the file in the data tree and selecting “Open With...”.

In general, one of two programs will open any Herschel image:

- If you have a PACS Photometer or SPIRE Photometer image, the default option should be [Standard Image Viewer](#). Click on the link to go to the relevant section of the Data Analysis Guide.
- If, in contrast, you have spectra or spectral cubes (PACS Spectroscopy, SPIRE Spectroscopy or HIFI), Virtual HIPE should view the image with [Spectrum Explorer](#). Click on the link to go to the relevant section of the Data Analysis Guide.

Sometimes you will find that there are two further levels of data: Level 2.5 and Level 3. These levels mean different things for different instruments, so you should check the documentation carefully to see how they are constructed and what the caveats about their use are: this is in the [Herschel Product Definition Document](#).

Above the image you will find a table of Metadata. This contains a lot of information about the observation and its possible caveats. You are strongly advised to scan the Metadata before doing any further work with your observation.

## **9. Data Analysis and Re-processing**

Now, you know how to install and configure Virtual HIPE and know the basics of using the Herschel Science Archive, how to look at data and how to import it into a session or to store it to disk.

Here your Virtual HIPE adventure starts for real. You should move to the four HIPE Data Reduction Guides to go further:

- [HIFI Data Reduction Guide](#)
- [PACS Photometry Data Reduction Guide](#) or, for a starting point, try the [PACS Data Reduction Launchpad: Photometry](#) for a guide to essentials.
- [PACS Spectroscopy Data Reduction Guide](#) or, for a starting point, try the [PACS Data Reduction Launchpad: Spectroscopy](#) for a guide to essentials.
- [SPIRE Data Reduction Guide](#)

Happy adventures in Virtual HIPE!