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## How to run ESO pipelines under Microsoft Windows (\*)

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### How to run ESO pipelines under Microsoft Windows (\*)

#### Introduction

ESO officially supports running its pipelines under recent versions of MacOS and several flavors of Linux. The Microsoft Store for recent version of Windows 10 and Windows 11 include the Windows Subsystem for Linux Version 2 (WSL2). WSL2 allows to run a GNU/Linux environment -- including command-line tools, utilities, and applications-- unmodified directly on Windows, without recompilation or porting, and without the overhead of a traditional virtual machine or dual-boot setup. With the installation of a free X Server, Windows can be used to run almost any Linux application, including those with GUIs. Such an installation can be used to run ESO pipelines either standalone or within the EsoReflex environment. ESO does not officially support running pipelines under Windows. However, we have reports of problem free experiences in running pipelines under Windows in that manner. After installation, all documents and tutorials written for Linux still apply. ESO is committed to helping users on a best effort base with problems while running pipelines under Windows. Below, we give a basic summary of how to install pipelines under Windows.

#### Prerequisites

Windows 10 versions earlier than 1903 did not allow to install WSL2. Its predecessor WSL worked in a different manner, and we strongly advise against trying to run the ESO pipelines with it. Before installing ESO pipelines, it is therefore strongly advised to upgrade Windows to its latest version. For a pleasant user experience, we recommend a computer with at least 8 GB of RAM, 50 GB of free disk space, and a modern CPU with at least 4 physical cores. Complex pipelines like MUSE require significantly more memory and computational resources.

#### Step-by-Step Guide to install ESO Pipelines

The following instructions have been tested with the Windows 10 operating system and should work with all recent versions of Windows 10 and 11. We recommend using the Ubuntu Linux distribution since it is provided directly by Microsoft and free. As an X server, we recommend to use VcXsrv.

## Step 1: install and configure Ubuntu

**1.1** The most reliable way to install WSL2 is to use the Microsoft Store. Simply open the Microsoft Store, search for “Ubuntu 20.04 LTS” or later, and install it.

**1.2** Open Ubuntu with a double click, provide the requested information to add a user account.

**1.3** Configure the display variable permanently by typing into the Ubuntu Window:

```
cd
```

```
echo "export DISPLAY=$(cat /etc/resolv.conf | grep nameserver | awk '{print\n$2}'):0" >> .bashrc
```

```
bash
```

## Step 2: install and configure X-server

**2.1** In a browser, go to <https://sourceforge.net/projects/vcxsrv/> , download the installer and run it.

**2.2** Create a shortcut for VcXsrv on the Windows desktop (not to be confused with a shortcut for XLaunch which also might be there):

On the Desktop, right-click and select "New => shortcut"

Assuming VcXsrv was installed at its default location, type the following in the box "location of the item" without line breaks:

```
"C:\Program Files\VcXsrv\vcxsrv.exe" :0 -ac -terminate -lesspointer -multiwindow -\nclipboard -wgl -dpi auto
```

**2.3** start VcXsrv with this shortcut by double clicking on it.

## Step 3: Install pipelines

**3.1** Install pre-requisites by typing into the Ubuntu window:

```
sudo apt-get update
```

```
sudo apt-get install openjdk-11-jre-headless
```

```
sudo apt-get install g++ zlib1g-dev make gzip bzip2
```

```
sudo apt-get install tar perl gawk sed grep coreutils pkg-config
```

```
sudo apt-get install python3-matplotlib python3-wxgtk4.0
```

```
sudo apt-get install python3-astropy python3-numpy default-jre libffi-dev
```

```
sudo apt install ftools-fv wish
```

**3.2** Install ESOReflex and pipelines by typing into the Ubuntu window:

```
mkdir eso_pipelines  
cd eso_pipelines  
wget https://ftp.eso.org/pub/dfs/reflex/install_esoreflex  
chmod +x install_esoreflex  
./install_esoreflex
```

Follow instructions to install selected pipelines, demo data and EsoReflex.

### Running the pipelines in EsoReflex

Before running the pipeline, make sure the Xserver and Ubuntu have been started (1.2 and 2.3 above). If the installation was done following the instructions above, then the executable for EsoReflex will be in `~/eso_pipelines/install/bin/esoreflex`.

To find out what pipelines have been installed, type into the Ubuntu window:

```
~/eso_pipelines/install/bin/esoreflex -l
```

To start EsoReflex with one of the installed `for_imaging` pipeline, type:

```
~/eso_pipelines/install/bin/esoreflex for_imaging
```

Tutorials on how to run EsoReflex are available at <https://eso.org/pipelines> .

### FAQs

1. Q: I started an EsoReflex workflow, but it seems to hang without any progress.  
A: In most cases, the reason is that EsoReflex is waiting for input, but the input window is closed. Check the task bar for windows related to EsoReflex and open them.

2. Q: My data are stored in a folder “my\_data\_dir” on my C: disk. How can I configure EsoReflex to use them? A: Files on disk C: can be accessed from within WSL as /mnt/c/my\_data\_dir. This path should be specified as EsoReflex’ BOOKKEEPING\_DIR either from the command line or on the workflow. For further details, see any of the Reflex tutorials.
3. Q: The Ubuntu window does not support a feature I use in my Linux terminal emulator. How can I work around it? A: Any terminal emulator available under Ubuntu can be installed and used. For example, xterm can be installed from the ubuntu window using “sudo apt-get xterm”.
4. Q: I want to use some other astronomical software to display or examine the files within EsoReflex. How can I do this? A: Virtually any software that is available under Ubuntu such as DS9 can be installed and used using the regular Linux installing procedure (e.g. apt-get).
5. Q: When starting ESOReflex, I get the error message "Can't connect to X11 window server using 'localhost:0.0' as the value of the DISPLAY variable." What is going on A: This means that the Xserver is not waiting for input as local display 0.0. Make sure that VcXsrv is installed and started as described in Step 2. You might want to test the Xserver installation by starting some other program such as xterm from the command line. ESOReflex will not be able to start as long as the communication with the Xserver does not work.

(\*) The text of this article has been kindly contributed by Wolfram Freudling and Pedro Fluxa.

#### Tags

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