Bellhop Installation Guide (Ubuntu 20.04 LTS)

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0.1 # Bellhop Installation Guide (Ubuntu 20.04 LTS)

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`Bellhop Python Simulation` relies on the following libraries:

```
- fortran compiler
- Acoustic Toolbox
- Arlpy
- Python3
- Jupyter Notebook(optional)
```

- First make sure you have `gfortran`,`gcc` and `gcxx compiler`.
- Please checked if the GNU Fortran compiler was in my system by typing `gfortran --version:` `GNU Fortran (Ubuntu 7.4.0-1ubuntu1~20.04.1) 7.4.0 Copyright (C) 2017 Free Software Foundation, Inc. This is free software; see the source for copying conditions. There is NO warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.`

If you have them then go for the GNU compiler, type: `export FC=gfortran Acoustic Toolbox` is in repo folder named `AcousticToolbox`. You can download from there or follow the instruction below.

0.2 Install latest `Acoustic Toolbox` (March 2019)

Please make sure you have newer version of Bellhop.

```
cd ${HOME}/Documents
wget http://telecom.dei.unipd.it/ns/woss/files/at.zip
tar -xzf at.zip
cd at/at
make
sudo make install
```

If something goes wrong, you need to do `make clean` in order to clear all necessary files and then again run the above mentioned steps.

Once installed, let's tell the system where to find our new libraries: (Please replace `ns` with your `hostname`)

```
export PATH=/home/ns/Documents/at/at/Bellhop:/home/ns/Documents/at/at/:$PATH
```

0.3 Step 1. Install compilers and building tools

First let's check which Linux are you running with the command:

```
lsb_release -ds
```

Will return something like:

```
Debian GNU/Linux 9.8 (stretch)
```

- For *Debian/Ubuntu/Linux Mint*:

```
$ sudo apt-get update
$ sudo apt-get install wget nano gfortran m4 build-essential
```

- Also check your python version, it is recommanded to use python3.

```
$ python --version
```

Will return something like:

```
Python 2.7.18rc1
```

or you might have something like this if you have python3 correctly installed:

```
$ python3 --version
```

Will return something like:

```
Python 3.8.2
```

0.4 Step 2. Install arlpy tools

Run the following command in your terminal. (It worked without sudo permission as well. It is recommanded to use sudo to installed everything properly.)

```
$ pip3 install arlpy
```

or

```
$ python3 -m pip install arlpy
```

or

```
$ sudo -H pip3 install arlpy
```

OS Specific Installation

- Windows 10
- Mac OS

More Details

0.5 Step 3. Interactive IPython Notebooks - Jupyter Notebook (Optional)

The Jupyter notebook is a web-based notebook environment for interactive computing.

0.5.1 Installation

You can find the installation documentation for the Jupyter platform, on ReadTheDocs.

The documentation for advanced usage of Jupyter notebook can be found here.

For a local installation, make sure you have pip installed and run:

```
$ pip install notebook
```

0.5.2 Usage - Running Jupyter notebook

0.5.3 Running in a local installation

Launch with:

```
$ jupyter notebook
```

0.5.4 Running in a remote installation

You need some configuration before starting Jupyter notebook remotely. See Running a notebook server.

0.5.5 Example Notebook of Bellhop

You can find the example notebook of Bellhop in the repo folder named `sample notebook`. Follow the instruction and commands in the notebook to perform basic simulations with bellhop.

- If you want to see the notebook output figures then download `sample notebook/bellhop.html` and open in your browser, it will open up notebook with all the output graphs.

0.6 Troubleshoot

To chech you have correctly set your PATH for acoustic toolbox, please type this in your command prompt

```
$ which bellhop.exe
```

It will show you path of your bellhop.exe, same like this,

```
/home/ns/Documents/at/bin/bellhop.exe
```

Reference

1. **M. Chitre 2020, "ARLPY python toolbox"** , https://github.com/org-arl/arlpy

2. **Ocean Acoustics Library.https://oalib-acoustics.org/**, Retrieved August 11, 2020.

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