Network to Code

Development Environments

Agenda

- Introduction to DevEnvs
- Code Editors & IDEs
- Other Tools: Terminals, Git
- Windows Subsystem for Linux
- Vagrant and Virtual Machines
- Python Tooling
- Docker
- Hands-on Labs

What is a Development Environment

A DevEnv is a collection of tools and machines on which you (the developer) work on your projects. It may contain, but not limited to:

- Code Editors and IDEs (Integrated Development Environments)
- One or more programming languages and their tooling (interpreters, compilers)
  - Third party libraries for these languages
- Hardware - your PC, network devices
  - Often in virtual format as well - VMs of various platforms
- Supporting software and services
  - Centralized code repositories
  - “Source of Truth” for input data (more commonly known as databases)
- Workflows, Standards, Processes

Code Editors & IDEs

These (opinionated) tools are your bread-and-butter

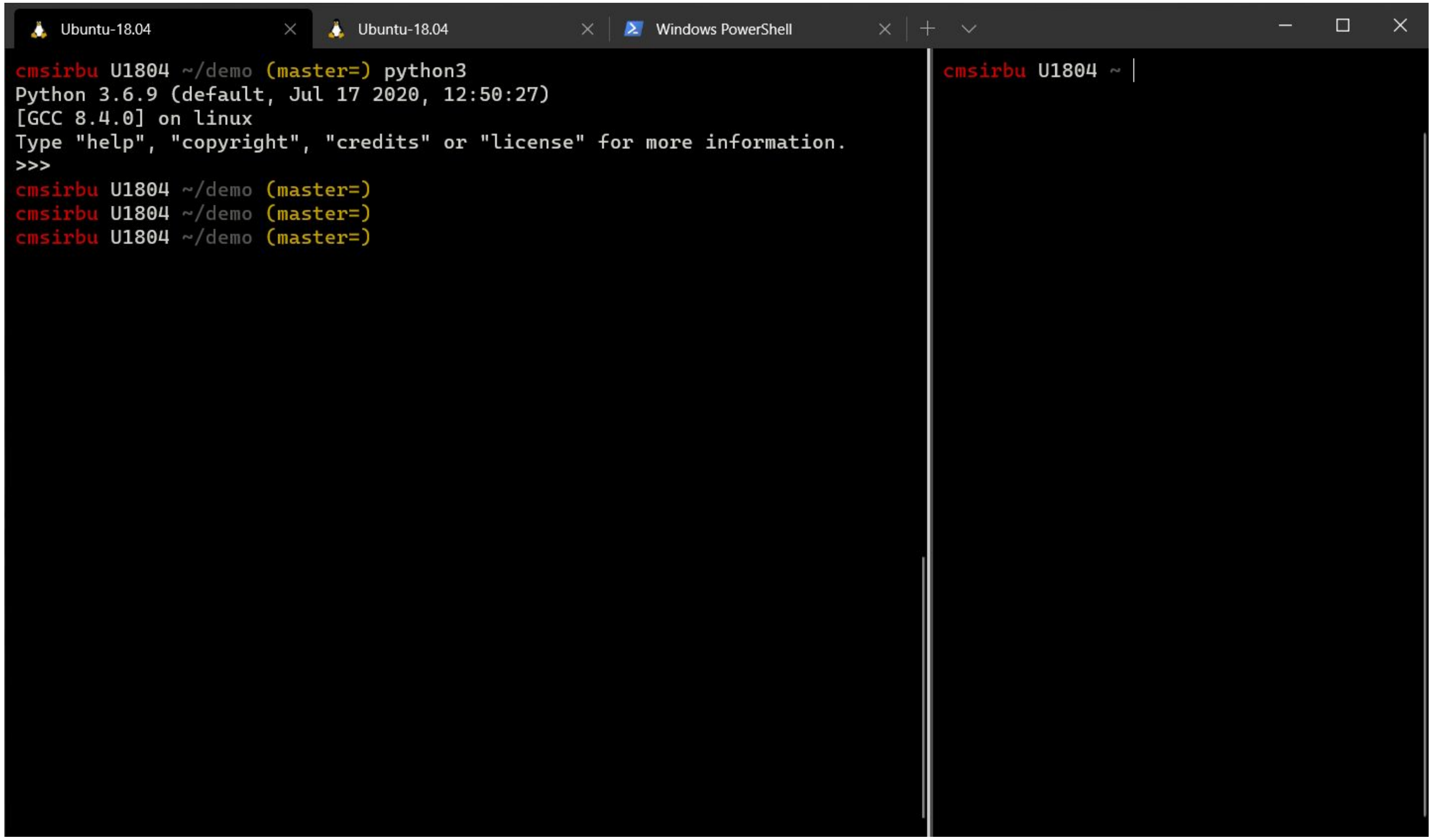
- A lot of choice, both free and paid software
- Beginners: start with popular options, expand as you gain knowledge
  - Watch how others work, you can always learn new things
- VSCode, SublimeText3, PyCharm, Atom, VIM
  - Research plugins and configuration
  - Learn shortcuts!

Other Tools: Git

Git is a distributed version-control system.

- It’s massively popular, thanks to wide adoption through Internet based centralized platforms like **GitHub** and **GitLab**.
- But there are others: CVS, Mercurial, Subversion, Bazaar (Open source)
- CLI-driven - so **learn the CLI**! Later on, add GUI tools for complex projects.
- Get comfy with git commands - very extensible and configurable. (Shell) aliases are your best friends.
  - alias gc='git commit'
  - alias gs=’git status --short’

Other Tools: Terminals



```
cmsirbu U1804 ~/demo (master=) python3
Python 3.6.9 (default, Jul 17 2020, 12:50:27)
[GCC 8.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
cmsirbu U1804 ~/demo (master=)
cmsirbu U1804 ~/demo (master=)
cmsirbu U1804 ~/demo (master=)
```

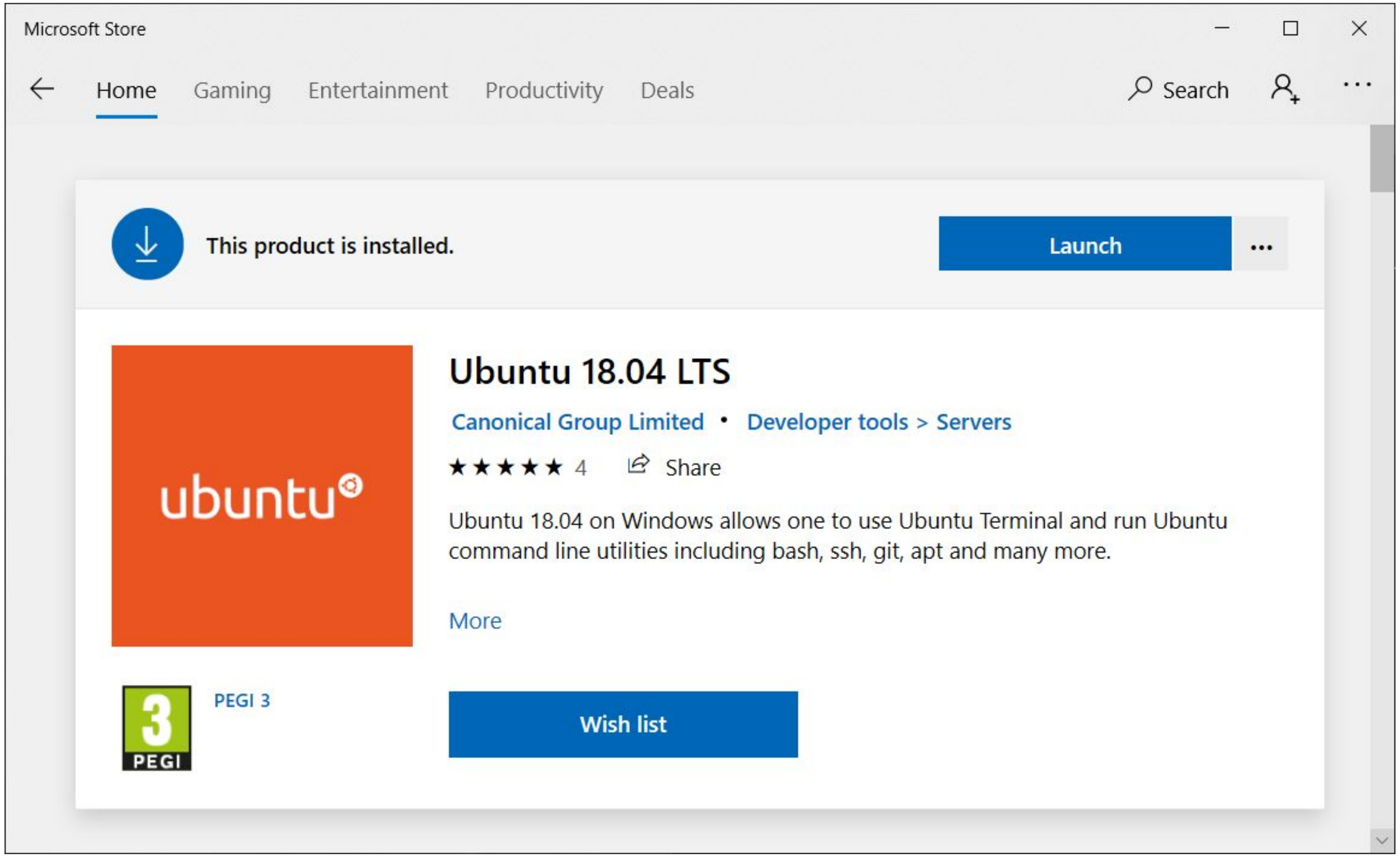
```
cmsirbu U1804 ~
```

Windows Subsystem for Linux

Git is a distributed version-control system.

- “The Windows Subsystem for Linux lets developers run a GNU/Linux environment -- including most command-line tools, utilities, and applications -- directly on Windows, unmodified, without the overhead of a traditional virtual machine or dualboot setup.”
- WSL1 from Windows 10 version 1709 (should be everywhere)
- WSL2 from Windows 10 version 1903 Build 18362.1049+, 1909 and 2004+
  - Ships a Linux kernel, makes performance improvements
  - You can run Docker more “natively”!
- Instructions: https://docs.microsoft.com/en-us/windows/wsl/install-win10

Windows Subsystem for Linux



This product is installed.

Ubuntu 18.04 LTS

Canonical Group Limited • Developer tools > Servers

Ubuntu 18.04 on Windows allows one to use Ubuntu Terminal and run Ubuntu command line utilities including bash, ssh, git, apt and many more.

DEMO TIME!

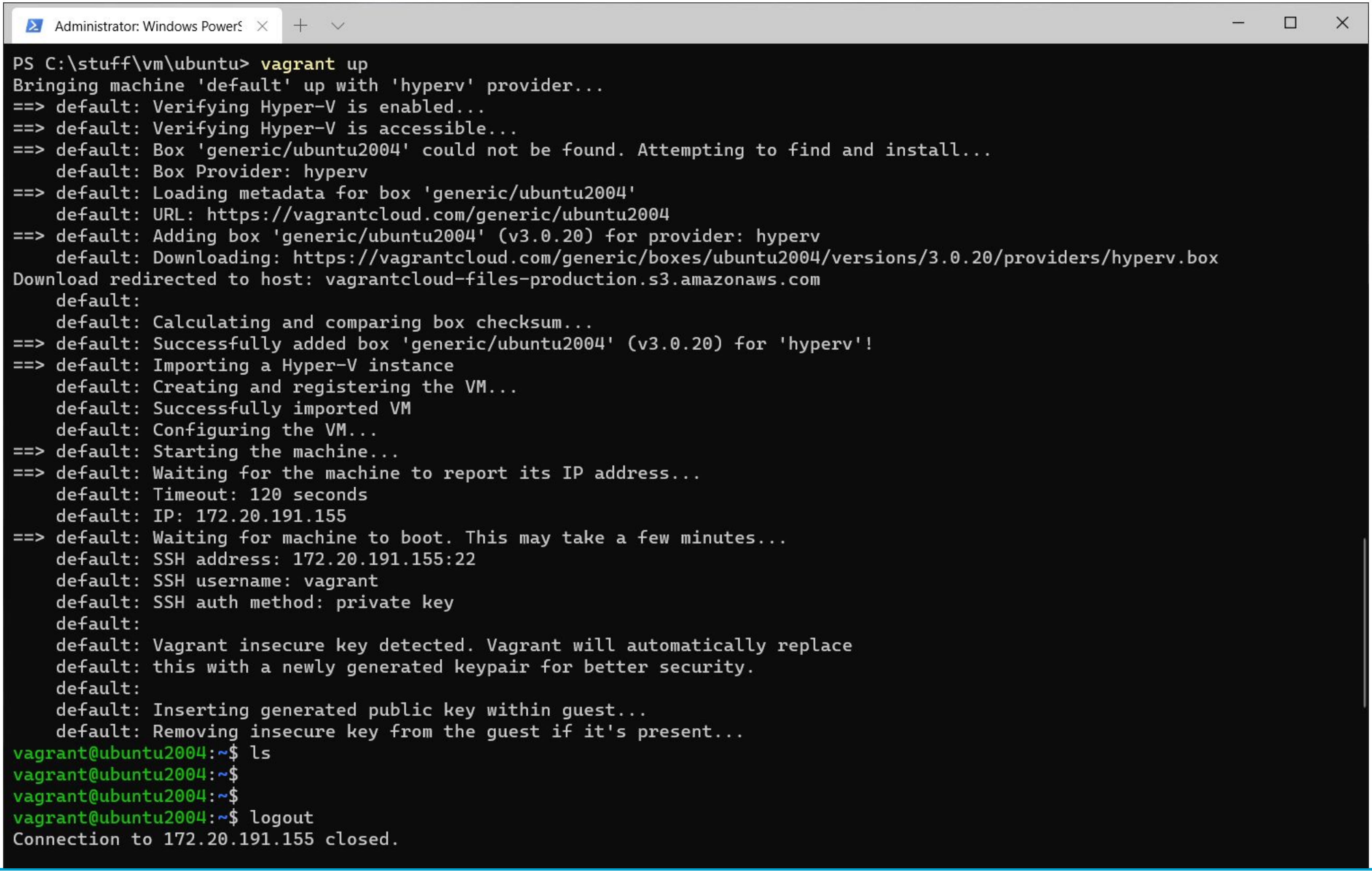
(VSCode, WSL)

Vagrant and Virtual Machines

Vagrant is an opensource tool for building and maintaining portable virtual software development environments.

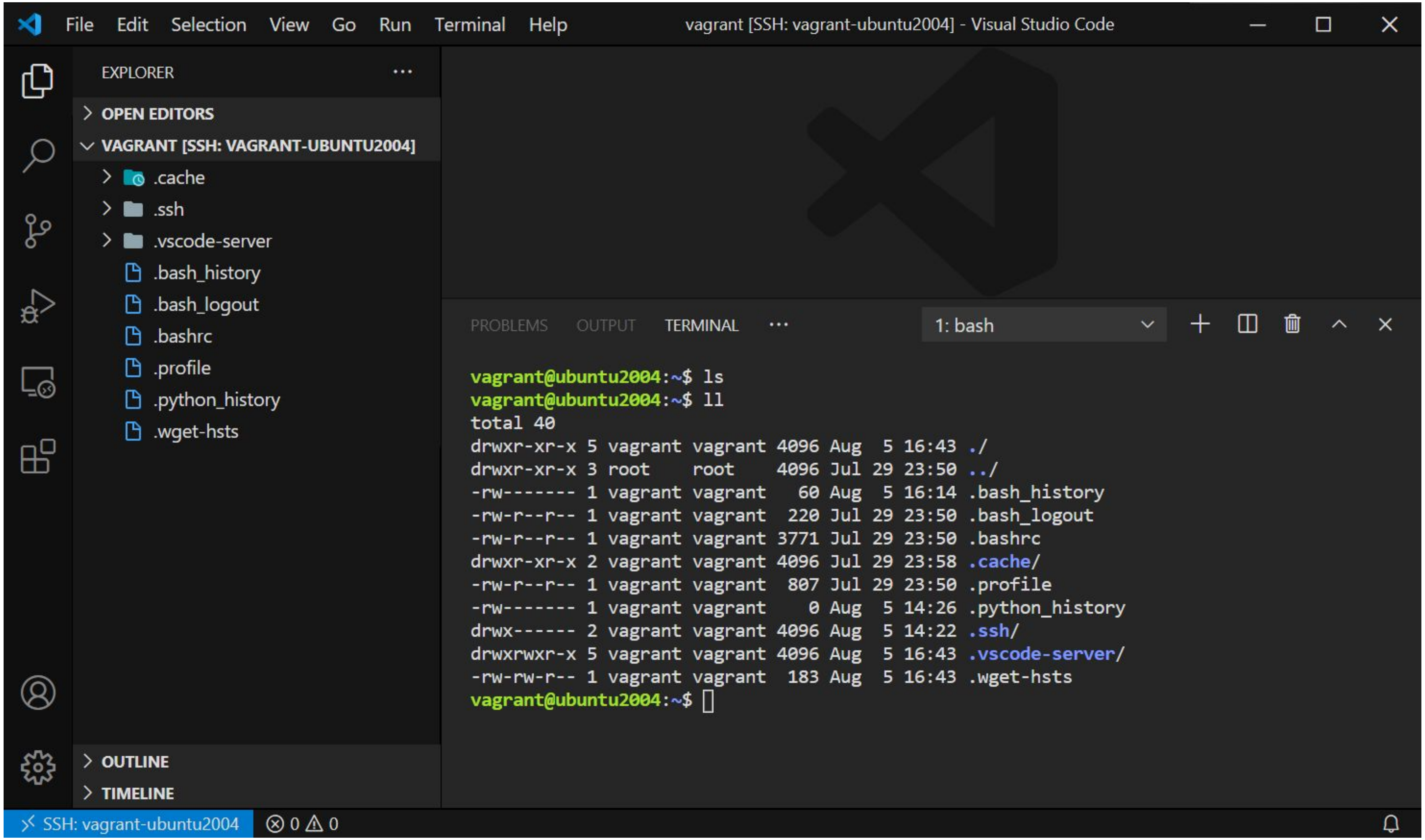
- Made by HashiCorp (they make great tools!) https://www.vagrantup.com/
- Works with VirtualBox, Hyper-V, KVM, VMWare
- Many “boxes” publicly available https://app.vagrantup.com/boxes/search

- There can (*usually*) be only one hypervisor!
    - On Win10 - Hyper-V is used for WSL
    - VMWare 15.5.5+ allegedly co-exists with Hyper-V by using its APIs



Administrator: Windows PowerS

```
PS C:\stuff\vm\ubuntu> vagrant up
Bringing machine 'default' up with 'hyperv' provider...
==> default: Verifying Hyper-V is enabled...
==> default: Verifying Hyper-V is accessible...
==> default: Box 'generic/ubuntu2004' could not be found. Attempting to find and install...
    default: Box Provider: hyperv
==> default: Loading metadata for box 'generic/ubuntu2004'
    default: URL: https://vagrantcloud.com/generic/ubuntu2004
==> default: Adding box 'generic/ubuntu2004' (v3.0.20) for provider: hyperv
    default: Downloading: https://vagrantcloud.com/generic/boxes/ubuntu2004/versions/3.0.20/providers/hyperv.box
Download redirected to host: vagrantcloud-files-production.s3.amazonaws.com
    default:
    default: Calculating and comparing box checksum...
==> default: Successfully added box 'generic/ubuntu2004' (v3.0.20) for 'hyperv'!
==> default: Importing a Hyper-V instance
    default: Creating and registering the VM...
    default: Successfully imported VM
    default: Configuring the VM...
==> default: Starting the machine...
==> default: Waiting for the machine to report its IP address...
    default: Timeout: 120 seconds
    default: IP: 172.20.191.155
==> default: Waiting for machine to boot. This may take a few minutes...
    default: SSH address: 172.20.191.155:22
    default: SSH username: vagrant
    default: SSH auth method: private key
    default:
    default: Vagrant insecure key detected. Vagrant will automatically replace
    default: this with a newly generated keypair for better security.
    default:
    default: Inserting generated public key within guest...
    default: Removing insecure key from the guest if it's present...
vagrant@ubuntu2004:~$ ls
vagrant@ubuntu2004:~$
vagrant@ubuntu2004:~$
vagrant@ubuntu2004:~$ logout
Connection to 172.20.191.155 closed.
```



```
vagrant@ubuntu2004:~$ ls
vagrant@ubuntu2004:~$ ll
total 40
drwxr-xr-x 5 vagrant vagrant 4096 Aug  5 16:43 ./
drwxr-xr-x 3 root    root    4096 Jul 29 23:50 ../
-rw------- 1 vagrant vagrant   60 Aug  5 16:14 .bash_history
-rw-r--r-- 1 vagrant vagrant  220 Jul 29 23:50 .bash_logout
-rw-r--r-- 1 vagrant vagrant 3771 Jul 29 23:50 .bashrc
drwxr-xr-x 2 vagrant vagrant 4096 Jul 29 23:58 .cache/
-rw-r--r-- 1 vagrant vagrant  807 Jul 29 23:50 .profile
-rw------- 1 vagrant vagrant    0 Aug  5 14:26 .python_history
drwx------ 2 vagrant vagrant 4096 Aug  5 14:22 .ssh/
drwxrwxr-x 5 vagrant vagrant 4096 Aug  5 16:43 .vscode-server/
-rw-rw-r-- 1 vagrant vagrant  183 Aug  5 16:43 .wget-hsts
vagrant@ubuntu2004:~$ 
```

DEMO TIME!

(VSCode, Vagrant)

Python Tooling

Python has a rich ecosystem of tools for development, testing, packaging, and distribution.

- Virtual Environments - start with the basics “python3 -m venv”
  - Other tools: virtualenv (the original), pipenv, poetry, tox, virtualenvwrapper
- Be careful where you install Python packages
  - Operating system level
  - User level
  - VirtualEnv

Developer Tooling

GNU Make is a build automation tool on Unix & Unix-like systems

- Originally designed to build (compile) files from source code
- Nowadays it's also used as a layer for simple task automation
- Uses a Makefile to describe rules and targets

```
.PHONY: black pylint

black:
    black --check --diff get.py

pylint:
    pylint get.py
```

Developer Tooling

Invoke is Python task execution tool & library

- It draws inspiration from **make** and **rake** (ruby)
- Defines tasks in Python - by default in a **tasks.py** file

```
from invoke import task

@task
def black(context):
    context.run("black --check --diff get.py")

@task
def pylint(context):
    context.run("pylint get.py")
```

>>> network .toCode()

DEMO TIME!

(Python VirtualEnvs, Make, Invoke)

Docker

Docker is a set of tools that use OS-level virtualization to package software.

- **Docker Containers** depend on Linux Kernel features for isolation and resource management (cgroups and namespaces)
  - Containers are largely synonymous today with *Linux* Containers
  - Many container orchestrators and runtimes - Kubernetes, OpenShift, LXC/LXD, Rkt, Podman
- **Goal today**: learn the basics of using docker commands
  - Downloading and running someone else's containerized tool
  - Build your own containers with your code
  - Build your own containers with your tools

DEMO TIME!

(Docker)

>>> network .toCode()

LAB TIME!

(Your turn)