OpenStack Infrastructure-as-a-Service Practical

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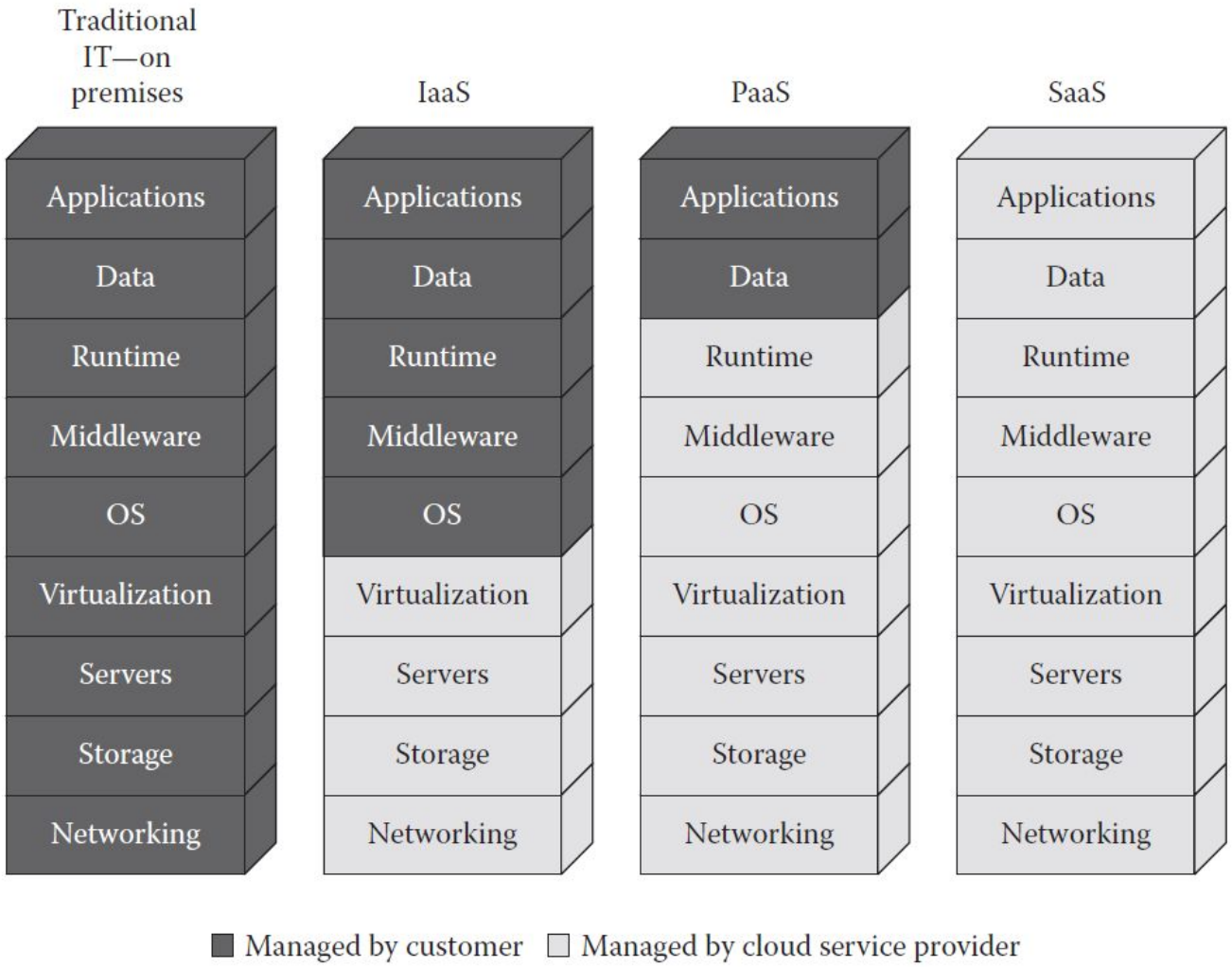
Application of virtual machines to distributed systems

- There are three main types of cloud computing services:
  - Software-as-a-Service (SaaS) - client provided usage of cloud application e.g. Google Docs.
  - Platform-as-a-Service (PaaS) - client provided virtualized environment with OS installed.
  - Infrastructure-as-a-Service (IaaS) - client provided virtualized hardware, storage, IP addresses and firewalls.

- Virtualization plays a key role in each of the above.
- For instance, in PaaS and IaaS a client typically rents access to a virtual machine instead of a physical machine.

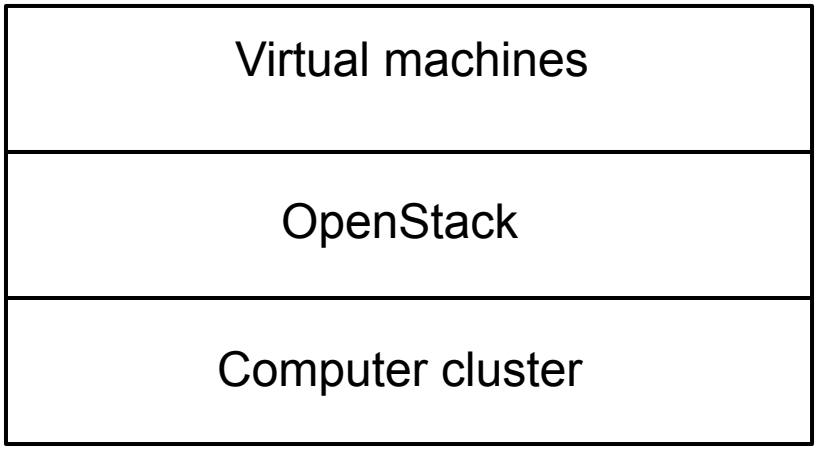


Separation of responsibilities in cloud operation (taken from Vacca 2016)

OpenStack

- OpenStack is a free and open-source software platform for cloud computing.
- Implements Infrastructure-as-a-Service (IaaS) - virtual machines are made available to clients.

- The School runs an OpenStack cluster for both students and staff to provide cloud computing capabilities.



Practical

During the practical you will complete the following steps:

1. Create a private/public key pair on your laptop.
2. Create a virtual machine instance using OpenStack; this should be a Ubuntu server instance.
3. Assign the above private/public key pair to the instance.
4. Remotely log into and access the instance using SSH.
5. Remotely install and play video games on the instance.
6. When complete terminate the instance.

Git Bash

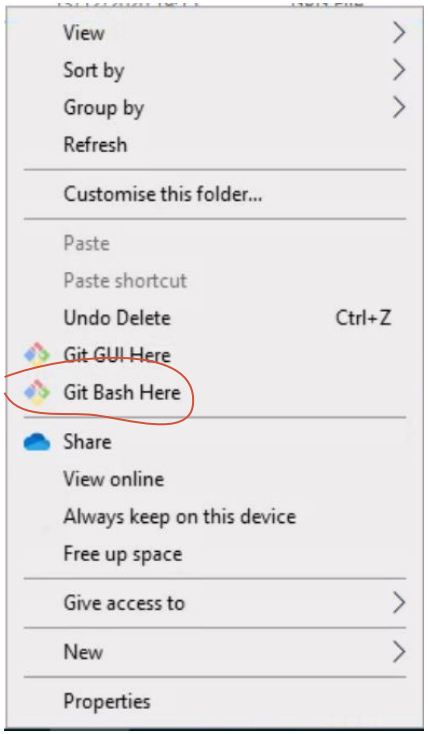
- Git Bash is a Microsoft Windows application which combines Git and Bash.
- Git is a version-control system.
- Bash is a Unix shell or command-line interpreter.

cd command

- To change the current working directory to “C:\My Documents\CMT202”, enter the command:

> cd “C:\My Documents\CMT202”

- On a university provided laptop you can open Bash in the current directory by right clicking and selecting “Git Bash here”.



ssh-keygen command

- To generate a private/public key pair suitable for the purposes of this practical enter the command:

```
> ssh-keygen -t rsa -b 4096
```

- ssh-keygen will generate two files; one without an extension and one with a “.pub” extension.
- The file without an extension in the private key.
- The file with a “.pub” extension is the public key.

ssh command

- SSH is a service for securely logging into a remote computer.
- To remotely log into the computer “ubuntu@10.72.96.20”, using myKey to perform authentication, enter the command:

```
> ssh -i ./myKey ubuntu@10.72.96.20
```

The University VPN

- To log into OpenStack virtual machines off campus, you must use the University Virtual Private Network (VPN).
- The VPN service lets users connect securely to the University's network.
- The VPN will be running by default on University provided laptops.
- For more information see:

  https://docs.cs.cf.ac.uk/notes/university-vpn/