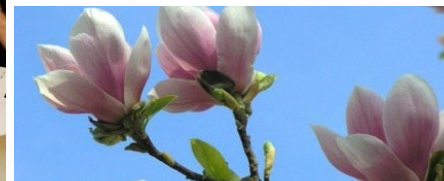# Data center networks lab

"Cloud networks"

Background

- Cloud based services
  - run on off the shelf servers in data centres
  - Organisations swap CAPEX for OPEX
  - easy to scale resources up and down based on need
  - "Everything is being cloudified"
    - 5G core network functions (NFV)
    - Data storage
    - Processing, computation
    - web services
  - the data center is a placeholder for the virtual universe
    - it has it's own way of dealing with networking

The two aspects in this lab

- Testing before deployment in live environment
  - Since many services share the same hardware platform in virtual instances, deploying new services and protocols is dangerous
  - emulate datacenter networks and test engineering solutions first (mininet)
- Hands on experience with configuration of virtual networks using the inbuilt native Linux support
  - know how it works in practice, not just theory

The Lab, Sibirien (E:2429)

- In Sibirien there are 12 PCs dedicated to this lab, one per desk. They are preinstalled with the correct environment to run the lab. Two PCs share monitor on each desk.

- The lab is open for students registered on the course

- Computers are FCFS

- Create a recovery USB with the ISO image (bootable and partition for saving data as you progress) If computer doesn't work, make clean installation (root access during lab)

- Login as: student, password: cloudnetworking (root password also: cloudnetworking)

Basic setup, Linux

- Since all students login with the same credentials, you cannot store anything on the lab PCs. ALWAYS save files on the USB disk.

- You will be working with a clean Linux distro, Ubuntu.

- On the left hand side, open up a Terminal and start following the lab instructions

- The lab will run self contained on a single PC where the network components will be virtualised using the native Linux virtualisation support.
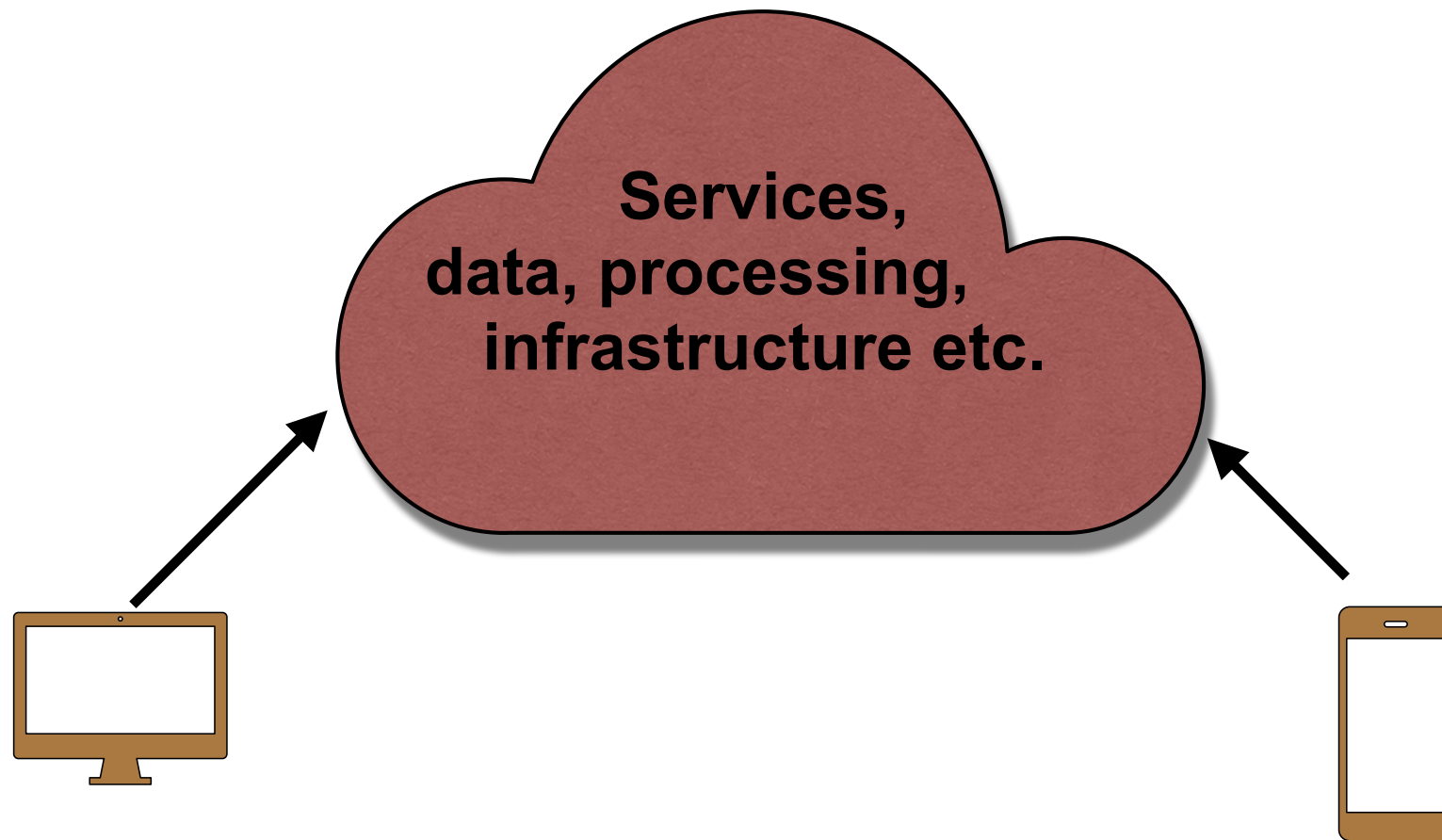
Report

- The lab has two components, the first is a walk through manual with some questions to be answered, shell commands given to be used and tested etc.

- Each group of maximum two students should hand in a report with all questions from parts one and two clearly and concisely answered. Unclear hand drawn figures and text will not be marked.

# The cloud, logically

The cloud, in reality

Off the shelf servers, general computational platforms

- A single physical machine contains multiple virtual instances of services

- A service can be replicated on more machines as needed

- How do you make it look like a single service from the outside?

- The service part - Open Stack

- The network part - Open Flow

- Reference implementations currently, much open source
  - The place to start to learn Cloud computing

A single server

Service 1   **Service 2**   **Service 3**

Virtual Switch

Physical NIC
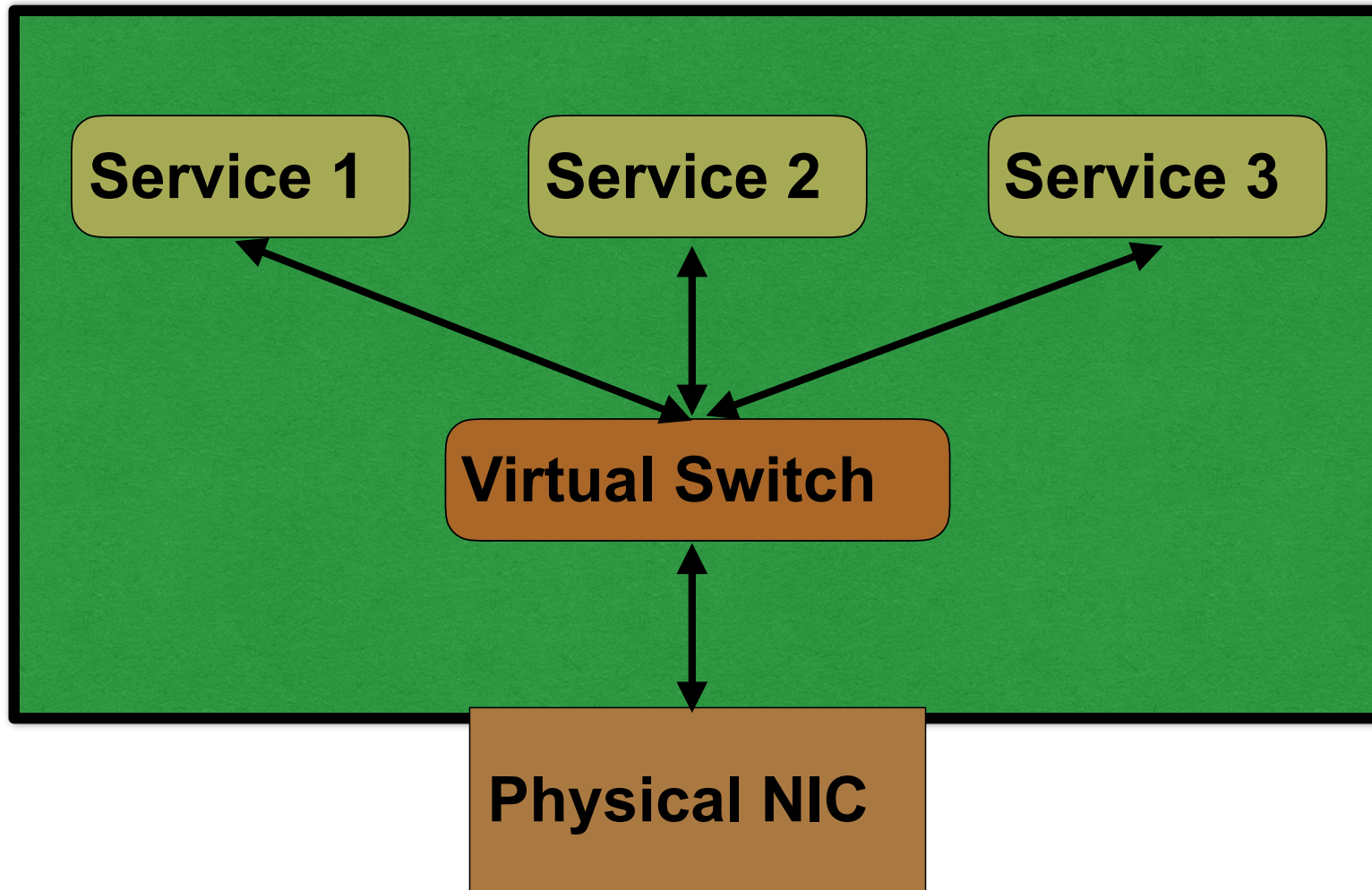
SDN

- At a larger scale, Software Defined Networking SDN.
- Key idea, separate management and data planes
- Forwarding switch and separate server function
- Allow forwarding policies to be updated at runtime using standard protocols and description formats (software defined)
- Allows much greater flexibility than the standard router paradigm when needed.

Lastly

- Check access to the lab

- If you are registered on the course at course start, you should have access

- We are still building the machines, more precise information about the USB images etc. will come soon.

- If you have never seen Linux before, start playing with it now to save time later……..