Course Introduction

Cloud Computing and Big Data (CLO)

Oxford University
Software Engineering
Programme
July 2020

Introduction

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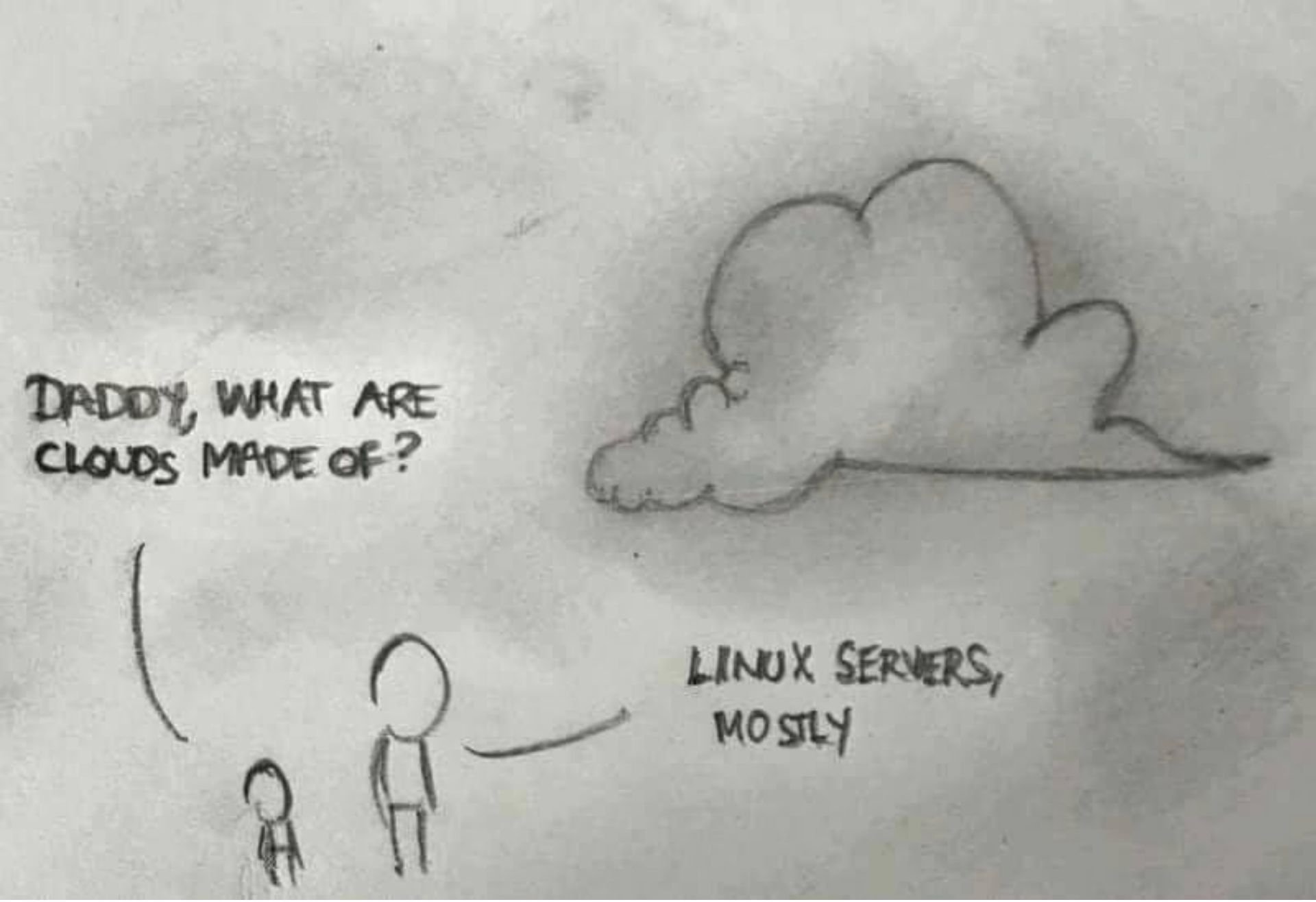
- Introductions



Aims

- Understanding of Principles of Cloud Computing and Big Data
- Theoretical background and origins
- Practical experience of different technologies
- Architecture and Design
- Wider context

Pre-requisites

Covered by the Pre-Study Guide

- **Command line** tooling and Unix commands
- Some **Python programming** and **text editors**
- **SQL** and data manipulation
- **Understanding** of networking, servers and distributed computing

Format

- A mixture of lectures and practical labs
- Lectures aim to provide the wider context and background
  - Independent of specific technologies
- Labs are based on specific technologies
  - Designed to demonstrate the principles

Lab model

- Local Virtual Machine
  - Ubuntu
  - Pre-installed big data software
    - E.g. Apache Hadoop and Spark, Docker, etc
- Amazon Web Services
  - Virtual machines in the cloud

Contents

- Overview and Introduction
- Cloud Computing
  - Introduction and Case Studies
  - Cloud Computing Theory and Background
  - Containers and Docker
- Big Data
  - Introduction and Case Studies
  - Map Reduce and Hadoop
  - Apache Spark and in-memory big data
  - Realtime
  - Visualisation
  - NoSQL
    - Cassandra

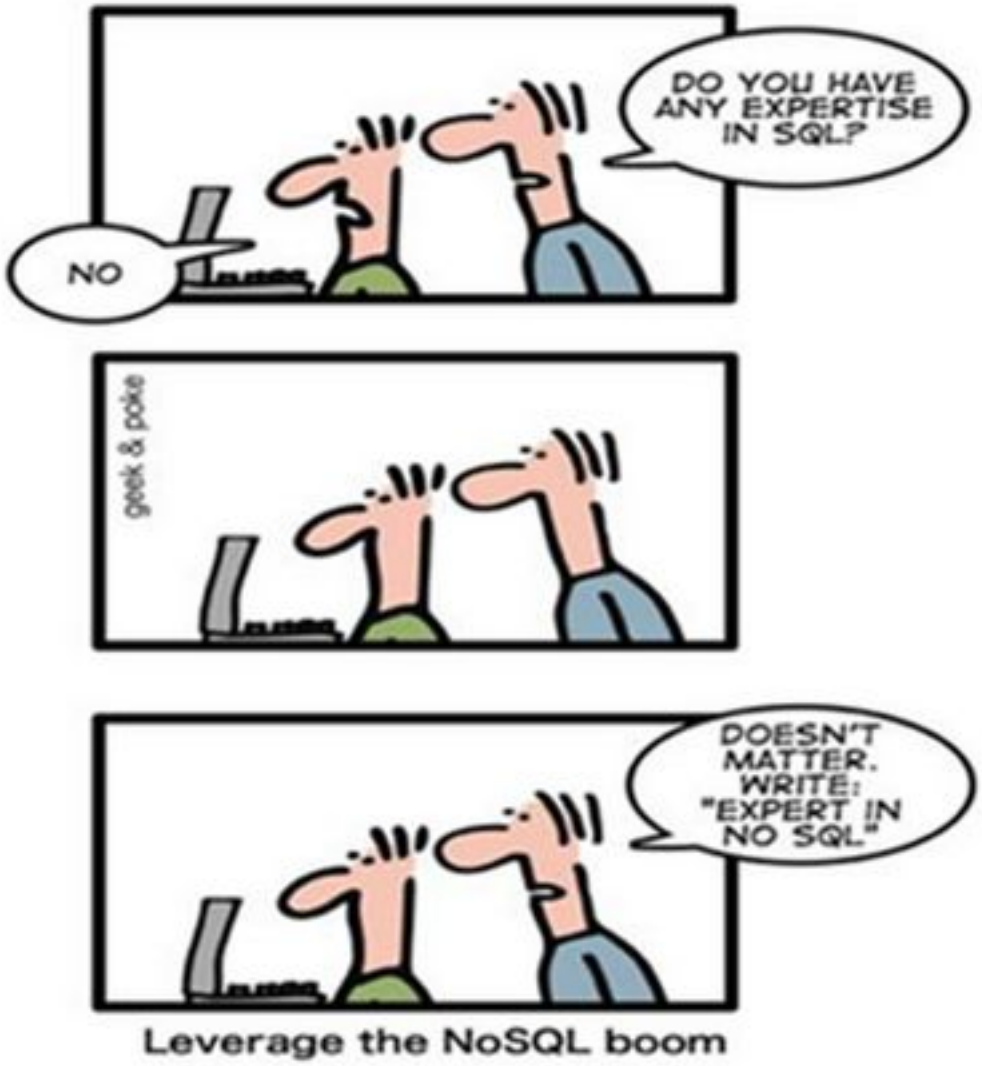
Practicals

- Using Cloud Services
- Elastic scaling
- Python Big Data, Pandas
- Spark, SparkSQL
- Cassandra and NoSQL
- Spark and Cassandra together
- Realtime big data
- Containers

Specific Objectives

- Understand the principles of cloud computing
  - Theory of scalability
  - Including scalability and deployment
  - IaaS frameworks, PaaS, containers
- Understand Big Data approaches, technologies and techniques
  - Theoretical background and approaches
  - Including Map Reduce, NoSQL, Realtime
- Be able to design and implement scalable cloud and big data systems
- Understand and implement effective Open Source systems on Amazon EC2

Improve your CV?



Beyond the scope of this course

- Detailed Data Science techniques
- Implementing a private cloud
  - Although we will look at technologies for private cloud
- Understanding all of Spark, Kubernetes, Containers, AWS, etc

Rules of Engagement

- ***Ask questions as we go along***
  - We will “park” any that are better answered later
  - Don’t wait till the end to ask or raise concerns
  - If you don’t ask we can’t help you

There ~~might~~ will be bugs!

- Please help out:
  - Create new issues on the Github repository

https://github.com/pzfreo/ox-clo/issues/new

Paul Fremantle

- CTO and Co-Founder of WSO2
- Previously Senior Technical Staff Member, IBM WebSphere architecture
- VP, Apache Synapse and Member of ASF
- BA in Maths and Philosophy
- MSc in Computation (1995)
- PhD in Computing (2017)
  - IoT security and privacy
- Also teaches SOA module

You?

Approximate Schedule

Monday	Tuesday	Wednesday	Thursday	Friday
Overall Introductions First Cloud lab exercise	Containers and Cloud Orchestration Docker Lab	Spark and SQL SparkSQL Lab	Storage and NoSQL Cassandra Lab	Overview and Recap Presentation Group Exercise
Cloud Overview and case studies Elastic Cloud Lab	Introduction to Big Data and case studies Data processing in Python	Spark Lab continued	Cassandra details Cassandra Lab2	Final Thoughts and Assignment
Cloud Theory Platform-as-a-Service, scaling Further Cloud Lab	Intro to Spark Spark Lab	Spark Extras Spark Labs continued	Realtime Big Data, Kappa Architecture Realtime Lab	

Let’s get started