

Course Introduction

Cloud Computing and Big Data (CLO)

Oxford University
Software Engineering
Programme
Sep 2016



Introduction

- Aims
- Pre-requisites
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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
- Hadoop and Map Reduce
- Spark, SparkSQL
- Cassandra and NoSQL
- Spark and Cassandra together
- Realtime big data
- Containers
- Visualisation



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 Hadoop, Spark, Mesos, CoreOS, 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



Paul Fremantle

- CTO and Co-Founder of WSO2
 - Currently on study leave
- Previously Senior Technical Staff Member, IBM WebSphere architecture
- VP, Apache Synapse and Member of ASF
- BA in Maths and Philosophy
- MSc in Computation (1995)
- Teaches SOA module
- PhD Research Student



You?



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Approximate Schedule

Monday	Tuesday	Wednesday	Thursday	Friday
Overall Introductions	Introduction to Big Data and case studies	Spark and SQL	Visualisation	Overview and Recap
First Cloud lab exercise	Hadoop Lab 1	SparkSQL Lab	Visualisation Lab	Presentation
Cloud Overview and case studies	Hadoop details, Map-Reduce	Storage and NoSQL	Containers	Group Exercise
Elastic Cloud Lab	Hadoop Extras	Cassandra Lab	Docker Lab	Final Thoughts and Assignment
Cloud Theory Platform-as-a-Service, scaling	Intro to Spark	Cassandra details	Realtime Big Data	
Further Cloud Lab		Cassandra Lab2	Realtime Lab	



Let's get started



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