Software, Systems and Applications III

Module leader: Dr George Mertzios

Module shadow: Dr Sarah Drummond

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Overview

- The module **Software, Systems & Applications III** consists of four sub-modules:

- Advanced Databases
- Cloud Computing
- Web Technology
- Computer Vision

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Advanced Databases

Lecturer: George Mertzios

Main Topics (1)

- **Database schemas & Relational Data Model**:
  - overview of a Databases Management System (DBMS), database schema, 3-level architecture, data independence, database languages, relational data model, relational keys, integrity constraints
- **Relational Calculus and Relational Algebra**:
  - two different approaches of query languages: Relational Calculus (non-procedural) & Relational Algebra (procedural),
    a presentation of the operations of Relational Algebra, especially joins
- **Enhanced Entity-Relationship (EER) model**:
  - how to enhance the classical ER model, specialization/generalization, subclasses/superclasses, type hierarchy, attribute inheritance, participation/disjoint constraints
- **SQL**:
  - DDL (creation of a database) and DML (manipulation of a database): how to create a database using DDL, domain types, constraints in DDL, subqueries, joins and views in SQL

Main Topics (2)

- **Semistructured Databases – XML:**
  - distinction between structured, unstructured and semistructured data (XML), basic concepts of XML, hierarchical tree data model, types of XML validation, Document type Definition (DTD)
- **XML data manipulation:**
  - the two main languages to query data in XML, namely XPath and Xquery
- **Transactions**:
  - the ACID properties, lost update problem, dirty data problem, inconsistent analysis problem, serial & serializable schedules, testing conflict serializability
- **Concurrency control:**
  - conservative vs. optimistic concurrency control, the locking method, 2-phase locking, the cascading rollback problem, deadlocks, recoverable schedules, the timestamping method

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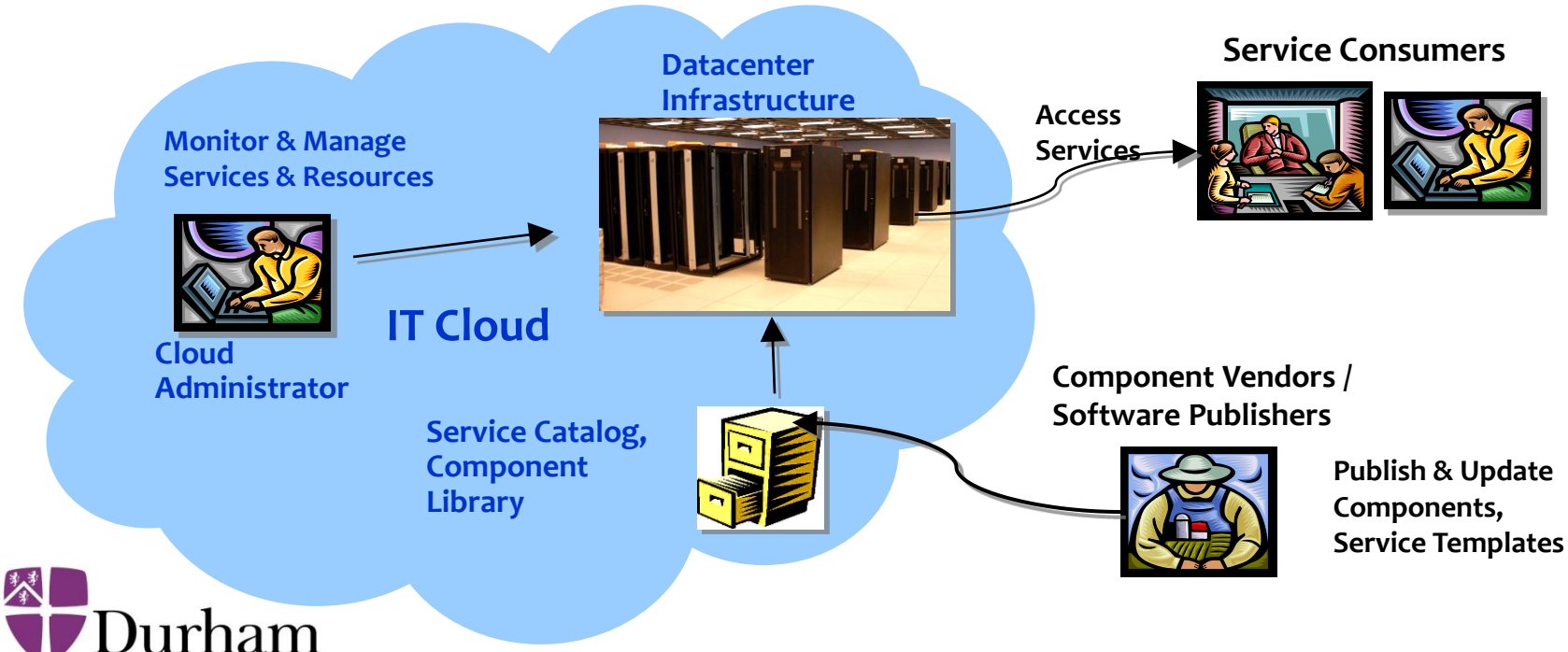
Cloud Computing

Lecturer: Georgios Theodoropoulos

What is Cloud Computing ?

- **It is a user experience and a business model**
  - Cloud computing is an emerging style of computing in which applications, data, and IT **resources are provided as services** to users over the web.
- **It is a infrastructure management and IT service delivery**
  - Cloud computing is way of **managing** large numbers of highly **virtualized resources** such that from a management perspective, they resemble a single large resource. This can then be used to deliver services.



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Main Topics

- Fundamentals – Grids vs. Clouds
- Service Oriented Architectures
- Virtualisation and Management
- Elasticity, Resiliency, On-Demand Usage
- Architecture and Service Models
  - Software as a Service
  - Platform as a Service
  - Infrastructure as a Service
- Security in the Cloud
- Industrial platforms

Web Technologies

Lecturer: Boguslaw Obara

Overview

- Study the latest technologies that support the construction of Web-based systems.
- Focus:
  - large-scale systems
  - Internationalisation
  - systems supporting mobile clients

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Main Topics

- Web Server Architectures
- Caching Technologies
- Dynamic Content Processing
- Media Processing and Transmission (Image and Video)
- Internationalisation (Unicode)
- Personalisation (User Adaptation)
- Summarisation (Text and Video)

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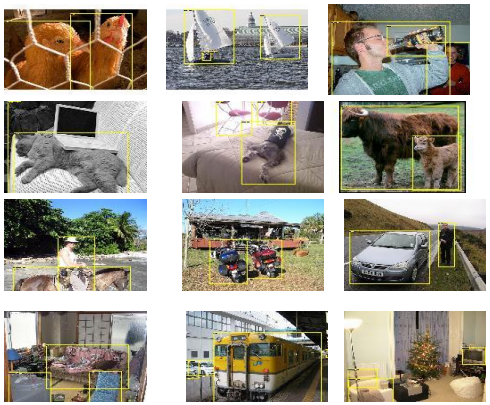
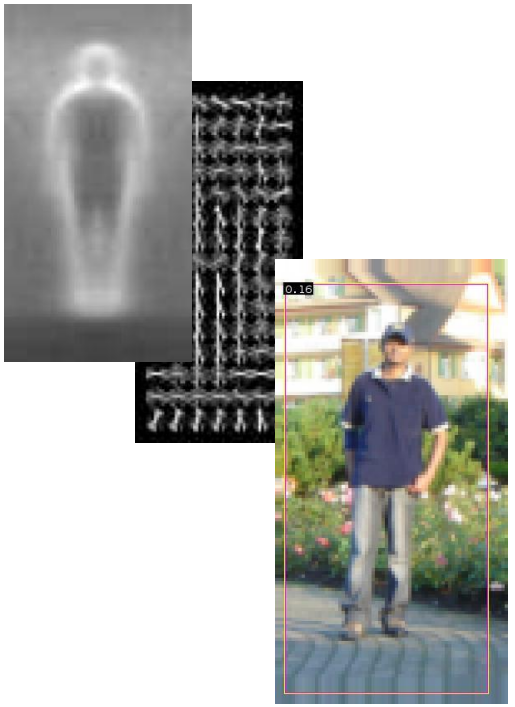
Computer Vision

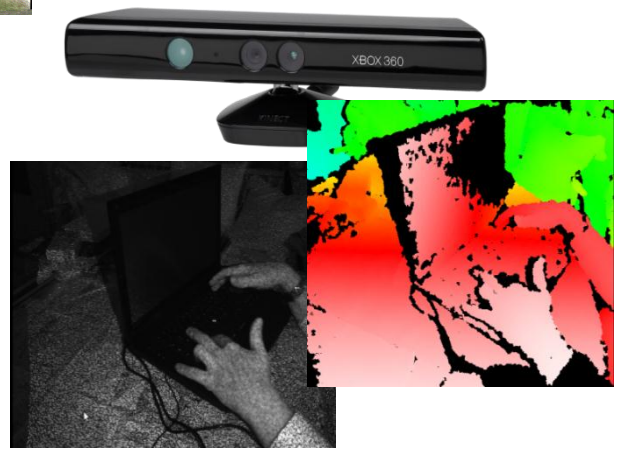
Lecturer: Toby Breckon

Computer Vision





- **feature extraction**
- **object recognition**
- **tracking**
- **3D scene understanding**
- **Applications:** image search & retrieval, robotic sensing, games HCI, surveillance, industrial inspection



Dr. Toby Breckon

http://www.durham.ac.uk/toby.breckon/demos/

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