National College of Ireland

Cloud Security

1. Overview

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- 1.1 Module Introduction
- 1.2 Cloud Computing Introduction
- 1.3 Cloud Security Introduction
- 1.4 Summary

1.1 Module Introduction

- Contact Details

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    - Room 3.18

1.1 Module Introduction

- Our Timetable:
  - Lectures
    - Thursday 11:00am – 01:00pm Room: CLOUD LAB
  - Tutorials
    - Friday 09:00pm – 11:00pm Room: CLOUD LAB

1.1 Module Introduction

- Module Aims

Module Aims
Investigate, critically analyses and assess security with respect to cloud computing.
Address the key security concerns and challenges pertaining to developing, implementing, maintaining and utilising cloud computing systems and resources.
Investigate and explore current techniques and methodologies employed to manage security risks and policies.
Develop strategies to identify, prevent, detect and recover from security breaches in cloud system environments.

1.1 Module Introduction

- Assessment Strategy

Allocation of Marks	
Project	40%
Terminal Examination	60%

- The project will be a cross-module assessment with either the Cloud Application Development module or the Cloud Infrastructure module depending on the elective stream you choose.

1.1 Module Introduction

- Required Reading for Exam

  – CSA - Security Guidance for Critical Areas of Focus in Cloud Computing v3.0

  https://cloudsecurityalliance.org/guidance/csaguide.v3.0.pdf

  – NIST - Guidelines on Security and Privacy in Public Cloud Computing

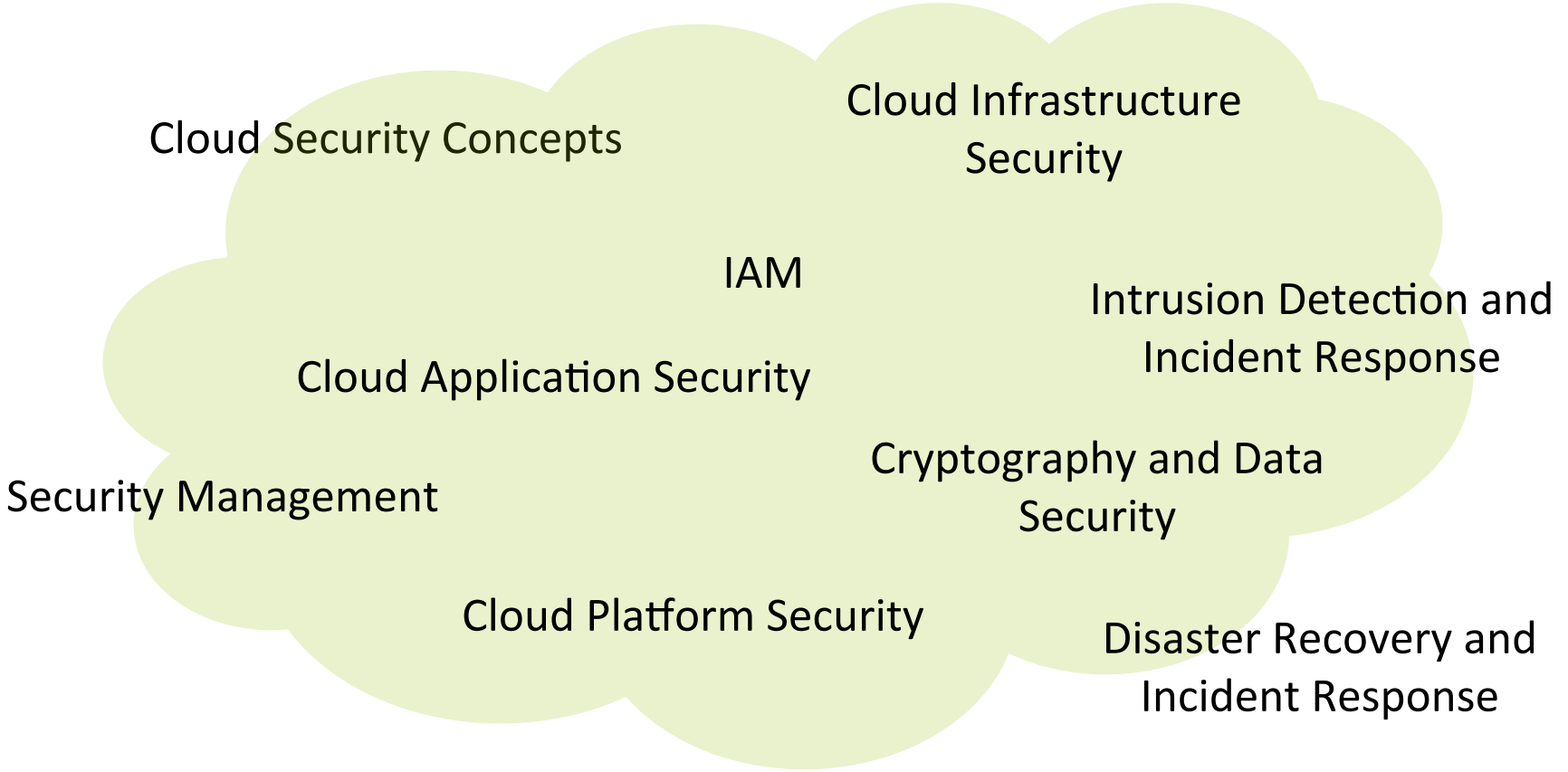
  http://csrc.nist.gov/publications/nistpubs/800-144/SP800-144.pdf

  – ENISA – Cloud Computing: Benefits, Risks and Recommendations for Information Security

  http://www.enisa.europa.eu/activities/risk-management/files/deliverables/cloud-compu ent

1.1 Module Introduction

- Overview of Topics



1.2 Cloud Computing Introduction

- Introduction

> The rise of the cloud is more than just another platform shift that gets geeks excited. It will undoubtedly transform the IT industry, but it will also profoundly change the way people work and companies operate.
>
> The Economist, 'Let it Rise', October 2008

- Cloud Computing enables the procurement of a wide range of enterprise level IT systems and capabilities on a pay-per-use basis.
- The cloud based services should be accessible from anywhere at any time.
- Some Forecasts
  - In 2009 Gartner forecast that the global market for cloud based services would grow to over $150 billion per year by 2013

1.2 Cloud Computing Introduction

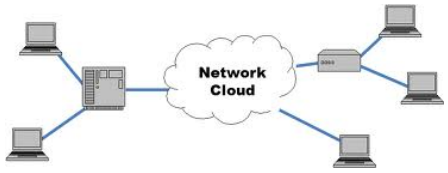
- What Exactly is Cloud Computing?

Cloud computing is a style of computing where scalable and elastic IT-enabled capabilities are provided 'as a service' to multiple external customers using internet technologies.

Gartner

- There is no consensus within the IT industry of exactly what cloud computing means

- The 'cloud' in the term 'cloud computing' gets its name from the usual depiction of the internet in network diagrams as a cloud.
  - The cloud icon typically represents 'all the other stuff' that makes the network function – somebody else's concern



1.2 Cloud Computing Introduction

- What Exactly is Cloud Computing?

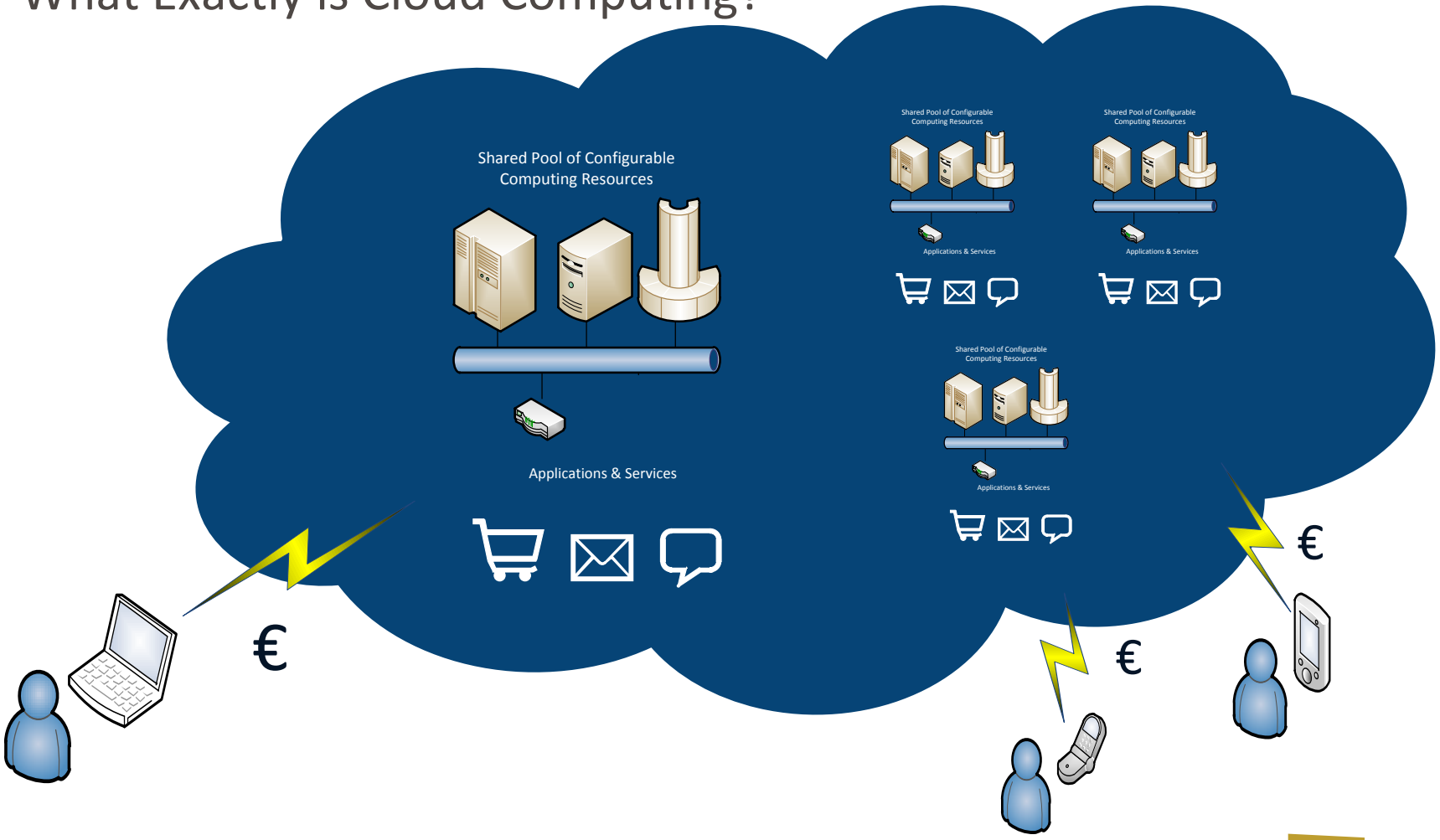
The interesting thing about cloud computing is that we've redefined cloud computing to include everything that we already do. I can't think of anything that isn't cloud computing with all of these announcements. The computer industry is the only industry that is more fashion-driven than women's fashion. Maybe I'm an idiot, but I have no idea what anyone is talking about. What is it? It's complete gibberish. It's insane. When is this idiocy going to stop?

Larry Ellison, CEO, Oracle, September 2008.

  - Cloud or Marketing Fog?
    - IT vendors engaging in 'cloud washing' or 'cloud envy' – efforts to market traditional IT services as cloud services
    - Business users do not necessarily care *how it works*, rather they are interested in *what it can do.*

1.2 Cloud Computing Introduction

- What Exactly is Cloud Computing?



1.2 Cloud Computing Introduction

- What Exactly is Cloud Computing?

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

N.I.S.T Definition
http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf

1.2 Cloud Computing Introduction

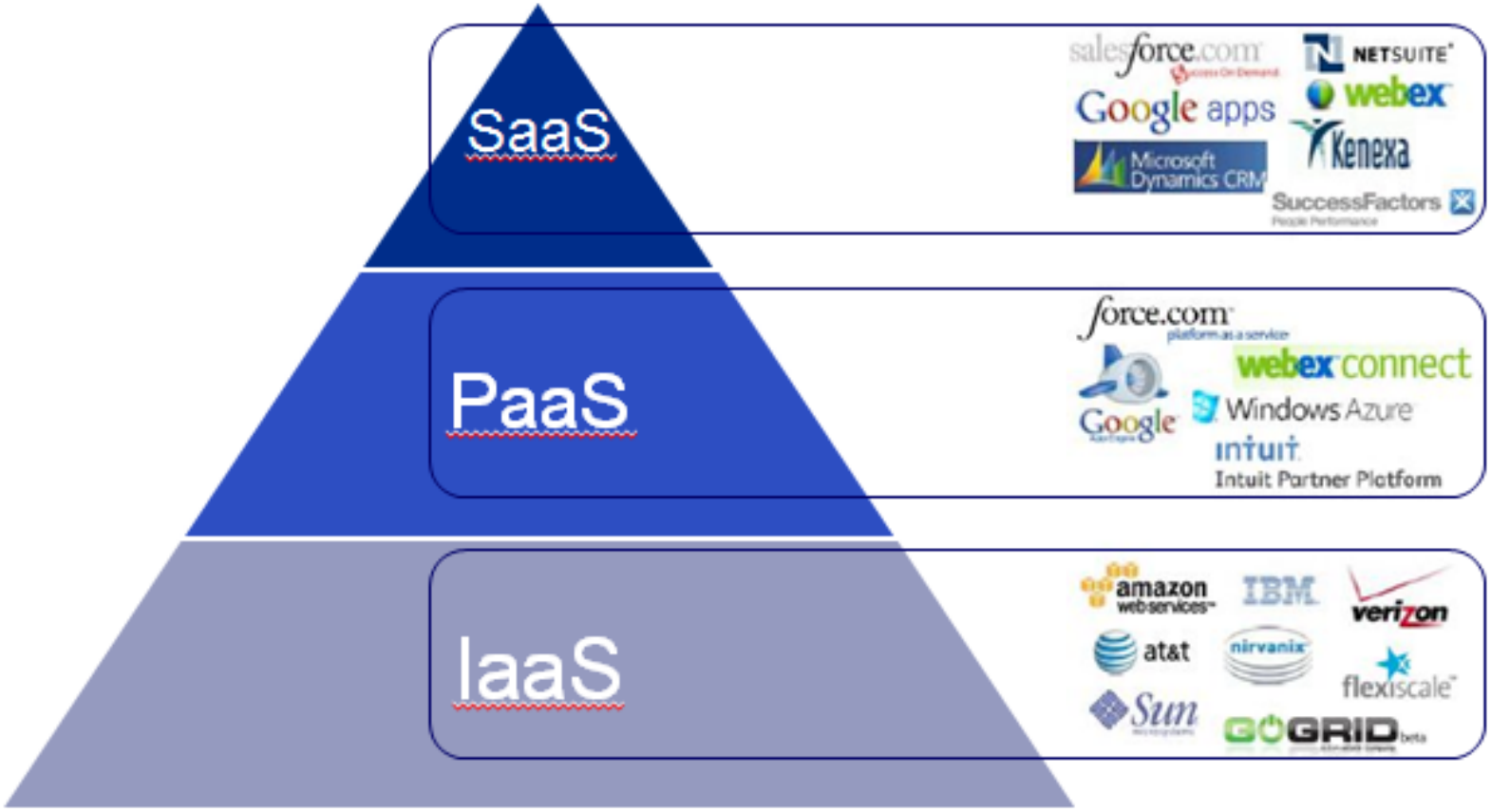
- What Exactly is Cloud Computing?

The Five Essential Characteristics

- On-Demand Self-Service
- Broad Network Access
- Resource Pooling
- Rapid Elasticity
- Measured Service

1.2 Cloud Computing Introduction

- What Exactly is Cloud Computing?



"SPI Model"

1.2 Cloud Computing Introduction

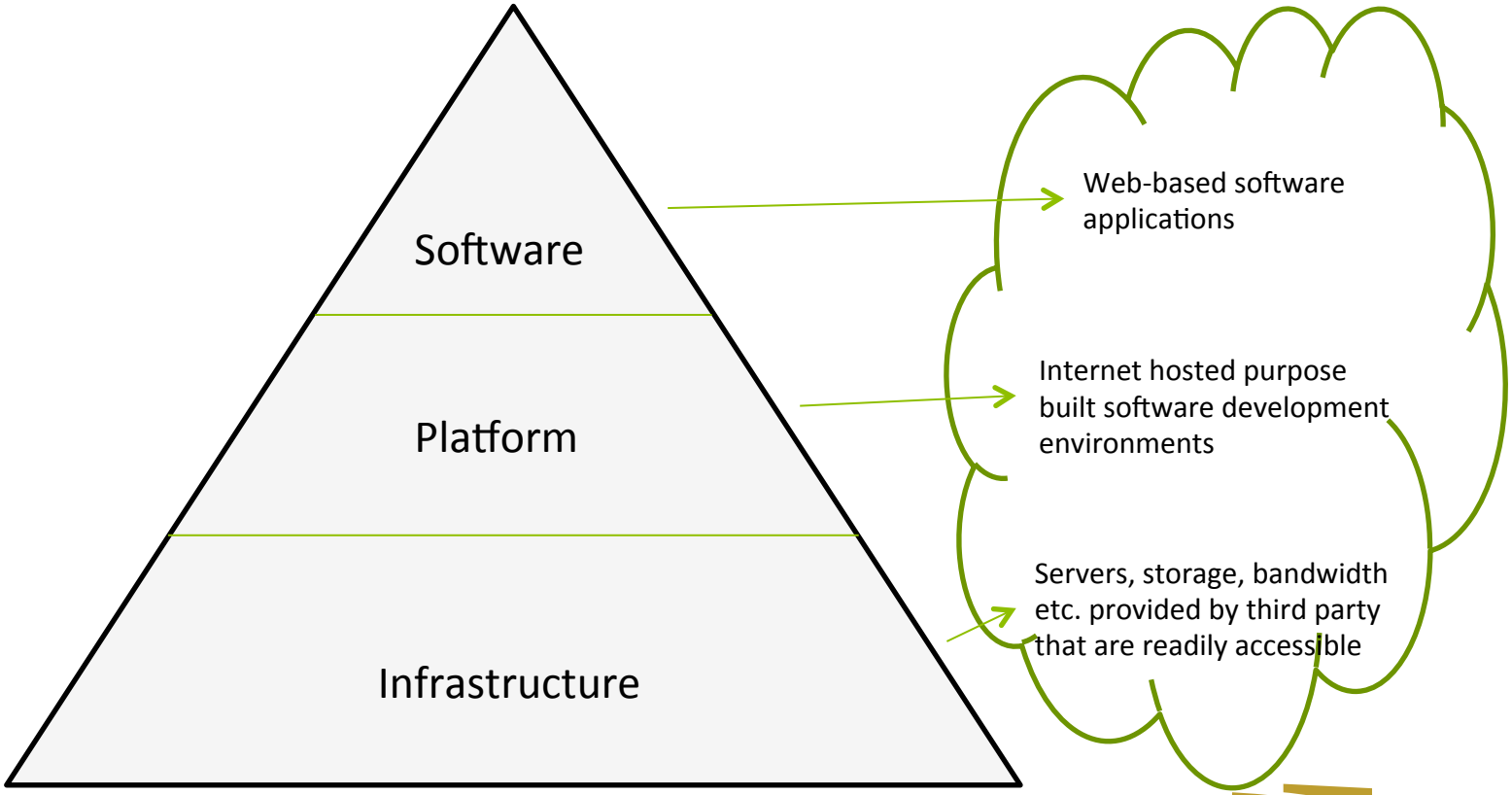
- What Exactly is Cloud Computing?

The Four Deployment Models

- Private Cloud
- Community Cloud
- Public Cloud
- Hybrid Cloud

1.2 Cloud Computing Introduction

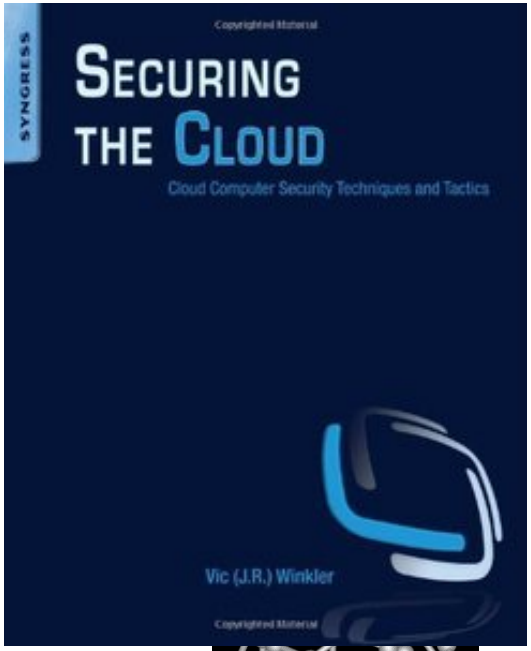
- An Analogy with Traditional Layers of Computing

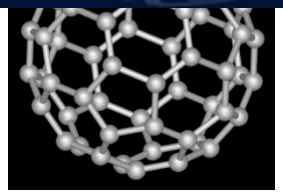


Simple Pyramid Model of Computing

1.3 Cloud Security Introduction

- A Closer Look at Elasticity
  - The importance of stable repeated patterns
    - Aggregation of resources
    - Benefits at scale
    - Minimising inefficiencies
    - Synergy
  - The sum is greater than the parts
  - Elasticity entails ongoing infrastructure reconfiguration
    - Network
    - Storage
    - Servers and Virtual Machines





How does this impact on security?

1.3 Cloud Security Introduction

- A Closer Look at Elasticity

  - Security Implications
    - Orchestration of security controls in dynamically changing environment
    - IP addresses / VMs
      - created / destroyed / recreated elsewhere in infrastructure
    - Audit
    - Balance between cloud computing scale benefits and security

  - Managing Security
    - Sophisticated management infrastructure required
      - Configuration Management Databases (CMDBs)

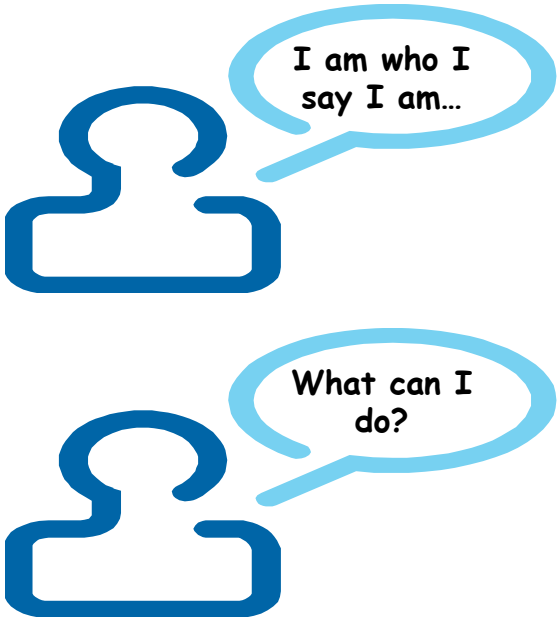
1.3 Cloud Security Introduction

- Key Security Concepts
  - Information Security
    - Security of IT systems as well as the non-IT processes supporting usage of IT systems.
      - Computer Security
      - Network Security
      - Data Security
      - Information Assurance
  - CIA – Confidentiality / Integrity / Availability

  - Least Privilege Principle
    - Users and processes should operate with a minimal set of privileges.

1.3 Cloud Security Introduction

- Key Security Concepts
  - Authentication
    - Establish identity
    - Typically, by presenting required credentials
  - Authorisation
    - Privileges granted to users or processes
    - Access Control Lists (ACLs)
  - Cryptography
    - Encryption
    - Decryption
    - Cryptoanalysis



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1.3 Cloud Security Introduction

- Key Security Concepts
  - Auditing
    - Generation, collection and review of system events
      - Network
      - Application
      - System
    - Review of processes and security controls
  - Accountability
    - Who?
    - What?
    - When?
    - How?

1.4 Summary

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