

# Cloud Computing

A brief introduction

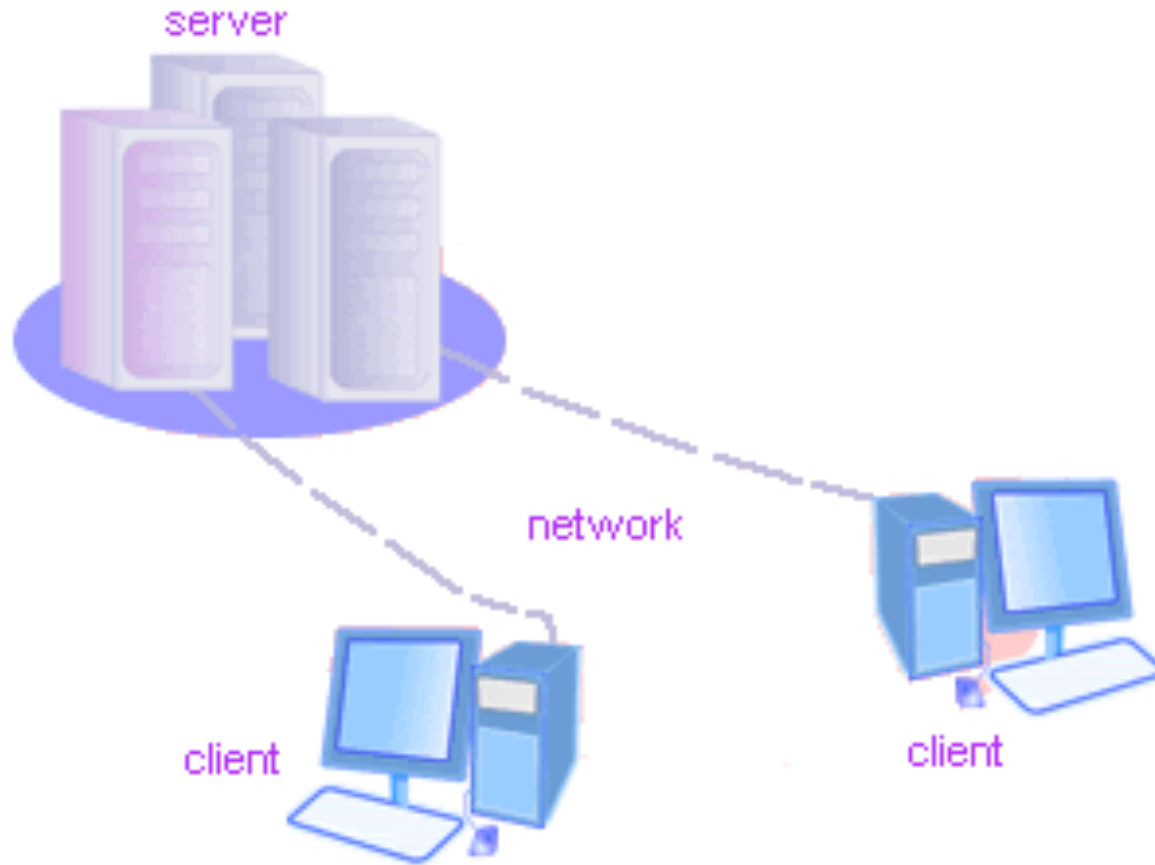
# About this session

- My name is Andrew Woodcock and I am the Lead SDE for the Cork Ecommerce team
- This is the second of a series of tech sessions aimed at the non-engineering staff and will cover cloud computing
- Idea is to do a brief introductory presentation on a series of techie subjects
- Open to questions at the end!

# Quick recap on client-server applications

- Client-server refers to any software design or implementation where one or more clients consume services from one or more servers
- In web terms:
  - the browser is the **client** because it consumes web pages generated by the webserver: it asks the webserver to serve it with web pages to display
  - And the webserver is the **server** because it serves requests from one or more clients: typically it reacts to requests rather than initiating them
- But there are many other client-server designs, not just web: ATMs and Bank Networks, email clients and servers, etc.

# Client-server: clients talk to a well-known server



# Computing as a service

- The Cloud is computing as a service – a utility
- What do we mean by that?
- Think of the electricity supply: traditional client-server is like having a generator – we know exactly where the power is coming from but we bear the cost of buying and running the generator and the risk if it breaks.
- The Cloud acts like the national grid: we don't know where the power was generated, nor do we care, only that when we flip a switch, we get power to our device

# The Cloud: clients consume a utility



# Are you being served?

- Clients are heterogeneous
- A client is not just a browser: it could also be an Android or iPhone app or even another website
- The nice thing about clients is that they do our work for us, saving us CPU and memory
- But clients are untrustworthy: we don't know who or what they are and we can't control them
- Bringing control back into our servers makes it easier and safer to work with multiple clients
- Cloud computing enables this by allowing us to consume computing power as needed and scale on demand
- It also means we don't need to develop for multiple devices, just produce standard HTML, CSS and JavaScript

# Cloudy skies

- There is not just one “Cloud”
- In reality the web is cloudy, with lots of clouds performing different services
- Amazon EC2, Windows Azure, Rackspace Cloud, Private clouds
- Cloud storage, hosting, applications
- One thing in common: clouds provide transparent computing services



# Where are the clouds?

- Clouds are hosted in datacentres
- Clouds are made up of many, many virtual servers working together
- There needn't be a one-to-one relationship between datacentre and cloud: a cloud can be in multiple datacentres and multiple clouds can be in any one datacentre
- The whole point is that they're amorphous: they can be pretty much anything!
- Continuing our analogy: our electricity can come from a mix of wind, coal, oil, gas and nuclear – we don't know and electricity is electricity ...

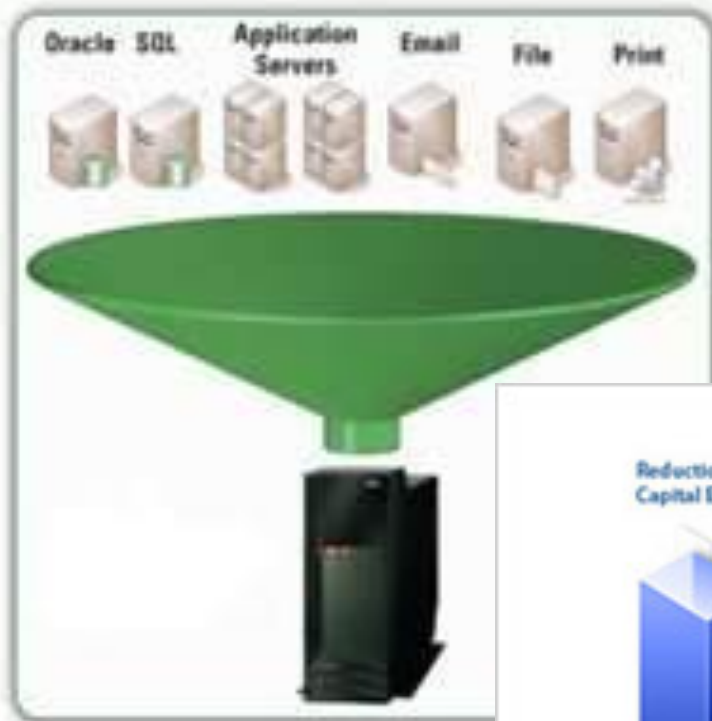
# Why “cloud”?

- Cloud refers in part to the traditional engineering design symbol for an external network: it is drawn as a cloud
- Clouds are also amorphous and cloud computing is different things at different times: storage, hosting, processing ...
- Clouds are opaque: we can't see what's going on inside but we understand what it does: water our garden, spoil our weekend, etc.

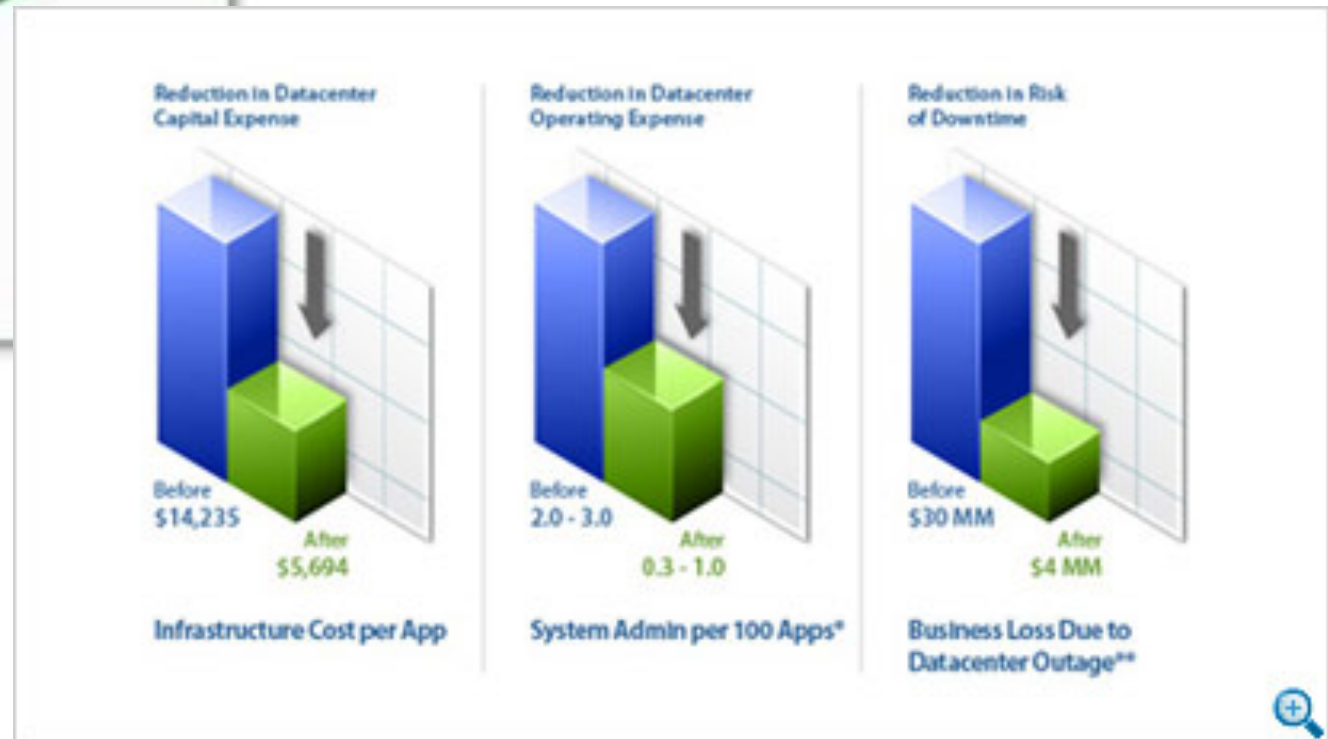
# Virtual clouds

- Cloud computing is built on virtualization
- Virtualization allows several servers to be transparently hosted on one physical machine
- Virtual servers appear and behave as if they were physical servers
- Client-server computing can work with virtual servers too but is much less flexible – still dealing with *servers* not a *service*
- Because a physical server can have multiple virtual servers, we can stop, start and create virtual servers at will, giving the “cloud” its elasticity
- The number of virtual servers in a cloud can be varied minute to minute: demand varies throughout the day and cloud computing services can scale up and down instantaneously to meet demand
- This flexibility is key to computing as a utility: in the national grid, power stations come on and offline transparently as needed to meet demand, virtual servers do the same in a cloud

# Virtualization, briefly



- Most physical servers are under-utilized
- Virtualization allows several logical servers to run on a single physical machine
- Improves utilization and reduces TCO



# What's the big deal?

- In client-server computing, clients are bound quite tightly to the server or servers – difficult to scale, upgrade, etc.
- In cloud computing, clients consume a service or services with a name – scales well
- What is within the cloud can change radically, grow and contract and the application will carry on working
- It is computing as a *utility* – we are now able to consume computing power, storage space, etc. without knowing how or where it is implemented

# Web scale

- Why do we care? Web scale and heterogeneous clients!
- Different clients behave subtly differently when processing – a challenge to code for
- Server-side computing makes it easier to server multiple, different clients because we own the server-side
- Scale is all-important to web companies: traditional client-server applications might have a few thousand concurrent users, web applications can have hundreds of thousands or millions of users
- At web-scale, client-server starts to become unmanageable
- Two basic ways to scale: vertically and horizontally
- Vertical scaling: add more processing power and memory to existing machines
- Horizontal scaling: add more machines!
- Cloud computing is horizontal scaling done web scale!

# What cloud computing isn't ...

In November, The Telegraph reported Galway Councillor Seamus Tiernan as saying: “Connemara in particular could become a centre of excellence for ... cloud computing, we have dense thick fog for nine months of the year ... there is tremendous scope for cloud computing to become a major employer in this region.”

Cllr Martin Shiels told him he was an “eejit to think that the cloud computing had anything to do with climate.”

Chairman Sile Ni Baoill asked for both councillors to withdraw their comments

“Sile Ni Baoill” unfortunately is an anagram of “a billion lies” ... it’s a hoax albeit a very good one!

# So to sum up ...

- Hosting services server-side allows us to run our applications in a controlled, known environment
- At the cost of having to provide our own processing power – get less of a free ride on the client
- At Web Scale, server-side computing needs serious power
- All this means web companies need serious scale
- We can scale horizontally, vertically or both but only horizontally will work well at web scale
- Virtualization and cloud computing enable better resource utilization, “limitless” power and massive scale
- Cloud computing turns computing into a utility – turn on and consume, a huge step forward