



# 雲端技術應用的新趨勢

*The Trend of Cloud Applications*

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# ***What is Cloud Computing?***

**何謂雲端運算？請用一句話說明！**

***Anytime* 隨時**

***Anywhere* 隨地**

***With Any Devices* 使用任何裝置**

***Accessing Services* 存取各種服務**

***Cloud Computing* =~ *Network Computing***

**雲端運算 =~ 網路運算**

# Common Cloud Services

常見的雲端服務有哪些呢？

實體	單機版	網路版	行動版
信箱	E-Mail	Web Mail	Mobile Mail
電視	電視盒	Web TV	Mobile TV
打字機	Office	Google Docs	M-Office
電話	數位電話	Skype	Flash Wengo
佈告欄	電子佈告欄	部落格	微網誌

**Who own the Cloud ?!**

這朵雲是誰家的?!

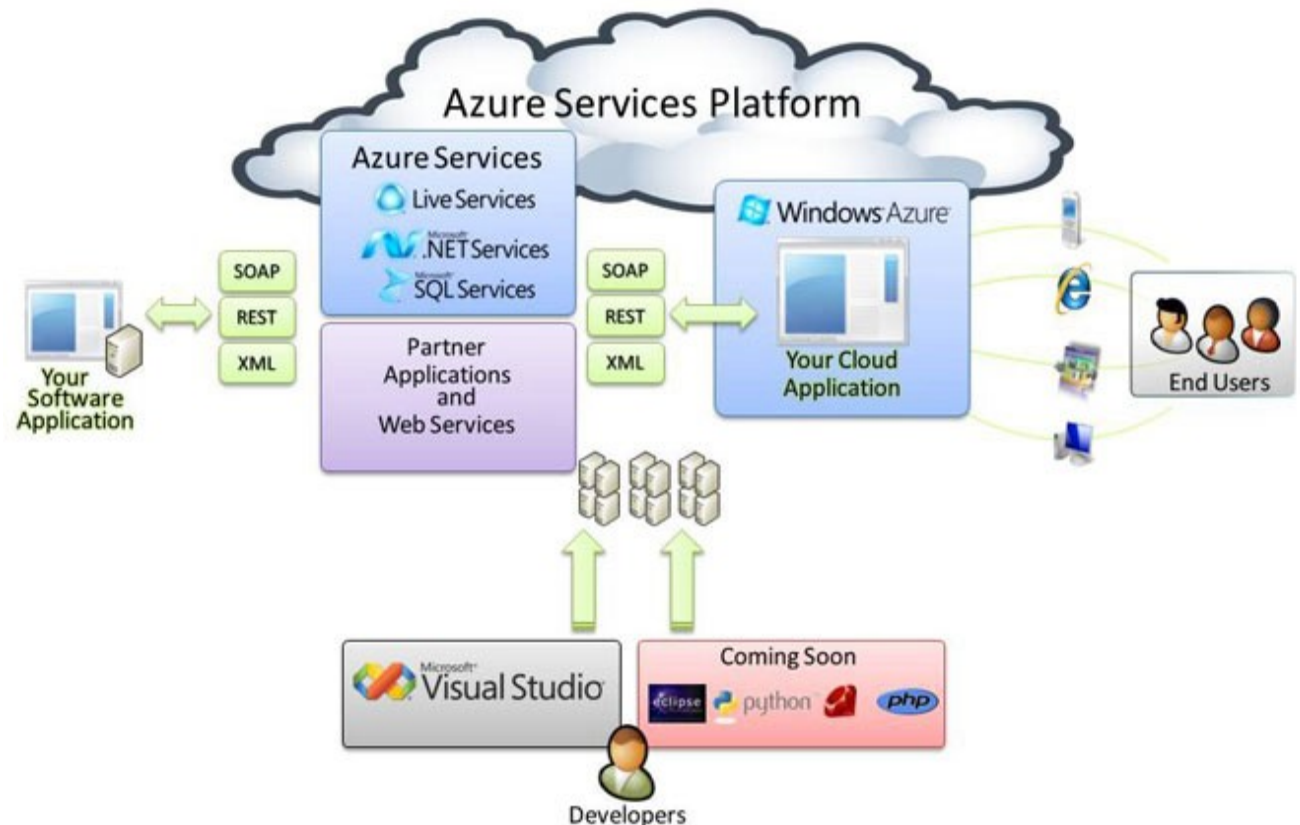


- Amazon Web Service ( AWS )
- 虛擬伺服器：**Amazon EC2**
  - Small (Default) \$0.10 per hour \$0.125 per hour
  - All Data Transfer \$0.10 per GB
- 儲存服務：**Amazon S3**
  - \$0.150 per GB – first 50 TB / month of storage used
  - \$0.100 per GB – all data transfer in
  - \$0.01 per 1,000 PUT, COPY, POST, or LIST requests
- 觀念：**Paying for What You Use**

- Google App Engine (GAE)
- 讓開發者可自行建立網路應用程式於Google平台中。
- 提供：
  - 500MB of storage
  - up to 5 million page views a month
  - 10 applications per developer account
- 限制：
  - 程式設計語言: Python、Java



- Microsoft Azure 是一套雲端服務作業系統。
- 作為 Azure 服務平台的開發、服務代管及服務管理環境。
- 服務種類：
  - .Net services
  - SQL services
  - Live services



# Types of Cloud Service Provider

## 雲端服務的市場區隔

### SaaS

Software as a Service

軟體即服務

### PaaS

Platform as a Service

平台即服務

### IaaS

Infrastructure as a Service

架構即服務



# *Everything as a Service* 啥米鬼都是一種服務

- AaaS Architecture as a Service
- BaaS Business as a Service
- CaaS Computing as a Service
- DaaS Data as a Service
- DBaaS Database as a Service
- EaaS Ethernet as a Service
- FaaS Frameworks as a Service
- GaaS Globalization or Governance as a Service
- HaaS Hardware as a Service
- IMaaS Information as a Service

## • **IaaS** **Infrastructure or Integration as a Service**

- IDaaS Identity as a Service
- LaaS Lending as a Service
- MaaS Mashups as a Service
- OaaS Organization or Operations as a Service

## • **SaaS** **Software or Storage as a Service**

## • **PaaS** **Platform as a Service**

- TaaS Technology or Testing as a Service
- VaaS Voice as a Service

*Customer-Oriented*

客戶導向

引用自：

[https://www.ibm.com/developerworks/mydeveloperworks/blogs/sbose/entry/gathering\\_clouds\\_of\\_xaas](https://www.ibm.com/developerworks/mydeveloperworks/blogs/sbose/entry/gathering_clouds_of_xaas)



***Rome wasn't built in a day !***

**羅馬不是一天造成的！**



圖片來源：<http://www.mjfq.com/pic/20070822/20070822234234402.jpg>

***When did the Cloud come ?!***

**這朵雲幾時飄過來的？！**

# ***Brief History of Computing (1/5)***



Source: <http://pinedakrch.files.wordpress.com/2007/07/>

***1960 PDP-1***

*·*  
*·*  
*·*

***1965 PDP-7***

*·*  
*·*  
*·*

***1969 1<sup>st</sup> Unix***

***Mainframe  
Super  
Computer***

***1977 Apple II***



***1981 IBM 1<sup>st</sup> PC 5150***



***Back to Year 1970s ...***



# ***Brief History of Computing (2/5)***



Source: <http://www.nhc.org.tw>

**Mainframe**  
**Super**  
**Computer**

**PC | Linux**  
**Cluster**  
**Parallel**

**1990 World Wide Web  
by CERN**

...

...

**1993 Web Browser  
Mosaic by NCSA**



**1991 CORBA**

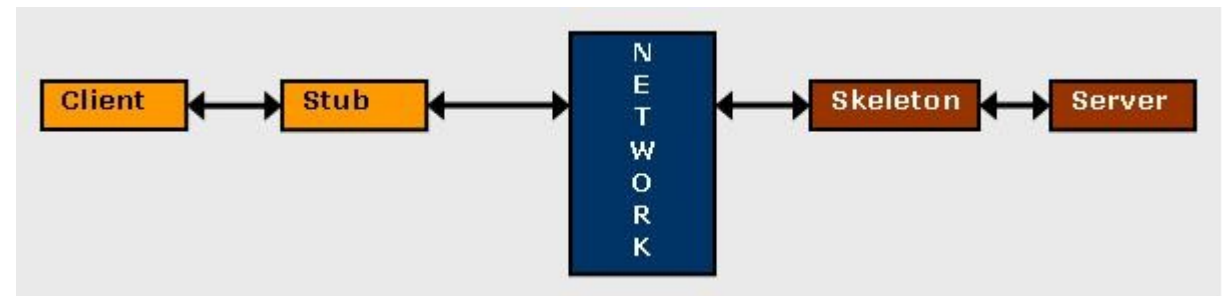
...

**Java RMI**

**Microsoft DCOM**

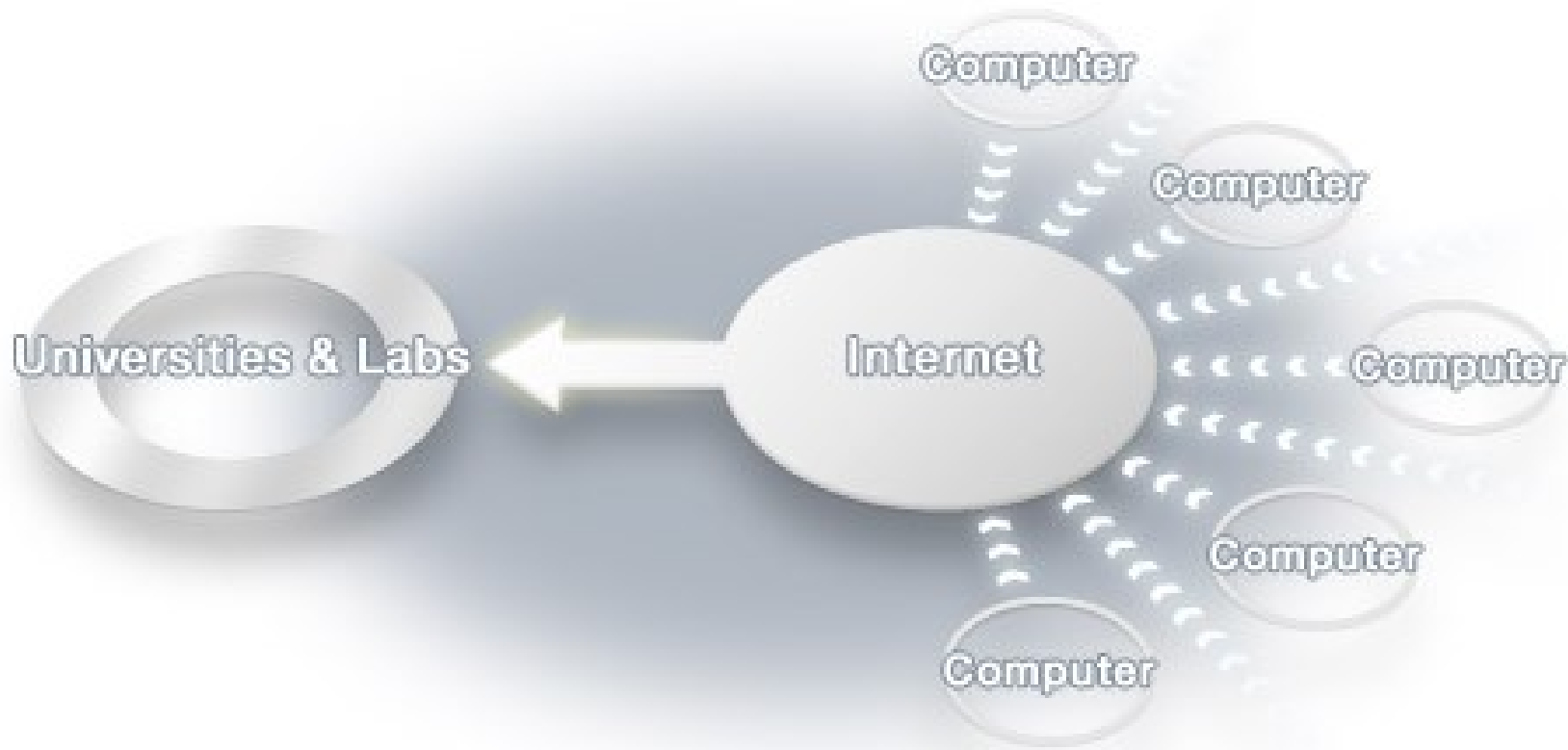
...

**Distributed Objects**



**Back to Year 1990s ...**

# ***Brief History of Computing (3/5)***



Source: <http://www.scei.co.jp/folding/en/dc.html>

**Mainframe**  
*Super  
Computer*

**PC | Linux**  
*Cluster  
Parallel*

**Internet**  
*Distributed  
Computing*

**1997 Volunteer Computing**  
**1999 SETI@HOME**



**2003 Globus Toolkit 2**



**2002 Berkley BOINC**



**2004 EGEE gLite**



**Back to Year 2000s ...**



# ***Brief History of Computing (4/5)***



Source: <http://gridcafe.web.cern.ch/gridcafe/whatisgrid/whatis.html>

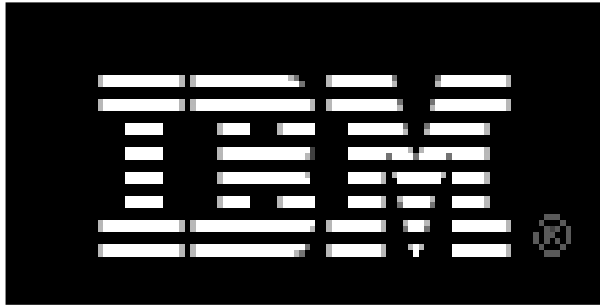
**Mainframe**  
*Super  
Computer*

**PC | Linux**  
*Cluster  
Parallel*

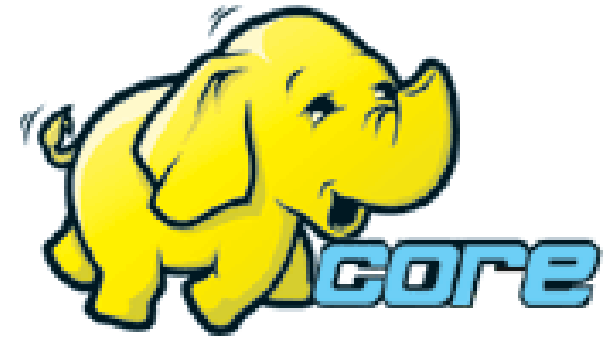
**Internet**  
*Distributed  
Computing*

**Virtual Org.**  
*Grid  
Computing*

**2001 Autonomic Computing**  
**IBM**



**2006 Apache Hadoop**



**2005 Utility Computing**  
**Amazon EC2 | S3**

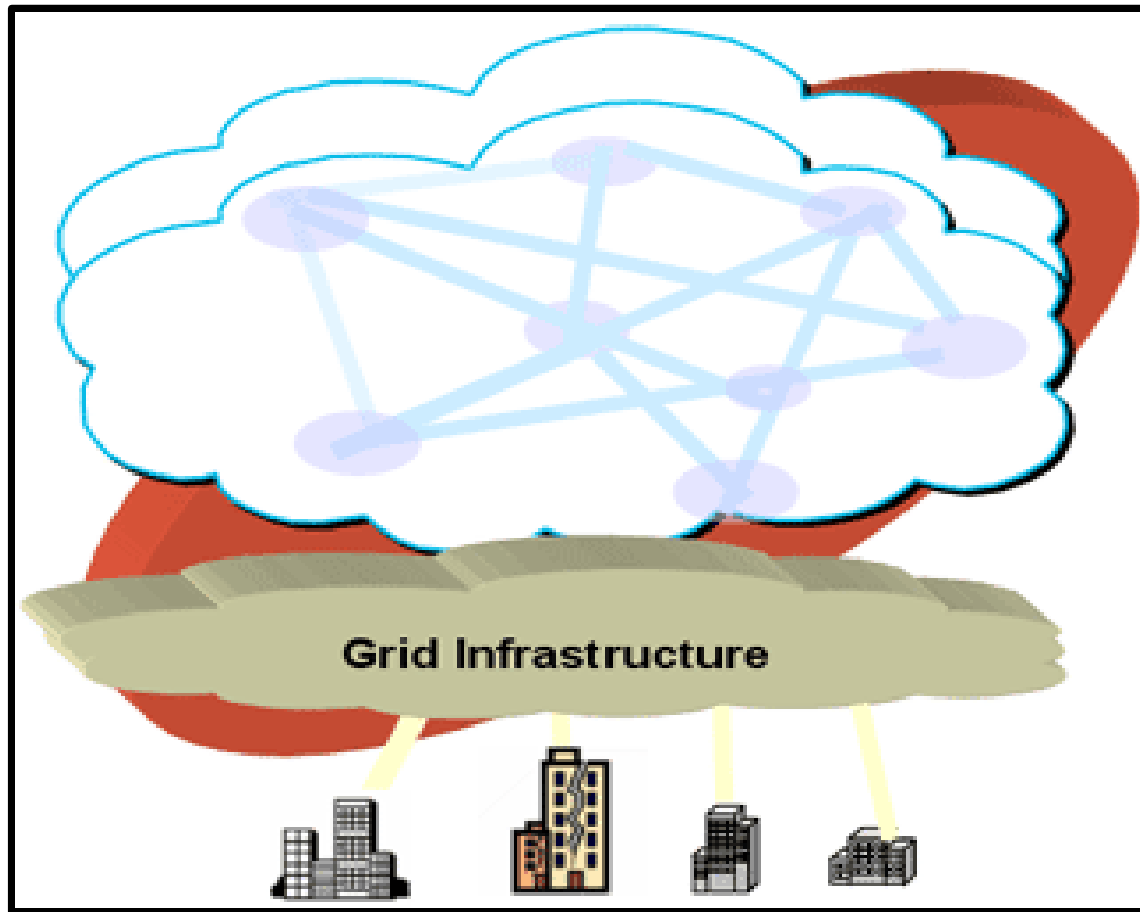


**2007 Cloud Computing**  
**Google + IBM**



**Back to Year 2007 ...**

# ***Brief History of Computing (5/5)***



Source: <http://mmdays.com/2008/02/14/cloud-computing/>

**mainframe**  
super  
computer

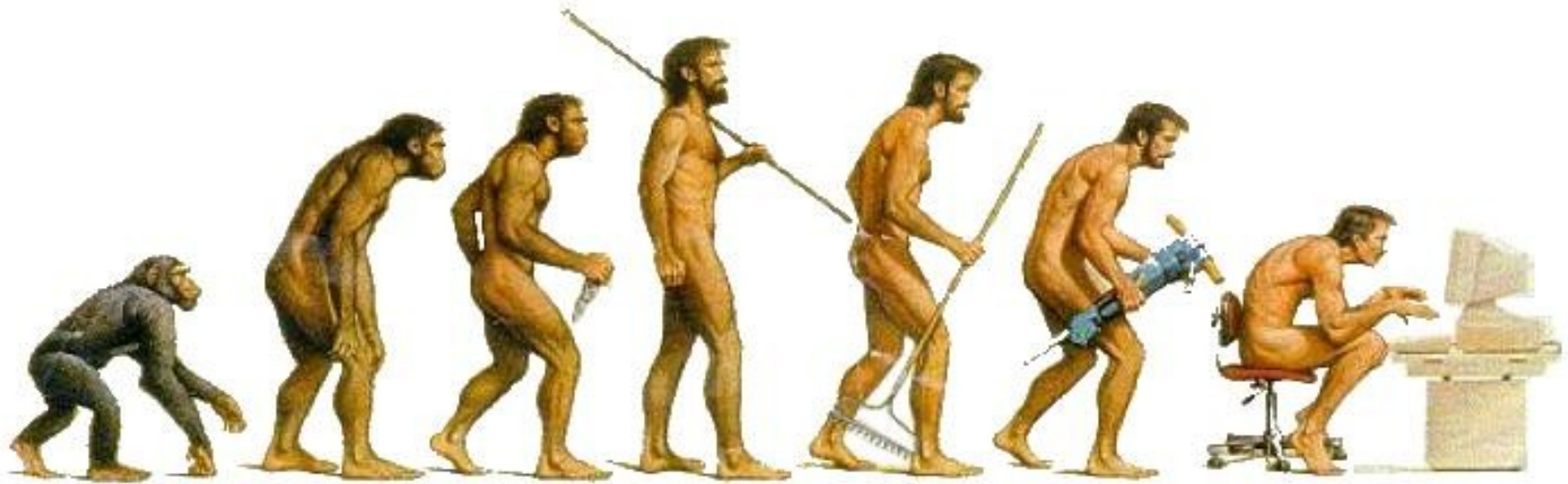
**PC | Linux**  
Cluster  
Parallel

**Internet**  
Distributed  
Computing

**Virtual Org.**  
Grid  
Computing

**Data Explode**  
Cloud  
Computing

# Evolution



(OR is it?)

***What can we learn from the past ?!***

**在這漫長的演化中，我們到底學到些什麼？！**

Source: <http://cyberpingui.free.fr/humour/evolution-white.jpg>

**Lesson #1: One cluster can't fit all !**

**教訓一：叢集的單一設定無法滿足所有需求！**

**Answer #1: Virtual Cluster 新服務：虛擬化叢集**

**Lesson #2: Grid for Heterogeneous Enterprise !**

**教訓二：格網運算該用在異業結盟的資源共享！**

**Answer #2: Peak Usage Time 尖峰用量發生時間點**

**Lesson #3: Extra cost to move data to Grid !**

**教訓三：資料搬運的網路與時間成本！**

**Answer #3: Total Cost of Ownership 總擁有成本**

**This is why Cloud Computing matters ?!**

**這就是為什麼雲端運算變得熱門?!**

# ***Trend #1: Data are moving to the Cloud***

**趨勢一：資料開始回歸集中管理**

***Access data anywhere anytime*** 為了隨時存取

***Reduce the risk of data lost*** 降低資料遺失風險

***Reduce data transfer cost*** 減少資料傳輸成本

***Enhance team collaboration*** 促進團隊協同合作

***How to store huge data ?!***

**如何儲存大量資料呢?!**

***Trend #2: Web become default Platform!***

**趨勢二：網頁變成預設開發平台**

***Open Standard*** 網頁是開放標準

***Open Implementation*** 實作不受壟斷

***Cross Platform*** 瀏覽器成為跨平台載具

***Web Application*** 網頁程式設計成為顯學

***Browser difference become entry barrier ?!***

**瀏覽器的差異造成新的技術門檻?!**

***Trend #3: HPC become a new industry***

**趨勢三：高速計算已悄悄變成新興產業**

***Parallel Computing*** 平行運算的技能

***Distributed Computing*** 分散運算的技能

***Multi-Core Programming*** 多核心程式設計

***Processing Big Data*** 處理大資料的技能

***Education and Training are needed !!***

**為了讓這些技能與產業接軌，亟需教育訓練！！**





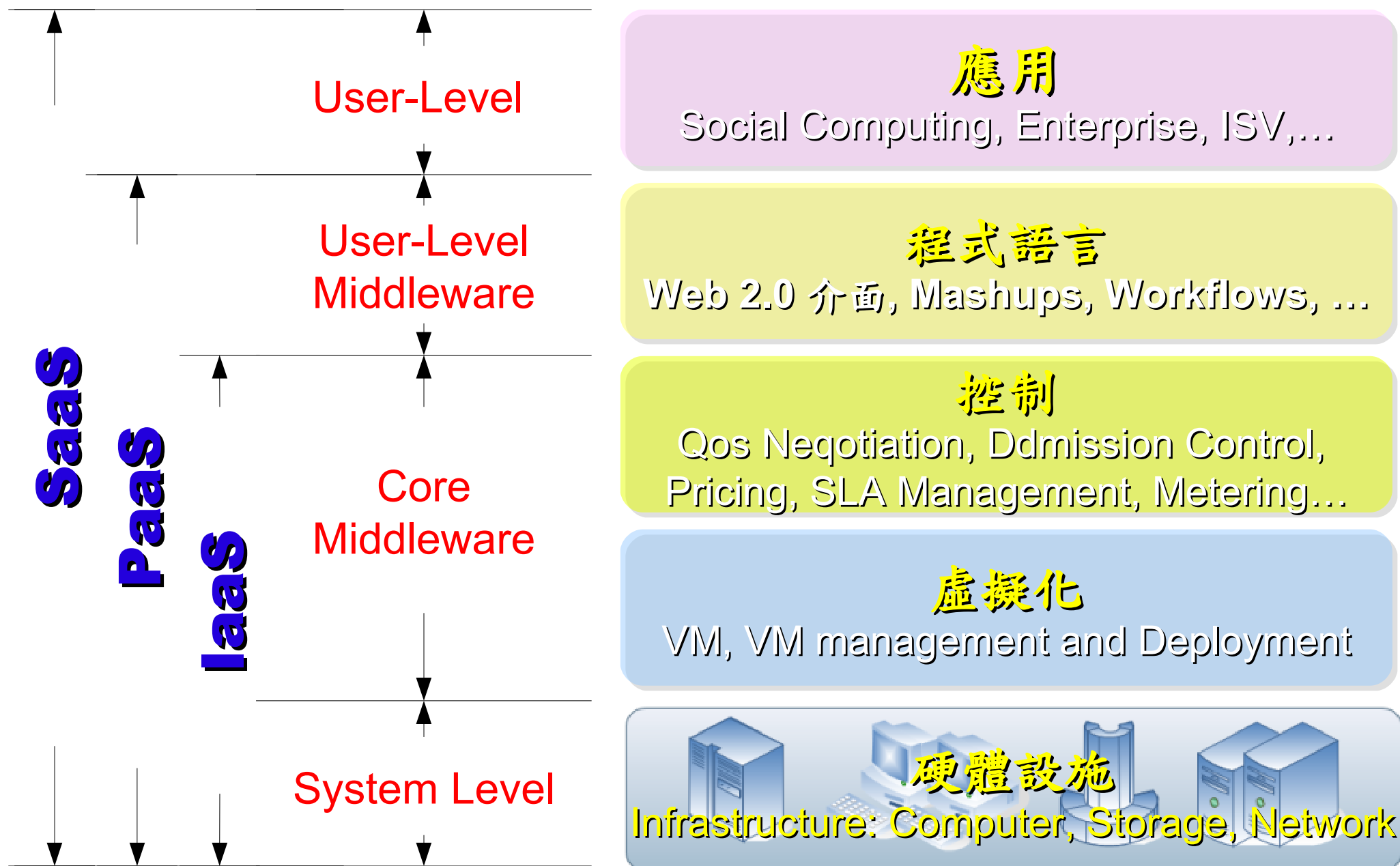
***Flying to the Cloud ...***  
***or***  
***Falling to the Ground ...***

Source: [http://media.photobucket.com/image/falling%20ground/preeto\\_f10/falling.jpg](http://media.photobucket.com/image/falling%20ground/preeto_f10/falling.jpg)

**How to build my own Cloud ?!**    如何打造私有雲？

# Cloud Architecture

## 雲端運算的參考架構



# Key Features of the Cloud

## 雲端運算的關鍵特徵

超大規模

Huge Data Scale

虛擬化

Virtualization

高可靠度

High Reliability

使用者付費

Pay per Use

高通用性

High Universality

高擴充性

High Scalability

成本低

Low Cost

參考來源：<http://baike.baidu.com/view/1316082.htm>

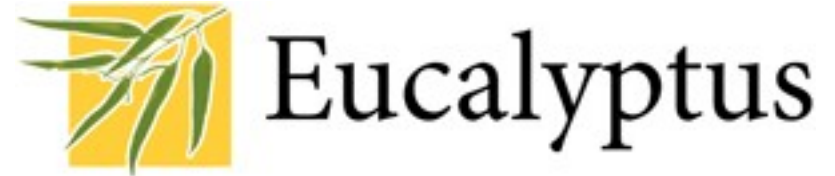
## How to build my own Cloud ?!

## 如何打造自己專屬的雲呢?!

- <http://hadoop.apache.org>
- Hadoop 是 Apache Top Level 開發專案
- 目前主要由 Yahoo! 資助、開發與運用
- 創始者是 Doug Cutting，參考 Google Filesystem，以 Java 開發，提供 HDFS 與 MapReduce API。
- 2006 年使用在 Yahoo 內部服務中
- 已佈署於上千個節點。
- 處理 Petabyte 等級資料量。
- Facebook、Last.fm、Joost ... 等著名網路服務均有採用 Hadoop。



- <http://sector.sourceforge.net/>
- 由美國資料探勘中心(National Center for Data Mining)研發的自由軟體專案。
- 採用C/C++語言撰寫，因此效能較 Hadoop 更好。
- 提供「類似」Google File System與MapReduce的機制
- 基於[UDT高效率網路協定](#)來加速資料傳輸效率
- [Open Cloud Consortium](#)的[Open Cloud Testbed](#)，有提供測試環境，並開發了[Ma1Stone效能評比軟體](#)。



- <http://open.eucalyptus.com/>
- 原是加州大學聖塔芭芭拉分校(UCSB)的研究專案
- 目前已轉由Eucalyptus System這間公司負責維護
- 創立目的是讓使用者可以打造自己的EC2
- 特色是相容於 Amazon EC2 既有的用戶端介面
- 優勢是Ubuntu 9.04 已經收錄 Eucalyptus 的套件
- [Ubuntu Enterprise Cloud powered by Eucalyptus in 9.04](#)
- 目前有提供 Eucalyptus 的官方測試平台供註冊帳號

# What we learn today ?

## WHAT

隨時隨地用任何裝置存取各種服務!!

Accessing services with any device anytime anywhere!!

## WHO

亞馬遜、谷歌、微軟等! 什麼都可以是服務 ~

Amazon, Google, Microsoft and more! Everything as a Service!

## WHEN

雲端運算是2007年繼格網運算之後的新趨勢!!

Cloud Computing become new trend since year 2007 !!

## WHY

資料集中、虛擬化、異業資源共享

Data-intensive, Virtualization, Heterogeneous

## HOW

採用自由軟體也能打造私有雲端

Hadoop, Sectore/Sphere, Eucalyptus, and more ....



**Questions?**

***Slides - <http://trac.nchc.org.tw/cloud>***

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