

# 2010-05-28 埔里高工參訪

時間	議程
09:30-09:40	國網中心簡介 - KING 計畫 (影片)
09:40-10:20	雲端運算的趨勢



# 雲端運算的趨勢分享

*The trend of Cloud Computing*

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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**

More definition?

其他定義請參考：

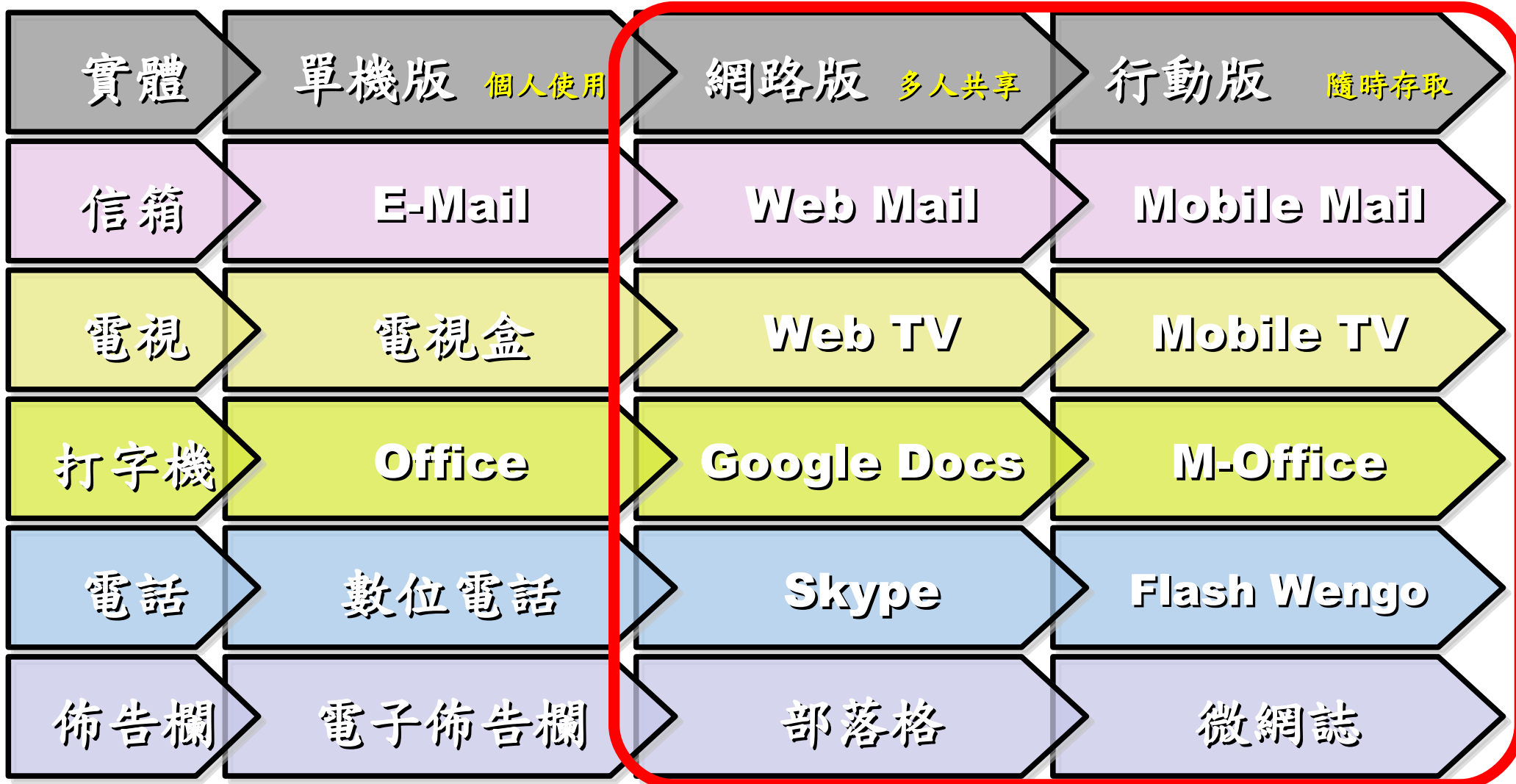
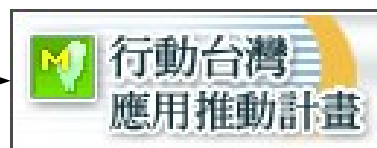
NIST Notional

Definition of Cloud  
Computing

# Evolution of Cloud Services

雲端服務只是軟體演化史的必然趨勢

數位化



***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***

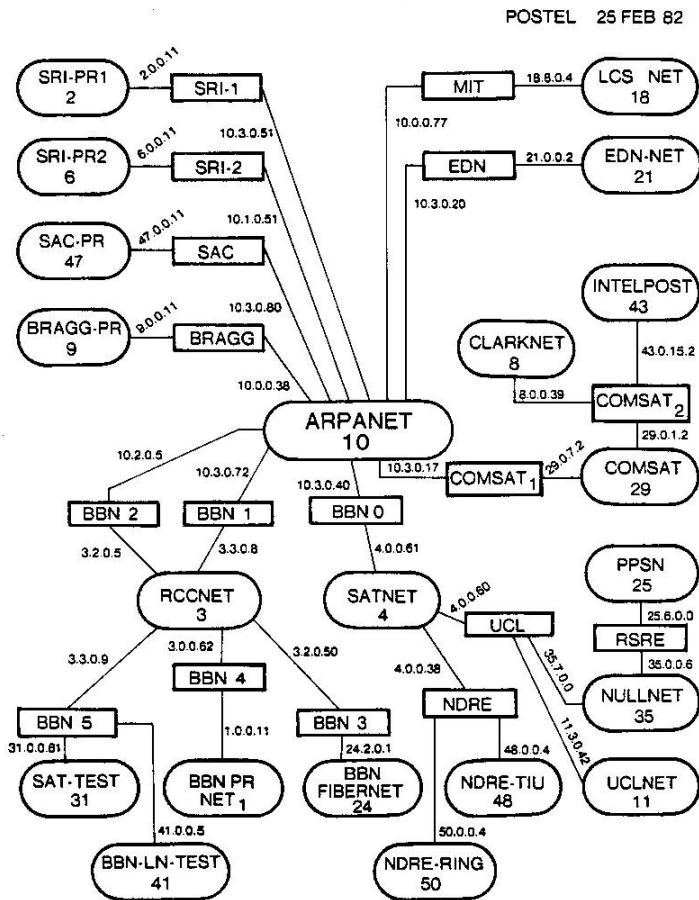


***1981 IBM 1<sup>st</sup> PC 5150***

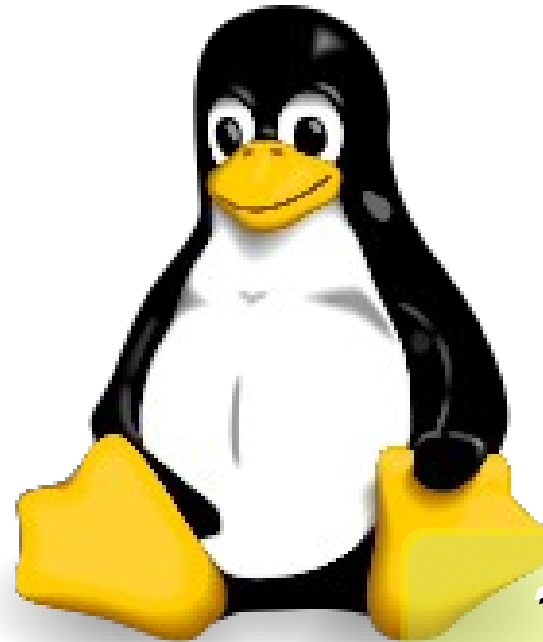


***Back to Year 1970s ...***

# 1982 TCPIIP



# 1983 GNU



**1991 Linux**

**Back to Year 1980s ...**



# ***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**

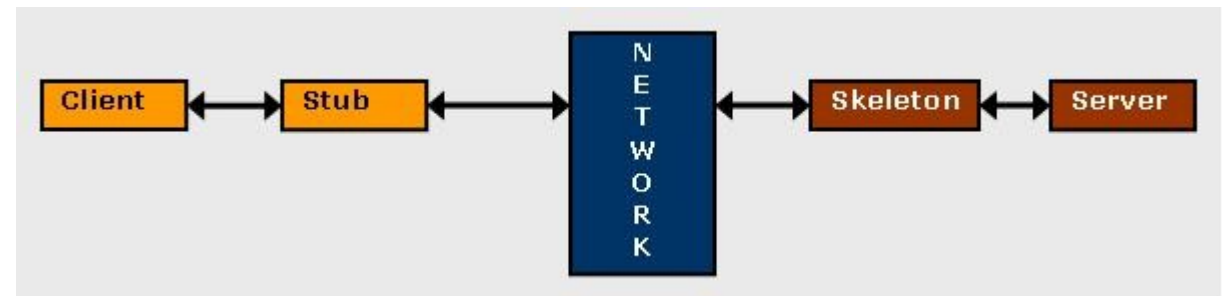
...

**Java RMI**

**Microsoft DCOM**

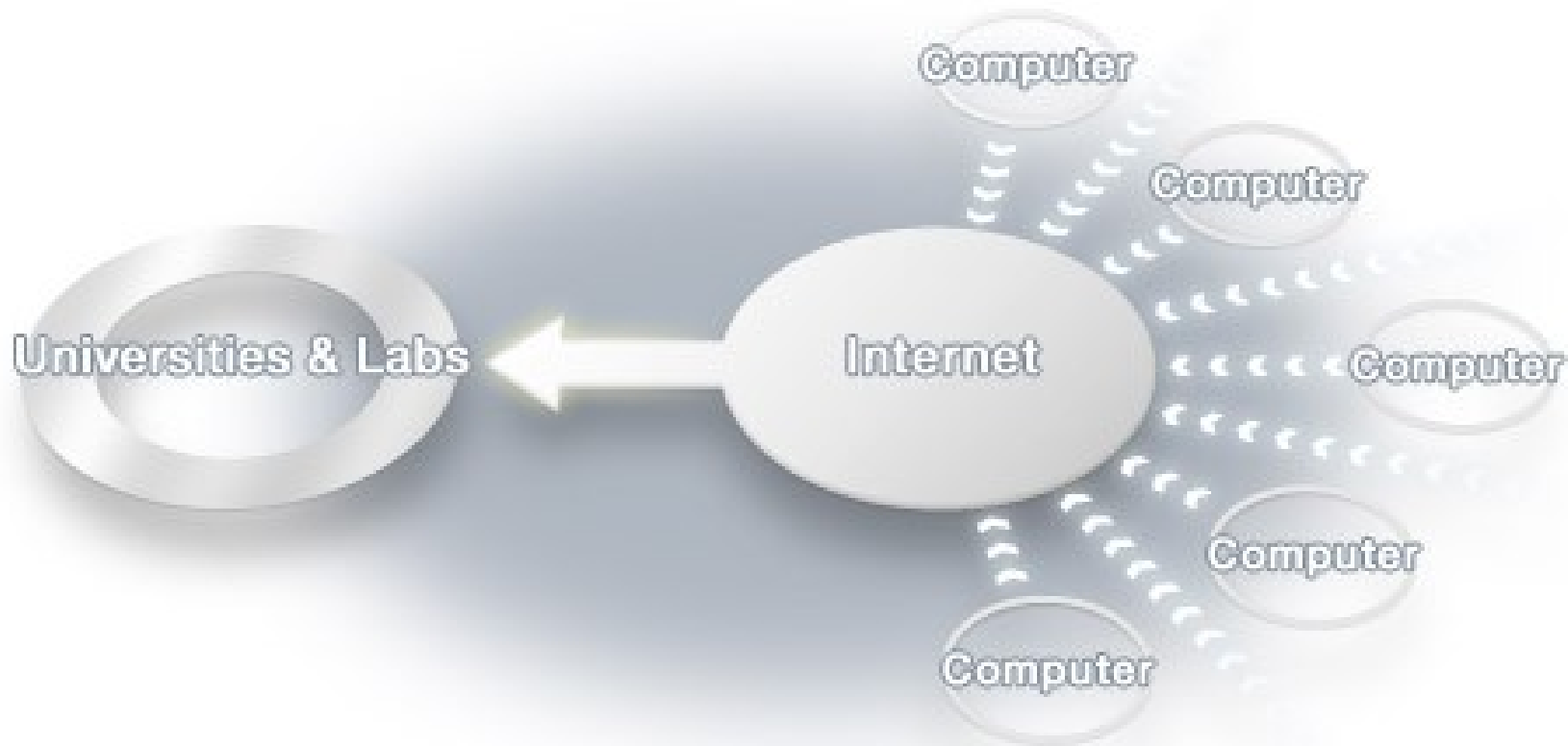
...

**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>

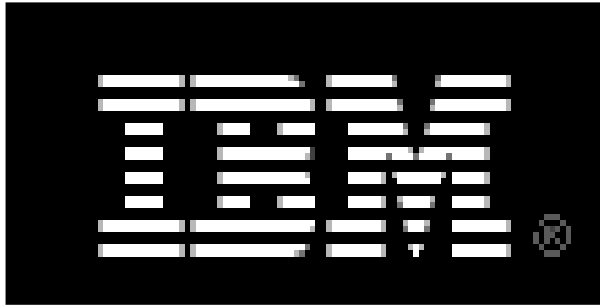
**Mainframe**  
*Super  
Computer*

**PC | Linux**  
*Cluster  
Parallel*

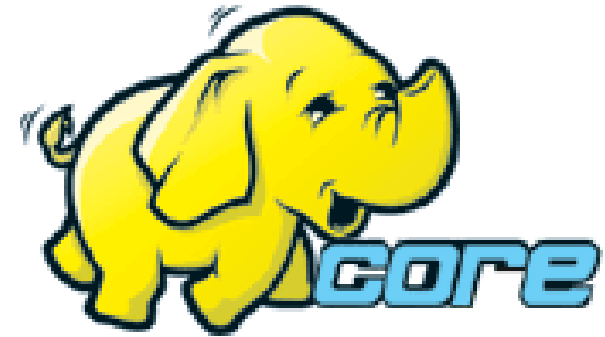
**Internet**  
*Distributed  
Computing*

**Virtual Org.**  
*Grid  
Computing*

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



**2006 Apache Hadoop**



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

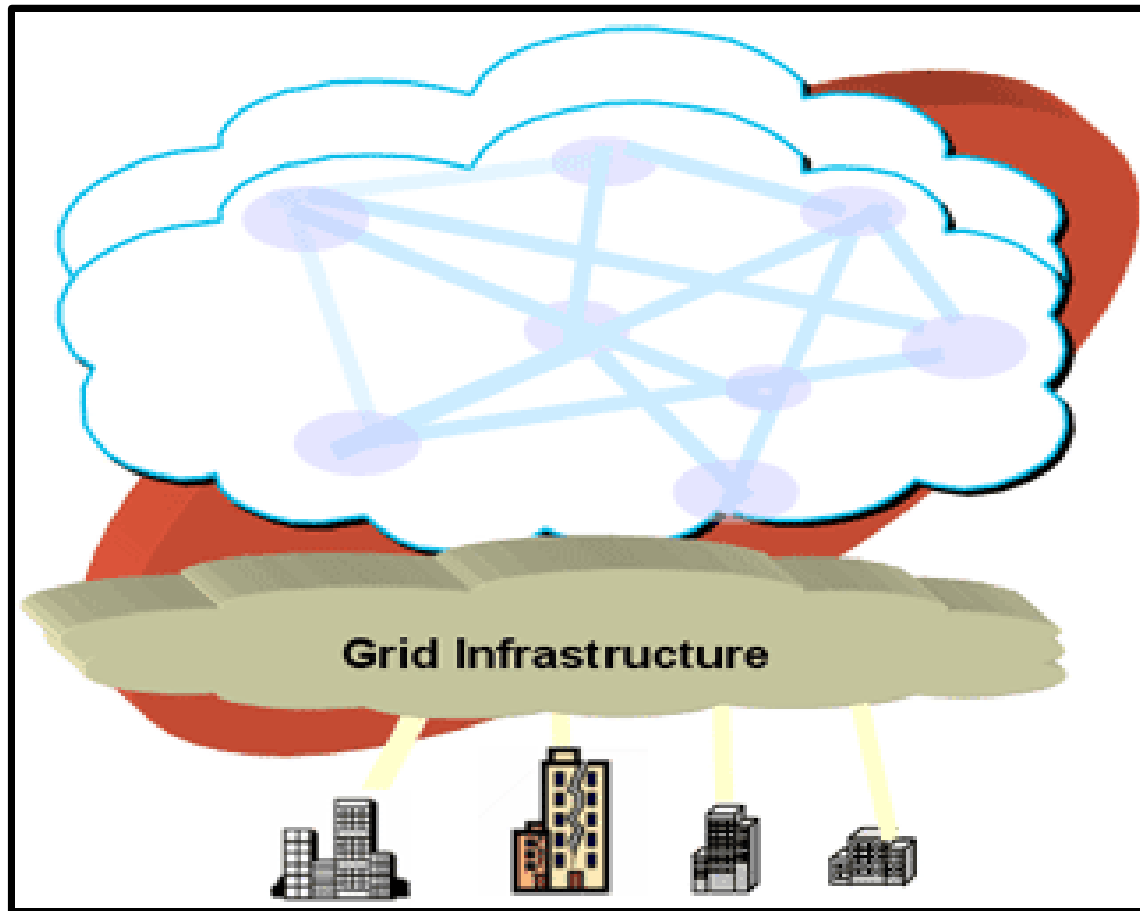


**2007 Cloud Computing**  
**Google + IBM**



**Back to Year 2007 ...**

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



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

**mainframe**  
super  
computer

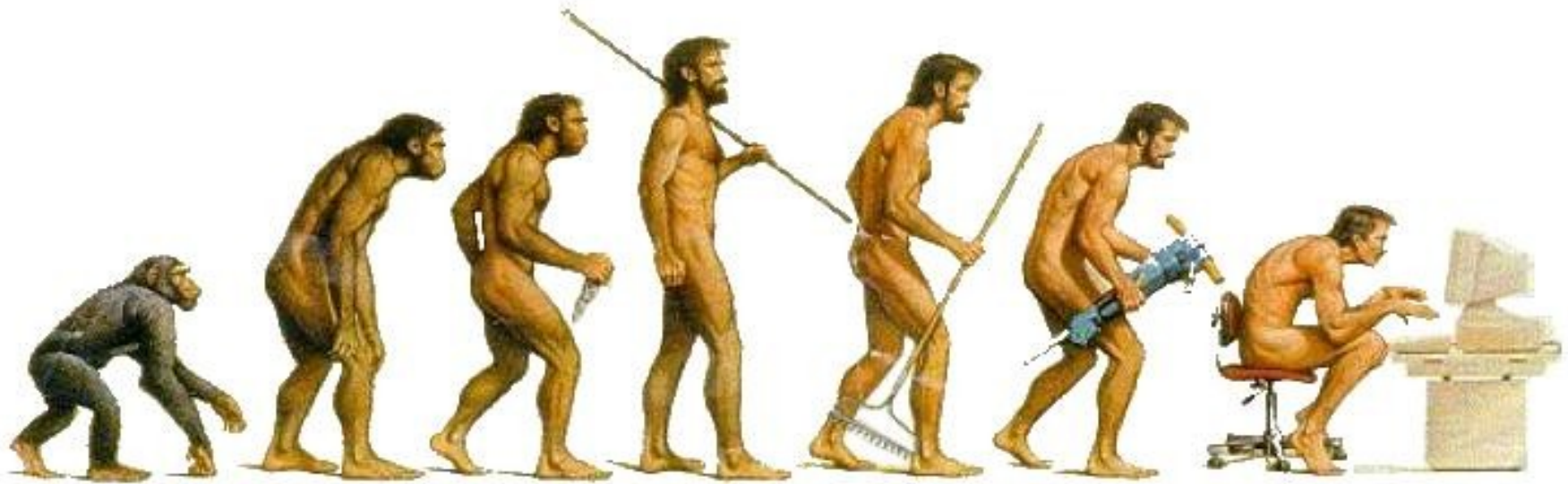
**PC | Linux**  
Cluster  
Parallel

**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！！**



## **Questions?**

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

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