巨量資料處理工具的過去、現在與未來

三種處理工具與未來的挑戰

Big Data Tools : PAST, NOW and FUTURE

- Three Types of Processing Tools and the Next Big Thing

National Center for High-performance Computing

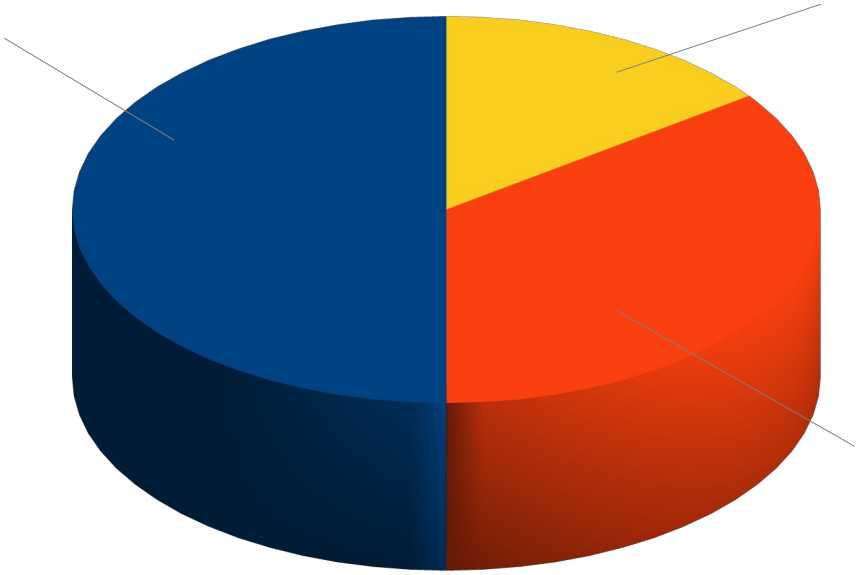
Jazz Yao-Tsung Wang

<0303109@narlabs.org.tw>

WHO AM I ? JAZZ ?

- About Speaker ：
  - Jazz Yao-Tsung Wang / Associate Researcher
  - Co-Founder and Evangelist of Hadoop.TW
  - 0303109@narlabs.org.tw
- All slides and training materials could be found at
  - http://trac.nchc.org.tw/cloud
  - Be Green ! Try not to print the slides. It changes frequently.

FOSS User
Debian/Ubutnu
Access Grid
Motion/VLC
Red5
Debian Router
DRBL/Clonezilla
Hadoop



FOSS Developer
TRTC WSU/
Haduzilla /
Hadop4Win / Ezilla

FOSS Evangelist
DRBL/Clonezilla
Partclone/Tuxboot
Hadoop Ecosystem

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演講大綱 Agenda

Linux is everywhere	開放無所不在
What is Big Data ?	何謂巨量資料
Big Data in Motion !	即時巨資應用
The Next Big Thing ?	下半場的重點
Conclusion	三大結論回顧

3 Buzzwords in 2013

三大年度熱門關鍵字

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物聯網

Internet of Things

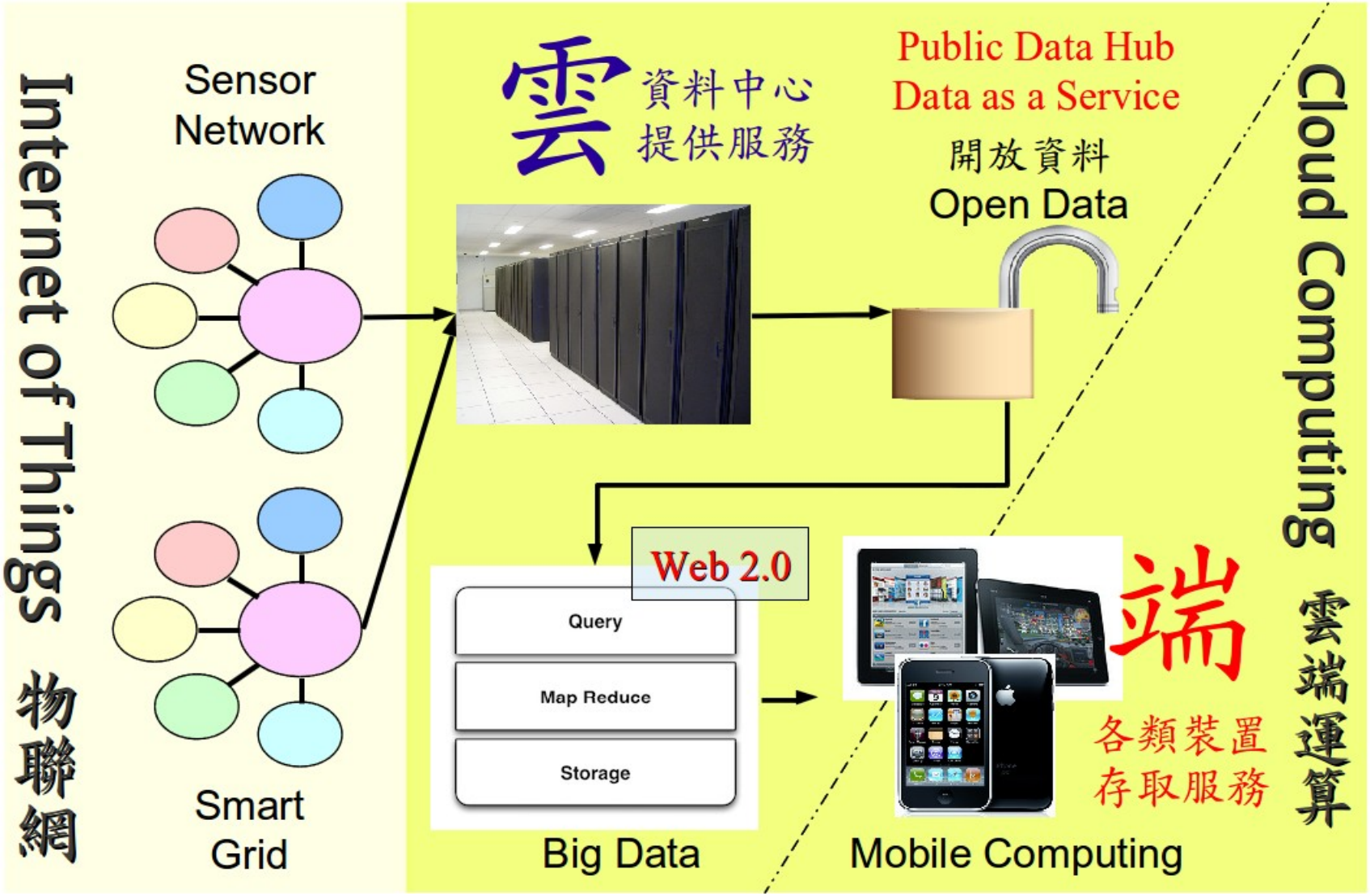
雲端運算

Cloud Computing

巨量資料

Big Data

巨量資料的奇幻漂流
Life of Big Data



Linux Adoption in Enterprise increase in last 3 years

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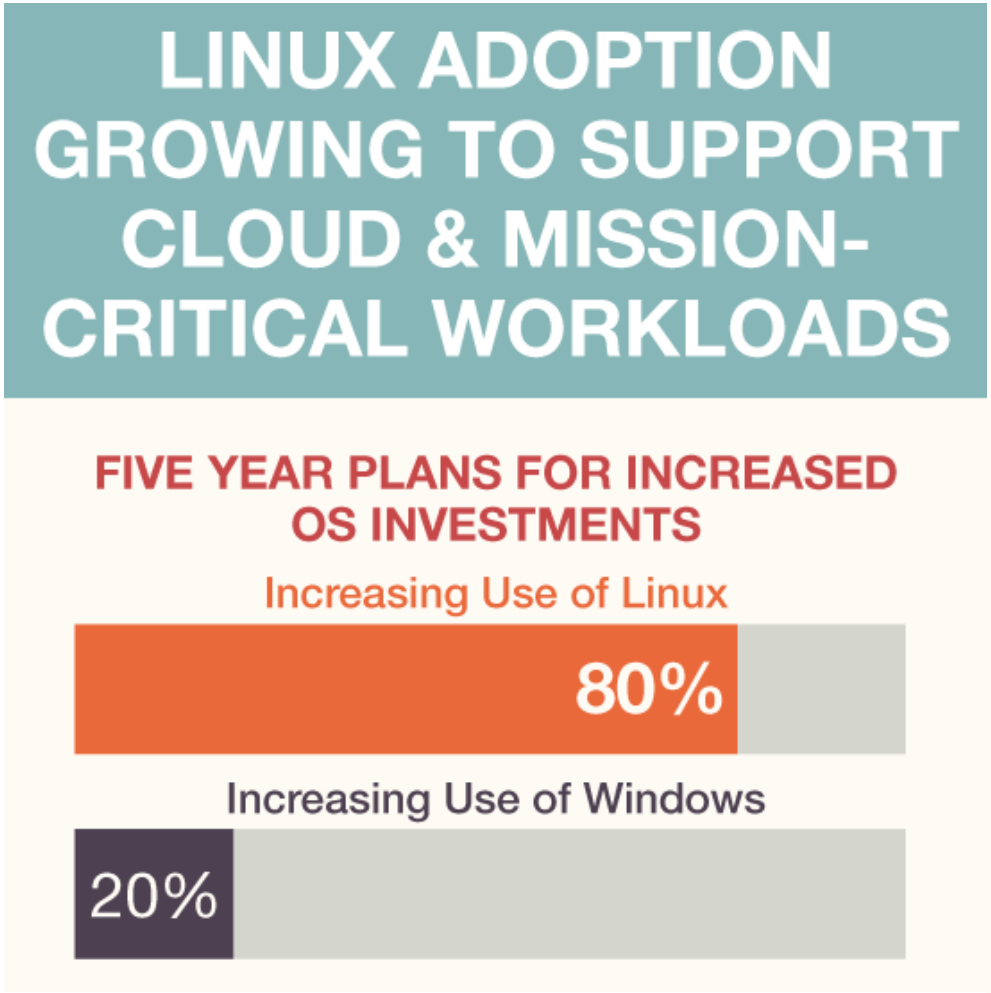

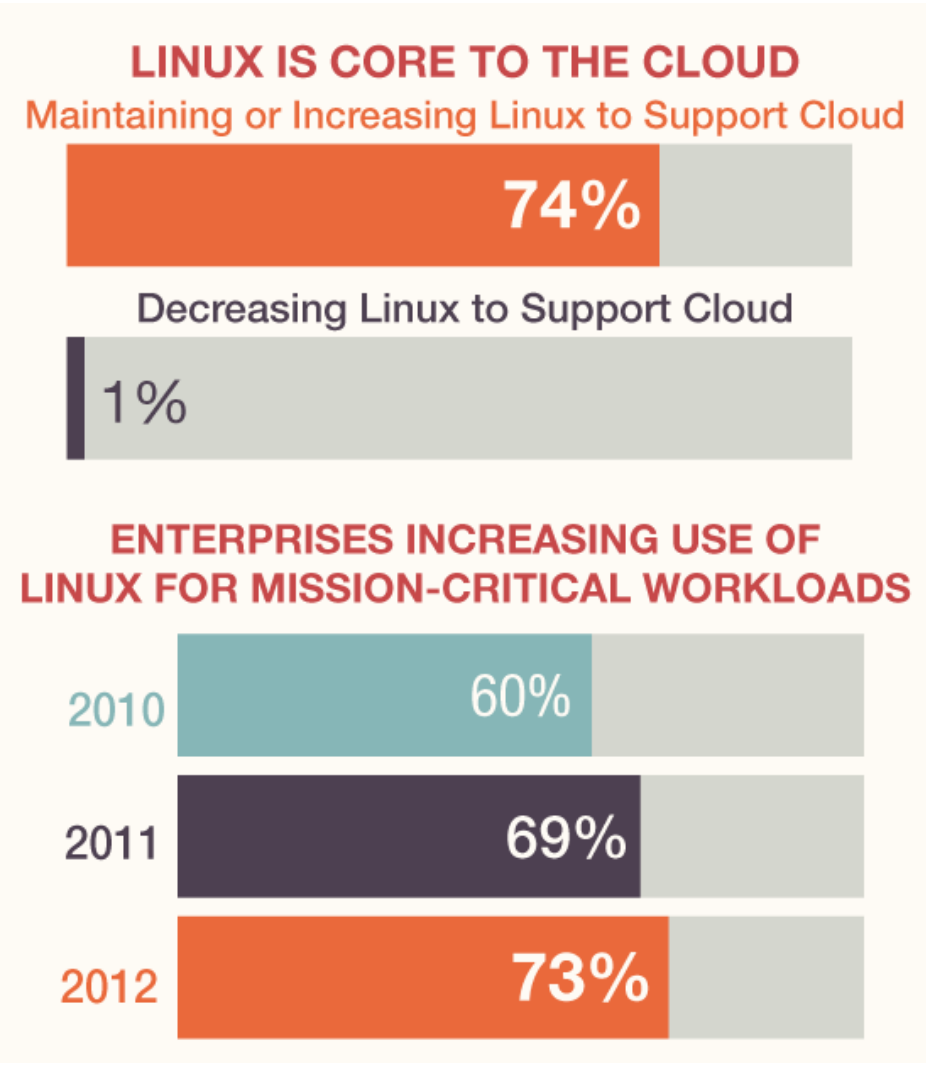

Source: "2013 Enterprise End User Report", Linux Foundation, March 2013

http://www.linuxfoundation.org/publications/linux-foundation/linux-adoption-trends-end-user-report-2013

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Linux in the Cloud

← Amazon

Yahoo ↓

If you have 4000+ server, which OS will you choose?

http://www.datacenterknowledge.com/archives/2010/09/20/inside-the-yahoo-computing-coop/
http://bits.blogs.nytimes.com/2013/01/08/amazons-unknown-unknowns/?_r=0

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Linux in the Devices !!

Linux have dominated Embedded, Mobile .....
maybe Internet of Things in near future ....

Google Chrome OS

http://crackberry.com/sites/crackberry.com/files/styles/large/public/topic_images/2013/ANDROID.png
http://boxysystems.com/myblog/wp-content/uploads/2011/01/google-chrome-OS-logo.jpg

Source: The most popular end-user Linux distributions are ...
http://www.zdnet.com/the-most-popular-end-user-linux-distributions-are-7000017223/

Why Linux ?
Total Cost of Ownership !

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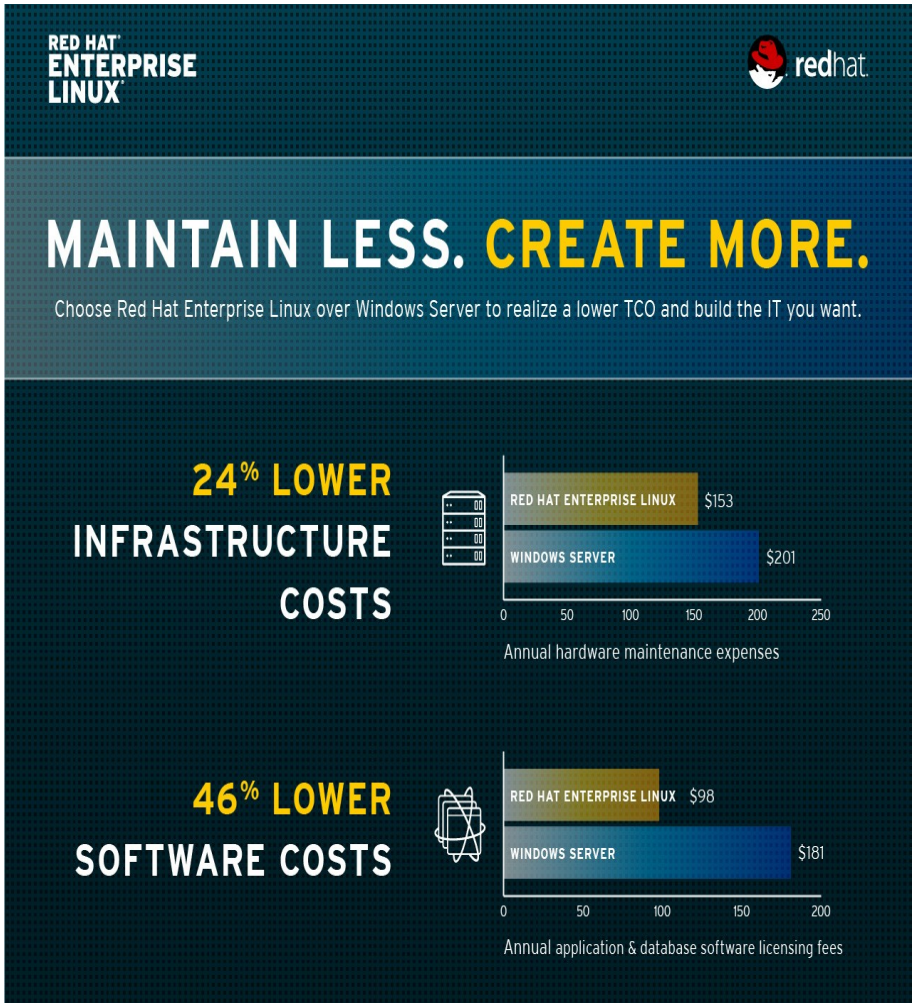

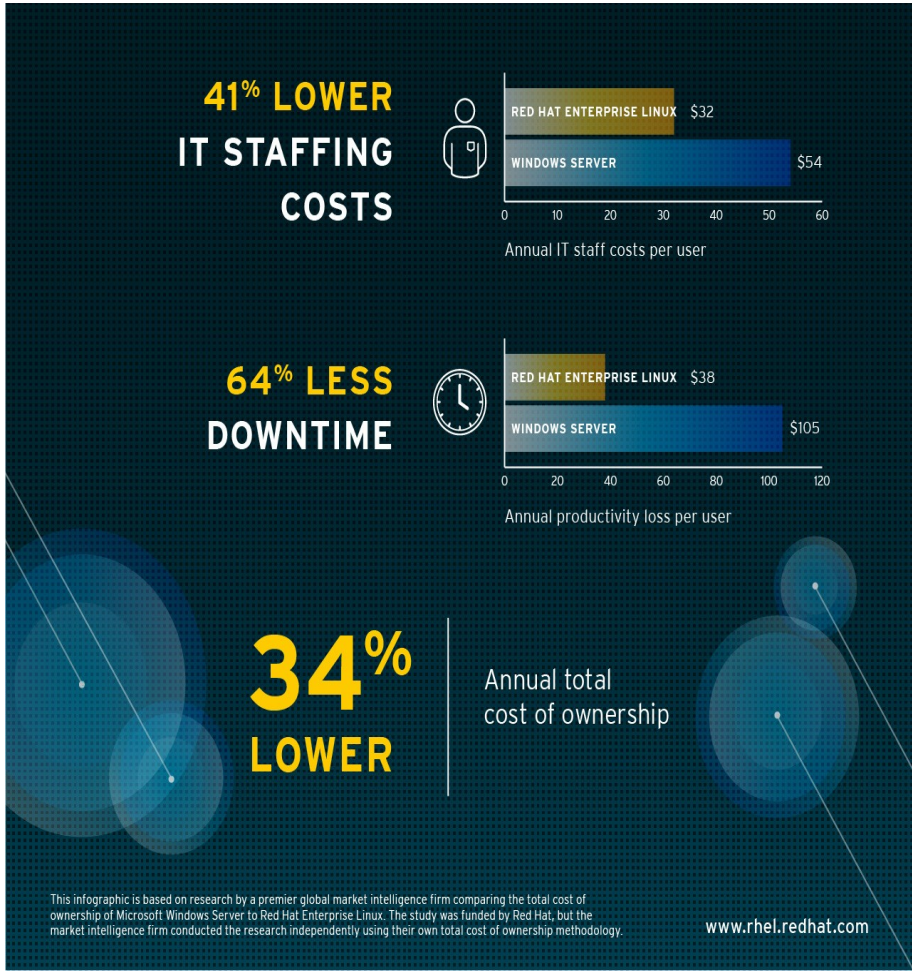

Source: How Red Hat Enterprise Linux trims total cost of ownership (TCO) in comparison to Windows Server, October 7, 2013
http://www.redhat.com/about/news/archive/2013/10/how-red-hat-enterprise-linux-trims-total-cost-of-ownership-in-comparison-to-windows-server

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巨量資料的三大挑戰
Challenges - 3 Vs of Big Data

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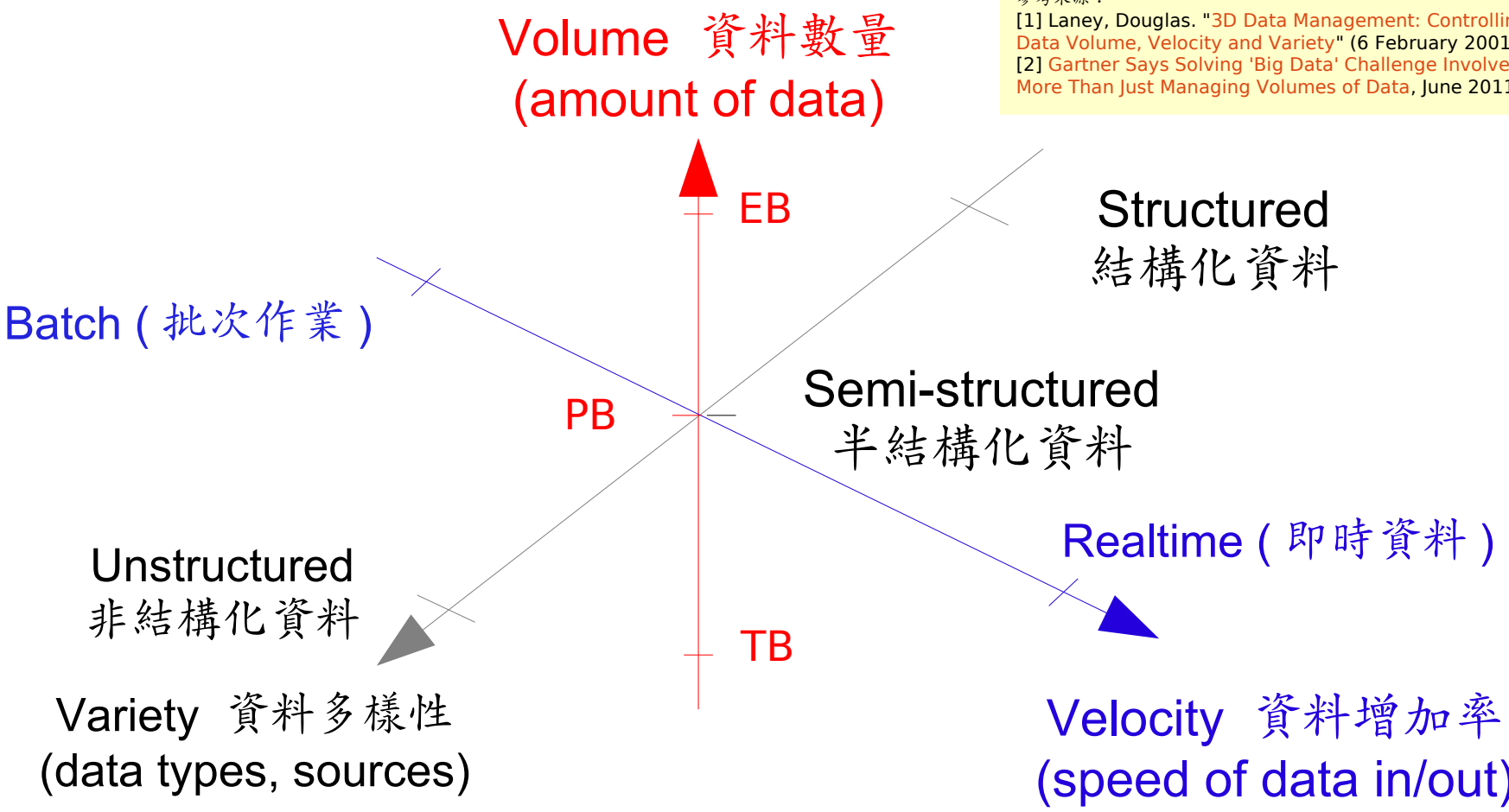
參考來源：
[1] Laney, Douglas. "3D Data Management: Controlling Data Volume, Velocity and Variety" (6 February 2001)
[2] Gartner Says Solving 'Big Data' Challenge Involves More Than Just Managing Volumes of Data, June 2011



巨量資料的挑戰在於如何管理「數量」、「增加率」與「多樣性」

知識源自彙整過去，智慧在能預測未來
Knowledge is from the PAST, Wisdom is for the FUTURE.

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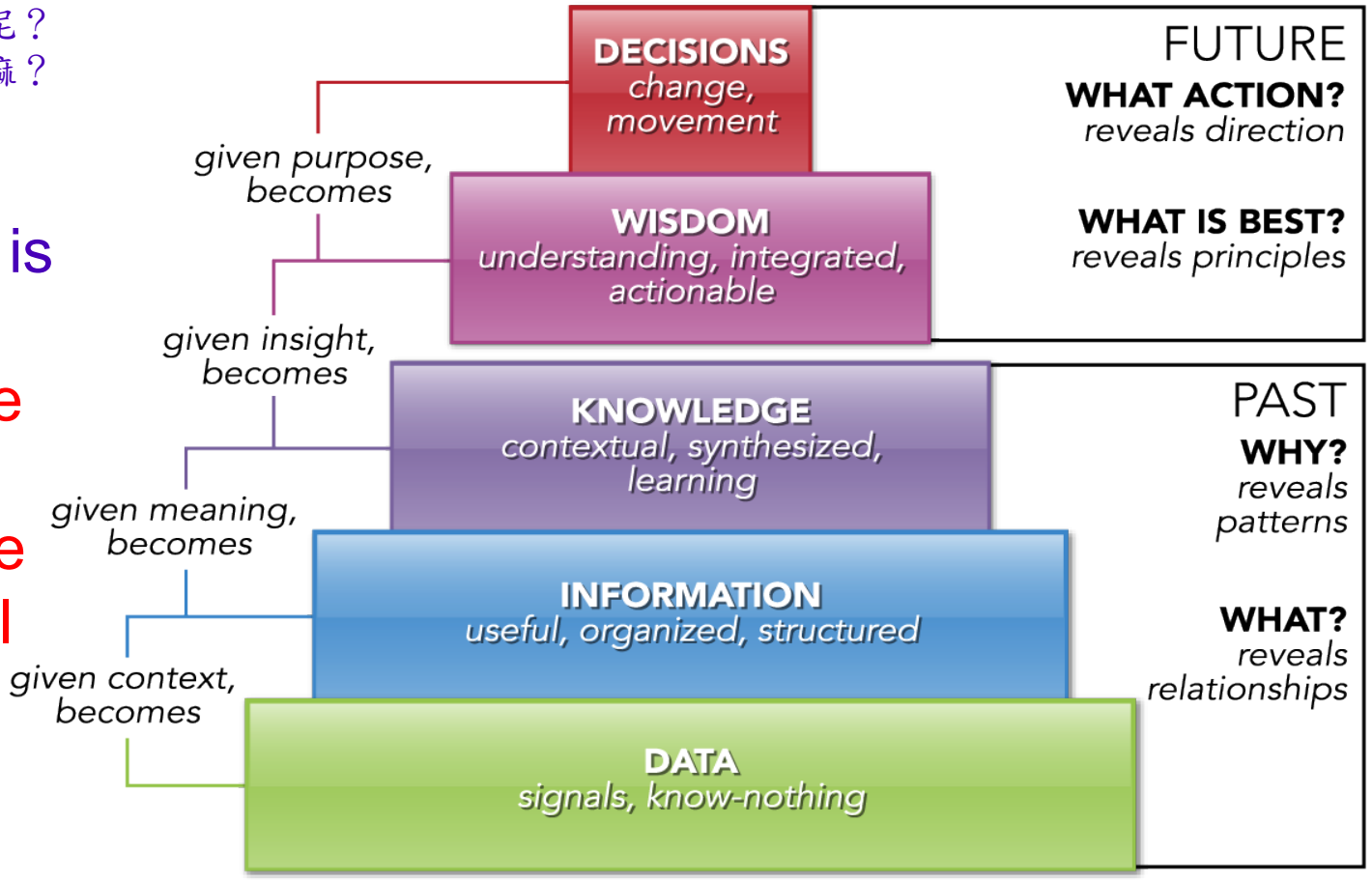
資料多寡不是重點，重點是
我們想要產生什麼價值呢？
時效合理嘛？成本合理嘛？

It does not matter how big is your data. The goal is to create VALUE within reasonable time period and total cost of ownership.



http://www.pursuantgroup.com/blog/tag/dikw-model/

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PAST: Big Data at Rest

Can gigabytes predict the next Lady Gaga?

By Stacey Higginbotham

Want to know how playing on Jimmy Kimmel Live will boost the sales of an artist's album? Or how about figuring out where fans go to find artists after they hit the evening news? What about the effect Whitney Houston's death had on her YouTube and Vevo plays? They shot up 4,525 percent, by the way.

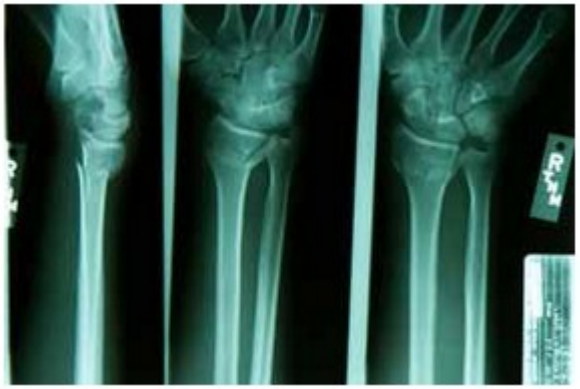
http://nextbigsound.com/

How big data can curb the world's energy consumption

http://www.openpdc.com/

fakebook®

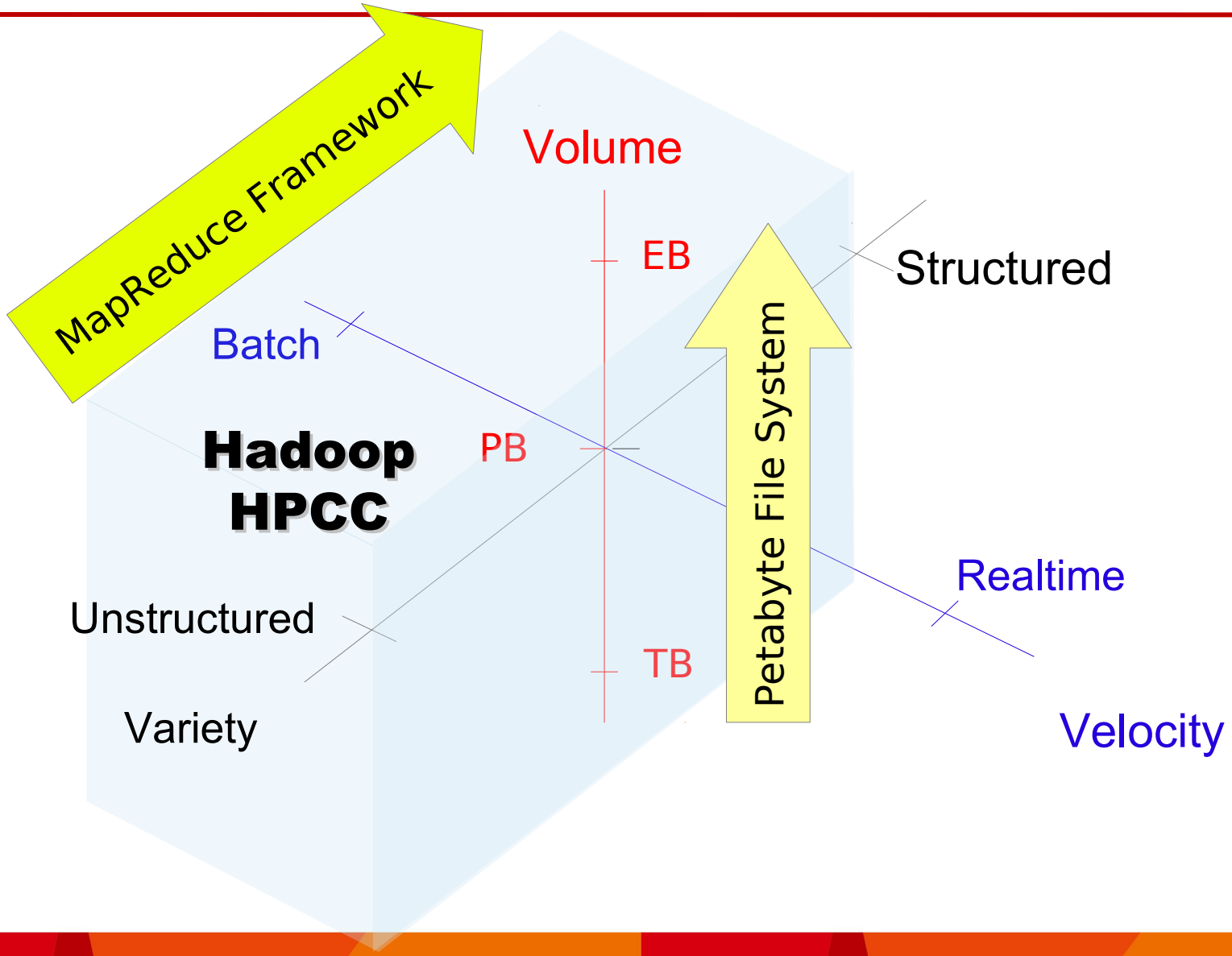
NETFLIX



One hospital's embrace of big data

Source: 10 ways big data changes everything,
http://gigaom.com/2012/03/11/10-ways-big-data-is-changing-everything

處理巨量資料的三類技術 (1)
Data at Rest – MapReduce Framework



巨量資料處理的資訊架構
The SMAQ stack for big data

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LAMP is for Web Services.

未來處理海量資料的人必需知道
You will need a big data stack called SMAQ（ Storage, MapReduce and Query ）

參考來源： The SMAQ stack for big data ， Edd Dumbill ， 22 September 2010 ，
http://radar.oreilly.com/2010/09/the-smaq-stack-for-big-data.html
圖片來源： http://smashingweb.ge6.org/wp-content/uploads/2011/10/apache-php-mysql-ubuntu.png

Key Concept : Data Locality

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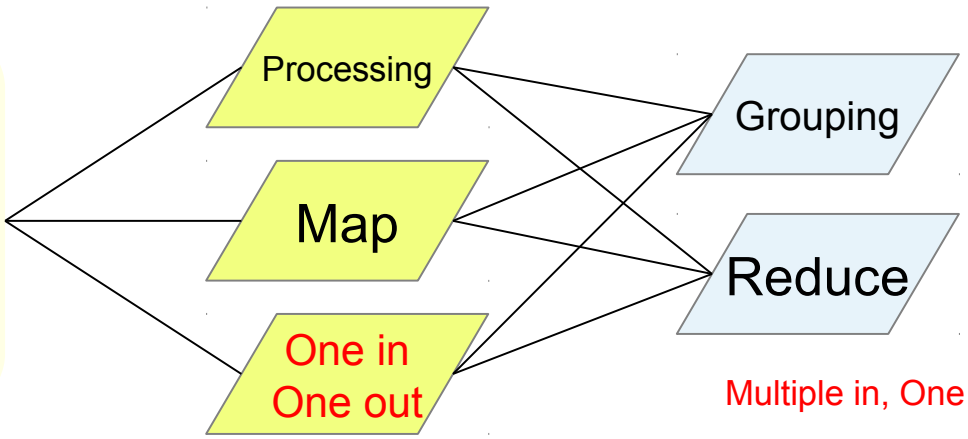
Hadoop is a framework for developer to wrote and execute massive data processing applications easily.

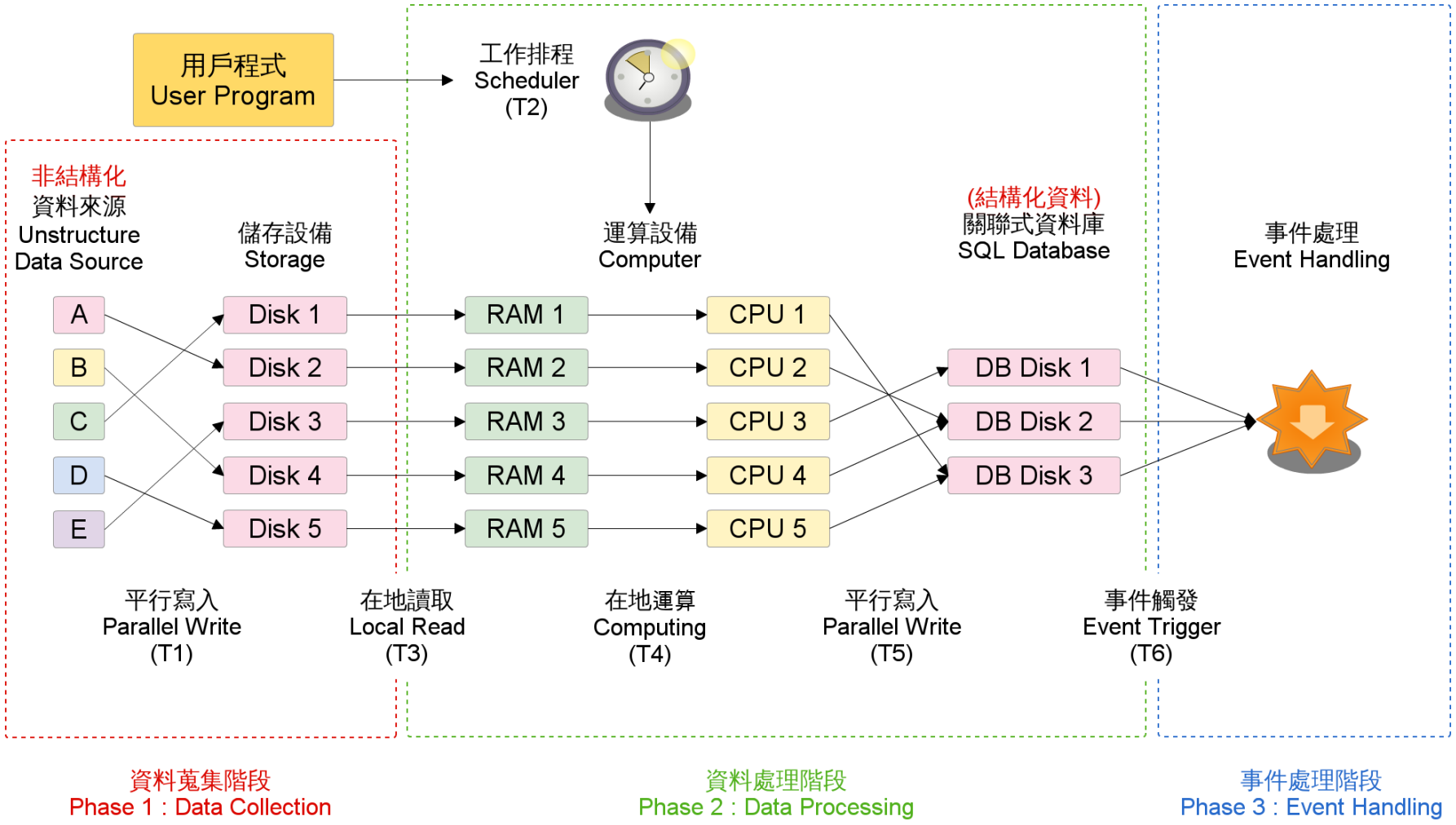
Hadoop includes two parts: HDFS and MapReduce.

Warehouse
for data source and output results.

HDFS stores
unstructure data
and structure data



批次作業的運算時間
Processing Time of Batch Jobs



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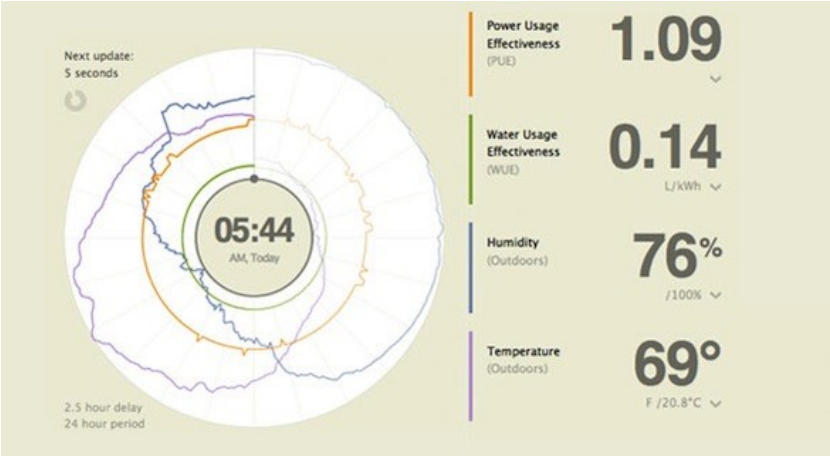
NOW: Big Data in Motion

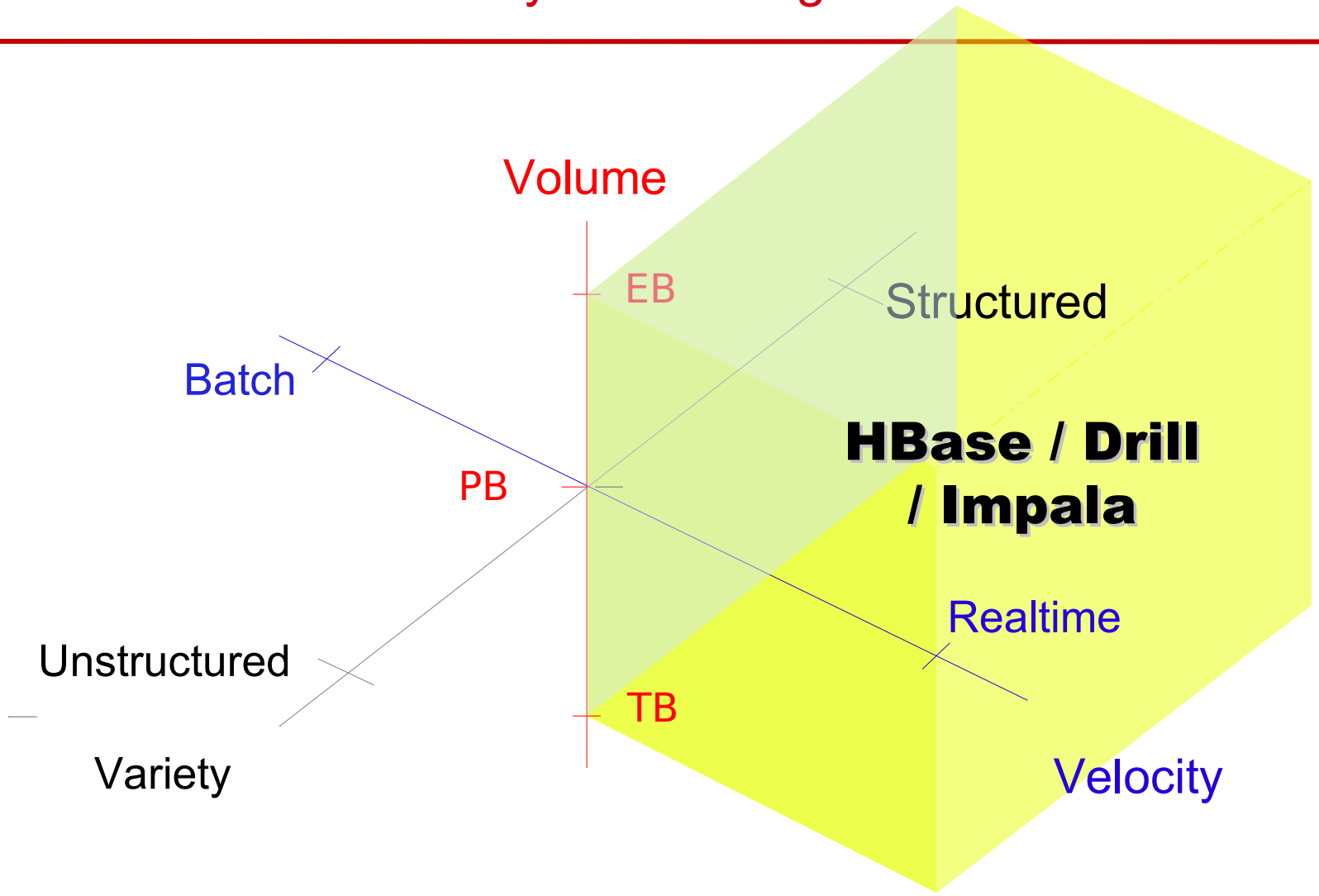
[金融] Trading Robot

[災防] 海嘯、土石流
Disaster Prevention
Tsunami Forecast



[資訊] 機房即時用電資訊監控、警訊
Realtime Data Center Power Usage and related notifications
http://www.newmobilelife.com/2013/04/21/facebook-pue-real-time-charts/

處理巨量資料的三類技術 (2)
Data in Motion – In-Memory Processing



Google 的技術演進 vs Apache 專案

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Big Query (JSON, SQL-like)	Dremel (2010)	Apache Drill (2012)
Incremental Index Update (Caffeine)	Percolator (2010)	
Graph Database	Pregel (2009)	Apache Giraph (2011)
Query	BigTable (2006)	Apache HBase (2007)
Map Reduce	MapReduce (2004)	Hadoop MapReduce (2006)
Storage	Google File System (2003)	HDFS (2006)

令人眼花撩亂的多樣化資料庫選擇
NoSQL vs NewSQL

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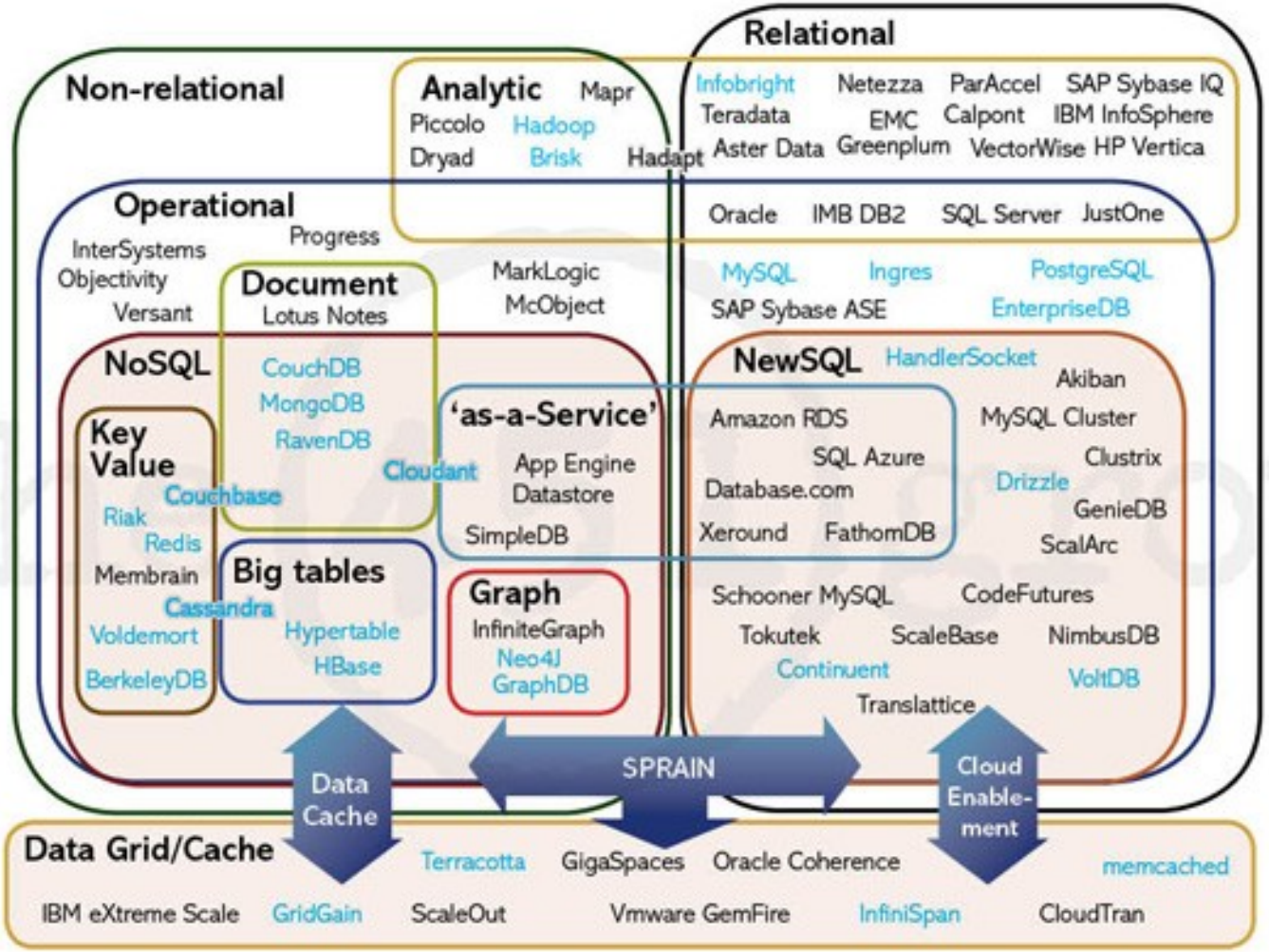
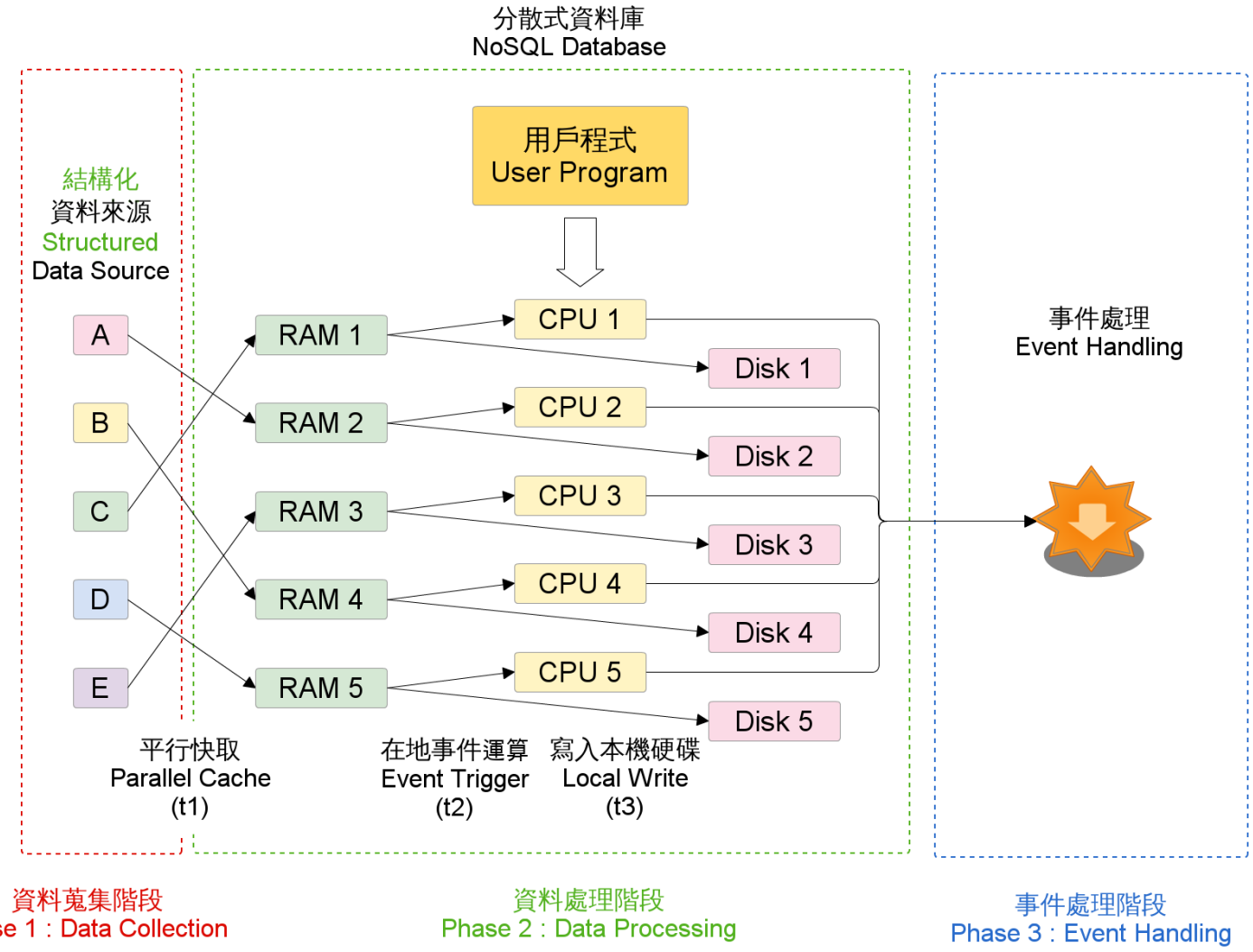
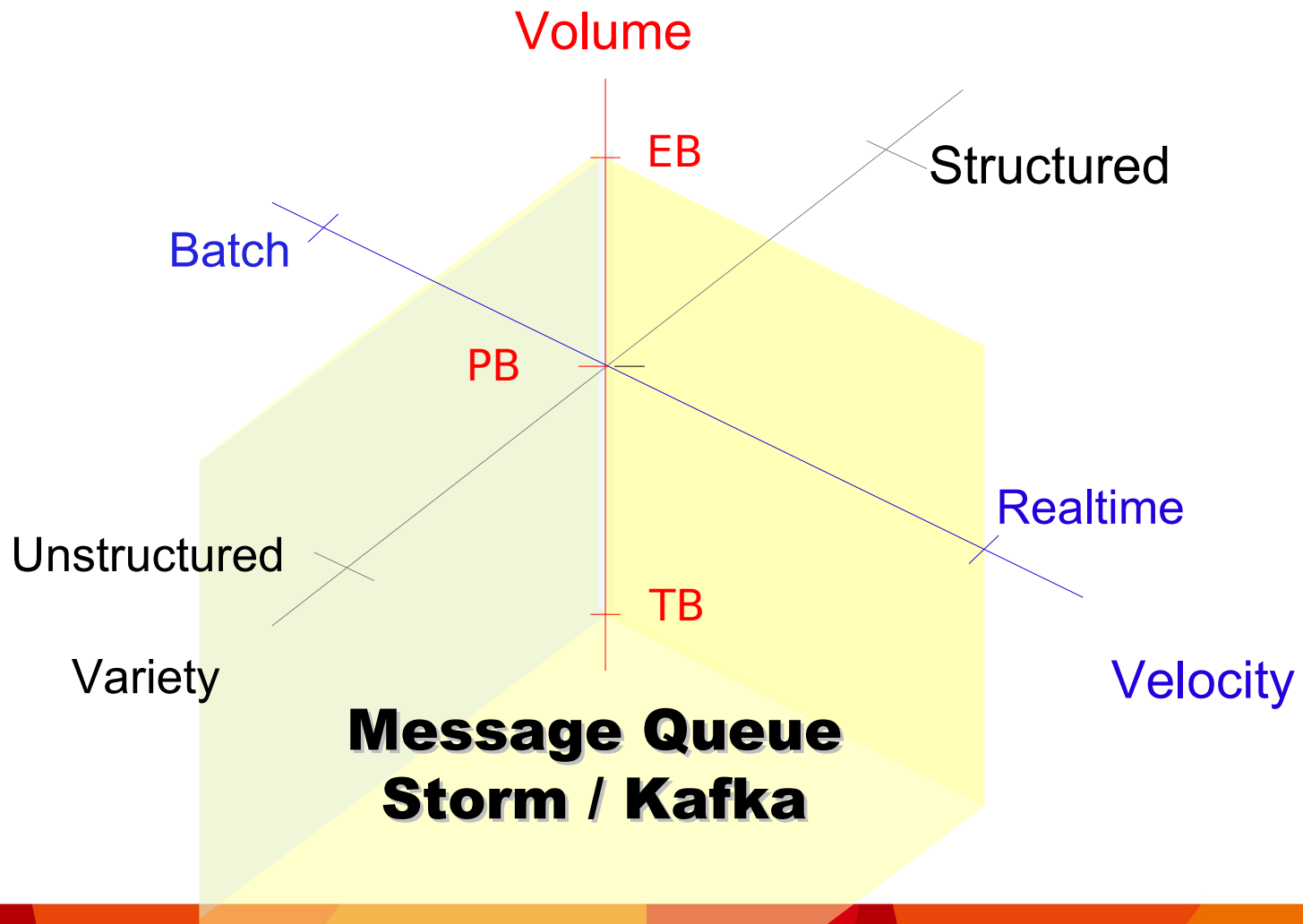


http://www.infoq.com/news/2011/04/newsql

In-Memory Processing 的運算時間
以 HBase 為例



處理巨量資料的三類技術 (3)
Streaming Data Collection



Twitter Storm + Apache Kafka

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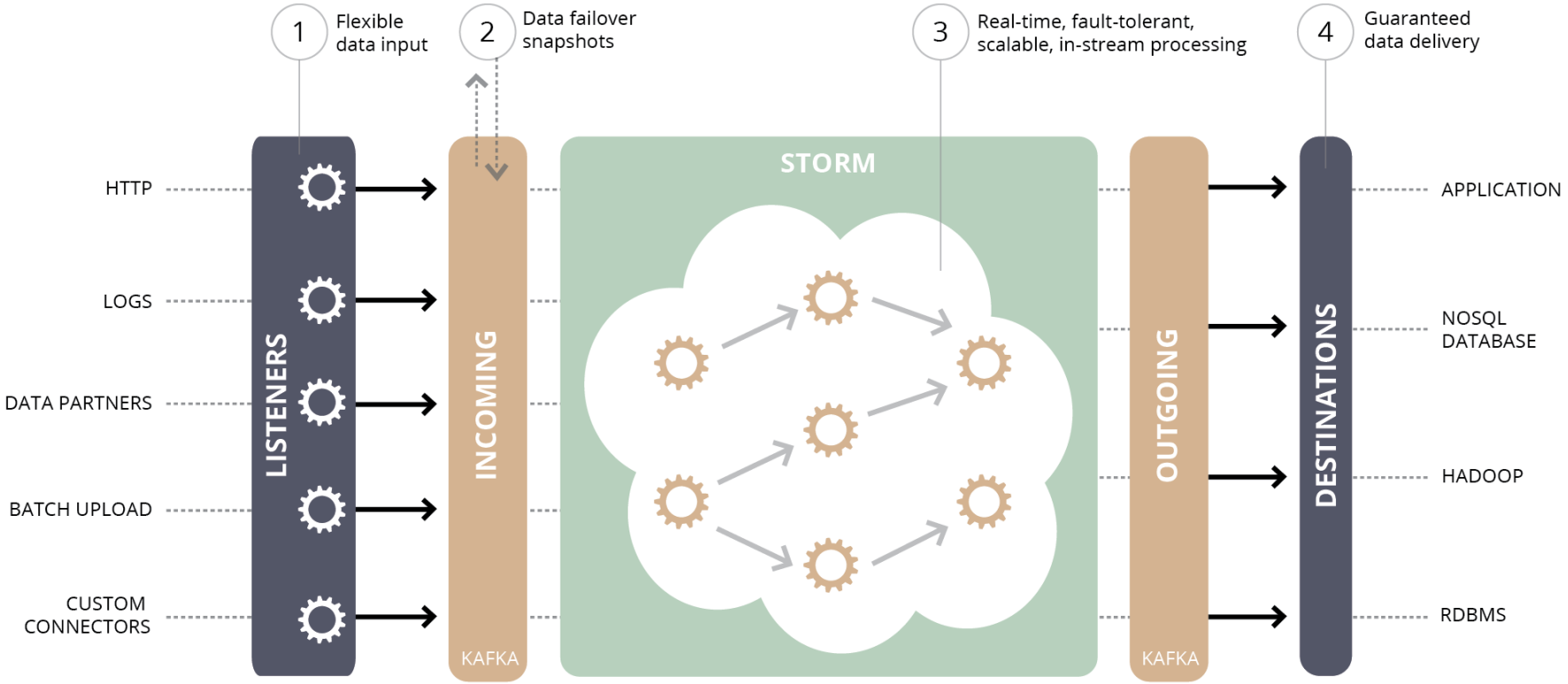
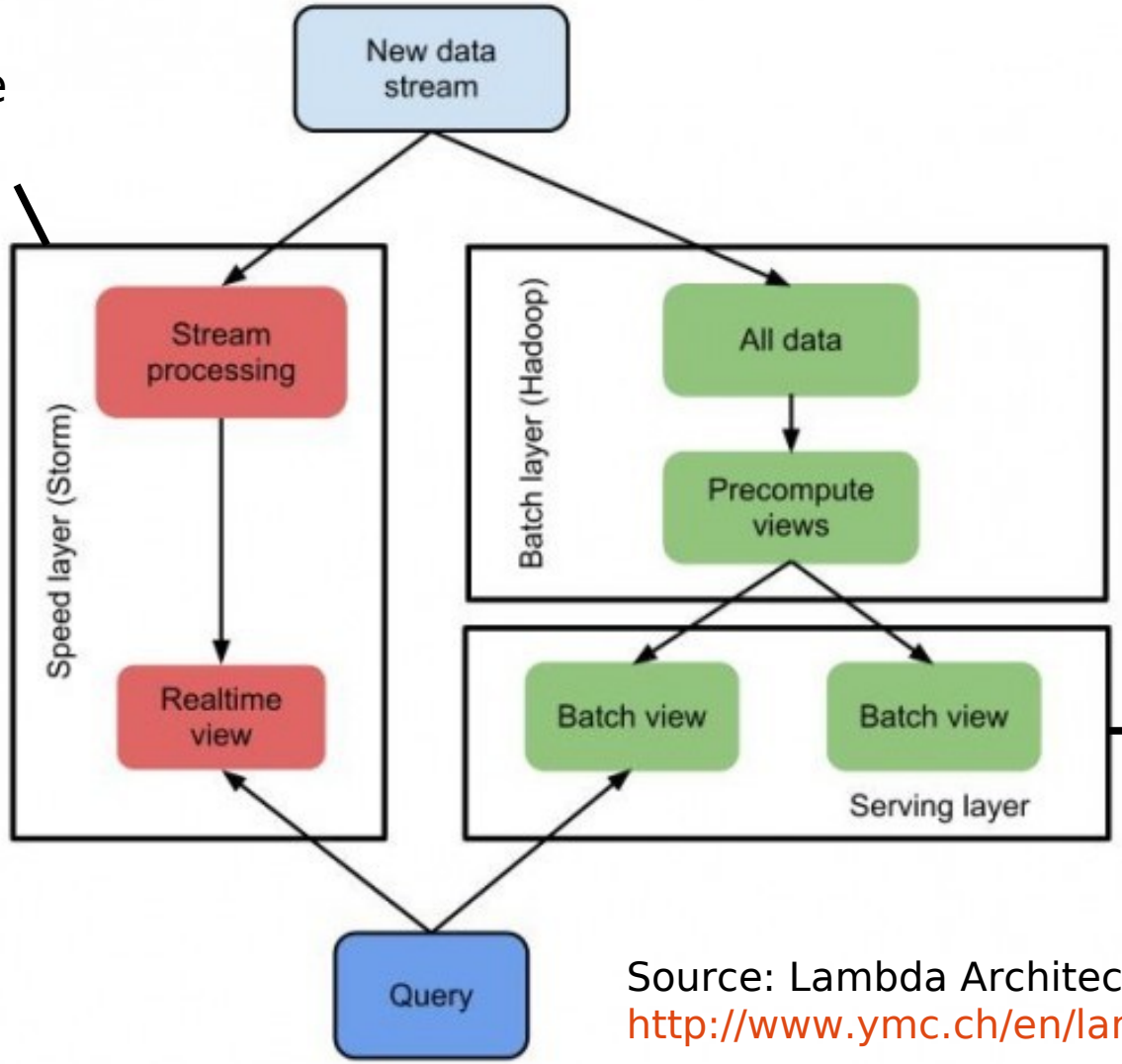


http://blog.infochimps.com/2012/10/30/next-gen-real-time-streaming-storm-kafka-integration/

混合模式的巨量資料處理架構
Lambda Architecture for Big Data after 2013



ElephantDB
Or
Voldemort

Source: Lambda Architecture, 8. March 2013
http://www.ymc.ch/en/lambda-architecture-part-1

結論二： Golden Ratio for Big Data
1 core : 2+ GB RAM : 1 SSD Disk

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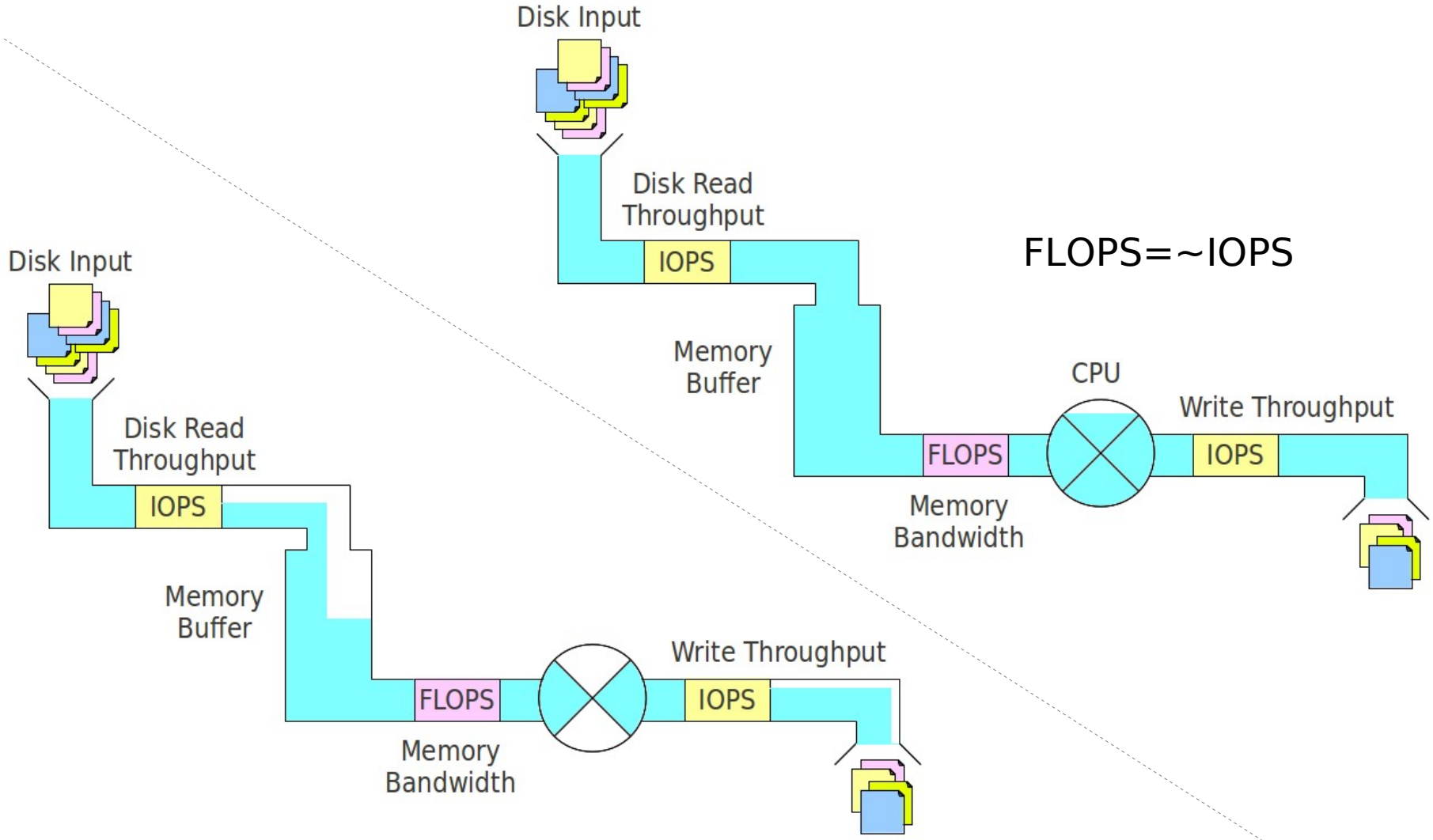

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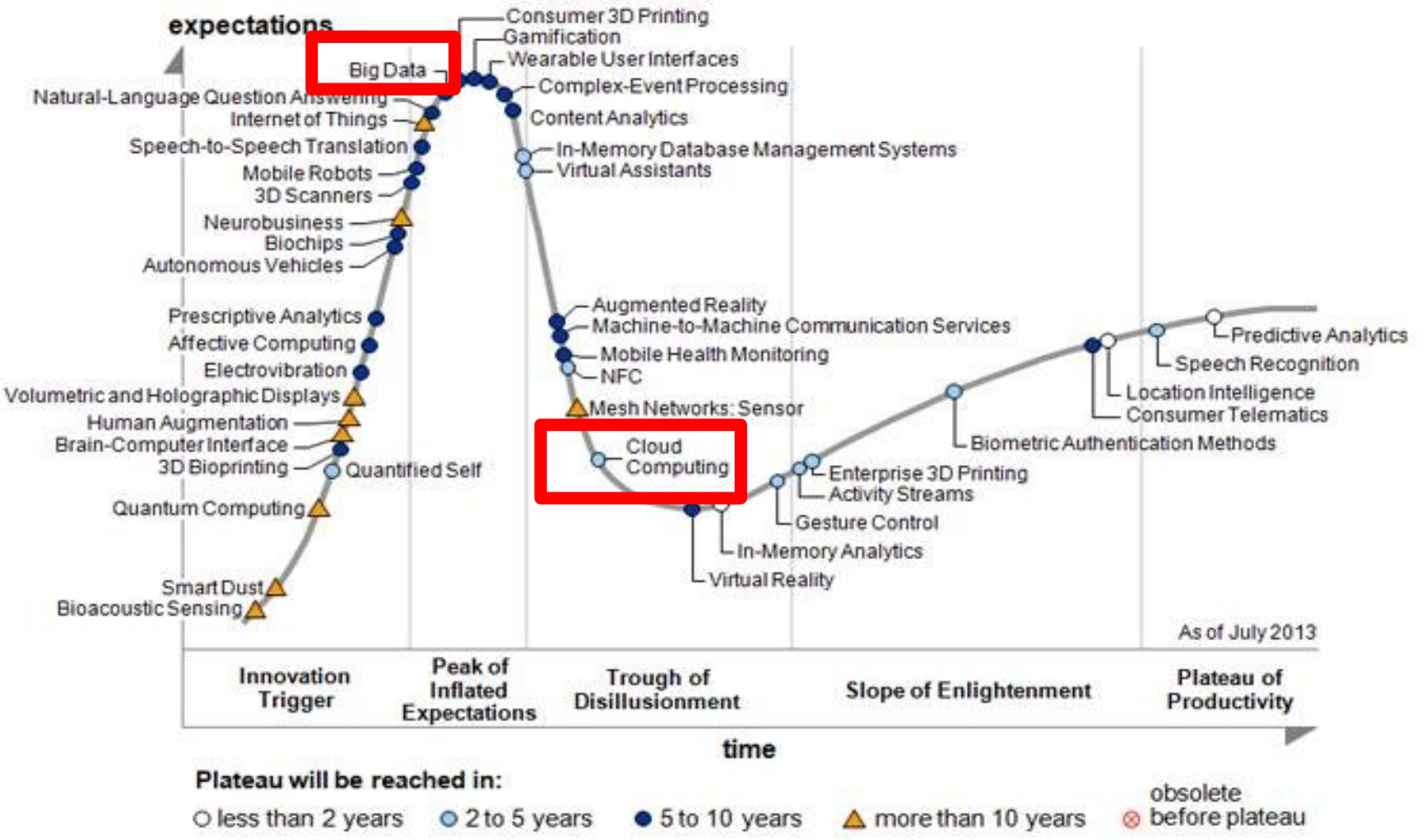
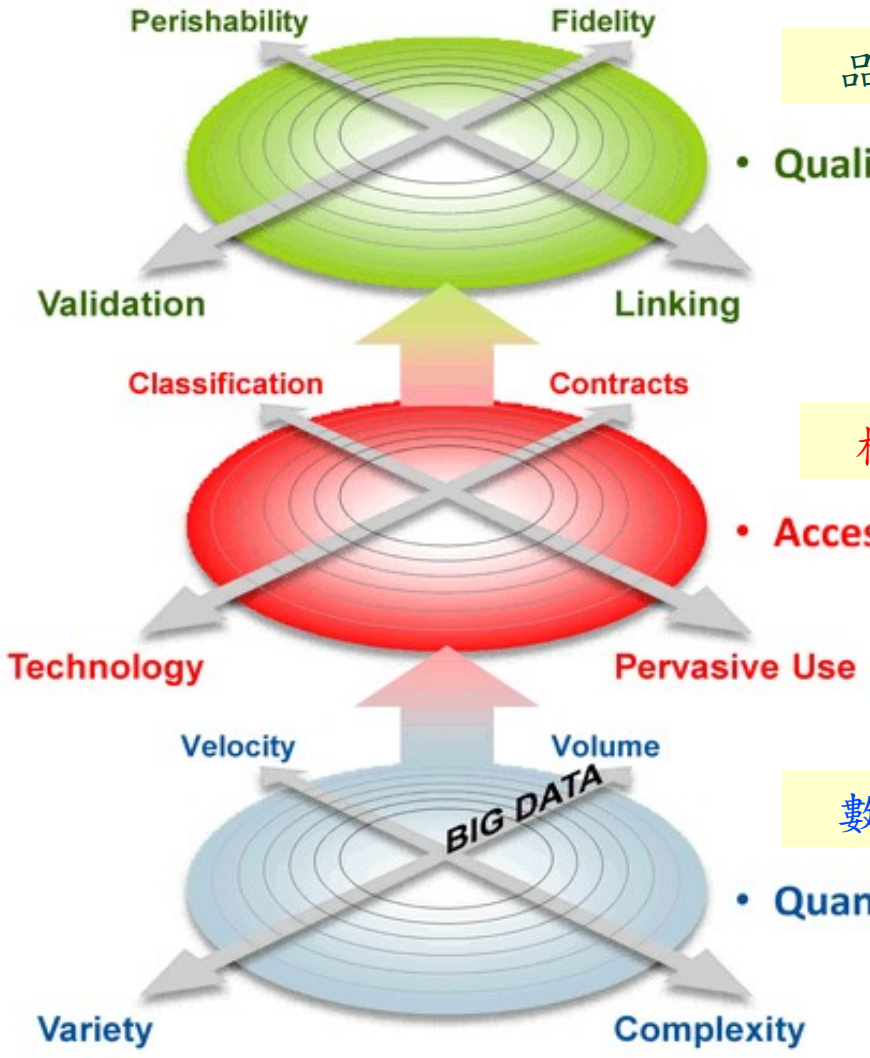
市場現況： Gartner Hype Cycle 2013

萌芽期 夢幻期 幻滅期 平原期 高原期



NEXT: Big Data Security



品質管控

- Qualification and Assurance

權限管控

- Access Enablement and Control

數量管控

- Quantification

當我們緊密相連 .....

世界政經：歐盟想分 **Tweeter**
找出經濟、政治的脈動

國家安全：美國 **PRISM** 計劃
(網軍**!** 終極警探 **4.0)**

組織如何因應 **APT ?**
Big Data 平台本身的安全性**?**

有太多安全的問題等待解決！

Source: Gartner (March 2011), 'Big Data' Is Only the Beginning of Extreme Information Management, April 2011, http://www.gartner.com/id=1622715

結論三： For Big Data Security, buy hardware with encryption support

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Power Hardware	PowerVM	PowerSC	AIX Operating System
	PowerVM™	PowerSC™	AIX®
Systems	Virtualization	Security & Compliance	Systems Software
Power Hardware with security built in & hardware assists for encryption	Secure Virtualization Platform ensuring isolation integrity	Virtualization Centric Security Extensions to protect the Cloud and Virtual Data Center	Secure Operating Systems– defense in depth: role based access, trusted execution, encrypted file system

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Conclusion:

1. Switch to Linux, it helps to reduce TCO (total cost of ownership) about 34% !
2. Hadoop only solve the problem for Big Data at Rest. You will need In-Memory Processing tools such as HBase, Spark, Impala for Big Data in Motion. To cleaning Big Data in real-time, you could try Message Queue, Storm and Kafka.
3. Consider to buy servers with SSD disk, it helps to improve processing time for Big Data at Rest. For Big Data in Motion, you will need tools like In-Memory Processing. Remember to buy more RAM for your cluster.
4. To protect your big data, please survey hardwares and operation system (OS) which have hardware encryption support !

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問題與討論

Questions?