

# Developing a Cloud Ecosystem in Singapore – IDA's Approach

Presentation at Datacraft CXO Luncheon

**By Dr. Lee Hing Yan**

Programme Director, National Grid Office, IDA

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**iDA**  
SINGAPORE

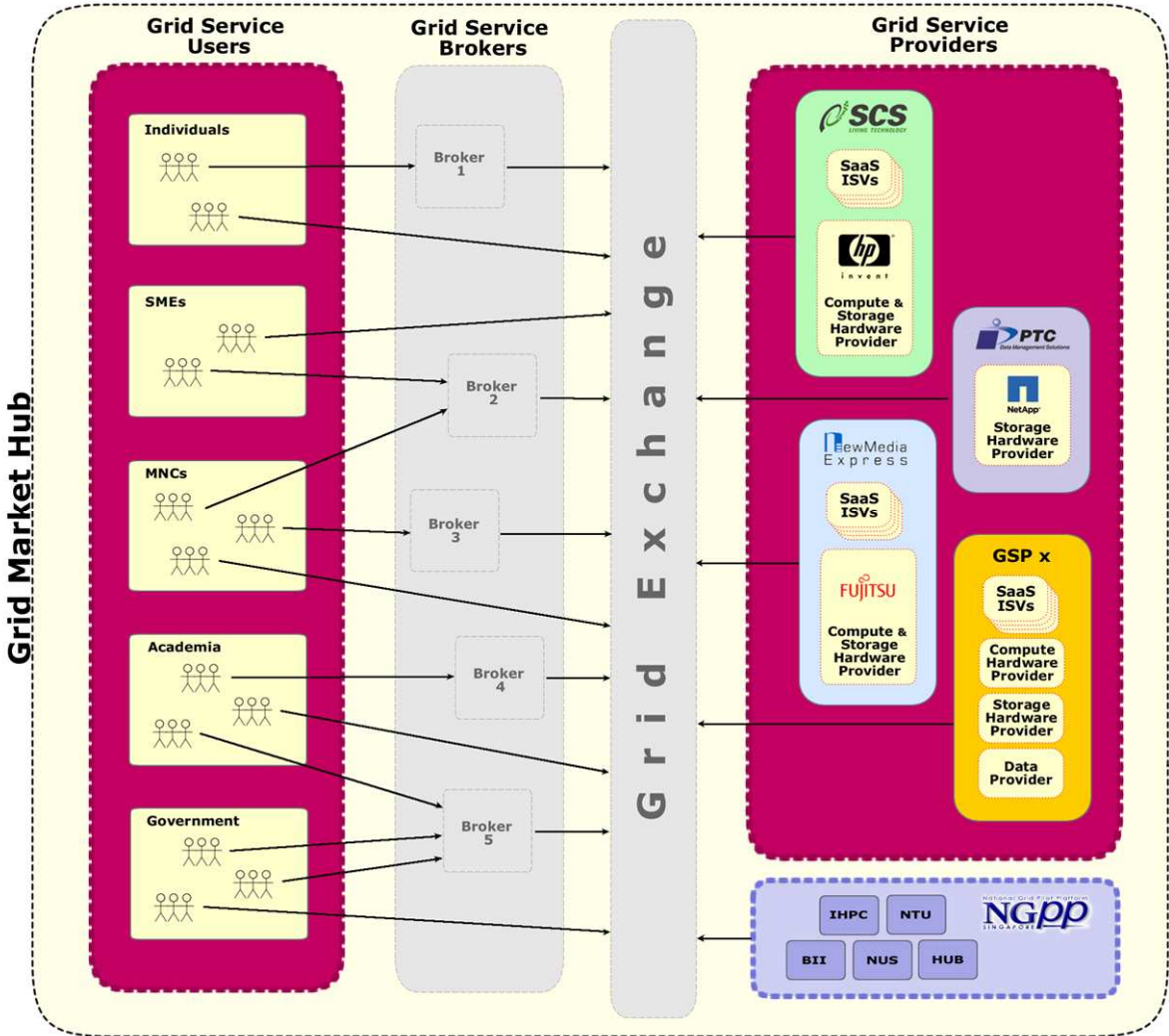
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# Infocomm Resource Marketplace

# Relevance to iN2015 Master Plan

- > Under the plans for Infocomm Infrastructure, Services & Technology Development
  - To establish an Infocomm Resource Marketplace (IRM) that would allow businesses & companies to share, buy & sell infocomm resources such as software, computing & storage resources on an “on demand” basis
    - The flexibility would enable new business delivery models & encourage innovation of infocomm services

# Towards IRM



# Objectives of Grid Service Provisioning

- > Accelerate deployment of software, hardware & storage utility provisioning for users in public & private sectors
- > Catalyse demand for utility model
- > Develop ISV ecosystem that enables SaaS to flourish
- > Strategic Objectives
  - Enable Infocomm infrastructure development for vertical clusters
    - Work with GSPs to attract ISVs to deploy software on base infrastructure
  - Establish Singapore as a Shared Services Hub
    - Enable local users, especially SMEs, to exploit SaaS for HR, finance, IT & other admin functions

# Benefits to Users

- > Low capital investment needed upfront
- > Capital is not sunk in (depreciating) hardware & (obsolescing) software
  - Positive impact on balance sheet with shift from Capex to Opex
- > Improved
  - Price for performance
  - Flexibility, agility & time-to-market
  - Robustness
  - Scalability

# Alatum Consortium

## > Consortium

- Singapore Telecommunications & Hewlett-Packard

## > Provisioning

- Starting with 2,400 processor cores & 16 TB of storage
- Offers compute, storage & SaaS
- Located at Data Center @ Bedok



# NME-Led Consortium (aka nGrid)

## > Consortium

- NewMedia Express, Fujitsu Asia, 1-Net Singapore, Microsoft Singapore

## > Provisioning

- Starting with 200 processor cores & 5 TB of storage
- Offers compute, storage & SaaS
- Co-located at 1-Net Data Center at technopark@chaichee

## > Business

- Targets SMEs
- Provides
  - Media streaming service
  - Digital media content management service
  - Web hosting service
- MediaCorp as anchor tenant

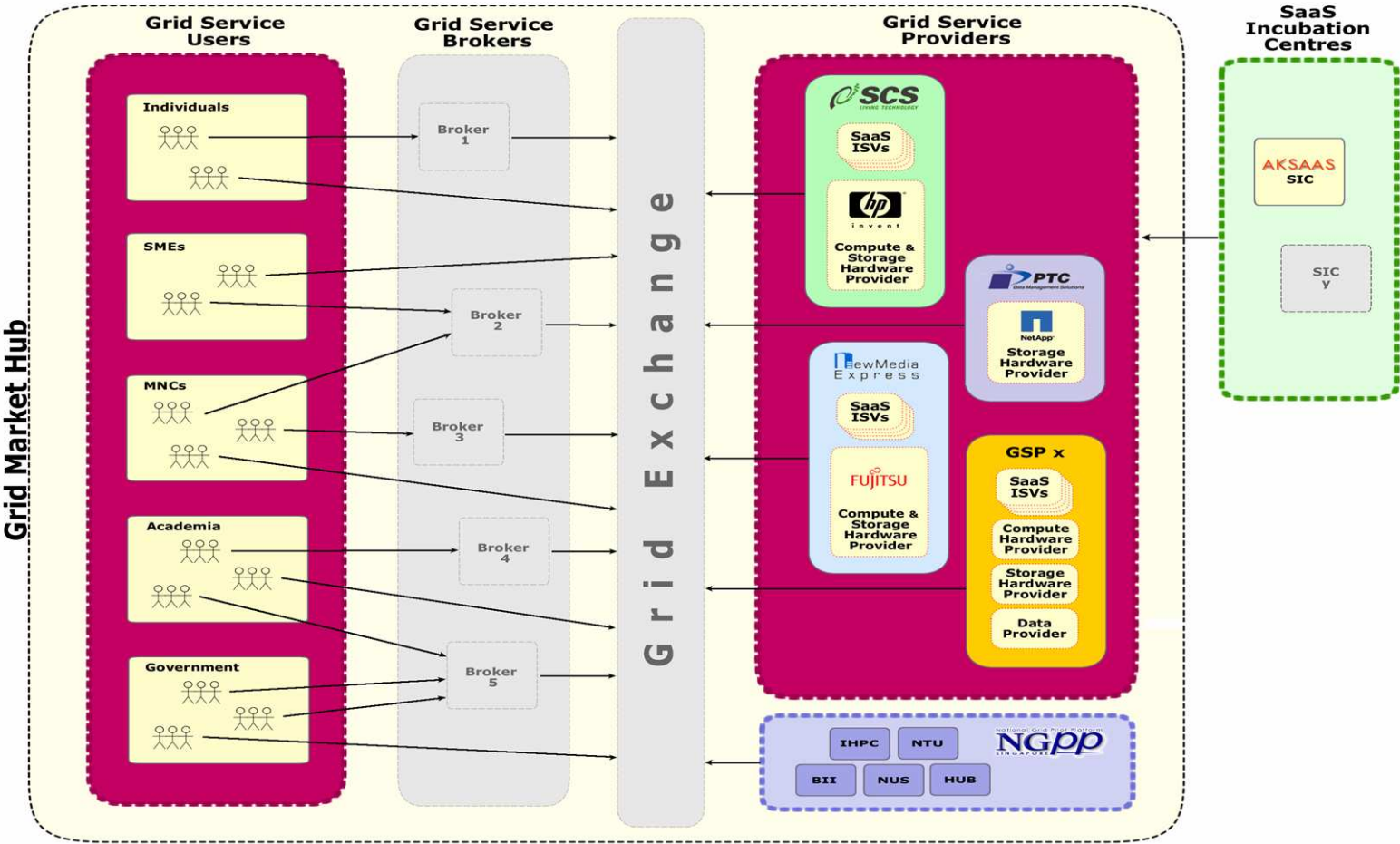


# PTC System



- > Storage supplier NetApp
- > Provisioning
  - Starting with 12 TB of storage
  - Offers Storage-as-a-Service
  - Co-located at Republic Polytechnic with SingAREN network connectivity to leverage on huge pipes to target customers
  
- > Business
  - Target for Storage Access
    - Institutes of Higher Learning
    - Research Institutes
  - Target for Archival (Tape-less Backup)

# Enhancing SaaS ISV Ecosystem



## Axsaas Incubation Centre - 1

AKSAAS

- > Operated by Aksaas Pte Ltd
- > Appointed by IDA as SaaS Incubation Centre in Sep 2008
  - Helps ISVs to SaaS-enable software to be hosted by GSPs
- > Hitherto, 8 companies/software underwent SaaS-enabling process

## > For Enterprises

- Provides business & technical consultancy
- Equips industry & consumers with on-demand & pay-as-you-use access to grid computing capabilities to deliver new & innovative business models
- Provides a staging area for SaaS ISVs
  - Testing & initial commercialisation for new SaaS providers
  - Integration with SaaS provisioning – portal & billing system
  - Technology augmentation
  - Implementing proof-of-concepts
  - Demonstration to end users

# Grids & Clouds Today

## GRID

- > Open standards
- > Publicly funded & operated (slow evolution)
- > No central management
- > Interoperability important
- > Geographical distributed; locally owned & managed
- > Share (usually modest) local resources
- > Scientific research, high-end users

## CLOUD

- > No standardised interfaces
- > Privately funded & operated (fast evolution)
- > Managed by a single entity
- > No interoperability
- > Geographically distributed; centrally owned & managed
- > Make huge systems available
- > Enterprise applications, information processing, data mining

Source: Dr. Martin Antony Walker, HP

# 2

## **Cloud Computing Strategy for Singapore**

# Strengths

- Political & economic stability, sheltered from natural disasters & strategically located in Asia
- Nationwide competitively-priced high-speed connectivity through Next Gen NBN + Regional telecom hub, one of most connected cities in world + High broadband penetration (~100% household penetration)
- Strong rule of law & IP protection regime
- Increasing cost pressures on enterprises towards outsourcing & adoption of cloud computing
- Large base of MNCs, potential “Queen Bee” adoption of cloud computing
- Large base of infocomm MNCs, potential partnership efforts

# Challenges

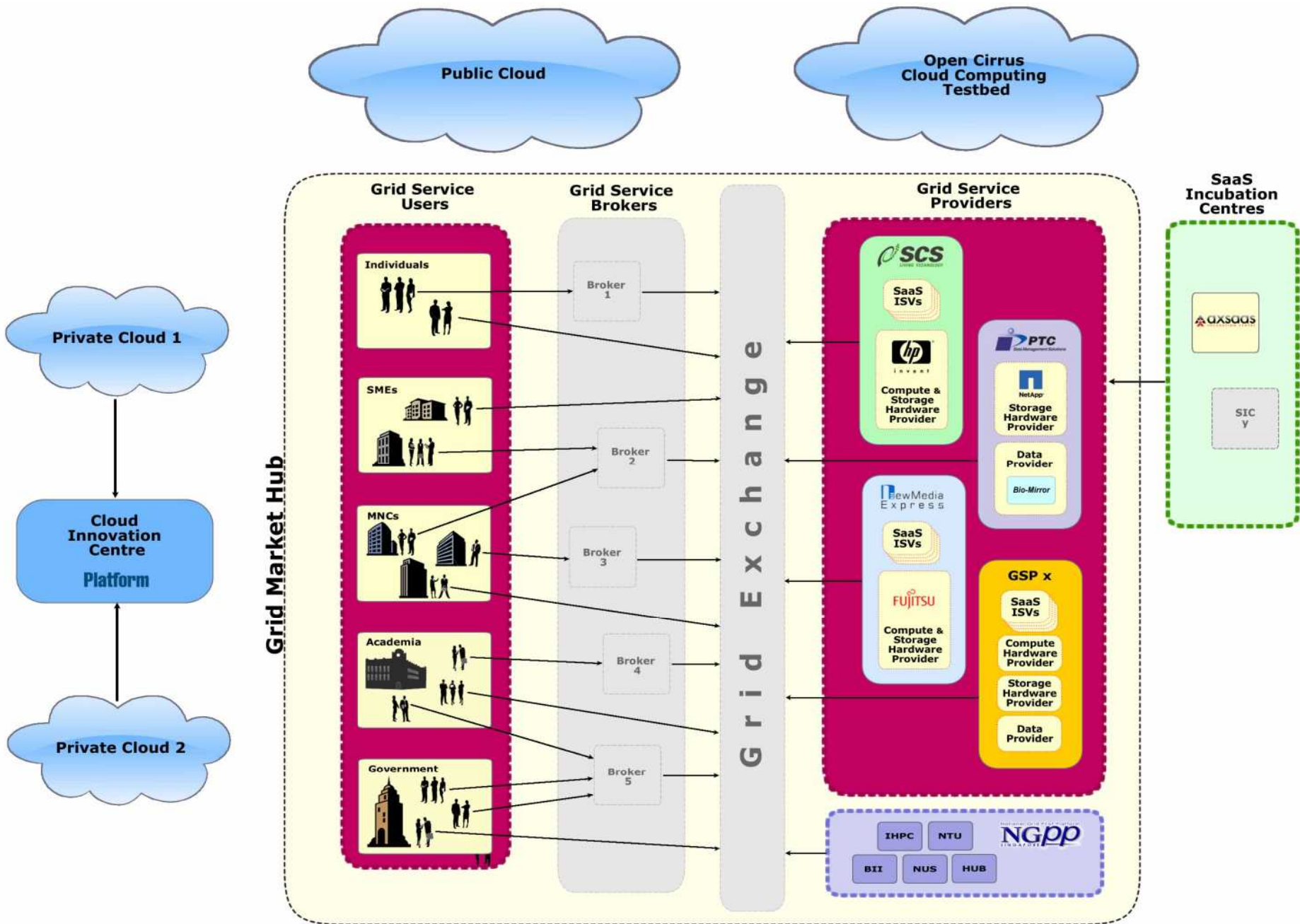
- Singapore infocomm industry heavily reliant on traditional hardware MNCs, e.g. HP, IBM, Microsoft (~ 30% of ICT revenue)
- Several countries are investing in cloud computing – shrinking window of opportunity for first mover advantage
- Lack of local infocomm enterprises with R&D capabilities for cloud computing
- Nascent infocomm manpower capability in cloud computing R&D

# Cloud Computing Thrusts

- > Collaborating with like-minded companies from private sector to attract leading Cloud Computing providers to grow ecosystem
- > Identifying & encouraging flagship adoption by verticals such as finance, healthcare, government, & education
- > Nurturing capability of local infocomm companies & workers to support needs of Cloud Computing service providers & end-users
  - Establish necessary framework & incentives for companies & research institutes to upgrade their competencies
  - Attract high-value cloud computing R&D & services development investments

# 3

## Cloud Computing Initiatives



# Getting a slice of 'cloud computing' pie

By ALFRED SIEW  
Technology Correspondent

SINGAPORE is moving to develop expertise in a popular new technology called cloud computing, which lets people tap into the Internet's vast resources to run their businesses.

Some 60 technology experts will be trained in the field, which allows researchers and businesses, among others, to farm out their computing needs over the Web.

A florist, for example, could pay a monthly fee to run a customer database on the Internet instead of forking out money for a computer or server to do the same job.

Officials announced late on Tuesday that local experts will be involved in a new training tie-up to develop cloud computing. The collaboration includes technology giants Intel, Hewlett-Packard and Yahoo and researchers in Germany and the United States.

Six centres – in the US, Germany and Singapore – will be set up to promote cloud computing, so called because it accesses the Internet, which is often drawn as a cloud in computer network diagrams.

In Singapore, the Infocomm Development Authority (IDA) expects to work on up to 45 projects, of which 15 are global collaborations.

IDA assistant chief executive Khoong Hock Yun said the agency hopes to encourage more companies to take up cloud computing. These include small and medium-sized firms with an eye on the bottom line.

The aim of the training is to build up expertise in online services ranging from management of data to analysis of social trends.

These services, which were run only on computer servers in offices and university campuses previously, can now be done remotely on a large pool of shared computers linked over the Internet. This means computer resources can be shared among more users, cutting costs.

Straits Times, Thursday, 31 July 2008



# IDA joins forces with tech firms and institutions for research

Six facilities to form cloud computing research test bed

By ONG BOON KIAT

THE Infocomm Development Authority of Singapore (IDA) has joined hands with three tech giants and three other prominent institutions to set up a research initiative to study one of today's hottest technologies: cloud computing.

The deal, which was announced yesterday, will see IDA work with Hewlett-Packard (HP), Intel, Yahoo, the University of Illinois at Urbana-Champaign, the Karlsruhe Institute of Technology in Germany and the US government agency National Science Foundation.

Six facilities – dubbed Centres of Excellence – will form this cloud computing research test bed. Expected to go online later this year, these centres are located in Singapore, Germany and the US. Each facility will host a cloud computing infrastructure, largely based on HP hardware and Intel



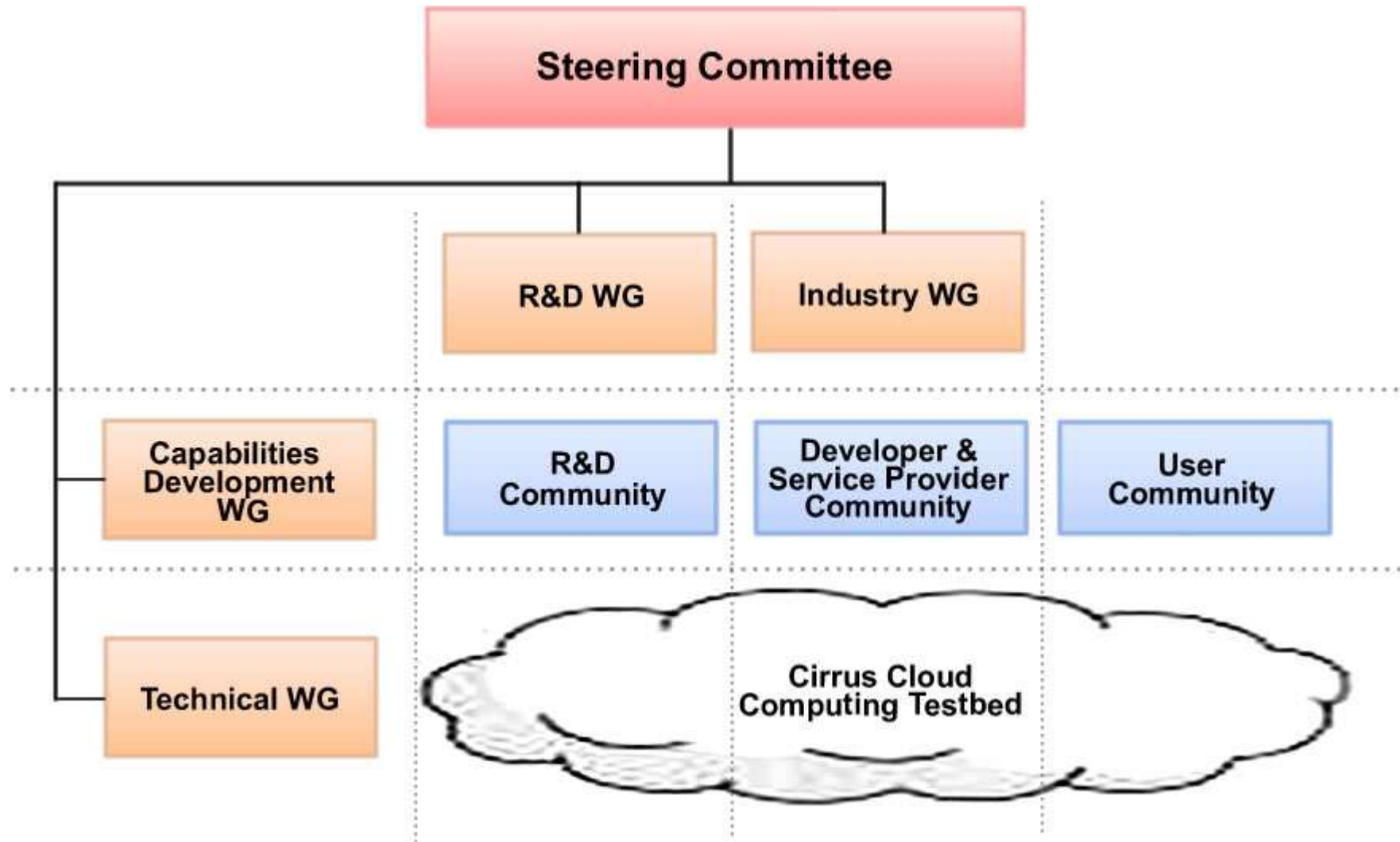
Mr Khoong: Says cloud computing is shaping up to be the next big thing

prise software, such as customer relationship management (CRM). Cloud computing also makes collaboration between far-flung users easier and cheaper.

As part of the initiative, IDA will work with Yahoo to train up to 60 local domain analysts from tertiary institutions and the industry. These trainers will in turn impart their expertise to their students and inter-

Business Times, Thursday, 31 July 2008







- > An open source software platform
  - Reproduce proprietary software infrastructure developed by Google
- > Works on large clusters of 2,000 nodes (commodity hardware)
  - Current design target is 10,000-node clusters
- > Scalable: Hadoop can reliably store & process petabytes.
- > Economical: It distributes data & processing across clusters of commonly available computers. These clusters can number into thousands of nodes.
- > Efficient: By distributing data, Hadoop can process it in parallel on nodes where data is located. This makes it extremely rapid.
- > Reliable: Hadoop automatically maintains multiple copies of data & automatically redeploys computing tasks based on failures.

# Uses of Hadoop (1)

- Support AWS (Amazon)
- Build ground models of Southern California (Yahoo!)
- Analyse web pages (Yahoo!)
- Anti-spam detection (Yahoo!)
  
- Natural Language Processing (U Maryland)
- Natural Language Learning (CMU)
- Online search for engineering content (CMU/Intel)
- Machine Learning (Stanford U)
- LHC data processing (U Nebraska)
- Genetic sequence analysis (UC Berkeley)
- Mapping world's photos (Cornell U)
- News & blog analysis (SUNY)

- Simplified online content sharing service (ShareThis)
- Matchmaking services (eHarmony)
- Search engine for research topics (DeepDyve)
- Advertising network (Lookery)
- Smart online advertising services (YieldEx)
- Recommendation system, text analytics, & ad optimisation (Facebook)
- Business intelligence (EMI Music)
- Processing huge user data sets (ChinaMobile)

## Uses of Hadoop (2)

- Used HIVE, a data warehouse built atop Hadoop, to analyse user behaviour & effectiveness of ads on Facebook site

**The New York Times**  
ON THE WEB

facebook

- Generated PDF files of 11 million public domain NYTimes articles (from 1851 – 1922) by gluing together multiple TIFF images per article
- Used 24 hours on 100 instances on Amazon EC2

### > Mailtrust (Rackspace's mail division)

- Process email logs
  - e.g., find geographical distribution of users
- Help to decide which Rackspace DC to place new mail servers in as it grows



**mailtrust™**

# Uses of Hadoop in Singapore



- Web Archives Singapore (WAS)
  - Archives web sites for subsequent retrieval
  - Need computational & network bandwidth for crawling & indexing 75,000 web sites with .sg domain names
- Used 44,000 hours on 32 processors for 1<sup>st</sup> cycle
- 2 cycles of crawl/index per year
  - 1<sup>st</sup> two cycles were done using NGPP resources
  - Thereafter, WAS uses commercial grid services offered by nGrid
- Plan to archive non-.sg web sites & blogs that provide materials related to Singapore's heritage & cultural interests

# Hadoop Training & Special Interest Group

- > Conducted 3 training courses
- > Attendance – 153 pax
  - Institutes of Higher Learning - NTU, NUS, SMU, NYP, SP, TP
  - Research Institutes - IHPC
  - Government Agencies - IDA, MDA, NLB
  - Private Sector
    - G Element, Crimson Logic, enova, HP, ICSP Solutions, InnoAsia, Lilly Singapore Center for Drug Discovery, nTegrasys, NVI, Phokki, Qala, Redhat, SCS, ST Electronics Info-Comms, StanChart, VSA Services, Yahoo SEA, ZonSystem, EADS Innovation Works, Shockwave India, Sambaash, Touchtier Technology Pte Ltd, SPH Search, CGGVeritas (Asia Pacific)
- > Objectives of SIG
  - Sustain interest in Hadoop, Pig & Zookeeper
  - Forum to exchange & share information & knowledge
  - Identify trainers
  - Identify projects in using Hadoop & related technologies
- > Monthly meetings

# Cloud Innovation Centre

## Platform™

- > 3-year programme based at Platform Computing office @ Fusionopolis
- > Provision:
  - > Office space
  - > Free access to Cloud software & hardware
  - > Full-time technical consultants
  - > Training programmes
    - > Target ~ 600 ICT professionals

## Firms to get leg up in cloud computing

By **ONG BOON KIAT**

FIRMS will soon be able to get technical help, training and access to free software to help them adopt cloud computing – a budding technology seen as one of Singapore's future economic pillars.

The Infocomm Development Authority (IDA) of Singapore and Canadian software firm Platform Computing announced yesterday that they will be setting up a Cloud Innovation Centre (CIC) in May.

To be housed in Platform Computing's Fusionopolis premises, it will provide Singapore-based firms access to technical consultants, training programmes and free cloud computing software.

The announcement was made at the GridAsia 2009 conference and exhibition.

According to a Platform Computing official, the initial investment of the CIC is "around several hundred thousand dollars over three years".

The centre, which will be run by four staff, aims to train over 600 professionals from enterprises, government organisations, software vendors and start-ups in Singapore over the next three years.

Cloud computing, which is closely related to grid computing, refers to the delivery of software and IT services over the Web and other networks. Google's popular Gmail service is often mentioned as an example of this model.

A major appeal of cloud computing is its on-demand and pay-as-you-use model, which lets firms save money.

Speaking at GridAsia, Leong Keng Thia, deputy chief executive and director-general (telecoms and post) of IDA, said the CIC will help foster "private clouds", which are different from public ones from vendors such as Amazon, Microsoft, Salesforce.com and others.

"Private clouds will be critical in these early days, to promote adoption among businesses who may hold back due to considerations and concerns about putting their operations up in the public clouds," he said.

"Private clouds will allow businesses to conduct its operations in a more secure manner. The CIC will assist independent software vendors and start-ups to acquire the know-how and technology to develop services for private clouds."

IDA has been actively promoting grid and cloud computing in Singapore. It launched the eye-catching National Grid Initiative last November; a part of the government's vision to create, by 2013, a grid computing marketplace called the Grid Market Hub.

Last July, IDA joined hands with global tech giants Yahoo, Hewlett-Packard and Intel to launch a global cloud computing test-bed.

*Business Times 14 April 2009*

# Cloud Innovation Centre

## > For enterprises, start-ups & ISVs

- Comprehensive 5-day Cloud training programme
  - Learn about private clouds
- Undertake trials & proof-of-concepts
- Obtain hands-on opportunities to cloud software & set-up
- Obtain guidance from technical consultants

# Conclusion

- > Cloud computing & associated areas represent next paradigm in computing
  
- > Implications for Singapore
  - Move quickly to establish leadership position in this next technological wave
  
  - Enhance competitiveness of local businesses
  
  - Infocomm companies can leverage Singapore's strengths to benefit from paradigm shift
  
  - Ensure Singapore remains relevant to infocomm MNCs

# SINGAPORE: AN INTELLIGENT NATION, A GLOBAL CITY POWERED BY INFOCOMM

[www.ida.gov.sg](http://www.ida.gov.sg)

[www.infocommsingapore.sg](http://www.infocommsingapore.sg)



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