YAYASAN PERGURUAN CIKINI
INSTITUT SAINS DAN TEKNOLOGI NASIONAL
FAKULTAS SAINS DAN TEKNOLOGI INFORMASI

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SURAT PENUGASAN TENAGA PENDIDIK

Nomor : 204 / 03.1 – I / IX / 2022

SEMESTER *GANJIL*, TAHUN AKADEMIK 2022 / 2023

Nama	: Aryo Nur Utomo, ST.,M.Kom.	Status Pegawai	:	Edukatif Tetap	
NIK	: 01.121225	Program Studi	:	Sistem Informasi	
Jabatan Akademik	: Asiste Ahli				

Bidang	Perincian Kegiatan	Ruang/ Tempat	Jam/ Minggu	Kredit (sks)	Hari / Waktu
I PENDIDIKAN Dan PENGAJARAN	**MENGAJAR DI KELAS (KULIAH / RESPONSI DAN LABORATORIUM)**				
	1. Cloud Computing (SI)	A-1	1 Jam/Minggu	1	Senin / 08:00-09:40
	2. Sistem Pendukung Keputusan (SI)	D-2	1,5 Jam/Minggu	1,5	Selasa / 08:00-10:00
	3. Sistem Temu Kembali Informasi(SI)	E-4	1 Jam/Minggu		Senin /15:30-17:00
	4. IT Service Management (SI)	D-3	1 Jam/Minggu	1	Jum'at / 14:30-16:00
	5. Keamanan Sistem Informasi (SI)	E-1	1 Jam/Minggu	1	Rabu / 15:30-17:00
	6. Algoritma dan Pemrograman (TIF)	A-2	1 Jam/Minggu	1	Kamis / 08:00-09:40
	7. Analisis dan Perancangan Algoritma (TIF)	A-1	1 Jam/Minggu	1	Senin / 10.30-12.10
	8. Pemrograman Jaringan (Java/Python)	D-2	1,5 Jam/Minggu	1,5	Selasa / 14.41-15.40
	9. Pembelajaran Mesin (TIF)	E-1	1,5 Jam/Minggu	1,5	Rabu / 13.00-14.40
	10. Komputer Forensik (TIF)	A-2	1,5 Jam/Minggu	1,5	Jumat / 12.30-14.00
	11. Pengelolaan Layanan TI (ITSM) (TIF)	A-1	1 Jam/Minggu	1	Senin / 08.00-09.40
	12. Data Compress & Coding (PIGS)	A-2	1 Jam/Minggu		Selasa / 08.00-09.40
	13. Manajemen Proyek Perangkat Lunak	A-3	1,5 Jam/Minggu		Kamis / 10.00-11.30
	14. Menduduki Jabatan Struktural (Ka.Prodi TIF)		20 Jam/Minggu	3	
II PENELITIAN	Penulisan Karya Ilmiah			1	
III PENGABDIAN DAN MASYARAKAT	Pelatihan dan Penyuluhan				
IV UNSUR-UNSUR PENUNJANG	Berperan Serta Aktif dalam Pertemuan IlmiahSeminar				
	Jumlah Total			16	

Kepada yang bersangkutan akan diberikan gaji / honorarium sesuai dengan peraturan penggajian yang berlaku di Institut Sains Dan Teknologi Nasional
Penugasan ini berlaku dari tanggal 02 September 2022 sampai dengan tanggal 29 Februari 2023.

Jakarta, 30 September 2022
Dekan,

(Marhaeni, S.Kom.,M.Kom.)

Tembusan :
1. Direktur Akademik – ISTN
2. Direktur Non Akademik – ISTN
3. Ka. Biro Sumber Daya Manusia – ISTN
4. Kepala Program Studi Sistem Informasi
5. Arsip.

DAFTAR HADIR PESERTA KULIAH MAHASISWA

GANJIL REGULER TAHUN 2022/2023

FAK / JURUSAN : Sistem Informasi S1 HARI/TANGGAL : Senin

MATA KULIAH : Cloud Computing

KELAS /PESERTA : A/5 JAM KULIAH : 08.00-09.40

KURIKULUM : 2018

DOSEN : Aryo Nur Utomo, ST.M.Kom. RUANG :

NO	NIM	NAMA MAHASISWA	TANGGAL PERTEMUAN								JUMLAH
			19/09	26/09	03/10	10/10	17/10	24/10	31/10	07/11	
1	20350003	Anisa Qadri Kurniasih	√	√	√	√	√	√	√		7
2	20350004	Rizky Fauzi Ramadhan	√	√	√	√	√	√	√		7
3	20350006	Miftah Zaidan Falih	√	√	√	√	√	√	√		7
4	20350008	Muhammad Ibnu Afan Fuadi	√	√	√	√	√	√	√		7
5	20350501	Achmad Zikri	√	√	√	√	√	√	√		7

Jakarta , ... Februari 2023

Dosen Pengajar

(Aryo Nur Utomo, ST.M.Kom)

BERITA ACARA PERKULIAHAN
(PRESENTASI KEHADIRAN DOSEN)
SEMESETER GANJIL TAHUN AKADEMIK 2022/2023
PROGRAM STUDI SISTEM INFORMASI S1 FSTI-ISTN

Mata Kuliah	:	Cloud Computing	Semester	:	357302
Dosen	:	Aryo Nur Utomo, ST, M.Kom	SKS	:	2
Hari	:	Senin	Kelas	:	A
Jam	:	08:00-09:40	Ruang	:	B-3

No.	TANGGAL	MATERI KULIAH	JML MHS HADIR	TANDA TANGAN DOSEN
1.	19-September 2022	Pengantar Cloud Computing. IaaS, PaaS, SaaS.	5	
2.	26-September 2022	Web Hosting tradisional	5	
3.	03-Oktober 2022	Topologi VPS	5	
4.	10-Oktober 2022	Web based Software Development - VCS	5	
5.	17-Oktober 2022	Git – Github tutorial	5	
6.	24-Oktober 2022	Migrasi aplikasi ke Cloud	5	
7.	31-Oktober 2022	Cloud Migration – Why migrate	5	
8.	7-November 2022	**UJIAN TENGAH SEMESTER (UTS)**	5	

DOSEN PENGAJAR

(Aryo Nur Utomo, S.T., M.Kom.)

DAFTAR NILAI

SEMESTER GANJIL REGULER TAHUN 2022/2023

Program Studi : Sistem Informasi S1
Matakuliah : Cloud Computing
Kelas / Peserta : A
Perkuliahan : Kampus ISTN Bumi Srengseng Indah
Dosen : Aryo Nur Utomo, ST.M.Kom.

No	NIM	N A M A	ABSEN	TUGAS	UTS	UAS	MODEL	PRESENTASI	NA	HURUF
			0%	0%	50%	50%	0%	0%		
1	20350003	**Anisa Qadri Kurniasih**	100	0	70	74	0	0	72	**B+**
2	20350004	**Rizky Fauzi Ramadhan**	100	0	70	74	0	0	72	**B+**
3	20350006	**Miftah Zaidan Falih**	100	0	68	69	0	0	68.5	**B**
4	20350008	**Muhammad Ibnu Afan Fuadi**	100	0	79	79	0	0	79	**A-**
5	20350501	**Achmad Zikri**	100	0	79	78	0	0	78.5	**A-**

Rekapitulasi Nilai							
A	0	B+	2	C+	0	D+	0
A-	2	B	1	C	0	D	0
		B-	0	C-	0	E	0

Jakarta,18 February 2023

Dosen Pengajar

Aryo Nur Utomo, ST.M.Kom.

Cloud Computing: Concepts, Technologies and Business Implications

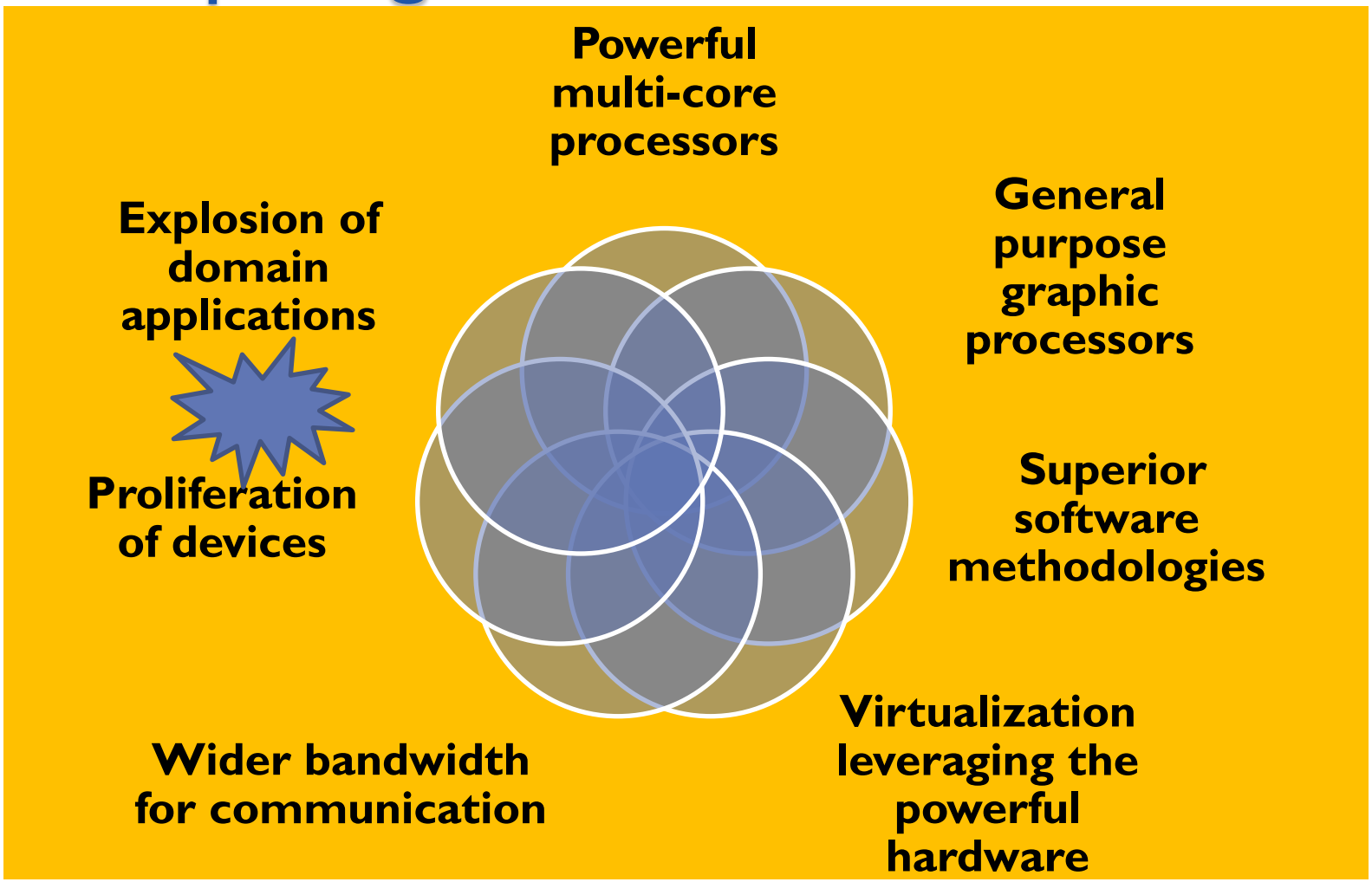
Outline of the talk

- Introduction to ***cloud context***
  - Technology context: multi-core, virtualization, 64-bit processors, parallel computing models, big-data storages…
  - Cloud models: IaaS *(*Amazon AWS), PaaS (Microsoft Azure), SaaS (Google App Engine)
- Demonstration of ***cloud capabilities***
  - Cloud models
  - Data and Computing models: MapReduce
  - Graph processing using amazon elastic mapreduce
- A ***case-study*** of real business application of the cloud
- Questions and Answers

Speakers' Background in cloud computing

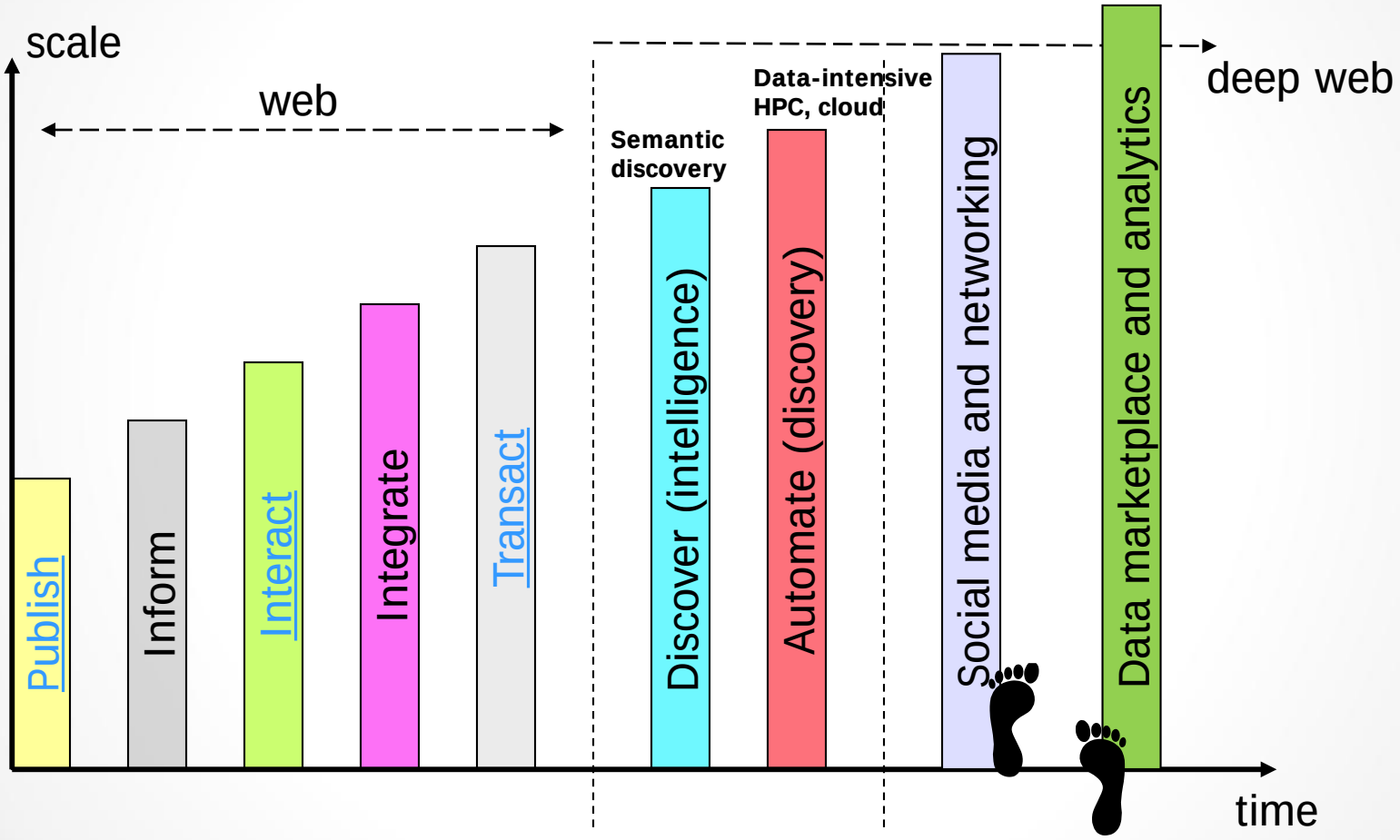
- Bina:
  - Has two current NSF (National Science Foundation of USA) awards related to cloud computing:
  - 2009-2012: Data-Intensive computing education: CCLI Phase 2: $250K
  - 2010-2012: Cloud-enabled Evolutionary Genetics Testbed: OCI-CI-TEAM: $250K
  - Faculty at the CSE department at University at Buffalo.
- Kumar:
  - Principal Consultant at CTG
  - Currently heading a large semantic technology business initiative that leverages cloud computing
  - Adjunct Professor at School of Management, University at Buffalo.

Introduction: A Golden Era in Computing

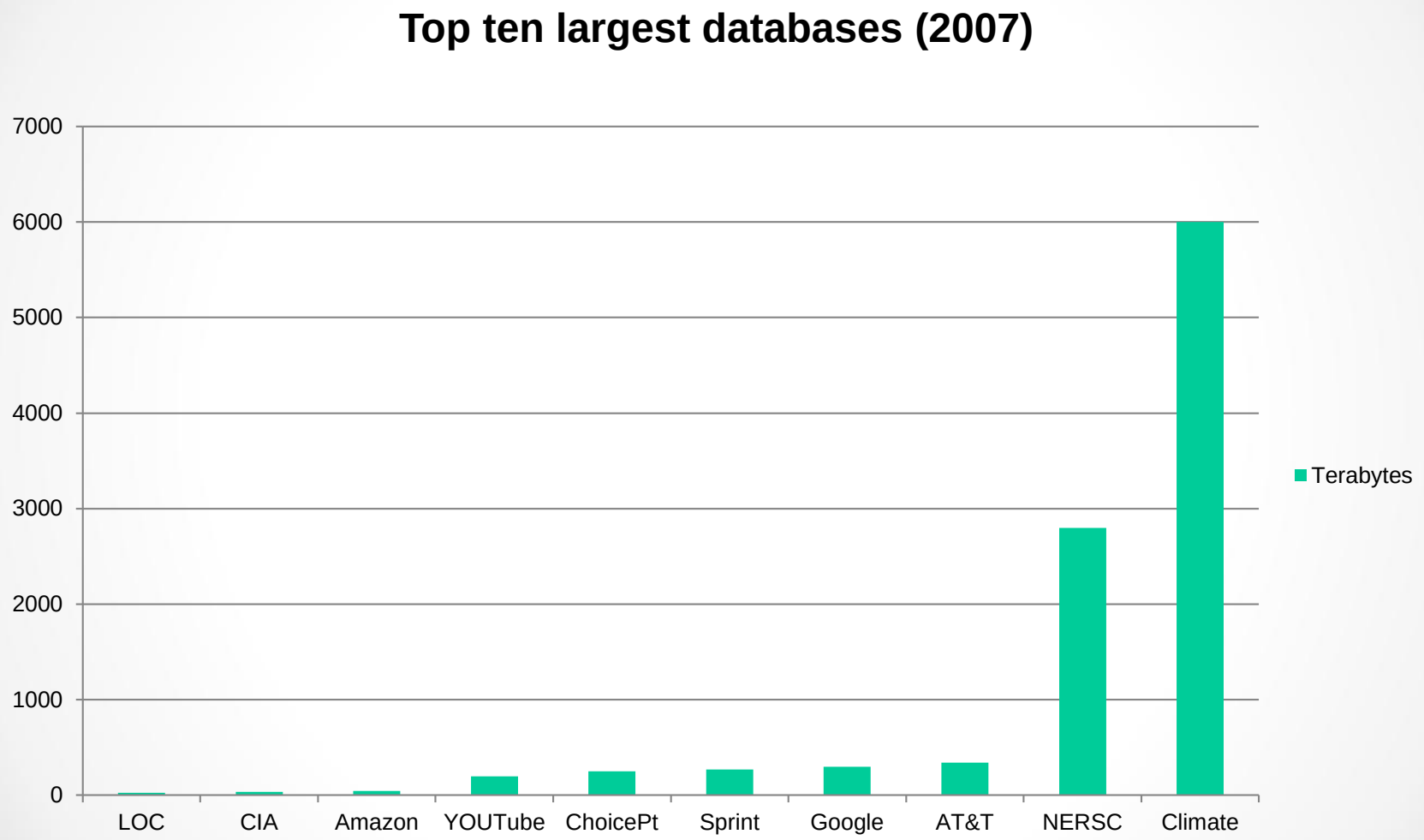


Cloud Concepts, Enabling-technologies, and Models: The Cloud Context

Evolution of Internet Computing



Top Ten Largest Databases



Ref: http://www.focus.com/fyi/operations/10-largest-databases-in-the-world/

Challenges

- Alignment with the needs of the business / user / non-computer specialists / community and society
- Need to address the scalability issue: large scale data, high performance computing, automation, response time, rapid prototyping, and rapid time to production
- Need to effectively address (i) ever shortening cycle of obsolescence, (ii) heterogeneity and (iii) rapid changes in requirements
- Transform data from diverse sources into intelligence and deliver intelligence to right people/user/systems
- What about providing all this in a cost-effective manner?

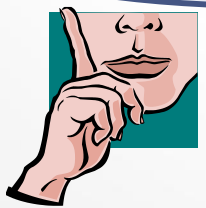
Enter the cloud

- **Cloud computing** is Internet-based computing, whereby shared resources, software and information are provided to computers and other devices on-demand, like the electricity grid.
- The cloud computing is a culmination of numerous attempts at large scale computing with seamless access to virtually limitless resources.
  - on-demand computing, utility computing, ubiquitous computing, autonomic computing, platform computing, edge computing, elastic computing, **grid computing**, ...

"Grid Technology: A slide from my presentation to Industry (2005)

- Emerging enabling technology.
- Natural evolution of distributed systems and the Internet.
- Middleware supporting network of systems to facilitate sharing, standardization and openness.
- Infrastructure and application model dealing with sharing of compute cycles, data, storage and other resources.
- Publicized by prominent industries as on-demand computing, utility computing, etc.
- Move towards delivering "computing" to masses similar to other utilities (electricity and voice communication)."
- Now,

Hmmm…sounds like the definition for cloud computing!!!!!



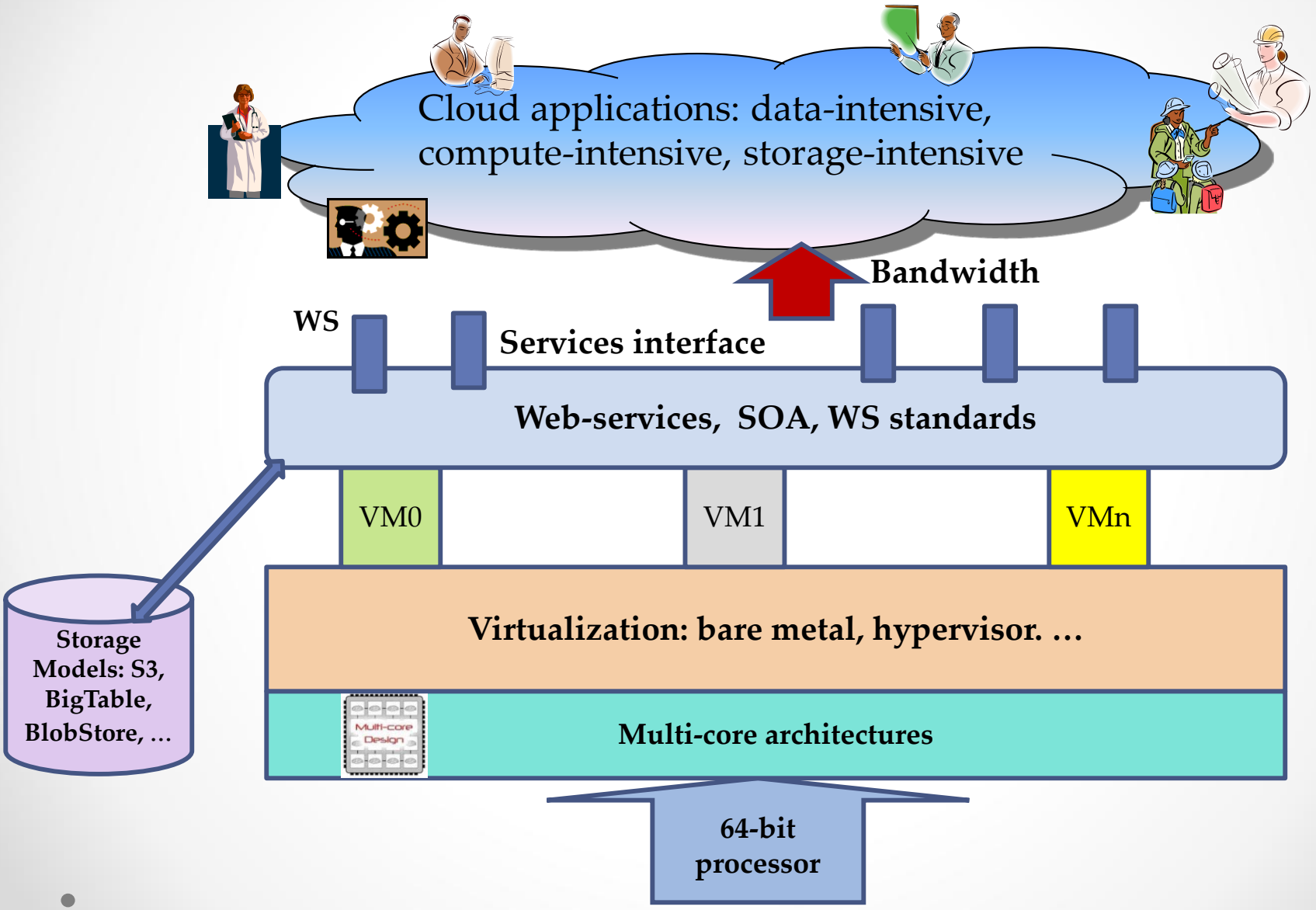
It is a changed world now…

- Explosive growth in applications: biomedical informatics, space exploration, business analytics, web 2.0 social networking: YouTube, Facebook
- Extreme scale content generation: e-science and e-business data deluge
- Extraordinary rate of digital content consumption: digital gluttony: Apple iPhone, iPad, Amazon Kindle
- Exponential growth in compute capabilities: multi-core, storage, bandwidth, virtual machines (virtualization)
- Very short cycle of obsolescence in technologies: Windows Vista→ Windows 7; Java versions; C→C#; Phython
- Newer architectures: web services, persistence models, distributed file systems/repositories (Google, Hadoop), multi-core, wireless and mobile
- Diverse knowledge and skill levels of the workforce
- You simply cannot manage this complex situation with your traditional IT infrastructure:

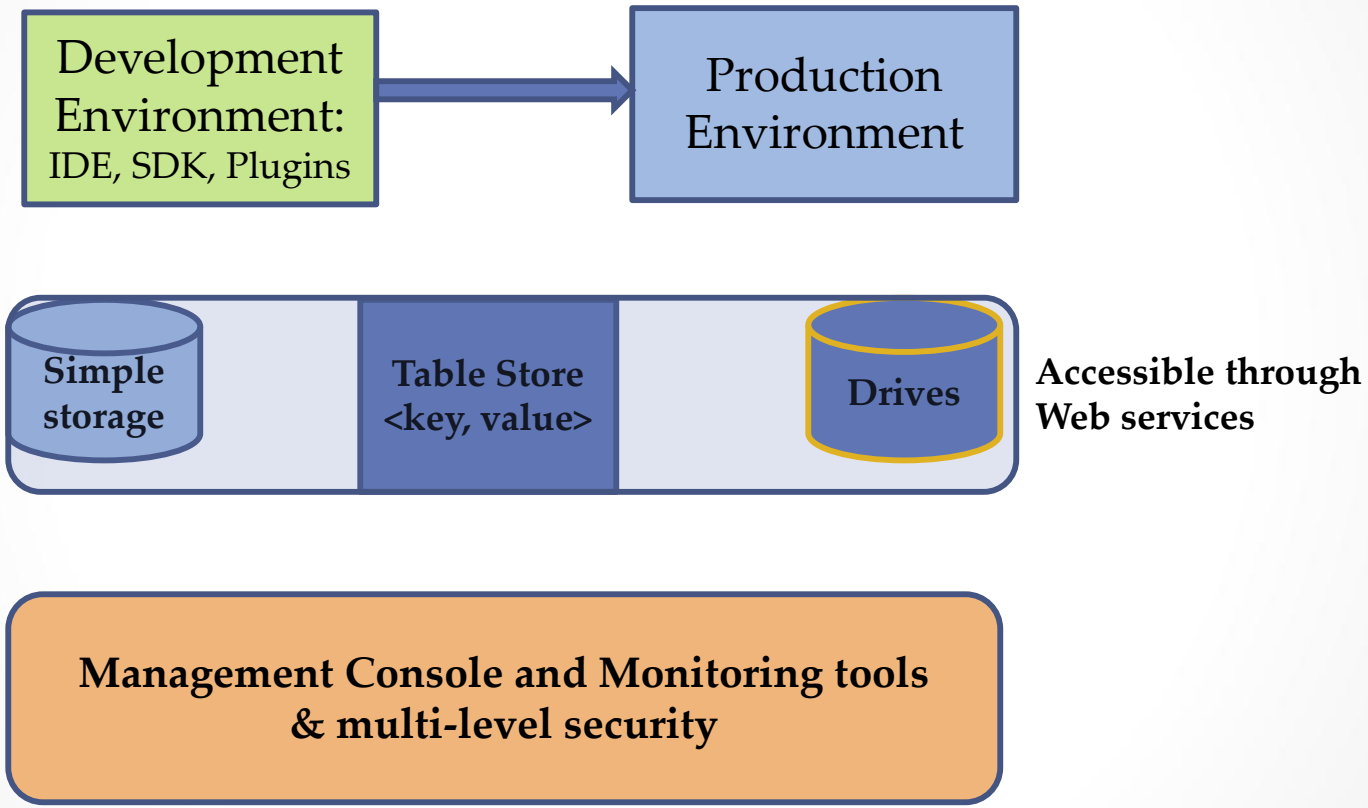
Answer: The Cloud Computing?

- Typical requirements and models:
  - platform (PaaS),
  - software (SaaS),
  - infrastructure (IaaS),
  - Services-based application programming interface (API)
- A cloud computing environment can provide one or more of these requirements for a cost
- Pay as you go model of business
- When using a public cloud the model is similar to renting a property than owning one.
- An organization could also maintain a private cloud and/or use both.

Enabling Technologies



Common Features of Cloud Providers



Windows Azure

- Enterprise-level on-demand capacity builder
- Fabric of cycles and storage available on-request for a cost
- You have to use Azure API to work with the infrastructure offered by Microsoft
- Significant features: web role, worker role , blob storage, table and drive-storage

Amazon EC2

- Amazon EC2 is one large complex web service.
- EC2 provided an API for instantiating computing instances with any of the operating systems supported.
- It can facilitate computations through Amazon Machine Images (AMIs) for various other models.
- Signature features: S3, Cloud Management Console, MapReduce Cloud, Amazon Machine Image (AMI)
- Excellent distribution, load balancing, cloud monitoring tools

Google App Engine

- This is more a web interface for a development environment that offers a one stop facility for design, development and deployment Java and Python-based applications in Java, Go and Python.
- Google offers the same reliability, availability and scalability at par with Google's own applications
- Interface is software programming based
- Comprehensive programming platform irrespective of the size (small or large)
- Signature features: templates and appspot, excellent monitoring and management console

Demos

- Amazon AWS: EC2 & S3 (among the many infrastructure services)
  - Linux machine
  - Windows machine
  - A three-tier enterprise application
- Google app Engine
  - Eclipse plug-in for GAE
  - Development and deployment of an application
- Windows Azure
  - Storage: blob store/container
  - MS Visual Studio Azure development and production environment

Cloud Programming Models

The Context: Big-data

- Data mining huge amounts of data collected in a wide range of domains from astronomy to healthcare has become essential for planning and performance.
- We are in a knowledge economy.
  - Data is an important asset to any organization
  - Discovery of knowledge; Enabling discovery; annotation of data
  - Complex computational models
  - No single environment is good enough: need elastic, on-demand capacities
- We are looking at newer
  - Programming models, and
  - Supporting algorithms and data structures.

Google File System

- Internet introduced a new challenge in the form web logs, web crawler's data: large scale "peta scale"
- But observe that this type of data has an uniquely different characteristic than your transactional or the "customer order" data : "write once read many (WORM)" ;
  - Privacy protected healthcare and patient information;
  - Historical financial data;
  - Other historical data
- Google exploited this characteristics in its Google file system (GFS)

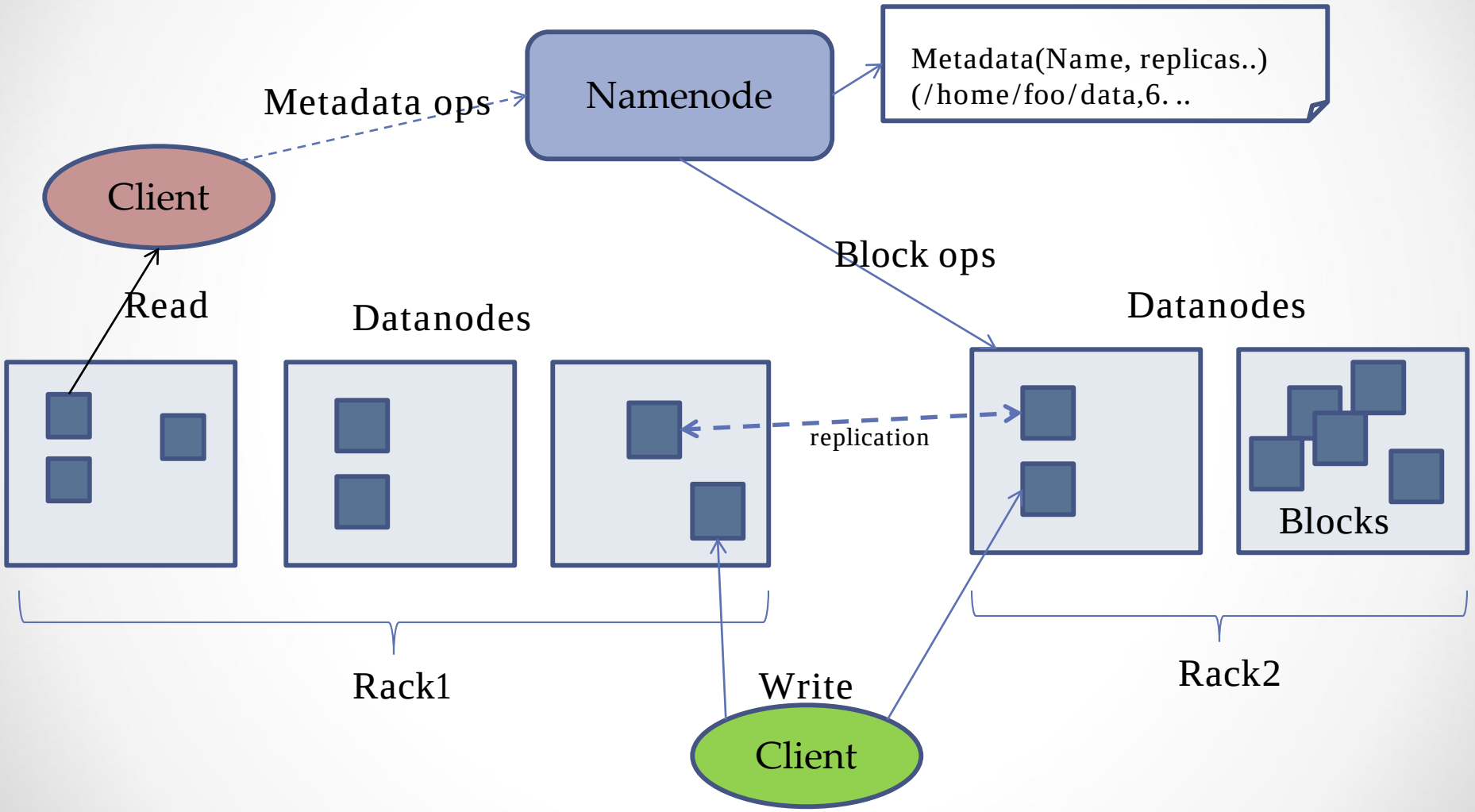
What is Hadoop?

- At Google MapReduce operation are run on a special file system called Google File System (GFS) that is highly optimized for this purpose.
- GFS is not open source.
- Doug Cutting and others at Yahoo! reverse engineered the GFS and called it Hadoop Distributed File System (HDFS).
- The software framework that supports HDFS, MapReduce and other related entities is called the project Hadoop or simply Hadoop.
- This is open source and distributed by Apache.

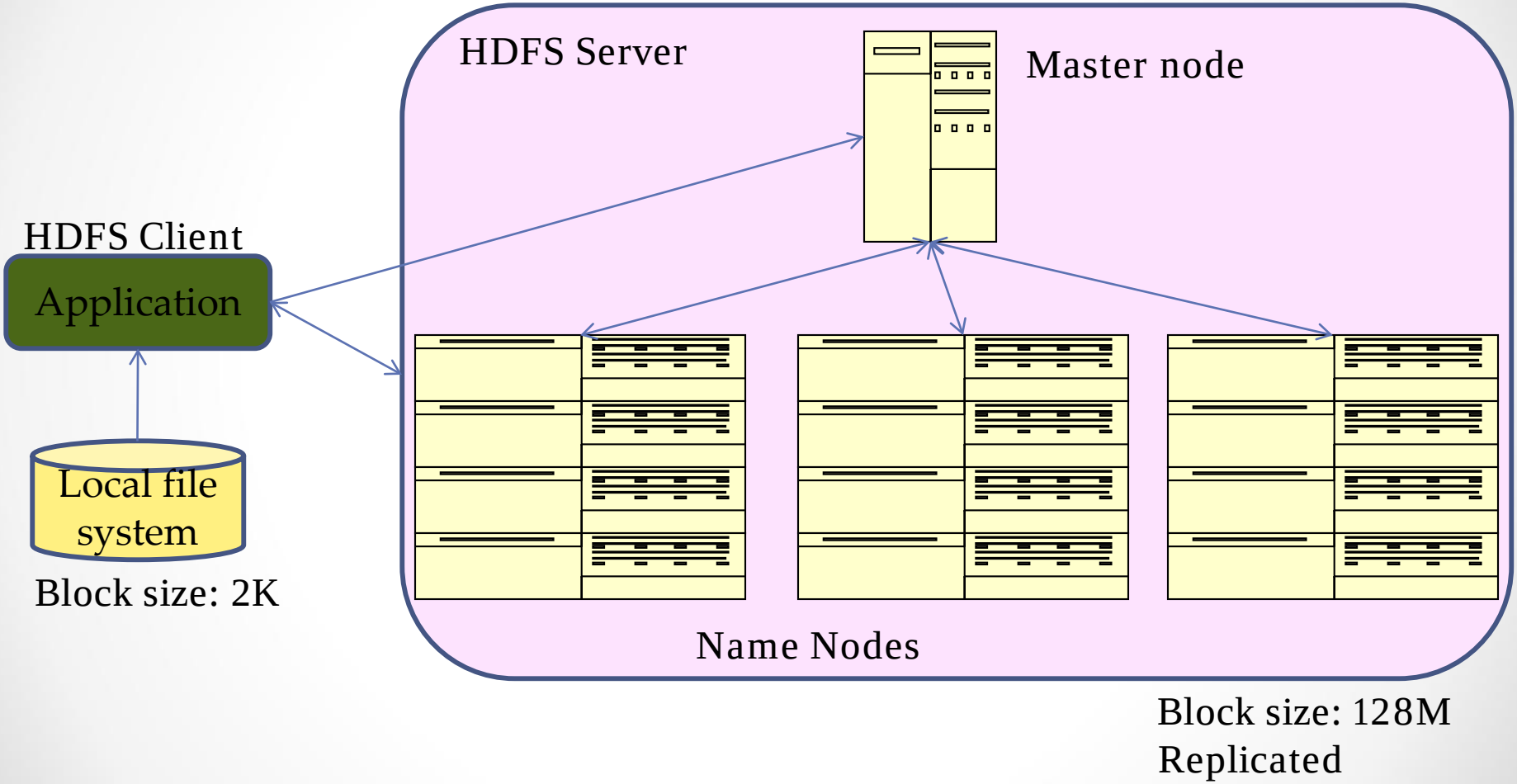
Fault tolerance

- Failure is the norm rather than exception
- A HDFS instance may consist of thousands of server machines, each storing part of the file system's data.
- Since we have huge number of components and that each component has non-trivial probability of failure means that there is always some component that is non-functional.
- Detection of faults and quick, automatic recovery from them is a core architectural goal of HDFS.

HDFS Architecture



Hadoop Distributed File System



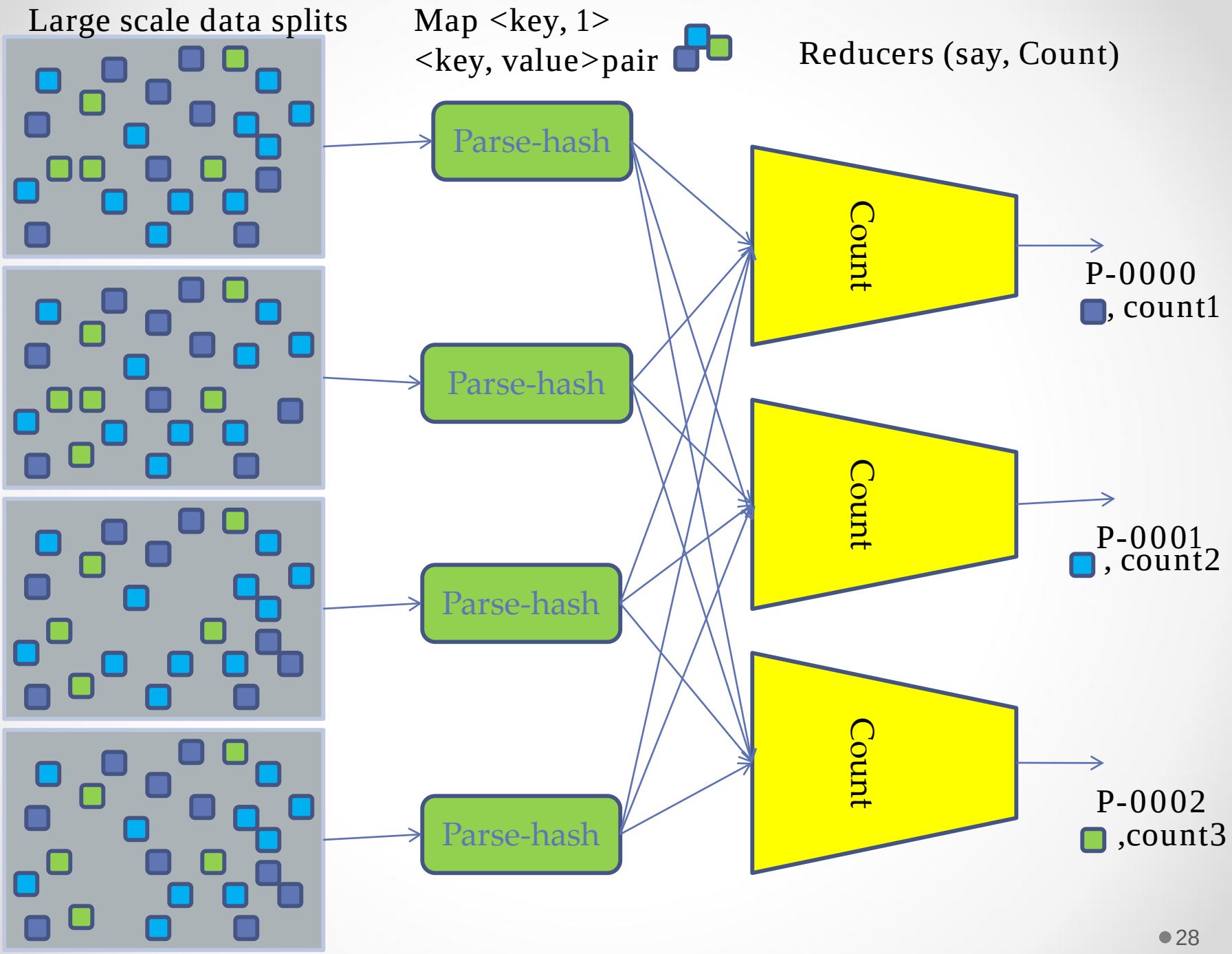
What is MapReduce?

- MapReduce is a programming model Google has used successfully is processing its "big-data" sets (~ 20000 peta bytes per day)
  - A map function extracts some intelligence from raw data.
  - A reduce function aggregates according to some guides the data output by the map.
  - Users specify the computation in terms of a *map* and a *reduce* function,
  - Underlying runtime system automatically parallelizes the computation across large-scale clusters of machines, and
  - Underlying system also handles machine failures, efficient communications, and performance issues.

  -- Reference: Dean, J. and Ghemawat, S. 2008. **MapReduce: simplified data processing on large clusters.** *Communication of ACM* 51, 1 (Jan. 2008), 107-113.

Classes of problems "mapreducable"

- Benchmark for comparing: Jim Gray's challenge on data-intensive computing. Ex: "Sort"
- Google uses it for wordcount, adwords, pagerank, indexing data.
- Simple algorithms such as grep, text-indexing, reverse indexing
- Bayesian classification: data mining domain
- Facebook uses it for various operations: demographics
- Financial services use it for analytics
- Astronomy: Gaussian analysis for locating extra-terrestrial objects.
- Expected to play a critical role in semantic web and in web 3.0

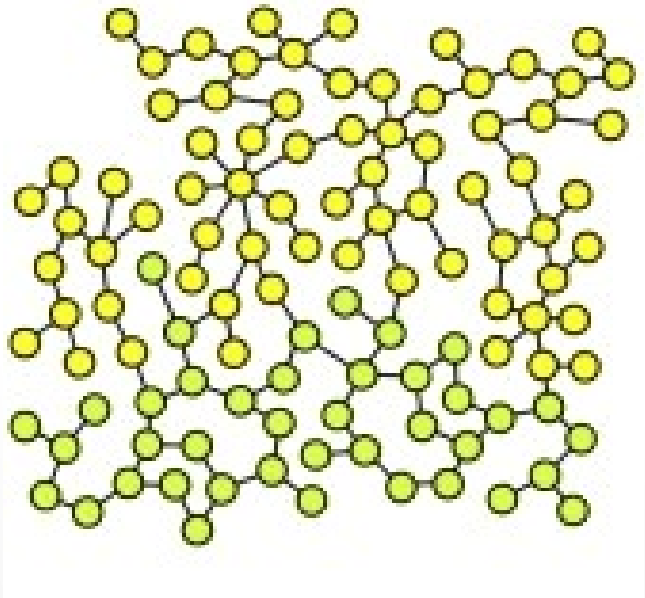

Large scale data splits
Map <key, 1>
<key, value>pair
Reducers (say, Count)
Parse-hash
Parse-hash
Parse-hash
Parse-hash
Count
Count
Count
P-0000
, count1
P-0001
, count2
P-0002
,count3

MapReduce Engine

- MapReduce requires a distributed file system and an engine that can distribute, coordinate, monitor and gather the results.
- Hadoop provides that engine through (the file system we discussed earlier) and the JobTracker + TaskTracker system.
- JobTracker is simply a scheduler.
- TaskTracker is assigned a Map or Reduce (or other operations); Map or Reduce run on node and so is the TaskTracker; each task is run on its own JVM on a node.

Demos

- Word count application: a simple foundation for text-mining; with a small text corpus of inaugural speeches by US presidents
- Graph analytics is the core of analytics involving linked structures (about 110 nodes): shortest path



A Case-study in Business: Cloud Strategies

Predictive Quality Project Overview

Problem / Motivation:

- Identify special causes that relate to bad outcomes for the quality-related parameters of the products and visually inspected defects
- Complex upstream process conditions and dependencies making the problem difficult to solve using traditional statistical / analytical methods
- Determine the optimal process settings that can increase the yield and reduce defects through predictive quality assurance
- Potential savings huge as the cost of rework and rejects are very high

Solution:

- Use ontology to model the complex manufacturing processes and utilize semantic technologies to provide key insights into how outcomes and causes are related
- Develop a rich internet application that allows the user to evaluate process outcomes and conditions at a high level and drill down to specific areas of interest to address performance issues

Why Cloud Computing for this Project

- Well-suited for incubation of new technologies
  - Semantic technologies still evolving
  - Use of Prototyping and Extreme Programming
  - Server and Storage requirements not completely known
- Technologies used (TopBraid, Tomcat) not part of emerging or core technologies supported by corporate IT
- Scalability on demand
- Development and implementation on a private cloud

Public Cloud vs. Private Cloud

Rationale for Private Cloud:

- Security and privacy of business data was a big concern
- Potential for vendor lock-in
- SLA's required for real-time performance and reliability
- Cost savings of the shared model achieved because of the multiple projects involving semantic technologies that the company is actively developing

Cloud Computing for the Enterprise

What should IT Do

- Revise cost model to utility-based computing: CPU/hour, GB/day etc.
- Include hidden costs for management, training
- Different cloud models for different applications - evaluate
- Use for prototyping applications and learn
- Link it to current strategic plans for Services-Oriented Architecture, Disaster Recovery, etc.

References & useful links

- Amazon AWS: http://aws.amazon.com/free/
- AWS Cost Calculator: http://calculator.s3.amazonaws.com/calc5.html
- Windows Azure: http://www.azurepilot.com/
- Google App Engine (GAE): http://code.google.com/appengine/docs/whatisgoogleappengine.html
- Graph Analytics: http://www.umiacs.umd.edu/~jimmylin/Cloud9/docs/content/Lin_Schatz_MLG2010.pdf
- For miscellaneous information: http://www.cse.buffalo.edu/~bina

Summary

- We illustrated cloud concepts and demonstrated the cloud capabilities through simple applications
- We discussed the features of the Hadoop File System, and mapreduce to handle big-data sets.
- We also explored some real business issues in adoption of cloud.
- Cloud is indeed an impactful technology that is sure to transform computing in business.