CLOUD COMPUTING

The Future of Computing

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Text Books

- Cloud Computing Principles and Paradigms (2011)

    By RAJKUMAR BUYYA, JAMES BROBERG, ANDRZEJ, GOSCINSKI

- Handbook of Cloud Computing (2010)

    By BORKO FURHT, ARMANDO ESCALANTE

Class Evaluations

- Final Exam
- Implementing a Private Cloud Using Group Members' Laptops.
- Selecting a paper on Cloud Computing and implementation of the paper idea, on your private cloud or applying a simulation tool.
- Extra 5 scores for those who publish a paper.
- Between 1-3 extra scores for those who just prepare a paper.

Research Topics

- مدل های محاسباتی
- مدل های اقتصادی و تجاری و مدل های پرداخت
- شبکه های مجازی
- امنیت ابر
- بهبود مصرف توان
- زمان بندی و تخصیص منابع
- مهاجرت
- مجازی سازی
- معماری های ابری
- مدیریت و نظارت بر ابر
- مدل های ارایه سرویس خدمات
- مقیاس پذیری
- برنامه ریزی ظرفیت

Research Topics

Infrastructure-as-a-Service Clouds
Software-as-a-Service Clouds
Application-as-a-Service Clouds
Business Clouds
Service-Oriented Architecture and Cloud Computing
Cloud Federation and Hybrid Cloud Infrastructure
Cloud-bridging and Cloud-bursting
Virtualization of Hardware Resources
Virtualization of Software Resources
Programming Models and Systems/Tools
Cloud Computing Consulting Methods
Design Tool for Cloud Computing
Economic and Business Models for Cloud Computing
Energy Efficiency and Clouds
Monitoring, Management and Maintenance of Clouds
Performance Modeling and Management
Cloud Computing Architectures
Innovative Cloud Applications and Experiences
Security and Privacy in Clouds
Business Process and Workflow Management in Clouds

Research Topics

The resource sharing at various levels results in various cloud offerings such as:

- **Infrastructure cloud** (e.g. hardware, IT infrastructure management)
- **Software cloud** (e.g. SaaS focusing on middleware as a service, or CRM as a service)
- **Application cloud** (e.g. Application as a Service, UML modeling tools as a service, social network as a service, etc)
- **Business cloud** (e.g. business process as a service)

Research Topics
Energy Efficiency

:: Carbon management policies and ecology:: related issues with ICT
:: Characterization, metrics, and modeling
:: Carbon metering and user feedback
:: Climate and ecosystem monitoring
:: Energy harvesting, storage, and recycling
:: Energy-aware computing
:: Energy-aware scheduling
:: Energy-aware software
:: Energy-efficient network services and operations
:: Energy-aware high performance computing and applications
:: Energy-aware large scale distributed systems, such as Grids, Clouds and service computing
:: Energy-aware network equipments and applications
:: Energy-efficient mass data storage and processing
:: Green computing models, methodologies and paradigms
:: Green software engineering
:: Green design, manufacture, use, disposal, and recycling of computers and communication systems
:: Life-cycle analysis of IT equipment
:: Low-power electronics and systems
:: Matching energy supply and demand
:: Power-aware algorithms and protocols
:: Power-efficient delivery and cooling
:: Power-aware software and hardware
:: Reliability, thermal behavior and control
:: Renewable energy models and prediction
:: Smart grid and microgrids
:: Smart transportation and manufacturing
:: Smart buildings and urban development
:: Sustainable computing
:: Using IT to reduce carbon emissions

# Research Topics
Energy Efficiency

Renewable energy models and prediction	Matching energy supply and demand
Smart grid and microgrids	Smart transportation and manufacturing
Smart buildings and urban development	Energy harvesting, storage, and recycling
Climate and ecosystem monitoring	Using IT to reduce carbon emissions
Carbon metering and user feedback	Power-aware algorithms and protocols
Power-aware software and hardware	Low-power electronics and systems
Green computing models, methodologies and paradigms	Green software engineering
Sustainable computing	Energy-aware computing
Energy-aware scheduling	Energy-aware software
Energy-efficient network services and operations	Carbon management policies and ecology- related issues with ICT
Characterization, metrics, and modeling	Reliability, thermal behavior and control
Power-efficient delivery and cooling	Life-cycle analysis of IT equipment
Energy-aware high performance computing and applications	Energy-aware large scale distributed systems, such as Grids, Clouds and service computing
Energy-aware network equipments and applications	Energy-efficient mass data storage and processing
Green design, manufacture, use, disposal, and recycling of computers and communication systems	Green IT metrics, maturity models, standards, and regulations
Creating green awareness using IT	Benefits of, and barriers to, adopting greener IT practices
Governments' roles in fostering and enforcing green initiatives	Green business process reengineering and management
Green networking and communication	Network design optimization
Stability of smart energy systems	Smart homes, buildings, offices, streets
Optimization of energy-efficient protocols	Modeling-representations, simulation and validation for energy consumption optimization problems
Online dynamic optimization for energy efficient systems	Robustness and performance guarantees
Management and profiling tools for energy efficient systems	

Why The Cloud?

Computing Evolution
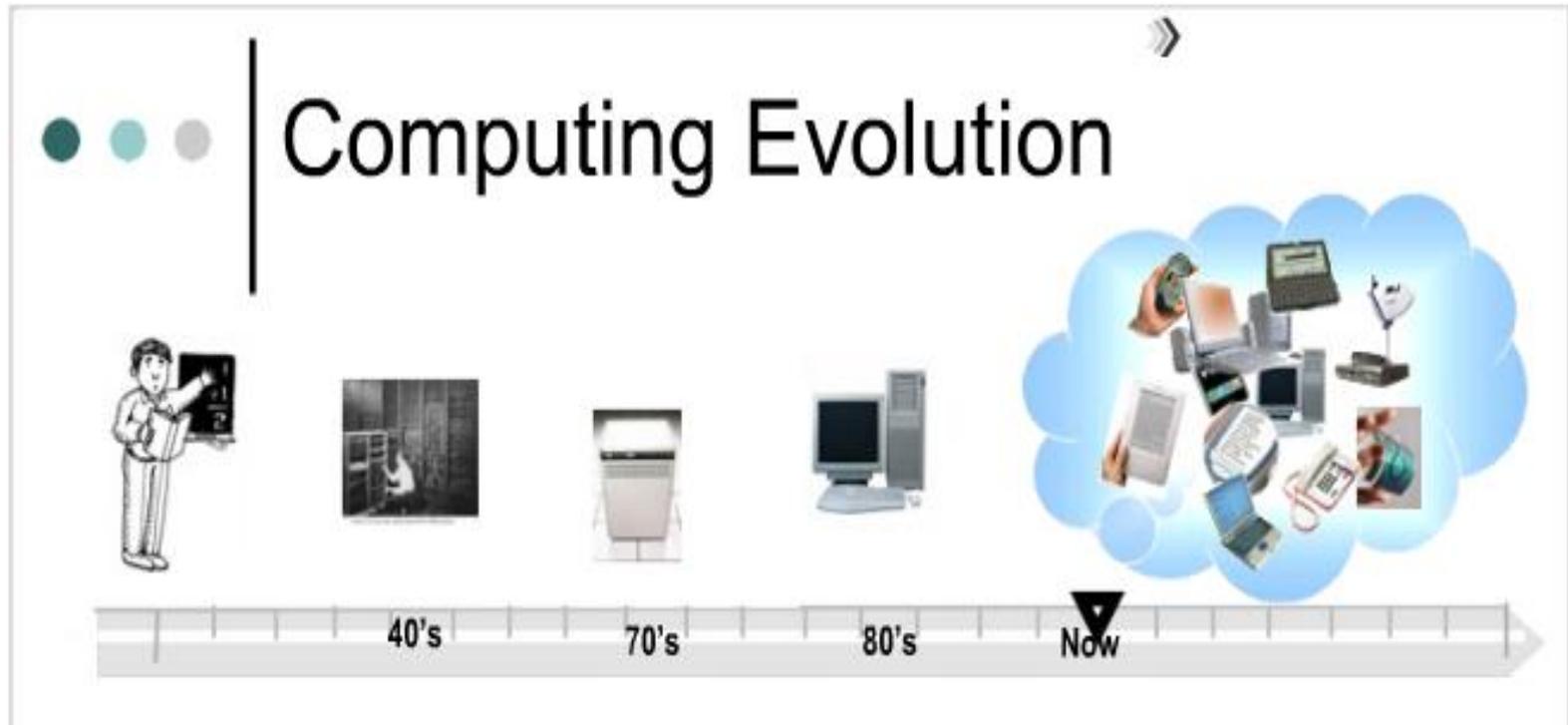
THE GARTNER HYPE CYCLE
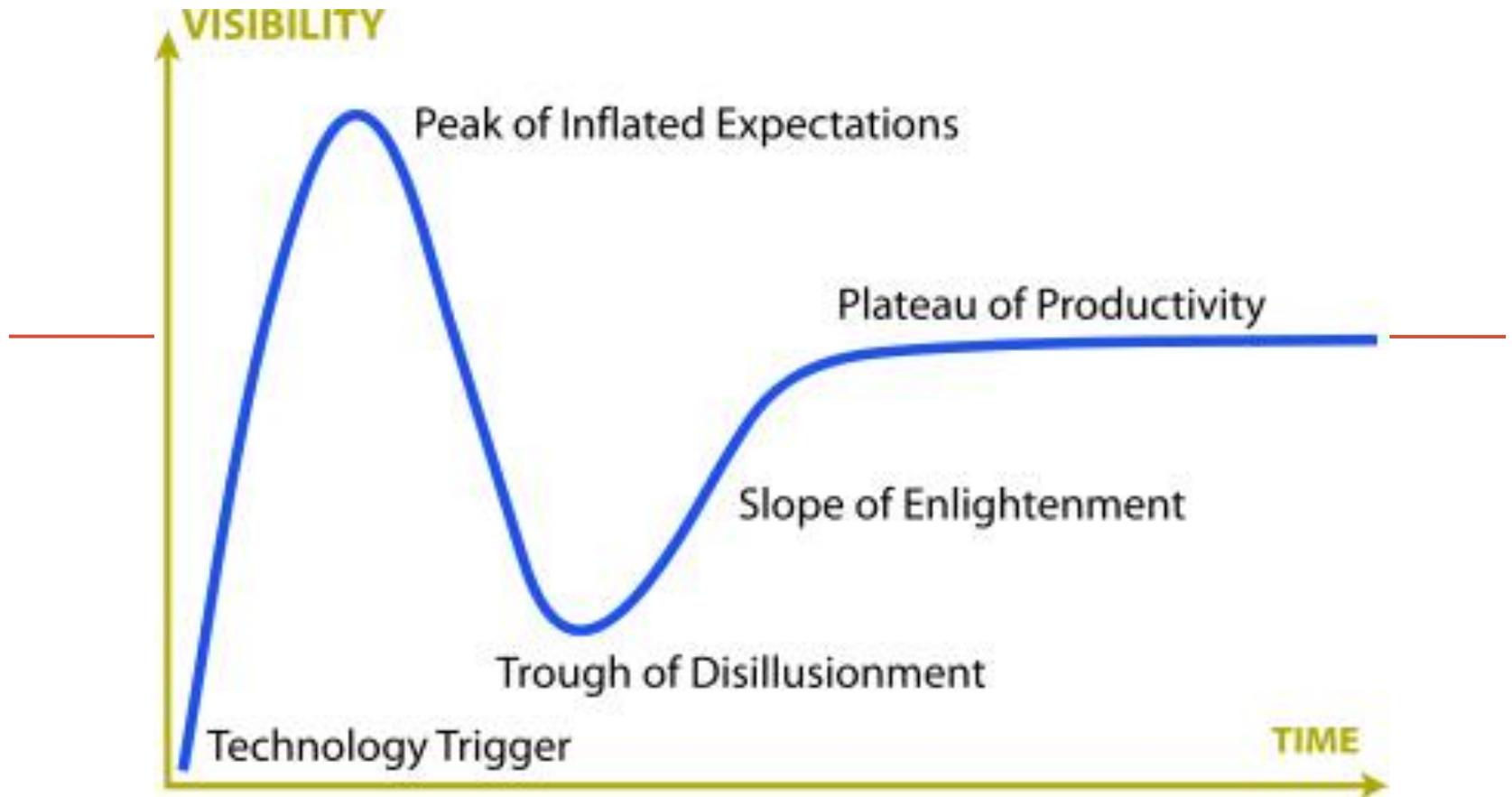
THE 2011 GARTNER HYPE CYCLE REPORT

"Gartner predicts that the most transformational technologies included in the Hype Cycle will be the following:

Virtualization, **Big Data**, **Cloud Advertising**, **Cloud Computing**, **Platform-as-a-Service (PaaS)**, **Public Cloud Computing**, and **Hybrid Cloud Computing.**"

Gartner 2011 Hype Cycle Report

RISE OF CLOUD COMPUTING

Cloud Computing

20%

20 Percent of
Businesses Will Own
No IT Assets By 2012
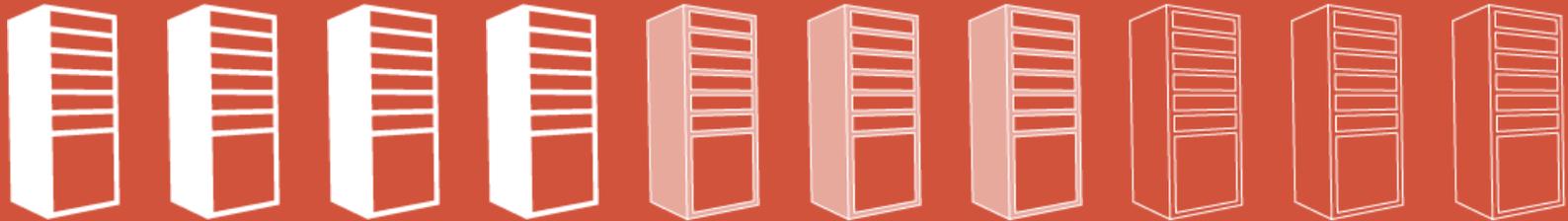--Gartner, Jan. 2010

RISE OF CLOUD COMPUTING

Cloud Computing

68%

68 Percent of Workloads Will be Virtualized by 2013, but Businesses Use Tools to Manage Less Than Half of Their Virtual Environment.

--IDC, June 2010

RISE OF CLOUD COMPUTING

Cloud Computing

80%

80% of New Commercial Enterprise Apps Will be Deployed on Cloud Platforms
--IDC, December 2011

RISE OF CLOUD COMPUTING

"By 2012, 80% of Fortune 1000 enterprises will be using some cloud computing services, 20% of businesses will own no IT assets."

Gartner

"The bottom line: Early adopters are finding serious benefits, meaning that cloud computing is real and warrants your scrutiny as a new set of platforms for business applications."

FORRESTER®

CLOUD IS HERE & NOW

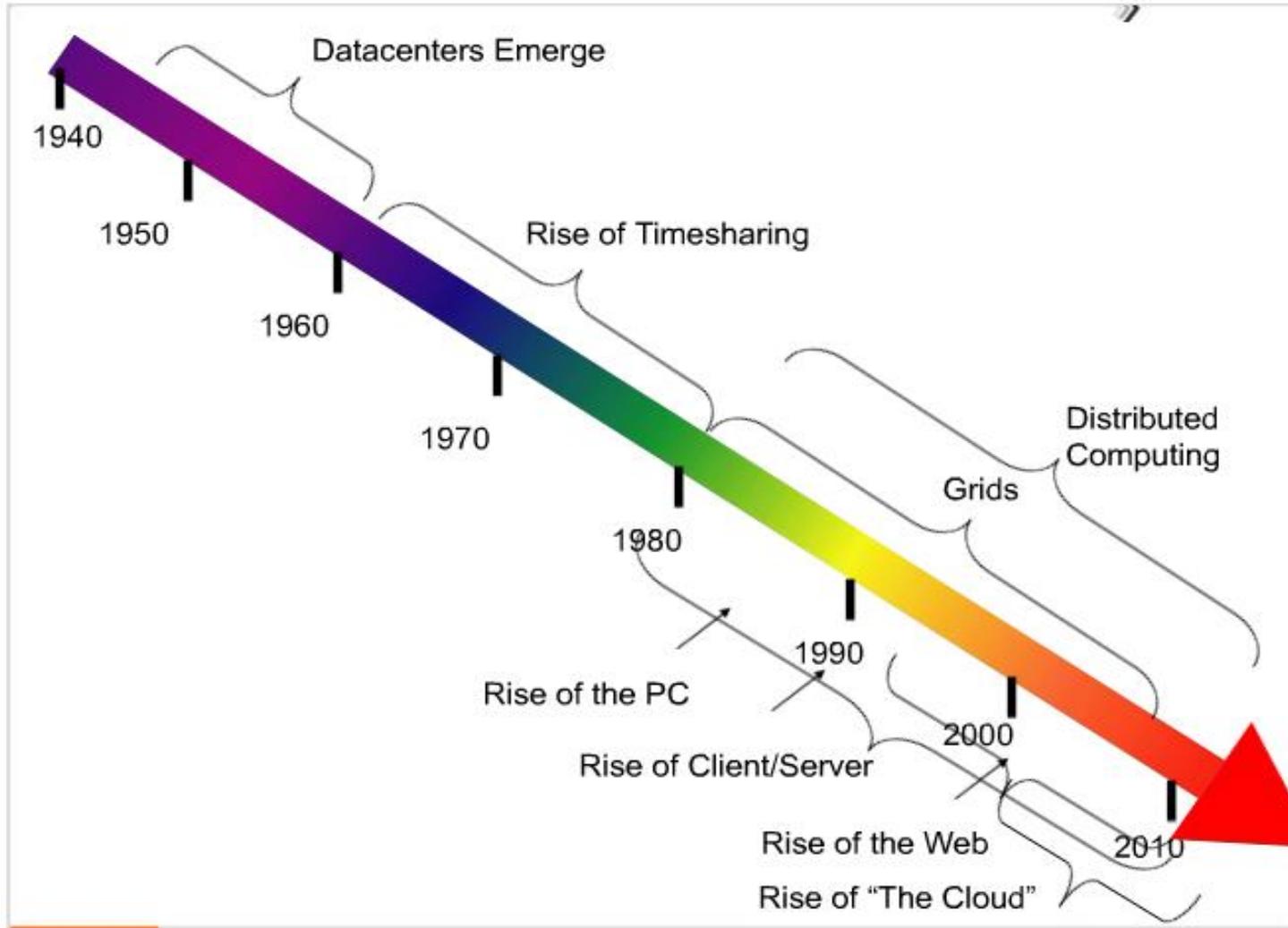"Annually Microsoft invests approximately 9 Billion dollars in R&D.

As of 2012, 95% of Microsoft's 40,000 engineers are working on new cloud applications and new cloud services.

Technology leaders like Microsoft do not invest this heavily on technology that is a fad or has no real chance of succeeding."

"The Cloud is fast changing the landscape of information technology and how businesses view and utilize IT resources"

Vince Mayfield

Gartner's Report on Future of Cloud Computing

Gartner's Report on Future of Cloud Computing