# Cloud based Enterprise Systems (15B22CI521)
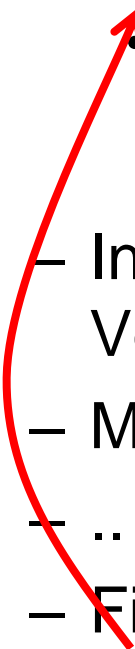
# Origin of the term "Cloud Computing"

- "Comes from the early days of the Internet where we drew the network as a cloud… we didn't care where the messages went… the cloud hid it from us"
Kevin Marks, Google

# The Next Revolution in IT
# The Big Switch in IT

- Classical Computing
  - Buy & Own
    - Hardware, System Software, Applications often to meet peak needs.
  - Install, Configure, Test, Verify
  - Manage
  - ..
  - Finally, use it
  - $$$$....$(High Capital Expenditure)

**Every 18 months?**

- Cloud Computing
  - Subscribe
  - Use
- Cost : pay for what you use, based on QoS
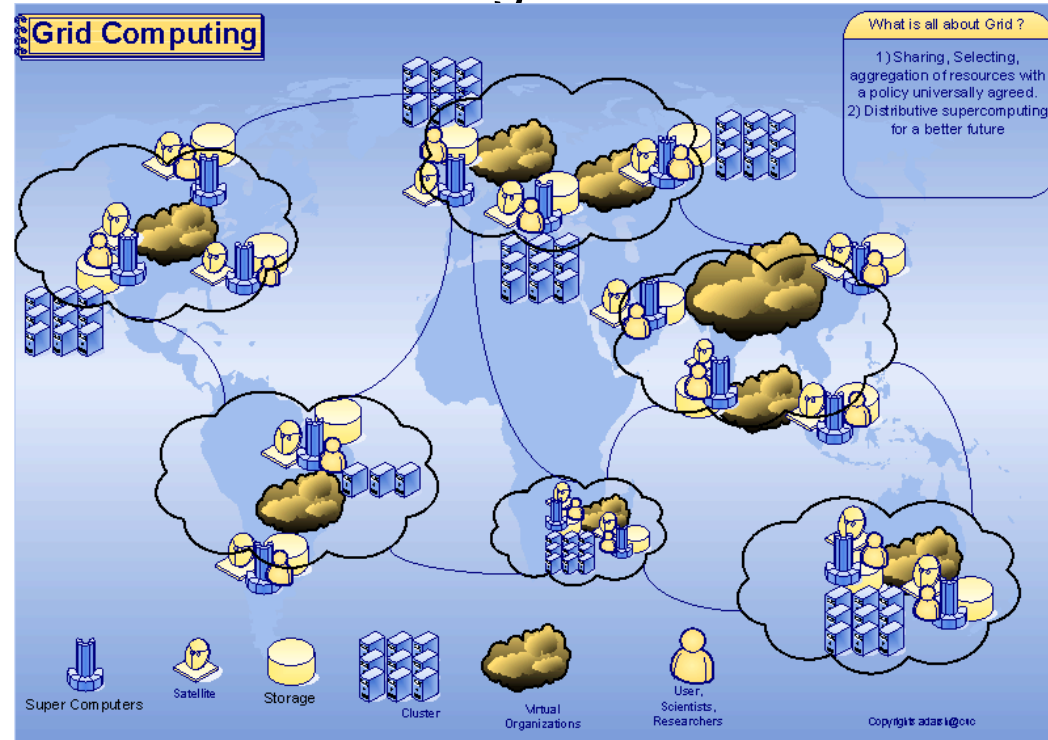
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# Distributed Computing (Grid Computing)

- According to Gartner, "a grid is a collection of resources owned by multiple organizations that is coordinated to allow them to solve a common problem."
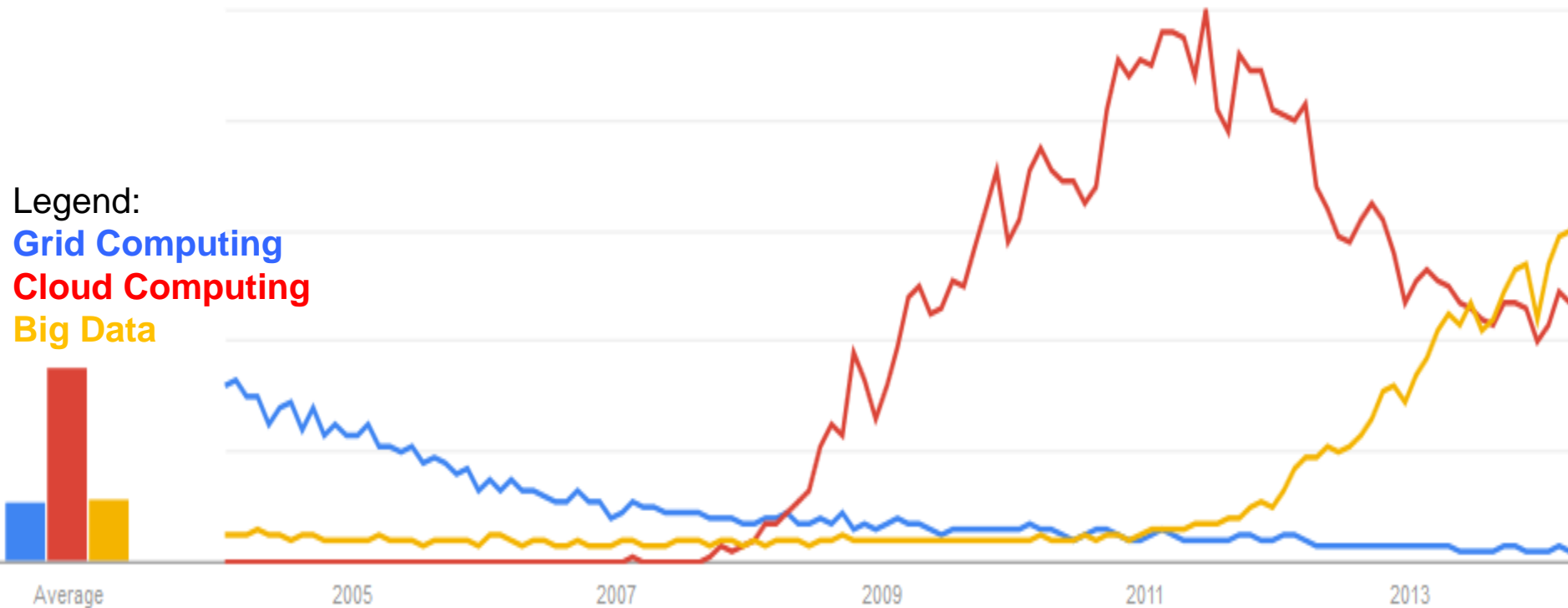
  Characteristics:

  – Loosely coupled

  – No Single System Image

  – Distributed Job Management & scheduling

- Originated early 1990s

# Interest over time
## {grid, cloud, big data} computing



Legend:
**Grid Computing**
**Cloud Computing**
**Big Data**

Average · 2005 · 2007 · 2009 · 2011 · 2013

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# A Working Definition of <mark>Cloud Computing</mark> (NIST)

Cloud computing is a model for

**<span style="color:red">enabling convenient</span>**,

**<span style="color:red">on-demand network access</span>**

to a **<span style="color:red">shared pool of configurable computing resources</span>**

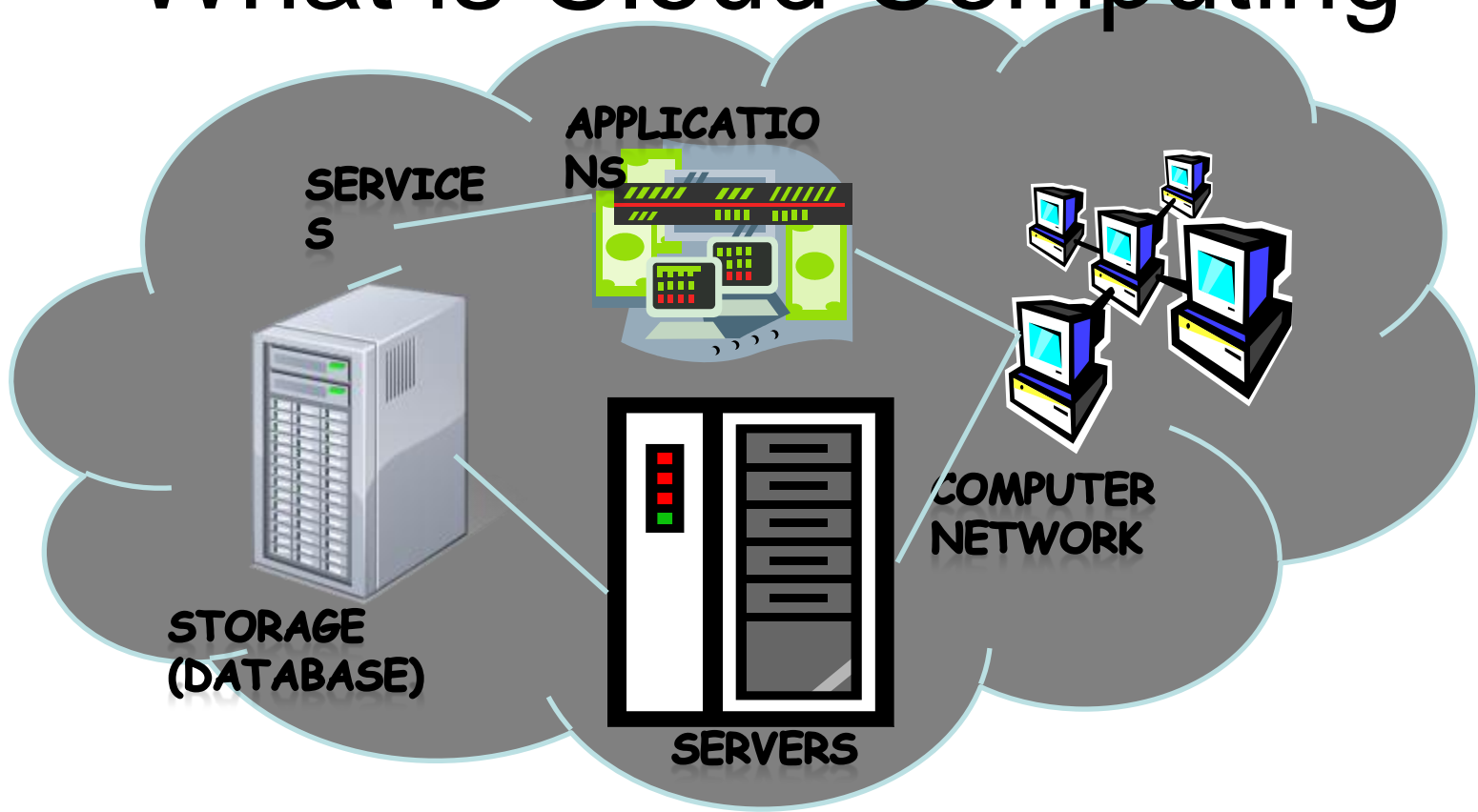(e.g., networks, servers, storage, applications, services, etc)

that can be

**<span style="color:red">rapidly provisioned</span>** and

**<span style="color:red">released with minimal management</span>** effort or service provider interaction.

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# What is Cloud Computing



- Shared pool of configurable computing resources
- On-demand network access
- Provisioned by the Service Provider

# Essential Cloud Characteristics

- On-demand self-service

- Broad network access

- Resource pooling

- Rapid elasticity

- Measured service

|                          | cloud computing solution | on-premise solution |
| ------------------------ | ------------------------ | ------------------- |
| up-front costs (one-time) |                          |                     |
| ongoing costs (monthly)  |                          |                     |

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|  | cloud computing solution | on-premise solution |
|---|---|---|
| up-front costs (one-time) |  | $6 1,400 |

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| | cloud computing solution | on-premise solution |
|---|---|---|
| up-front costs (one-time) | | $6 1,400 |
| hardware purchase | | $42,000 |
| software purchase | | $15,000 |
| labor costs | | $4,400 |

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| | cloud computing solution | on-premise solution |
|---|---|---|
| up-front costs (one-time) | | $6 1,400 |
| hardware purchase | | $42,000 |
| software purchase | | $15,000 |
| labor costs | | $4,400 |
| ongoing costs (monthly) | | $7,200 |

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| | cloud computing solution | on-premise solution |
|---|---|---|
| up-front costs (one-time) | | $6 1,400 |
| hardware purchase | | $42,000 |
| software purchase | | $15,000 |
| labor costs | | $4,400 |
| ongoing costs (monthly) | | $7,200 |
| hardware usage | | $0 |
| bandwidth usage | | $0 |
| hosting costs | | $1,800 |
| insurance costs | | $600 |
| licensing costs | | $1,800 |
| labor costs | | $3,000 |

| | cloud computing solution | on-premise solution |
|---|---|---|
| up-front costs (one-time) | $1,200 | $6 1,400 |
| hardware purchase | $0 | $42,000 |
| software purchase | $0 | $15,000 |
| labor costs | $1,200 | $4,400 |
| ongoing costs (monthly) | | $7,200 |
| hardware usage | | $0 |
| bandwidth usage | | $0 |
| hosting costs | | $1,800 |
| insurance costs | | $600 |
| licensing costs | | $1,800 |
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Bharat

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| ongoing costs (monthly) | $ 9200 | $7,200 |
| hardware usage | $6,000 | $0 |
| bandwidth usage | $1 500 | $0 |
| hosting costs | $0 | $1,800 |
| insurance costs | $0 | $600 |
| licensing costs | $700 | $1,800 |
| labor costs | $1,000 | $3,000 |

Bharat Gupta, India

| | cloud computing solution | on-premise solution |
|---|---|---|
| up-front costs (one-time) | $1,200 | $6 1,400 |
| hardware purchase | $0 | $42,000 |
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# Cloud Storage

- Several large Web companies are now exploiting the fact that they have **data storage capacity** that can be hired out to others.

- **Amazon's Elastic Compute Cloud (EC2)** and **Simple Storage Solution (S3)** are well known examples

# Big Data

- Lots of data is being collected and stored
  - Web data, e-commerce
  - purchases at department/ grocery stores
  - Bank/Credit Card transactions
  - Social Network
  - Healthcare
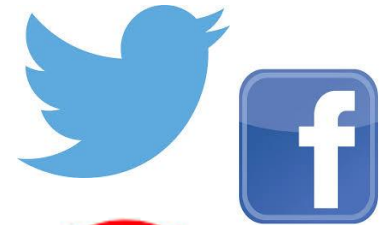
# Type of Data

- Relational Data (Tables/Transaction/Legacy Data)
- Text Data (Web)
- Semi-structured Data (XML)
- Graph Data
  - Social Network, Semantic Web, …
- Streaming Data
  - Network traffic, sensor data,…

# Big Data

- Datasets whose size or type is beyond the ability of traditional relational databases to **capture, manage and process with low latency**

- Majority of this data is real-time and of very large size
  - Wal-Mart handles more than 267 million customer transactions every day
  - Facebook handles more than 3 billion pieces of content from its users per day
  - The Large Hadron Collider (LHC) generates more than 60 TB data per day