Welcome to CLOUD & DEVOPS WORLD...

CLOUD COMPUTING Fundamentals

Cloudz DevOps
Learn & Earn

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COURSE CONTENT

- Who are we?
- Expectation from you…
- What is Cloud?
- Cloud types
- Cloud providers
- Cloud Benefits
- Cloud History
- Data Center
- Cloud Programing

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HOW DO WE DIFFER?

- Working professional in MNC

- Senior consultants and architects

- Real time projects

- Best in consulting & people network

- Industry best practices and governance policies

- Placement assistant

- Continuous friendly support

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WHAT IS THE EXPECTATION FROM YOU?

- Listen up…
- Dedication & Sincerity…
- Practice…
- Raise Question…
- Invest Time….

WHAT IS A CLOUD?

- It's a cluster!
- It's a supercomputer!
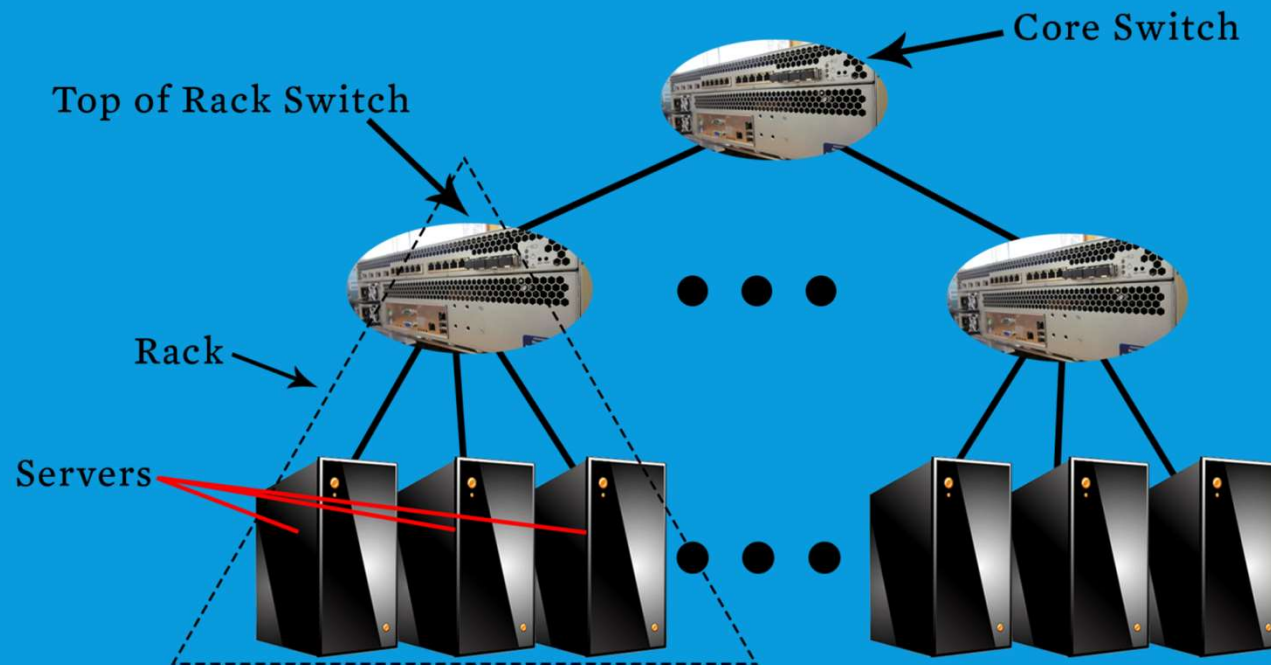- It's a datastore!
- It's superman!

- None of the above
- All of the above

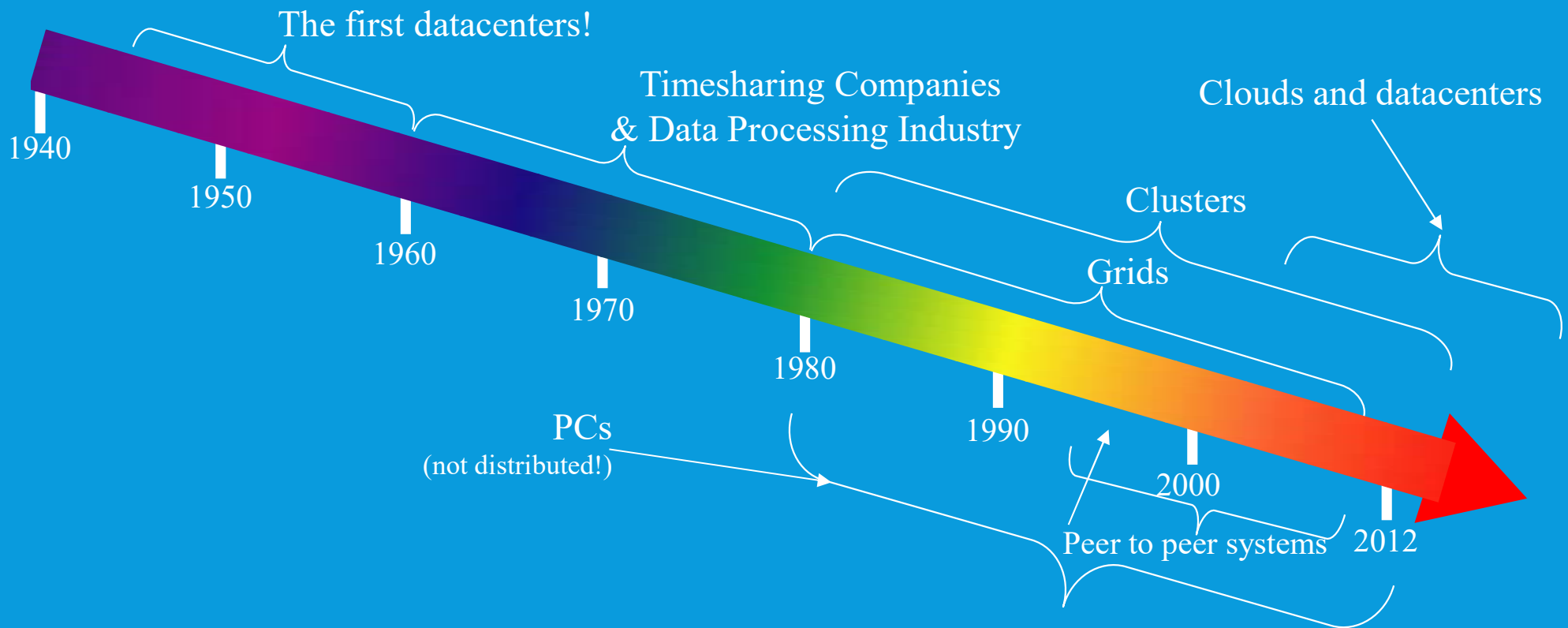- Cloud = Lots of storage + compute cycles nearby

WHAT IS A CLOUD?

- A single-site cloud (aka "Datacenter") consists of
  - Compute nodes (grouped into racks) (2)
  - Switches, connecting the racks
  - A network topology, e.g., hierarchical
  - Storage (backend) nodes connected to the network (3)
  - Front-end for submitting jobs and receiving client requests (1)
  - (1-3: Often called "three-tier architecture")
  - Software Services

- A geographically distributed cloud consists of
  - Multiple such sites
  - Each site perhaps with a different structure and services

A SAMPLE CLOUD TOPOLOGY

"A CLOUDY HISTORY OF TIME"

The first datacenters!

Timesharing Companies
& Data Processing Industry

Clouds and datacenters

Clusters

Grids

1940

1950

1960

1970

1980

1990

2000

2012

PCs
(not distributed!)

Peer to peer systems

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FOUR FEATURES NEW IN TODAY'S CLOUDS

I.   Massive scale
   I.   Scale in & Scale out
   II. Scale up & Scale down

II. On-demand access: Pay-as-you-go, no upfront commitment.
   –   And anyone can access it

III. Data-intensive Nature: What was MBs has now become TBs, PBs and XBs.

IV. New Cloud Programming Paradigms: MapReduce/Hadoop, NoSQL/Cassandra/MongoDB and many others.

TOP CLOUD PROVIDERS

1. Amazon Web Services (AWS)
2. Microsoft Azure
3. Google Cloud
4. Alibaba Cloud
5. IBM Cloud
6. Oracle
7. Salesforce
8. SAP
9. Rackspace Cloud
10. VMWare

CLOUD PROVIDERS...

- AWS: Amazon Web Services
  - EC2: Elastic Compute Cloud
  - S3: Simple Storage Service
  - EBS: Elastic Block Storage

- Microsoft Azure

- Google Cloud/Compute Engine/AppEngine

- Rightscale, Salesforce, EMC, Gigaspaces, 10gen, Datastax, Oracle, VMWare, Yahoo, Cloudera

- And many many more!

TWO CATEGORIES OF CLOUDS

· Public cloud & Private cloud

· Private clouds are accessible only to company employees

· Public clouds provide service to any paying customer:

- · Amazon S3 (Simple Storage Service): store arbitrary datasets, pay per GB-month stored
- · Amazon EC2 (Elastic Compute Cloud): upload and run arbitrary OS images, pay per CPU hour used
- · Google cloud: similar pricing as above
- · Google AppEngine/Compute Engine: develop applications within their appengine framework, upload data that will be imported into their format, and run

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CUSTOMERS SAVE TIME AND $$$

- Dave Power, Associate Information Consultant at Eli Lilly and Company: "With AWS, Powers said, a new server can be up and running in **three minutes** (it used to take Eli Lilly **seven and a half weeks** to deploy a server internally) and a **64-node Linux cluster** can be online in five minutes (compared with three months internally). … It's just shy of instantaneous."

- Ingo Elfering, Vice President of Information Technology Strategy, GlaxoSmithKline: "With Online Services, we are able to reduce our IT **operational costs** by roughly **30%** of what we're spending"

- Jim Swartz, CIO, Sybase: "At Sybase, a private cloud of virtual servers inside its datacenter has saved nearly **$US2 million annually** since 2006, Swartz says, because the company can share computing power and storage resources across servers."

- 100s of startups in Silicon Valley can harness large computing resources without buying their own machines.

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QUIZ: WHERE IS THE WORLD'S LARGEST DATACENTER?

THE WORLD'S LARGEST DATACENTER…

- China Telecom
  - Area: 10,763,910 square feet
  - Location: Hohhot, China

- Chine Mobile
  - Area: 7,750,015 square feet
  - Location: Hohhot, China

- The Citadel Campus
  - Area: 7,750,015 square feet
    Location: Nevada, United States

- **INDIA – Tulip Data Center**

- **Area:** 970,000 square feet
  Location: Bengaluru, India

- See:
  - https://www.rankred.com/largest-data-centers-in-the-world/
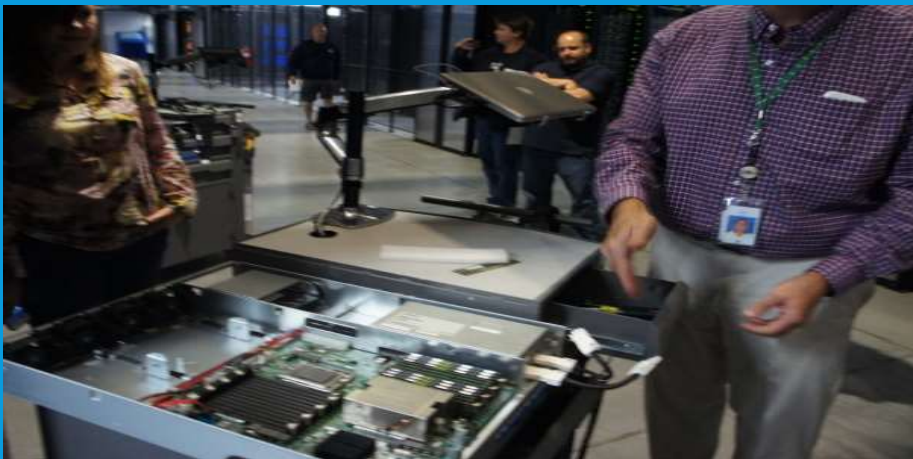
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WHAT DOES A DATACENTER LOOK LIKE FROM INSIDE?

SERVERS

Front

Back

In

Some highly secure (e.g., financial info)

ON-DEMAND ACCESS

On-demand: renting a cab vs. (previously) renting a car, or buying one. E.g.:
- AWS Elastic Compute Cloud (EC2): a few cents to a few $ per CPU hour
- AWS Simple Storage Service (S3): a few cents per GB-month

- HaaS: Hardware as a Service
  - You get access to barebones hardware machines, do whatever you want with them, Ex: Your own cluster
  - Not always a good idea because of security risks

- SaaS – Software as a Service
  - Office-365

- PasS – Platform as a Service
  - Azure App Service, Amazon Beanstalk

- IaaS: Infrastructure as a Service
  - You get access to flexible computing and storage infrastructure. Virtualization is one way of achieving this (cgroups, Kubernetes, Dockers, VMs,…). Often said to subsume HaaS.
  - Ex: Amazon Web Services (AWS: EC2 and S3), OpenStack, Eucalyptus, Rightscale, Microsoft Azure, Google Cloud.

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NEW CLOUD PROGRAMMING PARADIGMS

- Easy to write and run highly parallel programs in new cloud programming paradigms:
  - Google: MapReduce and Sawzall
  - Amazon: Elastic MapReduce service (pay-as-you-go)
  - Google (MapReduce)
    - Indexing: a chain of 24 MapReduce jobs
    - ~200K jobs processing 50PB/month (in 2006)
  - Yahoo! (Hadoop + Pig)
    - WebMap: a chain of several MapReduce jobs
    - 300 TB of data, 10K cores, many tens of hours (~2008)
  - Facebook (Hadoop + Hive)
    - ~300TB total, adding 2TB/day (in 2008)
    - 3K jobs processing 55TB/day
  - Similar numbers from other companies, e.g., Yieldex, eharmony.com, etc.
  - NoSQL: MySQL is an industry standard, but Cassandra is 2400 times faster!

SUMMARY

- Cloud basics

- Cloud types

- Cloud providers

- Cloud Benefits

- Cloud History

- Data Center

- Cloud Programing

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THANK YOU…

Q & A - Session