

TYPES OF CLOUD SERVICES

Chapter 3

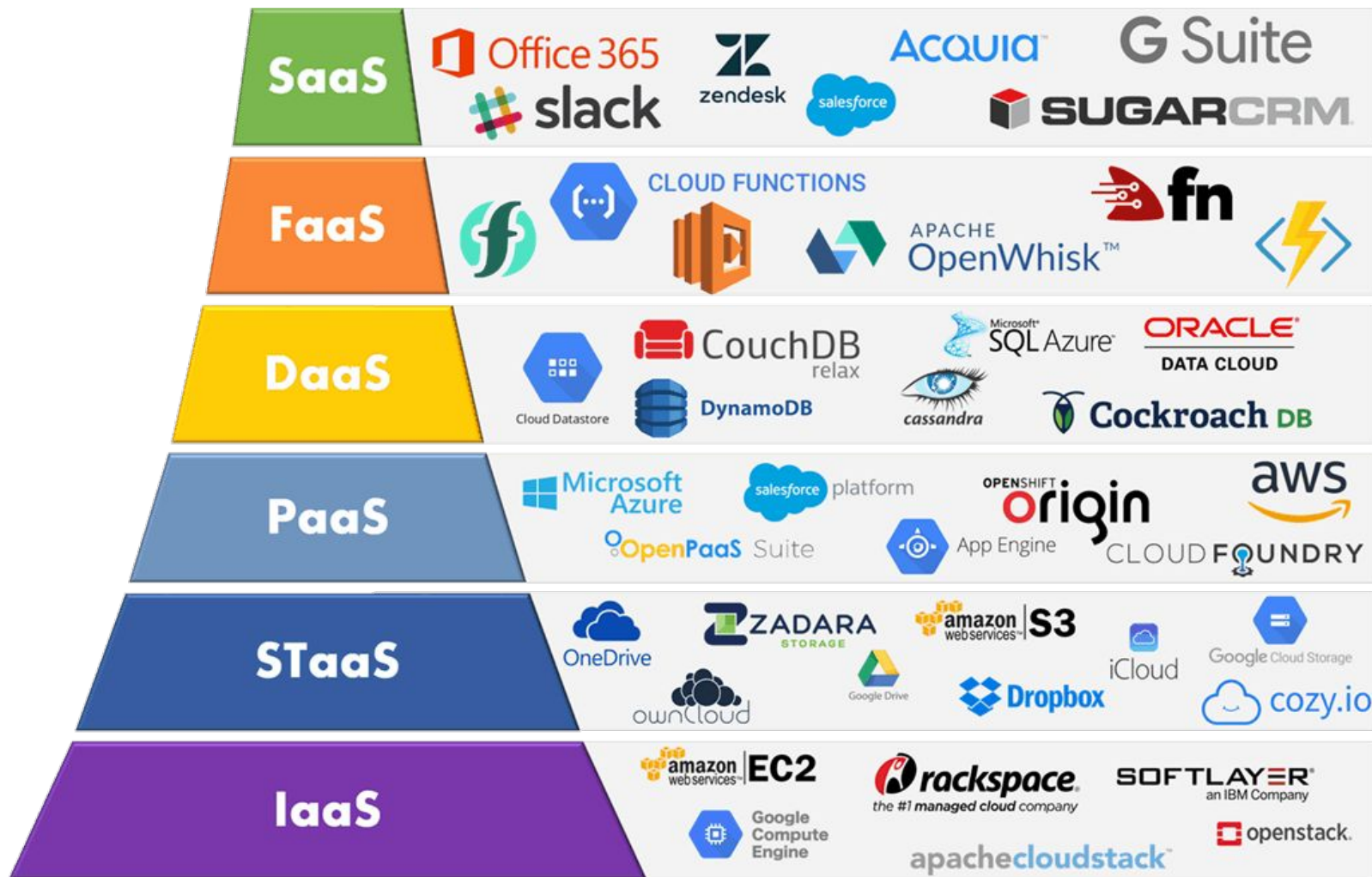
TOPICS

- Introduction to cloud different services
- Service providers
- Google -App Engine
- Amazon EC2
- Microsoft Azure
- Sales force
- Introduction to Hadoop Framework

CLOUD SERVICES
























Cloud services are application and infrastructure resources that exist on the Internet.

Third-party providers contract with subscribers for these services, allowing customers to leverage powerful computing resources without having to purchase or maintain hardware and software.



DevOps Services

@ Rabi Prasad Padhy

Category	AWS	Azure	Google Cloud
Source Code Management	 CodeCommit	 Repos	 Cloud Source Repositories
Package Management	 Elastic Container Registry	 Artifacts	 Container Registry
CI/CD Pipeline	 CodePipeline	 Pipelines	 Cloud Build
Unit and Integration Testing	 CodePipeline	 Test Plans	 Cloud Build
Deployment	 CodeDeploy	 Pipelines	 Cloud Build
Infrastructure Automation	 Cloud Formation	 Resource Manager	 Deployment Manager
Project Management	 CodeStar	 Boards	
Monitoring	 Cloudwatch	 Azure Monitor	 Stackdriver



- Elastic Compute Cloud (EC2)
- Elastic Kubernetes Service (EKS)
- Lambda
- Simple Storage Service (S3)
- Elastic Block Store
- Elastic File System
- Virtual Private Cloud
- Route 53
- Elastic Load Balancing
- Web Application Firewall
- RDS
- DynamoDB
- Redshift
- Elastic MapReduce
- Kinesis
- SageMaker
- Glue
- EventBridge
- Simple Queuing Service
- Simple Notification Service
- CloudWatch
- CloudFormation
- IAM
- KMS



- Virtual Machine
- Azure Kubernetes Service (AKS)
- Azure Functions
- Blob Storage
- Managed Disk
- File Storage
- Virtual Network
- DNS
- Load Balancer
- Web Application Firewall
- SQL Database
- Cosmos DB
- Synapse Analytics
- HDInsight
- Streaming Analytics
- Machine Learning
- Data Factory
- Event Grid
- Storage Queues
- Service Bus
- Monitor
- Resource Manager
- Active Directory
- Key Vault



- Compute Engine
- Google Kubernetes Engine (GKE)
- Cloud Functions
- Cloud Storage
- Persistent Disk
- File Store
- Virtual Private Cloud
- Cloud DNS
- Cloud Load Balancing
- Cloud Armor
- Cloud SQL
- Firebase Realtime Database
- BigQuery
- Dataproc
- Dataflow
- Vertex AI
- Data Fusion
- Eventarc
- Pub/Sub
- Firebase Cloud Messaging
- Cloud Monitoring
- Deployment Manager
- Cloud Identity
- Cloud KMS



- Virtual Machine
- Oracle Container Engine
- OCI Functions
- Object Storage
- Persistent Volume
- File Storage
- Virtual Cloud Network
- DNS
- Load Balancer
- Web Application Firewall
- ATP
- NoSQL Database
- Autonomous Data Warehouse
- Big Data
- Streaming
- Data Science
- Data Integration
- Events
- Streaming
- Notifications
- Monitoring
- Resource Manager
- IAM
- Vault

Top 10 Cloud Providers



GOOGLE APP ENGINE

GOOGLE APP ENGINE



GOOGLE APP ENGINE

The trend of building applications on the cloud is gaining traction because it offers a variety of advantages, including increased business opportunities, security, and scalability.

To develop a web application, however, you would need a suitable cloud computing technology.

This is where Google App Engine fits in by allowing you to build and host web applications on a fully-managed serverless platform.

WHAT IS APP ENGINE?

- App Engine is a fully managed, serverless platform for building and hosting web applications at scale.
- It is called serverless because when you deploy your application in App Engine, the infrastructure underlying the application is completely managed by Google.
- App Engine is Google's Platform-as-a-Service offering. It is a platform that allows you to host your applications without having to manage the underlying infrastructure or scalability of the platform.
- The platform is completely managed by the service provider, in this case, Google Cloud Platform. As a comparison to any other provider, Red Hat offers OpenShift as a PaaS solution, and AWS offers Elastic Beanstalk as a PaaS solution.

FEATURES OF GOOGLE APP ENGINE

1. App Engine supports several programming languages and provides the ability to import libraries and frameworks through Docker containers. You can develop and test the app locally using the SDK that includes tools for deploying apps. SDKs and runtimes are available for each language. Some of the languages offered are Python, PHP, .NET, Java, Ruby, C#, Go, and Node.JS.
2. The Google App Engine lets you customize the code for your web applications while Google takes care of the infrastructure. The engine ensures that your web apps are secure and running while protecting them from malware and threats.
3. It uses a pay-as-you-go model, meaning you only pay for the resources you use. The app engine automatically scales up resources when the application traffic shoots up, and vice versa.
4. Cloud Monitoring and Cloud Logging offers app scans for detecting bugs. The app reporting document assists developers in fixing bugs as soon as possible.
5. App engines automatically route traffic to different versions of apps as part of A/B testing. You can plan the increments based on which version of the app performs well.

APP ENGINE ENVIRONMENTS

In a standard environment, an application runs in language-specific sandboxes.

It supports Python 2.7, Python 3.7, Python 3.8, Python 3.9, Java 8, Java 11, Node.js 10, Node.js 12, Node.js 14, Node.js 16, PHP 5.5, PHP 7.2, PHP 7.3, PHP 7.4, Ruby 2.5, Ruby 2.6, Ruby 2.7, Go 1.11, Go 1.12, Go 1.13, Go 1.14, Go 1.15, and Go 1.16.

ADVANTAGES OF USING APP ENGINE

1. When there is no traffic, the application can scale down to 0 instances.
2. Simulates the actual live environment setup exactly for deployment. Can even be deployed straight from Eclipse to PROD.
3. Almost instantaneous deployment.
4. In cases of auto-scaling, the VM instance is created in seconds.

DISADVANTAGE OF USING APP ENGINE

1. There is no direct way to consume compute engine resources from the app engine, which is a major disadvantage.
2. VMs cannot be accessed via SSH from the standard environment. This limits the ability to integrate with third-party systems.
3. Background processes cannot be run. Alternatively, we can use cron.yaml and queues/TaskWorker for any background manipulation.
4. For projects that use multi-threading and where performance is a concern, a standard environment can be a killer.
5. Every instance comes with a start up charge of 15 minutes. You'll also be billed by Google for 15 minutes after the last thread is finished.
6. Applications in the standard environment are single-homed, meaning that they are all located in the same availability zone.

APPLICATION

An application is like a container for everything.

Each project can have only one application. For instance, if you want to deploy three microservices, you will first create one application in a project, and underneath that application, you can create services for each microservice. You can also create services for your full-stack applications, one for the backend and one for the frontend.

Service -

Services are the microservices or the app components that you can run on App Engine. A single application can contain multiple services.

Each service can be customized. Formerly, services were called modules. Underneath the service, you can have multiple versions of each service.

Version -

Versions are simply specific versions of your service which are accompanied by code and configuration. At the same time, there can be multiple versions. There can be more than one instance of each version. As part of your App Engine, you have options for rolling back and splitting traffic.

AMAZON EC2

Amazon Elastic Compute Cloud or Amazon EC2 is defined as a virtual computing environment.

It allows people to use their web service interfaces for launching several instances with diverse operating systems.

Along with that, it also allows the users to implement network access control or permissions.



WHAT IS AMAZON EC2 OR ELASTIC COMPUTE CLOUD?

Amazon EC2 is one of the most prominent services of AWS that has helped businesses to run their applications over the public cloud seamlessly. With the use of the EC2 interface, the developers can integrate several virtual machine instances and configure their scaling capacity.

The purpose of integrating Amazon EC2 into the business environment is to build apps for automating the scaling aspects based upon the needs and requirements at certain instances. Along with that, it becomes really easy to manage the storage and deploy virtual servers over the cloud with the use of Amazon EC2.

The best part is that you are saving a lot on the upfront cost of setting up the hardware proposition. And, you are also inching your operational aspects to streamline the development processes within your enterprise with EC2.

HOW CAN WE USE AMAZON EC2?

In order to better understand the efficacy of AWS Elastic Compute Cloud, it is important for you to understand and implement the right ways of using it. Therefore, here are the steps that you need to follow for using this popular AWS service:

1. Firstly, you will have to select an AMI (Amazon Machine Image), which is usually a pre-configured template. You need to pick one right away to instantly move onto the next step of integrating it. If not that, you can still create a custom AMI that will have your data, applications, libraries, configuration setting, and other such aspects.
2. In the second step, you will have to configure network and security accessibility upon the EC2 instance.

HOW CAN WE USE AMAZON EC2?

3. Now, select the type of instance you wish to integrate, following to which you can start, monitor, and terminate the instances as per the necessity of your AMI. You will be doing it with the use of APIs embedded within your web service and the management tools offered to you with EC2.
4. Now, you will have to determine whether you want to run your EC2 instance in multiple locations. Along with that, you will also have to utilize the IP endpoints. If not that, you will have to add block storage for your EC2 instances.
5. Finally, you will be billed only for the resources that you actually use, such as data transfer or instance hours.

Amazon EC2: Instances Types



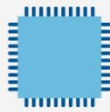
Amazon
EC2

General
Purpose



M4

Compute
Optimized



C4

Storage & IO
Optimized



I2

D2

GPU
Enabled



G2

Memory
Optimized



R3

Smaller
Instances

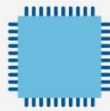


T2

Added
Instances
Types



M3



C3



I2



M1



C1



CC2



HI1

HS1



CG1



M2



CR1



T1

TYPES OF EC2 INSTANCES

The nature of our application or task will decide which type of instances we need. AWS offers different types of instances optimized for different use cases or workloads.

1. General Purpose Instance
2. Compute Optimized Instance
3. Memory Optimized Instance
4. Storage Optimized Instance
5. Accelerated Computing

GENERAL PURPOSE INSTANCES

The general purpose instances are divided into two varieties, T and M.

This type of instance is suitable for applications that require to balance performance and cost.

T and M instances are based on the virtualization types PV and HVM.

T instances are more suitable for testing environments and M instances are suitable for production workloads.

COMPUTE OPTIMIZED INSTANCES

The compute optimized instances (C type) are recommended for the workloads which require a lot of processing power from the CPU.

More suitable for data analysis and data processing applications.

MEMORY OPTIMIZED INSTANCES

If the application is heavy and needs a lot of RAM but doesn't require a lot of CPU power, then memory optimized instances are the best choice.

STORAGE OPTIMIZED INSTANCE

Storage optimized instances are provisioned with more storage capacity.

H, I and D instances belong to this group. When the application is huge and has a lot of data to be stored on the local disk, this type of instance would be a better choice.

ACCELERATED COMPUTING

P and G instance types belong to this group.

These types of instances are more suitable for the applications which require heavy graphics rendering.

These instances have their own graphics card and GPU based on the instance size.

ELASTIC COMPUTE CLOUD (EC2) PRICING OPTIONS

AWS offers different purchase options for EC2:

- On Demand Instances
- Spot Instances
- Reserved Instances
- Dedicated Hosts
- Dedicated Instances
- Capacity Reservations

EC2 PRICING BASED ON INSTANCE

On-Demand instances are used when you don't want any upfront payment and long term commitment. Follows pay-as-you-go pricing model and recommended for unpredictable and short term workloads.

Spot Instances can give discounts of up to 90% compared to on-demand instances. This pricing option enables you to bid on unused EC2 instances. Price fluctuates based on the availability of instances. Recommended for batch processing and not recommended for critical jobs.

Reserved instances save a significant amount of cost compared to on-demand instances. In this type you reserve the instance for a specific period of time.

PAYMENT AS PER RESERVATION

There are three payment options available for reserved instances:

- All Upfront
- Partial Upfront
- No Upfront

There are two term lengths available to select from:

- One-Year
- Three-Year

There are two different classes available in the reserved instance type:

- Standard Reserved Instances
- Convertible Reserved instances

MS AZURE

AZURE

Microsoft Azure, often referred to as Azure is a cloud computing platform run by Microsoft, which offers access, management, and development of applications and services through global data centers.

It provides a range of capabilities, including software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS).

AZURE SERVICES

Different areas of Azure services -

Storage services,

Compute services,

Network services,

App services,

DataBases,

Analytics,

Integration services,

IoT,

Security services,

Monitoring and Diagnostics, etc.



AZURE VIRTUAL MACHINE

Azure Virtual Machines are image service instances that provide on-demand and scalable computing resources with usage-based pricing.

More broadly, a virtual machine behaves like a server: It's a computer within a computer that provides the user the same experience they would have on the host operating system itself. In general, virtual machines are sandboxed from the rest of the system, meaning that the software inside a virtual machine can't escape or tamper with the underlying server itself.

Each virtual machine provides its own virtual hardware including CPUs, memory, hard drives, network interfaces, and other devices.

SALES FORCE

SALES FORCE

Salesforce, Inc. is an American cloud-based software company headquartered in San Francisco, California.

It provides customer relationship management software and applications focused on sales, customer service, marketing automation, e-commerce, analytics, and application development



SALESFORCE CRM

Customer Relationship Management (CRM) platform enables businesses to manage customer data, sales operations, and marketing campaigns.

It provides various features, and tools businesses can use to improve customer relationships, including customer segmentation, customer data management, and customer support.

Salesforce also offers a variety of integrations with third-party applications and services, making it a powerful and versatile CRM platform.



What is CRM?

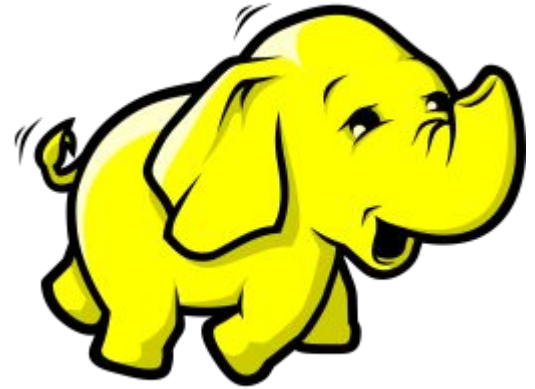


HADOOP

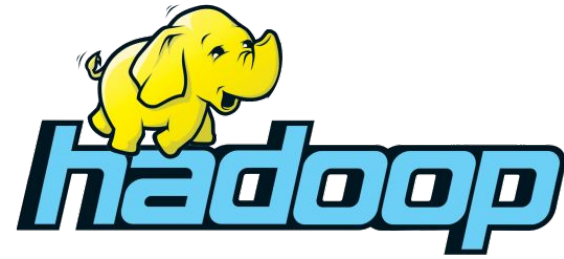
INTRODUCTION TO HADOOP FRAMEWORK

Apache Hadoop is a collection of open-source software utilities that facilitates using a network of many computers to solve problems involving massive amounts of data and computation.

It provides a software framework for distributed storage and processing of big data using the MapReduce programming model



WHAT IS HADOOP?



An Open Source framework that allows distributed processing of large data-sets across the cluster of commodity hardware

Open Source:

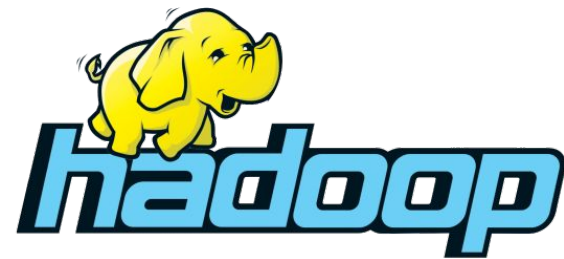
Source code is freely available, It may be redistributed and modified

Distributed Processing:

Data is processed distributedly on multiple nodes / servers

Multiple machines processes the data independently

WHAT IS HADOOP ? ..II



An Open Source
framework that allows
distributed processing
of large data-sets
across the cluster of
commodity hardware

Cluster:

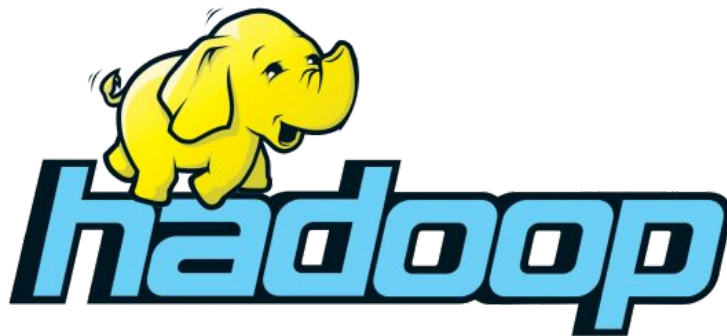
Multiple machines connected
together, Nodes are connected
via LAN

Commodity Hardware:

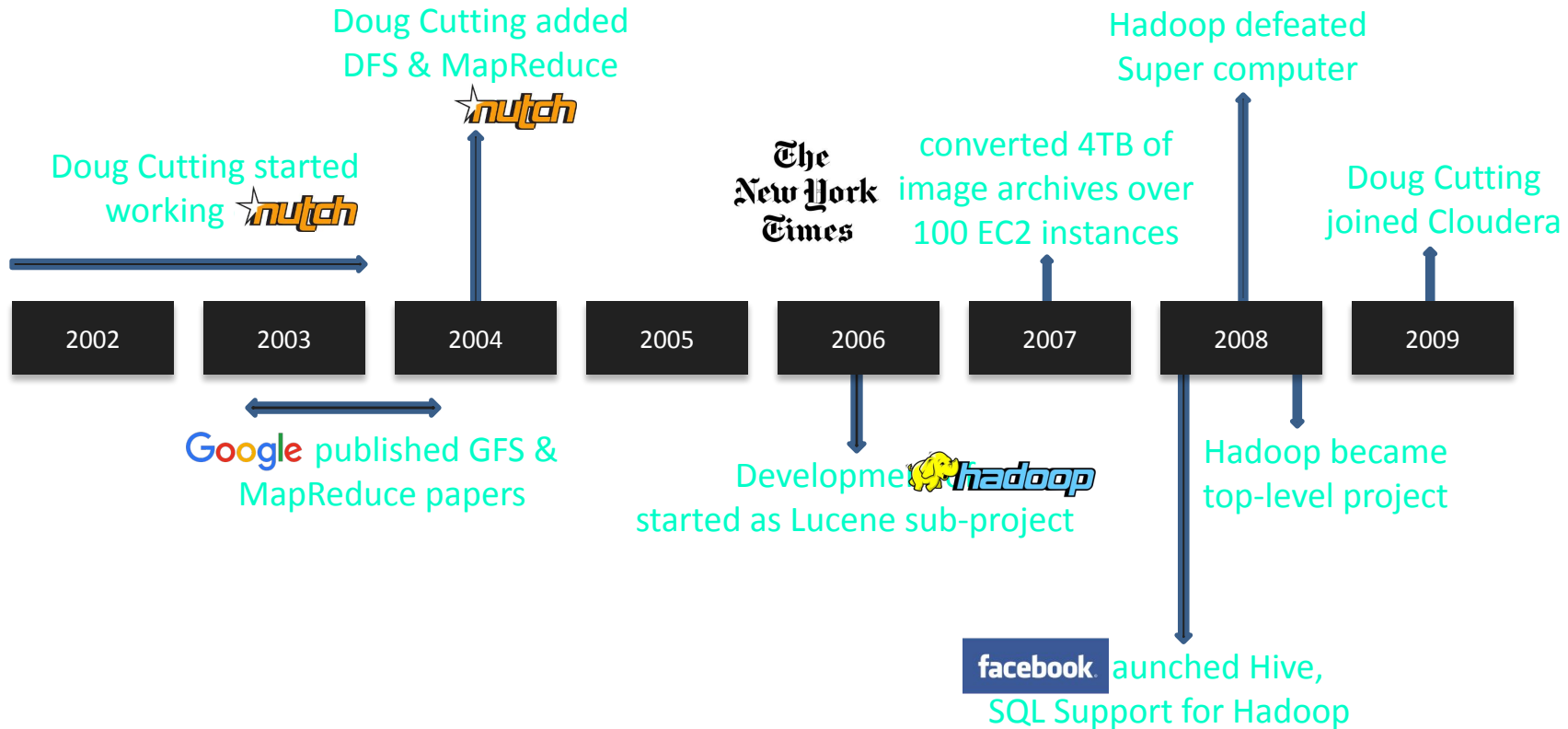
Economic / affordable machines
,Typically low performance
hardware

WHAT IS HADOOP?

- Open source framework written in Java
- Inspired by Google's Map-Reduce programming model as well as its file system (GFS)

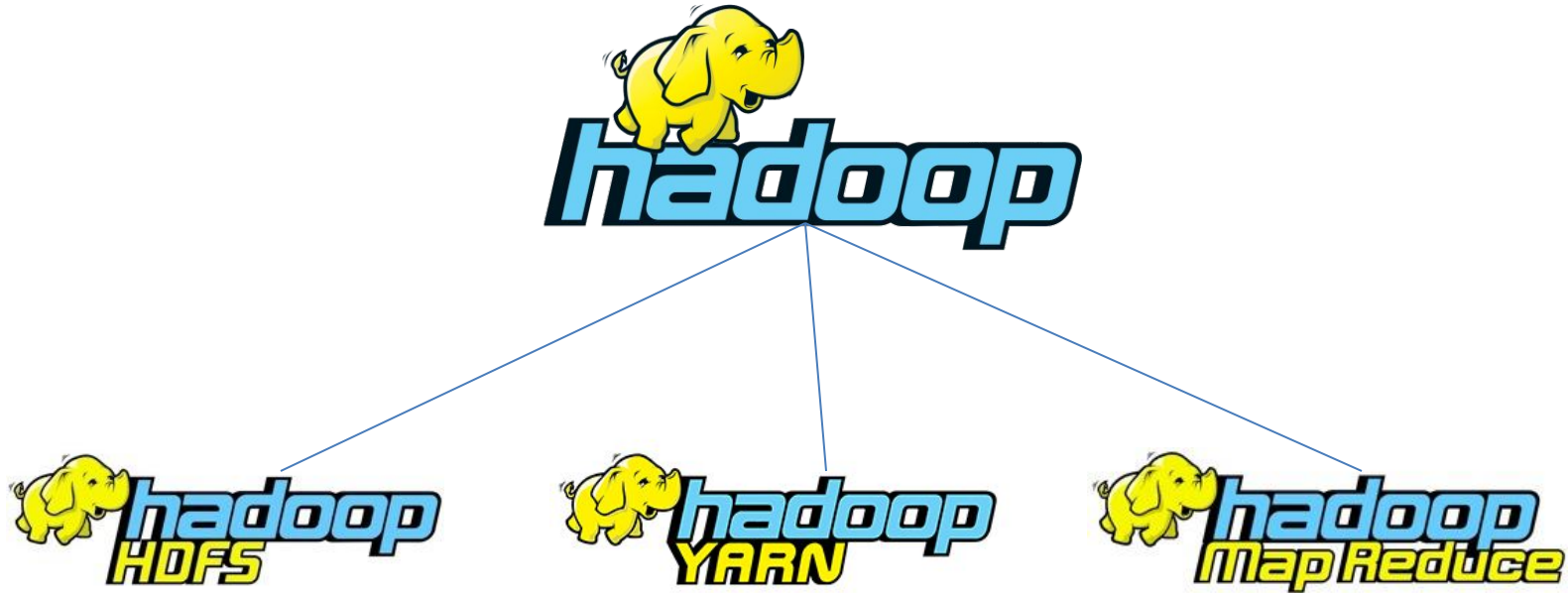


Hadoop History

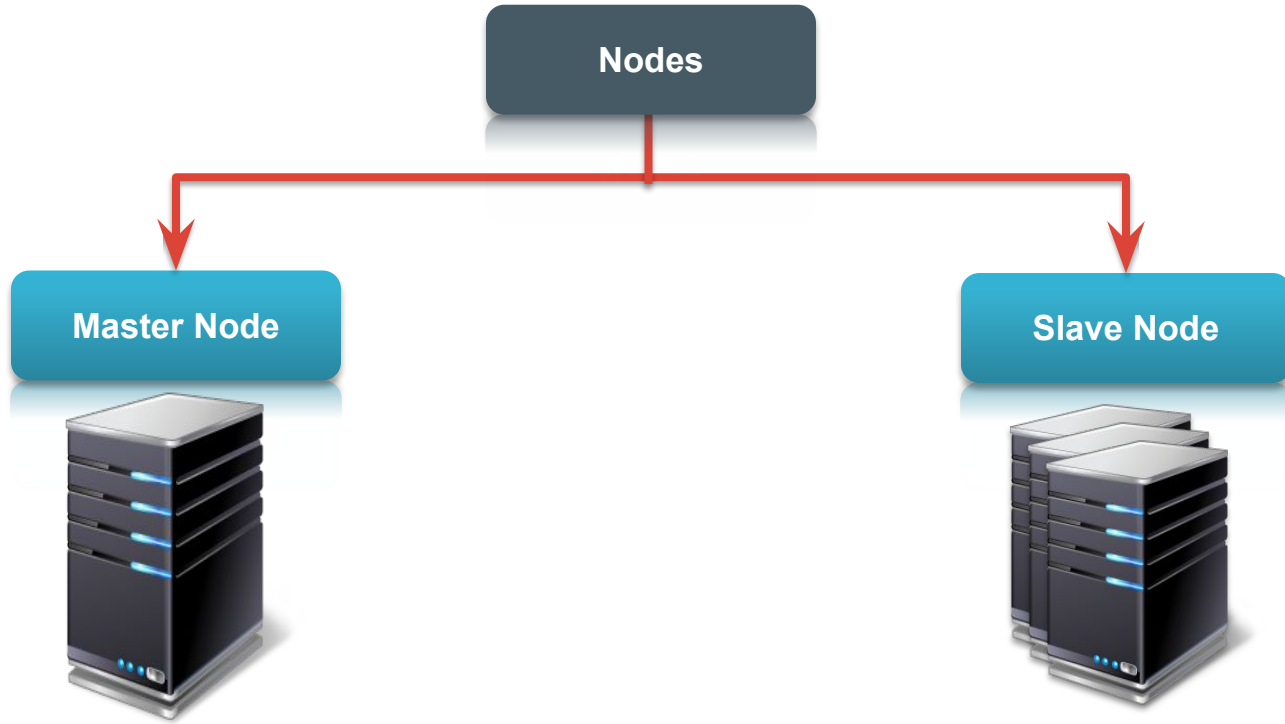


HADOOP COMPONENTS

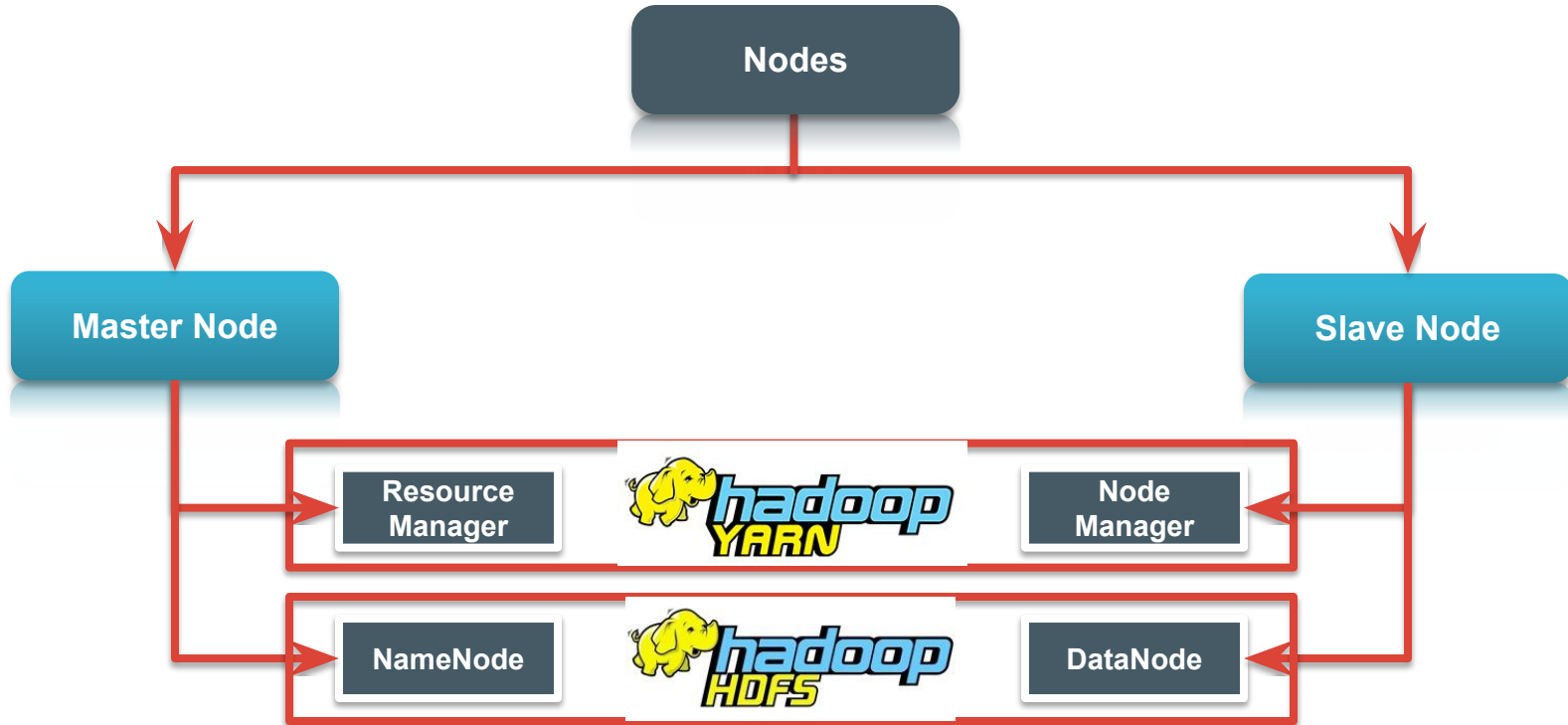
Hadoop consists of three key parts



HADOOP NODES



HADOOP DAEMONS



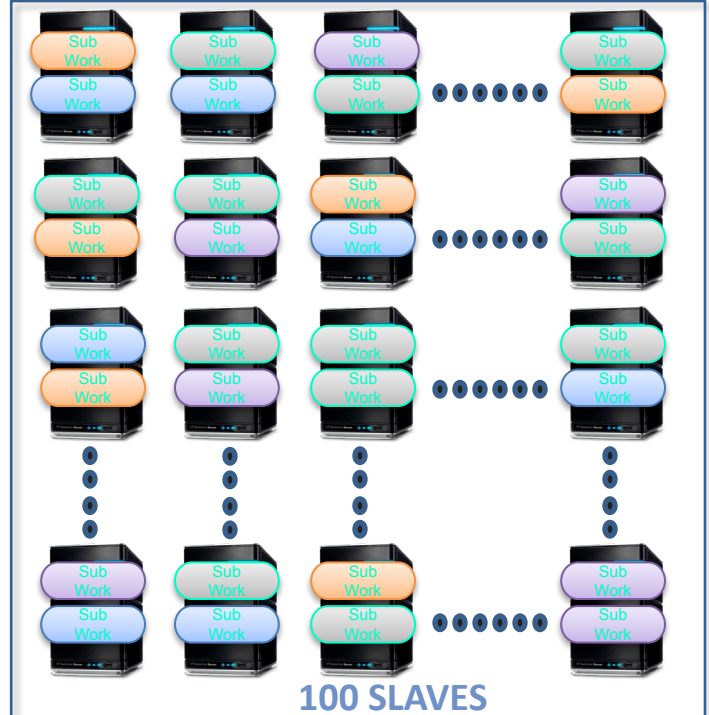
BASIC HADOOP ARCHITECTURE



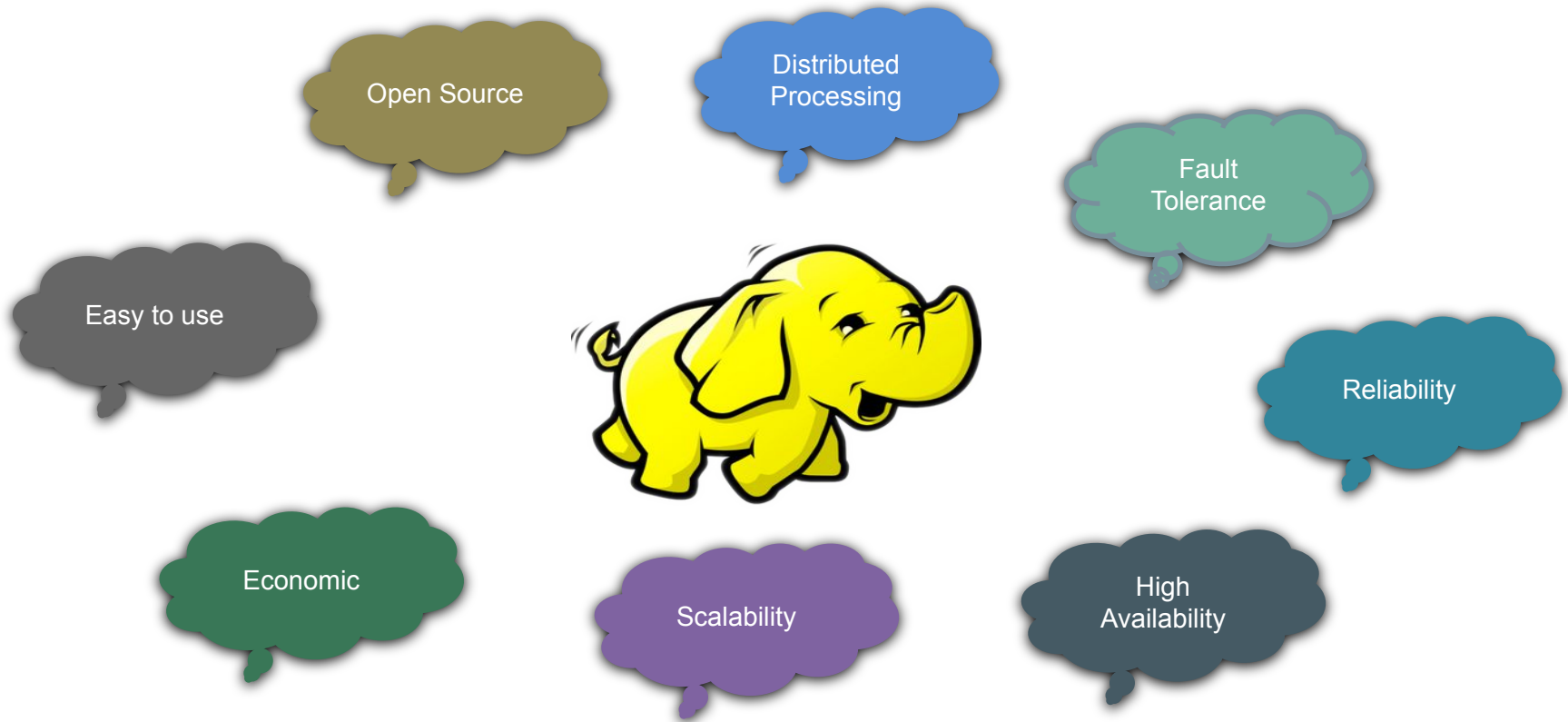
USER



MASTER(S)

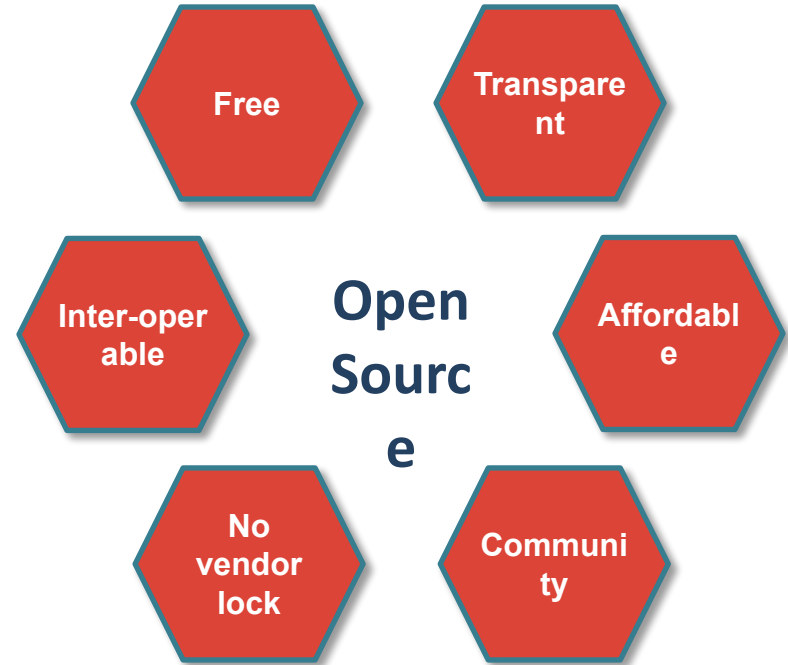


HADOOP CHARACTERISTICS



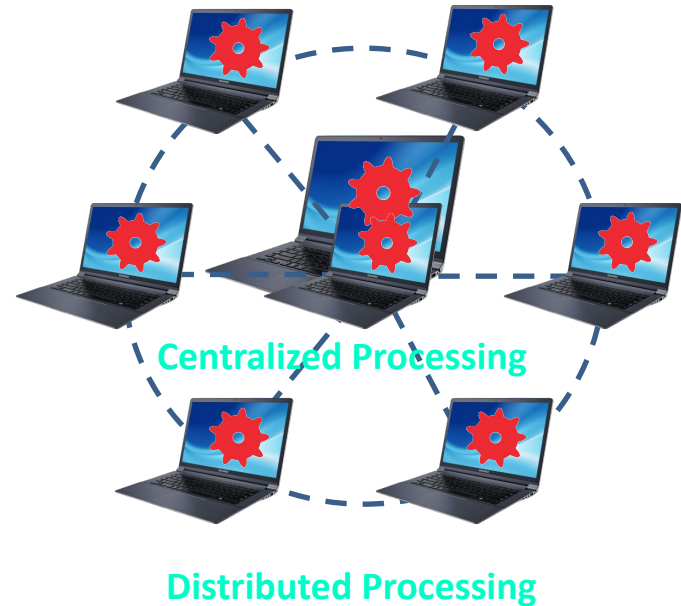
OPEN SOURCE

- SOURCE CODE IS FREELY AVAILABLE
- CAN BE REDISTRIBUTED
- CAN BE MODIFIED



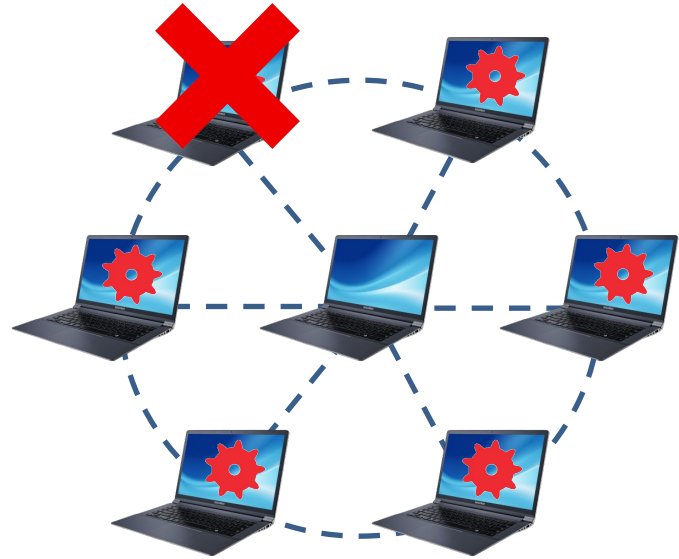
DISTRIBUTED PROCESSING

- DATA IS PROCESSED DISTRIBUTEDLY ON CLUSTER
- MULTIPLE NODES IN THE CLUSTER PROCESS DATA INDEPENDENTLY



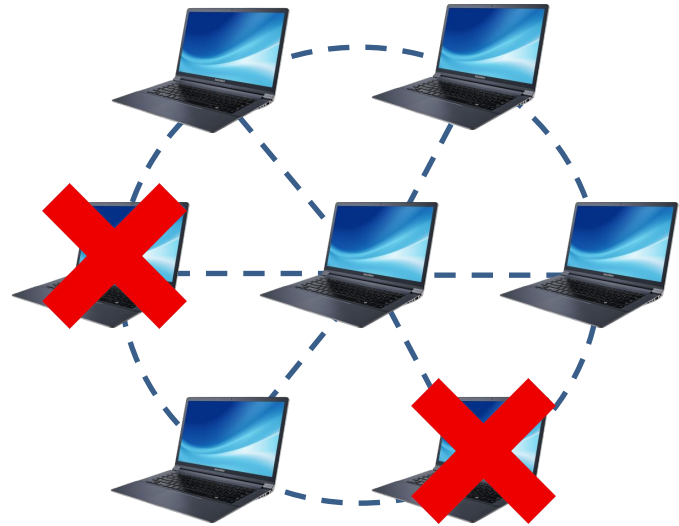
FAULT TOLERANCE

- FAILURE OF NODES ARE RECOVERED AUTOMATICALLY
- FRAMEWORK TAKES CARE OF FAILURE OF HARDWARE AS WELL TASKS



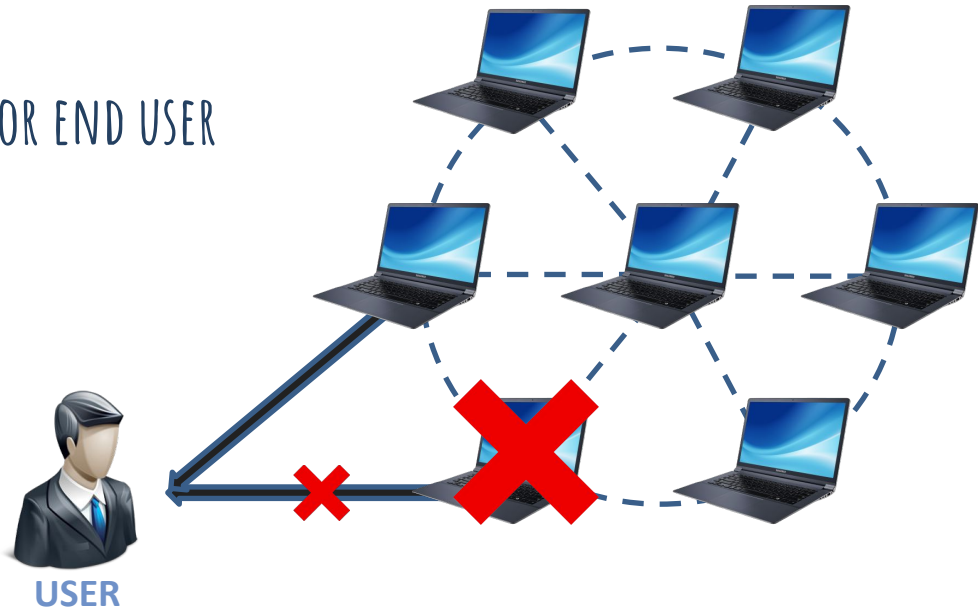
RELIABILITY

- DATA IS RELIABLY STORED ON THE CLUSTER OF MACHINES DESPITE MACHINE FAILURES
- FAILURE OF NODES DOESN'T CAUSE DATA LOSS



HIGH AVAILABILITY

- DATA IS HIGHLY AVAILABLE AND ACCESSIBLE
DESPITE HARDWARE FAILURE
- THERE WILL BE NO DOWNTIME FOR END USER
APPLICATION DUE TO DATA



SCALABILITY

- VERTICAL SCALABILITY – NEW HARDWARE CAN BE ADDED TO THE NODES

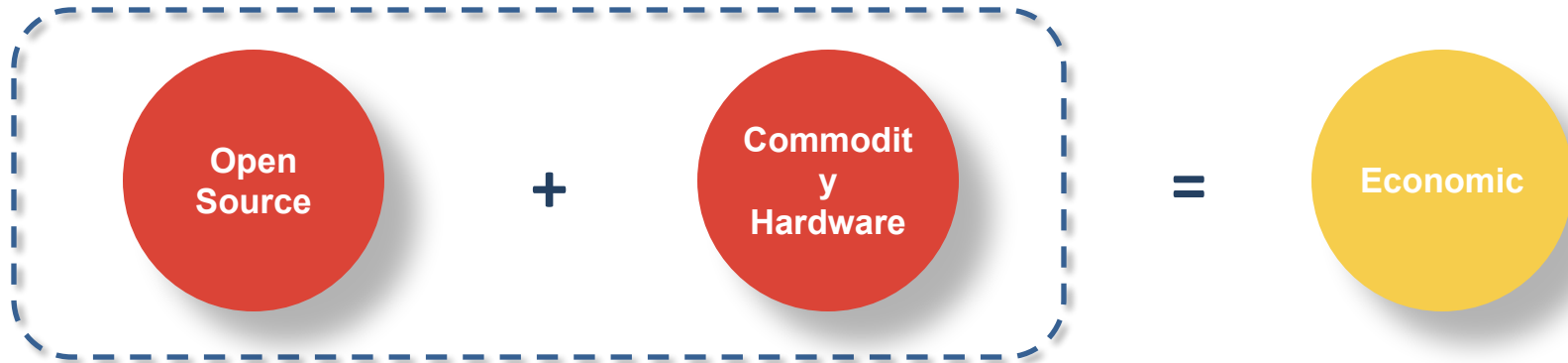


- HORIZONTAL SCALABILITY – NEW NODES CAN BE ADDED ON THE FLY



ECONOMIC

- NO NEED TO PURCHASE COSTLY LICENSE
- NO NEED TO PURCHASE COSTLY HARDWARE



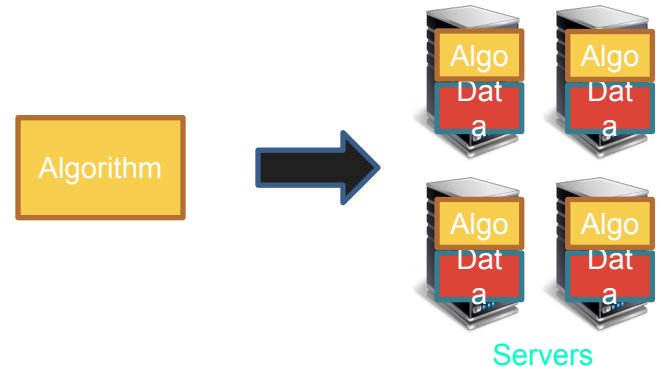
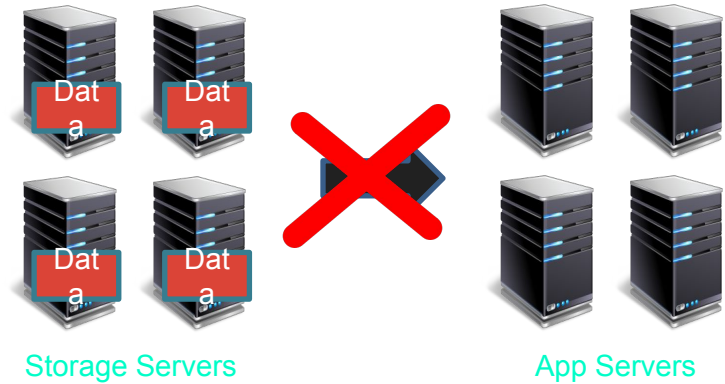
EASY TO USE

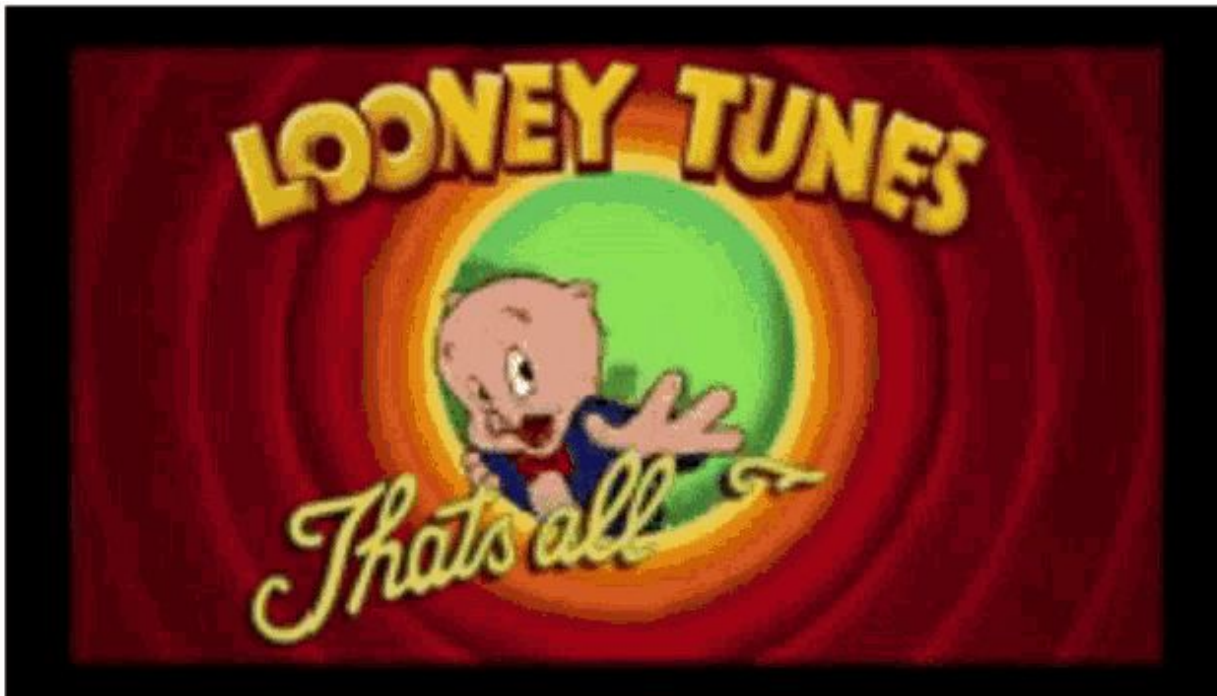
- DISTRIBUTED COMPUTING CHALLENGES ARE HANDLED BY FRAMEWORK
- CLIENT JUST NEED TO CONCENTRATE ON BUSINESS LOGIC



DATA LOCALITY

- MOVE COMPUTATION TO DATA INSTEAD OF DATA TO COMPUTATION
- DATA IS PROCESSED ON THE NODES WHERE IT IS STORED





That's all folks for this chapter !!!!