

## V-6 → Adv Techniques in CC.

Page No.  
Date

### \* Future of CC

- Increase storage capacity
- enhanced performance of Internet
- Modular software will be priority
- IOT along with CC
- Data shows how future changes
- Improvement in cloud services
- Security
- modular software
- Economic

### \* Mobile Cloud Computing (MCC) →

- combination of mobile computing, cloud computing & wireless network together for rich computational resources

- Advantages →
- saved battery power
  - execution faster
  - improvement in data storage capacity & processing power
  - reliability & availability
  - dynamic provisioning → providing of resources on a fine grained, self-service basis.
  - ease of integration

- Disadv →
- send program states (data) to cloud server
  - Network latency can be lead to execution delay

- Fpaln →
- email
  - Social Media
  - Commerce
  - Healthcare

## # comet cloud -

- decentralized coordination substrate & supports heterogeneous.
- automatic computing engine for cloud & grid environments.
- programming layer, service layer & infrastructure layers.
- programming layer / Appl<sup>n</sup> layer → workflow / policy based components, service adaptations & composition
- autonomics layer → resource provisioning, appl<sup>n</sup> performance & on basis of user objective.
- ~~service~~ layer → robust & self proactive management; sensitive adaptations.
- Infrastructure layer → demand scale-out, resilient failure & data handle dynamic joins supports trust boundaries.

## Space management

- virtually semantically-specialized shared space.
- space is associatively accessible by all system nodes
- dynamically constituted transient spaces

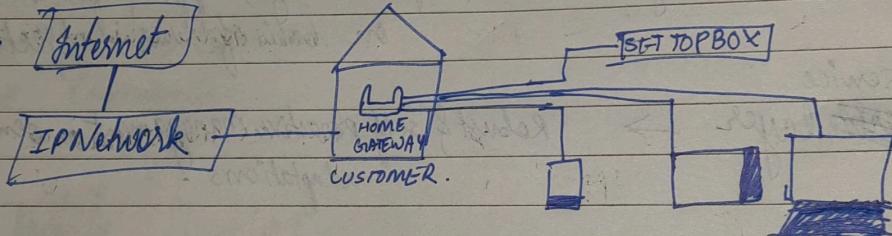
## Multimedia Cloud in CC

1) IPTV

→ Internet Protocol Television  
→ service → television programming & video content using  
Transmission Control Protocol / Internet Protocol  
(TCP/IP).

→ deliver live TV programs or on demand video content → via  
internet.

→ Internet



Pros

- high quality video → few interruptions.
- no special installation → only set top box.
- view on demand & get shows date of release

Cons

- sold as subscription based packages
- speed of internet can affect quality of streaming.

## Energy Aware Cloud Computing

### Jungle Computing.

- distributed computer system
- consists of all compute resources available to endusers.

Reasons to use this

- an appl<sup>n</sup> → compute power more than available.
- diff part of appl<sup>n</sup> → diff computational requirements → no single system meets all requirements

- multiple diverse platforms & systems simultaneously.  
eg → Jbis

characteristics

- support for heterogeneous workloads
- high interoperability
- high seed network connectivity
- Fault-tolerant
- integration with software.

## \* Diff b/w Edge Computing & Cloud Computing

Attributes.

	edge Computing	Cloud Computing
App Hosting	X	✓
Flexible computing power	X	✓
Resource Pooling	X	✓
Realtime Response	✓	X
Fault Tolerance	X	✓
Device dependent	✓	X
Entire domain awareness	X	✓
Cloud awareness	X	✓
Controllers	specific to edge	General
Security Scope	limited to device.	upto cloud layer.
Big Data Analytics	X	✓
Scalability	low	High
Use of virtualization	NO	Yes
Data Storage	NO	Yes, Nearly unlimited.



## Edge computing vs. Distributed computing.

### Edge Computing

### Distributed Compt

Focus:

Latency & bandwidth

Performance, scalability & availability

Location of Processing

Closer to data sources

Distributed data centers

Applicn

Real time applicn  
self drive cars &  
industrial automation

high-throughput  
applicn,  
video streaming &  
e-commerce

Architec<sup>n</sup>

Uses a mesh network

uses variety of  
network topologies

Security

challenging due to  
nature of system

more manageable  
due to extensible  
nature of  
system.

Independence

operate independently

node operates  
as part  
of a  
coordinated  
network.

Cost

less operational &  
maintenance cost.

cost is high  
but more  
efficient than  
cloud computing

## \* Container (Cloud Computing)

- lightweight packages of → appl'n codes together with dependency
- easy to share CPU, memory, storage & network resources
- executable units of software in appl'n code is packaged
- small, fast & portable because unlike virtual machine
- don't need include a guest OS in every instance.

use cases of container.

- microservices
- DevOps
- Hybrid & multi-cloud
- Appl'n modernization.

types of services of container.

- hosted container instances
- containers as a service (CaaS)
- Kubernetes as Service (KaaS)

Benefits

- lightweight
- portable & platform independent
- support modern development of architecture
- improves utilization

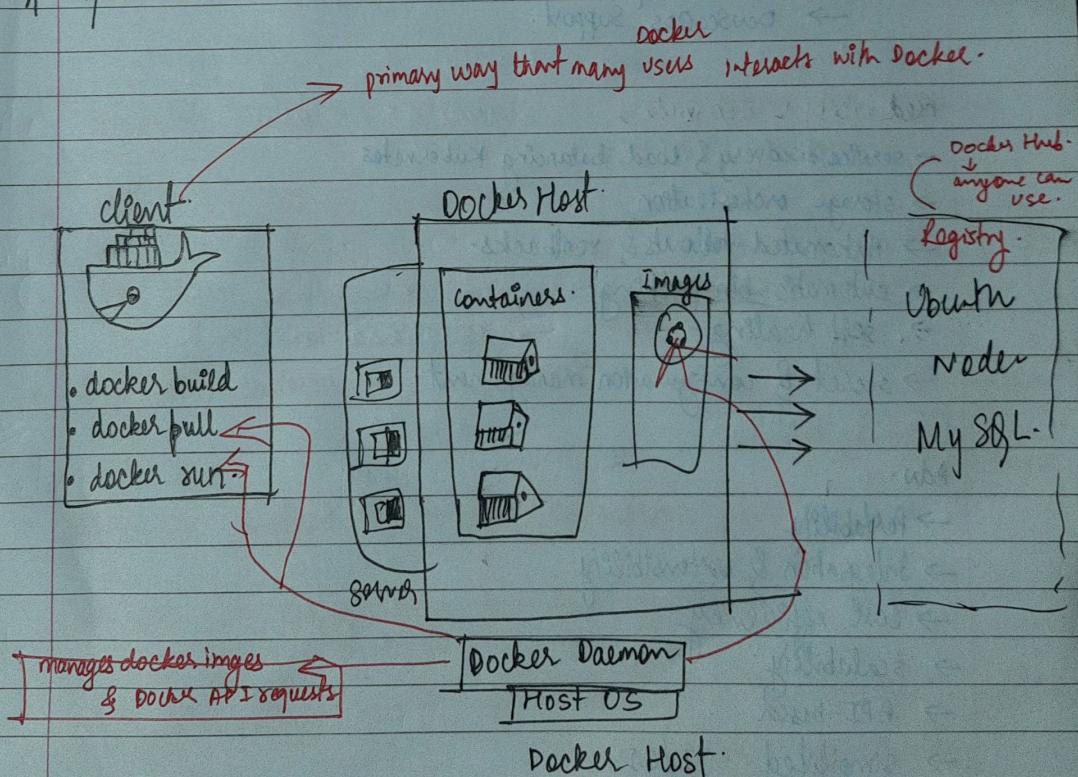
## \* Docker

- platform for developers & sysadmins to develop, deploy & run apps with containers.
- manage infrastructure in same ways as you manage your apps.

## \* Benefits

- Tailor-made platform
- Performance
- Space Allocation
- Accessibility
- Speed
- Flexibility
- Scalability
- Operating System Support
- Automation

## \* Architecture



## \* Kubernetes (CC).

- portable, extensible, open source platform.
- managing containerized workloads & services.
- developed by Google for managing microservices.
- large, rapidly growing ecosystem.

### features

- Autoscaling
- Lifecycle management
- Declarative mode
- Persistent storage
- Load Balancing
- DevSecOps Support.

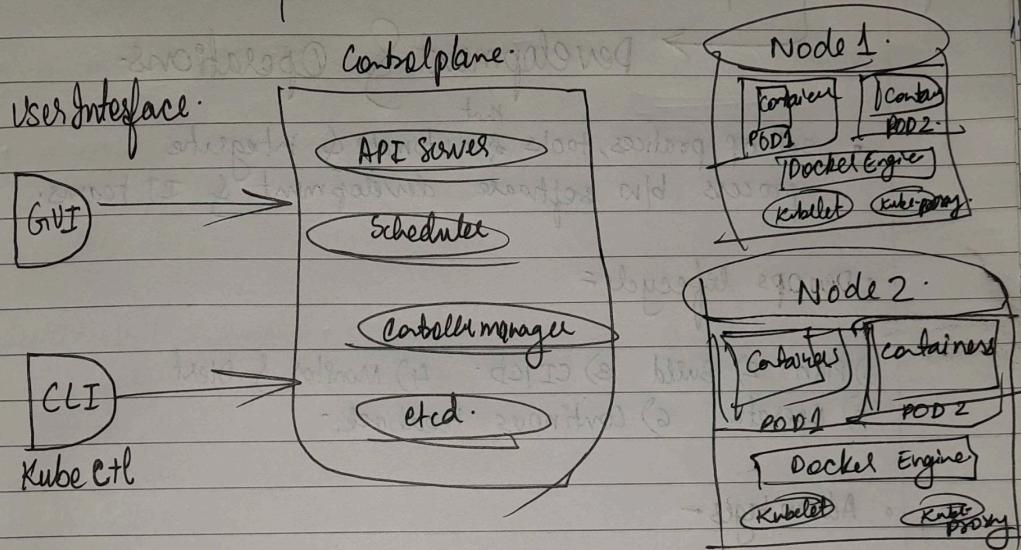
### need

- service discovery & load balancing
- Kubernetes
- storage orchestration
- Automated rollouts & rollbacks
- automatic bin packing
- self healing
- secret & configuration management

### Adv.

- Portability
- Integration & extensibility
- cost efficiency
- scalability
- API-based
- simplified CI/CD

## Kubernetes Architecture -



- **Kubellet** → runs on node, reads container manifests & assures defined containers have started & running
- **Node** → perform assigned tasks
- **Master** → controls Kubernetes nodes & sources all task assignments
- **Pod** → one or more containers → deployed to one node.  
↳ hostname, IP add., IPC & resources
- **Replication controller** → controllers no. of ~~one~~ identical copies in a pod.  
running in diff location of cluster.
- **Service** → decouple work definitions from pods.
- **Kubectl** → configuration tool for Kubernetes
- **Kubernetes objects** → persistent entities within Kubernetes system.  
→ represent state of cluster.

## ★ DevOps

### Development & Operations

- set of practices, tools & automate & integrate process b/w software development & IT teams.

- DevOps lifecycle -

- 1) Plan
- 2) Build
- 3) CI/CD
- 4) Monitor & Alert
- 5) Operate
- 6) Continuous Feedback

- Advantages -

- speed → fast
- Quality & Reliability
- flexible & adaptable
- Improved collaboration
- Security
- Rapid development
- Customer satisfaction enhanced

- challenges/disadv -

- expensive
- over focus <sup>only</sup> on tools
- skills required
- old habits & mindset
- operational workload

- DevOps practices -

- CI/CD
- Microservices
- situational awareness
- Infrastructure as code
- Monitoring & Logging
- Communication & Collaboration

- Apps

- HP
- United Airlines
- Amazon
- Netflix
- Adobe

## IOT ( Internet of Things )

→ collection of diverse technologies that interact with physical world

- characteristics.

- Based on Cloud Systems
- Unique Identify
- Inbuilt Intelligence
- Dynamic Configuration
- Several Connectivity Options
- Integrated with Other Systems
- operates at Large Scale.

- appln.

• Human (Improving health & raising productivity)

• Home

• Retail

• offices

• Factories

• Vehicles

• Cities

IOT @ Home

- controller
- smart devices
- access to everything
- events & notifications

- smart lighting
- smart appln
- Intrusion Detection
- Smoke/gas Detector

- challenges.

- data security & privacy
- Integration: multiple devices & protocols
- data overload & accuracy
- cost.