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# JK Coding Pathshala

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Mapping of Course Outcomes for Unit V	CO5	
Unit VI	FUTURE OF CLOUD COMPUTING	( 06 hrs)
<p><b>How the Cloud Will Change Operating Systems</b>, Location-Aware Applications, Intelligent Fabrics, Paints, and More, The Future of Cloud TV, Future of Cloud-Based Smart Devices, Faster Time to Market for Software Applications, Home-Based Cloud Computing, Mobile Cloud, Autonomic Cloud Engine, Multimedia Cloud, Energy Aware Cloud Computing, Jungle Computing. <b>Docker at a Glance:</b> Process Simplification, Broad Support and Adoption, Architecture, Getting the Most from Docker, The Docker Workflow</p>		

- Q7)** a) Enlist an important features of Cloud TV. Describe the use of cloud-based smart fabrics and paints. [9]
- b) Draw an architecture of Mobile Cloud Computing and explain in details. [8]

OR

- Q8)** a) Explain the Docker architecture with neat diagram. [9]
- b) Write short note on : [8]
- i) Energy Aware Cloud Computing
  - ii) Jungle Computing

- Q7)** a) Write a short Note on: Location Aware Application. [6]
- b) Explain architecture of mobile cloud computing with diagram. [6]
- c) Explain following Concept with diagram: Automatic cloud engine. [5]

OR

- Q8)** a) Draw and Explain multimedia cloud? [6]
- b) Explain key issues related to energy efficiency in cloud computing? [6]
- c) Explain the Concept of jungle Computing with a diagram? [5]

- Q7)** a) Write a short note on Location Aware Application. [6]
- b) Explain architecture of mobile cloud computing with diagram. [6]
- c) Explain following Concept with diagram: Automatic cloud engine. [5]

OR

- Q8)** a) Draw and Explain multimedia cloud. [6]
- b) Explain key issues related to energy efficiency in cloud computing. [6]
- c) Explain the Concept of jungle Computing with a diagram. [5]

**Q7)** a) What is autonomic Computing? Explain the need and various areas supported by autonomic Computing. [9]

b) Explain the Docker architecture with neat diagram. [8]

OR

**Q8)** a) What are the advantages of Mobile Cloud computing? Explain with an application. [9]

b) Write short note on : [8]

i) Mobile Cloud

ii) Home-Based Cloud Computing

- Q7)** a) Draw the Docker architecture and explain the components [6]  
b) Discuss in brief: Comet Cloud [6]  
c) What's the difference between cloudlets and clouds [5]

**OR**

- Q8)** a) Draw the kubernetes architecture and explain the components [6]  
b) Differentiate between multimedia Vs Mobile Cloud [6]  
c) Write a different application of fabric and paints [5]




- Q7)** a) Describe the use of cloud-based smart fabrics and paints. [9]
- b) What are the Benefits of Mobile Cloud Computing. How it is different than cloud computing. [8]

OR

- Q8)** a) Explain the Docker architecture with neat diagram. [9]
- b) Write short note on : i) Mobile Cloud ii) Multimedia Cloud [8]



# How the Cloud Will Change Operating Systems

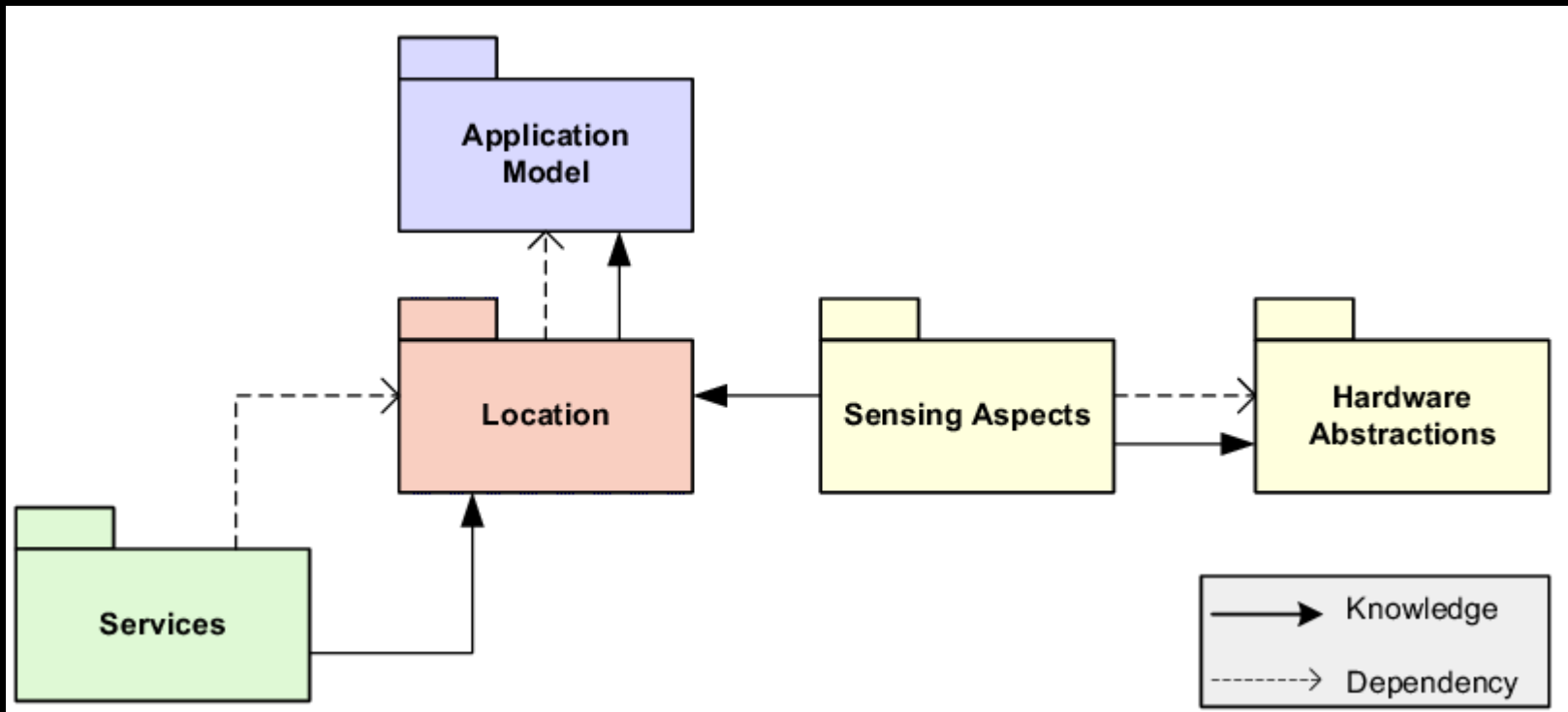
 No.	 Point Title	 Hinglish Explanation
1	<b>OS ka Role Shift ho raha hai</b>	Traditional OS hardware manage karta tha. Ab Cloud OS ka role hai remote access dena, sync karna, aur minimal local processing handle karna.
2	<b>Cloud-Native Applications Support</b>	Future OS cloud-native apps ko optimize karega — jaise containers, web-based apps, aur virtualization.
3	<b>Decoupled Storage &amp; Compute</b>	OS ab storage aur processing ko device se alag kar dega — sab kuch remotely handle hoga via cloud APIs.
4	<b>Platform Independence</b>	Cloud OS kisi specific hardware pe dependent nahi rahega. Browser-based OS ya thin clients se access possible hoga.
5	<b>Always Updated &amp; Managed via Cloud</b>	OS updates, security patches aur feature enhancements directly cloud provider manage karega — user ko kuch manually karne ki zarurat nahi.

### ★ Location Aware Applications

**Location aware application** ek aisa software system hota hai jo tumhari **current geographic location** ko use karta hai, taaki tumhe **smart aur personalized services** de sake.

#### **Examples:**




- Google Maps directions dikhata hai.
- Uber ko pata hota hai tumhe kahaan se pick karna hai.
- Weather app tumhare area ka forecast dikhata hai.







📌 Step	🔧 Component Name	🔍 Explanation (Hinglish)	🏠 Example (Real World)
1	<b>Hardware Abstractions</b>	Device ke internal sensors jaise GPS, accelerometer, gyroscope ko access karne ka layer.	Mobile ka GPS chip location detect karta hai.
2	<b>Sensing Aspects</b>	Ye layer sensor se data collect karta hai jaise speed, direction, location signals.	Phone sensor detect karta hai ki user move kar raha hai ya still hai.
3	<b>Location</b>	Actual location calculate karta hai (latitude/longitude) aur aage share karta hai.	Location system batata hai user abhi Nashik mein hai.
4	<b>Application Model</b>	App ka main logic jo location data ka use karta hai personalized service dene ke liye.	Uber app yeh decide karta hai ki kaunse driver ko bhejna hai.
5	<b>Services</b>	Background features jaise notifications, route suggestions, weather update etc.	Google Maps tumhe fastest route suggest karta hai.

➤ Arrow Type	📄 Meaning
→ Solid Arrow	<b>Knowledge Flow</b> – Ek layer dusri ko data deta hai
--- Dashed Arrow	<b>Dependency</b> – Ek layer doosre par dependent hai

# Intelligent Fabrics (Smart Fabrics)

 Feature/Aspect	 Description (Hinglish Explanation)	 Example / Use Case
<b>Definition</b>	Ye aise kapde hote hain jo sensors aur technology ke saath integrate kiye gaye hote hain.	Smart T-shirts jo heart rate monitor karti hai.
<b>Embedded Technology</b>	In fabrics mein sensors, conductive threads, microcontrollers ya wireless devices chip ke roop mein hote hain.	Smart jackets with Bluetooth connection.
<b>Functionality</b>	Body signals, temperature, movement ya environment ko sense karke data collect aur transmit karte hain.	Athlete ka body temperature track karna.
<b>Applications</b>	Health monitoring, sports, military, fashion aur wearable tech mein use hote hain.	Diabetic patients ke liye sugar-monitoring socks.
<b>Advantages</b>	Real-time data milta hai, health improve hoti hai, automation aur personalization possible hoti hai.	Elderly care mein fall detection smart clothes.

## Paints and More




  Aspect / Category	 Description (Hinglish Explanation)	 Example / Use Case
1. Basic Paints	Walls, ceilings ya surfaces ko decorate aur protect karne ke liye use hote hain.	Emulsion paint for interior walls.
2. Industrial Paints	Machines, vehicles ya metal surfaces ko rust se protect karne ke liye.	Anti-rust paint on pipelines.
3. Texture Paints	Special effects aur 3D texture banane ke liye istemal hote hain.	Marble finish ya brick texture walls.
4. Eco-Friendly Paints	Non-toxic aur environment-friendly paints hote hain.	VOC-free wall paint for kids' rooms.
5. Smart Paints	Color change karte hain ya temperature/pressure sense kar sakte hain.	Thermochromic paint jo heat par rang badalta hai.
6. Paints + Sensors	Advanced paints jisme embedded sensors hote hain, mostly research aur military applications ke liye.	Paint that detects cracks in buildings.

**"More" ka Matlab:**

Paints sirf deewar rangne ke liye nahi, ab **smart applications, industrial protection, aur environmental monitoring** ke liye bhi use ho rahe hain.



# The Future of Cloud TV

 Aspect / Feature	 Description (Hinglish Explanation)	 Example / Use Case
<b>1. No Set-Top Box Needed</b>	Cloud TV mein internet ke through content stream hota hai, koi physical box ki zarurat nahi.	JioCinema, Netflix, Amazon Prime on Smart TV.
<b>2. Access from Anywhere</b>	Kisi bhi device (TV, mobile, laptop) par content dekh sakte ho – anytime, anywhere.	Phone se travel ke time par shows dekhna.
<b>3. Personalized Content</b>	AI/ML ke through user ke interest ke according recommendations milte hain.	Netflix suggesting shows based on your taste.
<b>4. Live + On-Demand</b>	Cloud TV dono support karta hai – live TV channels aur recorded shows/movies.	Watching IPL live + Web series later.
<b>5. Cost Effective</b>	Cable bills aur installation charges kam ho jaate hain; plans flexible hote hain.	Monthly streaming subscriptions like ₹199.
<b>6. Interactive Features</b>	Pause, rewind, multi-language, subtitles, aur even shopping while watching.	Watching a cricket match with live stats.
<b>7. Cloud Storage</b>	Shows/movies cloud par save ho sakte hain – local storage ki need nahi hoti.	Resume playback from where you left off.

## Future of Cloud-Based Smart Devices

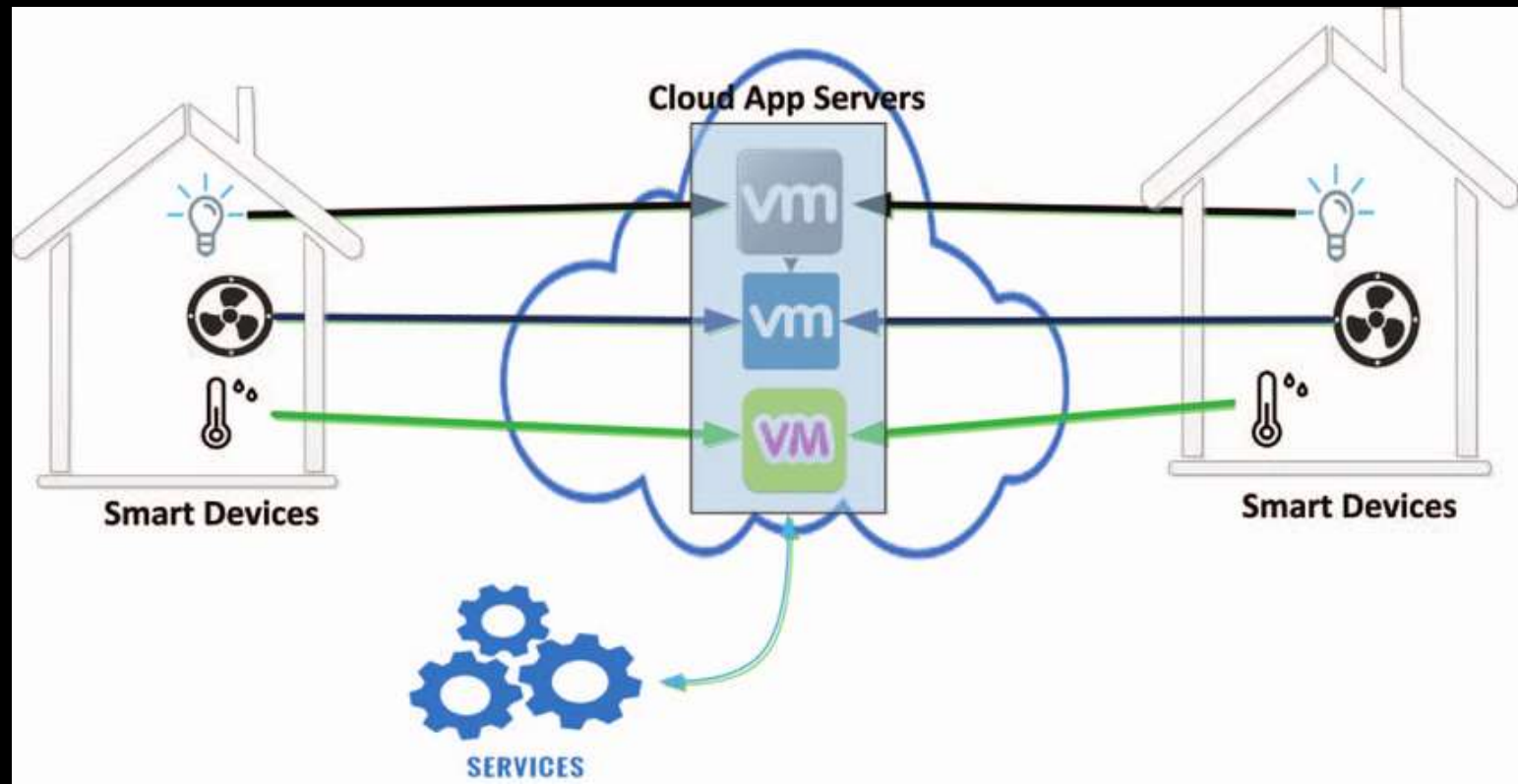
Point No.	Topic	Explanation (Hinglish)
1	Cloud Connection	Smart devices hamesha cloud se connected rahenge, data easily share aur access hoga.
2	AI Integration	Cloud par AI models challenge jo devices ko zyada intelligent banayenge.
3	Real-Time Processing	Devices ko cloud ke through real-time data milega, fast response possible hoga.
4	Security	Cloud-based security strong hogi, data safe aur private rahega.
5	Edge Computing	Edge computing cloud ke sath use hoga, jisse latency kam hogi aur data fast process hoga.
6	Scalability	Cloud se easily naye devices add kar sakte hain aur system ko scale kar sakte hain.

## Faster Time to Market for Software Applications

Point No.	Topic	Explanation (Hinglish)
1	Quick Development	Agile aur DevOps methods se software jaldi develop hota hai.
2	Continuous Integration	Code changes turant test aur deploy ho jate hain, delay kam hota hai.
3	Cloud Infrastructure	Cloud resources instant milte hain, infrastructure setup fast hota hai.
4	Automated Testing	Automated tools se testing fast aur accurate hoti hai, bugs jaldi milte hain.
5	Collaboration Tools	Team ke members easily communicate kar sakte hain, decision fast le sakte hain.
6	Faster Feedback Loop	User feedback jaldi milta hai, changes time par implement hote hain.

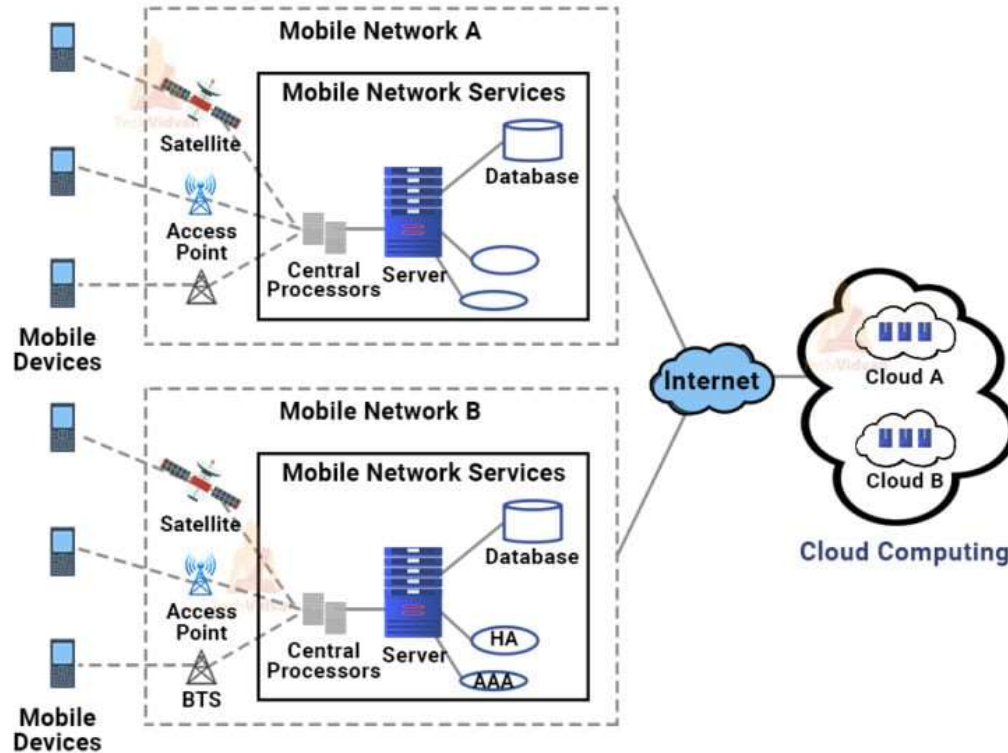
# Home-Based Cloud Computing

Topic	Explanation (Hinglish)
Definition	Home-based cloud computing matlab ghar se cloud services use karna, jisse data aur apps kahin se bhi access kar sakte hain.
Cloud Storage	Google Drive, Dropbox jaise services me apne files store karna.
Home Server	Apne ghar me ek personal server setup karke data manage karna.
IoT Devices	Smart devices (jaise smart bulbs, AC) cloud se connected rahenge aur control kar sakte hain.
Remote Access	Internet ke through apne ghar ka data aur devices kahin se bhi access karna.
Benefits	Remote access, data security, automation, aur cost saving hoti hai.



Component	Explanation (Hinglish)
User Device	Mobile ya Laptop jisse user remotely apne home devices ko control karta hai.
Internet Connection	Devices aur cloud ke beech data transfer ke liye fast internet zaroori hota hai.
Cloud Server	Ye central system hai jahan data store hota hai aur jahan se smart devices control hote hain.
Smart Home Devices	Lights, fans, AC, sensors, cameras jo cloud ke through control hote hain.
Router/Gateway	Ghar ka Wi-Fi router devices ko internet aur cloud server se connect karta hai.
Data Flow	User device se command jata hai → cloud server process karta hai → smart device execute karta hai.

# Mobile Cloud Computing Architecture



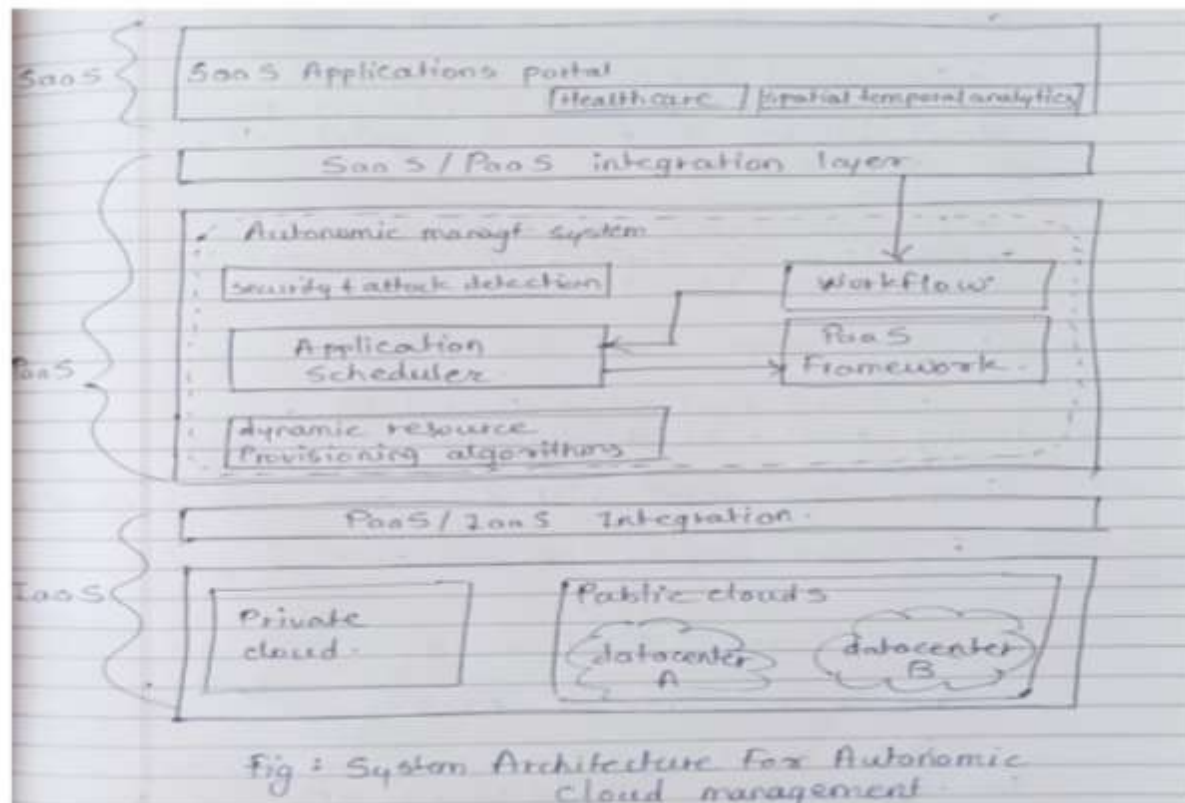
Heading	Hinglish Explanation
<b>Definition</b>	Mobile Cloud Computing ek aisi technology hai jisme mobile devices (smartphones, tablets) ka processing aur data storage load cloud servers par shift kiya jata hai via internet. Isse mobile apps fast, secure aur lightweight ban jaati hain.
<b>Mobile Devices</b>	Phones ya tablets jo data bhejte hain aur cloud services access karte hain.
<b>Satellite / Access Point</b>	Wireless communication ke liye use hota hai – signal ko network tak pahuchata hai.
<b>BTS (Base Station)</b>	Mobile tower jahan se mobile device network se connect hota hai.
<b>Central Processors</b>	Data ko process karte hain jo mobile network me aata hai.
<b>Server</b>	Network backend me hota hai – ye data ko store aur manage karta hai.
<b>Database</b>	Information store hoti hai – apps data, user info, etc.
<b>Mobile Network Services</b>	Server, database aur processing power milke mobile users ko service dete hain.
<b>HA (High Availability)</b>	System ko 24x7 available banaye rakhta hai – downtime avoid karta hai.
<b>AAA (Auth, Authz, Acctng)</b>	Security ensure karta hai – user verify, access control aur usage tracking ke liye.
<b>Internet</b>	Bridge hai jo mobile network ko cloud computing se connect karta hai.
<b>Cloud A / Cloud B</b>	Remote cloud servers jahan par applications, services aur data store aur process hote hain.



Advantage	Hinglish Explanation
1. Storage Flexibility	Data cloud pe store hota hai, phone ki memory save hoti hai.
2. Better Performance	Heavy processing cloud servers karte hain, mobile fast kaam karta hai.
3. Cost Saving	Expensive hardware ki zarurat nahi hoti – sab kuch cloud pe handle hota hai.
4. Real-time Access	Internet se kahin se bhi apps aur data access kiya ja sakta hai.
5. Automatic Backup	Cloud me data ka automatic backup hota hai, recovery easy hoti hai.
6. Scalability	Zarurat ke hisaab se storage aur resources easily badha sakte ho.

12 34	Application Area	Description (Hinglish)
1	<b>Mobile Banking</b>	Users apne phone se kahin bhi banking ka kaam kar sakte hain jaise fund transfer, balance check, etc.
2	<b>Education (m-Learning)</b>	Students mobile apps aur internet ke through kahin se bhi padhai kar sakte hain.
3	<b>Transportation &amp; Navigation</b>	Google Maps jaise apps travel route aur live traffic batate hain.
4	<b>Social Media &amp; Communication</b>	WhatsApp, Facebook, Instagram se log connect reh sakte hain aur instant messages bhej sakte hain.

# Autonomic Cloud Engine



Heading	Hinglish Explanation
<b>Definition</b>	Autonomic Cloud Engine ek intelligent cloud architecture hai jo SaaS, PaaS, aur IaaS services ko smartly integrate karta hai. Isme autonomic (self-managing) systems lage hote hain jo automatically workload manage, resource allocate aur security monitor karte hain – bina manual intervention ke.

Layer Name	Components	Hinglish Explanation
<b>1. SaaS Layer</b>	SaaS Application Portal, Healthcare, Spatial Temporal Analytics	Ye layer users ko direct cloud-based apps use karne ka portal deti hai, jaise health care ya analytics apps.
<b>2. SaaS/PaaS Integration</b>	Integration Layer	SaaS aur PaaS ke beech smooth communication aur data sharing ke liye responsible hai.
<b>3. PaaS Layer</b>	Autonomic Management System, Security & Attack Detection, Workflow, PaaS Framework, Application Scheduler, Dynamic Resource Provisioning Algorithms	Ye main control center hota hai. Yahan se resources assign hote hain, security handle hoti hai, aur apps ka execution schedule hota hai.
<b>4. PaaS/IaaS Integration</b>	Integration Module	Is layer ka kaam PaaS aur infrastructure (IaaS) ke beech resource coordination karna hai.
<b>5. IaaS Layer</b>	Private Cloud, Public Cloud (Data Center A & B)	Ye layer actual hardware aur network infrastructure ko manage karti hai – jaise ki storage, VMs, data centers.

No.	Advantage	Hinglish Explanation
1.	<b>Self-Management (Autonomic)</b>	System khud se resource allocate aur optimize karta hai – bina manual effort ke.
2.	<b>Improved Performance</b>	Smart scheduling aur resource allocation se overall performance fast hoti hai.
3.	<b>Enhanced Security</b>	Attack detection aur monitoring automatically hota hai, jisse system secure rehta hai.
4.	<b>Dynamic Resource Provisioning</b>	Need ke hisaab se resources add/remove ho jaate hain, jisse cost aur load balance hota hai.
5.	<b>Better Scalability</b>	Easily large number of users aur workloads ko handle kar sakta hai.
6.	<b>Reduced Operational Cost</b>	Automation se human effort kam lagta hai, jiski wajah se maintenance cost bhi kam hoti hai.

## Multimedia Cloud

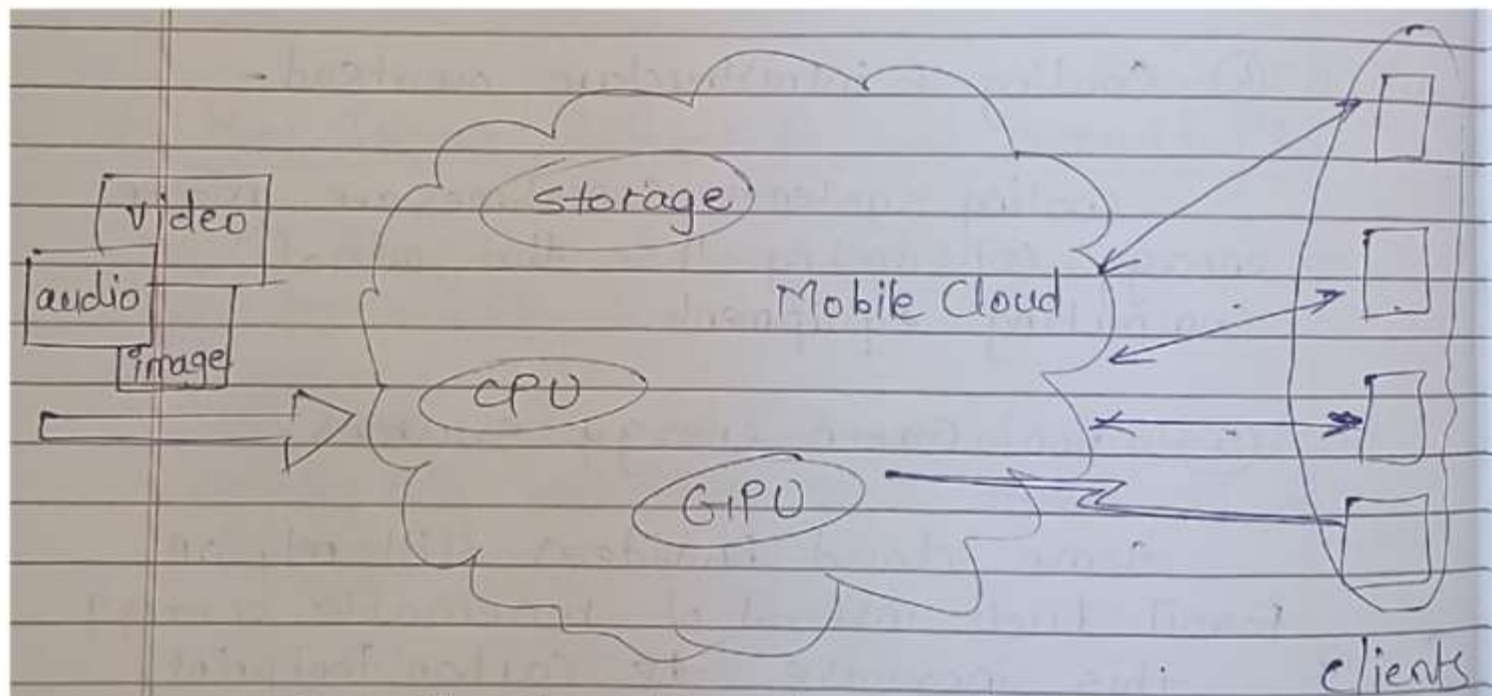


Fig: Multimedia cloud Architecture.

Term	Definition (Hinglish)
<b>Multimedia Cloud</b>	Multimedia Cloud ek aisa cloud computing platform hai jo video, audio, image jaise content ka storage, processing, aur delivery provide karta hai — fast, scalable aur real-time streaming ke saath.



Component	Hinglish Explanation
<b>Video/Audio/Image</b>	Yeh input multimedia data hai jo cloud mein process aur store kiya jata hai.
<b>Mobile Cloud</b>	Ek cloud environment jo smartphones ya mobile devices se connect hota hai – storage aur delivery ke liye.
<b>Storage</b>	Multimedia data (video, audio, image) ko store karne ke liye use hota hai.
<b>CPU</b>	Multimedia content ka basic processing yahan hota hai (e.g. encoding, compression).
<b>GPU</b>	High-speed graphical processing ke liye use hota hai – jaise video rendering, real-time editing.
<b>Clients</b>	End users jo multimedia content ko access karte hain – mobile, desktop ya tablet devices par.

<b>Multimedia Cloud ke Advantages</b>	<b>Explanation (Hinglish)</b>
<b>1. Data Anywhere Access</b>	Multimedia content ko kahin se bhi internet se access kar sakte hain.
<b>2. Storage Space Bachat</b>	Local device pe zyada space nahi lagta, cloud me store karte hain.
<b>3. Easy Sharing</b>	Photos, videos, files easily friends aur colleagues ke sath share kar sakte hain.
<b>4. Collaboration Simple Hai</b>	Multiple log ek saath same multimedia project pe kaam kar sakte hain.
<b>5. Automatic Backup Hoti Hai</b>	Data automatically cloud me save hota hai, loss ka tension kam hota hai.
<b>6. Scalability</b>	Jab zarurat badhe toh storage asaani se badha sakte hain.
<b>7. Cost Effective</b>	Apne paas server kharidne ki zarurat nahi, cloud services sasti padti hain.

## Energy Aware Cloud Computing

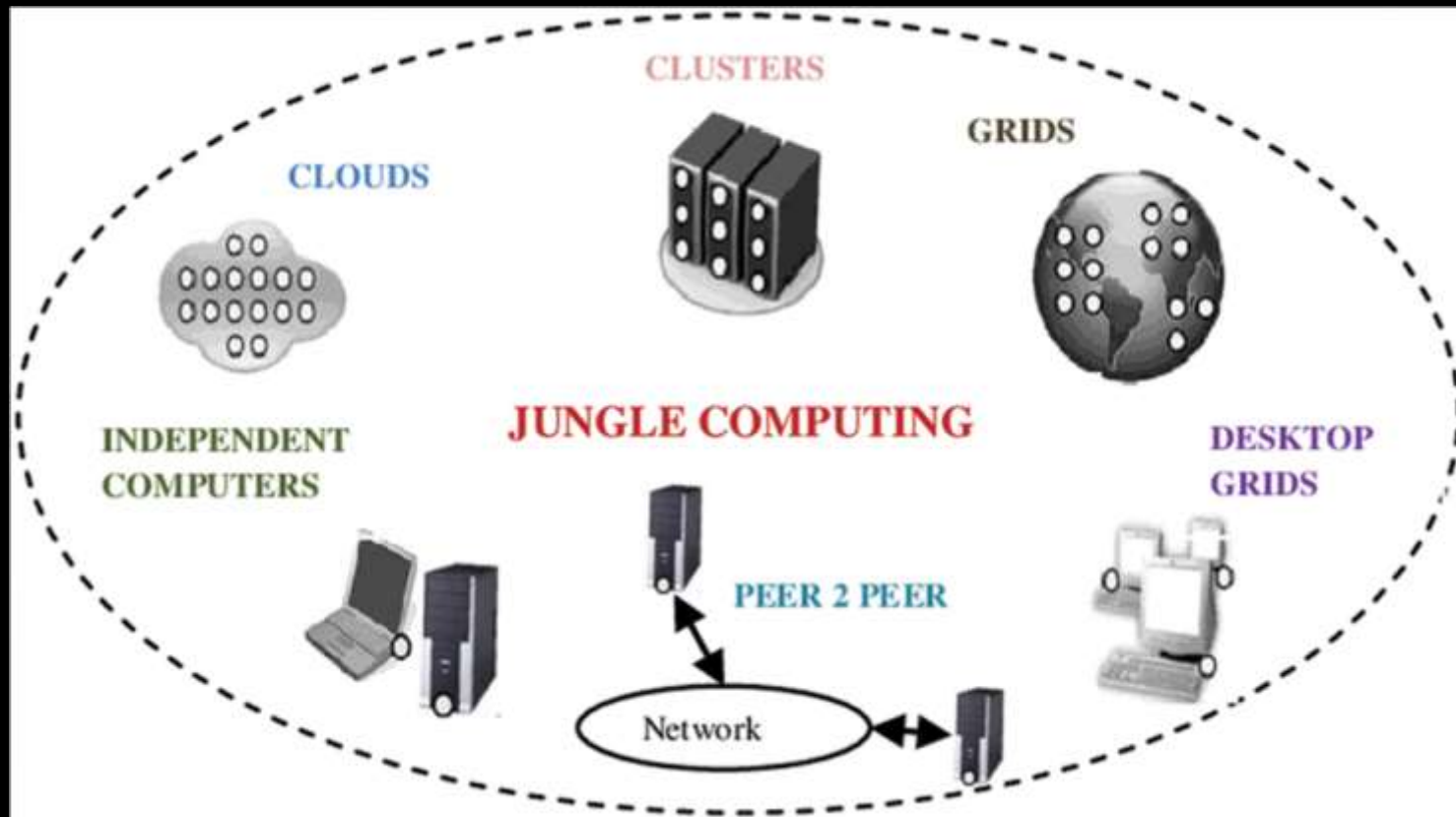
Term	Explanation (Hinglish)
<b>Energy Aware Cloud Computing</b>	Cloud computing jo energy consumption ko dhyan mein rakhta hai.
<b>Purpose</b>	Power bachana aur environment friendly banana.
<b>Kaise Kaam Karta Hai?</b>	Resources ko optimize karke, unnecessary energy waste kam karta hai.
<b>Use Case</b>	Data centers jahan energy efficient hardware aur software use hota hai.
<b>Goal</b>	Sustainable aur cost-effective cloud services provide karna.

Goals of Energy Aware Cloud Computing	Explanation (Hinglish)
1. <b>Energy Consumption Kam Karna</b>	Cloud systems me bijli ki khapat ko kam karna.
2. <b>Cost Savings Karna</b>	Operational cost reduce karna through energy efficiency.
3. <b>Environment Protection Karna</b>	Carbon footprint aur pollution ko kam karna.
4. <b>Resource Efficient Use Karna</b>	Hardware aur software ka smart use karke energy bachaana.
5. <b>Hardware Life Extend Karna</b>	Machines ko zyada chalane se bachana taaki unki life badhe.
6. <b>Performance Maintain Karna</b>	Energy bachate hue bhi cloud service ki quality banaye rakhna.
7. <b>Sustainability Promote Karna</b>	Long term environment friendly cloud solutions develop karna.

Advantage	Explanation (Hinglish)
1. Energy Bachata Hai	Power consumption ko kam rakhta hai, electricity bill bachat hoti hai.
2. Environment Friendly	Carbon emissions kam karta hai, pollution aur global warming reduce hoti hai.
3. Cost Effective	Energy bachat se data centers ka operational cost kam ho jata hai.
4. Resource Optimization	Hardware aur software resources ko efficiently use karta hai, unnecessary power waste nahi hota.
5. Longer Hardware Life	Machines overuse se bachti rehti hain, isse unka lifespan badhta hai aur maintenance cost kam hoti hai.
6. Sustainability Promote	Green computing ko support karta hai, jo future mein environment ke liye achha hai.
7. Performance Maintain	Energy saving ke bawajood cloud services ki speed aur reliability stable rehti hai.

## Definition of Jungle Computing :

**Jungle Computing** ek aisa computing environment hota hai jahan **different types of systems** — jaise **clouds, clusters, grids, desktop grids, peer-to-peer networks, aur independent computers** — sab ek saath milke kaam karte hain. Ye environment **heterogeneous (mixed)** hota hai aur isme **distributed resources** ka use hota hai jo alag-alag technologies aur locations se connected hote hain.



Component	Explanation (Hinglish)
<b>Clouds</b>	Internet-based computing services jaise storage, apps, aur servers ka cluster.
<b>Clusters</b>	Connected computers ka group jo ek single powerful system ki tarah kaam karta hai.
<b>Grids</b>	Geographically distributed computers ka network jo complex tasks milke solve karta hai.
<b>Desktop Grids</b>	Normal logon ke desktop computers ka ek grid system banaya jata hai for extra power.
<b>Peer 2 Peer (P2P)</b>	Ek aisa network jahan computers directly ek dusre se connect hote hain without central server.
<b>Independent Computers</b>	Standalone machines jo kisi network ya system ka part nahi hote.
<b>Network</b>	Sabhi components ko ek dusre se connect karta hai for data sharing and communication.
<b>Jungle Computing</b>	In sab mixed components ka combination jahan alag-alag technologies ek system jaise kaam karti hain.



## **Advantages of Jungle Computing:**

### **1.High Performance**

- Multiple systems milke fast processing provide karte hain.

### **2.Cost Efficient**

- Existing resources ka use karke kaafi paise bachte hain.

### **3.Scalable**

- Zarurat padne par easily naye systems add kiye ja sakte hain.

### **4.Fault Tolerant**

- Agar ek part fail ho jaye, system fir bhi kaam karta rehta hai.

### **5.Resource Utilization**

- Idle computers ka bhi use hota hai, waste nahi hota.

## Docker Kya Hota Hai?

Docker ek **container system** hai jisme aap **apni application + uski sari settings/dependencies** ko ek box (container) mein pack kar sakte ho, jise aap kahin bhi le jaa ke chala sakte ho — bina "it works on my machine" problem ke.

## □ Docker Container Kya Hota Hai?

Container ek lightweight, standalone unit hota hai jo aapki app aur uske environment ko carry karta hai.

### **Jaise:**

- App ka code
- Required libraries
- Tools, configs, etc.

Iska matlab: Aapki app har jagah **exactly same** tarike se chalegi – developer machine, testing server, ya cloud.

## ❑ Docker Ka Use Kyu Karte Hain?

Reason	Explanation (Hinglish)
✓ Portability	App kahin bhi chalegi (Windows, Linux, Cloud, etc.)
✓ Fast Deployment	App instantly launch ho sakti hai – container lightweight hota hai
✓ Consistency	Har environment mein same behavior – testing aur production mein koi fark nahi
✓ Easy Collaboration	Teams easily same container use karke kaam kar sakti hain
✓ Resource Efficient	Containers virtual machines se zyada lightweight aur efficient hote hain

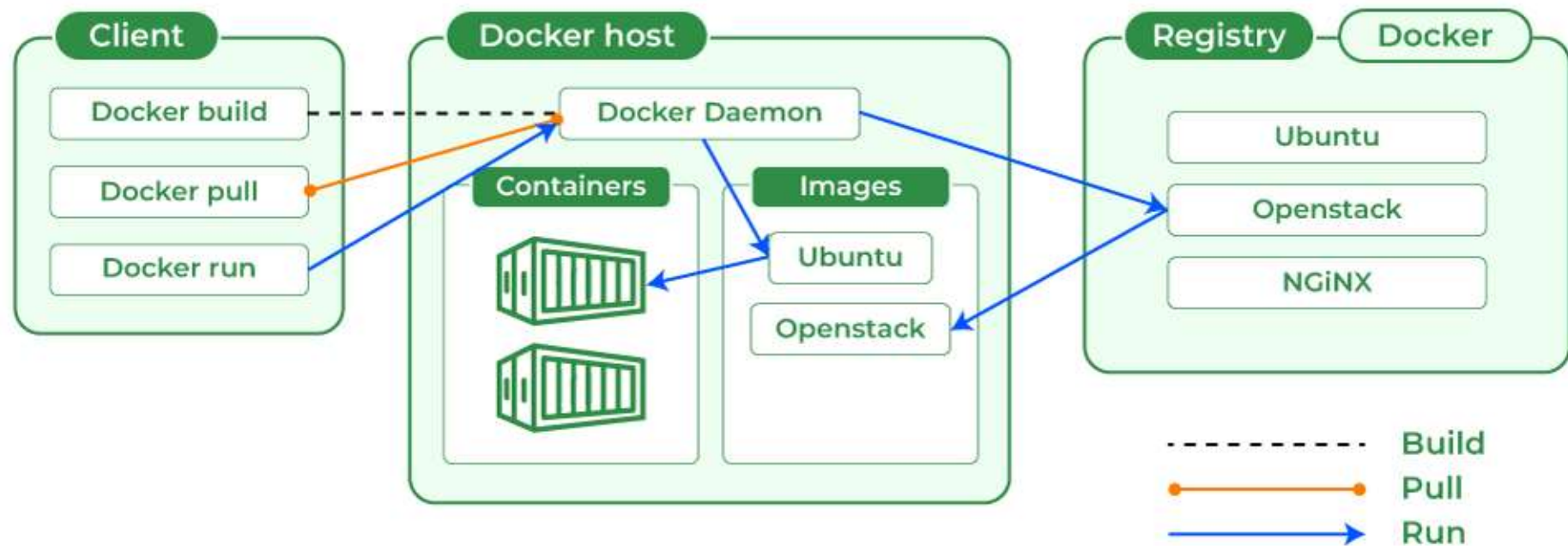
### **Example:**

Socho aapne Python app banayi jo kuch specific packages pe depend karti hai. Normally, kisi aur system pe chalane ke liye woh sab packages install karne padenge.

Lekin agar aap Docker container use karo, to app + packages dono ek saath ek image mein pack ho jaate hain — aur koi bhi sirf docker run karke use chala sakta hai.

**Docker at a Glance** ek chhoti summary hai jo batati hai ki Docker containers kaise application development aur deployment process ko easy, fast, portable, aur reliable banate hain.

Topic	Kya Batata Hai? (Hinglish)
<b>Process Simplification</b>	App ka setup aur deployment simple aur fast ho jata hai via containers.
<b>Broad Support</b>	Docker ko cloud, OS, aur companies wide support karti hain.
<b>Architecture</b>	Docker engine, CLI, images, containers, etc. ka structure kya hai.
<b>Getting the Most</b>	Best practices to use Docker effectively.
<b>Docker Workflow</b>	App create karne se lekar deploy karne tak ke steps.



**Docker Architecture** ko explain karta hai jismein 3 major components hain:

**1.Client**

**2.Docker Host**

**3.Docker Registry**

### ◆ Arrow Type/Color

**Black Dotted Line**

**Orange Line**

**Blue Arrow**

### ◆ Meaning

docker build – image creation process

docker pull – image registry se download

docker run – image se container create/run  
karna



⚡ Component	⚡ Description (Hinglish)
<b>Client</b>	User yahan se docker build, docker pull, aur docker run jaise commands deta hai.
<b>Docker Build</b>	Yeh command ek <b>Dockerfile</b> ko image mein convert karta hai (Image build hoti hai).
<b>Docker Pull</b>	Registry (e.g. Docker Hub) se koi existing image (e.g. Ubuntu, NGINX) ko local system par download karta hai.
<b>Docker Run</b>	Kisi image se container banata hai aur usse run karta hai.
<b>Docker Host</b>	Yahaan <b>Docker Daemon</b> hota hai jo client ke commands handle karta hai. Iske andar <b>Images</b> aur <b>Containers</b> stored hote hain.
<b>Docker Daemon</b>	Yeh background process hai jo images banata, containers run karta aur registry se images pull karta hai.
<b>Images</b>	Pre-built templates hote hain (e.g. Ubuntu, OpenStack), jisse container banta hai.
<b>Containers</b>	Running state of image – yeh actual working app hoti hai with its own file system and runtime.
<b>Registry (Docker Hub)</b>	Central repository jahan pre-built Docker images stored hoti hain (e.g. Ubuntu, OpenStack, NGINX).

Enlist an important features of Cloud TV. Describe the use of cloud-based smart fabrics and paints. [9]


Uses of Cloud-Based Smart Fabrics and Paints

Sl. No.	Use	Explanation
1	Health tracking fabrics	Aise kapde jo heart rate, body temp jaise health data track karte hain.
2	Cloud data sync	Ye data cloud par store hota hai, jise doctors remotely access kar sakte hain.
3	Fashion changes	Kapde cloud command ke basis par apna rang ya design badal sakte hain.
4	Smart paints for environment	Paints temperature, humidity, ya pollution detect karte hain.
5	Remote control via cloud	Paints ka color ya lighting cloud app ke through change kiya ja sakta hai.
6	Security usage	Kuch paints motion detect karte hain aur alert cloud ke through bhejte hain.

## b) Explain key issues related to energy efficiency in cloud computing? [6]

Issue (Samasya)	Explanation (Hinglish)
1 <b>High Power Consumption</b>	Data centers mein lakhon servers hote hain jo continuously power lete hain. Yeh energy cost ko badha deta hai.
2 <b>Cooling Infrastructure Load</b>	Servers heat generate karte hain, unhe cool rakhne ke liye powerful AC systems lagte hain jo extra energy lete hain.
3 <b>Underutilized Resources</b>	Kai baar servers full capacity mein use nahi hote, lekin fir bhi energy consume karte hain — energy waste hoti hai.
4 <b>Use of Non-Renewable Energy</b>	Cloud providers aksar coal ya thermal energy ka use karte hain, jo environment ke liye harmful hai.
5 <b>Old and Inefficient Hardware</b>	Purana hardware zyada power leta hai aur kam performance deta hai, jis se efficiency low hoti hai.
6 <b>Lack of Automation and Monitoring</b>	Agar smart monitoring tools na ho to unnecessary resources run karte rahte hain — energy ka misuse hota hai.

## Mobile Cloud

	Point	Explanation (Hinglish)
1	<b>Definition</b>	Mobile Cloud ka matlab hai mobile device ka cloud services se connect hona — jaise storage, apps, ya processing ke liye.
2	<b>Purpose</b>	Mobile device ke limited resources (storage, RAM, battery) ko manage karne ke liye cloud ka use hota hai.
3	<b>How It Works</b>	Mobile device cloud server se data ya application ko access karta hai — processing mostly cloud mein hoti hai.
4	<b>Examples</b>	Google Drive, iCloud, Dropbox, Google Docs, OneDrive — sab mobile cloud ke examples hain.
5	<b>Benefits</b>	◆ Data kahin se bhi access ◆ Device fast rehta hai ◆ Less storage use ◆ Auto backup
6	<b>Requirements</b>	Internet connection zaruri hota hai, bina uske cloud services access nahi ki ja sakti.

# What is autonomic Computing? Explain the need and various areas supported by autonomic Computing. [9]

Sl. No.	Topic	Description (Hinglish)
1	<b>Definition</b>	Autonomic Computing ek self-managing computing model hai jo human intervention ke bina systems ko automatically manage karta hai. Jaise human nervous system body control karta hai, waise hi yeh system khudko monitor, repair, aur optimize karta hai.
2	<b>Need (Zarurat kyu hai?)</b>	IT systems complex hote ja rahe hain. Har chhoti problem ke liye human administrator ko involve karna inefficient hai. Autonomic systems errors ko khud detect karke solve karte hain, isse downtime kam hota hai aur performance improve hoti hai.
3	<b>Self-Configuration</b>	System khud automatically setup hota hai aur nayi configurations apply karta hai bina manual help ke.
4	<b>Self-Healing</b>	Jab koi fault aata hai (like software crash ya network fail), system usse khud detect karke fix karta hai.
5	<b>Self-Optimization</b>	System performance ko monitor karke use improve karta hai — jaise load balancing, memory usage tuning etc.
6	<b>Self-Protection</b>	System khudko unauthorized access, malware attacks, aur threats se protect karta hai.
7	<b>Supported Areas</b>	Data Centers, Cloud Infrastructure, IoT Devices, Smart Homes, Robotics, Healthcare Systems, aur Large-Scale Network Management.

- b) Discuss in brief: Comet Cloud
- c) What's the difference between cloudlets and clouds

**OR**

- 28)
- a) Draw the kubernetes architecture and explain the components
  - b) Differentiate between multimedia Vs Mobile Cloud
  - c) Write a different application of fabric and paints

## Comet Cloud

Comet Cloud ek **open-source cloud computing platform** hai jo dynamic, flexible aur scalable cloud services provide karta hai.

Ye system **automatically resources ko manage karta hai** jaise self-healing, self-configuration, etc.

Comet Cloud **private aur public cloud** dono ko combine karke kaam karta hai using **cloud bursting** feature.

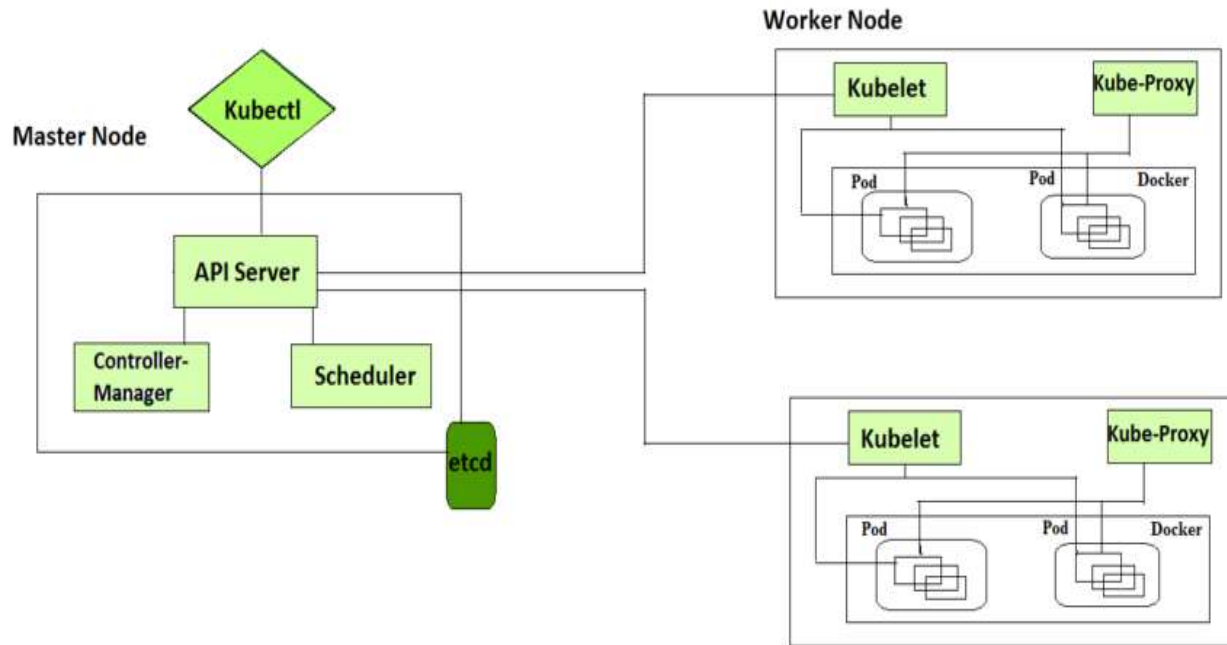
Iska use **real-time applications** jaise healthcare, weather forecasting, aur finance sectors me hota hai.

No.	Feature Name	Explanation (HiEnglish)
1.	<b>Autonomic Framework</b>	Comet Cloud automatically manages resources like self-healing, self-configuration, etc.
2.	<b>Cloud Bursting</b>	When local resources are less, it uses public cloud automatically for extra power.
3.	<b>Hybrid Cloud Support</b>	It supports both private and public cloud together for better flexibility.
4.	<b>Scalable Architecture</b>	It can easily scale up when number of users or workload increases.
5.	<b>Real-time Application Use</b>	It is used in real-time apps like healthcare, weather, finance, etc.
6.	<b>Dynamic Resource Allocation</b>	It gives resources like CPU, RAM, etc. based on the requirement of each task.

Point	Cloudlets	Clouds
Definition	Chhote data centers, user ke paas hote hain	Bade centralized data centers, door hote hain
Location	Edge ya local network ke near	Remote aur centralized locations
Latency	Low latency, fast response	High latency, thoda slow response
Purpose	Real-time apps jaise AR/VR, gaming, IoT ke liye	Large-scale data storage aur processing ke liye
Resource Capacity	Limited resources, chhoti scale	Bahut bade resources, large scale
Connectivity	Local devices se direct connection	Internet ke through global access



# Kubernetes architecture



Agar aapke paas **bahut saare containers** hain (apps/services) jo different machines par chal rahe hain, toh unko manually manage karna mushkil ho jata hai.

**Kubernetes** aapke liye yeh sab kuch **automatically** karta hai:

Feature	Explanation (HiEnglish)
<b>Deployment</b>	Aap easily apne applications ko deploy kar sakte ho multiple servers pe.
<b>Scaling</b>	Kubernetes automatically zyada traffic pe apps ko scale up/down karta hai.
<b>Load Balancing</b>	Users ka traffic equally distribute karta hai taaki koi ek server overload na ho.
<b>Self-healing</b>	Agar koi container fail ho jaye, to Kubernetes usse automatically dobara start karta hai.
<b>Rollouts/Rollbacks</b>	New updates apply karne aur pichhle version pe lautne ka simple system deta hai.

### **Kubernetes Use Karne ke Fayde:**

- High availability (app kabhi down nahi hoti)
- Resource optimization (CPU/Memory ka best use)
- Automation (manual kaam bahut kam ho jata hai)
- Portability (cloud ya local machine, dono pe chal sakta hai)

### **Kubernetes ka Use Kahan Hota Hai?**

- Cloud services (AWS, GCP, Azure)
- Microservices architecture
- CI/CD pipelines
- DevOps environments

Component	Definition (HiEnglish)
KubectI	Ye ek command-line tool hai jiske through hum Kubernetes cluster se baat karte hain aur commands dete hain.
API Server	Ye master node ka main component hai jo sabhi external ya internal requests ko handle karta hai.
Controller Manager	Ye cluster ki state ko monitor karta hai aur ensure karta hai ki sab kuch desired state mein ho.
Scheduler	Ye decide karta hai ki kaunsa Pod kis worker node pe chalega based on resources.
etcd	Ye ek distributed database hai jo pura cluster ka data (config, state) store karta hai.
Kubelet	Ye har worker node pe chalta hai aur ensure karta hai ki jo Pod assign hua hai wo sahi se chal raha ho.
Kube-Proxy	Ye network communication manage karta hai, taki Pods aur services easily connect ho saken.
Pod	Ye Kubernetes ka smallest unit hota hai jo container(s) ko run karta hai.
Docker	Ye ek container runtime hai jo container ko actual mein run karta hai inside Pods.

Feature	Multimedia Cloud	Mobile Cloud
Kya hai?	Ye cloud system multimedia content (video, audio, image) ko store, process aur deliver karta hai.	Ye cloud system mobile apps aur data ko support karta hai, jaise backup, syncing etc.
Use kis cheez ka hota hai?	Video streaming, online photo editing, media sharing.	Mobile apps ke backend, data storage, and processing ke liye.
Kaun use karta hai?	YouTubers, streamers, OTT platforms jaise Netflix, gaming platforms.	Smartphone users, mobile app developers, Android/iOS users.
Devices focus	Mostly <b>TVs, computers, servers</b> ke liye.	Mostly <b>smartphones, tablets</b> ke liye.
Data type	Heavy data: videos, audios, high-quality images.	Light data: contacts, messages, app data, mobile settings.
Examples	Netflix, YouTube, Adobe Creative Cloud.	Google Drive (on mobile), iCloud, Samsung Cloud.
Challenges	High bandwidth chahiye, fast delivery, latency issues.	Network slow hone par problem, battery drain, mobile storage limit.
Technologies used	CDN, media encoding, GPU processing.	Cloud APIs, mobile SDKs, backend-as-a-service (BaaS).

Category	Fabrics – Application Areas	Paints – Application Areas
Home Use	Bedsheets, curtains, sofa covers, carpets, towels.	Wall painting, ceilings, furniture painting, home decor.
Clothing	Daily wear clothes, uniforms, fashion wear, traditional dresses.	Protective coatings on leather jackets, printed T-shirts.
Industrial	Fire-resistant fabric, soundproof fabric, medical uniforms.	Machinery paint, corrosion-resistant paints, industrial walls.
Decorative	Embroidered fabrics, designer sarees, cushion covers.	Decorative wall paints, texture paints, murals, art paints.
Automotive	Car seat covers, interior lining, sunshades.	Car body paint, alloy paint, anti-rust coatings.
Medical Use	Bandages, surgical gowns, masks.	Anti-bacterial wall paints for hospitals.
Construction	Geo-textiles (soil stability fabrics), insulation covers.	Cement paints, waterproofing paints, epoxy coatings.
Sports & Safety	Sportswear, helmets padding, gloves.	Safety signage paints, ground marking paint, sports equipment paint.

What are the Benefits of Mobile Cloud Computing. How it is different than cloud computing. [8]

<b>Benefit</b>	<b>Explanation (HiEnglish)</b>
<b>1. Data Accessibility</b>	Users apne data ko kahin se bhi access kar sakte hain using mobile + internet.
<b>2. Low Storage Need</b>	Mobile devices pe kam storage chahiye, kyunki data cloud pe store hota hai.
<b>3. Automatic Backup</b>	Mobile apps cloud ka use karke data ko automatically backup kar lete hain.
<b>4. Cost Efficient</b>	Apps aur services ko locally install karne ki zarurat nahi hoti, maintenance cost kam hoti hai.
<b>5. Performance Improvement</b>	Heavy processing cloud pe hota hai, isliye mobile ki performance better rehti hai.
<b>6. Scalability</b>	Cloud resources ko as per need increase ya decrease kiya ja sakta hai.
<b>7. Cross-Platform Support</b>	Mobile cloud apps easily different devices (Android, iOS) pe run ho sakti hain.
<b>8. Real-time Sync</b>	Contacts, messages, files real-time sync ho jaate hain across all devices.



Aspect	Mobile Cloud Computing	Traditional Cloud Computing
Device Focus	Specifically for smartphones, tablets, mobile apps.	Mostly for PCs, servers, and enterprise systems.
Data Access	Data mobile networks ya Wi-Fi se access hota hai.	Generally broadband/ethernet networks se access hota hai.
User Interface	Lightweight, responsive UI optimized for small screens.	Full-featured UI for desktops/laptops.
Battery & Bandwidth	Battery-efficient and low-bandwidth usage important.	No battery concerns, high bandwidth usually available.
Use Cases	Cloud-based mobile apps, backup services, mobile gaming.	Cloud servers, enterprise applications, big data analytics, etc.
Connectivity	Kabhi-kabhi unstable (mobile signal dependency).	Usually stable (wired or enterprise networks).
Examples	iCloud, Google Photos, WhatsApp Backup.	AWS, Microsoft Azure, Google Cloud (for servers, websites etc.).

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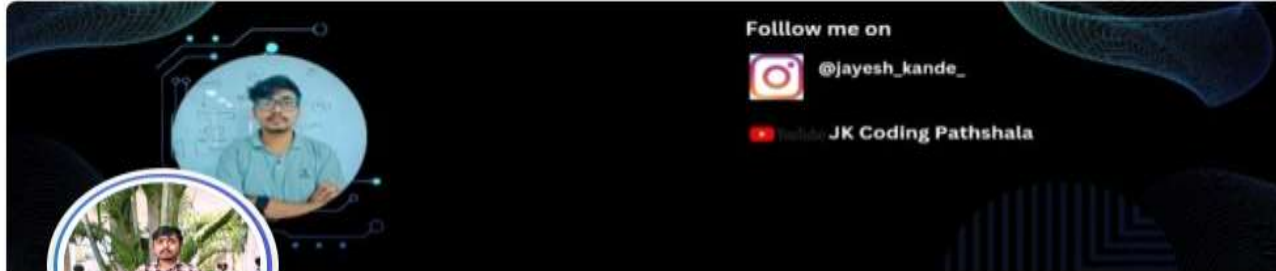
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