00:00:06 okay I think people are still settling down only these two blocks for sitting purpose okay so uh one of you can sit there and those who comes now you can inform them okay so what is cloud computing we discuss about Cloud Concepts definition different types of clouds and different deployment models but before that uh we jump there we can discuss what do we understand by cloud computing only these two blocks should be used for sitting purpose for rest of the course it's not only about today's class

00:01:08 but for rest of the course we have enough seats two two seats are empty here together okay so it's getting recorded what your friendship any okay so what is cloud computing any idea what is cloud computing why Cloud term is being used with Computing one seat is two seats are here empty please come forward I think today's class I am going to be your sitting guide yes so what is cloud Computing why it is not water Computing or weaper Computing why cloud computing what do you understand that cloud feature should come here in the

00:02:18 Computing how many of you have seen a video on cloud computing by some funny video by some politician not see I don't remember what is the title of that video plus but please do watch that politician guys uh raising concern what happen if there's a rain all the data will get washed away from cloud computing so you watch it later after the class you find one empty seat there here here also there are two empty seats so okay so what is Cloud in Computing what should be the cloud part it can be hurricane Computing as

00:03:28 well Computing that's why it is called CL cloud computing what feature of a CL of clouds you would like to have in your Computing I hope everyone has seen clouds is there anyone who has not seen clouds great so some people were thinking of raising hands then they see nobody's raising hands so they did not that's fine yes yeah so natural Cloud stores lots of water and then they float here is okay so a storage part uh we can assume that uh uh data can come from somewhere else and can be accessible to some other

00:04:40 places so clouds are being formed at a at a separate location so they are gathering data Gathering water from say location a and then they migrate to location B and there the data the water is accessible any anything else what are other Cloud features you want in your computer clouds can span over an entire area like a whole area excuse me empty seats in this block [Music] only so any other feature why we are calling Computing as a cloud so accessible from anywhere any time and distributed okay uh partially fine online people can

00:06:07 also unmute and participating in the discussion uh praa Sharma says distributed and accessible from anywhere anytime so this anywhere and anytime are uh like significant features for cloud notbook nice so uh like he mentioned about the security aspect that it should not be controlled by some hackers so you require higher security the cloud is up and high where generally people can't reach there in in person model physically it's only remotely accessible there are three empty seats in this block find your empty seat and

00:07:25 sit this one is not broken and that one is also not broken this one is not broken s okay so uh clouds are up in a so it's not in person mode accessible so you can have a separate dedicated security Arrangements which is remotely accessible and then you can open particular ports in computer or in data center which are accessible from outside and then you can also control the traffic whether it should be incoming traffic or outgoing traffic I'm assuming you have done some course on uh networking so you are

00:08:59 understanding what is in inbound traffic and outbound traffic opening Port what does it mean if you have not done pick up these terms after this class they are very easy to grasp okay what else any other feature of cloud which you want in your computer sir uh we always think the cloud to be a cloud some people randomly hello okay green cap green cap green okay okay H Green Cab hello sir louder there's one seat here in the second row security and what do you mean by security and storage so how they are resembl to

00:10:26 Cloud so the question is why we are calling our our Computing cloud computing anyways so what do you mean by storage and Security in Cloud any other VI can a akat so what do you mean by cloud computing back side nice continue so we can have a shared pool of expensive resources which might not be available to individual say if many of you are trying to set up a startup and you need heavy computing power either you can have an capital investment of few crots or you can just rent uh some cloud computing

00:12:10 power and pay some bills around 30,000 per month or so so you can have expensive specific Hardware resources put together as a shared pool and people can use it as pay as you go model or renting model like if you uh not once you get placement you'll go to Bangalore or Hyderabad or pun and there you will not buy house immediately we use rented properties right because capital investment requirement is a barrier to start anything it's better to start with rented so Cloud gives you that flexibility and how does it relate to

00:12:55 the actual Cloud this feature any anyone from Farmers background farming background they should be answering this question T can also participate in answering my questions no one is from farming background 67% population of India depends on agriculture for employment okay for this question you might not be from it something understand yeah is it something cre for your farm is not possible or difficult with artificial rain and all so it's better to have a common rain across the geography if you only have rain in your

00:13:52 palm the water will sip in in any way to other Farms that will not give you much advantage so that feature we can correlate with the cloud there's a common shared pool of resources and everyone can use from that Shar pool of resources fine anything else any other feature of cloud because of which we are calling our Computing as a cloud computing how do you perceive clouds maybe you can go back to your childhood uh when you were you are still young but when you were younger how you do you perceive CL how

00:14:37 did you perceive clouds have you seen these ramayan Mahabharat kind of serials how Cloud how they show clouds in s l they show clouds like in the background and the floor on the floor so what are the features you perceive there the clouds you can move through them okay similarly there are more feature related to this what else what fast moving right no fast moving clouds or lightweight clouds they fly you feel like flying in clouds right so they are lightweight in nature you don't need a heavy setup and

00:15:45 and it's very light to create new virtual machines uh how many of you have used AWS or Google Cloud VM so how much effort do you put in creating VMS how much this much or this much very little effort that's a very lightweight for user even to create a heavy VM with larger size of ram it's very lightweight the overall Cloud provision is very lightweight of course your machine will be heavy and if you put heavy processing task it will take its own time so I'm not saying lightweight process those people who have done

00:16:36 operating system course they understand what do we mean by process there are lightweight process which are known as threads and there are processes but the lightweight term I using here is in terms of using the Computing resources from cloud it's very easy to access and it's very fast moving so Dynamic access is there today if you need more resources you create more resources use them tomorrow if you don't use many resources you can easily terminate some virtual machines and it's uh there's no human

00:17:17 interference in between okay Pras says lightweight managed by God okay I did not s Gokul says cloud cloud cloud cloud CL okay so they have power of emoji you don't have in person one but you have power of expression so anyways okay any other feature of cloud which you can correlate with cloud computing okay uh just one another question how many of you are from nonn computer science background one two raise your hand fully so that I can have kind of okay so not many so uh you can ask question uh anytime if

00:18:16 you are unable to understand but I will I'm anyway trying to make the cloud computing analogy as non technical as possible as at least for this class okay any other feature of cloud why you are calling cloud computing don't answer like this in your interviews okay it floats and all it's only for your understanding so that you can have a better perception about cloud computing and then use it what else any other feature of cloud are there different types of clouds real clouds what are different types come on everybody knows some

00:19:13 different types of cloud White Cloud gray cloud black cloud dark clouds are having more resources more Water and Light White Cloud are like lightweight and does not have many much resources so similarly the cloud computing you can have a uh VM with lesser configuration or a virtual machine with very high configuration like uh akat mentioned about having not having expensive machine so if you have a GPU Cloud that will be expensive that will be expensive cloud with lot many resources and normal commodity based Cloud may not have those

00:20:02 many resources so there are different types of clouds any other types of cloud any other parameter on based on which we can divide uh we can categorize clouds government clouds there are some local clouds and then there are Monsoon clouds government uh you have seen Bangalore uh Bangalore has lots of local clouds originating from nearby places the Bangalore gets most of rain throughout the year except more from local clouds and then we have clouds coming from Ocean so in the same way we have different types of cloud deployment

00:20:50 there can be Cloud which are local clouds like uh your uh Erp uh what module on which you are doing course registration or D registration that is on local Cloud but your email Services which we are using from Gmail are not on local Cloud they are on global Cloud right so there are different types of cloud deployment it can be private Cloud there can be uh public Cloud there can be hybrid clouds as well and there can be Community clouds so um there's an enk line Internet line enk National knowledge U

00:21:36 Network through which you are uh through which you can access uh all the institutional resources across India from any of the academic Institute so that is nkn or any research lab so that is kind of community Cloud Network so a particular type of community can use Cloud but not other type of community so there are different types of clouds as well we'll see them in more depth in subsequent lectures but today I'm just uh making you understand what is cloud in a non- technical language okay what do you understand by

00:22:20 Computing we understand by Cloud what is the meaning of cloud here what do you understand by computing what is what is Computing here it's not calculator right what is it Computing ground cap H what is the Computing we from CS background you did not raise your hand yes sir what is computer where in might be fourth year third year okay yeah third year people can also take this course yes so what is Computing okay I'll make this question easy for you Ash rupta saying processing only processing is computing

00:23:30 yes CR operations is Computing now okay uh so I'm showing in person on the mouse that this is Mouse all of you agree with me any Rebellion okay why this is not laptop why this is not a computer why no I want answer why this is not Hardware from Hardware perspective why this is not a computer Richard okay H what that t no no I'm asking why this is not computer I'll put more processor more memory here equivalent to your laptop will you call it laptop h so what are those components which are in laptop but not

00:25:02 in Mouse s in operating systems interface is there this scroller is interface it might not be display screen but interface is there go ahead you're in right direction but I'm asking you to go in a bit of depth what else is there you go to market and buy laptop so you have certain specification in your mind what are those specification come on tell me everybody uses laptop processor memory what else display storage then one more thing which is important GPU processor is okay you can keep in same bucket what

00:26:04 else that's all what you need in your operating system okay what Hardware from Hardware perspective keyboard is okay battery all those are Plug and Play devices keyboard battery number of CPU CES is already covered memory CPU processing storage have already covered you want to answer I you input output operation that is part of your memory and Ram or storage motherboard but you don't buy motherboard you have you ever looked at the motherboard specification for buying laptop generally we don't because motherb is just connecting

00:27:01 circuit for all these component what else you can't live without that feature nowadays even for single day if it doesn't yeah some answer again Network so you also buy a laptop having networking interface or anybody has laptop without networking interface you can uh you can have an experiment today you visit your uh friends room in this classroom only and remove their networking device driver from their laptop and see what is the reaction you make a report of it and submit as a part of assignment

00:28:00 so what ethernet cadr not only ethernet but network interface card n IC card so at least you need an IC card having one uh slot so at a time your laptop can connect to one network servers have two n can have two NC card cards or four n cards so they can at the same time connect to two different line of Internet and that's we require for reliability purpose even one internet line is down server will can still have access to Second internet line the moment we go to to NC card the cost goes exponentially

00:28:47 high like buying for n card server May cost you around 64 lakhs or something and buying one ni card is quite cheap so uh it's like uh 30,000 laptop even have one n IC card so compute is generally considered of uh four components four Hardware components one is processing power then networking then memory and then storage when we say memory it's the RAM and whenever we say storage is the archival storage or secondary storage so that is what Computing is now we'll look at the formal definition of

00:29:42 cloud in subsequent slides and there all these four components will be used and we'll see how these four components Cloud properties makes a particular data center as a cloud comp Computing Center okay this brings to uh me a second question what is data center what do you mean by data center I'll have a random pick why both of you are in a in uniform Okay so uh what is data center so it's only about a storage your data center is only about a storage have you seen any data center okay she's signaling on back side

00:30:50 okay so in our department we have data center so what have so have you went inside and see what kind of machines are there only from outside okay so but there are CPUs like there are fans running it's not only about archival storage there are compute power as well there is processor there are processors there are rams secondary storage there are networks they connected to network so what is the difference between a Data Center and a uh cloud computing like balak Krishna is saying rxs of servers is equivalent to Data Center so

00:31:35 we have rxs vertical racks in each rack we can put one server machine and server has its own server class configuration like 1,000 GB Ram or 10 terabyte of a storage and 48 core GPU machine all those things can be possible so we put those servers in the rack vertically and then there's a cooling system associated with it and we maintain temperature less than 13 uh in Rajasthan when ideal temperature temperature should be around 20 below 25 okay so data center also have all these four components processor Network memory and

00:32:28 secondary storage so how does it different from cloud computing we don't call our department Center as a cloud center right it's known as data center so what is the difference between cloud computing and data center and it's a interview question you can vou for it okay which comes first First Data Center came first or cloud computing came first sorry data center so all of you know data center came first so what's the difference it's not Cloud right so what is it not we just discuss few features

00:33:16 of cloud so what is not data what is what are the features which is making it a data center but not cloud you have to answer in my class number of data center create a cloud uh not necessary horizontal scaling actually in and this physical classroom people suddenly have Advantage you know you can read the chat and then start making your own answer okay so horizontal scaling is for cloud vertical scaling for data center we'll discuss about this aspect horizontal scaling and vertically scaling but vertically scaling is not

00:34:10 applicable only for data center then cloud computing offers multiple services not just storage but CPU as well as GPU computation so data center also provides this computing power uh we have uh HPC cluster have you heard about HPC cluster what does it stands for high performance Computing cluster but it is not Cloud HPC Cloud it's not HPC Cloud it's HPC cluster and it's also kind of set up in a Data Center and it provides remote access to Computer Resources like the way Cloud does so now your question becomes a bit

00:34:59 difficult what do you mean by data center cluster and Cloud all of you note down this question difference between cloud data center and cluster cluster is set of notes so a cloud is a cluster or not although we we have not covered the definition of cloud officially but with our limited discussion you can answer a cloud is a cluster or not yes raise your hand only half cluster okay some Vex are saying it's a cluster others don't believe it's a cluster we'll see uh data center is a cluster or not cluster is set of notes noes means

00:36:28 Computing node maybe computers and cluster is a group of connected nodes yeah set of nodes should be connected yes so then only you will call it cluster if nodes are not connected if we have disconnected nodes and kept together in one may we say physical location still you can call it a data center so for uh as part of today's homework maybe you watch some videos about how Google maintains their data center or YouTube or Facebook maintains their data centers they are literally huge data centers in

00:37:22 which they keep running big trucks for carrying the uh broken hard dis and repaired one so during our 44 minutes of class in Google data center they might have changed around thousands of hard disks we'll come to that because every time some hard are failing olders are failing being replaced with new one for Instagram Facebook also it's the same story and it does not affect functionality for you the moment you log in on uh Instagram or Facebook or Gmail you get your own data you don't get any error

00:38:14 saying that oh your hard disk your corresponding hard disk has failed we are in and in repairing those things and we'll get back to you soon so that's another feature of cloud with data centers generally don't provide data center don't provide you this kind of high availability if they are not accessible they will give you error that they are not accessible but Cloud maintains multiple replicas in general data center is physical storage of data and can be based for implementation Cloud framework on top of

00:38:58 it yes so like uh you have data center on top of that you have a virtualization layer we don't know what is virtualization formally but uh what was the movie name Matrix have you seen Matrix movie all of you not see so there was clone of a particular person there are many clones of those things not Matrix algebra Matrix yeah so uh and the person was actually inside capsule but they were actually leing somewhere else in some hyper space other dimension so that cloning and that is a virtual representation of that

00:40:04 person not down another question which we'll entertain in uh later lectures when we discuss about virtualization difference between virtualization emulation and simulation [Music] you're also noting know questions right good so difference between merization simulation and emulation and you have to explain with the help of sci-fi movies like I already leaked out about Matrix there are other movies which mimic simulation and emulation as well so name three movies which represents virtualization simulation and

00:41:10 ulation with justification that's your homework Gokul gokul's imagine imagination is saying what if entire Google's data center gets destroyed in seconds so what we'll not get access to Gmail all our data will get lost but what we are doing is we are creating multiple data centers at remote geographical locations so like uh if you go to AWS [Music] so it will not happen as automatic scaling and replication mechanism are always there okay even if Sun is destroyed at this moment you still have eight minutes to

00:42:10 copy your data into pen drive anyways so uh what these cloud data centers are doing actually is they are placing their data center in a way in a strategic way so that even one geography get affected they still have replica in another data center in another continent or so like if you visit AWS and when you create VM you have one option to pick the Jone in which zone you want to create your virtual machine you can pick AIA Asia Zone which is Singapore or Mumbai data center or us West Coast or us East Coast or Australia

00:42:59 or something else now the next question is what will happen if all the data centers get destroyed within seconds then you may also get destroyed if it's happening across the Earth so don't worry about that post life uh consequences so uh data centers if you want to replicate across Ross different geography the cost becomes higher because there are lots of effort goes behind the scene so if your data is that critical you would like to have availability across different Jones uh all of you were there on in India in

00:43:51 2014 or 16 right we had North grid failure how many of you remember the most of the north India part were not getting electricity for around 40 hours or 48 hours I don't remember you were you might be busy playing on roads or streets so what happened during that time is uh there was small the reason was more electricity for that blackout in North India not a scarcity of electricity it was more electricity which created uh uh surge in one uh power supply line and that got dripped and it was grid connected so the

00:44:45 whole North India block get uh out of got got out of electricity and it happened for 40 plus hours and during that time uh I was in I kpur and we were happy that we are having backup the whole campus was running on backup and that backup also went down and because of that result AC cooling unit stopped working early as compared to your uh data center machines and data center got uh caught the fire and the whole data center got burned and we were having only single data center at that location if we were having another data

00:45:42 center applicated to South grid so India is in electricity terms are having these two main grids North grid and South grid so if we combine these two grids if you could have combined these two grids earlier the whole India might have gone out of electricity but having distributed n sometimes helps having two different availability zones will help you but it it's expensive now we are maintaining two grids if it's a combined grid we will maintain single grid so that's all about your cost Trad off so uh these if you look at the uh

00:46:29 have you checked the pricing of Google Cloud versus Amazon Cloud which one is cheaper any idea those who have used Cloud are using free credits so far I not not check prices anyway so Google cloud is expensive in general and as a technical person so rupta says GC what does it mean gcp it's expensive or cheaper expensive you know why he knows the answer he's doing mtech project with me and it was one of his task I asked him to do so he figured it out okay why ash you also might be knowing the reason why gcp is expensive

00:47:24 I remember telling you the reason you can unmute and share the answer what is this IDK I don't know I was relating it with jdq or some development kit okay so you don't remember the answer I I shared with you your number is going so the answer is gcp cloud is newer as compared to amazan Cloud why because it is just their business model no so uh see if you want to be in competition you have to have competitive pricing despite that gcp is much expensive uh don't worry about him he doing head count so uh gcp is newer as compared to

00:48:31 a WS and newer means you have newer Hardware which is more expensive or might be faster as well so if you create a random VM on gcp highly likely you will get the SSD storage in your virtual machine and in AWS if you are using free tier version or so you will get normal hard disk you will not get SSD hard disk right and SSD is in general expensive so the reason GCB is expensive is because of its newer hardware and they would definitely would like to monetize it if they have the capability so any so uh there are two questions for

00:49:27 you till now difference between data center cluster and Cloud then difference between virtualization simulation and emulation okay this is one of the meme from uh previous classroom F so how do you perceive clouds so in response to that concept this student has submitted this mean anyways uh we talked about this infrastucture right there are mainly four components in any cloud computing or data center or cluster comput is there means processing power then storage secondary storage Network or connectivity and application of software

00:50:20 modules or which are running in your RAM right so Ram is all about the running code so that's why application is there so as part of this course we will be covering compute mainly in compute our Focus will be on virtualization layer how we will create a virtual computer uh people have been talking about the dual boot so they uh either create uh two different graub pointers and install it or some people also asked about using Windows or Linux inside virtual box so that virtual box was virtualization so you will be using

00:51:12 virtualization as an end user and then as part of this class we will be understanding what is virtualization how does it work and to understand the working of virtualization you must must be knowing about the operating system working how does operating system works now it brings me to another question what do we mean by operating system okay before that you write another question difference between operating system software system application system and fourth one is your program which you might have written as part of

00:52:07 your btech first second year so difference between operating system application software and program but you start answering right now just who will answer now the guy who is putting his hands on his ear uh blue one yeah yes blue one what's your name man yes what is the difference between operating system applic software and program or we start with program what is program some lines of code how many lines of codes are there in operating system random guess 1 million which operating system by the

00:53:24 way Windows Linux Mac OS or you are talking about tiny Linux tiny us you know about tiny us some people right I remember giving VI so what is the size of tiny us I think 28 MB he doesn't remember I answered about Google Cloud you don't remember about tiny US size so tiny oper tiny us is a small operating system which is around 28 MB but we will not talk about n in normal windows or Linux normal means whatever you are using how many lines of cords are there in operating system one million is like 10 lakh lines

00:54:23 of cod right so his order is right so approximately 50 uh lakhs lines of God 5 million lines of God or more as you have more advanced feature lines of code will increase so program and operating systems are same if you say set of lines of code so where you put this uh boundary that beyond that it's not program anymore o is low level Code system software is middle level code application is high level and program is having no level so see when you say low level or high level or middle level it's all

00:55:25 about your uh abstraction how uh how much away you are from Hardware but at the end it's a programming code only it might be in different languages like most of your applications if you are talking about web development applications or mobile applications they might use higher level language like JavaScript or Java or cink and uh if you talk about operating system level it might be C C++ or objective c and middle level codes are generally database systems which may have their own scripting language so let's not go into this

00:56:12 labeling or abstraction level but at the end it's a set of lines of code written to perform some task so now what are the what is the difference between operating system and program and soft and application M nominate someone randomly quickly H continue okay uh stay there uh ATM you have used ATM machine there's a software inside ATM which does the banking task will you call it operating system because it's interacting with the hardware ATM your verification or maybe your library uh book returning

00:57:51 kiosk will you call it hard operating system because it it's just interacting with Hardware right as per your definition we are we are having just open discussion you can op for yes I will call it operating system I will not say anything it's up to you what what are other differences and what is Library add another item in your C list what do we mean by Library see Define software using program term as set of program is software which is running on operating system which is another software so what is library

00:59:08 now it's also a setup program what else you nominate someone remotely not in your V vinity and you cannot nominate back to the person who has nominated you at least in that same lecture you can take revenge in subsequent lectures okay minute some H difference between operating system application software and program and Library we have not defined program so we will not accept your library definition Define algorithm so algorithm is a set of lines of code okay I written lines of code and what is

01:00:40 program okay so algorithm is passive entity and program is active entity in terms of hardware and when you put your algorithm on Hardware you call it program right okay I don't know answer I will accept whatever is convincing for me go ahead okay so program becomes process in execution but we just said that algorithm executed his program you don't understand programs and then how do you write programs sir a set of instructions there are author of PDF you are all of you are using PDF format right the there I think two

01:01:39 people who created this PDF portable document format they can open PDF with text editor and can make meaning out of it they understand that different St symbols right have you ever opened by mistake that PDF a text editor it's all different symbols in a particular way so those two people can read PDF through that text editor also so program is also human understandable software is also human understandable operating system is also human understandable go ahead now what is program you just mentioned execution is

01:02:40 process CPU in CPU we have process on hard disk if it's in written it's program and if it's on your notebook then it's algorithm right okay go ahead so reusable set of programs is Library okay go ahead software and application and operating system softwares are not using okay Library can't use softwares have you uh okay all of you know library right not this physical Library the libraries which we are having in our systems does Library make use of operating system you have seen right go ahead now

01:04:15 continue so what's the difference between software and Library okay you're again going back to the same thing so operating system is also known as Software System and libraries are using software systems there are libraries which can make use of your met lab interface or some other software also [Music] H use it I'm not stopping you but use it and the whole class is looking at you for correct answer no your expectations are high for you for assignments go ahead uh there are some answers here s say set of applications running

01:05:28 together to perform entire complete ecosystem is called operating system so now operating system is being defined using the term application only us code allows us to interact directly with the hardware but applications interact with the OS we API calls for getting Hardware resources so they have uh restrictions whether you can run program and access Hardware or application can access Hardware or non directly who can control the CPU registers allocation paging those who have studied operating system they know these terms right so

01:06:13 operating system controls that I agree with we continue with prel sensor yes yes give me example of a librarian software name some library or some software psyit is a library and software name it if we know some there are many software outside world and what Instagram is an application it's not a software so what's the difference between application and software now you nominate someone too much has been done randomly say third row fourth guy who Sun okay is asking what is the question sorry that brings to another

01:08:06 question what is the first software or application or program you installed in your Hardware operating system is not the first one your colleagues are not in favor of you okay continue your [Music] answer so saying software doesn't have these kernel space and user space separation they have they have find another difference I except people who are sleeping others are thinking randomly pick someone else go to that block okay you pick someone whom you don't know H sa second row her right from left third person from left my left or

01:09:42 your left your left yes what's your name I did not get ganga then okay yes so what is difference between operating system and application he was sleeping in between and he got nominated righted to answer not sure is so you should not say no directly and get rid of me you you don't have choice you have choice for for one day to deregister for the course but if you are registered for the course you don't have choice to say no to me okay you're from CS background then why you are saying not sure you have completed or

01:10:47 btech then okay go ahead answer don't ask your neighbor applications runs after operating system and bios is one application which runs before operating system there's a in fact uh post application power on self test which runs even before bios loads in so that sequencing is not the correct okay nominate someone whom you don't know from that block randomly say some row and some seat number first of first person from which side that side M what's your name Shain okay yes so what is your view about operating system and application

01:12:08 and software if is interface then what is SSH those who have used Cloud they can access Cloud without operating system they do SSH and get the terminal access for resource management that's the purpose of operating system great uh do you know any application who also performs the task of resource management anyone you nominate someone randomly from this block some random row and random dat number jant who is j h we are popular guy in the community okay what is the question anyos which any application who

01:13:28 manages resources do you know any application he said operating system manages resources hardw any application are you aware about who which manages resources you are M Tech CS or non CS CS AI branch CS BR okay have you heard about kubernetes and GPU management kubernetes so what is the role of kues any idea anyone who have you yes GPU so managing containers on GPU clusters and what do we mean by managing containers on GPU cluster allocating resources is the management so we have many applications

01:14:42 which also manages resource allocation so not only operating system manages the resources but in general yes jvm also does the similar thing let's bring me to another question jvm uh how many of you know about Java not Java coffee beans but Java programming language so Java runs on jvm right so and jvm full form is what Java virtual machine so it's also a type of vir ual machine and Java existed since I think 1970s or so right from that time even VMS are existing uh so what is DVM DVM D for Delhi

01:15:53 DVM myang joural must be what is DVM you develop lots of mobile applications dalic virtual machine Android uses DVM so even your mobile system also using virtual machines two questions you write one is what's the difference between jvm DVM or the virtual machine which we are talking about in the context of cloud computer so virtual machine on cloud versus jvm or DVM what's the difference another question is which came first virtualization or operating system with justification all answers should be with

01:17:13 justification it looks very obvious right operating system must have come first then why then in that case I did not have asked you this question right if I'm asking this question the answer is other one so virtualization exists much before this general purpose operating system came into existence and the form of virtualization which existed much earlier is now more popular in form of containers how many of you have formatted your laptop and started using Linux anyone raise your hand after last

01:18:04 class before okay fine how many of your Linux user only Linux user not Windows okay how many of you are now terminal users great fine so terminal user question to questions for you you might be knowing answer that's why I'm asking question have you ever used CG group c g c groups permissions on file have you changed permissions on file CH mode change mode of you change mode for three types of users right the owner and then group and then everyone those who that's why I'm asking you to start using Linux and terminals

01:19:06 so that you understand these Concepts what I'm talking about so in Linux machine in fact those who have done one course with me it was part of your exercise right CH mode using CH mode that's how all of you raised your hands anyways so uh this CH mode allows you to change permission to particular file and you define your permission of file for three types of users one is the owner of that file whether they can read write or execute so three permissions then you define all these three permission of read write execute for

01:19:50 group which group the group which the owner belongs to so that group what kind of access they should have whether they only should be able to read the file or write into file or also execute the file and then you have everyone these are three right so everyone you say whether any user who are who is part of group or not part of group uh can read file write file or execute the and in Windows when you install any software you specify whether it should be for all the users on this operating system or only for the user who is

01:20:39 installing this this application right so if you say only user who is installing this application then other users might see that application is installed but they won't be able to use it they won't be able to execute it so you are not you are only giving them read reading permission but not executable permissions honor group and others yes uo thank you ashat but it will not help in getting marks which I deducted for not remembering gcp expensive re okay yes Ash you want to say something okay anyways so uh this CH mode defines these

01:21:34 three groups and now what do we we mean by groups and users they don't interfere in each other's space and that's being implemented using c groups and c groups are being implemented using containers and nowadays containers are more popular as compared to virtualization which we we'll also look into containers after virtualization so cloud computing we'll understand then we'll look into virtualization then we'll jump to Containers as well so containers much exist as exist as much before even operating system was

01:22:20 there even containers were there when AP poo Mission went to Moon do you remember pantium core processor P4 Pentium processors how many of you have heard about Pentium 4 search about its computing power that was the power which went into Apollo Mission hardware and I'm sure all of your mobile phones has much higher power in terms of Hardware as compared to what went to moon so all of you have infinite capability to go to Mars maybe Pluto with the current Hardware power in your pockets so contain that time operating

01:23:15 systems were not there but containers existed that separated different modules not letting interference and all all those things so virtualization exists much before our operating system concept concept was there for operating system but the kind of operating system we are seeing they came quite late okay so any question any doubt so I hope all of you are getting what uh I intend to communicate you'll get to know in your exams how much you are getting but any feedback any suggestion any question or any topic you want me to

01:24:07 cover as part of this course which I asked you on Saturday Saturday's class so next class is on Saturday 2 to 3 you

**Summary**

An informal discussion on cloud computing covers its definition, types, features, and differences from data centers, emphasizing accessibility, resource sharing, and security.

Highlights

☁️ Cloud Computing Defined: Discusses what cloud computing is and why the term “cloud” is used.

🌍 Accessibility: Highlights the ability to access resources from anywhere at any time.

🔒 Security Concerns: Emphasizes the importance of security in cloud computing.

📊 Shared Resources: Cloud computing allows multiple users to share expensive resources.

🏢 Data Centers vs. Cloud: Differentiates between data centers and cloud computing, focusing on their functionalities.

🛠️ Virtualization: Introduces virtualization as a key component of cloud computing.

📈 Dynamic Resource Management: Discusses the scalability and flexibility of resources in cloud environments.

Key Insights

☁️ Understanding Cloud Terminology: The term “cloud” signifies remote data storage and accessibility, similar to how natural clouds gather and distribute water, making it a fitting analogy. 🌧️

🌐 Global Access: Cloud computing provides the advantage of accessing services and data from any geographical location, enhancing collaboration and efficiency. 🌍

🔐 Robust Security Measures: Security is paramount in cloud computing, necessitating strong protocols to protect against unauthorized access and data breaches. 🔒

💰 Cost-Effective Resource Utilization: Cloud services offer a pay-as-you-go model, reducing the need for significant upfront investments in hardware for startups or individuals. 💸

⚙️ Importance of Virtualization: Virtualization technologies are crucial in cloud computing, allowing multiple virtual machines to run on a single physical server, optimizing resource usage. 🖥️

🔄 Scalability and Flexibility: Cloud computing allows for dynamic scaling of resources, enabling users to increase or decrease their computing power based on demand effortlessly. 📈

🏢 Comparison with Data Centers: Unlike traditional data centers, cloud computing offers higher availability and redundancy, ensuring continuous access to services even during failures. 🔗