00:00:03 good evening everyone and welcome to the next lecture uh there's a surprise for all of you today there's a small quiz but it's not graded quiz so nothing to worry so we uh talked about three different types of model ask pass and SAS and in detail we discussed about various variants and those variants can be categorized in one of these category right as password s so identify in which category all these threes are lying blue color red color and violet color so this CRM stands for customer relationship management softwares email

00:01:03 Services virtual desktops Communications games online game Services cloudbased games so in which category they are lying ask passw software service okay any other opinion other than S and then these execution runtime database web servers development tools which one pass uh platform as a service yes NVM servers storage load balancer networks infrastructure so all of you are agree ask pass s categorization yes sir [Music] so there are four deployment models which are also part of definition we are

00:02:06 still at the definition so there are different types of development models includes public private hybrid and Community what is public Cloud examples of public Cloud give me examples of public cloud gcp commercial clouds mostly which you are aware of they are in public Cloud domain any private Cloud you are aware of one I have worked on cloud Foundry uh uh we used in one of my previous is it private Cloud uh yeah I mean that was I mean they offered uh private clouds for uh banking domains uh okay so uh they set up Banks private

00:03:09 Cloud on banks premises is it the case um that was I mean sort of I'm not sure how the the infrastructure were done but um the concept was not having the public one so um I mean I guess it was set up on the bank premises but um uh exactly I cannot say how the infrastructure was okay so uh any other example of private Cloud which we all might be aware of all of you have used that private Cloud I know CC on is not uh cloud or not we just are exposed to applic a VMware VMware is how how why you are

00:04:08 saying it's a private Cloud Drive which one Oracle Drive Oracle Drive why they are private okay let's understand what is p private Cloud so what is private cloud so uh cloud is when when some entity or uh own own their own infrastructure and everything uh but their operation and product work as a in in their own uh Cloud infrastructure we call those clouds as a private Cloud so generally those clouds uh is not available for a any other uh uh any other entities for use so for example uh government India have one uh they call

00:05:10 it as mraj I think yes but MRA is allow you can if you government entity you can buy MRA VMS they will provide you like uh cloud which is belong to the particular organization like only use their cloud and it will be their for it will be dedicated for their organization only like dedicated example of such private Cloud which provides cloud services not exactly Cloud sources but it does provide FTP Service for all the students and we can store data any any other example of private Cloud which we might be aware of Microsoft or

00:05:57 AWS they are not private clouds right right but we can purchase them then only we can use it they are public Cloud open Stock IBM why you are saying they are private Cloud so any on-prem systems are uh so give me example which we all might be aware of what is common among all of us YouTu Google meet don't make random gu I'm asking services and AWS so we can like host our own storage next CL online people are you listening me yeah so I jur is common among all of us right your Erp is on private cloud of high

00:06:55 jur yes at the time of registration they try to scale it up that's a separate problem whether it it scales up or not but they try to scale it up on their private Cloud which is provided by your college is also kind of demand service yes uh someone was saying something so what happens in a p private Cloud the data center the hardware part is also deployed on on premises means in the territory of that organization it might be your main office or side office that doesn't M matter but uh all the rights or all the

00:07:51 purchase was done by that organization to which Cloud belongs to and that organization itself is responsible for managing the cloud infrastucture as well and they use this Cloud infra for hosting their own Services they don't rent it out to other entities so they use cloud because there's a requirement of dynamic scaling flexibility uh and uh this VM migrations facility or having everything on one cloud and hosting multiple applications together and those applications can work as a cloud cloud client but they are their

00:08:39 own clients so it's a private property you cannot ask for renting purpose and AWS gcp ibms they are all public clouds which are available for renting purpose anyone can pay and use these cloud services so these are mainly two different cloud and deployment models how you can deploy cloud services either in private mode or public mode then there's a extension known as Community Cloud so a community comes together or similar types of organizations comes to come together and share the Comm Cloud for example all iits can come

00:09:33 together there are 23 iits and they set up their own cloud and every I uses those that cloud services now this cloud is built by these group of organizations or say community and used by the community itself our enk service internet service andk National knowledge network is kind of community service in internet as a service which connects all educational institutes across country so that's example of community cloud service as a network service but it's a community service and then mix of all these three

00:10:20 is hybrid deployment Now give me one one scenario for each of these four when you will choose for public Cloud when you go for private Cloud given that you are you have authority to choose one of the deployment model so which one you will prefer in which scenario which kind of scenario so let's first discuss about public Cloud so when you will prefer public Cloud maybe when we are um having some um uh let's say customer facing applications or wherever scalability is the challenge um we can uh prefer public

00:11:08 one because U this is like on demand everything right see all clouds are on demand when I don't want to maintain the infrastructure then I will go for the so when when our services are actually for the public and anyone can access them then we'll go with the public private also so public Cloud will be use when when we wanted to share some data with the external holders also with some authentication so there we can use this okay so one question I know all of you are coming from nowadays AI background data is nowhere related to

00:11:56 Cloud as of now we have not talked about about only from data perspective when we are discussed about various cloud services or Cloud models we are not focused on data part so when you justify saying that you may be sharing data with public then only use public Cloud not a good answer because you are now justifying Based on data we'll come to data also data is also important but data is not the focus here when we are talking about Cloud remember data as a service or database as a service are just one type of cloud as a

00:12:40 service but and they can be categorized as ask pass or SAS so when I am asking you uh when to use public then you should argue if it's ass pass or S using public Cloud what kind of benefits you get or if it's a private cloud and it comes into any category of f pass s how does it benefit you why not to go for public Cloud so one answer came from physical classroom is cost is a factor if you want to own your own cloud private Cloud you need to invest a lot in capital infra infra right setting up a data Center is a huge

00:13:30 cost upfront cost so one is cost factor of course when you don't want to spend upfront Capital amount so you can go for some renting Services which is like public Cloud any other reason for going for public Cloud collaboration you can go through Community Cloud as well but what is forcing it to you public cloud so maybe when uh we don't have the expertise to manage when we have to set up our data centers across the globe then uh when you say uh private Cloud why do you think they are not globally accessible no not about

00:14:17 globally accessible I'm talking about setting up as physically the location wise yes so uh uh if you go by this uh of that Fortune 500 companies the it companies out of those 500 Fortune 500 companies they generally go for setting up their own data center Facebook does not rent AWS services or is it no it doesn't it doesn't so Facebook owns their own data center across Globe so private clouds can also be available across multiple availability zones then the cost will also not be Factor then if we are

00:15:05 considering this why not the factor just like Facebook post doesn't matter that's why they are setting up their own private center if we include other companies like the Facebook then this comes into the factor like if we have to have a data centers across in some countries where the regulations are there then you will go for the public crowd come again uh you you have uh made some interesting comment on regulations Yeah so basically some regulations are there in some countries where you need to set up your own data

00:15:40 centers required so instead of going for the private cloud and setting up that data centers and costing you will go for the public Cloud which is available over there okay uh so you are saying cost is a factor in deciding whether to go for public or private right sir when security medium or low also like suppose a new company is coming up in India it's like payment company or something and in India there's RBI regulation that the data cannot go outside the India for the processing instead of going at the first

00:16:14 hand for the private Cloud their own setting up their own cloud they will go for any public Cloud which is available in India with the data center so why they will decide to go for public cloud in India instead of they're setting up on their own private cloud in India just for the launch of the POC before going into the capital not just the cost even hiring the engineers and everything will come into the that is all about cost right hiring an engineer or what time and cost is also Factor capital investment

00:16:48 yes yeah so cost right capital investment and plus the timing is also the biggest Factor like private Cloud will take some if you want to quickly set up some services is provide make it online so you don't want to wait for setting up their own cloud because Cloud setup will take time so you rent so cost and time are two factors which for which you prefer public any other Factor raise your hand and then answer because maintenance you can make it part of cost because if you are Facebook you can also afford to maintain them not a

00:17:32 problem yes suvendu sir when the data are not uh means data security part are not that much crucial data is not a concern data privacy is not a concern you can think of going for public cloud and like uh previous argument mentioned that some countries regulations may not allow so data privacy is a concern there and that's the reason companies go for either public cloud in the same geography territory or set up their own data center if they want to run services in that particular territory yes Rahul uh you want to have

00:18:16 a different kind of a Services which are offered by the public Cloud okay so uh for example this function as a service Lambda service of AWS yeah any services like you have the AC example so if you have that unique offering from cloud service provider which is not easy to build for you or maintain not easy to maintain by you then you can opt for public Cloud right right okay okay any other on which you may decide is scale so which one scaling is so which one is more scalable public or private public I

00:19:04 guess because we can easily scaleable how many uh resources we want or something we can scale it very easily in public we assuming that your public cloud service provider has that much resources in their data center which you require for a scaling purpose and I'm not sure if I discussed about Cloud bursting I me mention right Cloud busting as an option so you can host your application on your private cloud and when you see that your private cloud is operating at 80 or 85% resource utilization you start Outsourcing

00:19:48 services on public cloud and when your load is gone you come back and release public Cloud VMS or services and restrict yourself to private Cloud so that is part known as Cloud bursting in case of uh these requirement you can B expand to other types of cloud from your private cloud or you can also expand from your one public Cloud to another public Cloud suppose you started using gcp and then you require more uh services and I'm assuming just assumption that after a certain threshold cloud services becomes

00:20:43 expensive what you can do you can use another public cloud with lower rate and distribute your services across these two public clouds so that is also a scenario of cloud busting or they comes under hybrid Cloud whenever you go for cloud busting by default you are in hybrid cloud or even without cloud bursting scenario you can also think of using hybrid cloud and the reason which we decide uh just discussed for public Cloud all the opposite reasons will become for private Cloud right if course is not matter data

00:21:30 privacy is the atmost and you have enough time to set up your own data center you go for private Cloud yes om prash sir even if I'm using two public Cloud that is also called the hybrid like gcps yes yes because uh I'll talk I'll come to uh uh this part of heterogeneous commodity Hardware uh in late part of this course right there will say why using these two clouds becomes hybrid although they are of similar type public deployment okay when you will prefer Community Cloud what are the reasons yes

00:22:23 sanand yeah saan so basically um if as you mentioned right all 23 it can have a cloud shared across and um that could be Community one because whenever uh same type of like if if the sector is same let's say any Healthcare chain or any education chain so they their um like uh Regulatory Compliance and everything Security will be close to U uh same for each other so that can be categorized as Community Cloud because they can share all the regulations um same across every entities F so this is one of the reason

00:23:08 that the community may have similar regulatory requirement but if we keep aside this policy or regulatory uh requirements what could be the technical reason to opt for Community Cloud but not private uh public Cloud yes so for example uh within that organization it has different departments if we take a case like different departments that are spread across the U geographical location and the these department needs to have their own private uh clouds also but they might need to uh interconnect with each

00:23:50 other's Cloud so they make a community Cloud also in that case so that they need uh for uh for themselves also but need to interact with each each other also so they have a community but they can't have a public crowd because of the security reasons if your argument is about one organization but multiple departments no no sir I'm just taking it as an example for it can be like like we uh talked about iats right spread across essentially they are belonging to the same type of uh organization so they are under one

00:24:27 umbrella what tech ed we can banking sector can yeah banking SE sector or Healthcare sector could be one example asking another question if all these iits are using Community Cloud what is the advantage they are getting for using community community Cloud but not public Cloud one reason could be like sharing the cost across um but public Cloud also they will be sharing the cost across all the public you know all the clients not only among iits so security public security is not there right uh in community they will be

00:25:09 collectively owning owning the cloud why do you think AWS or GCB are not secure so but at the end of the day uh if if you take example of Facebook has has its own uh a different Cloud right they don't use going for cloud no no sir I'm stating the reason why they have their separate own separate Cloud right so for a community to collectively own a separate Cloud the reason being that they don't want their data to be available to a third entity right so going to third entity because it's Community Cloud within

00:25:49 Community you are able to share data no so third party by third party I mean outside the community they don't want the data to be to outside the community there are individual entities part of community so if data is a concern data sharing is concern that concern is for individual right entity not for Community even IND say I jur cannot share all the data with all other iits why we should share yes Rahul uh it can be like a optimization of the cloud infrastructure yes so because you know the purpose of cloud

00:26:33 that Community has similar uses you can finetune your Cloud infra you can optimize your Cloud for providing only those services not any general service which are on public and that's the reason also public Cloud might not be efficient but private and Community Cloud might be efficient even in community community Cloud this uh data center management headache is of community they have to bear the cost it will be costly so if cost wise if you look at public Cloud might will be most cheap or cheapest then community and then

00:27:24 private private will be the most expensive among all these three now in what all scenarios you will prefer hybrid Cloud so in case of like uh two public clouds uh the diversity of the services uh for example in our case so we have to go with the AWS as well as gcp because we need a high number of gpus and AWS does not have that those gpus reserved for us so we go with the gcp also for to use those gpus this is the this this is the one of the case uh availability of features or services and those different clouds yeah the same way

00:28:22 if we expand it to private community and hybrid they offer different Services right Community cloud is optimized for particular kind of services if that is your requirement for example it jur it's using enken Services which is community based cloud service then it's also using Gmail which is public SCE then it's also having private Cloud on which it's hosting Erp or other similar applications so uh we are actually using hybrid Cloud if we say I jur is using Cloud a single Cloud but unfortunately

00:29:06 these clouds are not connected for it jpur that disc connected right uh your L password is different from your Gmail password right your email ID password why these two services are separate but if these two Services comes on a single cloud or hybrid Cloud then you can have a single password manage management for accessing all these different services on public Cloud private cloud or Community Cloud but your Erp and enk services are accessible through L your different username password which is valid only for IJ services and for

00:29:53 Gmail you use different password so any doubt any any other question uh I have one question there are government clouds also those are provided by the public Cloud providers only like AWS azur and all that so in which category those uh government clouds will come uh can you give me more more concrete example where AWS is providing government cloud in us the there is a uh type of organization or applications which only can run on a government Cloud if you are using some government services or specific data I

00:30:40 come across with some clients they cannot host those on a uh public version of that cloud but on a government Cloud they can host see now uh because of compliance is I I understand so like India is NI ser National information center servers most of government websites are hosted on Nic but they are now I think migrating to that MRA now okay so similarly US Government also ask their government organizations to use a separate Cloud now it depends how AWS has tied up with government whether they are completely

00:31:24 providing the separate data centers for their services or they are logically creating a virtual Separation on their public cloud and that virtual separation is only reserved for government departments of us I'm not sure what version they are using yeah might be virtual a around it depends on uh government requirements also yeah government may ask them to set up uh separate infrasture for only for the purpose of government or defense for defense mainly we require separate deployment of clouds okay

00:32:10 okay so now with this understanding you try out virtual box now you might have also tried out virtual box before this course but now if you create a VM you apply all the concepts of uh you think about all these Concepts while creating a VM and using it you will have lot more clarity where these concepts are being used and how and where so uh now I'm assuming that with this uh philosophy of cloud computing the understanding of definition of cloud computing all of you are eligible to think about course

00:32:56 projects so there can be different types of course projects you can uh go for one is uh you can use simulators like there are Cloud Sim kind of softwares in which you can simulate the cloud without having cloud in infrastucture uh come up with new interesting scenarios simulate them and get the results compare with existing approaches or existing optimization why those configurations gives you benefit or Edge and what kind of parameters you can assume in when we are configuring a cloud infra like

00:33:49 uh time to create a VM or whether you deploy SSD or HDD or GPU servers are there what is the network bandwidth suppose you have different data centers as part of single cloud and if those data centers need to communicate then there's a communication delay so all these factors you can configure in the simulators you can configure the types of uh machines you have in your data center I3 processor or I5 you can also configure the power consumption so so so many parameters you can configure in these

00:34:31 simulators and you will also find large number of research papers who have presented their case study using simulators so you can also take idea from them those published research papers and use simulators and create new scenarios and generate new results so that can be one dimension of your course project uh second is you can work on existing limitations of cloud ecosystem and how will you know what is existing limitation go back to definition what definition require unlimited scalability it doesn't

00:35:19 put any limit on scalability so if you are going for hybrid Cloud things are still very complicated in general the person who was saying that uh in their company they are using gcp as well as AWS but they are using gcp and AWS for different types of applications if their application require GPU they use G uh gcp if it does not require GPU then they are using AWS scenario is you require same application to be hosted on two different types of cloud and how will you dynamically manage your uh Cloud resources to bring down the

00:36:05 overall cost time and other factors like maintenance overhead and others how will you ensure security despite using multiple clouds deployment models or can you build an application that works flawlessly on as pass or S on different models so work on existing limitations another limitation is multi tency we'll discuss about multi tency later on uh in the course uh like uh this uh Gmail and WhatsApp the difference between Gmail and WhatsApp we discussed in the class right or not did we discuss about Gmail and

00:36:51 WhatsApp comparison we did Sir yes so that was part of multi tency we'll discuss it again so that is limitation for existing Cloud they don't support multi tency as such and live migration of VMS are actually virtually live migration they are not doing the real live migration what do we mean by real live migration of VMS transferring uh that cach a registers values at CPU level the third level cash second level cas cash lpus and all transfer it in real time to another physical hardware and immediately start the

00:37:36 process from where it left in on the older machine to on the newer machine so migrating that VM while it is running in real time is is still not achieved you still require a couple of seconds down time so you download the VMS you store the critical uh critical data or PCB blocks program control blocks people who have who have gone through operating system course they can relate what is PCB is and you transfer that PCB another cash caching data to another physical machine and the assumptions include that

00:38:23 other physical machine will also have similar addressing mechanism for regist because by now your uh assembler assembly program platform has hard binded your data points to particular register entry register address is hardbound by then when it runs on CPU now similar register addressing mechanism has to be there on the target physical machine to successfully migrate in in real time so those are still limitations for cloud ecosystem then uh you can use uh these uh real word systems like uh Google cloud or AWS and

00:39:18 Benchmark them compare them and identify which cloud is better for which type of services based on your benchmarking results and for benchmarking you generally prefer benchmarking payload or data load so you have benchmarking processes you can use them or you can also work on creating your new benchmarking to measure something else which existing uh processes are not allowing you to measure right then the fourth one is you uh refer to q1 journal or core a or a star conference from cloud domain pick some problem which you find

00:40:10 interesting implement it first objective is to generate results which are equivalent to the paper which which has published and then improve those results that's second objective so if you are able to come up with better results but maybe some constraints that is also fine but improve some results in a particular context or scenario so that can be your another type of project so start building your teams and pick one of these problem statement uh problem domain and start finding problem statement uh we'll be

00:41:01 sharing uh a Google sheet with all of you where you will mention what type of your project is and what is your expected problem statement and then few lines which is written by you not generated by gpts or alas right so after reading those few lines we will comment whether you should go ahead with this project or not sooner you mention about your problem statement and abct sooner we will be able to respond you back whether your project choic is okay or not and then you can start working towards your

00:41:45 project right deadline deadlines are already announced on Google classroom for your project uh there was one question regarding case study so for regular students case study is not compulsory if they are meeting the attendance criteria if by any chance if you don't find this classes entertaining or you don't want to come to class you attempt that case study portion also that is a relaxation I'm giving you to regular students sir do we need to take a group for this case study as well for the executive

00:42:31 batch uh yes uh case study maybe group of two and for project maybe group of four maximum okay and Sir for major project it's four and for the minor is two I think is there any minor project no I'm just confirming it no there's only project group of four maximum okay sir also okay sir for exe Executives as well as for regular excuse me you are not ta right H shift only T are allowed to sit in that block I'm wondering since last 45 minute how come I have this T and never met anyway any doubt any question

00:43:38 regarding project now uh I'll give you couple of ideas right now you can also pick from these ideas and it's okay uh multiple groups attempt same problem statement I don't have any objection there but the issue is you will be compared with other project group performance if you are working on same problem statement you will have competition otherwise you will be your grading will depends on me only but in case of competition your grading depends on your competitors also right uh those who are looking for some really

00:44:32 good in-depth problem statement with uh modern touch for them one of the problem is compare agentic AI deployment with cloud-based microservice architecture so how agent Ki is different from microservice architecture and as a cloud service provider you are expected to deploy agenting AI as well as micros service solution how it will differ from for you as a cloud service provider I hope all of you got the problem statement clear you have to be in feet of cloud service provider and now you are offering your

00:45:27 cloud services for agentic AI workflow versus microservice based architecture solution for any application so how will you optimize your cloud services for agentic AI and how does it differ for micro microservice based uh Solutions fine who has not heard about agent Ki how come you doing MTP with me so uh asentic a uh is seen as a new Revolution where we say that we will not might be creating generalized AI we will be creating very specific AI uh agents for example one uh AI agent is only good at writing

00:46:34 code and another AI agent is only good at reviewing the code now use these two agents back and forth and then improve your code so uh the first agent which is good at writing code you give them some problem say write code for agentic AI it will write may not be perfect one but close to Perfection give it to reviewer it will review say okay there's a bug in this line or this functionality is missing you give this feedback to uh code writing agent specify that there's a bug or there's a this functionality

00:47:20 lack of functionality agenting the code writer will again improve the code give it back to the reviewing agent and then reviewing agent will again review the code so there are two different agents trained for two different purposes but working together without having dependency but collaboratively and those who are aware about microservice architecture which I might I will be also discussing in microservice architecture you buil multiple microservices and combine use their apis to access each other's micros service

00:48:05 and then build one functionality or one application so at first glance they look similar but in depth there's lots of there's a lot of difference that I can perceive these things are not on paper so that's why I said it's a uh good research problem you can think of working on it as part of course project and uh if you need any discussion T are there I am here for any kind of technical discussion on your project topics another good project topic uh I already mentioned about multitenant applications how you will design

00:48:48 multitenant application for clouds like suppose you want to build one application which can provide services like Gmail also provide services like WhatsApp through single instance so you start your application your clients comes to you ask for email Services you provide them email Services another client comes to your application ask for chat Based Services you provide them chat Based Services but running same application not not two different Logics single logic application so how you will combine and make them

00:49:30 multi- applications so how to design such applications you can create a project on that and uh regarding benchmarking one of the study we did is uh gcp was faster than AWS at that time when we studied uh and we uh Dr down the reason and and find that gcp is newer as compared to AWS AWS is all having older data center but newer data center of AWS are also faster if you compare with gcp so older data center of AWS might be having old machines at that point of time so slower hard disk slower CPUs might be there so you can also

00:50:27 perform similar benchmarking study only study will not be sufficient but you also need to analyze the results and justify why particular results are coming or any other question or doubt regarding projects so on that Excel Street you will be able to see each other's projects problem statement and Abstract also we are deliberately keeping it open but don't go to someone some else someone else project row and edit it because Google history will tell us who has edited which row so don't uh edit it by mistake if

00:51:20 you have edited admit it and correct it immediately another Advantage is you can also go through the other people's problem statement if you find it interesting compete with them no one is stopping you or you can also learn from already approved projects that what kind of projects are getting approved what kind of projects are not getting approved by T or me so that you can revise your problem statement fine so uh let's decide your pro problem statement tentatively by 8th Fab and uh uh I think first Fab is

00:52:16 Saturday being used as wenesday so we will not have our regular class and it was already announced that no class day in academic calendar first Fab 8th Fab is also no class day so for next continuous Saturdays we will not be having class so utilize this opportunity to work on your project problem statement okay first web and 8 Fab are Saturday right so we are not having class on these two Saturdays because of academic calendar no class day for for any subject sir or for your subject sir uh as far as I can refer the

00:53:05 emails we have received a while back it is being said that 5th of February which is wedness day will be observed as a no class day and the class no fifth FB is uh it's a separate story why fifth fa we are not having classes but those classes are being no no but if you refer to academic calendar I think first second we have some event and on uh 8th n also we have some event right so D because of those events we are not having classes fine and this is not my decision this is institute's decision I'm just

00:53:51 informing you and following it but for first PB I think they have convered converted into class day so you will be following Wednesday's timetable so this classroom and you will not be available you might not be available during this time you may have classes because I have 370 plus candidates in this CL course so there might be some Clash so I cannot overrule the Wednesday's timetable for Tuesday's timetable on first but utilize this time I will be available on this Google link on both the Saturdays during class time if you

00:54:31 wish to join and discuss about your problem statement or any other thing regarding your job opportunities your professional career anything where I can be helpful I will be available online you can join and discuss with me but those things will not be recorded that will not be considered as counted lectures okay any other question or doubt regarding project so we are keeping it deadline as eth FB Saturday your ignas day right so Pro deadline is 8 F we need to submit project problem statement deadline is 8 F okay okay and

00:55:21 for that is also fine sry sir didn't get you no no the project deadline is already announced on Google Classroom which is somewhere in April right 13 ail or something okay we need to submit the problem statement by 8 8 F yes so like for PJD students also four members for each project is it maximum four members maximum four members yes okay all these figures are maximum okay thanks foration and any other doubt or question grading guidelines for course as well as for case study similar guidelines will be

00:56:14 used any doubt so first and 8 F we don't have CL like uh we can work we can proceed with our works we can proceed with your project work I mean regarding this utilize that time for your project problem statement identification creating groups okay okay we can connect in this meeting yes yeah okay sir thank you and quiz schedule also I have shared with all of you you make sure that those Saturdays you are available for quiz there won't be any makeup quiz or there won't be logistic regression applied on your missed quiz to find out

00:57:12 what you might have scored if you have attended the quiz no logistic regression it's not a AI machine learning course it's purely cloud computing course and if you missed your cloud computing resources you missed it you cannot recreate it and so this time also it will be same kind of pattern with slido only right yes slido will be used as a quiz platform and Sir here I can see that the 15 out of 15 will be awarded in Project when it is a published in reputed conference or journal with better results submit

00:57:56 okay submitted a full length Okay so do we need to take the participation in conference or journal or will it be sponsored by The Institute or how it is and that we'll discuss in first or eighth class okay yes uh yes mugilan sir am I audible yes yes yeah sir regarding this uh like as you mentioned submitting a paper in journal or any conference even though like secondary don't any conference or Journal it's written their reputed conference and journal yeah yeah yeah so for Student Chapter conference

00:58:40 happening in some local college and publish paper there no yeah that's fine sir but if if we take into consideration of the reputed conference or Journal so that is a lengthy process right sir so they also look into the quality of the paper so that all second but the thing is in order to submit that that requires lot of resources as well as lot of money sir so say for example if you take any reputed journals so the the what to say like if you need to submit any paper then it's a very costly Affair also so that is also comes into

00:59:11 consideration submission is not costly Affair I have completed my PhD and so far till submission stage I am not spend spend any money except having one laptop with me and working on results and coming coming up with not it was not required no of course submission you will get reviews and even before submission he'll at least consult with me okay cool sir got it you consult with me that you are submitting this paper in this particular conference and journal and I will also say okay it's a good paper paper you can submit there you can

00:59:57 Target publication and if it's a good journal and Conference we will support you monetary okay means Institute and we are together I'm not alone don't tell me that I promise that I will spend my personal money now they'll fund you through some project or Institute sponsorship there's Institute mechanism for regular students to get some sponsorship for publishing in good such venues they utilize those yeah sure sir thank you what is the minimum number of members required for project zero there can be project like agentic

01:00:45 AI versus micros service may not be opted by any group so it's fine okay any other question or doubt no sir maximum is for project case study two and I have mentioned so whenever you are picking any topic for case study and project okay for case study also you need to finalize by E Fab for both the things if you are opting for case study track so for case study and project whenever you decide first look at at the submission guidelines and check whether you will be able to produce all those artifacts or

01:01:34 not and if your answer is yes you're are little more confident that you are on right track for a problem statement fine any other doubt or question uh s just for clarification happier than in other classes yes yes sir just for clarification like uh as you mentioned case study and project problem statement need to submit by FIB yes right and we have assignment one submission on 5 9th H and quiz on 5 13th I think around yes this this is the schedule right in upcoming days so it is relaxed one right sorry you check with

01:02:20 regular people they are giving three exams in final semester in one day back to back so I was just clarifying sir that's okay so you have that potential with you don't underestimate yourself we working professional sir as so it's easy for you to find problem statement yeah yeah yeah that's it I was just getting clarification whether this is only the things or not to we submit that's thank you sir because we are missing first and eth F for classes so quizzes are slightly skewed towards after midf anyways any other question or doubt

01:03:09 regarding project or case study for regular student it is clear either you opt for case study and fight for 10% marks or you come sleep here listen me and get 10% marks for sir for for executive students like uh for pgd it is only Cas not no attendance marks okay okay so we we are moving further with our next set of topics as part of our course cabus which is on virtualization right so what is virtualization any idea those who have used worked with cloud computing already what is virtualization come on someone should be

01:04:22 able to answer 370 people uh sir virtualization is technology that you can use to create virtual representation or storage Network or some other physical machines like we are using in our offices virtual machines so we get u a whole setup on the virtual machine like the whole OS setup okay uh what's your name zish okay I fully agree with zish about this argument that virtualization is technology which provides virtualized resources in form of compute memory storage or network and what is cloud computer what is the difference between

01:05:16 cloud computing and virtualization and I agree with her argument regarding virtualization now identify that difference between cloud computing and virtualization we know cloud computing definition and we know what is virtualization by this one argument virtualized or abct creation of resources like CPU RAM storage Network or any other Hardware info what's the difference Che so cloud computing is basically the utilization of the virtual resources like how you uh how you utilize those virtual resources like for uh like uh cost

01:06:09 savings scalability flexibility those kind of okay so uh what's your name anurag anurag anurag anurag is saying that cloud computing uses virtualization to provide service y right agree all of you comfortable so far if cloud computing uses virtualization then why it is not extended form of virtualization why it is cloud computing there's are two different metaphors are being used here virtualization means virtual presence or uh it's not physically present but it's a virtually creating an entity

01:07:05 sir yes yes I think so in cloud computing there share resources in cloud computing you can share the resources and in case of viralization you can use the application is in single machine physical machine okay so for example if you go by this argument that in cloud computing we share resources but virtualization it's not then just wait a minute uh in you do this homework in your with your laptop install virtual box and create two VMS those two VMS are actually sharing same physical Hardware in virtualization also sharing

01:07:55 is happening and by creating to vmc will not call your laptop as a cloud service provider right so cloud computing is like a cloud cloud computing can consist wide range of like uh virtual services like uh infrastructure as a service uh software as a service those kind of things are like uh you can use the resource like on demand like as per your utilization as per your requirement virtualization is basically just the like virtual instance of any technology like you can uh virtu use Virtual server so when we say cloud computing

01:08:37 can have Dynamic scalability how does it providing Dynamic scalability you can add resources sir as per your requirements what is the resources in so you have a scalable option like right you can add multiple instances also yeah you can add multiple servers instance what is instance it's a virtual machine only yeah so when you say you can dynamically add new more instances means you are adding more machines viralized more machines more storage yeah virtualized storage virtualized Network virtualized

01:09:22 Ram or whatever yeah for cloud computing definition to implement it viralization only right yeah so it provides elasticity like you can uh add like you can utilize resources as per your requirements like that is what being enabled due to virtualization right yeah so why cloud computing is different from virtualization two entirely different metaphors sir sir can we say that virtualization is a technology that is creating virtual versions of hardware and software while cloud computing is a service which is uh delivering

01:10:16 the access for the resources yes sir so cloud computing basically uses virtualization for like scalability that's why I'm saying if if you go by this argument that cloud computing uses virtualization why we are not calling it extended form of V virtualization or maybe something else but entirely different matter for like Cloud one answer is coming from physical class so answer is not up to Mark we can continue our discussion so yes you want to answer head count is different for how many students so cloud

01:11:13 computing serious ethical concern in this classroom so we are getting 15 people proxy mon we stop after 7:30 and resolve it no one will go out of this classroom until we catch them or you meanwhile you have 15 minutes you stand up if you have marked proxy just simply cut it out will not take any action C 15 people who have Mar for whom have Mark proxy they are getting f grade in this course yes sir because it was not for online people for offline people we mention that any unethical task if you do for getting marks that will

01:12:08 result into f grade and marking attendance meanwhile I request is to count it again there might be some serial number issue count it and but if anyone has Mark silently go to RP and cancel it in next 14 minutes now yes let's come back to the discussion sir one more point I would like to add yes is like Cloud could like it could be one of the reason like Cloud computer is basically like uh it utilizes internet connections but virtualization is like basically like have you have you gone through have

01:12:58 you gone through first uh assignment statement not yet sir okay we are asking you to create a virtual Network also there virtualization will be used for Network also yeah and in in fact as part of our cabus we have these uh virtual and physical networking and storage virtualization but I like that argument which uh was mentioned by someone that virtualization is technology and cloud computing is application of that technology exactly sir but not only virtualization cloud computing also uses other Technologies such as

01:13:56 distributed computing I don't know how many of you have done distributed computing course so distributed computing also is being used and virtualization so combining these two technologies you can create a cloud service or Cloud platform fine so I answered it quickly otherwise I would have spent more time if that proxy issue my had not happened okay so what is cloud computing it's a implementation of it's an application which uses virtualization and distributed computing as technology so to become an expert in

01:14:48 cloud computing from a system point of view as a service provider you should be having your hand and on with virtualization as well as distributed computing so in this course we are only covering aspects of virtualization not distributed computing distributed computing is another full semester course where we talk about uh consensus mechanism uh leader election leader selection voting mechanisms among distributed notes and how they can coordinate among each other and we also talk about distributed

01:15:30 time clocks like vector clocks or lampers vector clock right okay uh okay so virtualization is engine and cloud computing is car okay so that's the analogy which is okay so car is not only about engine it also uses sensor technology and maybe interior have of some other material so virtualization is one of the technology which cloud computing uses okay now there are two different types of virtualization majorly we'll see there are three types of virtualization you might come up with four different types of virtualization

01:16:20 which is okay as we have seen there are many types of as a service but mainly we will come across with two types of virtualization one is OS level virtualization and second is Hardware level virtualization and if you look at this diagram in OS level virtualization we have first hardware and on top of that we have host operating system and on top of that we can run guest operating systems guest process when I say host operating system I mean the operating system which is originally installed on Hardware site

01:17:07 INF fracture right so that becomes host operating system and on top of that you create virtual machine and whatever operating system you install inside that virtual machine is your guest operating system or guest process right so in this diagram of os level virtualization we have OS as part host operating system as part of fixed layer and on top of that we are creating virtual machines please recount the tendance and in case of hardware virtualization we have Hardware we have hypervisor or uh minimum be operating

01:18:01 system drivers and on top of that we are running guest operating system and then guest processes right I have not written here guest operating system because of some reason we will come to know either today discussion or next Tuesday's discussion uh so what do you think which one will have more performance over it OS level virtualization or Hardware level virtualization and you have to justify also why raise your hand and then answer please to avoid M communication anyone which one will have less performance

01:18:57 overhead I'll give you one example then you can then you can analyze which one will have more performance over right suppose you want to get your leave approved and you have multiple hierarchy like your supervisor then your faculty advisor then for mtex dpgc convenor or for VX dgc convenor then it's spgc convenor or uh scgc convenor or in between you have department head also and then Dean academics or associate Dean academics and then finally it goes to office of your students right so that is the

01:19:42 procedure earlier but now the procedure is you get your leave approved from faculty advisor and maybe DC convenor or not required and when you submit to Department office it's done it will be only informed to office of academics or office of your students which one will have less performance over it second case or first case why the Lesser hles or if we use official language you have lesser competent number of competent authorities who are part of your leave approv chain your workflow is easier now apply same logic here and

01:20:32 compare which one is having less performance overhead and why OS level virtualization has the L because it has uh less number of [Music] layers okay any other argument any argument against this argument yes sir I think OS virtualization will have more override because it will like uh in the OS virtualization like it will like it will require a lot of configuration changes from one resource to another I did not get your justification I get a argument that hardware virtualization is better in terms of

01:21:30 performance but jic yeah because sir like in OS virtualization like uh if we are using like multiple applications some applications could be like container based applications the that takes too much time to run and that requires a separate you know container also container is uh uh alternative solution to virtualization yeah but not let's not mix up these two things right now there is some answer coming from offline yes there s more so it will have more performance overhead right if there are more layers

01:22:30 exactly each layer will you know as H uh consume some resources right for offline people it's not visible here it's guest OS return here so which one is still my question is same which one is more performance efficient and if me so what argument is coming from physical classroom is in case of hardware virtualization each guest OS is a dedicated process running on Hardware whereas in OS level virtualization all these guest Os or guest processes are running on same operating system and they are sharing more

01:24:16 resources so there might be more confusion or I'll say interference between each other partially yes but not exactly the reason interference may not always hamper your performance if there's interference then they will hamper but here we are asking a general question which one is always better in terms of performance as compared to other you might have separate guest processes in OS level virtualization which might not interfere with each other even in that case performance will not be that good as as

01:25:00 Hardware so I'm giving you answer that hardware virtualization is better in terms of performance as compared to OS level virtualization and reasons you need to come up in the next class I'll I will randomly pick someone and ask this question and if you're are unable to answer you will be Mark absent because you're not doing homework that's why will Mark you absent so for online people also uh this is the question for today's class hardware virtualization is good at performance as compared to S level

01:25:49 virtualization and you need to come up with proper justification why so H so that's all for today's class uh we'll see you in the next class

Summary

The lecture covered cloud computing models, deployment strategies, and virtualization, encouraging project submissions on cloud-related topics.

Highlights

🌐 Discussion of cloud computing concepts: types of models (SAS, PAS, IAS) and deployment models (public, private, hybrid, community).

🔄 Exploration of cloud bursting and hybrid clouds for enhanced scalability and flexibility.

💰 Advantages of various cloud models based on cost, scalability, data privacy, and security considerations.

🛠️ Potential project ideas include simulating cloud environments and benchmarking services.

👥 Encouragement for teamwork in project selection and submission of problem statements.

⚙️ Comparison of OS-level and hardware-level virtualization, discussing performance differences.

📚 Homework assignment to analyze the performance differences between virtualization types.

Key Insights

🌍 Diverse Cloud Models: Understanding different cloud models is crucial for businesses to choose the right fit based on their needs, enhancing operational efficiency.

📈 Scalability and Cost Efficiency: Hybrid clouds provide a balance between performance and cost, allowing businesses to scale resources as needed without overspending.

🔒 Data Privacy and Security: Selecting the appropriate cloud model can significantly impact data protection and compliance with privacy regulations, making it a priority for organizations.

🧑‍💻 Collaborative Projects: Team-based projects foster collaboration and innovation, encouraging students to tackle real-world cloud challenges.

⚖️ Virtualization Techniques: The debate between OS-level and hardware-level virtualization revolves around performance optimization and resource allocation, essential for effective cloud deployment.

📝 Research Application: Implementing research findings in cloud environments can address existing limitations and drive advancements in technology.

📅 Project Management Skills: Students learn valuable project management skills by forming teams, selecting topics, and adhering to submission deadlines.