You see how simple for the view also when you use semaphores damn And the main idea behind the semaphores is used for producer consumer that's one or for mutual exclusion so ah here if we look at the this example of the producer the producer is producing items writing things into a buffer sending emails there are many samples of the producers so the code starts with produce an item so you generate something and you put it into a buffer use the semaphore key of empty is going to a decrement account and check is there any OK he's going to say the empty buffers because you got you trying to put this but you have in your hand what are you doing empty bottle it's so empty he's gonna say do I have one so he's gonna take permit the count is in if he has one OK the next the next the next semaphore is to be able to encapsulate the code where you may have some problems there updated structure if more than one process tries to access the data structure you have to synchronize or you gonna get hers so the way to synchronize is with this center force K now in this case December for you stop before mutual exclusion. anybody in if not then you allow the the process to go in ears somebody's already inside another processes using that data structure you gotta put that process to sleep OK there is a waiting list of the sleep processes associated with that semaphore so you gotta put it to sleep but if you're able to enter then you can enter an emulated data structure and then at the end a few ticks what was that what's the be going to going to do want to say hey I'm leaving the critical section wow somebody else can come and get in gay that's basically just basically what is this gonna do plus is not going to check if there's somebody in the waiting lists if somebody's waiting to get in Dan is gonna be awake OK remember the difference with the one we saw before first example battesti sent where is the flight was forced yeah you gotta be looping it's not going to change you finish the question so he's gonna waste right there looking in here you don't if you cannot get into the green calesia you got to sleep when the one that is in degree angle region exit igeneration be in that field butex is going through take that process and allowed to get in but also you're going to do a video full why because you just created a football right you produce what you got there and then and then you produce a footballer if somebody was waiting for a full buffer you're going to go in what awakened that process so you see that P and we they are synchronized one is to get in and the only one is to get out if you cannot get it you go into a waiting list with me is you go out in somebody's waiting you waiting that causes up I any questions it's gonna be the reverse calls the producer that the producer Gary I never any needs empty buffer to put it OK the consumer he's gonna get it Bob Chris dot already full arrange him so that's why he says P of course are there any full buffers where do you get the footballers they are produced by the producer the producer gets empty buffers introduce full bars OK the consumer gets footballers and produces empty bottles is gonna be similar just B&B shorts because one produces one of the other one and the music is the mutual exclusion since since both of them when they do enter or remove they have to manipulate the data structure which could be an array start link list service right you want that manipulations only by one of them at the same time because we already saw what happens if more than one manipulates the data structure the quantum could stop any any point so we saw the example in which we asked for the question can I get in and the answer is yes before you have a chance to change the fact you're stopped so the only one comes and asks the same question and he says also yes but when you come back you already asked a question and he was yes so everything is stop being messed up Bing did you get the you understand that it's not difficult to understand it the center force was you have the concept of what what is that you're doing OK in rock in Word case of the piece thanks beast it's the case of mutex is a variable race only one error in your producing and consuming then you have you have many many things to consider many things to OK so look at this thing anything inside if you say sorry this problem right one shot using center force Let's talk about the process scheduling characteristics call Are very obvious yes of course you want your your scheduling to be fair we wish start was spare the best not always a case and send it scheduler you want each process get the fair share OK also air fryer you are a charge calls the company will you work with the computer center and one of the measures that you take just see how things are going is CPU utilization if you see it 100% is that good very good or you worry or is I think what is better

Or bad that your computer is using the CPU 100% of the time it is bad compared to OK that looks quite you think it's bad

Well you may be using it 100% but in that causes that you know you cannot respond on time to somebody else or you're taking too long ask somebody when she seems like a it would right be so that's not the only thing that if you are in an industry you should worry what is it what happens to industry when you work in industry James not completely staying up stable static new projects are coming products are introducing to the market something new is coming and what happened there gonna use the computer but if you're ready to upgrade so how do I how are you going to to handle the the new product line that is coming you're not gonna be able OK so I think to remember when you are the computer said that your product the ones that are making decisions is first you have to know and learn where is state coconut coin what new projects are coming into the pipeline you have to prepare so even computer center you have to know that there is gonna be a new plants and there's gonna be incorporated it and it's gonna happen the demand for your services are going to increase so you have to plan for those so if you are 100% then you have to worry if the plans are going to all things where very quickly you're not gonna be able to do it so you have to be aware what's what did the company is is doing in the short and the long term OK because you need to be prepared gay ah so

***one of the questions is what kind of measurements if you are at the computer center what kind of measurements did you look at and give you the most information about what's going on with your computer and use with your users what do you measure***

Well someone also the response time Bing did you have a lot of interactive users the averageresponse time is important what would be an acceptable response time one second one minute no idea just just think that when when you talking place assume that that we have a a response sign easy 3 seconds so you come with your friends in the morning if they say I am morning can you answer what happened to you nothing what do you think response your friends are gonna think something is something something is wrong so now you have an idea of what response time you are the computer if you don't get the response are you gotta think that something is not working correctly there OK act one measurement always informant is the user satisfaction wise well because you can sing 3 seconds response time users say it's OK Dennis OK but if we 3 seconds user saying this is not good then it is not good all the games on your user satisfaction it is something that not a lot of computer centers measure so you ever go into a computer center to ask for user satisfaction it's gonna be important it is gonna be going to make your life easier alright so the response time is going to be important we're trying to minimize the scheduling and God breaker minimize in response but then again imagine my recent getresponse system was one second and I have to spend a lot of time and effort increased 750 25% any sun is something effort for scheduler is it's just one thing well sometimes that is not the case it is important when he makes a difference if your user size faction is saying that three is not good and you should try to lower it I if you can do a point but you always minimize it it doesn't make sense to always do it because you pay for doing something so it doesn't and don't bring systems like an Organism something here something in some other place is going to be affected everything and then operating system is connected Angel something in what place is going to play in some other place so you always have to be on have to be aware of to be careful in there even though we want to minimize we don't want to over turn around dash jump scares select your job and they put it into the cube be executed it when he thought they returned it to you so that's the turn around time diner since of course you always want to minimize you know you want to do it as fast as as possible Dan the final is there throughput is the number of jobs costs so you want to process as many jobs as possible OK so basically the categories scheduling algorithms what is scheduling for batch jobs even though not always is the basic idea with the batch is you get the job and you run it till it finishes I friends with the interactive when the interactive job for a short period of time remove another one remove run another one I Bing fast as possible possible so it looks like you're running several of those under same guy and finally we have the real time be our system is controlling invite situation OK automobile airplanes an X ray machine sword and he needs answers Anna circle based on a certain amount of time OK so he has some limitations inherited and in the algorithms because you know finals playing in the AHL rocks you want to move right away create otherwise they claim they keep going and so you need to you need to do things thanks OK any questions Is this country let your mother related to try to resolve before world systems we need to be fair you mean when we wanna the process is to get the share of CPU only see application means that is related with fairness if you want you want all the policies to be applied to all the all the processes even though later on and we have we may have priorities for put the jobs K in when she start wanna be treated differently from the others because of the priority but then the priority is not be part of it of the algorithm but the idea again is can the policies apply to everybody M you wanna a end italics you don't want to be a you do better with interacting that with batch or vice versa you want to to say you need a balance in the way processes distance of course the turn around if I give you a job I'm not sticking to return the job that's it that's the batch an example the best there anything for example the payroll the payroll is a typical example of her badge in German a running or they may running overnight in the next day or results OK with all the checks generated by the cable I but you're also interested in what is called OK how many jobs are we crossing beginning of time processing as many as as many as possible efficient I don't want to take too long to decide what to do typical example in the first operating system of the IBM 360 it took about two minutes for the operating system find out what is it that the batch job requires Bing why it cost first the machines were slower than they are and have many many many many options and system the more time you take it find out what to do sometimes like many things in life we learn the hard way so first breaking system user everything everything and we realize that there is a cost of doing that just ask use everything in he has been that that kind of lesson still sometimes difficult for some if you see for example that the machines close they have many many options what happens 95% of the time people do use only once a day So what happened but you pay for everything next that's what happens their response time is it gonna be important interactive sadness again is still not want what crosses to be more have more CPU than others and finally for ring times important deadlines you need to run a process every every deadly circles you have to walk across every day in seconds call my excuse so he asked to be predictable that's the whole point alteril other real time scheduling Nichols OK let's take a break alright

of two types of scheduling what is called not preemptive and the only one is preempted non preemptive is do not remove the process from the CPU and a preemptive this when I'm you process arrives during move the process from the CPU let me go back hey soul when a new process arrives from the waiting to the ready OK what is this on preemptive nothing happens OK the one that is running keeps on running if it's pre emptive the moment that the process arrives the running process is removed and he is put into the ready in the scheduler selects again he may select the same one that was there but he may select a different one depending on how the scheduler is the sign so the idea of preemption is and you wanna ride the one that is running goes back to the list of we selected to one next play that's the whole point of preemption stop the one that is running K now why do we want to do that like we want to to use a preemption

The execution times before hand how do we know

Usually their jobs are processed periodically like the payroll every week you rock the table every week every week OK so the person submitting the job he knows that the CPU utilize the CPU usage is going to be 10 minutes right two hours whatever OK so on job commands K for the operating system one of the parameters in there the job is gonna be how long is this process going to take so you gonna put there 10 minutes so it's an estimation of the user OK that way that's the only way to bring system is gonna know OK so it looks at all the estimations and get stared at the shortest channel first why did shortest sharp first what do we gain with that always when when we're talking about the best job you can think like when you go to the supermarket OK does her best chance you go with your cart full of things and you're not lying OK what is it that is going to make things go faster come on you have seen supermarkets what do they do I never got to see more the more canes are dispatch the better say that again the more clear the more customers or processes in this case are dispatch the better I know what what do the supermarkets do to make things faster

there's more but there is more than one there is more than one more user OK there's more than one CPU let's say OK that's one what else OK maybe yes yes yes yes in what what what do they require for the express lines so in this case what small jobs why well because if they don't do that if you are going to buy three things then you are behind somebody that has a huge cards will have things you're gonna wait a long time right So what do they do with the ones that have very few things they can get them out quicky box that's why that's the reason why if you select this mall is want to go first overall the overall waiting time the processes is going to be shortly OK which is not the case with the press conference server alright if you if you card if you are at the supermarket or in a band is the same thing about right if you go in align and the one that probably has many things what happens he won't take long time right So what do you wanna do you wanna make things move faster OK alright so that's the idea of the shortest job first but remember in the case of the supermarket the one making the decisions again is a consumer since I have less than 50 items so I can go there now what happens if you have more than 15 he had happened to me the guy said hey line the other lines right probably is the same thing with operating system if you say that you were going to walk for three minutes 3 minutes fast if you have finished you may be removed it in and put the way to fill the other ones are finished just as a punishment I song it is important that your estimation is a good one gay throatpie higher than that the expected K now the last one the last one is children's remaining time first if if it's preemptive OK so in this case we have pre-action it means that when I knew job arrives OK I'm gonna check this verse is the one that is running OK and I'm gonna say OK which one of the two is going to finish first if it's a new one I swapped him if not I just leave the the process is a continual running but remember that when I'm going to check with the one that is running is the remaining time because that process for example let's suppose that process started and they said you're gonna run for three minutes and after two minutes and you one arrives so you not gonna check 3 minutes against two minutes this one only has one minute left so insert is this one has one minute left in this one is gonna run for two you leave that one in there OK so is there remaining time everybody understands if there's three algorithms any questions about them help good alright let's list let's look at the interactive scheduling the easiest the scheduling algorithm is called ram probit right is using many operating systems he started he started in Unix Linux all of those in there still still there why it's very simple downloading is very simple what is the algorithm so waiting list OK and first come first serve alright you get the one at the beginning of the list put it to run run for a quantum always drop for quantum if the quantum is exhausted you put it back into it the list air B generates Ohio Dan is gonna go through it the front list OK member that we have we just saw that the model where we have the the waiting ready in rock is is that the ones that are the ready in Toronto also the only ones that we're showing here in this waiting list the ones in the waiting list R the ready process they wanted the CPU is a running process OK is the running process generation I hope he goes out of business still waiting list to wait for their oil to be be executed OK so they run Roman is very simple Ann is simple to program this simplistic manipulating and is simple to understand I any questions about the wrong road let me see if I help thanks Anybody knows where can I get the blackboards here somewhere no Equals city no no idea well I'm not going to the one one way I was gonna write it but I don't know how to do that right now one way that the they're on Roman is a sign OK for example he says OK I'm going to divide one second one second to make it easy one second between the processes that I have in my waiting list OK soul if if there in my waiting list I have only two processes then I'm gonna give them each 500 milliseconds each of quantum OK yes I have four then 250 so I always divided 1000 milliseconds between the number of processes OK that's how you calculate the ah then calculate the quantum for this round Robin very simple right now what happens if if you have many processes OK for example instead of you have 20 OK 20 processes then but 50 milliseconds each baby is too short So what do you do what's the all the algorithm has to lose that is a boundary condition you don't want to give anything less than they suppose that is 50 milliseconds so you divide 1000 by the number of processes if he gives less than 50 less than 50 you get 52 each otherwise you're going to you're gonna regenerate problems OK everybody understand what how did the rock rolling that drum roaming works yes so one important parameter into the sign of this round Robin up his run royal algorithm is how much do weather by right align one second or do I do like two or half a second if you change that parameter in in an operating system you're going to see the different reactions from the processes OK that's why I was saying that is small change in this Alberta if you say no 1000 I divide by angry and everything changes try so everything is connected in there OK so it now I mean yeah with this round Robin I may have reaction or not cringe OK I have priorities which for example in in windows priorities for the processes so when our new process arrives at the cube then I check what is the priority of the one that arrives versus the one that is running if the weather arrives is is is higher than I swapped if not I just put that process in kinda waiting lists and keep running the one that is there yes very simple