Blockchains Architecture, Design and Use Cases
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Lecture - 25
Fabric Demo on IBM Blockchain Cloud – I _Lec_17

Hello everyone welcome back to the Blockchains Architecture, Design and Use Cases course. So, over the next 3 lectures we will be seeing some hands on demonstrations. I will be showing you how to set up network on hyperledger fabric, how a smart contract look like looks like. So, I will take you through how you can do it yourself, set up a network and I will take you through some of the steps there. So, these first demo we are going to do it keep it very simple. So, this is going to be a demo on IBM cloud so, you can set up your own network for free.

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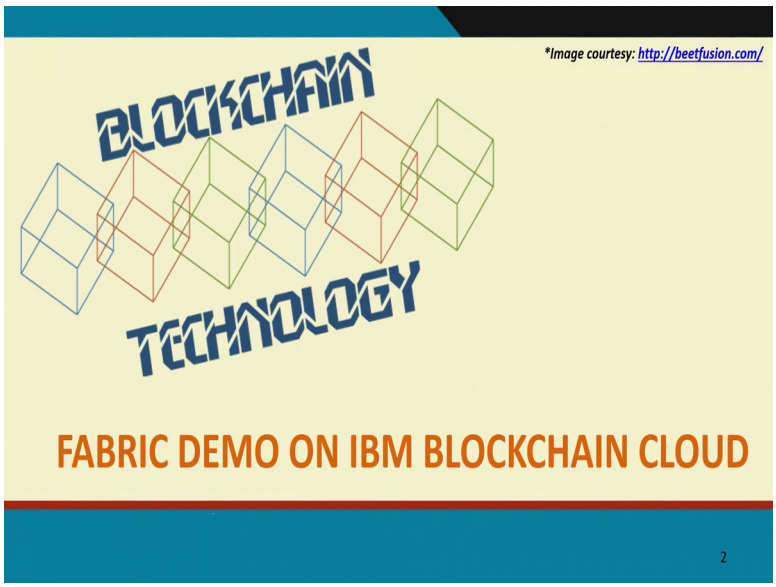

So, it is made it easy for you. So, you can just through few clicks, you can set up a network play around with it; there are some sample applications. So, in the next demo which we will show you some of the sample application; so, in this demo so we are going to set up a network.

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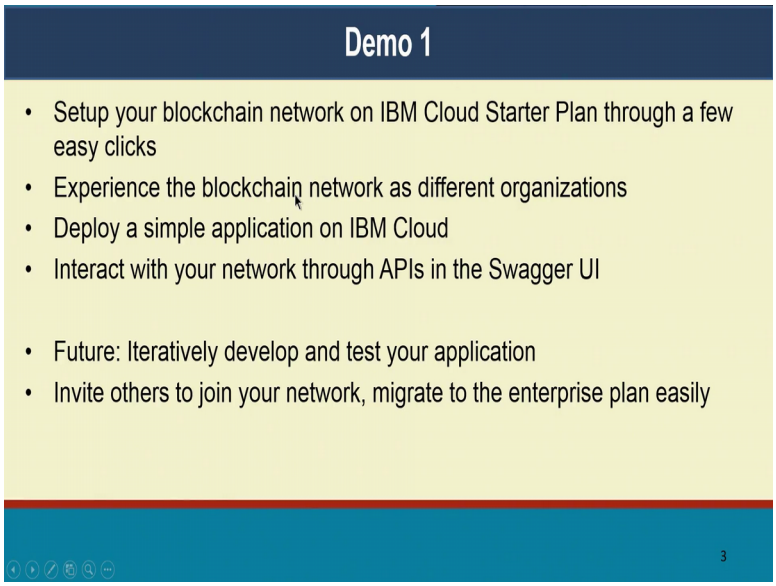

We will play around with how different organizations will be the part of this network how that can be experience it. The sampling applications will be the next demo and a how you can interact with this network through API. So, you can also connect it to a existing systems so, that you can do end to end business automation. And this also clean neat swagger UI that that is that you get along with the networks. So, you can you can integrate it with existing systems.

So, after we finish this demo you have a network in place. So, what I would encourage you to do is iteratively develop and test your application. So, try and build your own application in top of this network. So, I will give you feel for what blockchain is about, and what blockchain applications look like. And by the way you can also invite others to join your networks. You can start a network, invite others and they can be part of your network as well. So let us switch to the demo now. So, I have given sorry, I have given a link here.

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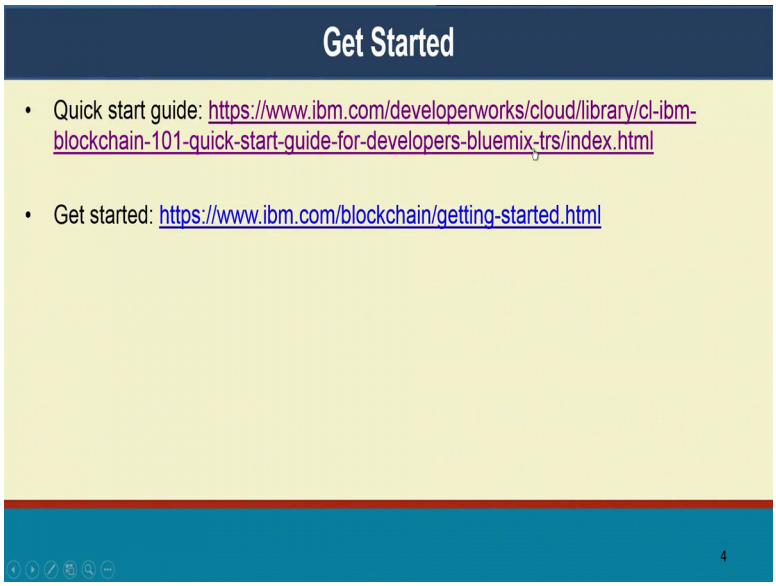

This is to a block that gets it is a quick start guide for developers. So, I am actually going to have this opened ok.

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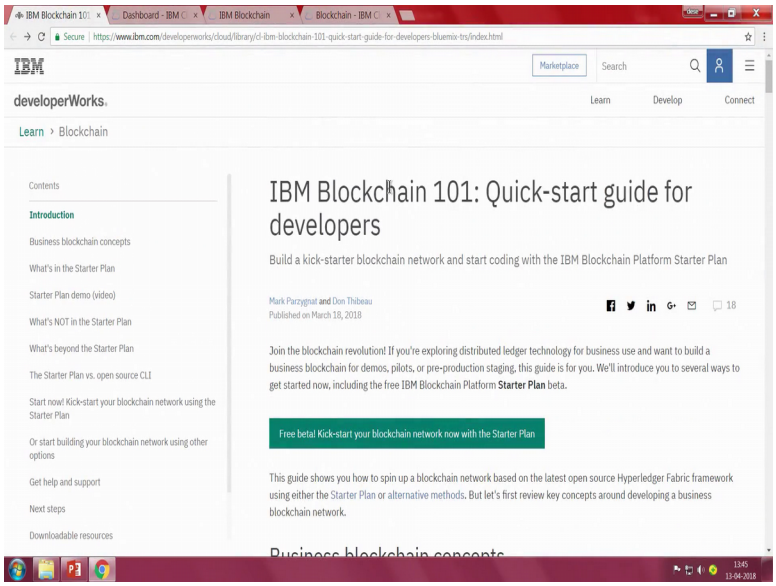

So, this is the quick start guide, this gives you like easy way of stepping through what this is about.

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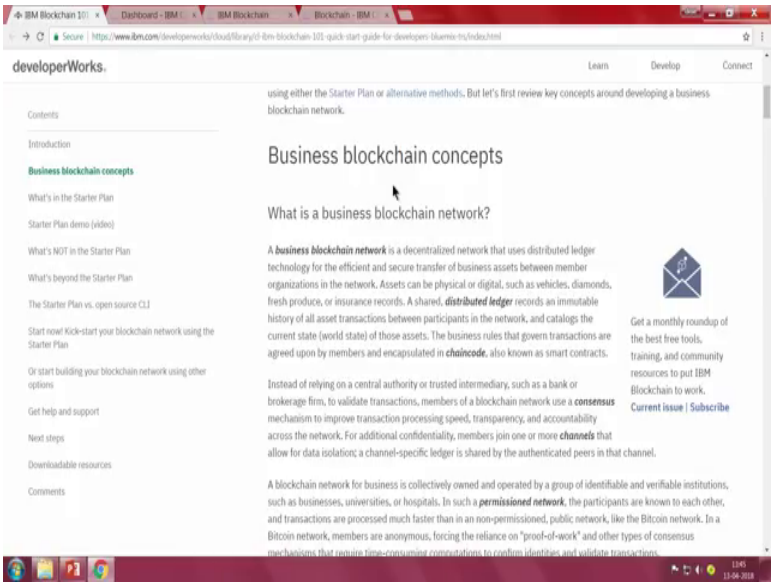

That is way as a video here of how to use this IBM block chain starter plan.

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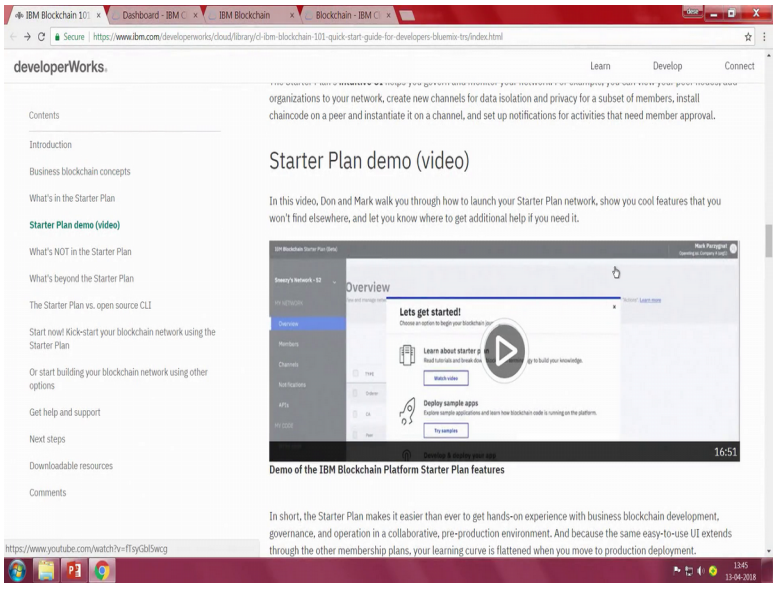

So, it is free for developers to try and use for a limited period of time. It also explains what is not in the starter plan.

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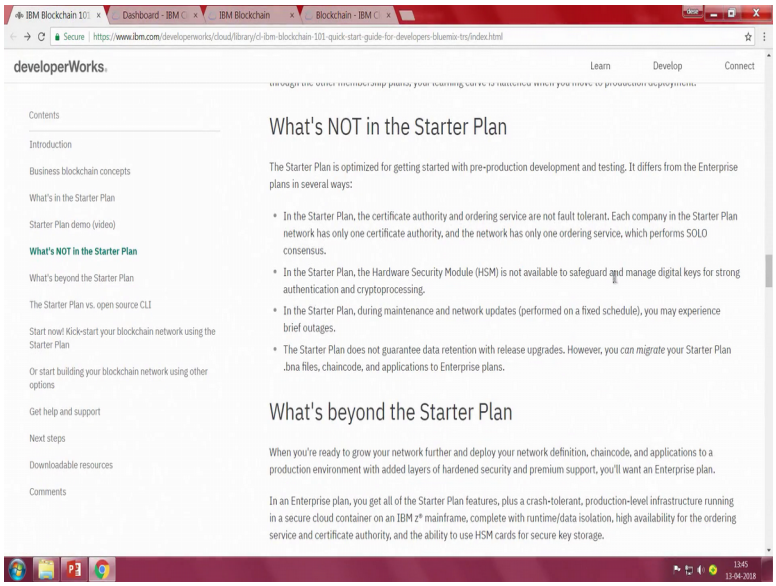

There are some limitations which I will walk you through as while we while I show you the demo. There is a enterprise plan which is paid service, which as the real field for a block chain applications. So, you will have completely isolated instances, across multiple organizations, different administrators owning some of those instances operation them, and how you can invite others, and there will be policy management and so on ok.

So, that I will I will take you through some of what is there in the starter plan, what is not there in the starter plan as well ok. So, let us get started, there are quick links here on that can get you started.

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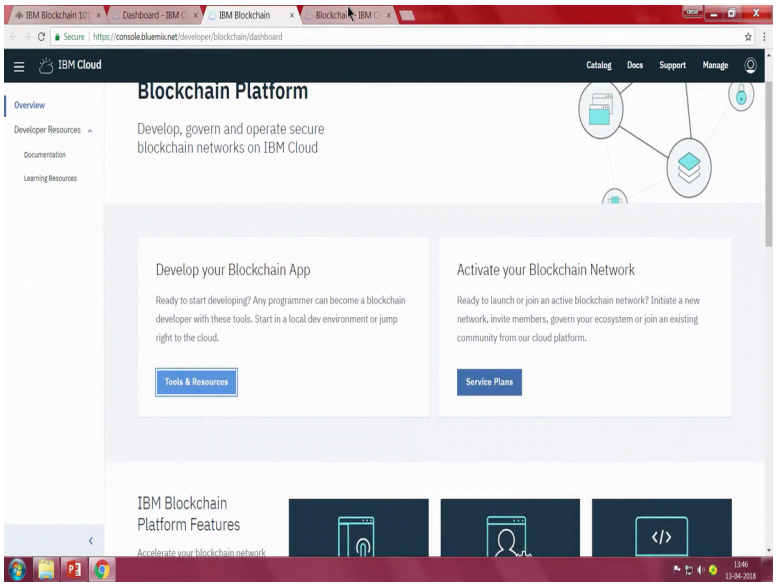

So, will what this will take you to is so, you will you will be able to, sorry.

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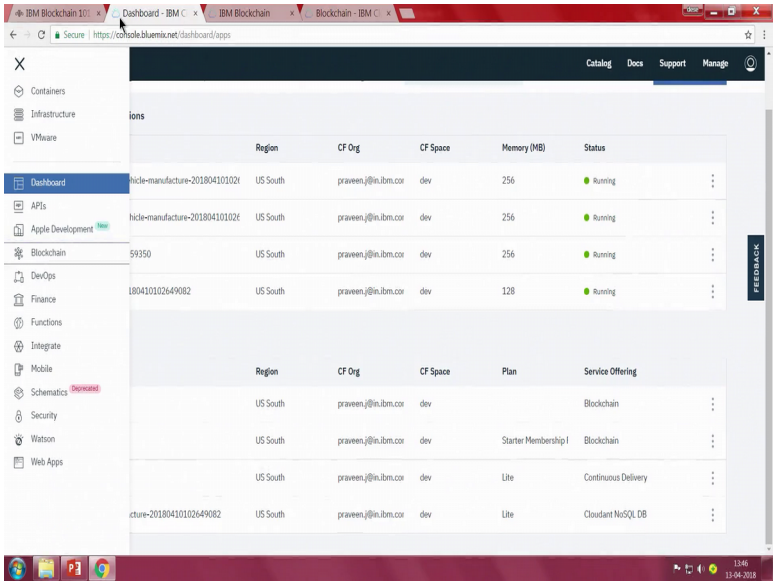

You will be able to sign up easily.

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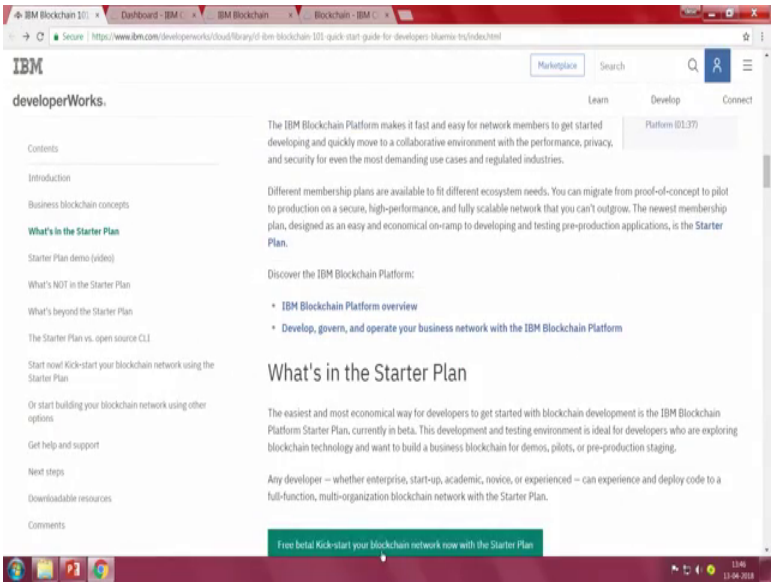

We will just follow, I thought I have the link ready, but I will open that quickly. So, I will take you to a page where you will have a lot of resources there.

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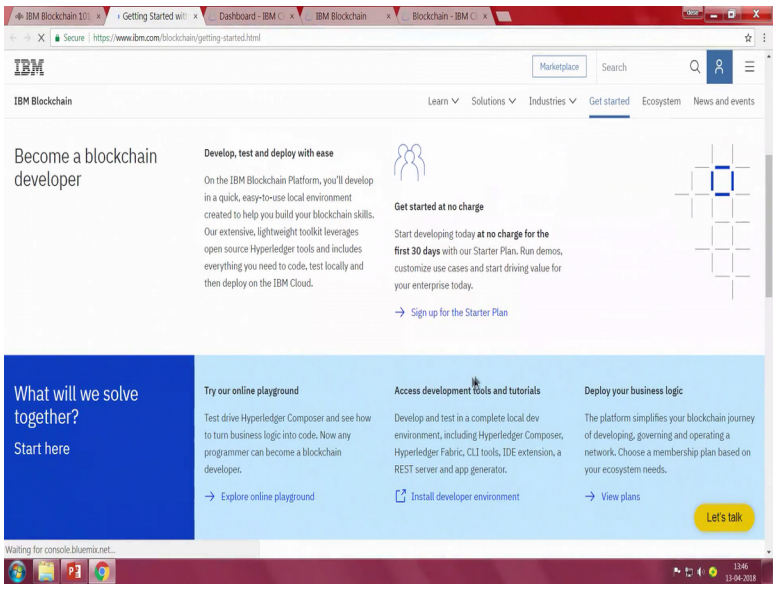

And you will be able to sign up for the start up plan. So, let say I am just going to click and show that you I have already signed up. So, I will not be doing the sign up life in the demo. But it is a very simple sign up, you just need any email address and you will be able to sign up.

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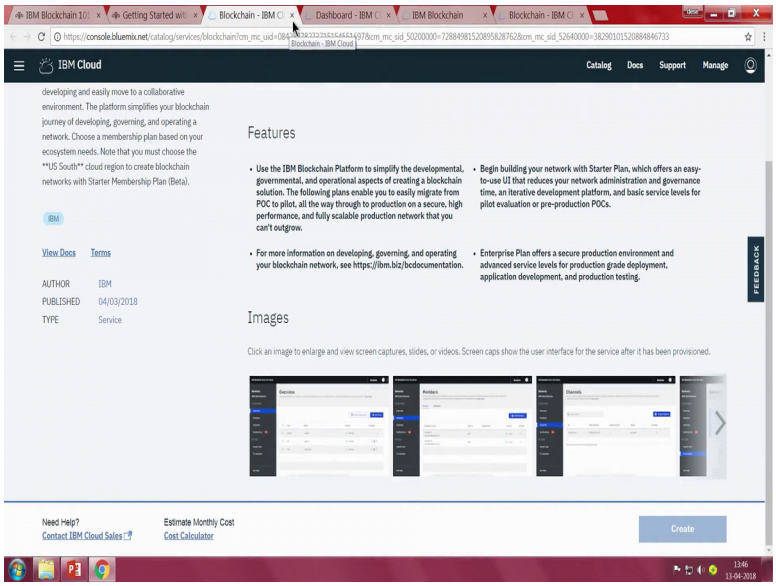

So, right now actually it is not showing that to we because we already logged it.

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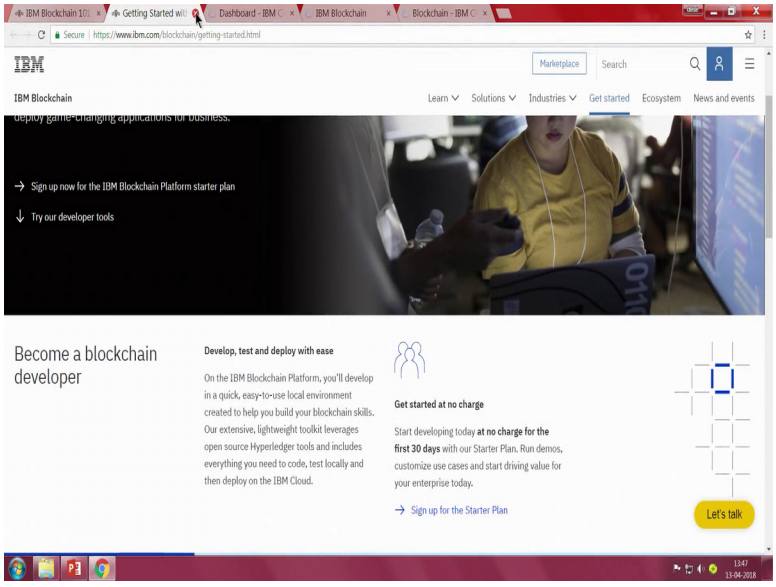

Anyway, so, it is very a simple sign up just takes 2 minutes any email add address is sufficient for you to get started ok. So, let me show you what it will look like right.

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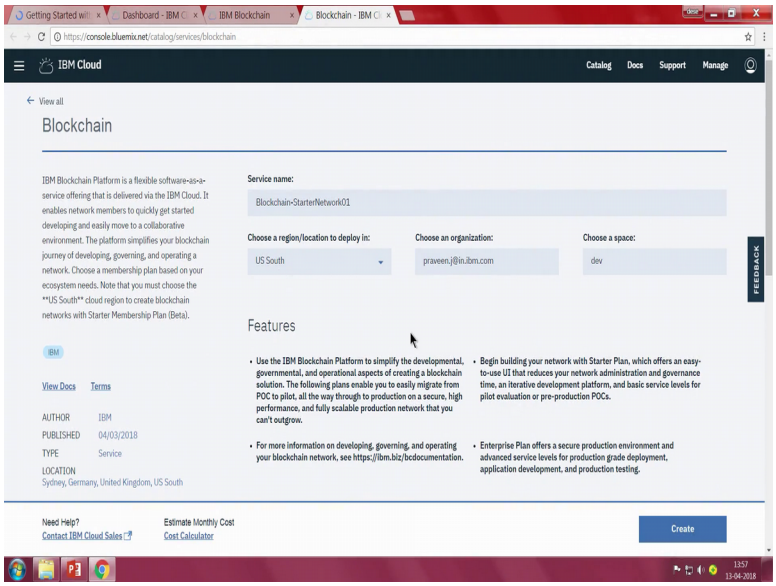

Once you have signed up and you get to the start up plan, you will see this page right, where you will see both the pricing plans below so, I will just scroll down.

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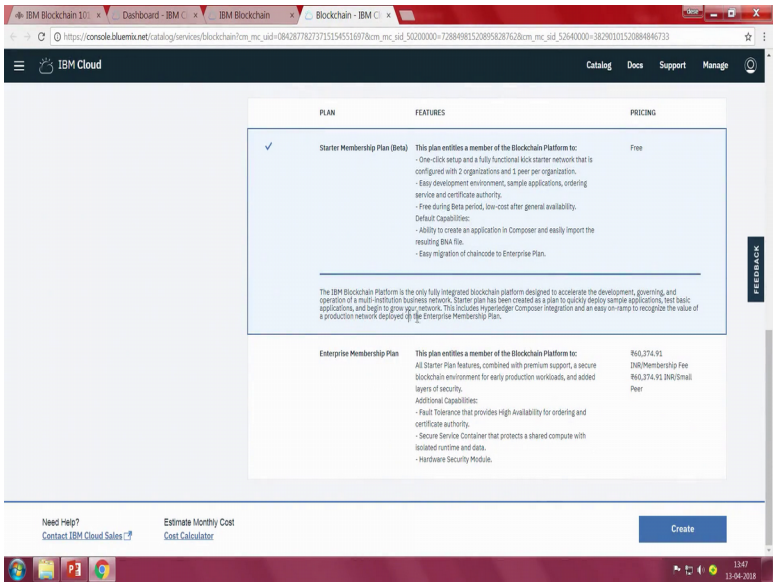

So, please choose the starter plan and also make sure you are choosing the right regions here. For instance, you please do choose us south, at least at the time of this recording us south is only place where starter plan is available so, please choose us south. This will already be prefilled. So, you will have your user name and organization there. So, you do

not have to change that. And you can always change your service name. So, I can call this starter network 0 1.

So, this is my I have already created one network with I am going call this starter network 0 1. So, you have selected us south as the region, you have given the name for your network, you have set up selected the starter plan. So, let us go head and create the network. So, what this is going to create is, it is going to create 2 organizations, it is going to create one peer on each organization.

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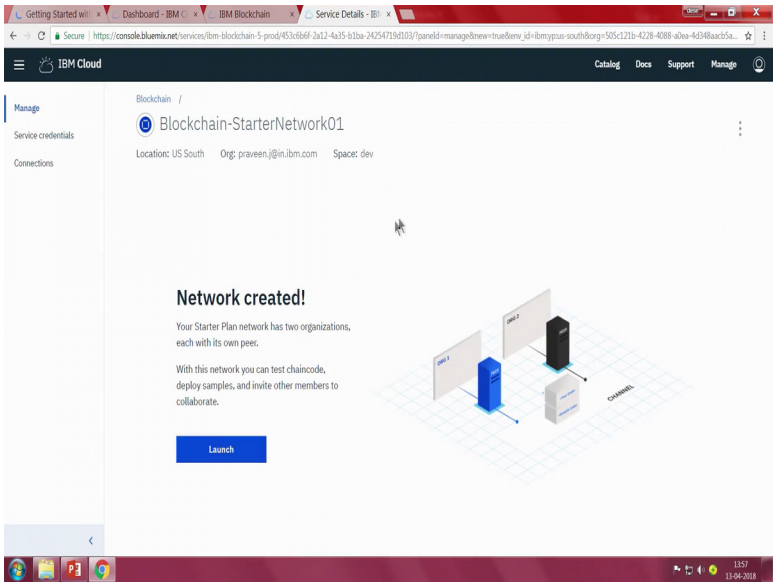

And it gives you dash code where you can you can manage their entire network. So, the block chain network 0 1 has been created. So, let us launch your network.

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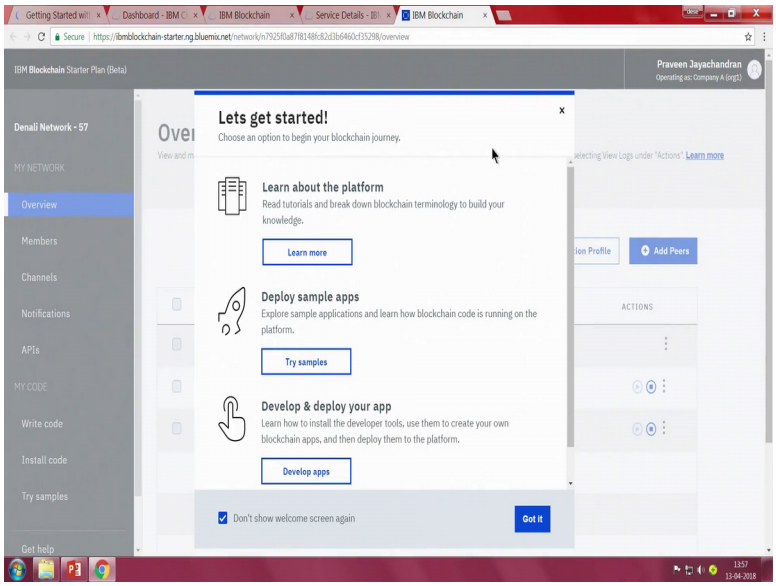

So, this just are getting started page you can learn more about the platform itself about block chain terminology, already done that in the first few lectures. You can deploy sample apps, I will take you through this. And of course, you can develop your own app and a project on a network.

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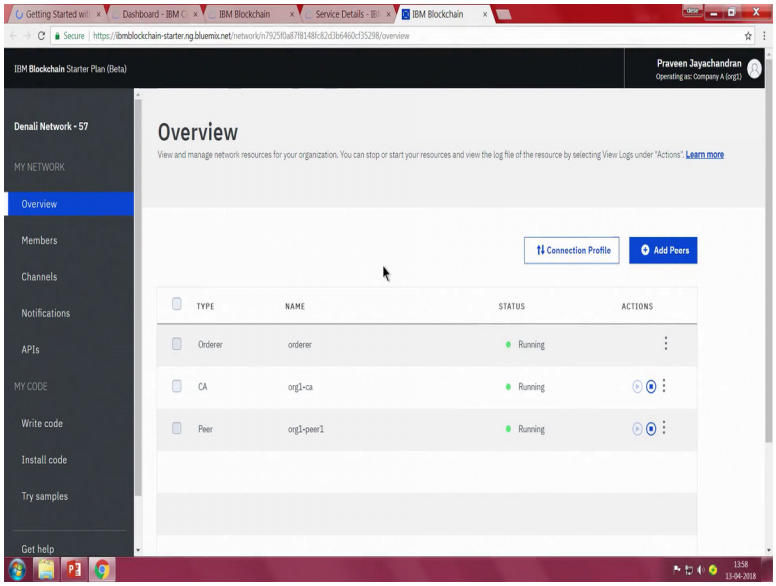

Let us go through what the what some of the features are right. So, what is networks gives you is you are given 2 organizations like I mentioned. The view that you are seeing right now is you are operating as just one organization called company A right. So, this is

a starter plan it is suppose to be meant for just for playing around basic development. So, there is no fault tolerance here right. So, this is the single ordering service so, single node, it is running solo ordering service. We have one CA and one peer for organization A it is company A.

And on the top right if you click there, you can go see what company B's view look view will look like so, let pick company B. So, company B is able to again see the ordering service it has access to the same ordering service, not a different ordering service, this is same one this is a single order. But he has org 2 CA and org 2 peer 1. So, this is these are their own CA's and peers. So, each organization will be able to see their own CA's and peers and the common orders node correct. So, for instance or 2 the company or 2 will not be able to see the resources of company org 1. So, this is just to show you how it all feels, and you have access to both in this case right. So, within your own space you are able to view both org once view as well as org 2's, view by just the simple toggle view here.

But in reality the way it is going to be org 1 will have it is own administrator will be able to see it is peers and certificate authorities. Org 2 will have a different administrator will have a different credentials and a different view right. So, this is going to be 2 different isolated entities, in the enterprise plan. But in the starter plan we made it simple so that just one person can just deploy a network can and can test it. It is not dependent on multiple accounts and having all of them connected to one network. So, let us play around this little more.

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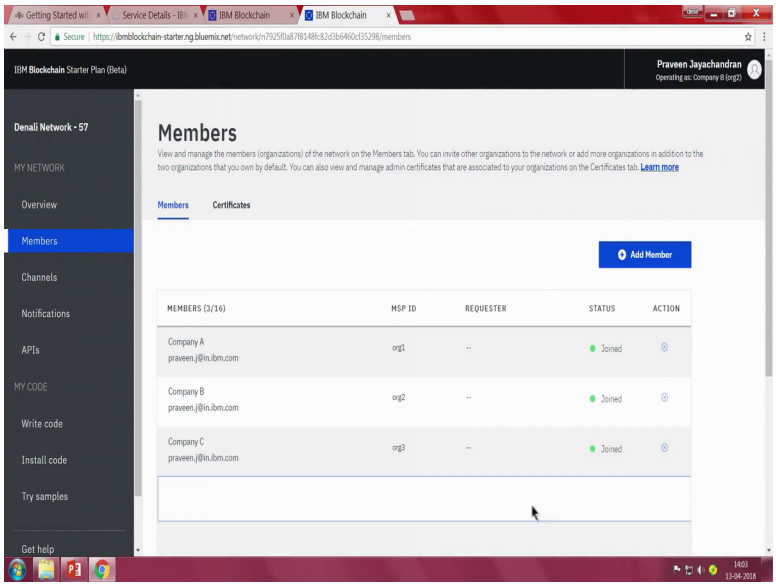

So, if you go to the members tab on the left, you will see who are the members of this network. So, there is one organization company, you can go edit that name if you want if you would like to. These are company B org 2 right. And both of them have actually joined the network already.

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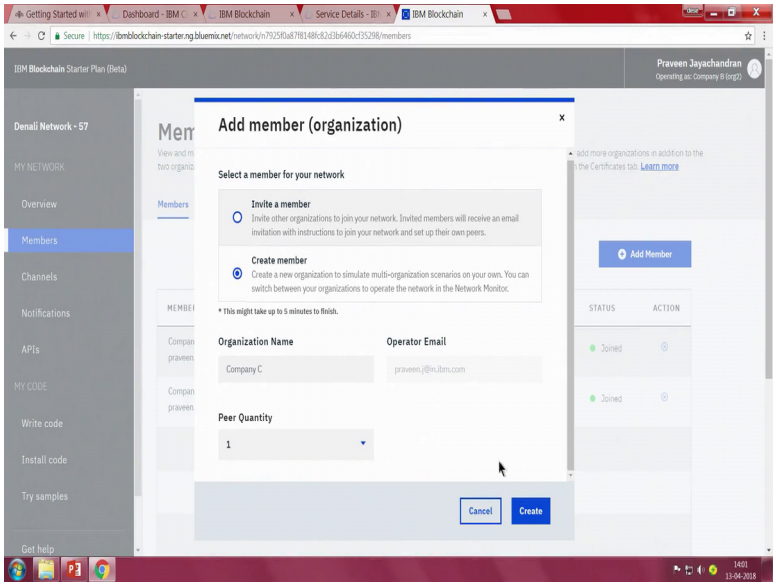

And what you can easily do is you can go add a new member. And here once I click on the add member button, it allows you to invite a new member in which case you will have to enter an organization name and email address.

So, for instance you can go invite your friend who also has of the mix account, who set up their blue mix account you they can type out their blue mix email address, and a email actually be sent to them with a link and once they accept that link they can actually be joint in to the same network that you also have if you of do it is possible. If a not just keep it simple, we will just create a member ourselves. So, we are going to create company C and this is the email. And we can set that how many peers you want. So, I am going to set is has one peer right.

So, I want to create this new member. So, let us wait a member to get added. So, in the background you can imagine some of the things that are happening right not imagine, but you know what is all happening the peer is getting stood up for the particular company, but before all of that the credentials of the company has to be set. So, that given identities peers credentials also has to be set. So, the peer identity has to be created and the peer has to be brought up. Now, at this point I have not yet gone through the channels aspects. The peer has not yet joined the network itself and not part of any channel yet. So, will be we will have to add that peer in that organization to a channel. So, we will do that next.

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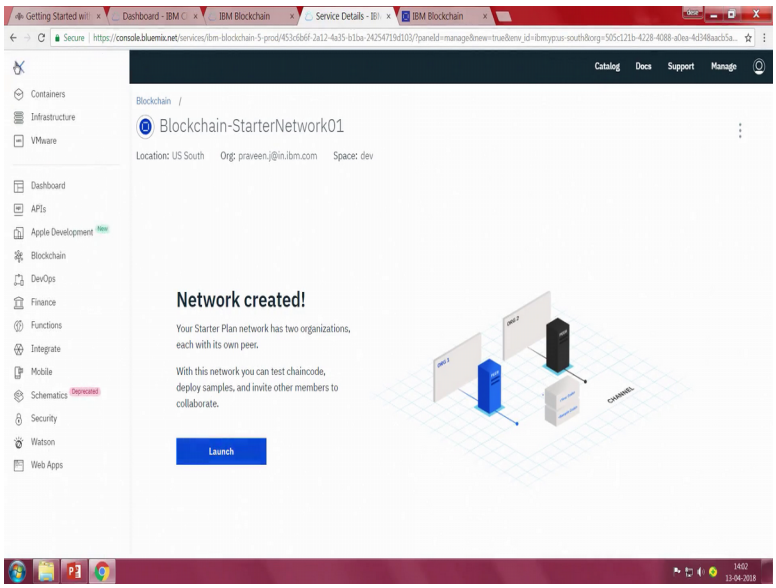

So, let us just open while that is happening we do not have to get you do not have to wait for that.

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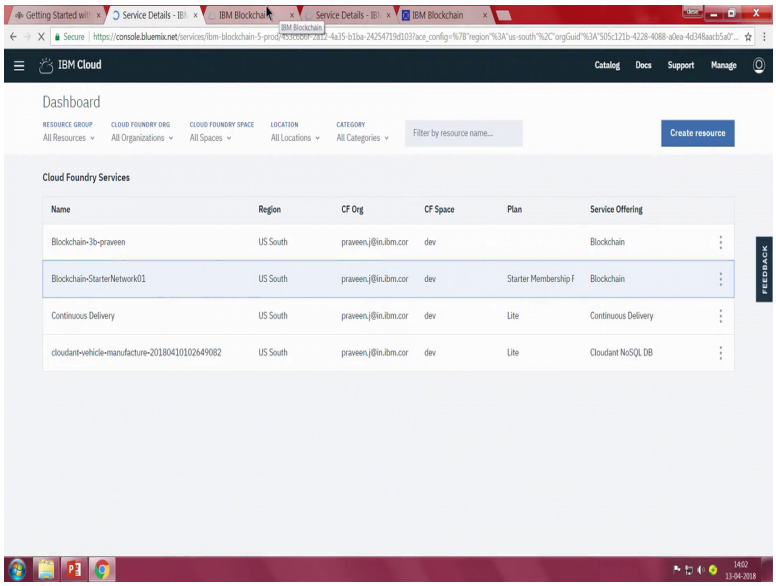

Can just go to my dash board, and I can view all the apps all the networks that I am running right now. And I can just open a new view of that. So, I am just going to open starter network 0 1 and I am going to open that again. So, this is so in beta phase so, there might be some UI errors. My guess is it is UI errors.

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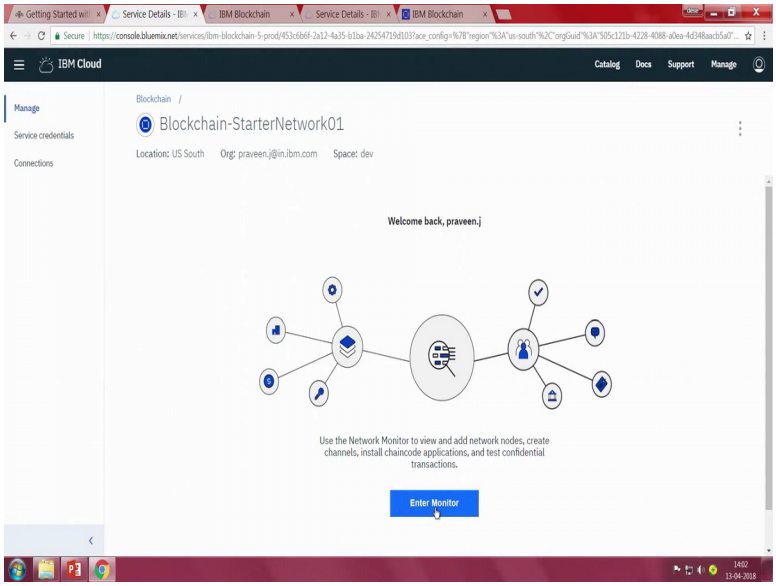

So, let us join open the network ok, let go look at members. So now, the company C has also been created, and says that join the network. So, let us go look at the next view, right the channels.

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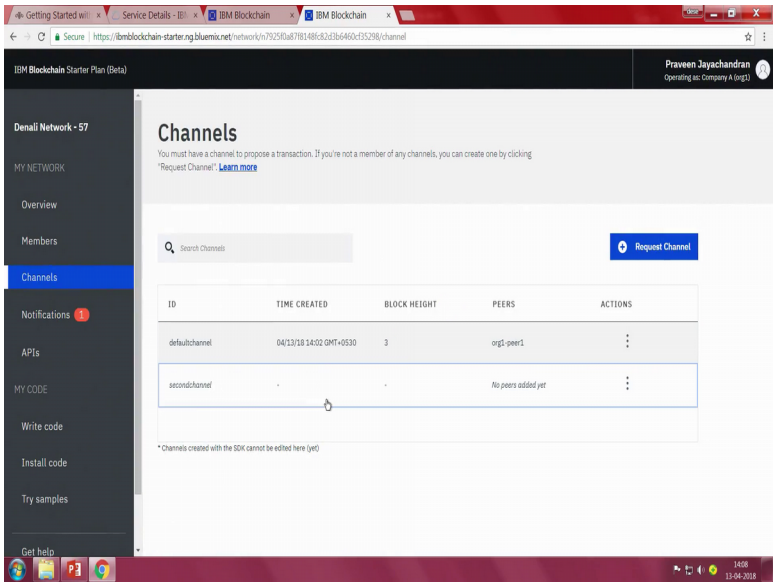

So, if you go look at channels right now when you created the network itself, we create a default channel for you, it is give given to you, say it is a block height of 3. And you can actually go see details about this channel. Let us just open the channel.

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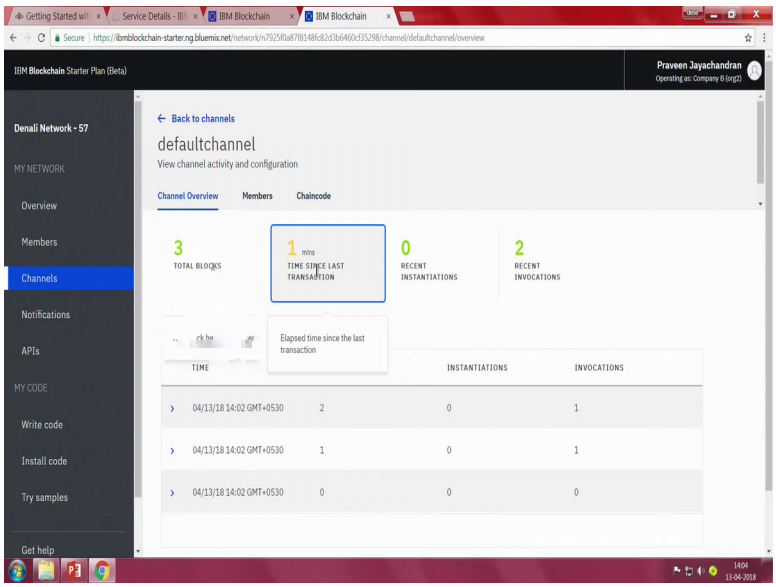

It is say there a 3 blocks to this channel. It is been 1 minute since a last transaction happened it will give you some details. And you can actually click any of these things just to see what the details are.

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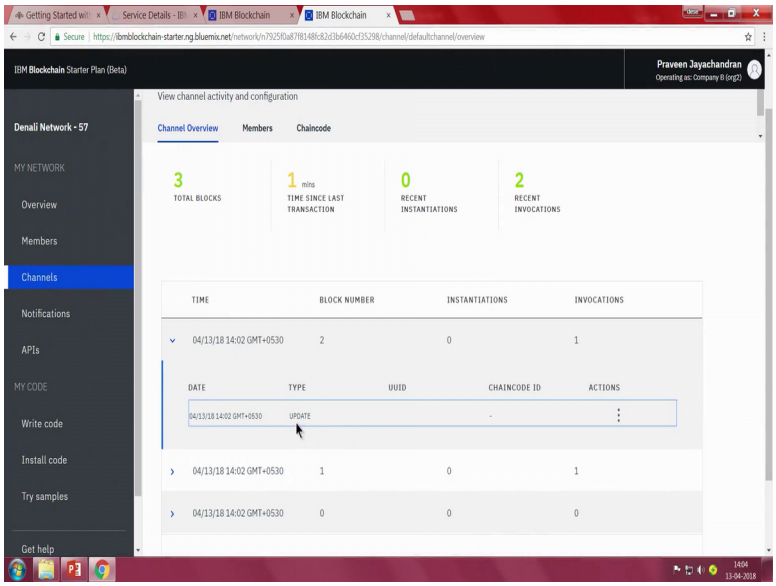

So, this was channel update transaction. It is no chain code involved, because it is the system transaction. And what you can also do is you can look at members. So, who are the members of these channels currently right.

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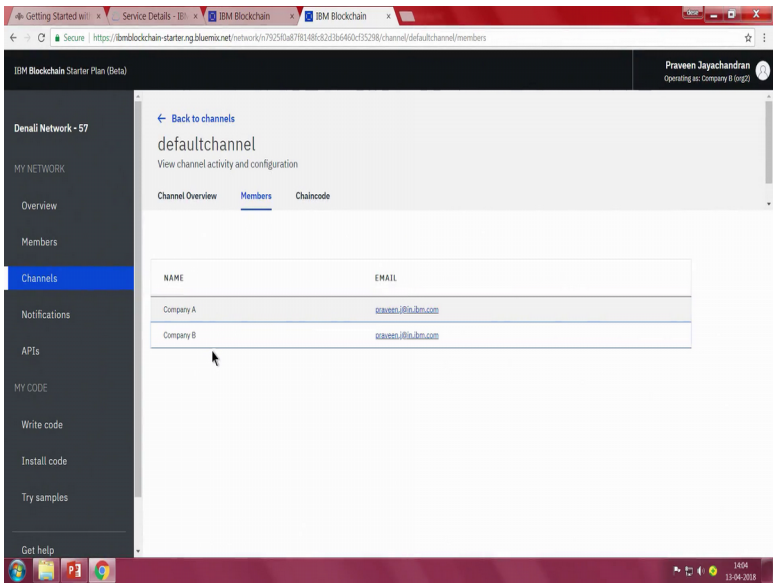

Now, there will be there are 2 members company A and company B, company C is not yet part of this channel yet. Yet we have not installed any chain code, so that is also going to be empty.

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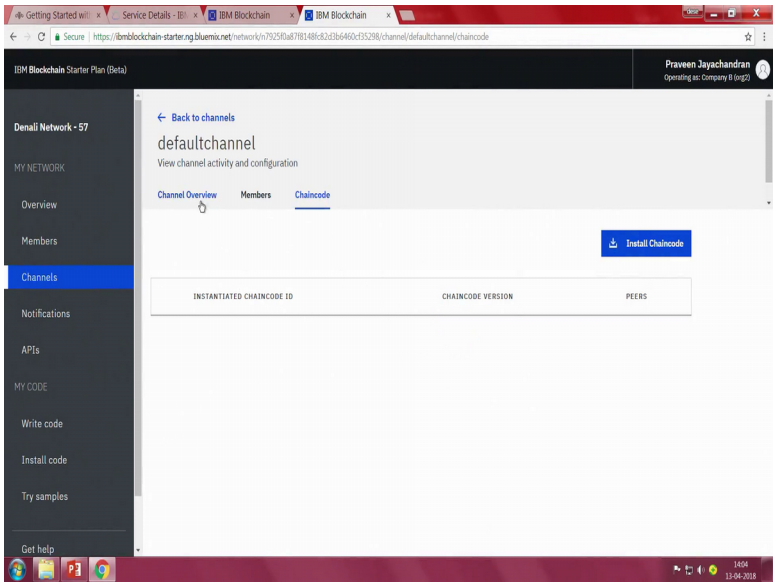

So, what we will do now is, let us go add a new channel. So, let us go back to the channels view we can create a new channel here. So, I am going to create a new channel; call it a second channel.

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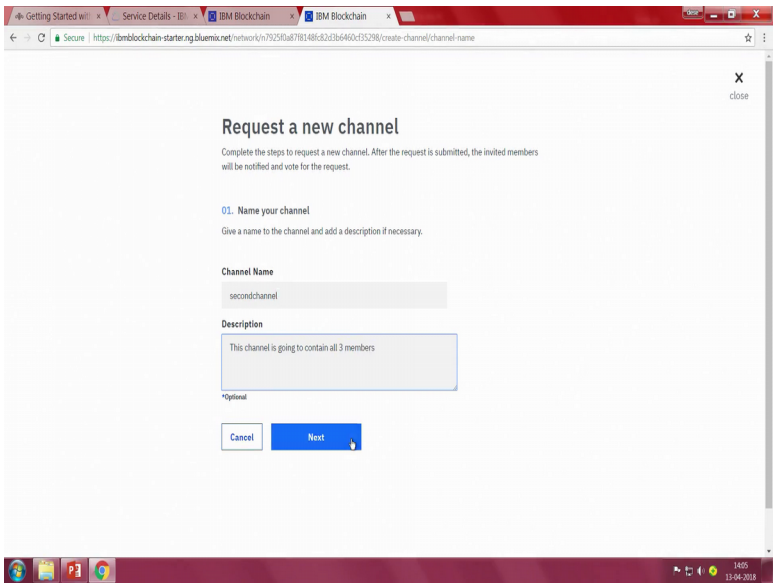

And this channel is going to contain all 3 members ok. So, let us go create that channel.

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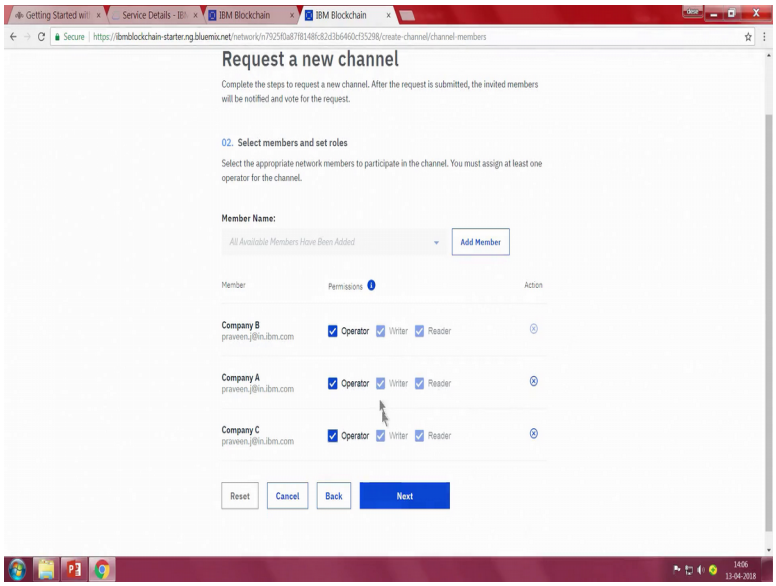

So, the so here on this view we can go add who all needs to be in this channel. So, we will say company A needs to be added, company B is already there and let us add company C as well. So, if you see here all 3 companies have been added, you can set what their privileges are. So, can be a reader writer or operator. What does reader mean? All it going to do is if this is the committer only node that I had discussed before. So, it all it might not participate in executing chain code it is not participating in endorsement. But all it will do is whenever something comes, it will commit all the error transactions and you can query that node.

So, all it will do is query data that stored on the block chain. But you can choose to give it righter axis, which is it will also do endorsements on top right. Apart from just being a committer node it will also execute chain code and it will perform endorsement. In addition, you can make an operator. An operator is inclusive of the writer aspects as well. The operator will allow you to do the channel configuration transactions as well, which means that I will be able to invite other members in to this channel I will be able to vote for other configuration changes on this channel and so on right.

So, let us for now assume that everyone has full rights on this channel. But see we can actually give very fine grained access on who gets what kind of access right reader writer operator access.

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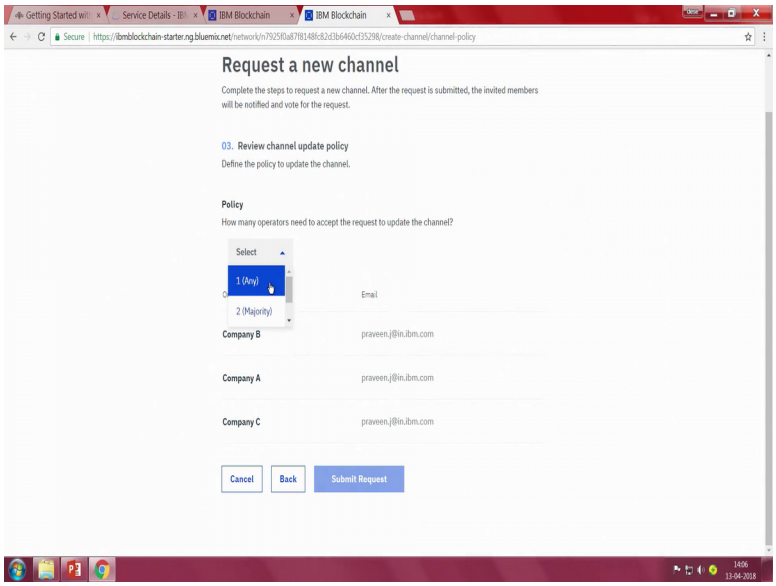

So now the last thing we need to do is what is the policy right. So, you can set any so, any one person can approve changes to the channel, we can set it has a majority or set it has all 3 right. But for now let us just keep it as any just to reduce the number of operations we will have to do right for this demo. So, let us you say any one person needs to approve this. So now, we are going to request a new channel so, we that submit the request.

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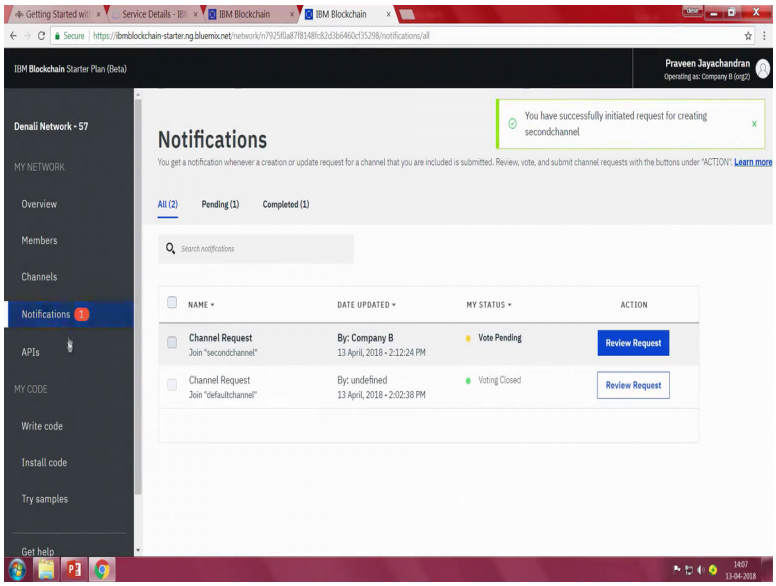

So, once you submit the request? Every participant in the network will actually get a notification. So, this is the forth tab here on the left. So, you will see that here the new channel request that it comes. And I can actually review this request and vote on this request. Likewise, if I go to company, let us go to company C, we not seeing company C at all. So, that is what a company C, company C would also have a channel request which got that pending.

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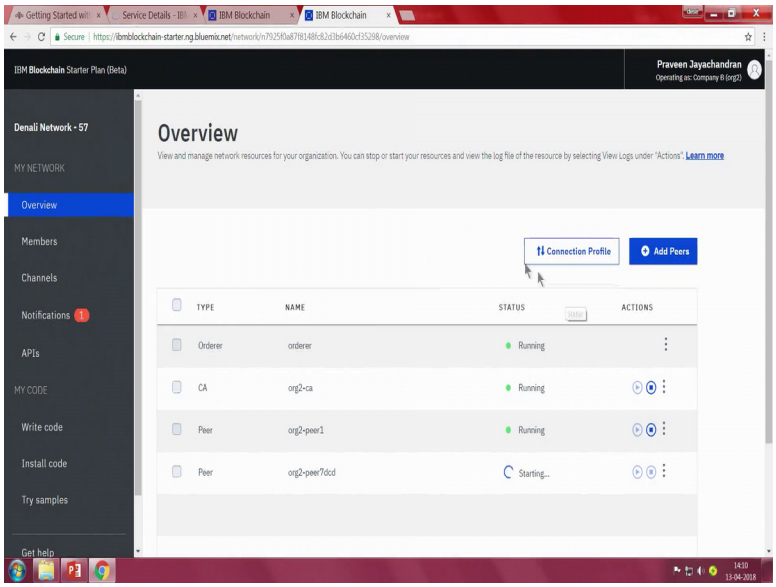

And let us go also go to the overview of the company C, you see that it has a new CA and a new peer. And it has a same view of the order. And note that of course, I cannot go shutdown the order, I can, I can shut down the peer and the ca, but of course, I cannot shutdown the order. So, let us go to the notification we will review it.

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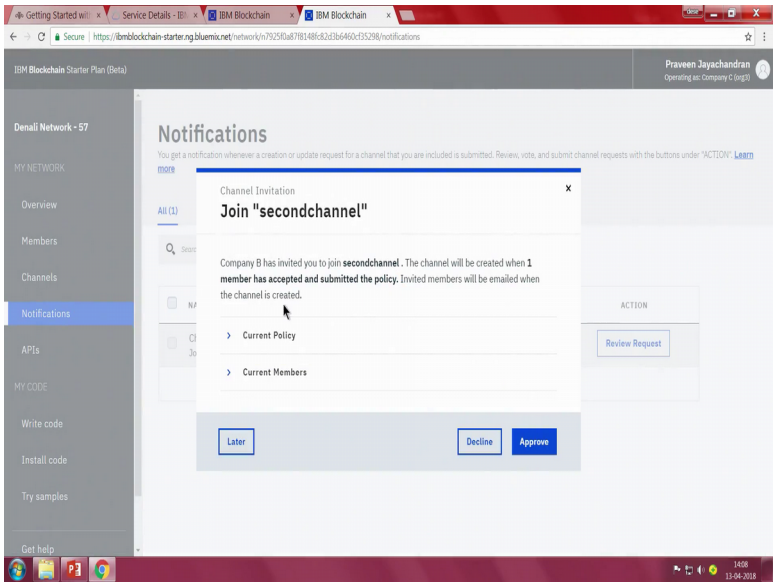

And let us accepts this, one person must be approve that is the that is a policy, And let us approve.

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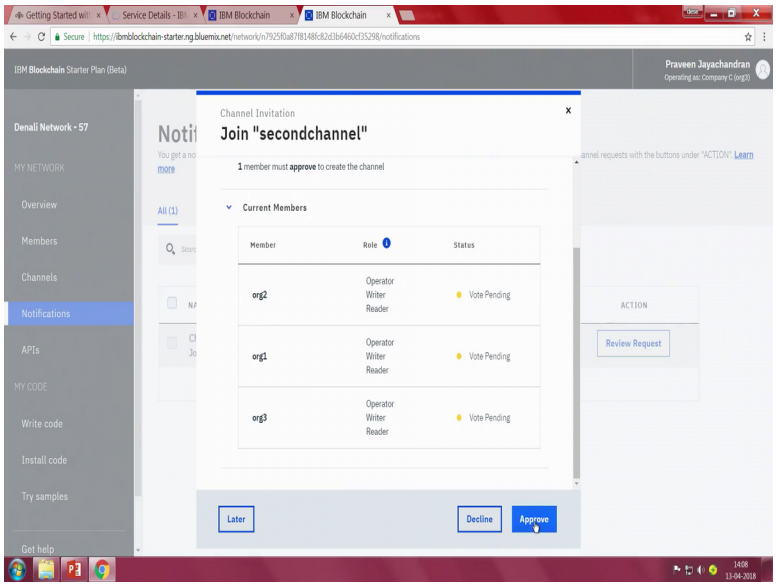

So, submit request ok, let us go back to the channel. So, second channel if you go look at company C there is only part of second channels. So, they only know about second channel they do not know about the default channel that was originally there. If you go to company A and look at their channels, there should be able to see 2 channels now. They will be they will have the default channel as well as the second channel; so, those are the

2 channels. And the second channel as you can see there are no peers who have joined this. So, that block height is also null, let us go join peers.

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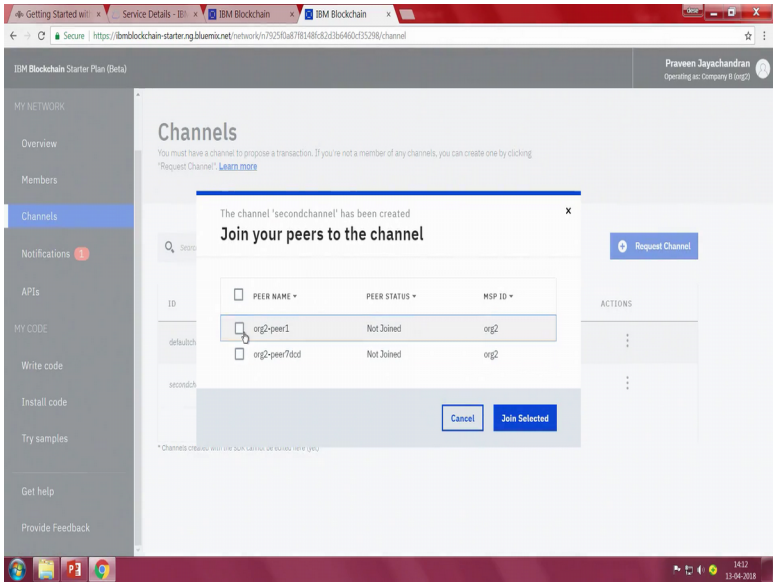

So, I am going to join and company A can join only it is own peers to this channel. So, it is going to join this channel with peer that it has. So, if you successfully added a peer to the channel. So, the block height is increased and the peer show that that company is peer org 1 have peer 1 has actually joined this channel.

Let us go to company B and do something else. So, company B is what it wants to do is it is, does not want same peer to be both on default channel as well as the second channel. So, what I am going to do is I am going to create a new peer. So, company for company B let us create a new peer.

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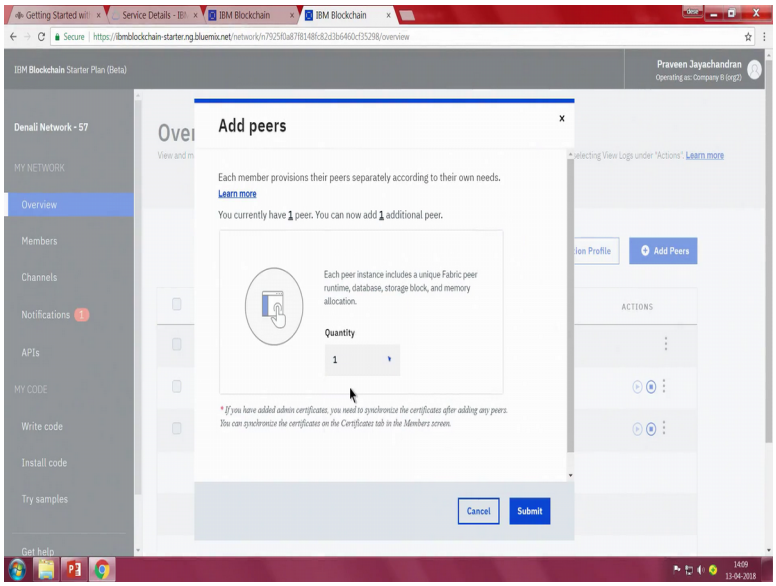

I am going to add one more peer. Let us add that and let us have the additional pears join the second channel. So, that way company B will have 2 peers, one peer is operating on the default channel another peer is operating on the second channel whereas, in company A, it was just one peer that was operating on both channels. So, you do have that flexibility on deciding which peer should operate on which channel. So, peer is a new peer got created is getting started up.

And here you can go look at logs and you can also remove peers if you if you like, ok. So, let us while I think it can start and mean while let us go to go to channels, and let see if we can add this peers to the second channel. So, let us join peers, I think it is still filling out the peers section. I think we need to wait for this peer to fully start. And then connect to the network and then we will be able to added to the channel. So the meanwhile while this peer starts let me show you a couple of other things right.

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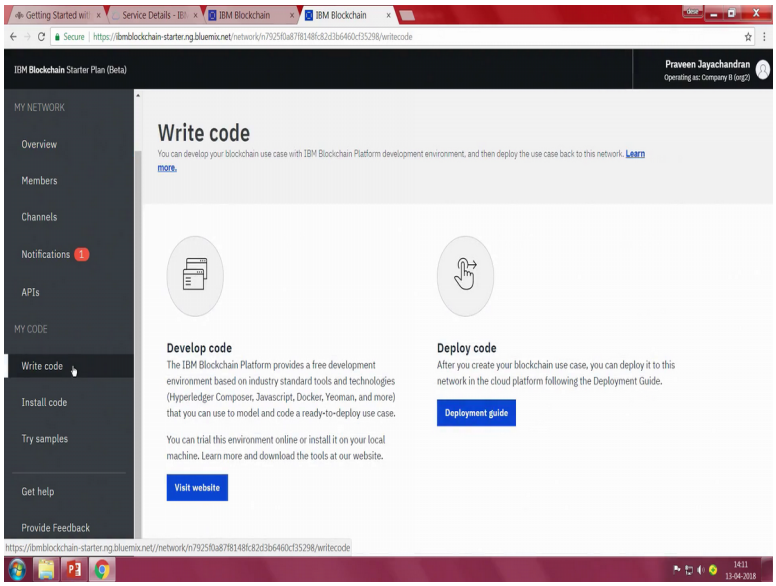

So, you have a channel already, you have the default channel stating the second channel now. So, what you can go do with the right code section? You can go and develop your own block chain application, and you can deploy it here. This will take you to the IBM block chains (Refer Time: 17:16) tell you it how you can develop your own application.

We talked about a bit of that, and a code guide to how you can deploy your own code into this network that if created. And the what is are the options, of developing your fabric code and deploying it here?

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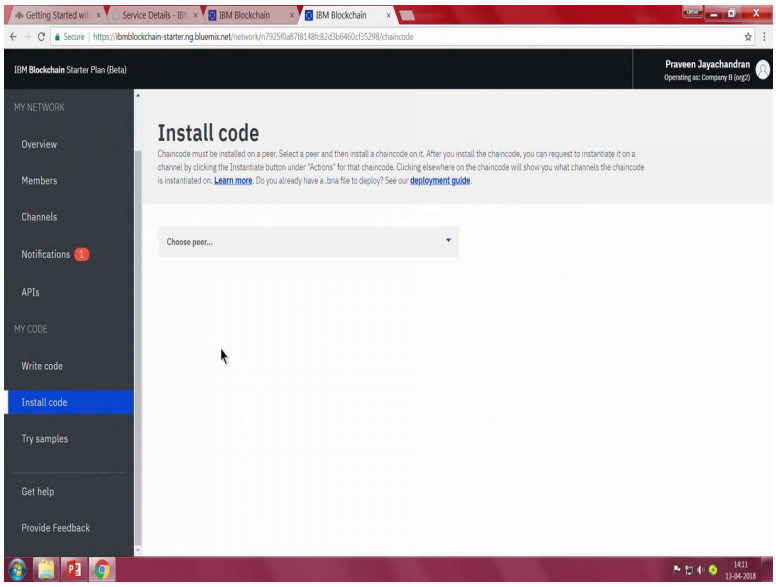

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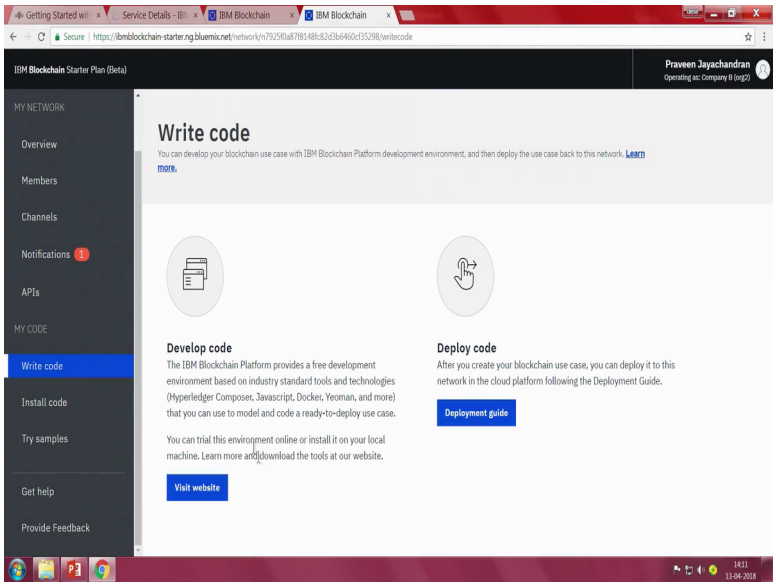

So, the right code part which for hyperledger composer which we will see in a couple of lectures. And this part is for writing your chain code and applying your installing your chain code on a particular peers. You can choose your peer and install chain code.

Let us go see if the peer has been created ok, the peer is running now. So, let us go to channels and add the new peer that you just created on to the second channel. So, let us join peers, but I want this was org 2 has joined default channel. So, I want the new peer to join the second channel that I have just created. So, the peer is getting added to that channel, and we will see that the channel configuration would have been updated. And now the block height is also got an updated.

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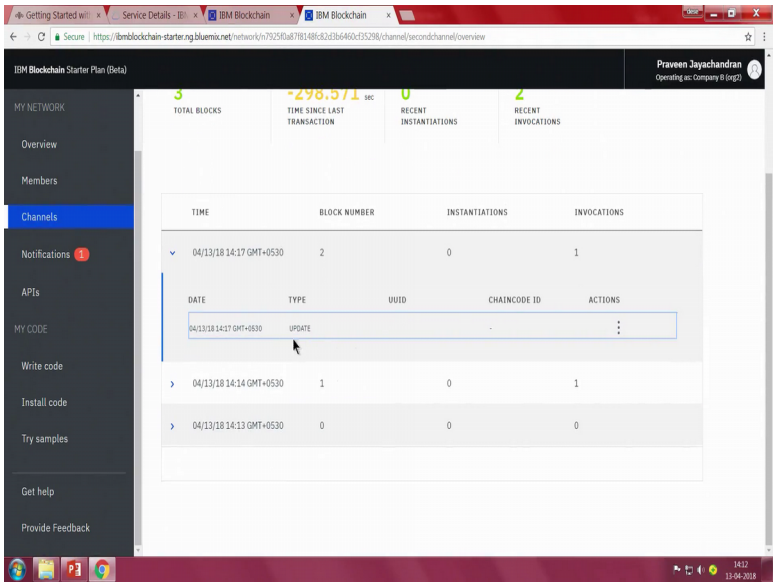

So, you can actually see there is an update channel update transactions that added a peer to this, that was the channel configuration transactions ok. So, that kind of flow, so let us also do that for company C. Let company C let company C also join this channel. So, right now I have no peers company C does not have any peers added. So, it is going to go add peer to the channel.

And now all 3 organizations are part of the network they all have one peer each on the second channel that we created. And they can all use this for deploying their applications or chain codes on top right. So, that has also been added now. So, block height is now gone up from 3 to 4. So, the other interesting aspects that I want you to show is the aspects of API's.

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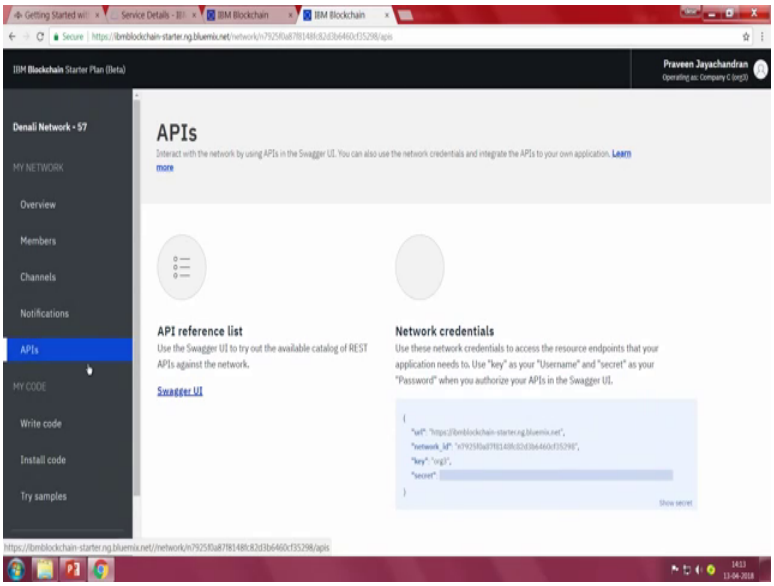

You can actually use APIs to interact with your network. So, on the right you will see network credentials, these in your credentials to connect with your networks. So, we are operating has company C now. And there is a network ID and key and a secret. So, if you click on that you will actually see the secret. And this will of course, be different for different users. So, when you are doing it yourselves, you will see that this key will be different.

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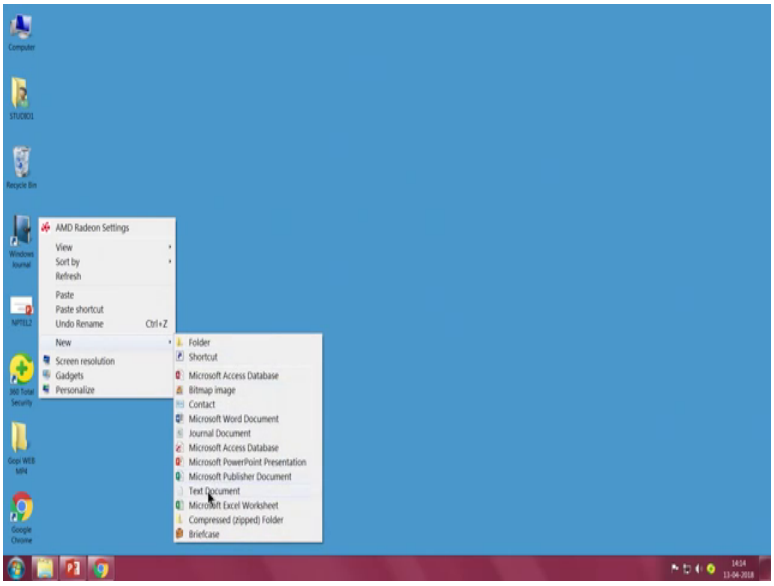

So, do note this also so, let me open place where I can copy out this key because, I will need to use this.

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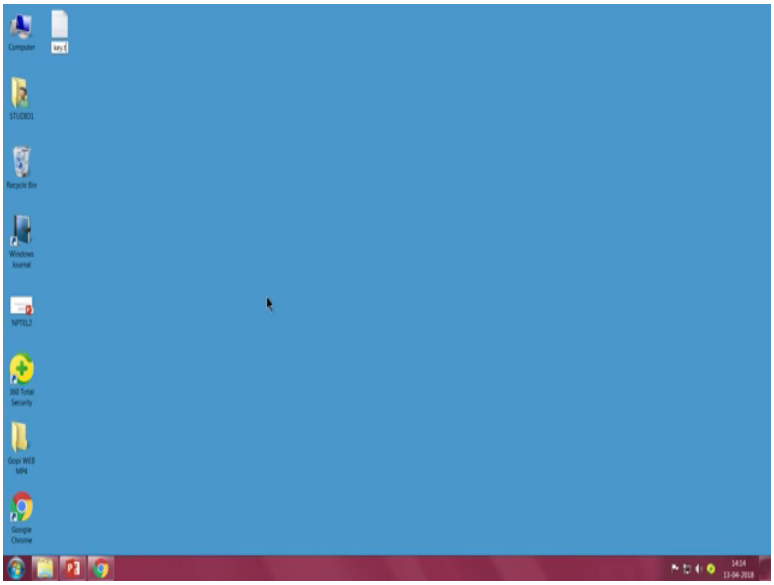

So let me copy the network ID and the secret for organization C.

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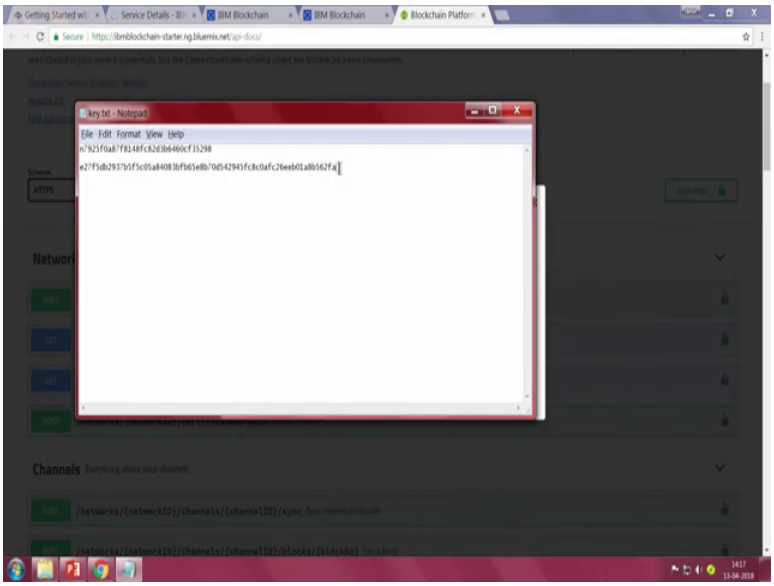

If I go to organization D or A, there ID is their secret will be different. The network ID will be the same, but the secret will be different. So, let us open up the swagger UI for interacting with your network and see what it look like, ok. So, first have to authorize

myself with the secret that we just copied from the previous client. So, that was the secret for the company C let us wait for the API to show up, ok.

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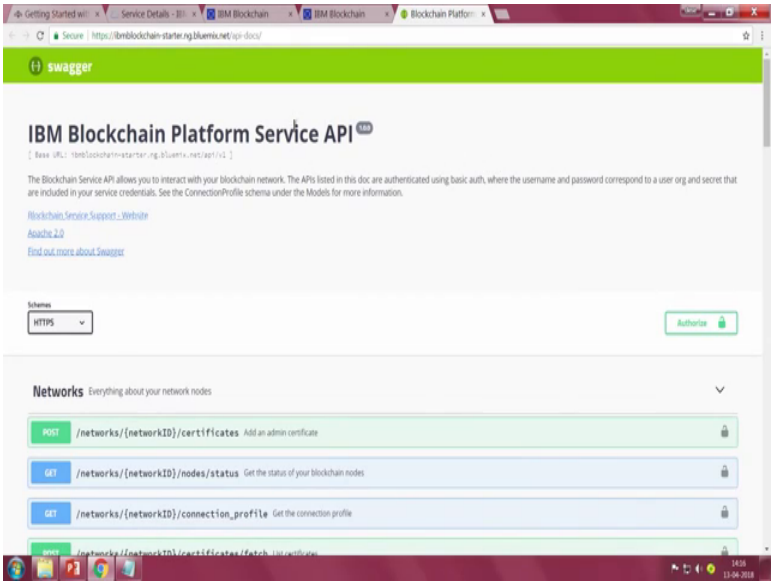

So, the API has of loaded so, there is one thing we need to do which is authorized, but before that let just quickly go and look at what are some of the think that you can do. So, in the networks resource you can add certificates of new admin users. You can obviously, this is to work with nodes and what is their status is are.

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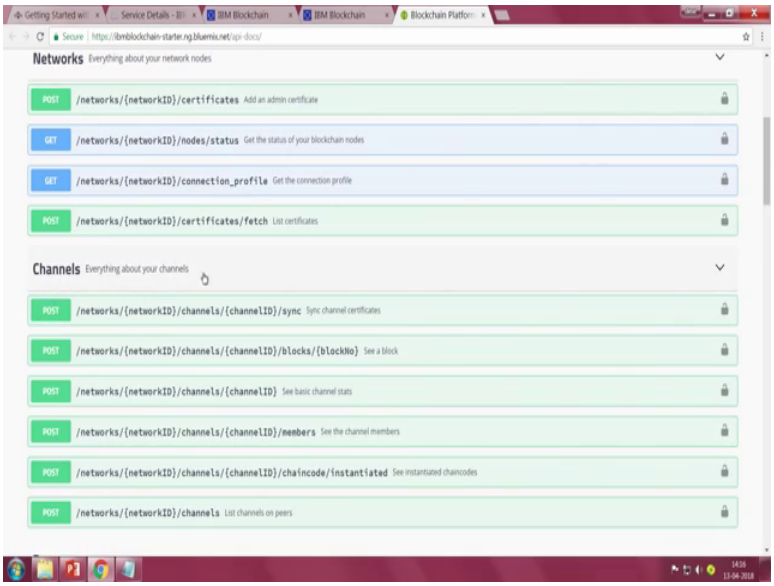

You can look at what channels you can create your own channel, you can add your peers to this.

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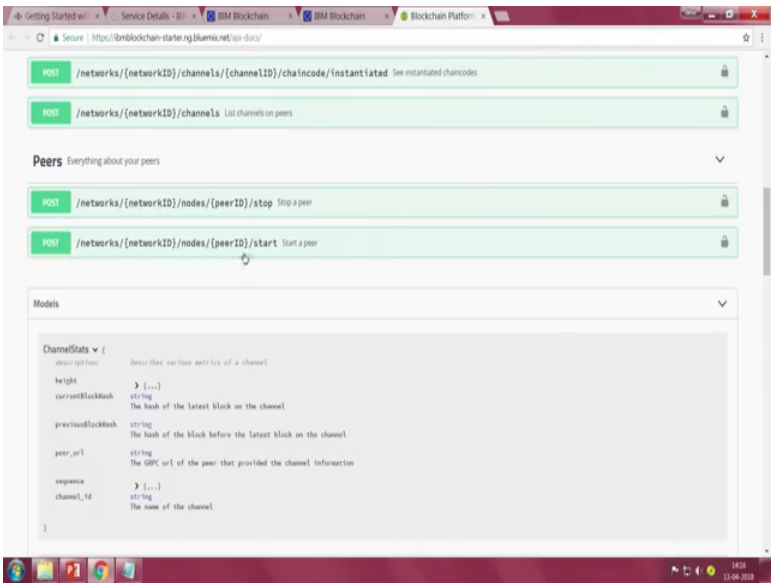

Right so, everything is captured in here. So, what will do is we will just do one API call.

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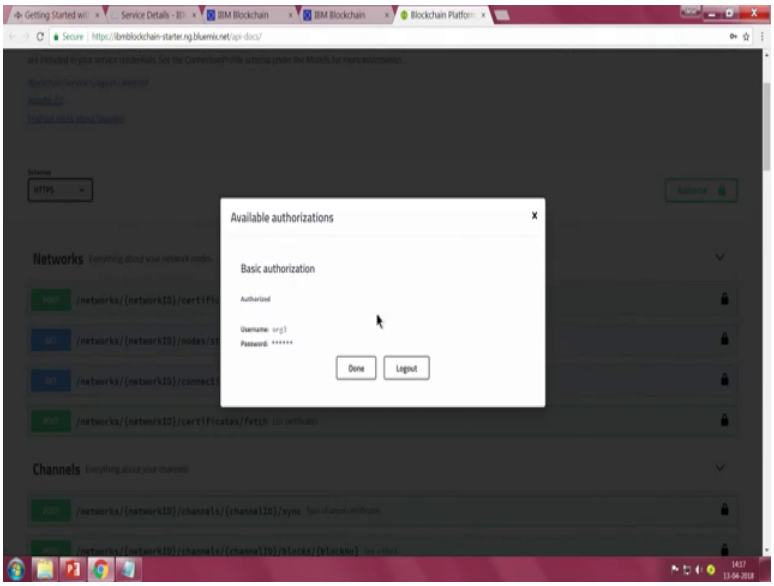

So, the basic authorization my name my org name is org 3, and my password is the wrong password that I had here. Right it was company A it will be org 1. So, let us authorize and we are done. So, note is that we that lock sign here went from open to

close, that detects that says that if already authorized in your to go now. So, next is do one API call which will go and get the states of your network right.

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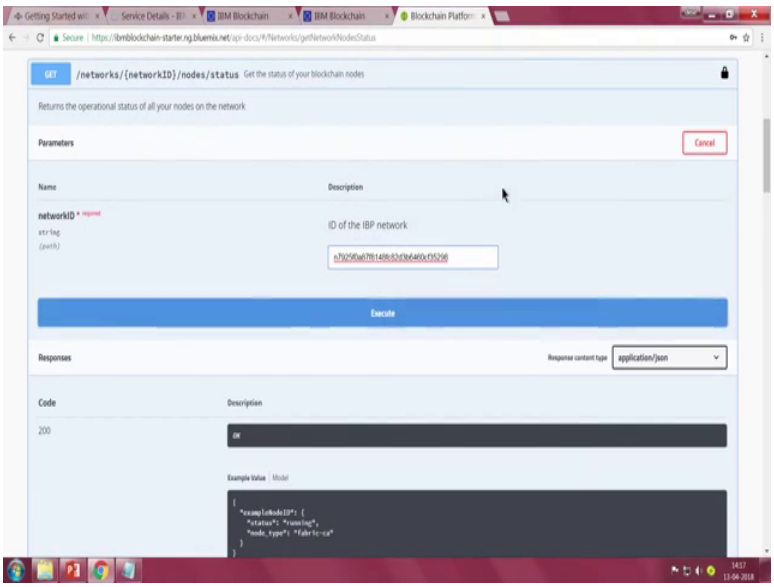

So, this is going to give you what the networks look like. So, we are going to try it out. So, we are going to make this API call to get this status of all nodes hm. And there I need to enter my network adding which I copied down. Let us put the network ID in there, and let us execute ok. So, this should give you full status of your (Refer Time: 22:08) network.

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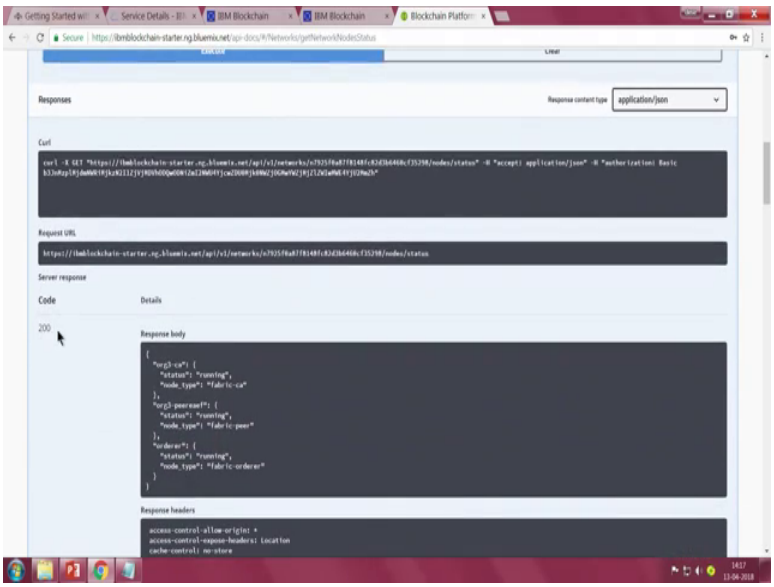

So, gives you the 200 ok, response so, your call was. Let us look at the response body right. So, what is your network look like? We have org 3 CA which is running, org 3 peer running and order service. So, all 3 of them that is your view of the network and all of them are running fine right. So, that says one API call, you can of course, add peers you can you can do all such things with the API call here.

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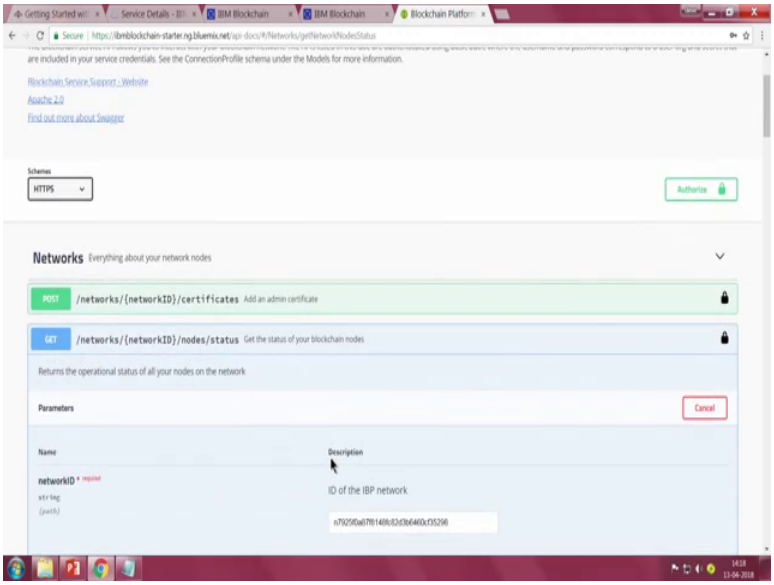

So, that brings an end to whatever I wanted to show in just the basic UI, how you can create a fabric network very quickly. You can add new channels, you can new add new peers, you can new you can add new members in their own organizations coming with their own peers.

You can invite others; you can collect this via APIs to your applications to create new channels or peers. And also deploy your applications on top of this network. So, in the next lecture, we will look at our sample application which is toy application, will go through what the code looks like, how you would deploy it and give you an experience for real block chain applications, ok.

With that see you soon.