Software Project Management
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Lecture - 36
Resource Allocation

Good morning. So, today we will take up a new chapter that is on Resource Allocation.

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We will see about little bit basic concepts of resource allocation. But what do you mean by resource's what are the different types of resources; then, we will discuss about the nature of the resources; categories of resources and then, we will see how to identify the resource requirements in a project.

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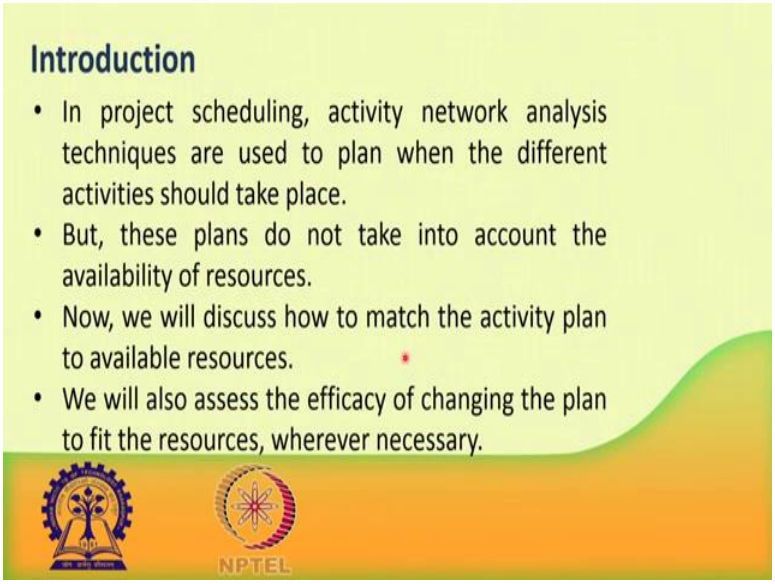

You know that in project scheduling, I hope you have already known about project scheduling. You must have used the terms critical part method or CPM PERT project evaluation and review technique etcetera those are used for scheduling a projects.

In project scheduling, normally, activity network analysis techniques they are used to plan where the different activity just take place. So, people are using activity network or the precedence networks, these are the difference what basically diagrams they will be used to make this planning regarding which activity will take when; which activity will take place when.

Now, these plans that are being made for the project scheduling, they do not take into account the availability of the resources. But actually we may make the plan if we do not take into what resources are available, then that plan will be just ideal, it will not work properly. So, now, that is why we will discuss how to match the activity plan that we have made to what to the available resources.

So, if the available resources are not sufficient enough, then we might have to change the activity plan. We might have to change the plan, then in that case we will assess the efficacy of changing the plan to fit the available resources. So, whenever it is necessary. So, we will see basically two things here; how to take into account the resources while making the activity plan and then, if the resources are not sufficient; how we can change the plan depending upon the available resources.

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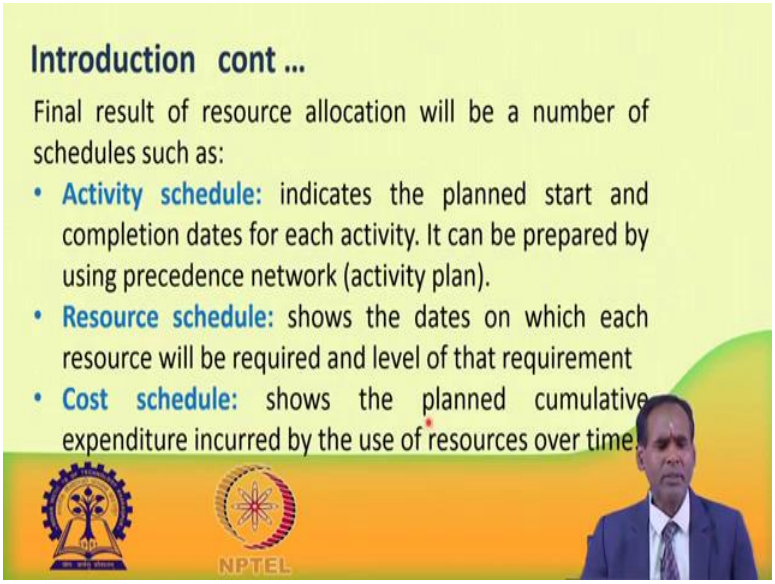

Now, let us see what is the result of the resource allocation. As we know that every phase of software development lifecycle is having an output. So, similarly here, the final result of resource allocation will be a number of resource will be number of schedules; those schedules are activity schedule, resource schedule and cost schedules. So, what do you mean by activity schedule?

So, this schedule will indicate the planned start and the completion dates for each activity. You know every activity we must have a plan when it should start and when it should be complete. So, this activity schedule will indicate the plan start date as well as the completion date for each activity and how it can be prepared? It can be prepared by using a special type of diagram or a graph, we call it as a precedence network or activity plan.

So, another outcome is resource scheduling. So, where it shows the dates on which each resource will be required and level of that requirement. So, as I have already told you in the activity plan we should also take into account the availability of the resources. So, this resource schedule will show the dates on which the different types of the resources will be required the level of that requirement.

Then, the another output of this resource allocation is a cost schedule which will show the planned cumulative expenditure; what will the cumulative expenditure that will be incurred by the use of the resources over the time the during the project development.

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Now, let us see, first of all, what you mean by resource? A very trivial what the concept we can define conventionally that resource means it is any item or a person which is required for successful execution of the project. Some resources they will be required for the whole duration of the project and some of the resources will be required only for a single activity. For example, you can take the project manager.

He is required for the whole duration of the project whereas, the programmer he will be required only for a specific activity, may be the coding. Designer will be required for only when we will perform the design and similarly, analyst or system analyst they will be required during the requirement analysis phase. So, some of the resources will be required for the whole duration of the project; whereas, some others will be used or during will be used only for a single activity or a what couple of activities.

A project manager is very much vital to the success of the project. So, it does not require the same level of scheduling as a programmer; programmer you might be required for coding, you might require say two programmers or so. But a project manager it does not require the same level of scheduling as a programmer or a system designer or a tester. So, the manager may request for the use of a programmer who belongs to a pool of resources at the program level. So, we have already seen earlier the difference between project and programme. So, the manager is responsible for one project.

So, now, but a programmer may belong to a pool of resources as a programming level. When you require the help of a programmer, you have to consult to the program head and you will release a particular programmer for your work. So, for your project. So, that is why they are the level of this programmer may not be same as that of the what the project manager.

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Now, let us see categories of resources this is very much important what could be the possible what categories or the types of the different resources. We will see the different important categories of resources are level labour, equipment, materials, space, services, time and money. So, let us see one by one. So, labour means normally this will include the members of the development project; the persons, the members of the development projects such as project manager system analyst program or system designer, tester these are all coming under this category labour. So, basically they are the members of the development project.

So, then comes equipment. So, the various computing and other equipments they are required for successful execution of the project. They will come they will come under these resources will come under equipment. For example, the servers workstations desktops, PCs, laptops, keyboards, printers, scanners, all those things are coming under the equipment and since, they require some accessories like furniture etcetera, they will also come under the category of equipment.

Materials, these are the items that are consumed rather than used. So, these items they will be consumed. So, some items are there you can use them for some period of time or for some duration. But these are the materials which will be consumed that it is after some time or when it is used. So, for example, you want to copy what some of these was softwares from one system to another system etcetera we have to use disks, CDs etcetera.

So, once they are used normally we will treat them these are consume. So, papers etcetera, these are the items those are consumed rather than being used. Space is very simple. So, you may require some office space or working space in order to execute your project where your programmers, also system designers etcetera they will sit.

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Services, some projects may require procurement of specialized services. So, along with the of the your own specialities, they may require what hiring some specialized services. For example, if you are developing a wide area distributed system, you may require scheduling of the telecommunication services. So, you may require what some help of a telecommunication services. You may require postal courier services etcetera. So, these are coming under these are also, even if they are services they will be considered as a resources and they are coming under the services resources.

Time is also consider an important what resource. So, here we consider time as elapsed time. So, the time that is elapsed. So, elapsed time it can be considered as a resource. The elapsed time can be reduced by adding more staff. So, this time requirement, the required

time if you are meeting you the deadline very soon, then the elapsed time that can be reduced by adding by hiring more staff members.

See money it is also considered as a resource very important, but normally we do not consider it as a primary resource. It is considered a secondary resource. Because this money you can you are using this money to buy other resources that is why money is also considered as a resource; but it is a treated as a secondary resource. So, it is similar to other resources in the sense that it is available at a cost, but it is that in case of the interest charges.

So, here we may in order to purchase something, we have to borrow money from the bank. We have to borrow money as a loan from the bank with some interest charges. So, that is why it is also similar to other resources and it is available at a cost. In this case this is the interest rate.

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Now, let us see how to allocate the resources to different activities. So, first step in this resource allocation is identify what are the resources, they are needed for each activity and then, create a resource requirement list. So, the first step in resource allocation is identify the different types of resources needed for each activity and create a resource requirement. We have already seen different types of resources just few minutes before. Then, we have to identify what the resource types, we have already discussed about some of the possible resource types.

So, in some cases the individuals are interchangeable within a group. For example, if you are using VB programmers and they can be interchangeably used with this software developers. So, after identifying the resource types, we have to allocate the resource types to various activities and examine the resource histogram. So, after this identifying the resource types, we have to allocate the different resource types to the different activities.

We will say how to allocate them and then, we have to prepare a diagram called as a resource histogram and then, we have to examine the resource histogram whether the resources are properly allocated or not; they have uniformly allocated or not we have to see this resource histogram. I hope this histogram you have already studied earlier in 10th or plus 2 level; basically these are some kinds of what graphs bar graphs etcetera.

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We will see as I have already told you one of the important step is identifying the resource types, I have already identified several what resource types. But now let us see in a software development project; so, what could be the possible resource requirements.

So, basically in a software project development, the followings are the resource requirements; we have to identify the hardware, we have to identify the software that will be required to develop the project and identify the supporting staff. The support staff required to carry out the project. So, basically these resource requirements are needed.

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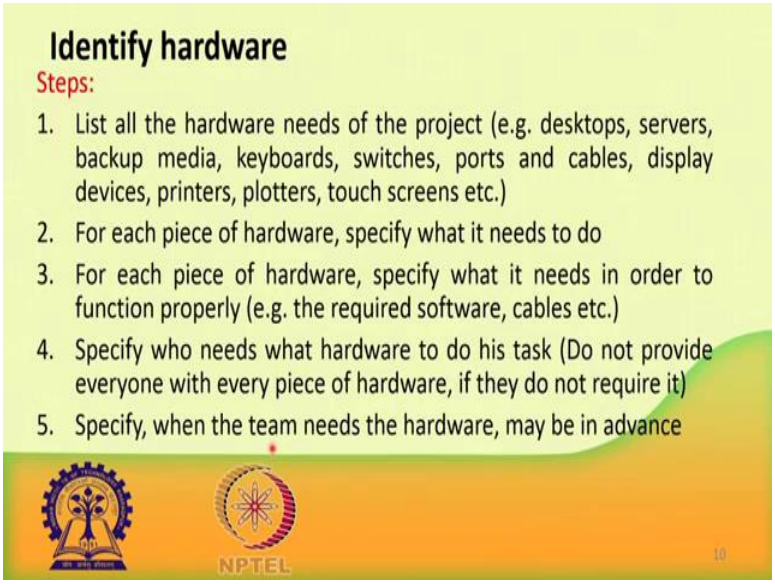

So, let us first say about the identify the hardware. What are the steps they must be followed to identify the hardware? So, first we have to see first we have to make or we have to prepare a list of all the hardware needs of the project. So, your project will require what kind of hardware; what types of hardware your project will need. First list all those things.

For example, you have to list if your project required some desktops, laptops, servers, backup media, keyboard, switches, different networking ports and cables, display units, printers, plotters, touch screens etcetera. So, examine your project requires what kind of hardware devices you will list them.

Then, for each piece of hardware specify what it needs to do. So, each piece of hardware suppose a cable what desktops server, what kind of activity it will do; what will its functionality. So, for each of the hardware specify what it needs to, then for each piece of hardware specify what it needs in order to function properly. So, first of all we should see that for each piece of hardware, what it will do; what will its objective; what will its functionality.

Then, in order to do that functionality in order to achieve that functionality. For each piece of hardware, we have to specify what it needs in order to function properly. In order to achieve that functionality, so what it needs for example? Whether the what hardware, it requires some special kind of software tools; it requires some cables for

interconnection etcetera. So, for each piece of hardware, we also specify what exactly it needs in order to properly function.

Then, we have to specify who needs what hardware to his task. So, there are several manpower several persons associated with the project. So, which person needs what kind of hardware to perform its task. See please do not provide everyone with the every piece of hardware. So, all the persons they will we have seen different types of hardware in a project, they may be required. So, do not assign do not what provide all the types of hardware to all the different persons.

Because they may not require all these things. They may require only a suppose desktop, they may not require a server. Similarly, they may require a what just display monitor, they do not require touch screen etcetera. So, that is why do not provide everyone with every piece of hardware, if they do not require it and finally, specify when the team needs the hardware may be in advance.

So, it is before what taking of this execution specify when the team, when the project needs the hardware; at what point of time if you can identify a little bit advance that will help in asking the resources from the top management. So, that is why specify when the project needs, when the team needs the hardware and if possible in advance. These are the different steps required to identify the hardware requirements of your project.

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Then, the next is how to identify the software. So, we know that in order to develop a software project many other supporting software are also needed. So, some examples are like the basic software's like operating systems, compilers, linkers, loaders etcetera they may be required for developing a project and if these basic software like operating system, compilers etcetera, they are wrongly installed or they you have not using the proper latest version, upgraded version; then, they may also cause projects.

So, different versions of software mismatched service packs and the different release of libraries, they may also create problems. If we will ignore the issues that will lead to severe problems during the software development.

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The experienced project managers they know that the software upgrades during the project, they cost the team productivity and may create serious problems. So, that is why they take proper care when to use the proper when to use the when to go for upgradations, when to use the different versions they judiciously use they judiciously decide. So, there is a need to plan for the upgrades, we should not go for the upgrades randomly. The project manager should plan for the upgrades at right time, judiciously, properly and they schedule them and the impact on the team and the project can be minimized.

So, the project manager to see that when the impact of this was upgrades on the team and the project, it can be minimized then he may go for a plan for upgrades and scheduling

them. Project managers can get a handle on software support by following the below steps let us see what the steps are.

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So, he has to list. So, let us see we are discussing now, the steps for identifying the software. The project manager first he has to list the software requirements just like listing the hardware requirements. So, for any software to be developed or in a software project, the project manager has to prepare a list containing the software requirements. Then, specify the software versions; what are the different versions that you your software will use.

Identify the upgrades and service packs; what are the different upgrades and the service packs and when you should go for them that identify. Also identify who upgrades which software; who is responsible for upgrading which software, you must ensure that because all persons they cannot be what responsible for upgrading the software. Then, specify when to upgrade which software; at which point of time here we are identifying which software needs upgrades. But then also we have to specify when the software needs upgradations and which software needs upgradation at what point of time that you have to specify.

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Let us see the first step here that is list the software requirements. The team may need we are discussing about the list of the software requirements; what kind of software we may additionally required for developing your software project. The team may need a well specified set of software products so that product inconsistency can be minimized the project or the team, they may require a well specified properly specified set of software products.

So, that the product in inconsistencies can be minimized. Upgrades can be planned properly and licensing also can be done properly. To get this set the project manager needs to manage the details of all the software to be used. So, project manager he has to properly manage the details of all the software's, they are to be used in the project. He may start by specifying the software that the team will need including the following. So, let us see what he project manager should specify? He should specify these additional softwares.

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What operating systems, he will use or what operating system the team members will use; what compilers will be used in the project; the configuration management system will see towards the end of the session about configuration management system; what kind of email what system you will in project will be used; the different software supporting software such as FTP, web browser etcetera, what will be the list of that.

Then the different libraries or the other DLL dynamic link libraries, standard templates libraries, graphic user interface library etcetera that will be used in your project. Then, office of the office software such as word processing package, excel sheet, power point presentation etcetera that will be required list of that and if any what software tools are required by your projects or such as various CASE tools, design tools such as if you know that RSA, Visual paradigm etcetera.

Testing tools such as JUnit and these what JUnit, Jumble, Selenium etcetera the testing tools and finally, the SPM software project management tools such as Gantt chart tools, Libra project etcetera. So, what kind of different software tools are required. So, that also have to be listed. So, these are the additional or the supporting what components that the project manager must prepare this list.

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Then, the next step is specify the software versions. Given the list of the existing software products, the project manager has to specify the team needs exactly which version of each of these pieces of software because there are different versions. So, which version exactly the team members needs that also we have to specify. We have to also specify when changes to these might become available. So, when changes will become available to these what versions that also the project manager has to specify.

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Then, next step is identify upgrades and service packs, you know software is not a static entity, there will be upgrades and enhancements from time to time. So, the project manager, he needs to know which pieces of software need these upgrades and when these upgrades will occur during the project. So, the project manager may have to answer the following questions for each software product, the team will use.

For example, what will the length of your project in relation with the upgrades service packs or new versions of the software products. Will the team need to upgrade whether the team request for upgradation or not? Similarly, when if yes, when the upgrade be available; when the upgrade will be available? So, these answers must be made. Accordingly, he can identify the upgrades and this service packs.

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Then, identify who upgrades which software. Please see you have to be project manager has to identify who is responsible for installing and upgrading of each piece of software. Because all persons are not responsible for that. Whether the system administrator overlay the system; administrator he is responsible or for a your particular project is the project may be a project what manager or a project developer or a system designer.

He is responsible for these upgradation that the project manager has to what identify. Make sure that the project manager has identified who does what and everyone agrees on who performs installations and upgrades. So, the project manager has identified the correct person who will make these upgrades and everyone agrees to that that which

person is doing that; who is doing the installation and upgrades, everybody must know it everybody must agree on it.

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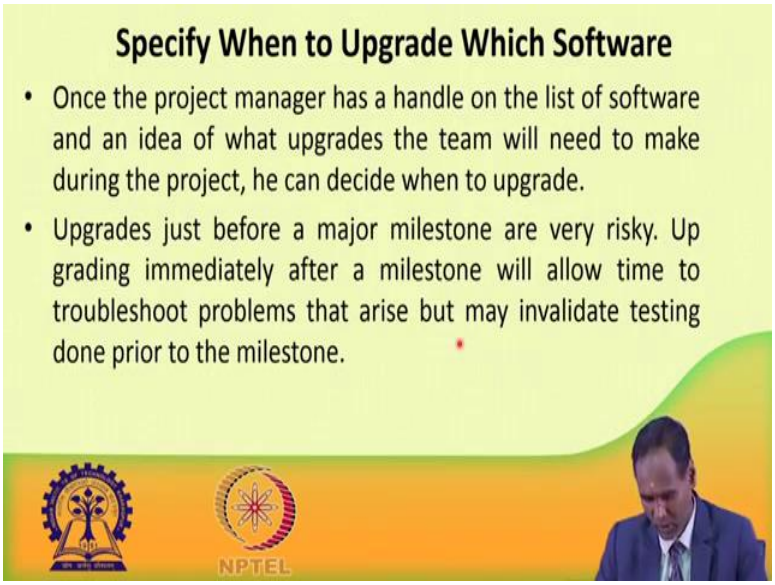

Then, specify when to upgrade which software. As I have already told you once the project manager has the handle on the list of software and an idea of what upgrades the team will need to make during the project, he can decide when to upgrade ok. So, the once the project manager has a handle on the list of the software and the idea of what upgrades; then, the team will need to make during the project that he can decide when to upgrade because we have to specify at what point of time the he has to upgrade and which software.

So, upgrades. So, normally if you will upgrade the software, just before a major milestone; then it is very risky because that what upgradations may not work properly and you may what miss the milestone, you may miss the target date, but upgrading immediately after a milestone will allow to get some time to troubleshoot the problems that arise, but may validate the testing run prior to the milestone.

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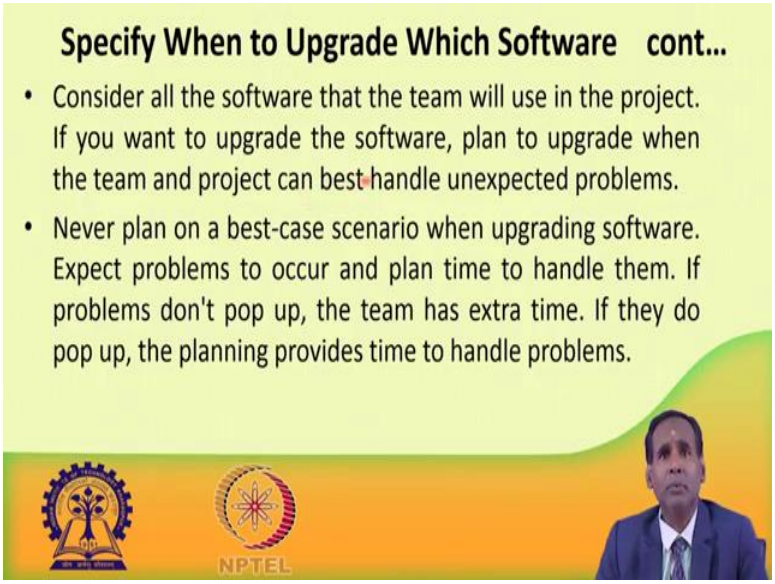

Then, specify. So, consider all the software that the team will use in the project if you want to upgrade the software, you have to plan to upgrade when the team and project can best handle the unexpected problems. So, when the problems are not there, you are expecting at this point of time problems may not occur. Then, at that point of time, you may go for the upgradation. Do not go for the upgradation before some major milestone or some what major target line. So, never a plan on a best case scenario, when upgrading the software do not be optimistic that at this point of time no problem will be there. So, we may go for the upgradation.

So, always expect that problems to occur and plan time to handle them. So, if ah. So, do not say that do not expect that problems will not occur and you should go for this what upgradation. Always anticipate that expect that problems may occur and plan the time to handle them; if problems they do not pop up, then its fine. The team will get extra time. If they do not pop up and if they pop up, then what will happen? If the problems pop up, then we have already done the planning. The planning will provide time to handle the problems. So, this is how we have to specify when to upgrade and which software.

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Then, identify the support. So, first here identify these steps are like this identify the support needed for each group; from each group of this what from each group of the different persons or these stakeholders, identify the support needed from each group. Then, specify when support will be required at what point of time so that the project can make progress without making any delay.

Then, specify how the support will be occur whether the staff will be available physically or via phone or by email etcetera, then gain commitment from each group for the support required For example, you may get the commitment through a verbal commitment or through a contract or a commitment letter and then, maintain a good relationship with the project staff. Unless you maintain a good relationship with the support staff, its very much difficult to complete the project.

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So, then after identifying the resources, we have to prepare a list called the resource requirement list first. The first step in producing a resource allocation plan is to prepare a resource requirement list which will contain the different resources that will be required along with the expected level of demand. So, this preparation of resource requirement list can be done by considering each activity present in a precedence network. I hope in project scheduling you must have studied precedence network or this activity network.

So, preparation of resource requirement, a list can be done by considering each activity present in the precedence network and identifying the resource required. We have already seen what are the different types of resources required. Now, we will prepare sample resource requirement list from a given activity network or a given precedence network.

So, you I have told you that there can be some resources that are not activity specific, but they are part of the whole project infrastructure. For example, the project manager he is required for the whole completion for the full duration of the project or required to support some other resources etcetera.

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See this is a very sample what example of a precedence network. So, here I hope for this development of precedence network, activity network we have already seen in the project scheduling. Here say these are different stages are given and here, the earliest start time, earliest finish time, latest start time and latest finish time is given.

Also what is this float I mean the free time also can be is given. Free time means by this much amount of time if the activity can be delayed the project completion date will not be affected. So, in this way a given precedence network, its shown where the different activities are there like specify the overall system. Then, what design, module A, design module B, design module C, design module D are there and similarly coding and other activities are mentioned in this diagram.

So, since you have already known this thing in the project scheduling, I have not discussing the details of this. My objective is how to create a resource requirement list from this given precedence network.

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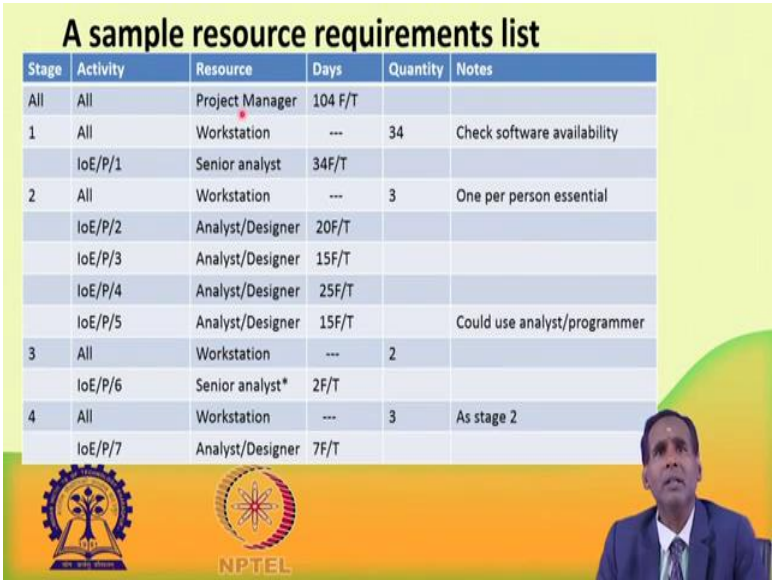

So, looking at this we have we will prepare the list like this it will see that the resource requirement list will contain these items like what are the stages, what are the activities, what are the resources, for how many days the resources are required, the quantity if any and if any notes or remarks are there you can see that.

So, we require as I have already told you whatever may be the stage, whatever may be the activity, for all the stages or the activities we require a resource person we require a resource called the project manager. He is available for the whole project and how many days are required for the total day and he can see that the total duration of the project is 104 days. So, that is why here we have written that he must be available 104 days full time.

And similarly, how many work station are there. So, for the stage one for all activities, we require some around 34 number of what work station and also for those working of the work stations, we must check the whether the associated softwares are available or not and then, comes P 1 ah. Here this is the what project activity 1; for this activity 1, how many days required you can see I think this is 34. So, we require some system see this is a stage 1 and activity 1.

This is we require 1 system or 1 senior analyst and that should be required for how many days? As I have already told you, here it is required 34 days. So, he may be required 34 full days and then, for we can go to stage 2. This is stage 2 and we require some

workstations or the resources say maybe 3 workstations one for person essential and for P 2, I mean activity 2 we can see; this is activity 1, this is activity 2. You see how many days are required? I think this is 20 days.

So, see in this case we require for activity 2, we require analyst and or designer for how many days? 20 full time days and like this you investigate all the stages all the activities, identify what are the different resources required and maybe for how many days and what is the quantity and if any note or remarks you can write here. In this way, you can prepare the sample requirement list.

So, this sample requirement list has been prepared, I using this given precedence network or by taking this precedence network. So, in this way we can prepare the resource requirement list given the precedence network ok.

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So, in this way you can prepare the resource requirement from a given precedence network. So, this is the first step before the resource allocation, you have to prepare the resource requirement list from or by using a given precedence network ok.

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So, today we have discussed about the different categories of resources. We have to explain the identification of resource requirements such as what the different types of resources are the labour and time, money, equipment etcetera. We have also presented the steps for identifying the hardware software and supporting staff, we have also discussed how to prepare a resource requirement list from a given precedence network. So, today, we have seen the basic concepts or the basic steps of the at least we have seen the first step of resource allocation. These are the references we have taken.

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Thank you very much.