Software Project Management
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Lecture - 47
Project Monitoring and Control (Contd.)

Good afternoon. Now, let us see the remaining portion of software configuration management.

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We will see first the configuration management process, then we will see some of the tools available for configuration management, and then at last we will see some other project management tools.

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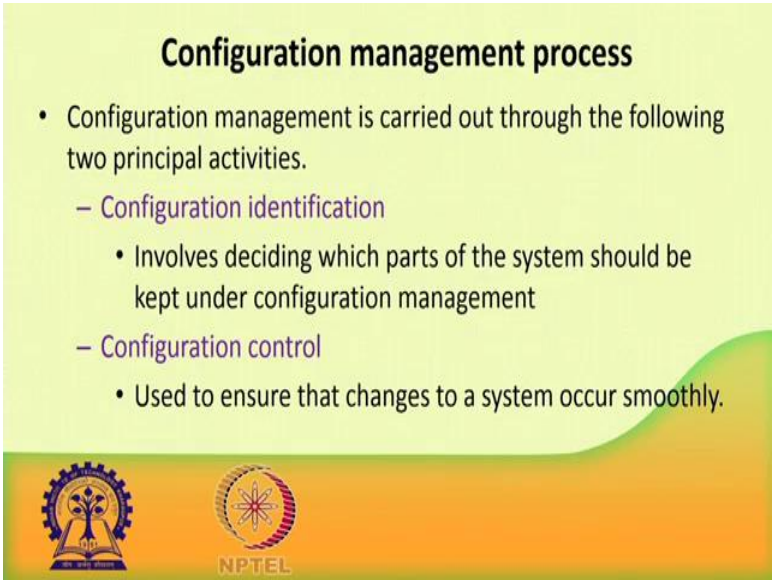

So, we have already discussed the fundamental concepts of configuration management, various terminologies of configuration management in the previous class. Now, let us see how configuration management is carried out. Configuration management is carried out through the following two principle activities, one configuration identification, then two, configuration control. In this process configuration identification, it involves deciding which parts of the system should be kept under configuration management, which items will be kept under what configuration management such as your SRS document, code, design documents, test plans, etcetera. And in configuration control this process is used to ensure that the changes made to a system, they occur very smoothly.

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We will first see about configuration identification in detail, and then we will see about this configuration control. So, the project managers normally they classify the work products associated with a software development process into three main categories. So, the work products could be as I have already told, there could be SRS document, design document, codes, test plans etcetera or the design test cases they are the work products. They can be divided into three categories, controlled products, pre-controlled products and uncontrolled products.

So, let us see what are controlled work products, controlled work products are those that are put under configuration control, that means, the work products which can be put under configuration control, these are known as control work products. The team members must follow some formal procedures to change these; they have to follow some accepted procedures, formal procedures to change this. We will discuss the procedure. Then pre-controlled work products are those work products which are not yet under configuration control, but eventually they will be under configuration control may be in near future.

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And then last one is this uncontrolled work products. These are the work products, which will not be subject to the configuration control; they will not be subject to the configuration control. These controllable work products and pre-controlled work products and pre-controlled work products together, they are known as controllable work products.

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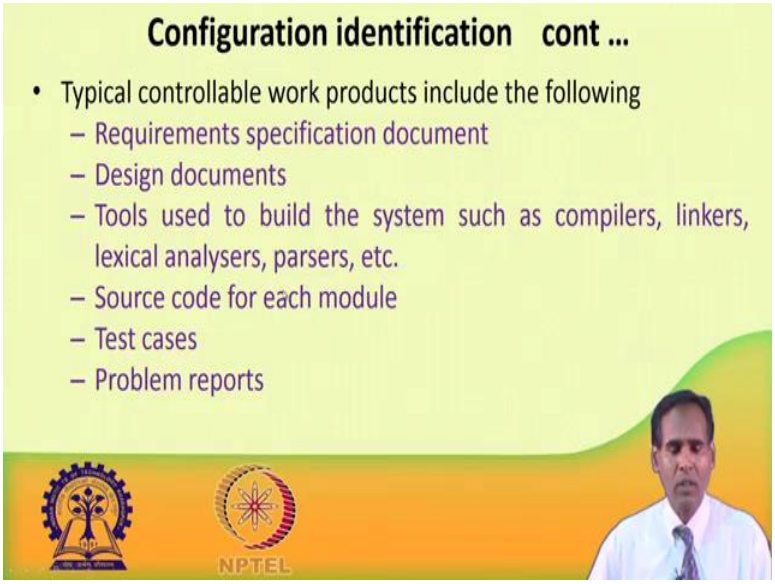

Then let us see what work products can be coming under which work products may come under controllable work products like as I have already told you requirement

specification document, design documents such as DFDs, UML diagrams etcetera, the tools which are used to be in the system such as compliers, linkers, loaders, lexical, analyzers, parsers, etcetera, they can come under control level work products. Similarly, the source code for each module that can be also considered as a controllable work products; the design, test cases, test plans etcetera, they will be also coming under controllable work products. And finally, the problem reports they can also be what; they can also come under the controllable work products.

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Next we will see about configuration control, how to perform configuration management or how to perform this configuration control. So, configuration control is the process of or configuration control is the part of configuration management system, which most directly affects the day-to-day operations of the developers. The configuration control it allows only authorized changes. So, those persons which have being authorized might be a project what steering committee or the project manager.

So, the configuration control, it will allow only those persons only authorized the changes made by those authorized persons to the control objects, and it prevents any unauthorized changes. Anybody else whoever want we cannot make change. So, they have to get permission either from the project manager or from the steering committees. So, that is why configuration control it allows only the authorized changes to be controlled and it prevents the unauthorized changes. The project manager can give

permission, can give authorization to some specific members who will be able to change or assist the specific work products, and others they cannot make any unauthorized change or any unauthorized access.

In order to change a controlled work product such as a work code, etcetera, a developer he has to get a private copy of the module through a operation called as a reserve operation. He cannot just do the change on the master copy. He has to first request or he has to first reserve for a private copy; and once his request is approved, he will be given a private copy where you will make the changes, then that copy will be tested if everything is what successful. If the project committee of the project manager approve the changes, then only that master copy will replaced by this developed private copy, this is how the configuration control, this process it works.

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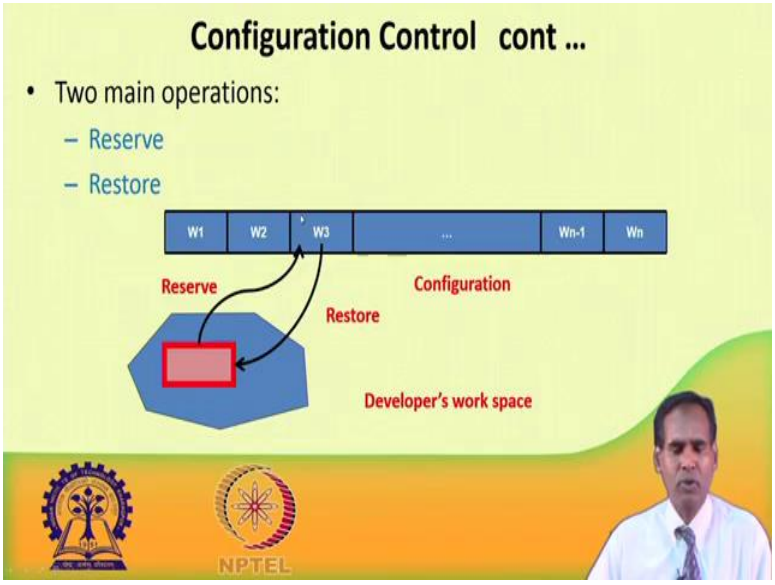

So, let us explain how this configuration controls this process work. As I have already told you, there will be two main important operations in configuration process, one reserve; another is restore. You see, so suppose this is the developer's work space. One developer wants to make to some changes to the what configuration item W 3. So, what he has to do, he has to send a reserve message to this project manager or to the steering committee requesting that I want to make some changes in the configuration item W 3. So, if his request is approved by the project manager or by the steering committee, then a private copy of the W 3 this configuration item will be given to the developer. Then the

developer will make any sort of changes whatever he wants; what is justifiable he will make the changes on W 3.

He will, please remember he will not directly do in the masters copy. A copy of W 3 will be given as the private copy. The developer will make the changes in this private copy and then this what, changes what he has made in the private copy that will be sent to the project manager or the steering committee, we call it a committee as a committee called as CCB. I will just show you, so that committee then he will investigate the various changes various aspects of the changes if they are satisfied, then they will approve the changes.

And after that, if everything is approved, yes, the changes are correct, then the, what developer will replace this master copy W 3 with the developed or the yes with the developed copy or with the private copy through a operation called as restore operation. So, through reserve operation, he can reserve a copy of W 3. And he will be issued a private copy and then with the restore operation, then he; and if the changes are approved, then the developer can restore, these privately developed this private copy, it can be put in the masters copy place, that means, the master copy will be replaced with this private copy if that is approved by the CCB. So, this is how the configuration control process it takes place by using two different important operations reserve and restore.

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So, this thing I have explained here that the configuration management tools allow only a one team member to reserve a module at any time. So, because we have already seen the problem of what concurrent assess, it will not allow more than one person at a time to do the reserves, so that is why configuration management tool allows only one team member to reserve a particular module at any time. Once that work product is reserved, it does not allow anybody else to reserve the same module until the reserve module is restored. So, in this way, we can prevent or the tool can prevent more than one developer to simultaneously reserve a module, thus the problems which are associated with the concurrent access that can be taken care of.

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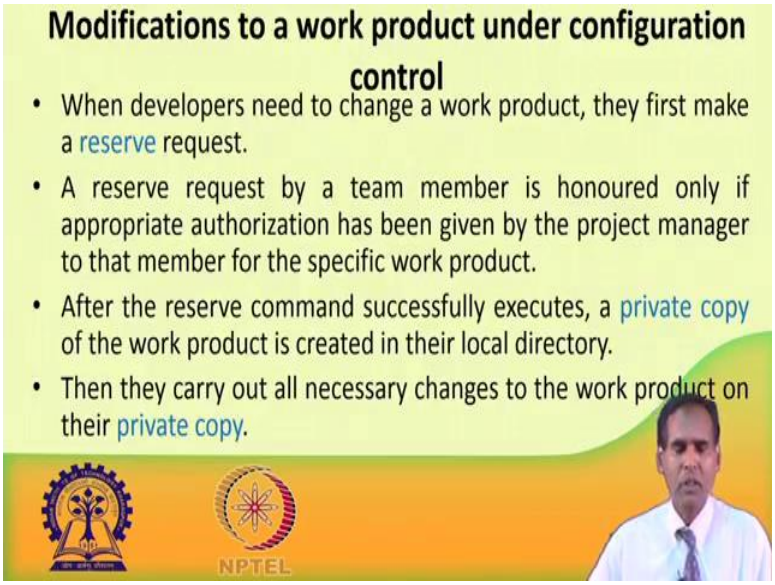

Now, let us see how the modifications to a work product are made under configuration control. I have already told you that when a developer needs to change a work product, he first makes a reserve request. Then that reserve request is honoured only if the appropriate authorization has been given by the project manager; otherwise this request will not be honoured, ok. So, a reserve request by a team member is honoured only if the appropriate authorization has been given by the project manager to the member for that specific work product.

After the reserve command successfully executes, a private copy of the work product or the configuration item is created in his local directory. And then; and the project or the developer he can carry out the necessary changes to the specific work product on the

private copy only not only master copy, he can make any changes in the private copy only.

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Then once the developer has satisfactorily a completed all necessary changes, then the changes are need to be restored in the configuration management repository. However, restoring the changed work product to the system configuration, it requires approval; it requires permission of a board called as change control board. The change control board is usually constructed by taking members among the development team members. Now, for every change that needs to be carried out, this CCB reviews the different aspects of the changes made to the controlled work product and certifies certain aspects they endorse certain comments about the changes.

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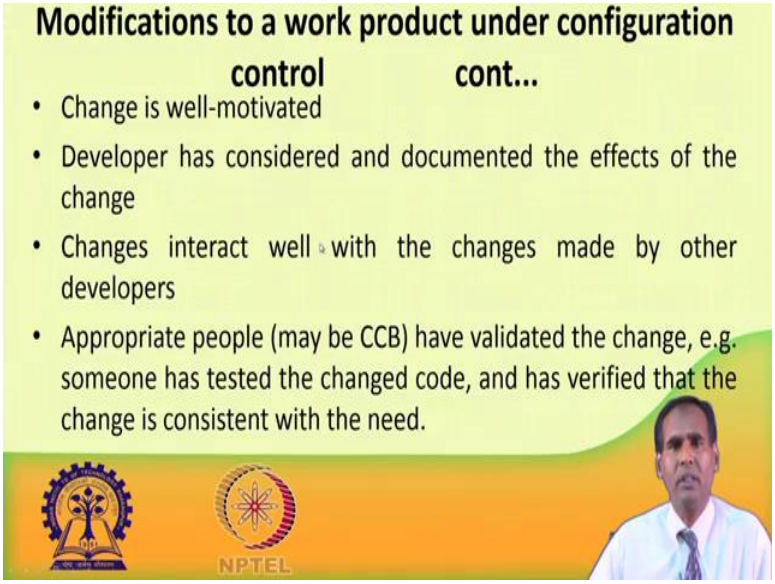

They may give comments in these aspects that change is well-motivated. The developer has considered on document the what will the effects of the change the developers has also already considered and documented, whether there is a adverse effect or only positive effects will be there, if any negative effect also the developer has already mentioned. So, the committee is aware of that. Then the changes interrupt well with the changes made by other developers. So, what changes particular developer has made, whether those changes are what interacting well with the other the changes made by the other developer that also the committee will see, and then the appropriate people may be from the CCB, they have validated the change, they have tested the change, they have validated the change.

For example someone has tested the changed code and has verified that the change code is consistent with as per their need. So, if they verify and the committee or the CCB satisfied with every aspect of the changes made in that what work product, then they will approve and they will give the permission, and then the what software developer, he can replace, he can restore the master copy with these changed copy.

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So, now let us see in the CCB will be there. Normal, with the changed control board is seldom a group of people, normally for smaller project the project manager himself if the he test the role of CCB. Except for very large projects, the functions of the change control board are normally discharged by the project manager or by some senior member of the development team. So, once the CCB reviews the changes to the module and approves all these changes, then the project manager updates the old configuration item with the new one through a restore operation.

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A configuration tool does not allow a developer to replace a work product in the configuration with his local copy unless he gets an authorization from the CCB. So, unless the CCB authorizes, unless the CCB approves the changes even if the software developer has got the private copy, but he cannot upload it, he cannot restore this modified copy. So that is why configuration control tool, it does not allow any developer to replace work product in the configuration with his local copy unless he gets an authorization or permission from the CCB. Therefore, incompletely modified or improperly modified or inappropriately modified work products, they cannot be updated in the configuration.

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So, we have last class we have already seen about what version and we have also seen release. We have already seen how the versions can be managed. The software what configuration management we have seen let us quickly see out how the different releases can be managed; so, release management. The release management process it systemizes the work carried out by developers to provide a new release of a software and on the part of the users to smoothly obtain and use a new release. So, see two important things you can see that the real release management process is the systemizes two things, the work carried out by the developers, how to provide a new release of a software, and for the users how they can smoothly obtain, and use a new release this can be provided by the release management process.

The release process should involve what see now that this release management becomes very much important after the users getting the facility of easy downloading of the releases from the internet. Then, so that is why this release management has become very much important. The release process should involve what minimal effort on the part of the developer. See two important stakeholders are there, developer as well as the user. This release process should involve minimal effort as much as less effort on the part of the developer to upload a new release of software; similarly this for the users this process should involve minimal effort for downloading it and installing it.

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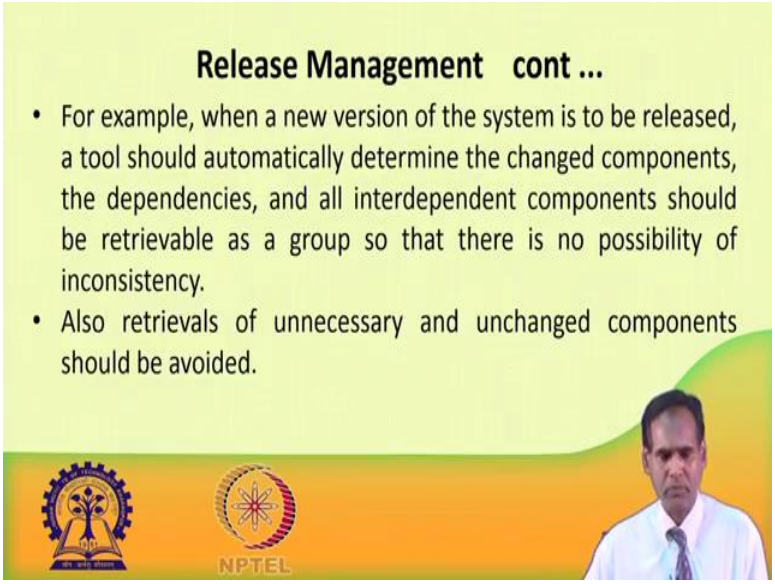

For example, when a new version of the system it has to be released, the tool should automatically determine what will be the changed components, the dependency among them, and all the interdependent components, they should retrieval as a group, so that there will be no possibility of inconsistency. Also retrievals of unnecessary and unchanged components should be avoided. So, whenever there will be retrieval of some unnecessary components some unchanged components that should be avoided by the release management tool.

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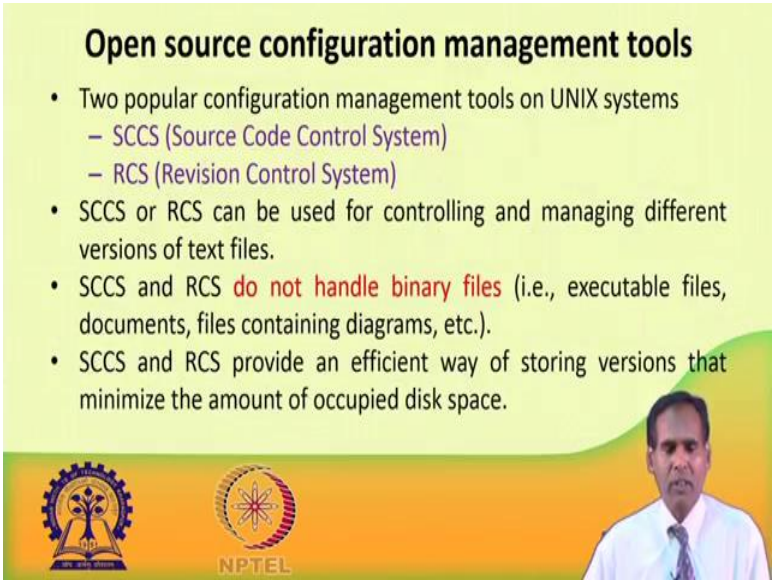

Now, let us see as I have already told you, there are several configuration management tools are available; out of them some are free, that means, open source tools and some now somehow some are commercial tools. So, today we will discuss what some open source tools. So, two popular configuration management tools on UNIX systems are there may be these are open source, one is SCCS, it is named as source code control system. Another is RCS that is that stands for revision control system either SCCS or RCS they can be used for controlling and managing different versions of text files.

Please remember they can be used for managing different text different versions of text, files, they do not handle binary files. For example, executable files, documents, file changing diagrams, etcetera they cannot be handled by SCCS and RCS. SCCS and RCS they provide an efficient way of storing the different versions that minimize the amount of the occupied disk space. So, these tools they provide some efficient way for storing versions that will minimize the amount of occupied disk space.

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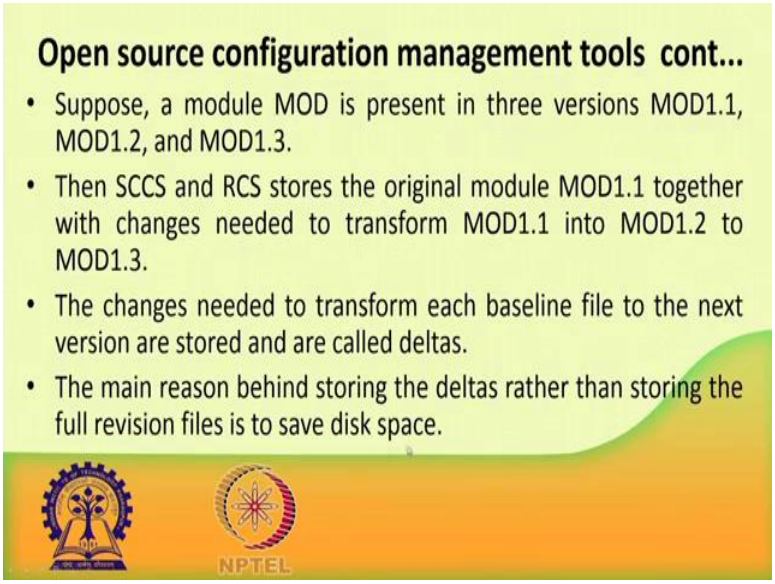

Now, let us see suppose a module mod is present in three versions. For example, a module mod is present in three versions may be module 1.1, module 1.1, module 1.3. Then the tools SCCS or RCS they store the original module what module 1.1 together with the changes needed to transform from module 1.1 into module 1.2 to module 1.3. Please see they will not store all the versions module 1.1, module 1.2 and the module 1.3, they will store the original module, the baseline module, module 1.1. Along with that they will store the changes which are required to transform from module 1.1 to module 1.2 and from module 1.2, module 1.3. So, basically they will store the baseline version module 1.1, and the changes required to move to module 1.1, module 1.3.

The changes needed to transform each baseline file to the next version are stored, and are called deltas. So, the changes which are needed to transform from the baseline module may be from your module 1.1 to module 1.2. So, these changes which are needed to transform each baseline file to the next version, they are stored and these changes are called deltas. The main reason behind storing the deltas rather than storing the full revision files is to save the disk space.

So, if you while store all these versions module 1.2, module 1.2, module 1.1, module 1.2, module 1.3, the disk storage requirement will be very high. Both the files store only the baseline version module 1.1 then the changes required to transform into module 1.1

module 1.3, then the required disk space will be very less. So, RCS and SCCS do or follow this approach.

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The change control facilities provided by SCCS and RCS. What facility they provide, they include how to the ability to incorporate restrictions on this setup individuals, who can create new versions. So, proper what, authorization is required, and facilities for checking the components in and out, that means, who can reserve one can reserve among the who can perform the restore operations, ok.

So, who can perform and who can perform reserve and restore operations and how they can perform, these facilities are provided by this tools SCCS and RCS. Individual developers they check out to the components and modify them, ok. The individual developers they check out the components and modify them. Then after they have made all the necessary changes to a component, and after all the changes have been reviewed and approved by CCB, then they can again check in what the changed module into the SCCS and RCS, and the master file is replaced with this what changed module.

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Now, let us see about some of the features of SCCS. I have already told you that SCCS is a configuration management tool; it is available on UNIX systems and it helps control and manage text files only. It also implements an efficient way of storing the versions; it minimizes the amount of occupied disk space by storing only the baseline version and the changes required for transformation, not all the what, revisions.

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Suppose a module is present in 3 versions this I have already told you like module 1.1 module 1.2 and module 1.3. And SCCS stores the original on the baseline version 1.1.

Along with the changes those are needed to transform it into module 1.1 and module 1.3 and these changes or modifications they are known as deltas.

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So, access control facilities provided by SCCS, they include that facilities for checking components in and out. Individual developers they can check out components and modified them. And after they have changed the module as required and the module has been successfully tested and verified by CCB, then they can check in the changed module into the SCCS. The master copy now will be replaced with this modified copy.

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Revisions are normally generated by numbers in ascending order like revision 1.1, revision 1.2, 1.3 etcetera. It is also possible to create variants of a component, ok. It is also possible to create different variants of a component by creating the what by creating a fork by using fork in the development history ok. It is also possible to create different variants of a component by creating a fork in the development history. So, these are the configuration management tools. Many other configuration management tools are there. You can find out from other books on internet.

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So, now I will just conclude with this I will give some examples of other project management tools. So, these two are RCCS and SCCS are explicitly they are used for software configuration management, but there are other project management tools to support other activities such as drawing Gantt chart, etcetera for the CPM for handling, CPM PERT for dealing with CPM PERTetcetera, there are other project management tools.

So, I have listed here some other project management tools to perform some other project management related activities. For example, Gantt project is one of the freeware ok. For example, Gantt project is one of the freeware. It is GPL-licensed project management software. It is a very open source software that runs under the, what windows operating systems, Linux operating systems and MAC operating systems. There is another tool called as Microsoft project. It is the basic project management

software from Microsoft Corporation. The, and you can see this is available if you are using Microsoft what system; Microsoft software you know computer then you can see that this Microsoft project is already there.

Advanced capabilities of Microsoft project the advanced capabilities are supported through Microsoft office project server and Microsoft office project as access software. The advanced capabilities, they are supported through what Microsoft office project server as well as Microsoft office project web access software. So, if you are having Microsoft office, then you can see in your computer that this Microsoft project software is there, which you can use for project management related activities.

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So, another software is there called as Primavera project management software which is a widely used suite of project management software. So, you can see there are two versions here SureTrack is one which is the entry level software, and Primavera 6 is the advanced software. These software's you can use also project management related activities. Using SureTrack's Project KickStart a project manager can define the different project phases, establish the goals, anticipate the obstacles and delegate the different assignments. So, these are only basic things I am just giving the information. You can see the details from the books and the internets.

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So, let us just compare the different features of the project management tools. Like see Gantt project, it can handle scheduling project scheduling if you have known CPM and PERT etcetera. So, Gantt project supports scheduling. It also supports resource management. I have already told you for what representing resource management, Gantt project is one of the best software and it is open source software.

Similarly, Microsoft project it supports portfolio management, portfolio management you have already what discussed initially. So, its supports project management. It is also web based. It also supports scheduling activities such as through PERT CPM and PERT. Also cost management is supported through Microsoft project. And resource management we have already discussed resource management; resource management is also support is supported through Microsoft project, but this is not an open source software when you are what licensing Microsoft package, then you will get this tool.

Then primavera SureTrack is this also supports portfolio management it is also an web based what software. This supports scheduling activities through CPM, PERT etcetera, and it also supports cost management it also supports resource management, but this is not on open source software. So, these are few of the, what project management tools we have listed here. Many other what projects are there for example, another project management tool is called as Libre project. So, you can also use Libre project for the different project management related activities ok.

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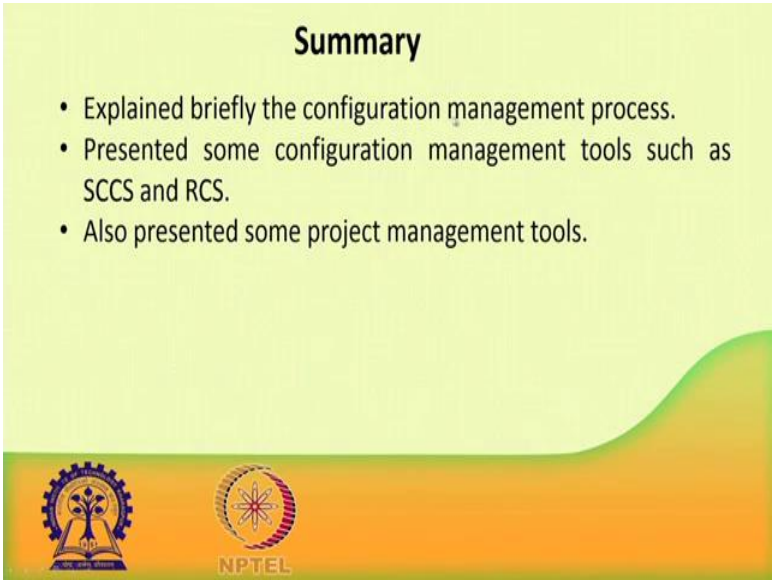

So, today we have discussed in this class the detailed steps for configuration management process. We have already seen, in this class we have seen the details of configuration management process. We have presented some configuration management tools such as SCCS, RCS etcetera. We have also presented some other project management tools such as Microsoft project and primavera and these what Gantt project Libre project etcetera.

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We have taken the represents from these books.

Thank you very much.