Embedded software testing
Unit 5: Test Management
Lecture2
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Hi all, next lecture 2 session of embedded software testing the test management and defect management this are unit five so in this session we will look on the stronger counties of what we have studied in privies session.

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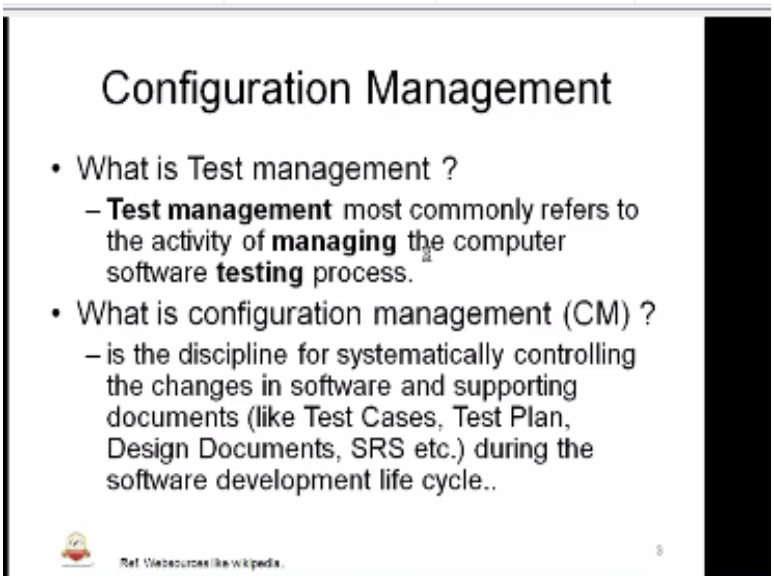

so in the privies session we studied about test management understanding what is test management is it has configuration management and test management itself so you know in configuration management will be having configuration items and in test management test process how test process are relates to software V-model "design by control", test drive development, agile development processes etc we can studied about that and what is test management?

Test management mostly commonly it refers to the activity of managing the computer software testing process, from the test planning tell the test exhibition and reporting we will studied what it is in the next slides what is configuration management? You know that any items that are to be controlled in terms of changing or delivering terms of software testing and include also the supporting document all this are the part of the configuration management examples that we have like test cases, test plans, any document SRS all this are part of the configuration management

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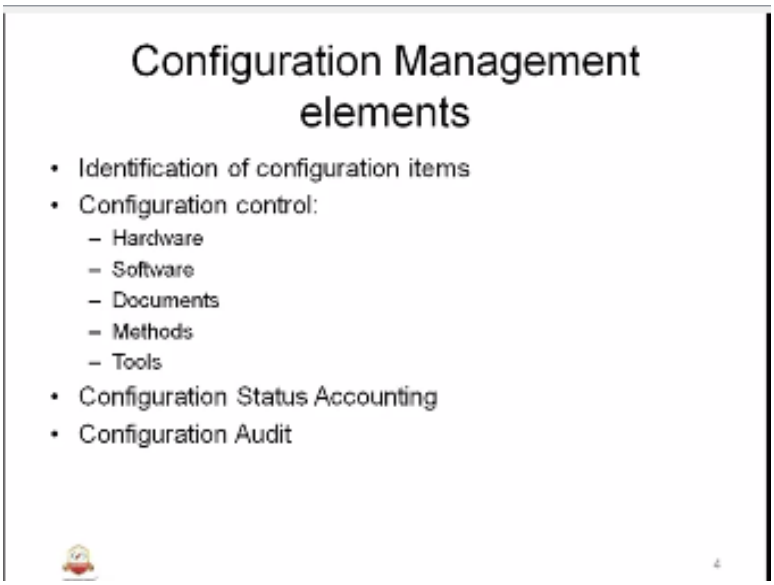

Configuration management elements are configuration items, configuration control, configuration status accounting and configuration audit this are the four main elements of the configuration management actives okay, and configuration control can have hardware, software documents, methods, tools and we do status accounting in terms of accounting all the configuration items and audit will insure that elements complaints of what is been planed.

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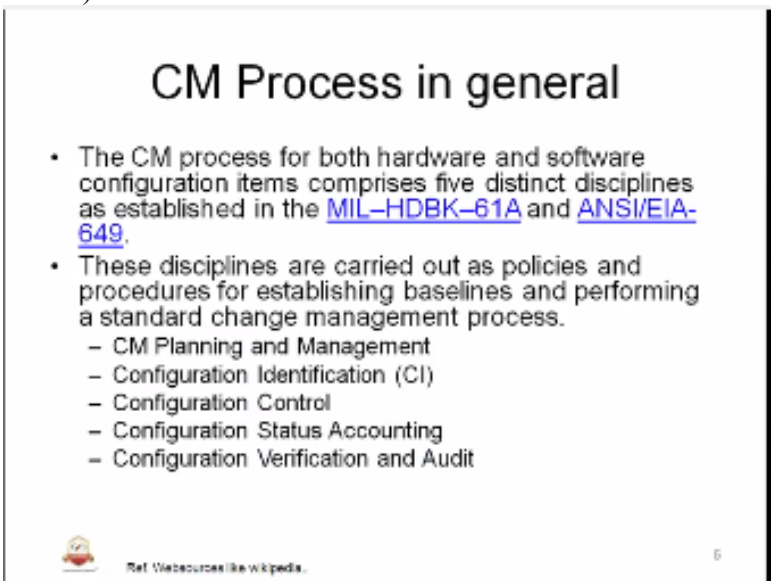

So in general we had seen a definition of CM process as for the MIL-HDBK-61A and ANSI/EIA-649 so the disciplines are planning configuration identification configuration control status accounting and verification and adult and their details we had studied about the Cm planning and management configuration control and we have seen the model witch like the varies locks of or the element of the configuration management.

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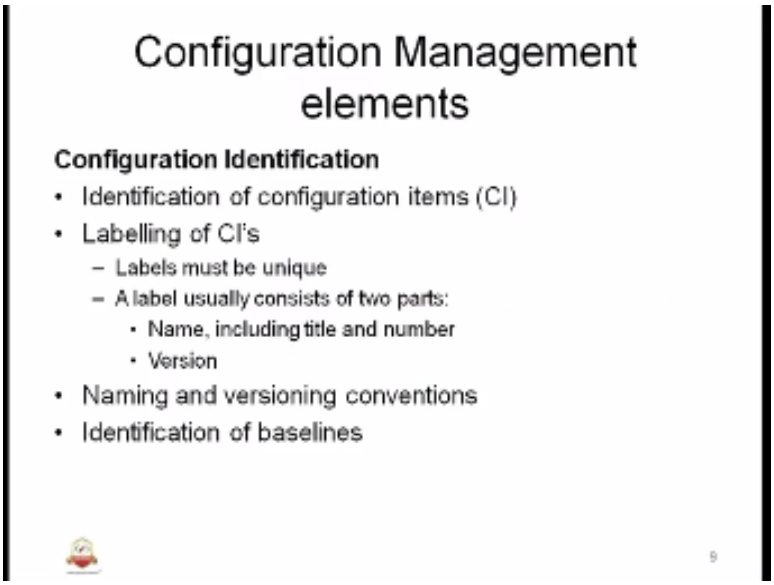

Configuration identification deals with the identification of configuration items labeling of the CI's it should be unique how should we versioning all that we will try to studied in detail about software configuration management today and what are the naming and versioning conventions what are followed in industries identification of baselines what are the base lines all that

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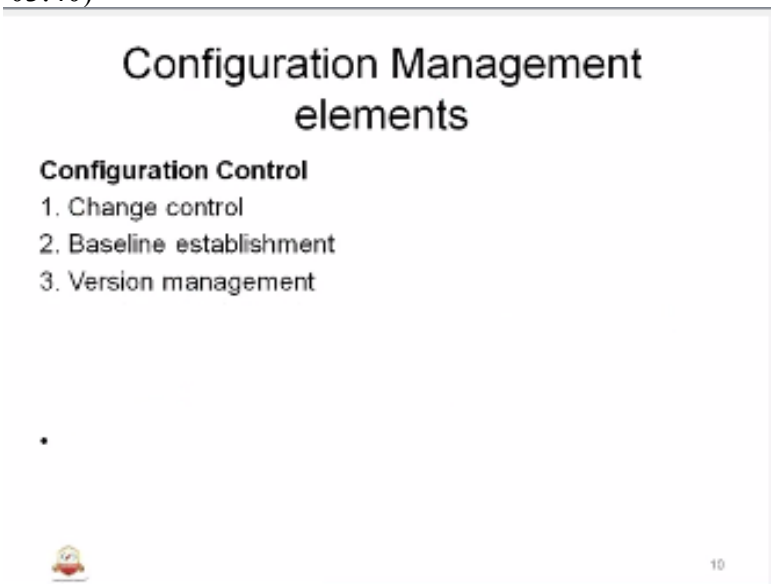

Configuration control deals with change control, baseline establishment and version management

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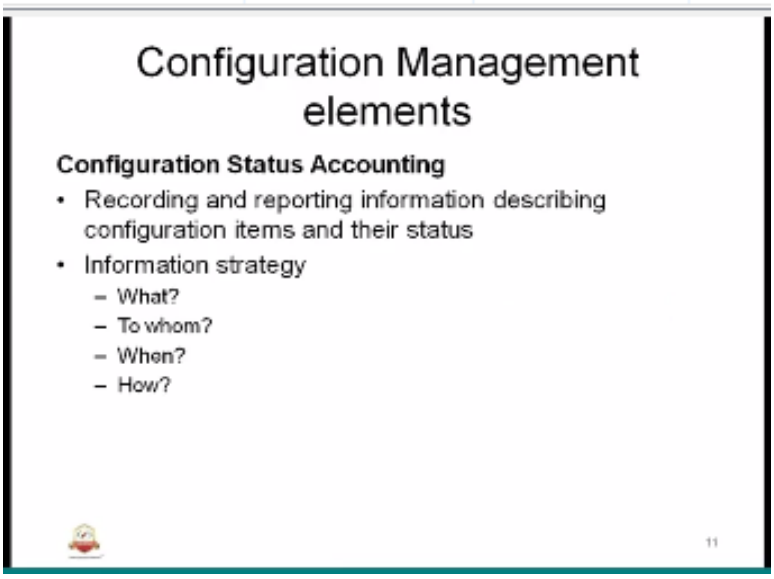

Configuration status accounting a recording and reporting information describing configuration items and their status so the information will have what are the configuration items to whom? It is addressed, when it was assigned, how it going to be moved to the next steps

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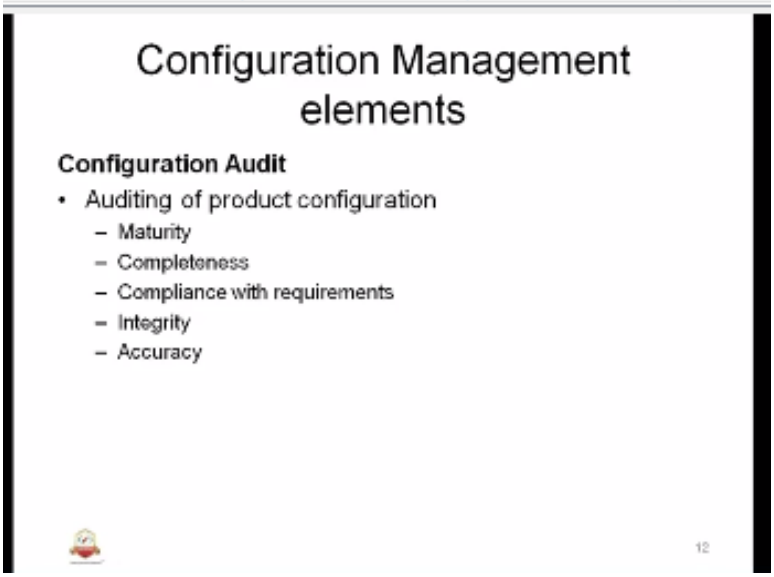

Configuration audit basically does the auditing of product configuration witch maturity, completeness, compliance with requirements, integrity, and accuracy.

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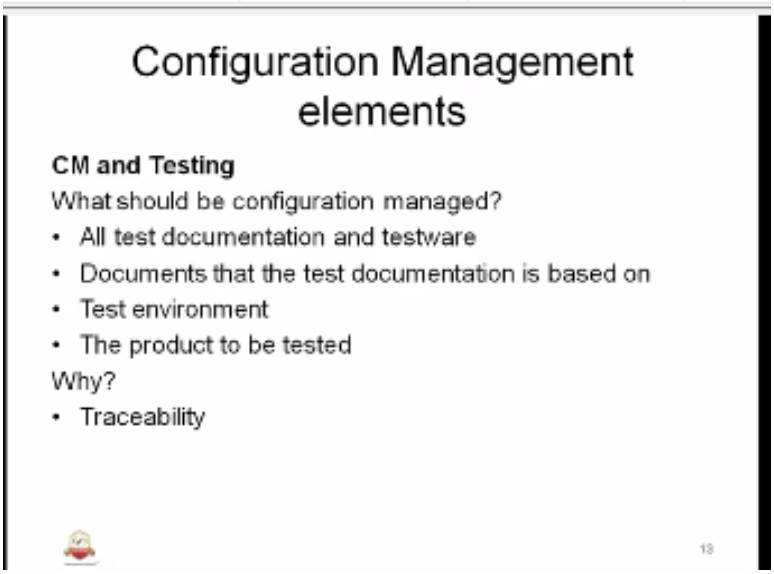

And we have configuration management elements CM and testing what should be configuration managed? All test documentation and test ware including tools and all that added stuffs and test environment the product to be tested why? Is to be configuration tested also it is a traceability part so that is why all is important in terms document that is to be traceable to one of the other documents part of the software life cycle or embedded software testing that why we use configuration management okay.

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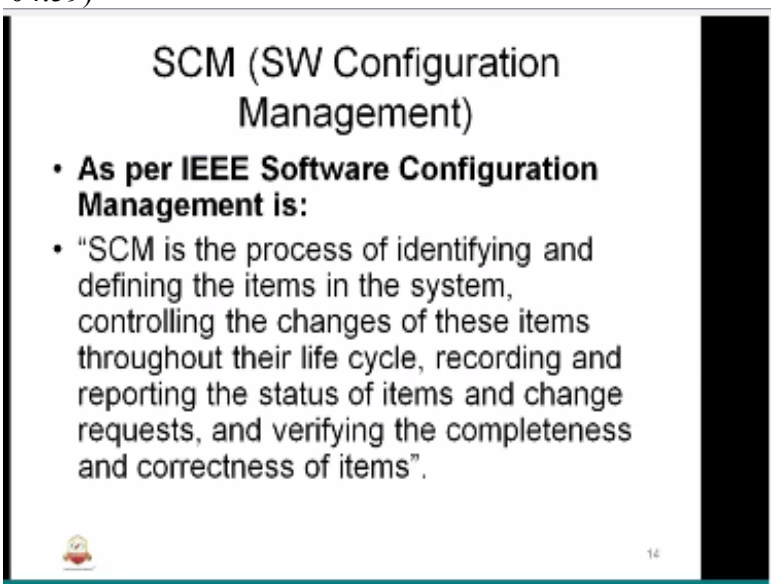

Now coming to SCM software configuration management so SCM is the process of identifying and identify and defining the items in the system controlling the changes of these items throughout their life cycle ,recording and reporting the status of items and change requests and verifying the completeness and correctness of items.

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So why SCM when changes in products that are developed we need software configuration management to control the changes so that they have minimal effect on cost, schedule and quality basically we need to control the changes so that the minimal the infract is doing to get addressed it helps in development and change implementation activities SCM activities help in accomplishing software quality assurance activates which provide assurance that the software products conform to their specified requirements to provide confidence that quality is being put in to the software, SCM tools helps in tracking the changes along with user name.

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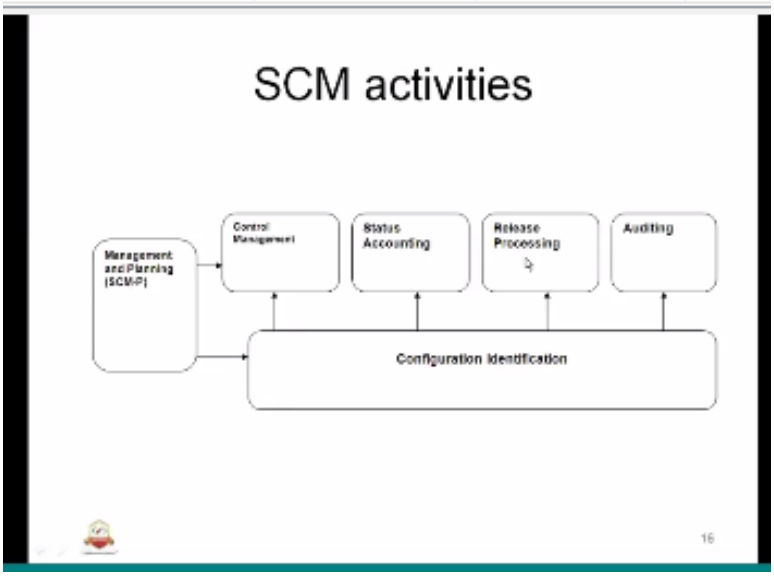

As we have seen this are the SCM activities block in terms of planning control management system, status accounting, release processing, auditing and identification okay now coming to today's session of test management and configuration management we will try to understand software configuration management actives so what are the things involved in SCM planning.

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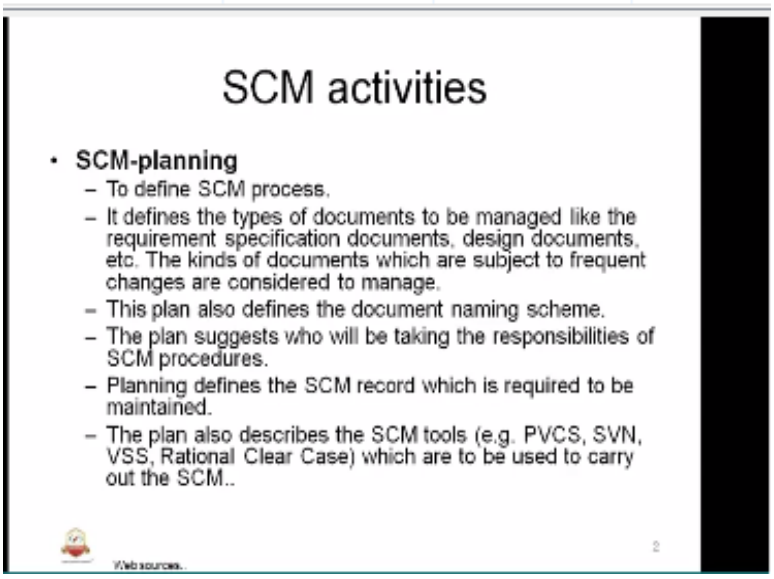

So SCN plan is document basically which serves the reference for the SCM progress it defense the type of documents to be managed like the requirement specification documents, designing documents etc. The kinds of documents which are subject to frequent changes are considered to manage, this plan all define the document naming scheme based on the costumers raisin or any consenters that are happening within the configuration item.

The plan suggest who will be talking the responsibilities of SCM procedures documents defines the SCM records which is required to be maintain the SCM record basically identifies all inter space of the changes and whose warning it whose responsible the plan also describes to the SCN tool like PVCS, SVN, and dimensions etc. privies' dimensions visual for save SVN jut there are lot of tools in the industrial so this tools basically used for caring out the SCM actives so the position calls of the tool also.

Equip selection basses also are mentioning in the plan mentoring the SCM planes is also called as SCMP is a documents separately mentioned for the document So basically all is are involved in the SCM plans so to define the SCM process how should be cared out it identifies the types of documents to be mange like required specification design etc. also the plan will spiffy about the document manual scam how this to be divide into varies document throughout the software configuration should be moved it plan suggest who will be taking the responsibilities of SCM progress planning define the SCM records plan also describes the SCM tools okay.

Continues of SCN actives softer configuration identification dustups deals identifying of items to the control establishing identification schemes for the items their versions and establishing the tools techniques to be used in managing the controlled items establishing configuration base line for each configuration items base lining basically base lining very important active that involves managerial agreement on the content of a configurable item the configuration control born there is board called CCB which involves subject management etc. basically they define and they come to an conclusion that this item can be base line base line is a basecoat event on witch all the rest of the sub systems or the sub events are going to take place okay.

Requirement has base lined means that base line will be used for testing that base line can be use for component testing integration testing assistant testing depending on the type f base line that we have similarly that we can have base lines for the test cases so we have developed the test cases and we come to conclusion saying that this test cases are in if to go head for the next stage of actives.
So we say that are the test cases frozen this frozen is nothing but the base lining.
Define naming scheme to identify the software configuration items of each and every document that means naming scheme and identification of that configuration item is also an important document aspect that also will be done in the SCM actives basically software configuration identification deals in identifying the items to be controlled establishing identification scheme software items and configuration and establishing the tools and technique to be used in managing the controller here.
We eatables the configuration base line for each of the configuration item base lining involves managerial agreement on the content of the configuration items and it is called as a base line items and the naming scam also can be provide very customer or the customer can also have sometimes of configuration so we may need to alien with this configuration basically this also a important thing that we need to understand aliening the artifacts with costumer configuration this also are the important aspects because we also have some short of a test artifacts or developments artifacts or any other items that he wants control along with the wander or the contractor deplorable.
So suppose you are contractor or we are delivery team delivering to the costumer then we may have to alien to the configuration whatever the costumer asks or it is also possible that he may ask for some suggestion to have a configuration by our self so that we can control by our self that itself becomes an activity on it is won so that is what we do with the SCM process in identifying the software configuration okay.
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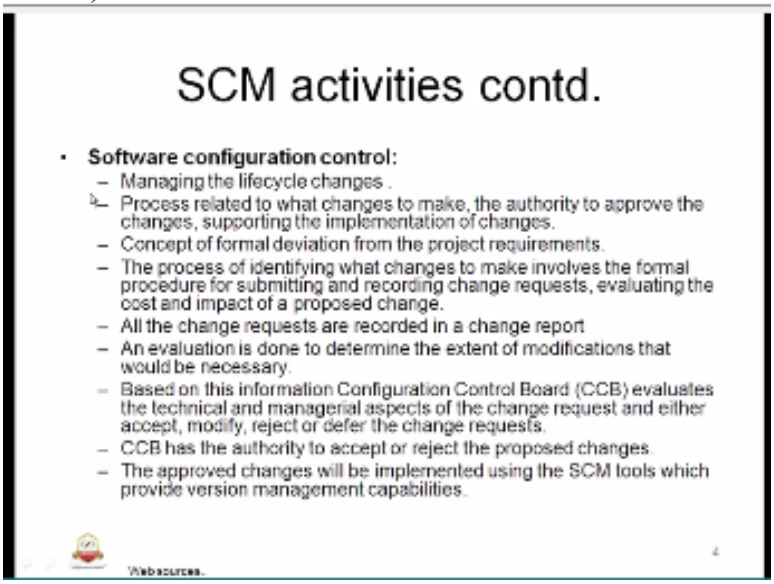

Next one is after we identify the software identification of the documents we need to control it basically that is what is called a software configuration control, so basically what we do here is

managing the lifecycle changes, the lifecycle changes could be any of the test cases procedure any input documents any repotting events etc. all is lifecycle artifacts and it changes maintains will have to be managed that is what we do with the configuration control process related to what changes to make the authority to approve the changes supporting the implementation of the changes all this well be part of this configuration control that.

Next one is the concept of formal deviation for the project requirements suppose the requirements is going to change as if the deviation in some short of a active done where it control that as well in terms of deviation process, the process of identifying what changes to make involves the formal procedure for submitting and recording change request evaluating the cost and impact of a proposed change.

All the change request are recorded in a change report, where the change report that will identify what changes have been done so whatever request against which the changes have been done and what is the conclusion who is author who is a responsible how it is controlled all is the part of the change report and evaluation is done to determine the extent of modifications that would be necessary.

So basically along with the change request the changed request well be evaluated to determine what is the malefaction are the change that is going to happen, so after the evaluation what we do is there is a CCB change control board so basically it comprises both technical and non technical people in terms of deseeding weather the change is necessary and can go head for the next updates that well be dissuaded in the CCB change control board

So basically CCB evaluated the technical and managerial aspects of the change requests and either they will expect or ask some changes in the updates that are required or they may differ it or they may reject it for the change request so CCB has the full authority to except or reject the propose changes the unproved changes well be implemented by using the SCM tools it is configuration control tool that well be used which provide version management capability

So this changes have to be definitely controlled that what we do the software configuration control so throughout the lifecycle of the test artifacts it going to be many changes the managing the changes is odd in software confirmation and consulter this step is consoled with covering the process related to what changes to make according to output the changes supporting the implementation of changes all this well be controlled in addition to this activates it over's the concept of devastations form the project requirements the process of identifying what changes to make or the formal procedure for submitting and recording change request and evaluating them evaluations.

Also in terms of cost whatever the changes that propose changes is going to make and we may identify some resources we may identify tools to make the change what is the procedure we are going to fellow any costumer involvement is also required all well be decide this decision we be taken care by the CCB that is configuration control board and resource of change also we be identify during that CCB meeting may costumer request it could be analyzed solution for bug or some kind of a optimization.

What are it could be all those changes it have be controlled and it should be documented in a change request it called a SCR software change request if it is software change also called as

SCR if it a change request from a problem that been identify before it is called as SPR or software problem report basically that identifies where is a bug what kind of a changes what is the cause and all it will be provided based on that the CCB will meet and decide on the change request.

And in some projects this changes are communicated using a defect tracking tools such as bugzela are particular change the bug is opened and all communication are done through that particular bug test take holders well be communicated accordingly so that itself will became a SCR or the software changing request that will be mentioned within the tool and aromatically it is going to get recorded whose is warning that change and who is responsible who is doing the evaluation all this well be taken care

So ones the SVR is prepared or all the change requests are recorded in the bug and evaluation is done to determine the extent of modification that would be necessary based on this information that the CCB or the change configuration control board evaluates the technical and abnormal aspects of the change request and either they expect the modified chit or deffer the change request CCB has the full authority to expect or reject in some projects CCB members are the part of the offshore team in CCB members are entirely from the costumer side it could be or it is mix of the both costumer and other side like offshore team or test team or any relevant stack holders test engineer or test led anyone who is responsible.

So the approved changes well be implemented in the SCM tools which provides version management cabbalists examples like CVS, VSS, SVN, which basically provides the version control capabilities we have assume rental capabilities or something like check in, add, check in, check out this are the basic capabilities of the tools basically it helps in identify the elements which are going to be added which are going to be checked in which are going to be checked out which are going to be moved to a different stages all is part of the SVM tool.

So detail of all this things are not miss scope of imbedded software testing but the basic understanding we need to know that software configuration control will be done throw the SCM tools, SCM tools help in terms of adding an element checking in basically which will help in terms of creating a version and check out for modifying anything we need to check out the element we need to update it we are going to check in back, so that it will be in the repository of the server and that check in check out can counties for different shack holders interims of revue, rework, release, and frieze all this stages can be done.

Next one the software configuration status accounting so software configuration status accounting provides the leads to the cod and reports on configuration data it involves creating a knowledge base information necessary to mange configuration effectively it is purpose is to configuration information that is required to required for configuration management basically it has all the information to manage the configuration item basically so it maintains the information about the configuration documentation it maintains the products configuration such as version number.

Or change done on a particular artifacts it maintains information about the product operational and maintains documentation for the departments effected by each change and there update status information of out the SCM process such as the change of the change request all this will

be part of the configuration status software configuration statues accounting enables retrieval of information concerning it and changing dictions and provide the source for configuration of a product.
All of it is the configuration documentations all the data collected during the configuration status accounting is main tend in configuration accounting status report SVAR it also called as configurations status accounting helps in establishing and maintain congregating records for the configuration items okay all this well be part of the project the project well have this information in terms of any of the configuration identification done on the different artifact and how it is controlled.
Who is maintaining it so where the documentation about and the status of each of the items can be part of the accounting this itself is an active so in a frequency they will generate this report and that report well go to the next stage of the SCM activates that is auditor so the auditor well done by the audit who well ensure that each configuration item meets its requirements basically so based on the summery that we have seen in the status accounting the configuration auditor well audit the varies artifacts that to make sure that each of the configuration items id getting its requirements is part of that particular actives the software audit is an active performed independently is very important this well be done outside the team QA can be involved or the independent body that is designated to take care auditor the silly way of perform the independently to evaluate the conformances of softer products and process to be standers guidelines plangent procedures.
So that are planed ways of controlling and identifying and bring the process of SCM all this SCM actives well be audited with the help of auditor software configuration audits help in verifying that configuration management task for a particular CI as successfully achieved all of the requirements specified in the configuration base lines so configuration base line well be identify with the details in the configuration management plan all this against that verified actually and their two types of audits that are done.
In I will take an example one of the industries that we fellow those types of audits are FCA functional configuration audit otherwise physical confirmation audit so what are those functional configuration audit is done to insure that a configuration item to audit its constant which is specification so there is requirement there is specification we make sure that as for the specification it is consistently been followed and all the CA are appropriately configured that is what we do with the functional configuration audit okay the next one is physical configuration audit.
So this is basically done to ensure that the design and documentation witch constant with the build software products that means whatever venation you going to build whatever you are going to test whatever you are going to deliver is constant again and again with the changes with the configuration that we have in the configuration depository that what we physically verify against the what we have in the documentations here we do with the assistant check with respect to the specification.
What we have expired next what we do is we verify the software function and it is performances they are really compare with the requirements and impact of devastation if any are un Larsson

control all this functionality in terms of audit configuration is performed this all well be checked with the help of functional configuration audit in physical configuration audit we well check for the higher key the physical reparations many conations all this are they reading what is that been followed to studs about the SCM actives of software configuration audit so we have go throw the software configuration identification software configuration control software configuration accounting.

And configuration audit this four elements are basic element that are used in SCM actives and plain is of course part of the either projects managements plan or we can have it has a sprat SCM plan itself some industry like arrow space they have separate plane that is deliverable this itself is a confirmation item again so this is the mandatory to have industries like arrow space so we need to have SCMP or software configuration management plan document oaky now straight away go to configuration items for lifecycles.

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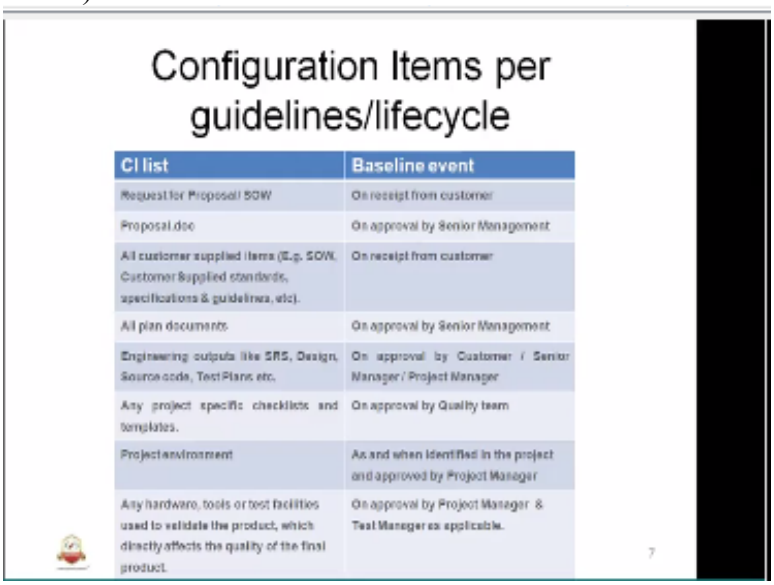

So what are the configuration items it could be in the imbedded software lifecycle and how they are going to be based lined we know the base line is an event where we are going to base line that particular artifact saying that that are artifact is ready to next page or next event it is available so that will be spoken in the configuration identifying list basically okay you can see two columns.

One is the CI list and the varies documents and artists on the right hand side you can see a baseline event on which baseline event this would called as base lined this items are called as base lines I picked up few examples for a mod from a typical embedded industry okay we when we get a outsource embedded software testing or embedded software to target development it could be, so what we do is we first get the proposal or which contract or the statement of work

So all this well be configurable again because there could be a change right or a period so definitely the change control has to happen and those should be part of the CI okay so the event is on recite from the costumer we are going to have a request or proposal RFP or we can get a statement of war from the costmary.

So that itself is base line we are going to base line it and we have proposal internally we developed that technical team and the mangers or the test manger on a lid and a proposal was we approve internally with the help of seiner management team we are going to say it as base line event so proposal well be summated to the costumer okay next element of the lifecycle is all coaster supply's items from the contract is award the element to have a statements of work custom supple any standards any eluding rules specification guide lines costumer requirements or any tools we can provide any bold for example target board for testing any equipments fixed all this are considered as important items we well may be touch in code.

And the configurable items may be in a feature flits all this will be the part of the CA and that is called as the base line when we rise it for the costumer all planning documents that we have internally project magnet plan, project testing plan, all this well be approved by the senior management and we are going to have it called as a base line then we have interfering outputs like requirements specification design test plans etc.

This also approved stage by stage by the costumer or senior management or the project management if it is internal project or if it is costumer or interact project based on that this well be called as a base line event and against the base line event we are going to base lined the particular CA or configuration items and any projects specify check leafs templates this also can be a configuration items and this is basically needs to approved by the quality team so that base line be created then we have the test endearment or the project endearment this should be identify.

As and when any project approved by the project manger or the test manger and next one is the hardware, tools as facilities used to validity the product it could be a test equipments test machines, laptops any wiring glop boards any target boards any flash programmer all this are the part of the hardware tools that directly effects the quality of the products all this could be controlled throw CI list and that also needs to approved by project manager to make it has a base line this what configuration items typically followed in the embedded software testing or embedded software lifecycle okay.

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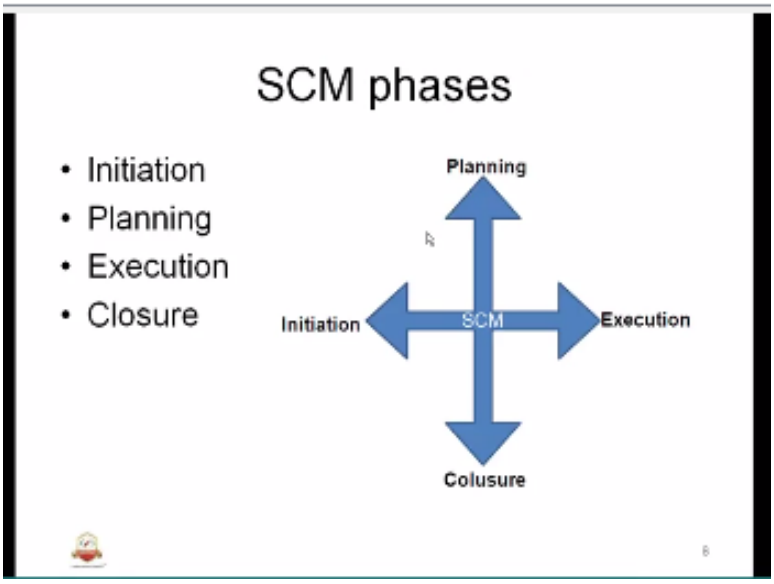

The next one is about a SCM phases what are the software configuration management phases that are involved those are four phases initiation, planning, execution, closure this well go in a circle fashion that why I have out a arrow to identify it end of the arrow initiation planning execution and closure so what are we going to do in initiation what we are going to in planning what we are going to do in execution and how you are going to close it so this are basic elements for the SCM okay

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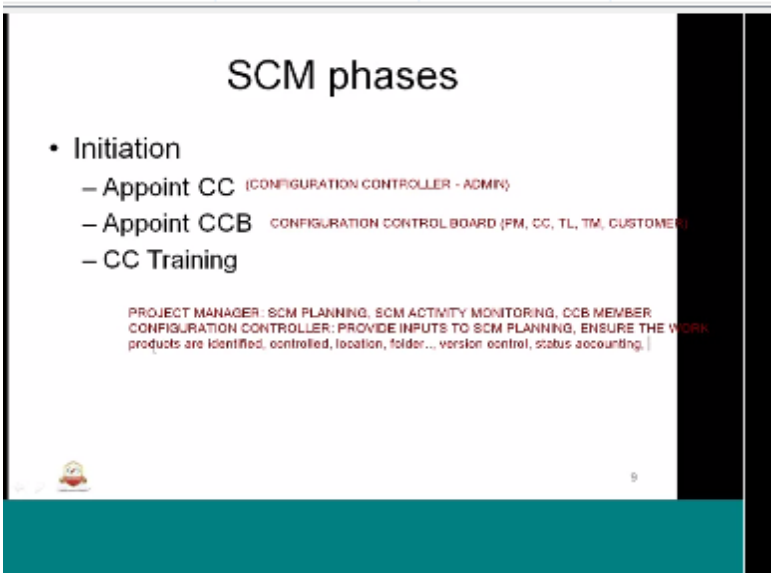

Initiation so what are going to instate we are going instate software configuration management by appointing a configuration controller basically it controls all the configuration items and we are going to appointing CCB as I said configuration control board which could comprise I will try to configuration controller so we call as admen who can maintain all the artifact under the configuration, configuration control board could be compare of PM and CC a team a team member or test member it can also involved customer also basically this people well take

appointment in terms of CCB when we define the project plan or a test plan and for doing this actives.
We need training that is also called as configuration control training and there are varies roles and responsibilities that we have for each of the configuration initiation actives so for example we have a project manger his responsibility would be SCM planning and he will do SCM actives mentoring of the tracking and he is also a CCB member by becoming a member what he does is he will equally responsible for taking the dictation for the changes next one is the configuration controller CC is also called as CC so he will basically provide a inputs throw PM for SCM planning he will ensure that the work products are identify because we need to identify the confirmation items.
And he should make sure that it is controlled that means all the check in check out admin actives creating the folders locations all this well be taken care by the CC and he is also reckonable for version control he will basically do the base assigning he well do the base as I said early slide information about the artifacts in depose trey of the configuration control should be reposted all this are deliverables.
It could be or it could be CAS so basically he has the owner ship of controlling it basically still the in vales of the test members or test inner as a responsibility of controlling in terms of items like SOS file or test cases etc but overall the CC takes care of the complete control next is the CCB so this board basically comprising CC, PM, test lid and it can involved costumer and SM that is senior manger also so this board basally oratories the CS identification and project base line and changes so this are the important actives and they should approve also because without approval changes will not Accor so those are some the responsibilities of the project manager, CC and CCB this well be initiated during the indication period of SCM next one is planning.
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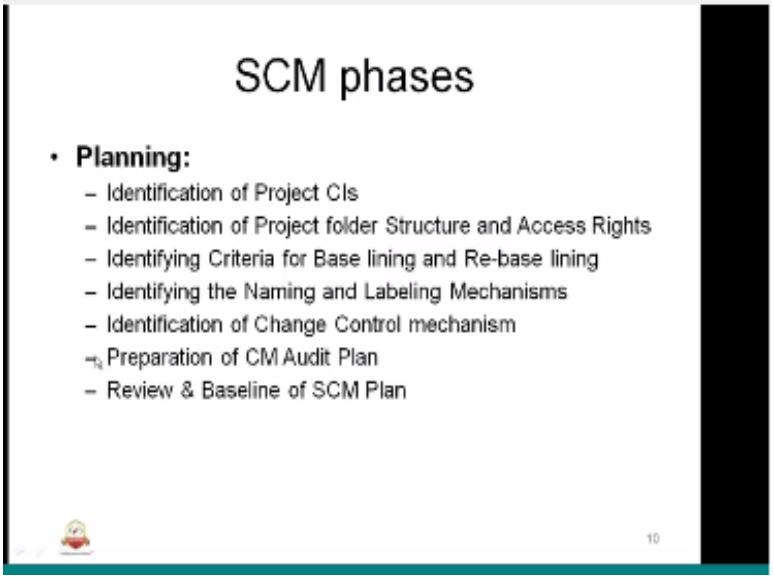

So planning what we do basically we will identify the project CIs identification of project folder structures and access rights this is very important thing CC take care this folder structure well be created and who should do on read access who should do on the write access who should do on

change access all this part of the formation well be granted or denied CC based on the project planning and identifying.
The criteria for base lining and re base lining indentifying the naming and labeling mechanisms the commendations that are followed and identification of change control mechanism how it going to be changed preparation of CM audit plan configuration items have to be audit for the status accounting plan against that that preparation well be planed frequency and duration of that all is to be part of the planning then this is all important review baseline of SCM plan the next two SCM phases are execution and closure.
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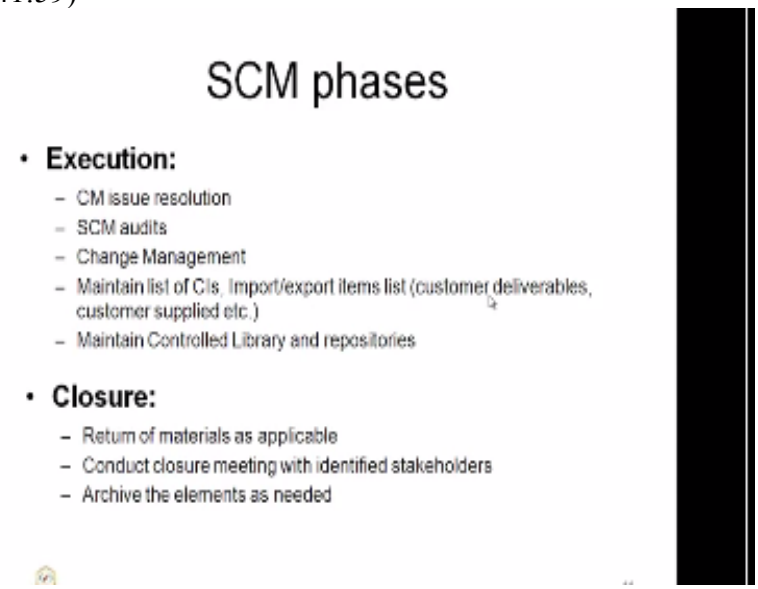

In execution what we do is any configuration management issue that we are going resolve SCM audits is also a part of the SCM execution change management is also execution maintain the list of CIs import export items list costumer deliverables customer supplied after the project is over all this well be the part of the execution which well take an activity during the SCM and of course maintain the control library and repositories that repositories have regularly backed up that is what maintain means.
Back up archive and deles in basically this a tears called retention , retention period any project suppose to have a retention period why because that may go for a call back or that may go for role over that need to maintained again triggered from the customer input or internal or warranty or guaranty whatever is required till that period retention has to be taken care all this well be part of the execution that is defined in the SCM plan or the important SCM phases lastly what we are going to do.
SCM phases is closure all the project are done they are going to have SCM closure so return of materials as applicable it return either the costumer or to wander if you have rented out any pose places short of martial we are going to return them and conduct closure meeting with identified stakeholder we need to conduct closure meeting for the projects so what basically does is it identifies any lessons or practices that we have done in the project we are going to document it also can be configured and closed ones we have done all this we are going to archive the elements the CIs as needed we are going to create a back up and put attritions and a safety plan

interims of where to keep whatever location all that this well be the part of the closure actives the next one is example try to understand SCM process example how is going to define all that.
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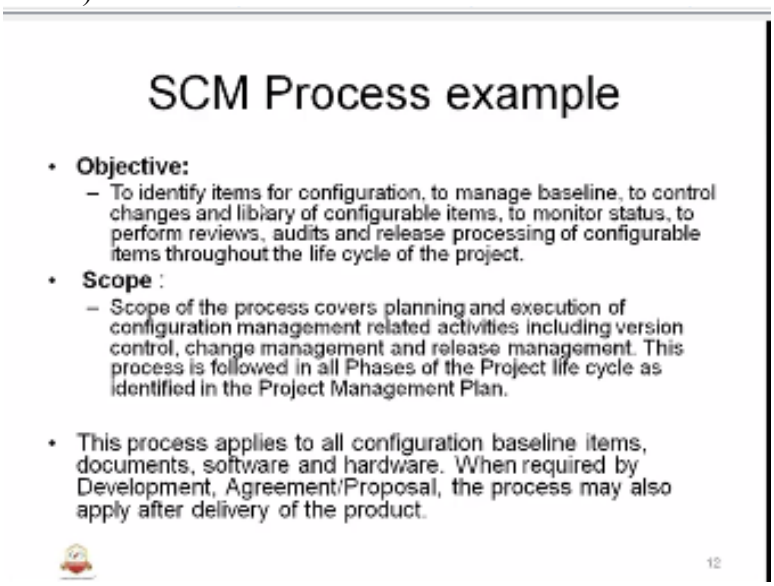

So simple way of between objective we are going to objective SCM process to identify items for configuration to mange base line to control changes and libeler go configurable items to monitor the status to perform reviews, audits and release processing of configuration items throughout the lifecycle of the project so the scope of the SCM process is covers the planning and execution of configuration managements related actives including version control change management and release management this process is followed in all the cases of the project lifecycle as identifying the project management plan or the project plan this process applies to all configuration baselines items documents.
Software and hardware when required by development agreement, process may also apply after delivery of the product so what are the SCN process tasks example tasks establish the CM environment configuration environment identify the CIs, create intermediate and final product baselines raise CR/PR CR is the change request and PR is the problem report the change request could be problem report problem report is nothing but identifying a problem of the tester software or tester features and reporting them to the relevant struck holder it could be devloping team or it could be a costumer or winder any one basically it is the part of the modification in this software lifecycle perform change analysis for PR and approve or reject changes required so this also a important process report status of b software lifecycle date items baselines PRs to the relevant stakeholder and maintain the CM record this also one the process tasks okay
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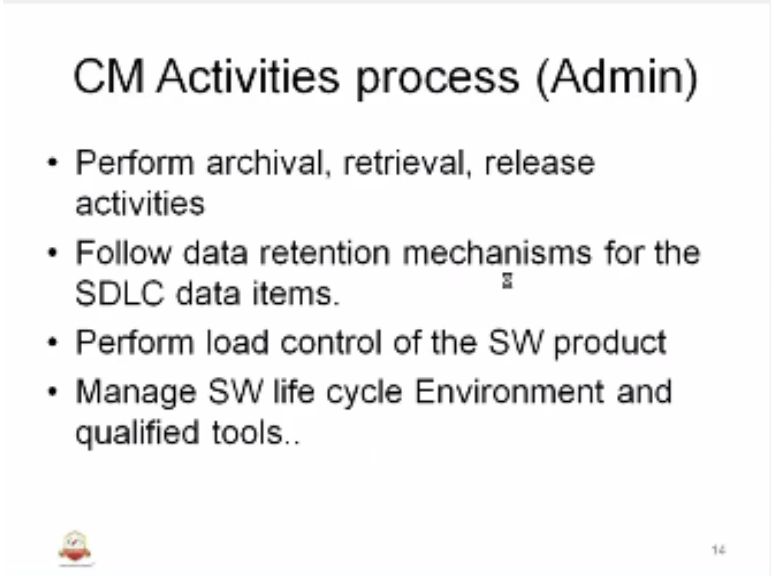

So next the CM actives process from the admin prospective other side admin could be change controller or detected change control could be there admin can be defend but most of the mid size projects the admin and the change controller well be same for the particular project identified so what it does is he does perform archival, retrieval, release actives he does the fellow data retention mechanisms so the SDLC data items other side SDLC is the important thing free to retention the project lifecycle artifacts tell the term or the guaranty of the project is maintained in the origination with relation to the costumer perform load control of the software products mange software lifecycle environment and qualified tools that is also a part the admin as part of the CM actives .

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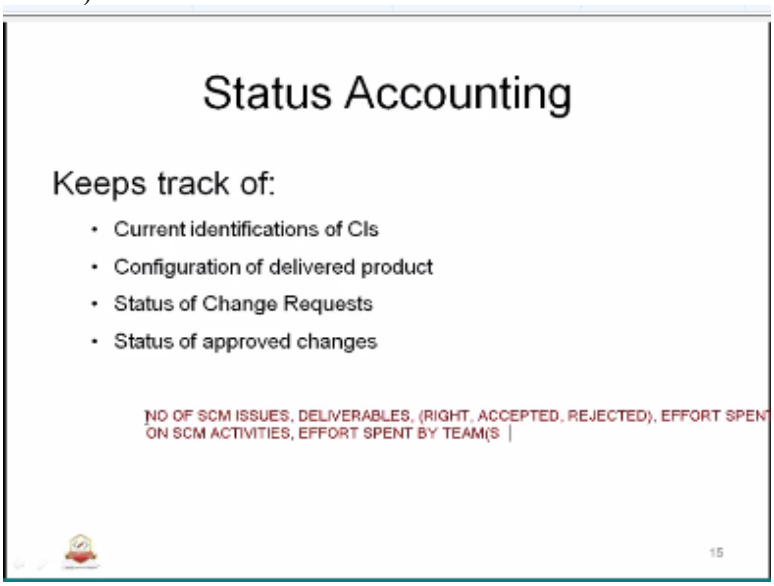

Next is the status accounting so what we do with this status accounting is that we keep track of current identifications of CIs configuration of delivered products status of change requests status of approved changes all this well be reported in a report format that what we do with the status accounting basically there is frequency like by weekly or weekly or monthly defending on the

project nature and the size other aspects they are going to restore the accounting accordingly okay.

And this status accounting can also report some of items like number of SCM issues basically it are done by the CC or the admin for the particular project what are the deliverables? Deliverables they are right deliverables accepted rejected and the costumer all this well be reported and the effort spend on SCM actives by the CC and effort spent by team not on development on testing by like check in, check out all the regular actives in terms of configuration control and another important thing is change request is numbers expected rejected on hold open close so all this short of information well be part of the change request status report can be done by the status accounting mechanism that what we have to do with the status accounting okay.

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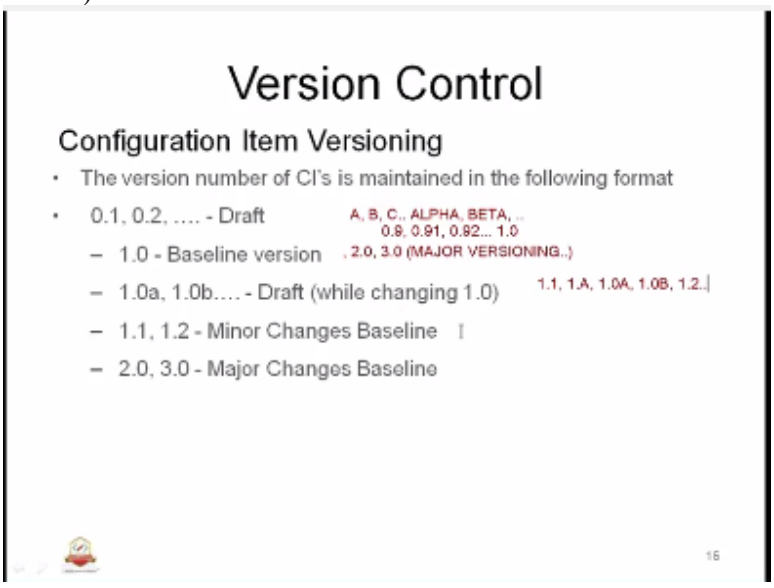

Next coming to the important items called version control so what is version anything that identifies one configuration item with a number or a name that process is called versioning so configuration items well be versioned the version number of CIs is maintained in the following format in general I'm talking about basically draft version will have 01.02 or .2 or it can have something like ABC or alpha, beta, theta whatever it could be so basically it identify with an example of point 1,point 2 etc tell it becomes matured and complot it will be following like this so you may argue like after point 9 what I will do we can easily go with zero point 91 0.92etc tell reaches 1.0.

Basically we call 1.0 as the base line version and that 1.0 version could have multiple baselines in next version like 2.0, 3.0 basically it a major positioning this well be taken care with the huger number in the integer. So what do happen with 1.0 extant changes are going to happened we can creak as 1.1or we create as 1.A, 1.0A, 1.0B 1.2n etc it is up to the defecation or the planning of the SCM hoe we are going to have remember this had to be done during the SCM planning and if any major and minor change have to be versioned that can be versioned with 1.1 or it can be 1.2 and in major changes it would be 2.0, 3.0 and most of the changes are done we can make it has a base line 10.0some thing like this So what we do with the version control okay.

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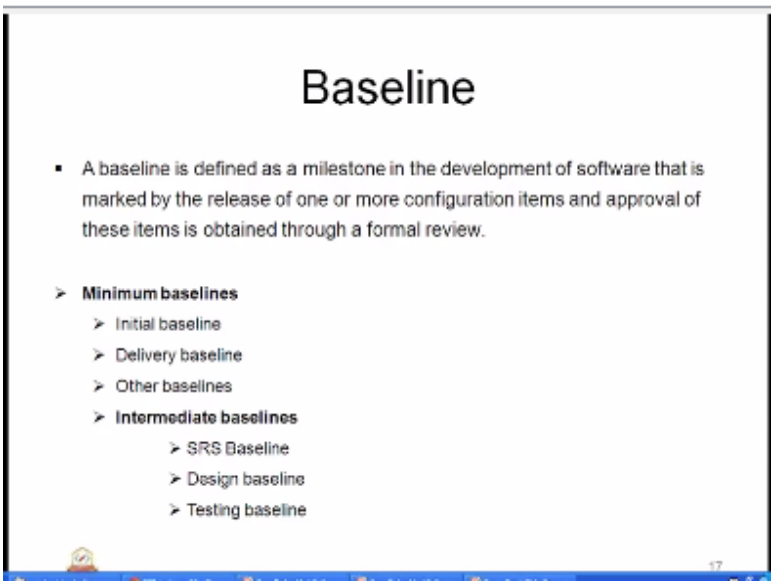

The next important thing is the base line so what do you mean by base line a base line defined as a milestone in the development of the software that ii marked by the release of one or more configuration items and approval of this items is obtained a throw a formal review so ever thing has to formalin so we call it as guest inversion or a base line for a item we did a milestone in the development testing of the software that is marked by the riles one or more CIs is very important thing items and it requires approval of those items which are going to be obtained throw a review process.

As you have seen in our earlier session that is formal review the review items have to be completed and closed up on which we are going to say that that protects matured and reviewed and complete and against that we are going to create a milestone by the name called as a baseline so minimum base lines we can have initial baseline delivery base line other baselines or it could be intermediate base line also and of course the kind of base lines we can create in terms of using final baseline but suavely we minor base lines major base lines and profit delivery or before the finial delivery we can have intermediate base lines such as design baselines this we be part of the base line actives okay.

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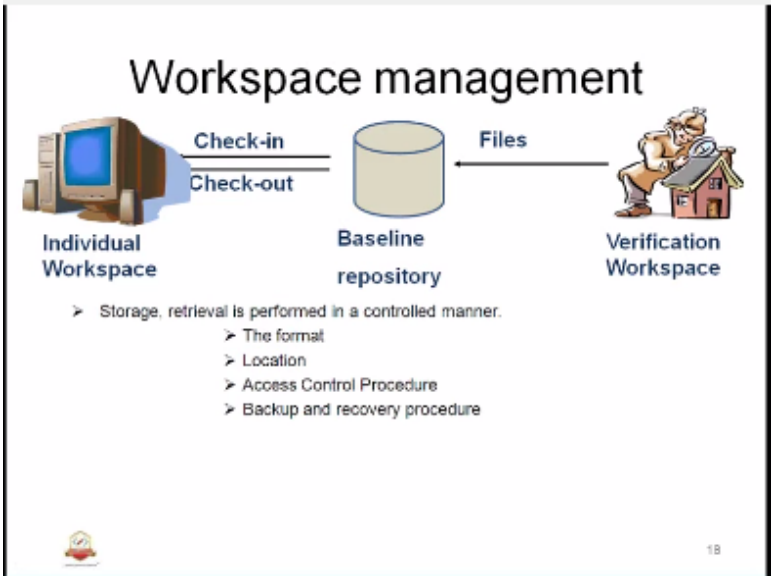

So the next one workspace management how an workspace is getting managed we know that base line has to be created depository and the depository needs to take care by all this stack holders right from the SCM process people, testing development team etc so definitely there is a need of work space the workspace is nothing but the place holder having identify and items such as CI items in the project that what we do with the work space management or going to mange in general in picture.

You can see there is base line depose trey something like this server and this server the files should be either put or take out with the help of process called check in and this well be done by individuals that is called individuals work space that well be there in the desktop and for testing and verification workspace we have splutter or depository and software files well be there and that well be again using the base lines and the depositary all this life cycles have to go throw the depositary it is called base line depositary.

And it the part of the work space management and this all been tacked care by the indusial swell as the maintains the control all that well be done by the CC configuration stronger retrieval is performed in a control manner thee format the location access control process like lights all that backup and recovery procedure how are going to back up and how are going to recover suppose some file gets deleted we are going to recover it after we get the report or the users so we will have the back up and back up is used for all this well be defend in the work space management okay.

So that is what we had studied about the different CAM actives process status accounting version control base line and workspace management. In the next class we will be studying about the change management, incident management the revision history how it should be and configuration management tools etc. So with this we will conclude session of the configuration management.