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**Meeting Topic:** EST-Lecture-3

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| **Meeting Number:** | 808 826 391 |
| **Date:** | Monday, May 12, 2014 |
| **Time:** | 8:14 PM, Local Time (GMT +05:00) |
| **Host:** | Seer Akademi |
| **Presenter:** | Seer Akademi |
| **Participant:** | Madhu, Seer Akademi |

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We are discussing about embedded software testing.
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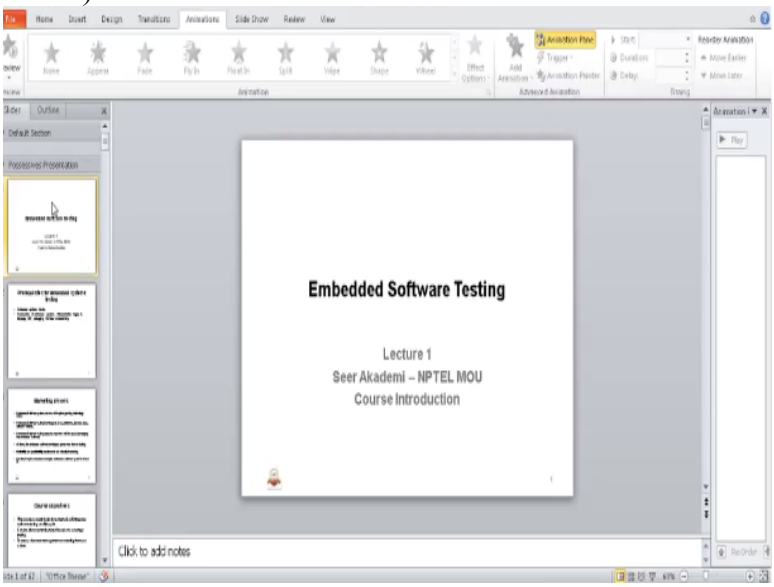


We have seen some of the basic concepts of embedded software testing and embedded system testing basic from the previous session so to highlight what are the types of testing.
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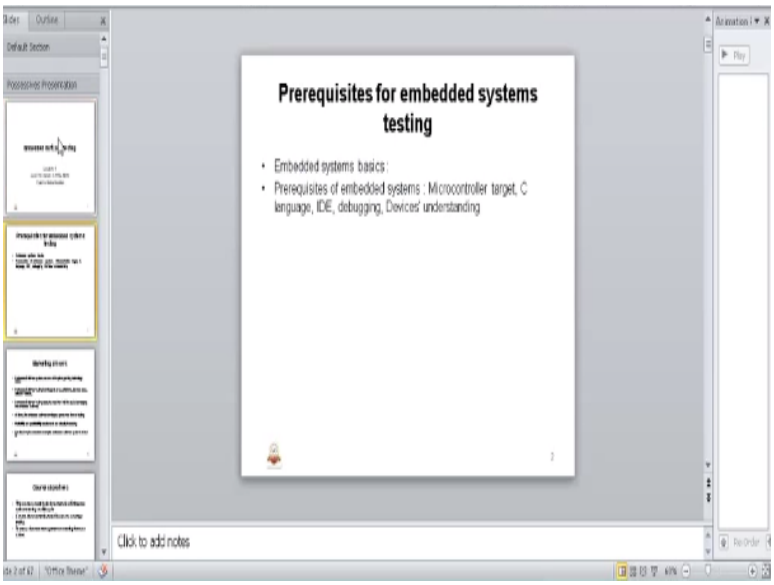


And what are the prerequitsics.

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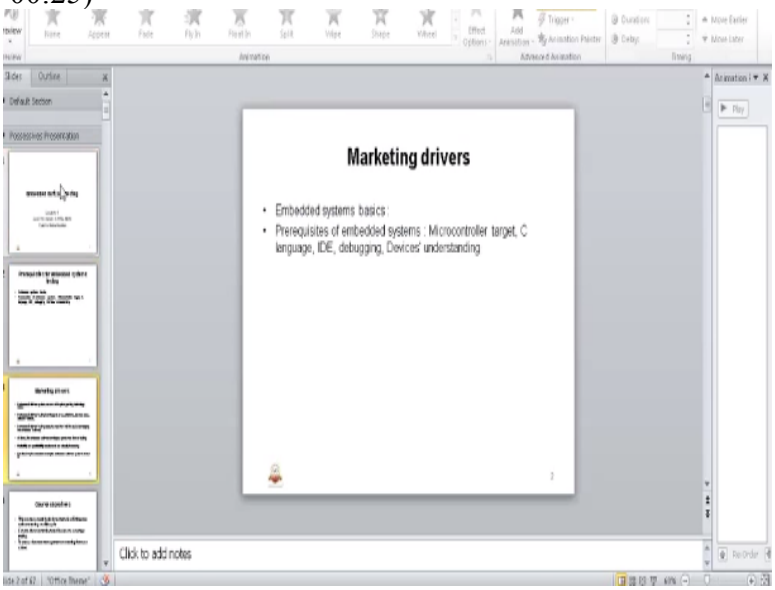


The course interfere we had course objectives.

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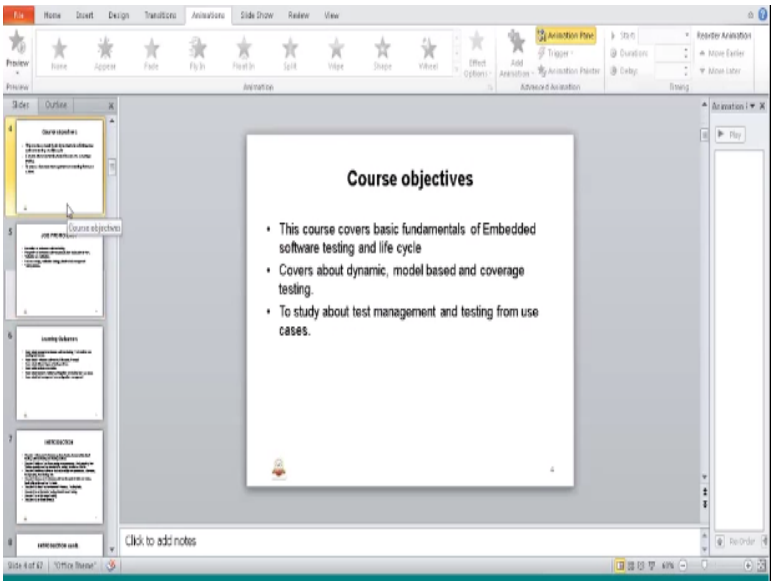


Course objectives
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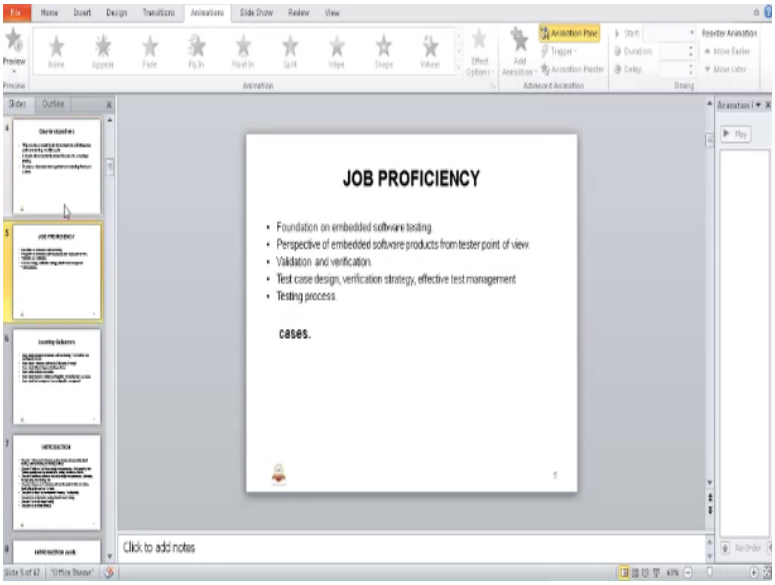


Job proficiency
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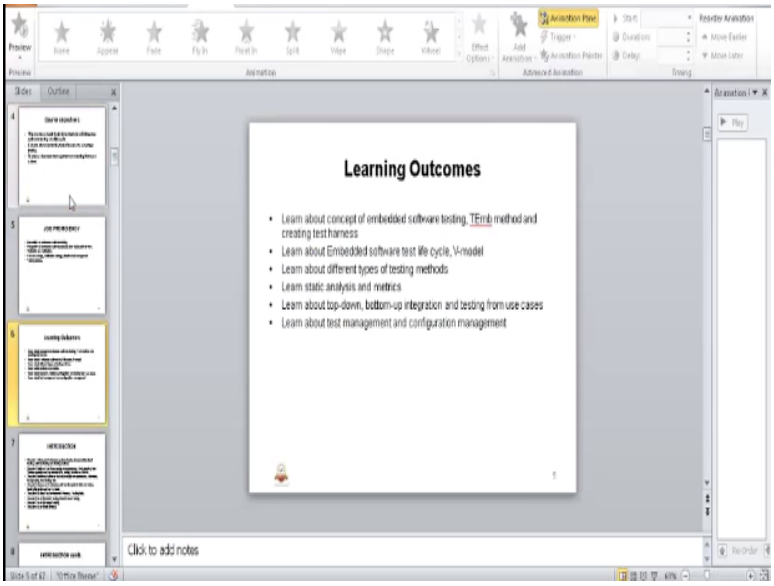
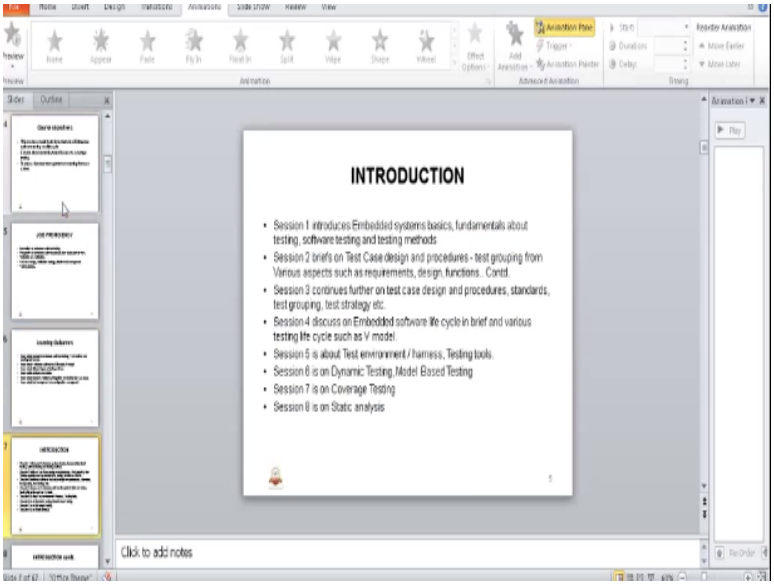



Learning

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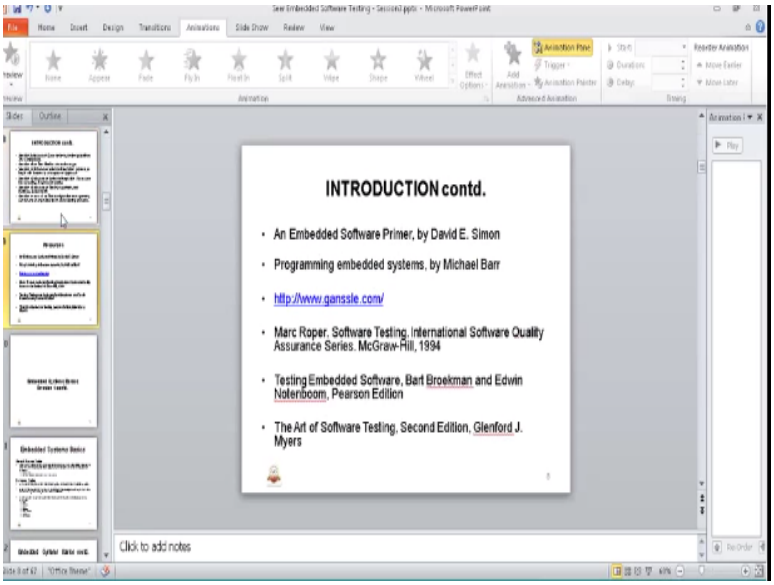


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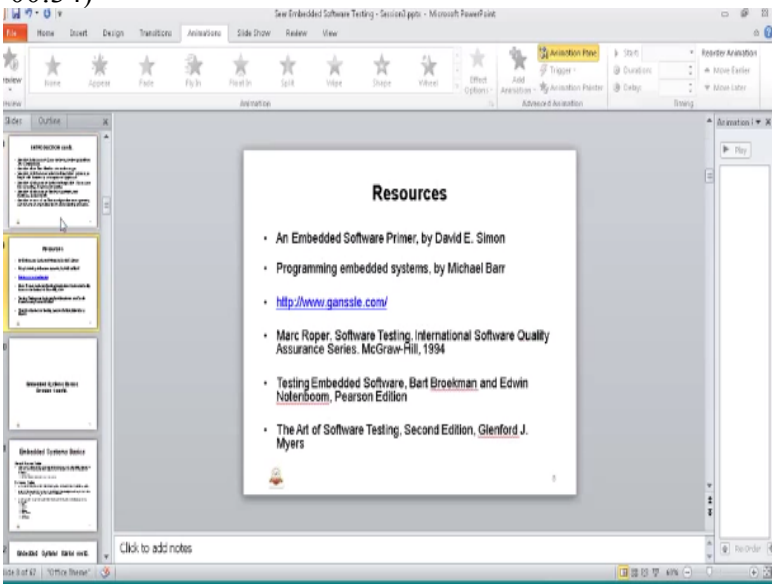


Some of the embedded system basics
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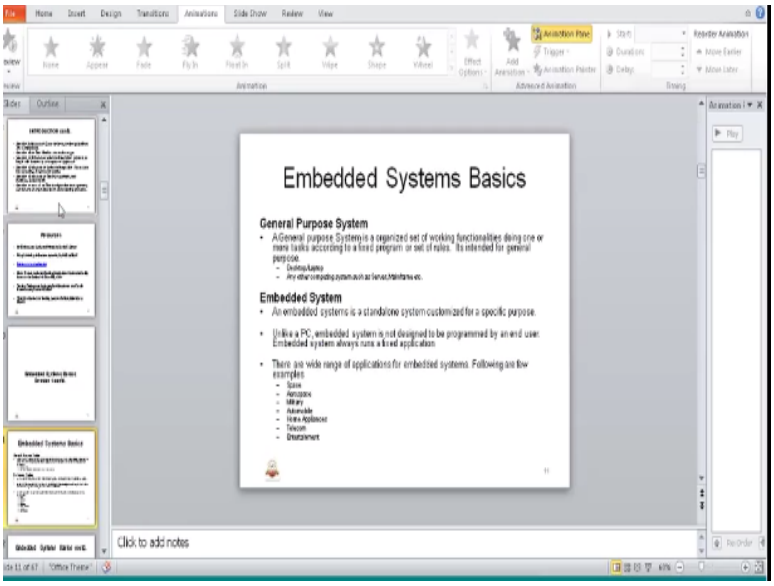


Do you have defined what the difference between general and embedded system is.

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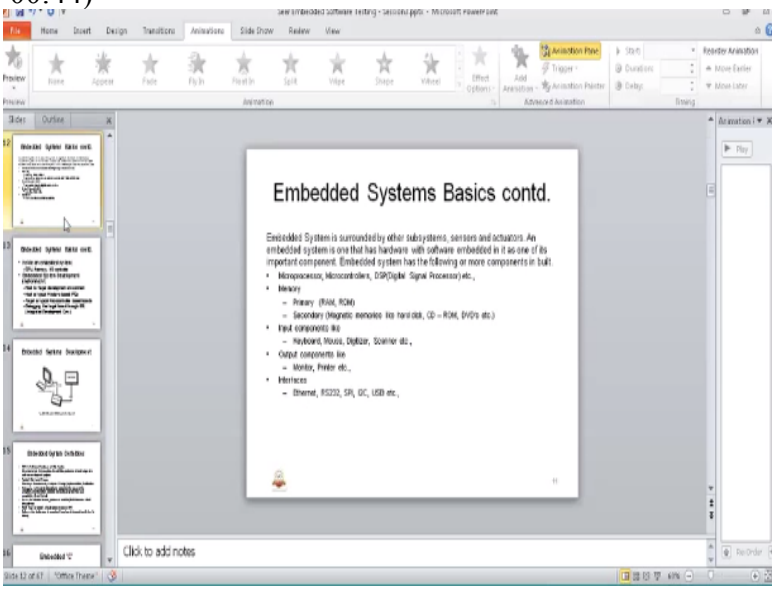


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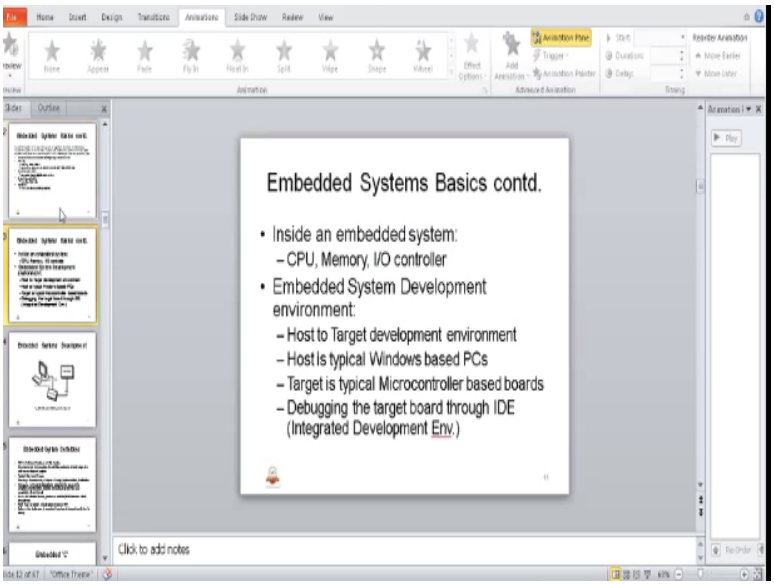


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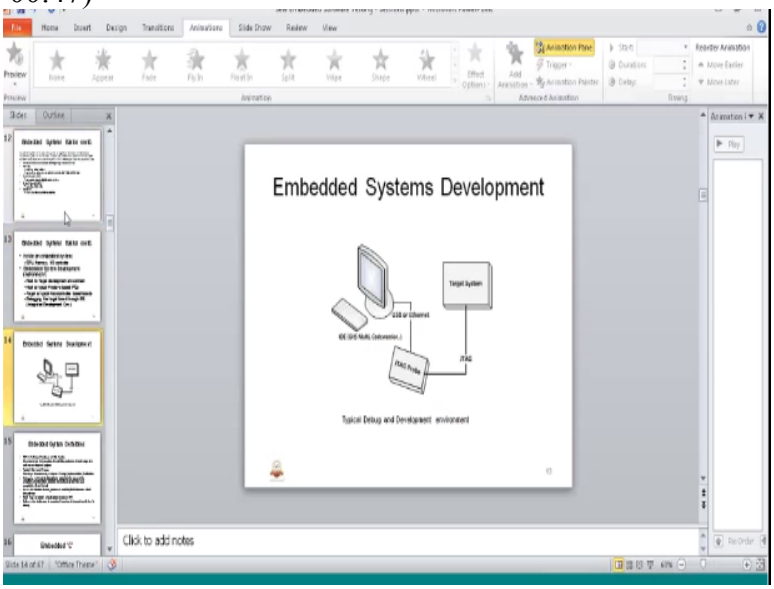


And also we had a technician about elements of the embedded system, so what are the conducts of the embedded system typically embedded system will be permanent and also we had an understanding, embedded system development all that target is a connected embedded software development similarly.

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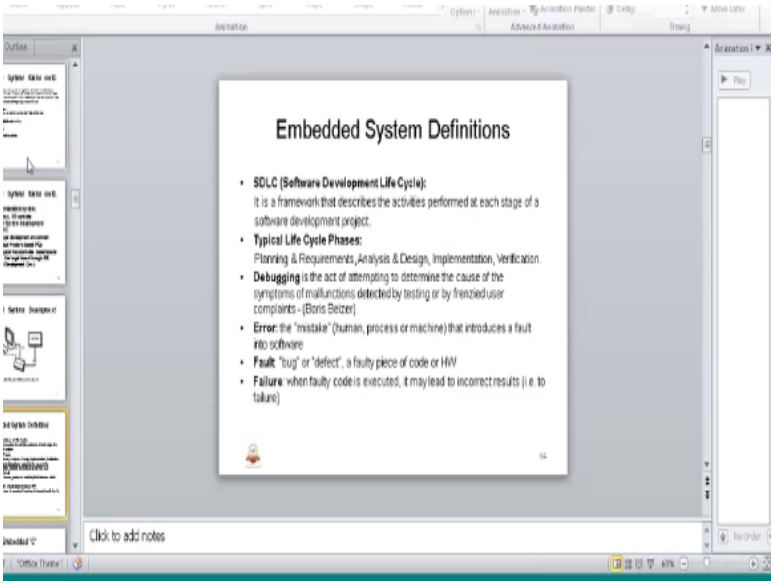


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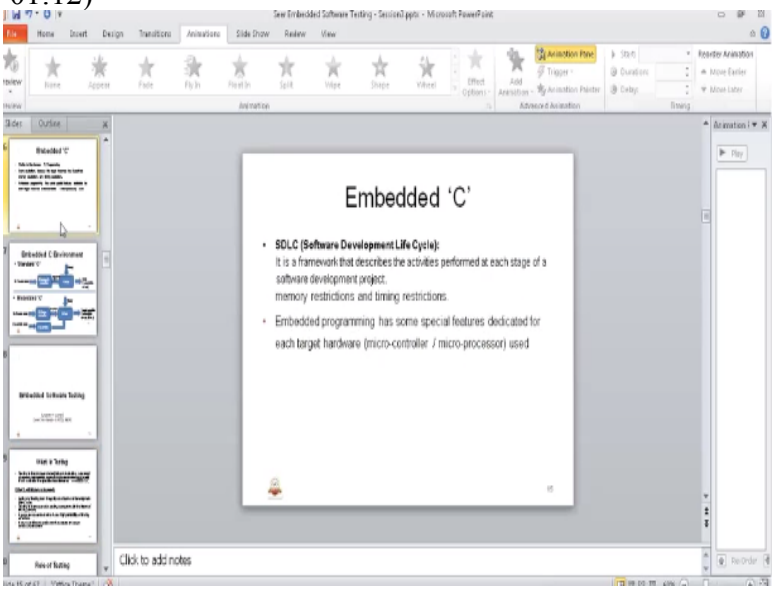


We had an embedded C.

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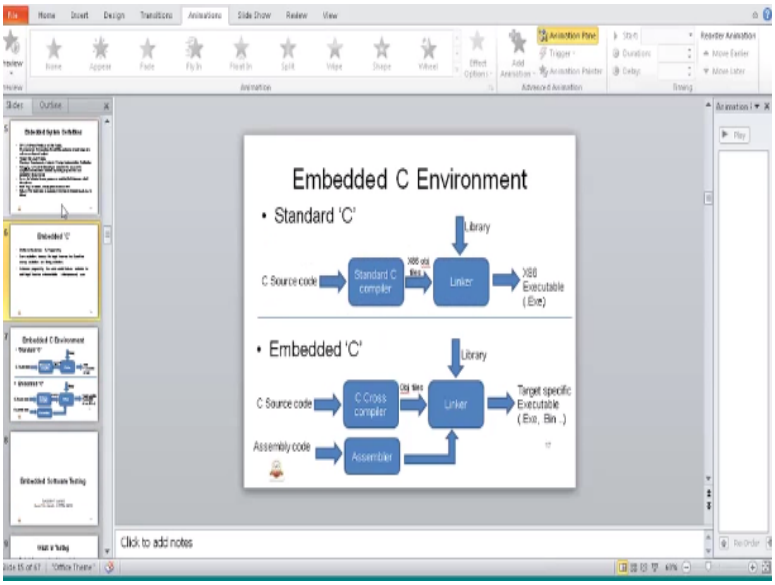


All that is used development do we required why we called a some of the manual testing we may have to understand language for on the aspect we understood that there will be analyze when we had trash coder the link will the latency we have seen and assemble and some requirement handling together what is a target disable a certain time. The binary X suitable they can give only embedded software testing.

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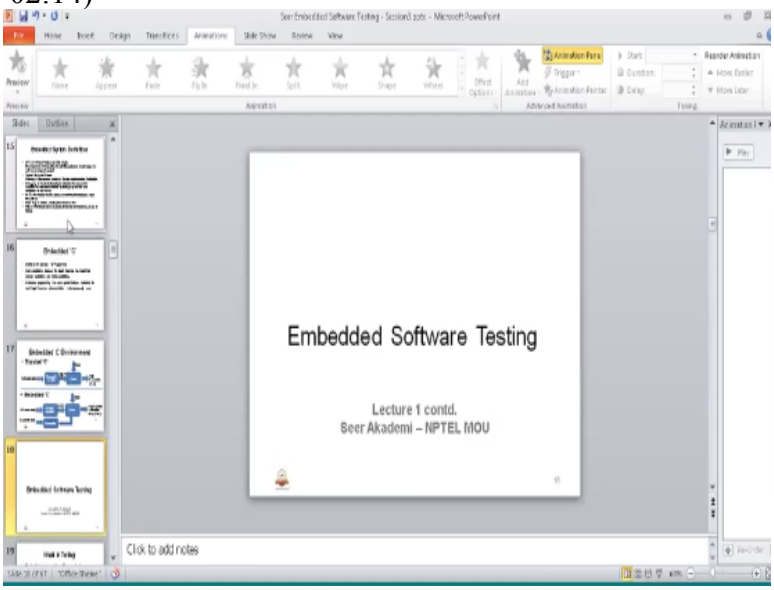


We also basic understanding of embedded software testing

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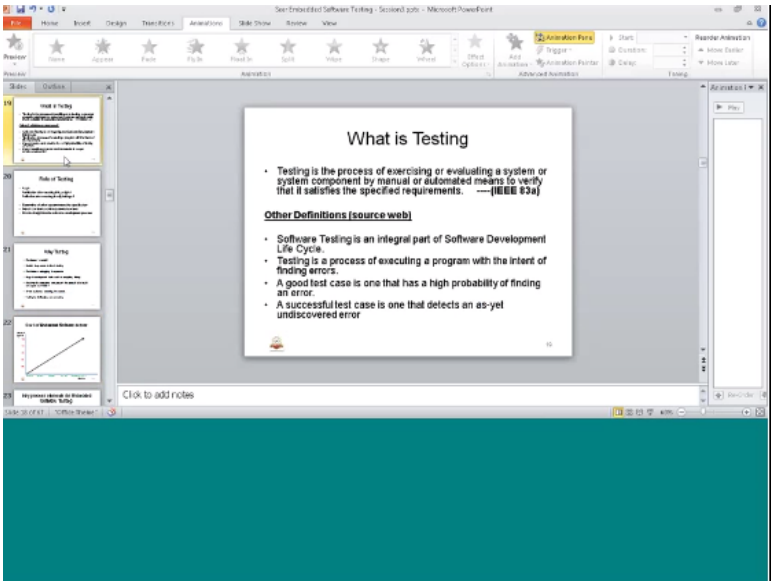


So we had wanted through some of the testing definition from hydrocally and other software.
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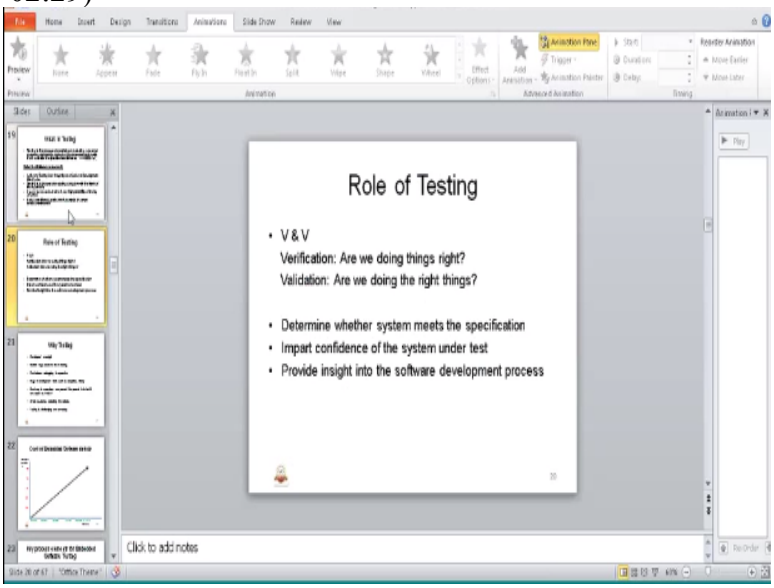


We understood that all are testing.
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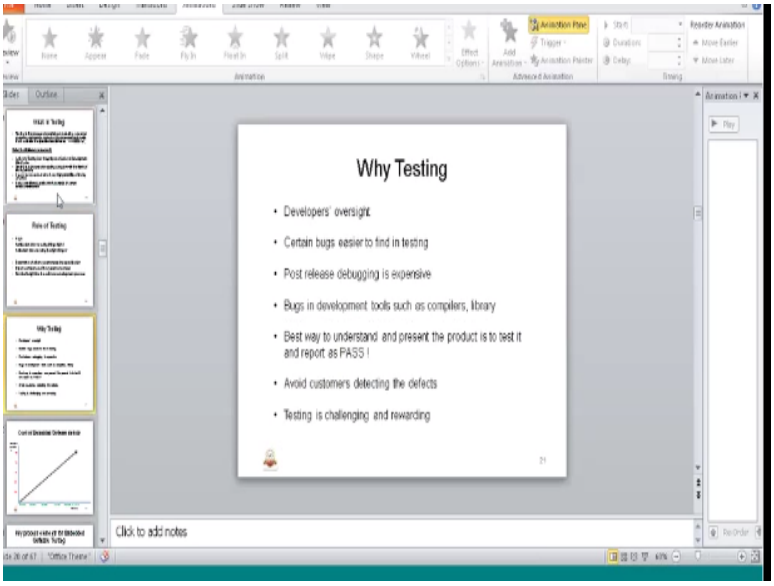


Avoid testing will be greater.
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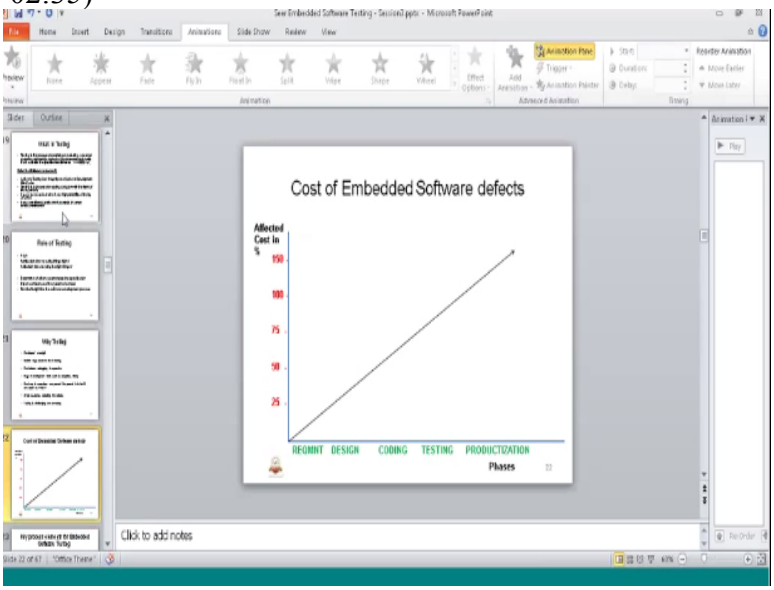


A module effect of defects what is being is done scalars, test requirements online coding testing etc and we keep process.
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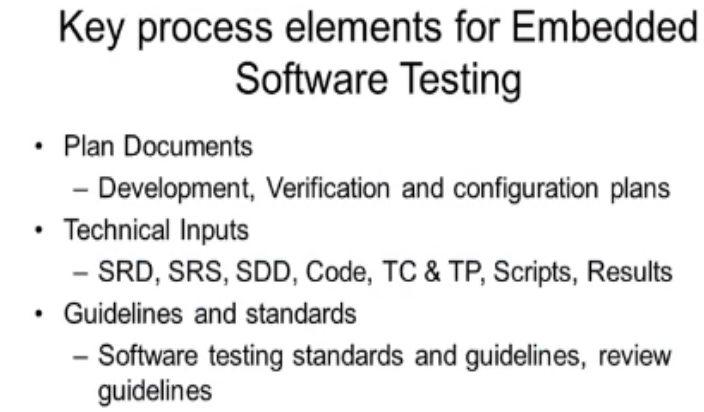


Elements for an embedded software testing like plan documents technical input guideline.
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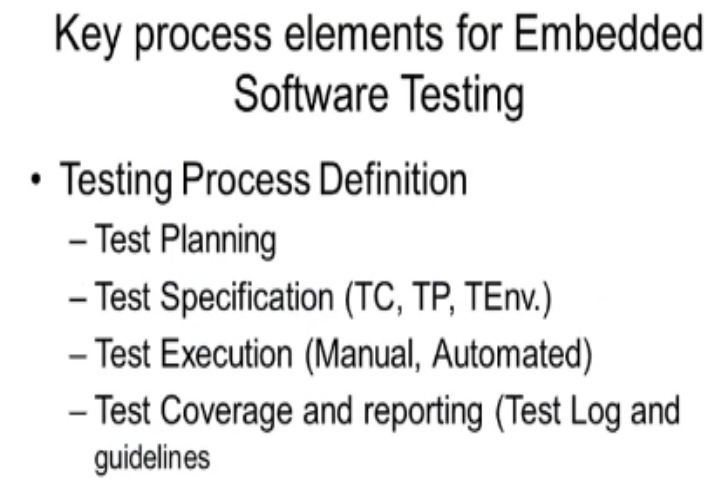


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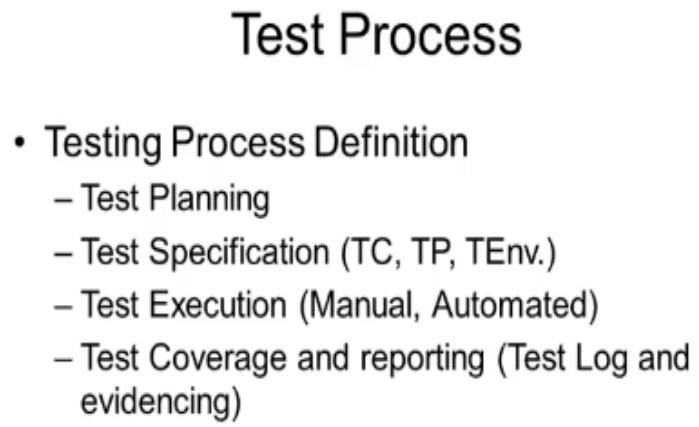


Testing process plan definition sort of test planning, test specification
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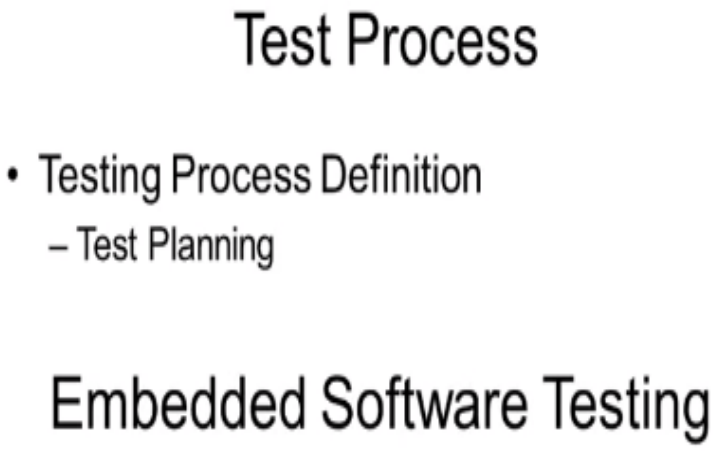


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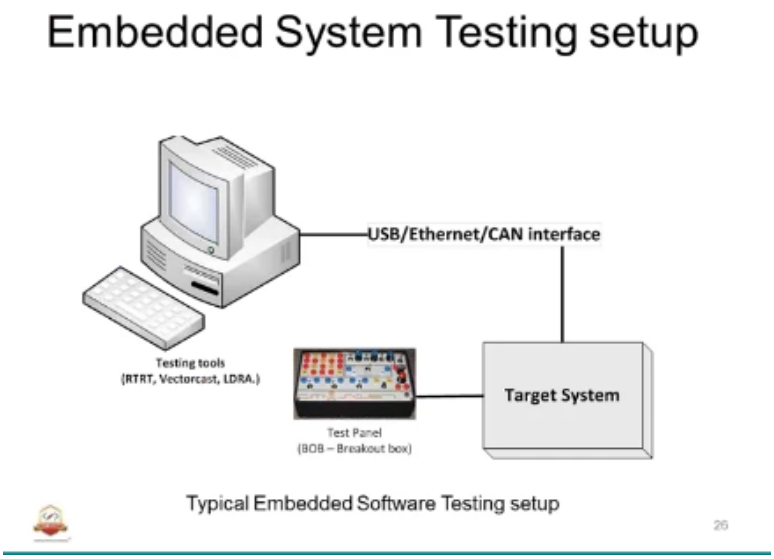


We had gone through the system testing setup and the system test consist of how it will be Ethernet whole on system testing setup in terms of end to end of testing setup how it to do whether and for the target system there are two running on the whole testing with the help of a embedded test provide to the target system.

And receiver and you cannot be enough to this is the target system which is tool there is a need of in target input the target time input can be provided you can help of testing etc.

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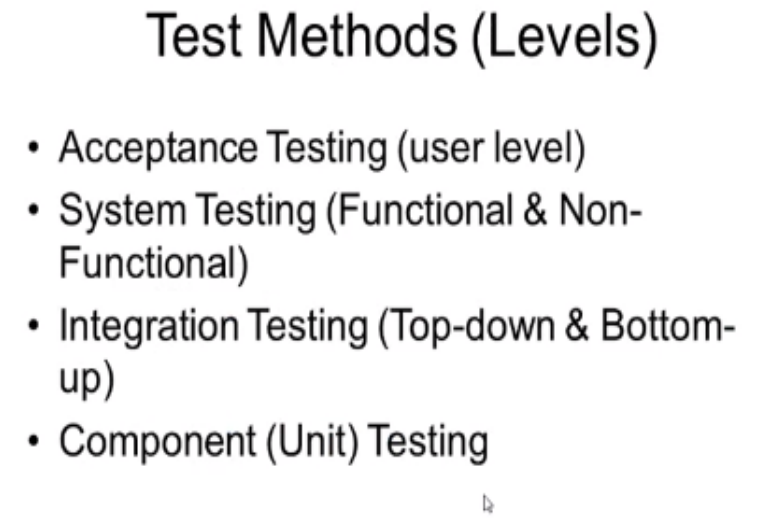


And we are going through different testing, acceptance testing, and integration testing component testing level of methods.

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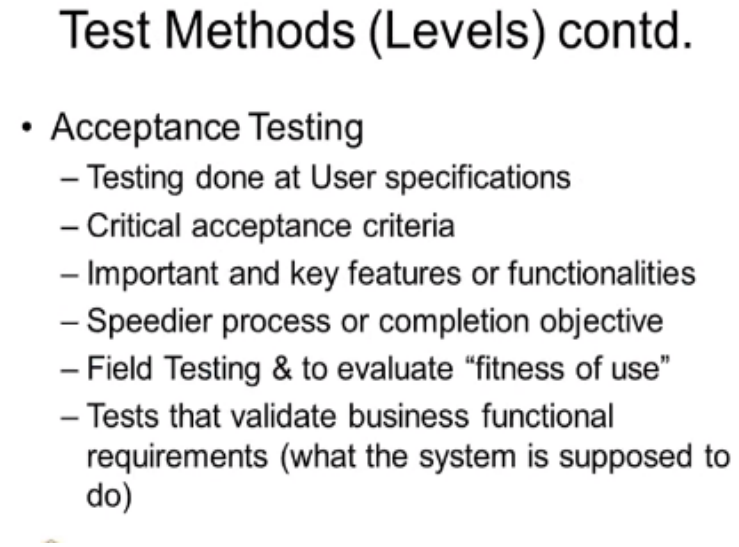


And may be acceptance about a, acceptance testing at a user level different testing to the tested may be the tested.

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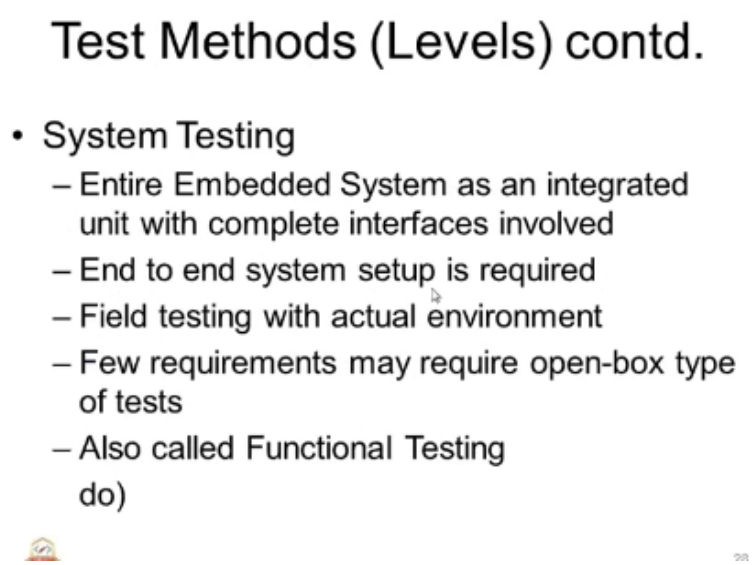


Confirm we had a gone through a different testing.

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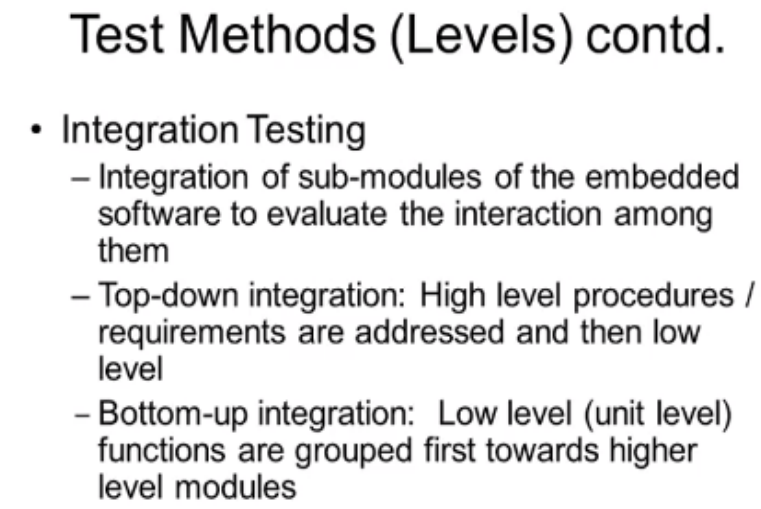


Integration testing different level at the top-down about the bottom-up integration
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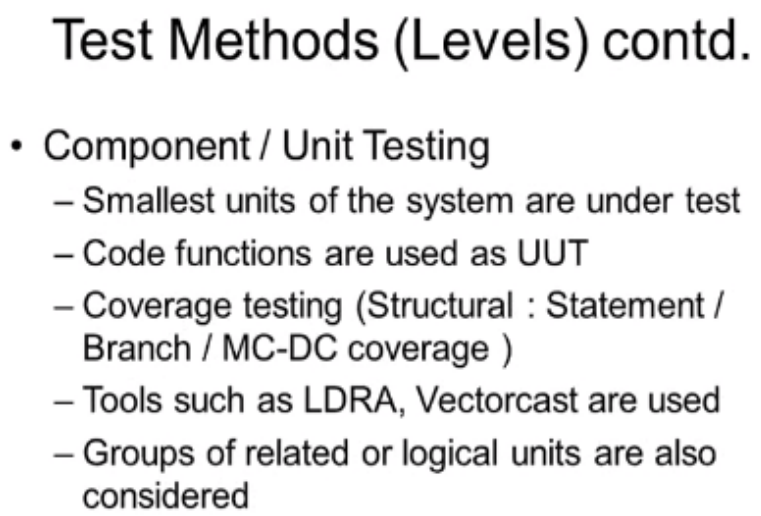


And informing testing with a smallest unit of the system and the under test this could be code functions which can be consider as in consist of also we have a coverage type of testing this called we can have statement branch /MC-CD coverage tools are used for such as LDRA vector cast etc. Multiple unit cast can be two called under the testing.
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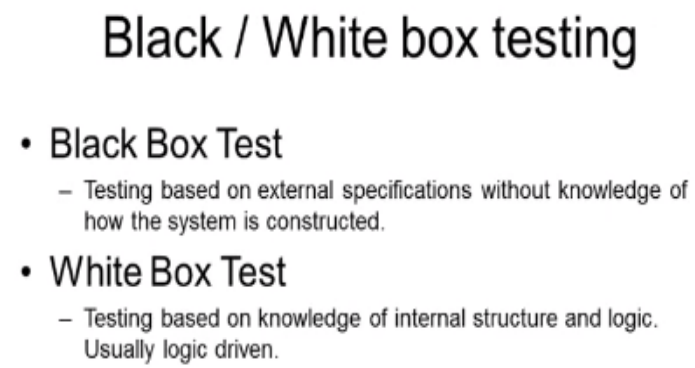


We know the two method of testing back box and white box testing ,black box testing were external specification without a interfaces of the embedded system or consisted white box approach we enter may be test box to understand internal or the logic for the logic of the that is we can do alright.
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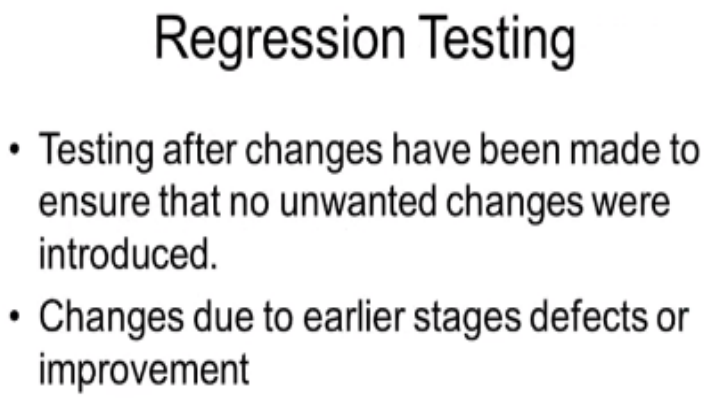


Ofcourse regression testing multiple versions of we could have fix some that had some of the outcome previous testing under course can be tested is the regression testing.
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## Regression Testing

1. What is an embedded System and how its different than General system?
2. Identify at least 5 embedded systems surrounding us.
3. Why Embedded System Testing is needed?
4. What are the different types of embedded software life cycle, name at least 2?
5. What are the Test methods under Embedded Systems testing?
6. What are the main differences between the black-box and white-box testing differences?

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## Questions

1. What is an embedded System and how its different than General system?
2. Identify at least 5 embedded systems surrounding us.
3. Why Embedded System Testing is needed?
4. What are the different types of embedded software life cycle, name at least 2?
5. What are the Test methods under Embedded Systems testing?
6. What are the main differences between the black-box and white-box testing differences?
7. Under what circumstances we use white-box testing?
8. What are the different types of integration testing?

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I have few questions on past system from the you can make a note or you can come up the answer on the you can tested the in next session what are the answer on this so that we think question being a what is an embedded system and how frequent then please define a one of the sentence answer and discussed you unified at least many embedded system you might be earlier you can why embedded system testing.

Is needed you know that embedded system open till that so as an entity separately you need to have a embedded software or a embedded system why it mean and especially about what are the different types of embedded software life cycle so that embedded software life cycle SB, SB followed in the unit software system that is medium a one or two what are the test method from that embedded.

So next what are the main difference black box, white box testing and what the functions that use white box, what are the different types of embedded testing without a different type because the more the functions forgetting answers then our fundamental for the concepts of embedded

software system and embedded software testing will be good through we are next discussion I expect a all the questions than the equation we can there are any doubts we can align embedded software testing.
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Okay so coming to the next session repressively we will a go through the test case design allotment and test design here are being used or followed.
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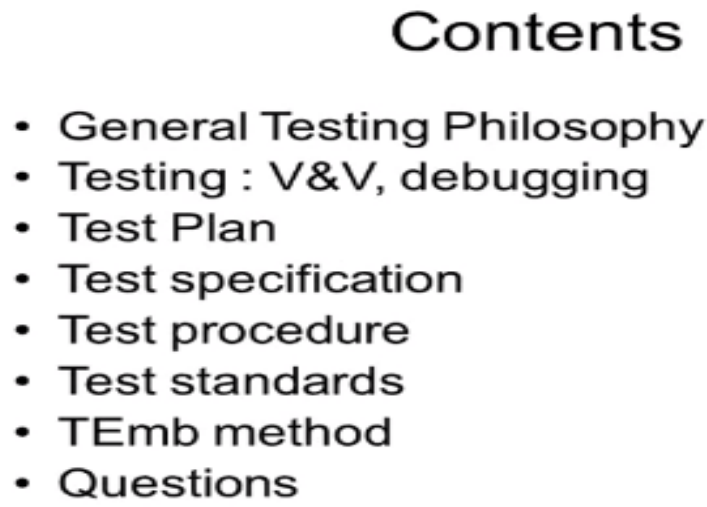


Contents of this testing philosophy here this can be line and allotment or we use different methodology and all that so general testing can also satisfy we will a highlight and testing concepts and we debugging we will what is the test plan so before starting exists at the activity we need to have a test this plan ,test plan we will four of all the aspect of the embedded so what are the test plan embedded testing you are not complete so you have a first thing that we will return part of so first of on test plan from an example next one is a test specification that the test

specification either that test and how this the line so what are the different methods for various requirements.
At the functionality you can example you like will the next one will be under test specifications given a test specification identifying how are we going to developed test questions basically they are in order to active a test procedure to know all these question specification we need a set of that is test method.
So test standard basically the define how test specification should look like so what are the element what are roles, what are the guideless of the test like to consider for developing the test so that you will be along the example and so one of the test method that will be used in embedded test called TEmb method so we will brief and get through the slides what do we type of and it is one of the method that is being followed.
Whereas that whatever we going to highlight in the test specification ,procedure standard we hope generate like a that is getting forward in the one of the useful embedded life testing TEmb method we will like arrives those keys what are the different types of that followed embedded testing lot of things.
TEmb method and we will end with different questions on about contents we will see, we can see we can also have question general test next session or those on the progress we will do example specification procedure standard you can acceptable in the okay.
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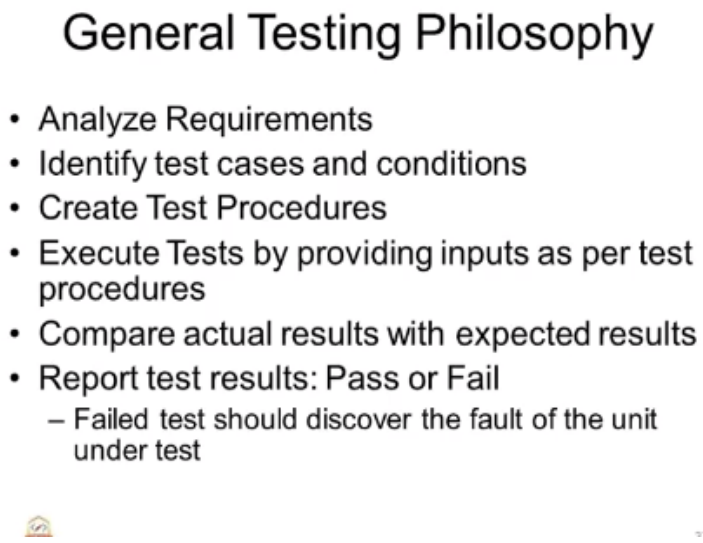


So general testing philosophy so to test in embedded product so we need to adopt the philosophy how you are going to testing given a product so what are the element so that are required though what is the testing methods or so how we use a look for what are the philosophy so first needs to go through the requirement unreal the requirement so what he is going to test the then I am going to identify that inputs and conditions.
Here what we do is we are not going to identify test process but into a requirement so each requirement you know the addressing and tested what are the conditions so that will have the identification of test bases once we have that test cases identified we are going to create

procedure so different cases fashions that are nothing to the test cases so basically identify test cases and conditions.
Create a step there are creating a test procedures practical test in nature then we have regression so basically when we done with the test procedure having to the test bases the practical of the test position are done with the help of so testing visuals are conducted with the help of test input as per the test procedure to test input reproduce the input condition and once the exhibition is done so we are going to come up with the then once we have done with the exhibition so we are going to have a actual result.
And we are going to compare the result with the expected the results will be the part of the what should be expected so base on the comparison that we have that actual results so the expected results we are going to report particular test as pass or fail you repeat you output of the habilitation testing equation we must inverse actual results that will be compare it is a expected results.
That expected results are identify with the test cases and the result of the comparison output of the actual results we will highlight pass or fail that could be reported for each of the test the main test should discover the fault I mean you fail you will identify there is a issue with the particular tested also I will highlight of the identity of the particular this is the overall test philosophy for any comparison it does not matter.
Which domain whether it is a telecom or it will have part of the controller or it is a controller any of the networking cost system.
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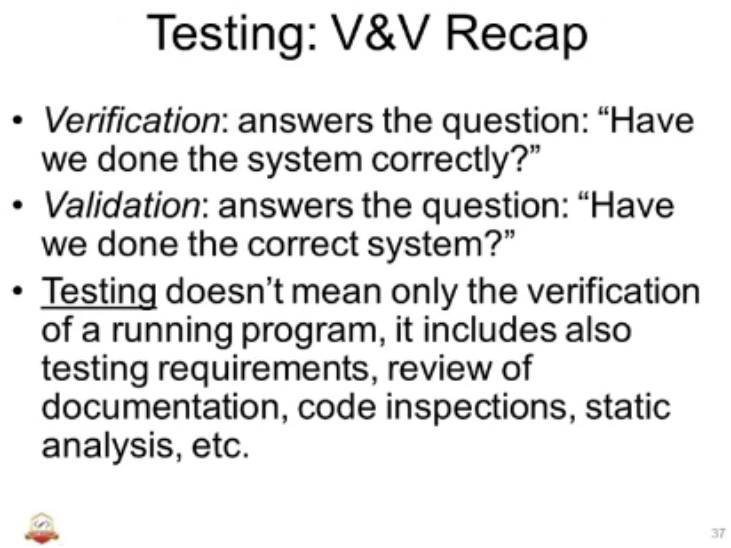


Okay so once we understood that the various element we know that we are going to do verification ,so verification haves have you done the this system correctly that means ,correctly the system as being developed the either validation we do highly the two aspect want to developed only with the comparison and the correct system will there are not for example, we are going to developed an telecoms to man and test so verifying the telecom instrument that is known were it is functioning of link part of the verification so validation is that whether the

telecom instrument is built perceptive need whether the instrument is correct specification another point you have that testing.
Does not mean that only verification of some a product for all the time or a program target demand and alone it also have some of the requirements we need to have a review of the documentation, we many to be some code inspections so may have to do some static analysis so testing you also have with perfect there can only the testing completed so we are need a part of the testing.
So we should understand that the real means one of the process so which comparison of so consider a testing or anything testing does not mean or verification code and a validation code of a running program with also have various other the like requirements the review of the documentation and the system development.
It is also can have the debugger work through coding inspection and some of the competed exist inspections code analysis, static analysis dynamic analysis etc.
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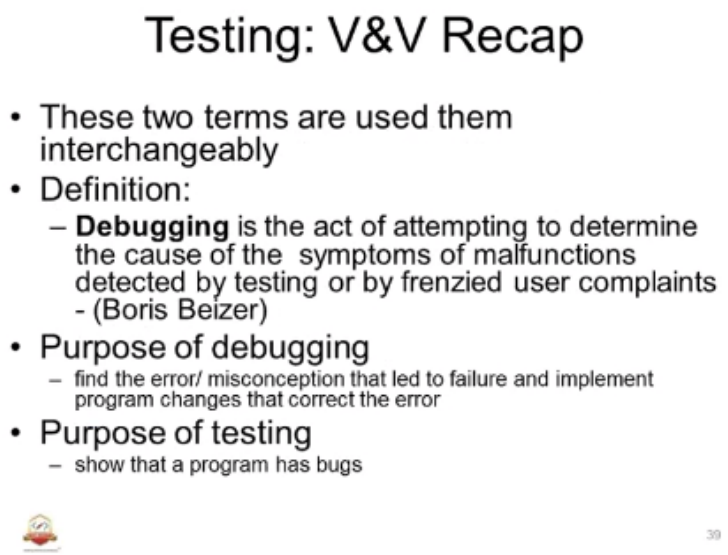


Okay now for the next we can use the testing and debugging these two terms will be used for embedded system testing there we have used interchangeably for the definition is debugging it is the act of attempting the determine the cause of the symptoms of malfunctions detected by testing or by frenzies user complaints that means debugging we will help in understanding and identifying some of the functioning doing the testing.
Son that is what definition like and purpose they will use to find the interpretation it will for there are which is like a tailor and a rework on the implement the program so basically used able to debugging so perform to only to identify the cause of the symptoms to determine the cause of the symptoms so that is the cause from function for in the second thing is the testing is we will reproduce the some of the testing terms again or not so the debugging will it is on and once we have the program debugged and fixed will do this testing the clear the bug purpose of testing into identify when the program has this.
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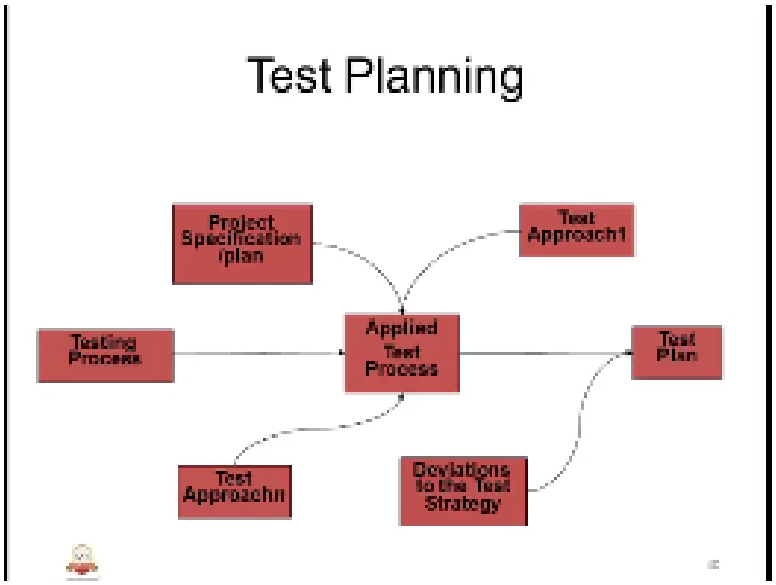


Once we send all this, this design for the MV the 1st step is or as to the test plan in, test planning is the most important method that will be fallowed as a 1st step for any of the embedded system discipline one so what are the test planning we have items that are which else which going to there are various things various blocks this start with we are going to have a project specification that project plan the project plan has an input.

Used for test planning test planning have an input from the test cases that means the entire project is the planned that means project execution which will have the how the requirements are made over how the coding is done what is the environment improve what are the development terms etc so this will be part of the project plan.

As similarly we have testing process define during the planning so what is the testing process I am going to fallows what are the calculate or review test or again understand this and what we used is all will be test approach then we have test approach like how do the various requirement for the functionality for the embedded system product will be test plan will using the process we discuss earlier approach.

Could be using the system testing approach to system could be integration testing is could be using in testing so always software should be used in terms of test planning approach 1, approach 2 etc up to test approaches etc I will be part of the test plan for doing a test planning I will send the reject testing process which will be used for testing alone the testing process along with a plan input and test approaches.

Will for a applied a test process so applies test process will be a set of test processor let will be forward all will be a test processor that is going to be used for the embedded function finally we will come out will be test plan so the test plan will have all this element the embedded system and of course for developing the test plan that could be some deviations for the test planning, test planning nothing but the strategy for each of the approach system level test there are different functionalities for each function is the I can adopt function I have a group of functionality in terms of performance the functionality for user test plan group of functionality for certain test plan etcetera this all will be categories in a test strategy and will make that some deviation which

may result in alter in test cases test plan is to be aliened which will be organization so a company approach this are be which processor.
Which organization adopt with the current product based of project specification so process this will be primary input so all this together have been applied a test process and that means and over all make how do will be a tester embedded system I particular product become that this is the implement and in as the plan or we test process using the particular will be part of the test plan so basically test plan will be document.
Retune in a natural language the I will example test plan with an example we will understand what are the test plan the processor of creating a test plan is test planning the test plan mostly done set and this project sometimes it will be done development based on that means while we are a doing that refer sometimes may be require that next am be requirement will be allowed fort that the develop times will being assign.
Some of the approaches that we will know what we consider for test otherwise to be here developing the during the specification project management the project plan have a reference plan softer after quality plan software configuration than software testing plan all will de develop of the models of different methods we will discuss in the later session always development project planning of the what could be in the initial state okay this is a the test plan Here quality plan after quality plan software configuration control plan software testing plan configure that are develop that will the initial time of course deferent model different methods how we will disuses in the later session can detail always development occurs the problem planning would be use in the initial thing okay this is about test plan.
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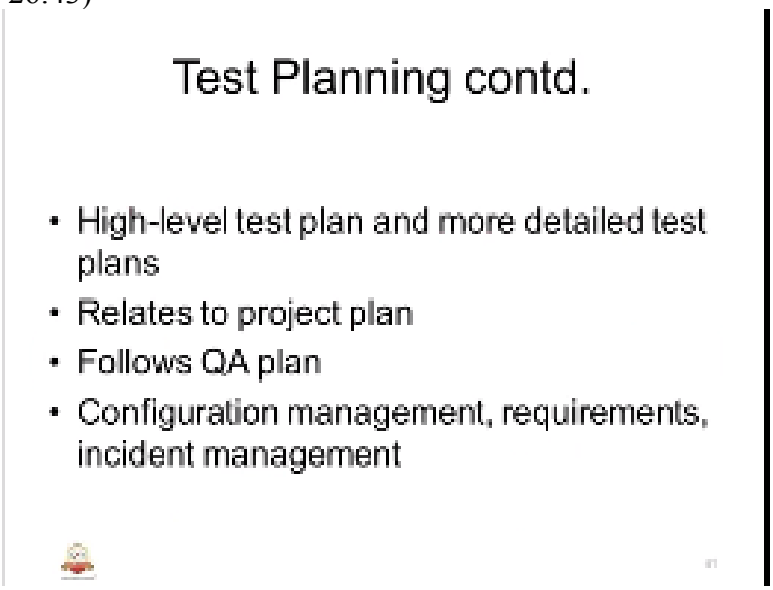


Test file is that the goal the goals of the test plan so the plan is the high level e plan and more detail the test plan ago will be there sometimes I may not be enough be have a higher level test plan sometimes it may have to rate our into detail test plan that we can write that the same thing we have a standard system, the standard system also have a sub system so sub system , sub system can be call as a embedded sub system their maybe a lead for sub system testing for this those can be detailed out separately.

So that is what is the high level plan , plan so this should be align with the project plan project plan as we said the compression of development plan test plan and all that and he test plan should relate to the covering plan and o course transfer the QA quality analysis test plan quality analysis can do to this some o the standard this is the place a review process and all that ,that should be a good pointer of plan it will be allow the their plan and configuration management requirements test requirement all should be test plan and both ho the test are configure how that failure in that for certain plan for how different requirement for this for managed it said back so all it will be integrated together as part of the test plan so this are some of the test plan.
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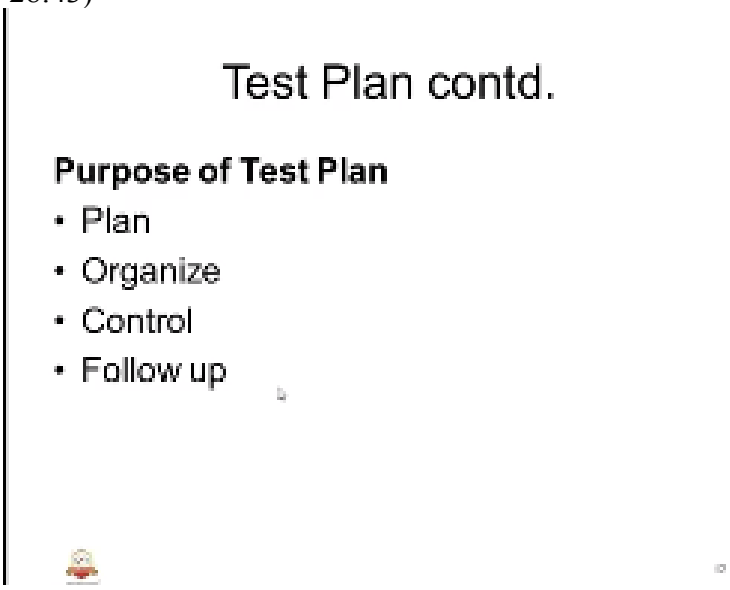


Okay and purpose of this test plan is thing basically test plan organize control and fallow up so what it means is into define a work flow for that or k flow will be define in a test plan basically to give directions on how testing should be perform which means to testing with plan use methods tools and templates use all this means part of the plan and once defined all this static processor methods and tools if used to be controlled and it should be fallowed and basically we need to co ordinate the control and give contiguous this control flow for a period while testing is will play also we need to create condition for controlled adjustments of suppose there are certain deviation that may have while doing the testing that should be a test plan control all what the part of the test plan.
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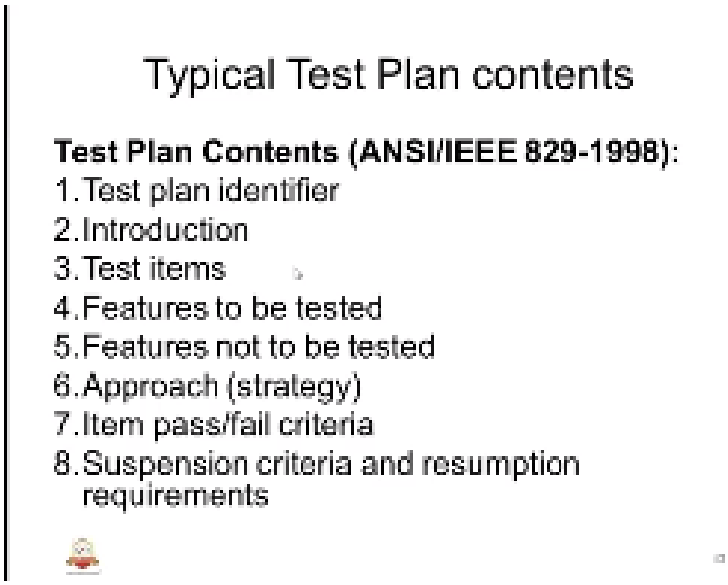


And the typical test plan contain as per the IEEE standard will be as below there are different contains because the organizations could the fallow to only different organization within the organization also so there are different domains are divergent project they fallow this is typically we have basically some need of the customer or we need of the product , the product may need inject test plan in detail some product am not being that much again depending it becomes from the definition of the product and what level let me use for the plan or in times of embedded system that so as per the ANSI or IEEE.

It will test plan contains are test plan identifier introduction for test plan what are the test items and what are the features that are be tested what are the feature that are not require to be tested and approach the test attribute and criteria to define pass fail of the test and the test and criteria and resumption requirement we have certain requirement to the while testing we may come from is frame work so suspend that go with the next basic of this software and one statistics how are we going to define the criteria.

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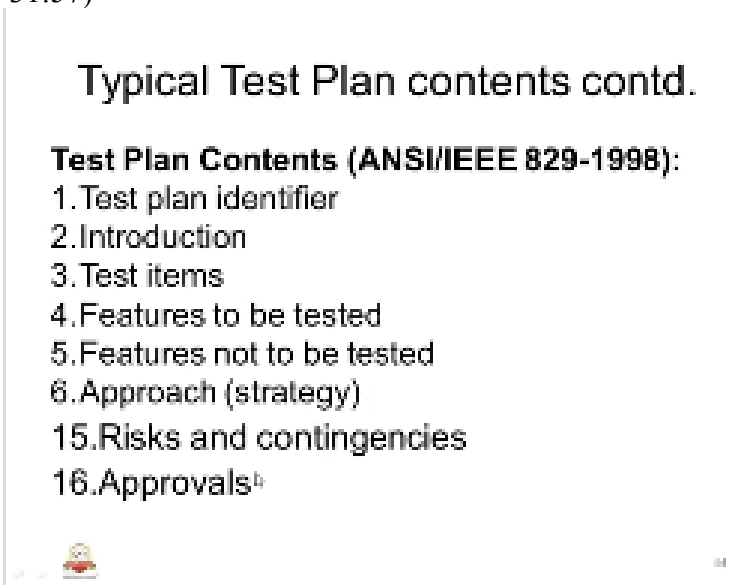

For pass or fail so the next test will be done deliver that an input and what are the testing task? What are the environmental needs in the testing and who are all the responsible and that is the responsibility and per define the responsibility of the so what are the staffing and training them system process so basically while I have listed I have is a very necessary that the embedded system this standing equally.
Whether I terms of the n product so what is the n product is suppose to do what is the outcome of the embedded product Electra so all this in terms of the specification requirement may be some of this element as be the system knowledge is enhance of without system knowledge is test script for basically test is user cannot define a test case or define a test procedure and without system knowledge for the test plan.
So this will be define test plan of there is a skill, the skill we have testing aspects like end there is a define test is available please going to all for this which testing remember the these from when we going to regulation test from the we can have an example of an test it ill how will be may be in the next cycle okay.
So what are the test case what are the continues to this whatever is a going for doing testing and the testing aspect will done who is going to in our organizations there are different department which are responsible for test responsible the test comes so those will be part of this approach this section so this are not test content in may example that I fallow in that right will either directly or indirectly fallowed the standard there are ad this to test plan identifier you're not continue as much the introduction items typical test plan.
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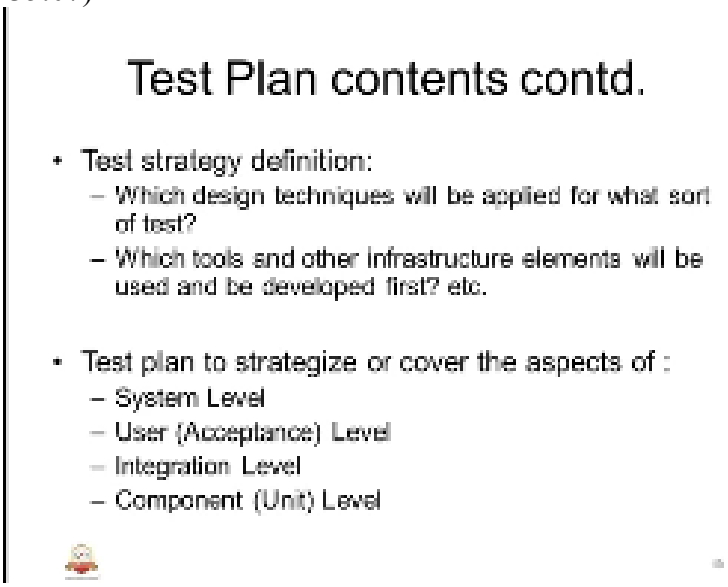


So have reader may be we tell out this topics in the test strategy once we have the plan contains so the we will have test part of the content try to be definition so these are some of the important things that we to define so what is test strategy so basically this will define which design techniques which to be applied for what set right we have test identifier that particular requirement so how I am going to test.
So what is the test design? So what are the inputs? Are the technique that will apply for that requirement and to produce the good strategy and for doing that what is the tool are the test

condition are infrastructure that are needed or to be developed to the test of requirements or the functionality from the embedded system so this is a 1st thing that I to have awareness of that means which needs to be done.

1st before I the test case or as part of the test case test plan will strategies will cover the aspect of system level, user level, integration level, component level that means test plan will identify clearly so given a embedded product how the to be tested in what level what is the going to be tested the system level the complete black box will be tested or user level which means to use will be done and integration.

Will have top of bottom top up or bottom up this will be use in terms of integrating the various module similarly we have which level component level of testing that also the part of the testing plan , of course which this strategy are the test plan strategy is depending of the project size and complex will be this to be aware of the complex and test planning can be divided into hierarchy of test plan for example high level test and some as a said sub systems can be forward and all it will this can be commitment define this plan, okay.

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So I will go through an example of test plan how it like basically this , provides an example of plan looks like how we can specifies software okay test plan example let have a understanding of this so basically with this a template typically used so the product e will be here with the name of expected which can be anything can be control in the for an instrument for in our can give it so we have a header with software test plan identification so this is what and the name of the product we have the probably you can go through this entire with this have all the document distribution and items like that said the strategic the and test plan strategy in terms of covering from the level now we will go through an example test plan okay. So now we will go through an example test plan.

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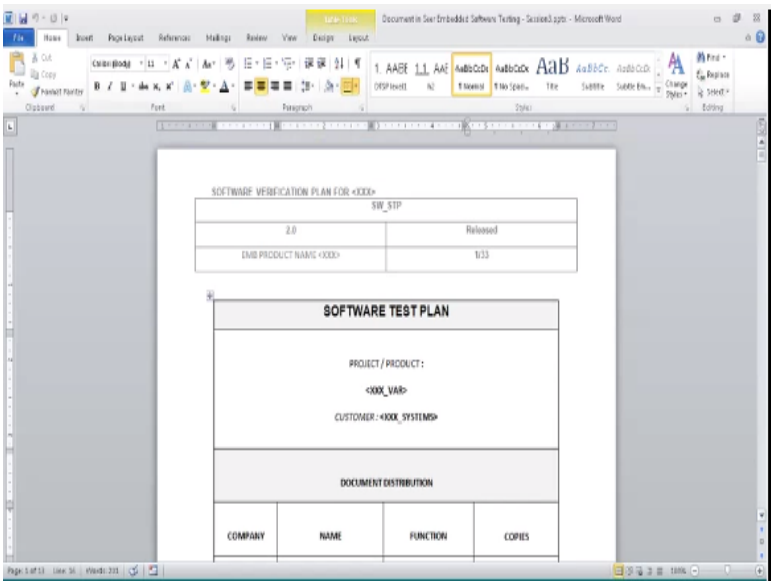


So this is the typical software test plan, which is followed in the industry, I pick an example, it is named by the product xxx, you can name any of the product name as controlling it, or any instrument name, so the header, test plan is identifying the products, which is the function, the various people or stakeholders required, and their function name ,so approved the particular test plan, so it is very important, because the test document is controlled, in the configuration, and this will be released.

And so we begin our test cycle, so these are the header, footer and the starting page, and we have the revision history.

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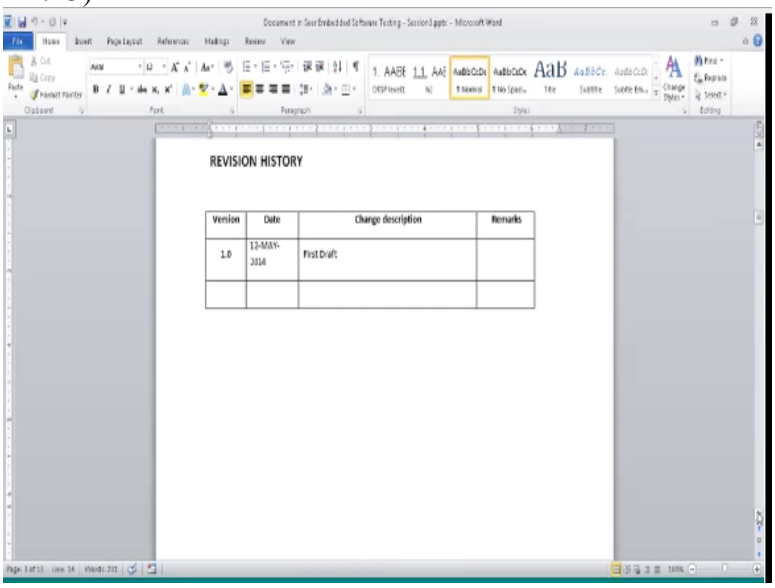


And whenever we update this test plan, otherwise, there could be some decision, and there will be some change in the strategy, for a period of testing, that we bring under the revision history, and time to time it changes.

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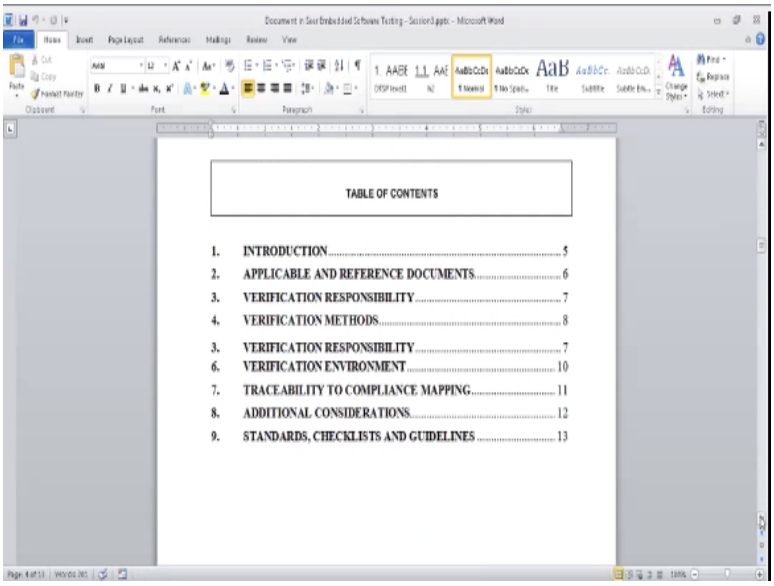


And of course, we have the introduction of the test plan, the applicable or the documents, the responsibility, methods and verification activities, verification environment, I have used verification here, interchangeable words along with the test plan, and traceability to compliance mapping, and additional considerations and the standards, checklist and the guidelines.

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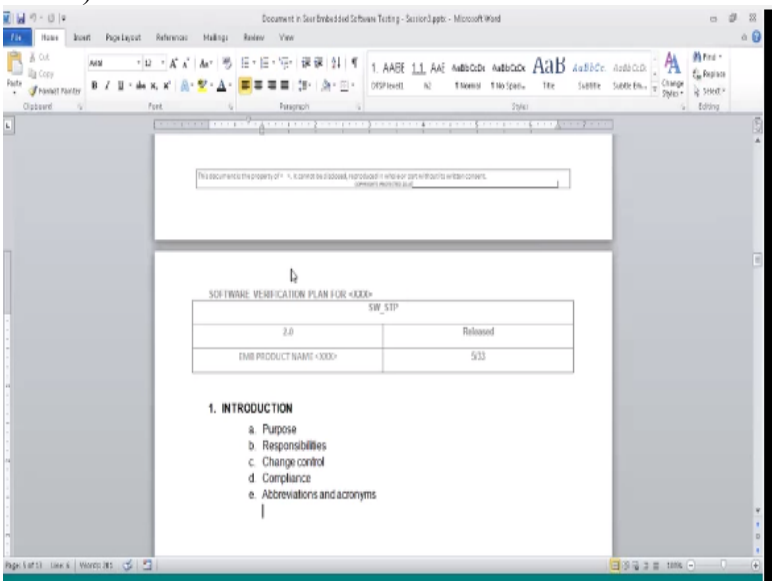


So in the introduction, we are going to introduce the purpose of the test plan, so we are going to look at the responsibilities, the change control, and the compliance and the abbreviations and acronyms and I have not put any text, under this, may be in the end, we can create an example, in the embedded system, so probably, I am going to raise an activity, to come up with a good test plan.

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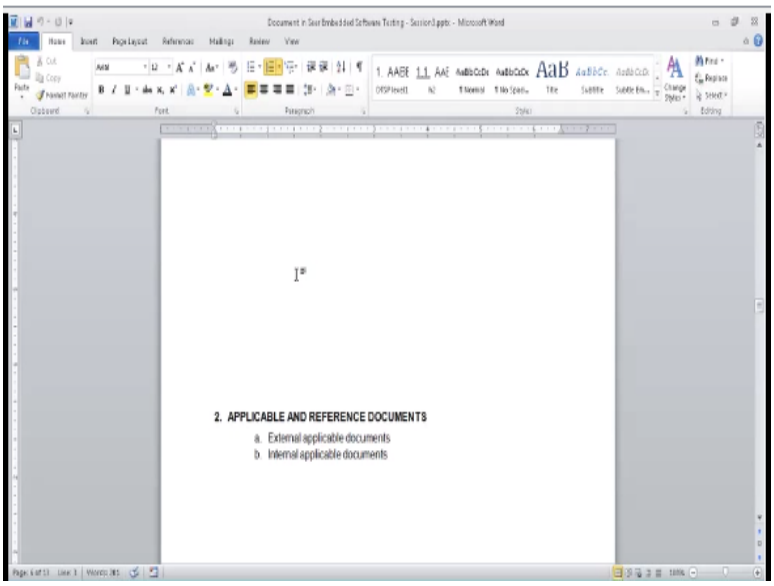


And next, we have the applicable and the reference documents, part of the test plan, so what are the external documents we are going to refer, as part of the development of the test plan, this could be a customer given document or any, industry standard, which are used for the development of the test plan, similarly we will have an internal applicable document, which has organizational, review guidelines, and whatever it is.

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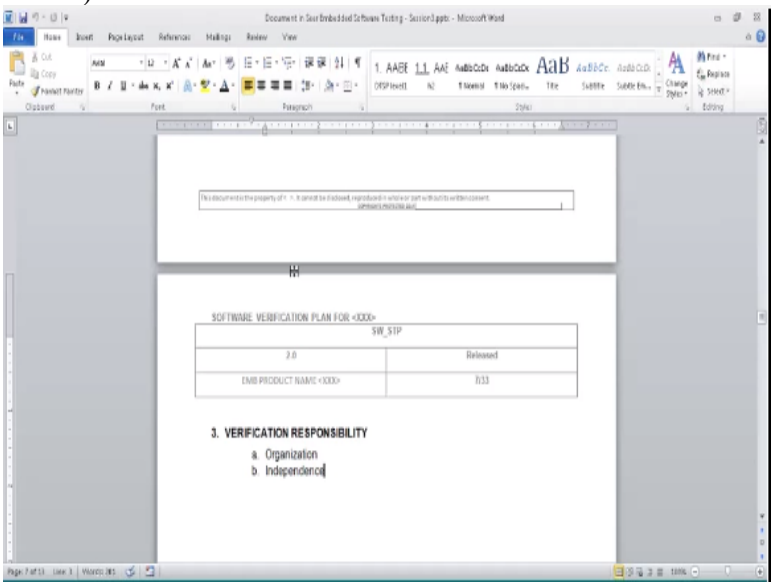


And the verification responsibilities, for every project or product, there is an responsibility, the responsibility will have the identity of identifying the organization, so the organization will identify, what is a team, how and who is responsible for what, that could be a 10 member team, what are the people responsible for, who is responsible for delivery, who is responsible for process adherence, who is responsible for quality ,and who can do an independent validation, o these will be part of the verification responsibilities.

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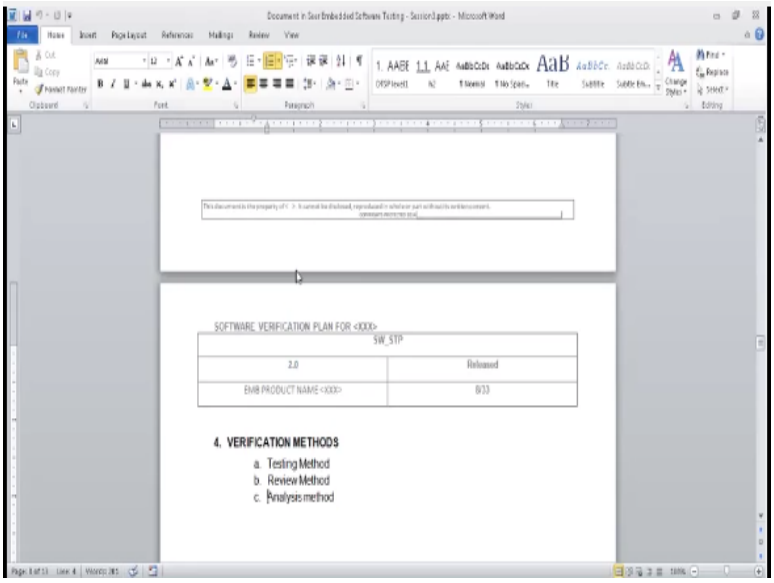


Then we will have an verification method, so this will basically identify the testing methods like high level testing, low level testing, all these methods are defined under the testing methods, and as I said earlier, the testing is not only the method that is followed, so there are other strategies also, which is to be used, so the other could be static analysis, or it could be a review method, if I do a review, which method I am going to do, an offline review, or review with customer, and testing in terms of the analysis.

The testing in terms of code analysis, code instruction, or static analysis of the entire project, so these are all part of the verification method.

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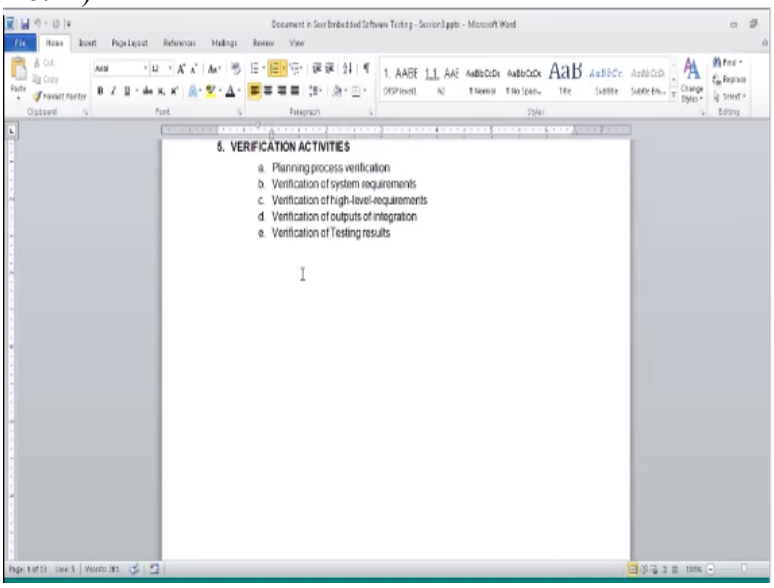


The next we have the verification activities, so once I define all these methods, it could be a planning process verification, that means the test plan, the process has been followed, and the verification of system requirements, that means the verification will take care of the system requirements, and similarly the high level requirements, and verification of outputs of

integration, and verification of testing results, that mean the entire test life cycle, will be verified with these type of activities.

That means the planning process or the requirement verification or some of the software requirements, or the high level requirements, modules of integration , then the testing results could be verified , whether the results as per the test plan, so once we have the verification activities, we will identify the verification environment.

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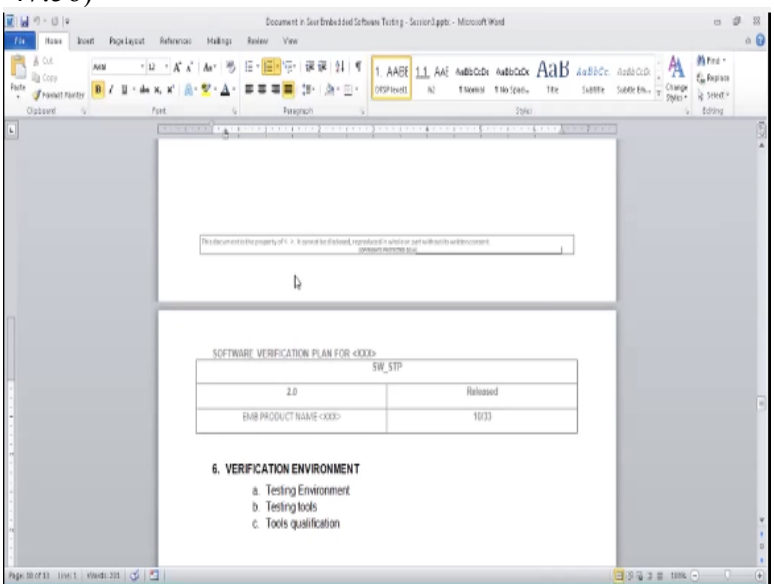


The environment , I am going to use, in terms of the test plan, like low level testing, high level testing, what are the environment I am going to use for the test strategy, and to have that environment, what are the tools I am going to use, it could be a test PC, lowest possible assembly code, lowest possible tools that are to be used in this testing, similarly the tools are used, whether the used tools, whether they are to the standard, they can be accessible by the customer, all this is in the part of the verification environment.

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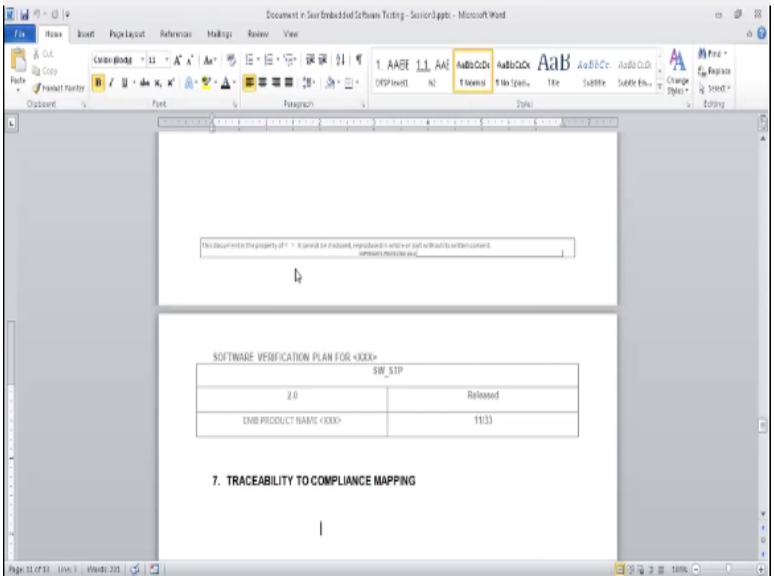

Then we have the traceability ,to compliance mapping ,this is how I am going to trace it, how we test the test requirement, I have a testing strategy, and some testing high level requirements ,so the objective is to cover 100% of the embedded system requirements, so how I am going to map it, all this will be part of the traceability, for example it could be, requirement based testing, for testing the requirements, o that should cover up the 100% of the requirements, and I am doing integration testing, mapping to the embedded system.

Similarly the low level design, or any of the low level requirements, with the help of unit testing, there should be compliance with the low level requirements, so how I am going to trace it.

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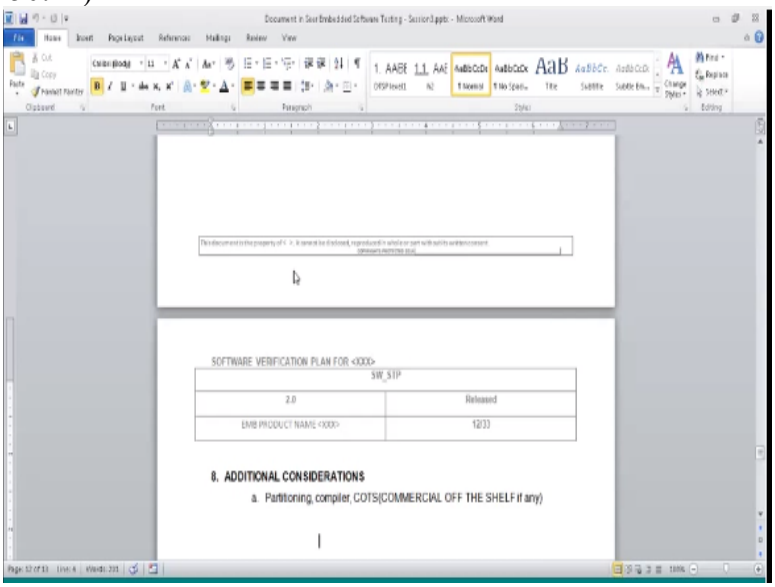


And any other considerations, I am using for partitioning, partitioning here means the embedded system, will have mostly 2 units, low level partition with different components, and the high level partition with different objectives, for example, the low level partitioning, it could be a boot loader or the boot software, high level partition is application sitting on top of the boot software, so both are needed, so given an embedded product, it can be comprised of such similar partition.

And applications, will also have, different partitions, where we have multi threaded, multitask, and if there are any partitions used, that also needs to be highlighted, similarly the compilers for compiling, the test software or the embedded software, and during the testing, we use a lot of tools, or we may use some of the standard libraries, and the group is called commercial off the shelf, it could be a library, all this could be considered in the test plan.

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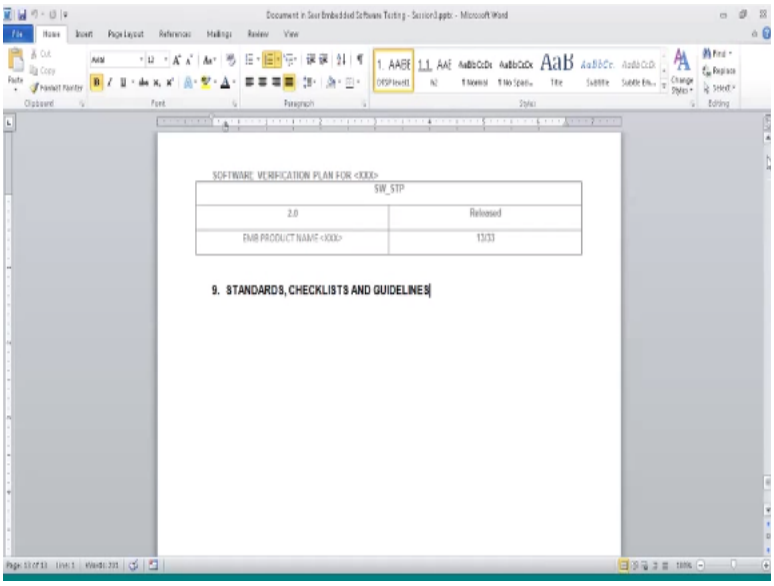


Then the lat, but not the least, the standards, checklists and the guidelines, these are some of the process elements, need to be adhered for doing the embedded testing, so we will go through them separately, in the next slide, so once again I will highlight the basic elements of the software test plan or verification plan, we will have the verification responsibilities, and the verification activities, and the environment that is used for the verification, and how I am going to trace it.

And of course we have the partition consideration, like partition the compiler, and we will list out the standard checklist and the guidelines, we will also configure various processor, as used by the guidelines, so these are all about the test plan, so this is the software test plan and the template, as I said we can create test plan, that you can have it as an activity, or an assignment, the test plan example.

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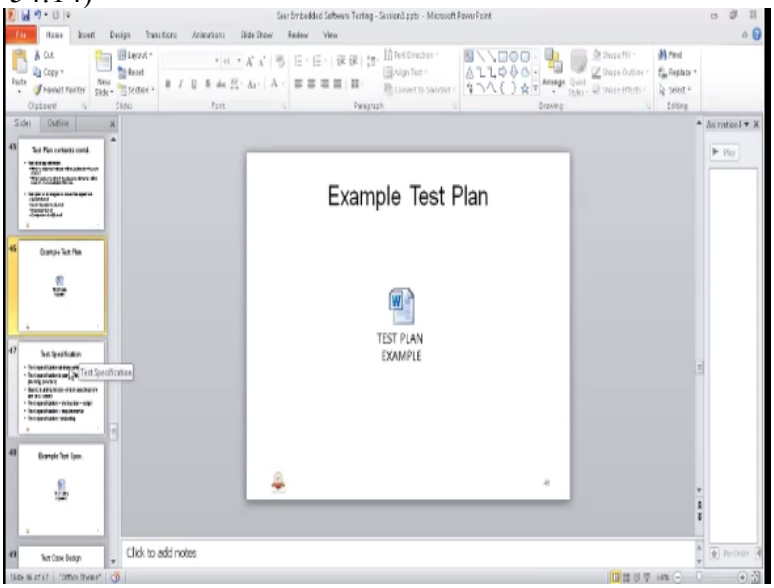


Then coming to the test specification

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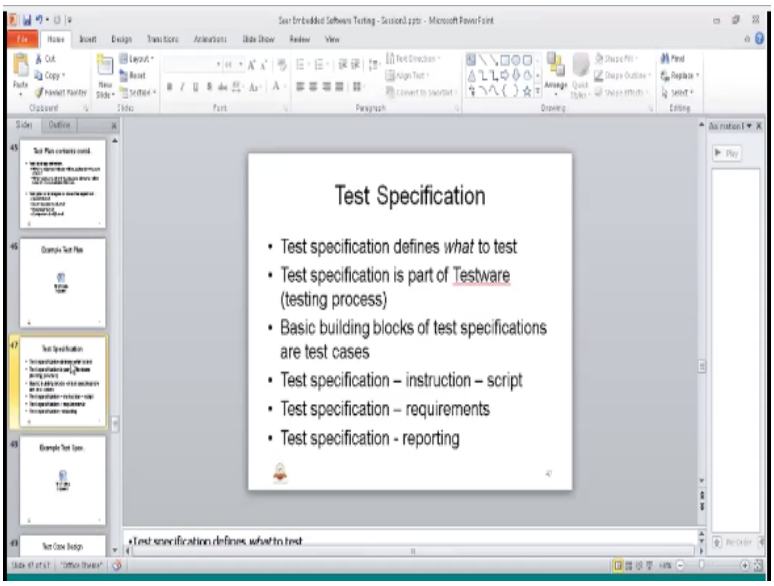


So once we have the test plan, laid out, there won't be start, with the test specification, so what is test specification, the test specification defines what to test, test specification is a part of test ware and I will tell you what is test ware ,it is a process basically , identifying test data and test condition etc , these all will be under that is configuration control, and the test specification will have basic building block of test cases, test specification will have instruction to use, the scripts, test specification will identify the requirements.

The test specification will report the test cases, so this is about the test specification, and I will go through and test specification example.

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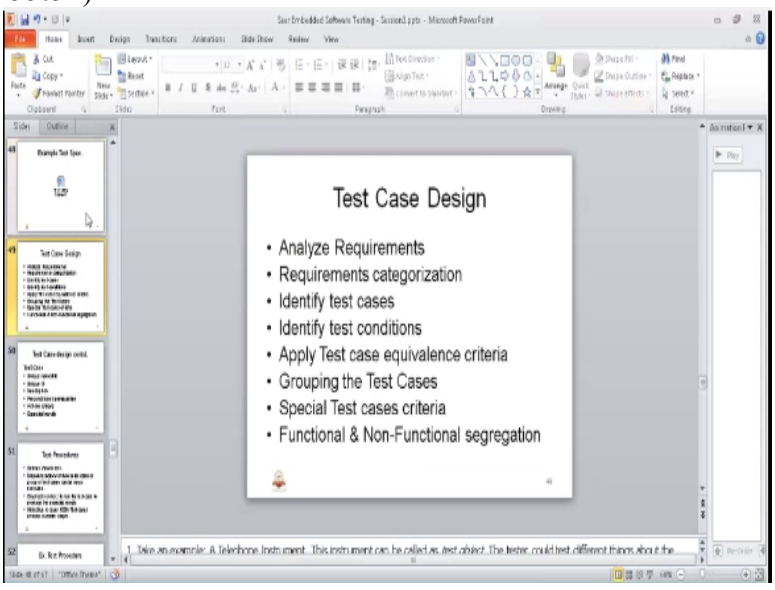


And later on the test case design, of course the test case design, I part of the test specification, this is the typical test case development or test case specification.

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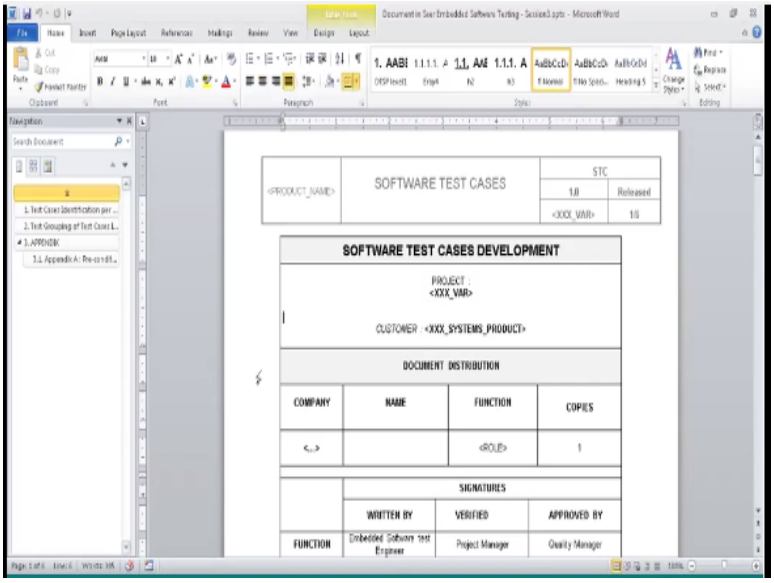


The template is the similar one, I have used, this is same as the test plan, we will have a project name, and the software test cases, can be identified as the test specification.

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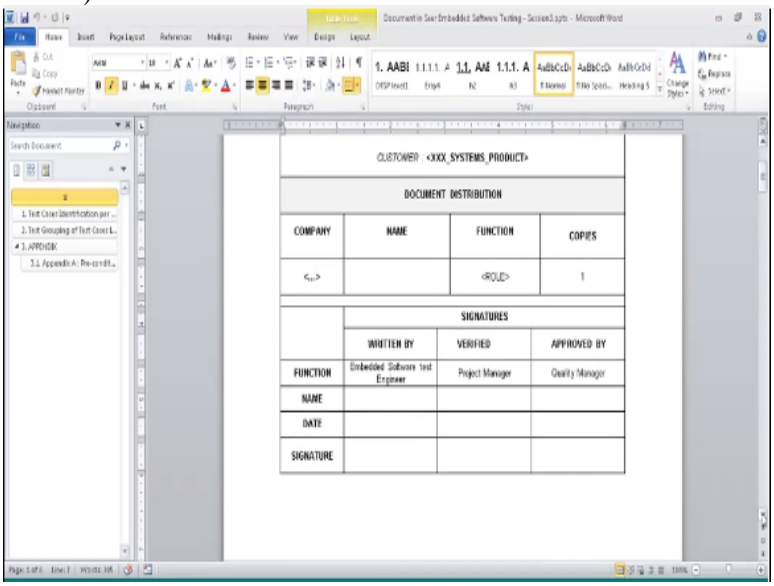


Then from the earlier one, we have various stakeholders identified , and then we have the revision history, so we will basically update the document, change in the test case, there is a possibility that the test cases will have a which seems to be released, change into the test specification.

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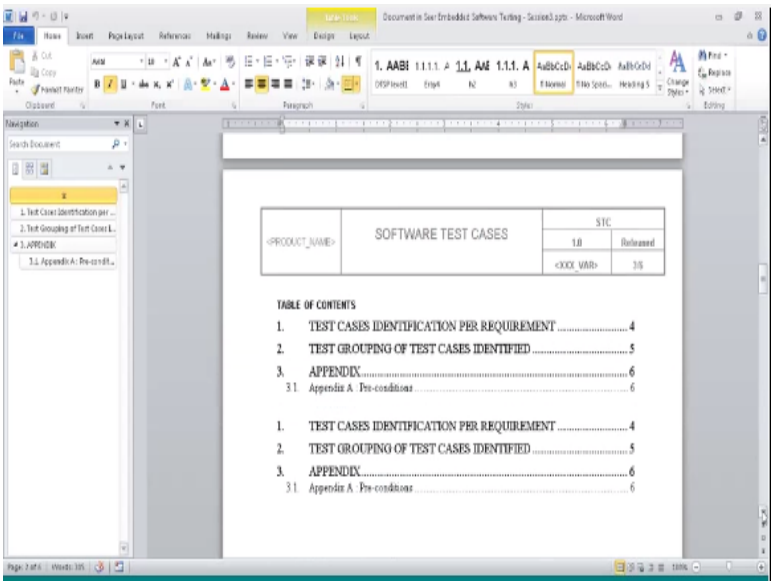


The test specifications will have 2 basic sections, the 1st section will identify the test cases for each of the requirement, the next section, will identify the group, basically one should develop all the test cases, for each of the requirement, and just group it, why we need to group and all that, we will understand, for doing the test cases, there is a precondition, that means, for developing the test cases.

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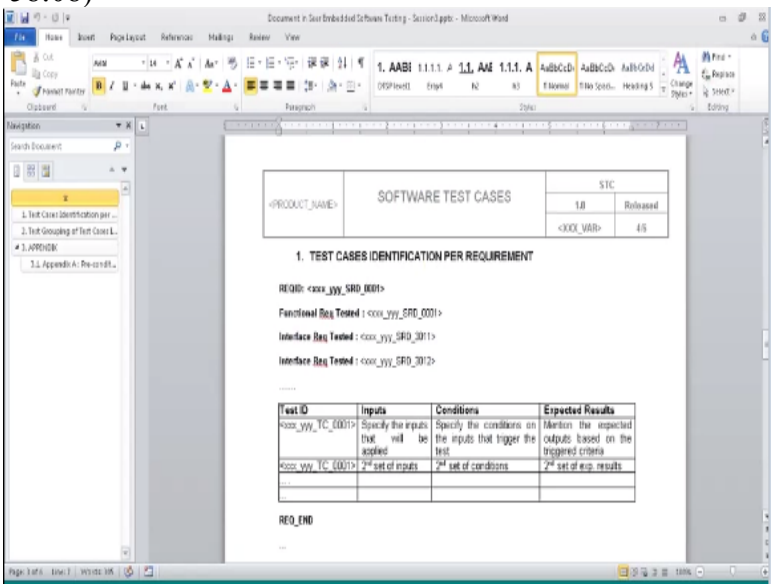


That will be discussed so test cases for each of the requirements that is the first session.

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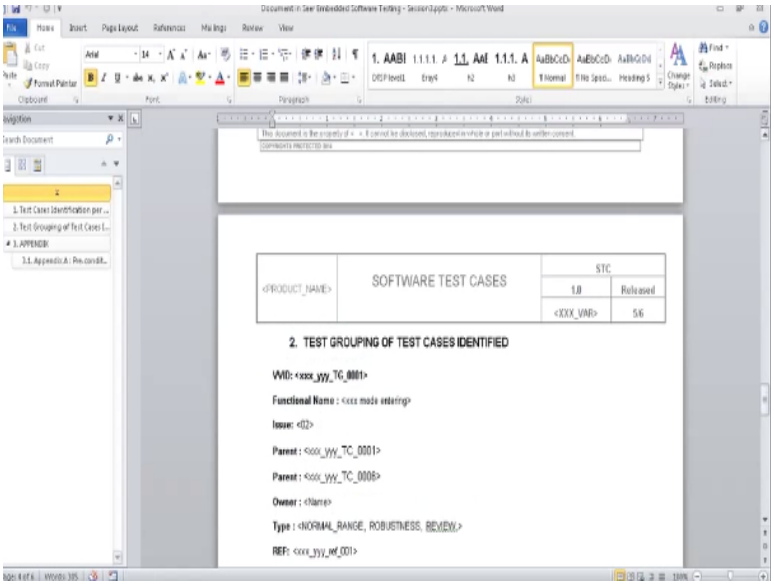


The next session about test grouping that means all the cases whatever we have identified here.
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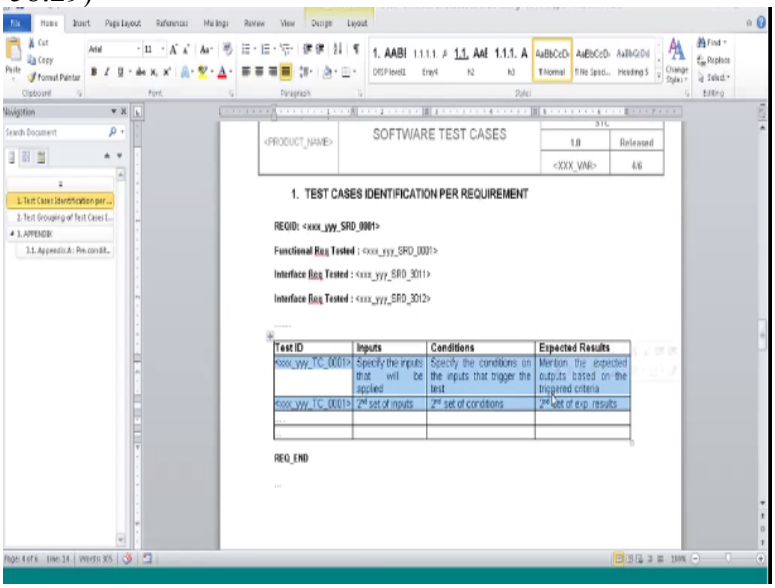


That means each one is the test name, test cases 1, 2, 3 up to end for each of the requirement there could be multiple requirement and requirement could have multiple test cases.
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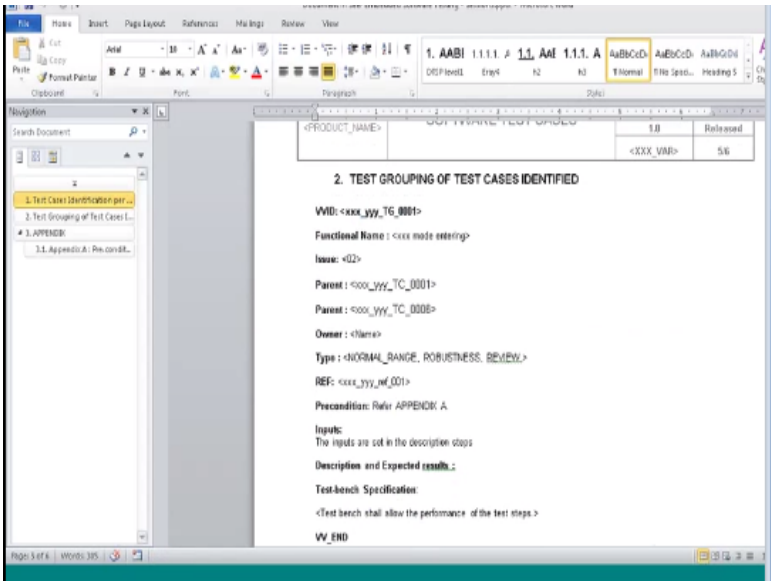


Once we identify test cases the entire test living so why we need to grouping at all the time expand data then we will understand need of a grouping so that will be we end.

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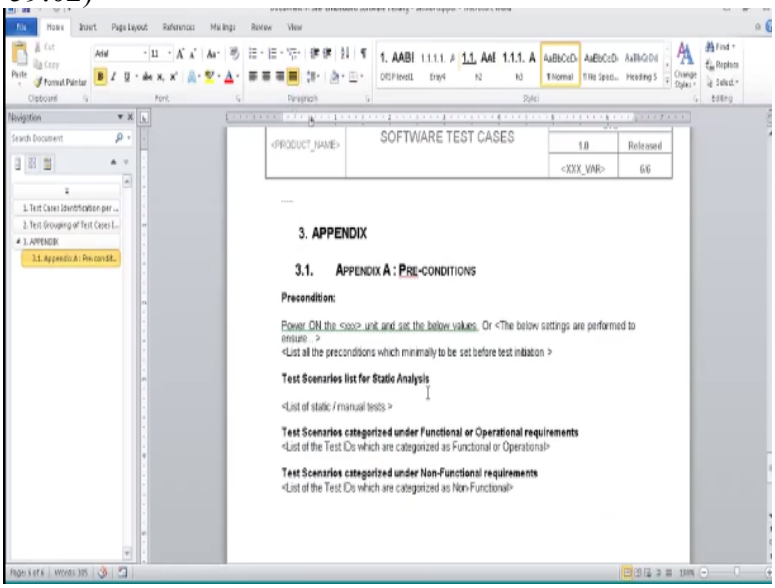


For doing the test we need to have certain test we will do have a minimum three condition of the test case for the done for doing the test cases of course we have test scenario list for static analysis method you had something like different tests that are update and they going to rest out what are the different types of static analysis which are the functional test that are taken very much.

So what is the non functional requirement all has to be highlighted as appendix?

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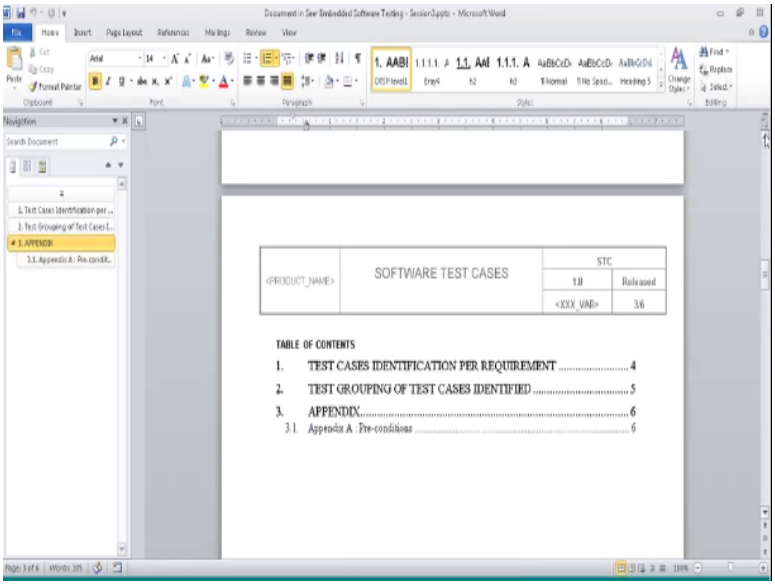


Three basic sessions will hosted the test specification requirement of the test cases and the defined I will detail out or be explain each of this

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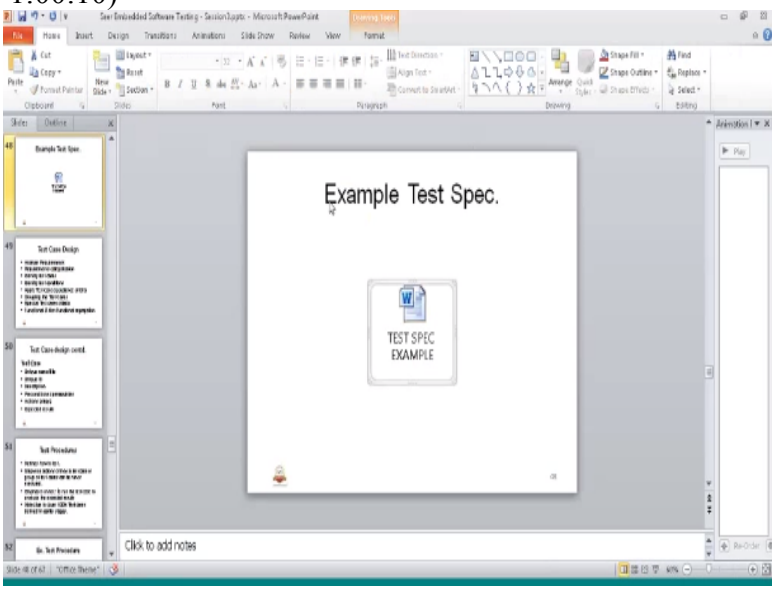


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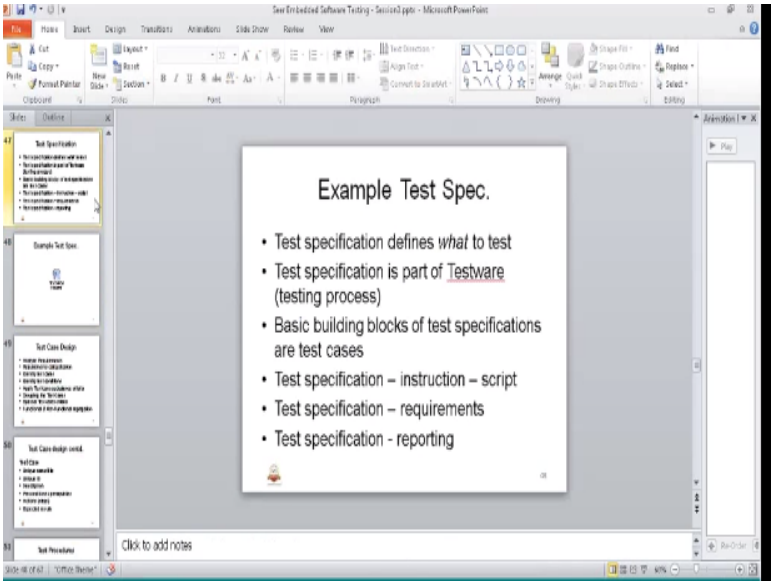


Okay so in the next session we will touch upon a test case design is going to that we are same in the test case session that we are going to have test cases identified test cases conditions and three conditions also we have grouping how we are going to do it, it is all part of the test cases.

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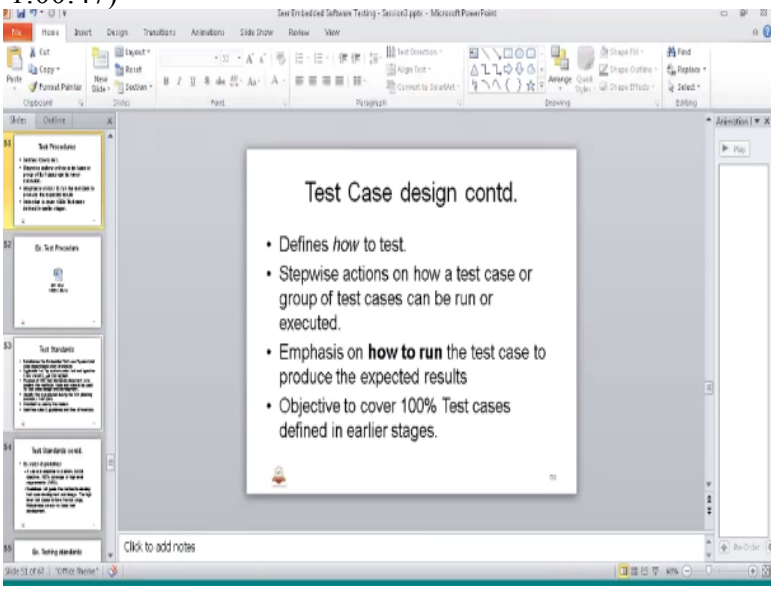


And what are the elements for the test case design and once we have done with the test cases we are going to have test positions ,addressed in the beginning test procedure nothing I expect of this action of the test cases in the cases of practical that means test cases are theoretical.

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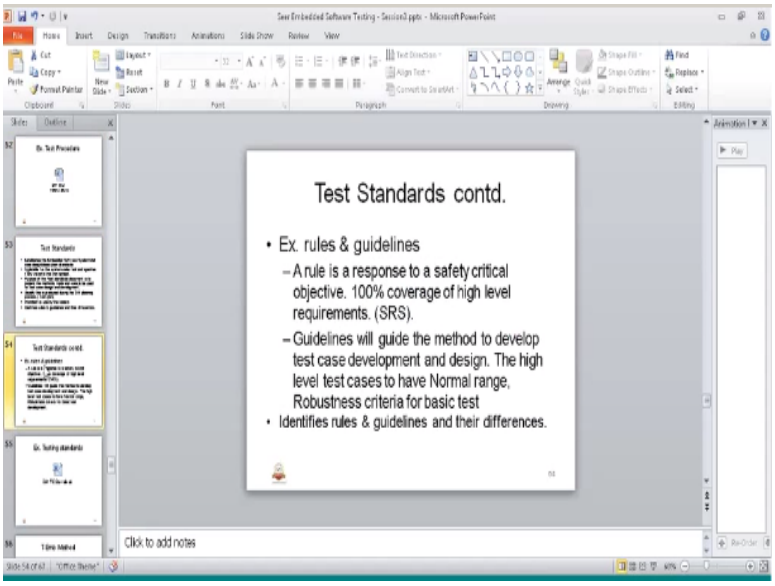


Nature but a rest procedure is practical okay that is all about this session a we will have a another session form the test specification and test and also we will have in the next test case design, test procedure for examples of a test procedure and last thing will before the standard that are means we will go through an examples typical we go through that will product the standards.