**Dr. Salamah**

Welcome you currently have document that Dr. Gates and her guidance team is currently handing out to you. Introduce the idea of patterns and scope. So Today my goal is just for 5 to 10 minutes to go over what this means and then I guess we will open for questions.

**Dr. Gates**

So what we are going to do this time is I didn’t put together your question so we are going to go by each team and you are going to ask a question from your team that you feel is not answered.

**Dr. Salamah**

Alright so this idea of this pattern and scope combination is to help the scientist come up with properties that interest to them. There are many, many, many, properties that they can specify or care to specify. So using pattern scope helps them focus on what they want and actually triggers some questions that will enable them to come up with the best possible property that matches what their trying to understand. So in the first description that I have here is well multiple diagrams of what a scope is and a scope is just a function of the data in this case that you care about the property holding it. So you care about the whole data set you want that property to hold across the whole data set and that’s what a global scope comes in so you are saying I want that property I want temperature to never fall below zero over the whole set of data, so take that property over every single reading. That’s what the global scope is for that’s the simplest form. The next one is the before R scope. So before a specific event happens before something happens that’s the part of the scope that we care for. From the beginng up until that point the L condition that I am concern about holds. So you see here in this diagram I have in the before R I have the blue box is the scope of interest the part of the letters I care about the part where I am going to check my properties over. The rest of this I don’t care about the properties can fall or not fall I don’t care it is not my concern. Questions so far. Something about the before R is that the scope does not include the reading where R falls. So the scope is only for those readings or reading within that set precedes what R holds. What R holds is not part of the scope. Questions I am not sure you are getting this by the way you are looking at me, or is it too easy.

**Dr. Gates**

So if you are looking at before R and you are looking at near real time. So there are two ways that you can be monitoring right near real time and after the fact. We have a data reading from last year or week before and now you are going to ~~~ so before R can you do that check in near real time.

**Dr. Salamah**

Probably not. That has to be of a certain data. With the before R ~~ with the real time is about the patterns and less about the scope. Scope comes in when you are dealing with things you are limiting parts of the data that your looking at.

**Dr. Gates**

Global

**Dr. Salamah**

Global is an after L and after L and after L

**Dr. Gates**

**Dr. Salamah**

The next one probably the next one So the next scope is your set of interest set of data interest is the one that happen after the condition L happen. So lets say a condition L is the temperature reached 100 after that then look at all the data that comes after that. That's what my property is has to hold and that what we are talking about if that condition then that is applicable to this time. once that condition happens then now I have to record any my properties are correlated and so on. Then comes the next two intresting scopes, the between L and R scope and the after L until R scope. For the first three scopes those are not defeating scopes meaning we have only one single scope for example for the before R I have only one before R scope. Even if there are conditions R such that R has happen many times I dont care I put and care about only the first occurance of R. Did you understand that? Okay so only the first occarance of R is the one I care about and my scope is on every data set, every reading that happen before that part. And the same thing for after L, and of course global scope is only one which is the whole data set. This is a little bit different for the between L and R scope. Between L and R scope is I care about the interval between the condtion L and the condition R thats my scope. But, this scope could repeat so every time L follows by R forms I add a new scope. Right, so if I had L is tempertures 50 R is temperture 100 if the conditions holds true after that then now I have another scope after that. And with these I can have misfits. This is why this is alittle bit hard. Because if first the last L is not with the first R , so you can see in the diagram that I have two scopes one with lite blue and one with dark blue. My dark blue is actually is called scope. From the first L until the last R includeing that big scope that is blue that light blue scope but I am checking within the two scopes I am checking the big one and I am checking also the small one. You are rarely gonna have this. What you will have is the situation that I was describing before. So you have an L followed by an R and then another after that anther L followed by an R. Thats more typical. Than having this scope. Questions so far?

**Dr. Gates**

Will that create a problem.

**Dr. Salamah**

The nested

**Dr. Gates**

Yeah, so if we want to have temperature that we would not have yesterday temperture equal to 100 and yet this reading is 103 be expecting on the right hand side temperture reaching 80.

**Dr. Salamah**

Right

**Dr. Gates**

We might not be able to nest it.

**Dr. Salamah**

Right and its not gonna be a bit its really not coming up with the spirit of this you are going to be checking the smallest scope which is the last L. And again this is not the typical type of scope that you will face. What I think that you will see more is the between L followed by condition R. That becomes your scope and then you start all over again at some latter form. Okay we good?

**Dr. Gates**

Did we talk about the open on the right

**Dr. Salamah**

Thats a good point, so remember when we say that the scope for the before R. So remind me the scope for the before R does it. What's speacial about it?

**Student**

Stops right before the R

**Dr. Salamah**

Stops right before the R good. So with the scope after L it includes the state R, its a mistake calling it state, the data reading where L holds. So its not the same, with the after L it does include the data reading where L holds. Where the before R does not include the data reading where R holds. And this is the same for between L and R. It includes the reading for L it doesn't include the reading for R. Yeah?

**Dr. Gates**

I was on the last open on the right

**Dr. Salamah**

Yeah, and if you see the definition. The definition also the textual definition not the diagram that specified as well. The after L until R is similar very similar to between L and R the only difference here is the R never holds that the scope is between the first L all the way until the end of the data. Or until you get an R or if you don't you just keep checking the R if you don't get an R until the very end of the data. Were good. Okay. Alright so lets move to patterns and for today we decide to just give you a subset of this and hopefully solicit some questions from you and then maybe we can come up with more examples. So we talked about scope is a range of intrest where I want my properties to hold. Where my properties specify by a factor. A factor is a certain time property which repeats over and over and over. So we are breaking these into time dependent and not time dependent. And today we giving you more examples of the not time dependent. So for example The universal the first example that we had. All for that scope now the scope can be whatever anyone of the five scopes we discuss before. Over that scope that set of data, data reading I want that universal factor to hold which means I want that property to hold over every reading in that scope. So if I have a global scope I want that reading universality property to be true over every reading in my data set. Okay. If I have a universality in between L and R then I don't care what happens before L, I don't care what happens after R. I only care that this property holds in every reading between the L until just before the R. That's what universality means. That property, for example lets say the temperture has to be smaller or equal to 35 that temperture has to be smaller or equall in every reading within the scope. So again if I am doing gobal scope, the temperature has to be 35 or less in every reading over all my set of data reading. Or if I am doing after L I don't care what happens before L but temperature better be 35 or less at the L until the end of the reading. Until the end of my data set. Easy, so far? Okay, Absence is a little bit the opposite. That property should never hold, in my scope. So we were saying universality if the truth holds in every reading. Absence it should never be hold in any of my readings. Again within the scope you're always gonna get by and existence it has to happen at some point it has to happen at least once. If it doesn't happen at least once then it is an anomaly that is a violation and the interesting one is response. If you notice in all the ones before this one that the topic so far all the ones we have discuss so far we are trying to gain one type of reading like its either temperature, its either humidity, or something. We are doing one type of reading. WIth the response we have two scopes, because we have two data readings. I'm reading about temperature, I'm reading about humidity for example. And I am saying in response, if the temperature falls to 50 then the humidity must behave a certain way. That's why were saying we are performing or we are checking two data sets. The data set for temperature and the data set for humidity. Now somehow your job will be to calibrate those two data sets. To make sure that, that order is preserve. If the temperature happens at reading number 5 then the temperature becomes 50 at temperature number 5 then make sure the humidity becomes, I don't know 80%. At that same reading, reading number 5 within the humidity that is set or at reading number 6. It happens at that same reading or readings immediately after. Questions?