<https://www.sitepoint.com/understanding-angulars-apply-digest/>

Best reference : <http://tutlane.com/example/angularjs/angularjs-digest-function-example>

Ref : http://tutorials.jenkov.com/angularjs/watch-digest-apply.html

**$watch service :**

**$digest service :**

**$apply service :**

The AngularJS $scope functions $watch(), $digest() and $apply() are some of the central functions in AngularJS. Understanding $watch(), $digest() and $apply() is essential in order to understand AngularJS.

When you create a data binding from somewhere in your view to a variable on the $scope object, AngularJS creates a "watch" internally. A watch means that AngularJS watches changes in the variable on the $scope object. The framework is "watching" the variable. Watches are created using the$scope.$watch() function which I will cover later in this text.

At key points in your application AngularJS calls the $scope.$digest() function. This function iterates through all watches and checks if any of the watched variables have changed. If a watched variable has changed, a corresponding listener function is called. The listener function does whatever work it needs to do, for instance changing an HTML text to reflect the new value of the watched variable. Thus, the$digest() function is what triggers the data binding to update.

Most of the time AngularJS will call the $scope.$watch() and $scope.$digest() functions for you, but in some situations you may have to call them yourself. Therefore it is really good to know how they work.

The $scope.$apply() function is used to execute some code, and then call $scope.$digest() after that, so all watches are checked and the corresponding watch listener functions are called. The $apply() function is useful when integrating AngularJS with other code.

I will get into more detail about the $watch(), $digest() and $apply() functions in the remainder of this text.

**$watch()**

Note : A variable takes care of a variable and it’s value.Suppose we have two different variables it means that we have 2 different watchers created in angular memory and all that are used by the digest cycle. If any variable is not used as a data binding inside the template then it is not be watched.

Ref : <https://www.youtube.com/watch?v=VS6vDlsqW7o>

**Watch listeners :** We can attach the functions for each variables when changed.We can attach these functions with the watches.These function are known as watch listeners.

**Watchers count :** The maximum no of watchers that an application can use is better for **2000.** After that count that may have performance problem. It is recommended to keep the watchers as less possible to prvent the performance issue.We can see the number of watchers through two chrome plugins :

a)Angular watchers

Based on the number of binding we will see the watchers.

**<input ng-model="b**"> ..Two way data binding

**<input ng-model="a">**"> ..Two way data binding

**The The count is {{a}}**"> ..One way data binding

**The The count is {{b}}**"> ..One way data binding

This code will contain 4 watchers because 4 data bindings are there.

b)Batarang

**Creating our own watch :**

The $scope.watch() function creates a watch of some variable. When you register a watch you pass two functions as parameters to the $watch() function:

* A value function
* A listener function
* $scope.watch(‘c’,function(**newValue**,**oldValue**){

})

The callback function is known as watch listener.

Here is an example:

$scope.$watch(function() {},

function() {}

);

The first function is the value function and the second function is the listener function.

The value function should return the value which is being watched. AngularJS can then check the value returned against the value the watch function returned the last time. That way AngularJS can determine if the value has changed. Here is an example:

$scope.$watch(function(scope) { return scope.data.myVar },

function() {}

);

This example valule function returns the $scope variable scope.data.myVar. If the value of this variable changes, a different value will be returned, and AngularJS will call the listener function.

Notice how the value function takes the scope as parameter (without the $ in the name). Via this parameter the value function can access the $scope and its variables. The value function can also watch global variables instead if you need that, but most often you will watch a $scope variable.

The listener function should do whatever it needs to do if the value has changed. Perhaps you need to change the content of another variable, or set the content of an HTML element or something. Here is an example:

$scope.$watch(function(scope) { return scope.data.myVar },

function(newValue, oldValue) {

document.getElementById("").innerHTML =

"**" + newValue + "**";

}

);

This example sets the inner HTML of an HTML element to the new value of the variable, embedded in theb element which makes the value bold. Of course you could have done this using the code **{{ data.myVar }**, but this is just an example of what you can do inside the listener function.

**Types of watches :**

**a)$watch** : **Reference watch** : If the variable to be watched is primitive. It means that the data type of the watch will be integer,float etc. But suppose , if we are trying to watch an object then

Ex :

$scope.emp = {

first\_name : ‘Mohan’,last\_name : ‘kumar’,age : 21

}

Now , emp is not an normal variable but it is an object. So, if any property like first\_name , last\_name gets changes then watch will not be called. Only if the emp gets assigned to any other object then only the watch gets called.

b)$watch with true : **Equality watch**

This is not what we want to achieve. So this is a deep watch .We can watch it through the **true Boolean** argument

$scope.watch(‘c’,function(**newValue**,**oldValue**){

},true) // Now it will watch for the object also.

c)$watchGroup

When we want to apply the same type of watch listeners for more then one variables to be watched.

$scope.$watchGroup([‘a’,’b’],function(newValue,oldValue){

}); So, if any of the a or b gets changed then the same listener function gets called.

**$digest()**

The $scope.$digest() function iterates through all the watches in the $scope object, and its child $scopeobjects (if it has any). When $digest() iterates over the watches, it calls the value function for each watch. If the value returned by the value function is different than the value it returned the last time it was called, the listener function for that watch is called.

The $digest() function is called whenever AngularJS thinks it is necessary. For instance, after a button click handler has been executed, or after an AJAX call returns (after the done() / fail() callback function has been executed).

You may encounter some corner cases where AngularJS does not call the $digest() function for you. You will usually detect that by noticing that the data bindings do not upate the displayed values. In that case, call $scope.$digest() and it should work. Or, you can perhaps use $scope.$apply() instead which I will explain in the next section.

**$apply()**

The $scope.$apply() function takes a function as parameter which is executed, and after that$scope.$digest() is called internally. That makes it easier for you to make sure that all watches are checked, and thus all data bindings refreshed. Here is an $apply() example:

$scope.$apply(function() {

$scope.data.myVar = "Another value";

});

The function passed to the $apply() function as parameter will change the value of $scope.data.myVar. When the function exits AngularJS will call the $scope.$digest() function so all watches are checked for changes in the watched values.

**Example**

To illustrate how $watch(), $digest() and $apply() works, look at this example:

<div ng-controller="myController">

{{data.time}}

<br/>

<button ng-click="updateTime()">update time - ng-click</button>

<button id="updateTimeButton" >update time</button>

</div>

<script>

var module = angular.module("myapp", []);

var myController1 = module.controller("myController", function($scope) {

$scope.data = { time : new Date() };

$scope.updateTime = function() {

$scope.data.time = new Date();

}

document.getElementById("updateTimeButton")

.addEventListener('click', function() {

console.log("update time clicked");

$scope.data.time = new Date();

});

});

</script>

This example binds the $scope.data.time variable to an interpolation directive which merges the variable value into the HTML page. This binding creates a watch internally on the $scope.data.time variable.

The example also contains two buttons. The first button has an ng-click listener attached to it. When that button is clicked the $scope.updateTime() function is called, and after that AngularJS calls $scope.$digest() so that data bindings are updated.

The second button gets a standard JavaScript event listener attached to it from inside the controller function. When the second button is clicked that listener function is executed. As you can see, the listener functions for both buttons do almost the same, but when the second button's listener function is called, the data binding is not updated. That is because the $scope.$digest() is not called after the second button's event listener is executed. Thus, if you click the second button the time is updated in the $scope.data.timevariable, but the new time is never displayed.

To fix that we can add a $scope.$digest() call to the last line of the button event listener, like this:

document.getElementById("updateTimeButton")

.addEventListener('click', function() {

console.log("update time clicked");

$scope.data.time = new Date();

$scope.$digest();

});

Instead of calling $digest() inside the button listener function you could also have used the $apply()function like this:

document.getElementById("updateTimeButton")

.addEventListener('click', function() {

$scope.$apply(function() {

console.log("update time clicked");

$scope.data.time = new Date();

});

});

Notice how the $scope.$apply() function is called from inside the button event listener, and how the update of the $scope.data.time variable is performed inside the function passed as parameter to the $apply() function. When the $apply() function call finishes AngularJS calls $digest() internally, so all data bindings are updated.