Usage of forceLayout(), requestLayout() and invalidate()

Asked 7 years, 7 months ago Active 1 month ago Viewed 93k times

186

I'm a bit confused about the roles of `forceLayout()`, `requestLayout()` and `invalidate()` methods of the `View` class.

When shall they be called?

android android-layout android-view

edited Mar 3 '16 at 0:44

asked Dec 13 '12 at 8:55
sidebet
16.8k ● 9 ● 67 ● 137

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6 Answers

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To better understand answers provided by François BOURLIEUX and Dalvik I suggest you take a look at this awesome view lifecycle diagram by Arpit Mathur:

edited May 23 '17 at 12:34
Community ♦
1 ● 1

answered Sep 15 '14 at 10:44
Bartek Lipinski
24.8k ● 7 ● 74 ● 106

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28 I often see requestLayout being called directly after invalidate is called. I even see that happening in Android source code for things like TextView, but according to this diagram doing so is redundant, right? So is there any purpose for doing that? – ktox May 12 '15 at 22:10

5 Well that's an interesting question, and to be honest I don't really know why they call both methods in e.g. TextView. I thought that maybe they have to draw the `View` for the last time before they change its layout-related parameters, but it doesn't really make any sense if we think about those calls being invoked in the different order (very last call: `invalidate()` right after `requestLayout()` in `TextView` as well). Maybe it deserves another question on StackOverflow :)? – Bartek Lipinski May 16 '15 at 9:21

14 (1/2): I don't think you understand those two methods (`invalidate()` and `requestLayout()`) properly. The purpose of those methods is to tell the `View` what sort of invalidation (as you called it) has happened. It's not like the `View` decides what path to follow after you call one of those methods. The logic behind choosing the `View` lifecycle-path is the choosing of the proper method to call itself. If there's something related to size change - `requestLayout()` should be called, if there's only a visual change without a size changed - you should call `invalidate()`. – Bartek Lipinski Jun 15 '16 at 11:54

11 (2/2): If you change the size of your `View` in some way, e.g. you get current `LayoutParams` of a `View` and you modify them, but NOT call either `requestLayout` or `setLayoutParams` (which calls `requestLayout` internally), then you can call `invalidate()` as much as you want, and the `View` will not go through the measure-layout process, therefore will not change its size. If you don't tell your `View` that its size has changed (with a `requestLayout` method call), then the `View` will assume it doesn't, and the `onMeasure` and `onLayout` wouldn't be called. – Bartek Lipinski Jun 15 '16 at 13:55 ✓

2 @ktox more here --> stackoverflow.com/questions/35279374/... – Solti Nov 3 '16 at 13:09

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invalidate()

128

Calling `invalidate()` is done when you want to schedule a redraw of the view. It will result in `onDraw` being called eventually (soon, but not immediately). An example of when a custom view would call it is when a text or background color property has changed.

The view will be redrawn but the size will not change.

requestLayout()

If something about your view changes that will affect the size, then you should call `requestLayout()`. This will trigger `onMeasure` and `onLayout` not only for this view but all the way up the line for the parent views.

Calling `requestLayout()` is not guaranteed to result in an `onDraw` (contrary to what the diagram in the accepted answer implies), so it is usually combined with `invalidate()`.

```
invalidate();
requestLayout();
```

An example of this is when a custom label has its text property changed. The label would change size and thus need to be remeasured and redrawn.

forceLayout()

When there is a `requestLayout()` that is called on a parent view group, it does not necessary need to remeasure and relayout its child views. However, if a child should be included in the remeasure and relayout, then you can call `forceLayout()` on the child. `forceLayout()` only works on a child if it occurs in conjunction with a `requestLayout()` on its direct parent. Calling `forceLayout()` by itself will have no effect since it does not trigger a `requestLayout()` up the view tree.

Read this Q&A for a more detailed description of `forceLayout()`.

Further study

- Creating a View Class: Add Properties and Events (helpful docs)
- View documentation
- View source code

edited Jun 20 at 9:12
Community ♦
1 ● 1

answered Feb 24 '17 at 4:19
Suragch
309k ● 196 ● 1029 ● 1059

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1 but wouldn't it then make more sense to first call requestLayout() and then invalidate() ? – scholt Aug 23 '19 at 14:46

2 @scholt, As far as I know the order doesn't matter, so you can call `requestLayout()` before `invalidate()` if you want. Neither one does a layout or draw immediately. Rather, they set flags that will eventually result in a relayout and redraw. – Suragch Aug 24 '19 at 6:37

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Here you can find some response: http://developer.android.com/guide/topics/ui/how-android-draws.html

27

For me a call to `invalidate()` only refreshes the view and a call to `requestLayout()` refreshes the view and compute the size of the view on the screen.

edited Jul 27 '17 at 4:02
Alexander Abakumov
9,269 ● 8 ● 63 ● 97

answered Dec 13 '12 at 10:51
François BOURLIEUX
606 ● 8 ● 21

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3 how about forceLayout() then ? – sidebet Dec 13 '12 at 11:58

@fddler , this method just sets two flags: PFLAG_FORCE_LAYOUT and PFLAG_INVALIDATED – sultanshi Jan 24 '14 at 3:19 ✓

2 @sultanshi What are the consequences of setting the flags then? – Sergey May 15 '15 at 11:55

1 @Sergey The consequence seems to be that this flag overrides measure cache (views use cache to measure faster in the future for the same MeasureSpec); see line 18783 of View.java here: github.com/android/platform_frameworks_base/blob/master/core/... – RhetoricalRuoloh May 25 '16 at 19:35

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This answer is not correct about `forceLayout()`.

3

As you can see in the code of `forceLayout()`: it merely marks the view as "needs a relayout" but it does neither schedule nor trigger that relayout. The relayout will not happen until at some point in the future the view's parent was laid out for some other reason.

There is also a much bigger issue when using `forceLayout()` and `requestLayout()`:

Let's say you've called `forceLayout()` on a view. Now when calling `requestLayout()` on a descendent of that view, Android will recursively call `requestLayout()` on that descendent's ancestors. The problem is that it will stop the recursion at the view on which you've called `forceLayout()`. So the `requestLayout()` call will never reach the view root and thus never schedule a layout pass. An entire subtree of the view hierarchy is waiting for a layout and calling `requestLayout()` on any view of that subtree will not cause a layout. Only calling `requestLayout()` on any view outside that subtree will break the spell.

I'd consider the implementation of `forceLayout()` (and how it affects `requestLayout()`) to be broken and you should never use that function in your code.

edited Oct 21 '17 at 5:38
Suragch
309k ● 196 ● 1029 ● 1059

answered Jun 27 '17 at 13:25
fluidsonic
4,155 ● 1 ● 19 ● 32

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1 Hi! How have you come up with that spell? Is that documented somewhere? – aziz0kan Jun 27 '17 at 13:31

1 Unfortunately it's not documented and likely not even intended. I figured that out by investigating the code of `View` and by running into the issue myself & debugging it. – fluidsonic Jun 27 '17 at 13:49

Then I'm curious about the purpose of `forceLayout()`. API: it doesn't actually force a layout pass, rather it just changes a flag which is being observed in `isRequiredLayout()`, but `isPreLayout()` wouldn't be called unless `requestLayout()` or an explicit `ViewMeasureSpec()` is called. That means, that `forceLayout()` should be paired with `requestLayout()`. On the other hand, why then to perform `forceLayout()` if I still need to perform `requestLayout()`? – aziz0kan Jun 27 '17 at 14:46

@aziz0kan no, you don't have to. `requestLayout()` does everything which `forceLayout()` also does. – fluidsonic Jun 27 '17 at 20:28

2 @Suragch missed that one, thanks! Very interesting analysis. The intended use of `forceLayout` makes sense. So in the end it's just very badly named and documented. – fluidsonic Oct 20 '17 at 19:19

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3

you use invalidate() on a view that you want to redraw, it'll make its onDraw(Canvas c) to invoked, and requestLayout() will make the whole layout rendering (measurement phase and positioning phase) run again. You should use it if you are changing child view's size on runtime but only in particular cases like constraints from the parent view(by that I mean that the parent height or width are WRAP_CONTENT and so match measure the children before they can wrap them again)

edited Oct 23 '16 at 11:20

answered Jul 19 '14 at 0:14
Nate
2,873 ● 1 ● 32 ● 60

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1

`invalidate()` --> `onDraw()` from UI thread

`postInvalidate()` --> `onDraw()` from background thread

`requestLayout()` --> `onMeasure()` and `onLayout()` AND **NOT Necessarily** `onDraw()`

- **IMPORTANT:** Calling this method does not affect the called class's child.

`forceLayout()` --> `onMeasure()` and `onLayout()` **JUST IF** the direct parent called `requestLayout()`.

answered Jun 13 at 9:45
Ehsan Mashhadi
1,185 ● 10 ● 22

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