Fast campus

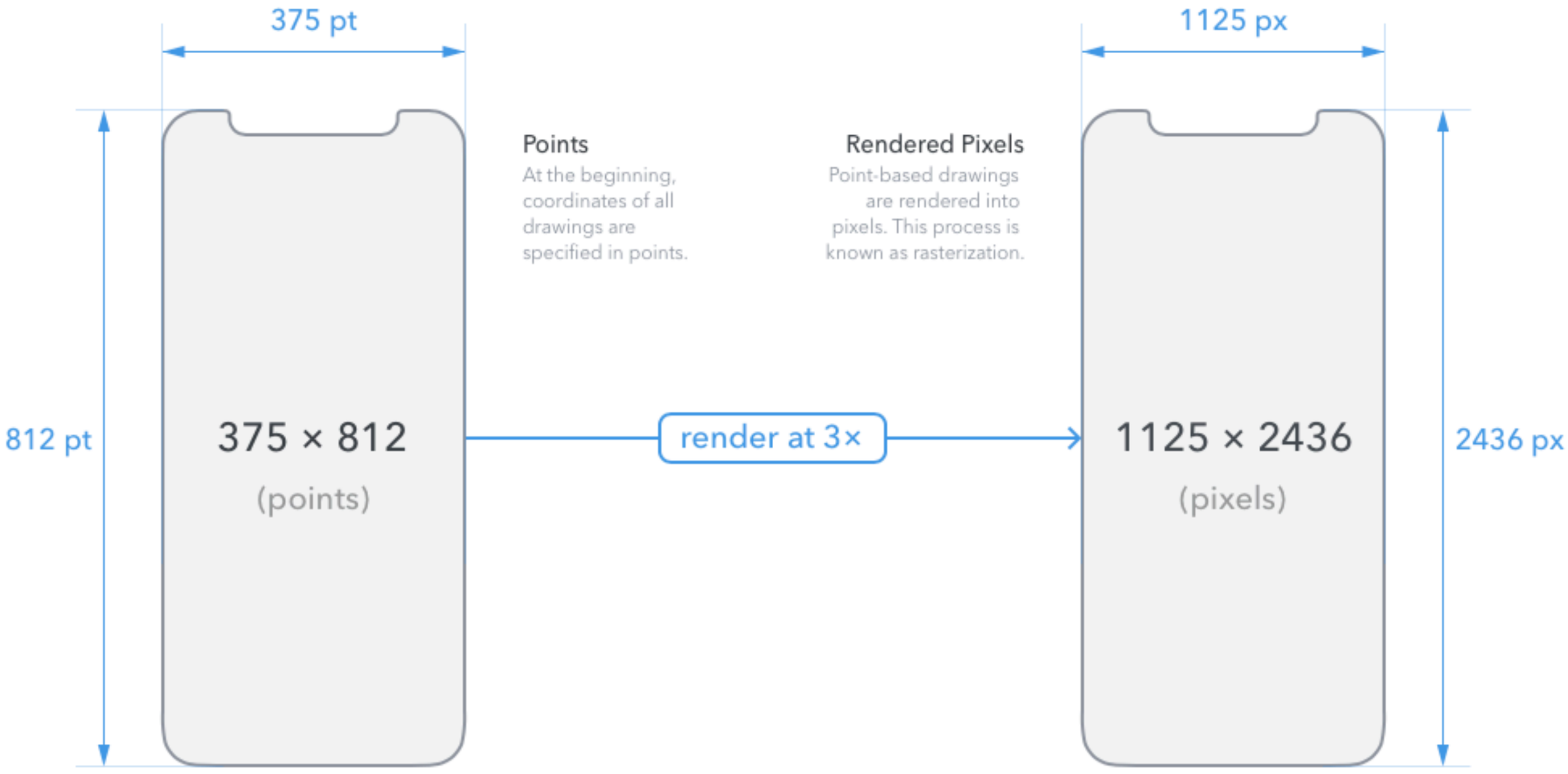
UI Guide

Giftbot

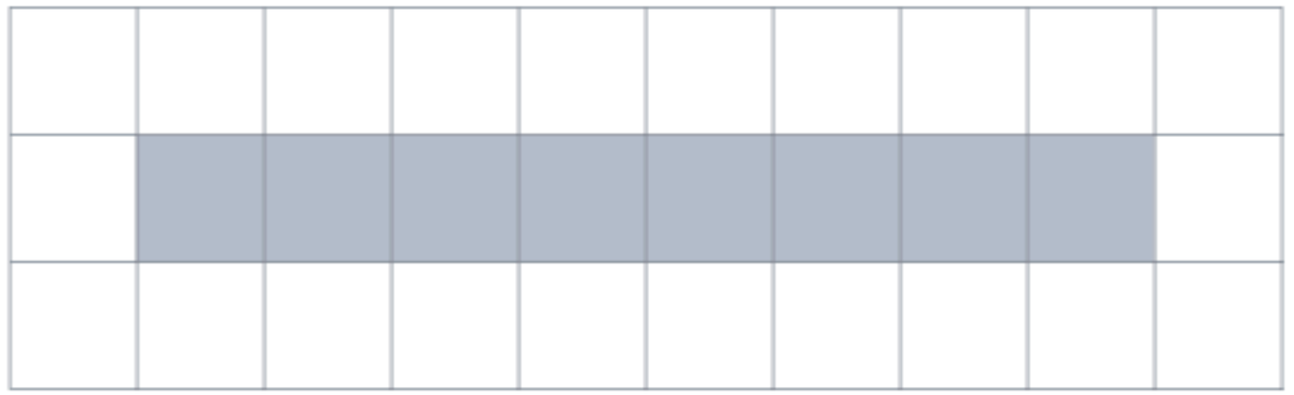
Original iPhone	iPhone 4	iPhone 5	iPhone 8	iPhone 8 Plus	iPhone X
320 x 480 points	320 x 480 points	320 x 568 points	375 x 667 points	414 x 736 points	375 x 812 points
@1x	@2x	@2x	@2x	@3x	@3x
320 x 480 pixels	640 x 960 pixels	640 x 1136 pixels	750 x 1334 pixels	Downsampled (87%) 1080 x 1920 pixels 1242 x 2208 pixels	1125 x 2436 pixels

Device	Retina	Portrait (px)	Landscape (px)
iPhone XS Max		1242 x 2688	2688 x 1242
iPhone XR		828 x 1792	1792 x 828
iPhone X, XS		1125 x 2436	2436 x 1125
iPhone 6+, 6S+, 7+, 8+		1080 x 1920	1920 x 1080
iPhone 6, 6S, 7, 8		750 x 1334	1334 x 750
iPhone 5, 6SE 5, 5S, 5C, 6SE		640 x 1136	1136 x 640
iPhone 4 4, 4S		640 x 960	960 x 640
iPhone 1st, 2nd & 3rd Generation		320 x 480	480 x 320
iPad Air / Retina iPad 1st & 2nd Generation / 3rd & 4th		1536 x 2048	2048 x 1536
iPad Pro		2048 x 2732	2732 x 2048
iPad Mini 2nd, 3rd & 4th Generation		1536 x 2048	2048 x 1536
iPad Mini, 1st & 2nd Generation		768 x 1024	1024 x 768

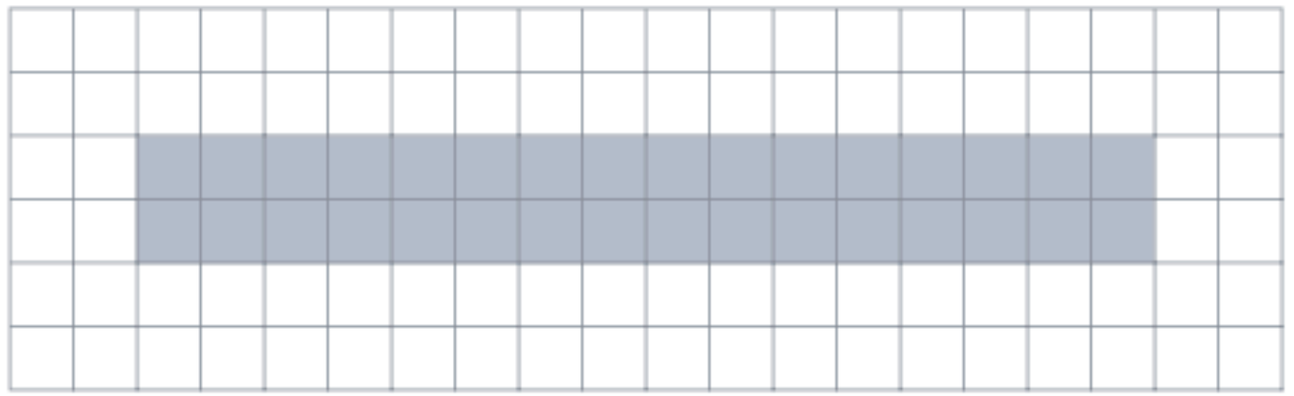
iPhone X Resolution



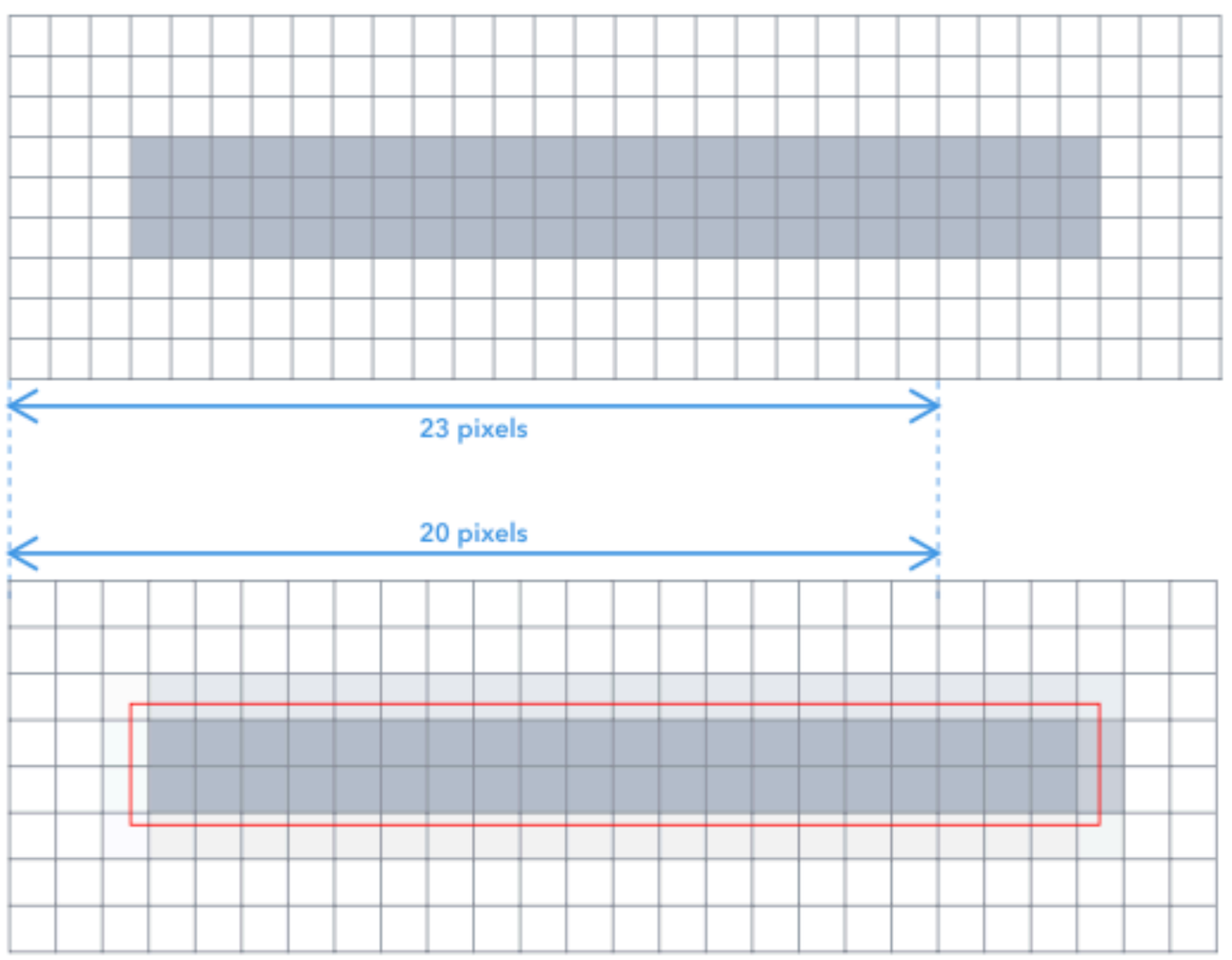
Original iPhone



iPhone 5



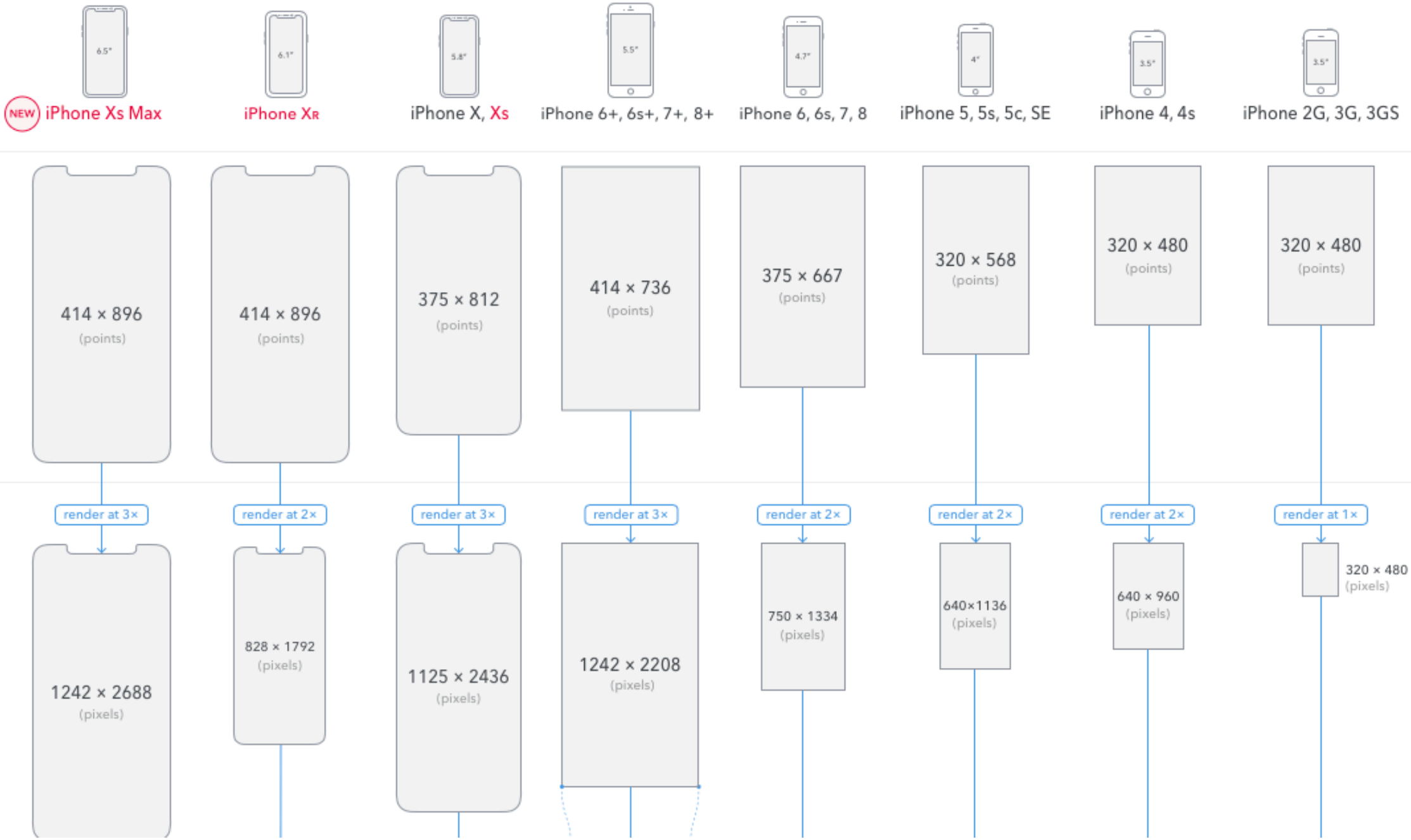
Hypothetical
Perfect 3× Display



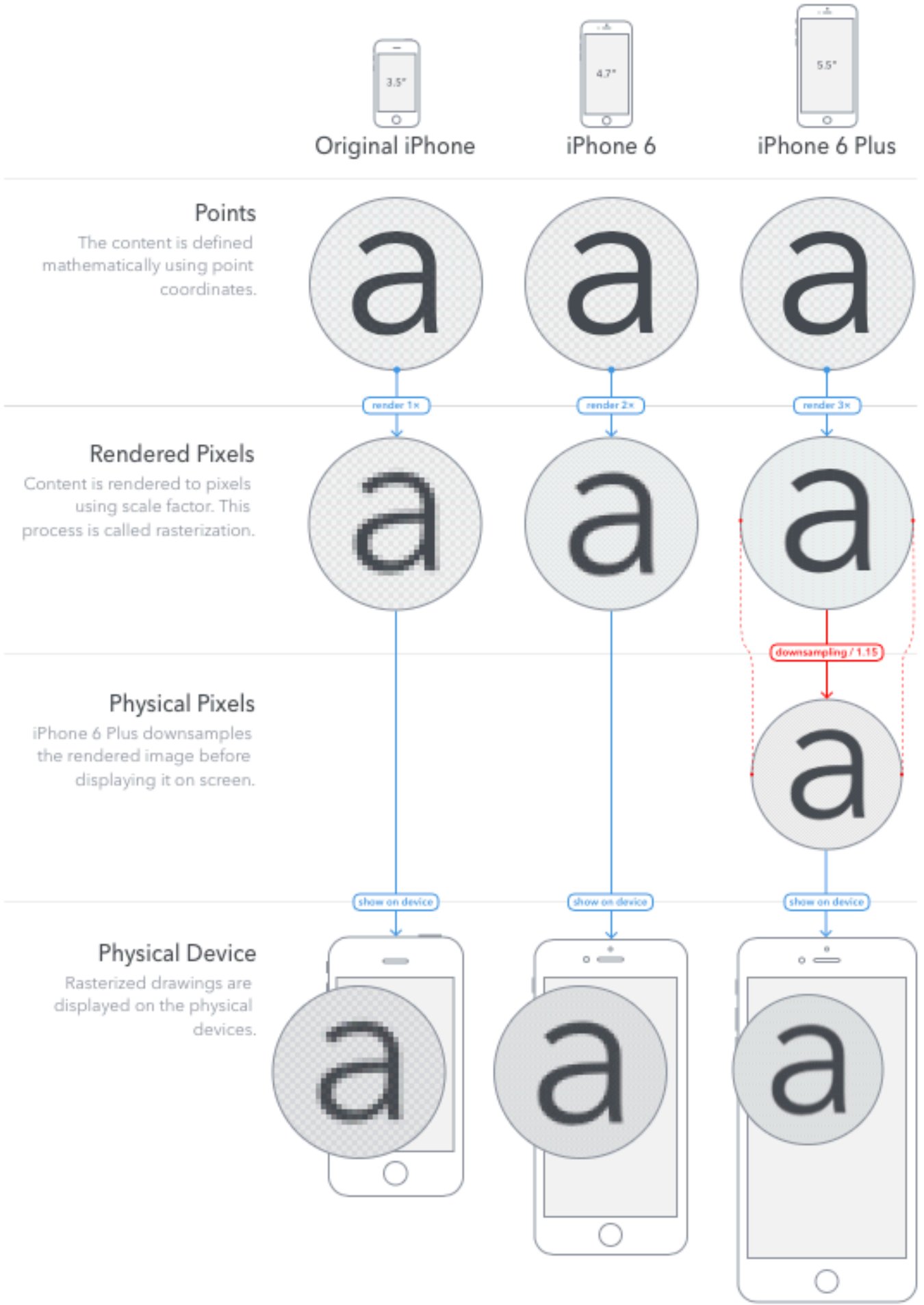
iPhone 6 Plus

iPhone Resolutions

Fast campus



https://goo.gl/vwbzQY


3.5"
4.7"
5.5"
Original iPhone
iPhone 6
iPhone 6 Plus
Points
The content is defined mathematically using point coordinates.
render 1×
render 2×
render 3×
Rendered Pixels
Content is rendered to pixels using scale factor. This process is called rasterization.
downsampling / 1.15
Physical Pixels
iPhone 6 Plus downsamples the rendered image before displaying it on screen.
show on device
show on device
show on device
Physical Device
Rasterized drawings are displayed on the physical devices.

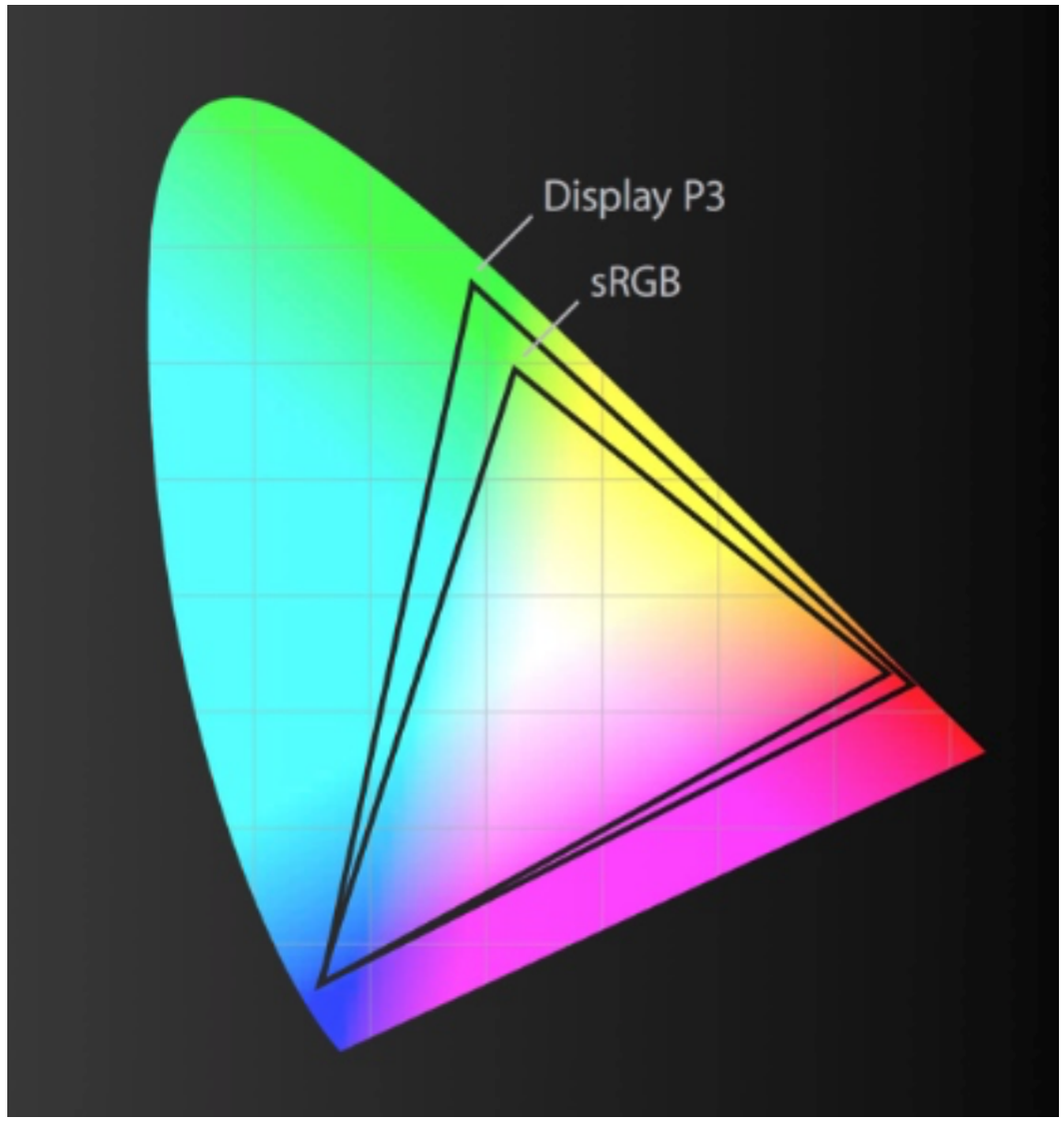
iOS Device Screen Geometry

Fast campus

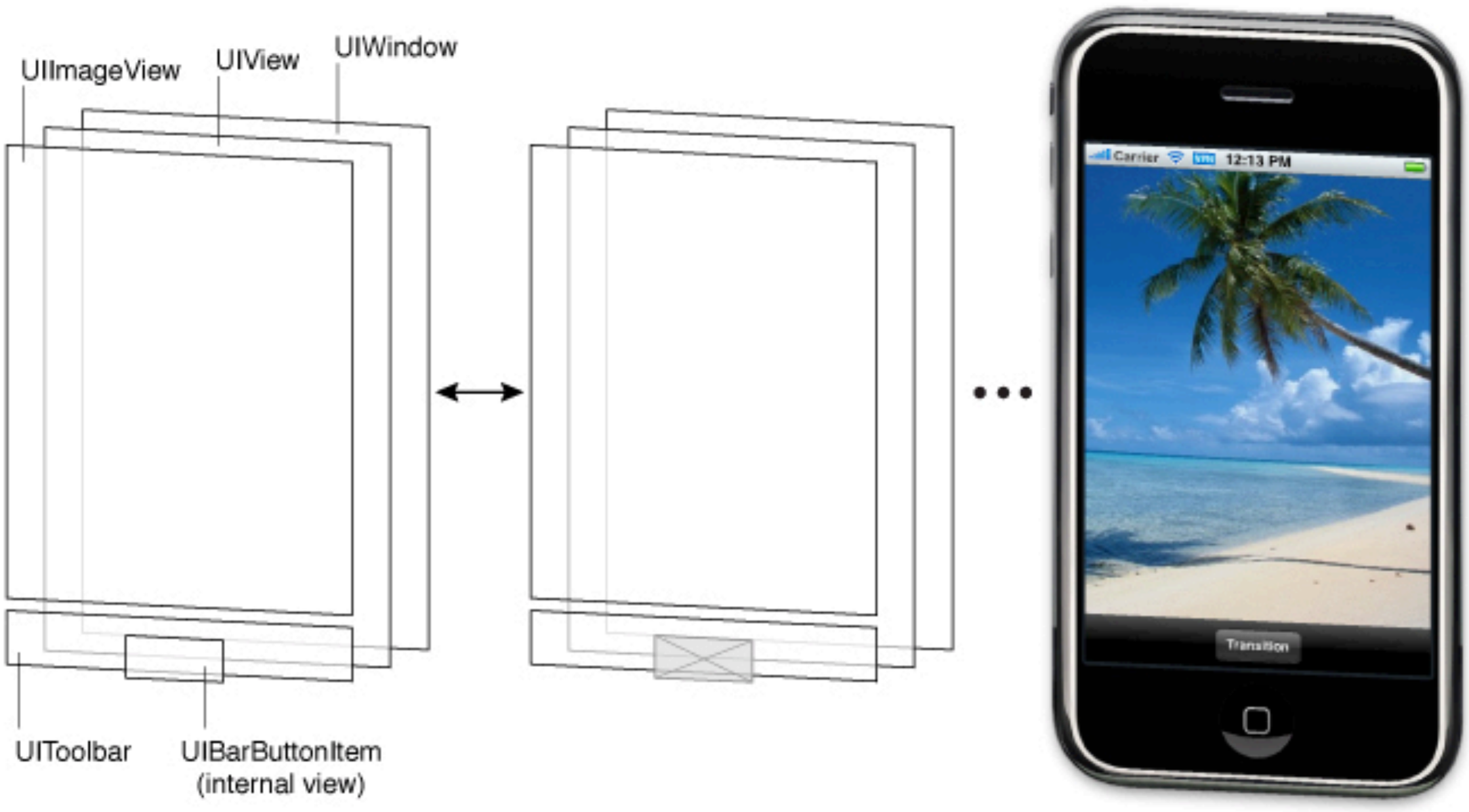
Device	Native Resolution (Pixels)	UIKit Size (Points)	Native Scale factor	UIKit Scale factor
iPhone X	1125 x 2436	375 x 812	3.0	3.0
iPhone 8 Plus	1080 x 1920	414 x 736	2.608	3.0
iPhone 8	750 x 1334	375 x 667	2.0	2.0
iPhone 7 Plus	1080 x 1920	414 x 736	2.608	3.0
iPhone 6s Plus	1080 x 1920	375 x 667	2.608	3.0
iPhone 6 Plus	1080 x 1920	375 x 667	2.608	3.0
iPhone 7	750 x 1334	375 x 667	2.0	2.0
iPhone 6s	750 x 1334	375 x 667	2.0	2.0
iPhone 6	750 x 1334	375 x 667	2.0	2.0
iPhone SE	640 x 1136	320 x 568	2.0	2.0
iPad Pro 12.9-inch (2nd generation)	2048 x 2732	1024 x 1366	2.0	2.0
iPad Pro 10.5-inch	2224 x 1668	1112 x 834	2.0	2.0
iPad Pro (12.9-inch)	2048 x 2732	1024 x 1366	2.0	2.0
iPad Pro (9.7-inch)	1536 x 2048	768 x 1024	2.0	2.0
iPad Air 2	1536 x 2048	768 x 1024	2.0	2.0
iPad Mini 4	1536 x 2048	768 x 1024	2.0	2.0

Color Reproduction

Device	Native Color Space	TrueTone Display
iPhone X	Display P3	Yes
iPhone 8 Plus	Display P3	Yes
iPhone 8	Display P3	Yes
iPhone 7 Plus	Display P3	No
iPhone 7	Display P3	No
iPhone 6s Plus	sRGB	No
iPhone 6s	sRGB	No
iPhone SE	sRGB	No
iPhone 6 Plus	sRGB	No
iPhone 6	sRGB	No
iPad Mini 4	sRGB	No
iPad Air 2	sRGB	No
iPad Pro 12.9-inch (2nd generation)	Display P3	Yes
iPad Pro 10.5-inch	Display P3	Yes
iPad Pro (12.9-inch)	sRGB	No
iPad Pro (9.7-inch)	Display P3	Yes

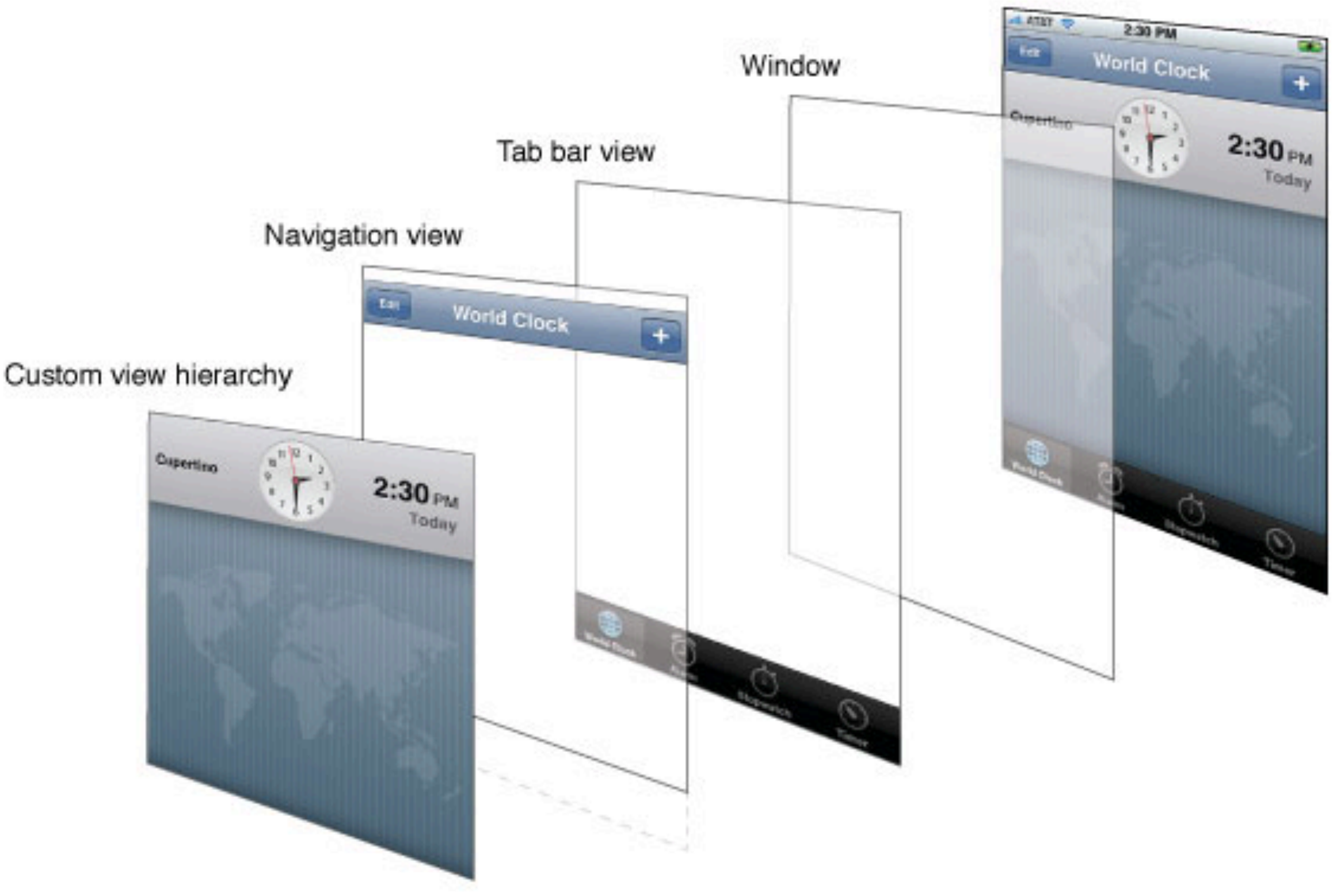


Architecture of the views

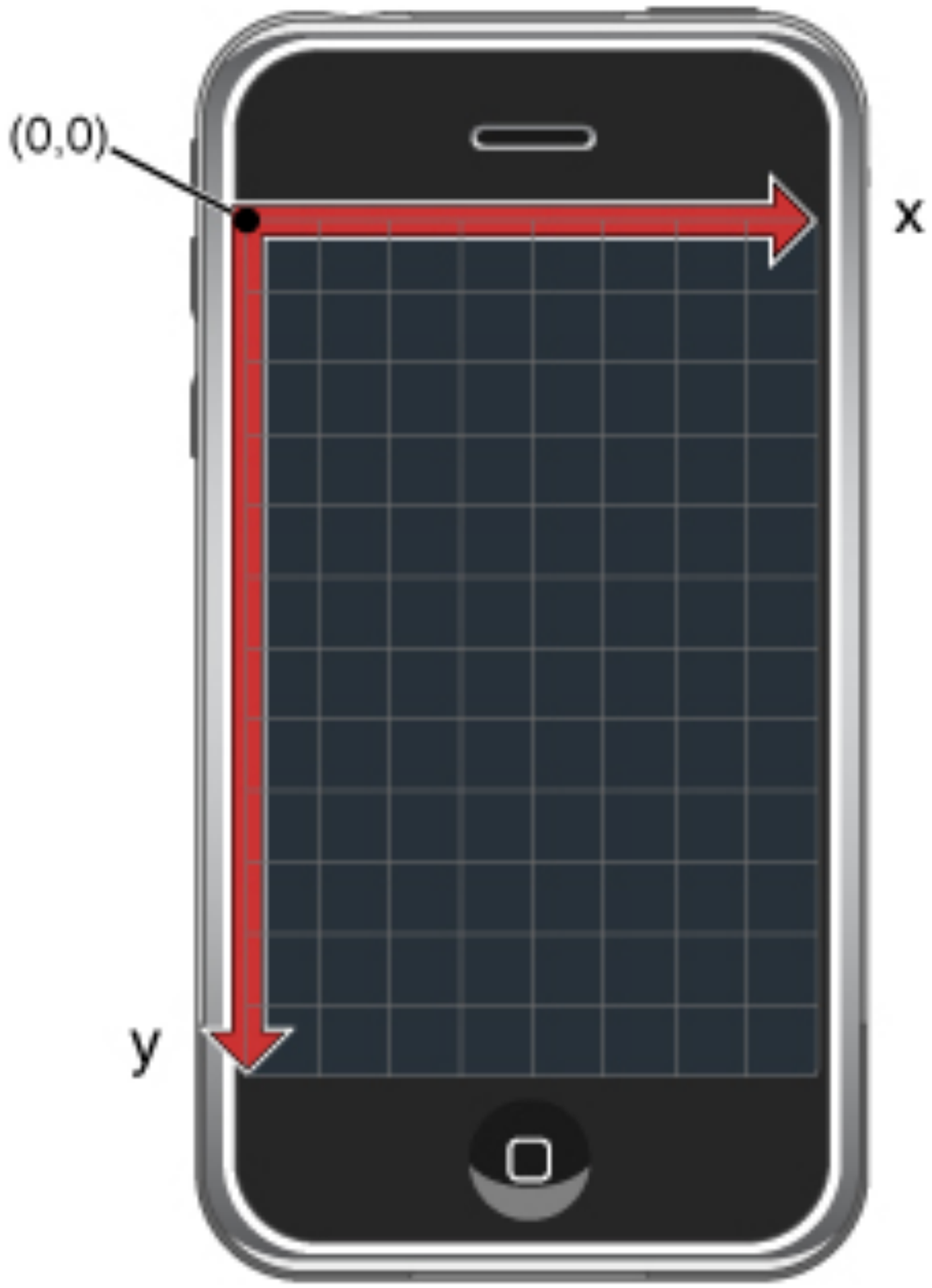


UIKit views **Core Animation layers**

Layered views

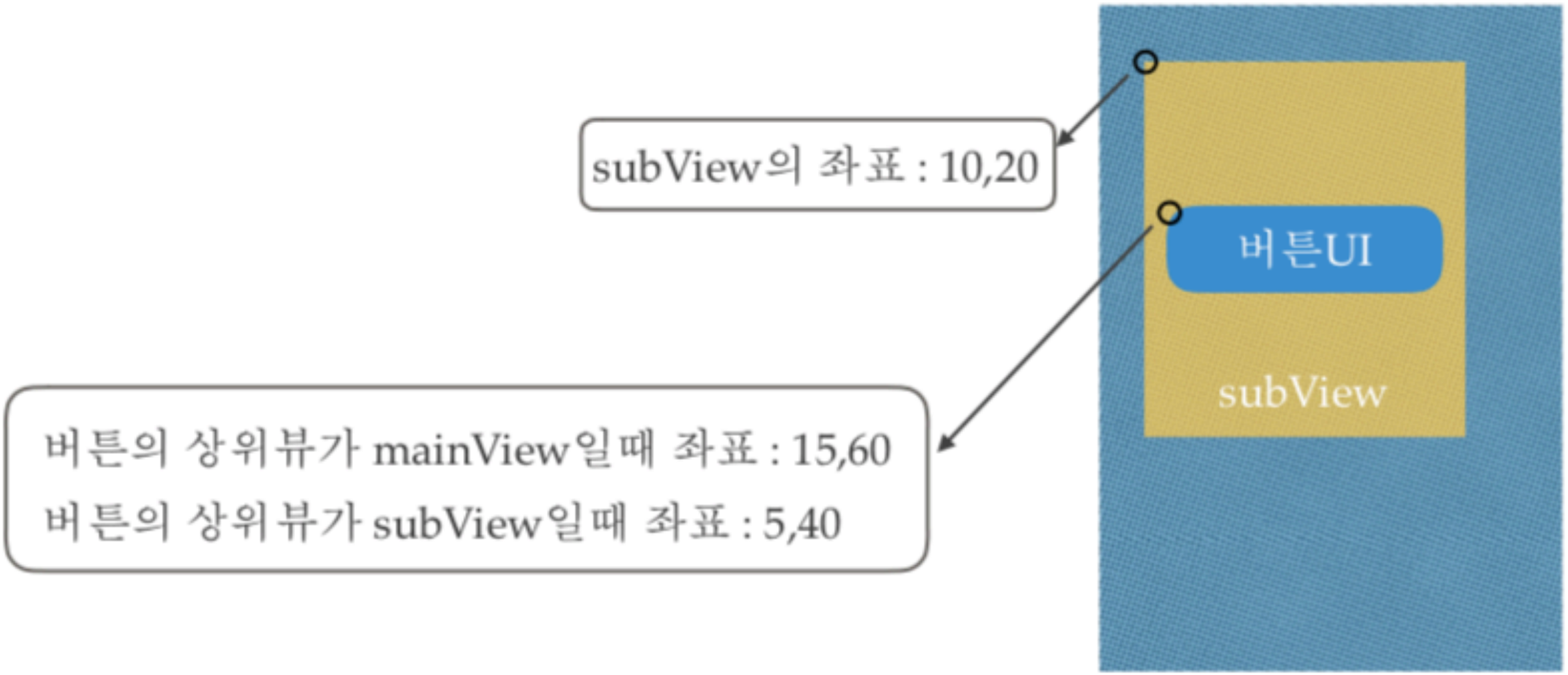


Coordinate system orientation



View Frame

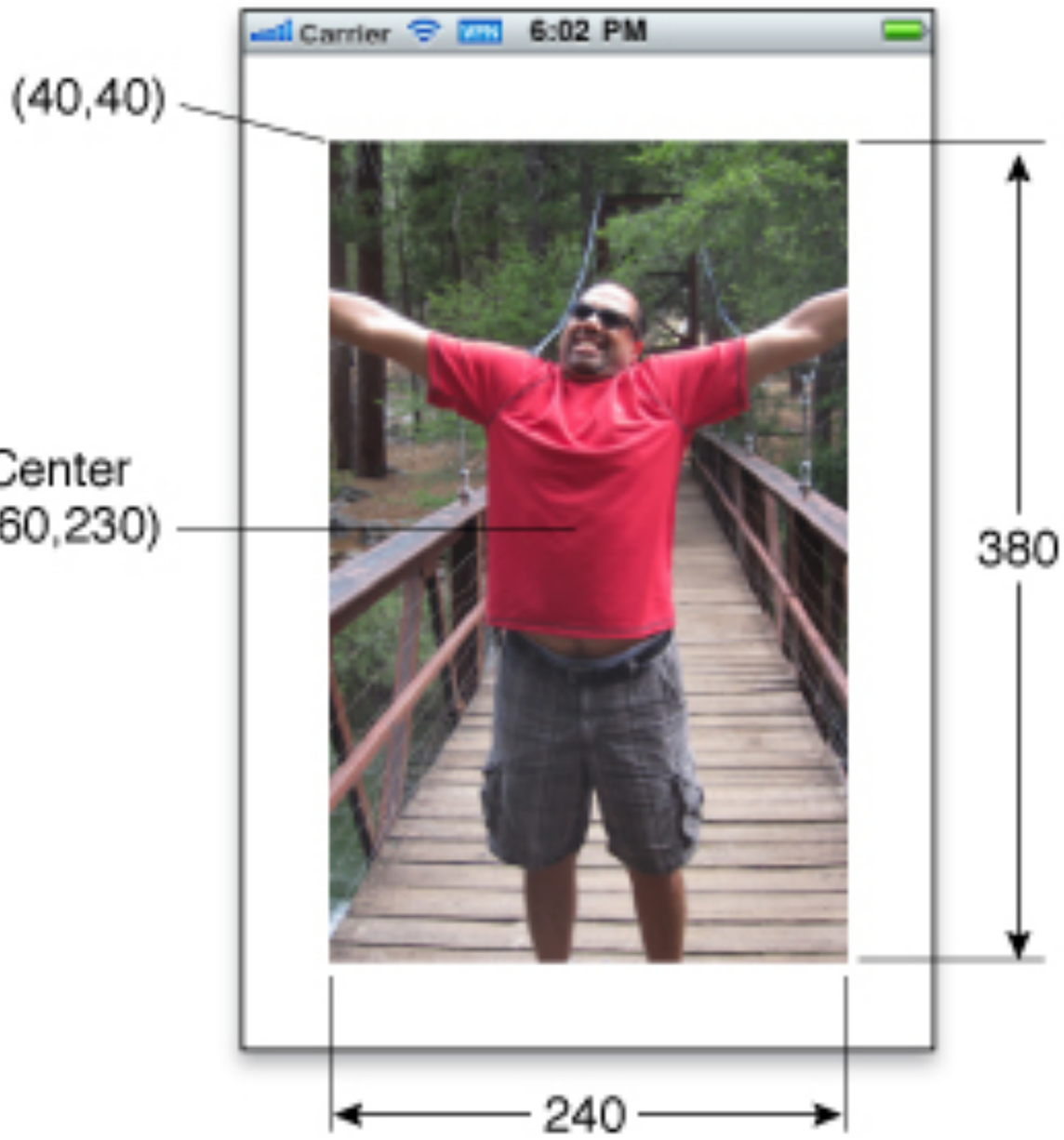
View Frame 의 좌표는 상위뷰를 기준으로 결정

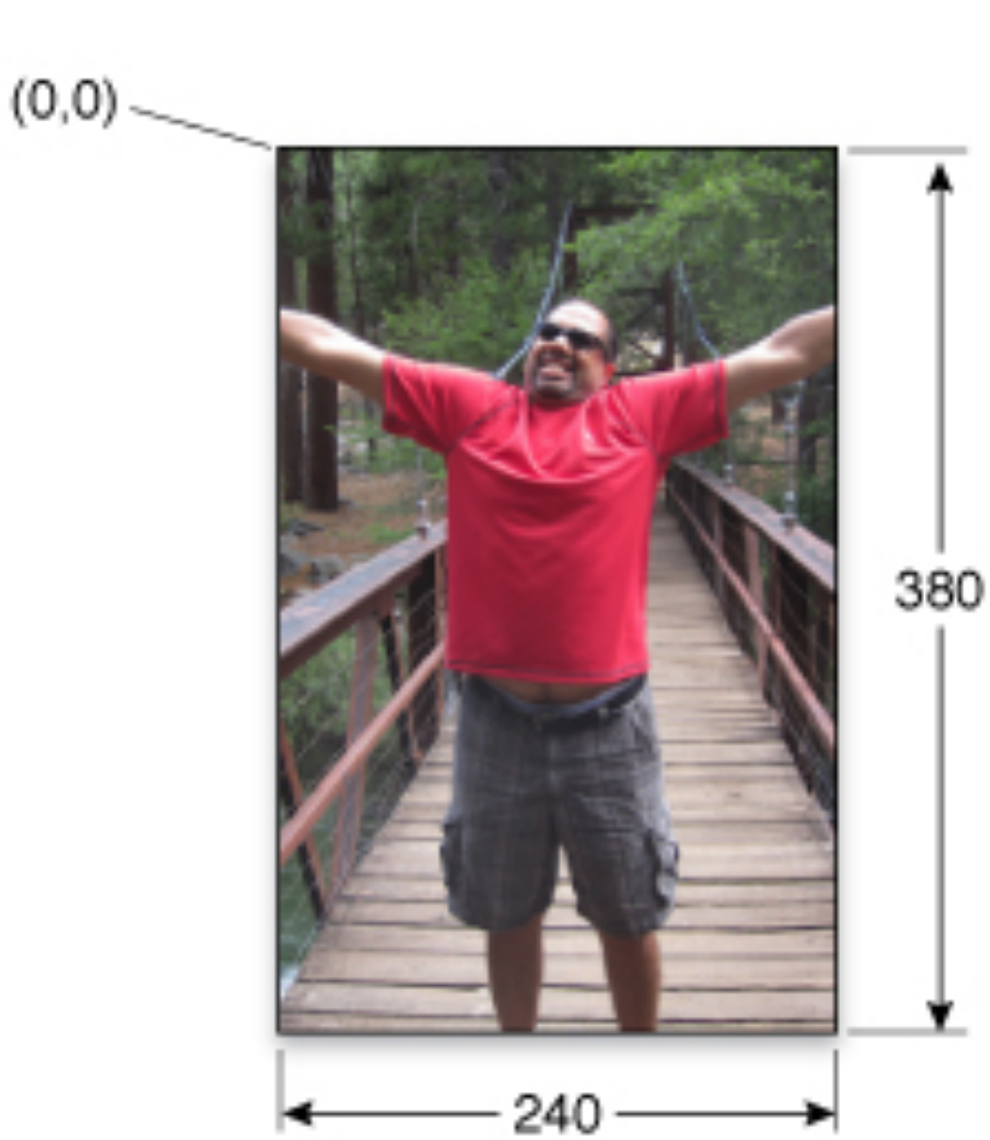


Frame and Bounds

상위 뷰로부터 얼마만큼 떨어져있는지

이미지 스스로가 기준값으로

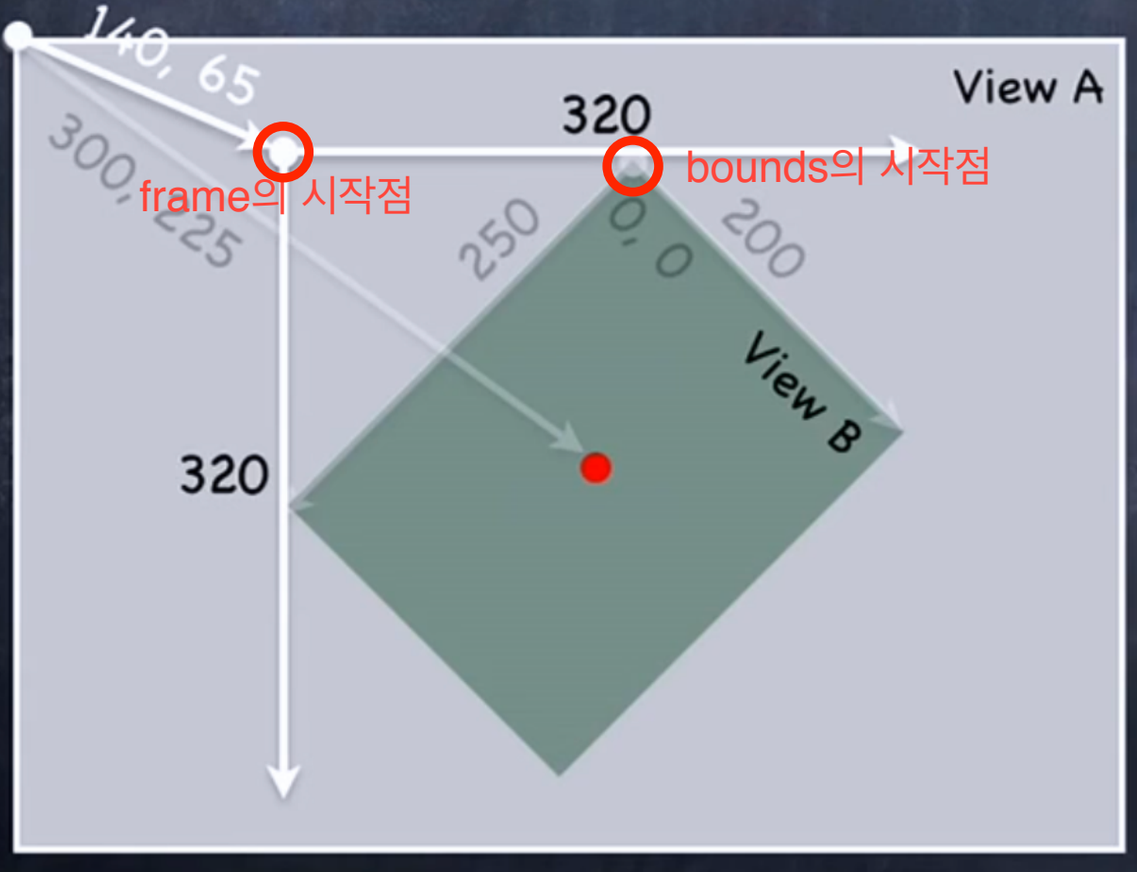




Frame and Bounds

bounds vs frame

- Use `frame` and/or `center` to position a `UIView`
  - These are never used to draw inside a view's coordinate system
  - You might think `frame.size` is always equal to `bounds.size`, but you'd be wrong …



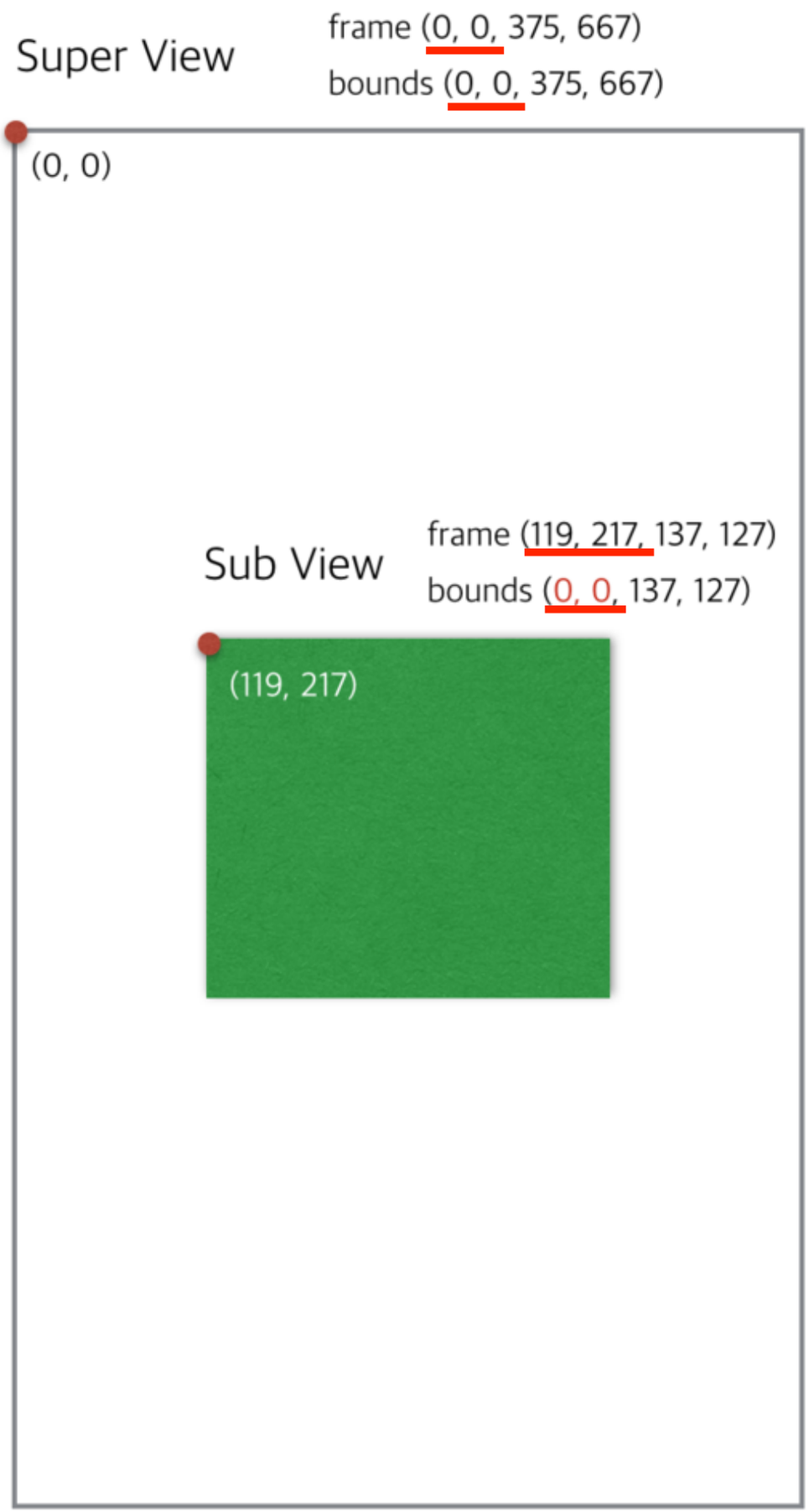
Views can be rotated (and scaled and translated)

```
View B's bounds = ((0,0),(200,250))
View B's frame = ((140,65),(320,320))
View B's center = (300,225)
```

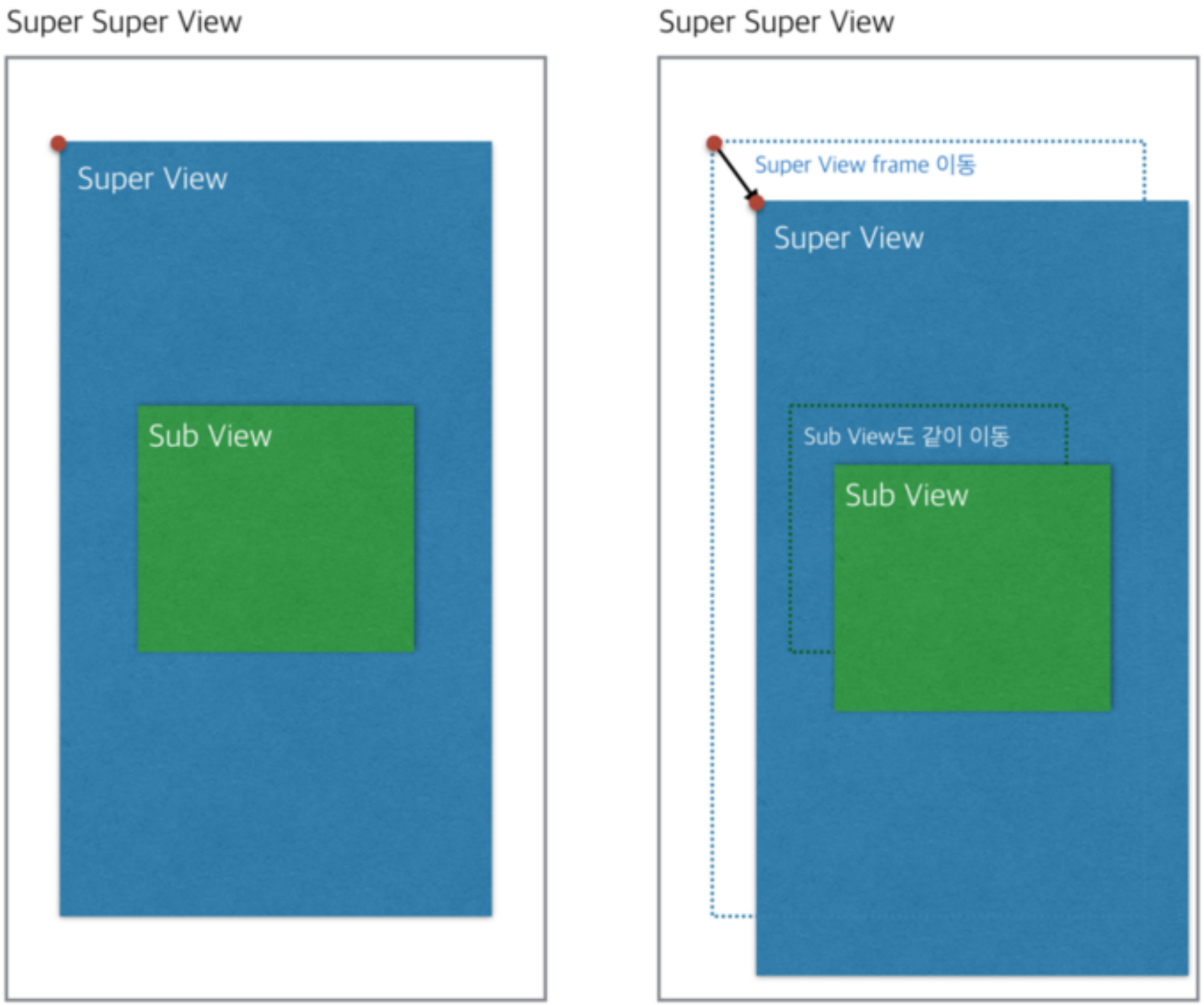
View B's middle in its own coordinates is …
`(bounds.midX, bounds.midY) = (100, 125)`

Views are rarely rotated, but don't misuse `frame` or `center` anyway by assuming that.

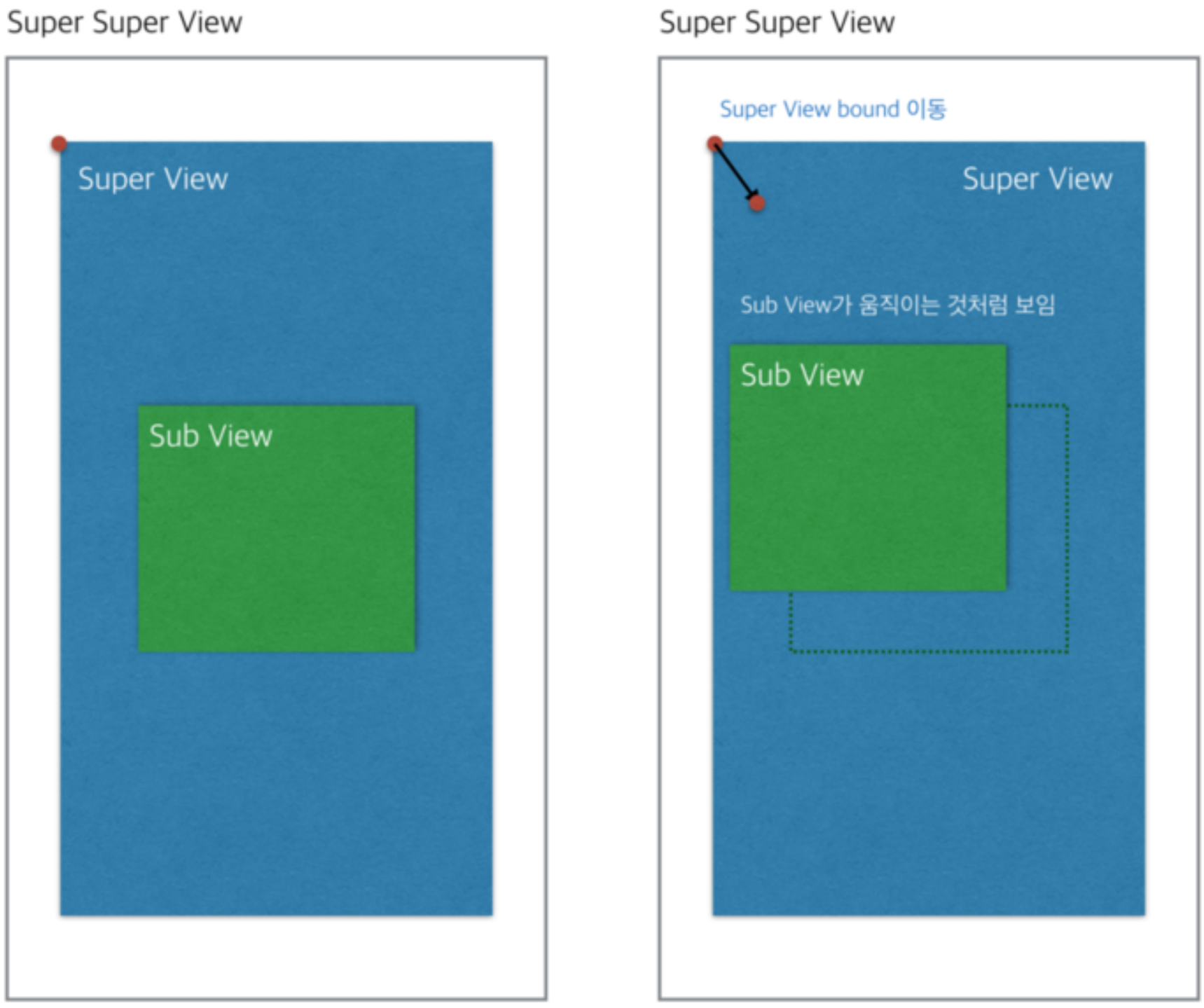
CS193p
Spring 2016


Super View
frame (0, 0, 375, 667)
bounds (0, 0, 375, 667)
(0, 0)
Sub View
frame (119, 217, 137, 127)
bounds (0, 0, 137, 127)
(119, 217)

Frame


Super Super View
Super View
Sub View
Super Super View
Super View frame 이동
Super View
Sub View도 같이 이동
Sub View

Bounds


Super Super View
Super View
Sub View
Super Super View
Super View bound 이동
Super View
Sub View가 움직이는 것처럼 보임
Sub View

UIViewContentMode

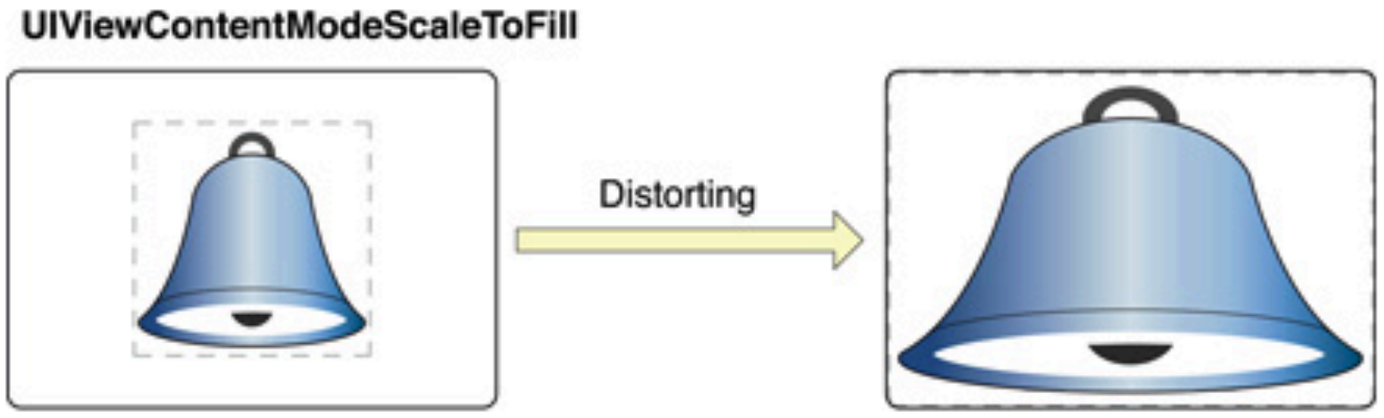
```
public enum UIViewContentMode : Int {
  case scaleToFill
  case scaleAspectFit
  case scaleAspectFill

  case redraw

  case center
  case top
  case bottom
  case left
  case right
  case topLeft
  case topRight
  case bottomLeft
  case bottomRight
}
```

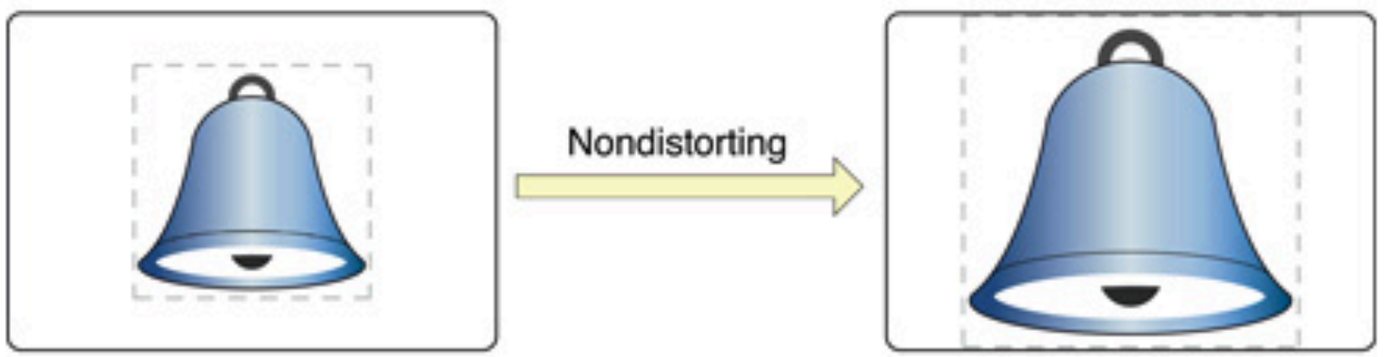
Scailing

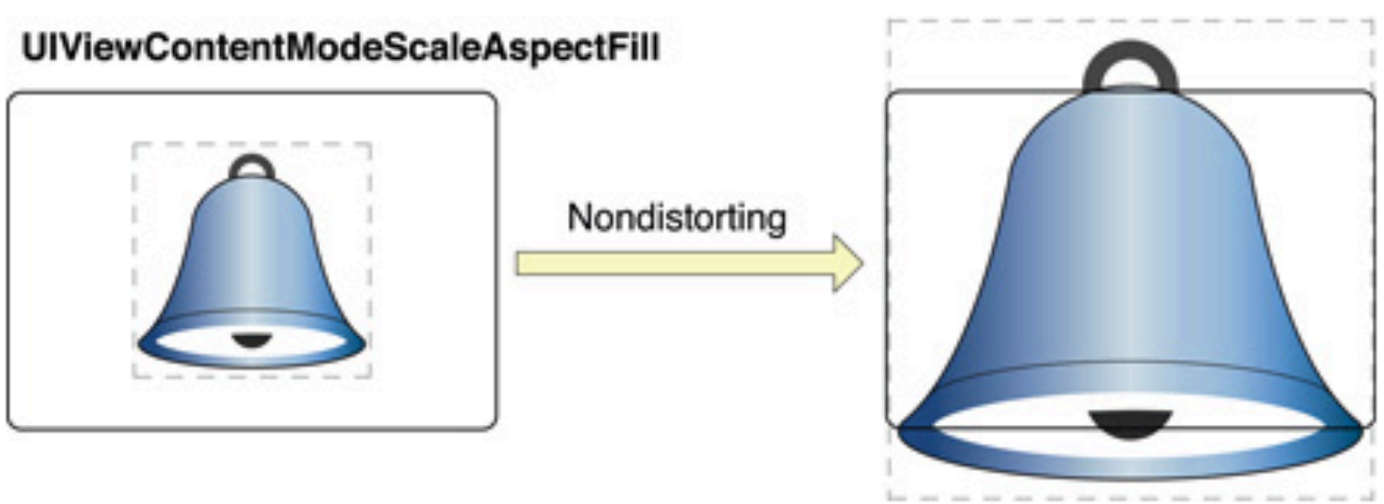
Redrawing

Positioning

Scaling


UIViewContentModeScaleToFill
Distorting


UIViewContentModeScaleAspectFit
Nondistorting

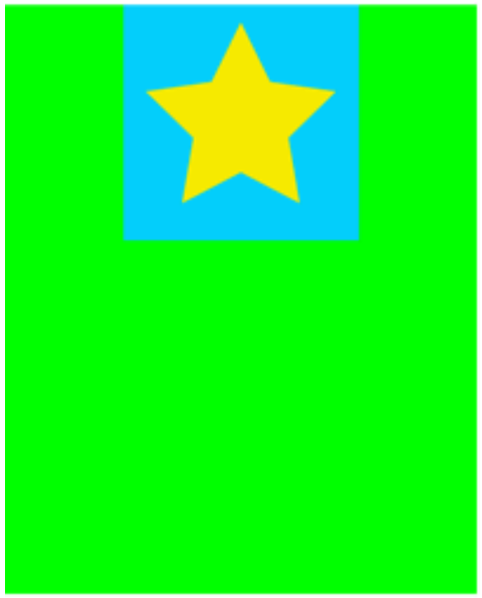

UIViewContentModeScaleAspectFill
Nondistorting

Redrawing

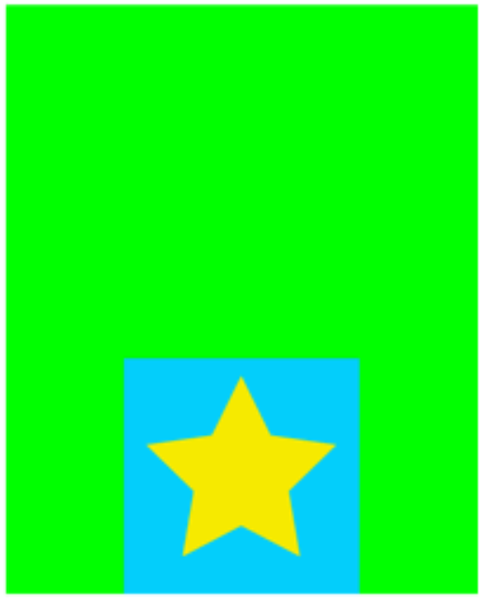
- View 의 크기가 변경될 때마다 setNeedsDisplay() 메서드를 호출하여 연관 컨텐츠를 항상 다시 그리게 하는 것
- draw(_:) 메서드에 별도의 그리기 작업이 들어가고 크기에 영향을 받을 경우 설정
- 크기 변경시마다 매번 다시 그려야 하므로 성능상으로는 좋지 않은 영향

Positioning

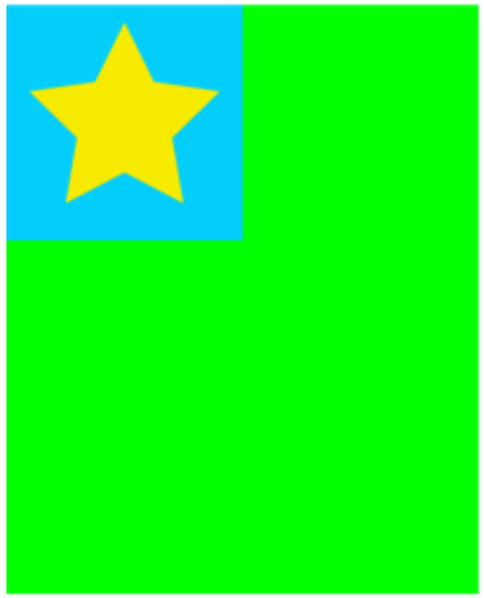
.Center



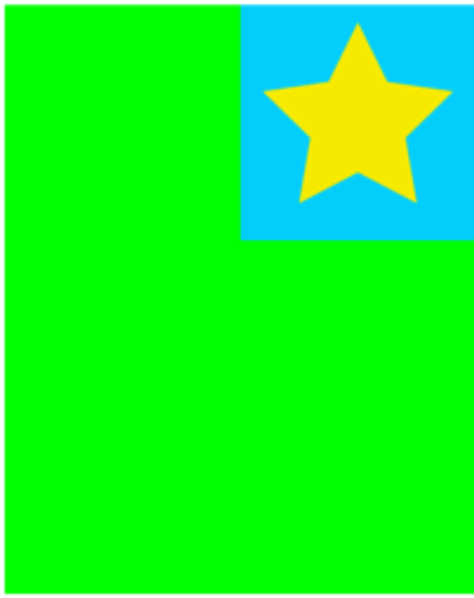
.Top



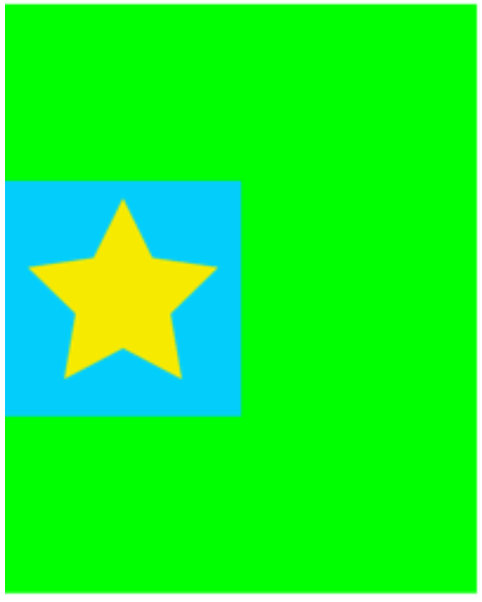
.Bottom



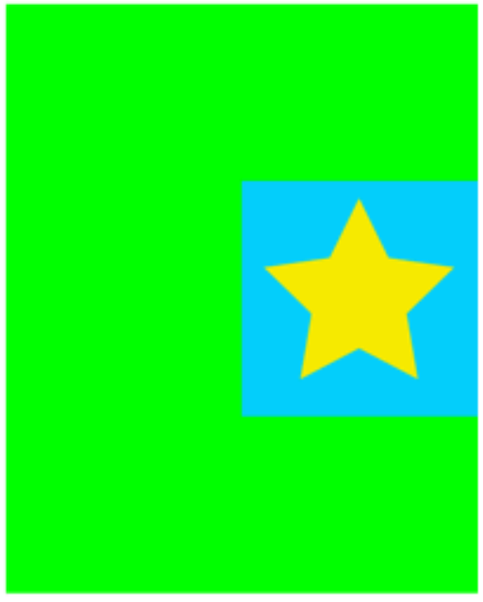
.TopLeft



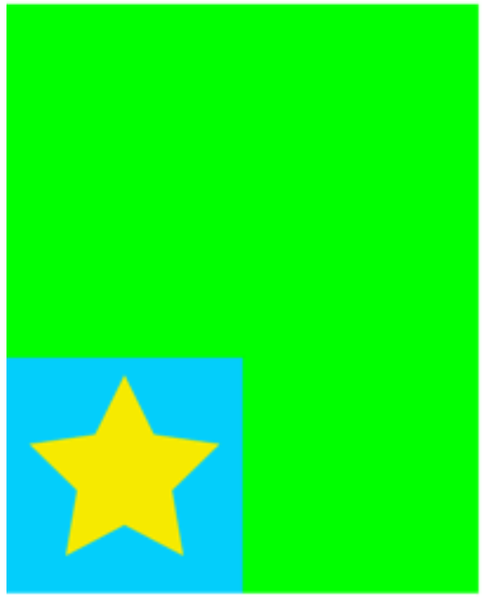
.TopRight



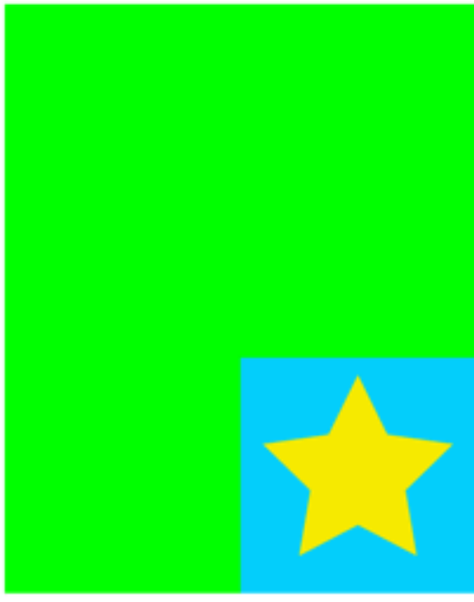
.Left



.Right



.BottomLeft



.BottomRight