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# CAKeyframeAnimation Class Reference

[Graphics & Imaging](#) > Quartz



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# CAKeyframeAnimation Class Reference

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|-------------------------|---|
| <b>Inherits from</b>    | CAPropertyAnimation : CAAnimation : NSObject  |
| <b>Conforms to</b>      | NSCoding (CAAnimation)<br>NSCopying (CAAnimation)<br>CAAction (CAAnimation)<br>CAMediaTiming (CAAnimation)<br>NSObject (NSObject) |
| <b>Framework</b>        | /System/Library/Frameworks/QuartzCore.framework   |
| <b>Availability</b>     | Available in Mac OS X v10.5 and later.  |
| <b>Declared in</b>      | CAAnimation.h   |
| <b>Companion guides</b> | Core Animation Programming Guide<br>Core Animation Cookbook   |

## Overview

`CAKeyframeAnimation` provides generic keyframe animation capabilities for a layer property in the render tree. You create an `CAKeyframeAnimation` instance using the inherited `animationWithKeyPath:` method, specifying the key path of the property updated in the render tree during the animation. The animation provides a series of keyframe values, either as an array or a series of points in a `CGPathRef`. While animating, it updates the value of the property in the render tree with values calculated using the specified interpolation calculation mode.

## Tasks

### Providing Keyframe Values

[path](#) (page 7) *property*

An optional `CGPathRef` that provides the keyframe values for the receiver.

[values](#) (page 8) *property*

An array of objects that provide the keyframe values for the receiver.

## Keyframe Timing

[keyTimes](#) (page 6) *property*

An optional array of `NSNumber` objects that define the duration of each keyframe segment.

[timingFunctions](#) (page 8) *property*

An optional array of `CAMediaTimingFunction` instances that defines the pacing of the each keyframe segment.

[calculationMode](#) (page 6) *property*

Specifies how intermediate keyframe values are calculated by the receiver.

## Rotation Mode

[rotationMode](#) (page 7) *property*

Determines whether objects animating along the path rotate to match the path tangent.

## Properties

For more about Objective-C properties, see “Properties” in *The Objective-C 2.0 Programming Language*.

### calculationMode

Specifies how intermediate keyframe values are calculated by the receiver.

```
@property(copy) NSString *calculationMode
```

#### Discussion

The possible values are described in “Value calculation modes” (page 9). The default is `kCAAnimationLinear` (page 9).

#### Availability

Available in Mac OS X v10.5 and later.

#### Declared In

`CAAnimation.h`

### keyTimes

An optional array of `NSNumber` objects that define the duration of each keyframe segment.

```
@property(copy) NSArray *keyTimes
```

#### Discussion

Each value in the array is a floating point number between 0.0 and 1.0 and corresponds to one element in the values array. Each element in the `keyTimes` array defines the duration of the corresponding keyframe value as a fraction of the total duration of the animation. Each element value must be greater than, or equal to, the previous value.

The appropriate values in the `keyTimes` array are dependent on the `calculationMode` (page 6) property.

- If the `calculationMode` is set to `kCAAnimationLinear`, the first value in the array must be 0.0 and the last value must be 1.0. Values are interpolated between the specified keytimes.
- If the `calculationMode` is set to `kCAAnimationDiscrete`, the first value in the array must be 0.0.
- If the `calculationMode` is set to `kCAAnimationPaced`, the `keyTimes` array is ignored.

If the values in the `keyTimes` array are invalid or inappropriate for the `calculationMode`, the `keyTimes` array is ignored.

#### Availability

Available in Mac OS X v10.5 and later.

#### Declared In

`CAAnimation.h`

## path

An optional `CGPathRef` that provides the keyframe values for the receiver.

```
@property CGPathRef path;
```

#### Discussion

Defaults to `nil`. Specifying a path overrides the `values` (page 8) property. Each point in the path, except for moveto points, defines a single keyframe segment for the purpose of timing and interpolation. For constant velocity animation along the path, `calculationMode` (page 6) should be set to `kCAAnimationPaced` (page 9).

#### Availability

Available in Mac OS X v10.5 and later.

#### See Also

[@property rotationMode](#) (page 7)

#### Declared In

`CAAnimation.h`

## rotationMode

Determines whether objects animating along the path rotate to match the path tangent.

```
@property(copy) NSString *rotationMode
```

#### Discussion

Possible values are described in “[Rotation Mode Values](#)” (page 8). The default is `nil`, which indicates that objects should not rotate to follow the path.

The effect of setting this property to a non-`nil` value when no path object is supplied is undefined.

#### Availability

Available in Mac OS X v10.5 and later.

**See Also**[@property path](#) (page 7)**Declared In**

CAAnimation.h

**timingFunctions**

An optional array of `CMediaTimingFunction` instances that defines the pacing of the each keyframe segment.

```
@property(copy) NSArray *timingFunctions
```

**Discussion**

If the receiver defines  $n$  keyframes, there must be  $n-1$  objects in the `timingFunctions` array. Each timing function describes the pacing of one keyframe to keyframe segment.

**Special Considerations**

The inherited `timingFunction` value is always ignored.

**Availability**

Available in Mac OS X v10.5 and later.

**Declared In**

CAAnimation.h

**values**

An array of objects that provide the keyframe values for the receiver.

```
@property(copy) NSArray *values
```

**Discussion**

The `values` property is ignored when the [path](#) (page 7) property is used.

**Availability**

Available in Mac OS X v10.5 and later.

**Declared In**

CAAnimation.h

## Constants

**Rotation Mode Values**

These constants are used by the [rotationMode](#) (page 7) property.



```
NSString * const kCAAnimationRotateAuto  
NSString * const kCAAnimationRotateAutoReverse
```

### Constants

`kCAAnimationRotateAuto`

The objects travel on a tangent to the path.

Available in Mac OS X v10.5 and later.

Declared in `CAAnimation.h`.

`kCAAnimationRotateAutoReverse`

The objects travel at a 180 degree tangent to the path.

Available in Mac OS X v10.5 and later.

Declared in `CAAnimation.h`.

### Declared In

`CAAnimation.h`

## Value calculation modes

These constants are used by the `calculationMode` (page 6) property.

```
NSString * const kCAAnimationLinear;  
NSString * const kCAAnimationDiscrete;  
NSString * const kCAAnimationPaced;
```

### Constants

`kCAAnimationLinear`

Simple linear calculation between keyframe values.

Available in Mac OS X v10.5 and later.

Declared in `CAAnimation.h`.

`kCAAnimationDiscrete`

Each keyframe value is used in turn, no interpolated values are calculated.

Available in Mac OS X v10.5 and later.

Declared in `CAAnimation.h`.

`kCAAnimationPaced`

Keyframe values are interpolated to produce an even pace throughout the animation. This mode is not currently implemented

Available in Mac OS X v10.5 and later.

Declared in `CAAnimation.h`.

### Declared In

`CAAnimation.h`



# Document Revision History

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This table describes the changes to *CAKeyframeAnimation Class Reference*.

| Date       | Notes   |
|------------|---|
| 2007-07-24 | New document that describes the class that provides keyframe interpolation of a layer property. |

## REVISION HISTORY

### Document Revision History

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