Chapter 1: Application containers

Adobe® Flex® defines the Spark Application and Halo Application containers that let you start adding content to your application without having to explicitly define another container.

The application containers support an application preloader that uses a progress bar to show the download progress of an application SWF file. You can override the default progress bar to define your own custom progress bar. For more information, see "Showing the download progress of an application" on page 14.

About the Application container

The first tag in an MXML application is either the `<s:Application>` tag for the Spark application container, or the `<mx:Application>` tag for a Halo application container. The application container then becomes the default container for any content that you add to your application.

The application object, of type spark.components.Application or mx.core.Application, is the default scope for any ActionScript code in the file. Therefore, the ActionScript keyword `this` refers to the application object.

You also use the application container to define the initial size of the application. By default, the application sets its height to 375 pixels and its width to 500 pixels.

Although you might find it convenient to use an application container as the only container in your application, usually you explicitly define at least one more container before you add any controls to your application. For example, you might use a Panel container as the first child container of the application.

The application containers have the following default layout characteristics:

Characteristic	Spark Application container	Halo Application container
Default size	375 pixels high and 500 pixels wide in the Standalone Flash Player, and all available space in a browser.	375 pixels high and 500 pixels wide in the Standalone Flash Player, and all available space in a browser.
Child layout	BasicLayout, meaning that you have to explicitly size and position all children.	Vertical column arrangement of children centered in the Application container.
Default padding	0 pixels.	24 pixels for the `paddingTop`, `paddingBottom`, `paddingLeft`, and `paddingRight` properties.
Scroll bars	Added by skinning the container.	Built into the container.

Sizing an application container and its children

You can set the height and width of an application container by using explicit pixel values or by using percentage values, where the percentage values are relative to the size of the browser window. By default, the application container sets its height to 375 pixels and its width to 500 pixels in the Standalone Flash Player, and sizes itself to use all available space in a browser.

The following example sets the size of the Application container to one-half of the width and height of the browser window:

```
<?xml version="1.0"?>
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    height="50%" width="50%">
    ...
</Application>
```

The advantage of using percentages to specify the size is that Flex can resize your application as the user resizes the browser window. Flex maintains the application container size as a percentage of the browser window as the user resizes it.

If you set the `width` and `height` properties of the child components to percentage values, your components can also resize as your application resizes, as the following example shows:

```
<?xml version="1.0"?>
<!-- containers\application\AppSizePercent.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    width="100%" height="100%">

    <s:layout>
        <s:VerticalLayout/>
    </s:layout>
    <s:Panel title="Main Application" width="100%" height="100%">
        <mx:HDividedBox width="100%" height="100%">
            <s:TextArea text="TA1" width="50%" height="100%"/>
            <mx:VDividedBox width="50%" height="100%">
                <s:TextArea text="TA2" width="100%" height="75%"/>
                <s:TextArea text="TA3" width="100%" height="75%"/>
            </mx:VDividedBox>
        </mx:HDividedBox>
    </s:Panel>
</s:Application>
```

The following example uses explicit pixel values to size the application container:

```
<?xml version="1.0"?>
<!-- containers\application\AppSizePixel.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    width="200" height="150">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <mx:Panel title="Main Application">
        <mx:TextInput id="mytext" text="Hello"/>
        <mx:Button id="mybutton" label="Get Weather"/>
    </mx:Panel>
</s:Application>
```

If you want to set a child container to fill the entire application container, the easiest method is to set the child's `width` and `height` properties to 100% in MXML. In ActionScript, set the `percentWidth` and `percentHeight` properties to 100.

Because the Spark Application container defines 0 pixels of padding around its content area, a child sized to 100% fills the entire area of the container. In the following example, the child VBox container fills the entire application container:

```
<?xml version="1.0"?>
<!-- containers\application\AppNoPadding.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    width="100%" height="100%">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <mx:VBox width="100%" height="100%" backgroundColor="#A9C0E7">
        <!-- ... -->
    </mx:VBox>
</s:Application>
```

The Halo Application container defines 24 pixels of padding around all four sides of its content area. Therefore, if you want a child to occupy the entire area of the Application container, set the container's padding properties (`paddingTop`, `paddingBottom`, `paddingLeft`, `paddingRight`) to 0.

Using scroll bars with the application container

The Halo Application container has built in support for scroll bars. Therefore, if the children of the Application container are sized or positioned such that some or all the component is outside the visible area of the Application container, Flex adds scroll bars to the container.

In the following example, the VBox container in the Halo Application container is larger than the available space within the Application container, which results in scroll bars:

```
<?xml version="1.0"?>
<!-- containers\application\AppVBoxSizeScroll.mxml -->
<mx:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    width="100" height="100">

    <mx:VBox width="200" height="200" backgroundColor="#A9C0E7">
        <!-- ... -->
    </mx:VBox>
</mx:Application>
```

To add scroll bars to the Spark Application container, define a skin that supports scroll bars. The following example shows a skin in the file MyAppSkin.mxml. This skin modifies the default skin for the Spark Application container, spark.skins.default.ApplicationSkin, to add the Spark Scroller component:

```
<?xml version="1.0" encoding="utf-8"?>
<!-- containers\application\mySkins\MyAppSkin.mxml -->
<s:Skin xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark">

    <fx:Metadata>
        [HostComponent("spark.components.Application")]
    </fx:Metadata>

    <s:states>
        <s:State name="normal" />
        <s:State name="disabled" />
    </s:states>

    <!-- fill -->
    <s:Rect id="backgroundRect" left="0" right="0" top="0" bottom="0">
        <s:fill>
            <mx:SolidColor color="{fxComponent.backgroundColor}" />
        </s:fill>
    </s:Rect>

    <s:Scroller height="100%" width="100%">
        <s:Group id="contentGroup" left="0" right="0" top="0" bottom="0" />
    </s:Scroller>
</s:Skin>
```

The following application uses this skin:

```
<?xml version="1.0"?>
<!-- containers\application\AppSparkScroll.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    width="150" height="150"
    skinClass="mySkins.MyAppSkin"
    clipAndEnableScrolling="true">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <mx:VBox width="200" height="200" backgroundColor="#A9C0E7">
        <!-- ... -->
    </mx:VBox>

    <mx:VBox width="200" height="200" backgroundColor="#000000">
        <!-- ... -->
    </mx:VBox>
</s:Application>
```

Overriding the default Application container styles

By default, the application containers have the following properties and style properties that define the following visual aspects of the application and differ from the default container values:

Property	Spark Application default value	Halo Application default value
backgroundColor	The color of the Stage area of Adobe® Flash® Player or Adobe® AIR™, which is visible during application loading and initialization. This color is also visible if the application skin does not define any other background color or image. The default value is 0xFFFFFF (white).	The color of the Stage area of Adobe® Flash® Player or Adobe® AIR™, which is visible during application loading and initialization. This color is also visible if the application background is transparent. The default value is 0xFFFFFF (white).
backgroundGradientAlphas	Not implemented; define in the container skin.	[1.0, 1.0], a fully opaque background.
backgroundGradientColors	Not implemented; define in the container skin.	undefined, which means background gradient is generated based on the backgroundColor property. By default, the backgroundColor property defines a white background.
backgroundImage	Not implemented; define in the container skin.	A gradient controlled by the backgroundGradientAlphas and backgroundGradientColors styles. The default value is mx.skins.halo.ApplicationBackground.
backgroundSize	Not implemented; define in the container skin.	100%. When you set this property at 100%, the background image takes up the entire Application container.
horizontalAlign	Not implemented; set in the layout class associated with the Application container.	Centered.
paddingBottom	0 pixels.	24 pixels.
paddingLeft	0 pixels.	24 pixels.
paddingRight	0 pixels.	24 pixels.
paddingTop	0 pixels.	24 pixels.

Changing the Spark Application background

The Spark Application.backgroundColor property defines the default background color of the Application container during application loading and initialization. If the Application skin does not set a different color, the backgroundColor property also defines the background color of the application when it is running. The default value is 0xFFFFFF (white).

To set the background color of the Spark Application container to something other than a solid color, or to set a background image, you define a skin for the container. For example, the following skin defines a gradient fill for the background of the Application container that goes from blue to gray:

```
<?xml version="1.0" encoding="utf-8"?>
<!-- containers\application\mySkins\MyAppBackgroundSkin.mxml -->
<s:Skin xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark">

    <fx:Metadata>
        [HostComponent("spark.components.Application")]
    </fx:Metadata>

    <s:states>
        <s:State name="normal" />
        <s:State name="disabled" />
    </s:states>

    <!-- Define a gradient fill for the background of the Application container. -->
    <s:Rect id="backgroundRect" left="0" right="0" top="0" bottom="0">
        <s:fill>
            <s:LinearGradient>
                <s:entries>
                    <s:GradientEntry color="0x0000FF" ratio="0.00" alpha="0.5"/>
                    <s:GradientEntry color="0xCCCCCC" ratio="0.5" alpha="0.5"/>
                </s:entries>
            </s:LinearGradient>
        </s:fill>
    </s:Rect>

    <s:Group id="contentGroup" left="0" right="0" top="0" bottom="0" />
</s:Skin>
```

You then use the `skinClass` style property to apply the skin to the Application, as the following example shows:

```
<?xml version="1.0"?>
<!-- containers\application\AppSparkBackground.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    skinClass="mySkins.MyAppBackgroundSkin">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

</s:Application>
```

The next skin example uses the Image control to embed an image for the background of the Application container:

```
<?xml version="1.0" encoding="utf-8"?>
<!-- containers\application\mySkins\MyAppBackgroundImageSkin.mxml -->
<s:Skin xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark">

    <fx:Metadata>
        [HostComponent("spark.components.Application")]
    </fx:Metadata>

    <s:states>
        <s:State name="normal" />
        <s:State name="disabled" />
    </s:states>

    <!-- Use an Image control to embed an image for the
            background of the Application container. -->
    <mx:Image source="@Embed(source='assets/logo.jpg')"
        left="0" right="0" top="0" bottom="0"
        maintainAspectRatio="false" />

    <s:Group id="contentGroup" left="0" right="0" top="0" bottom="0" />
</s:Skin>
```

For more information on skinning, see Creating Spark Skins.

Changing the Halo Application background

The Application container `backgroundGradientAlphas`, `backgroundGradientColors`, and `backgroundImage` styles control the container background. By default, these properties define an opaque gray gradient background.

You specify an image for the application background by using the `backgroundImage` property. If you set both the `backgroundImage` property and the `backgroundGradientColors` property, Flex ignores `backgroundGradientColors`.

You can specify a gradient background for the application in two ways:

1 Set the `backgroundGradientColors` property to two values, as in the following example:

```
<mx:Application xmlns="http://ns.adobe.com/mxml/2009"
    backgroundGradientColors="[0x0000FF, 0xCCCCCC]">
```

Flex calculates the gradient pattern between the two specified values.

2 Set the `backgroundColor` property to the desired value, as in the following example:

```
<mx:Application xmlns="http://ns.adobe.com/mxml/2009"
    backgroundColor="red">
```

Flex sets the gradient background to solid red.

To set a solid background to the application by using the `backgroundGradientColors` property, specify the same two values to the `backgroundGradientColors` property, as the following example shows:

```
<mx:Application xmlns="http://ns.adobe.com/mxml/2009"
    backgroundGradientColors="[#FFFFFF, #FFFFFF]">
```

This example defines a solid white background.

The `backgroundColor` property specifies the background color of the Stage area in Flash Player, which is visible during application loading and initialization, and a background gradient while the application is running. By default, the `backgroundColor` property is set to `0xFFFFFF` (white).

If you use the `backgroundGradientColors` property to set the application background, set the `backgroundColor` property to compliment the `backgroundGradientColors` property, as the following example shows:

```
<mx:Application xmlns="http://ns.adobe.com/mxml/2009"
    backgroundGradientColors="[0x0000FF, 0xCCCCCC]"
    backgroundColor="0x0000FF">
```

In this example, you use the `backgroundGradientColors` property to set a gradient pattern from a dark blue to gray, and the `backgroundColor` property to set the Stage area in Flash Player to dark blue, which is visible during application loading and initialization.

Using the plain style with the Halo Application container

The Flex default style sheet defines a plain style name that sets all padding to 0 pixels, removes the default background image, sets the background color to white, and left-aligns the children. The following example shows how you can set this style:

```
<mx:Application xmlns="http://ns.adobe.com/mxml/2009"
    styleName="plain">
```

You can override individual values in the plain setting, as the following example shows:

```
<mx:Application xmlns="http://ns.adobe.com/mxml/2009"
    styleName="plain" horizontalAlign="center"/>
```

Application events

The following events are dispatched only by the application containers:

- `applicationComplete` Dispatched after the application has been initialized, processed by the LayoutManager, and attached to the display list. This is the last event dispatched during an application's startup sequence. It is later than the application's `creationComplete` event, which gets dispatched before the preloader has been removed and the application has been attached to the display list.
- `error` Dispatched when an uncaught error occurs anywhere in the application.

Viewing the application source code

You can use the `viewSourceURL` property of the application containers to specify a URL to the application's source code. If you set this property, Flex adds a View Source menu item to the application's context menu, which you open by right-clicking anywhere in your application. Select the View Source menu item to open the URL specified by the `viewSourceURL` property in a new browser window.

Set the `viewSourceURL` property by using MXML, not ActionScript, as the following example shows:

```
<?xml version="1.0"?>
<!-- containers\application\AppSourceURL.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    viewSourceURL="../assets/AppSourceURL.txt">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <s:Button label="Click Me"/>
</s:Application>
```

You typically deploy your source code not as an MXML file, but as a text or HTML file. In this example, the source code is in the file AppSourceURL.txt. If you use an HTML file to represent your source code, you can add formatting and coloring to make it easier to read.

Specifying options of the Application container

You can specify several options of the application container to control your application. The following table describes these options:

Option	Type	Description
`frameRate`	Number	Specifies the frame rate of the application, in frames per second. The default value is 24.
`pageTitle`	String	Specifies a String that appears in the title bar of the browser. This property provides the same functionality as the HTML `<title>` tag.
`preloader`	Path	Specifies the path of a SWC component class or ActionScript component class that defines a custom progress bar. A SWC component must be in the same directory as the MXML file or in the WEB-INF/flex/user_classes directory of your Flex web application. For more information, see "Showing the download progress of an application" on page 14.
`scriptRecursionLimit`	Number	Specifies the maximum depth of Flash Player or AIR call stack before Flash Player or AIR stops. This is essentially the stack overflow limit. The default value is 1000.
`scriptTimeLimit`	Number	Specifies the maximum duration, in seconds, that an ActionScript event listener can execute before Flash Player or AIR assumes that it has stopped processing and aborts it. The default value is 60 seconds, which is also the maximum allowable value that you can set.
`usePreloader`	Boolean	Specifies whether to disable the application preloader (`false`) or not (`true`). The default value is `true`. To use the default preloader, your application must be at least 160 pixels wide. For more information, see "Showing the download progress of an application" on page 14.

Note: *Properties `frameRate`, `pageTitle`, `preloader`, `scriptRecursionLimit`, and `usePreloader`, cannot be set in ActionScript; they must be set in MXML code.*

About the application object

Flex compiles your application into a SWF file that contains a single application object, of type of type spark.components.Application or mx.core.Application. In most cases, your application has one application object. Some applications use the SWFLoader control to add more applications.

An application object has the following characteristics:

- The file defining the application object is the first file loaded by the application.
- You can refer to the application object as `mx.core.FlexGlobals.topLevelApplication` from anywhere in the application.
- If you load multiple nested applications by using the SWFLoader control, you can access the scope of each higher application in the nesting hierarchy by using `parentApplication`, `parentApplication.parentApplication`, and so on.

About documents

Every MXML file used in an application is referred to as a *document class*. For example, you define an MXML file named MyForm.mxml that contains the following code:

```
<?xml version="1.0"?>
<mx:Form xmlns:mx="library://ns.adobe.com/flex/halo">
    ...
</mx:Form>
```

MyForm.mxml is the document class and instances of MyForm.mxml are referred to as *documents*. An MXML file that includes the `<s:Application>` or `<mx:Application>` tag is the document class that defines the application object. MXML files that omit the `<s:Application>` or `<mx:Application>` tag are custom controls.

A document has the following characteristics:

- All MXML files that an application uses are document classes, including the MXML file that includes the `<s:Application>` or `<mx:Application>` tag.
- Custom ActionScript component files are document classes.
- The Flex compiler cannot compile a SWF file from a file that does not contain the `<s:Application>` or `<mx:Application>` tag.
- You can access the scope of a document's parent document by using `parentDocument`, `parentDocument.parentDocument`, and so on.
- Flex provides a `UIComponent.isDocument` property so that you can detect if any given object is a document.

Accessing document and application scopes

In your application's main MXML file, the file that contains the `<s:Application>` or `<mx:Application>` tag, you can access the methods and properties of the application object by using the `this` keyword. However, in custom ActionScript and MXML components, event listeners, or external ActionScript class files, Flex executes in the context of those components and classes, and the `this` keyword refers to the current document and not to the application object. You cannot refer to a control or method in the application from one of these child documents without specifying the location of the parent document.

Flex provides the following properties that you can use to access parent documents:

mx.core.FlexGlobals.topLevelApplication The top-level application object, regardless of where in the document tree your object executes. This object is of type spark.components.Application or mx.core.Application.

mx.core.UIComponent.parentDocument The parent document of the current document. You can use `parentDocument.parentDocument` to walk up the tree of multiple documents.

mx.core.UIComponent.parentApplication The Application object in which the current object exists. Applications can load other applications, therefore, you can access the immediate parent application by using this property. You can use `parentApplication.parentApplication` to walk up the tree of multiple applications.

Using the mx.core.FlexGlobals.topLevelApplication property

To access properties and methods of the top-level application object from anywhere in your application, you can use the `topLevelApplication` property of the FlexGlobals class. For example, you define an application that contains the method, as the following code shows:

```
<?xml version="1.0"?>
<!-- containers\application\AppDoSomething.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    xmlns:MyComps="myComponents.*">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <fx:Script>
        <![CDATA[
            import mx.controls.Alert;

            // Open an Alert control.
            public function doSomething():void {
                Alert.show("The doSomething() method was called.");
            }
        ]]>
    </fx:Script>

    <!-- Include the ButtonMXML.mxml component. -->
    <MyComps:ButtonMXML/>
</s:Application>
```

You can then use the `FlexGlobals.topLevelApplication` property in the ButtonMXML.mxml component to reference the `doSomething()` method, as the following example shows:

```
<?xml version="1.0"?>
<!-- containers\application\myComponents\ButtonMXML.mxml -->
<s:SkinnableContainer xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark">
    <s:layout>
        <s:HorizontalLayout/>
    </s:layout>

    <fx:Script>
        <![CDATA[
            // To refer to the members of the Application class,
            // you must import mx.core.Application.
            import mx.core.FlexGlobals;
        ]]>
    </fx:Script>

    <s:Button  label="MXML Button"
        click="FlexGlobals.topLevelApplication.doSomething();"/>
</s:SkinnableContainer>
```

The `topLevelApplication` property is especially useful in applications that have one or more custom MXML or ActionScript components that each use a shared set of data. At the application level, you often store shared information and provide utility functions that any of the components can access.

For example, suppose that you store the user's name at the application level and implement a utility function, `getSalutation()`, which returns the string "Hi, *userName*". The following example MyApplication.mxml file shows the application source that defines the `getSalutation()` method:

```
<?xml version="1.0"?>
<!-- containers\application\AppSalutation.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    xmlns:MyComps="myComponents.*">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <fx:Script>
        <![CDATA[
            public var userName:String="SMG";

            public function getSalutation():String {
                return "Hi, " + userName;
            }
        ]]>
    </fx:Script>

    <!-- Include the ButtonGetSalutation.mxml component. -->
    <MyComps:ButtonGetSalutation/>

</s:Application>
```

To access the `userName` and call the `getSalutation()` method in your MXML components, you can use the `topLevelApplication` property, as the following example from the MyComponent.mxml component shows:

```
<?xml version="1.0"?>
<!-- containers\application\myComponents\ButtonGetSalutation.mxml -->
<s:SkinnableContainer xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    width="100%" height="100%">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <fx:Script>
        <![CDATA[
            /* To refer to the members of the Application class,
               you must import mx.core.Application. */
            import mx.core.FlexGlobals;
        ]]>
    </fx:Script>

    <mx:Label id="myL"/>
    <s:Button label="Click Me"
        click="myL.text=FlexGlobals.topLevelApplication.getSalutation();"/>
</s:SkinnableContainer>
```

In this example, clicking the Button control executes the `getSalutation()` function to populate the Label control.

Using the parentDocument property

To access the parent document of an object, you can use the parentDocument property. The parent document is the object that contains the current object. All classes that inherit from the UIComponent class have a `parentDocument` property.

In the following example, the application references the custom AccChildObject.mxml component:

```
<?xml version="1.0"?>
<!-- containers\application\AppParentDocument.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    xmlns:MyComps="myComponents.*"
    width="100%" height="100%">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <!-- Include the AccChildObject.mxml component. -->
    <MyComps:AccChildObject/>

</s:Application>
```

In this example, the application is the parent document of the AccChildObject.mxml component. The following code from the AccChildObject.mxml component uses the `parentDocument` property to define an Accordion container that is slightly smaller than the Application container:

```
<?xml version="1.0"?>
<!-- containers\application\myComponents\AccChildObject.mxml -->
<mx:Accordion xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    width="{parentDocument.width*.80}"
    height="{parentDocument.height*.50}">

    <mx:HBox label="Child HBox"/>

</mx:Accordion>
```

You use the `parentDocument` property in MXML scripts to go up a level in the chain of parent documents. You can use the `parentDocument` to walk this chain by using multiple `parentDocument` properties, as the following example shows:

```
parentDocument.parentDocument.doSomething();
```

The `parentDocument` property of the application object is a reference to the application.

The `parentDocument` is typed as Object so that you can access properties and methods on ancestor document objects without casting.

Every UIComponent class has an `isDocument` property that is set to `true` if that UIComponent class is a document object, and `false` if it is not.

If a UIComponent class is a document object, it has a `documentDescriptor` property. This is a reference to the descriptor at the top of the generated descriptor tree in the generated document class.

For example, suppose that AddressForm.mxml component creates a subclass of the Form container to define an address form, and the MyApp.mxml component creates two instances of it: `<AddressForm id="shipping">` and `<AddressForm id="billing">`.

In this example, the shipping object is a document object. Its `documentDescriptor` property corresponds to the `<Form>` tag at the top of the AddressForm.mxml file (the definition of the component), while its descriptor corresponds to the `<AddressForm id="shipping">` tag in MyApp.mxml file (an instance of the component).

Walking the document chain by using the `parentDocument` property is similar to walking the application chain by using the `parentApplication` property.

Using the parentApplication property

Applications can load other applications; therefore, you can have a hierarchy of applications, similar to the hierarchy of documents within each application. Every UIComponent class has a `parentApplication` read-only property that references the application object in which the object exists. The `parentApplication` property of an application object is never itself; it is either the application object into which it was loaded, or it is `null` (for the application object).

Walking the application chain by using the `parentApplication` property is similar to walking the document chain by using the `parentDocument` property.

Showing the download progress of an application

The application containers support an application preloader that uses a download progress bar to show the download and intialization progress of an application SWF file. By default, the application preloader is enabled. The preloader tracks how many bytes have been downloaded and continually updates the progress bar.

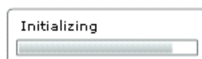
The download progress bar displays information about two different phases of the application: the download phase and the initialization phase. The application container's `creationComplete` event dismisses the preloader.

Flex includes two download progress bar classes: the SparkDownloadProgressBar (Spark) and the DownloadProgressBar (Halo). The following image shows the Spark download progress bar:

A. Spark download progress bar. B. Download progress track. C. Initialization progress track.

When the SWF file is downloading, download progress track expands. When the application is initializing, the initilization progress track expands. The SparkDownloadProgressBar class does not contain text.

The following example shows the Halo download progress bar during the initialization phase:



The Halo download progress bar supports text. The bar displays the text "Downloading app" during the SWF download. It displays the text "Initializing app" during application initialization.

The download progress bar is not displayed if the SWF file is on your local host or if it is already cached. If the SWF file is not on your local host and is not cached, the progress bar is displayed if less than half of the application is downloaded after 700 milliseconds of downloading.

Setting the download progress bar class

By default, an Application container uses the SparkDownloadProgressBar class. To configure the Application container to use the Halo class, DownloadProgressBar, use the `preloader` property as the following example shows:

```
<s:Application ... preloader="mx.preloaders.DownloadProgressBar">
```

Disabling the download progress bar

To disable the download progress bar, set the `usePreloader` property of the Application container to `false`, as the following example shows:

```
<s:Application ... usePreloader="false">
```

Creating a custom progress bar

To create a custom download progress bar, you can create a subclass of the SparkDownloadProgressBar or DownloadProgressBar class, or create a subclass of the flash.display.Sprite class that implements the mx.preloaders.IPreloaderDisplay interface.

You can implement a download progress bar component as a SWC component or an ActionScript component. A custom download progress bar component that extends the Sprite class should not use any of the standard Flex components because it would load too slowly to be effective. Do not implement a download progress bar as an MXML component because it also would load too slowly.

To use a custom download progress bar class, you set the `preloader` property of the application container to the path of a SWC component class or ActionScript component class. A SWC component must be in the same directory as the MXML file or in a directory on the classpath of your application. An ActionScript component can be in one of those directories or in a subdirectory of one of those directories. When a class is in a subdirectory, you specify the subdirectory location as the package name in the `preloader` value; otherwise, you specify the class name.

The code in the following example specifies a custom download progress bar called CustomBar that is located in the myComponents/mybars directory below the application's root directory:

```
<s:Application ... preloader="myComponents.mybars.CustomBar">
```

Download progress bar events

The operation of the download progress bar is defined by a set of events. These events are dispatched by the Preloader class. The SparkDownloadProgressBar and DownloadProgressBar classes defines an event listener for all these events.

Within your custom class, you can optionally override the default behavior of the event listener. If you create a custom download progress bar as a subclass of the Sprite class, define an event listener for each of these events.

The following table describes the download progress bar events:

Event	Description
`ProgressEvent.PROGRESS`	Dispatched when the application SWF file is being downloaded. The first `PROGRESS` event signifies the beginning of the download process.
`Event.COMPLETE`	Dispatched when the SWF file has finished downloading. Either zero or one `COMPLETE` event is dispatched.
`FlexEvent.INIT_COMPLETE`	Dispatched when the application finishes initialization. This event is always dispatched once, and is the last event that the Preloader dispatches. The download progress bar must dispatch a `COMPLETE` event after it has received an `INIT_COMPLETE` event. The `COMPLETE` event informs the Preloader that the download progress bar has completed all operations and can be dismissed. The download progress bar can perform additional tasks, such as playing an animation, after receiving an `INIT_COMPLETE` event, and before dispatching the COMPLETE event. Dispatching the COMPLETE event should be the last action of the download progress bar.
`FlexEvent.INIT_PROGRESS`	Dispatched when the application completes an initialization phase, as defined by calls to the `measure()`, `commitProperties()`, or `updateDisplayList()` methods. This event describes the progress of the application in the initialization phase.
`RslEvent.RSL_ERROR`	Dispatched when a Runtime Shared Library (RSL) fails to load.
`RslEvent.RSL_LOADED`	Dispatched when an RSL finishes loading. The total bytes and total loaded bytes are included in the event object. This event is dispatched for every RSL that is successfully loaded.
`RSLEvent.RSL_PROGRESS`	Dispatched when an RSL is being downloaded. The first progress event signifies the beginning of the RSL download. The event object for this event is of type RSLEvent.

Creating a simple download progress bar class

The easiest way to create your own download progress bar is to create a subclass of the SparkDownloadProgressBar or DownloadProgressBar class, and then modify it for your application requirements.

The following example shows a custom download progress bas based on the SparkDownloadProgressbar class. This class overrides the getter methods for the `SparkDownloadProgressbar.backgroundImage` and `SparkDownloadProgressbar.backgroundSize` properties to show an image during application download and inititialization:

```
package myComponents
{
    import mx.preloaders.*;
    import flash.events.ProgressEvent;

    public class SparkDownloadProgressBarSubClassMin extends SparkDownloadProgressBar
    {
        public function SparkDownloadProgressBarSubClassMin() {
            super();
        }

        [Embed(source="assets/logo.jpg")]
        [Bindable]
        public var imgCls:Class;

        // Override to set a background image.
        override public function get backgroundImage():Object{
            return imgCls;
        }

        // Override to set the size of the background image to 100%.
        override public function get backgroundSize():String{
            return "100%";
        }

        // Override to return true so progress bar appears
        // during initialization.
        override protected function showDisplayForInit(elapsedTime:int,
            count:int):Boolean {
                return true;
        }

        // Override to return true so progress bar appears during download.
        override protected function showDisplayForDownloading(
            elapsedTime:int, event:ProgressEvent):Boolean {
                return true;
        }
    }

}
```

The following application uses this custom class:

```
<?xml version="1.0"?>
<!-- containers\application\SparkMainDPBMin.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    preloader="myComponents.SparkDownloadProgressBarSubClassMin">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>
    <!-- Add a couple of controls that don't do anything. -->
    <s:Button label="Click Me"/>
    <s:TextInput text="This is a TextInput control."/>
</s:Application>
```

The Spark download progress bar does not support text, but the Halo one does. The next example creates a subclass of the Halo DownloadProgressBar class to define custom strings for the download progress bar, and set the minimum time that it appears, as the following example shows:

```
package myComponents
{
    import mx.preloaders.*;
    import flash.events.ProgressEvent;

    public class DownloadProgressBarSubClassMin extends DownloadProgressBar
    {
        public function DownloadProgressBarSubClassMin()
        {
            super();
            // Set the download label.
            downloadingLabel="Downloading app..."
            // Set the initialization label.
            initializingLabel="Initializing app..."
            // Set the minimum display time to 2 seconds.
            MINIMUM_DISPLAY_TIME=2000;
        }

        // Override to return true so progress bar appears
        // during initialization.
        override protected function showDisplayForInit(elapsedTime:int,
            count:int):Boolean {
                return true;
        }

        // Override to return true so progress bar appears during download.
        override protected function showDisplayForDownloading(
            elapsedTime:int, event:ProgressEvent):Boolean {
                return true;
        }
    }

}
```

You can use your custom class in an application, as the following example shows:

```
<?xml version="1.0"?>
<!-- containers\application\MainDPBMin.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    preloader="myComponents.DownloadProgressBarSubClassMin">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>
    <!-- Add a couple of controls that don't do anything. -->
    <s:Button label="Click Me"/>
    <s:TextInput text="This is a TextInput control."/>
</s:Application>
```

Creating an advanced subclass of the DownloadProgressBar class

In the following example, you create a subclass of the DownloadProgressBar class to display text messages that describe the status of the downloading and initialization of the application. This example defines event listeners for the events dispatched by the download progress bar to write the messages to flash.text.TextField objects.

```
package myComponents
{

    import flash.display.*;
    import flash.text.*;
    import flash.utils.*;
    import flash.events.*;
    import mx.preloaders.*;
    import mx.events.*;

    public class MyDownloadProgressBar extends DownloadProgressBar
    {
        // Define a TextField control for text messages
        // describing the download progress of the application.
        private var progressText:TextField;

        // Define a TextField control for the final text message.
        // after the application initializes.
        private var msgText:TextField;

        public function MyDownloadProgressBar()
        {
            super();

            // Configure the TextField for progress messages.
            progressText = new TextField();
            progressText.x = 10;
            progressText.y = 90;
            progressText.width = 400;
            progressText.height = 400;

            addChild(progressText);

            // Configure the TextField for the final message.
            msgText = new TextField();
            msgText.x = 10;
            msgText.y = 10;
            msgText.width = 400;
            msgText.height = 75;

            addChild(msgText);
        }

        // Define the event listeners for the preloader events.
        override public function set preloader(preloader:Sprite):void {
            // Listen for the relevant events
            preloader.addEventListener(
                ProgressEvent.PROGRESS, myHandleProgress);
            preloader.addEventListener(
                Event.COMPLETE, myHandleComplete);
```

```
            preloader.addEventListener(
                FlexEvent.INIT_PROGRESS, myHandleInitProgress);
            preloader.addEventListener(
                FlexEvent.INIT_COMPLETE, myHandleInitEnd);
        }

        // Event listeners for the ProgressEvent.PROGRESS event.
        private function myHandleProgress(event:ProgressEvent):void {
            progressText.appendText("\n" + "Progress l: " +
                event.bytesLoaded + " t: " + event.bytesTotal);
        }

        // Event listeners for the Event.COMPLETE event.
        private function myHandleComplete(event:Event):void {
            progressText.appendText("\n" + "Completed");
        }

        // Event listeners for the FlexEvent.INIT_PROGRESS event.
        private function myHandleInitProgress(event:Event):void {
            progressText.appendText("\n" + "App Init Start");
        }

        // Event listeners for the FlexEvent.INIT_COMPLETE event.
        private function myHandleInitEnd(event:Event):void {
            msgText.appendText("\n" + "App Init End");

            var timer:Timer = new Timer(2000,1);
            timer.addEventListener(TimerEvent.TIMER, dispatchComplete);
            timer.start();
        }

        // Event listener for the Timer to pause long enough to
        // read the text in the download progress bar.
        private function dispatchComplete(event:TimerEvent):void {
            dispatchEvent(new Event(Event.COMPLETE));
        }
    }
}
```

You can use your custom class in a application, as the following example shows:

```
<?xml version="1.0"?>
<!-- containers\application\MainDPB.mxml -->
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:mx="library://ns.adobe.com/flex/halo"
    xmlns:s="library://ns.adobe.com/flex/spark"
    preloader="myComponents.MyDownloadProgressBar">
    <s:layout>
        <s:VerticalLayout/>
    </s:layout>

    <!-- Add a couple of controls that don't do anything. -->
    <s:Button label="Click Me"/>
    <s:TextInput text="This is a TextInput control."/>
</s:Application>
```

Creating a subclass of Sprite as a download progress bar

You can define a custom download progress bar as a subclass of the Sprite class. By implementing your download progress bar as a subclass of Sprite, you can create a custom look and feel to it, rather than overriding the behavior built into the DownloadProgressBar class.

One common use for this type of download progress bar is to have it display a SWF file during application initialization. For example, you could display a SWF file that shows a running clock, or other type of image.

The following example displays a SWF file as the download progress bar. This class must implement the IPreloaderDisplay interface.

```
package myComponents
{
    import flash.display.*;
    import flash.utils.*;
    import flash.events.*;
    import flash.net.*;
    import mx.preloaders.*;
    import mx.events.*;

    public class MyDownloadProgressBarSWF extends Sprite
        implements IPreloaderDisplay
    {
        // Define a Loader control to load the SWF file.
        private var dpbImageControl:flash.display.Loader;

        public function MyDownloadProgressBarSWF() {
            super();
        }

        // Specify the event listeners.
        public function set preloader(preloader:Sprite):void {
            // Listen for the relevant events
            preloader.addEventListener(
                ProgressEvent.PROGRESS, handleProgress);
            preloader.addEventListener(
                Event.COMPLETE, handleComplete);

            preloader.addEventListener(
                FlexEvent.INIT_PROGRESS, handleInitProgress);
            preloader.addEventListener(
                FlexEvent.INIT_COMPLETE, handleInitComplete);
        }

        // Initialize the Loader control in the override
        // of IPreloaderDisplay.initialize().
        public function initialize():void {
            dpbImageControl = new flash.display.Loader();
            dpbImageControl.contentLoaderInfo.addEventListener(
                Event.COMPLETE, loader_completeHandler);
            dpbImageControl.load(new URLRequest("assets/dpbSWF.swf"));
        }

        // After the SWF file loads, set the size of the Loader control.
        private function loader_completeHandler(event:Event):void
        {
```

```
        addChild(dpbImageControl);
        dpbImageControl.width = 50;
        dpbImageControl.height= 50;
        dpbImageControl.x = 100;
        dpbImageControl.y = 100;
    }

    // Define empty event listeners.
    private function handleProgress(event:ProgressEvent):void {
    }

    private function handleComplete(event:Event):void {
    }

    private function handleInitProgress(event:Event):void {
    }

    private function handleInitComplete(event:Event):void {
        var timer:Timer = new Timer(2000,1);
        timer.addEventListener(TimerEvent.TIMER, dispatchComplete);
        timer.start();
    }

    private function dispatchComplete(event:TimerEvent):void {
        dispatchEvent(new Event(Event.COMPLETE));
    }

    // Implement IPreloaderDisplay interface

    public function get backgroundColor():uint {
        return 0;
    }

    public function set backgroundColor(value:uint):void {
    }

    public function get backgroundAlpha():Number {
        return 0;
    }

    public function set backgroundAlpha(value:Number):void {
    }

    public function get backgroundImage():Object {
        return undefined;
    }

    public function set backgroundImage(value:Object):void {
    }

    public function get backgroundSize():String {
        return "";
```

```
        }

        public function set backgroundSize(value:String):void {
        }

        public function get stageWidth():Number {
            return 200;
        }

        public function set stageWidth(value:Number):void {
        }

        public function get stageHeight():Number {
            return 200;
        }

        public function set stageHeight(value:Number):void {
        }
    }
}
```