DART

Dart on the Modern Web

Google I/O 2013 — Code lab

Dart on the Modern Web

Using Dart to Build a Modern Web App

Dart code lab for Google I/O 2013

Introduction

Welcome to Dart! We built Dart to help developers from all platforms build awesome apps for the modern web. Dart compiles to JavaScript to run across all modern browsers. Dart is an easy-to-learn language at the hub of a powerful set of tools for structured web app engineering. The Dart SDK contains a rich set of libraries, a powerful editor, a package manager, and much more.

In this code lab, you'll build a simple, single-page, modern web app for desktop and mobile.

You will learn:

- A bit of the Dart language and libraries
- Client-side templating
- Declarative dynamic DOM generation
- MDV-style data binding to sync UI elements with data
- How to use the Dart HTML and Web UI libraries
- How to store data locally in your browser
- Optimizing for mobile devices

Prerequisites

This code lab assumes that you are familiar with web programming (HTML, CSS) and object-oriented programming. You do not need to be an expert in web programming to enjoy this code lab.

This code lab requires Dart Editor, which you will download and install in Step 0.

Note: Dart Editor runs on Windows (Vista, 7, or 8), Linux, or Mac.

Resources

There are numerous resources for the new Dart developer. Here are some of our recommendations:

- A Game of Darts - Tutorials
- Target 6: Get Started with Web UI
- Dart Language Tour
- Dart Library Tour
- Programmer's Guide

Step 0: Get the app, run it in Dart Editor, and practice debugging

This step sets the stage. You make sure you have the right software, can run the finished app, and know how to use Dart Editor's integrated debugger.

Objectives

1. Get the latest version of Dart Editor
2. Download the source code for the sample app
3. Run the finished version of the app
4. Look at debugging information for the running app

Concepts overview

- **Dartium** (Chromium with a built-in Dart VM) and the Dart SDK are included in Dart Editor download.
- You can run Dart web apps in Dartium or in **any modern browser**. (Dart Editor compiles the Dart code to JavaScript, using an SDK tool called dart2js.)

Walkthrough

Download or update Dart Editor

If you **don't** have a copy of Dart Editor, get it:

1. Go to dartlang.org/editor/.
2. Download the version for your OS.
3. Unzip the file. You're done!
4. Launch Dart Editor by double-clicking the **DartEditor** executable file.

DartEditor

> **Note:** If you're on a Mac, you might see an "unidentified developer" error. Here's the solution: Instead of double-clicking the **DartEditor** executable file, right-click (or Ctl+click) it to bring up a context menu, and choose **Open**. Then, in the dialog that comes up, click **Open**. An alternative workaround is to change your security settings (see Troubleshooting Dart Editor).

If you **do** already have a copy of Dart Editor, make sure you're on the latest build:

1. Launch Dart Editor.
2. Close **Preferences** if you've opened it.
3. Open **About Dart Editor**.
4. If the button at the bottom right (**Check for Update** or **Download Update**) is enabled, click it, and download the update.
5. When the button says **Apply Update**, click it.

Download the app's source code

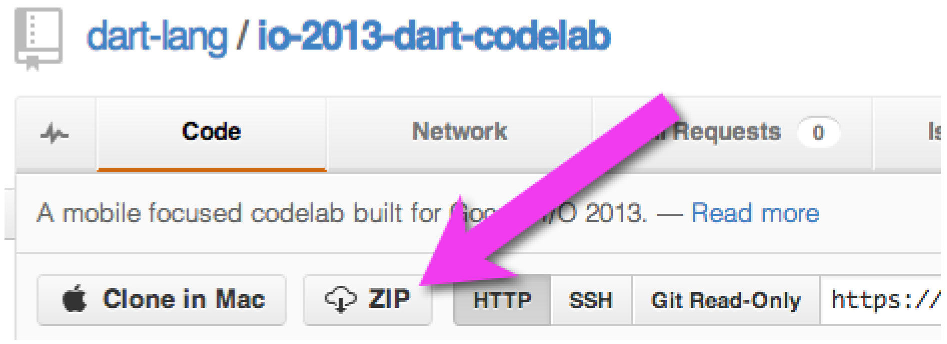
You can either clone the git repo or download the ZIP file.

To clone the repo from the command line:

```
git clone https://github.com/dart-lang/io-2013-dart-codelab
```

To get the source as a ZIP file:

1. Go to https://github.com/dart-lang/io-2013-dart-codelab
2. Click the **ZIP** button.


dart-lang / io-2013-dart-codelab
Code
Network
Requests 0
A mobile focused codelab built for Google I/O 2013. — Read more
Clone in Mac
ZIP
HTTP
SSH
Git Read-Only
https://

Run the finished application

Now that you've downloaded the source code, try out the finished application.

1. If you haven't already done so, launch Dart Editor by double-clicking the **DartEditor** executable file.

   DartEditor

   If you have trouble, see Troubleshooting Dart Editor.

2. In Dart Editor, type **Ctl+O** (Linux/Windows) or **Cmd+O** (Mac) or choose **File > Open Existing Folder**.

3. Select the **io-2013-codelab-finished** directory in the folder where you extracted the source code, and click **Open**.

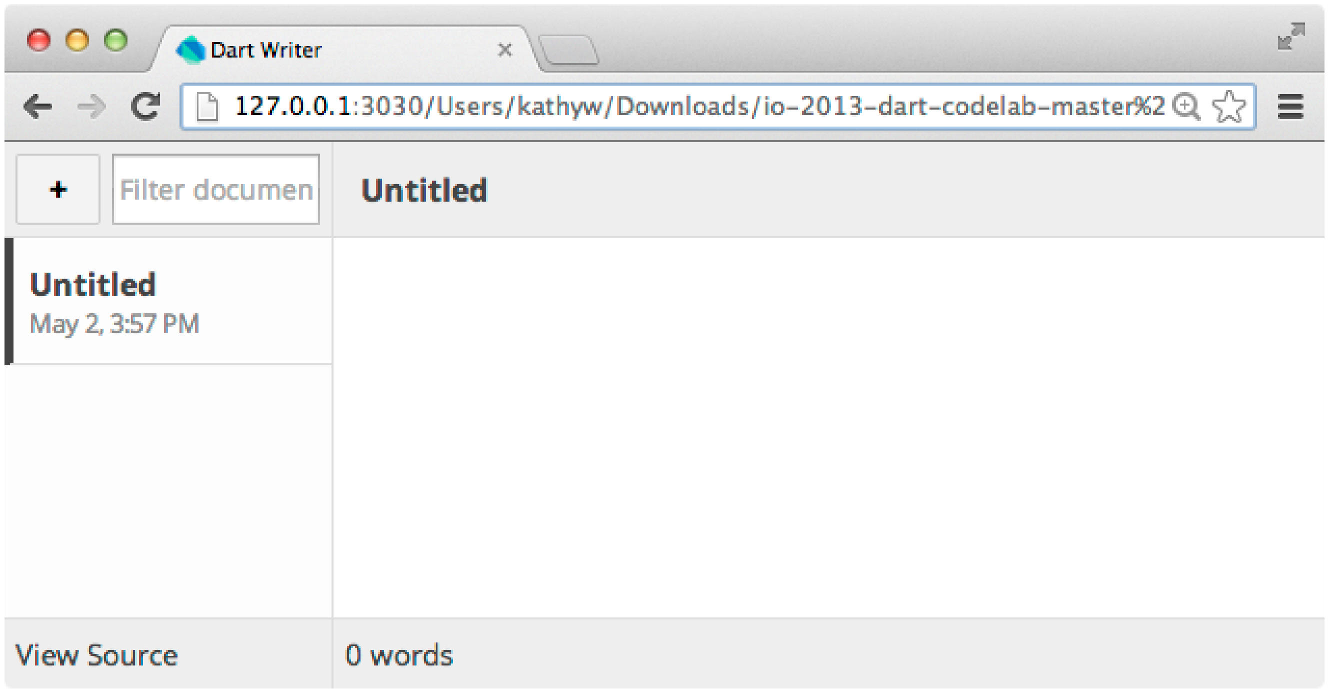
   Dart Editor installs the app's dependencies and starts building it. The progress bar is in the lower right corner of the window. Dart Editor keeps the dependencies and compiled version up-to-date. However, if you ever need or want to build the app manually, you can follow these steps:
   a. In the Files view, right-click **pubspec.yaml** and choose **Pub Install**.
   b. In the Tools menu, choose **Reanalyze Sources**.

(The editor might beat you to this, but it won't hurt to do it twice.)

c. In the Files view, right-click **build.dart** and choose **Run**.
   The output should look something like the following.

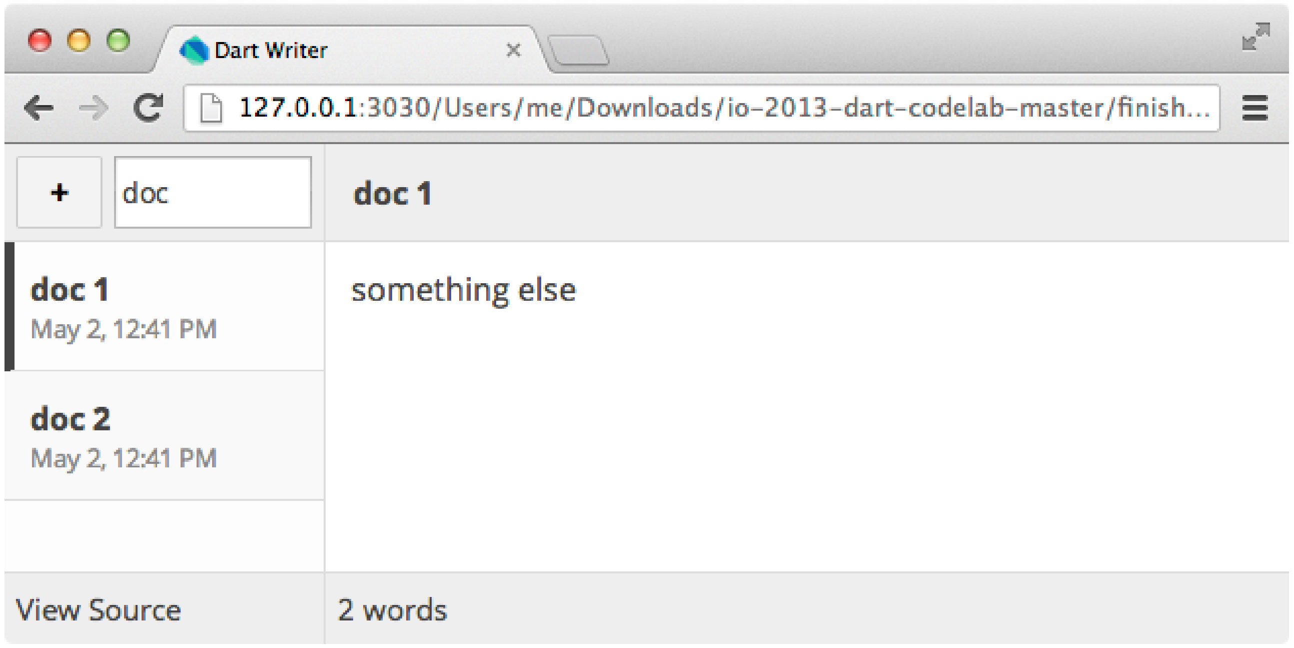
```
Total time spent on web/index.html                            -- 1159 ms
Total time                                                    -- 1194 ms
Build finished!
```

4. Run the app in Dartium:
   a. In the Files view, find the **web** directory and right-click its **index.html** file.
   b. Choose **Run in Dartium**. The app initially looks like this:



Note: If you don't see an Untitled document, try steps 3a-3c. Also check that the **web** directory contains an **out** directory. Try running **web/out/index.html**. If it still doesn't work, restart Dart Editor.

5. Play with the app:
    a. Click the + button to create an untitled document.
    b. Rename the untitled document by editing the title in the right-hand pane.
    c. Put some text in the document.
    d. Use the + button to create more documents.
    e. Use the **Filter documents** field to limit the documents shown to those that have a certain string in their title or contents.

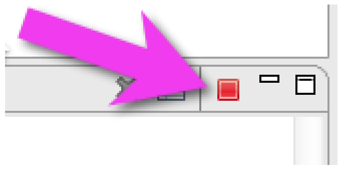


    f. Make the window narrower, and observe how the layout changes.

6. Copy the app's URL from the tab that's running the app, then close that tab. Open another tab and navigate to the app's URL. Notice how all the documents you created remain, as long as you're using the same browser and profile.

7. Now that you've see the app running in Dartium, try running it in your default browser and in another browser:

a. Quit the Dartium app, either by closing its tab or by clicking the **red square** in the Debugger pane.

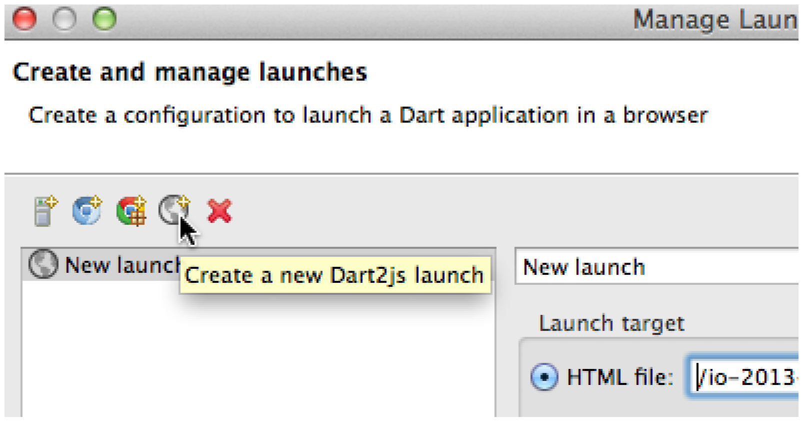


b. To run the app in your default browser (probably Chrome), right-click **web/index.html** and choose **Run as JavaScript**.

c. To run it in another browser:

   i. From the **Run** menu, choose **Manage Launches**.

   ii. Click the gray world button (to the left of the big **red X**) to create a new dart2js launch.



Manage Laun

Create and manage launches

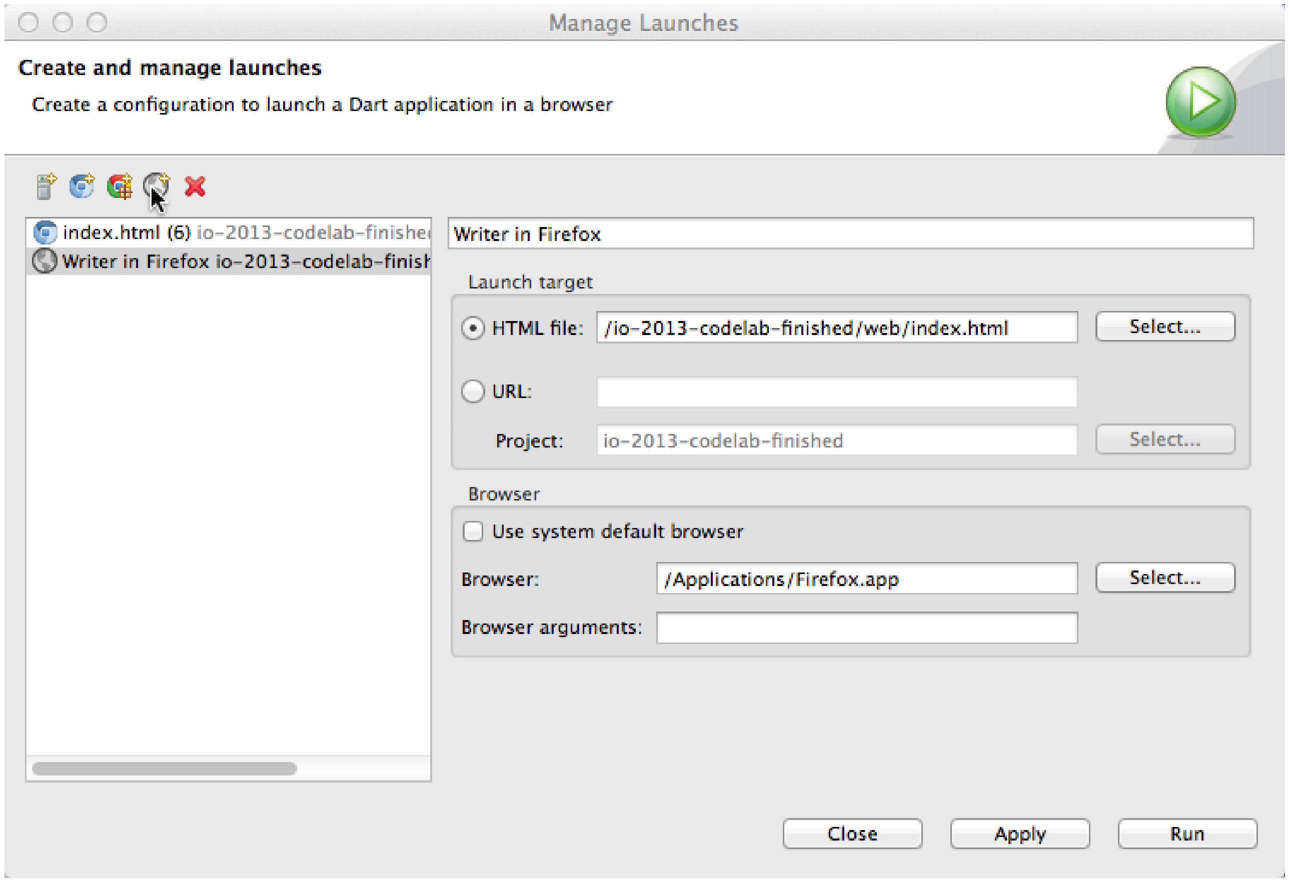
Create a configuration to launch a Dart application in a browser

   iii. Enter information for the launch. For example:

   ‣ Change "New launch" to **Writer in Firefox**

   ‣ For the HTML file, enter **/io-2013-codelab-finished/web/index.html**

   ‣ Uncheck "Use system default browser", and select the browser you need. For example, you might set the Browser field to **/Applications/Firefox.app**


Manage Launches

Create and manage launches

Create a configuration to launch a Dart application in a browser

index.html (6) io-2013-codelab-finishe

Writer in Firefox io-2013-codelab-finish

Writer in Firefox

Launch target

(● HTML file:) /io-2013-codelab-finished/web/index.html

URL:

Project: io-2013-codelab-finished

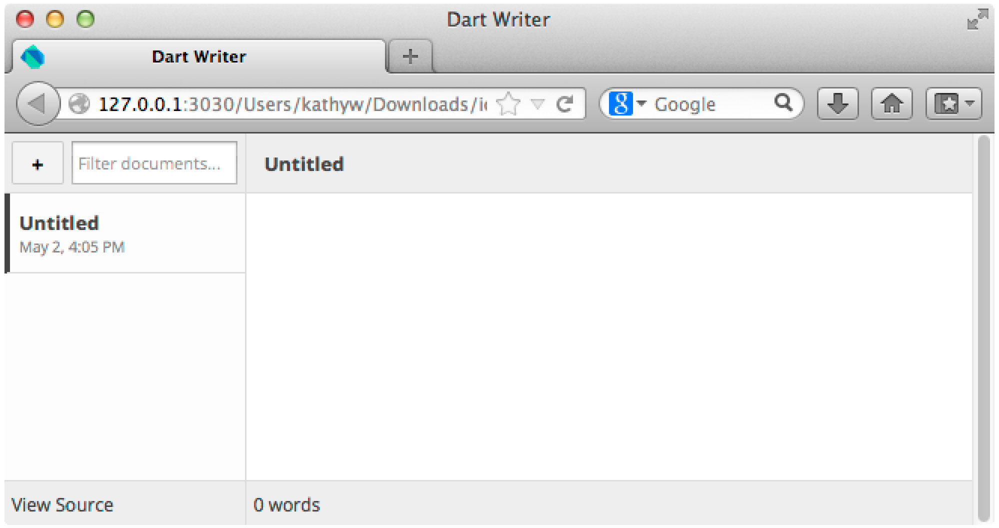
Browser

☐ Use system default browser

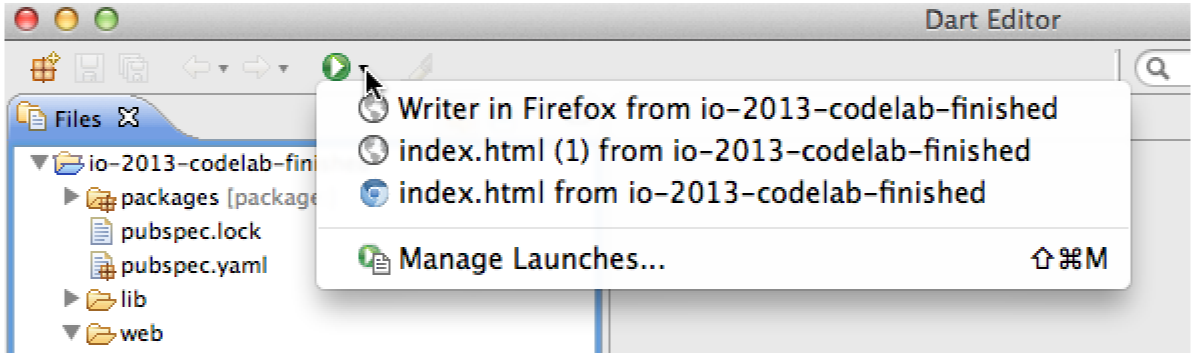
Browser: /Applications/Firefox.app

Browser arguments:

iv. Click **Run**. Your app should look the same as it did in Dartium and your default browser:



From now on, you can use the little arrow next to the Run button to choose the launch you want to use.

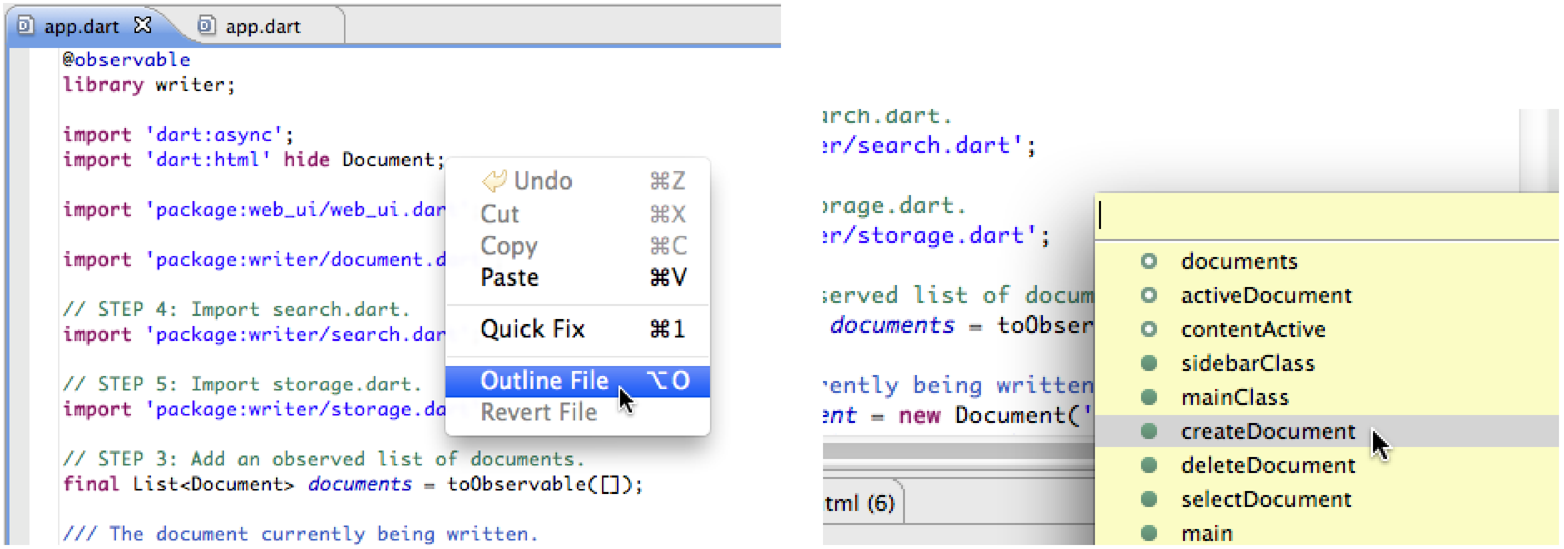

Dart Editor
Files
io-2013-codelab-fini
packages [package
pubspec.lock
pubspec.yaml
lib
web
Writer in Firefox from io-2013-codelab-finished
index.html (1) from io-2013-codelab-finished
index.html from io-2013-codelab-finished
Manage Launches... ⇧⌘M

Debug the running app

The easiest way to debug a Dart app is with Dart Editor and Dartium. Try this:

1. Open **web/app.dart** in Dart Editor. (Double-click it in the Files view.)

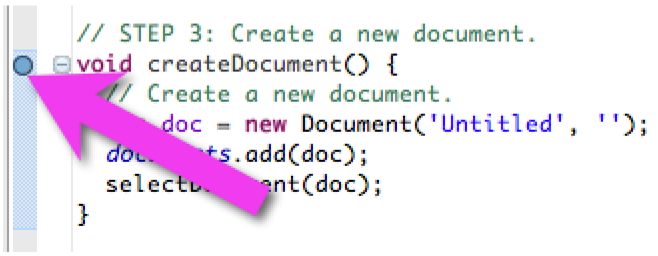
2. In app.dart, find the createDocument() function (line 34).
   *Trick: Right-click in the Editor pane and choose **Outline File**. Then click **createDocument**.*



```
@observable
library writer;

import 'dart:async';
import 'dart:html' hide Document;

import 'package:web_ui/web_ui.dar

import 'package:writer/document.d

// STEP 4: Import search.dart.
import 'package:writer/search.dar

// STEP 5: Import storage.dart.
import 'package:writer/storage.da

// STEP 3: Add an observed list of documents.
final List<Document> documents = toObservable([]);

/// The document currently being written.
```

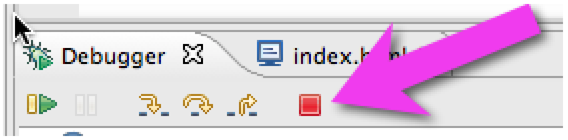
```
ırch.dart.
ır/search.dart';

ırage.dart.
ır/storage.dart';

ıerved list of docum
 documents = toObser

ıently being written
ınt = new Document('
```

3. Set a breakpoint in the function by double-clicking the gray bar to the left of “void createDocument() ...”.

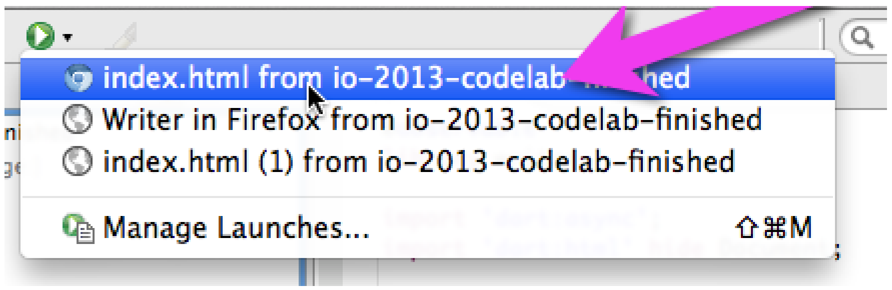


```
// STEP 3: Create a new document.
void createDocument() {
  // Create a new document.
     doc = new Document('Untitled', '');
  do    ts.add(doc);
  select     nt(doc);
}
```

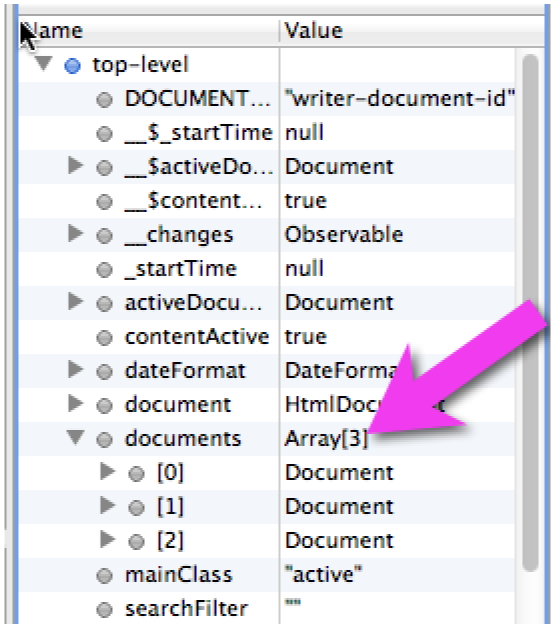
4. Stop the app if it’s already running. You can close the browser window the app is running in or click the **red** stop button in Dart Editor.



5. Run the app in Dartium. If you are using the launches menu, choose the launch with the mini **blue** Chromium icon.

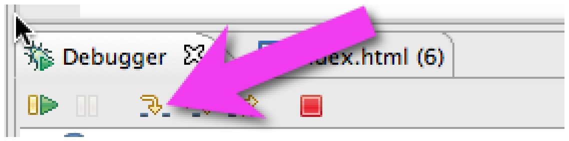

index.html from io-2013-codelab-finished
Writer in Firefox from io-2013-codelab-finished
index.html (1) from io-2013-codelab-finished
Manage Launches... ⇧⌘M

6. Get the app to hit the breakpoint.
    a. If you do not have any documents saved, the app hits the breakpoint on startup because it needs to create a new document to begin with.
    b. If the app starts up without hitting the breakpoint, create a new document by clicking the + button. The app hits the breakpoint.
7. In the Debugger pane, open **top-level** and then click the **documents** variable (*not the **document** variable)*. It's an array of Document objects. In the image below, the array contains three Document objects.



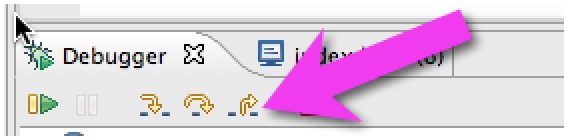
Name	Value
▼ top-level	
DOCUMENT...	"writer-document-id"
__$_startTime	null
▶ __$activeDo...	Document
__$content...	true
▶ __changes	Observable
_startTime	null
▶ activeDocu...	Document
contentActive	true
▶ dateFormat	DateForma
▶ document	HtmlDoc
▼ documents	Array[3]
▶ [0]	Document
▶ [1]	Document
▶ [2]	Document
mainClass	"active"
searchFilter	""

8. Use F5 or click the “Step Into” icon.

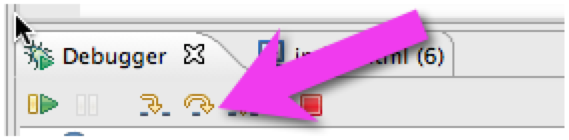


Whoops, now you’re in library code!

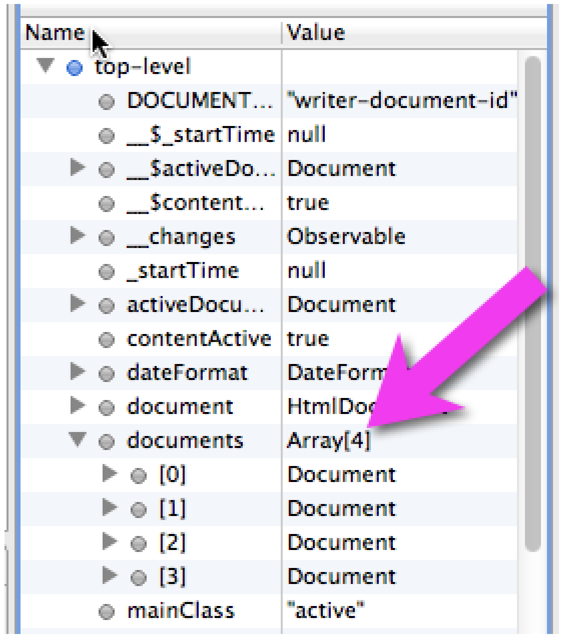
9. Use F7 or the “Step Return” icon to get back into app.dart code.



10. In the Debugger pane, look at the **doc** variable, which is an instance of Document.
11. Use F6 or “Step Over” to get to the next line of code.



12. Look at the top-level documents variable again. The array contains one more item than it did before.

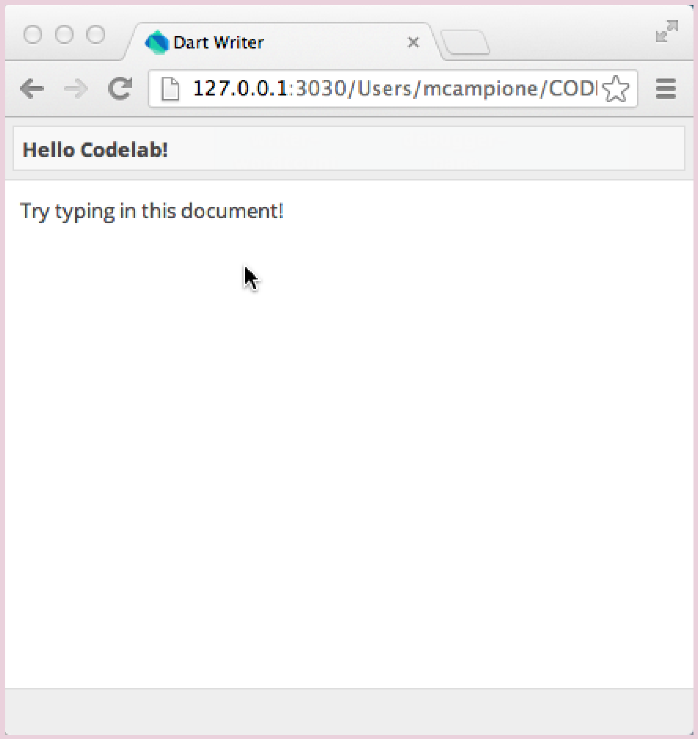


Name	Value
top-level	
DOCUMENT...	"writer-document-id"
__$_startTime	null
__$activeDo...	Document
__$content...	true
__changes	Observable
_startTime	null
activeDocu...	Document
contentActive	true
dateFormat	DateForm
document	HtmlDoc
documents	Array[4]
[0]	Document
[1]	Document
[2]	Document
[3]	Document
mainClass	"active"

13. Continue playing with the debugger.

Note: Don't open Developer Tools in Dartium while you're debugging. Due to a bug, this crashes the debugger.

Overview: A visual summary of what you'll be doing

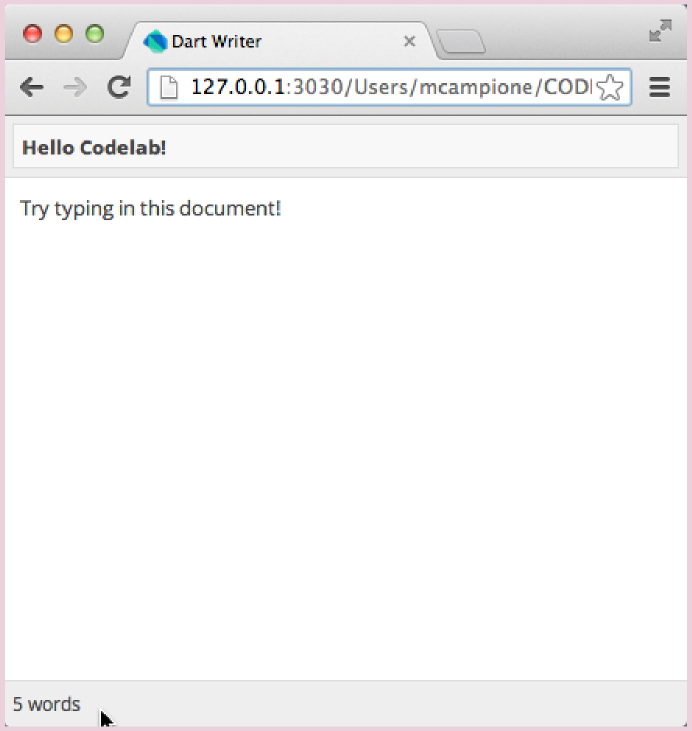
Begin with skeletal app	

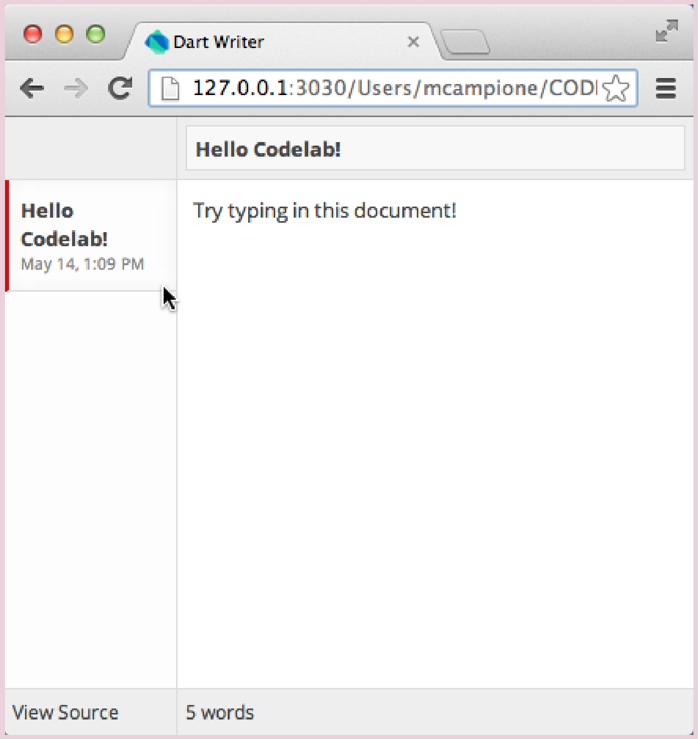
Dart Writer

127.0.0.1:3030/Users/mcampione/CODI

Hello Codelab!

Try typing in this document!

Add document word count to the footer	 Dart Writer 127.0.0.1:3030/Users/mcampione/CODI **Hello Codelab!** Try typing in this document! 5 words

Create side bar	

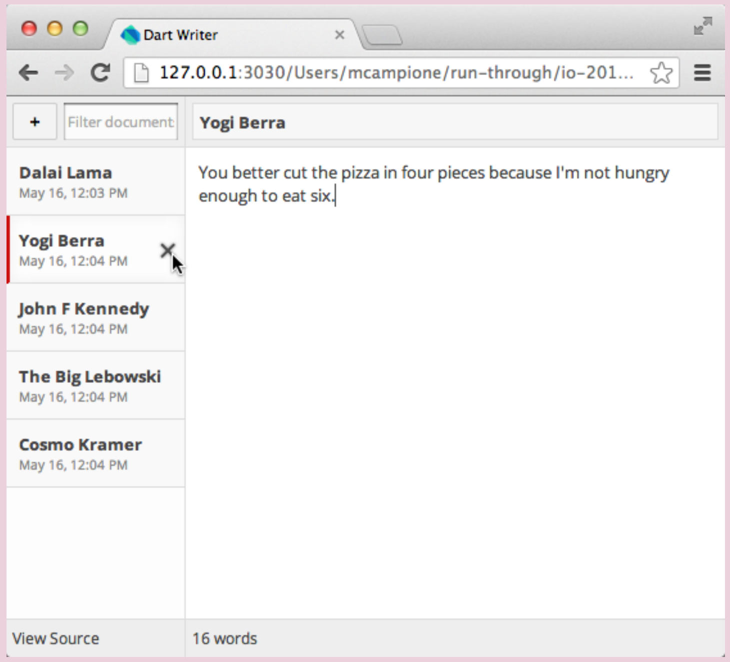
Hello Codelab!

Hello Codelab!
May 14, 1:09 PM

Try typing in this document!

View Source

5 words

Add the ability to create, select, and delete documents	

Yogi Berra

Dalai Lama
May 16, 12:03 PM

Yogi Berra
May 16, 12:04 PM

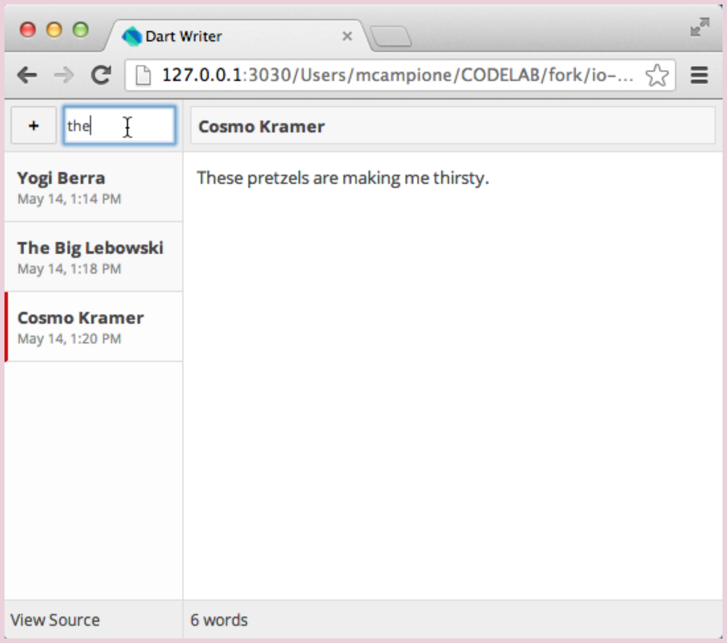
John F Kennedy
May 16, 12:04 PM

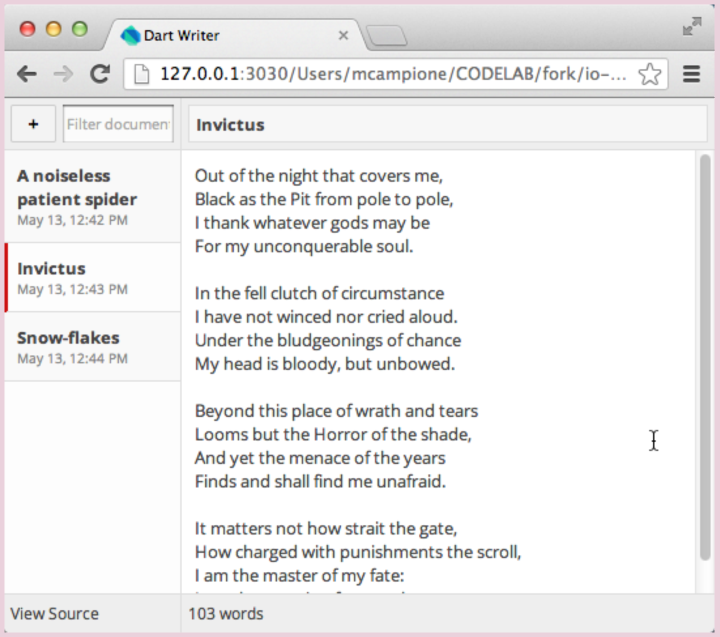
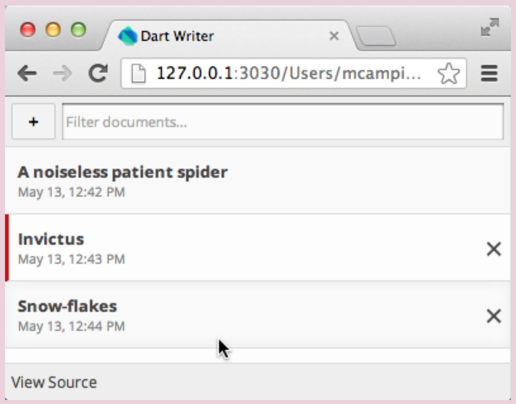
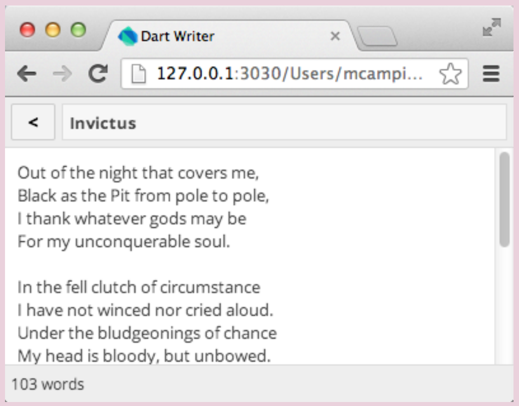
The Big Lebowski
May 16, 12:04 PM

Cosmo Kramer
May 16, 12:04 PM

You better cut the pizza in four pieces because I'm not hungry enough to eat six.

16 words

Add search filter	 Dart Writer 127.0.0.1:3030/Users/mcampione/CODELAB/fork/io-… the Cosmo Kramer Yogi Berra May 14, 1:14 PM The Big Lebowski May 14, 1:18 PM Cosmo Kramer May 14, 1:20 PM These pretzels are making me thirsty. View Source 6 words

Add local storage (provides document persistence between invocations)	 Dart Writer 127.0.0.1:3030/Users/mcampione/CODELAB/fork/io-… + Filter documen Invictus **A noiseless patient spider** May 13, 12:42 PM **Invictus** May 13, 12:43 PM **Snow-flakes** May 13, 12:44 PM Out of the night that covers me, Black as the Pit from pole to pole, I thank whatever gods may be For my unconquerable soul. In the fell clutch of circumstance I have not winced nor cried aloud. Under the bludgeonings of chance My head is bloody, but unbowed. Beyond this place of wrath and tears Looms but the Horror of the shade, And yet the menace of the years Finds and shall find me unafraid. It matters not how strait the gate, How charged with punishments the scroll, I am the master of my fate: View Source 103 words
Optimize layout for mobile devices	Index  Dart Writer 127.0.0.1:3030/Users/mcampi… + Filter documents... **A noiseless patient spider** May 13, 12:42 PM **Invictus** May 13, 12:43 PM ✕ **Snow-flakes** May 13, 12:44 PM ✕ View Source Contents  Dart Writer 127.0.0.1:3030/Users/mcampi… < Invictus Out of the night that covers me, Black as the Pit from pole to pole, I thank whatever gods may be For my unconquerable soul. In the fell clutch of circumstance I have not winced nor cried aloud. Under the bludgeonings of chance My head is bloody, but unbowed. 103 words

Step 1: Begin with a skeletal app, add the word count to the footer using data binding

Now that you have Dart Editor set up and understand how the application works, let's rebuild the app step-by-step, starting with a skeletal version. The code you downloaded from github contains a directory for each completed step of the code lab. So if necessary, you can begin each step with a correct version of the app. In the walkthrough portion of this step, you begin with the code in **io-2013-codelab-step1**.

What you will learn

You can display the value of a Dart variable on your web page directly within the HTML code. When the value of the variable changes within the Dart program, the UI automatically updates. This capability, called one-way data binding, is implemented by the Web UI public package. The Writer application uses one-way data binding to display the current document's word count in the footer of the page.

Concepts overview

1. Import public packages.
2. Libraries.
3. One-way data binding with Web UI.
4. Getters.

Import public packages

A package is a distributable bundle of code, often containing one or more libraries. The pub package manager helps you install and manage 3rd party packages. Dart's public repository pub.dartlang.org hosts many useful packages, including the Web UI package, which you need later for this step. The code below is a *package import*, which includes the Web UI package in a Dart file.

```
import 'package:web_ui/web_ui.dart';  // import the Web UI package
```

Libraries

Dart code can be organized into *libraries*. A library is a namespace that can contain top-level fields, top-level functions, classes, and more. A library can import other libraries, and be imported into other libraries.

The Dart core libraries start with "dart:", such as dart:core, dart:collection, and dart:async. These libraries come from the Dart SDK. For example, to import the core async library, simply add this to the top of your library:

```
import 'dart:async';  // an important Dart core library
```

A library can be split across multiple files, also known as *parts*. We don't show an example of parts in the code lab.

One-way data binding with Web UI

The Web UI package implements one-way data binding, which provides dynamic and automatic synchronization between an HTML element and an observable Dart variable. The @observable meta-data annotation marks a variable to be observed. The Web UI compiler, dwc, generates extra code that notes changes to an observable variable and keeps the UI in sync with those changes. Here is an observable string:

```
@observable String aStringOfNote = 'Hello, World!';
```

The value of an observable variable can be embedded in an HTML page, by including the variable name between double curly braces, {{*name_of_observable_var*}}, within normal HTML code, as shown:

```
<p> {{aStringOfNote}} </p>
```

Later, if the value of the variable changes in the Dart code, the web page automatically updates to reflect the new value of the variable. For example, after the following line of Dart code runs, the paragraph element changes from “Hello, World!” to “Goodbye, cruel world!”

```
aStringOfNote = 'Hello, Universe!';
```

Getters

Dart allows you to create getters and setters that look like fields when used. This means your design can start with simple fields, and evolve over time to use getters and setters. No more defensive and preemptive encapsulation!

Here is an example. Consider a simple Car class with a single field called isRunning.

```
class Car {
  bool isRunning;
}

main() {
  var car = new Car();
  print(car.isRunning);
}
```

Imagine that you later add an Engine field to Car. Engine knows if it's running, thereby making Car's isRunning field obsolete. Do you break existing users? No way! Use a getter method!

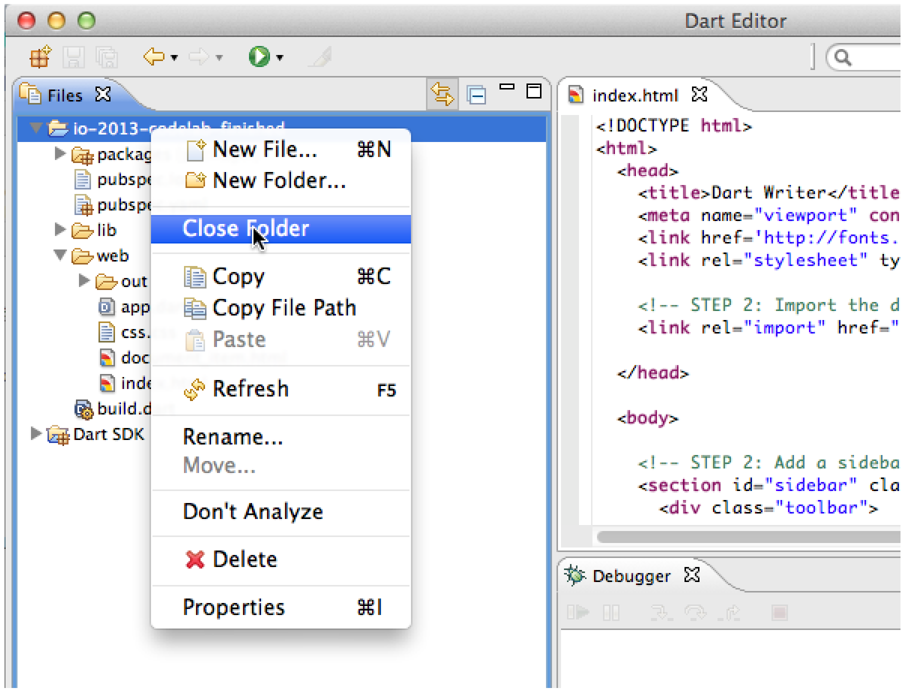
```
class Engine {
  bool isRunning;
}

class Car {
  Engine engine;

  bool get isRunning => engine.isRunning;
}

main() {
  var car = new Car();
  print(car.isRunning);
}
```

Notice how the usage of the car.isRunning is the same with both the getter and the field. The users of the Car class did not have to update their code when you changed the implementation of Car.

Walkthrough

Open the code for step 1

Close the **io-2013-codelab-finished** directory: right-click on the folder in the Files view of Dart Editor and select **Close Folder** from the menu.



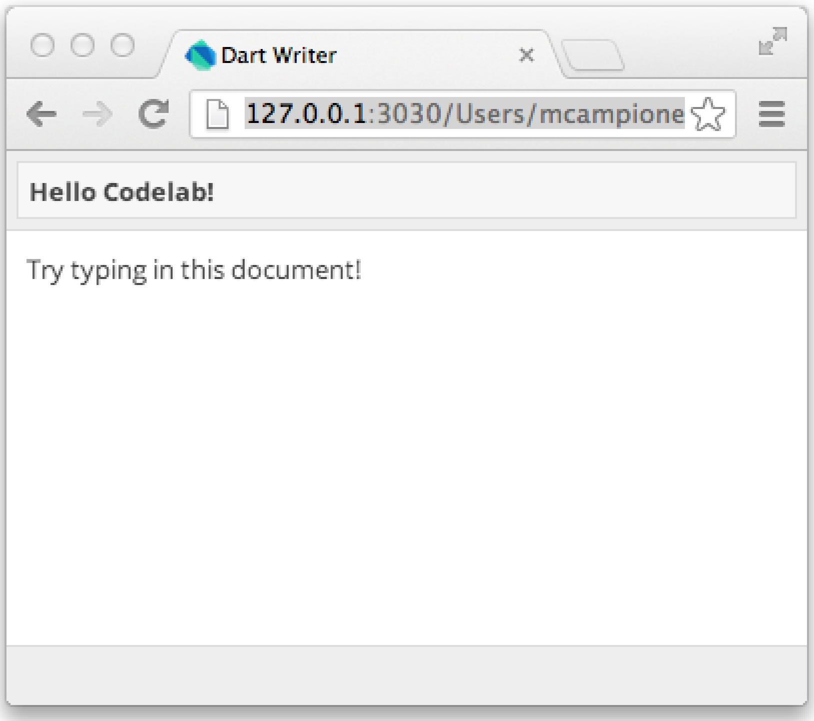
```
<!DOCTYPE html>
<html>
  <head>
    <title>Dart Writer</title
    <meta name="viewport" con
    <link href='http://fonts.
    <link rel="stylesheet" ty

    <!-- STEP 2: Import the d
    <link rel="import" href="

  </head>

  <body>

    <!-- STEP 2: Add a sideba
    <section id="sidebar" cla
      <div class="toolbar">
```

Open **io-2013-codelab-step1** with **File > Open Existing Folder** as you did with the finished directory in the previous step.

Dart Editor installs the app’s dependencies and builds it.

Run the app

Right click **web/index.html** and choose **Run in Dartium...**. The app should initially look like this:



Import the Web UI package

The **lib/document.dart** file contains the code that implements a plain text document. The Document keeps track of its creation time, has a title, and text content. In this step, you add a getter to the Document class that calculates the number of words in the document.

Double click **lib/document.dart** to open the file.

Near the top of the file, notice this comment.

```
…
/// STEP 1: Import the Web UI package
…
```

Comments of this style appear throughout the code, clearly marking what to do for each numbered step. The **lib/document.dart** file has three comments for step one.

Beneath the comment, type in the import directive for including the Web UI package. In the gray code boxes throughout this code lab, the code you need to add is **`bold`**. Code you need to delete is ~~`struck through`~~.

```
// lib/document.dart
…
/// STEP 1: Import the Web UI package.
import 'package:web_ui/web_ui.dart';
…
```

Mark the Document class with @observable

Find the next STEP 1 comment; it appears a few lines below the import directive you just entered.

```
…
/// STEP 1: Mark the class with @observable.
…
```

Mark the Document class with the @observable meta-data annotation. This makes all fields of an instance of the Document class observable.

```
// lib/document.dart
…
/// STEP 1: Mark the class with @observable.
@observable
class Document {
…
```

Calculate the word count for the current document

To find the final task for step 1 in the **`lib/document.dart`** file, search for “STEP 1” and locate the comment for the wordCount method in the code.

```
…
  /// STEP 1: Add wordCount method.
…
```

To search in Dart Editor, go to the **Edit** menu and choose **Find/Replace...**. Then type “STEP 1” into the text field and click **Find**.

Under the comment, add the code for a new getter called wordCount. The getter uses the RegExp class, which is provided in the dart:core library, to calculate how many words are in the document. The return value of this getter is embedded in the HTML in the next step.

```
// lib/document.dart
…
  /// STEP 1: Add wordCount method.
  /**
   *  Number of words in the document.
   *
   *  A "word" is a string of characters separated by a space or a newline.
  String get wordCount {
    int count = new RegExp(r"(\w|\')+").allMatches(_content).length;
    if (count >= 1) {
      return '$count words';
    } else if (count == 1) {
      return '$count word';
    }
    return 'No words - Yo, Yo write something...';
  }
…
```

Save the file using **File > Save**. You have completed all of the step 1 tasks in the **lib/document.dart** file.

Embed the word count in the footer of the web page.

The HTML page that hosts the Writer app is **web/index.html**. Let's add the word count to the footer of the page.

Double click **web/index.html** to open it.

Search for "STEP 1" and locate the code for the footer.

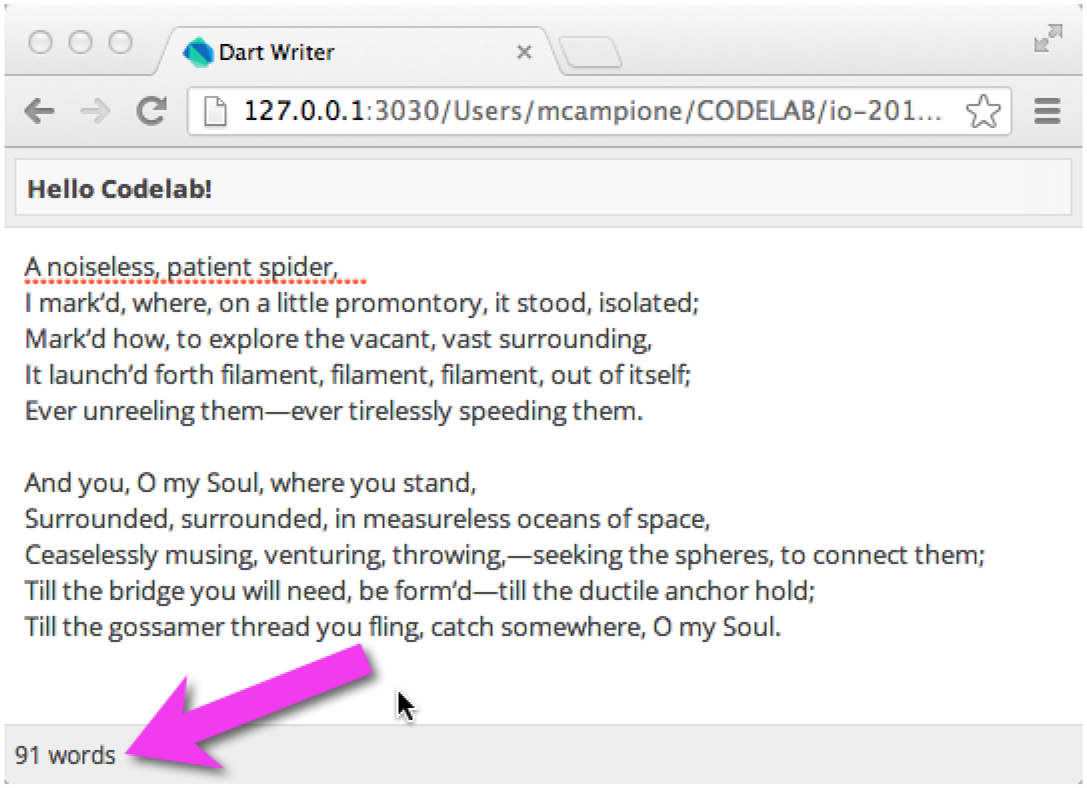
Add the code to display the word count in the footer of the document, using the double curly bracket syntax.

```
// web/index.html
…
        <div class="footer">

          <!-- STEP 1: Show the current word count. -->
          {{activeDocument.wordCount}}

        </div>
…
```

Save your changes with **File > Save**. You have completed all of the step 1 tasks.

Run the revised version of the app.

Run the app again, and type in the document. As you type, the word count updates at the bottom of the page:



Hello Codelab!

A noiseless, patient spider,
I mark'd, where, on a little promontory, it stood, isolated;
Mark'd how, to explore the vacant, vast surrounding,
It launch'd forth filament, filament, filament, out of itself;
Ever unreeling them—ever tirelessly speeding them.

And you, O my Soul, where you stand,
Surrounded, surrounded, in measureless oceans of space,
Ceaselessly musing, venturing, throwing,—seeking the spheres, to connect them;
Till the bridge you will need, be form'd—till the ductile anchor hold;
Till the gossamer thread you fling, catch somewhere, O my Soul.

91 words

Congratulations! You've completed the first step.

Step 2: Create a sidebar to list the documents

The family of Web Component specifications, such as custom elements and HTML imports, give the web developer real encapsulation of the structure, style, and behaviors of elements in the DOM. With help from the Web UI package, you can make your own tags!

In this step, using the <element> tag, you create a custom element to implement the behavior and view of a sidebar that lists the documents. Then, you use the new custom element to create a sidebar in the Writer app.

What you will learn

1. Define custom elements.
2. Import HTML into HTML.
3. Use custom elements.
4. One-line functions.

Concepts overview

Define custom elements

A custom element extends the lexicon of HTML. A custom element definition encapsulates the structure (the HTML), styles (CSS), and behavior (Dart or JavaScript code) of a new kind of element. For example, you can extend <button> to create a <fancy-button> tag, with new custom behaviors and appearance.

By convention, custom element names begin with x-. For example <x-flower>. Custom element names *must* have a hyphen (-) in their name, such as <fancy-button>. Following the x- naming convention ensures that your custom element names always have a hyphen.

The new <element> tag allows you to declare a new element (using HTML to declare HTML, I like it!) Here is an example:

```
<element name="x-comment" extends="div" constructor="CommentComponent">
```

```
  <template>
    <div class="name">{{name}}</div>
    <div class="comment"><content></content></div>
  </template>
  <script type="application/dart">
    import 'package:web_ui/web_ui.dart';
    class CommentComponent extends WebComponent {
      String name;
      String comment;
    }
  </script>
</element>
```

The element tag defines a new kind of HTML element. To create an instance of a custom element use the element name as you would any other HTML tag. To create an instance of the element defined above, write <x-comment>. A custom element instance *must* have a closing tag </x-comment>.

Within the template definition above, notice the <content> tag. When an <x-comment> element is instantiated, you can use other HTML elements between <x-comment> and </x-comment>, a paragraph, a span, a list, for example. Those elements replace the <content> tag for that instantiation. Using attributes, you can filter for specific elements to replace the <content> tag.

Import HTML into HTML

To use a custom element, you often *import* the HTML that contains the <element> tag. Luckily, HTML has a method for including resources: the <link> tag. Here is an example:

```
<link rel="import" href="comment_component.html">
```

The <link> tag must appear in the <head> of the document.

Use custom elements

Once you have imported the custom element, you can use it in your document. Here is an example:

```
<ul>
  <li><x-comment name="Bob">I totally agree!</x-comment></li>
  <li><x-comment name="Alice">I totally disagree!</x-comment></li>
</ul>
```

One-line functions

Dart makes it easy and terse to write one-line functions with the "fat arrow" syntax. Here is an example:

```
int nextNumber() => i++;
```

The above code is syntactic sugar for:

```
int nextNumber() {
  return i++;
}
```

Walkthrough

The custom element's file

First, create a new file for the custom element inside of the **web/** directory.

1. Right-click on the **web** directory and select "**New File**".
2. Name this file "document_item.html". Dart Editor provides some boilerplate code. Delete it.
3. Open **__for_later/document_item.html**, copy its contents, and paste it into **web/document_item.html**.

Declare the custom element

Ensure you are working in **web/document_item.html**, and add the following code:

```
// web/document_item.html
<html><body>
  <!-- STEP 2: Define a custom element. →

  <element name="x-document-item" constructor="DocumentItem"
      extends="div" apply-author-styles>

    <!-- STEP 2: Define the DOM template for our custom element -->
    <template>

    </template>

    <!-- STEP 2: Add the script tag that defines this component's behaviour. -->
    <script type="application/dart">

    </script>
  </element>

</body></html>
…
```

A few notes about the code above:

- The name of the element is x-document-item.
- The custom element extends <div>. That is, x-document-item is a special kind of div.
- Some behavior of the x-document-item is implemented by a Dart class named DocumentItem. You will create and include this class below.

- The apply-author-styles attribute indicates that styles from the larger HTML document apply to the contents of the custom component.

Notice the <template> tag inside of <element>. A custom element can define its own structure with the <template> tag. Fill in this template now.

The template

Add the code for the template as shown. You need to also add the comments for STEP 3 just as we have them in the code. You need the comments to orient yourself later when you implement Step 3.

```
// web/document_item.html
…
    <!-- STEP 2: Define the DOM template for our custom element -->
    <template>

      <!-- STEP 3: On click, select the document. -->
      <div class="item {{isActiveClass}}">

          <div class="title">{{title}}</div>
          <div class="modified">{{modified}}</div>

          <!-- STEP 3: Add delete button. -->

      </div>
    </template>
…
```

You can use one-way data binding in a template. Each time a custom element is instantiated, an instance of the Dart class is created and associated with the custom element. Data bindings in the template are bound to fields in that Dart instance. For example, {{title}} binds to a field from the instance of DocumentItem that is created when an element of this type is created. It's a good idea to move all logic into the Dart class, and just use fields and getters for the HTML.

Speaking of the class, let's add that now!

The script

Use a <script> tag to declare the Dart class that goes with the custom element. The Dart class contains any state and behavior applicable to the view.

Ensure you are still editing **web/document_item.html**, and add the following code inside the <script> and </script> tags:

```
// web/document_item.html
…
    <!-- STEP 2: Add the script tag that defines this component's behaviour. -->
    <script type="application/dart">
      import 'package:web_ui/web_ui.dart';

      import 'package:writer/document.dart';
      import 'app.dart' as app;

      /**
       * This Dart class defines the behavior and
       * state of the custom element.
       */
      class DocumentItem extends WebComponent {
        Document doc;

        String get title => doc.title.isEmpty ? 'Untitled' : doc.title;

        String get modified => dateFormat.format(doc.modified);

        String get isActiveClass => doc == app.activeDocument ? 'active' : '';
      }
    </script>
…
```

Note: Dart Editor doesn't yet fully support Dart code embedded inside of <script> tags. For example, you can't use code completion inside of a <script> tag yet. We anticipate that the editor will have this functionality in time for 1.0.

A few notes about the code above:

- The DocumentItem class acts as a *View Model*, encapsulating any state used by the view, and linking model classes like Document to the view. We use getters for title, modified, and isActiveClass because calling a getter is shorter than calling a method.
- A DocumentItem uses a Document object, called doc, for its data model. The doc field gets initialized when the custom element gets instantiated. You'll see this later when you add the sidebar in the HTML code.
- The Document class defines a top-level object, called dateFormat, used to format the modified date. (Look at the bottom of **lib/document.dart** for the code that creates dateFormat.) The DateFormat class is provided by the intl package.

Save your changes to **web/document_item.html**.

Import the custom element into the main HTML

To create instances of <x-document-item>, the main application's HTML needs to import the code that defines the custom <x-document-item> tag. Luckily, HTML already has a mechanism to link to other resources: the <link> tag!

Open **web/index.html** and add the following code:

```
// web/index.html
…
    <link rel="stylesheet" type="text/css" href="css.css">

    <!-- STEP 2: Import the document item component. -->
    <link rel="import" href="document_item.html">

  </head>
…
```

Add the sidebar

With the custom element implemented, and imported, time to use <x-document-item>!

Make sure you are still editing **web/index.html**. And yes, you need to write all those comments just as we have them in the code. You will add more functionality in the following steps, so you need the comments to ensure you can orient yourself later.

Add the following code:

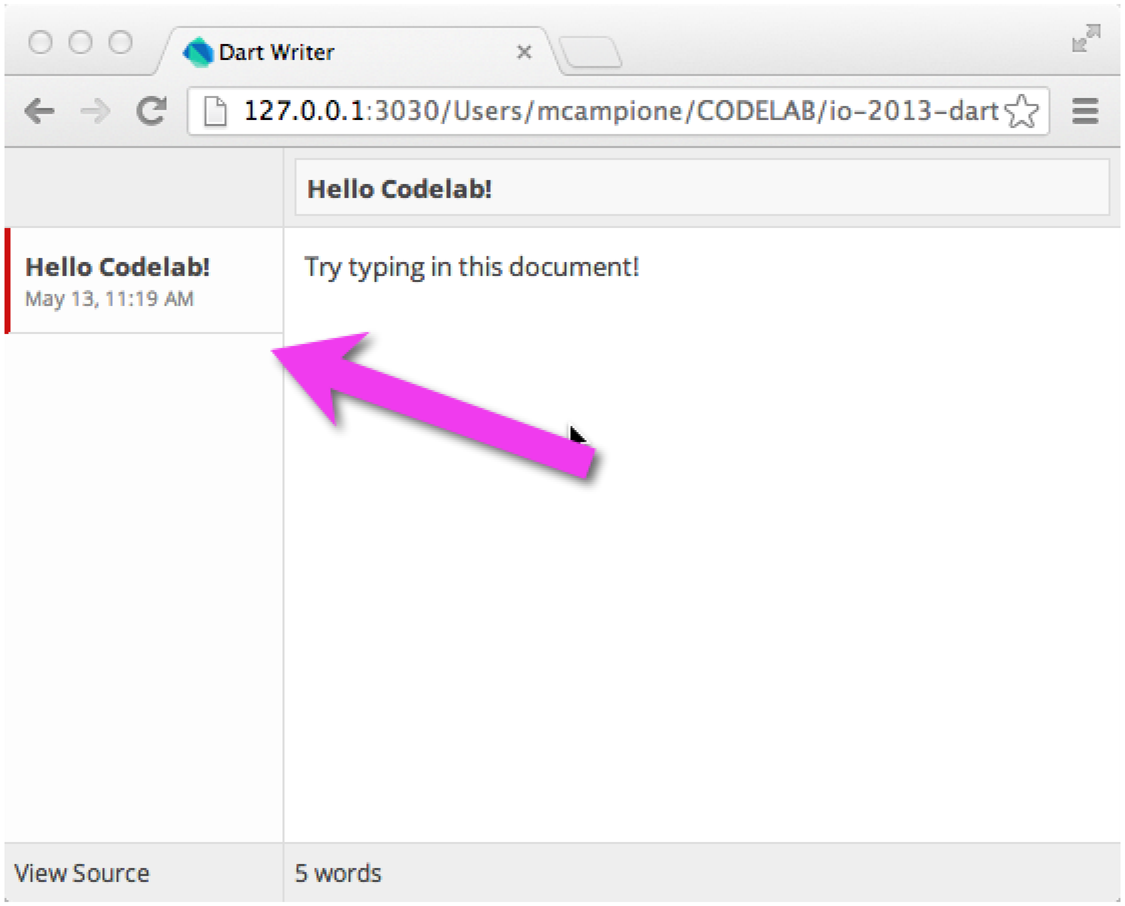
```
// web/index.html
…
  <body>

    <!-- STEP 2: Add a sidebar to the application. -->
    <section id="sidebar" class="{{sidebarClass}}">
      <div class="toolbar">

        <!-- STEP 3: Add a button to create a new document. -->


        <div class="input-wrap">
          <!-- STEP 4: Add a input box to filter documents. -->

        </div>
      </div>

      <!-- Documents list -->
      <div class="items">

        <!-- STEP 3: Iterate over list of documents. -->

        <!-- STEP 2: Add the active document to the sidebar. -->
        <x-document-item doc="{{activeDocument}}"></x-document-item>

      </div>

      <!-- Also check out dartlang.org! -->
      <div class="footer">
        <a href="https://github.com/dart-lang/io-2013-dart-codelab">View Source</a>
      </div>
    </section>

    <!-- Editing window -->
    <section id="main" class="{{mainClass}}">
…
```

Take a look at <x-document-item doc="{{activeDocument}}">. The active document is bound into the x-document-item tag via the doc attribute. The activeDocument object is a top-level variable from app.dart.

Save your changes in **web/index.html** and in **web/document_item.html**, if you haven't already done so.

Depending on the order in which you saved the files, you might see warnings or errors in Dart Editor complaining about unknown custom elements. Try running **Tools > Reanalyze Sources**.

Run the app. On the left side of the app is a sidebar that contains a document.



Try typing in this document!

Step 3: Add the ability to create, delete, and select documents in the list

In this step, you'll implement support for creating, deleting, and selecting documents. Your code will use an observable list to keep track of which documents exist.

What you will learn

1. Using Web UI's toObservable() function to make a list observable.
2. Using <template iterate...> to create an element for each item in a list.

Concepts overview

The toObservable() function

Use the toObservable() function from the Web UI library to make a List or a Map observable. In the Writer app, making the list of documents observable enables Web UI to update your app's UI whenever a document is created or deleted.

Template iterate

Template loops allow iteration over Iterable Dart objects, such as Collections. To create a loop that operates on each item in an Iterable object, use the iterate attribute in a <template> tag. The code below displays the alphabet by looping over a list of strings, of which each string contains a single character.

```
// in Dart code
List<String> alphabet = toObservable('abcdefghijklmnopqrstuvwxyz'.split(''));

// in HTML code
<template iterate="letter in alphabet"> {{letter}} </template>
```

Walkthrough

You'll be editing three files this time: **web/app.dart**, **web/index.html**, and **web/document_item.html**.

(**Optional**: Remember that if necessary, you can start with clean files for each step. If you want to, close the directory for step 2 and open the **io-2013-codelab-step3** directory now.)

Add an observable list of documents

Open **web/app.dart** and add the line of code shown below that creates an empty, observable list of documents.

```
// web/app.dart

// STEP 3: Add an observed list of documents.
final List<Document> documents = toObservable([]);
```

Add functions for creating, deleting, and selecting documents

First, let's implement creating documents.

Continue editing **web/app.dart**.

Add the createDocument() function to **web/app.dart** where indicated by the comments. The new function calls another function, called selectDocument(), which is not defined yet and about which Dart Editor issues warnings. You'll add that function just below, so ignore the warnings for now.

```
// web/app.dart

// STEP 3: Create a new document.
void createDocument() {
  // Create a new document.
  var doc = new Document('Untitled', '');
  documents.add(doc);
  selectDocument(doc);
}
```

Next, let’s implement deleting a document.

```
// web/app.dart

// STEP 3: Add code to delete a document
void deleteDocument(Document doc) {
  documents.remove(doc);

  // STEP 5: Also delete from local storage.
}
```

Now, let’s implement setting the currently selected, or *active*, document.

```
// web/app.dart

// STEP 3: Add code to select a document.
void selectDocument(Document doc, {bool markActive: false}) {
  if (documents.isEmpty) {
    activeDocument = null;
  } else if (doc != null && documents.contains(doc) && doc != activeDocument) {
    // Change active document.
    activeDocument = doc;
  } else if (activeDocument != null && documents.contains(activeDocument)) {
    // Stay on the active document and display the editing window.
    contentActive = markActive && doc == activeDocument;
  } else {
    // Fall back to the last document.
    activeDocument = documents.last;
  }
}
```

A quick note about Dart syntax. The second argument, markActive, is optional as indicated by the curly brackets. If the caller does not provide the argument, the value is false.

Save **web/app.dart**. The Dart Editor warnings should go away.

Add document initialization to main()

We need a little more Dart code to create and select the first document.

Find the main() function and add two lines of code:

```
// web/app.dart

void main() {
  // STEP 5: Initialize with all documents from local storage.

  // STEP 3: Create a new document if there are none.
  if (documents.isEmpty) createDocument();

  // STEP 3: Select the first document in the list of documents.
  selectDocument(documents.first);
}
```

Save **web/app.dart**.

Now that we have functions that let us create, delete, and select documents, we can create elements that provide a UI to use that functionality.

Create new elements in web/index.html

Open **web/index.html**.

Create a + button, and set our new createDocument() function as the button's mouse click callback function.

```
// web/index.html

      <div class="toolbar">

        <!-- STEP 3: Add a button to create a new document. -->
        <button on-click="createDocument()">+</button>
...
```

Delete the old code that created a single <x-document-item>, and replace it with code that creates one <x-document-item> for each item in the documents list.

```
// web/index.html

        <!-- STEP 3: Iterate over list of documents. -->
        <template iterate="doc in documents">

          <!-- STEP 4: Hide documents that don't match search filter. -->

          <!-- Our custom document element! -->
          <x-document-item doc="{{doc}}"></x-document-item>
        </template>

~~<!-- STEP 2: Add the active document to the sidebar. -->~~
~~<x-document-item doc="{{activeDocument}}"></x-document-item>~~
```

Save **web/index.dart**.

Add code to select a document and to delete a document

Open **web/document_item.html**.

Now that we have selectDocument() and deleteDocument() functions, our custom component can use them. The following code uses the new selection function and adds an “X” button to <x-document-item> that deletes the item. Be sure to delete the ‘>’ from the end of the <div> tag.

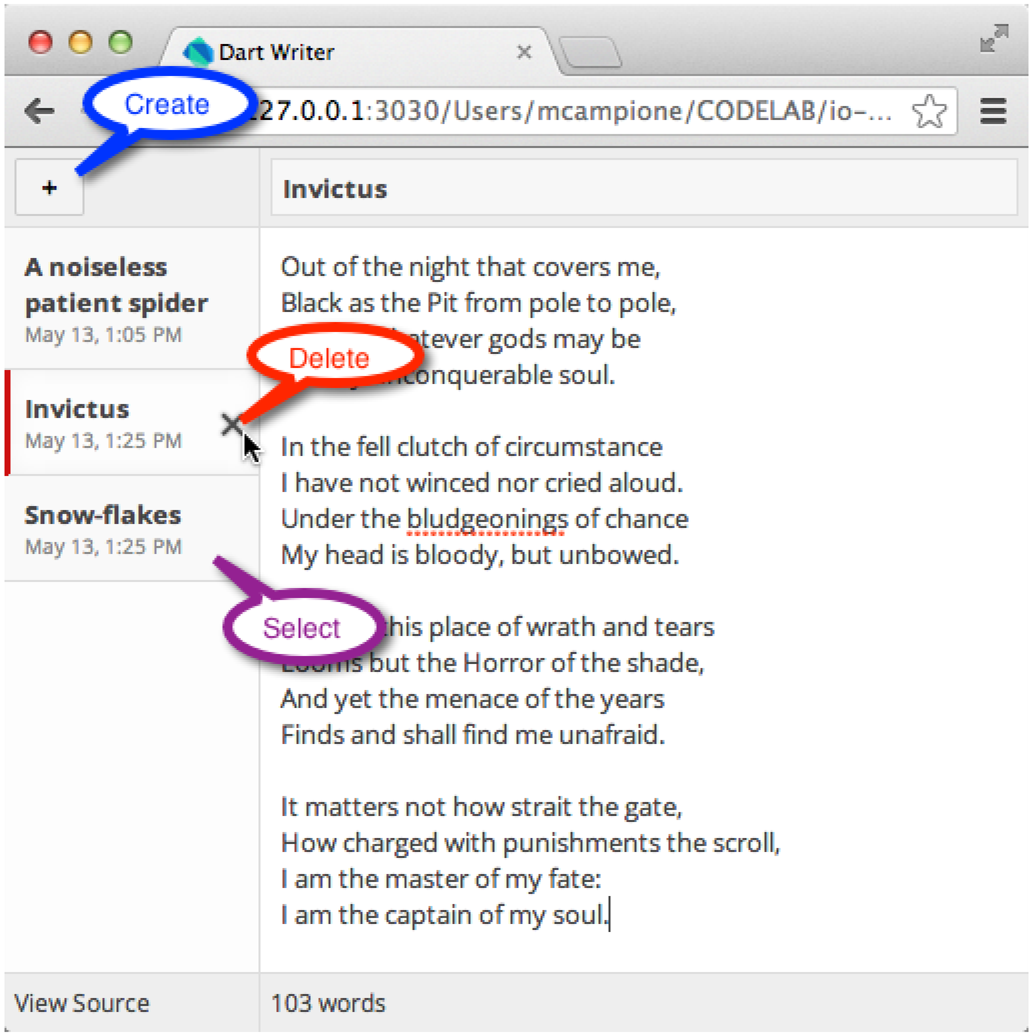
```
// web/document_item.html

      <!-- STEP 3: On click, select the document. -->
        <div class="item {{isActiveClass}}"~~>~~
             on-click="app.selectDocument(doc, markActive: true)">
…
          <!-- STEP 3: Add delete button. -->
          <button class="delete" on-click="app.deleteDocument(doc)">&times;</button>
```

Save **web/document_item.html**.

Try out the new functionality

Try it out! Run the app.

- Click the + button to create a new document.
- Type in some text.
- Change the document name.
- Click on a document in the sidebar to select a document. A **red** vertical line appears on the left and its contents appears in the text area.
- Hover the mouse over a document in the sidebar and an ‘X’ appears. Click the ‘X’ to delete the document.



Invictus

A noiseless patient spider
May 13, 1:05 PM

Invictus
May 13, 1:25 PM

Snow-flakes
May 13, 1:25 PM

Out of the night that covers me,
Black as the Pit from pole to pole,
…tever gods may be
…nconquerable soul.

In the fell clutch of circumstance
I have not winced nor cried aloud.
Under the bludgeonings of chance
My head is bloody, but unbowed.

…his place of wrath and tears
…s but the Horror of the shade,
And yet the menace of the years
Finds and shall find me unafraid.

It matters not how strait the gate,
How charged with punishments the scroll,
I am the master of my fate:
I am the captain of my soul.

103 words

Step 4: Add a search bar

In this step, you will learn how to connect an HTML input field to a Dart object, and then conditionally display DOM elements based on the contents from the input field.

What you will learn

1. Instantiate DOM elements based on conditionals.
2. Bind an input field to a Dart object (aka two-way data binding).

Concepts overview

Template conditionals

The contents of a <template> tag can be added to, or removed from, the DOM based on a *conditional*. If a conditional is true, the contents of the <template> are added to the DOM (in other words, the contents are displayed on the page). If the conditional is false, the contents are removed from the page.

Here is a simple example of a conditional template:

```
<template if="user.agreedToTOS">
  Thanks for clicking agree!
</template>
```

Every time the conditional changes (from false to true, or from true to false), the contents are added or removed.

Field binding

An HTML input field, such as a text input, can be bound to a Dart object. Whenever the input field's value changes, the Dart object's value changes. Whenever the Dart object's value changes, the input field changes. This is known as *two-way binding*.

Here is a simple User class:

```
class User {
  String username;
}
```

Here is a simple example of an input field binding:

```
<input type="text" name="username" bind-value="user.username">
```

The value property of the input field is bound to the username field of the `user` object—an instance of the `User` class.

Walkthrough

Create a new library

To help you get started, we've given you the shell for the new search library.

1. Right-click on the **lib** directory and select "**New File**".
2. Name this file "search.dart".
3. Open **__for_later/search.dart**, copy its contents, and paste into **lib/search.dart**.

Observe the search filter

You need to add a top-level field that will contain the search filter.

Add the following code to **lib/search.dart**.

```
// lib/search.dart
```

```
import 'package:writer/document.dart';

// STEP 4: Add an observed string to filter documents.
@observable
String searchFilter = '';
…
```

Filter documents

Now that you have an observable searchFilter string, you can filter documents.

Inside of **lib/search.dart**, add the following code:

```
// lib/search.dart

// STEP 4: Add function to check if a document matches the search filter.
bool matchesSearchFilter(Document doc) {
  if (searchFilter.isEmpty) {
    return true;
  }

  return doc.title.toLowerCase().contains(searchFilter.toLowerCase()) ||
         doc.content.toLowerCase().contains(searchFilter.toLowerCase());
}
```

Notice that searchFilter.isEmpty is a *getter*—it doesn't have trailing parentheses.

Save your changes.

Import search into app

With the search library complete, you need to import it into the main application.

Open **web/app.dart** and add the following code:

```
// web/app.dart

import 'package:writer/document.dart';

// STEP 4: Import search.dart.
import 'package:writer/search.dart';

// STEP 5: Import storage.dart.
…
```

To keep the path to **search.dart** relative to **app.dart**, we use the package: import method to import the search.dart library from the writer package. The **pubspec.yaml** file declares the writer package. The pub command creates all the necessary symlinks to allow you to not have to create import paths like '../../lib/search.dart'.

Save your changes.

Input field for filter

Let's turn our attention to the HTML for the search box. You added the observable searchFilter field in search.dart, now let's bind that into an HTML input field.

Open **web/index.html** and add the following code:

```
// web/index.html
…
        <div class="input-wrap">
```

```
          <!-- STEP 4: Add a input box to filter documents. -->
          <input type="text" placeholder="Filter documents..." bind-value="searchFilter">
        </div>
…
```

The variable name *searchFilter* must match the string inside of the bind-value attribute.

Dynamically hide or show docs based on the filter

When the search filter changes, we want to dynamically update the documents displayed on the page.

Continue editing **web/index.html** and add the following code:

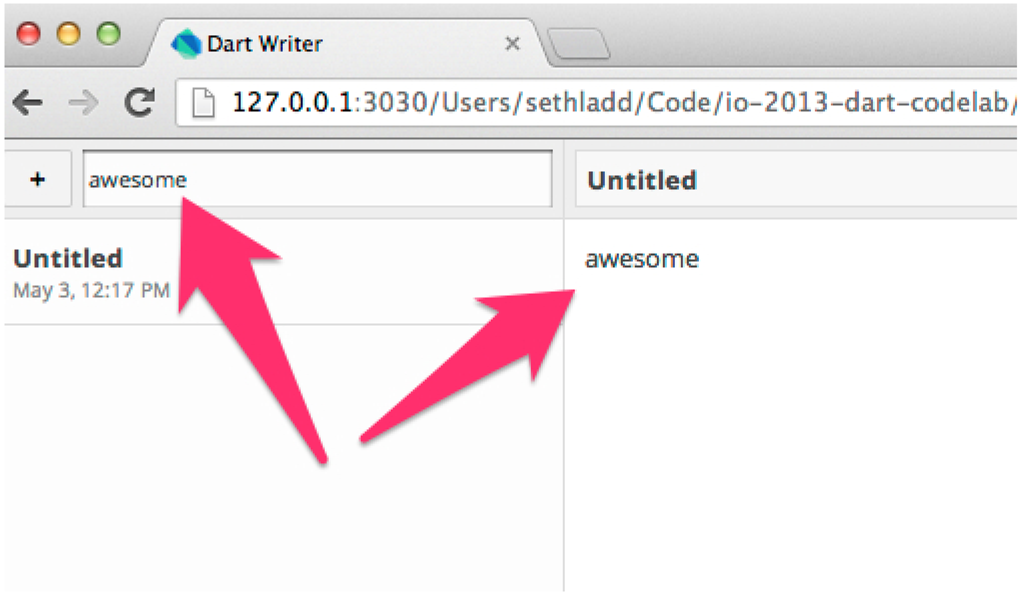
```
// web/index.html
…
        <!-- STEP 3: Iterate over list of documents. -->
        <template iterate="doc in documents">

          <!-- STEP 4: Hide documents that don't match search filter. -->
          <template if="matchesSearchFilter(doc)">

            <!-- Our custom document element! -->
            <x-document-item doc="{{doc}}"></x-document-item>
          </template>

        </template>
…
```

Notice that you are placing the conditional template within the template loop.

The Web UI library knows that matchesSearchFilter relies on searchFilter, so whenever searchFilter changes, it re-runs this template. Only those documents that pass matchesSearchFilter will be displayed with the custom <x-document-item> tag.

Run the code

Time to run the code! After completing this step, you should be able to search for documents by title or contents. The search results are live. *Note*: there is a known bug, if the currently opened document does not match the filter, it won't disappear.



If you do not see the input field for the filter, run **Tools > Reanalyze Sources**.

Step 5: Adding local storage

In this step, you learn how to save the user's documents in local storage, and later to remove the documents. In addition to saving the documents in local storage, the app also maintains a list of document IDs in local storage. The main() function uses this list to initialize the app and load the first document. The app saves the documents as JSON-formatted strings. You also learn how to use the JSON library to serialize and revive the document contents.

What you will learn

1. Save documents in local storage.
2. Remove documents from local storage.
3. Maintain a list of document IDs in local storage.
4. Use JSON to read and write the contents of the documents.

Concepts overview

Local storage

Local storage can be use to keep persistent data between invocations of your app. The data may only be accessed by the origin that created it. The Window object that hosts the web app has a localStorage object that your code can use to store and retrieve data. The local storage object is implemented as a Map<String, String>.

Save data in local storage by putting a key/value pair in the localStorage object.

```
window.localStorage['key1'] = 'val1';
window.localStorage['key2'] = 'val2';
window.localStorage['key3'] = 'val3';
```

Delete data from local storage by removing a key/value pair from the localStorage object.

```
window.localStorage.remove(['key1']);
```

You can use Map APIs such as containsValue(), clear(), and length:

```
assert(window.localStorage.containsValue('does not exist') == false);
window.localStorage.clear();
assert(window.localStorage.length == 0);
```

JSON

JSON is a text-based, human-friendly format for representing data of different types. The dart:json library has two useful functions for converting data to/from JSON: stringify() and parse(). Here's a small example that converts a list of objects to JSON and back again.

```
import 'dart:json' as JSON;

var list = [1, "two", 3.0];                  // a list of objects
String listAsString = JSON.stringify(list); // convert list of objects to JSON string
print(listAsString);                        // [1,"two",3.0]
var revivedList = JSON.parse(listAsString); // convert JSON string to list object
print(revivedList);                         // [1, two, 3.0]
```

Walkthrough

Create a library to handle local storage.

This step requires you to edit three files: **lib/storage.dart**, **web/index.html**, and **web/app.dart**. Let's begin with **storage.dart**.

Save a document to local storage. Add the document ID to the list.

To help you get started, we've given you the shell for the new local storage library.

1. Right-click on the **lib** directory and select "**New File**".
2. Name this file "storage.dart".
3. Open **__for_later/storage.dart,** copy its contents, and paste it into **lib/storage.dart**.

Modify the saveDocument() function. Add the code, shown in bold below,

1. to convert the document to a JSON-formatted string and save it in the window's local storage,
2. to add the document ID to the internal list of IDs, if necessary,
3. and finally, to save the list of document IDs, in JSON format, to the local storage.

```
// storage.dart
…
          <!-- Document title -->
/// Save the document to local storage.
void saveDocument(Document doc) {
  // STEP 5: Save the serialized version of the document to local storage.
  window.localStorage[doc.id] = doc.toJson();

  // STEP 5: Add the new document ID to our list of document IDs.
  if (!_storedIds.contains(doc.id)) {
    _storedIds.add(doc.id);
  }

  // STEP 5: Update local storage map of IDs.
  window.localStorage[DOCUMENT_ID_KEY] = JSON.stringify(_storedIds);
}

…
```

Remove the document from local storage. Remove the document ID from the list.

Continue editing **lib/storage.dart**.

Modify the removeDocument() function. Add the code

1. to remove the document ID from the internal list,
2. to remove the document from local storage,
3. and to save the list of document IDs in local storage.

```
// storage.dart
…
/// Removes the document from local storage.
void removeDocument(Document doc) {
  // STEP 5: Remove the document from local storage.
  _storedIds.remove(doc.id);
  window.localStorage.remove(doc.id);
  window.localStorage[DOCUMENT_ID_KEY] = JSON.stringify(_storedIds);
}
…
```

Load the list of IDs from local storage. Then load the documents.

Continue editing **lib/storage.dart**.

Modify the fetchDocuments() function. Add the code

1. to get the list of document IDs
2. to load all of the documents from local storage using the private method _fetchDocument()
3. and to display one of the documents.

```
// storage.dart
…
// Returns a collection of all documents from local storage.
Iterable<Document> fetchDocuments() {
  // STEP 5: Get all document IDs from local storage.
  if (window.localStorage[DOCUMENT_ID_KEY] != null) {
    _storedIds = JSON.parse(window.localStorage[DOCUMENT_ID_KEY]);
  }

  // STEP 5: Get all documents from local storage.
  return _storedIds.map(_fetchDocument);
}

/// Gets a document from local storage.
Document _fetchDocument(String id) {
  // STEP 5: Return one deserialized document from local storage.
  return new Document.fromJson(window.localStorage[id]);
}
…
```

Save your changes to **lib/storage.dart**.

Add event handlers to HTML elements to save the document.

Now that you've written the library code that saves and retrieves documents, you can use the new functions in the app. The app saves the documents based on user-generated events in the UI. So let's add event handlers to the HTML elements for saving the documents.

Open the **web/index.html** file.

Find the code that creates the text element for the document titles.

Add a key-up event handler to the text field. Each time the user types a character in the document title, the event handler saves the document.

```
// index.html
```

```
…
          <!-- Document title -->
          <div class="input-wrap">

            <!-- STEP 5: Add event handler to save the active document. -->
            ~~<input type="text" bind-value="activeDocument.title">~~
            <input type="text" bind-value="activeDocument.title"
                on-key-up="saveDocument(activeDocument)" />
          </div>
…
```

Now, find the textarea used to enter the contents of a document.

Add a key-up event handler to the textarea. Each time the user types a character into the document, the event handler saves the document.

```
// index.html
…
        <!-- Content box -->
        <!-- STEP 5: Add event handler to save the active document. -->
        ~~<textarea class="content" bind-value="activeDocument.content"></textarea>~~
        <textarea class="content" bind-value="activeDocument.content"
            on-key-up="saveDocument(activeDocument)"></textarea>

…
```

Save your changes to **web/index.html** .

Import storage.dart

For removing documents and initializing the app, you need to edit the Dart code.

Open **web/app.dart**.

Add an import directive near the top of the file to include the storage.dart library you just wrote.

```
// app.dart

@observable
library writer;

import 'dart:html' hide Document;

import 'package:web_ui/web_ui.dart';

import 'package:writer/document.dart';

// STEP 4: Import search.dart.
import 'package:writer/search.dart';

// STEP 5: Import storage.dart.
import 'package:writer/storage.dart';

// STEP 3: Add an observed list of documents.
final List<Document> documents = toObservable([]);
…
```

Initialize the app with the locally stored documents.

Continue editing **web/app.dart**.

Modify the main() function in app.dart. Use the fetchDocuments() function from the storage.dart library to initialize the app with the saved documents.

```
// app.dart
…
/// Starts the application.
void main() {
  // STEP 5: Initialize with all documents from local storage.
  documents.addAll(fetchDocuments());

  // STEP 3: Create a new document if there are none.
  if (documents.isEmpty) createDocument();

  // STEP 3: Select the first document in the list of documents.
  selectDocument(documents.first);
}
…
```

Remove the document from local storage.

Continue editing **web/app.dart**.

Find the deleteDocument() function. Add code to remove the document from local storage when the user deletes the document from the app.

```
// app.dart
…
// STEP 3: Add code to delete a document
void deleteDocument(Document doc) {
  documents.remove(doc);

  // STEP 5: Also delete from local storage.
  removeDocument(doc);
}
```

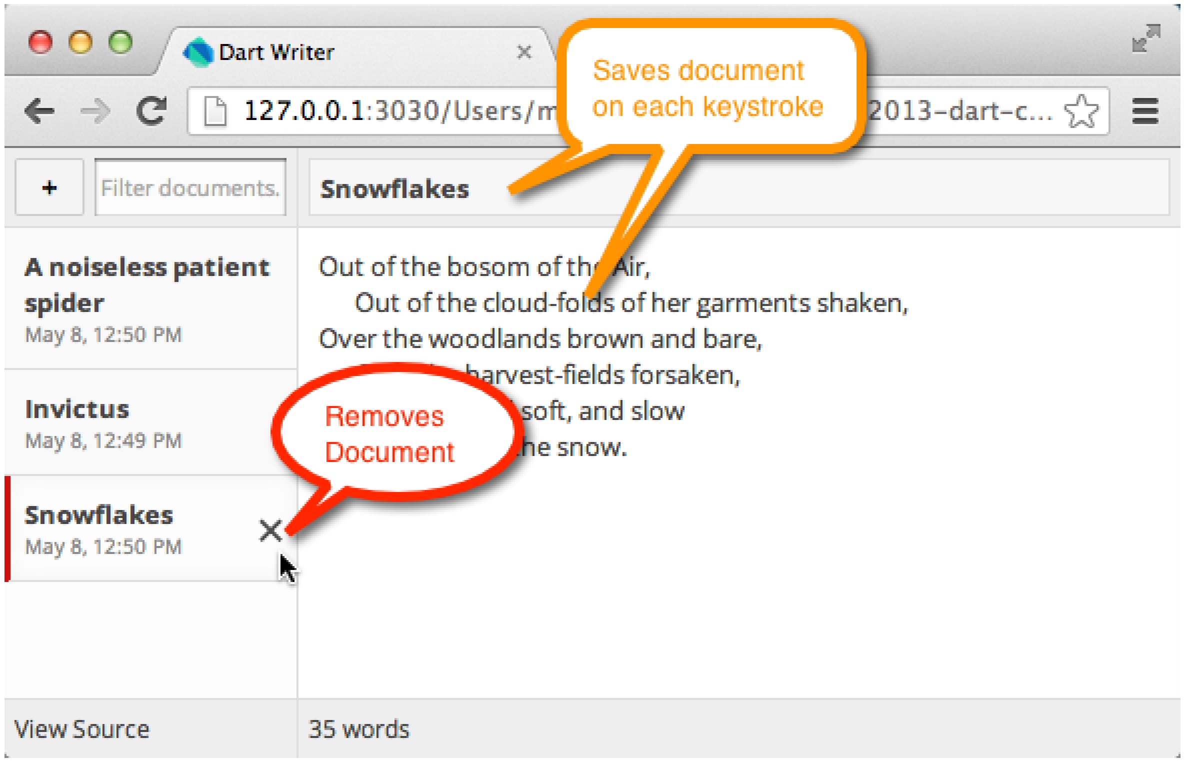
```
...
```

Save your changes to **web/app.dart**.

Run the revised version of the app.

You've completed the code edits for this step. Make sure all of your changes are saved.

Run the app again. Create and name several documents. Kill the app and start it up again. The documents you saved persist between invocations of the app.



Out of the bosom of th Air,
    Out of the cloud-folds of her garments shaken,
Over the woodlands brown and bare,
harvest-fields forsaken,
soft, and slow
he snow.

Step 6: Optimize layout for mobile devices

Your app already works on mobile, since many gestures emulate mouse events, such as clicks. But we can do better. In this step, you'll make your app feel more native on mobile by adding some code to control layout on mobile devices and by adding some specialized CSS styles.

What you will learn

1. Using a meta tag to control layout on mobile devices
2. CSS styles for mobile devices

Concepts overview

Control layout on mobile devices

The <meta> tag, with the viewport attribute, helps to optimize your site for mobile devices. Here's what the Mozilla developer website has to say about mobile-optimization:

A typical mobile-optimized site contains something like the following:

```
<meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1">
```

The width property controls the size of the viewport. It can be set to a specific number of pixels, like width=600, or to the special value device-width, which is the width of the screen in CSS pixels at a scale of 100%. (The content attribute also supports corresponding height and device-height values, which may be useful for pages with elements that change size or position based on the viewport height.)

The initial-scale property controls the zoom level when the page is first loaded. The maximum-scale, minimum-scale, and user-scalable properties control how users are allowed to zoom the page in or out.

CSS styles for mobile devices

The @media rule allows different style rules for different media in the same style sheet. Shown below are two rules, one which applies when the app runs in an environment, such as a small mobile device, which has a maximum width of 500 pixels. The other applies when the app runs in an environment that allows a larger width.

```
@media all and (max-width: 500px) {
  …
}
@media all and (min-width: 501px) {
  …
}
```

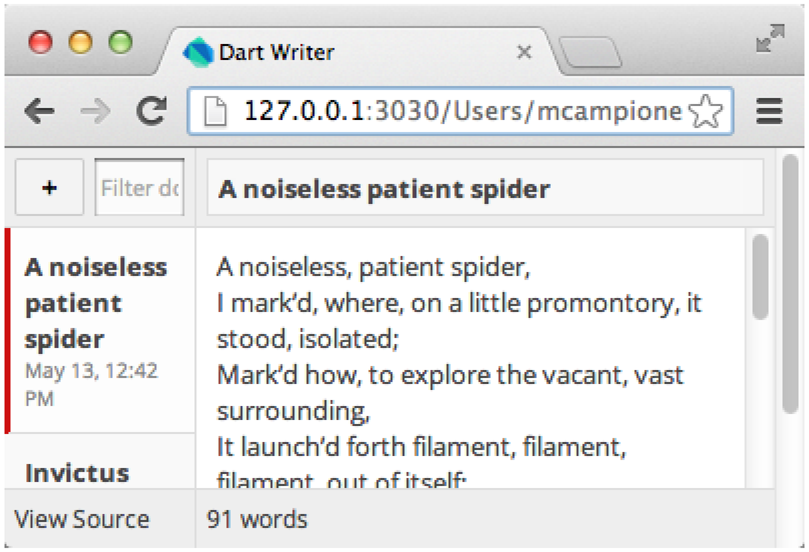
Walkthrough

Run the app in a small browser window

Before you start changing the code, run the app in a tiny window so you can emulate the app’s behavior on a mobile phone. You can contrast this behavior with the revised version of the app at the end of this step.

Run the app. Shrink the window down as small as you can.

The UI is not too cluttered and has a double scroll bar. We can do better!


Dart Writer
127.0.0.1:3030/Users/mcampione
+
Filter dc
A noiseless patient spider
A noiseless patient spider
May 13, 12:42 PM
Invictus
View Source
91 words

A noiseless, patient spider,
I mark'd, where, on a little promontory, it stood, isolated;
Mark'd how, to explore the vacant, vast surrounding,
It launch'd forth filament, filament,
filament, out of itself;

Add meta viewport tag to HTML code

Open **web/index.html**.

At the top of the file, within the <head> section add this meta tag:

```
// web/index.html
…
    <!-- STEP 6: Add viewport meta tag to control layout on mobile devices -->
    <meta name="viewport"
          content="width=device-width, initial-scale=1, maximum-scale=1, user-scalable=no">
…
```

This tag fixes the size of the app to the exact size of the device.

Save your changes.

Add CSS styles for mobile

Open **web/css.css**.

At the bottom of the CSS file, add all of the code in bold (79 lines):

```
// web/css.css
…

/* STEP 6: Add styles for mobile devices */
/* Mobile styles. */
@media all and (max-width: 500px) {
  body {
    overflow: hidden;
  }

  #sidebar .touched .item {
    background-color:rgba(250, 150, 150, .8);

    -webkit-transition: all .7s cubic-bezier(.65,-0.50,.76,1.32);
    -moz-transition: all .7s cubic-bezier(.65,-0.50,.76,1.32);
    transition: all .7s cubic-bezier(.65,-0.50,.76,1.32);
  }

  #sidebar {
    top: 0;
    left: 0;
    right: 0;
    bottom: 0;
    width: 100%;
    -webkit-transition: -webkit-transform 0.3s ease-in-out;
    -moz-transition: -moz-transform 0.3s ease-in-out;
  transition: transform 0.3s ease-in-out;
  -webkit-transform: translate3d(-20%, 0, 0);
  -moz-transform: translate3d(-20%, 0, 0);
  transform: translate3d(-20%, 0, 0);
}

#sidebar.active {
  -webkit-transform: translate3d(0, 0, 0);
  -moz-transform: translate3d(0, 0, 0);
  transform: translate3d(0, 0, 0);
}

#sidebar .item.active .delete {
  opacity: .7;
}

#main {
  top: 0;
  left: 0;
  right: 0;
  bottom: 0;
  -webkit-transition: -webkit-transform 0.3s ease-in-out;
  -moz-transition: -moz-transform 0.3s ease-in-out;
  transition: transform 0.3s ease-in-out;
  -webkit-transform: translate3d(100%, 0, 0);
  -moz-transform: translate3d(100%, 0, 0);
  transform: translate3d(100%, 0, 0);
}

#main.active {
  -webkit-transform: translate3d(0, 0, 0);
  -moz-transform: translate3d(0, 0, 0);
  transform: translate3d(0, 0, 0);
}
```

```
  #main .title button {
    display: block;
  }

  #main .title .input-wrap {
    margin-left: 40px;
  }

  /* Let's not go there. It is a silly place. */
  #main:only-of-type {
    -moz-transition: none;
    -webkit-transition: none;
    transition: none;
  }

  #main:only-of-type button {
    display: none;
  }

  #main:only-of-type .title .input-wrap {
    margin-left: 0;
  }
}
```

This code separates the app into two panels: one for the index of documents and one for the content of the current document. Choosing a document from the index slides the content panel into view. In the contents panel, a new button slides from the documents contents back to the index.

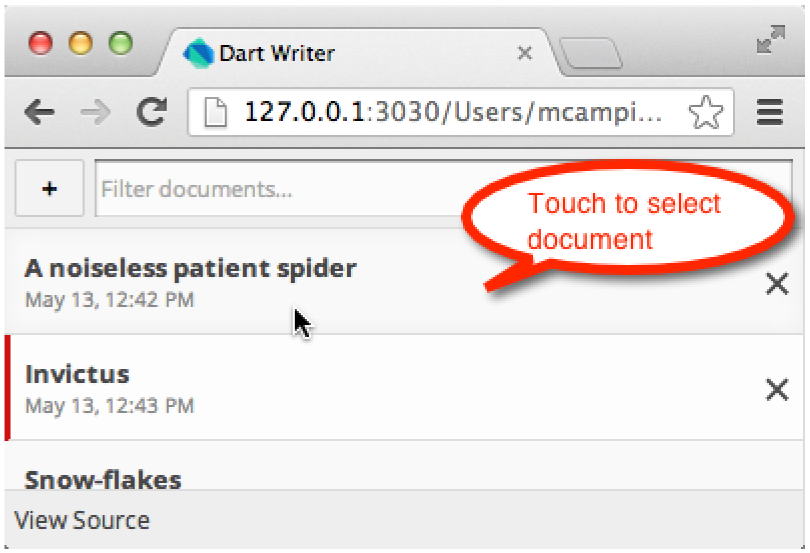
Save your changes.

Run the revised version of the app

Run the new version of the app in your browser and shrink the window down as small as possible once again.

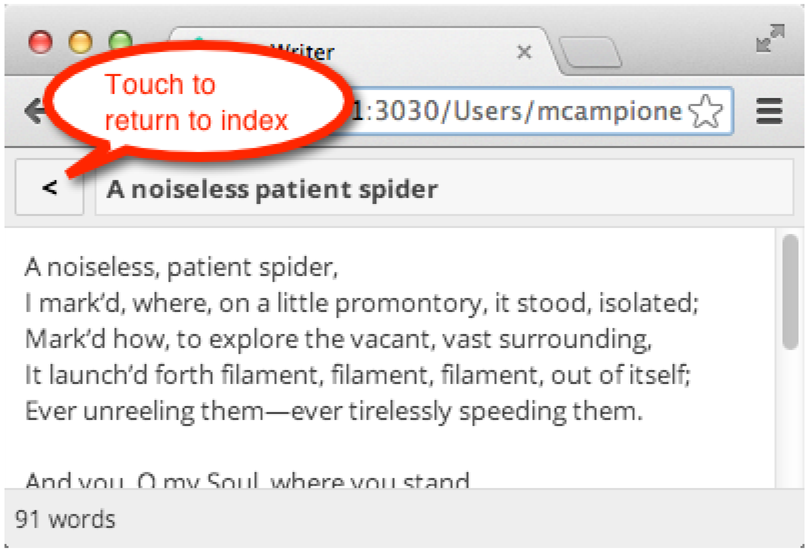
On the document index panel, you see a list of the documents you've created.

Click a document to view its contents.



On the document contents panel, a small button with an arrow '<' appears to the left of the document title.

Click it to return to the document index.



A noiseless, patient spider,
I mark'd, where, on a little promontory, it stood, isolated;
Mark'd how, to explore the vacant, vast surrounding,
It launch'd forth filament, filament, filament, out of itself;
Ever unreeling them—ever tirelessly speeding them.

And you, O my Soul, where you stand

91 words

Run the finished app on your phone

You can find the deployed app at:

http://dart-lang.github.io/io-2013-dart-codelab/deploy/out/index.html

A shortcut: **goo.gl/hC0NM**

What next?

Congratulations, you've completed the code lab! If you'd like to do more Dart, check out our website and open-source projects:

- www.dartlang.org (our website)
- pub.dartlang.org (packages available for you to use)

- dart.googlecode.com (Dart open-source project)
- github.com/dart-lang/dartlang.org (the source for www.dartlang.org; pull requests welcome!)