

Comp 422 - Software Development for Wireless and Mobile Devices

Fall Semester 2016 - Week 12 Notes

Dr Nick Hayward

Contents

- final assessment
- final report
- project status report
- Other UI options
- Cordova app - continued
- design considerations

Presentation

- Yale's Giuseppe Amatulli on Big Data meets Geo-Computation
- Friday 2nd December 2016
 - 2.45pm to 3.45pm
- Location
 - IES-123, Lake Shore Campus
- continue class after presentation

Final Presentation & Report

- team presentation on 9th December @ 2.45pm
- team report due on 16th December by 2.45pm

Final Assessment Outline

- continue to develop your app concept and prototypes using Apache Cordova
- implement a custom Cordova plugin for the following native Mobile OSs
 - *Android*
- produce a working app
 - *as far as possible try to create a fully working app*
 - *explain any parts of the app not working...*
- explain design decisions
 - *outline what you chose and why?*
 - *what else did you consider, and then omit? (again, why?)*
- which concepts could you abstract for easy porting to other platform/OS?
- describe patterns used in design of UI and interaction

Final Assessment Report

- report outline - demo and report

Project Status Report

- what is currently working?
 - which data store?
 - what is left to add or fix? features, UI elements, interactions...
-
- who is working on what? logic, design, testing, research...
-
- team alert
 - team bill splitter (study buddies)
 - team crunchtime
 - team fitness
 - team hallpass
 - team horatio
 - team loyola classifieds
 - team loyola group fitness
 - team service request
-
- team walking through naboo

Cordova app - Extras

Other UI Options - Ionic - part I

- briefly consider option of using Ionic's framework
 - *for developing your UI for Cordova applications*
- Ionic is a HTML framework
 - *designed specifically for development of hybrid applications*
 - *including Cordova mobile applications*
- originally created by a group of developers called **Drifty**
- known to be simple to use and very fast
- Ionic provides
 - *overall UI framework*
 - *accompanying CLI*
- CLI is wrapper for Cordova CLI
- install Ionic using NPM

```
sudo npm install -g ionic
```

- start using Ionic at CLI with `ionic` command

Cordova app - Extras

Other UI Options - Ionic - part 2

- Ionic provides a number of useful starter templates
 - *use and modify for the development of our Cordova applications*
- create a new Ionic project
 - *use the following command at the CLI,*

```
ionic start csteach422 blank
```

- specify the project name
 - *in this example csteach422*
- required template for this project
- in this example blank
- templates include
 - *Tabs (default) - Demo*
 - *Sidemenu - Demo*
 - *Blank - Demo*
- Ionic CSS Styles - Demo
- Ionic creates a Cordova application
 - *with addition of support and styling for Ionic based UI*

Cordova app - Extras

Other UI Options - Ionic - part 3

- Ionic framework has now used Cordova to build the new project
- also added some Ionic specific components
 - *custom components to help with builds, UI framework updates...*
- Ionic adds platform support for iOS by default
 - *then we can the standard Android support*

```
ionic platform add android
```

- Ionic CLI commands closely match familiar Cordova commands
- a useful command

```
ionic serve
```

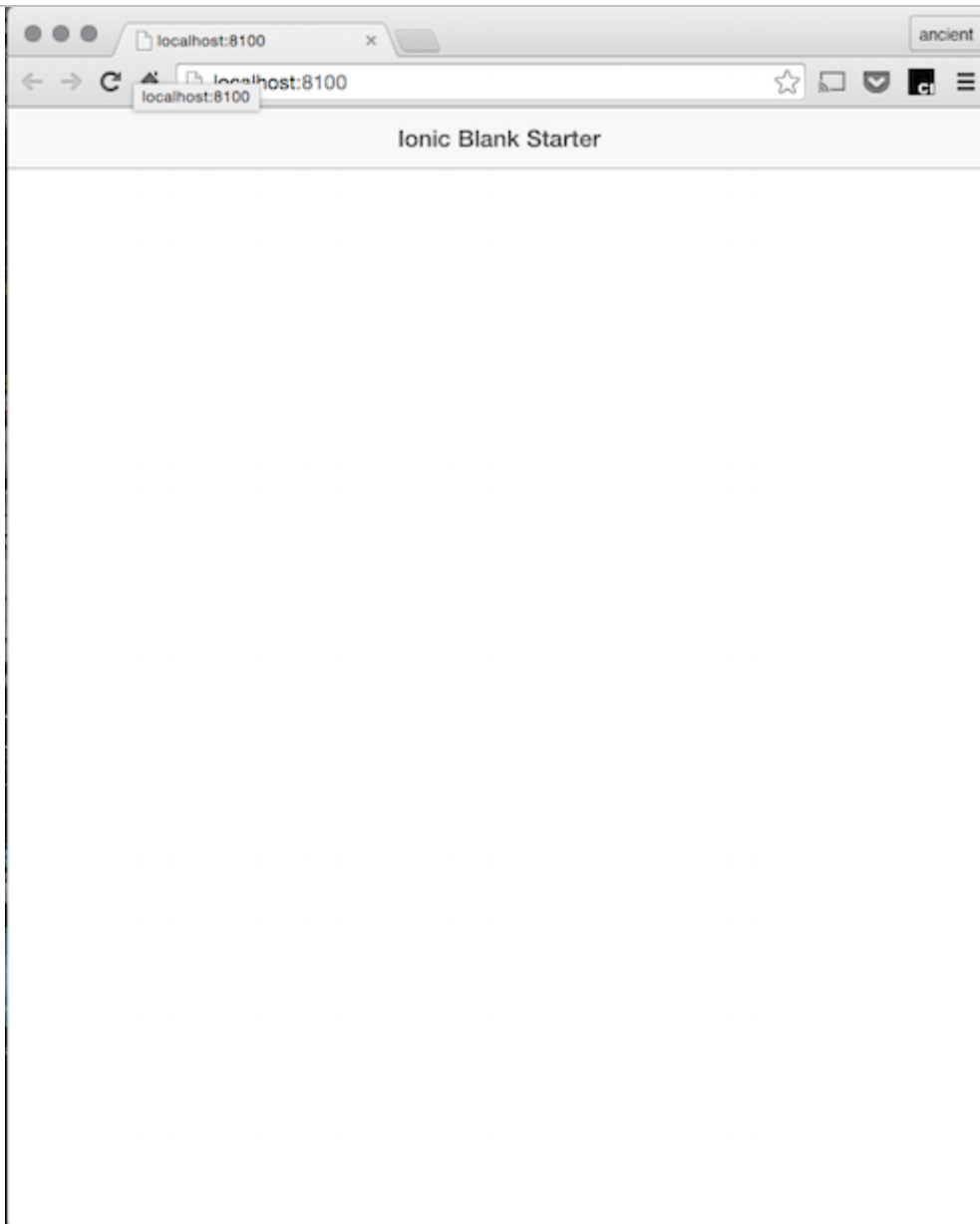
- start a local web server and test our project from the working directory
 - *CLI checks preferred server address, eg: localhost*
 - *loads project in default browser*

Image - Ionic Starter



[Ionic Starter on Android](#)

Image - Ionic Starter



Ionic Starter in the browser

Cordova app - NoteTaker - v1 - OnsenUI

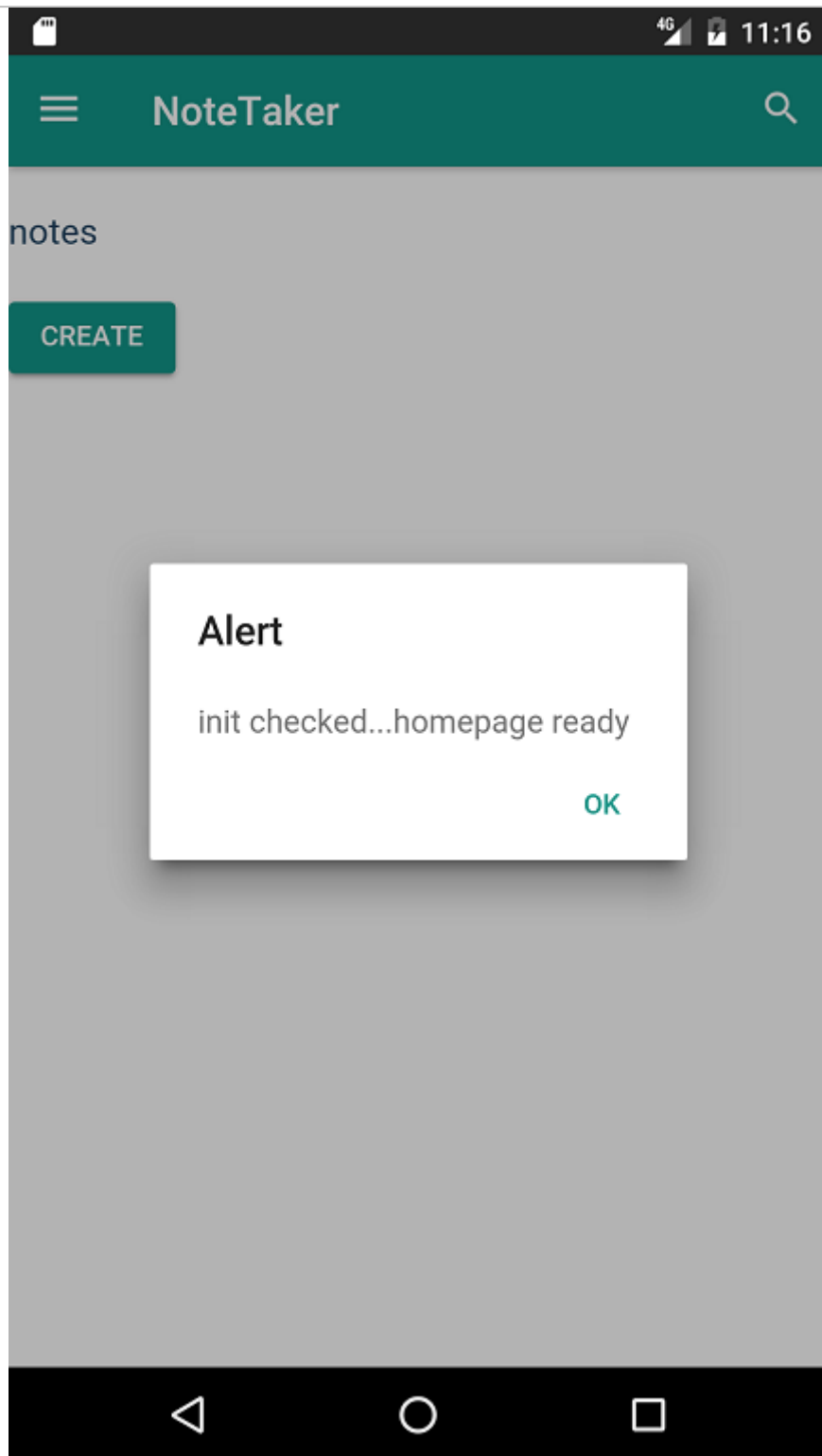
notes app - recap

Latest app features and updates,

- home page and create note page
- initial navigation stack
- statusbar customisation and titles
- splashscreens and icon
- initial page elements
- checked loading of
 - *deviceready* for Cordova
 - *init* for OnsenUI on-page component

and a few updates to the general aesthetics...

Image - NoteTaker - check init event - OnsenUI



NoteTaker app - check init event

Image - NoteTaker - load home page - OnsenUI

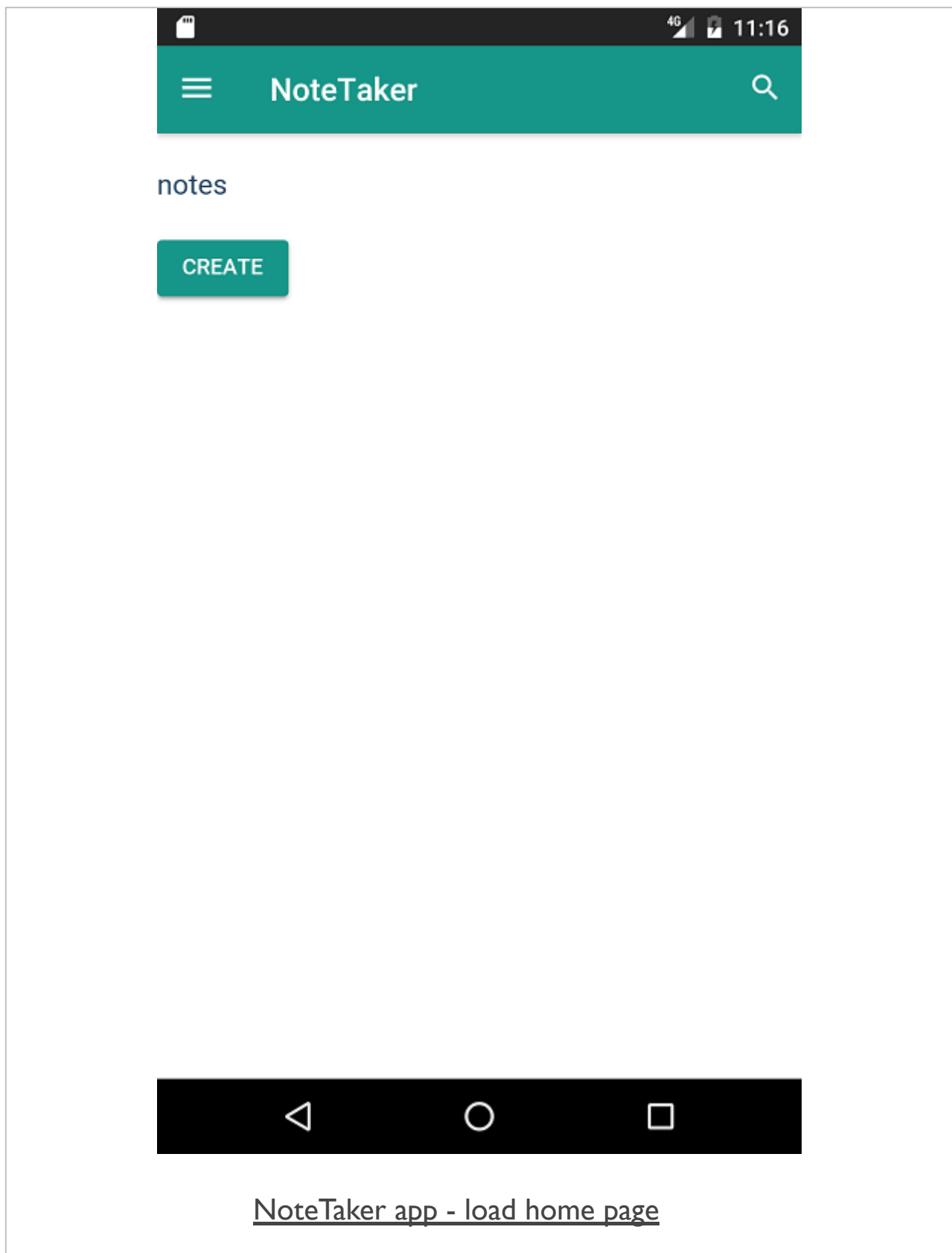


Image - NoteTaker - add navigation - OnsenUI



create note



NoteTaker app - add navigation

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI

- start to modify our initial UI for our OnsenUI based app
- add a standard Material Design icon for creating a note
- use with our existing navigation stack
- standard floating action button pattern
 - *defined in the Material Design specification*

```
<ons-fab position="bottom right">  
  <ons-icon id="create-note" icon="md-plus"></ons-icon>  
</ons-fab>
```

- Material Design specification - Floating Action Button

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - grid layout

- need to use a grid layout for our initial notes
- consult the Material Design guidelines for a **grid list**
 - *Material Design Guidelines - grid list*
- OnsenUI provides components for rows and columns, e.g.

```
<ons-row>
  <ons-col>
    <div class="note-card">
      <h5>note 1</h5>
    </div>
  </ons-col>
  <ons-col>
    <div class="note-card">
      <h5>note 2</h5>
    </div>
  </ons-col>
</ons-row>
```

- also add a custom class to recreate some cards for our notes, e.g.

```
.note-card {
  box-shadow: 0 1px 4px #b1c4b1;
  background-color: #ffffff;
}
```

Image - NoteTaker - grid layout portrait - OnsenUI

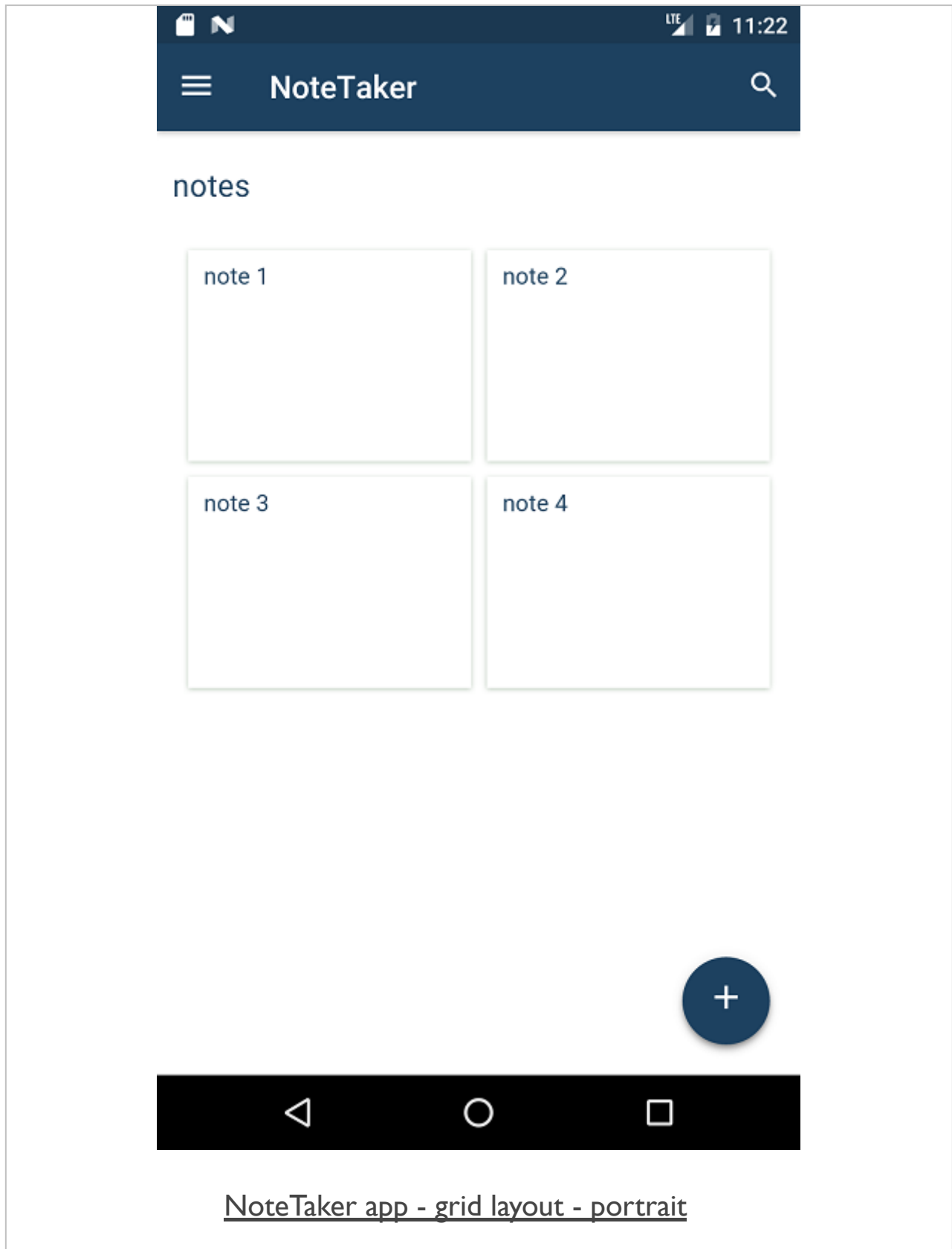
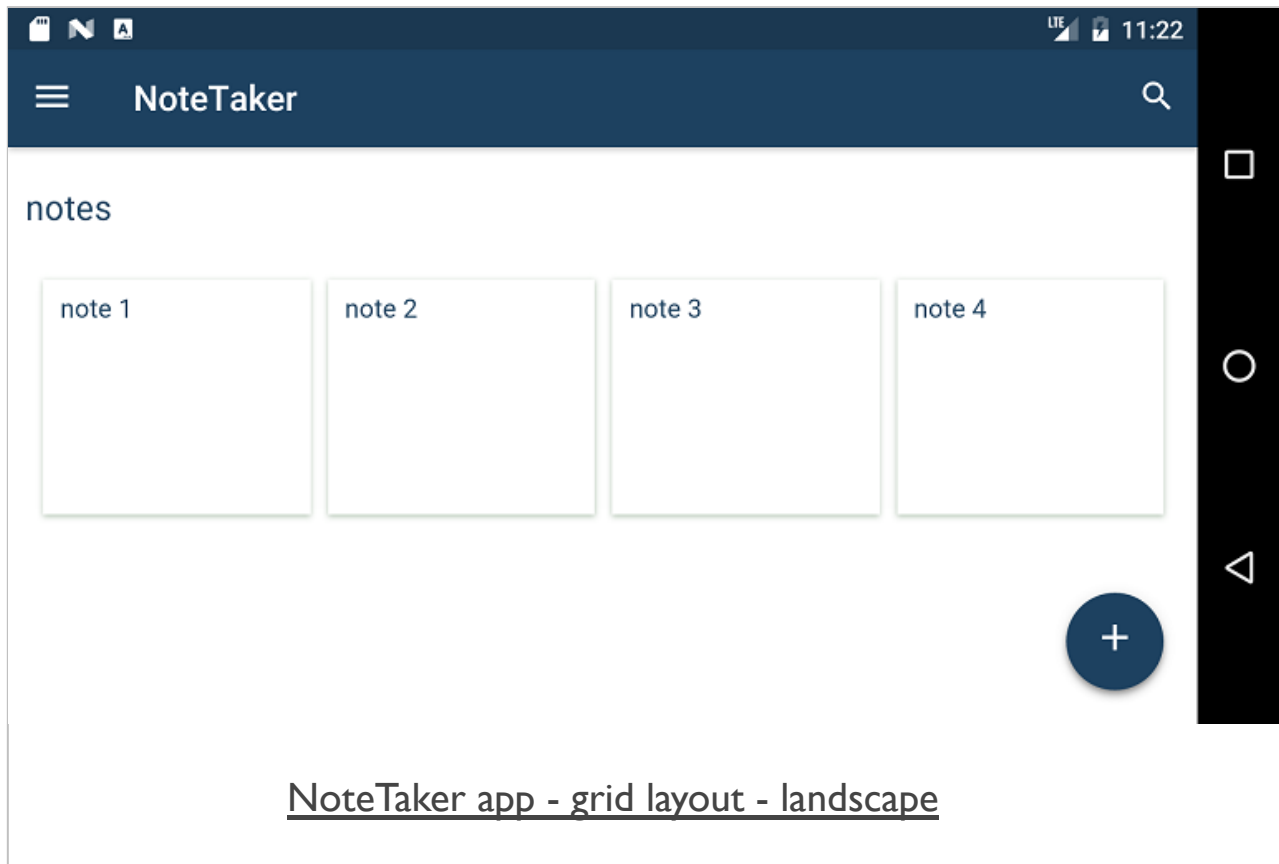


Image - NoteTaker - grid layout landscape - OnsenUI



Cordova app - NoteTaker - v1 - OnsenUI

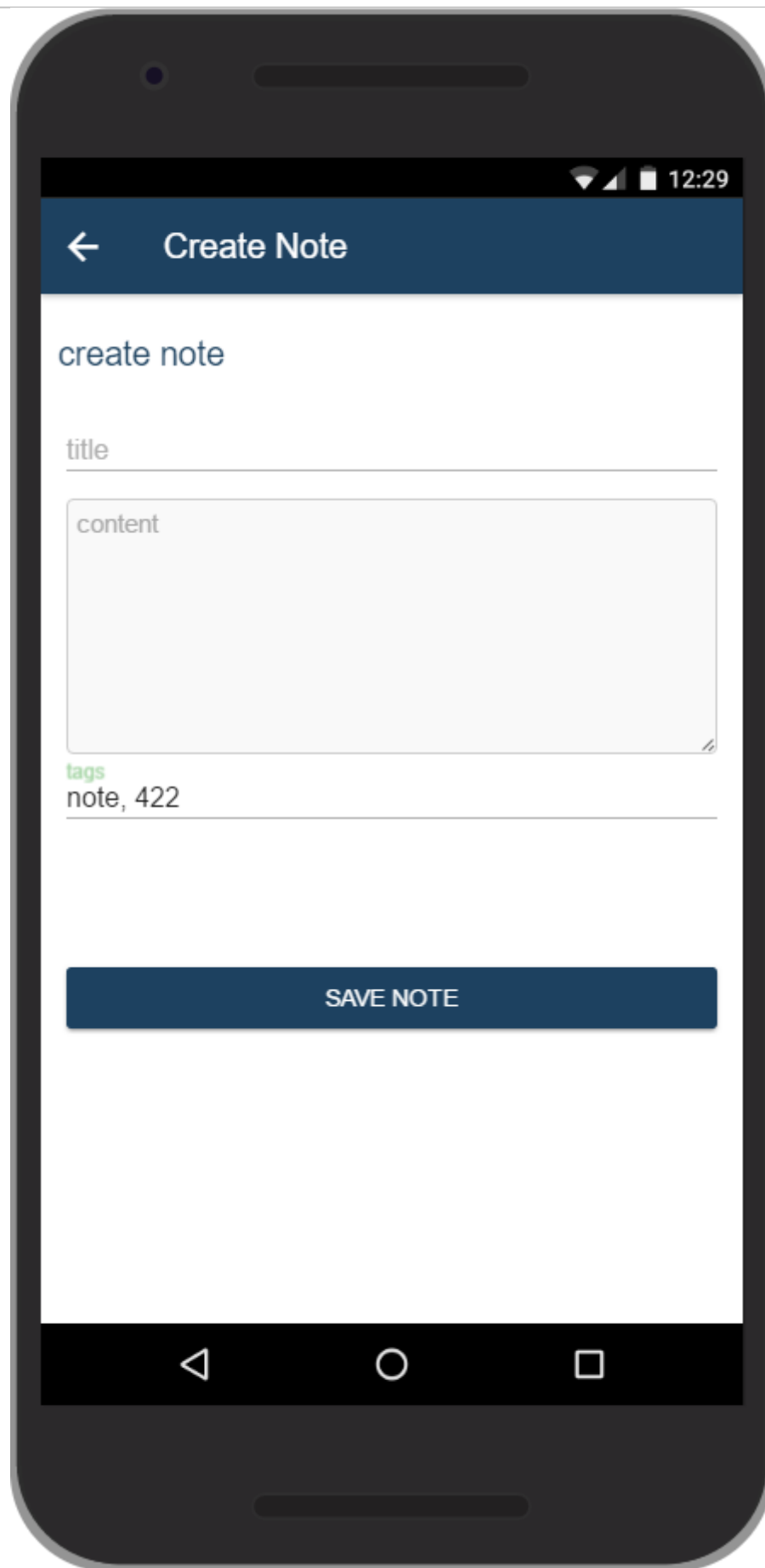
notes app - create note page

- next initial update
 - add options for a user to create their notes on the **create note** page
- need to add a form with various fields for a note
- `<ons-input>` component for input fields
 - component supports many different common form elements
 - checkbox, radio button, password field...
- need the following minimum elements and options for our **create note** page
 - title, content, tags

```
<section style="padding: 10px 0 10px 0">
  <ons-input type="text" placeholder="title" modifier="material"
    style="display: block; width: 100%"></ons-input>
</section>
<section style="padding: 5px 0 5px 0">
  <textarea class="textarea" placeholder="content" modifier="material"
    style="width: 100%; height: 150px; resize: vertical;"></textarea>
</section>
<section style="padding: 10px 0 10px 0">
  <ons-input type="text" placeholder="tags" modifier="material"
    style="width: 100%; height: 100px; resize: vertical;"></ons-input>
</section>
<section>
  <ons-button modifier="large">save note</ons-button>
</section>
```

- mixture of standard HTML5 elements and OnsenUI components
 - desired layout and rendering for our create note page

Image - NoteTaker - create note page - OnsenUI



NoteTaker app - create note page - initial design

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - navigation and splitter structure

- current navigation uses `<ons-navigator>` component
 - push **create note** page to navigation stack
- `<ons-splitter>` component
 - use to create a main menu option
- component offers different frames that allow us to render varied content
 - e.g. add our menu with a left splitter - contains menu links, title...
 - each link loads requested URL to `<ons-splitter-content>`
- frames normally contain a `<ons-page>` component
 - also nest multiple navigation components
 - e.g. `<ons-navigator>`
- basic usage, e.g.

```
<ons-splitter>
  <ons-splitter-side id="menu" side="left" width="220px" collapse swipeable>
    <ons-page>
      <ons-list>
        ...
      </ons-list>
    </ons-page>
  </ons-splitter-side>
  <ons-splitter-content id="content" page="home.html"></ons-splitter-content>
</ons-splitter>
```


Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - navigation and splitter structure

- combine the navigator and splitter component
 - need to consider how they will complement each other
 - ensure navigation stack works correctly
- structure of our HTML needs to be updated
 -

```
<ons-navigator id="navigator" page="splitter.html"></ons-navigator>
<ons-template id="splitter.html">
  <ons-splitter>
    <ons-splitter-side id="menu" side="left" width="220px" collapse swipeable>
      <ons-page id="menu.html">
        <ons-list>
          <ons-list-item url="home.html" class="menu-link" tappable>home</ons-list-item>
          <ons-list-item url="about.html" class="menu-link" tappable>about</ons-list-item>
        </ons-list>
      </ons-page>
    </ons-splitter-side>
    <ons-splitter-content id="content" page="home.html"></ons-splitter-content>
  </ons-splitter>
</ons-template>
```

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - navigation and splitter promises

- slightly different from the prescribed pattern in the OnsenUI docs
- after testing an initial pattern
 - *navigator component as a parent container to the splitter component*
- initially errors reported relative to blocked, existing promises
- splitter and its associated animation was in conflict
 - *with subsequent calls to the menu itself*
 - *and the navigator component*
- forum answer was an initial concern, not a satisfactory resolution
 - *Onsen Community*
- this issue led to the previous design and updated JS logic
- no longer blocks the required promises...

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - navigation and splitter logic

- relative to our menu option
 - *add this check to force the logic*
 - *checks target page before loading the menu itself*
- if not, execution of JS logic will return 'null' for requested menu open selector. e.g.

```
if (event.target.id === 'home') {  
  //get menu icon - query selector OK due to one per ons page  
  var menuOpen = document.querySelector('.menu-open');  
  //check menu open is stored...  
  if (menuOpen) {  
    console.log("menu open stored...");  
  }  
}
```

- checking that we can actually now use the menu open selector
 - *toggle state of the menu*
 - *then add an event listener for the main menu*
 - *allows us to open the menu on any applicable ons page*

```
//add event listener for main menu  
menuOpen.addEventListener('click', function(event) {  
  event.preventDefault();  
  //open main menu for current page  
  menu.open();  
}, false);
```

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - navigation and splitter logic

- need to handle multiple possible links in the menu itself
 - *ensure requested page is loaded in the splitter content*

```
if (event.target.id === 'menu.html') {
  console.log("menu target...");
  //es6 Array.prototype.forEach iteration...
  Array.from(menuLink).forEach(link => {
    link.addEventListener('click', function(event) {
      event.preventDefault();
      var url = this.getAttribute('url');
      console.log("menu link = "+ url);
      content.load(url)
        .then(menu.close.bind(menu));
    }, false);
  });
}
```

- updated navigator and splitter component structure helps with overall logic
- check and add a listener for each menu item
 - *as and when the menu is actually loaded in the app*
 - *resolves situation of locked promises for splitter component...*
- allows us to correctly select our menu, and menu items
- also select **create note** option as well on a given page
 - *set navigation stack for the **create note** option by checking against given page event*

```
if (event.target.id === 'home') {
  //set navigation
  onsNav(event.target);
}
```

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - splitter, navigation, and backbutton

- using the `<ons-splitter>` and `<ons-navigator>` components
 - *helps create the correct structure for our app*
- need to consider interaction with hardware backbutton on Android
- Android device default usage pattern
 - *default behaviour for hardware backbutton = close the app*
 - *user may reopen app from recent items using the overview button*
- Android behaviour pattern replicated by Cordova
 - *fires event to handle hardware button within an app*
 - *part of the default `cordova.js` file*
- OnsenUI also set handlers for this hardware button for given UI components
 - *Dialogs - close a cancelable dialog*
 - *Navigator - if page stack not empty, pops a page from navigation stack*
 - *Splitter - close the menu if currently open*

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - splitter, navigation, and backbutton

- menu system based upon the splitter component
 - *careful how we handle this hardware back button*
 - *default action is to simply exit an app*
- can update or modify this behaviour to create explicit action
 - *offer feedback to users before an **exit** is executed*

```
// initially disable hardware backbutton on Android
ons.disableDeviceBackButtonHandler();

// set custom backbutton handler
ons.setDefaultDeviceBackButtonListener(function(event) {
  ons.notification.confirm('Exit app?') // check with user
    .then(function(index) {
      if (index === 1) { // 'ok' button
        navigator.app.exitApp(); // default behaviour - exit app
      }
    });
});
```

- another option might simply be to maintain an in-app tracker
 - *track pages pushed and popped relative to the splitter component*
- still need to be aware of the default, expected behaviour for Android
- should not modify this behaviour too much from default

Cordova app - NoteTaker - v1 - OnsenUI

notes app - update UI - splitter options & structure

- working menu and navigation stack within our initial app
- many different ways to use this splitter option
 - *often informed by an app's page and navigation requirements*
- initially identify the following page and link requirements for our NoteTaker app

Main Menu

```
* home
* media
* notes
* tags
```

navigation stack

```
* create note
* edit note
* tag note
* delete note
* ...
```

Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- now need to add our initial notes for the app
- load them as the app starts
- render them on the home screen
- using IndexedDB for app based storage
 - *check and support offline storage for app*
- then save to a cloud based data store
 - *e.g. user requests saving a specific note, notes...*
- add our initial check for IndexedDB support as part of the deviceready event

```
//set variable for IndexedDB support
var indexedDBSupport = false;
if("indexedDB" in window) {
    indexedDBSupport = true;
    console.log("IndexedDB supported...");
} else {
    console.log("No support...");
}
```

- create initial variable to store the boolean result
- check variable after deviceready event has fired and returned successfully

Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- database is local to the browser,
 - *only available to users of the local, native app*
- IndexedDB databases follow familiar pattern of read and write privileges
 - *eg: browser-based storage options, including localStorage*
- create databases with the same name, and then deploy them to different apps
 - *remain domain specific as well*
- first thing we need to do is create an opening to our database

```
var openDB = indexedDB.open("notetaker", 1);
```

- creating a variable for our database connection
 - *specifying the name of the DB and a version*
- open request to the DB is an asynchronous operation

Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- create our required DB
 - *check it has persisted during subsequent application loading and usage*
- open a connection to the DB
- checks for three events
 - *upgrade, onsuccess, and any returned errors*
- ready to use the success event
- start to build out our database for our NoteTaker app
 - *add the required initial **object stores***
- also add our required **keypaths**, and a useful index

Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- update the upgrade event
 - *includes creation of app's required object store*

```
...
openDB.onupgradeneeded = function(e) {
    console.log("DB upgrade...");
    //local var for db upgrade
    var upgradeDB = e.target.result;
    if (!upgradeDB.objectStoreNames.contains("ntos")) {
        upgradeDB.createObjectStore("ntos");
    }
}
...
```

- check a list of existing object stores
- if required object store unavailable we can create our new object store
 - *listen for result from this synchronous method*
- as a user opens our app for the first time
 - *the upgradeneeded event is run*
 - *code checks for an existing object store*
 - *if unavailable, create a new one*
 - *then run the success handler*

Image - check and load IndexedDB

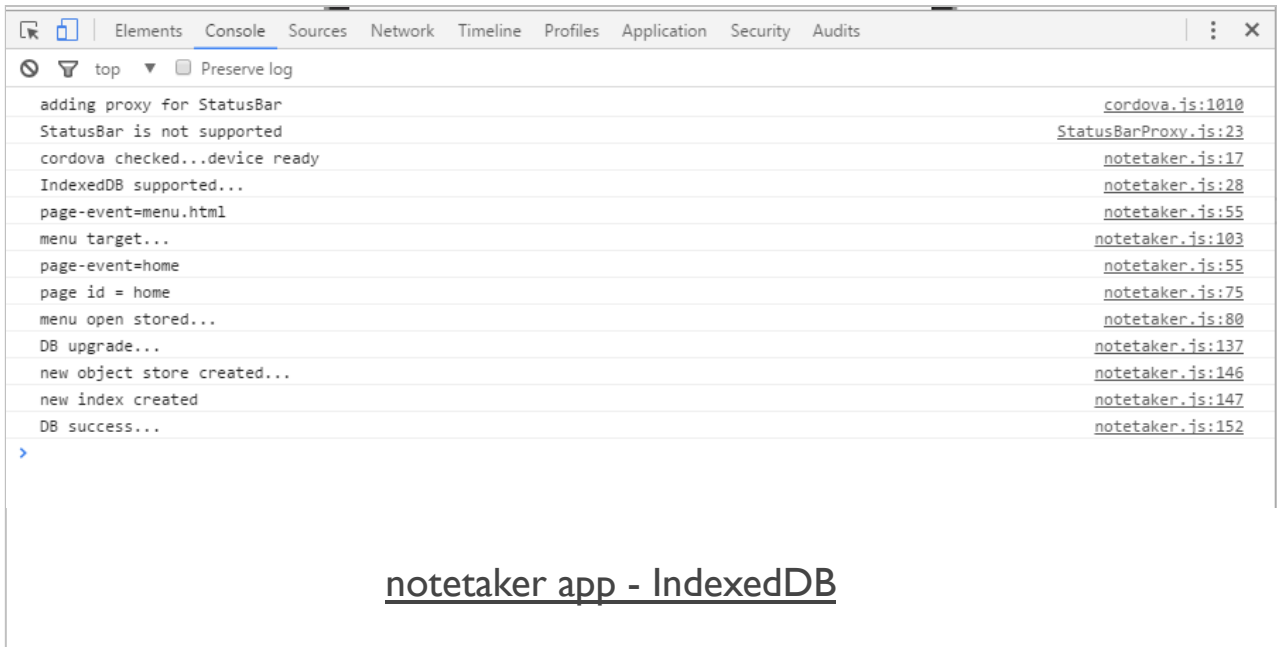
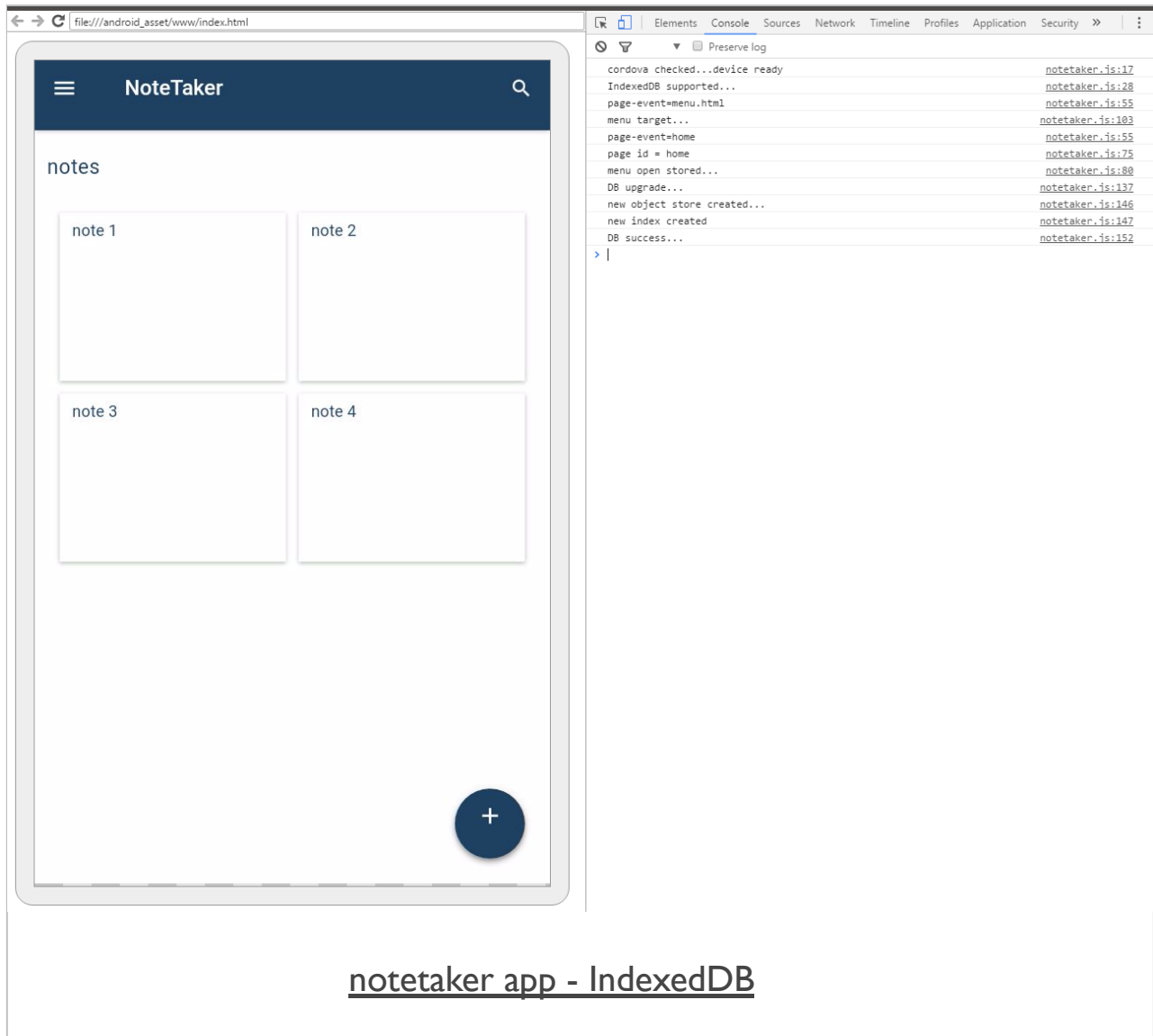


Image - check and load IndexedDB



Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- start to add some data for the initial notes
- IndexedDB allows us to simply store our objects in their default structure
 - *simply store JavaScript objects directly in our IndexedDB database*
- use transactions when working with data and IndexedDB
- transactions help us create a bridge between our app and the current database
 - *allowing us to add our data to the specified object store*
- use the `readwrite` operation on our previous object store, `ntos`

```
var dbTransaction = openDB.transaction(["ntos"], "readwrite");
```

- use it to retrieve the object store for our data

```
var dataStore = dbTransaction.objectStore("ntos");
```

Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- set the schema for the note objects

```
// note
var note = {
  title:title,
  note:note,
  tags:tags
}

// add note
var addRequest = datastore.add(note, key);
```

- schema matches input fields defined for **create note** form

Cordova app - NoteTaker - v1 - OnsenUI

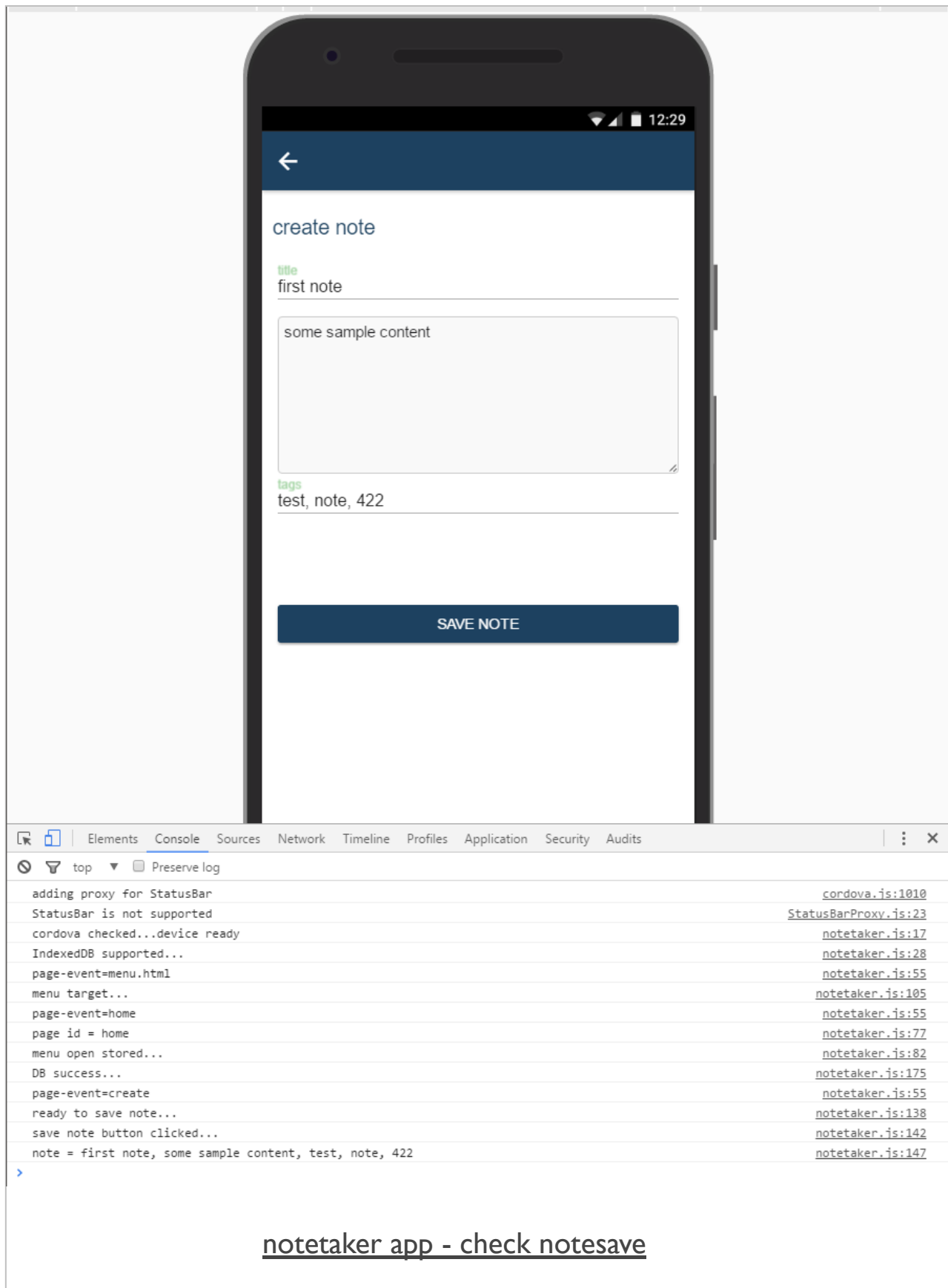
notes app - load initial notes

- add a handler for the **create note** form
- check for the input values
 - *passed to a function to be saved within our database*

```
function createNote(page) {  
    //note save handler - check create note page is active...  
    if (page.id === "create") {  
        console.log("ready to save note...");  
        document.getElementById('noteSave').addEventListener('click', function(event) {  
            //prevent any bound defaults  
            event.preventDefault();  
            console.log("save note button clicked...");  
            //get values for note - title, content, tags  
            var noteTitle = document.getElementById('noteTitle').value;  
            var noteContent = document.getElementById('noteContent').value;  
            var noteTags = document.getElementById('noteTags').value;  
            console.log("note = "+noteTitle+", "+noteContent+", "+noteTags);  
            saveNote(noteTitle, noteContent, noteTags);  
        });  
    }  
}
```

- using page events within the app
 - need to check **create note** page is active, available in the DOM
 - before we can start to add listeners for events
 - if not, error thrown for the **notesave** element
- then get values for input fields
- need to validate input before form submission...

Image - check and load IndexedDB



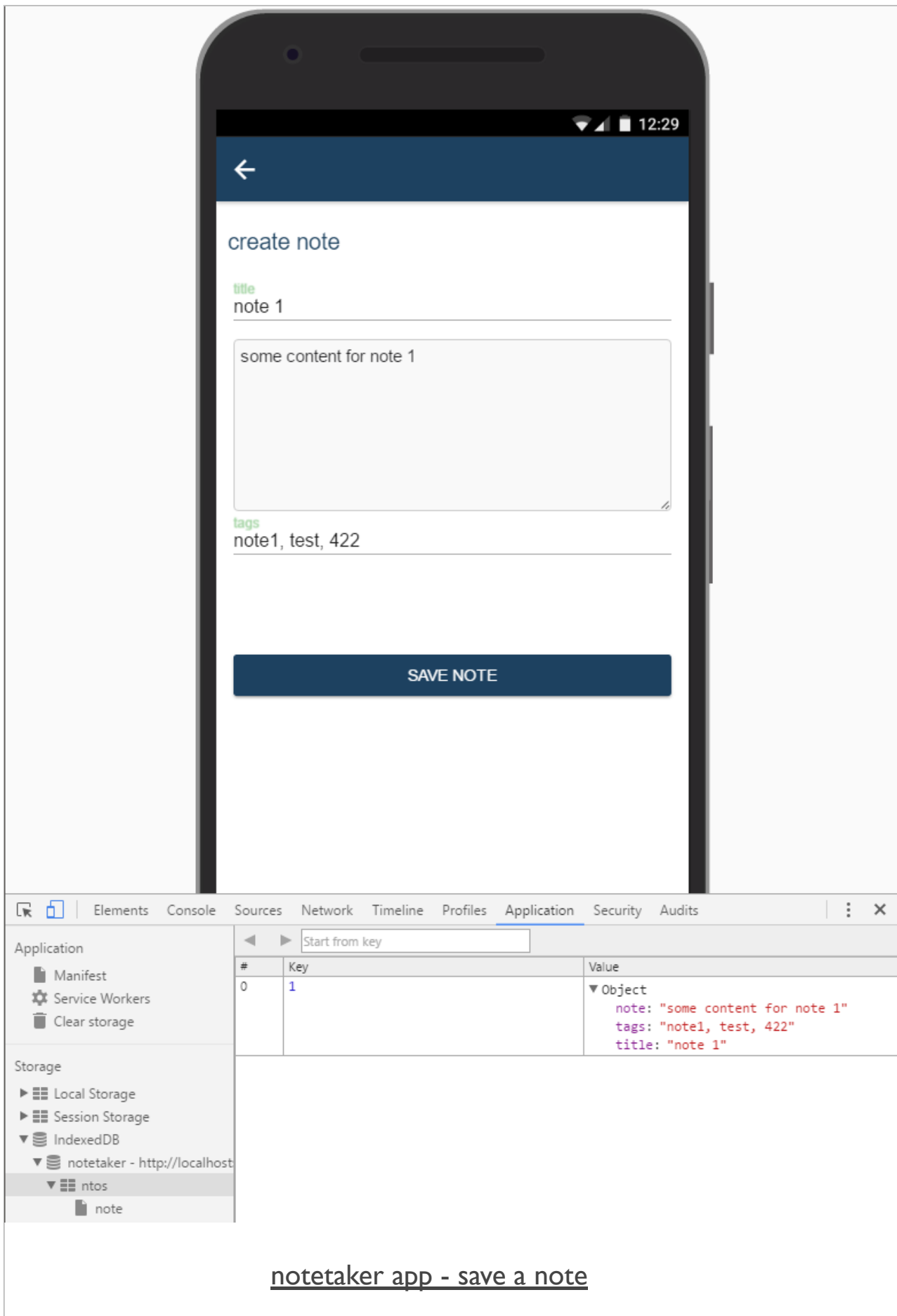
Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- add our `saveNote()` function
 - *saves note values in specified object store in the database*

```
//save note data to indexeddb
function saveNote(title, content, tags){
    //define a note
    var note = {
        title:title,
        note:content,
        tags:tags
    }
    // create transaction
    var dbTransaction = db.transaction(["ntos"],"readwrite");
    // define data object store
    var datastore = dbTransaction.objectStore("ntos");
    // add data to store
    var addRequest = datastore.add(note);
    // success handler
    addRequest.onsuccess = function(e) {
        console.log("data stored...");
        // do something...
    }
    // error handler
    addRequest.onerror = function(e) {
        console.log(e.target.error.name);
        // handle error...
    }
}
```

Image - check and load IndexedDB



Cordova app - NoteTaker - v1 - OnsenUI

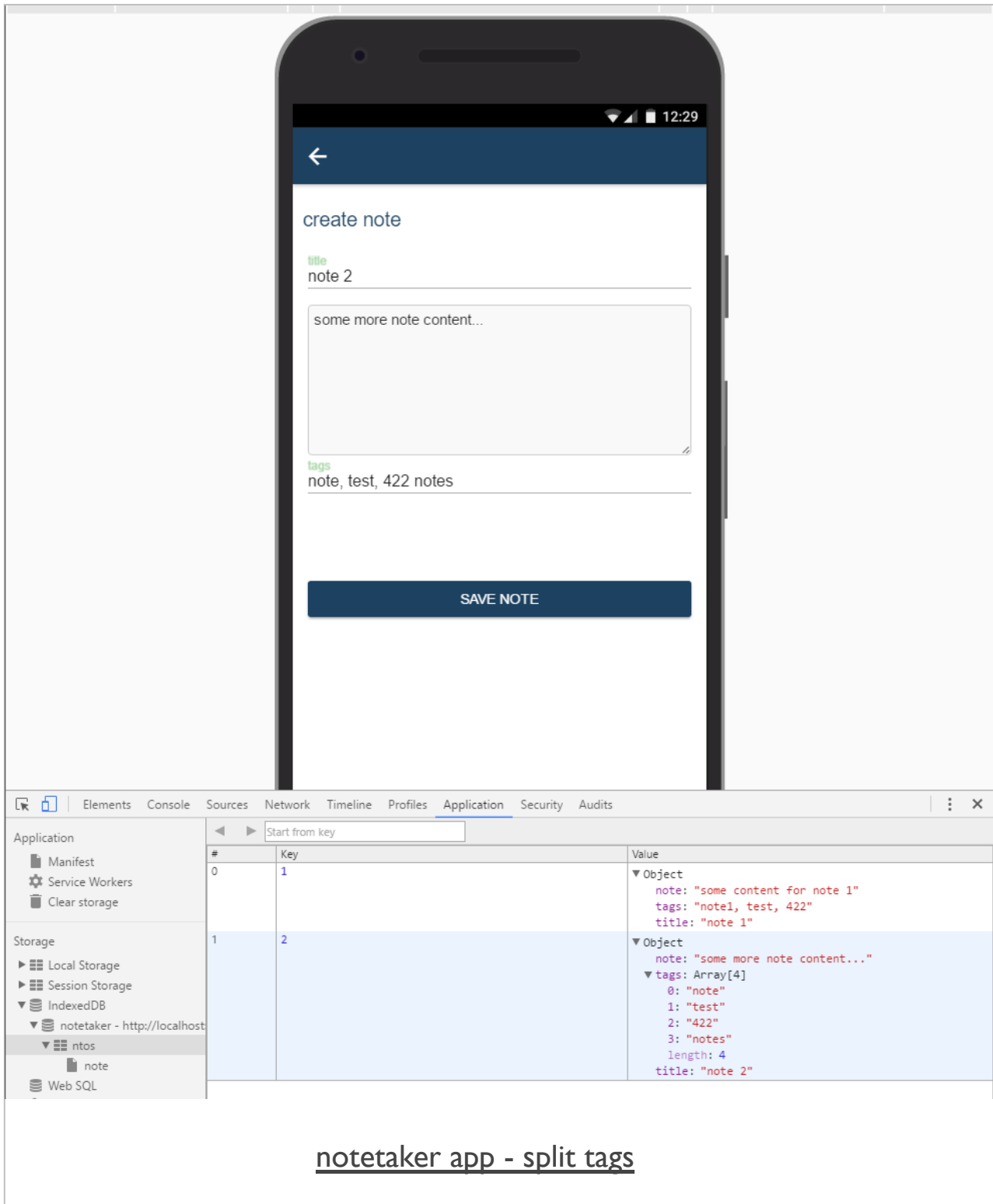
notes app - load initial notes

- need to decide what to do with
 - *tags, success handler, rendering of the new note...*
- as part of the validation for the **tags** input field
 - *we can control structure of input text for tags*
 - *e.g. comma separated, spaces...*
- split each tag from our string
 - *use JS function `split()`*
 - *combine it with a regular expression*

```
...  
tags.split(/[ ,]+/);  
...
```

- now split our tags from the **create note** form
 - *based on sequence of one or more commas or spaces*

Image - check and load IndexedDB



Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- consider how to handle success event
 - *saving our note data in database's object store*
- might simply return a user to the **create note** form
 - *after showing a notification &c. to provide feedback for saving the note...*
- might return the user to the home page
 - *new note rendered with a feedback message*
- common factors for rendering include the following,
 - *feedback to a user to inform them*
 - *e.g. whether the note was successfully saved or not*
 - *consistent rendering of the notification, buttons, location...*
- consider how to handle error event

Cordova app - NoteTaker - v1 - OnsenUI

notes app - load initial notes

- choose a pattern for **success** event - a saved a note in the database
- show notification with two options
 - **return to notes** and **create new note**
- many different patterns available relative to app requirements
- option one - **return to note**
 - *listen for the button's click event*
 - *then dismiss the notification*
 - *pop the **create note** page from the navigation stack*
 - *return to the home page*
- option two - **create new note**
 - *listen for the button's click event*
 - *dismiss the notification*
 - *reset the form fields*

Cordova app - NoteTaker - v1 - OnsenUI

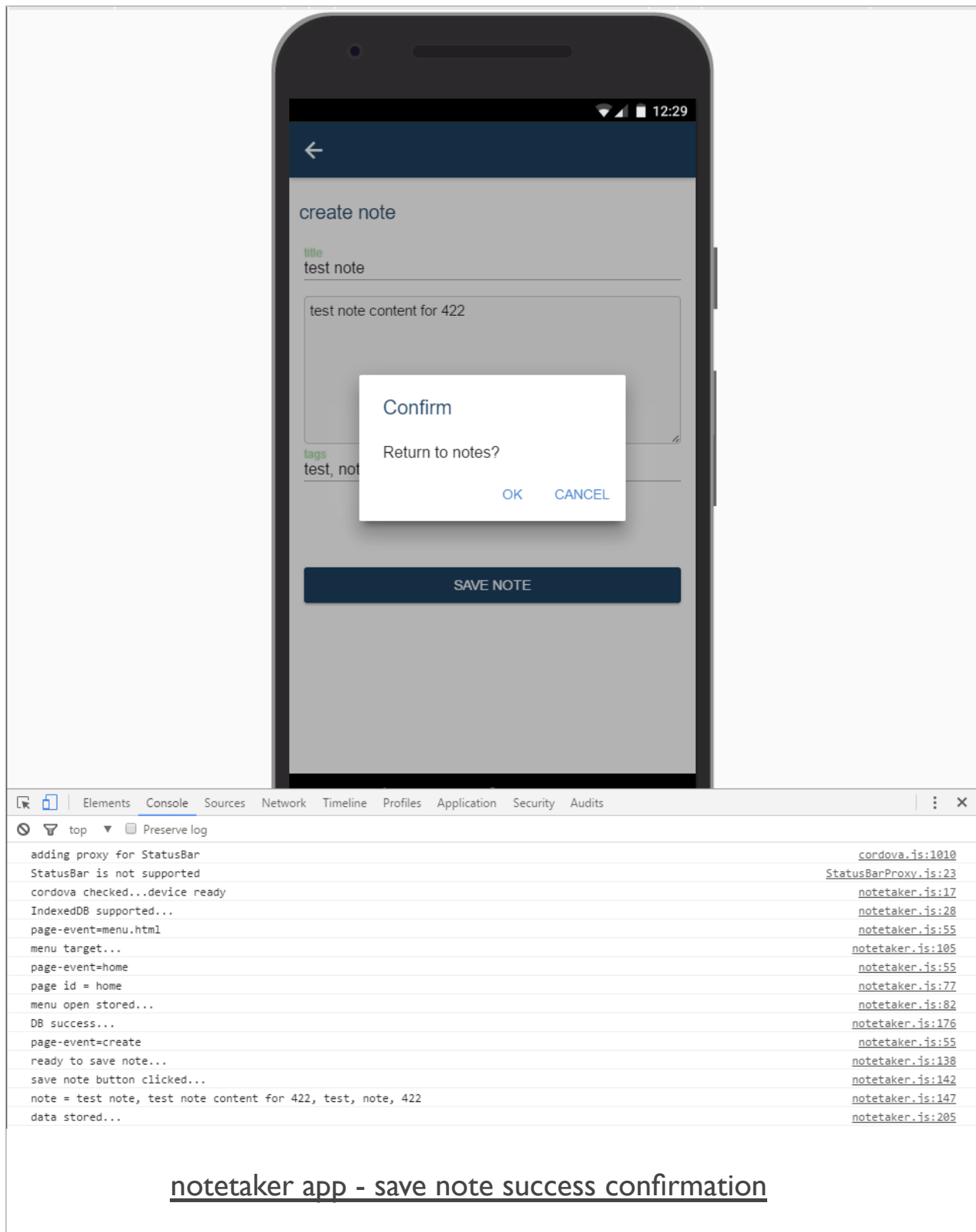
notes app - load initial notes

- add the first option, **return to notes**
 - as response to user successfully saving a new note
- need to update the `saveNote()` function

```
...
// success
addRequest.onsuccess = function(e) {
  console.log("data stored...");
  //update user on note stored
  ons.notification.confirm('Return to notes?') // check with user
  .then(function(index) {
    if (index === 1) { // 'ok' button
      document.querySelector('#navigator').popPage(); // return to previous page
    }
  });
}
...
```

- add a notification to Onsen's `ons` object
 - define it as a confirm notification with message text
- check user response from button index
- options include
 - continue with additional new notes
 - return to all notes - home page

Image - save note success



Cordova app - NoteTaker - v1 - OnsenUI

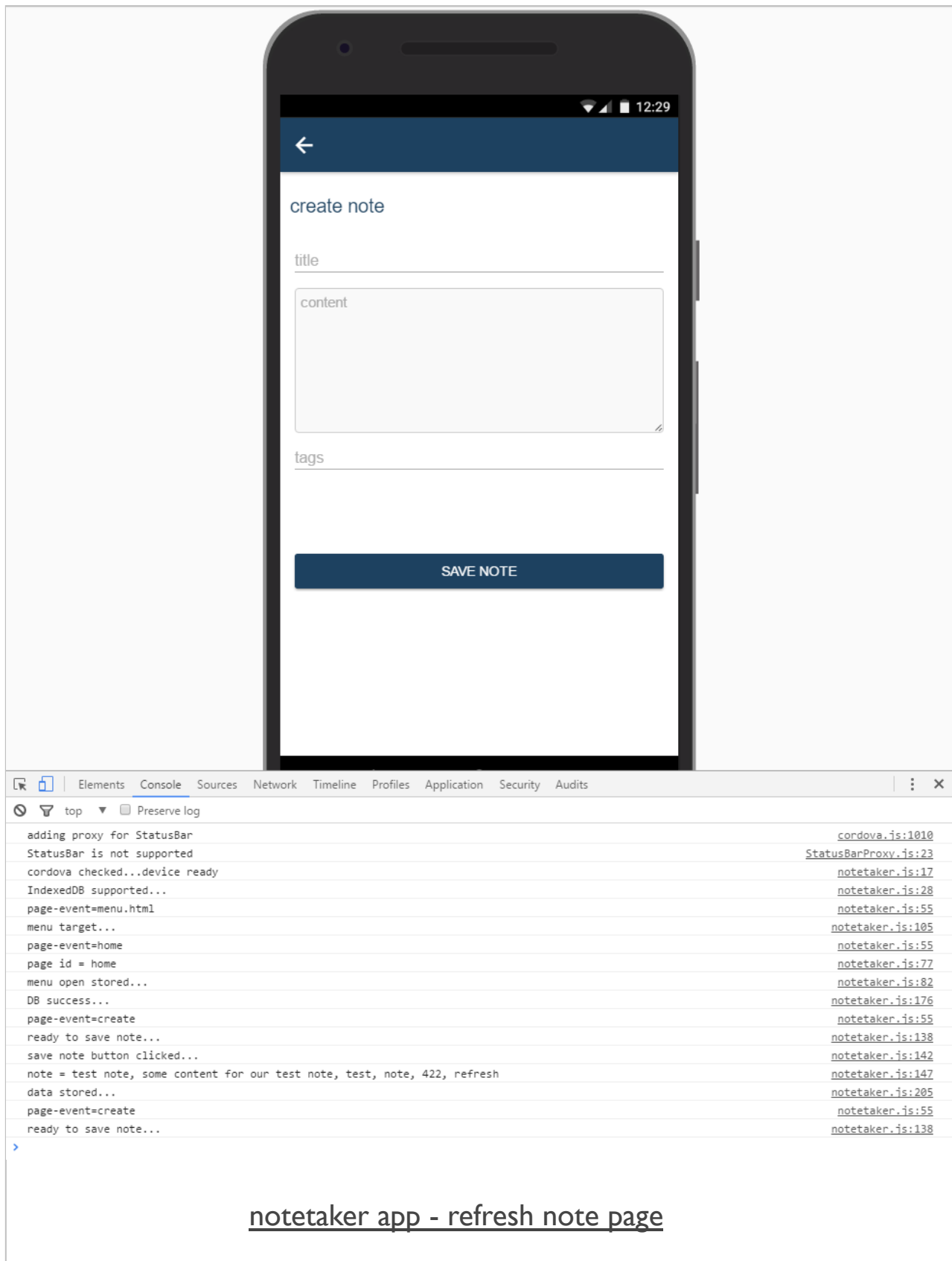
notes app - load initial notes

- need to consider how to handle the current **create note** page
 - assuming a user selects **cancel** option in the confirmation window
- user will be returned to the current page in the navigator stack
 - our **create note** page
 - input fields still show previous entry data for note
- need to ensure that these input fields are cleared
- use existing OnsenUI navigator object to refresh current page

```
//update user on note stored
ons.notification.confirm('Return to notes?') // check with user
.then(function(index) {
    if (index === 1) { // 'ok' button
        document.querySelector('#navigator').popPage(); // return to previous page
    } else if (index === 0) { // check 'cancel' button
        document.querySelector('#navigator').replacePage('create.html', {'animation': 'none'});
    }
});
```

- replace the current top page
 - set animation for this event to none

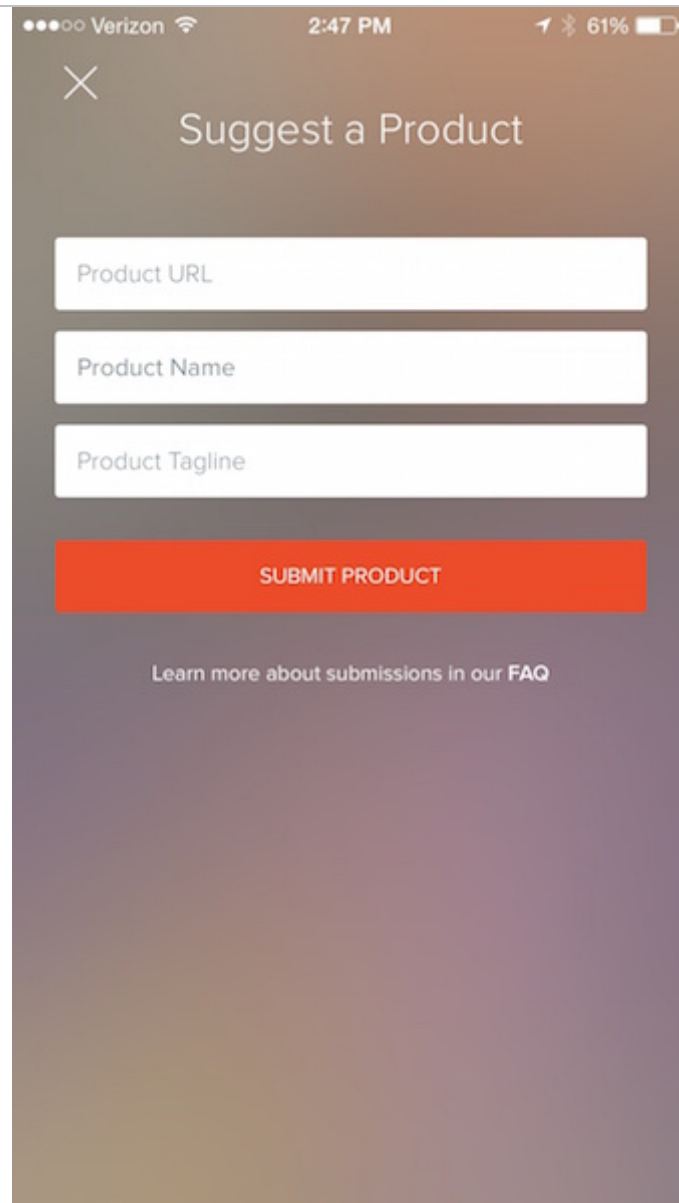
Image - save note success



Considering mobile design patterns - forms and data

Consider various UI representations of data, including mobile options for forms and data input.

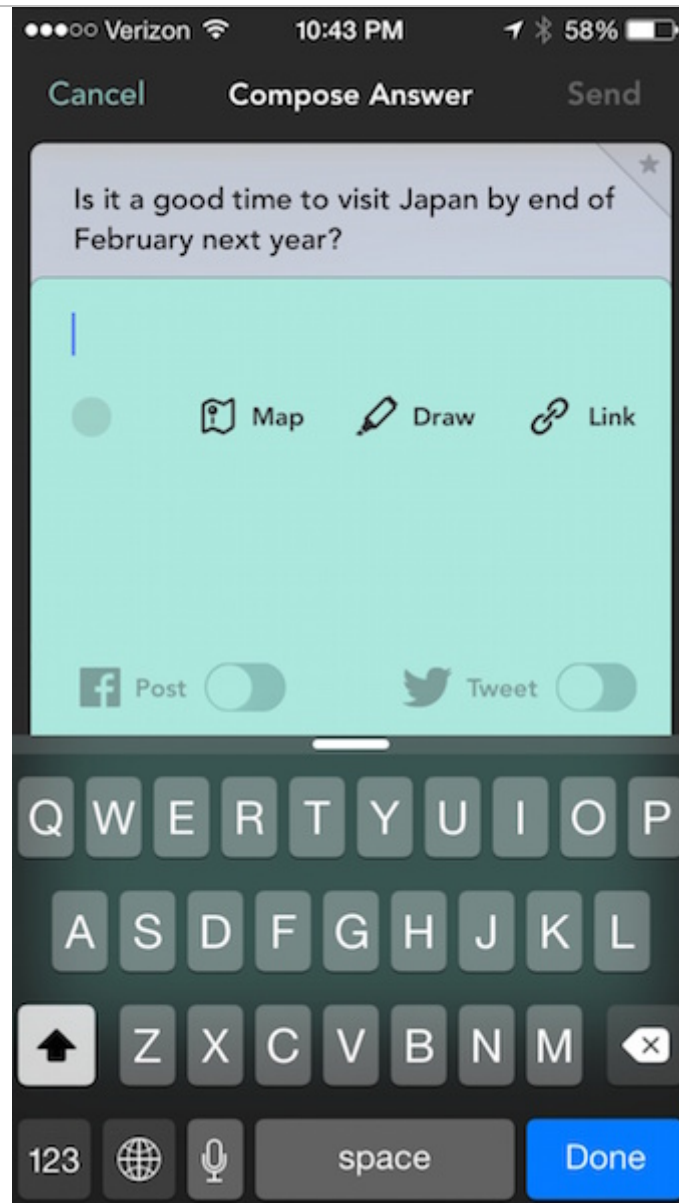
screen I - Product Hunt on iOS



The screenshot shows the 'Suggest a Product' screen in the Product Hunt iOS app. The status bar at the top indicates 'Verizon', '2:47 PM', and '61%' battery. The screen has a dark, blurred background. At the top left is a white 'X' icon. The title 'Suggest a Product' is centered at the top. Below the title are three white input fields with placeholder text: 'Product URL', 'Product Name', and 'Product Tagline'. Below these fields is a prominent orange button with the text 'SUBMIT PRODUCT'. At the bottom, there is a link that says 'Learn more about submissions in our FAQ'.

Product Hunt on iOS

screen 2 - Jelly on iOS



Jelly on iOS

screen 3 - Pages on iOS

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Style

List

Layout



12 pt Baskerville



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PARAGRAPH STYLE

Title

Pages on iOS

screen 4 - eBay on iOS

Cancel Register

First Name Last Name

Names on Etsy are public, but optional.

Female Male Rather Not Say

Your Email

Password

Confirm Password

Username

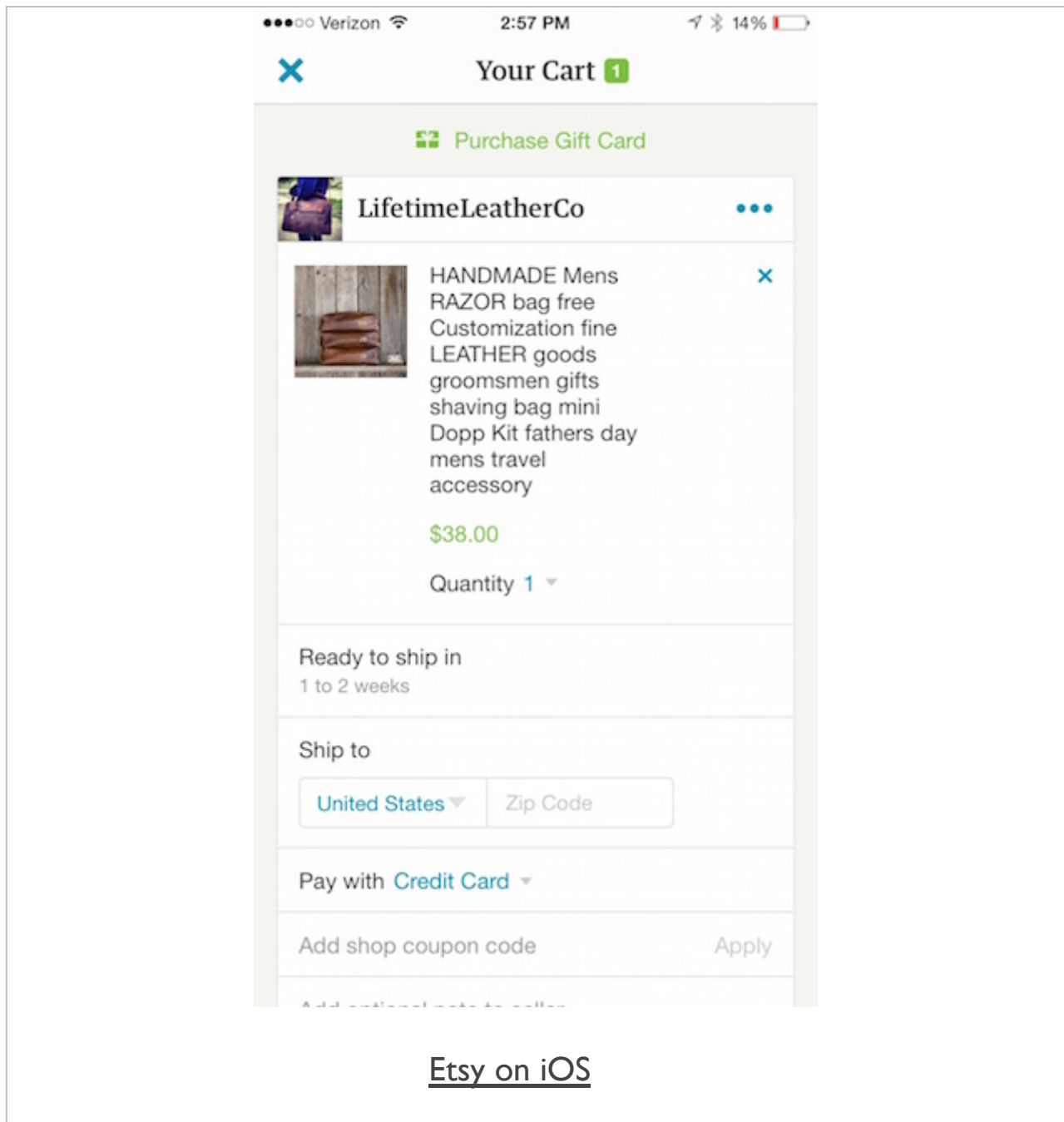
Register

By registering, you confirm that you accept our [Terms of Use](#) and [Privacy Policy](#).

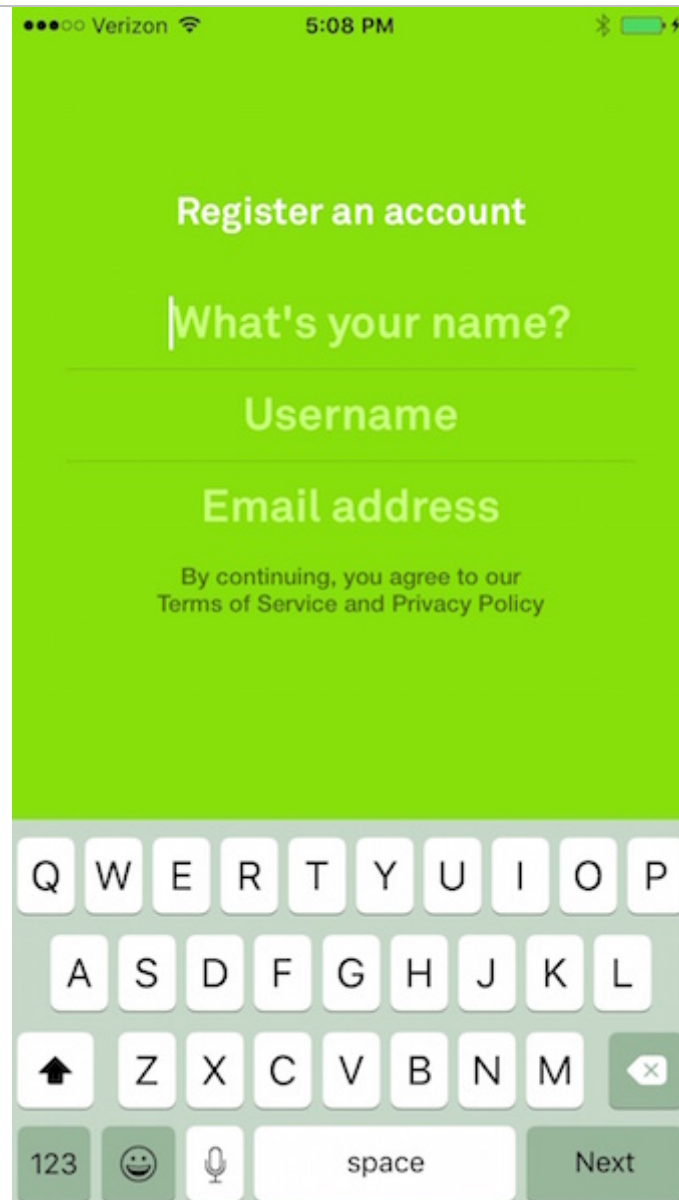
Have an account? [Sign In](#)

eBay signup on iOS

screen 5 - Etsy on iOS



screen 6 - Free on iOS



The screenshot shows an iOS registration screen with a solid green background. At the top, the status bar displays 'Verizon', signal strength, Wi-Fi, the time '5:08 PM', and battery level. The main heading is 'Register an account' in white. Below it is a text input field with the placeholder 'What's your name?' and a white cursor. Underneath is a 'Username' label and another text input field. This is followed by an 'Email address' label and a third text input field. A line of fine print reads: 'By continuing, you agree to our Terms of Service and Privacy Policy'. At the bottom of the screen is a white QWERTY keyboard. The keyboard has a 'Next' button in the bottom right corner, which is highlighted in a darker shade of green.

Register an account

What's your name?

Username

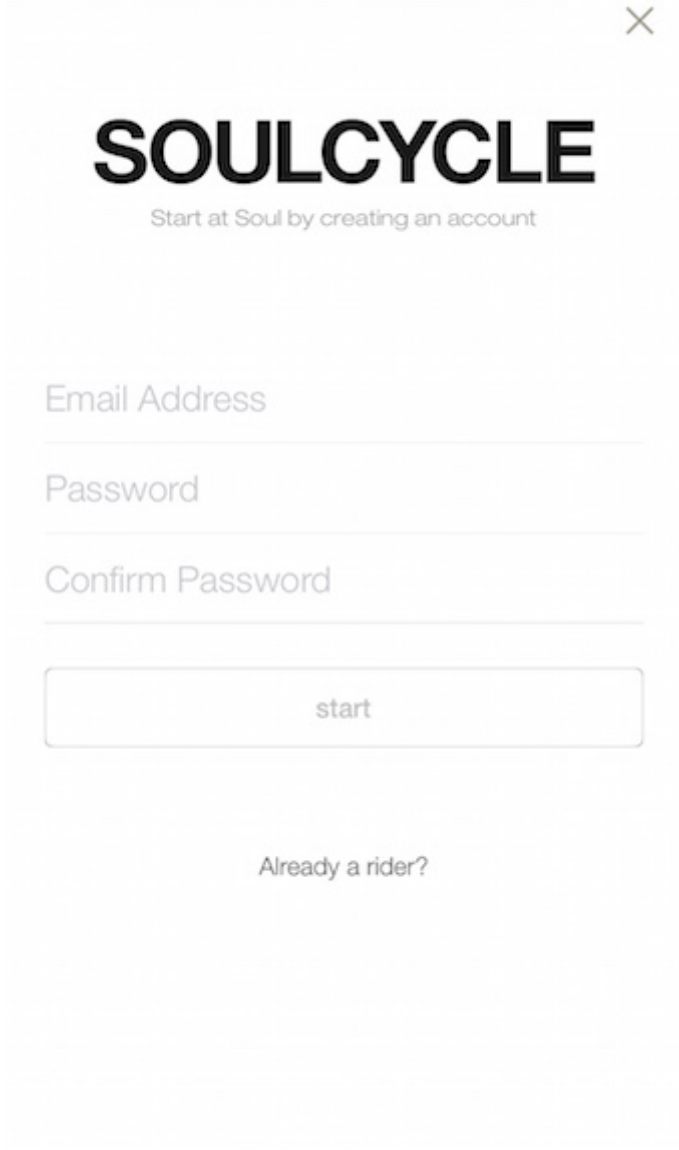
Email address

By continuing, you agree to our Terms of Service and Privacy Policy

Q W E R T Y U I O P
A S D F G H J K L
↑ Z X C V B N M ↵
123 😊 🎤 space Next

Free on iOS

screen 7 - SoulCycle on iOS



Verizon 7:58 PM 83%

SOULCYCLE

Start at Soul by creating an account

Email Address

Password

Confirm Password

start

[Already a rider?](#)

[SoulCycle on iOS](#)

References

- OnsenUI
 - *JavaScript Reference*
- MDN - IndexedDB
 - *IndexedDB API*
- MDN - JavaScript reference
 - *String.prototype.split()*
 - *RegExp*