



THE CUSTOMER SUCCESS PLATFORM
SALES SERVICE MARKETING COMMUNITY ANALYTICS APPS

Build Salesforce IoT applications with ARM mbed™

Build a Salesforce IoT application with ARM mbed in less than an hour!

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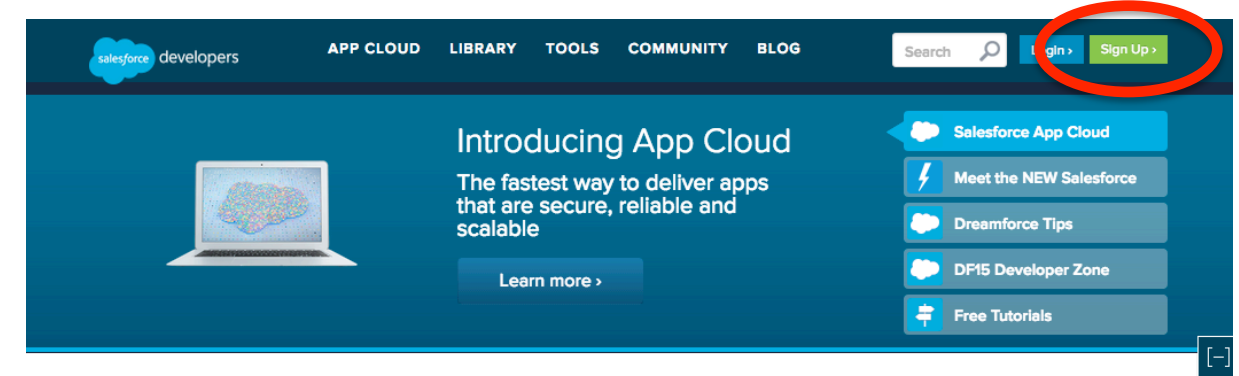
Objective

- * Before we begin: COUNT OFF!! *And... remember your number...*
 - * <http://mbed.com/df2015> - go here to get this presentation and other details!
- * Demonstrate delivery of devices, on constrained networks, into Salesforce.com via ARM mbed Device Server (mDS)
- * Introduction to the MBED online developer environment
- * Setup of mbed device, device connectivity, and mDS Bridge in Salesforce
- * See your heart rate and location telemetry in Salesforce!

Creating a Salesforce Developer Account

* Start Here

* <https://developer.salesforce.com>



* Click on “Sign Up”

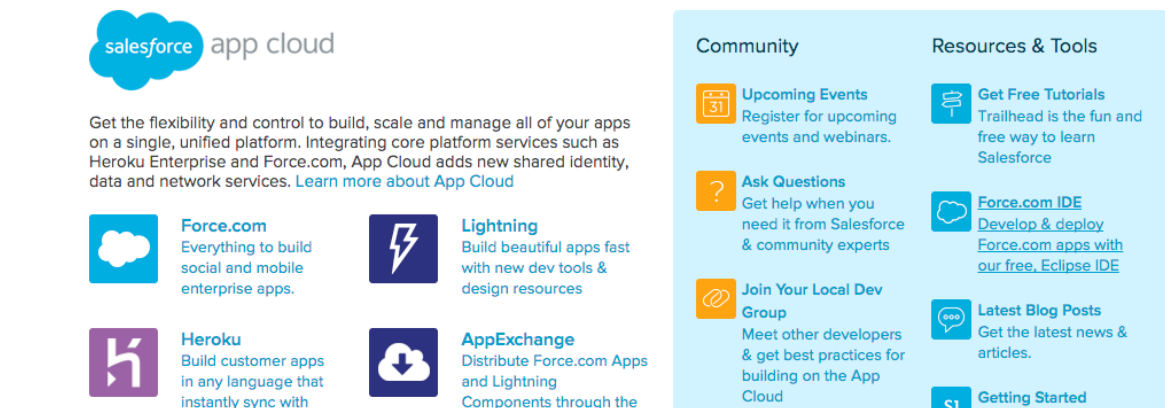
* Fill in the Form...

* **IMPORTANT: Use an email address that you can receive email *NOW***

* Salesforce will send you a confirmation email that must be acknowledged

* Once acknowledged, log in here: <https://login.salesforce.com>

* Click through, then Click on “Setup” in the upper right-hand side of the page



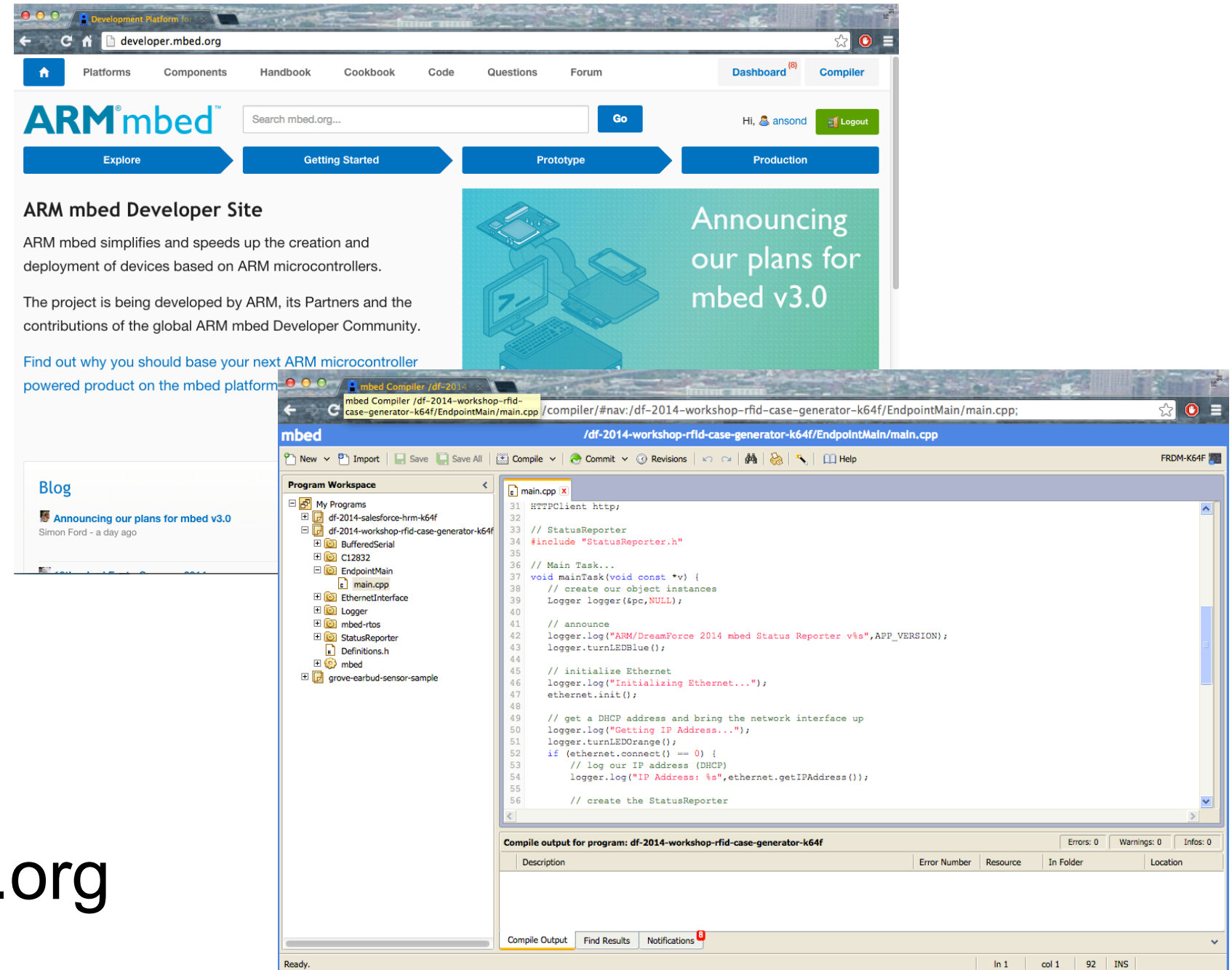
mbed Online Developer Environment



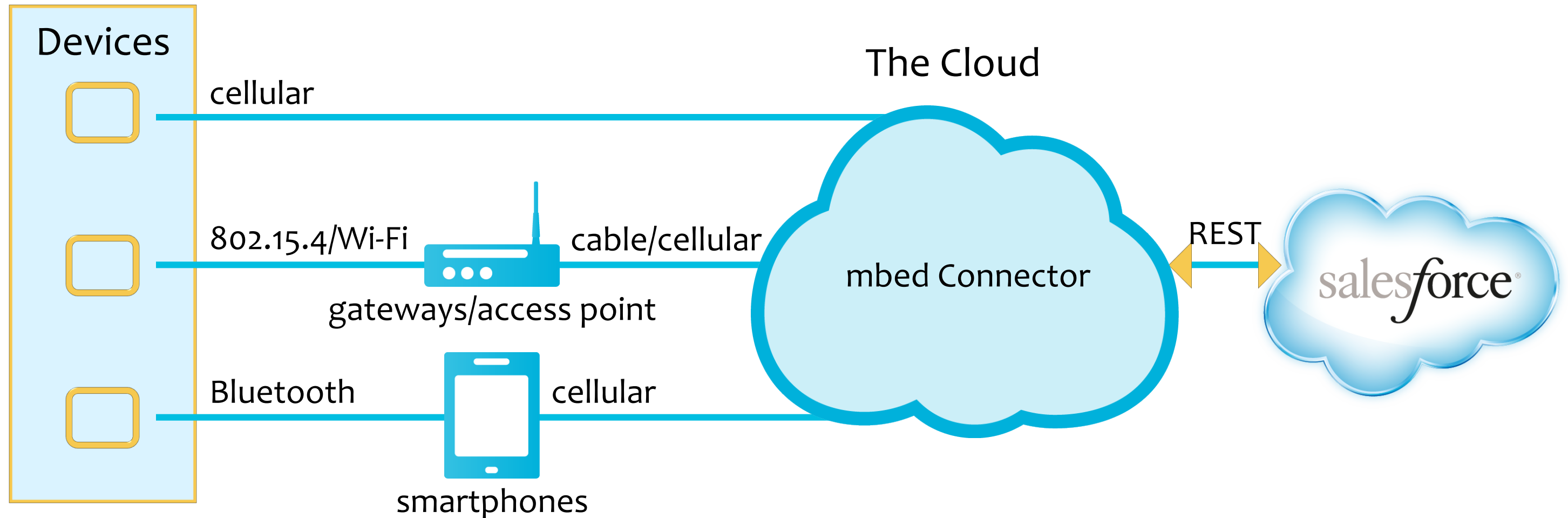
- * Cloud-based
- * Supports multiple compile targets (platforms)
- * Full source code control
- * Online forum, wiki

* Go here now and setup your free Account for the exercise:

<http://developer.mbed.org>



mbed Connector: Simplify IoT Device Connection/Access

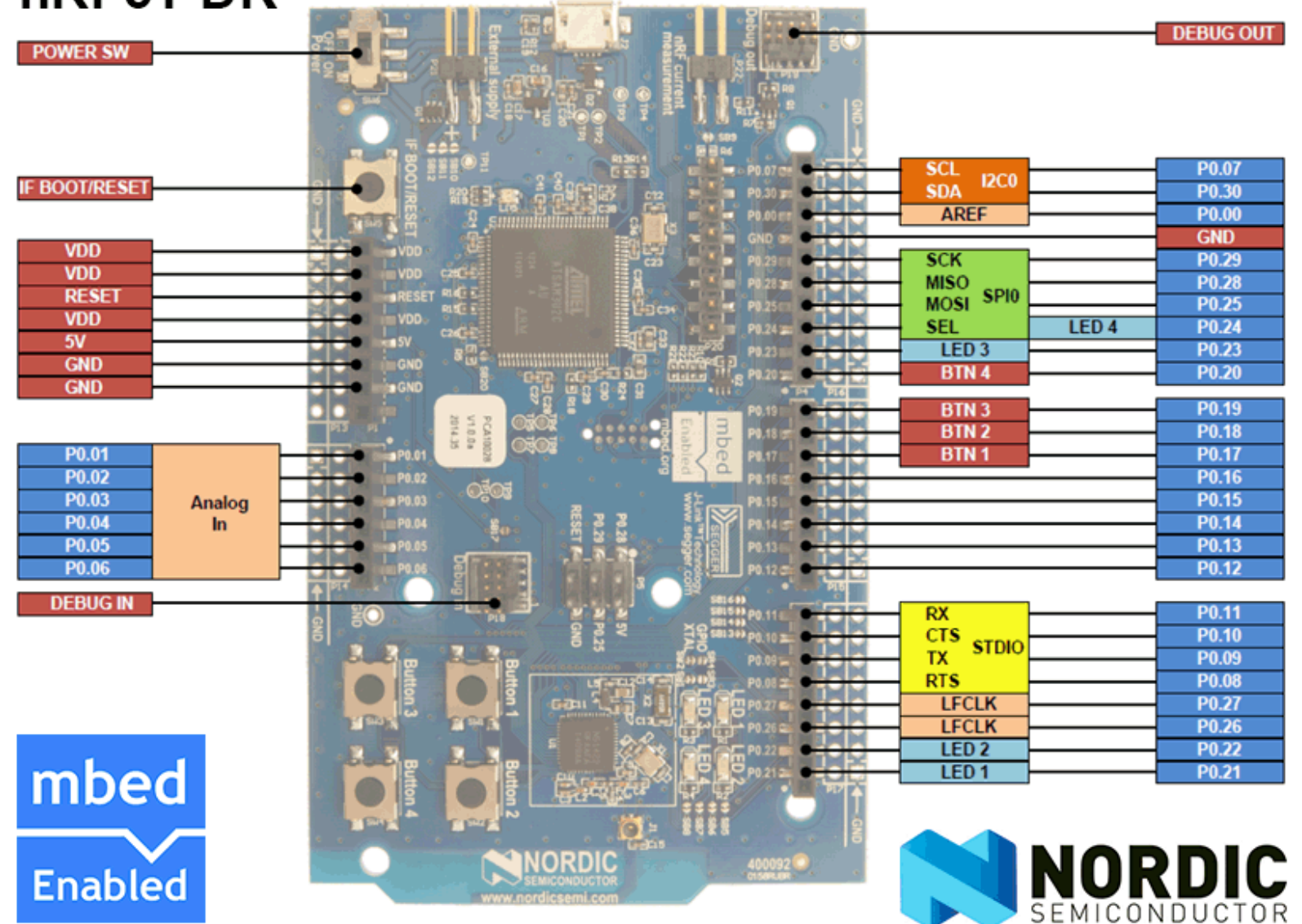


- * “Impedance Matcher” between sleepy devices on constrained networks and IPv4/IPv6
- * Addressable through REST call interface
- * Secure

BLE mbed Device – What is it?

- * Ultra low power Cortex-M0
- * 32KB RAM, 128KB Flash
- * V4.1 Compliant BLE
- * Arduino R3 Compatible Header
- * Enumerates as USB flash drive
- * Coin cell holder for low power operation
- * J-Link and CMSIS-DAP debug Interfaces
- * Pins for power consumption measurements

nRF51-DK



Oh... One more thing...

- * ARM would like to give each workshop attendee your mbed hardware!

Just:

- * Choose between the BLE or K64F mbed board options...
- * Complete the workshop...
- * The mbed board, Grove Shield, and Heart rate sensor are yours to keep!

Enjoy and Have Fun!

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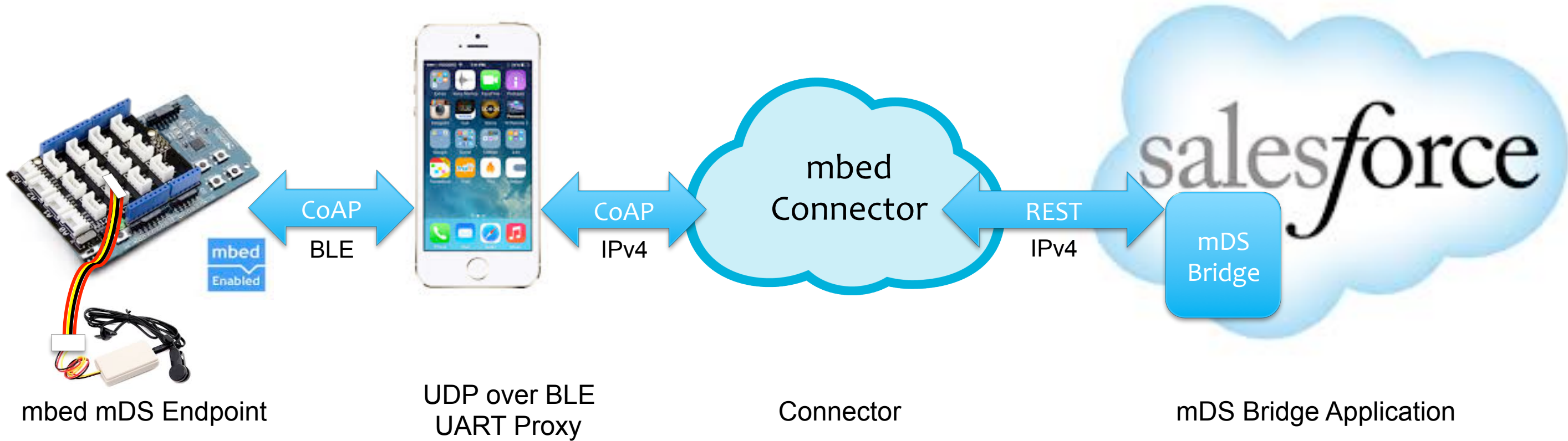
Workshop Scenario: BLE Wearable Heartrate Sensor

- * Create and connect a BLE-based heart rate sensor to your Salesforce.com account through ARM's mbed Device Server (mDS).
- * Install, into your Salesforce.com developer account, an early access version of the ARM mDS Bridge Salesforce application. This application will connect your Salesforce account with a cloud-hosted instance of ARM's mbed Device Server
- * Stream, via your Salesforce.com mDS Bridge application, heart rate, location, altitude, and speed onto a Google™ map page. This page is included in the mDS Bridge application and makes use of Salesforce's Streaming API service.



- IMPORTANT: Due to the amount of wireless activity in Moscone and the density of Cellular/WiFi Usage, you have two options**
- Give the BLE exercise a try
 - Go with a wired ethernet exercise (K64F)

Workshop Scenario: What we will build (BLE)...



Demonstrate delivery of devices, on constrained networks, into Salesforce.com

ARM[®] mbed[™]



LETS GET STARTED!
(10 steps...)

1). Import the mDS Bridge Package into Salesforce

* Log into your Salesforce.com Developer Account


* Navigate to install version 1.7 of the mDS Bridge package :

<https://login.salesforce.com/packaging/installPackage.apexp?p0=04t610000001YSe>

* Password is “arm1234” (no quotes)

* Select “Install for All Users”

* Press “Install”

 **Install mDS Bridge**
By ARM


 Installing and granting access to all Users...

App Name	Publisher	Version Name
mDS Bridge	ARM	Summer 2015

Description
Pre-Alpha version of the ARM mbed Device Server (mDS) Bridge for Salesforce. This bridge is account. mDS managed endpoints and their resources will be accessible as Custom Objects in notifications are supported. This bridge is intended for experimental use only - its pre-alpha - th

Additional Details [View Components](#) [API Access](#)

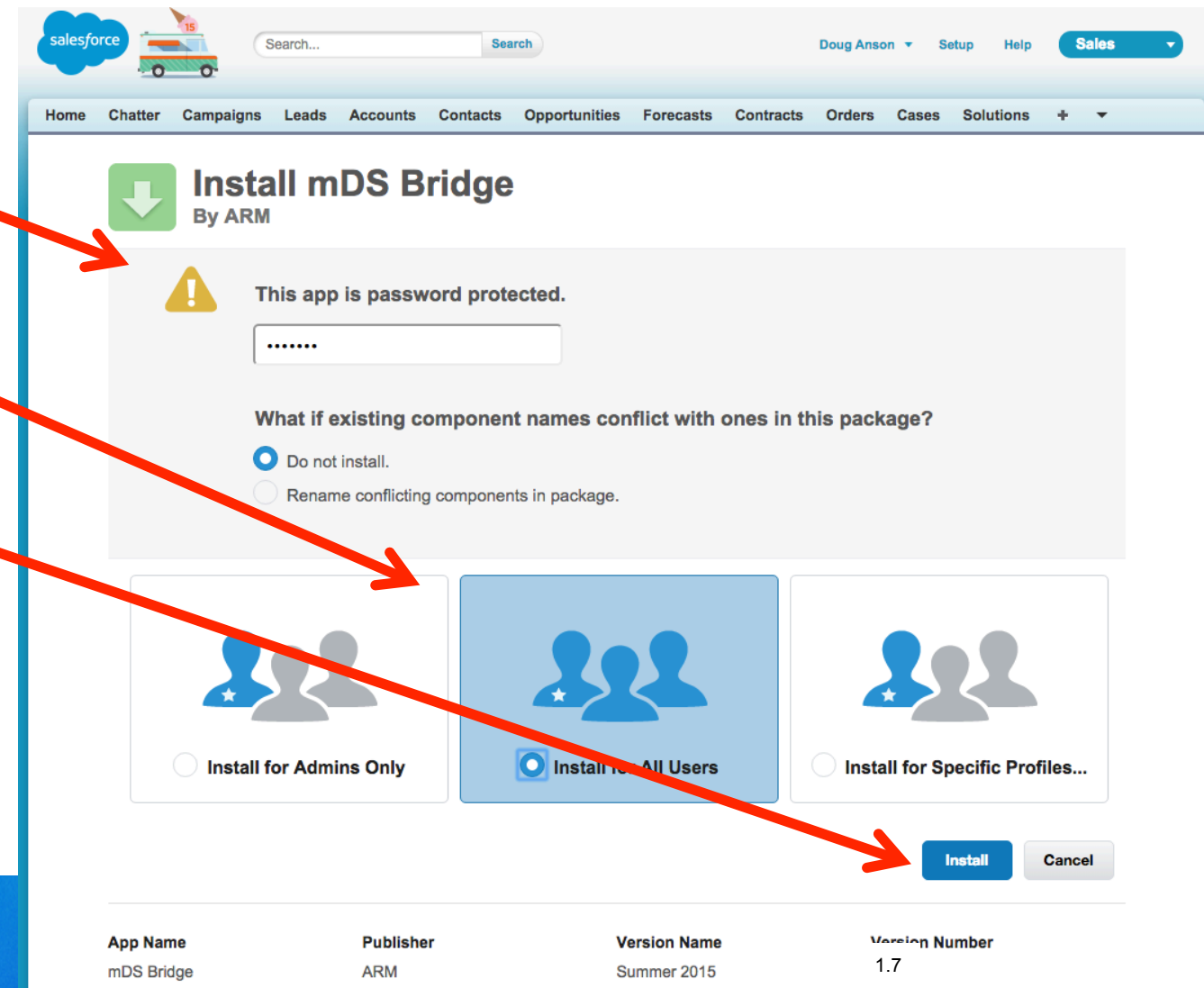
 **Install mDS Bridge**
By ARM

 Installation Complete!

Done


App Name	Publisher	Version Name	Version Number
mDS Bridge	ARM	Summer 2015	1.7


Description
Pre-Alpha version of the ARM mbed Device Server (mDS) Bridge for Salesforce. This bridge supports linking of mDS to a given Salesforce account. mDS managed endpoints and their resources will be accessible as Custom Objects in Salesforce. CoAP GET, PUT, and observation notifications are supported. This bridge is intended for experimental use only - its pre-alpha - thanks!



salesforce

Home Chatter Campaigns Leads Accounts Contacts Opportunities Forecasts Contracts Orders Cases Solutions +

 **Install mDS Bridge**
By ARM

 This app is password protected.

.....

What if existing component names conflict with ones in this package?

Do not install.
 Rename conflicting components in package.

Install for Admins Only Install for All Users Install for Specific Profiles...

Install **Cancel**

App Name	Publisher	Version Name	Version Number
mDS Bridge	ARM	Summer 2015	1.7

2). Create a “Site” in your Salesforce Developer Account

Starting at the “Setup” page, Look at the left-hand Navigation Pane

*Navigate to: Develop → Sites (Left-hand side... in the “Build” section)

*Select a domain name

*Press “Check Availability”

*Check “Agree to ...”

*Press “Register My...”

NOTE: Developer accounts are permitted one site domain ONLY... and it cannot be changed once set... so choose this name wisely...

The screenshot shows the 'Sites' setup page in Salesforce. At the top, it says 'What is a Site?' and provides an overview of Force.com sites. Below this, there's a diagram titled 'Your Sites' showing a 'Your Force.com Domain' box containing 'MyCompany.force.com' with three arrows pointing to site URLs: 'MyCompany.force.com/developers', 'MyCompany.force.com/customers', and 'MyCompany.force.com/marketing'. A blue arrow points to the domain box with the text 'Register Your Force.com Domain'. Below the diagram, there's a warning message: 'You cannot modify your Force.com domain name after the registration process.' At the bottom, there's a form with a text input field containing 'http:// df2015-test2 -developer-edition.1234.force.com', a 'Check Availability' button, a checked checkbox for 'I have read and accepted the Force.com Sites Terms of Use', and a 'Register My Force.com Domain' button. Red arrows from the text on the left point to the domain name input field, the 'Check Availability' button, the terms of use checkbox, and the 'Register My Force.com Domain' button.

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2a). Create a “Site” in your Salesforce Developer Account...

* Navigate to: Develop → Sites → Create Site... Click “New”

* Fill In Details

* Require HTTPS

* Press “Save”

The screenshot shows the 'Site Edit' page in Salesforce Developer Edition. The 'New Site' form is visible with the following details:

- Site Label: My Site
- Site Name: My_Site
- Site Description: My Developer Site
- Site Contact: Doug Anson
- Default Web Address: http://df2015-test2-developer-edition.na34.force.com/
- Active Site Home Page: mDSBridge
- Inactive Site Home Page: InMaintenance
- Site Template: SiteTemplate
- Site Robots.txt:
- Site Favorite Icon:
- Analytics Tracking Code:
- URL Rewriter Class:
- Enable Feeds:
- Clickjacking Protection Level: Allow framing by the same origin only (recommended)
- Require Secure Connections (HTTPS):
- Guest Access to the Knowledge API:

A 'Lookup' window is open over the 'Active Site Home Page' field, showing search results for 'mDSBridge':

Label	Name	Namespace	Prefix	Api Version	Description	Created By
mDSBridge	mDSBridge			34.0	mDS Bridge Configuration	...

The screenshot shows the 'Sites' page in Salesforce Developer Edition. It includes a 'What is a Site?' section, a diagram of 'Your Force.com Domain' and 'Your Sites', and a table for 'Sites (df2015-test2-developer-edition.na34.force.com)'. The table currently has no records.

• Find “mDSBridge”

• Select it

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2b). Create a "Site" in your Salesforce Developer Account...

Starting at the "Setup" page, Look at the left-hand Navigation Pane ("Build" section...)

- *Navigate to: Develop → Sites
- *Click on your sites' "Site Label"
- *Press "Public Access Settings"
- *Scroll down to "Enabled..."

Action	Site Label ↑	Site URL	Site Description	Active	Site Type	Last Modified By
Edit	My Site	http://df2015-test2-developer-edition.na34.forc...	My Developer Site	✓	Force.com	Doug Anson, 8/29/2015 3:50 PM

Site Details
My Site

« Back to List

Site Detail

Site Label: My Site

Site Description: My Developer Site

Site Contact: Doug Anson

Login: Not Allowed

Public Access Settings | Login Settings | URL Redirects | **Activate**

Profile
My Site Profile

Users with this profile have the permissions and page layouts listed below. Administrators can change a user's profile by editing that user's...

If your organization uses Record Types, use the Edit links in the Record Type Settings section below to make one or more record types available.

Login IP Ranges [0] | Enabled Apex Class Access [0] | Enabled Visualforce Page Access [12] | Enabled External Data Source Access [0] | Enabled Custom Permissions [0]

Profile Detail

Name: My Site Profile

Enabled Apex Class Access [Edit]

Apex Class Name	AppExchange Package Name
EventHandler	mDS Bridge

Enable Apex Class Access

Select the Visualforce pages that you want to make accessible at this Force.com site.

Available Apex Classes

- ChangePasswordController
- ChangePasswordControllerTest
- ConfigurationController
- ConfigurationControllerTest
- ForgotPasswordController
- ForgotPasswordControllerTest
- MapViewController
- MyProfilePageController
- MyProfilePageControllerTest
- SiteLoginController
- SiteLoginControllerTest
- SiteRegisterController
- SiteRegisterControllerTest

Enabled Apex Classes

- EventHandler

Add | Remove

Save | Cancel

- Press "Edit"
- Find "EventHandler", press "Add"
- Press "Save"

Be sure to "Activate" your Site!!



3). Add a “Remote Site” (i.e. mDS)

Starting at the “Setup” page, Look at the left-hand Navigation Pane

- * Navigate to: Administer → Security Controls → Remote Site Settings
- * Create A “New” Remote Site
- * Fill in the Details
 - * Site URL: <http://129.41.134.116:8080>
 - * Site Name: “mDS”
- * Press “Save”

The image shows two screenshots from the Salesforce Setup interface. The top screenshot is the 'All Remote Sites' page, which displays a table of existing remote sites. A red arrow points from the 'New Remote Site' button to the 'Remote Site Edit' page below. The bottom screenshot is the 'Remote Site Edit' page, where the details for a new remote site are being entered. Red annotations highlight the 'Save' button and the 'Remote Site Name' and 'Remote Site URL' fields.

All Remote Sites

Below is the list of Web addresses that your organization can invoke from salesforce.com. To add another Web address, click New Remote Site.

View: All Remote Sites Create New View

Action	Remote Site Name	Namespace Prefix	Remote Site URL	Active	Created By	Created Date	Last Modified By	Last Modified Date
Edit Del	ApexDevNet	-	http://www.apexdevnet.com	✓	Anson, Doug	8/29/2015 3:36 PM	Anson, Doug	8/29/2015 3:36 PM

Remote Site Edit

Enter the URL for the remote site. All s-controls, JavaScript OnClick commands in custom buttons, Apex, and other code that is invoked from salesforce.com.

Save Save & New Cancel

Remote Site Name: mDS

Remote Site URL: http://129.41.134.116:8080

Disable Protocol Security: ⓘ

Description: mDS in the Cloud

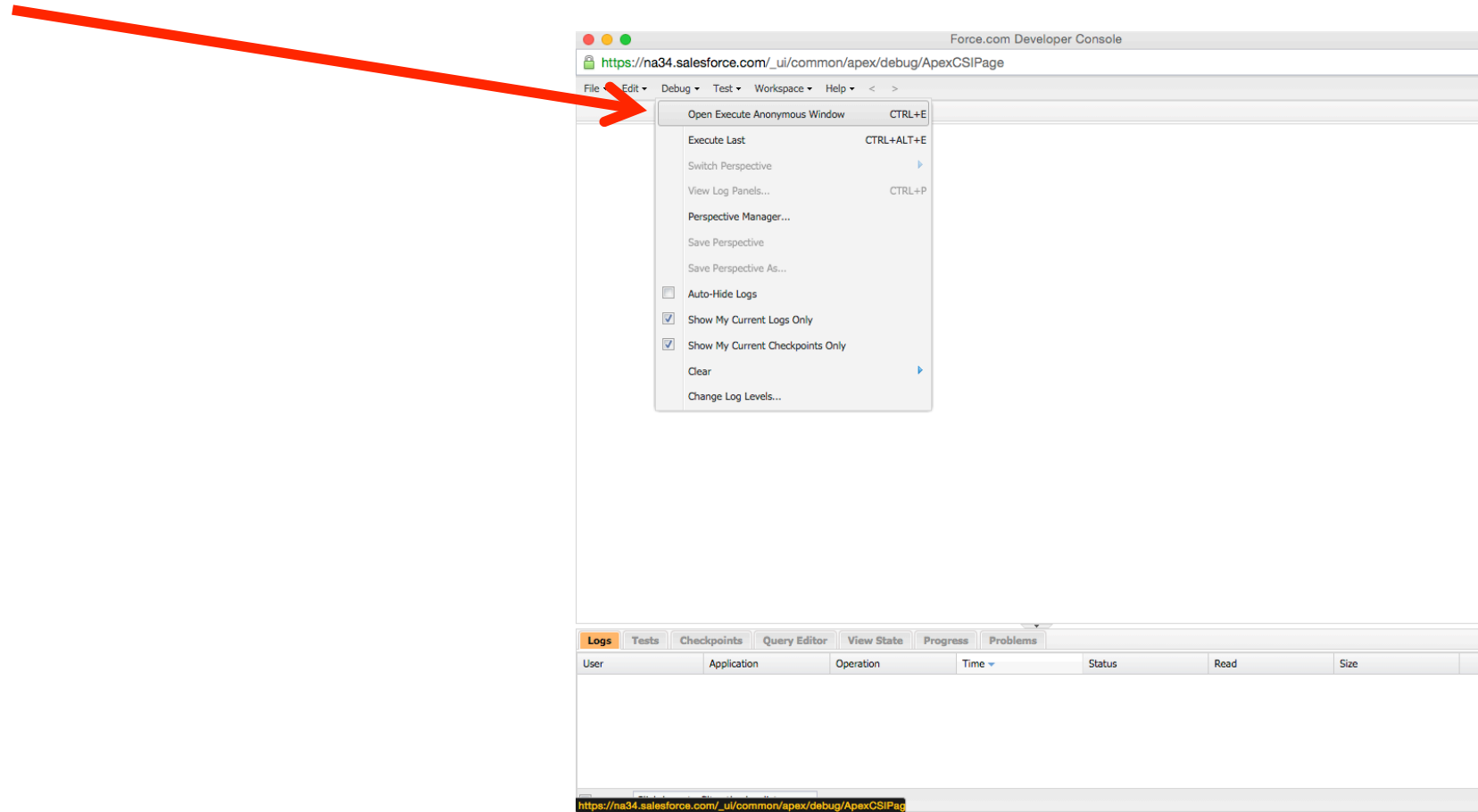
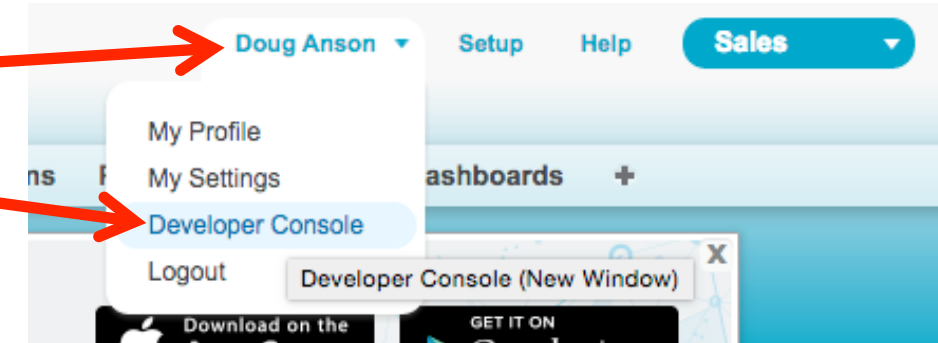
Active:

Save Save & New Cancel



4). Install a PushTopic

- * Starting at the “Setup” page, bring up the “Developer Console”
- * Debug->Open Execute Anonymous Window



4a). Insert and Install this PushTopic...

* Enter the following code Snippet into the Execute Anonymous Window (**ARMPushTopic.txt**):

```
1 PushTopic pushTopic = new PushTopic();
2 pushTopic.Name = 'GetHRM';
3 pushTopic.Query = 'SELECT Id, Name, endpoint_name__c, payload__c FROM Resource__c';
4 pushTopic.ApiVersion = 28.0;
5 pushTopic.NotifyForOperationCreate = true;
6 pushTopic.NotifyForOperationUpdate = true;
7 pushTopic.NotifyForOperationUndelete = true;
8 pushTopic.NotifyForOperationDelete = true;
9 pushTopic.NotifyForFields = 'Referenced';
10 insert pushTopic;
```

* Press **“Execute”**

* Keep the console open... you can see debugging output from here...

User	Application	Operation	Time	Status	Read	Size
Filter Click here to filter the log list						

Helpful Notes:

Case Sensitive!

“payload__c”
“Resource__c”
“endpoint_name__c”

Use double underscore

Code should be in a file on your desktop:

ARMPushTopic.txt



5). mDS Bridge is Installed! Configuring it up....

The screenshot shows the Salesforce mDS Bridge configuration interface. The top navigation bar includes the Salesforce logo, a search bar, and user information (Doug Anson). The 'mDS Bridge' tab is selected in the top right. The left sidebar shows 'Home' and 'mDS Bridge' tabs. The main content area is titled 'Bridge Configuration' and contains the following fields:

- mDS Server Address (default: api.connector.mbed.org): 129.41.134.116
- mDS Domain for your account (default: domain): dfbridge1
- mDS REST port (default: 80): 8080
- Use API Tokens (default: checked):
- API Token: CDT3E1RMHVPPRT777FXMNO55ZOVMOQA3RTYVZ5Z
- Client Username: bridge
- Client Password: secret

Below the configuration fields is the 'Bridge Actions' section with the following buttons:

- Reset mDS Bridge Configuration to default: Reset Config...
- Save mDS Bridge Configuration: Save Config...
- Clear mDS Endpoints: Clear Endpoints...
- Discover mDS Endpoints: Retrieve Endpoints...
- Reset mDS Notification URL: Reset Notification URL...
- Subscribe to Observable mDS Resources: Subscribe...
- Turn Page Refresh ON/OFF: Turn OFF Page Refresh...
- DEBUG: OK

At the bottom is the 'Discovered Endpoints/Resources' section with a table:

Endpoint Name	Resource URI	Resource Value	Observable Resource
---------------	--------------	----------------	---------------------

Select "mDS Bridge" in this drop down

Select the "mDS Bridge" TAB...

Make sure its set to 129.41.134.116

Set to "dfbridgeXX" where **XX** is your number from the count-off at the beginning of the lab..

Save your configuration!

Lastly, refresh your page and ensure that all of your settings are properly set !

6). BLE: Install the BLE-UDP Proxy on your Smartphone

iPhone Users

- * Go to the App Store
- * Search for “mbed BLE”
- * Install the application
- * Allow the application access to your location when asked

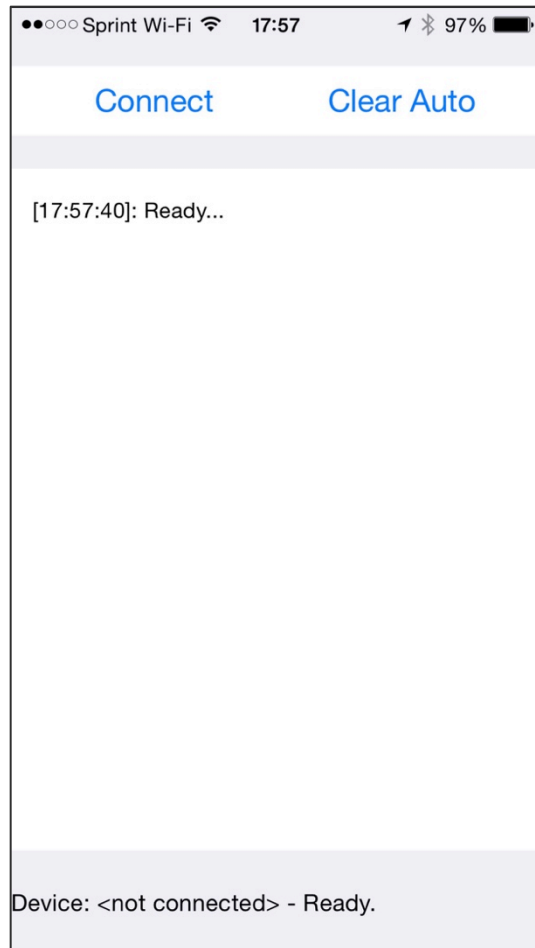
Android Users

- * Go to Google Play
- * Search for “mbed BLE”
- * Install the application
- * Allow the application access to your location when asked

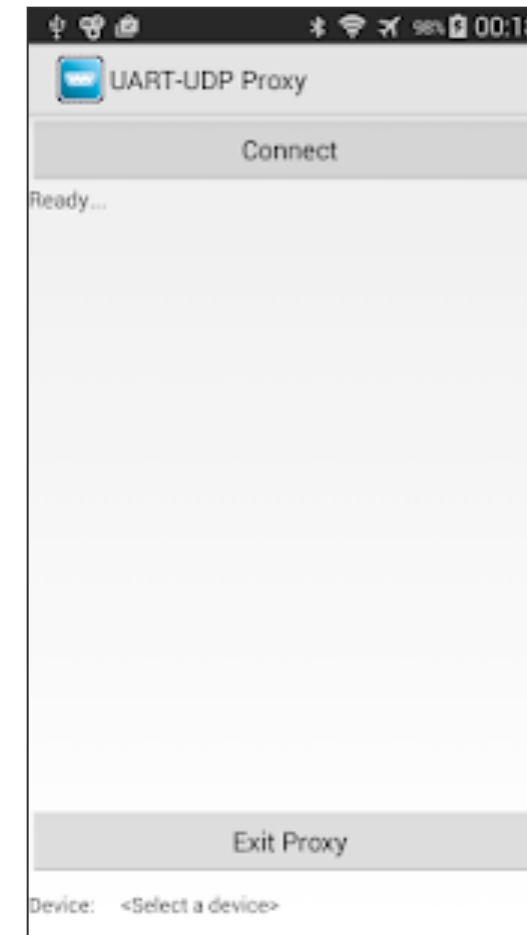
Note: Android has had issues with the density of BLE in the room... not to worry... you can retry outside the forum

6a). BLE: Install the mbed BLE UDP Proxy on your Smartphone...

iPhone Users (author: Doug Anson – me!)



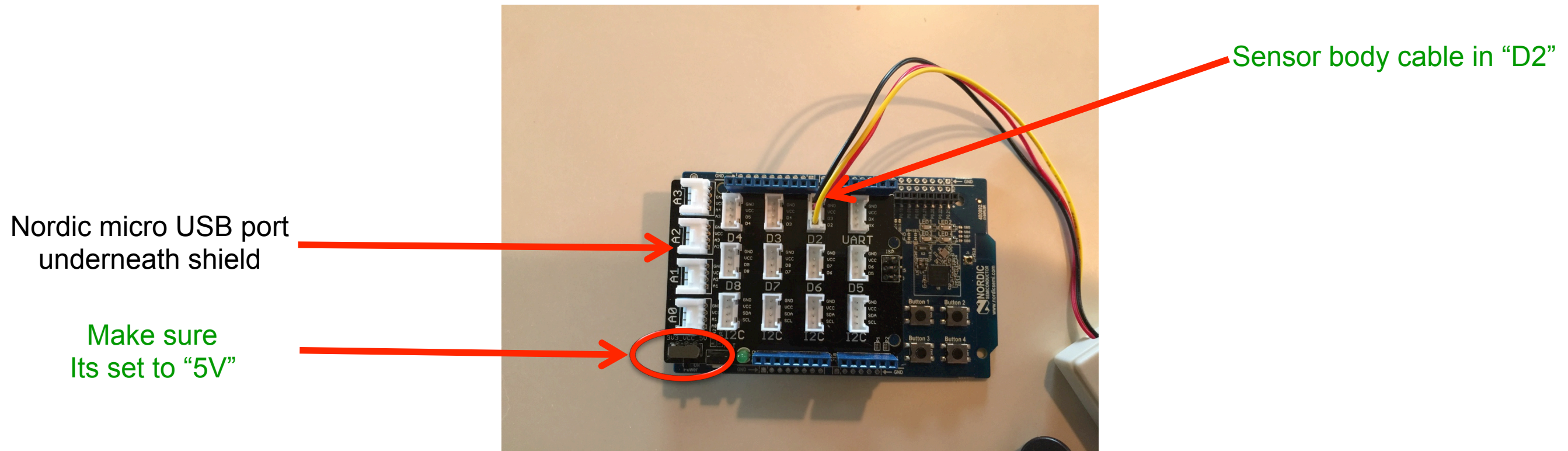
Android Users (author: flightbriefer.net – [still me!](#))



Search for “mbed BLE UDP Proxy” in either the Apple App or Google Play store...

- Install
- Allow access to Location – this will be necessary for the map view

6b) Construct your mbed Device



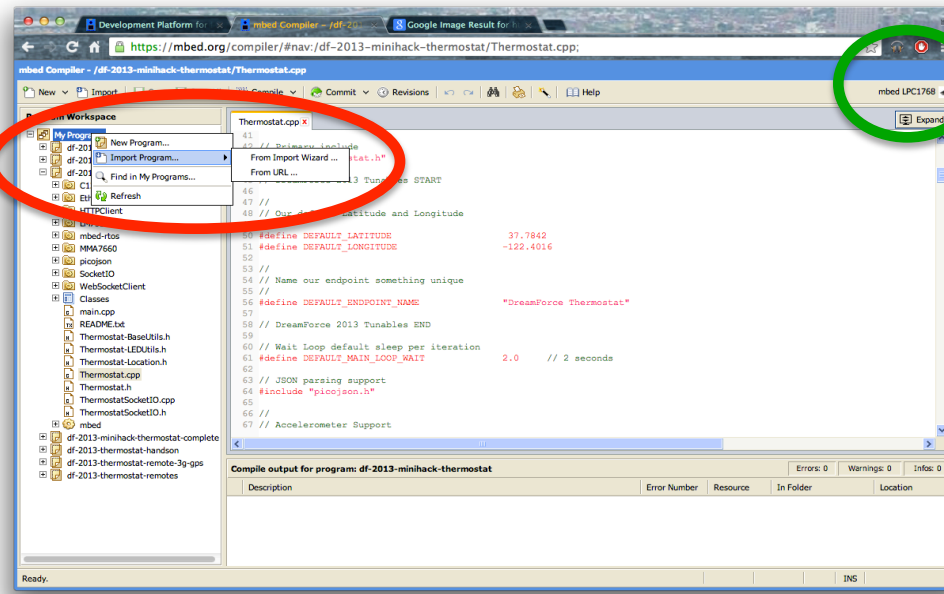
- * Carefully remove the pin guards from your Nordic board
- * Carefully insert your Grove Shield onto your Nordic board (K64F)
- * Insert the heart rate sensor body cable into "D2" on the Grove Shield
- * Insert the earbud phono plug into the heart rate sensor body

7). mbed Development: Create your dev account...

- * Creating your (free) mbed developer account: <http://developer.mbed.org> , sign up
- * In a new Chrome browser tab, go to <http://developer.mbed.org> . Log in
- * In the upper left-hand part of the page, click “Platforms”
- * Search for “Nordic nRF51-DK” – click on the picture
 - * K64F Users: search for “FRDM-K64F” instead...
- * Note the details about the board (cool... eh?). Click on “Add to Compiler”
- * Now, in the upper-right hand part of the page click “Compiler”

7a). ... Import Code

Right-Click “My Programs”
Select: “Import from URL”



Make sure that
“Nordic nRF51-DK” target
selected... (or FRDM-K64F)

Select first row Press
“Import from URL”

* Import using this URL:

BLE: <https://developer.mbed.org/users/ansond/code/df2015-ble-hrm/>

K64F: <https://developer.mbed.org/users/ansond/code/df2015-eth-hrm-k64f/>

* Press “Import”. Then, select Compile->Compile All

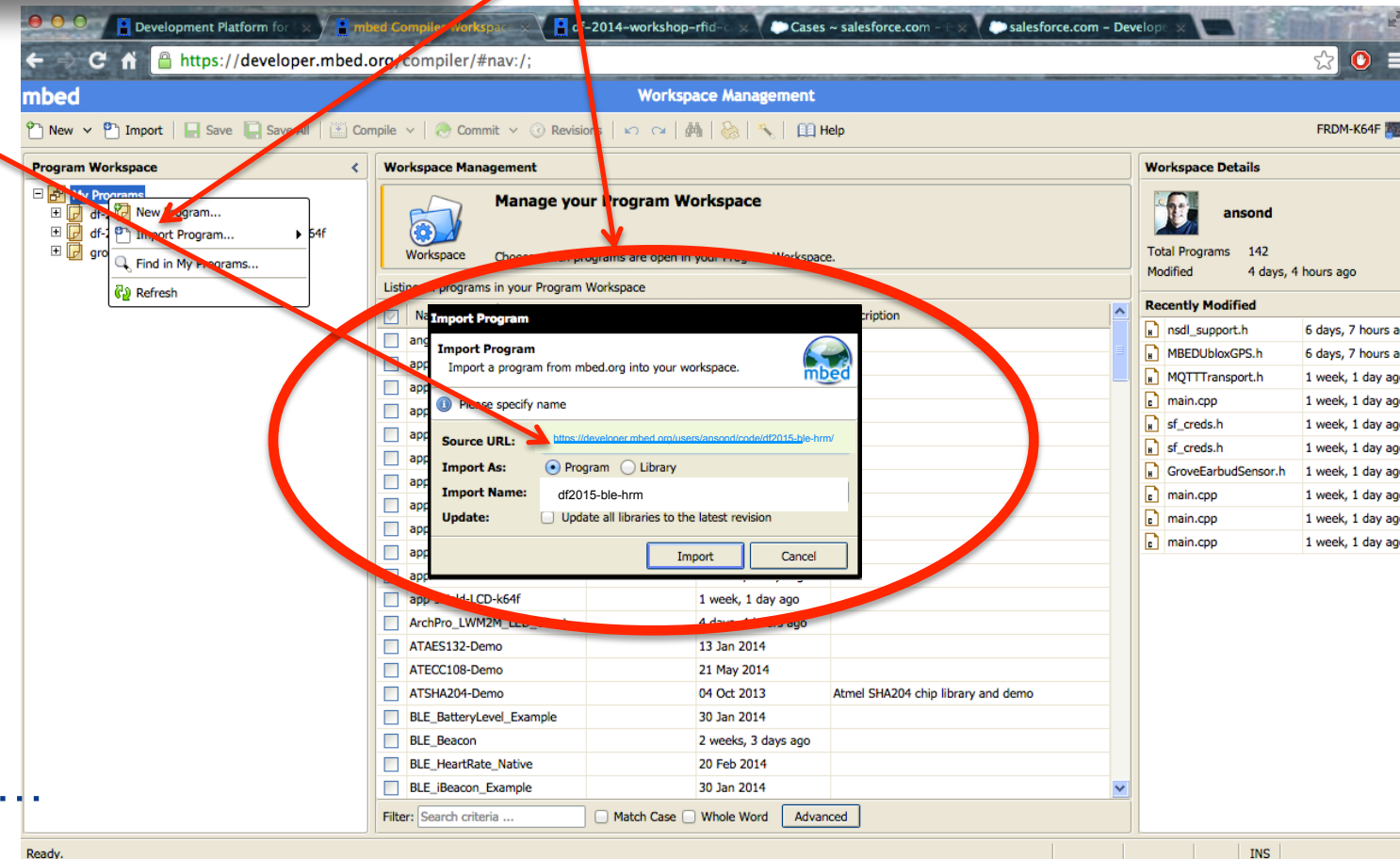
* A “hex” (K64F: “bin”) file should be created and downloaded

* Insert the usb cable to the Nordic/K64F board, then the PC.

* Let Windows find the device...

* You should see a flash drive called “MBED”

* Copy the downloaded “hex” (“bin”) file to the MBED flash drive...



7b). mbed Development: Customize and Re-Compile

- * Expand the Imported Project – look for “main.cpp”

- * Click on “main.cpp”... go to lines 47 and 50... Change as follows:

```
// My Endpoint Name
```

```
#define MY_ENDPOINT_NAME "dougs-hrm-XX"
```

← Set to something unique! You can use your number as part of the name

```
// My NSP Domain
```

```
#define MY_NSP_DOMAIN "dfbridgeXX"
```

← Set this to the same value that you set in the mDS Bridge Tab...

- * Have a look at the other parts of the code... its very simple!

- *mbedEndpointResources directory has the actual CoAP implementation for the HRM and location resources

- * Save the file, select “Compile->Compile All”.

- * Copy the downloaded “hex” (“bin”) file to the “MBED” flash drive

- * In your CoolTerm and/or Putty terminal, disconnect and reconnect... Send the “Break” command

- *Windows users may have COM issues with sending “Breaks”... so just disconnect and reconnect the cable

8). See your Endpoint in mDS Bridge on Salesforce.com

* Back on your Salesforce Developer Page:

Bridge Configuration

mDS Server Address (default: api.connector.mbed.org)	129.41.134.116
mDS Domain for your account (default: domain)	dfbridge3
mDS REST port (default: 80)	8080
Use API Tokens (default: checked)	<input type="checkbox"/>
API Token	CDT3E1RMHVPPHT777FXMNO55ZOVMMNOQA3RTYVZ5Z
Client Username	bridge
Client Password	secret

Bridge Actions

- Reset MDS Bridge Configuration to default:
- Save MDS Bridge Configuration:
- Clear MDS Endpoints:
- Discover MDS Endpoints:
- Reset MDS Notification URL:
- Subscribe to Observable mDS Resources:
- Turn Page Refresh ON/OFF:
- DEBUG:

Discovered Endpoints/Resources

Endpoint Name	Resource URI	Resource Value	Observable Resource
mbed-ble-hrm-dk	/999/0/1234	{"latitude":30.21071,"long GET PUT	<input checked="" type="checkbox"/>
mbed-ble-hrm-dk	/888/0/5850	50.0 GET PUT	<input checked="" type="checkbox"/>
mbed-ble-hrm-dk	/311/0/5850	1 GET PUT	<input type="checkbox"/>
mbed-ble-hrm-dk	/dev/mdl	nRF51822-DK GET PUT	<input type="checkbox"/>
mbed-ble-hrm-dk	/dev/mfg	Nordic Semi GET PUT	<input type="checkbox"/>

Clear your endpoint out of Salesforce
Retrieve Your Endpoints into Salesforce

Click to turn "OFF" the Page Refresh

Your Endpoints Resources are listed!

Location and Heartrate Resource values

"PUT" a "0" or "1" to turn on/off LED light

9). Streaming Heartrate/Location....

* Back on your Salesforce Developer Page:

Bridge Configuration

mDS Server Address (default: api.connector.mbed.org)	129.41.134.39
mDS Domain for your account (default: domain)	dfbridge3
mDS REST port (default: 80)	8080
Use API Tokens (default: checked)	<input type="checkbox"/>
API Token	CDT3E1RMHVPPHT777FXMNO55ZOVMMNOQA3RTYVZ5Z
Client Username	bridge
Client Password	secret

Bridge Actions

Reset mDS Bridge Configuration to default	Reset Config...
Save mDS Bridge Configuration	Save Config...
Clear mDS Endpoints	Clear Endpoints...
Discover mDS Endpoints	Retrieve Endpoints...
Reset mDS Notification URL	Reset Notification URL...
Subscribe to Observable mDS Resources	Subscribe...
Turn Page Refresh ON/OFF	Turn OFF Page Refresh...
DEBUG	OK

Discovered Endpoints/Resources

Endpoint Name	Resource URI	Resource Value	Observable Resource
mbed-ble-hrm-dk	/999/0/1234	("latitude":30.21071,"long	<input checked="" type="checkbox"/>
mbed-ble-hrm-dk	/888/0/5850	50.0	<input checked="" type="checkbox"/>
mbed-ble-hrm-dk	/311/0/5850	1	<input type="checkbox"/>
mbed-ble-hrm-dk	/dev/mdl	nRF51822-DK	<input type="checkbox"/>
mbed-ble-hrm-dk	/dev/mfg	Nordic Semi	<input type="checkbox"/>

K64F Users – some additional notes:

- */dev/mdl and /dev/mfg will be different!*
- *Endpoint name will also be different*

Press “Subscribe”

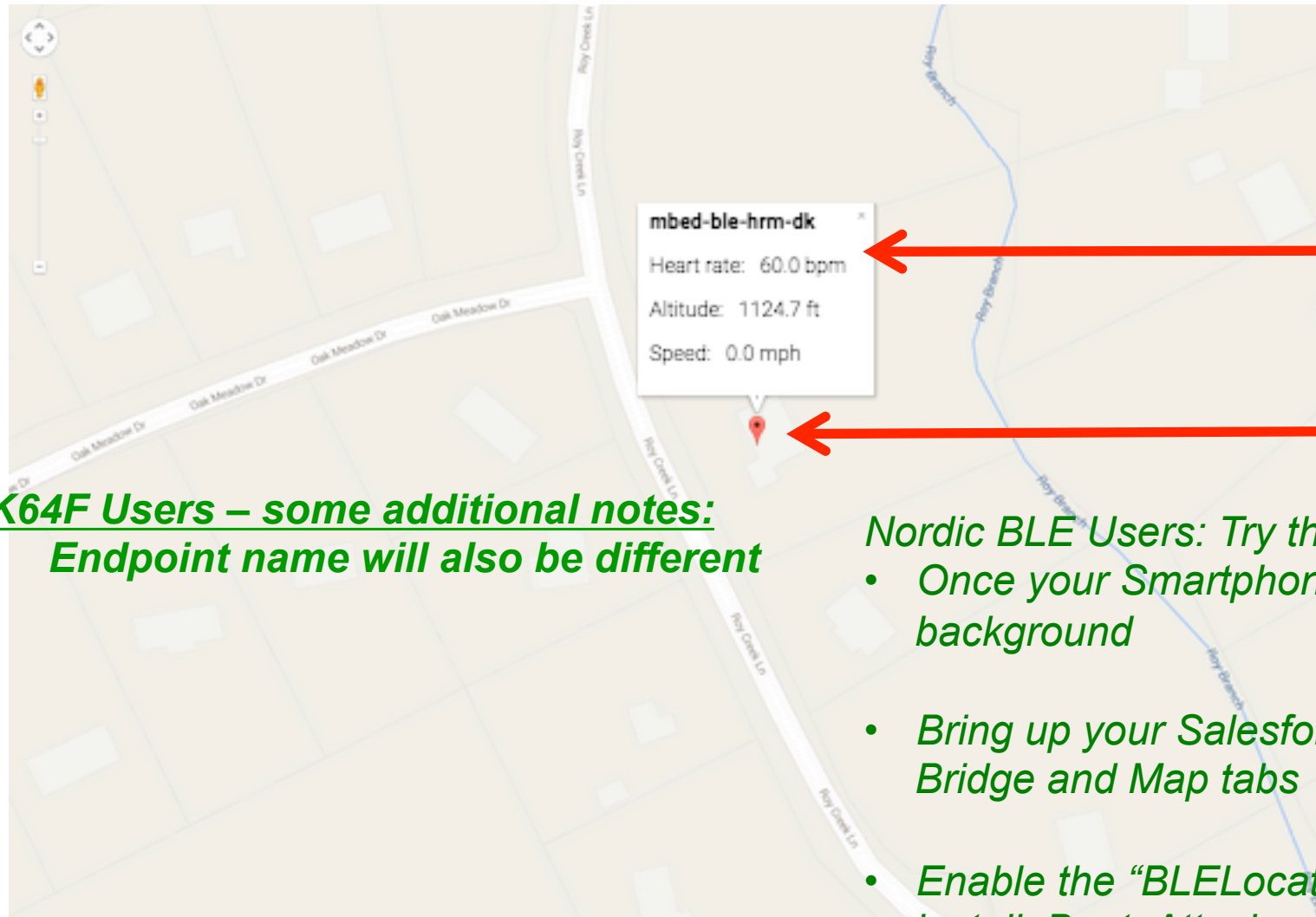
Click to turn “ON” the Page Refresh

Location and Heartrate Resource values should now update automatically...

This is called CoAP “Notifications”. Both Heartrate and Location resources are “Observable” (main.cpp)

10). Streaming Heartrate/Location....

- * Now... check the “HRM Map” Tab/Page in the upper left-hand corner



Heartrate and Location are “Streamed” within Salesforce from the mDS Bridge

As your smartphone and heart rate sensor move around, this page will update with your latest heart rate, altitude, speed, and position on the map.

K64F Users – some additional notes:

- **Endpoint name will also be different**

Nordic BLE Users: Try this:

- *Once your Smartphone’s Proxy app is connected your device, you can send it to the background*
- *Bring up your Salesforce page in your smartphone browser... log in... go to your mDS Bridge and Map tabs*
- *Enable the “BLELocation” experimental option in your mbed main.cpp. Recompile, install. Boot. Attach a USB-Battery. Re-subscribe in SF. Now, this page will display on your phone and will update its location, over 3G/LTE as you walk around..*

Congrats! Mission Accomplished!

- * You have successfully connected your heart rate sensor, through mbed Device Server via CoAP, (over BLE) and IPv4/3G into Salesforce.com as a custom Object... so, you can now stream observable CoAP resources into Salesforce.com
- * mbed Device Server and Salesforce.com together form a powerful platform for bringing devices, connected via various constrained networks, into Salesforce.com and its ecosystem.
- * The mbed online development environment is a powerful and flexible ecosystem to build IoT applications on low power mbed devices

 Thank You

ARM mbed™

Doug Anson – doug.anson@arm.com

Sam Grove – sam.grove@arm.com

Brian Daniels – brian.daniels@arm.com