Rapid Development Leveraging BEMS Services and the Shared Services Framework

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<Short Legal Notice>

1. Workbook Scope

This workbook corresponds to session –

- Rapid Development Leveraging BEMS Services and the Shared Services Framework

2. Compatibility

The instructions in this manual have been tested in the following environment:

Component	**Version**
Android Studio	Android Studio 3.1.4
Android SDK Build-tools	27.0.3
Android SDK Platform	25
Physical device running Android	8.1.0
BlackBerry Dynamics SDK for Android	4.2.0.69
BlackBerry UEM	12.9.0

These exercises can't be done with an application running in Enterprise Simulation mode.

3. Source code download & setup

Application sample code can be downloaded from - http://www.blackberrydevsummit.com

Note that this sample assumes the BD SDK was installed to the default location. **If you installed to a non-default location,** you will need to update the path in the maven url in the build.gradle file for the project as shown in bold below.

```
def localProperties = new File(rootDir, "local.properties")

Properties properties = new Properties()

localProperties.withInputStream { instr ->

    properties.load(instr)

}
```

```
def sdkDir = properties.getProperty('sdk.dir')

maven { url sdkDir+'/extras/blackberry/dynamics_sdk/m2repository' }
```

Complete the following steps to configure the sample application

1. Open the **settings.json** file located in the application's assets directory and update the **GDApplicationID**, replacing ### with the number assigned to you at the BlackBerry Developer event.

When installed onto an Android Device or Simulator the sample code app name is 'Services'

4. Shared Services Exercises

These exercises can't be done with an application running in Enterprise Simulation mode. If necessary, see the Application developer basics manuals for instructions on running applications in normal enterprise mode.

The Application-Based Services feature is for communication between two BlackBerry Dynamics applications, referred to as the service *consumer* and the service *provider*. You will therefore need two applications to complete these exercises.

Exercise considerations – BlackBerry Work

One way to do these exercises is to use BlackBerry Work as one of the applications. BlackBerry Work is a provider of services, including Send Email and Transfer File, and also a consumer of services, including Transfer File.

Note that BlackBerry Work can only be installed onto a physical device. If you don't have a device available to install BlackBerry Work use the AppKinetics sample app as part of the BD SDK sample apps.

4.1 Exercise One – Service Discovery

The first stage in Shared Services is for the Consumer to Discover any Service Providers which provide the service that developer has researched and coded into Consumer.

1. Build / install / activate sample code against the lab BlackBerry UEM then launch the Services application and navigate to the Service Discovery screen.

   Attempt Service Discovery by selecting ‘Transfer File’ from dropdown and pressing DISCOVER. Note: There is no Service Discovery results found as currently no Service Provider applications are activated.

2. It is now required to activate Service Provider application(s) against your user in the lab BlackBerry UEM. These applications must be activated against same user & enterprise.

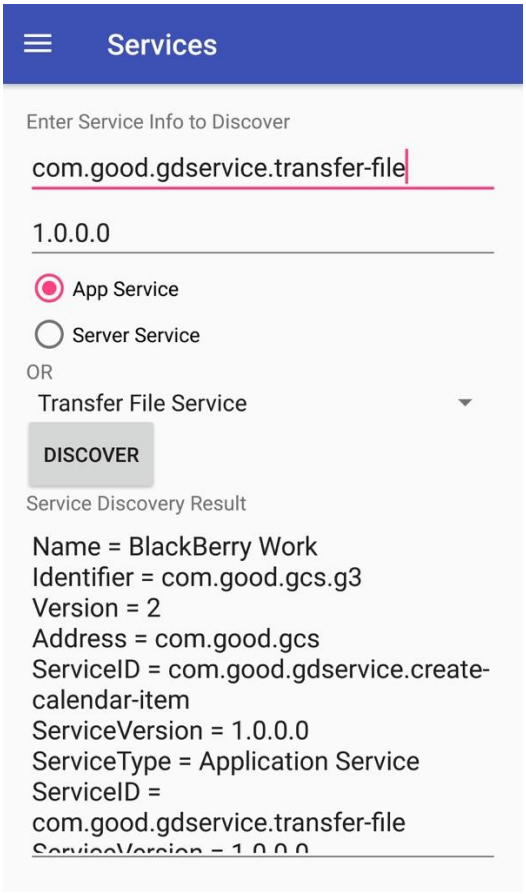
   If possible (You are using a physical device that doesn’t already have BlackBerry Work activated) activate BlackBerry Work.

   In either case of physical device or simulator build / install / activate the AppKinetics sample application found in BlackBerry Dynamics SDK.

   Activate BlackBerry Work using the BlackBerry UEM. To do this follow Appendix A. After BlackBerry Dynamics activation BlackBerry Work requires Active Sync setup. The password required is AD password used to login to BlackBerry UEM – DevUser!2018

3. Now with AppKinetics and/or BlackBerry Work activated as well as the Services sample code it is time to retry Service Discovery. This can be achieved by either by selecting Service from drop-down or by entering the Service ID and version manually and then pressing DISCOVER button.

   You should see a similar result than below screenshot



4. If you have activated BlackBerry Work you can also check Service Discovery for the Send Email Service. As a reminder Service definitions can be found here - https://apps.good.com/#/services

5. The key API involved is GDAndroid.getServiceprovidersFor() , usage of this API can be found in ServicesControl.java. UI screen control can be found in ServiceDiscoveryFragment.java.

6. One key piece of information returned is the Provider application native address. This is required to communicate with the Service Provider.

   By setting breakpoints in the code ensure that Service Discovery concept and API usage and returned parameters are well understood.

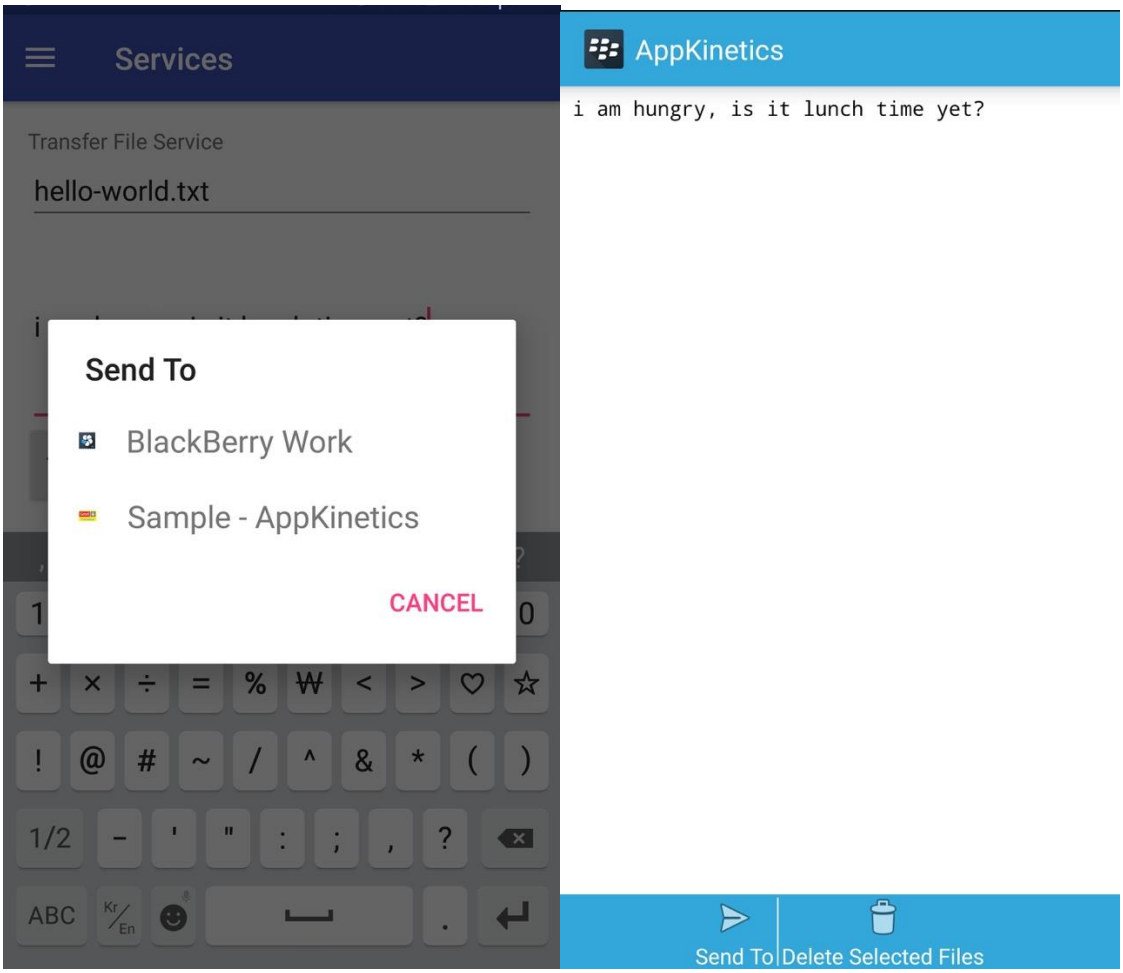
4.2 Exercise Two – Part 1 – Consume a Service – Transfer File Service

After Service Discovery returns that single/multiple Service Providers of the desired Service exist on the device it is now possible to consume that service. This part of the exercise consumes the Transfer File Service.

1. Navigate to the Transfer File tab in the Services Example. Enter a filename and file content into the UI and press 'TRANSFER FILE' button

   At this point the following happens –

   - File is created with the desired name and content in the BlackBerry Dynamics Secure Container. Only files in Secure Container can be sent via Shared Services
   - Service Discovery is executed to find providers of Transfer File Service.
   - Transfer is made to Service Provider



2. An important point highlight by the above screenshot. If you have more than one Service Provider for requested service activated on your device then GDAndroid.getServiceProvidersFor( ) will return a ServiceProvider object for each one.

   In this case both BlackBerry Work and AppKinetics provide the Transfer File Service so both are returned. It is the consumer application's responsibility to make the choice on which provider to use. In the case of Services sample code, an Android Dialog is created allowing the user to choose.

   If only AppKinetics is activated then the transfer is automatically completed without further user interaction.

3. The key class for consumption of Transfer File Service in Services example code is **FileTransferService.java**.

   This uses the items defined in the Service Definition (Reminder Service definitions can be found online at - https://apps.good.com/#/services)

   The key method for Service consumption is GDServiceClient.sendTo( ) this is called from **FileTransferService.java** with correct parameters based on the Service Definition and the file to send.

   Make sure the parameters and call flow are understood by placing breakpoints in the code or asking questions. The same pattern can be used for consumption of any Shared Service.

4.3 Exercise Two – Part 2 – Consume a Service – Send Email Service

Note: This exercise can only be carried out if using a device with BlackBerry Work activated

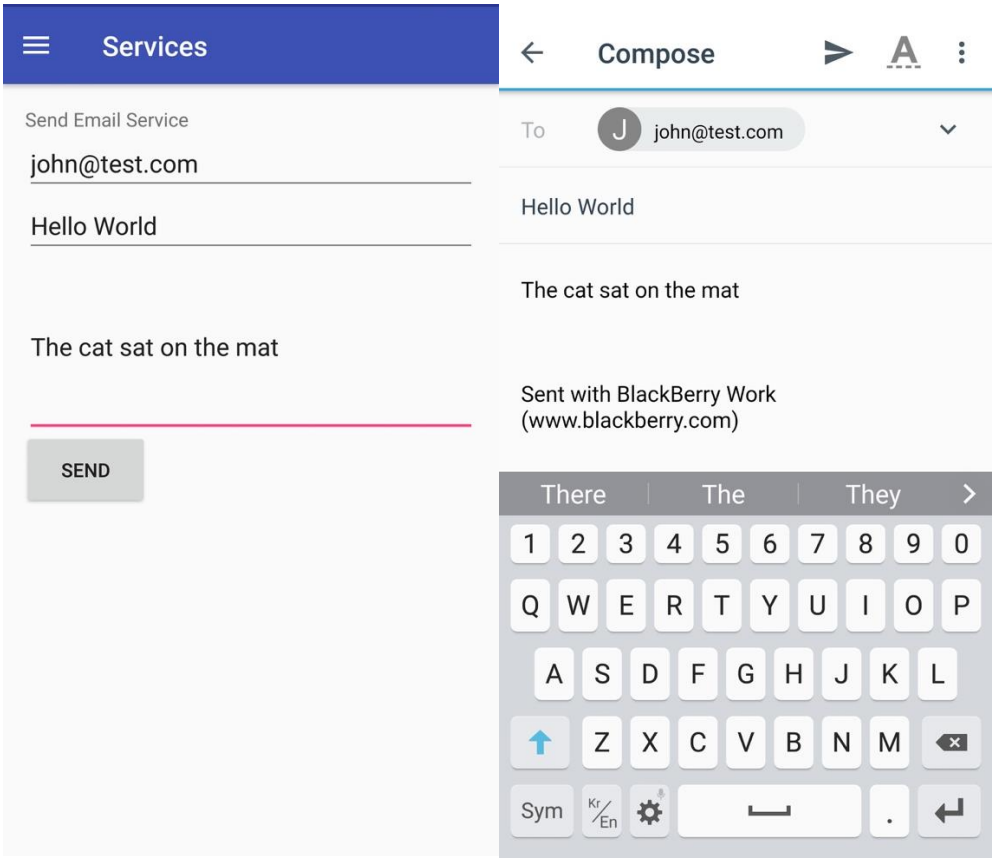
The intention of this exercise is to consume the Send Email Service which BlackBerry Work provides, and thus to show from a coding and structure perspective that consumption of any Shared Service follows the same pattern.

1. Navigate to the Send Email Service tab in the Services Example. Enter a TO email address, and email subject, and an email body and press SEND button.

At this point the following happens –

- Entered email parameters are packaged into object as per the Send Email Definition.
- ServiceDiscovery is used to find the Provider of the Send Email Service. In this case it will be BlackBerry Work.
- GDServiceClient.sendTo( ) is used to consume service by sending request to Service Provider.

This flow is shown in below screenshots



2. The key class for consumption of this service in Services example code is **SendEmailService.java**.

   Every service request is assigned an ID, these IDs are then used to associate the request with success or failure callbacks. A successful request will cause UI code to be reset. A failure callback will cause the failure to be displayed to the user.

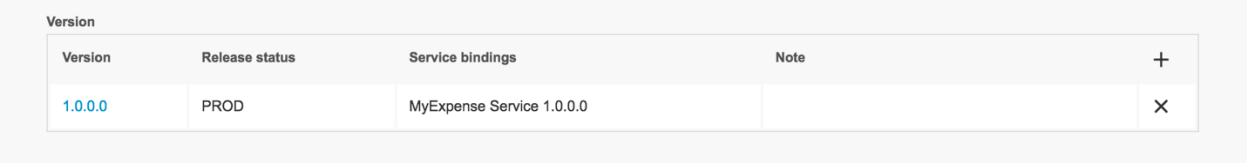
   Make sure the call flow and key methods are understood by placing breakpoints in the code or asking questions.

4.4 Exercise Three – Provide a custom service

The purpose of this exercise is to demonstrate an example of Providing a Service which other applications can consume.

The first stage is to bind Service to BlackBerry Dynamics application.

Note: This has already been done with Services Example in the lab BlackBerry UEM.

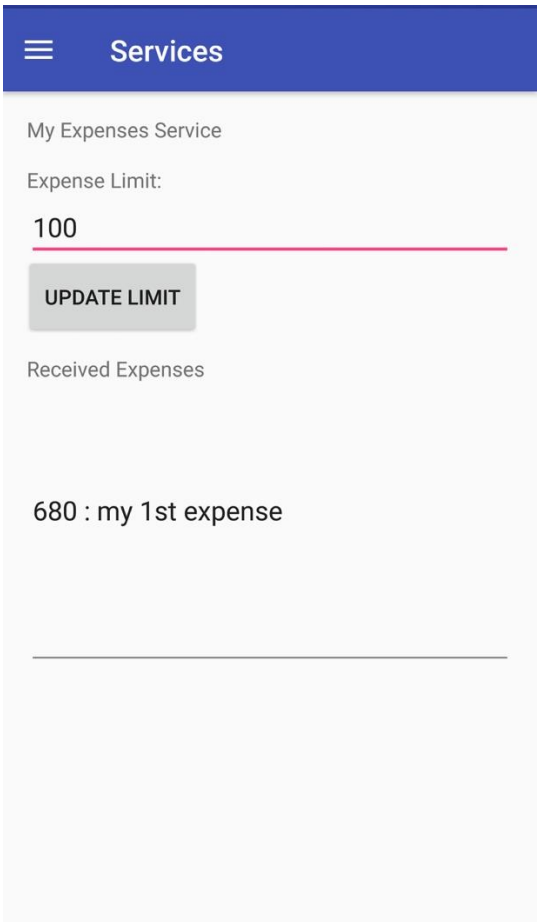


However, to implement your application as a Service Provider for another service you will need to bind that Service.

A Service consumer can send a Provider a request at any time. Service Provider needs to register a Listener to be able to handle this Service request. This is done by calling GDService.setServiceListener( ), setting an implementation of the Listener. The Services example code provides an implementation of listeners in ServicesControl.java. Called from the ServicesApplication.java onCreate( ). Make sure you understand this code.

When a Service Request is received, this will call GDServiceListener.onReceiveMessage( ), this then requires processing by Service Provider. In the Services sample code this is implemented by **MyExpensesService.java**.

The UI exposed by the MyExpenses Service Provider can be found in the MyExpenses tab of the Services sample code. This is shown below –



The Service Definition of MyExpenses Service can be found in this workbook Appendix B.

The functionality provided by this Service (and how it relates to the UI is as follows) –

- Services has a method where Consumer can query Expense limit which is returned by Provider.
- Service has a method where the Consumer can send an Expense item which the Provider will receive and store.
- Expense limit is set as a secure Shared Preference, which can be updated in the UI
- Received Expenses are stored in secure File, and shown in UI
- Expense limit request is received via GDServiceListener and is processed in MyExpensesService.java, the actual limit is returned to the consumer via GDService.replyTo( ) call
- New expense item is received via GDServiceListener and is processed in MyExpensesService.java

There is no sample code supplied for the consumer example which uses consumes the MyExpenses Service. Creation of this can be considered an ‘extra credit’ exercise and could reuse components of the Services sample code or an existing Blackberry Dynamics you have already created could be configured to be a consumer of this service.

5. BEMS Services Exercises

These exercises correspond to the: Consume a BEMS Service session.

These exercises are based on the same sample code, the Services sample application

5.1 Exercise One – Prepare BEMS Service usage

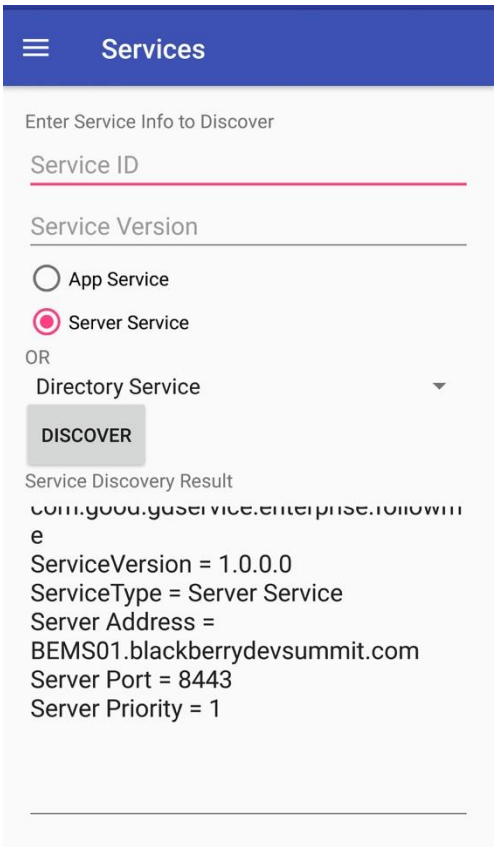
If the initial Shared Services exercises were completed then the Services application will already be built, installed and activated on device or simulator. If not do that first.

Server Based Services are ones which are provided by a Server and not an application. However, these Services are discovered in the same way as application services are discovered.

GDAndroid.getServiceProvidersFor( ) is the key method to use, and the Server Services definitions can be found in list of public services - https://apps.good.com/#/services

In the Services application navigate to Service Discovery tab and either enter the Service ID & Service Version of the Server Based Service (making sure to switch type to Server Service) or select Docs or Directory Service from the drop-down.

The UI shows the result of Service Discovery for selected Server Service, as seen in below screenshot;



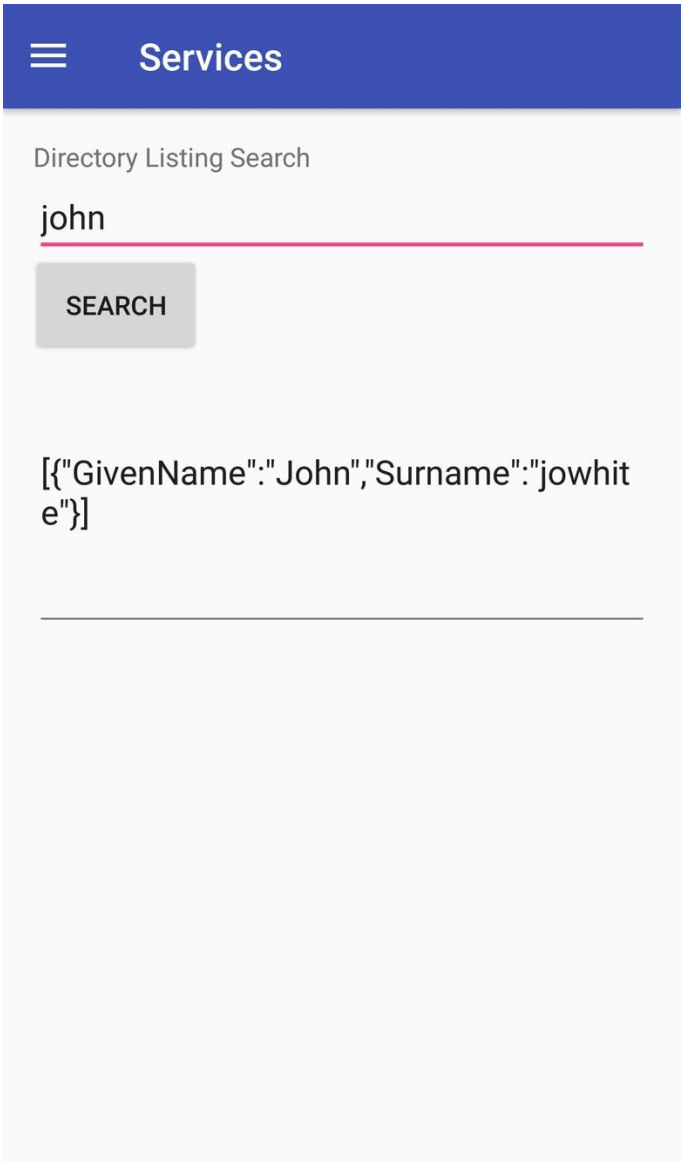
The important points from Server Service perspective are; Server Host, Server Port, Server Priority. This information is then used as basis to consume Server Based Services.

Make sure you understand the returned items from Service Discovery query by browsing code, setting breakpoints and asking questions.

5.2 Exercise Two – Consume Directory Service

The Directory Service provides a REST API to query & retrieve information from Active Directory. The specifics of the API can be found by reading API documentation which can be found via Service Definition -https://apps.good.com/#/services

Navigate to the Directory Listing tab of the Services application. Enter a search query and select SEARCH. For example, you could search for ‘DevUser’. Below screenshot shows example output (A production environment AD would likely have more fields) –



The code which handles actual Service use is – **DirectoryServices.java**, UI code is – **DirectoryListingsFragment.java**.

This code works as follows –

- On pressing SEARCH Service Discovery is used to find the BEMS Server host and port. These are then used together with the lookup API endpoint address to create a full query URL
- GDAuthToken is used to authenticate the User to BEMS, as such app code checks if it has a currently valid Auth Token for this URL. If it does not it requests one – GDUtility.getGDAuthToken()

- When GDAuthToken is successfully returned an AsyncTask is created and executed which makes the actual networking request.
- GD HTTP API is used as BEMS Service is an Enterprise Service and as such secure behind enterprise firewall.
- A query is formed into post the body which is sent. The response is parsed into a String and updated into the UI.

The core flow here is important, and the same for other Server Based Services –

1. Discover Server/Port for requested Server Service.
2. Form URL based on this and desired API endpoint (from Service definition).
3. Request GDAuthToken for URL (if don't already have one).
4. Make HTTP Request providing query.
5. Receive and process the response.

Make sure you understand this flow and code involved in **DirectoryServices.java** by adding breakpoints, changing query, asking questions.

5.3 Exercise Three – Consume Docs Service

Consume Docs Service is another example of consuming a Server Based Service. In the Services Example application navigate to the Docs Listing Tab and hit "SEND LIST DOCS REQUEST". This will make a HTTP request to return contents of root of the Developer Summit docs site.

This code can be found in **DocsService.java**. It follows the same flow as previous example however shows use of different Service.

Make sure you understand the code involved by adding breakpoints, changing the query and asking questions.

5.4 Exercise Four – Auto Discover Service

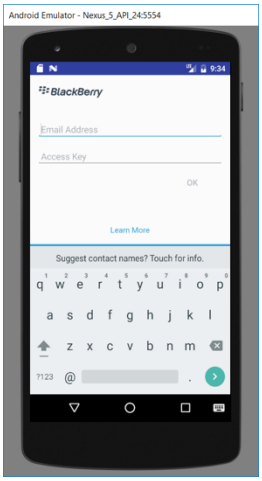
This exercise is ‘extra credit’ no sample code is provided.

However existing code could be repurposed to make use of this Service. This is an example of making use of BEMS for auto discovery.

```
REQUEST –

POST /api/autodiscover

{

   "Settings": [

      "EwsUrl",

      "EasUrl"

   ]

}


RESPONSE


{

"EasUrl":{

"Status": "ok",

"Url": "https://XXXX/Microsoft-Server-ActiveSync"

},

"EwsUrl":{

"Status": "ok",

"InternalUrl": "https://XXXX/EWS/Exchange.asmx",

"ExternalUrl": "https://XXXX/EWS/Exchange.asmx"

}

}
```

Appendix A – Activate an Application in the BlackBerry Developer Lab

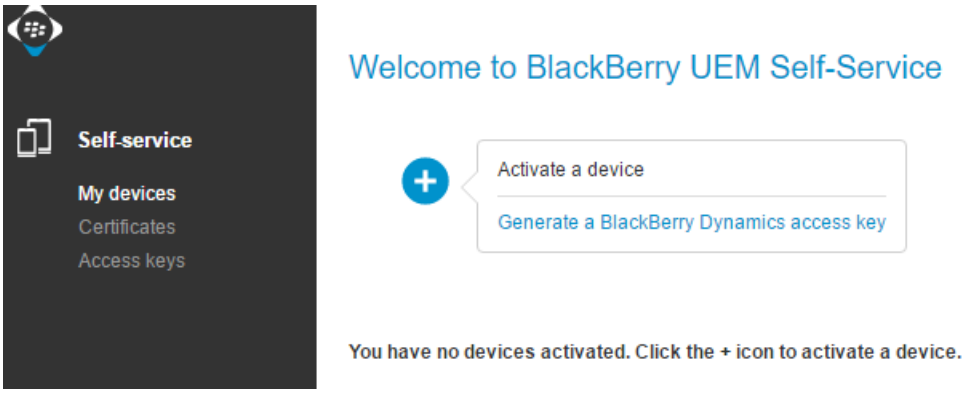
1. In activation screen of your sample application enter an email address of DevUser###@BlackBerryDevSummit.com, replacing ### with the number assigned to you when you arrived at the summit. The activation screen will appear as shown in the screenshot below.



2. Navigate to the BlackBerry UEM Self Service Portal to generate an access key: https://uem.blackberrydevsummit.com:10443/index.jsp

3. Log in using the following credentials:
   - Username: DevUser###
     - Replace ### with the number assigned to you when you arrived at the summit.
   - Password: DevUser!2018
   - Domain: BlackBerryDevSummit.com

4. Once logged in, click on the + button and choose “Generate a BlackBerry Dynamics access key”.



5. Return to your sample application and enter the access key you just generated.
6. Press the OK button.
7. The activation processing carousel will scroll through its stages.
8. Create a password that will be required to start the application.

The application user interface will then be displayed. Note that activation isn't necessary when you reinstall the application as an upgrade, without uninstalling.

Appendix B – MyExpenses Service Definition

MyExpenses is a private Service which the Services sample code is configured to implement Service Provider. Below is the Service Definition for this Service.

```
{
"title": "My Expense",
"service-id": "com.blackberrydevsummit.2017.service.my-expense",
"version": "1.0.0.0",
"description": "This service offers services of providing the expense limit to a requesting application and allow an application to set a expense item",
"methods": {
```

```
"getExpenseLimit": {

"description": "The consumer should specify itself to be brought to
the foreground when sending a request with this method. The service
provider should respond returning the expense limit (Integer) as
parameter",

                "params": {

                      "type": "null"

                },

                "result-value": {

                      "type": "integer",

                      "description": "Integer value of expense limit"

                }

           },

           "setExpenseItem": {

                "description": "",

                "params": {

                      "type": "object",

                      "properties": {

                            "item": {

                                  "description": "Name of expense item",

                                  "type": "string"

                            },

                            "amount": {

                                  "description": "Amount of the expense
item",

                                  "type": "integer

                            }

                      }
```

```
                        }
                    }
                }
            }
```