**Note:** This code must be executed by connecting to a device, it doesn’t work in emulator.

1. **Server Connectivity:**

**Local server setup:**

* Download Xampp and install it in the system
* Place the give send.php file in xampp->htdocs->fcm folder
* start xampp\_start.exe and then xampp\_control.exe
* Once Xampp controller starts start the apache sever

**Checking local server connection:**

* To check if apache has started or not open any browser and type localhost it should show apache dashboard. It means sever started successfully
* Then take system IP address in which local sever is started and replace the ip address in MainActivity.java file in code at line 323 and URL should something like this "http://xxx.xxx.x.xx/ fcm/send.php?title=Master%20needs%20your%20help%20for%20matrix%20multiplication".
* Now try the same URL in web browser it should send notification to all the devices in which this app is installed

**send.php:**

* This file is placed in the PhpForSendingNotification folder. It must be placed in xampp🡪 htdocs🡪fcm folder

1. **Project Code:**

Project code is there in AndroidStudioCode folder.

1. **Mobile App:**

Installable apk is there in MobileApp folder. That app can be directly installed in mobile devices for testing

* **Prerequisite:**

After the app is installed for the first time, we must give location permissions in the settings. To give location permissions go to **Settings->Apps->MobileOffloading\_Group15->Permissions.** Enable **Location** under Permissions. It is a onetime requirement.

1. **Videos:**

Demo videos are there in videos folder. Below show the videos that are there in the folder, description and the requirements of the project that are covered.

1. **MainVideo.mp4:**

* **Description:**

This video covers how the application works in case of successful scenario and in case if any of the slave rejects offloading (i.e., how failure recovery algorithm is handled). Below are the functionalities covered in the video

**This video covers below functionalities :**

* Prerequisites that has to be done for the app so that all the functionalities work without any issue.
* Enabling Bluetooth in case if it’s disabled
* Notification sent by master to other devices asking for their help
* Slave accepting master request and starts listening so that master can connect
* Master connecting to slave if it’s within its location proximity of 0.1 miles
* Slave sending it’s battery level to Master on successful connection.

**Successful Scenario (All the slaves accept offloading):**

* Showing the devices connected to each of the device. (Master is connected to all the 3 slaves and all the 3 slaves are connected to master)
* All the slaves are accepting offloading
* Master starts offloading work to slaves on getting matrix size within limits of 2 & 13
* Slaves accepting work from master and sending results to master
* Master collecting results from slave and displaying below results on screen after receiving all the rows
  + - Output result of the matrix
    - Battery level drop at slaves
    - Battery level drop at master with offloading
    - Time taken by matrix multiplication with offloading in nano seconds (ns)
    - Time taken by matrix multiplication without offloading in nano seconds (ns)
    - Battery level drop at mast4er without offloading for matrix multiplication

**Failure Recovery Algorithm (In case if one of the slave rejects offloading):**

* Showing the devices connected to each of the device. (Master is connected to all the 3 slaves and all the 3 slaves connected to master).
* One of the slave is rejecting offloading
* Master offloading work to slaves on getting matrix size within limits of 2 & 13
* 2 Slaves accepting work from master and sending results to master and other slaves accept work from master but it doesn’t calculate and return results
* Master waits for row 2 result sent to slave that is rejecting offloading. After 5 seconds of waiting it’s sent to other slave that is free (i.e., is available)
* Master collecting results from slave and displaying below results on screen after receiving all the rows
  + - Output result of the matrix
    - Battery level drop at slaves
    - Battery level drop at master with offloading
    - Time taken by matrix multiplication with offloading in nano seconds (ns)
    - Time taken by matrix multiplication without offloading in nano seconds (ns)
    - Battery level drop at mast4er without offloading for matrix multiplication
* **List of requirements covered that were given in project description document:** 1, 2, 3, 4, 5, 6, 7, 8, 13, 14, 15. 16, 17, 18
* **Use cases in report explaining the functionality shown in the video:** 1,2

1. **BatteryLowAtMaster.mp4:**

* **Description:**

This video shows what happens if a device is trying to act as a master if it’s battery level is less than the threshold of 40%.

**This video covers below functionalities :**

* + Device trying to act as master even though its battery level is less than 40%
  + Can’t connect to any slaves and in connection status it shows battery level is low
* **List of requirements covered that were given in project description document:** 2,13
* **Use cases in report explaining the functionality shown in the video:** 3

1. **BatteryLowAtSlave.mp4:**

* **Description:**

This video shows what happens if a device is trying to act as a slave if it’s battery level is less than the threshold of 40%. It also shows that master can’t connect to any device with battery level less than 40. This video also focuses on what all functionalities that are disabled in master and slaves.

**This video covers below functionalities :**

* + Device trying to act as slave even though its battery level is less than 40%
  + Can’t listen from slave and in connection status it shows battery level is low
  + Showing connected devices in all the devices
  + Explaining the buttons that are disabled in master and slaves
  + Master Sending offloading to connected slaves and displaying stats
* **List of requirements covered that were given in project description document:** 1, 2, 3, 4, 5, 6, 7, 8, 13, 14, 15. 16, 17, 18
* **Use case explaining the functionality shown in the video:** 4

1. **SlaveFarFromMaster.mp4:**

* **Description:**

This video shows master can’t connect to slave devices if the slave is outside of location proximity which is 0.1 miles radius from master

**This video covers below functionalities :**

* + Slave device starts listening to master
  + Master trying to connect to slave
  + Slave sending its battery level and location to master
  + Master found slave outside of its location proximity of 0.1 miles radius and hence displaying message “Device too far……hence disconnecting” message at master
  + Showing disconnected status at both master and slave
  + Showing no device connected message at both slave and master on click of show connected button
* **List of requirements covered that were given in project description document:** 3,13
* **Use case explaining the functionality shown in the video:** 5

1. **Note:**

In case videos are not clear (as we have added audio separately, we have lost some resolution of the video) below drive has videos without audio which are clearer.

<https://drive.google.com/drive/folders/1jpUJNwaNDLTt_sw9me3e8pluK57Zplqj?usp=sharing>

YouTube link below has a single demo video (all the 4 videos are merged)

<https://youtu.be/BQti6aMJ_vo>

1. **Code References:**
   1. <https://www.youtube.com/watch?v=1lT0ZliubU0>s
   2. https://www.geodatasource.com/developers/java
   3. https://www.tutorialspoint.com/android/android\_location\_based\_services.htm
   4. https://www.youtube.com/watch?v=NR1sDXMzyww&list=PLFh8wpMiEi8\_I3ujcYY3-OaaYyLudI\_qi