GPS Recorder

COMP 4981 Project 3

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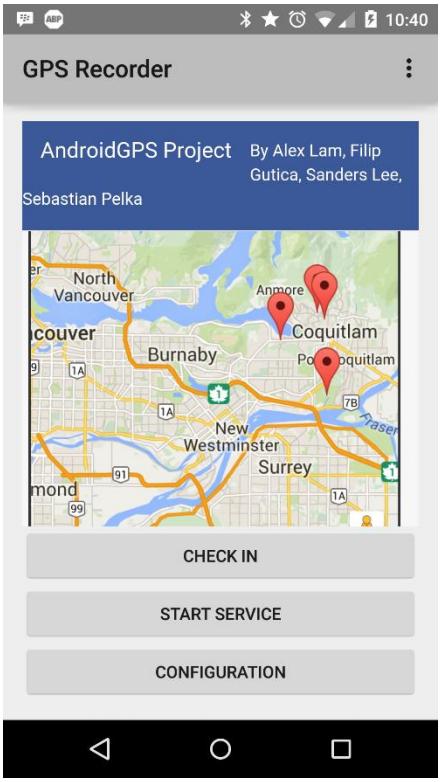
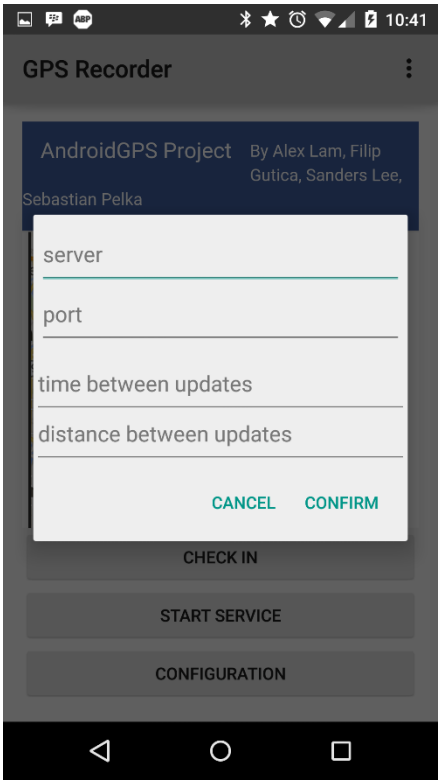
Contents

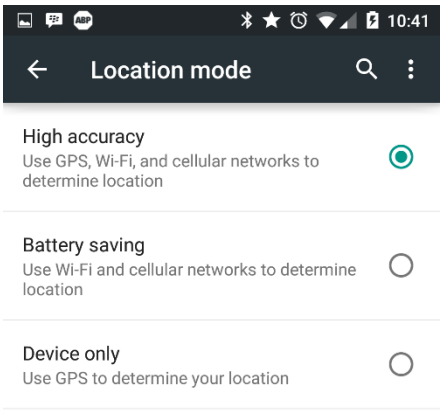
Android Application instructions



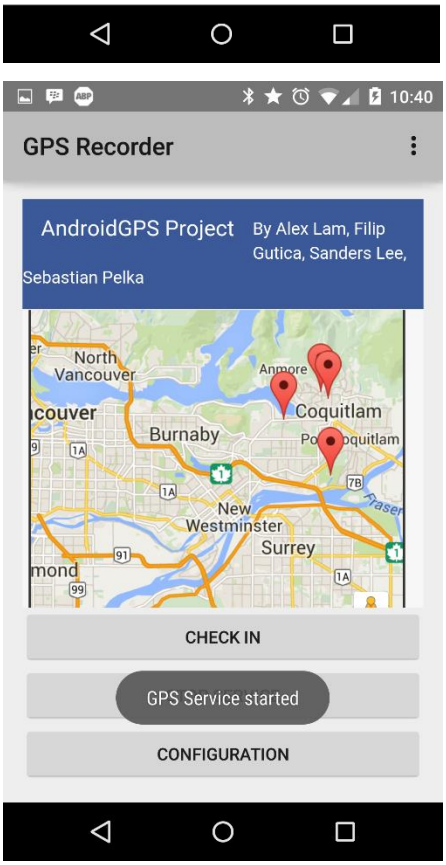
When Application first loads, you will see our website loaded, with a map and a table of received location data.
There are three buttons: Check In for a single location update of where you are at the moment, Start Service to start the automatic back ground location discovery service that will, on location changed, send your location to our servers, and a configuration button that you may use to set some configurations for the application.



Configure your application here after clicking on the “Configuration” button. You can specify a server IP or host name to connect to. The port for the server you are connecting to, the minimum time interval between location updates and the minimum distance between location updates.

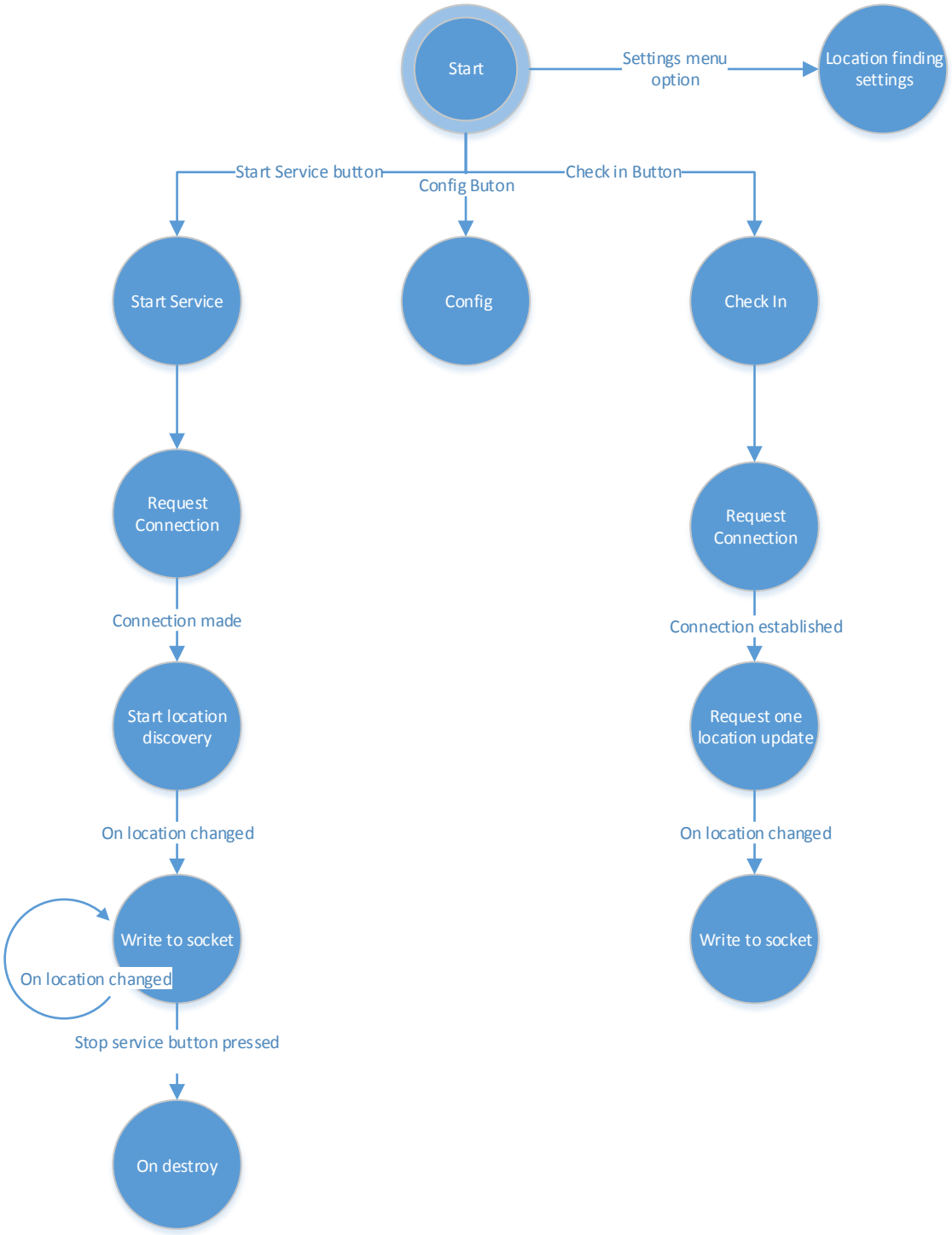


Upon clicking on the menu option on the top right hand corner of the app and selecting the “Settings” option you will be presented with this location mode page.
Here you may set the mode for your device’s location discovery which will influence which provider is being used for location discovery.



Upon Starting the service a toast will appear notifying you that the service has started. The button’s text will appear as “Stop service” and you will be able to see your location updates appear on the map in our website.

Android Design: FSM



Android Design: Pseudo-code

Start

On Create of main activity
Instantiate shared Preferences, location Manager, and the web view
Load the web view with our website

Check In

Get the device IP and MAC address
Request a connection with the server
Request a single location update

Request Connection

Get the server IP and Port from the shared preferences.
Instantiate a client socket passing the IP and Port as parameters to the constructor

Request Location update

Check enabled providers.
If network provider enabled use network provider
If GPS provider enabled but network provider is not enabled, use GPS provider
Else use the Passive provider

Instantiate a Location listener
Implement the onLocationChanged callback
Get the longitude, latitude and time from the location object
Write the longitude, latitude, ip address, mac address and time on the socket

Location manager request single update(provider to use, location listner)

Write to socket

Instantiate output stream
Set out put stream to the socket's output stream
Write the passed string parameter onto the os stream
Close socket

Config

Inflate the config fragment where user can enter the server's IP address, Port number, frequency of location updates and minimum distance change for a location update

Start Service

Calls On Create of our Service class
Starts the thread which this service will run on
Calls on start command of service class
Request connection
Instantiate shared preferences object
Get the device IP and MAC address
Start location discovery
Returns Start sticky so that the service will continue running even when the application is closed.

Start Location Discovery

Instantiate the location manager object

If network provider enabled use network provider
If GPS provider enabled but network provider is not enabled, use GPS provider
Else use the Passive provider

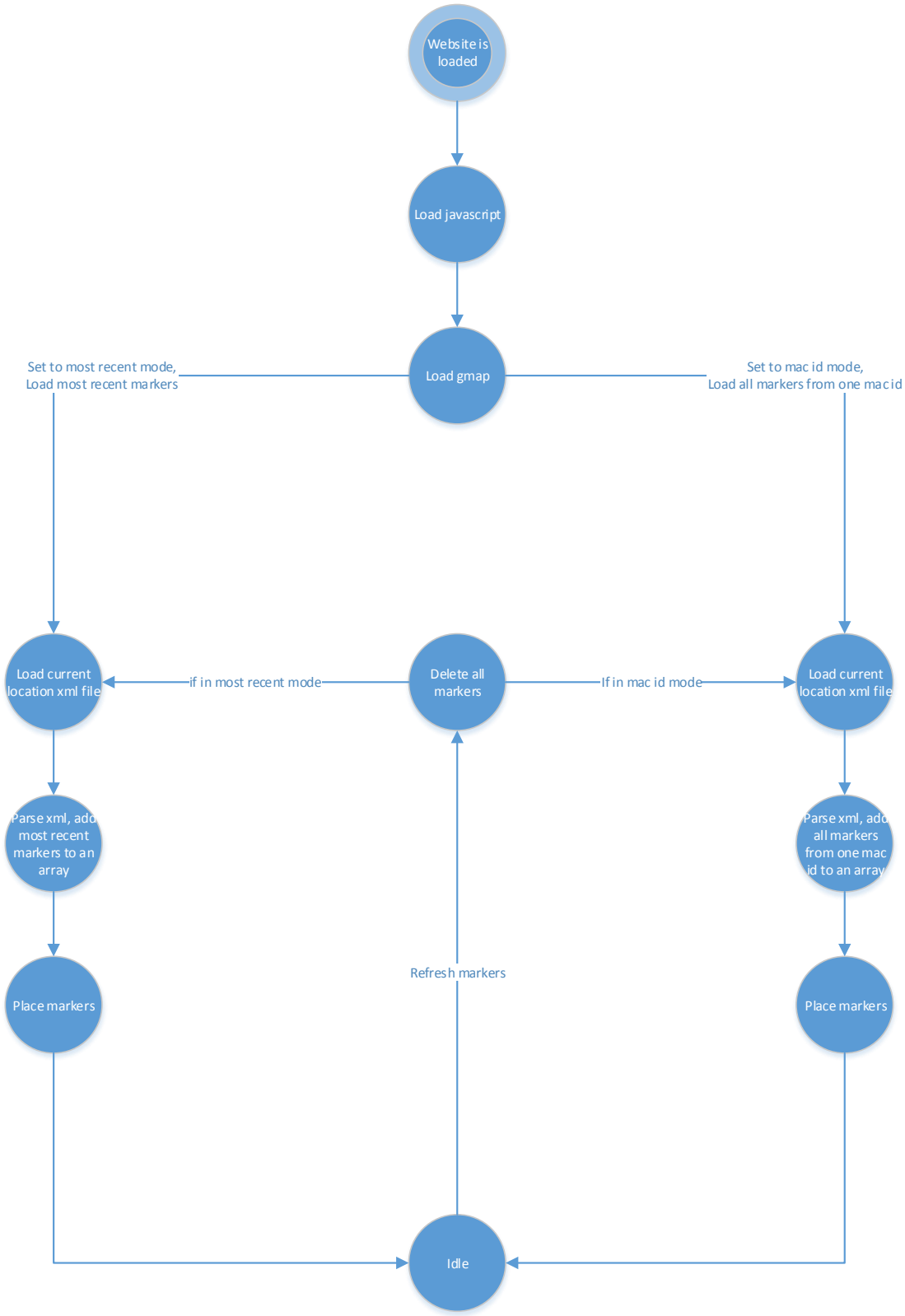
This will continuously listen for location updates from the location manager
Instantiate a Location listener
Implement the onLocationChanged callback
Get the longitude, latitude and time from the location object
Write the longitude, latitude, i`p address, mac address and time on the socket

Request Location Updates (provider, min time, min distance, location listener) - Continuously get location updates

Stop Service

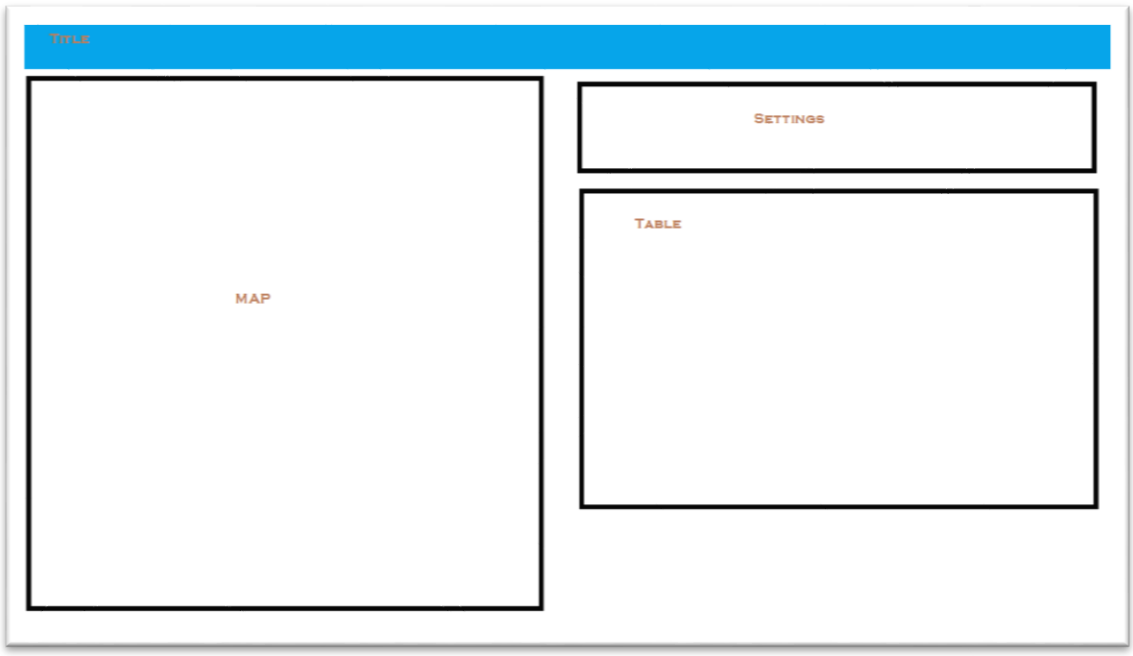
Calls on Destroy of service class
Stop the service thread
Close the client socket

Website FSM

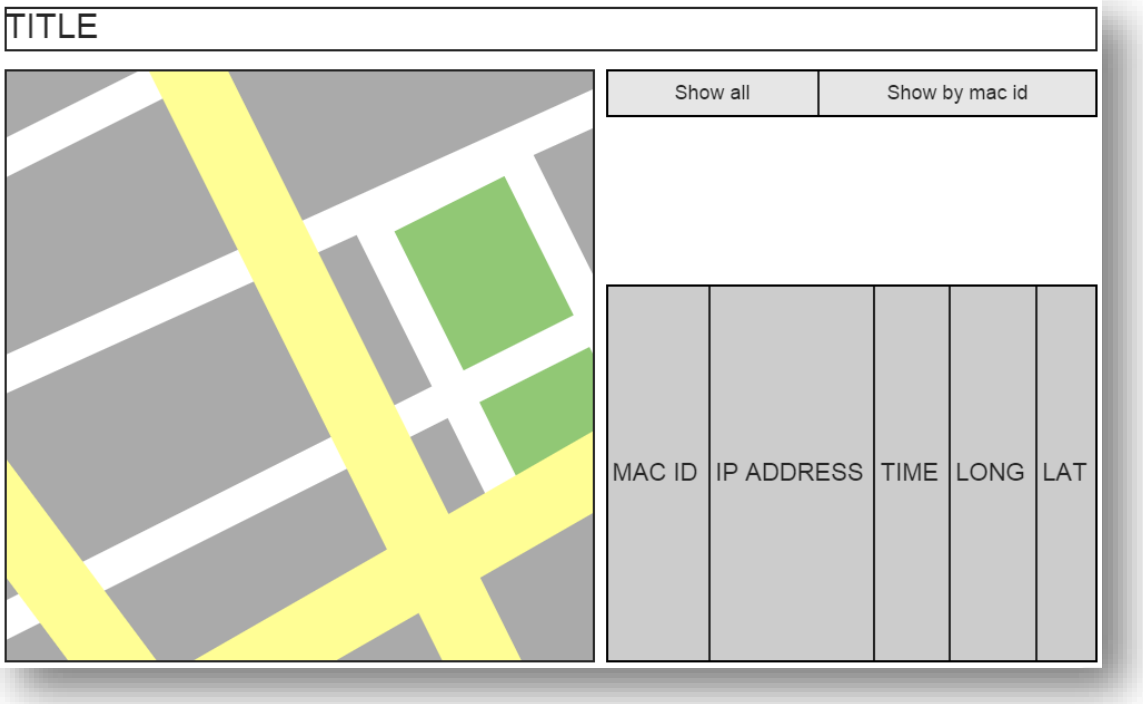

Website is loaded
Load javascript
Load gmap
Set to most recent mode, Load most recent markers
Set to mac id mode, Load all markers from one mac id
Load current location xml file
if in most recent mode
Delete all markers
If in mac id mode
Load current location xml file
Parse xml, add most recent markers to an array
Parse xml, add all markers from one mac id to an array
Place markers
Refresh markers
Place markers
Idle

Website Planning:

Simple sketch of what our site will look like:



Using a framework tool



Psuedocode

Index.html:

```
Header
        Import js
        Import css
Body
        Title css with banner
        Left div
                Map
        Right div
                Setting buttons
                Table
```

Gmaps.js

```
Initialize
        Create google map
        Set center to BCIT
        Generate table headers
        Set mode to most recent markers
        Load most recent markers
Refresh
        Delete  all current markers
        If mode is “all current”
                Load most recent markers
        else
                Load markers by mac id
Delete all markers
        Delete rows from table
        Go through array of current markers and remove markers
```

```
Most recent markers
        Load xml doc
        Parse xml into array
                If it’s a new mac id
                        Add to array
                If it’s an existing mac id
                        Override old entry
        Create markers
        Make table row
Mac History markers ( mac id )
        Load xml doc
        Parse xml into array
                If xml element mac id == mac id
                        Place markers
                        Add table rows
Set mode to all current
        Mode = all Current
        Refresh
Set mode to mac id
        Get text from textbox
        Mode = text
        Refresh
Refresh
        Set interval to call refresh
Refresh Off
        Remove interval to call refresh


Load XML Doc
        Using xmlhttprequest, load the coordinates xml
        Return loaded xml
```

Bonus: Server Configuration

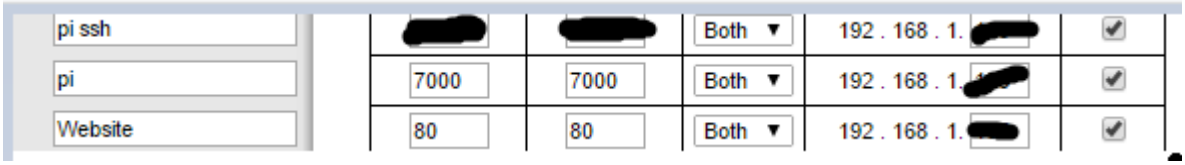
For this assignment, we have had Alex setup the website and server on a raspberry pi.

- http://lamckalex.ddns.net/GPSAssign/
- Login: dcomm
- Password: bcit

The configuration was as follows:

- Setup SSH
- Setup apache
- Setup .htaccess and .htpasswd

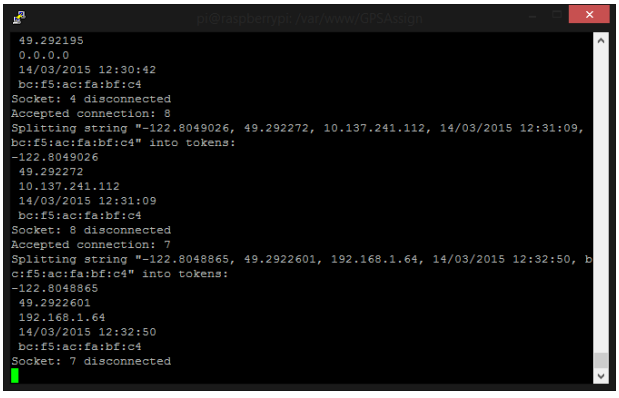
Setup Port Forwarding:

- Port ??? was forwarded for ssh.
- Port 80 was forwarded for the website
- Port 7000 was forwarded for the server
- 

To solve the issue with the IP being possible changed

- We have setup a domain with No-IP
- No-IP is a free service that can be installed onto the raspberry pi, it will provide updates to the server with its IP Address, and this allows the website to know what the correct IP for the server is even if the ISP decides to change the IP for the Raspberry Pi.

The server was then compiled on the Raspberry Pi and it is not running 24/7.

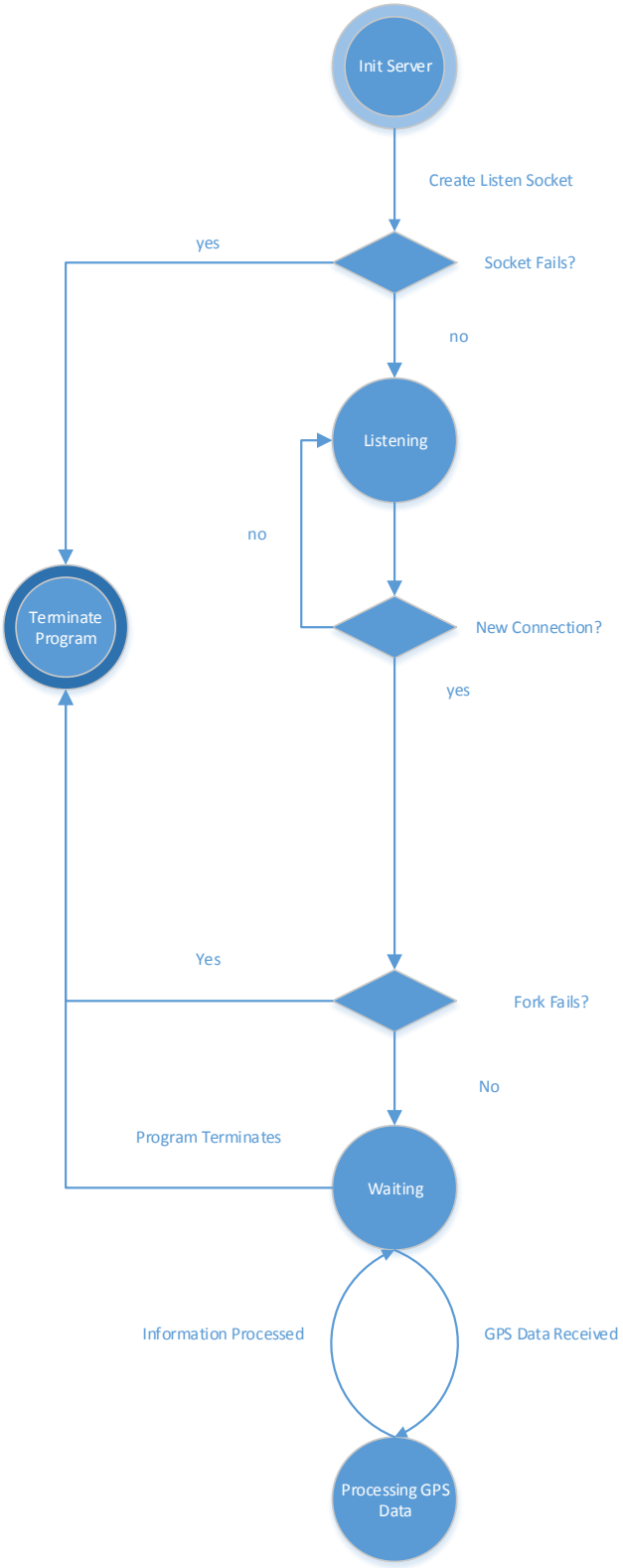
- 

Resources:

http://www.instructables.com/id/Host-your-website-on-Raspberry-pi/?ALLSTEPS

http://httpd.apache.org/docs/2.2/howto/auth.html

Server State Diagram



Pseudocode: Server

Init Server

Create a TCP socket for listening

If the socket fails

Terminate the program

Initialize a data structure to accept connections from any IP address

Bind the socket

If binding fails

Terminate the program

Begin listening for connections

Go into a read loop (the Listening state)

Listening

If a new connection occurs, fork a child process to handle the request

If the fork fails

Terminate the program

Else, go to the Waiting state

Waiting

Check the socket for data

If data is on the socket

Go to the Process GPS Data state

If the program terminates

Terminate the program

Process GPS Data

Read raw GPS data from android in

Convert the raw data into an easily useable form (a struct)

Read the contents of the XML document to a list

Append the new GPS coordinates to the list

Write the updated list back to the file

Terminate Program

{

Terminate all Child processes

Close all sockets

}