TESTING A
GPS APPLICATION

Testbytes Methodology and Procedure

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Location based apps and software are becoming omnipresent owing to its great potential. Applications of such apps are plentiful and at present they are mainly put to use in industries such as,

Retail industry for Geo Location

Games

On-demand services such as online taxi

Courier/Delivery services
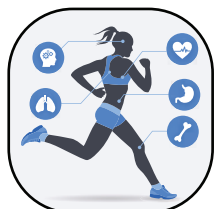
Fleet management

Educational institution

Travelling

Construction

Fitness

Food & Drinks

Testbytes has tested many location based application in the past. One of the prestigious one was created by Trackschoolbus.

Let's walkthrough the process, methodology and tools used in testing the app

Hurdles in front

GPS positioning systems can accurately detect an object in normal conditions. However, it can show great deal of fluctuations when there is a barrier involved. Above all that if there an adverse weather conditions GPS signals can get affected too.

Since huge amount of data is transferred between client and server side applications performance of the apps can be gravely affected

This bottleneck comes from the limitation of both hardware and software of the mobile device. Network connection is one of the reasons that makes the location based service device's vperformance go up and down.

Moreover, GPS handles a huge amount of data and it solely work on integration with satellites extensive testing is required. Moreover, hardware integrated with it and devices which GPS work have the chances to produce varied result. Thus making testing on the most important process in the production of such location based software.

Features of the app

- Regular location updates
- Route planner
- Route optimization
- Online payment system
- Excursion management
- Speed calculation
- Share location

- Angle of deviation calculation
- Two factor attendance management
- Trip detail generation
- Parking slot management
- Geo fencing
- Compare user location – pickup – drop off point

Tools used for the project

For testing and test automation

custom coded scripts

APACHE
JMeter™

For documentation and tracking bugs

in-house application

REDMINE
flexible project management

Signal Simulator

in-house artificial
signal generators

H

Hercules

Executing text based commands

>_

Terminal

Test strategy process and procedure

Types of testing performed

- Functional testing

- Design issues

- Usability testing

- Manual Testing

- Load testing

- Performance testing

- Field testing

- Integration testing

- Cross platform testing

- Installation testing

- Real device testing

- Emulator based testing

Main focus points in testing

Functionality:

in the case of a location based application functionality test will differ from that of a normal one. We tested the app to find out how the mobile app behaves to input contexts, validate location query and data. Often, black-box testing techniques such as equivalence partitioning and decision-table-based methods were conducted to ensure functional perfection of the software. When new features, location etc. Are added to the app, regression testing was done to spot anomalies.

Network Connectivity Testing:

steady and stable network connectivity is a must for any tool that's being put to use for location based activities. To get a real picture of mobile apps behaviour and performance network testing has to be done in different network context. Besides all these, accuracy of positioning system and bandwidth are cardinal factor of any location based app.

Scalability Testing:

In testing LBS, a test engineer should ensure scalability of resources and services of the entire system. Resources including database, application servers, positioning systems and network services has to be checked continuously. Considering the huge increase in mobile phone user's tests like this has to be conducted. Measuring scalability bottlenecks can be integrated into a test environment where hardware and software resources are analyzed, and the change of the app behaviour is monitored and reported for a further test plan. To achieve these goals, load and stress testing are proper solutions
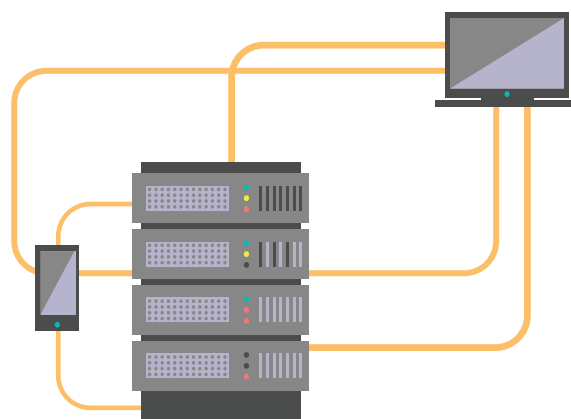
Usability Testing:

Usability of any software is essential for its survival. It is ensured through users' participation and their expectations on satisfaction, learnability, and efficacy of the app. From a user perspective usability can be evaluated by interface design, ease of access, swiftness and reliability of the app in response to requested location service. To meet the expectation of a user combination of various field as well as lab tests has to be performed on the app. Field based testing has of more importance in a location based application as it is the scenario in which a user is directly engaged to the application·
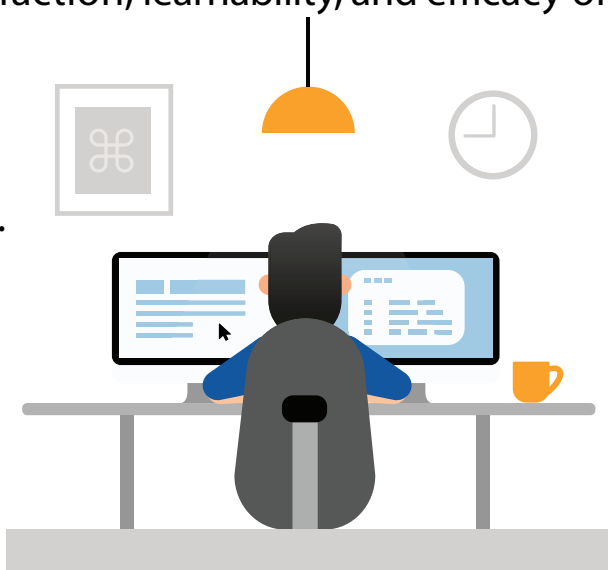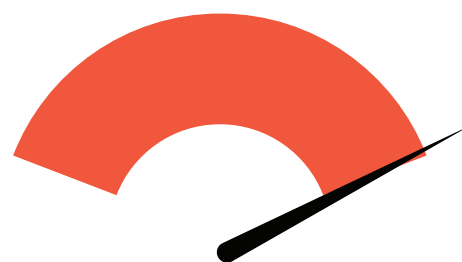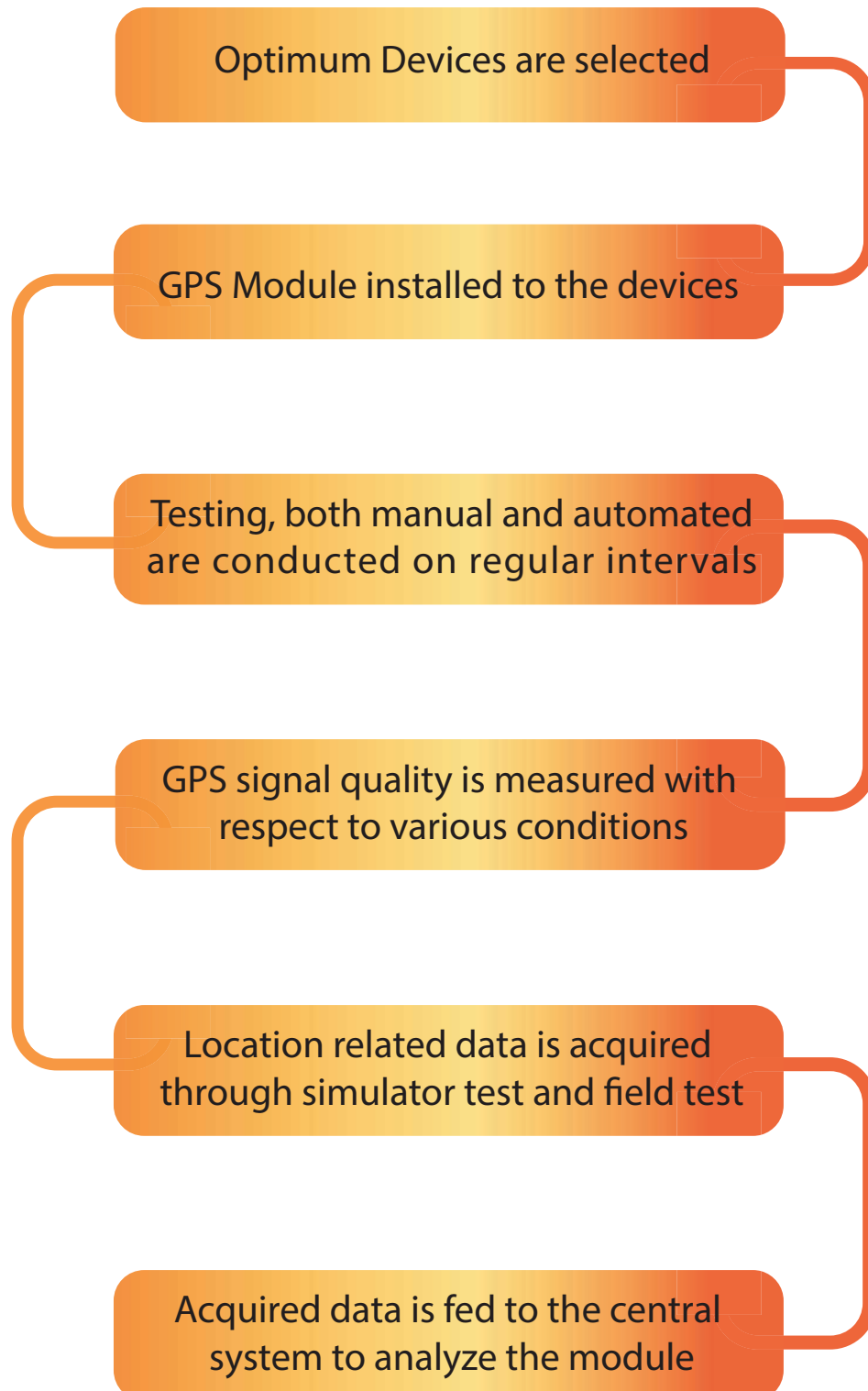
Security and Privacy:

Security is the biggest concern of any location based application and the potential danger of revealing your location can happen. To overcome this, testcases has to be designed that has a secure transmission protocol.

Performance:

Be it any app performance is vital. In the case of a location based application there are other factors that will come to play. This was kept in mind while performance of the app was tested.

GPS module testing procedure

Optimum Devices are selected

GPS Module installed to the devices

Testing, both manual and automated are conducted on regular intervals

GPS signal quality is measured with respect to various conditions

Location related data is acquired through simulator test and field test

Acquired data is fed to the central system to analyze the module

GPS module testing procedure

- Always testing on physical devices is better, owing to that we used mobile phones from various vendors for testing

- Devices and hardware used for testing are carefully picked after confirmation from previous tests

- We have always made sure tests are conducted on regular interval as per our system configuration

- We have developed in-house testing tools for both bug tracking and report generation

- For field testing a digital perimeter is set and vehicles with live tracking apps are set to travel. In short, lot of live trip data is collected for analysis

- Since Mobile phones work on internal GPS. Satellite catch accuracy, frequency and strength was evaluated

- Various geographical locations and barriers are selected to measure the signal quality

- Successive signals are compared for anomalies

- Signal strength and vehicle speed is also compared

- There are plenty of GPS hardware out there in the market made by multiple vendors for accurate tracking and other purposes. We make use of the most widely used ones to collect varied data to conclude which one is the best.

- Historic trip data is fed to the system at regular intervals to check anomalies

- If there is any, fine tuning will be done and the tests will be repeated

- To artificially generate GPS signals we have developed in-house simulators that feed the system with artificial signals at different intervals.

- Various signals such as 2G, 3G and 4G are fed to the system to find out how it responds.

- Since location is changing continuously in vehicle signal strength and type can also change test cases designed for such cases are done by considering various factors such as wireless network environments, position environment, speed, location relation between moving object and mobile users etc.

- Data that we gained using real-time vehicle travel and simulators are fed to the system and a in-house software is integrated to it so that feeding data can be auto-repeat

- Results and bug tracking report are sent to customers at recommended intervals

- Regular communication between client, developers and testers were carried through

Testing using JMeter

Jmeter is an impeccable tool when for load testing and performance testing of any software.

Here is how we used the tool in testing the application,

- Vehicle tracking and trip creation environment were artificially simulated using TCP sampler by using GSM signals

- Values such as latitude and longitude were parsed in GSM signals with the help of various Jmeter elements such as Timers, processor, configuration elements etc.

- We used "Thread group" component for hit certain amount of signals on the server with particular time duration with respect to loop count(s)

- Load test report with vivid graphical representation were created using listeners

- Clients can see various results in form of graphical representation, summary reports, result tree etc.

JMeter graphical representation window

Log data of signal,
latitude and longitude related testing
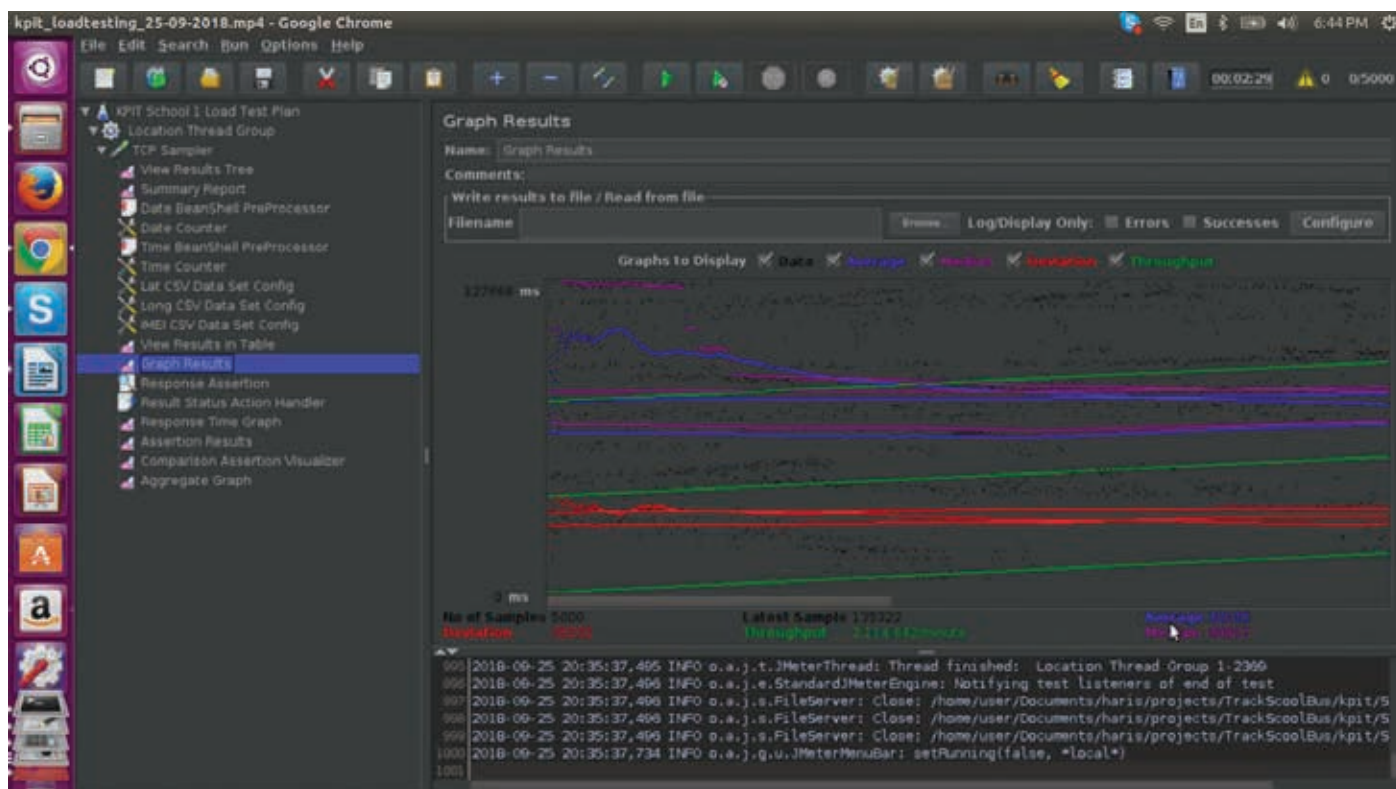
Custom made windows
for clients and testers to track issues

Our test strategy

Creating a test environment: Choosing the correct tools, optimal device selection, methodology, which OS, simulators, servers etc are finalised in this fragment

Test scenario creation and implementation: Based on varied factors, requirements. Point of interest, location data etc. test cases were developed

Test Coverage Analysis: Required coverage criteria is applied to validate the importance of location and moving path for mobile elements

Execution of test cases: All locations chosen and test cases were tested well. Information gathered as a result were documented.

Cloud based testing:

Time-to-time cloud resources were utilised to minimize human effort and to maximize efficiency of the tests performed. They also acted as remote for various devices located all around the globe.

Positive traits

- Time frame was one of the biggest hurdles in front of us, Since our company is enriched with people who are good at time management, it was not that much of a big deal.

- Location based apps are a bit tricky to test since weather plays an integral part in the GPS signal quality. We were able to tackle the situation effortlessly

- Array of devices were deployed to test the application. An AI based program was created by our development team to check whether the processes and devices are in sync

- Since field testing was one the most important aspect of the entire testing project, more testers had to be deployed and effective resource management

- DevOps methodology was adopted to accelerate the testing-development process for quick deployment

- Our company believes in customer-centric approach. So make all the processes transparent, an in-house issue tracking window was created so that customers can monitor our activities.

Conclusion

Future proof approach

- We set up an entire laboratory that as the capability to carry out testing 24X7. We are further planning to develop it into a testing facility that can also work 365 days an year

- The brand new facility will be fully automated and will have simulators that can create any kind of scenario

- In this state-of-the-art laboratory the section which can carry out location based appt testing will have AI that can identify internal and external factors that can impact smooth running of the Location based application

- External factors that can affect the application include, capability of hardware to fetch signals, geographical parameters etc

- Internal factors include scalability of servers and simulators, software, hardware system integrated to it etc.

- If there is any kind of disruption in between this connected device our in-house AI program will detect it and can notify us as early as possible.

For Further insights on GPS related app features and testing

https://www.redbytes.in/top-10-best-gps-tracking-apps-for-android/

https://www.redbytes.in/how-to-make-a-gps-tracking-app/

https://www.testbytes.net/blog/5-conditions-added-mobile-app-testing-checklist/

https://www.testbytes.net/blog/mobile-apps-testing/

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