Browsing Internet via Bluetooth
Graduation Project 1

12/15/2009
Computer Engineering Department

Students:
Hind A.H Wadi
Lubna Y. Dwaikat

Submitted to supervisors:
Dr. Lu'ai Malhees
Dr. Ra'ed Qadi
Ins. Anas Tumeh
Ins. Haya Samanneh

Introduction:

Browsing internet through mobiles is widely used most of the time it's done by using GPRS, on other hand GPRS services too costly. Regular DSL is available for PCs, laptops and much cheaper than GPRS.

Most PCs, laptops, mobiles have Bluetooth nowadays.

The idea behind "Browsing Internet via Bluetooth" is to use the common resource in PCs and mobiles basically "Bluetooth" to carry Internet from PC to mobile.

Beginning:

We need two programs:

1. Mobile Browser
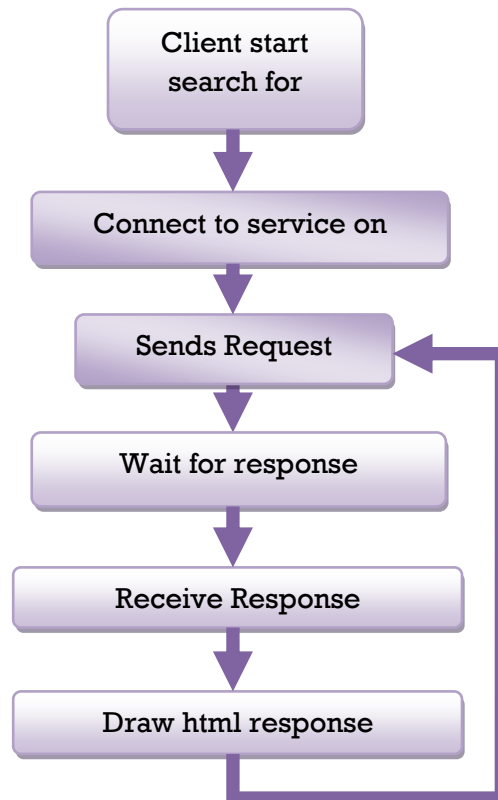2. Desktop server

Mobile Browser

Browsing Internet in mobiles usually needs browser for mobile and this browser use mobile's OS APIs to open communication, so in order to change communication direction form TCP/IP to Bluetooth we need permission from Mobile's APIs, but mobiles OS doesn't allow this!!

The second option is to have an open source mobile browser; this takes a long time to work on.

Then understanding this browser to know how it deals with connection, handling communication, parsing HTML stream, and understanding the programming language which we use for mobiles, we use" JAVA FOR MOBILE EDITION "or "J2ME".

After that, we start with changing connection from TCP/IP to Bluetooth connection, remove any thing referred to TCP/IP connection we create our own class for connection, this class is the way which we can send and receive data via
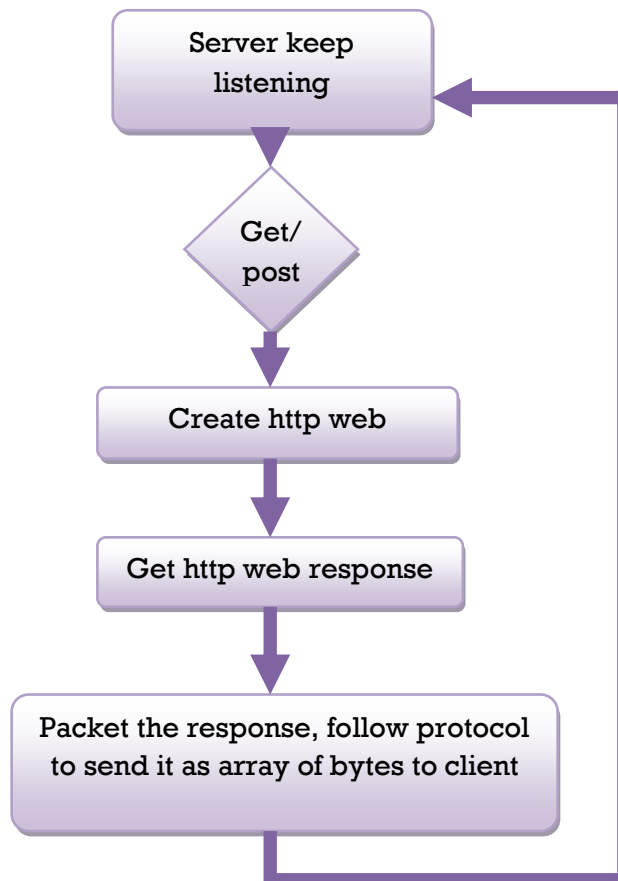
Bluetooth and give the user the ability to search for available server. Once find server connect to it and keep connection opened between them until finished browsing

```
┌─────────────────┐
│   Client start  │
│   search for    │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│Connect to service on│
└─────────────────┘
         │
         ▼
┌─────────────────┐
│  Sends Request  │◄──────┐
└─────────────────┘       │
         │                │
         ▼                │
┌─────────────────┐       │
│ Wait for response│      │
└─────────────────┘       │
         │                │
         ▼                │
┌─────────────────┐       │
│ Receive Response │      │
└─────────────────┘       │
         │                │
         ▼                │
┌─────────────────┐       │
│Draw html response│      │
└─────────────────┘       │
         └────────────────┘
```

Desktop server

The desktop program acts as a server, when lunched it keep listening for any request, once it received a request ,get it ,create a http web request and retrieve the response ,packet it depending in our own protocol and then send it back to client "mobile" as array of bytes.

The request is either get or post, this type determine how to build the http connection.

```
┌──────────────────┐
│  Server keep     │◄─────────────┐
│  listening       │              │
└──────────────────┘              │
         │                        │
         ▼                        │
      ◇ Get/ ◇                    │
      ◇ post ◇                    │
         │                        │
         ▼                        │
┌──────────────────┐              │
│  Create http web │              │
└──────────────────┘              │
         │                        │
         ▼                        │
┌──────────────────────┐          │
│ Get http web response│          │
└──────────────────────┘          │
         │                        │
         ▼                        │
┌────────────────────────────────┐│
│ Packet the response, follow     ││
│ protocol to send it as array of ││
│ bytes to client                 ││
└────────────────────────────────┘│
         │                        │
         └────────────────────────┘
```

Protocols:

Beside the main protocols which used in this project http, https, Bluetooth, serial communication underneath we develop our own protocol which used in both C# program and J2ME program.

While connection is kept opened between PC and mobile we must send start of data, end of data and the length of data.

Security:

This application provides a high level of security as http, https provide to for web request/response so user on server cannot see any of data sends or received by user on mobile. Also add to it the security provided by Bluetooth communication.

Get Attention:

Regular data cannot do any limitation for sending or receiving but data like IMAGES make need more attention to handle it. Usually PC's browsers lunched thread to handle images, in our browser doesn't do that since the main communication we use is serially!

In parsing the html code if we have an image tag <img > we send another request to server and wait for image response. So if have many images in one html page we wait for each image separately and then view the page overall.

Another issue: LOG IN

The browser we have does not support cookies, also does not support https protocol, so we cannot log in l!!

Solution:

We support cookies in C# program, each request we get from mobile we get the cookies related to it and send it back with the next request to related page then check if any change it value or if they added another , keep it in the cookie collection.

By this way we can log in to email.

This issue is hard to handle completely it need complex type of authentication.

And what about https protocol we support it in both J2ME browser and C# application in allowing redirection.

Benefits:

- It's free.
- Use the same internet connection to serve two simultaneously.

Limitation:

Serial communication is typically slow, so receiving the response for any html page as byte by byte , with additional bytes for protocol needs take minutes

To be done:

Make server support many clients.

Knowledge we gained:

In addition to learn a new programming language "J2ME" , and deepen the understanding of networks communication and network protocols ,Bluetooth protocols, C# programming we learn that Nothing Is impossible. With hard working and Perseverance we can reach what we need.