Android and JavaScript

Background:

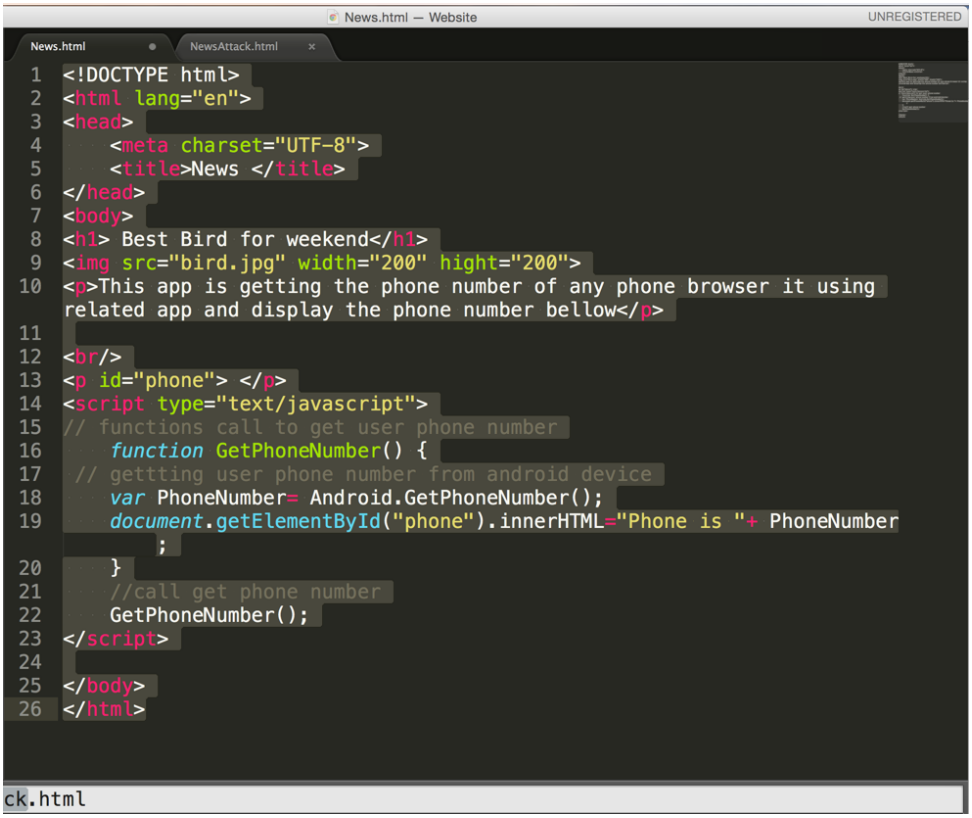
Android has a tool named **WebView** allowing users to visit websites and view other content on the web. This web content normally consists of some HTML, CSS and JavaScript that are rendered in **WebView**. Android allows developers to enable or disable running JavaScript in **WebView** for security purposes. As JavaScript is client side, Android Allows JavaScript to read and write data to and from the device. For example, we could have JavaScript display an alert or open a new activity on the Android device. This means that anyone could view the source code of a web page that has Android JavaScript, get access to the script and use this script (in another website) to access data on the device.

Today we will investigate how sending and receiving sensitive data using JavaScript is not secure.

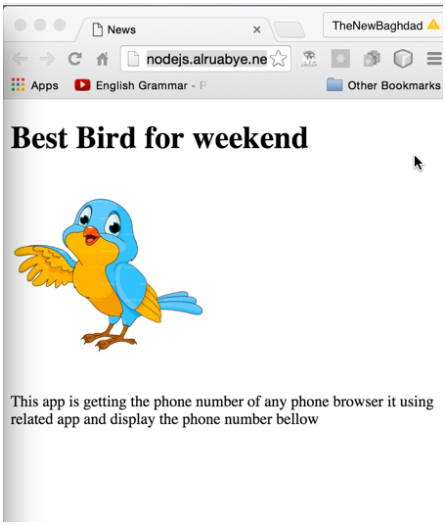
We will build an app that sends sensitive data like the user's phone number to the server, and then demonstrate how a hacker's app can read and get access to this data.

Steps to build the Webhost server

Open new file names News.html

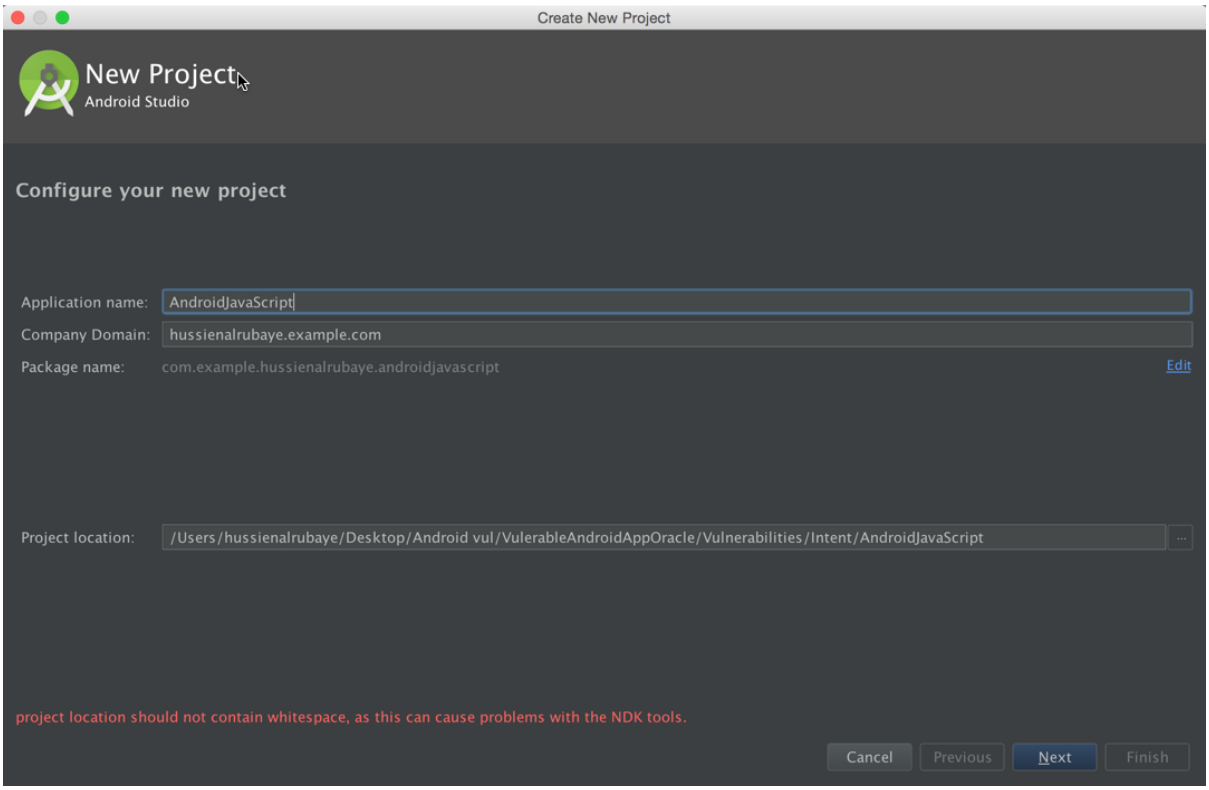


The website should look like this.

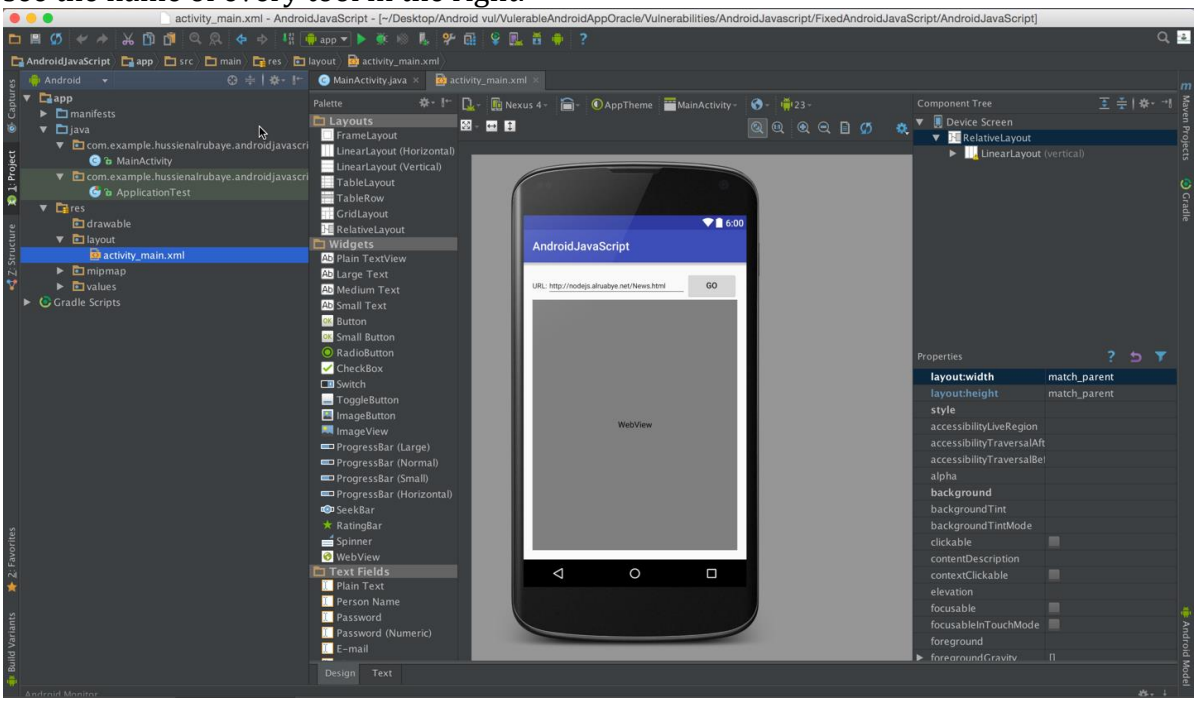


Activity Instructions
Steps to build the News View App

1- Open new project with name “AndroidJavaScript”, save the package name will will need next



2- add some objects (TextView, EditText, Button,WebView) and make the app like this, see the name of every tool in the right.



3- Add permission in MAinfest.xml files to access to network and user phone number

Java

```
<uses-permission android:name="android.permission.INTERNET" />
<uses-permission android:name="android.permission.READ_PHONE_STATE"/>
```

4- The code will be like this code

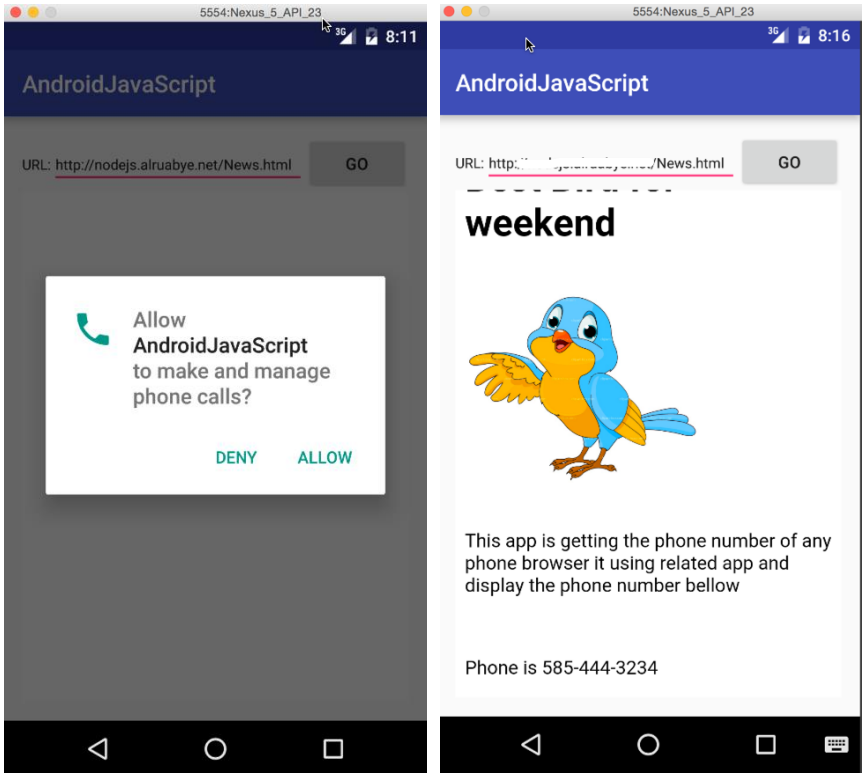
Java

```
public class MainActivity extends AppCompatActivity {
EditText etURL; //navigation url
   WebView browser; // web browser
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      etURL=(EditText)findViewById(R.id.etURL);
      browser=(WebView)findViewById(R.id.wvURL);
      //Enable Javascript
      browser.getSettings().setJavaScriptEnabled(true);
      //Inject WebAppInterface methods into Web page by having Interface name 'Android'
      browser.addJavascriptInterface(new WebAppInterface(), "Android");

      // button that click to go to url
       Button buClick=(Button)findViewById(R.id.buGo);
      //  event to navigate to website
      buClick.setOnClickListener(new View.OnClickListener() {
```

```
        @Override
        public void onClick(View v) {
          //check if the API>=23 to display runtime request permission
          if ((int) Build.VERSION.SDK_INT >= 23)
          {
            // check if this permission is not grated yet
            if (ActivityCompat.checkSelfPermission(getApplicationContext(), Manifest.permission.READ_PHONE_STATE) !=
                PackageManager.PERMISSION_GRANTED )
            {
              //shouldShowRequestPermissionRationale(). This method returns true
              // if the app has requested this permission previously and the user denied the request.
              if (!shouldShowRequestPermissionRationale(Manifest.permission.READ_PHONE_STATE)) {
                // display request permission
                requestPermissions(new String[]{Manifest.permission.READ_PHONE_STATE},
                    REQUEST_CODE_ASK_PERMISSIONS);
                return  ;

              }

              return  ;
            }
          }
          //load the url that written in edittext to the webview
          LoadURL();
        }
      });
    }

    //Class to be injected in Web page
    public class WebAppInterface {

      //This method return user phone number to the javascript calls from website
      @JavascriptInterface   // must be added for API 17 or higher
      public String GetPhoneNumber() {
        return GetUserPhoneNumber();// "585-444-3234";
      }

    }
  /* this method is getting
  user phone number from his device
  */
    String GetUserPhoneNumber(){
      TelephonyManager tMgr = (TelephonyManager)getSystemService(Context.TELEPHONY_SERVICE);
      String mPhoneNumber = tMgr.getLine1Number();
      return mPhoneNumber;
    }
    void LoadURL(){

      //load the url that written in edittext to the webview
      browser.loadUrl(etURL.getText().toString());
    }

    //get access to mailbox
    final private int REQUEST_CODE_ASK_PERMISSIONS = 123;
    //request permsion result
    @Override
    public void onRequestPermissionsResult(int requestCode, String[] permissions, int[] grantResults)
    {
```

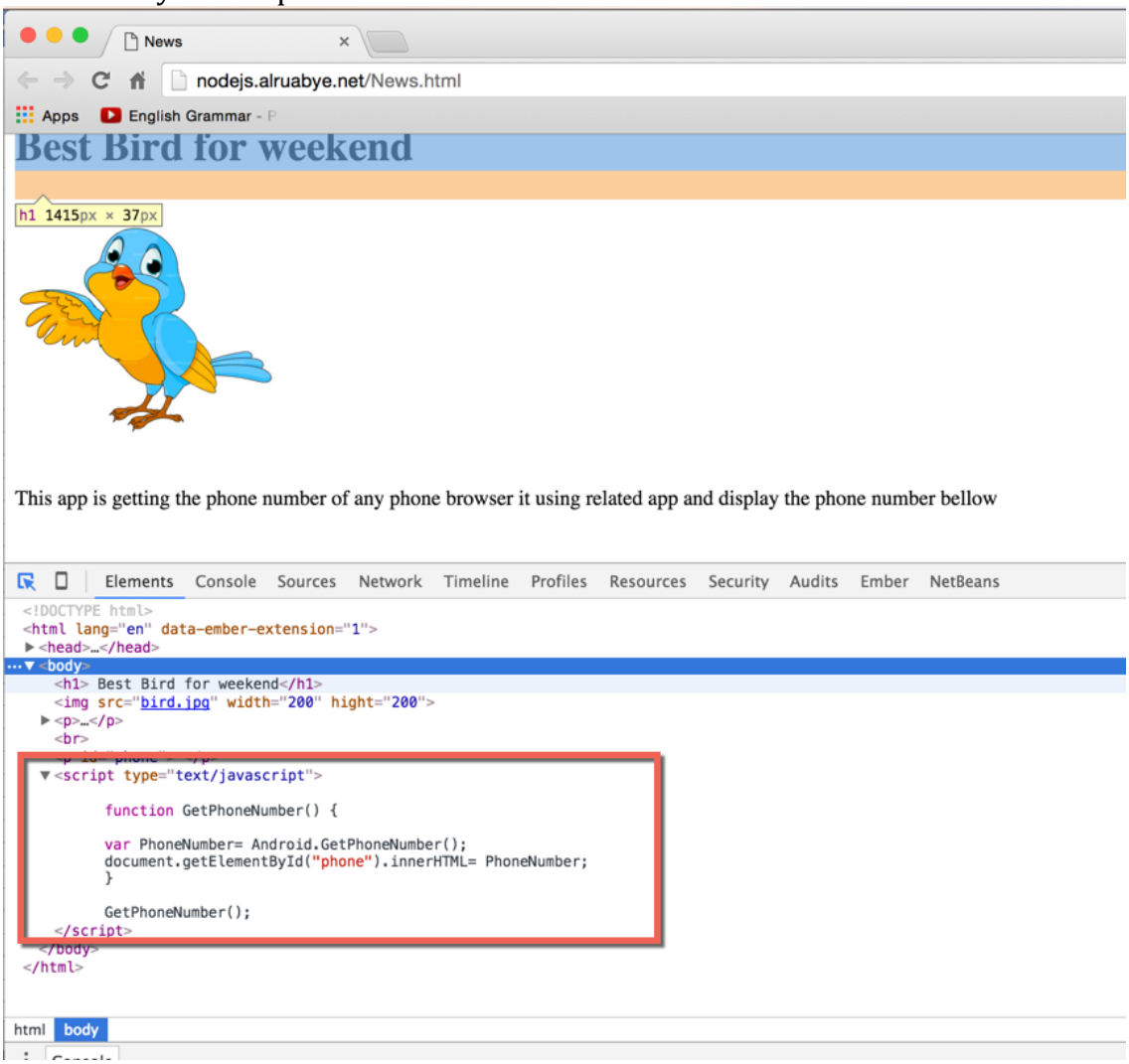
```
    switch (requestCode)
    {
      case REQUEST_CODE_ASK_PERMISSIONS:
        if (grantResults[0] == PackageManager.PERMISSION_GRANTED)
        {
// load the url data
          LoadURL();
        } else {
          // Permission Denied

        }
        break;
      default:
        super.onRequestPermissionsResult(requestCode, permissions, grantResults);
    }
  }
}
```

View the page content

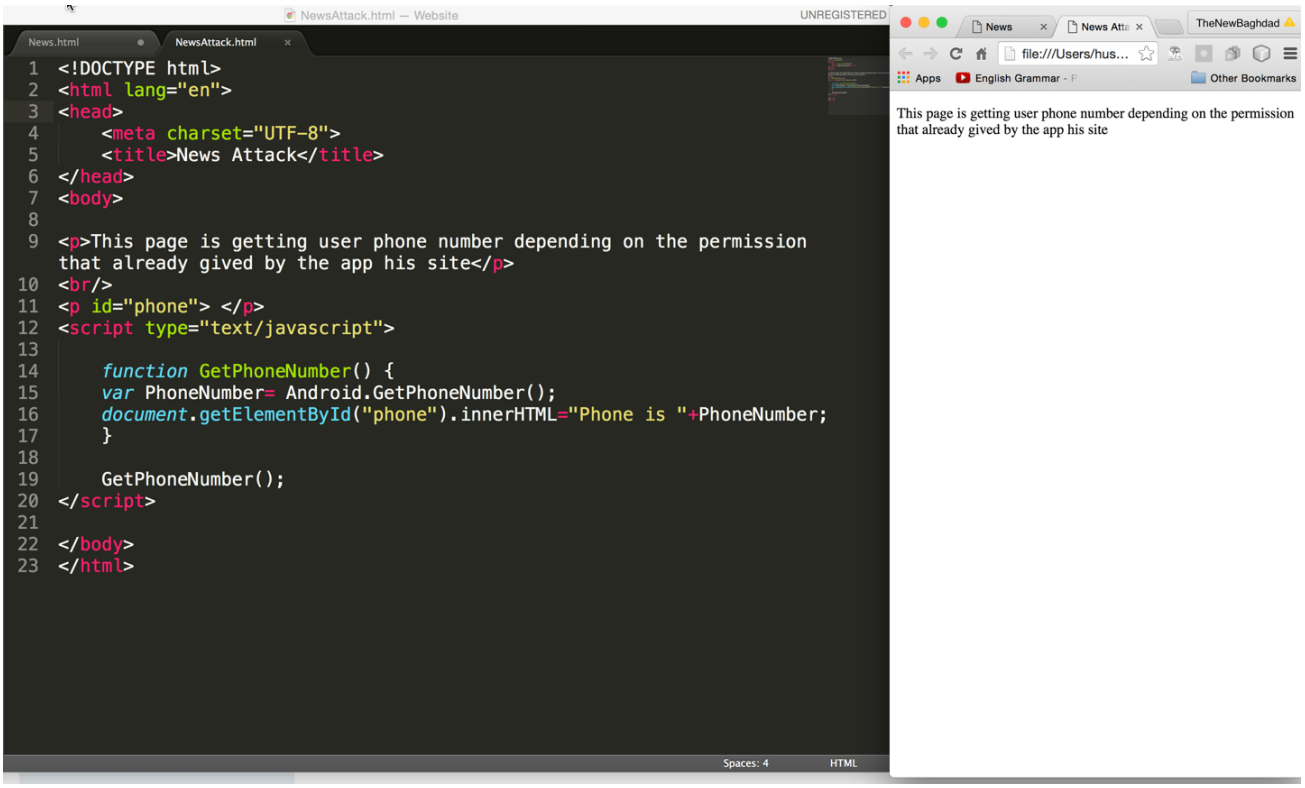


Steps to build the hacker app: Another website can embed the same permissions included in your website's script to gain access to user's data on the device.

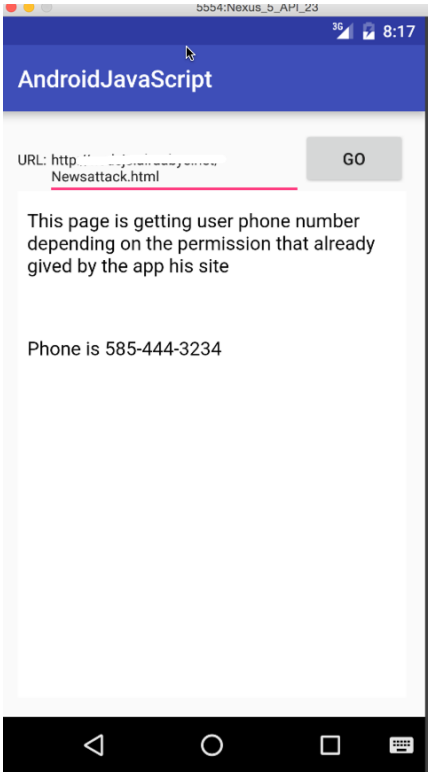
1- A hacker could inspect your website's code and see that you are using Android function in your script



2- Hacker will insert same JavaScript in his website. When your users view this website, he will get user's personal information through your app's permissions



Example of the user view hacker website, and the hacker get his phone number



Fix This Problem

To fix this problem, we must send sensitive data only to the websites that we wish to authorize to access this data like our websites, or we could enable JavaScript to be run only in our website. The code below allows for sending sensitive data only to the websites that we authorize.

Java

```
public class MainActivity extends AppCompatActivity {
EditText etURL; //navigation url
   WebView browser; // web browser
   // host name
   public String HostingURL="hostname";

   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      etURL=(EditText)findViewById(R.id.etURL);
      browser=(WebView)findViewById(R.id.wvURL);

      //Inject WebAppInterface methods into Web page by having Interface name 'Android'
      browser.addJavascriptInterface(new WebAppInterface(), "Android");

      // button that click to go to url
       Button buClick=(Button)findViewById(R.id.buGo);
      //  event to navigate to website
      buClick.setOnClickListener(new View.OnClickListener() {
         @Override
         public void onClick(View v) {
            //check if the API>=23 to display runtime request permission
            if ((int) Build.VERSION.SDK_INT >= 23)
            {
               // check if this permission is not grated yet
               if (ActivityCompat.checkSelfPermission(getApplicationContext(), Manifest.permission.READ_PHONE_STATE) !=
                     PackageManager.PERMISSION_GRANTED )
               {
                  //shouldShowRequestPermissionRationale(). This method returns true
                  // if the app has requested this permission previously and the user denied the request.
                  if (!shouldShowRequestPermissionRationale(Manifest.permission.READ_PHONE_STATE)) {
                     // display request permission
                     requestPermissions(new String[]{Manifest.permission.READ_PHONE_STATE},
                           REQUEST_CODE_ASK_PERMISSIONS);
                     return  ;

                  }

                  return  ;
               }
            }

            LoadURL();
         }
      });
```

```
  }

  //Class to be injected in Web page
  public class WebAppInterface {

    //This method return user phone number to the javascript calls from website
    @JavascriptInterface   // must be added for API 17 or higher
    public String GetPhoneNumber() {
      // only send the phone to authorize website
      if(etURL.getText().toString().indexOf(HostingURL)==0)
      return GetUserPhoneNumber();// "585-444-3234";
else
        return  null;
    }

  }
  void LoadURL(){
/* we could enable javascript to be run only in our website
    if(etURL.getText().toString().indexOf(HostingURL)==0)
      //Enable Javascript
      browser.getSettings().setJavaScriptEnabled(true);
    else
      //Enable Javascript
      browser.getSettings().setJavaScriptEnabled(false);
*/
    //load the url that written in edittext to the webview
    browser.loadUrl(etURL.getText().toString());
  }
/* this method is getting
user phone number from his device
*/
  String GetUserPhoneNumber(){
    TelephonyManager tMgr = (TelephonyManager)getSystemService(Context.TELEPHONY_SERVICE);
    String mPhoneNumber = tMgr.getLine1Number();
    return mPhoneNumber;
  }


  //get access to mailbox
  final private int REQUEST_CODE_ASK_PERMISSIONS = 123;
  //request permsion result
  @Override
  public void onRequestPermissionsResult(int requestCode, String[] permissions, int[] grantResults)
  {
    switch (requestCode)
    {
      case REQUEST_CODE_ASK_PERMISSIONS:
        if (grantResults[0] == PackageManager.PERMISSION_GRANTED)
        {
// load the url data
          LoadURL();
        } else {
          // Permission Denied

        }
        break;
      default:
        super.onRequestPermissionsResult(requestCode, permissions, grantResults);
```

```
    }
  }
}
```

As we see our website could access to phone number while hacker website cannot.