# Design and Implementation of Tourism Information System Based on Google Maps API

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*Abstract*—**Obtaining more accurate information of tourism destinations is the most concerning thing for tourists, especially for self-navigation tourists. This paper proposed a resolution which constructs tourism information system using Google Maps with Web GIS. Based on J2EE platform, adopting technologies of struts2 framework, Google Maps API, Ajax, JSON and so on, an open travel information platform was implemented. Using the platform, tourists can conveniently obtain more references for their travel.**

***Keywords- Tourism Information System; Google Maps; Web GIS***

## I. INTRODUCTION

Tourism has been becoming more and more popular with the improvement of people's living standard. Unfortunately, it has also accompanied increasing inconveniences and deficiencies of traditional tourism which is concentrated on travel agencies or tourism agents, so more tourists are apt to travel by self-driving and self-navigation and so on. So self-navigation is becoming tendency to future traveling.

For some tourists, making a reasonable travel plan is one of their primary concerns; it has become essential to obtain more accurate information of tourism destinations, including some aspects of food, shelter, traveling, shopping, entertainment, and so on. More tourists tend to collect traveling information with the help of some search websites. But some deficiencies using search websites are as follows:

### *A. Tourism information is scattered.*

It is difficult to classify the tourism information from search website by different traveling aspect. So the users need to rearrange the information and pay additional work.

### *B. Tourism information is unconfirmed.*

It is also difficult to obtain real and valid information from the huge tourism information from search website because of some rubbish and mendacious information. Some description of traveling destination is second-hand or subjective.

### *C. Tourism information is flat.*

Because the information from search website is simple text-description, it is difficult to obtain three-dimensional tourism information of destination.

In order to adapt to self-navigation tourism, this paper proposed an idea which construct an open tourism information system using technologies of Google Maps API and Web GIS.

## II. ANALYSIS OF SYSTEM FUNCTION

Based on technology of Google Map and system marked, with the user help, classified tourism information in the platform is gradually filled. Travelers can freely mark and discuss the place where he traveled using the system to provide reference for self-navigation. Finally, through the marked information, comments, feedback of all users, a tourism information database including food, shelter, traveling, shopping, entertainment is constructed.

The main users are guests, members, administrators. Its use case model is shown in Fig. 1.

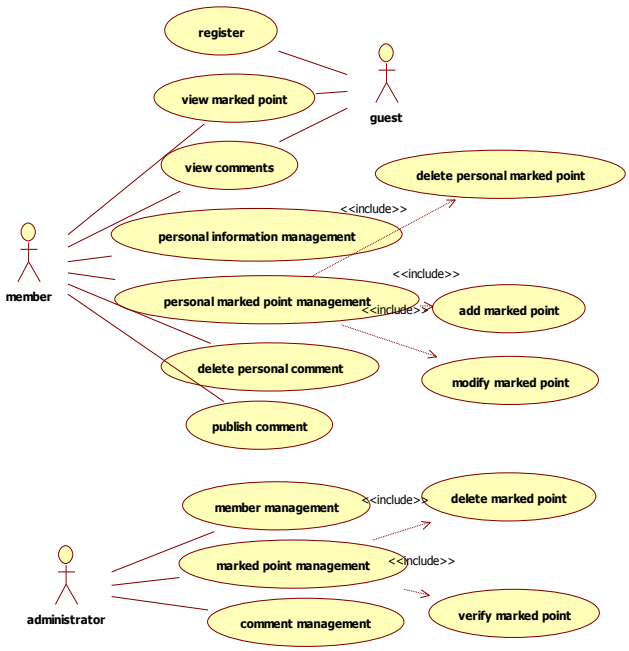


Figure 1. Use case diagram

Guests can view all marked-points, detailed information and comments, not mark new point and comment any marked-point. Members can make new point and comment all marked-

points. Administrators have management functions of members, marked-points, comments and etc.

## III. DESIGN OF SYSTEM

### A. Architecture Design of System

The tourism information system is adopted B/S pattern and three-layer architecture which includes view layer, business logic layer and data layer. One of obvious advantages from three-level architecture is divided into the user interface, application logic layer and data management layer, so that the system can easily deal with various needs. Its architecture is shown in fig. 2.

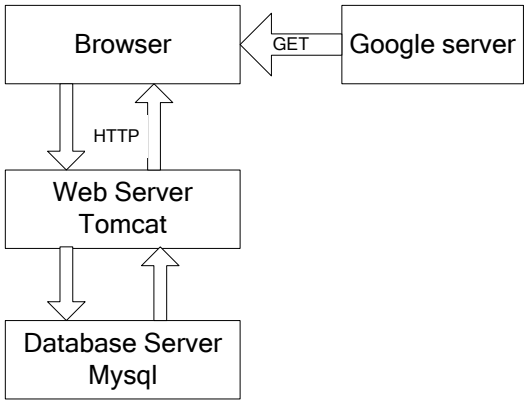


Figure 2. Architecture diagram

Using Google Maps API, web browser can realize some map functions like loading, scaling, mobile and distance calculating. The main tasks of web server are to receive the users' requests, analyze and respond to them, for instance, adding new marked-point or showing marked-point information and so on. Database server is served as information storage like user, marked-point, comments, etc.

In architecture design, we adopted popular structure technology of Struts2 so that it has employed advantages of flexibility and extensibility.

### B. Database Design of System

Some tables are constructed in database design like user information table, marked-point table, comments table and so on. In the design, we saved data information of cities and provinces by JS data format. The main logic relationship of database is shown in Fig. 3.

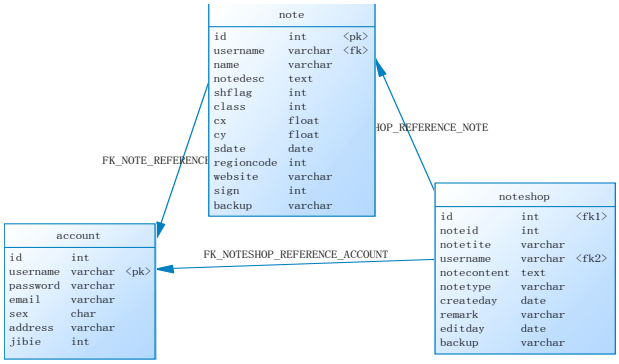


Figure 3. Logic relationship of database

## IV. KEY TECHNOLOGIES OF SYSTEM

### A. Map Service based on Google Map API

Google Maps API is programming interface which is developed and provided by Google Company. Using it, developers can conveniently realize extensible programming. The API is provided by JavaScript language, so, using JavaScript programming, developers may easily integrate Google Map service with their own projects. Using API library, users can freely make marked point and various information windows.

Base on Google Maps API, the process of developing tourism information system is as follows.

*1) Embedding Google Map into web page.*

In this platform, tourism information system provides these classifications, such as food, shelter, traveling, shopping and entertainment to make user search conveniently, meanwhile, the system also provides three-layer navigation menu of county, city, and province. Combined with above two functions, So users can freely locate, view and mark the tourism information according to their own needs. In addition, users can carry out location by search function of Google Map. Relative Javascript codes are seen as follows:

```
var map = new GMap2(document.getElementById("map_canvas"),{draggableCursor:'auto',draggingCursor:'move'});
map.setCenter(new GLatLng(cy,cx), 14);// cx,cy are //parameters from navation, cx is longitude,cy is latitude.
```

*2) Initializing Google Map*

The main task of initializing map is to add various monitor events such as click, drag and so on. Some codes are shown as follows.

```
var customUI = map.getDefaultUI();
customUI.maptypes.hybrid = false;
map.setUI(customUI);
geocoder = new GClientGeocoder();
GEvent.addListener(map, "click", function(overlay,latlng)
{
if((parent)&&(!parent.chosenotetool)){
return ;
}
if ((parent)&&(parent.chosenotetool)&&(latlng)) {
map.addOverlay(createMarker2(latlng, 3));
cy= latlng.lat();
cx= latlng.lng();
}
});
·····//add various monitor events
```

*3) Marking in Google Map*

When users login the system successly,they can freely mark in Google Map. The mark tourism information including name, picture, address, website, and detailed description is saved in database. The codes are seen as follows:

```
function createMarker1(
point,noteid,notename,notedesc,noteuser,
notesh,website) {
        ……
var marker = new SuperMarker(point, markerOpts);
    GEvent.addListener(marker,"mouseover",  function()
{
        marker.setImage(imgHover);
        });
         gmarkers.push(marker);
    noteids.push(noteid);
    notenames.push(notename);
    notedescs.push(notedesc);
    noteusers.push(noteuser);
    noteshs.push(notesh);
    GEvent.addListener(marker,"click", function() {
      getmarkinfo(marker);
     window.open("/boda/noteshop/shopdetail.jsp?id="+cu
rnoteid+"&lat="+lat+"&lng="+lng);
        });
         return marker;
  }
```

Function of map mark is shown in Fig. 4.

Figure 4. Screenshot of map mark

Detailed mark information is shown in Fig. 5.

Figure 5. Screenshot of detailed mark information

## B. *Techonolgy of JQuery*

JQuery is an excellent cross-browser JavaScript framework. It provides some page components and light JavaScript library, so users can freely deal with html documents, events for animation effects. In addition, it provides function of AJAX interaction for straightforward page operation.

Using technology of JQuery framework, page logic is separated from page contents so as to simplify the work of html code because we need define component id instead of calling some JS codes in html page.

Technology of JQuery is often used in tourism information system. For example, when users upload their head photo in register, the system needs to hide different div elements in different phase and adjust the size according to the image scaling.

Some image scaling codes are as follows:

```
……
    $iconElement.css({ width: currentWidth + "px", height:
currentHeight + "px", left: originLeft + "px", top: originTop +
"px" });
    $imagedrag.css({ width: currentWidth + "px", height:
currentHeight + "px", left: dragleft + "px", top: dragtop +
"px" });
    $("#txt_width").val(currentWidth);
    $("#txt_height").val(currentHeight);
    $("#txt_top").val(0-dragtop);
    $("#txt_left").val(0-dragleft);
    $("#txt_Zoom").val(scaleFactor);
……
```

## C. *Technology of JSON*

JSON (JavaScript Object Notation) is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate. It is based on a subset of the JavaScript Programming Language, Standard ECMA-262 3rd Edition - December 1999. JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. These properties make JSON an ideal data-interchange language.

Combining AJAX technology with JSON, the system realized the perfect effect of page display in system development. For example, when mouse hovers over the information markers, the mark information should be shown automaticly.

Some codes of construction JSON data format in server are as follows:

```
JsonArray jsonArray = new JsonArray();
if(rs.next())
{
JsonObject obj = new JsonObject();
        obj.add("id",rs.getInt("id"));
        obj.add("note",rs.getString("note"));
        obj.add("image",rs.getString("image"));
        obj.add("description",rs.getString("description"));
        ……
        jsonArray.append(obj);
        }
        result = jsonArray.generateJsonText();
        ……
```

The data returned from server can be conveniently dealed in client as follows:

```
……
var obj = eval('(' + resutl + ')');
obj.id;//obtain object's id
obj.note;//obtain's object's note
……
```

## V. CONCLUSIONS

Combined the technologies of Web GIS with Google Maps, the tourism information system has implemented so that it can effectively resolve the defects of information search in traditional website. It has characterized with specific classification, real and three-dimensional tourism information as well as extensible factors. Based on this, it can also provide accurate and concrete travel information for more tourists.


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