Baidu Mobile Application & Search On Mobile

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Agenda

- About Baidu Mobile and Search Application
- The Architecture of Baidu Mobile
- Mobile Search Basic
- Mobile Search Enhancement
About Baidu Mobile and Search Application

Features of Baidu Mobile :
- Search => Text, Image, Voice
- Browse => WebApp and Native UI
- Cards => Entries of everything
- O2O => Connect People to Service
- Payment => Service Closed-loop

MAU of Baidu Mobile Application > US population
About Baidu Mobile and Search Application

Different Search

Vertical Field
Novel Video News

Social Networking Services

O2O

Crowd Segmentation
About Baidu Mobile and Search Application

- C/C++
- Python
- Hadoop
- MySQL
- PHP
- Redis
- Linux
- NGINX
- HTML5
- Android
- Apple

User Experience
Compatible
Accumulation
Multifunction On Client
Big Data
High-Concurrency
Monitor
Respond Quickly
Search On Mobile Application

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The Architecture of Baidu Mobile

Browsers Framework
(Browsers Management, JS Bridge, Search Optimizer)

Native Framework
(Native Display, Cache, Subscribe, Native Storage)

Monitor & CMS

Search Web Page Renderer
Native Controller & UI Renderer

Universal Search

Multiple Search Backend

Search Service

Browsers / Server Communication

Baidu Mobile Resource

3rd Party Connection

Native Controller & UI Renderer

SearchBox Service

Client / Server Communication

Multiple Search Backend

Baidu Mobile Resource

MUP & Personalization recommends

Message System

Client Plug-In System

Message Module

Multiple Search Backend

Client

Universal Search

Native Controller & UI Renderer

Baidu Mobile Resource
The Architecture of Baidu Mobile

- Enhanced Browser and WebApp —— B/S Mode
- Super Client-Server Application —— C/S Mode
- Accumulation of Information and Service
- Personalization And Recommendation
- Client Plug-In System
Enhanced Browser and Web App

Baidu Mobile Application can work as enhanced browser. There is standard WebApp and special WebApp.

- Supporting standard WebApp.
- Some UI features on Browser
- Additional Web APIs for hybrid
- Search Result Page as Core content
- Special WebApp as Own UI
Enhanced Browser and Web App

Browser of Baidu Mobile:
- Baidu T5/T7 Kernel for Android.
- Browsers Core with additional modules
- CloudaJS WebAPI
- Different Browsers UI for different situations

WebApp of Baidu Mobile:
- Search Result Page is optimized.
- Internal WebApp can use additional module to build the application UI.
- Some external O2O WebApp (@) can also use additional WebAPI and run in different UI
Super Client-Server Application

Baidu Mobile is a super application. The main design conception is cross-platform template. Client-Server mode is a basic of UI mechanism of Baidu Mobile.
Super Client-Server Application: Performance

We consider two aspects of Client-Server application:
- Capability of Server (CPU, Memory, IO)
- User Experience (data channel, display speed)

Optimizations Points:
- Server Page Cache => Separate / Force Time / Permutation & Combination
- Asynchronous Loader and Displayer => Image Loader, display sequence
- Request Merging => JSON data, protocol buffer
- Cache Negotiation => Client stores data cache and use the return code, Server judges both timestamp and data signature
Super Client-Server Application: Compatibility and Expansibility

There is program on Client side and Complex Client Storage. Compatibility and expansibility are core conception of CS Mode application.

- Code policy
  - Forwards compatible on Client Side
  - Backward compatible on Server Side

- Cache Policy
  - Distributed Cache Adjustment
  - Cache on Client

- Storage Policy
  - Persistent Storage Optimization
  - Storage on Client
Super Client-Server Application : Controllability

The distribution of Mobile Application is not easy. When we want to update the content to user, the mobile application cannot be updated immediately.

Powerful controllability:
- Several template methods
- Content : Data, UI, Behavior
- 2 sides : Flexibility vs Complexity
- Customer Schema and Browsers?
Accumulation of Information and Services

Information and services are from own resource and upstream service.
- Information: news, video, novel, gallery and so on.
- Services: lots of O2O support

The Resource of Baidu Mobile include:
- Multiple high concurrency business
- Resource connectivity center
- O2O business support
- Connecting to the World

![Diagram of User Interface Layer, Business Logic Layer, and Data access Layer with Rich C/S or Special B/S connections and Adapting UI, Persistent Storage, Cache, Gather arrows.]

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Accumulation of Information and Service

Offline System and Storage
- Data cache
- Disaster Recovery cache

Adapting UI Layer
- Totally Different Resources
- Fill the template
- Abstract the schema

Resource Management
- Resource Switcher and MAP
- Resource Monitor
Personalization And Recommendation

The goal is different services for different users. The main points are:

- Storage and Management of big data
- Mobile User Profile
- On-line Service And Off-line Data Processor

User Behavior
User Scene

Requirement  Data mining  User Profile  Recommendation  Feedback  Optimization
Personalization And Recommendation

- Feedback API
  - Statistic data collection
  - Behavior collection
- Recommendation API
  - Algorithm Selector
  - Algorithm and Model
  - Data Mining Result
- On-line
  - Recommendation
  - Algorithm Configure Rule
- Off-line
  - Report
  - CMS
  - Data Import
- Machine Learning

- Data Mining
- Hadoop
Client Plug-in System

Client Plug-in System make Baidu Mobile have multiple functions.

Plug-in feature:
- Dynamic and Static Plug-in
- Common Host API for Plug-Ins
- Virtual API between Plug-Ins
- JavaScript PlugIn API for WebApp

Some capabilities for PlugIn:
- Account
- Share
- Pay
- Cards
- Some UIs
- ……
Client Plug-in System: Android
Client Plug-in System: iPhone
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Mobile Search Basic

Difficulties on Mobile
- Adapt screens
- Adapt networks
- Adapt devices

Differences on Mobile
- UI Behavior
- User Scene

Features on Mobile
- Enhance the display for results
- Media-Rich Search
  (Voice Search, Image Search)
Page Display Layer

Page Display Layer works as container (server and front-end).

Main Template:
- Depend on Devices, network, parameter
- Server => Distinguish difference
- JavaScript => Use host ability

Item Template:
- Template + Resource => Display Item
- Only answer => highlight result
- Weak Item => for secondary order item
- Use behavior => feedback to order
Mobile Contents

The points for mobile contents:

- Mobile device type and ability => different content
- When there is a mobile query request from mobile device. It will provide:
  - Mobile original content
  - Mobile transcoding content
- There is a rule for mapping the Mobile H5 Resource and PC resource.
- H5 Resource inherits the link relationship and right information of PC.
Demand Analysis

The points of Demand Analysis on Mobile Device:

■ According to the orientation of query, recognize the user needs and find the corresponding standard category

■ According to the corresponding category in the field of information, extract the specific tag field to support detailed query and selection of vertical resource.

■ Provide the internal subclass, and give the importance of distinguishing
Search On Mobile Application

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How to Enhance Searching on Mobile Application

- Powerful Interactive
- Information Closed-Loop
- Communication on Search

Connect Web Page and Native UI
Mechanism First, Vertical Business Later
Change one point => extend to global
Reserve the content and rank

JS-Bridge capability @ Search Result Page
Native UI capability @ Browsers
Message capability @ Mobile Client

Technical Core-Competitiveness

Several Technical points For Business Feature
JS-Bridge capability @ Search Result Page

JS-Bridge capability => hybrid WebApp.
- Use native device or system ability
- Use the additional native UI
- Use additional API for special business
- JS-Bridge module works as separated component
- JS-Bridge can work with the every result item component
- Target also includes the landing page
Native UI capability @ Browsers

Native UI with browsers framework:

- Flexible as Web
- High performance
- Support Gesture
- Support the general browsers behavior (Back, Forward, Share, URL)
- Support Multi-Windows with browsers
- Maintain the state machine in webpage
Message capability @ Mobile Client

Message is special ability on Mobile Client:
- Persistence connection between Client and Server
- Client notification
- User Profile: from login users
- Device Profile: from mobile devices
- Data Collection: build the relations
- User Behavior: build the groups
Powerful Interactive

Features:

- Search Result as Application
- Powerful UI rather than web app
- Following the browsers behaviors
- Expanded Status for O2O
- Closed Status for other result
Powerful Interactive

The technical points:
- Dynamic template of Client / Server
- Associated behaviors and animation of Native UI and WebView
- History and re-entry of Web Pages
Information closed-loop

Features:
- **Result** => become a Card
- **Card** => show the information directly
- **Card action** => conduct user to any where
- **Card** => attach to a reminding
- **Reminding** => trigger some message
- **Messages** => back to the application
Information closed-loop
Communication on Search

Features:
- Result => attach to comments entry
- The comments => attract users to communicate
- Users => Setup relation
- Users => Gather as groups
- User characters => be dug
- User information => Generate some messages
- Messages => a notification to users
Communication on Search

- Search Web Service
- Logic Flow
- Map between result and comments
- Baidu Mobile Client
- Browsers
- Entry
- Landing Page
- Entry
- Comments Web Service
- Message Subscribe
- Relation & Groups
- Recommendation
- Message Service
- Push Message
- Baidu Mobile
- Baidu Mobile Client
- Browsers UI
- Search Result WebApp
- Entry
- Launch
- Logic Flow
Thanks!