An Efficient Meet-Up Mechanism by Mashing-up Social and Mobile Clouds

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JOIN: A mobile social network application

- Objective: Provide immediate and personalized LBS information for a group of users.
- Real-time meet-up activities for a group of mobile users
  - Integrating GPS, cloud computing, smart phone and wireless communications.
  - A on-line LBS service beyond the combination foursquares.com and latitudes.com.

Mashup Clouds for Mobile Social Networks

Mobile Networks Social Networks

Cloud Platforms: Facebook, MSN
System Components: Community Engine
Functions: 1. Group Event Announcement
2. Group Membership

GPS

GPS

3G/LTE

Internet

WiFi

Mobile Devices

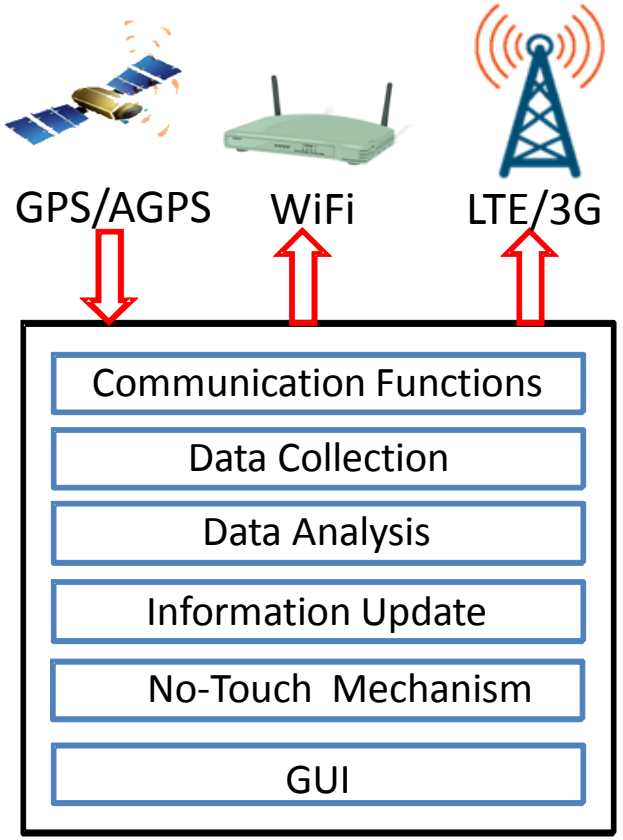
NCTU Cloud Platforms

Cloud Platform: Hyper-v
System Components: JOIN Engine
Functions: 1. Mobile User Location Database
2. Area Interesting Events Advertisement
3. Location–based Group Scheduling
4. Speech Recognition

Windows Azure

JOIN Client Architecture

- Software Design and Using:
  - Android Developer
  - WP7
- Hardware Using:
  - Smart Phone
  - Location
    - GPS (satellite fix)
    - AGPS (base station fix)
    - Sensors
  - Communication devices:
    - WiFi
    - 3G / LTE



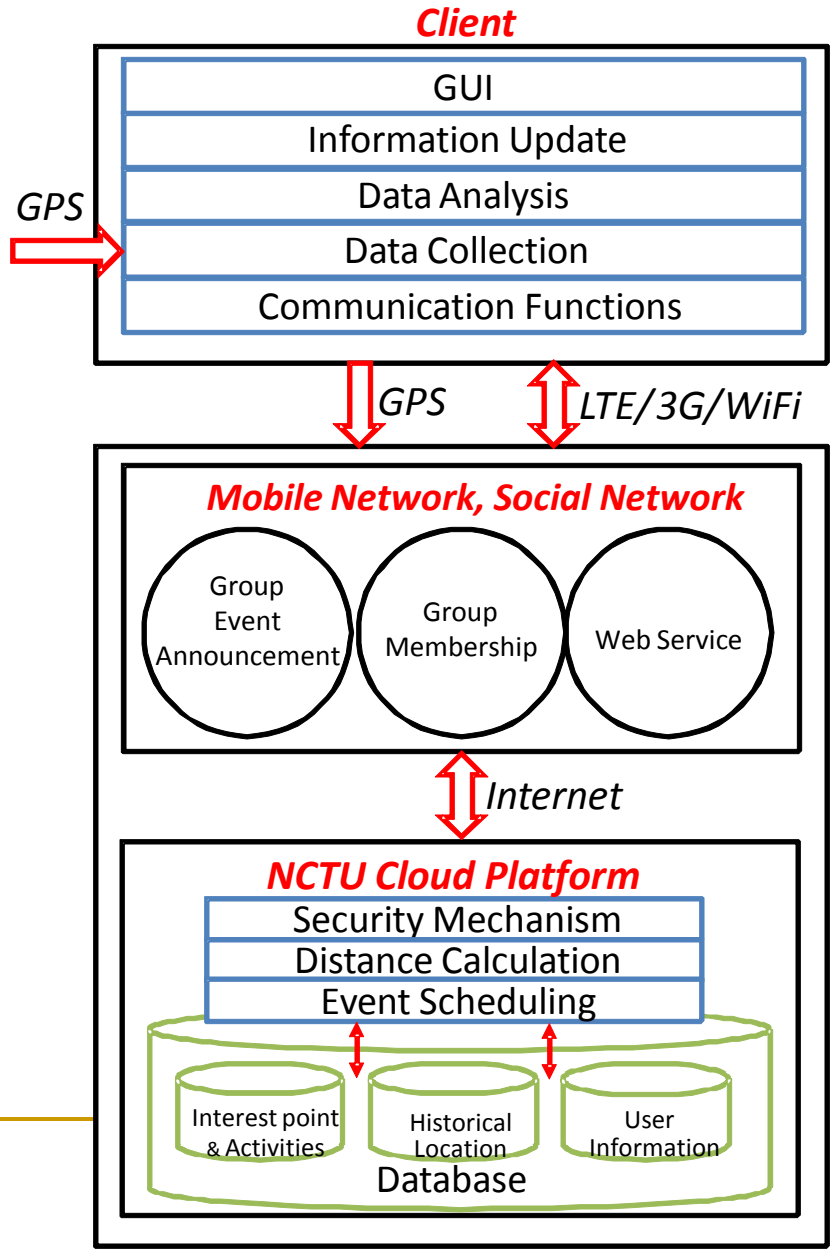
JOIN Cloud Architecture

NCTU Cloud Platforms

- JOIN engine:
  - Location database
    - Current and historical locations of each user
    - Dynamic calculation of distance among friends
    - Static locations of stores related to interested groups
  - Group membership and polling
  - Event Scheduling with data mining

Social Networks

- Community engine
  - Group Event Announcement
  - Group Scheduling

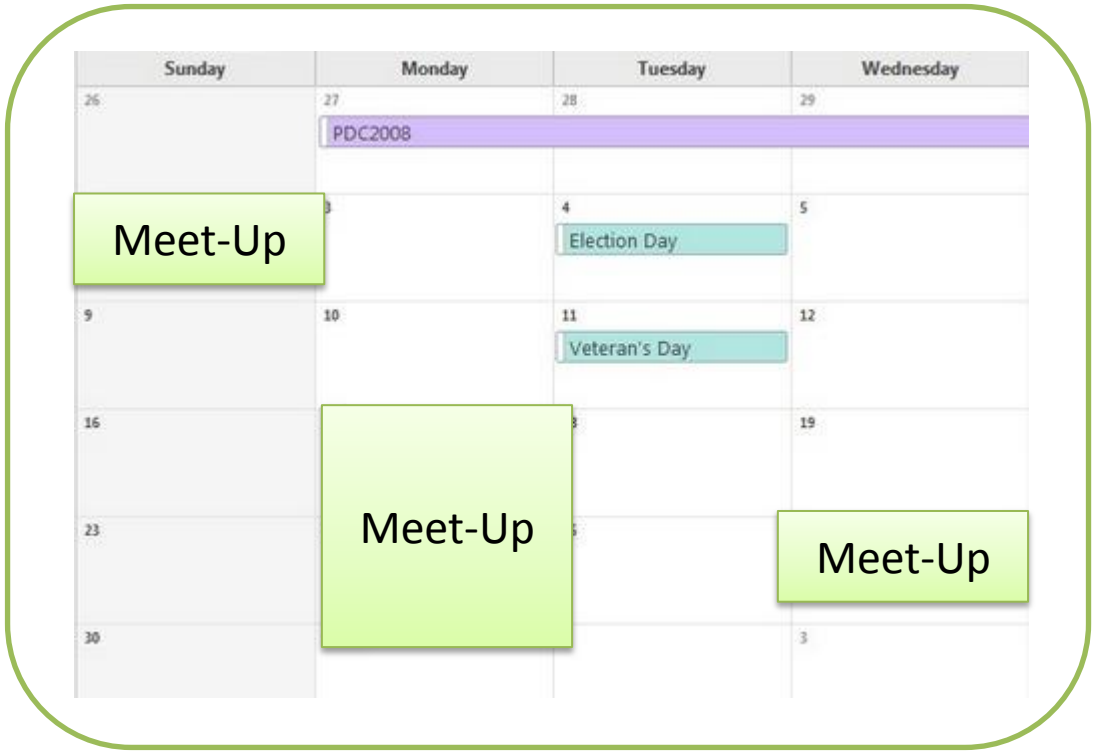


Developed mechanisms for mobile meet-up

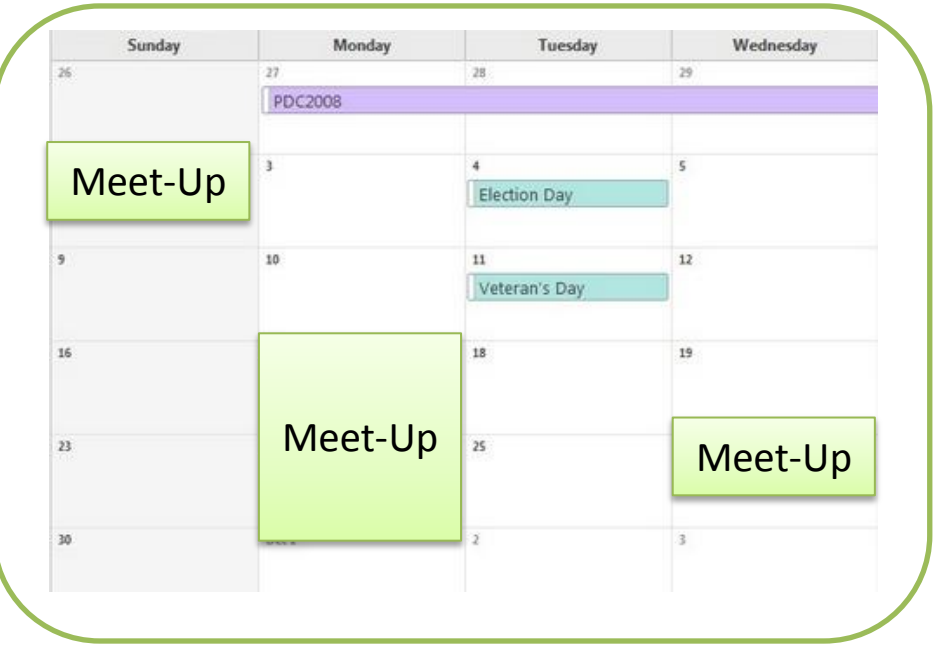
- Calendar Merge-Up Mechanism
- Meet-Up Voting
- Location Pushing-Up Mechanism
- Proximity-Based No-Touch Mechanism for voting

Calendar Merge-Up Mechanism

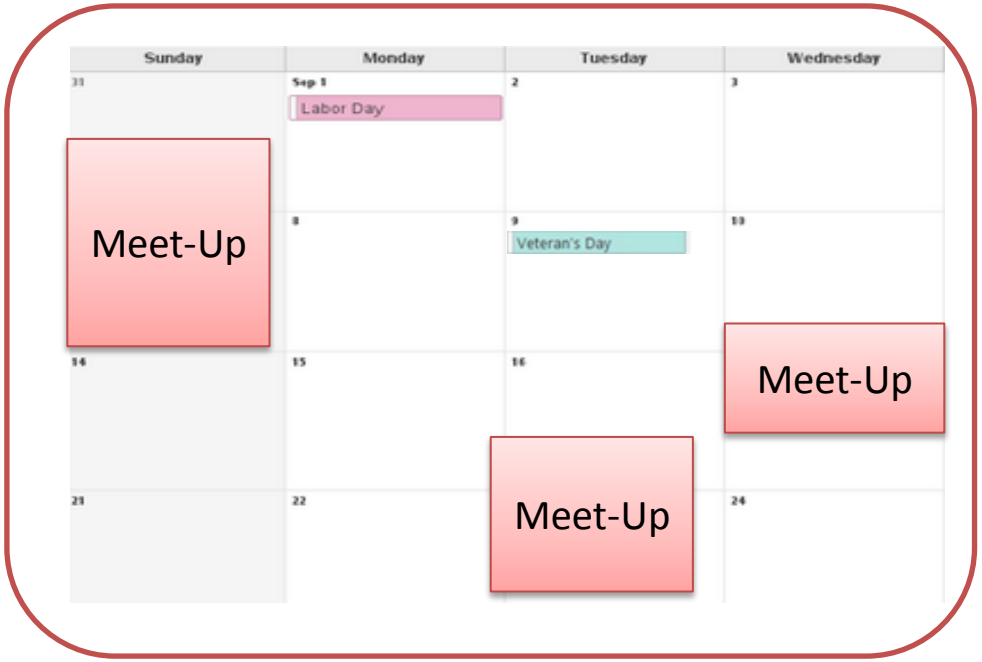
- JOIN can search the common available time for each user in their calendar.

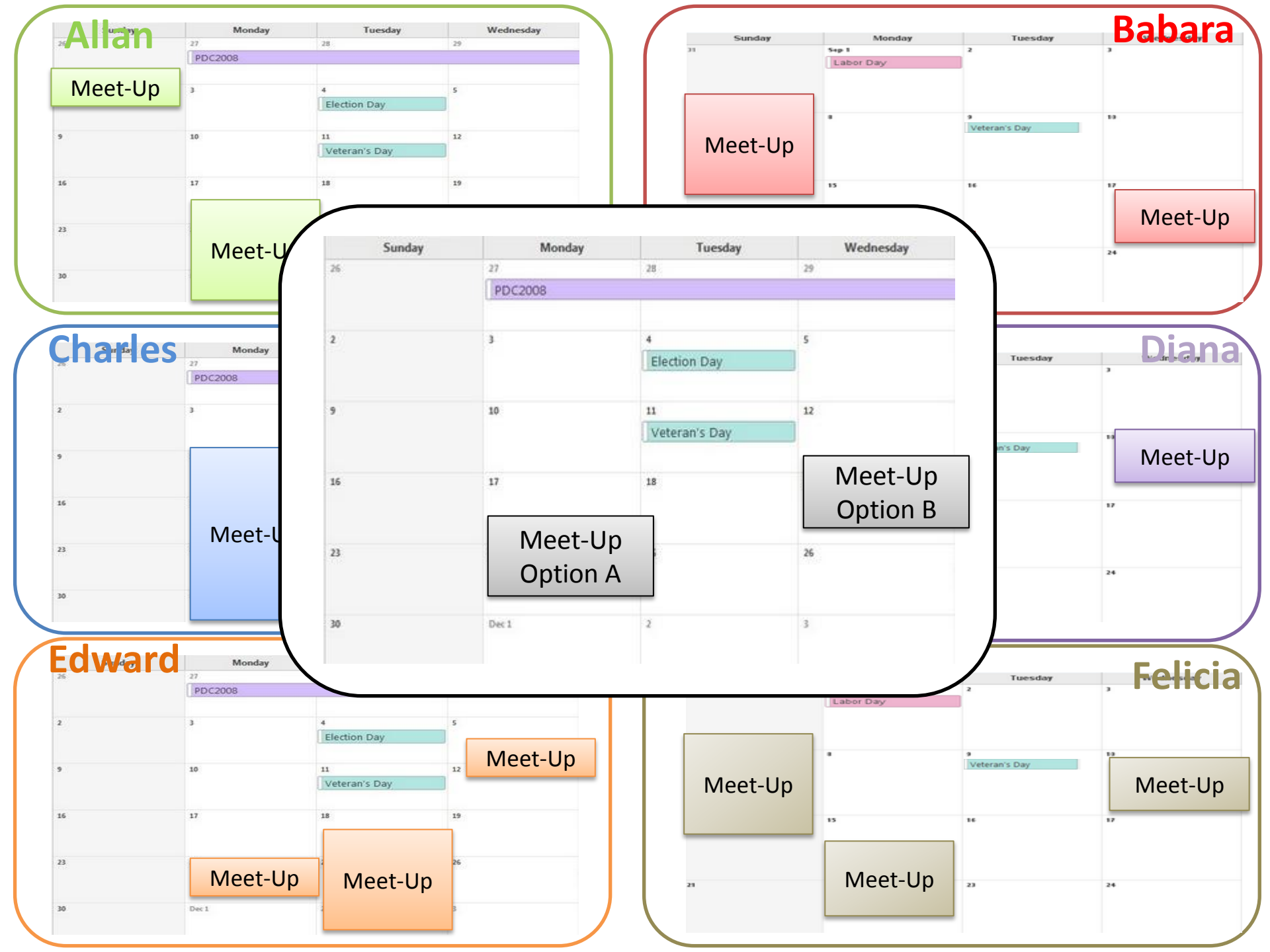


Allan



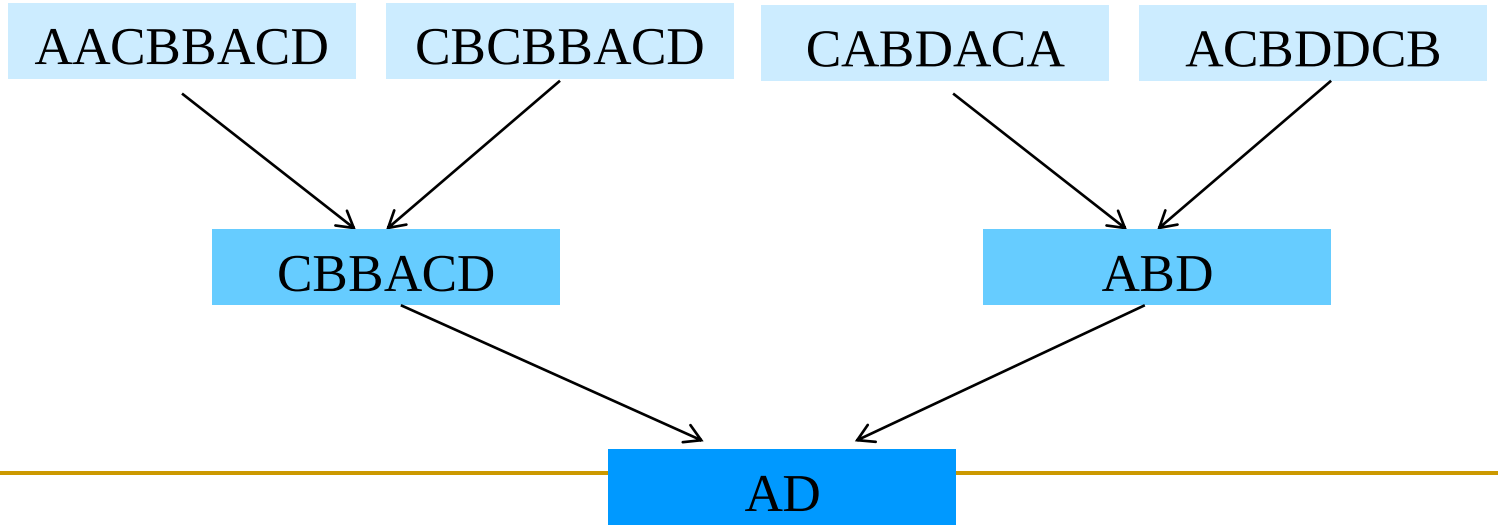
Babara




Allan
Meet-Up
Meet-U
Babara
Meet-Up
Meet-Up
Charles
Meet-U
Diana
Meet-Up
Sunday
Monday
Tuesday
Wednesday
PDC2008
Election Day
Veteran's Day
Labor Day
Meet-Up
Option A
Meet-Up
Option B
Edward
Meet-Up
Meet-Up
Meet-Up
Felicia
Meet-Up
Meet-Up
Meet-Up

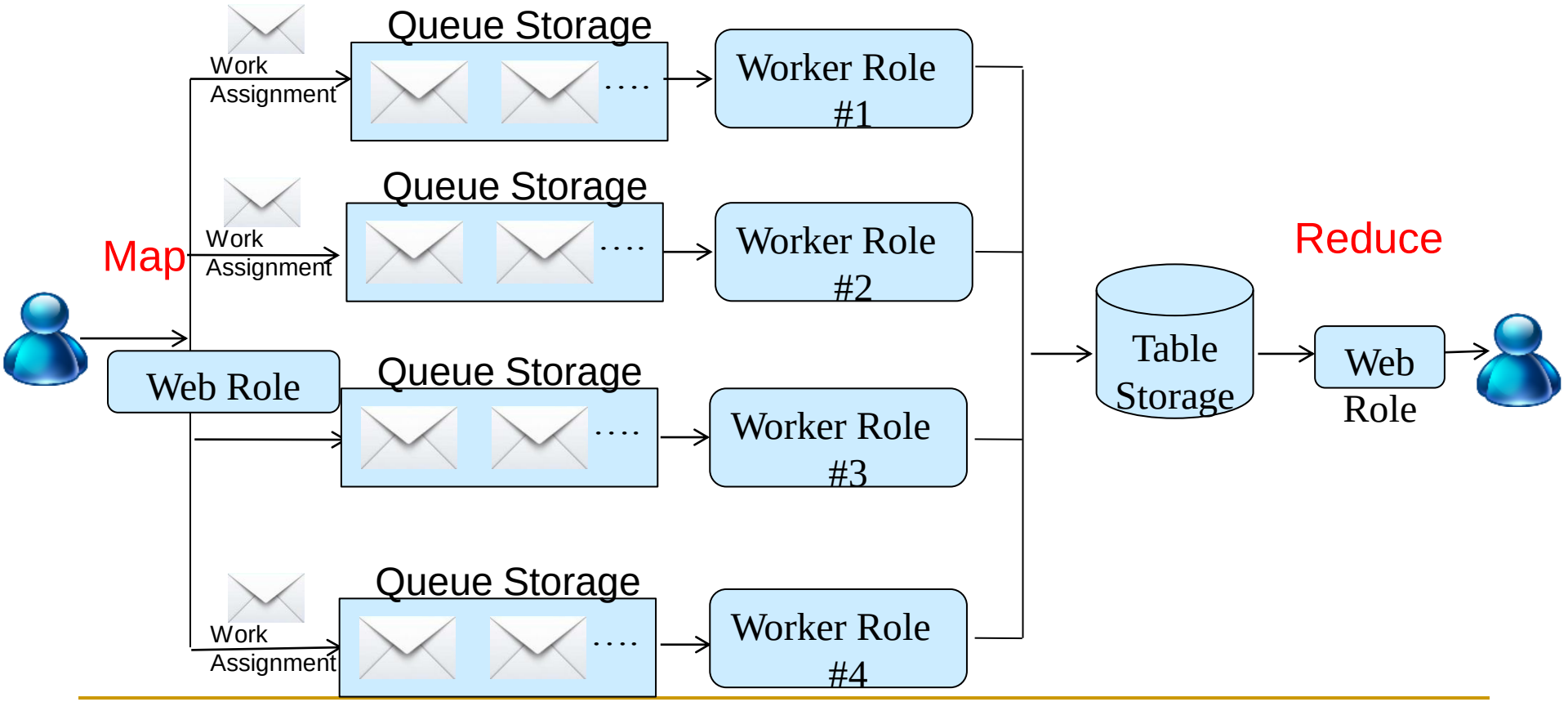
Calendar Merge-Up Mechanism(Cont.)

- Finding longest common subsequence(LCS) on MapReduce
- Mapper: Find LCS between two users
- Reducer: Combine the result



Map Reduce Technique

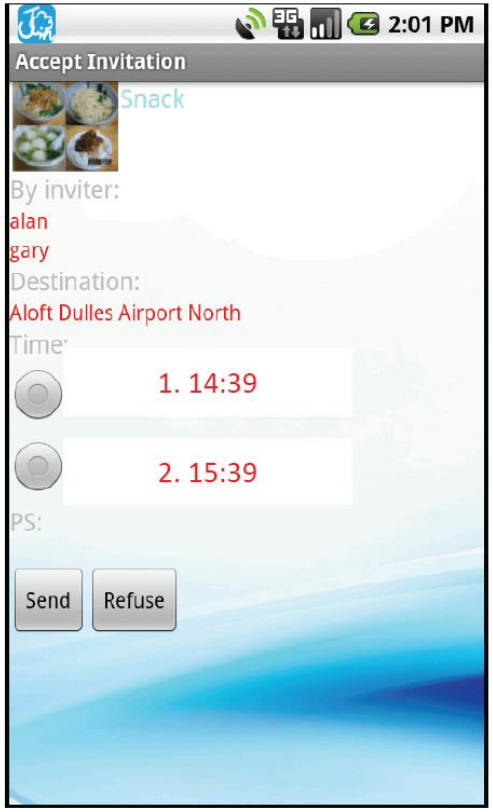
- Windows Azure with MapReduce



[5] http://msdn.microsoft.com/zh-tw/windowsazure/ff721941

Meet-Up Voting

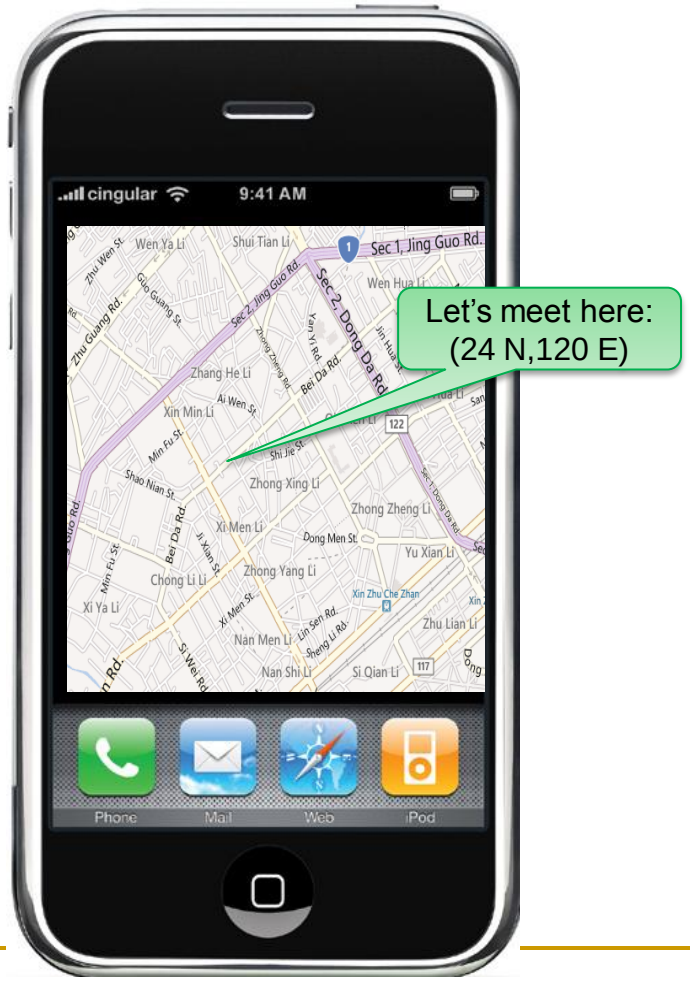
- Users can hold a activity.
  - vote for destination and time.
- Server can also proactively schedule the Meet-Up activity.

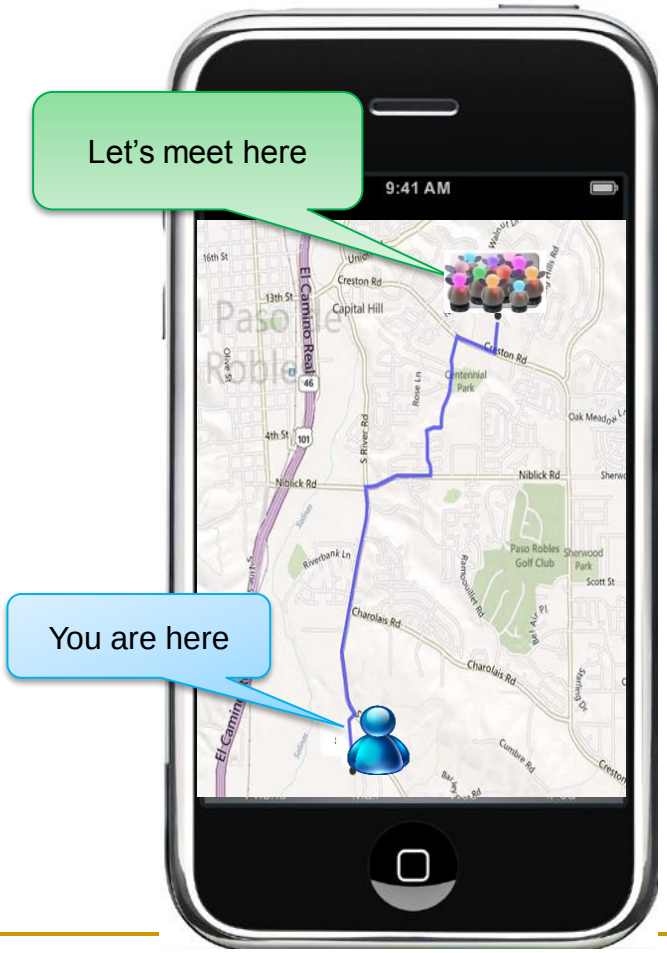


Location Pushing-Up Mechanism

- Location Pushing
  - Destination is pushed to each user with route planning.
- Reservation
  - Tickets
  - Rooms
- Booking in personal Calendar
  - Reminder


(24 N,120 E)

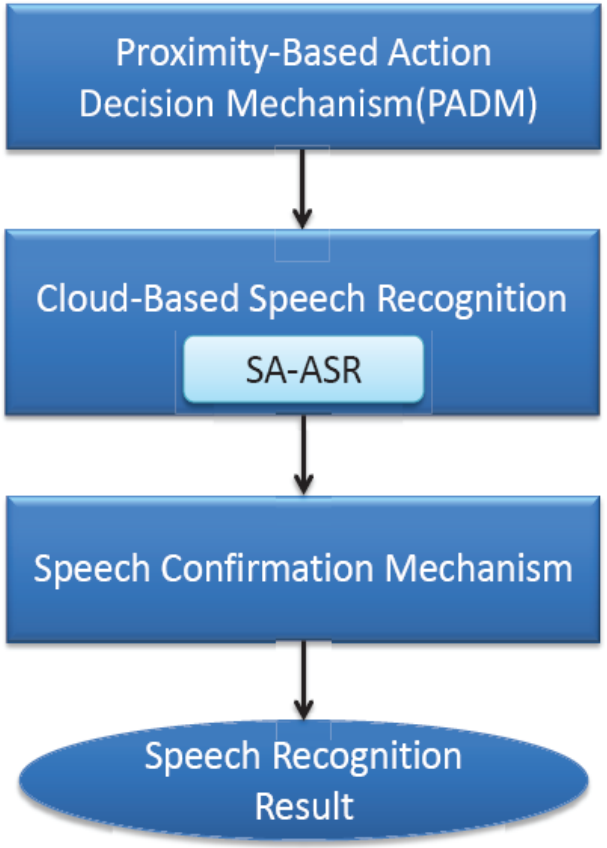

cingular
9:41 AM
Let's meet here:
(24 N,120 E)
Phone
Mail
Web
iPod


Let's meet here
9:41 AM
You are here

Proximity-Based No-Touch Mechanism for Voting

- Using touch screens are not safe for mobile phone users.
- Applying proximity sensors to initiate mobile applications without the need of touching the screen
- Integrate with cloud speech recognition

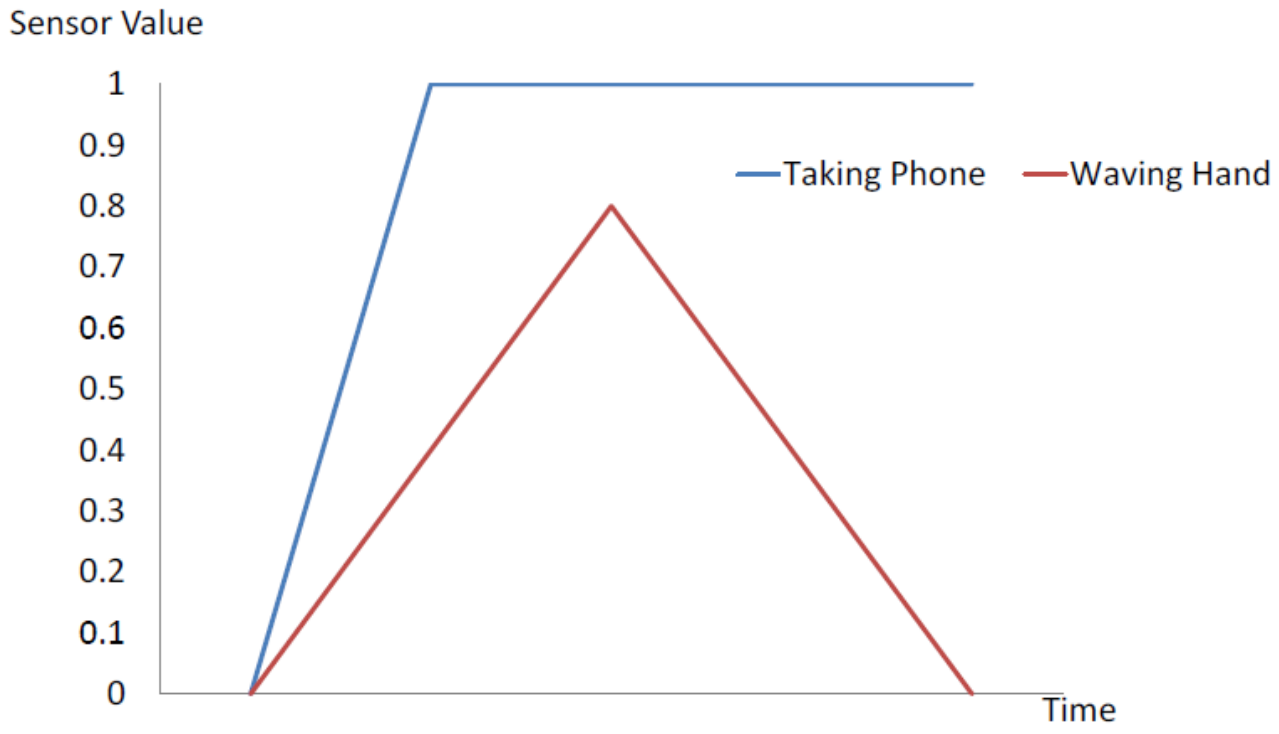
Proximity Sensor



[1] C. Y. Lin、Y. J. Chen、L. C. Wang and Y. C. Tseng, "Proximity-Based Speech Recognition in Mobile Cloud Computing, " 2nd International Workshop on Mobile Sensing (IPSN Workshop 2012)
[2] C. Y. Lin、Y. J. Chen、L. C. Wang and Y. C. Tseng, " A No-Touch Mechanism to Initiate Mobile Applications on Smart Phones, " IEEE Vehicular Technology Conference (VTC2012-Fall), September 2012.

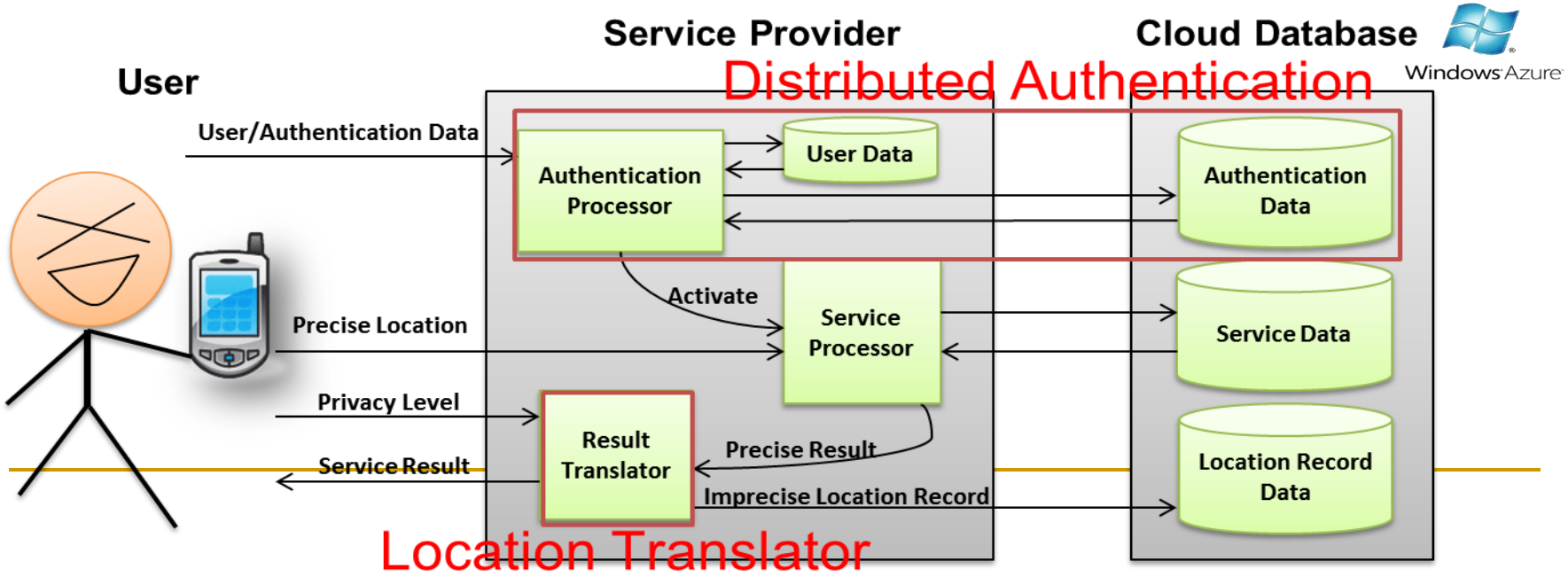
Proximity-Based No-Touch Mechanism for Voting(cont.)

- Body language Translator



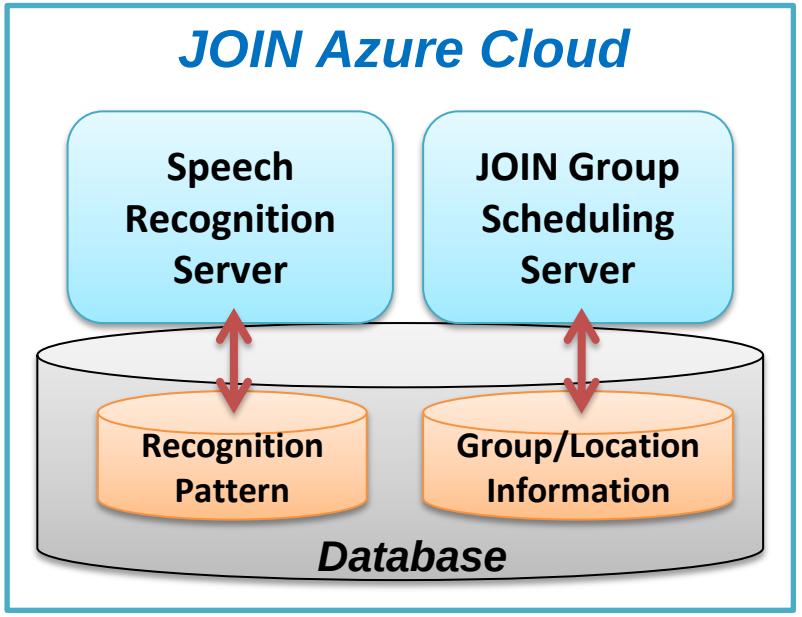
Enhanced Location Privacy

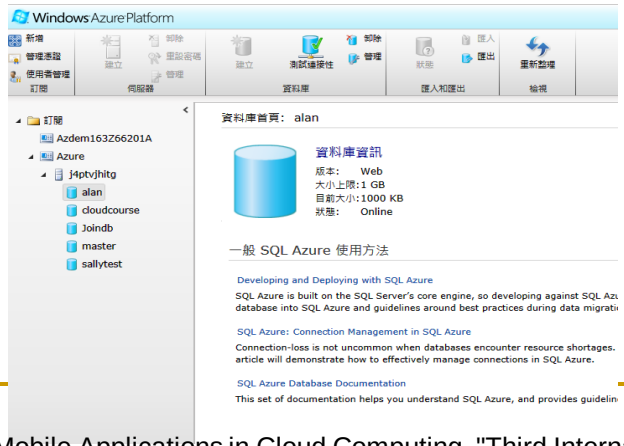
- Providing location security in LBS system with ODB service model
- IMSI-based pseudonym to secure the location data in JOIN services
  - Provable security
  - Less Power Consumption



Used Techniques in Database

- Windows Azure Platform
  - Speech recognition server
  - Group scheduling server
- Network Coding for Location Privacy
  - IMSI-based JOIN secure mechanism
- VMs Load Balancing
  - Queuing theoretical resource prediction





[3] Y. J. Chen and L. C. Wang, "A Security Framework of Group Location-Based Mobile Applications in Cloud Computing, "Third International Workshop on Security in Cloud Computing (CloudSec 2011)

Conclusion

- Present enabling mechanisms of meet-up applications for mobile phones, consisting of
  - calendar merge-up and polling mechanism
  - route information pushing-up mechanism
  - proximity-based no-touch mechanism
- Provide immediate and personalized social LBS information to mobile phone customers.

Reference

[1] Y. T. Lee, L. C. Wang, and R. Gau," Implementation Issues of Proactive Location-Based Group Scheduling for Cloud Applications", in IEEE VTS Asia Pacific Wireless Communications Symposium, 2010.

[2] C. Y. Lin、Y. J. Chen、L. C. Wang and Y. C. Tseng, "Proximity-Based Speech Recognition in Mobile Cloud Computing, " 2nd International Workshop on Mobile Sensing (IPSN Workshop 2012)

[3] C. Y. Lin、Y. J. Chen、L. C. Wang and Y. C. Tseng, "A No-Touch Mechanism to Initiate Mobile Applications on Smart Phones, " IEEE Vehicular Technology Conference (VTC2012-Fall), September 2012.

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[5] http://msdn.microsoft.com/zh-tw/windowsazure/ff721941