Community Seismic Network for Rapid Shakemap Notification

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Outline

- CSN: Community Seismic Network
- Android Client
- App Engine Server
- New Progress
- Conference
- Demo
Community Seismic Network

A new earthquake monitoring system based on a dense array of low-cost sensors. The goal of the system is to produce block-by-block estimates of strong ground shaking.

- Global distributed network
  - Rapid shakemap notification
- Citizen Science
A new earthquake monitoring system based on a dense array of low-cost sensors. The goal of the system is to produce block-by-block estimates of strong ground shaking.

- Global distributed network
  - Rapid shakemap notification
- Citizen Science
- Analysis in the *cloud*
- Inexpensive USB & embedded cell phone accelerometers
Benefits & Target Users

- Easy deployment in areas w/o seismic networks
  - Cell phones are prevalent
- Shakemap Notifications
Benefits & Target Users

- Easy deployment in areas w/o seismic networks
  - Cell phones are prevalent
- Shakemap Notifications
- Use by utilities (e.g. Edison)
- Identify hard-hit areas quickly
  - Direct first responders
  - Resource allocation
Cloud Computing
Google App Engine
Android Client

- Android phones have accelerometers
- Need to eliminate noise
  - Tag data as “in pocket,” etc.
- Dense network
Android Client Overview

Registration (One time event)

Service

- Activity User Interface
- Accelerometer Data
- Playback
- Pick Sender
- Heartbeat
Picking Algorithm

1. Detected significant shaking
2. Maximum shaking
3. Sent message to server

Pause for this length of time before sending a message to the server again.

STA/LTA > threshold
Android Application

(Actual app)
New Android Client Progress

- Registers with App Engine server
- Background service collects and analyzes data
- Displays accelerometer data
  - Allows user to start and stop the program.
- Identifies Pick events
- Dedicated message sending thread to talk to App engine server
Server-side

- Client interaction
  - Registration
  - Pick messages
  - Heartbeat messages
Server-side

- **Client interaction**
  - Registration
  - Pick messages
  - Heartbeat messages

- **Data interaction**
  - Activity maps (pick + client)
  - Management console
  - Datastore API
  - Associator
Server-side

- Client interaction
  - Registration
  - Pick messages
  - Heartbeat messages

- Cloud Infrastructure
  - Google App Engine
  - Google Web Toolkit + Google Maps (web interface)

- Data interaction
  - Activity maps (pick + client)
  - Management console
  - Datastore API
  - Associator
Server-side Overview

Client Interaction
- Registration Handler
- Pick Handler
- Heartbeat Handler

Remote Access
- Datastore

Data Interaction
- Activity Maps
- Associator
- Management Console

API
New Server-side Progress

- API for Datastore access
- Streamlined visual style
  - Integrated pick and client maps
- Heatmap (relative acceleration)
Future Work: Server

- Management interface
- Map improvements
- Basic associator on App Engine
**Future Work: Android**

- Automatically identify when phone should collect data.
  - Currently controlled in user interface
  - Professor Krause + Jonathan & Manuel
- Smarter picking algorithm
- Heartbeat and playback support
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Demo

+ 

Q&A
CSN Map Prototype

Click the buttons below.

Pick Map  Client Map
Click the buttons below.

Pick Map  Client Map

Pick #11
Client: tester
Magnitude: 6.06426356864118
Date: Tue May 25 03:25:09 PDT 2010