

Technology for transit

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1/14/2010 for HackPittsburgh

Overview

Overview

- Problem domain

Overview

- Problem domain
- Survey of open source tools

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- Problem domain
- Survey of open source tools
- What's missing

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- What's missing
- Technical issues (Pittsburgh)

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- Survey of open source tools
- What's missing
- Technical issues (Pittsburgh)
- Political issues (Pittsburgh)
- Experimentation

Interlude

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- Pittsburgh Transit Guide (1994)

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 - My CMU CivE senior seminar project

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- Pittsburgh Transit Guide (1994)
 - (was) <http://transit.dementia.org/>
 - Hand-typed schedules (nothing to scrape!)
 - Perl CGI based simple route planner
 - My CMU CivE senior seminar project
 - I still have the code

Background, Biases

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- College in Oakland (CMU)

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Why tech for transit

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- Make best use of available service

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 - Funding cuts reduce what's available

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 - Fewer “one seat rides”

Why tech for transit

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 - Funding cuts reduce what's available
 - Fewer “one seat rides”
 - Unfamiliar can be intimidating

Why tech for transit

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- Make service accessible

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- Make service accessible
 - Help new riders find needed service

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- Make service accessible
 - Help new riders find needed service
 - Help visitors see what's available

Why tech for transit

- Make service accessible
 - Help new riders find needed service
 - Help visitors see what's available
 - Find open wheelchair or bike slots

Classes of problem

Classes of problem

- What's possible generally

Classes of problem

- What's possible generally
 - Schedules

Classes of problem

- What's possible generally
 - Schedules
 - Route planning

Classes of problem

- What's possible generally
 - Schedules
 - Route planning
 - Service features

Classes of problem

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- What's possible now

Classes of problem

- What's possible now
- Current schedule

Classes of problem

- What's possible now
 - Current schedule
 - Detours

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- What's possible now
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 - Detours
 - Delays

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- What's possible now
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 - Resource availability

Tools

Tools

- Trip planner

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- Trip planner
 - The most basic needed tool

Tools

- Trip planner
 - The most basic needed tool
 - Trip data

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 - Trip data
 - Google Transit Feed

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 - OpenStreetMap

Schedule data sourcing

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- Need a base of data to work from

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 - Google Transit Feed Specification

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 - Supported by many agencies

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 - <http://code.google.com/p/googletransitdatafeed/>

Manipulation/Visualization

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 - validate (FeedValidator)
 - manipulate (TransitFeed)
 - visualize (ScheduleViewer)

Trip planning

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- Graphserver

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 - <http://graphserver.github.com/graphserver/>

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 - Example: <http://www.walkscore.com/transit-map.php>

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 - C++, Python, Boost, SWIG
 - Development stopped
 - Simple to deploy
 - Minimal dependencies
 - Small footprint

Trip planning

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- gosmore

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- pgRouting

Mapping

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- Not directly transit

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 - But people want to see it

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 - Python bindings available
- OpenLayers, GeoServer, et al

Schedule publishing

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- **TimetablePublisher**

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 - Contributed by a transit agency (TriMet)

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 - Java, open source

Mobile Apps

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 - Obj-C iOS, Ruby server

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 - GTFS data source

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- PDXBus

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 - <http://www.teleportaloo.org/pdxbus/src/>
 - Obj-C iOS
 - Some PDX-specific data formats

What's missing

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- Real-time arrival data API

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 - Not part of GTFS

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 - Usually (system-specific) XML via HTTP

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 - Not part of GTFS
 - Usually (system-specific) XML via HTTP
 - APTA TCIP *might* help
- Detour/route update API
 - A street closes. Where is my bus?

What's missing

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- *Low* tech solutions

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 - Not everyone has a smart phone

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- Mode merging

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 - Bike routing data

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- Mode merging
 - Bike routing data
 - Pedestrian routing data

Technical Issues

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- Real time tracking

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 - Requires hardware

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 - Often shipped on new buses, not enabled

Technical Issues

- Real time tracking
- Requires hardware
 - Often shipped on new buses, not enabled
 - Backend server needed to share

Technical Issues

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- Detours

Technical Issues

- Detours
 - Just needs deployed tools

Technical Issues

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 - Just needs deployed tools
 - This data is already shared

Political Issues

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- Lack of Port Authority staff time to spend on improvements

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- Lack of money to license patents

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- Union opposition to real-time tracking

Political Issues - Money

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- Grant writing to fund new projects

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 - Requires ally inside Port Authority

Political Issues - Patents

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- NextBus and ArrivalStar patents

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 - But who can afford the attorneys to find out?

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 - May not be an issue
 - But who can afford the attorneys to find out?
- Further details: transit-developers list, 1/4/2010

Political Issues - Unions

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- A hot potato

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 - Recent Red Line (Beechview light rail) delays

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 - Would likely be a contract point of contention

Political Issues - Unions

- A hot potato
 - Recent Red Line (Beechview light rail) delays
 - Would likely be a contract point of contention
 - Which is worse in “no money” world

Political Issues

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- Workarounds

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- Aggregate “opt in” data from smartphone users

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 - License real time location data from cellular providers

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 - Aggregate “opt in” data from smartphone users
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 - License real time location data from cellular providers
 - Just experiment for now

Experimentation

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- Building blocks

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 - Linux or FreeBSD

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 - Something with a decent set of prebuilt or buildable tools

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- Linux or FreeBSD
 - Something with a decent set of prebuilt or buildable tools
 - Python, Ruby, web server

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 - HOWTO on website

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Experimentation

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 - Or tutorial here:
 - *https://gs_tutorial.s3.amazonaws.com/presentation/Applied%20Routing.html*

Experimentation

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- OpenStreetMap

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 - Best free source of street and trail data

Experimentation

- OpenStreetMap
 - Best free source of street and trail data
 - But some attributes missing

Experimentation

- OpenStreetMap
 - Best free source of street and trail data
 - But some attributes missing
 - Pick likely “test” routes and verify data

Experimentation

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- Real-time tracking

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 - But how do you tell it what trip info to transmit?

Experimentation

- Real-time tracking
 - Define minimal tracking format
 - Build minimal gumband tracker
 - But how do you tell it what trip info to transmit?
 - Likely need intermediate server to rewrite to XML

Experimentation

Experimentation

- Detour info

Experimentation

- Detour info
 - Screen-scrape Port Authority site

Experimentation

- Detour info
 - Screen-scrape Port Authority site
 - If we get serious, I have limited contacts there.

Resources

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- onebusaway.org

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- onebusaway.org
- opentripplanner.org

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- opentripplanner.org
- openplans.org

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- onebusaway.org
- opentripplanner.org
- openplans.org
- geoserver.org

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- geoserver.org
- code.google.com/p/fivepoints

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Questions?

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