

An open source multimodal journey planning system based on 'de facto' standards

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Multimodal journey planning



What is it all about?

Given an origin and a destination...

From

London

To

Glasgow



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Multimodal journey planning



What is it all about?

... and a set of optimization criteria...

- Shortest path
- Fastest path
- Fewer transfers



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Multimodal journey planning



What is it all about?

... get one or more routes combining different transport modes.

Rutas sugeridas con las próximas salidas:

- 1: 06/05/2008 05:38 - 06:29 (52 min)   
- 2: 06/05/2008 06:08 - 07:01 (54 min)   
- 3: 06/05/2008 06:33 - 07:20 (48 min) 



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Some examples



Google Transit

Google Maps

Dirección de origen p. ej. "SFO" SS1 3HJ Dirección de destino p. ej. "94526" 51.569708,0.645618 Cómo llegar

Buscar en el mapa Buscar negocios **Cómo llegar**

Resultados Mis mapas

Indicaciones: [En coche](#) - **Transporte público**

Opciones Rutas alternativas

Rutas sugeridas con las próximas salidas:

- 1: 06/05/2008 05:38 - 06:29 (52 min)
- 2: 06/05/2008 06:08 - 07:01 (54 min)
- 3: 06/05/2008 06:33 - 07:20 (48 min)

[Obtener rutas invertidas](#)

De: Southend-on-sea, Essex SS1 3HJ Reino Unido [Editar](#)

Transporte público
Se muestra la duración del viaje: alrededor de 52 min muestra el [Viaje 1](#)

Camine hasta Thorpe Bay, Thorpe Bay Railway Station (opp)
Aproximadamente 11 min

Autobus - 7 - Rayleigh - Hockley - Rochford - Southend - Shoeburyness - Dirección: Rayleigh, Rayleigh Railway Station (N-bound)
Servicio de Arriva Southend
05:49 Salida de Thorpe Bay, Thorpe Bay Railway Station (opp) (ID de

©2005 Google - Datos de mapa ©2005 Tele Atlas - [Términos de uso](#)



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Some examples



TMR Vull Anar

VULL ANAR

De Estació de Sants de RENFE - Est de Sants, 0, a Aparcament Sagrada Família - Pl Sagrada Família, 9
Pel dia 10/03/2009. Hora de sortida: 19:00, Hora d'arribada: 19:17

Nou recorregut Mostrar camí de retorn Modificar dia i hora ? Ajudar

Descripció del recorregut: 5
Agafa la línia 5-CORNELLÀ / HORTA de Metro a la parada SANTS ESTACIO i després de 5 parades baixa a SAGRADA FAMÍLIA.

Temps total, 17 min
Has de caminar, 05 min

Mapes
Origen: Estació de Sants de RENFE - Est de Sants, 0
Sants Estacio
Sagrada Família
Destí: Aparcament Sagrada Família - Pl Sagrada Família, 9

Veure recorregut text
 Veure recorregut 3D

Consultar línies
 5-CORNELLÀ / HORTA

Consultar altres recorreguts possibles Tots els recorreguts

Viatjant en metro: 5 (17')
Viatjant en autobús: 43 (42')
Viatjant en metro i autobús: 5 + 33 (29')

Què vols fer?
 Imprimir
 Enviar a un amic
 A la teva PDA



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Benefits

to the user

- Getting seamless information about the whole journey
- Reduction of waiting time
- Reduction of traveler stress



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Benefits

to the transport operator

- Seen as a good practice by the users
- Promotes use of public transport
- Operators can get information about the demand



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Decomposition of the problem

step 1 geocoding

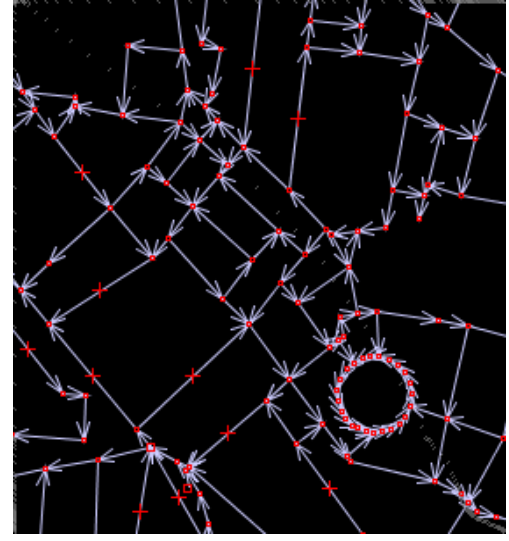
directions

From

To



graph nodes



coordinates



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Decomposition of the problem

step **2** route calculation

Least cost path algorithm (Dijkstra, Bellman-Ford, A*...)
peculiarities

- Edge weights may vary with the optimization criteria (distance, time...)
- There are temporal edges (timetable data)



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Decomposition of the problem




step 3 presentation

route summary

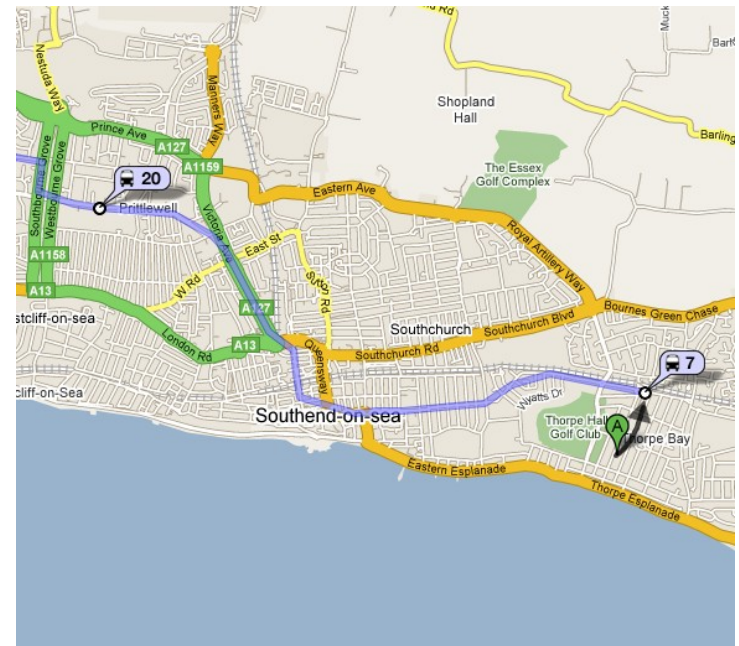
Rutas sugeridas con las próximas salidas:

- 1: 06/05/2008 05:38 - 06:29 (52 min)  
- 2: 06/05/2008 06:08 - 07:01 (54 min)  
- 3: 06/05/2008 06:33 - 07:20 (48 min) 

navigation directions

-  [Transporte público](#)
Se muestra la duración del viaje: alrededor de 52 min muestra el **Viaje 1**
-  [Camine](#) hasta Thorpe Bay, Thorpe Bay Railway Station (opp)
Aproximadamente 11 min
-  [Autobus - 7 - Rayleigh - Hockley - Rochford - Southend - Shoeburyness - Dirección: Rayleigh, Rayleigh Railway Station \(N-bound\)](#)
Servicio de Arriva Southend
05:49 Salida de Thorpe Bay, Thorpe Bay Railway Station (opp) (ID de

map



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SITI Project

Sistema de Información de Transporte Intermodal



Supported by the Spanish Ministry of Transport
(Ministerio de Fomento) FOM2005-TTE-19

One of the results of this project
was the prototype that will be next presented



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Prototype

requirements

- demonstrate basic functionality
 - geocoding
 - door to door route calculation
 - textual directions
 - drawing the route on a map



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Prototype

requirements

- urban as well as inter urban coverage
- low cost
 - completely based on open source solutions
 - minimizing cartography costs
- scalable



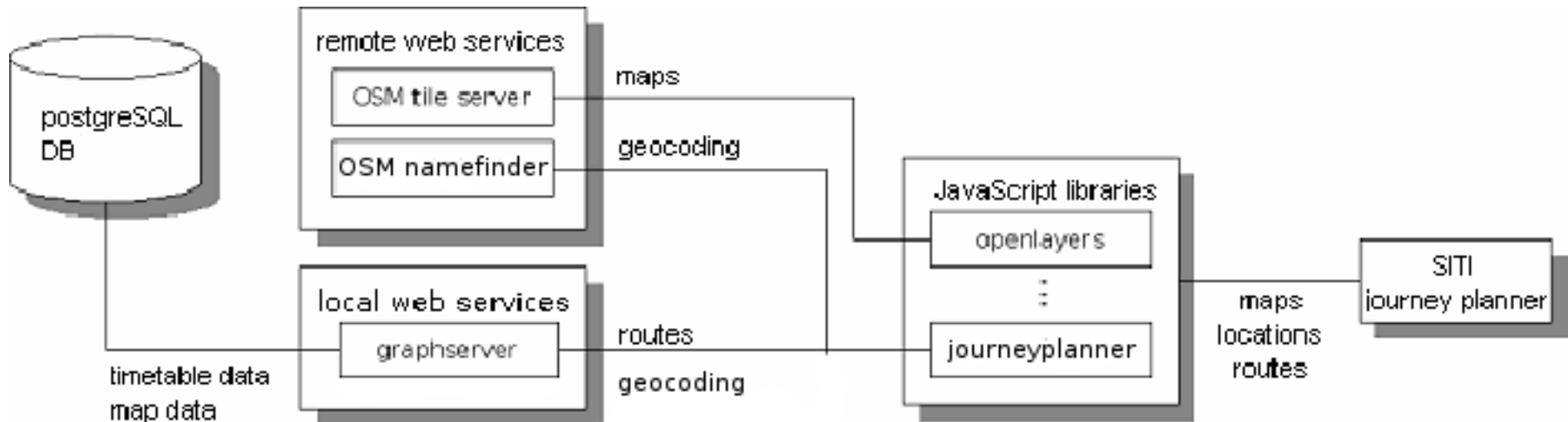
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Prototype

architecture



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Prototype

components of the mashup



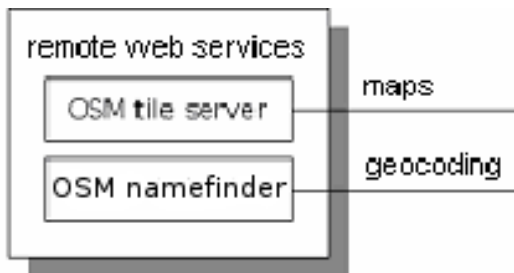
- PostgreSQL database
 - OpenStreetMap vectorial cartography
 - timetable data in Google Transit (GTFS) format



Prototype

components of the mashup

- Remote web services



- OSM tile server: OpenStreetMap rendered maps (raster)
- OSM namefinder: direct and reverse geocoding



Prototype

components of the mashup

- Local web services
 - Graphserver: multimodal route calculation (extended to provide reverse geocoding)



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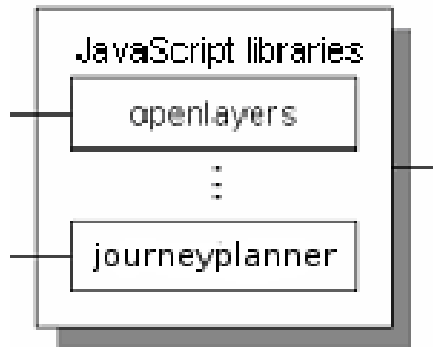
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Prototype

components of the mashup

- JavaScript libraries
 - OpenLayers: map management
 - Othe created on purpose to glue all the pieces



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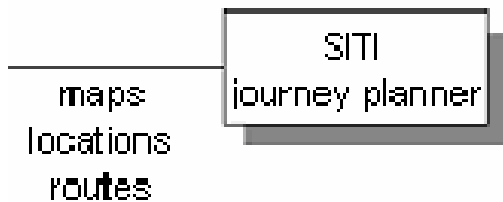
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Prototype

components of the mashup

- Multimodal journey planner SITI
 - User interface
 - Only HTML and CSS



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Data sources

Cartography: OpenStreetMap

- A 'de facto' standard for collaborative cartography
- Contribution to Graphserver
 - Parsing OSM files to PostGIS DB
 - Simplifying redundant nodes from the graph



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Data sources

Public transport timetable data: GTFS

- A 'de facto' standard for public transport timetable data, used in Google Transit
- Contribution to Graphserver
 - Improving the parsing of GTFS, enabling simultaneous use of several operators and including frequencies



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Conclusions

Simple, easy to configure

- Download OpenStreetMap data
- Download or create GTFS data (there are public feeds available)
- Execute some scripts to load data into the DB and simplify the graph
- Launch the journey planner :)



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Conclusions

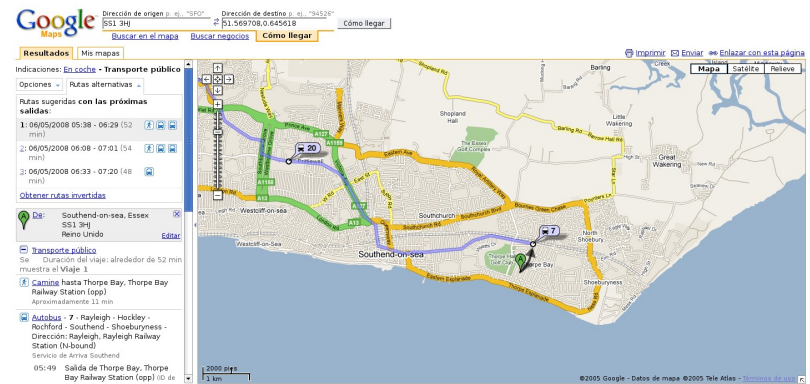
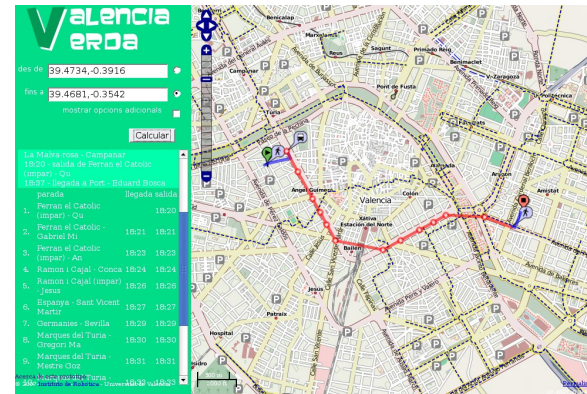
Utility of de facto standards



map.osm



google_transit.zip



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Visit our web site
www.intermodal.es

Test the online demo
<http://ssiti.uv.es/valencia>

Download the source code
<http://graphserver.svn.sourceforge.net/svnroot/graphserver/branches/juanguir>

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