RideShare

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RideShare

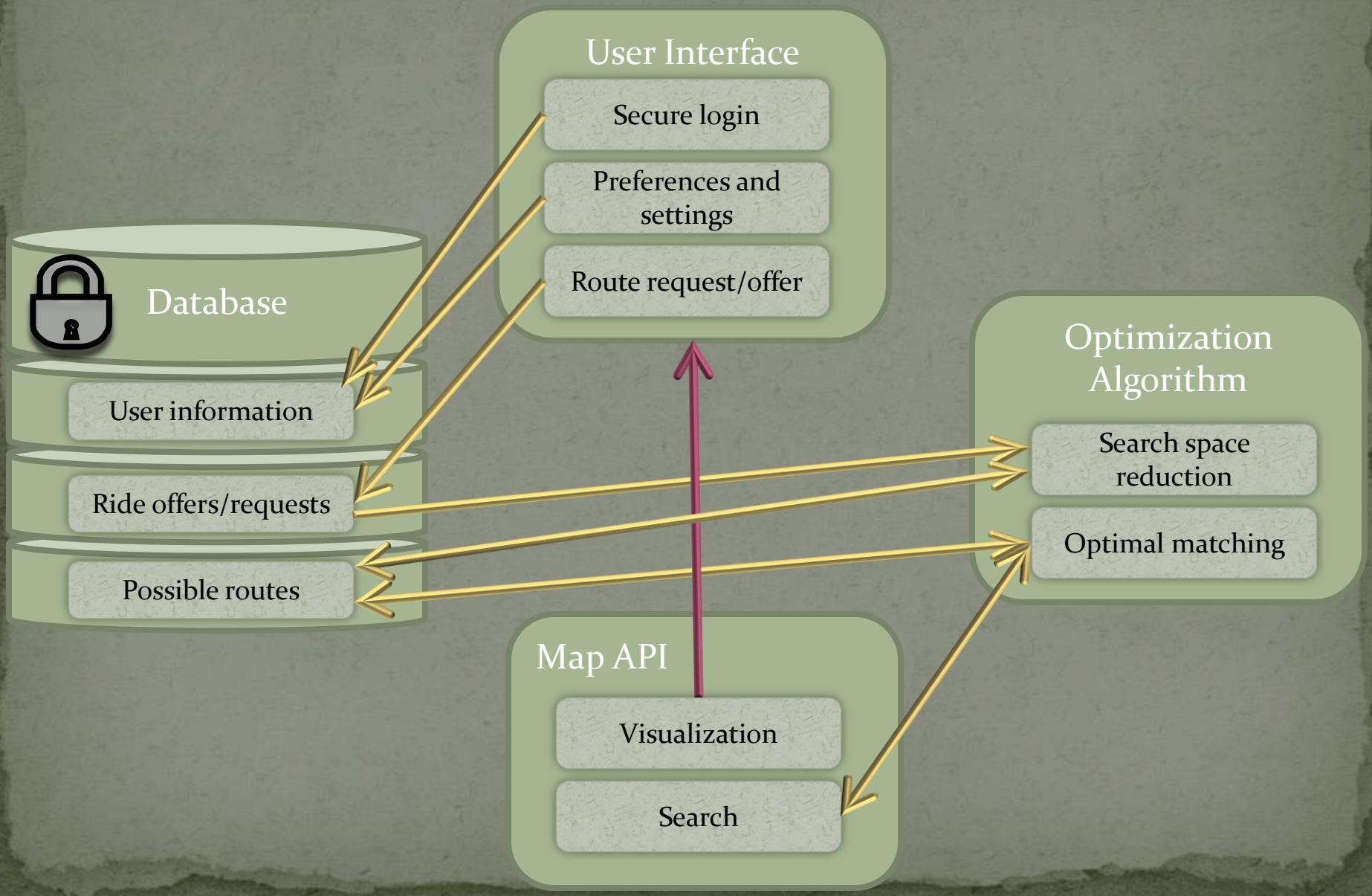
Map-based web application to facilitate ridesharing between drivers and passengers.

- Application Requirements
- Architecture and Design Alternatives
- Design Choices
- Information Sources

Application Requirements

- User information management
  - Secure login, preferences, friends, communication, ratings, photo
- Ride offers/requests management
  - Creating new rideshares, accessing and changing existing rideshares, choosing among matches
- Maximal matching
  - Algorithm efficiency
  - Time complexity must be polynomial
  - Ability to apply preliminary criteria to reduce search space
- Search and visualize routes
  - Ability to manipulate graphic layers easily
  - Ability to query map server in high volume

Data Flow Graph



Architecture and Design Alternatives

- Content Management System
- Application Server
- Database
- Matching Algorithm
- Map API

Content Management System (CMS)

	Drupal	django	Ruby on Rails
Programming language	PHP Optional module-level development Little coding required	Python	JavaScript, AJAX, Ruby
Application server support	Apache (Windows, Linux, Mac OS X)	Windows, Linux	Windows, Linux, OS X (Leopard)
Database support	MySQL, PostgreSQL, SQLite	MySQL, PostgreSQL, SQLite, Oracle	MySQL, PostgreSQL, SQLite, Oracle, DB2
User base/ Documentation	Online tutorials, Forums, How-to Videos, many user-contributed modules	Online tutorials, mailing list, IRC channel	Books, online tutorials, user-contributed advice
Map Modules	Google Maps	Not detailed	Google Maps (rudamentary)

Unknown Author, “Drupal," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.drupal.org /
Unknown Author, “Django ," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.djangoproject.com/
Unknown Author, “Ruby on Rails," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.rubyonrails.org/

Application Server

- Apache
  - Standard, very widely used
  - Stable, open source
- Microsoft Windows Server

Unknown Author, “Apache HTTP Server Project," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://httpd.apache.org/
Unknown Author, “Windows Server 2003," [Online document], 2007, [cited 2007 Nov 13], Available HTTP:http://www.microsoft.com/windowsserver2003/
Matthew Broersma, “Apache zooms away from Microsoft's Web server," [Online document], January 12, 2004, [cited 2007 Nov 13], Available HTTP: http://www.news.com/2100-7344-5139511.html

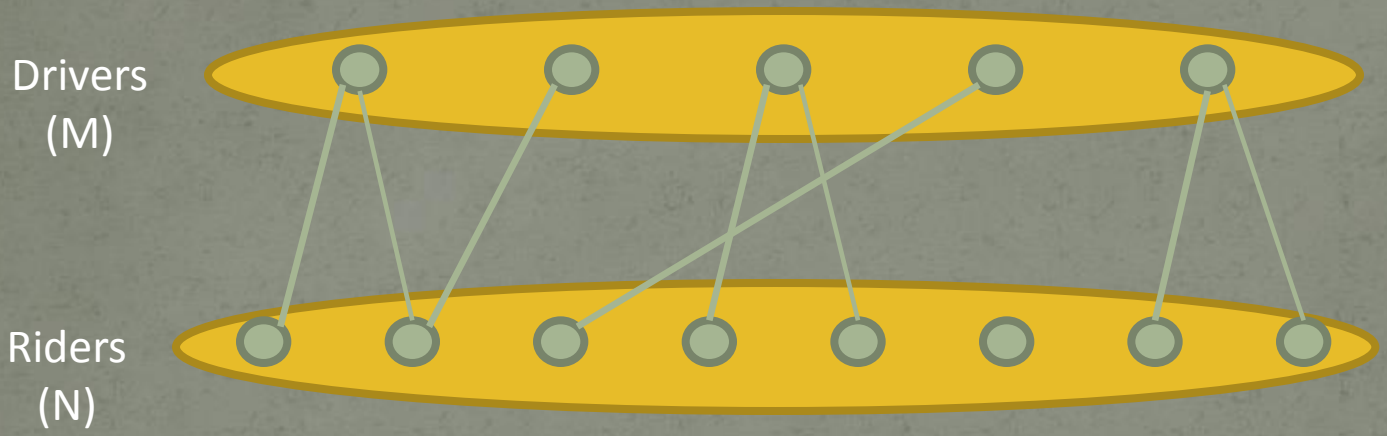
Database

- MySQL
- Oracle
- MS SQL
- PostgreSQL
- SQLite

- MySQL, PostgreSQL, SQLite supported by all three development frameworks
- MySQL, PostgreSQL, and SQLite are is free
- MySQL and PostgreSQL are backed up by a broad, open-source user base
- PostgreSQL includes more features
- MySQL is hosted on the majority of web-servers

Unknown Author, “MySQL," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.mysql.com/
Unknown Author, “Oracle," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.oracle.com/
Unknown Author, “Microsoft SQL," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.microsoft.com/sql/default.mspx
Unknown Author, “PostgreSQL," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.postgresql.org/
Unknown Author, “SQLite," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.sqlite.org/

Maximal Matching Algorithm



- Time complexity breakdown by type of solution:
  - Bipartite: $O(M*sqrt(N))$, $O(M*N^2)$
  - General Graph: $O(N^4)$
- Ability to generate otherwise efficient solutions
  - Reduce search space prior to running algorithm
  - Wrapper around algorithm comparing results

Istvan Simon, "Bipartite Matching," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.mcs.csuhayward.edu/~simon/handouts/4245/hall.html
Cameron McLeman, “Maximal Bipartite Matching Algorithm," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://planetmath.org/encyclopedia/MaximalBipartiteMatchingAlgorithm.html
Santosh Vempala, “Matching Algorithms," [Online document], September 9, 2007, [cited 2007 Nov 13], Available HTTP: http://www.cs.dartmouth.edu/~ac/Teach/CS105-Winter05/Handouts/vempala-blossom.pdf

Map API

Google & Yahoo

- Google Maps is well supported by Drupal and Ruby on Rails
- Google Maps has a larger user-developer community

Unknown Author, “Google Maps," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.google.com/apis/maps/
Unknown Author, “Yahoo Maps," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://maps.yahoo.com/maps.php/
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Unknown Author, “Ruby on Rails," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.rubyonrails.org/

Unknown Author, “MySQL," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.mysql.com/

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Unknown Author, “Microsoft SQL," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.microsoft.com/sql/default.mspx

Istvan Simon, "Bipartite Matching," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.mcs.csuhayward.edu/~simon/handouts/4245/hall.html

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Unknown Author, “Google Maps," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://www.google.com/apis/maps/

Unknown Author, “Yahoo Maps," [Online document], 2007, [cited 2007 Nov 13], Available HTTP: http://maps.yahoo.com/maps.php/

RideShare – Design Choices

- App Server
  - Apache
- Content Management System
  - Ruby on Rails
- Database
  - MySQL
- Matching Algorithm
  - Wrapper around algorithm for bipartite graphs
- Map API
  - Google Maps

Questions?