

CarPal: interconnecting overlay networks for a community-driven shared mobility

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Abstract. Car sharing has proven to be an effective solution to reduce the amount of running vehicles by increasing the density of passengers per car amongst medium/big communities like schools or enterprises. However the success of such practice relies on the ability by the community to share and retrieve effectively information about travelers and itineraries. Structured overlay networks such as Chord or CAN has emerged recently as a flexible solution to handle large amount of data without the use of high-end servers, in a decentralized manner. In this paper we present CarPal, a proof-of-concept for a mobility sharing application that leverages a Distributed Hash Table to allow a community of people to spontaneously share trip information without the costs of a centralized structure. The peer-to-peer architecture allows moreover the deployment on portable devices and opens new scenarios where trips can be updated in real time. Furthermore by the use of our Synapse protocol to interconnect different overlays/communities the success rate can be boosted up thus increasing the effectiveness of our solution. Some simulations results are shown to give a possible estimate of such effectiveness.

Keywords. Peer to peer, overlay networks, case study, information retrieval, car sharing

1 Introduction

1.1 Context

[Gigi: Responsible] [Vincenzo: Co-responsible]

1.2 Problem overview

[Gigi: Responsible] [Vincenzo: Co-responsible]

1.3 Contributions

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1.4 Outline

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2 Application architecture

[Vincenzo: Responsible] [Gigi: Co-responsible] [Laurent: Co-co-responsible]

2.1 Overlay network structure

2.2 Multiple queries

2.3 Data structures

2.4 Chained lists

2.5 Figures

2.6 Math formalization

[Gigi: revois ca parce que moi je suis pas trop fort dans la formalisation mathematique]

3 Interconnecting multiple networks

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3.1 Problem with non interconnection

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3.2 Synapses State of the Art

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3.3 New architecture

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4 Proof of concept

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4.1 Application description

4.2 Screenshots

5 Experimental results

5.1 Simulation settings

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[Vincenzo: take it as it is from the synapse paper]

5.2 Simulation results

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[Vincenzo: Take results from synapse paper]

5.3 Results interpretation

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[Gigi: Good luck on that :-D]

6 Conclusion and further work

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6.1 Range queries

6.2 Different overlay protocols

6.3 Mapping overlay/underlay

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