DEUKS internship: On the Interconnection of Heterogeneous Overlay Networks

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Overview

1. Introduction
2. Overlay Networks
3. Babelchord
4. Application Demo
5. Further Work
6. Cote d'Azur

Overview

1 Introduction

2 Overlay Networks

3 Babelchord

4 Application Demo

5 Further Work

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- DEUKS - Doctoral School towards European Knowledge Society, Tempus Project JEP - 41099 - 2006
- Consortium Members:
  - Universita Degli Studi di Udine (I)
  - University of Novi Sad (RS)
  - Institut National de Recherches en Informatique et en Automatique - Sophia Antipolis (FR)
  - Mathematical Institute of the Serbian Academy of Science And Arts - Belgrade (RS)
  - State University of Novi Pazar (RS)
  - Universidad Politecnica de Valencia - Valencia (ES)
  - Individual experts:
    - Prof. Pierre Lescanne, Ecole Normale Superieure de Lyon (FR)
    - Prof. Pawel Urzyczyn, University of Warsaw (PL)

Main objectives of DEUKS:

- Promotion of the current European landscape of doctoral programmes in Serbia;
- Building-up and implementing pilot doctoral programme according to the European innovative recommendations;
- Introduction of improved and new teaching methods: acquisition and exchange of knowledge in the specific fields of teachers' and students' interests;
- Building-up the environment for linking the EHEA and ERA.

My Participation

- Internship at INRIA Sophia Antipolis - LOGNET Team
- Team leader: Luigi Liquori
- Colaborators: Francesco Bongiovanni and Cédric Tedeschi
- Duration of stay: February 27^{th}, 2009 - May 25^{th}, 2009
- Main goal to develop a software which will follow algorithm described in the paper:
  L. Liquori, C. Tedeschi, and F. Bongiovanni: BabelChord: a Social Tower of DHT-Based Overlay Networks. In 14^{th} Symposium on Computers and Communications (ISCC 2009). IEEE, 2009.

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6 Cote d'Azur

Basic Terms

Definition (Overlay Networks)

An overlay network is a (computer) network which is built on top of another network. Nodes in the overlay can be thought of as being connected by virtual or logical links, each of which corresponds to a path, perhaps through many physical links, in the underlying network.

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Points of Interest

Scalability, resource discovery, failure recovery or routing efficiency, in particular in the context of information retrieval

Chord Protocol

- Ring of nodes

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- Uses consistent hashing to assign keys to nodes

Golden Rules of Chord

Notation

$$Key_x = H(Key)$$

$$IP_y = H(IP)$$

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$$Key_x = H(Key)$$

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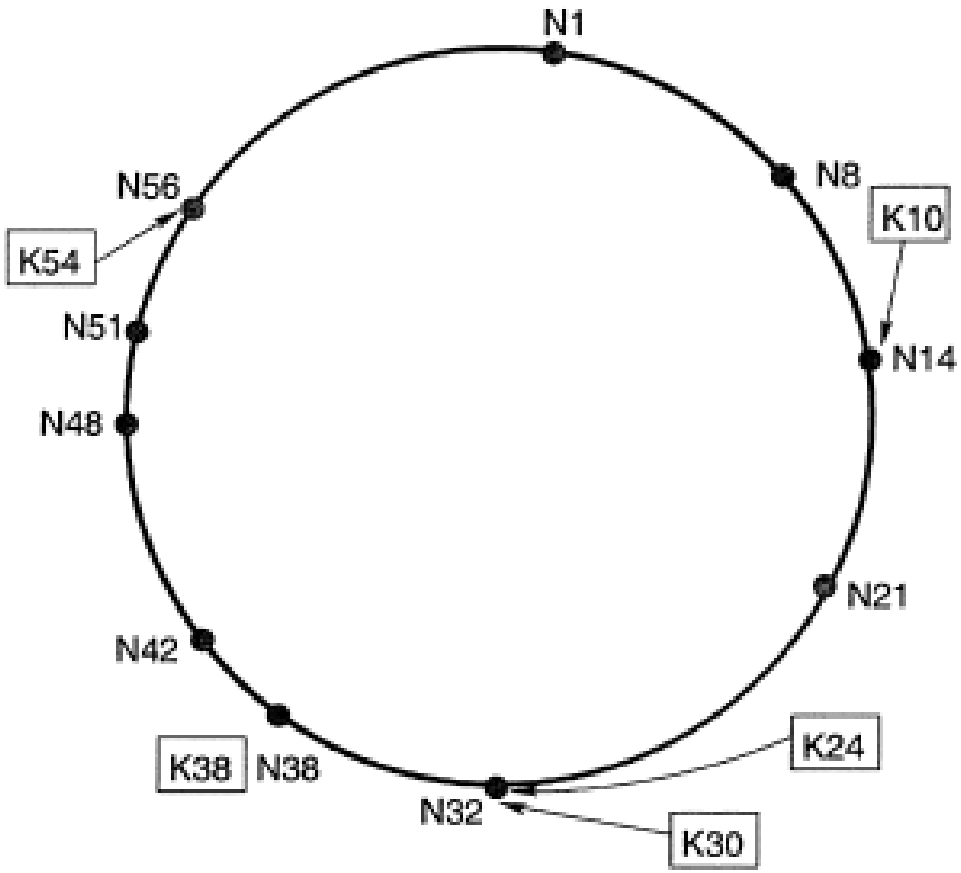
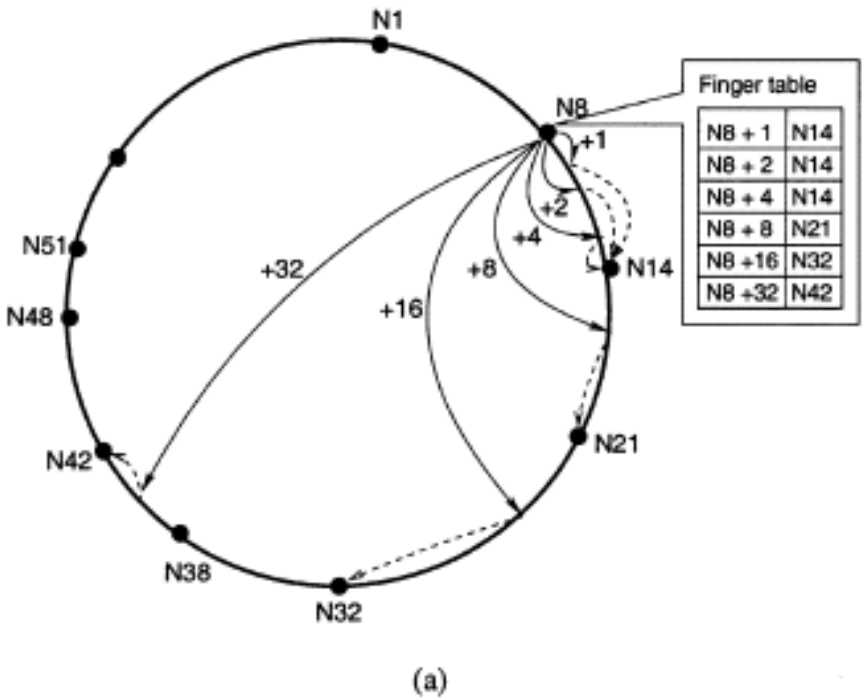
Golden Rules

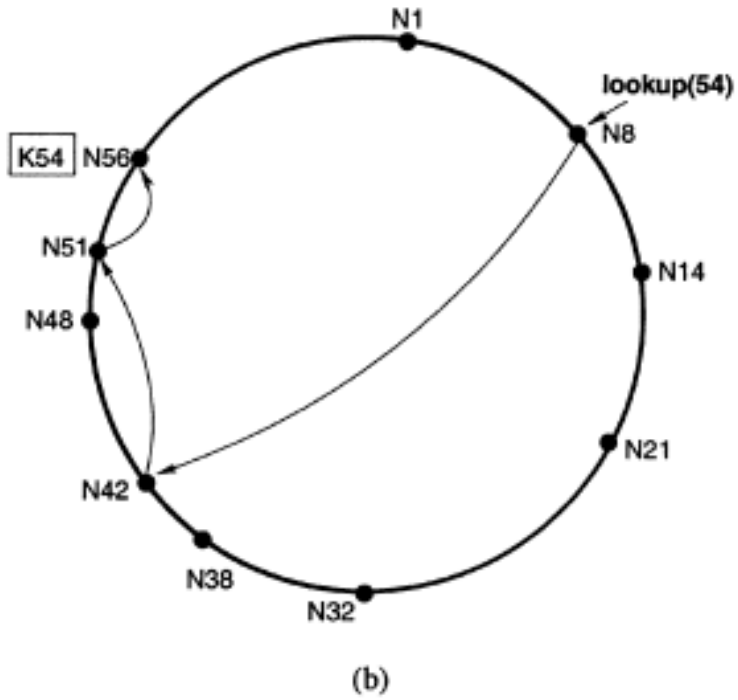
1. Invariant: Key_x, IP_y iff $x \leqslant y$
2. After JOIN keep GR1
3. After LEAVE keep GR1

Chord - Example

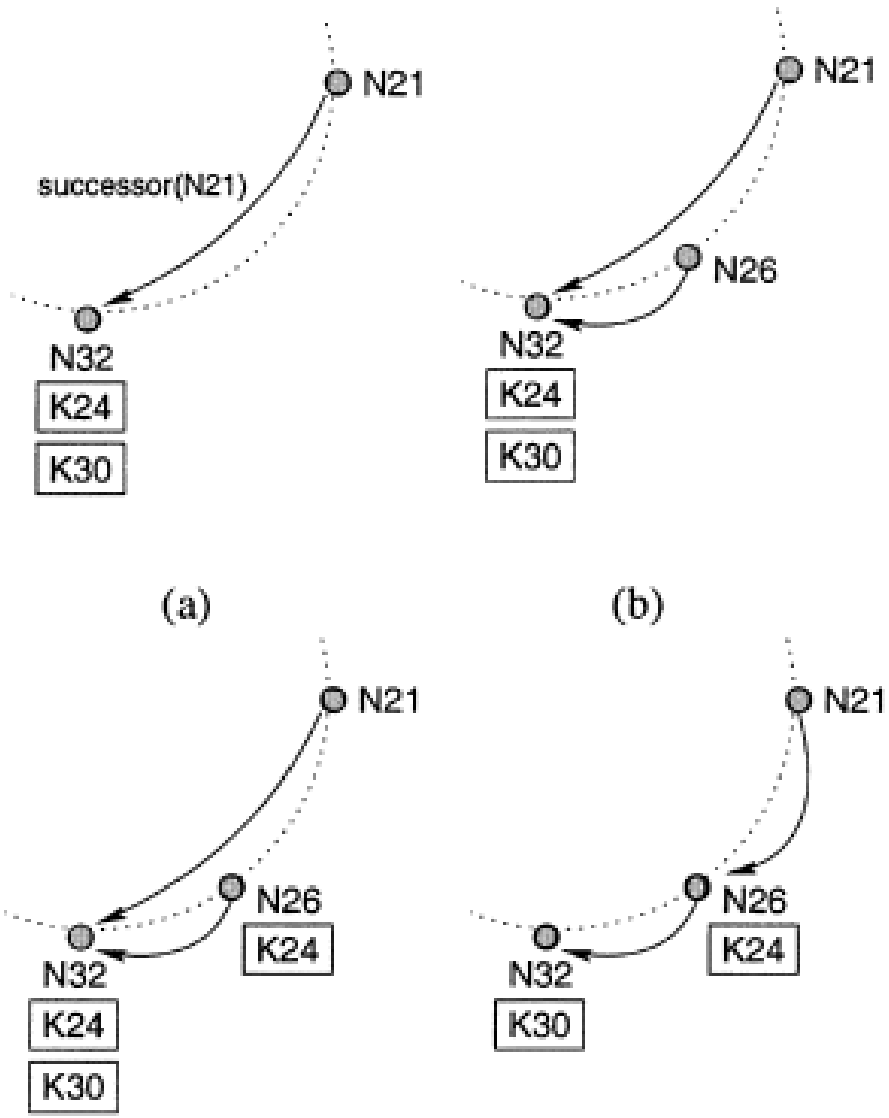


Chord - Example - Lookup procedure





Chord - Example - Joining of the new node



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Babelchord - Introduction

- Motivation: Merging of two Chord rings is costly
- Connecting smaller Chord networks in an unstructured way
- Nodes as *neural synapses*

Babelchord - Protocol

- Social component

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- Rings as Floors

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- Social component
- Rings as Floors
- Multi-floor routing

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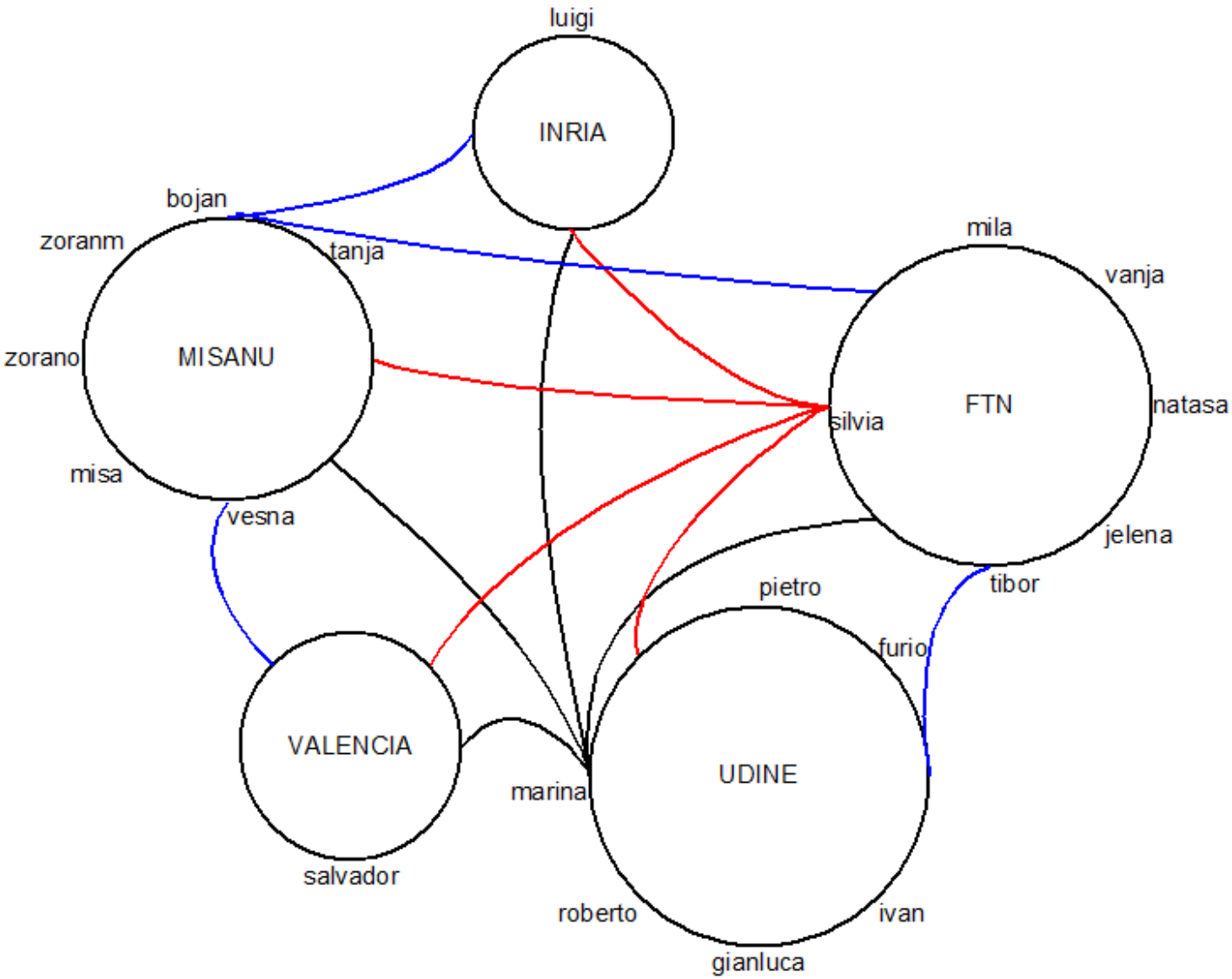
6 Cote d'Azur

Babelchord - Example



Eclipse demo

- Implementation is based on openChord 1.0.5
- Developed by: Distributed and Mobile Systems Group Lehrstuhl fuer Praktische Informatik Universitaet Bamberg
- Written in Java
- GNU public licence

Simulation and Test Results

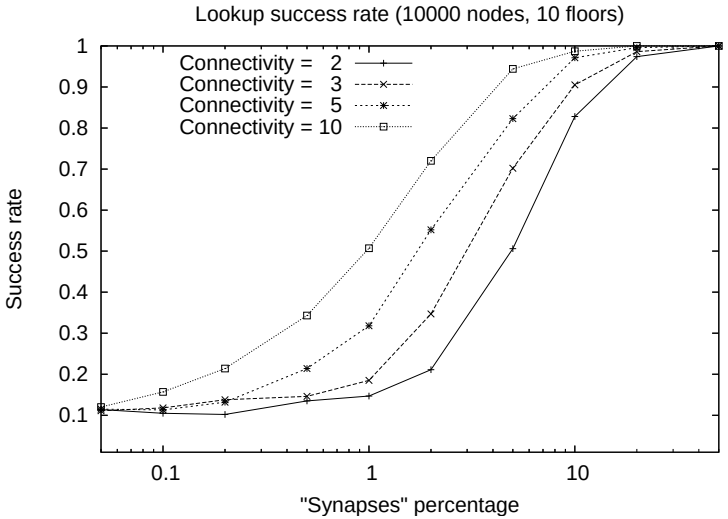


Figure: Simulation: Exhaustiveness

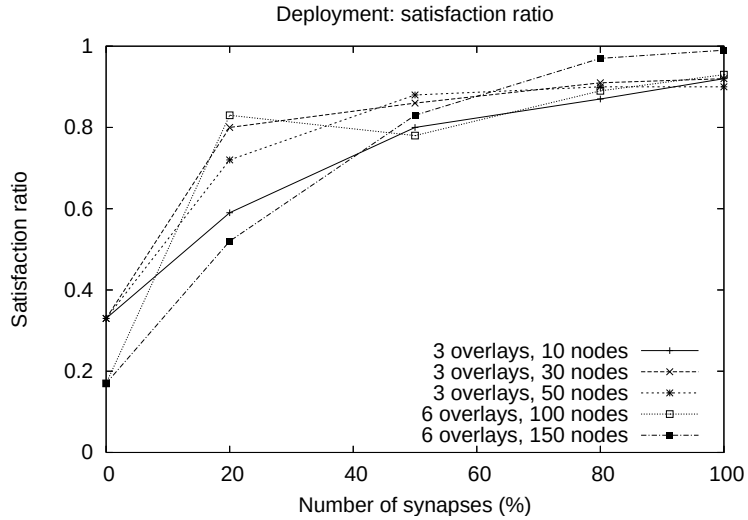


Figure: Deploying JSynapse[1]: Exhaustiveness

[1] JSynapse: Another implementation by LogNet team members

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Further Work

- Publishing paper
- "Babelize" other protocols for overlay networks
- Apply these techniques in other fields

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- Places
- Events
- Other

Merci Beaucoup!
Questions?

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