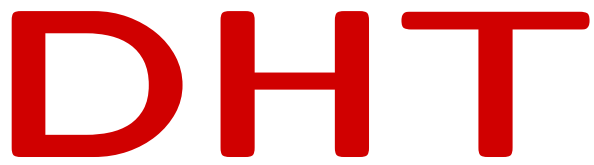
Server



wt

A Peer Activity Study in eDonkey & Kad

Thomas Locher
David Mysicka
Stefan Schmid
Roger Wattenhofer

DYNAS 2009 - Internationa...

http://dynas2009.im.pwr.wroc.pl/

Platzieren Sie Ihre Lesezeichen hier in der Lesezeichenleiste, um schneller auf sie zugreifen zu können.

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Submission

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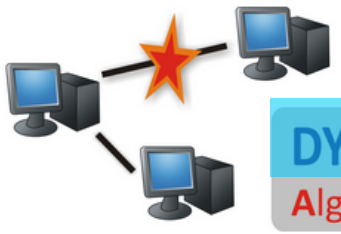
Conference Venue
Info for Visitors



DYNAS

DYnamic Networks
Algorithms and Security

International Workshop on DYnamic Networks: Algorithms and Security

September 5, 2009, Wroclaw, Poland

Place: Wroclaw University of Technology, building D1, room 215

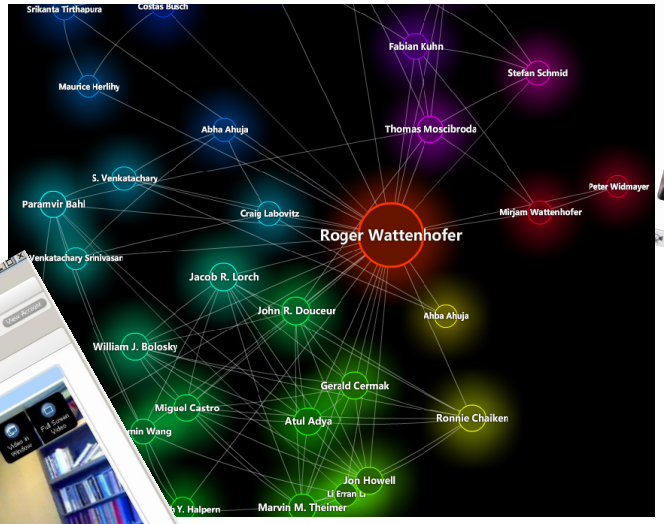
DYNAS is about dynamic networks such as Peer-to-Peer, Sensor and Ad-Hoc Networks. We will gladly welcome descriptions of original, well defined (possibly not yet completely solved) problems in the following areas.

- Algorithms for construction and maintenance of Peer-to-Peer, Sensor and Ad-Hoc Networks.
- Algorithms working on top of networks.
- Security and anonymity issues in systems of computationally weak devices (like RFID-tags).

The workshop will be colocated with FCT 2009. We plan to have sessions interleaving with longer time for discussions (possibly in small groups) and we will possibly have invited talks or tutorials. We especially encourage young active computer scientists to participate.

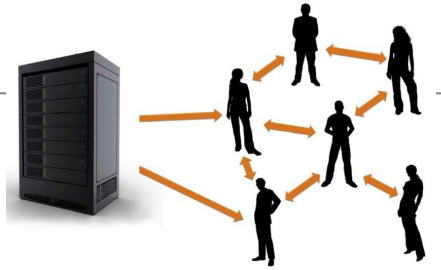
Dynamic Systems

- Many dynamic systems exist!

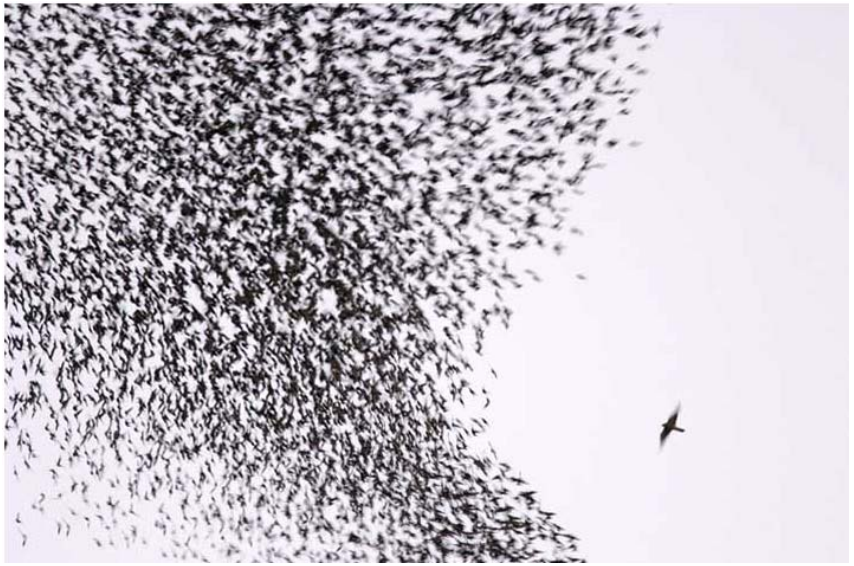


- Social networks, peer-to-peer systems...

Peer-to-Peer Systems



- In this talk: peer-to-peer systems



- How to design&organize an open distributed system?

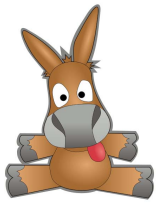
- Centralized (e.g., Napster)
- „Random“ (e.g., Gnutella),
- DHT-like (e.g., Kad)

What is better?!
It depends...

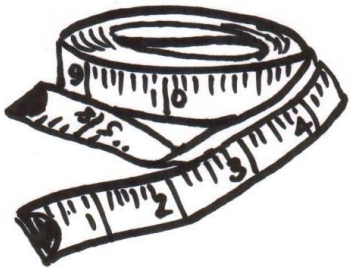
This Paper: Server vs DHT

- We performed measurements on two popular systems:
  - The server-based eDonkey system
  - The Kad network (essentially a DHT)

Both are accessed by eMule client:

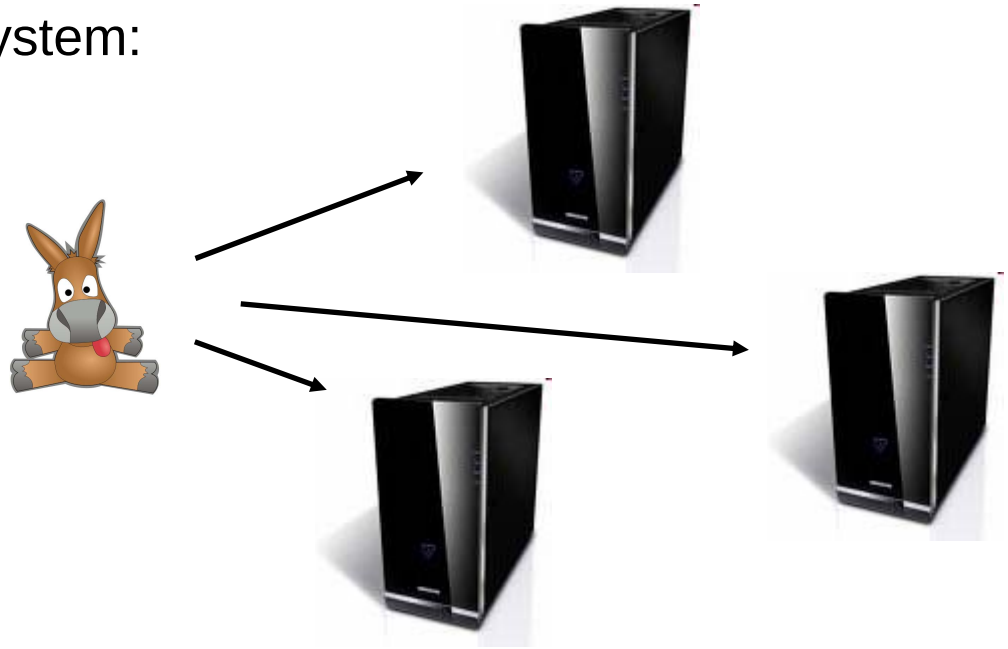


- How to measure?



eDonkey (Simplified!)

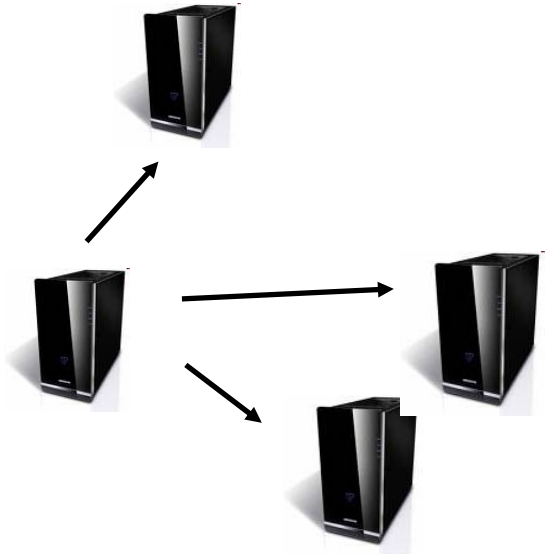
The eDonkey system:



We reverse engineered the *lugdunum* software (not open source to prevent fake servers),
set up our own servers,
and published them in the system.

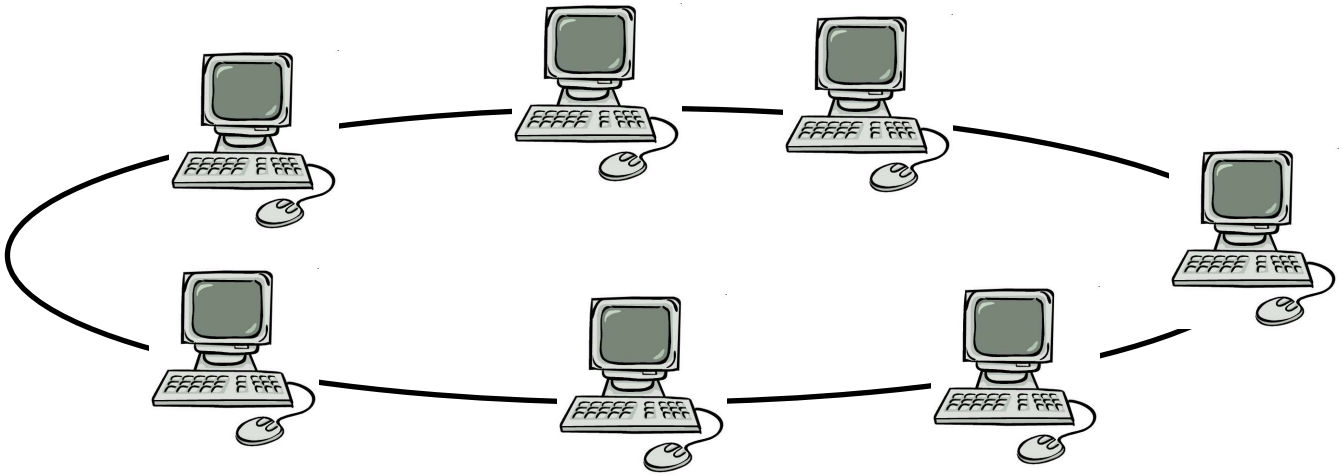
eDonkey (Simplified!)

- Peers iterate over list of servers, sending keyword requests
  - until 300 answers have been received
- Our fake server announces itself to many servers
  - they will send this info to the peers
- We answer status requests from servers, but do not allow peers to log in (reply we are full)
- We pretend to have many users and files



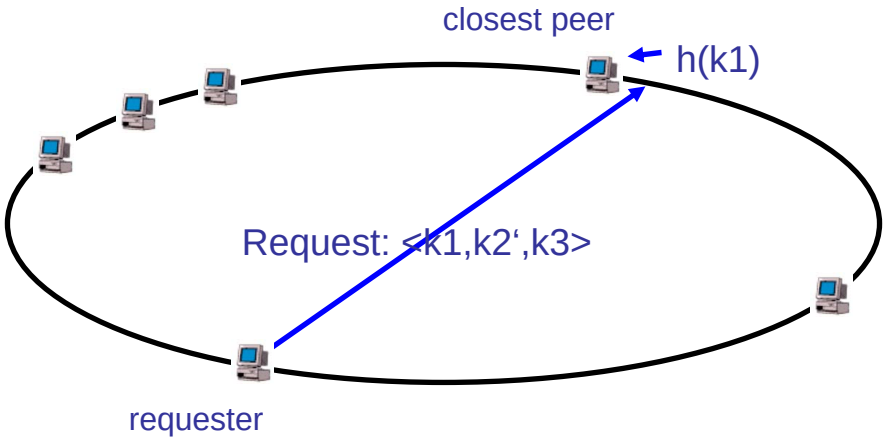
Kad (Simplified!)

The Kad system:



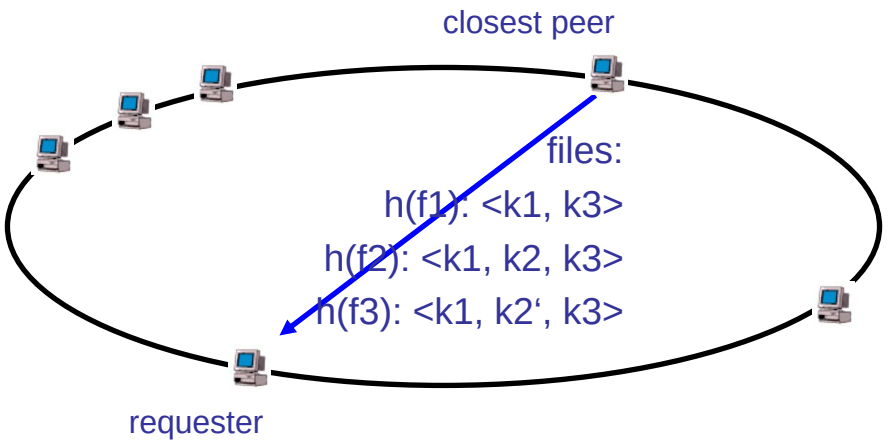
We generated an overlay ID at an interesting position („weakness“ of Kad)

Background: Kad Keyword Request



Lookup only with first keyword in list. Key is hash function on this keyword, will be routed to peer with Kad ID closest to this hash value.

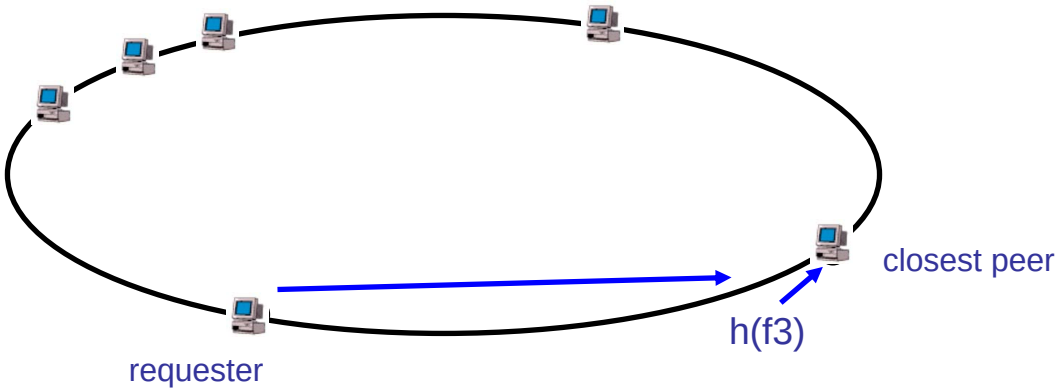
Background: Kad Keyword Request



Peer responsible for this keyword returns different sources together with keywords.

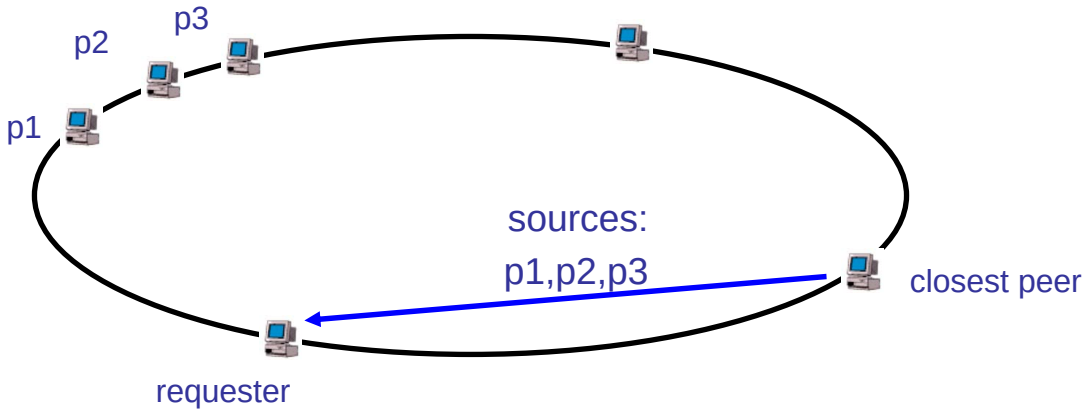
(remark: only those files with entries that include remaining keywords of request are returned, see later)

Background: Kad Source Request



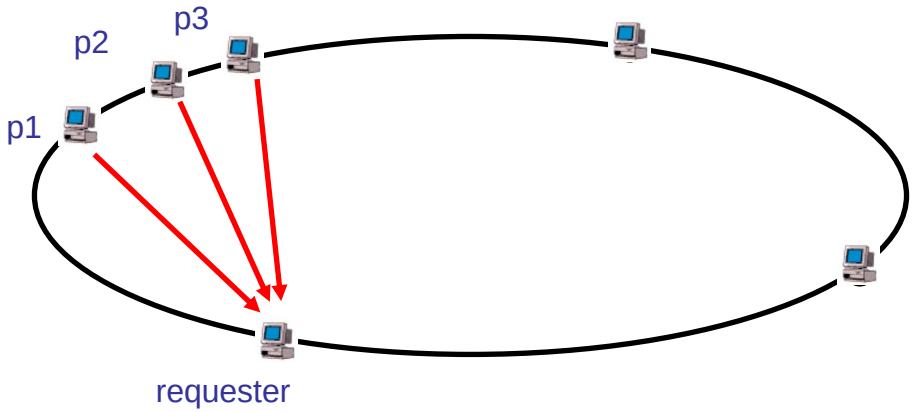
Peer can use this hash to find peer responsible for the file (possibly many with same content / same hash)

Background: Kad Source Request



Peer provides requester with a list of peers storing a copy of the file.

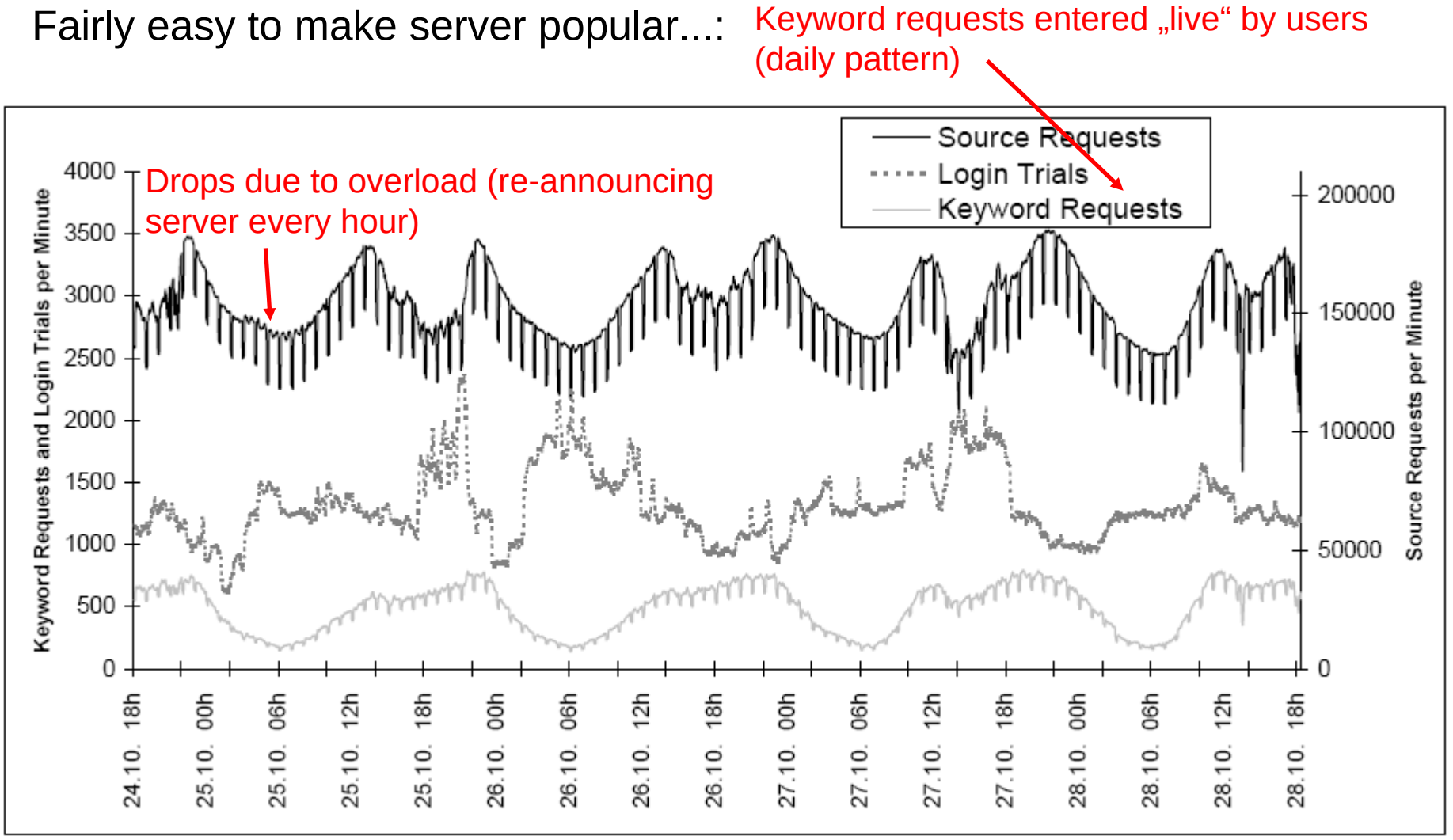
Background: Kad Download



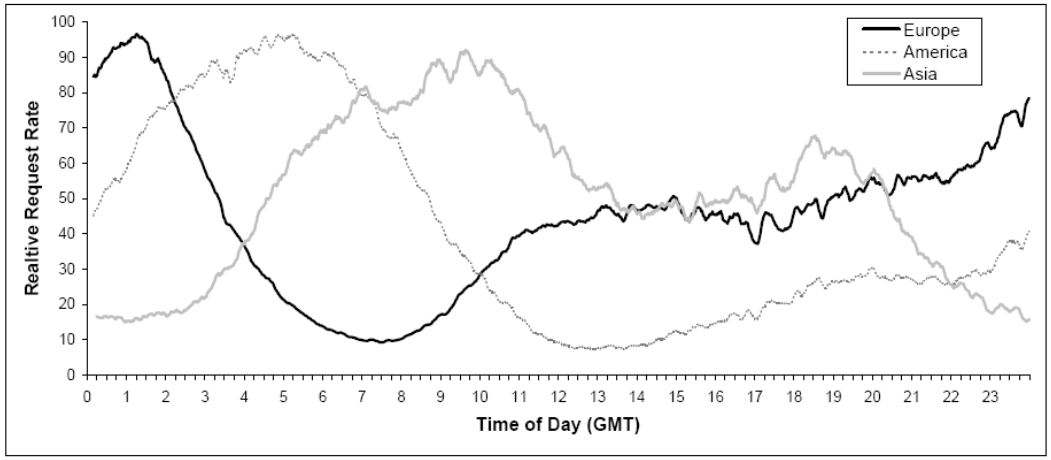
Eventually, the requester can download the data from these peers.

Activity on eDonkey

Fairly easy to make server popular...:



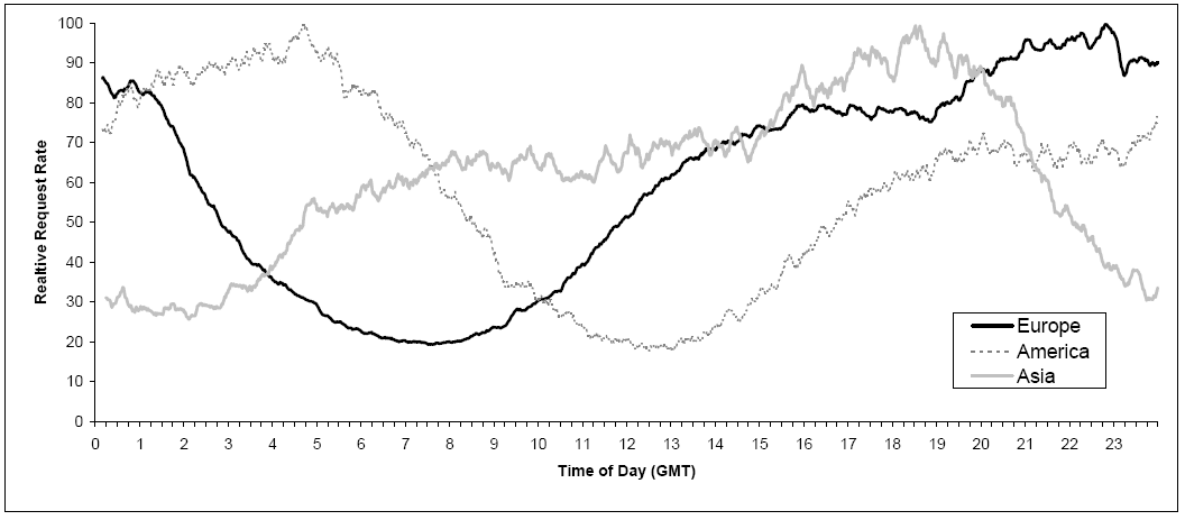
Temporal Distributions (wrt GMT)



eDonkey

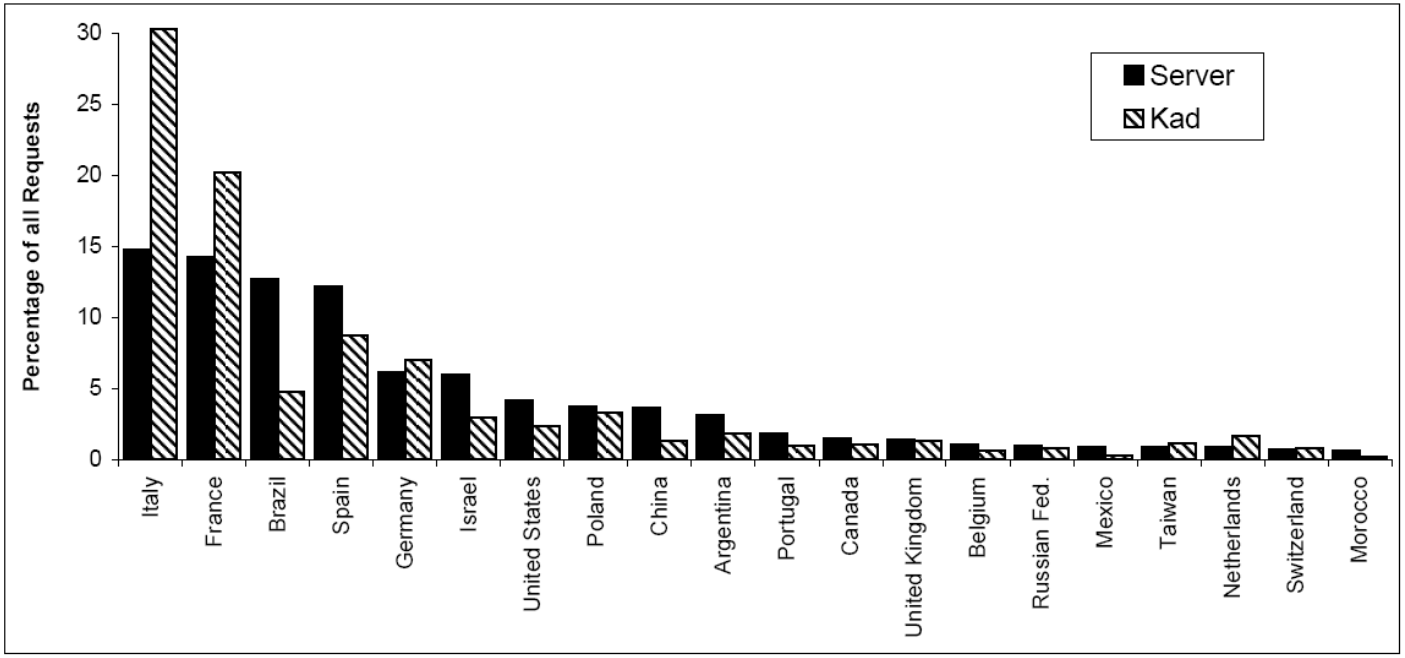
Kad

(average over 14 positions)



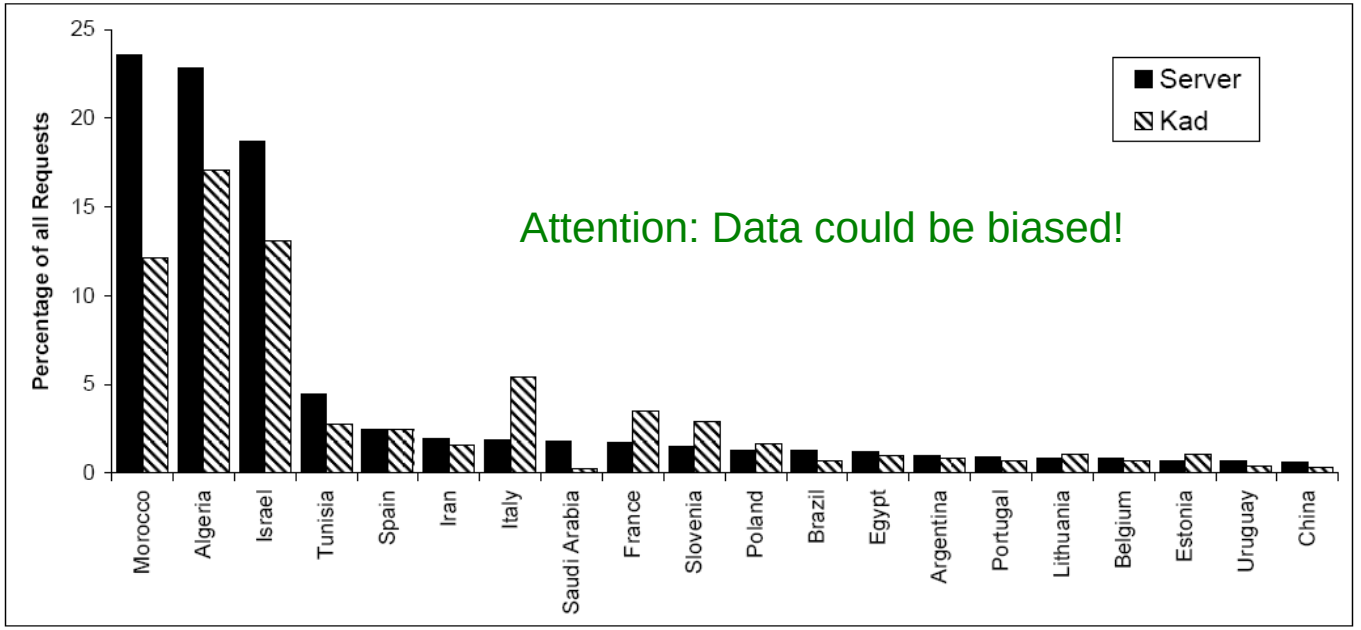
No surprise: main activity in both networks in the evening.

Origin of Keyword Requests (Server vs DHT)



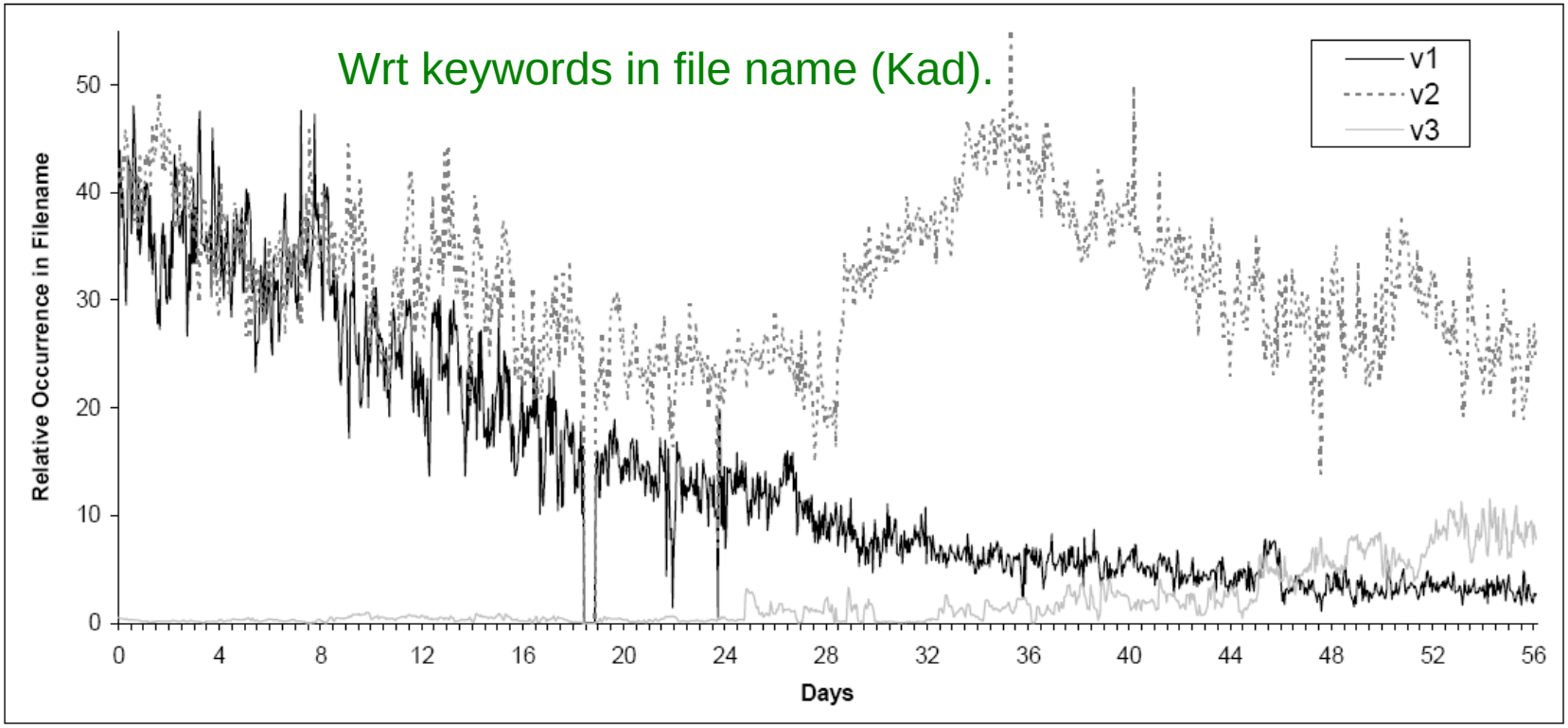
- Users can choose where to search...
- In both networks, the same countries are the most active.
- In Kad, the distribution is more concentrated. In particular, it is quite popular in European countries.

Origin of Keyword Requests (Server vs DHT)



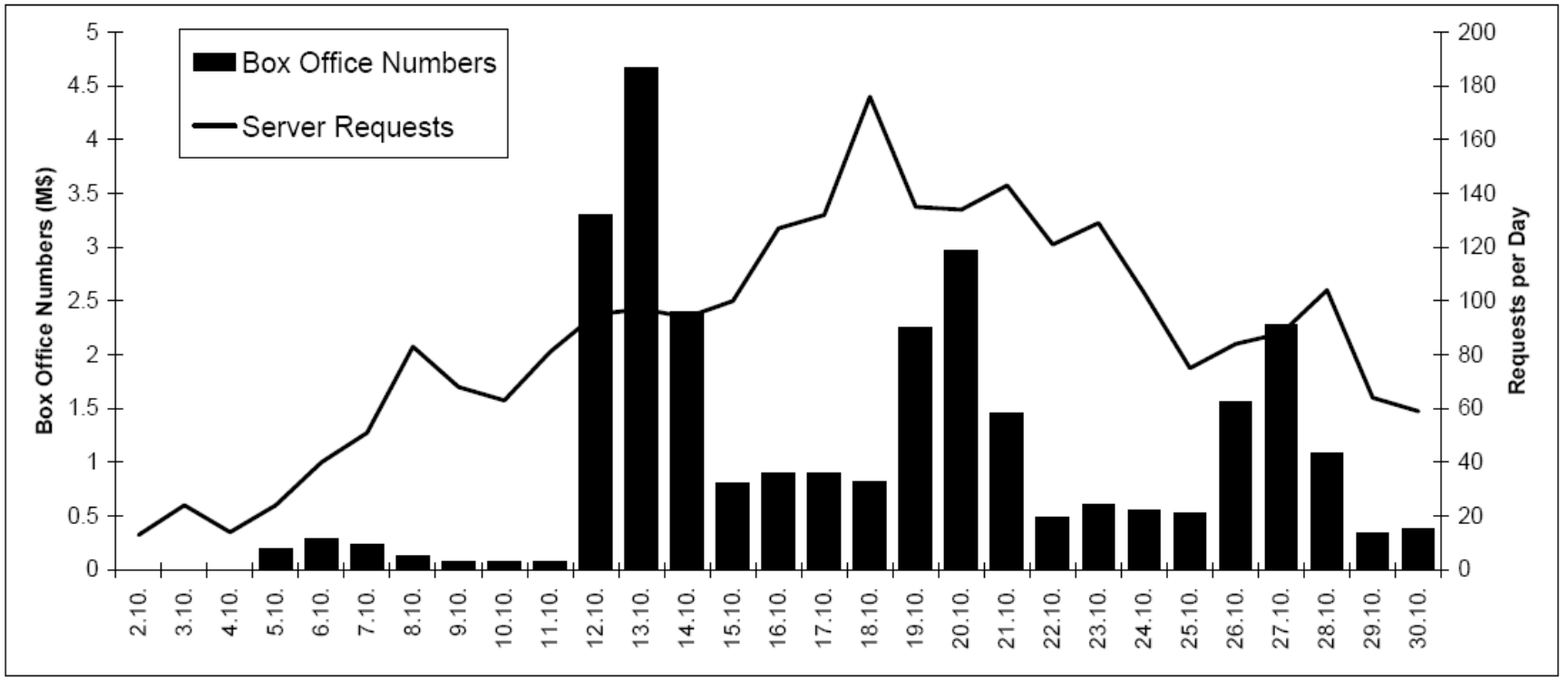
- Different countries have different population sizes...
- ... thus, we normalized the number of requests by number of Internet users in that country!
- Different picture now!
- Explanations? Because of few Internet users in Marocco? Because traffic is obfuscated by servers there (many requests from same IP!)?
- Popular in Europe, especially Israel, but not in the U.S.
- Distribution has heavy tail!

Search Content: Movie Quality



- Different qualities of a movie: no surprise, as soon as a better version is announced, users start looking for it!

Kad vs Real World



- For a specific movie, popularity in cinema and Kad exhibits a similar trend.
  - with a slight delay

Open Questions / Experiments

- Is there a statistical trend towards DHTs?
  How fast does the popularity of Kad grow?
- Given current network data, can we make predictions about real developments? (cf also Google trends)
- Demographic / political / sociological trends:
  E.g., is there a relation between political regimes and usage of centralized vs decentralized computing?
- Cultural developments:
  Which countries are interested in the culture (music, movies, ...) of each other?

What Else Can I Find in the Paper?

A Peer Activity Study in eDonkey & Kad

- More information on the measurement environment

- Discussion on representativeness of data

- Interesting related work, e.g., by Biersack and Steiner

Thank you for your attention!

More infos on:

http://www.cs.uni-paderborn.de/fachgebiete/fg-ti/personen/schmiste.html

Representativeness

- Is our data representative?!
  - Server: Obtains all kinds of requests, but there are other servers
  - Kad: We only obtain the requests from the positions we monitor

- Server
  - eMule sends all source requests to bot eDonkey and Kad
  - In Kad, we obtain almost all requests for a given ID
  - Thus, we can measure the fraction of requests at our server!
  - There is no reason why selecting servers is biased, e.g., by geography? Distribution is same as for Kad!
  - Interestingly, it‘s almost **around 10%!**

- Kad
  - Monitoring as many uniformly chosen positions as possible
  - Attention: other peers may not be distributed uniformly, though!