Autonomic Management of Maintenance Operations in a Peer-to-Peer Routing Overlay
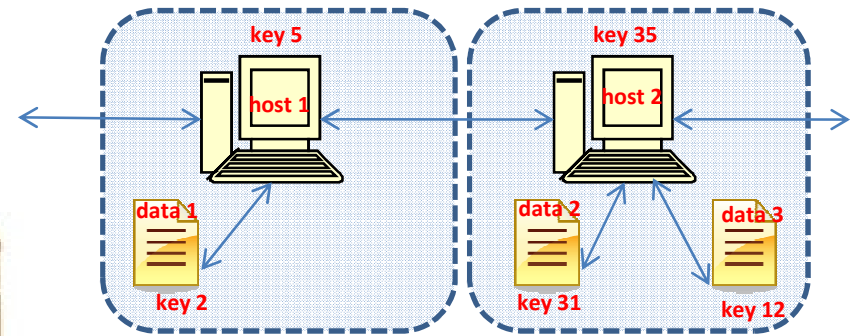
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SCONE 2008

Research Area

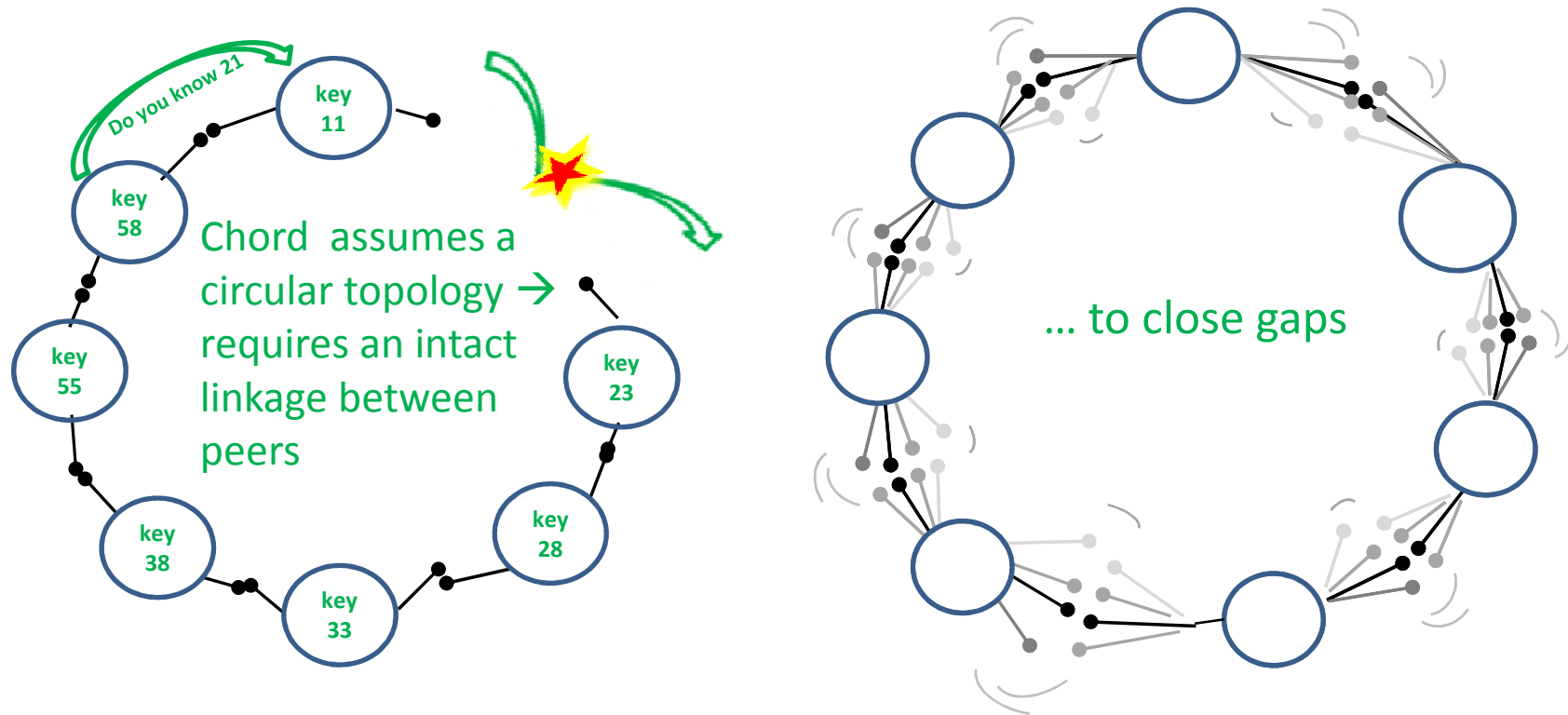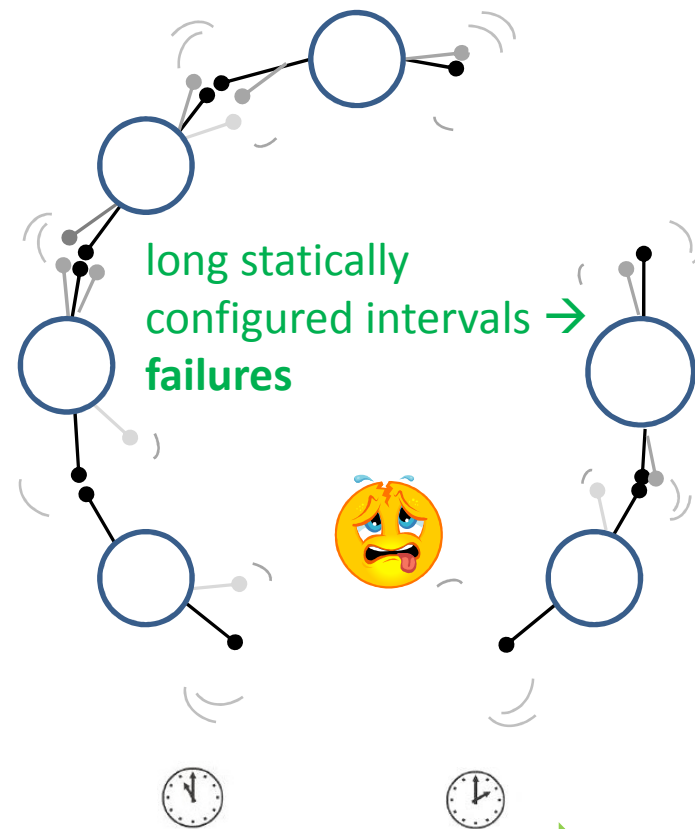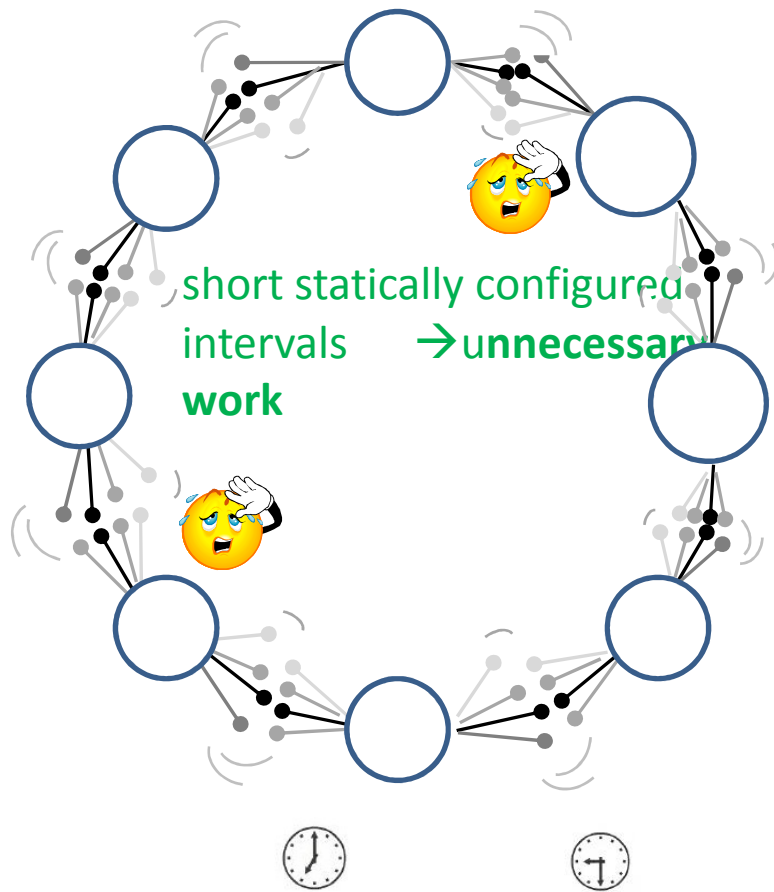## Decentralised (Distributed) Storage Systems: **ASA**

Key Based Routing (KBR)

P2P Routing Overlays implement KBR functionality.

Host lookup(key);

Every P2Phost only knows only about a fraction of hosts (peers) → requires a sequence of requests for **looking up** a key (e.g. log(N) in Chord).

Do you know 21

key 11

key 58

key 55

key 38

key 33

key 28

key 23

Chord assumes a circular topology → requires an intact linkage between peers

... to close gaps

Problem Definition

short statically configured intervals →**unnecessary work**

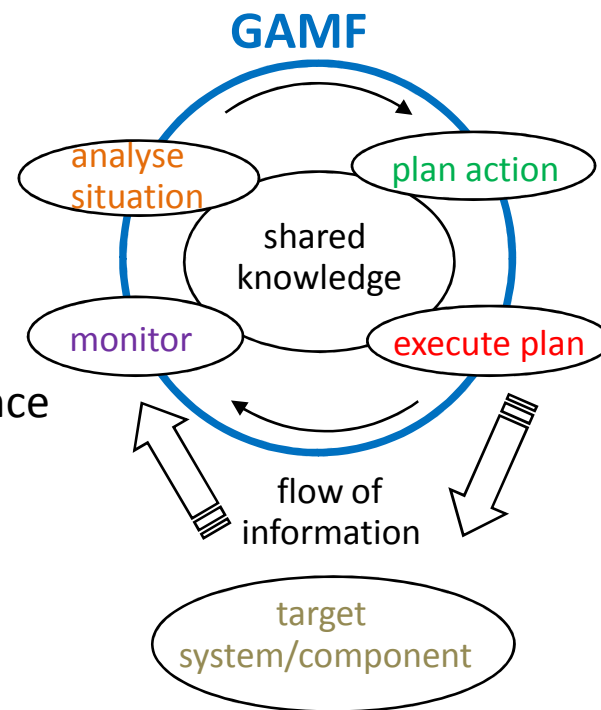long statically configured intervals → **failures**

The Solution: Autonomic Management (and how to apply it)

Analysing situation by extracting netrics: monitored information averaged over an observation period

Monitoring:
- non-effective maintenance operations
- peer access failure rate
- lookup performance

GAMF

analyse situation

plan action

shared knowledge

monitor

execute plan

flow of information

target system/component

Planning an action guided by a high level policy: Determines a change of the interval proportionally to the amount a metric diverts from an "ideal" value (per metric). Balance out varying requirements equally.

Executing the plan via an effector: applies new wait period

ASA P2P Layer

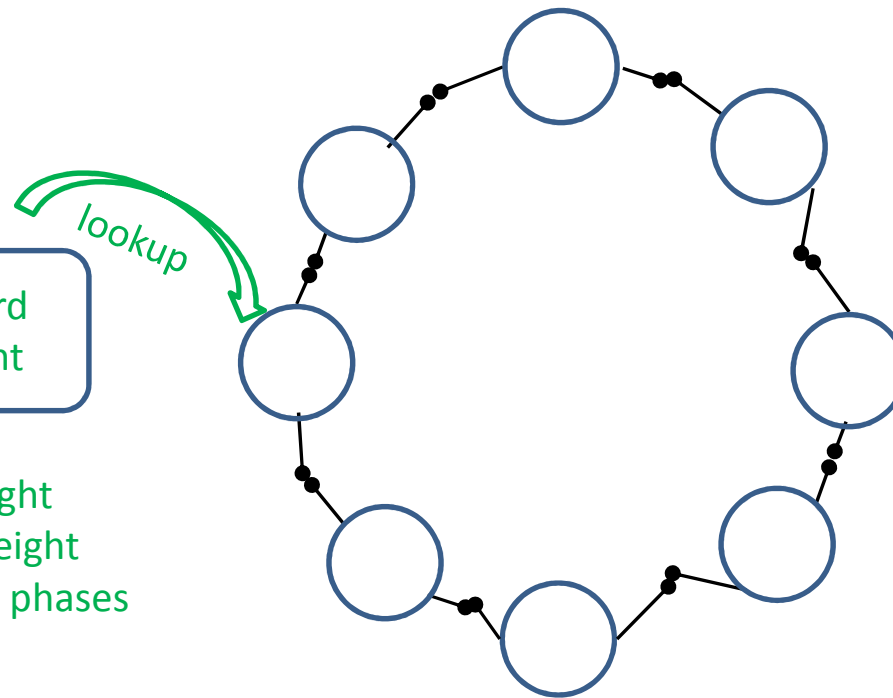StAChord's Maintenance Mechanism

Experiment Specification

network behaviours:

1. stable network
2. unstable network
3. heterogeneous network
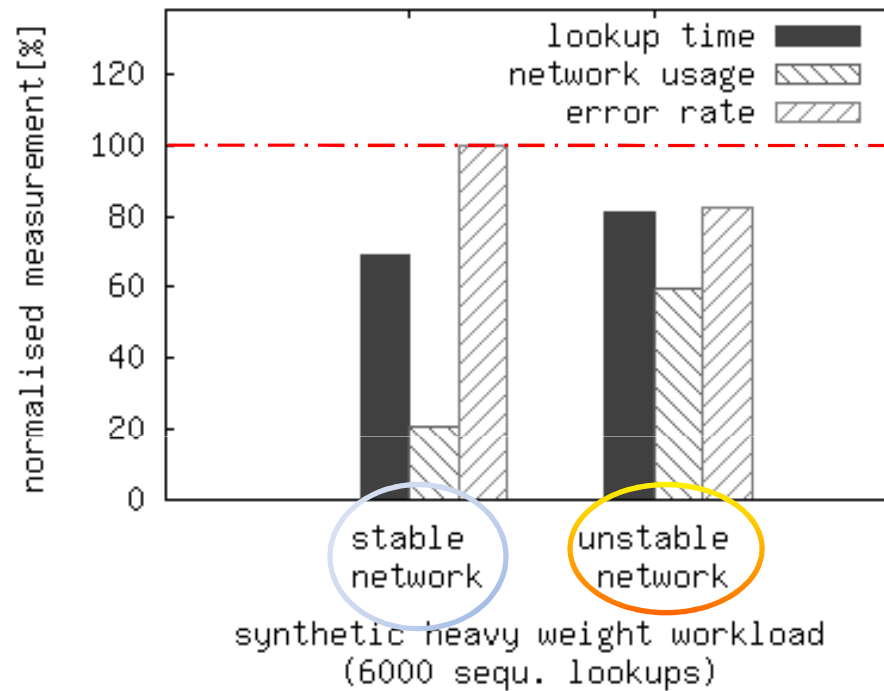4. different phases

Chord client

lookup

workloads:

1. synthetic light weight
2. synthetic heavy weight
3. synthetic different phases
4. ASA FS workload
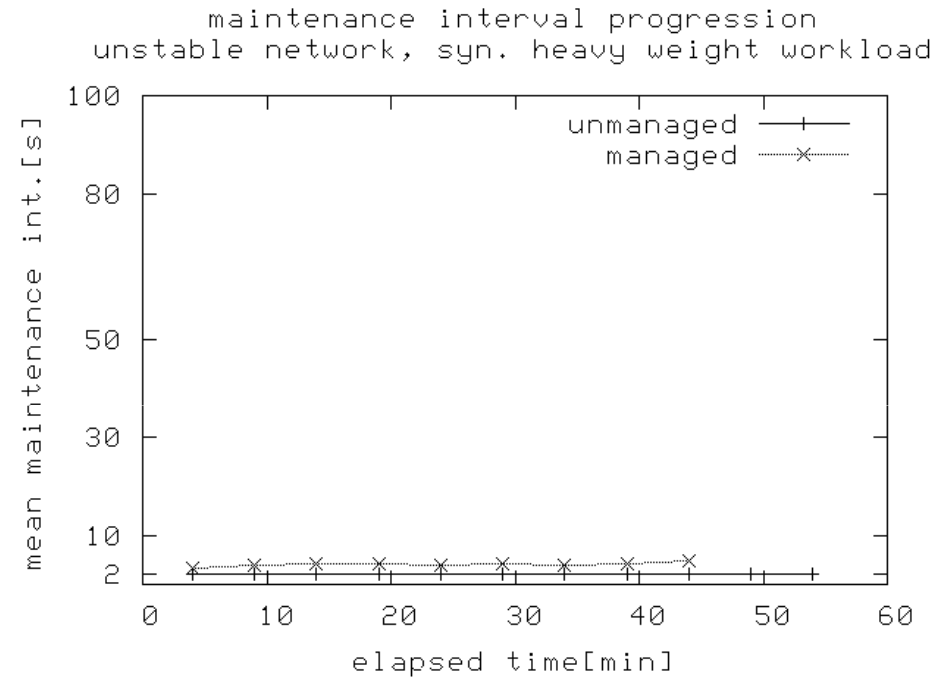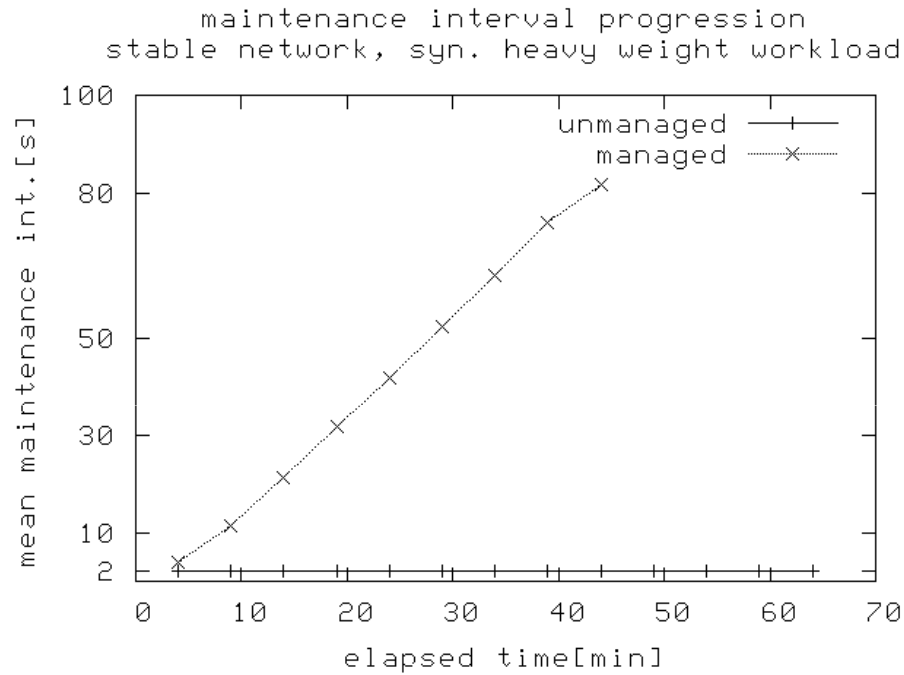
evaluation criteria:
1. lookup time
2. lookup error rate
3. network usage

Results

Measurements of networks with managed nodes are in avg. 55 % better in a stable network and 26 % better in an unstable network.

Results (details)

Intervals averaged over 5 minutes, 3 repetitions and **ALL** participating hosts

Results (even more details)

stabilize interval progression (NB1 WL2 R2)

stabilize interval progression (NB2 WL2 R2)

Questions?

Feedback?

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