Traffic Simulation

on

Parallel Computers

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Topics of Today's Talk

- Traffic Model (Cellular Automata)
- Net Elements
- Parallelization
- Load Balancing
- Application: Online Routing

TRANSIMS Research Group (LANL, TSA-DO/SA)

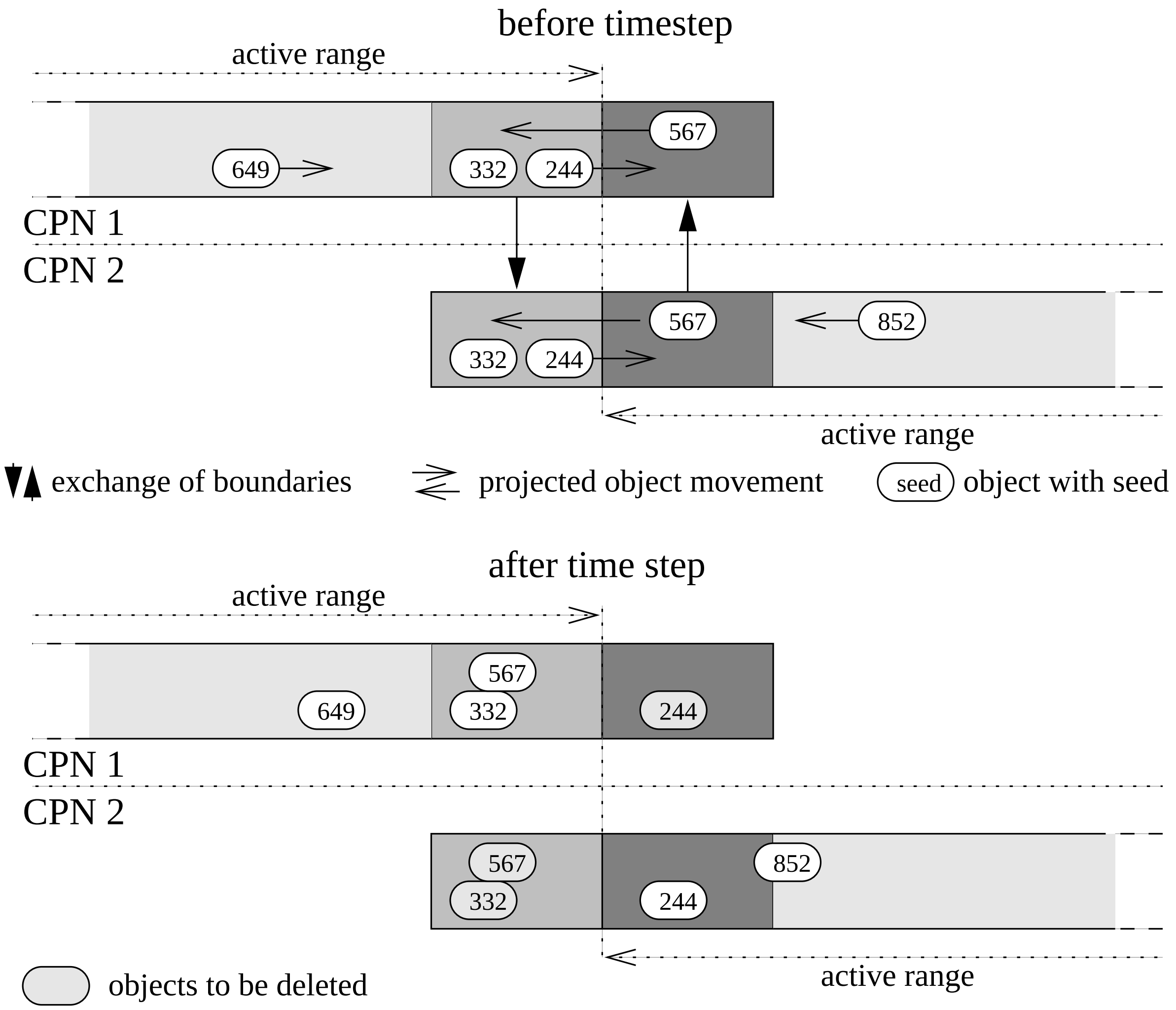
- Chris L. Barrett, Kai Nagel, Richard L. Beckman
- Madhav Marathe, Riko Jakob
- Paula Stretz, Roger Frye, Stephen Eubank

FVU-NRW Research Group (ZPR, Cologne University)

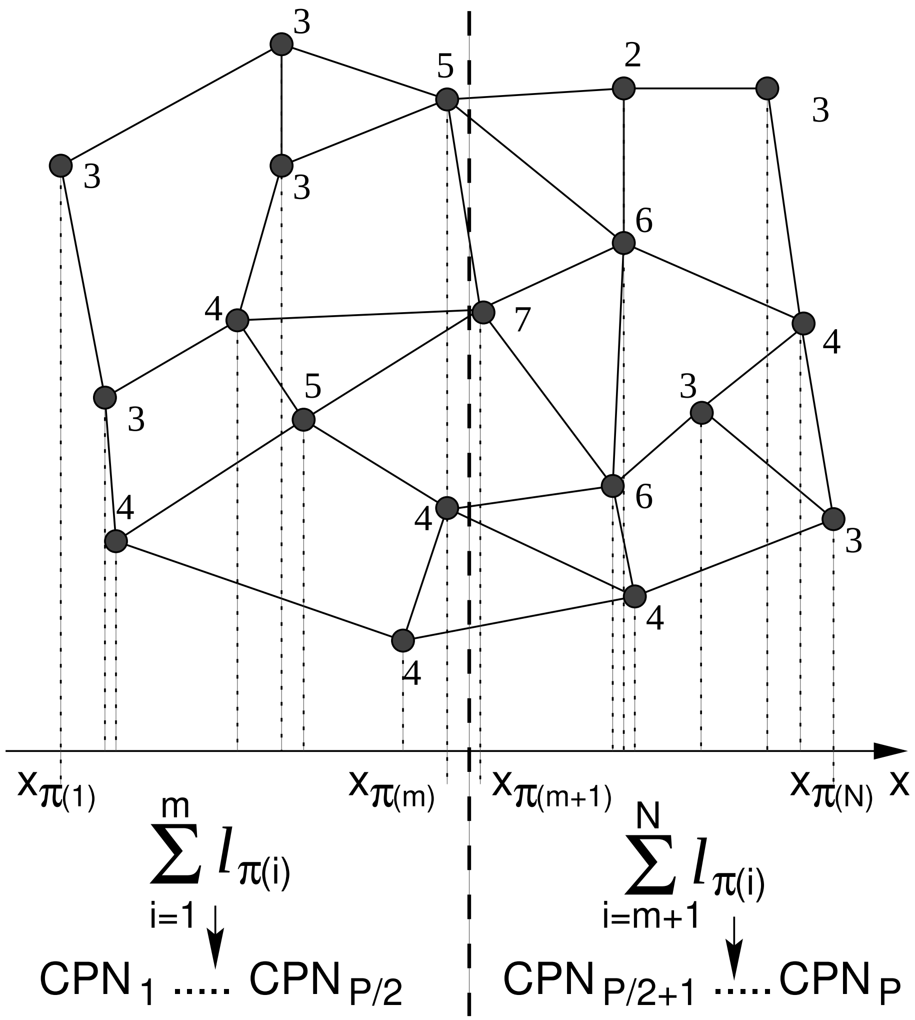
DLR Research Group (German Aerospace, Cologne)

- Prof. A Bachem, Prof. R Schrader
- Stefan Krauß, Peter Wagner, Christian Gawron

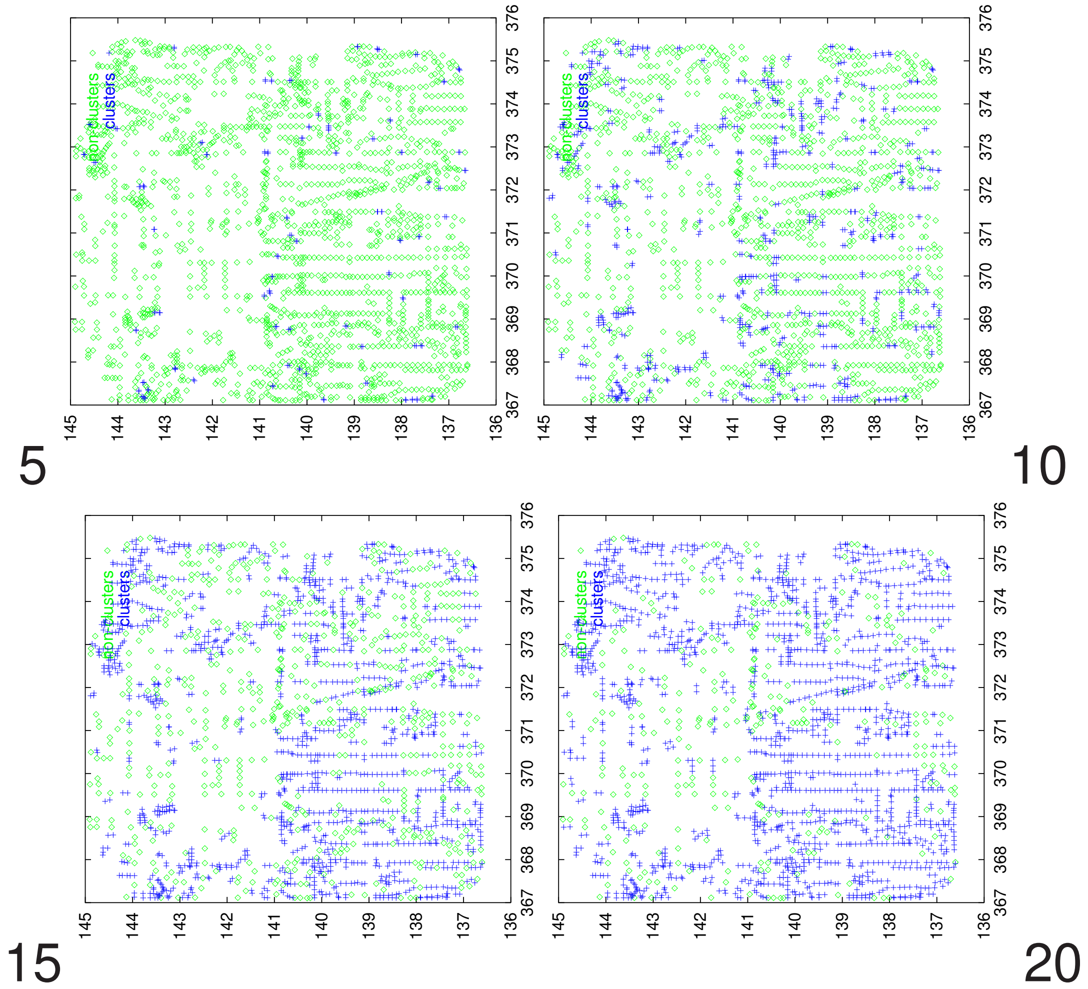
Parallelization (Boundary Objects)



Parallelization (Orthogonal Bisection)



Parallelization (Clustering Due to Granularity)



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Parallelization (Load Balancing)

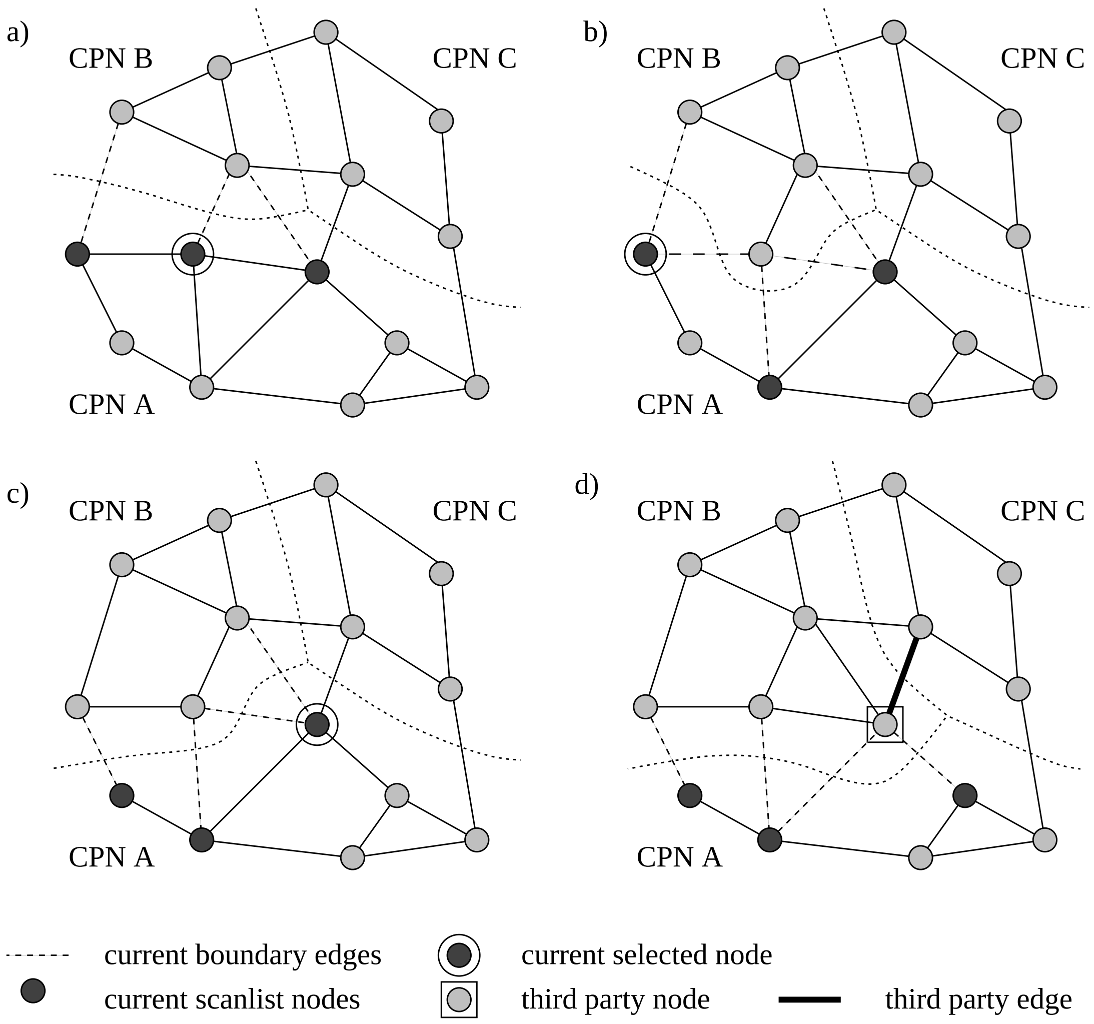
Reasons for Load Balancing

- Heterogeneous traffic density
- Heterogeneous load on CPUs

Transfer Street Network Elements...

- to maintain equal execution time on all CPUs,
- with local synchronization only,
- along common boundaries,
- preferring vertices furthest away from the center

Parallelization (Transferring Net Elements)



Dynamic Traffic Assignment in an Activity-Driven Iterative Simulation Model

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Topics of Today’s Talk

- What is assignment?
- Iterative Assignment with Simulation Feedback
- Iteration Parameters
- Artifacts

Dynamic Traffic Assignment

Given

Time-dependent origin-destination matrix for traffic network

Wanted

Consistent route-set as input to micro-simulation

Approaches

Traditional solution: Static assignment

Exact solution: Non-linear programming (with link-performance function)

Today's talk: Iterative re-planning with simulation feedback

Current Parameters:

Which initial route-set?

$\Rightarrow$ Shortest Path, Fastest Path, Void, Random

What re-planning fraction?

$\Rightarrow$ constant, decreasing

What subset of routes is to be re-planned?

$\Rightarrow$ random, linear age, fixed fraction

How many iterations?

$\Rightarrow$ 20...110

What artifacts occur?