Demo: Distributed Task Execution in Mobile Ad Hoc Networks

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Demo #1 : TG Instantiation

Demo #2: TG Re-instantiation

Demo #3: TG-Patching

Detection of Disconnections

- Disconnections between instantiated nodes causes tasks to get disrupted
- These disconnections can be detected by periodic soft state HELLO messaging

Detection of Disconnections (in taskd)

- Source of disconnections
  - Network partitions due to failure or mobility
  - Route failures for extremely long routes
- Next steps after detection:
  - Re-instantiation (replacement of a lost child)
  - TG-patching (salvaging the tree below the lost child)

Summary of Key Research Contributions

- A novel distributed framework for task based resource discovery and deployment
- Algorithms
  - Theoretical foundations: computational complexity issues in embedding TGs onto irregular networks (MANETs)
  - New algorithms and protocols for discovery/selection of devices in the network while obeying the TG structure/attributes
  - Approximation bounds for the heuristic algorithms
- Techniques for efficient adaptation of distributed application / task to device mobility in the MANET
- Performance Evaluation
  - Metrics for analyzing performance of the above protocols
  - Performance evaluation by extensive simulation in ns-2
  - Development of a proof-of-concept prototype in a laboratory environment on off-the-shelf hardware
- Scalability Issues
  - Service composition using hierarchical task graphs
  - Focus: reuse of service instances that have been composed before by other users
- Future Work: Extending TG concepts to other application scenarios

Selected Publications