Intentional Networking

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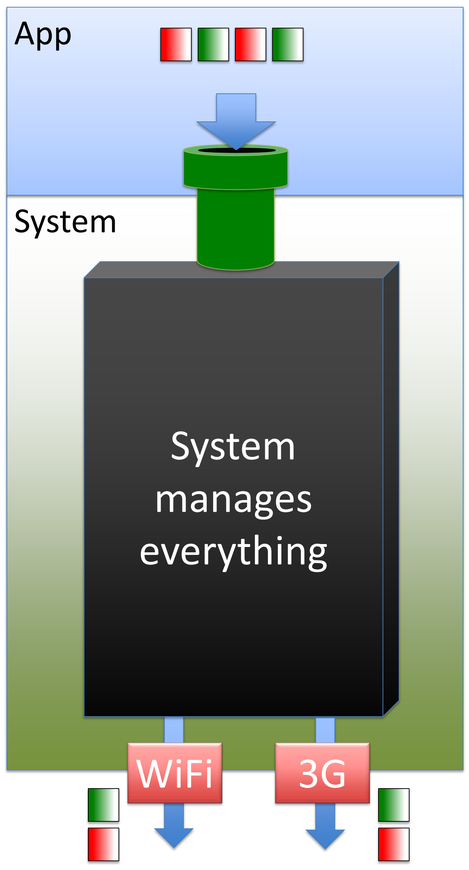
Mobile Network Diversity

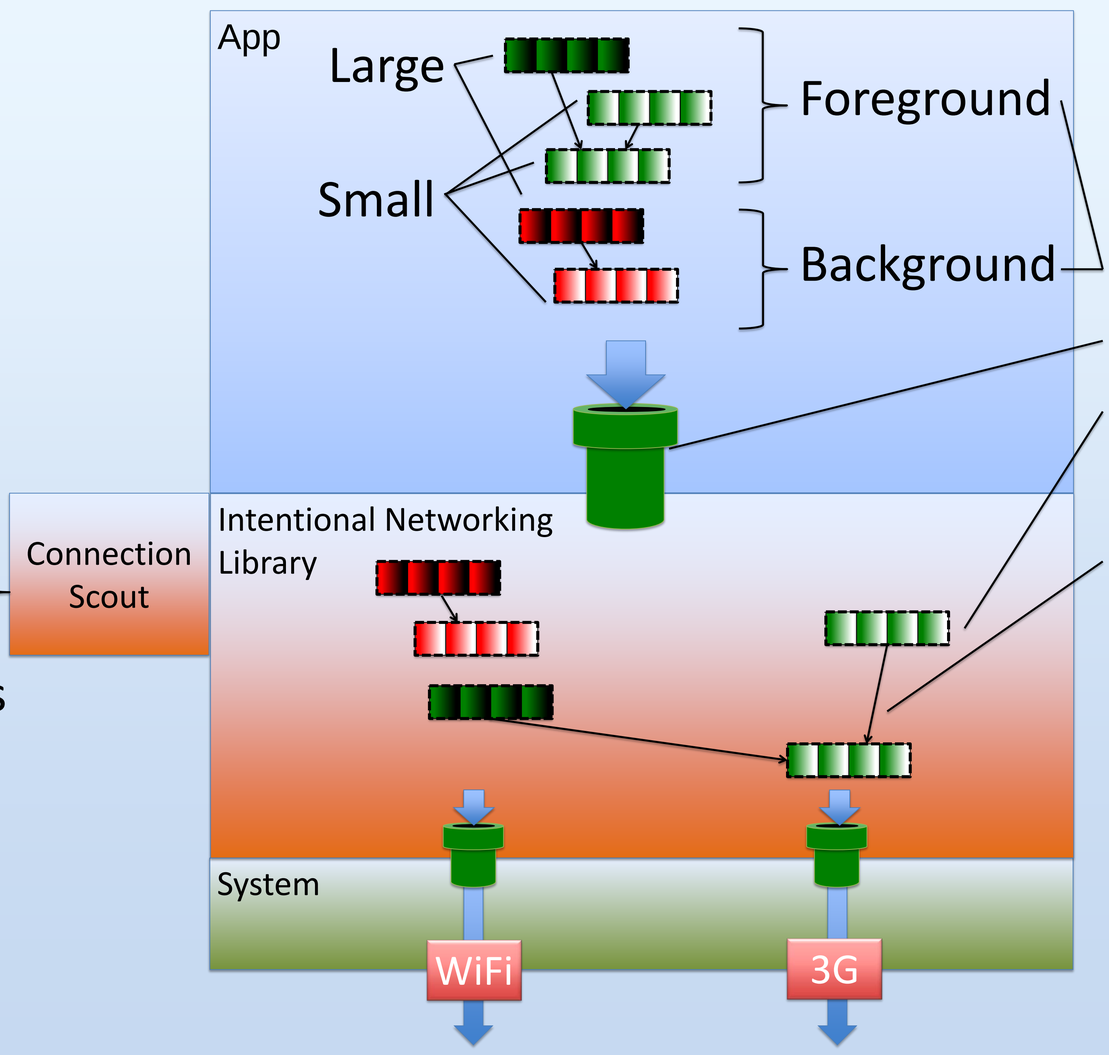
- **Opportunity:** multiple available networks
  - Different strengths/weaknesses
- **Challenge**: Match networks to app's needs
- Current approaches
  - System manages everything
    - Simple, but ignores app intent
  - Application manages everything
    - Expressive, but complex & inelegant
- **Our goal**: simple & expressive network selection



Our Solution: Intentional Networking

Design Goals

- Separate concerns
  - Application:
    - Describe intent
  - System:
    - Monitor networks
    - Characterize networks
    - Match flows to networks
- Be qualitative
  - FG/BG, small/large
  - Simplify developer's job

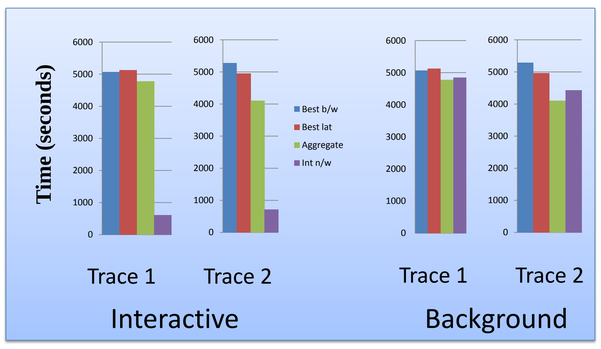


Abstractions

- Labels
- Multi-socket
- Mutual exclusion
  - Atomic delivery unit
- Ordering constraints
  - Happens-before
  - Default: strict ordering
- For all constraints:
  - Sender declares
  - Receiving library enforces

Applications & Evaluation

- Modified three apps
  - Distributed FS →
  - Email
  - Vehicular sensing
- Vehicular trace-based evaluation
- **42%-13x** reduction in interactive latency
- Only 1-8% throughput overhead



Future Directions

- Intent-aware power management
  - Performance/energy savings tradeoff
  - Background data: prioritize energy savings
- Inferring application intent
  - Trace back from network action to cause
    - *e.g.* caused by user == foreground
  - Remove need to modify application