Directions for COIN

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Intention

• What does in-network really mean?
  • Exploring numerous (present and future) options

• Some thoughts on computing
  • Looking at code and its provisioning, execution, etc.

• What could/should COIN look at?
This Draft

Different types of in-network computing systems

Examples: CFN-ICN & Akka

Terminology

Research Challenges

Characterizing Computing in the Network vs. Packet Processing & Networked Computing
Status update

• Accepted as RG item
• Received feedback by Xavier (THANKS!)
• Had additional rounds of discussions with co-authors and collaborators
• Currently working with application developers on new use cases (beyond Data Center and MEC)
Feedback and Relevant Questions

• Editorial comments and terminology clarification
• The extent and relevance of packet processing
• Discovery aspects in research challenges
• Who is the user?
  • Already discussed source of code (user vs. service provider)
    • Instantiator may or may not be distinct from user
  • Add more discussion of who invokes in-network compute functions
    • “Foreground” operation: End user (human, device, …) vs. other (in-network) function
    • “Background” operation: daemon, cron job, service

• Related: lifetime / lifecycle of in-network compute functions?
• Result provenance?
  • Usability of intermediate results across versions?
• Impact of Mobility?
Computing in the Network vs. In-Network Computing

- Not (just) about integrating computing in the “capital I” Internet
- Not as an alternative to present cloud architectures

- Rather: applying Internet principle to distributed computing
  - But also employing distributed computing principles for overall system design
- And then building solutions for different environments (on similar principles?)
- Not necessarily constrained by TCP/IP limitations…

- Think also about exploring domain-specific solutions
  - E.g., Industrial IoT use case, …
Authors’ View

(not explicitly pronounced in draft yet)

• Computing in the Network: More than just forwarding packets to nodes that happen host VMs or processes
  • Can be done today with various tools
• Embrace the idea of supporting distributed computing by leveraging networking concepts and mechanisms
  • Instead of building better pipes between processes
• Enhancing TCP to support in-network computing not promising
  • e2e (stream) model in conflict with hop-by-hop processing
  • Could possibly do better by rethinking requirements fundamentally
  • Security model unclear
  • Not sure a Research Group should fiddle with TCP
Future Additions

• More use cases?
  • especially divert from classic cloud / edge scenarios
  • reference the use cases draft

• Beefing up related work towards diversity – in progress

• Some form of taxonomy to aid discussion in COINRG?

• Outline and structure the space that COIN work considers_addresses?

• Overall goal remains:
  help us understand problem – not so much prescribing solutions

• One size unlikely fits all – call for broad exploration
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