■ ASPLOS2 日目

昨日は昼間いい感じに目が覚めててよかっと思ったものの,
夕方激しい睡魔におそわれ睡眠 ... からの深夜に起床.
ワークショップの一部がハンズオン的な感じだったこともあって
割と一日有意義に起きてられてよかった.

■ Unlocking the Power of Edge Computing

Towards Special-purpose Edge Computing

What are architectural and research challenges for realizing specialized edge computing?

- two-tier: cloud <-> IoT device
- three-tier: cloud <-> Edge node <-> IoT device, cloud <-> cloudlet <-> IoT device,
  - cloudlet: edge data center, distributed edge cloud
- two-tier specialized edge: edgenode(+ VPU/TPU) <-> IoT devices
  - specialized edge nodes
  - accelerate specific workloads
  - "server-class" performance
  - Little/no cloud reliance
- two-tier specialized edge variants: edgenode(+ VPU/TPU) <-> IoT devices(with accelerator)
  - tensorflow board, GAP8 IoT processor
- Research challenge
  - specialized edge can only run a single class of application
    - lower hardware reuse across application classes(no multi-tenancy)
    - multiple specialized hardware configurations needed to support different application classes
    - - increases hardware costs and management complexity
- Cloud vs. Edge economics
  - cloud: greater multiplexing benefits
  - edge: smaller number of servers per site - lower smoothing: reduces multiplexing benefits
  - lower ecnomy of scale for edge clouds
- Hardware Heterogeneity
- split application processing
  - application needs to be distributed across tiers - what function to put where?
- Challenges
  - greater hardware complexity
  - greater application complexity
- Macroprogramming
  - origins in sensor networks (circa 2005)
  - specify aggregate system behavior rather than device behavior
    - hides hardware diversity from programmers
    - write onece, run anyware
- cf. http://lass.cs.umass.edu/

Live Video Analytics - the“ killer app ” for edge computing!

Video analytis towards vision zero

- cf. https://www.microsoft.com/en-us/research/publication/video-analytics-towards-vision-zero/
- cf. https://www.psrc.org/sites/default/files/peer1707-pres-videoanalytics.pdf

- Democratize ideo analytics
  - real-time, low-cost, accurate
- video analytics at scale with approximation, NSI17, SIGCOMM18, SEC18 OSDI18
  - video pipeline optimizer sigcomm18
  - resource manager nsdi17
  - edge/cloud executer sec18
  - camera manager ipsn18
  - video event store osdi18
- low-cost ingestion: chaper CNN
  - cheap CNNs are less accurate
  - cheap CNNs can achieve high recall with small top-K results
  - -> solution: top-k approximate index
- low-latency query: redundancy elimination
- cf. https://www.microsoft.com/en-us/research/project/live-video-analytics/
- cf. https://github.com/antriv/MLADS_FALL_GAN_2017/tree/master/ppt

Edge-to-cloud computing infrastructure inspired by the emerging needs of Telco applications

cf. https://www.lfedge.org/projects/akraino/

cf. https://www.o-ran.org/

Edge computing in the extreme and its applications

cf. https://paradrop.org/

cf. https://paradrop.readthedocs.io/en/latest/index.html

3rd party apps/service drop into your home WiFi router on-demand

■ Programming Quantum Computers: A Primer with IBM Q and D-Wave Exercises

https://arcb.csc.ncsu.edu/~mueller/qc/qc-tut/

IBM Q -- Quantum Gate Programming

- Quantum Algorithm Strategies
  - create supoerposition of states
  - apply transforms that amplify desirable values and diminish unwanted values

D-Wave

Quirk

https://algassert.com/2016/05/22/quirk.html

https://github.com/Strilanc/Quirk/tree/master/src/base

- toffoli
- swap
- Grover Alg.