CS7NS1/CS4400 SCALABLE COMPUTING

Processing Units

Flip Classroom

Understand the principles and concepts

You will take your own personal notes

Supplement what you learned from your own paper summaries

Scalable Computing : Processing Units

What is it …	What does it encompass …
Properties: ✓ Scalable : how big is big ✓ Adaptive : how easily reconfigurable and repurposed ✓ Dispersed : tasks, resources, nodes, processes ✓ Accessible : Human, machine ✓ Affordable : Devices, comms, energy, deployment ✓ Reliable : Lifetime, MTBF, consequences **Domains:** ✓ Internet of Things ✓ Processing Units: CPUs, GPUs ✓ Functional Groupings: Cluster, Grid, Cloud ✓ Nano architectures ✓ Quantum architectures	**Core:** ➢ Processing : computational, data, … ➢ Communications : carriers, systems, protocols ➢ Proximity : location, distance ➢ Trust : security, P2P **Concepts:** ➢ Horizontal/Vertical Scaling ➢ Self organization ➢ Adaptation ➢ Tuning

Scalable Computing : IoT

Discuss	Properties
✓ Processing Units ✓ CPUs: ✓ CPU frequency/performance scalability : basic principles https://www.mcs.anl.gov/~itf/dbpp/text/node26.html ✓ Parallelism – Partitioning, communication, agglomeration, mapping, multi-core ✓ Performance, algorithms, tools. ✓ GPUs: ✓ Scaling – weak and strong. ✓ Small domains can be less efficient with multiple GPUs? ✓ Hash cracking – benefits? ✓ ASICs – Bitcoin miners – useful for hash crack?	➢ Scalable ➢ Adaptive ➢ Dispersed ➢ Reliable

Scalable Computing : IoT

Use cases	Use cases…

➢ Vehicular
  ➢ Systems
  ➢ Passengers
  ➢ Interconnectivity
  ➢ DSRC
  ➢ WiFi
  ➢ 3/4/5G
  ➢ Processing
  ➢ Energy
  ➢ Security/Trust
  ➢ Deployment
	➢ Data Science / Learning
	  ➢ Systems
	  ➢ How to design efficient scalable ML
	  ➢ Interconnectivity
	  ➢ Availability
	  ➢ Absolute/Probabilistic
	  ➢ Processing
	  ➢ Algorithm Efficiency and Energy
	  ➢ Security/Trust
	  ➢ Deployment

Scalable Computing

Third assignment …

✓ **Hard final** deadline. 5pm Monday 8th October.

Fog Computing:

1. https://ieeexplore.ieee.org/document/8100873 (Survey)
2. https://ieeexplore.ieee.org/document/8314121 (Survey)
3. https://ieeexplore.ieee.org/document/8066283 (Securing)

Cloud/Edge Computing

1. https://ieeexplore.ieee.org/document/7409914 (Resiliency)
2. https://ieeexplore.ieee.org/document/8030322 (Edge)
3. https://ieeexplore.ieee.org/document/7807328 (Resource)

✓ Each student to take and study **one (1) paper** (i.e. 1,2 or 3) from **each** group on this list – a total of two papers. Each paper you choose must focus on a different technology, solution or purpose. Only choose papers relevant to your stream and specific interests

✓ For each of those papers, specifically

- identify the four key contributions/findings/conclusions of the paper;
- identify the four key technology insights provided by the paper;
- identify the four key insights of relevance cloud/fog/edge scalability that you have gleaned from this paper.

Third *submission* …

- Blackboard: mymodule.tcd.ie
- AUTOMATIC plagiarism detection

- Submit a pdf of a single sided A4 page including your name, student ID, course code (and stream as relevant) and your concise writings on each of the two papers you chose
- Your total submission should be no longer than one standard single sided A4 page, 11pt font so please be as concise and technically precise as possible in your writing.