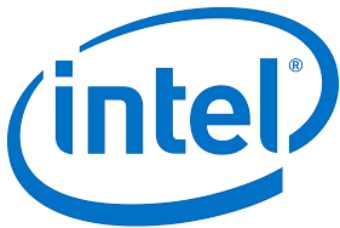


# 2020 Winter Review



PLATFORMLAB

# Thank You, Sponsors!



# Platform Lab Faculty



**Bill Dally**  
Architecture



**Sachin Katti**  
Networking



**Christos Kozyrakis**  
Architecture,  
System Software



**Phil Levis**  
Embedded Systems



**Nick McKeown**  
Networking



**John Ousterhout**  
Granular Computing  
(Faculty Director)



**Guru Parulkar**  
Networking  
(Exec. Director)

February 13, 2020



**Balaji Prabhakar**  
Networking



**Mendel Rosenblum**  
Distributed Systems,  
Networking



**Mac Schwager**  
Distributed  
Robotics



**Keith Winstein**  
Networking,  
Granular Apps



**Matei Zaharia**  
Big Data,  
Cloud Computing

# Lab mission:

define new hardware/software  
platforms

that enable exciting new classes  
of applications

# How We Work

- **All work is open, freely accessible**
- **Goal: results not just interesting, but actually **useful****
- **We love industrial collaboration**
  - Interested in your ideas and feedback
  - Looking for opportunities to transfer technology

# State of the Lab

- **11 affiliate companies: welcome, Intel!**
- **12 faculty in CS, EE, and Aero/Astro**
- **Dozens of research projects**
- **This is our fifth year**
  - A good time to look backward and forward

# Driving Themes

- **Self-Programming Networks**

- Raise the level of network programming
- Describe desired behavior declaratively, at a high level
- Compute low-level control actions automatically

- **Granular Computing**

- Building large-scale datacenter applications out of **large numbers of very short-lived tasks**
- We have explored both infrastructure and applications

# Unplanned Surprise

## High-accuracy clock synchronization

- **Originally envisioned for self-programming networks**
- **Realization: can impact applications also**
  - Immediate impact in Financial Technology
  - Change the way we think about distributed systems?



# Where We Are

- **Research continues in all these areas**
- **Clock sync/Fintech still at an early stage**
- **We will review successes and challenges at the Spring Retreat**
- **But, this is a good time to think about new driving themes for the next five years**
- **Initial discussions have started among faculty**

# Possible Future Themes

- **Candidate #1: Platform for Any-Scale Applications**
  - Developers write applications in a scale-independent way
  - Applications can run on a variety of platforms and scales:
    - Laptop
    - Public cloud (with/without lambdas?)
    - Hybrid cloud: enterprise, edge cloud, public cloud
- **Candidate #2: Platform for Post-Moore's Law Computing**
  - System architecture is undergoing radical changes:
    - Special-purpose accelerators
    - New system architectures (disaggregation?)
  - Is there a platform that makes it easy to write applications for these new architectures?

**If you have thoughts, let us know (more discussion at Spring Retreat)**

# Today's Technical Talks

## 8:30 Session 1

Update and Future Directions of the Platform Lab  
Efficient Systems for Machine Learning  
Tock Operating System: Security Model and Implications

John Ousterhout  
Matei Zaharia  
Phil Levis

## 10:30 Session 2

On-demand Film-scale Raytracing on a Mesh Network of 10,000  
Granular Microservice Workers  
On Designing Real-Time Communication Frameworks for Cloud Inference  
Distributed Inference and Learning Between Robots and the Cloud

Keith Winstein  
Pan Hu  
Sandeep Chinchali

## 2:00 It's About Time: New Approaches to Network Control and Financial Trading

Overview  
Edge-Pause  
Cloud Exchange

Balaji Prabhakar  
Shiyu Liu  
Vinay Sriram

## 4:00 Virtualizing Financial Trading: Opportunities and Challenges

Overview/Moderator: Balaji Prabhakar  
Panel: Mendel Rosenblum, Stanford, Nikolai Larbalastier SVP, Nasdaq,  
Greg Lavender CTO, VMware, Ravi Radhakrishnan CIO, Wells Fargo

# Questions/Discussion

