

SEDCL/Platform Lab Retreat

**John Ousterhout
Stanford University**



Transition

SEDCL  Platform Lab

- **More faculty**
- **More students**
- **Existing projects will carry over**
- **Broader research agenda**

Platform Lab Faculty



Bill Dally



Sachin Katti



Christos Kozyrakis



Phil Levis



Nick McKeown



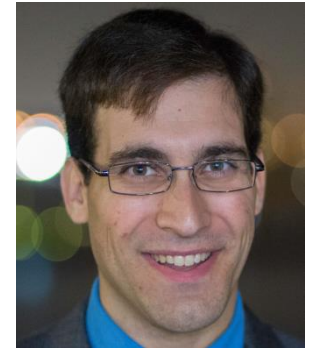
John Ousterhout
Faculty Director



Guru Parulkar
Executive Director



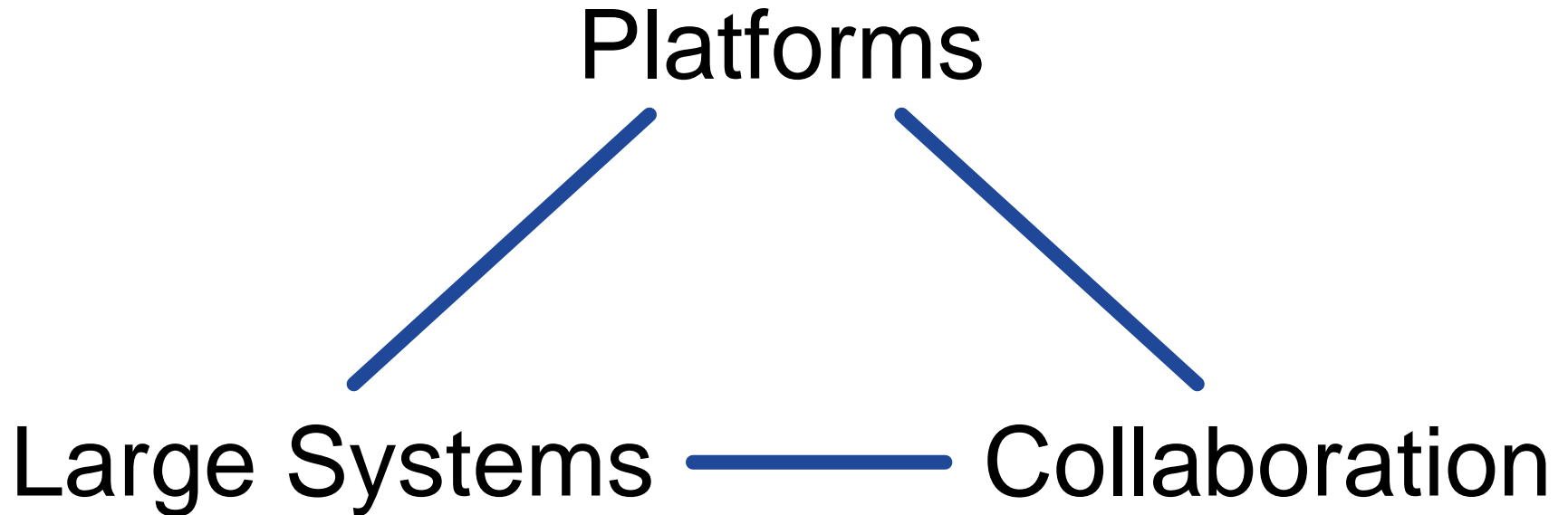
Mendel Rosenblum



Keith Winstein

Platform Lab Vision

New platforms enable new applications



What is a Platform?

- **General-purpose substrate**
 - Makes it easier to build applications or higher-level platforms
 - Solves significant problems
 - Usually introduces some restrictions
- **Software and/or hardware**
- **Example: Map/Reduce computational model**
 - Simplifies construction of applications that use hundreds of servers to compute on large datasets
 - Hides communication latency: data transferred in large blocks
 - Automatically handles failures & slow servers
 - Restrictions: 2 levels of computation, sequential data access

New Platforms Enable New Applications

- **1980's:**
 - Platform: relational database
 - Applications: enterprise applications
- **1990's:**
 - Platform: HTTP + HTML + JavaScript
 - Applications: online commerce
- **2000's:**
 - Platform: GFS + MapReduce
 - Applications: large-scale analytics
- **2010's:**
 - Platform: smart phones + GPS
 - Applications: Uber and many others

“Seed Platforms” for the Platform Lab

- **Software-defined networking:**
 - Separates network control and data planes
 - Makes it easier to build novel control/management applications
- **RAMCloud:**
 - High-speed key-value store for datacenters
 - All data in DRAM for low-latency access
 - Makes it easier to build applications using DRAM-based storage

Large Systems

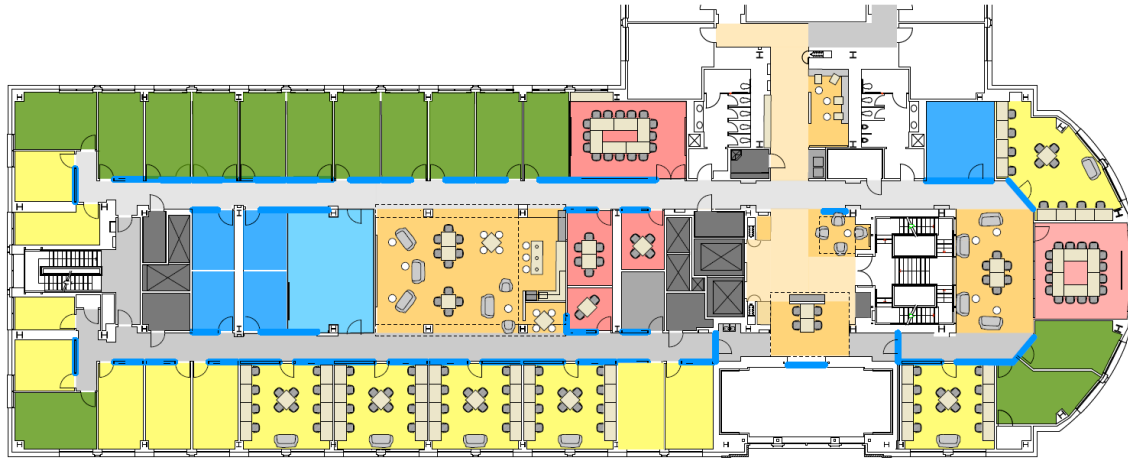
- **Most universities can't do large systems projects**
 - Fragmented funding model
 - Promotions determined by paper counts, not impact
 - Result: short-term outlook
- **Why universities should do large systems projects:**
 - Companies don't have time to evaluate, find best approach
 - Universities can lead the market
 - Produce better graduates
- **Goal for Platform Lab:**
 - Create environment where large systems projects flourish

Collaboration

- **Forces against collaboration:**
 - Faculty overcommitment
 - Diversity of interests
 - Physical space
- **Best way to generate collaboration:**
 - Shared research goals
 - Large projects require collaboration
- **Other ways to stimulate collaboration**
 - Events: seminars, reading groups, group lunches, etc.
 - Physical space

Collaboration, cont'd

- Can physical space help?
- **Planning major renovation of Gates 3A:**
 - Nothing but glass from window to window
 - Sight lines between researchers
 - Open space for casual conversation



Faculty Retreat, April 3-4

- **Attendees**

- Platform Lab faculty (9)
- Non-lab faculty
 - Mark Horowitz
 - Chris Re
- Friends from industry:
 - Keith Adams (Facebook)
 - Mahesh Balakrishnan (VMware)
 - Jeff Dean (Google)

- **Goals**

- Brainstorm possible research topics
- Discuss lab organization: how to maximize collaboration

Fundamental Challenges

- **Achieve physical limits**
- **Heterogeneity and specialization**
 - General-purpose systems fundamentally inefficient
- **Scalability and elasticity**
- **Raise the floor for developer productivity**

Research Areas to Explore

- **Programmable network fabrics**
(**Katti**, Levis, **McKeown**, Ousterhout, Parulkar)
- **Low-latency datacenter**
(Dally, Katti, Kozyrakis, Levis, **Ousterhout**)
- **Infrastructure for scalable control planes**
(**Katti**, Ousterhout, Parulkar)
- **New memory/storage systems for the 21st Century**
(**Dally**, Kozyrakis, Levis)

Agenda for this Retreat

- **Future-looking faculty talks**
- **Break-out sessions for discussing research topics**
- **Student talks**
- **Long break for outdoor activities, informal discussions**
- **Last session: industrial feedback**


Transition Details for Affiliates

- **Lab structure similar to SEDCL**
- **Existing SEDCL agreements carry over**
- **All results released open-source**
- **Two levels of affiliate membership**
 - Base level similar to SEDCL Associate
 - New premium level for companies interested in higher level of engagement

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SAMSUNG

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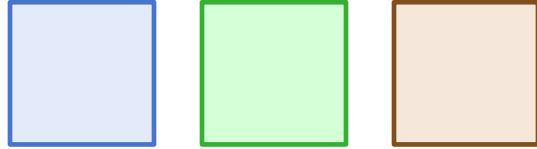
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Extra Slides



Palette



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