Introducing the Platform Lab

John Ousterhout

Stanford University

Background

- **SEDCL history:**
  - Formed Spring of 2010, first retreat in June of 2011
  - Brought together research on networking (Prabhakar), storage (Ousterhout and Rosenblum)
  - Additional faculty joined over time: Dally, Kozyrakis, Levis
  - Original SEDCL projects are finishing
- **Spring 2014:**
  - VMware interested in expanding relationship with Stanford
  - Challenged us to “think big”
  - Discussions among faculty → Platform Lab proposal
- **December 2014:**
  - Grant from VMware University Research Fund provides core funding to start lab

Platform Lab Vision

- **New platforms enable new applications**
- **Platform = general-purpose substrate**
- **Recent examples:**
  - Storage: GFS, BigTable, Hadoop, Cassandra, RAMCloud
  - Computation: MapReduce, Spark
  - Communication: Software-Defined Networking
  - Development frameworks: Ruby on Rails, Django, node.js
  - Virtual machines
- **Platform lab goal:**
  Create environment in which major new platforms can be developed and evaluated

Platform Lab Vision, cont'd

- **Most universities can't do large systems projects**
  - Fragmented funding model
  - Short-term outlook
  - Promotions determined by paper counts, not impact
- **Why universities should do large systems projects:**
  - Companies don't have time to evaluate, find best approach
  - Can lead the market
  - Produce better-trained graduates
- **Large systems require:**
  - Collaboration between faculty
  - Unconstrained long-term funding (projects last 5-10 years)
  - Infrastructure (equipment, staff)

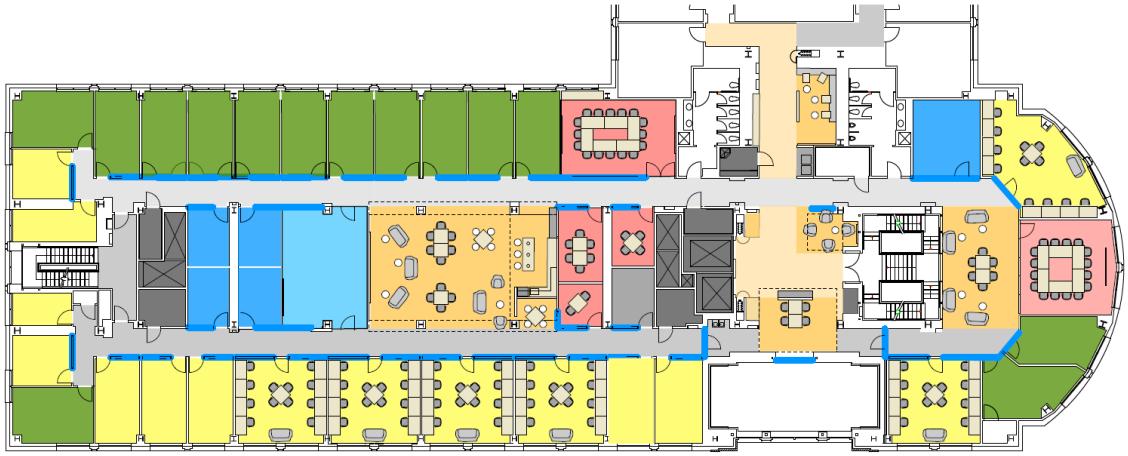
Lab Structure

- **Medium-size group of faculty**
  - Large enough for critical mass, resource pooling, collaboration
  - Small enough for sense of community
- **4-8 faculty "two feet in"**

  (Sachin Katti, Christos Kozyrakis, Nick McKeown, John Ousterhout, Phil Levis, Mendel Rosenblum, ...)
- **2-4 faculty "one foot in"**
  - (Bill Dally, ...)
- **Management:**
  - Executive Director: Guru Parulkar
  - Faculty Director: John Ousterhout
- **30-50 graduate students**

Lab Structure, cont'd

- **Funding the lab:**
  - Primarily through industrial affiliates (unrestricted grants provide crucial flexibility)
  - Supplemented with traditional federal support
- **Fostering deep collaboration:**
  - Our biggest challenge
  - Best forcing function for collaboration: shared goals
  - Bring faculty and students together physically



A Few Platform Ideas…

- **New networking architecture for datacenters:**
  - Programmable network switches (McKeown)
  - Software-defined datacenter transport (Katti, Alizadeh)
    - Manage complex/conflicting application-layer requirements
  - New RPC architecture for large-scale low-latency applications (Ousterhout)
    - Replace TCP/IP on the wire (better congestion control, latency)
    - New threading architecture for applications
- **Secure platforms:**
  - New OS for Internet of Things (Levis)
  - Datacenters (Kozyrakis)
- **Programming models and runtimes for low-latency applications (Kozyrakis, Ousterhout)**

Rollout

- **1H 2015:**
  - Create lab administrative structure
  - Brainstorm about projects, how to collaborate
- **May 28-29, 2015: joint SEDCL/Platform Lab retreat**
- **2H 2015:**
  - SEDCL projects transition to Platform Lab
  - New Platform Lab projects start
- **December 31, 2015: SEDCL concludes**
- **2016 and beyond:**
  - Exciting new platforms emerge as lab gains momentum

What this Means for Affiliates

- **Same general structure as SEDCL:**
  - $150K annual gift for membership
  - 2 meetings/year
  - All research results freely available
- **Advantages of the Platform Lab:**
  - More faculty than SEDCL
  - More/larger research projects
  - More graduate students
- **We hope you will find the Platform Lab even more attractive than SEDCL!**

Questions/Comments?