hubzero

Increasing Developer Productivity by Assigning Well-Defined Roles in Teams

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UNIVERSITY OF NOTRE DAME

CRC
CENTER FOR RESEARCH COMPUTING

What is Developer Productivity?

- Impact
- Software sustainability

NOT

- counting lines
- number of solved bugs
- working hours

HUBzero History: Operating Model Path

- 1996: PUNCH (precursor to nanoHUB)
- 2002: NSF funding for nanoHUB
- 2007: Spin-out of HUBzero from nanoHUB
- 2015: Diversification, self-funded sustainability
- Composition:
  - Hubs hosted by Purdue (for a variety of institutions)
  - Foundation members running their own hubs
  - Open source hubs

HUBzero History: Key Team Enablers

- 1996: Vision (Mark Lundstrom)
- 2002: Vertical Expansion (Gerhard Klimeck)
- 2007: Horizontal Expansion (Michael McLennan)
- 2015: Business Transition (Michael Zentner)
- Composition:
  - Hubs hosted by Purdue (for a variety of institutions)
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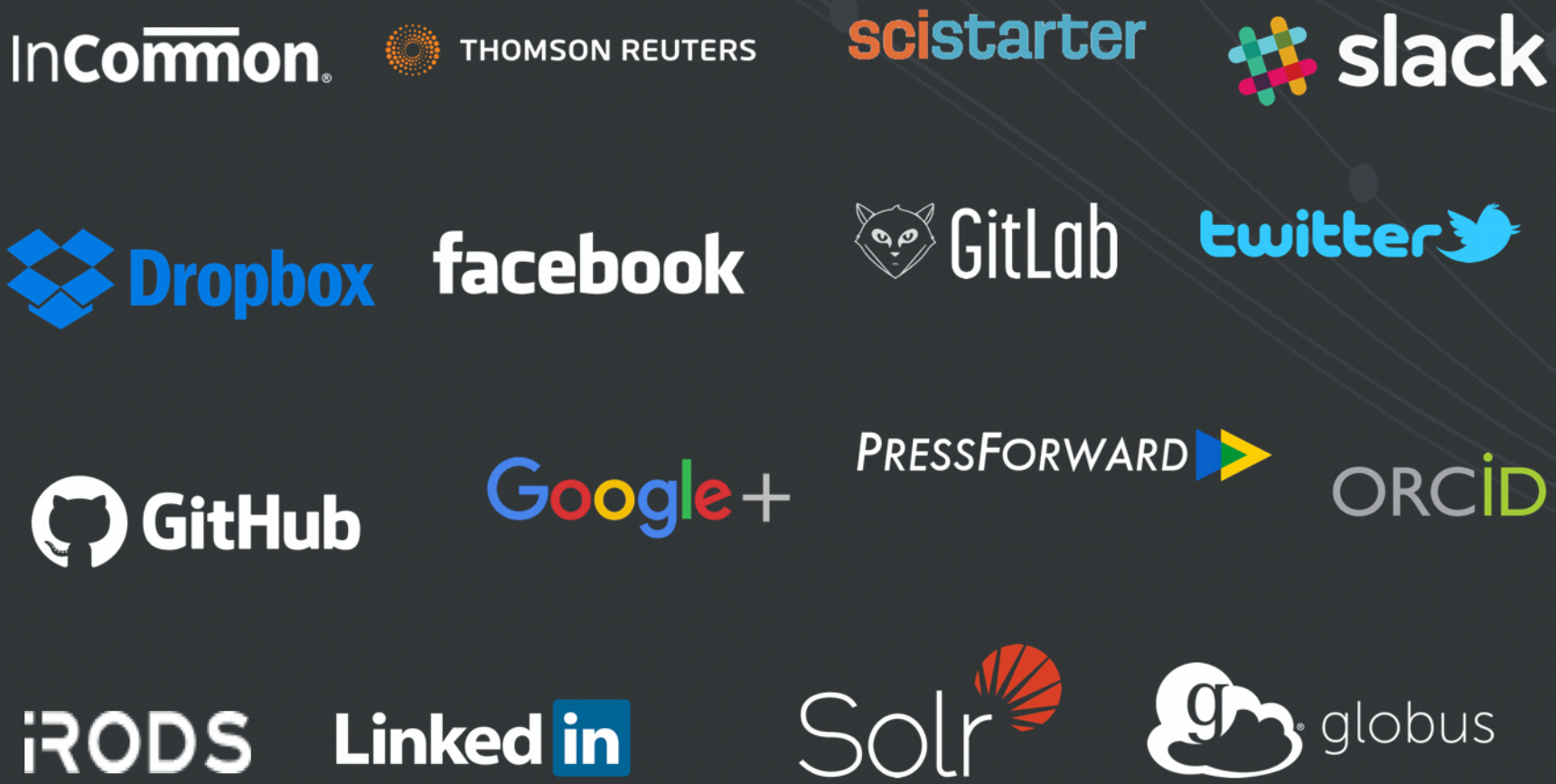
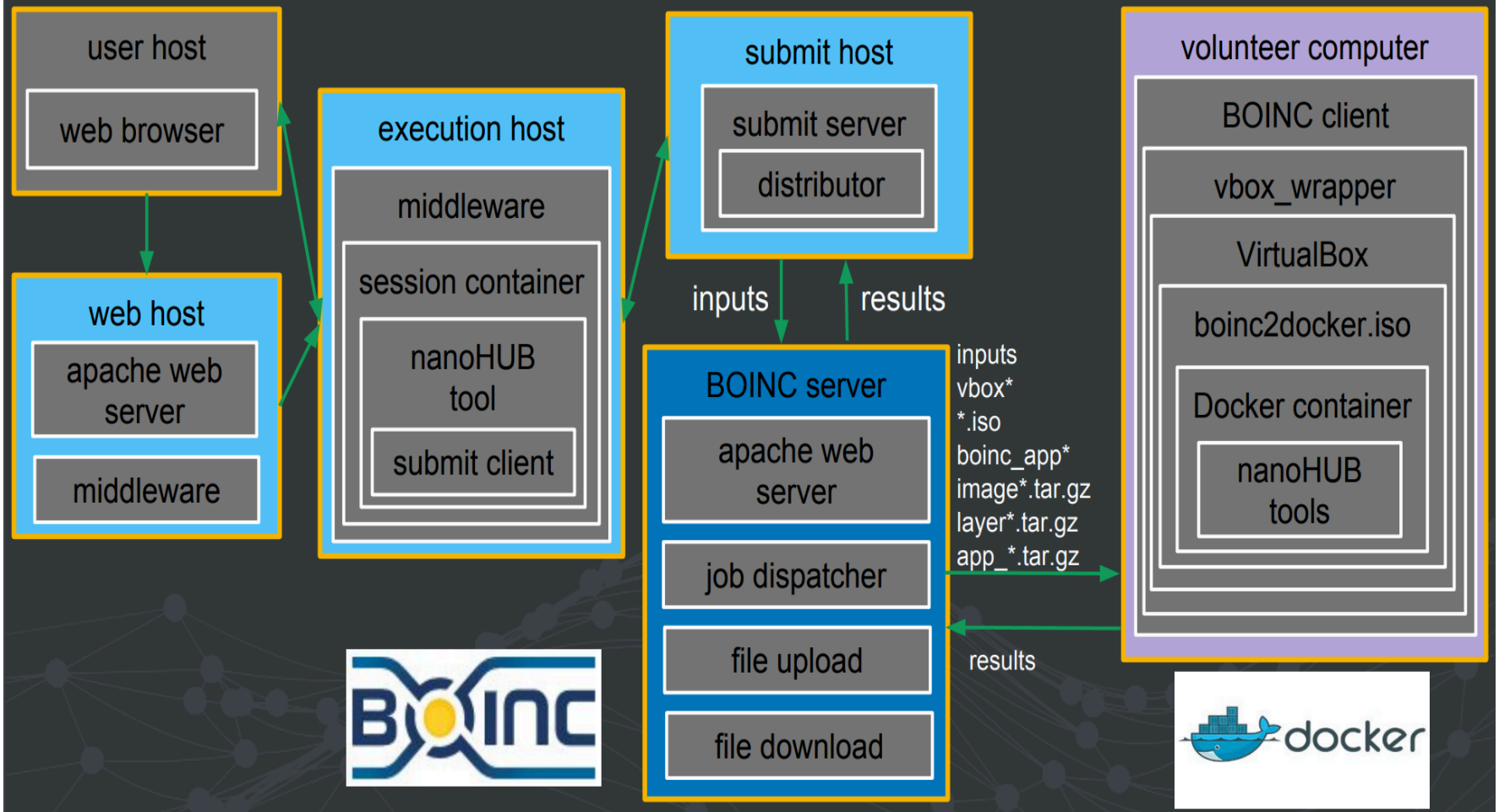
HUBzero in 2020

- A group at SDSC and a software framework
- 20 full time software professionals specializing in:
  - Cybersecurity
  - Web programming
  - User experience design
  - Scientific application development
  - Analytics
  - Middleware
  - High performance computing
  - System administration
  - Customer service
- Servicing over 2 million total visitors annually
- Entirely self funded

Collaborations & Integrations



ARCHITECTURE - nanoHUB/BOINC



Center for Research Computing

- Software development and profiling
- Cyberinfrastructure/science gateway development
- Computational Scientist support
- Collaborative research/ grant development
- System administration/ prototype architectures
- Computational resources: 25,000 cores+
- Storage resources: 3 PB
- National resources (e.g., XSEDE)
- ~50 researchers, research programmers, HPC specialists

CRC HPC Center (old Union Station)

http://crc.nd.edu

ND CRC in 2006-2008

- Effort with 7 FTEs centrally funded
- HTC and HPC Computing and basic user support
  - One centrally funded cluster plus multiple faculty funded clusters in various cabinets on campus
  - Around 300 active users
  - 80% centrally funded hardware
- No other kinds of research computing services
- Underserved social sciences and humanities for their need on science gateways
- ~1000 faculty, ~12000 students

ND CRC Mission

CRC engages in computational science, fosters multidisciplinary research and provides advanced computational tools and services. The CRC works to facilitate discoveries across science, engineering, the arts and humanities, social sciences, business and other disciplines.

ND CRC Vision

To become an internationally recognized multidisciplinary research computing center based upon our reputation for facilitating and accelerating discovery through effective and novel applications of cyberinfrastructure.

ND CRC Director's thoughts on Vision

- "Nice vision, but how we get there?"
- "What should we do first?"
- "Users should tell us what they need…"
- "HPC works fine, so let's focus on CI Development…"
- "We need portals and other collaborative environments"
- "We need good user support, and good, straight resource usage policies"
- "We need CI and HPC teams working together"
- "How do we fund all these with very limited resources?"
- "What is available out there?
- And so on…

Implementation by Jarek Nabrzyski

Take the risk and hire people first

➔ train people

➔ generate / bring projects

➔ assign people to projects and focus on getting more projects and more people -> etc...

➔ if not successful then exit, i.e. quit ☺

Fortunately, we had many projects, mostly science gateway projects of various kinds and difficulty.

ND CRC in 2020

- 50 FTEs with 70% of the staff salaries supported through grants and services
- HTC and HPC Computing and user support
  - 30,000 cores
  - 2,200 active users
  - 12 HPC engineers and user support staff
  - 25% of compute nodes are centrally funded
- Cyberinfrastructure development
  - ~15-20 CI projects each year with ~35 faculty from various departments including social sciences and humanities
  - supported by ~25 research programmers, ~8 computational scientists, some FTE fractions of HPC engineers, and a few (7) grad students and undergraduate interns (4-6)
- ~1000 faculty, ~12000 students

Thanks!

Questions?

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https://crc.nd.edu/

https://hubzero.org/