PROGRAMMING ENVIRONMENTS: WHAT'S NEXT?

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EARLY THOUGHTS ON THE PE NEXUS

Disclaimer: The terms and organization presented here are early thoughts. They are intended for discussion purposes and subject to change in the future.

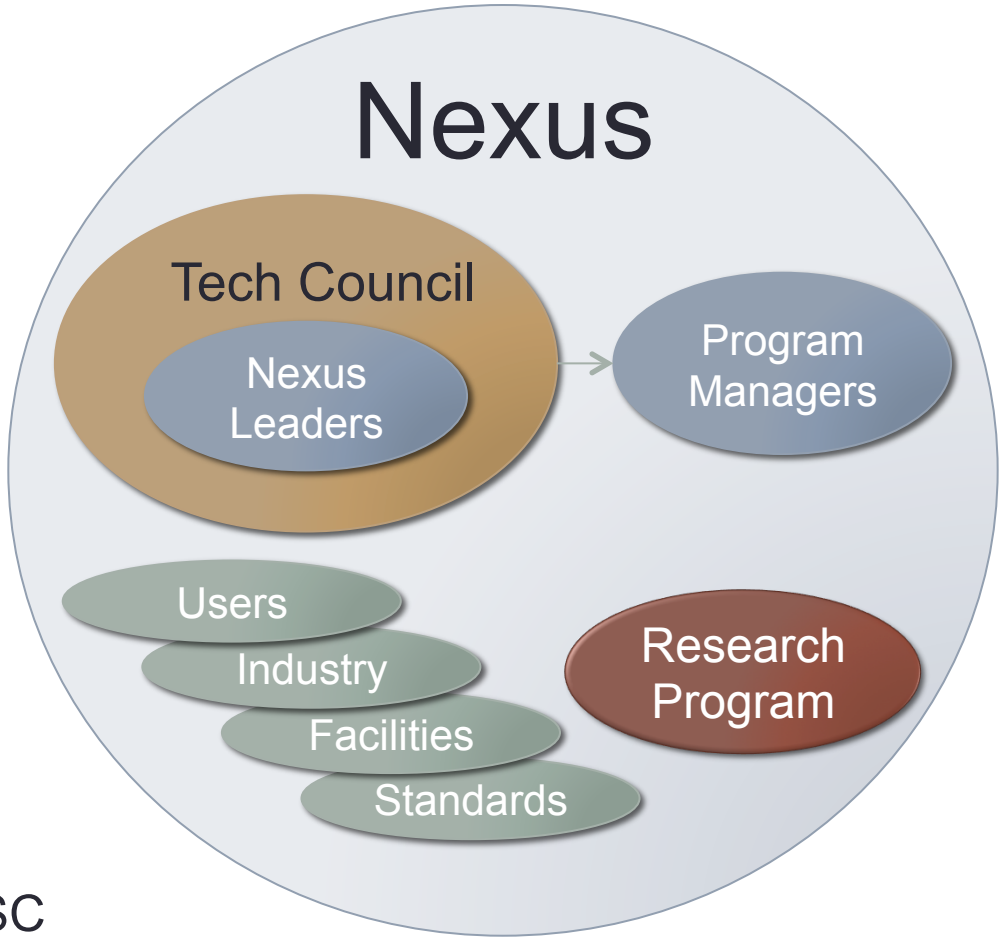
Envisioned Goals of the PE Nexus

Mission driven research: Success of the research program depends on the documented translation of research results into deployed products

- Identify challenges and approaches for the programming environments of exascale systems
- Provide context for programming environments research
  - Engage broader community of stakeholders
  - Document progress of the research program
  - Document new challenges (gaps) identified by research projects and stakeholders

Envisioned Structure

- Nexus
  - All stakeholders
- Program Manager
  - DOE PMs
  - Oversee research program
- Nexus Leaders
  - Designated lab staff.
  - Oversee and coordinate activities in the nexus.
- Tech Council
  - Nexus leaders plus lab staff, as needed, to cover technical areas and constituencies.
  - Provides advice to ASCR and ASC



Envisioned Activities of the Nexus

- Identify stakeholders: Research teams, exascale system users, facilities, vendors, standards committees …
- Coordinate annual workshop to facilitate stakeholder interaction

- Collect and disseminate stakeholder input: requirements and metrics
- Summarize progress, report gaps and roadblocks

- Identify and support coordination among individual research projects

- Facilitate and document translation of research artifacts to deployed products

State of the Nexus: A Living Document

- The principle product of the nexus is envisioned to be a living, “State of the Nexus,” document
  - Summarize progress (completed milestones and approaching milestones) of research projects
  - Document impact (publications, translation of research results, etc.)
  - Track progress on key challenges and gaps in the portfolio
  - Summarize and prioritize key issues to be addressed
- Updated twice per year: January, July
- Based on consultation and input from all stakeholders

Envisioned Stakeholder Engagement

- Emphasis on DOE Communities, but broadly inclusive
  - Build partnerships to avoid duplication
  - Support broader impact of results
- Define communities based on self-declared membership
- Email for announcements
- Public, web-based forums for discussion

Envisioned Ad hoc Panels

- Create ad hoc teams to study specific areas
  - Deeper understanding of a particular topic
  - Engage all stakeholders
  - Integration is the primary responsibility
- Intermediate results submitted for comment

Examples of ad hoc panels

- Technical area survey
  - List of projects that are relevant to the area
  - Current status and source of funding
- Stakeholder survey
  - List of key requirements
  - Metrics for success, both long term metrics and early indicators
- Workshop organizing committee
  - Solicit and evaluate position papers
  - Develop agenda and coordinate workshop

Proposed State of the Nexus Calendar

July version	January version	Document status
February-April *PI Meeting in March*	August-October *Workshop in September*	Collect input
May	November	Produce draft update
June	Dec	RFC
July	January	Produce final update

Envisioned Topic Areas in the PE Nexus

- Programming models and languages
- Language-facing runtime systems
  - Execution models
  - Mapping frameworks
- Translation tools
  - Compilers
  - Development and migration tools
  - Refactoring tools
- Engineering of Scientific Software
  - Correctness tools
  - Software testing
  - Code verification
  - Performance (and debugging)

What's the score?

- Need to answer how well the research program is doing
  - Which challenges are being addressed?
  - What are the most important challenges?
- How do you decide that challenges have been met?
- How do you add new challenges?