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XSEDE Certificate Authority

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XSEDE

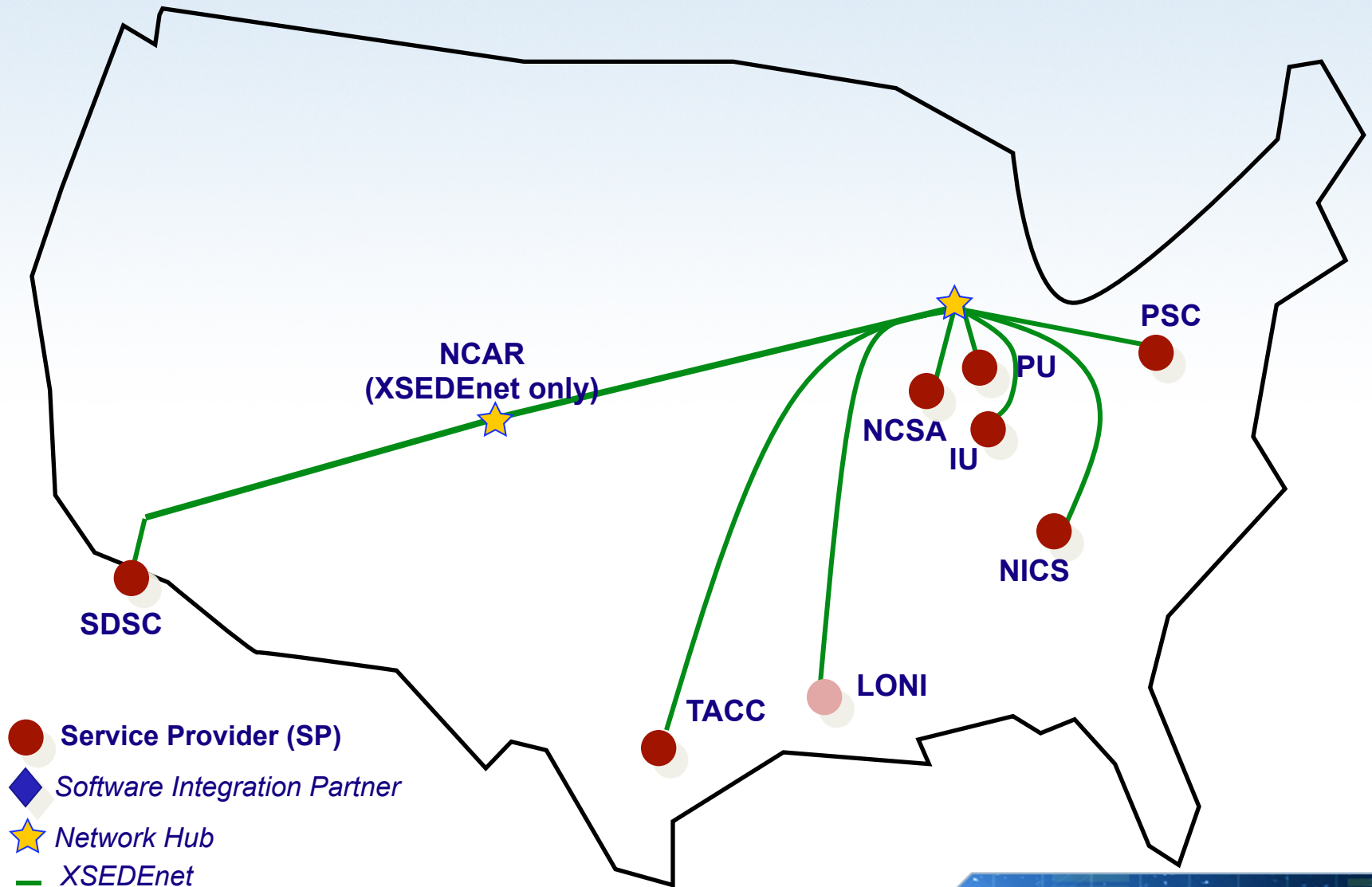
Extreme Science and Engineering
Discovery Environment

What is XSEDE?

XSEDE is a comprehensive, professionally managed set of advanced heterogeneous high-end digital services, integrated into a general-purpose infrastructure

XSEDE will be distributed but architecturally and functionally integrated.

9 Service Providers, 1 Cyberinfrastructure



XSEDE

XSEDE Growth

- The XSEDE cyberinfrastructure will likely will be a larger set of organizations than existed in the TeraGrid and will likely continue to grow in the future due to the national cyberinfrastructure, science gateway and campus bridging goals of XSEDE.

XSEDE Cyberinfrastructure Goals

- **Improve and facilitate Science Gateways**
XSEDE will support thousands of people who use data collections, portals, and science gateways to develop applications, submit jobs, and analyze and store data. XSEDE is providing a consistent set of tools for use by science gateway developers to transfer, submit, monitor and manage files and jobs to an extensible cyberinfrastructure.

XSEDE Cyberinfrastructure Goals

- **Campus Bridging**

Campus bridging intends to integrate campus resources into a secure virtual environment. Extending the XSEDE environment to campus bridgers will provide users and developers the perception of a single system rather than a set of different systems with different administrative domains. Computing and data resources can be accessed from anywhere, in a uniform fashion and by providing capabilities, such as: resource connection, registration and discovery, single sign-on capability extended to support campus credential-based authentication, a single name space for files, and infrastructure services to support the cyberinfrastructure. This relies on XSEDE's greater integration, service infrastructure automation, and standardization of user and system interfaces. The lowering of usability barriers will facilitate new communities' incorporating high-end digital resources into their regular work.

XSEDE CA

- To support these goals XSEDE has developed and investigated the requirements and use cases for this national cyberinfrastructure
- These give support to the recommendation that XSEDE should develop, document, accredit and implement an XSEDE Certificate Authority

XSEDE requirements

- Understanding stakeholder requirements is an important part of the XSEDE cyberinfrastructure planning, design and implementation processes.
- The XSEDE proposal process included high-level requirements collection and derivation and a subset of these requirements give insight into the high-level requirements for an XSEDE CA
- XSEDE Systems Requirements Specification (SRS) document [XSEDE-PD3.7-SRS.pdf](#)

XSEDE CA requirements

- CA requirements categories and count
Full requirements spec in XSEDE CA Requirements, Use Cases and Proposed Implementation paper
- Security requirements: 6
- Workflow requirements: 3
- Portals, Gateways and Campus Federation: 3
- User interface requirements: 3
- Common Environment requirements: 2
- Outreach requirements: 1
- Advanced user support requirements: 1
- Coordination and Management requirements: 5

XSEDE Use Cases

- The XSEDE Architecture Use Case document (Appendix A of XSEDE CA paper) includes nine use cases for XSEDE. Three of those use cases indicate use of grid technologies that relate to the need for an XSEDE CA. They are:
 - D.1 Workflow/Science Gateway/Problem Solving Environment
 - D.2 Data Grid Application
 - D.9 Grid Interoperability

XSEDE Use Cases

- “D.1 Workflow/Science Gateway/Problem Solving Environment” examples include the thirty-five XSEDE Science Gateways. These include:
 - Astero seismic Modeling Portal
 - CIG Science Gateway for the Geodynamics Community
 - Network for Earthquake Engineering Simulation
- Full listing is located at <http://www.xsede.org/gateways-listing>

XSEDE Use Cases

- “D.2 Data Grid Application” use cases include projects and communities that have developed a Data Grid to solve their data management and data collections problems. Examples are:
 - MotifNetwork
 - Ocean Observatories Initiative
 - Large Synoptic Survey Telescope
 - iRODS

XSEDE Use Cases

- “D.9 Grid Interoperability” use cases involve the interoperability between XSEDE and other national and international grids that provide similar cyberinfrastructure capabilities.

Examples include:

- OSG becoming an XSEDE service provider
- Interoperability between XSEDE and PRACE, the Partnership for Advanced Computing in Europe

XSEDE Use Cases

- XSEDE use cases are continuously being discovered and documented by the XSEDE Systems and Software Engineering Process. This process and the campus bridging initiative of XSEDE has recently determined new use cases from a Call for Proposals for the Early Adopter Program for Campus Bridging. Seventeen proposals were submitted.

XSEDE Use Cases (campus bridging)

- Example Use Cases describing grid and cyberinfrastructure integration includes:
 - Submission 1: Integration of a medical center compute cluster with regional biomedical HPC resources
 - Submission 2: Integration of compute resources at two state universities supporting 600 researchers and the ability to scale up to XSEDE resources from the state resources

XSEDE Use Cases (campus bridging)

- continued
 - Submission 3: Development of a university research institutes capability in using grid technologies for data management to reuse, share and avoiding multiple copies of the same data including university researchers using their data located on local and/or on national supercomputing facilities from their desktops

XSEDE Use Cases (campus bridging)

- continued
 - Submission 4: Use grid technologies starting with a single researcher familiar with the TeraGrid to access university and XSEDE HPC resources, then expand the use of XSEDE grid technologies to other researchers using the university HPC resources, finally expand the use of XSEDE grid technologies for university research across the university and XSEDE resources

XSEDE Use Cases (campus bridging)

- continued
 - Submission 12: Improve the capabilities of the computational materials scientist by making use of grid technologies to efficiently utilize widely distributed heterogeneous cyberinfrastructure to conduct thousands to tens of thousands of high-performance computations

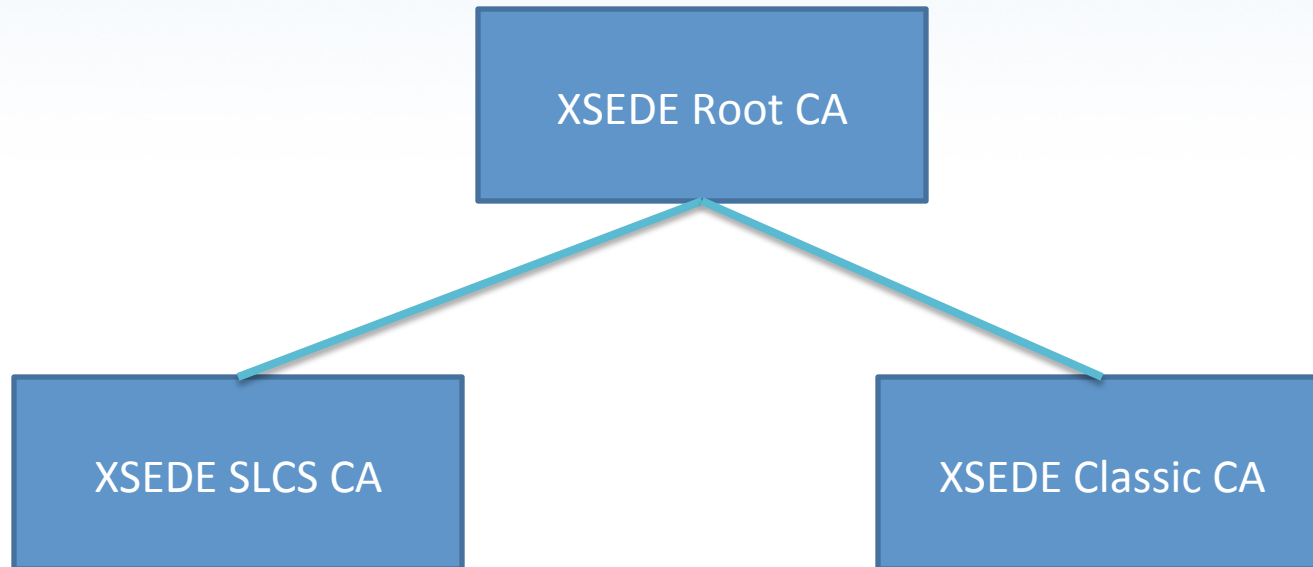
XSEDE CA Implementation Proposal

- In order to reduce the number of CAs that will be needed in the national cyberinfrastructure being deployed and managed, XSEDE proposes to implement an XSEDE CA with multiple Registration Authorities, an XSEDE root CA with one or more subordinate CAs as necessary and to develop automated service mechanisms to support deployment and use of the XSEDE cyberinfrastructure

XSEDE CA Implementation

- It is proposed that XSEDE will initially have one XSEDE root CA and two subordinate CAs: a subordinate “Classic” CA for issuing long lived host and service certificates and one subordinate short lived certificate service (SLCS) for issuing short lived user certificates
- ‘Owned’ by the XSEDE Project and not an organization
- Supports optional OTP for additional security

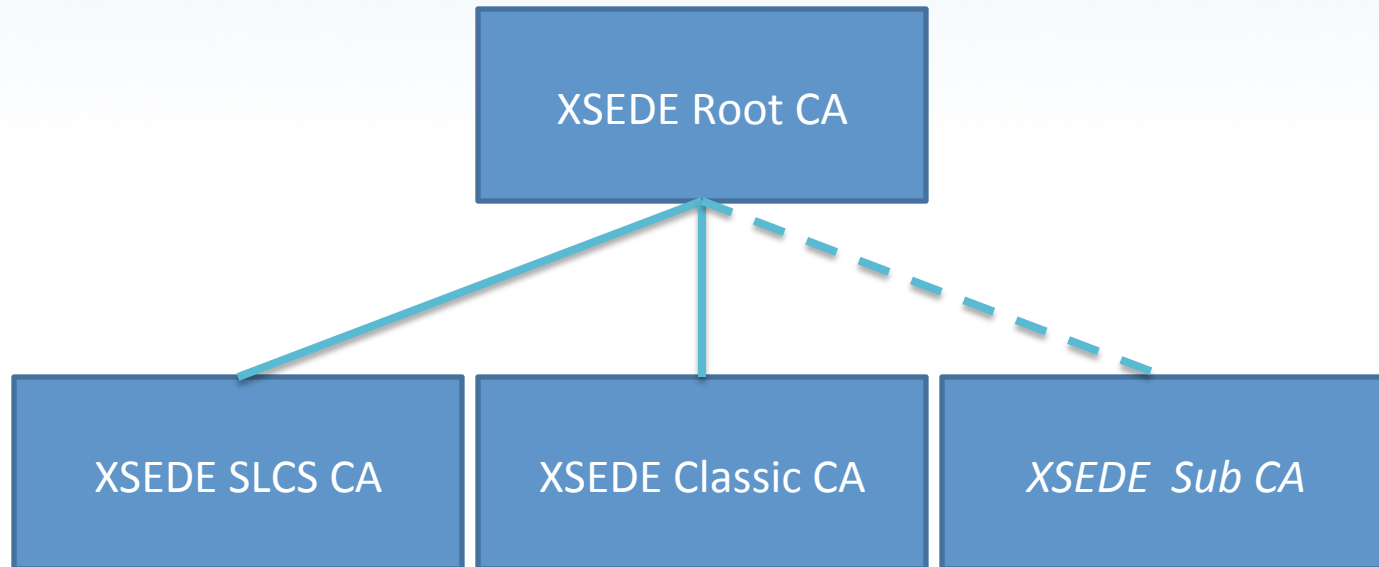
XSEDE CA Implementation



XSEDE CA Implementation

- In a limited number of cases, the XSEDE CA plans to accommodate one or more subordination CAs to organizations that partner or participate in XSEDE. These cases will require definition of requirements and use cases that describe the clear need for the XSEDE partner to have its own SLCS CA for issuing user certificates and/or their own classic CA for issuing host certificates.
- These cases should be rare

XSEDE CA with Subordinate Partner CA



Next Steps

- CP/CPS development