



Cooperative Research and Development Agreement (CRADA) Opportunity:

Measuring the Performance of a Next-Generation Modular Data Center

Deadline: February 1, 2010

4 PM Pacific Standard Time

Summary

Lawrence Berkeley National Laboratory (Berkeley Lab) is seeking a private partner to design and fabricate a highly energy-efficient modular data center, and to deploy a prototype at Berkeley Lab. Berkeley Lab staff will install and operate computing clusters in the new facility, measure the facility's energy efficiency in a range of environmental and weather conditions, and publish performance metrics.

Berkeley Lab encourages interested parties to respond to this Cooperative Research and Development Agreement (CRADA) announcement with a proposal by Feb 1, 2010.

Motivation

Many organizations are seeking lower cost, more energy-efficient, and more flexible data center options. Several companies have addressed this need by developing modular structures derived from shipping containers or similar components, with integrated cooling and power distribution equipment. However, the cost to install and commission such products can be high, especially if external cooling infrastructure is required. Berkeley Lab is seeking to promote the development of a modular data center product which makes extensive use of air-side and/or water-side economizers (so-called 'free cooling'), and which minimizes local infrastructure costs. Such a product has the potential to be more economical and more energy-efficient than current-generation designs. Berkeley Lab also desires to assess the features of container or modular solutions to determine if improved energy performance is possible by extending technologies employed today, or by finding new solutions for power and cooling.

Basic Parameters

A CRADA is an agreement designed to enable collaborations between government laboratories and industry partners. It is not a grant, and no funds are transferred from the laboratory to the partner or partners in connection with the project. A CRADA will be established to outline the respective rights of each participating party, including details about the container disposition after expiration of the CRADA.

Roles and Responsibilities

The Industrial Partner will design, fabricate, install, commission, support, and maintain a next-generation modular data center for evaluation at Berkeley Lab over a period of at least one year. Berkeley Lab will populate the data center with computing clusters, operate the clusters, and use them to run computational jobs in pursuit of the Lab's scientific mission. Collaboratively, the Industrial Partner and Berkeley Lab will measure the efficiency of the modular data center over

time, in various environmental and weather conditions. Berkeley Lab will analyze and validate performance data, and make such data publicly accessible. Berkeley Lab will also provide feedback to the Industrial Partner on the design and performance of the data center. The partner will have access to the site for demonstrations and viewing by potential customers.

Modular Data Center Characteristics

This CRADA announcement is designed to encourage innovation in the design of modular data center products, and to permit a range of possible design strategies. Having said that, all CRADA responses need to meet Berkeley Lab's operational requirements. The Industrial Partner will specify the minimum environmental service levels provided by the modular data center when situated at the Berkeley Lab site (see details below), as well as the redundancy characteristics of major electrical and mechanical systems. Note that capacity and efficiency are more important design criteria than resiliency in this instance, because the container will house high-performance computing and not mission-critical business systems. A UPS system is not a necessary component of the container. At a minimum, the container's environmental monitoring system should allow access to real-time energy and thermal performance, and real-time PUE.

Proposals

The CRADA proposal must be **received by 4:00PM Pacific Standard Time, February 1, 2010**. CRADA proposals submitted thereafter may be considered if a suitable CRADA collaborator is not selected from among the timely responses. Final negotiations of the CRADA agreement and terms and conditions will be completed after initial discussions have concluded. The proposals and any inquiries should be directed GRBell@lbl.gov. CRADA proposals should be in .pdf format, and inquiries about the CRADA should be received by January 27, 2010.

If necessary, new information regarding this CRADA announcement will be posted at <http://www.lbl.gov/Workplace/CFO/ospip/index.html>.

Proposals should be limited to fewer than 10 pages and should include the following components (if applicable):

Partner description

1. Identification of partner and a description of partner's qualifications, experience, and contributions to the CRADA.
2. Description of expected Berkeley Lab resources.

Modular data center description

1. Detailed description of proposed modular data center – including details concerning local facilities infrastructure requirements, cooling infrastructure, power requirements and power distribution, smoke detection, fire suppression, control system, maximum power density of IT equipment, and maximum container capacity.
2. Description of facility's ability to accept computing equipment supplied by multiple vendors, and any limitations associated with operation in a multi-vendor mode.
3. Projected PUE or DCiE (averaged over 1-year period), assuming installation at Berkeley Lab.

4. Environmental service levels provided by container, assuming site location at Berkeley Lab – preferably expressed in terms of ASHRAE recommended and allowable temperature and humidity ranges.
5. Description of mechanism to measure performance of facility (including necessary power meters, flow meters, environmental monitors, etc), proposed measurement objectives, and proposed roles and responsibilities.

Business Plan

1. Schedule of key milestones, including projected start of construction/operation.
2. Operating model, including discussion of partner access requirements.
3. Discussion of any expansion opportunities or additional collaborations.
4. Details regarding disposition of equipment after completion of the CRADA, as well as duration of CRADA agreement. It is highly desirable that the container remain at Berkeley Lab after expiration of the CRADA. If the partner wishes the container to be returned, it will agree to pay for associated costs.

Evaluation

CRADA terms are subject to the approval of the DOE. Selection of a CRADA offering will be solely at the discretion of Berkeley Lab. The primary criteria used to evaluate submissions will be:

- a. The overall likelihood that the proposal will result in an operable, next-generation modular data center facility as determined by factors such as applicant qualifications, track record, and quality of proposal.
- b. The degree to which the proposed facility demonstrates novel energy-efficiency technologies, and can positively alter the existing market for modular data center products.
- c. The degree to which the proposed facility minimizes local infrastructure and facilities costs (by making use of trailers or other technology, rather than permanent infrastructure, for foundation and support).
- d. The ability of the proposed facility to accommodate equipment from a range of server, storage, and networking vendors, and to assure environmental conditions that do not void customary equipment warranties.
- e. Disposition requirements for container (a longer term for container evaluation would be preferred).
- f. Acceptance of CRADA terms and conditions found [here](#).