

## STARS ALIGN TO VIRTUALIZE ACCESS TOP SCIENCE INSTRUMENTS

### University Coalition Launches new Tools to Remotely Access and Manage Research Equipment.

**Disclaimer: For visioning purposes only, document may not reflect current state of project**

**(September 1, 2020 - Tempe, Arizona)** Research just got easier for scientists who need access to rare, expensive science instruments and equipment for their work. Today, a coalition of universities, including ASU, UofA, NAU, University of Reno, NASA, Sun Corridor Network (SCN) and Internet2 announced SIRAS, the Science Instrument Reservation and Access System. SIRAS is an open-sourced software application for science assets, including instruments, data sets, supercomputers, and Internet of Things (IOT) devices. SIRAS both standardizes and simplifies the access and management of science assets for owners and users.

“I am a professor at the University of Indiana in Bloomington. There is one specialized instrument in the whole world that my research depends on and it is in Arizona,” said Sky Smith. “Before SIRAS, the only way I could reserve time and use that instrument was to get on a plane and go to Tucson. Now I can schedule my workloads remotely using the SIRAS reservation system. SIRAS knows who I am, that I am authorized to use the equipment, and what is required from the instrument and networks to optimize performance. Now I can run my project remote from Bloomington without traveling, which makes my wife and kids happy and my university finance officer too.”

Science assets like supercomputers, special telescopes and microscopes, satellites, colliders and other large research platforms come with large price tags to build and maintain, limiting the number that exist in the world. Today the systems for accessing and using research equipment are largely stuck in the dark ages and can hold up projects and lead to inefficient scheduling and use.

“We get requests from colleagues all over the world. We can’t let just anyone use our equipment so we have an authorizing process, a scheduling process, a whole bunch of processes. It’s a lot of work to manage our portfolio of equipment and it keeps us from doing our own research,” said April Jones, Core Research Director at ASU. “SIRAS has made our life so much easier to manage our equipment and easier for researchers to use. We can control access management, users can schedule workloads and they run large projects virtually. SIRAS is a win for everyone.” By making it easier for researchers worldwide to access science assets, SIRAS helps to democratize science and improve the cost-effectiveness of expensive instruments.

SIRAS combines three elements – a software defined network (SDN) that supports network performance optimization for remote access, operation and collaboration of science assets; software resident on science instruments to support scheduling, communicate requirements, and support instrument virtualization; and self-service provisioning of science assets and networks by researchers.

The SIRAS solution is open source and can be configured to work with a number of instruments. The initial SIRAS application suite includes a microscope at ASU, telescopes at UofA and NAU and an IOT sensor array at UNR. NASA is currently adapting the tool for use with their Earth science research satellites.

For more information, please visit [SCN/Internet2](#) or read about the project at the ASU CIC website - [smartchallenges.asu.edu](http://smartchallenges.asu.edu). Researchers interested in learning more about SIRAS and using the software can download the source code, applications and operations manual on GitHub.

#### Frequently Asked Questions (FAQ)

- 1. What are you launching today?** SIRAS is a cloud based software application that automates the process for identifying, accessing and using scientific research equipment.
- 2. Why should I use service SIRAS?** SIRAS is a helpful tool for both equipment owners and users. It solves common challenges around managing access and availability by automating and digitizing the customer experience. This is helpful to equipment owners in saving time and improving the process both for staff and customers. SIRAS is helpful for users by improving the ability to identify equipment and book time for research.
- 3. What is the competitive landscape?** The competitive landscape is unclear. A desktop study did not identify a similar application. Core Facilities departments at academic and research institutions do use custom or repurposed tools to schedule. There are examples of Internet of Things applications for smart connected devices that provide similar functionality. One example is Enterprise Car Shares mobile application that allows users to log in, identify cars, schedule a reservation and then access the vehicle. This does not appear to exist for research equipment today.
- 4. What differentiates this solution from any other available solution?** See above. There does not appear to be an available solution. The differentiator is that SIRAS is a complete solution specifically made for scientific equipment and academic and research institutions.
- 5. How does the Identity and Access Management function work?** User register and access SIRAS with their organization credentials and find and select the equipment desired. By selecting the equipment the user will access a dedicated page with all of the information, including access requirements for using the equipment. Users will then click the verification button and complete the process specific to the equipment. Most equipment will require verification of affiliation and may require certification or proof of qualification to use the equipment. The request for authorization will then be evaluated by the equipment owner.
- 6. How do you schedule projects?** Users will schedule projects by accessing the SIRAS site, identifying the equipment (consisting of sets of science instruments and associated HPC, storage, networking, and other resources) they want to use and the mode in which they want to use it, and after securing authorization use the reservation system to book the desired available time and duration, and secure payment if necessary.

**7. Do I need to belong to Internet2 to use?** Users do not need to belong to Internet2. Internet2 may offer additional functionality like providing a directory of science instruments available through Internet2, or high-performance direct connections which reduce latency and increase data transfer throughput.

**8. How is the system secure?** SIRAS uses multiple levels of security, including registration and 3rd party authorization for equipment use. The SIRAS system is built in the AWS cloud and is based on a shared responsibility model.

**9. Who manages SIRAS if users have a problem with passwords, operations, etc?** SIRAS is managed by Internet2 and uses their existing customer service capabilities for maintenance and operations, in coordination with local and regional science instrument operators.

**10. Who maintains and updates the application and source code, fixes bugs, patches, etc?** SIRAS is owned and maintained by Internet2. Internet2 receives funding from participating equipment owners from a portion of the user fees. This funding is used to maintain and update the system.

**11. How much does it cost to configure an instrument and who does that?** Configuration varies by equipment, the operating system that equipment uses, and operational modality/service requested by the user; and ranges from fully automated, self-service configuration to interactive configuration with instrument-local technicians. SIRAS has a complete user library on how to configure instruments. If the equipment owner does not want to self service then they can access a list of vendors who can be hired. Configuration pricing is set by instrument owners, and will vary depending on type of instrument, service requested, time of day, duration of service, and utilization.

**12. How do you configure an instrument? What hardware and software is required?** Configuring equipment is mostly self-service through the SIRAS portal. Equipment owners can select the authorization process elements and what the requirements for use are, as well as the guidelines for reservation, like duration, frequency, etc.

**13. Who pays the network data use costs and how is that tracked and billed?** Users pay data costs to their network provider, Internet 2 or other network and are billed per usual.

**14. Can the IAM function control how much time people can schedule instruments for?** Yes, equipment owners can configure SIRAS with the amount of time users can book.

**15. Is SIRAS interoperable with other reservation or access tools? Do I have to use all of SIRAS?** SIRAS provides access management and scheduling functionality. It is not interoperable with comparable tools.

**16. How do I know if someone is using the system who shouldn't be or using it in a way they shouldn't?** SIRAS has built in security functionality that can identify possible threats, including unauthorized logins and activity.

**17. How do I stop that – can SIRAS stop it automatically?** SIRAS has built in functionality that can be programmed to respond to certain threat levels. SIRAS has built in default levels that can be configured to meet the specific requirements of equipment owners.

**18. What else do I need to use SIRAS?** Requirements vary by equipment, but general requirements include verification from the users organization.

**19. Can I use SIRAS with any digital instrument?** No. The equipment needs to be registered and provisioned for use with SIRAS. Owners of equipment not currently connected with SIRAS can contact Internet 2 for guidance on including in the equipment portfolio.

**20. What is the latency of the system – how responsive is SIRAS?** SIRAS latency can vary depending on users network connection and location. SIRAS can be locally hosted in different AWS locations to reduce latency and improve performance. The best locations to host the application can be determined and changed to match user requirements.

**21. How far in advance can a user reserve and program a workload?** Scheduling lead time varies depending on the individual equipment and owning organization policies. These policies are not set by SIRAS or Internet2, but the information on the timeline and policies can be found on SIRAS.

**22. How many users can SIRAS manage at one time?** The SIRAS application can support unlimited users on the application itself. However, individual research instruments will have limited use specific to the equipment.

**23. Where does the SIRAS system live? Is it all in the host cloud?** The SIRAS software application is hosted in the AWS cloud and is operated and maintained by Internet 2, a non-profit that owns and operates a research communications network connecting major research institutions.

**24. Will SIRAS impact instrument performance?** SIRAS does not currently impact the use of instrument performance. A future function may be to support the remote use and control of equipment through a director connection to the instruments. Such a function could potentially impact performance through latency, computer viruses or misuse.

**25. What is the worst possible headline from this project?** A bad actor uses SIRAS to gain access and damage a rare scientific instrument.