Product Spotlight

Enabling remote operations

Introduction

When being in the lab every day is impractical, because of challenging laboratory environmental conditions, time-consuming personnel commutes, or for many other reasons, people and companies can be faced with situations where there is a need to access systems and data remotely.

For daily laboratory operations, it's inevitable that someone needs to be in the laboratory to perform manual steps with the instruments and prepare samples. The same is valid for the IT department when, for example, computer hardware needs replacing. However, many routine operations and maintenance tasks can be performed remotely. With Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS) both the lab and the IT department can work remotely, from across the lab to different sites or even different geographies, safely and efficiently.

Challenges for remote working

When considering a laboratory, remote working comes with challenges. The first is the physical location of laboratory equipment and resources, which will be inaccessible when working remotely. Typically, analysts only need to be in front of an instrument for a limited number of activities. Another important aspect is data security, both preventing unauthorized access to the system and ensuring resilience during data acquisition. Finally, there can be a financial impact from implementing a solution that enables remote working.

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Built for the lab

Remote instrument control and monitoring

Once the instrument is prepared (for example preparing new eluent for high performance liquid chromatography (HPLC) systems), control can be achieved remotely via Chromeleon software's intuitive ePanels (Figure 1). Access is straightforward as only the current instrument is shown without any hidden windows. Simply click an instrument to monitor its status, control all parameters, for example flows or temperatures, monitor the baseline and start, monitor and stop an analysis.
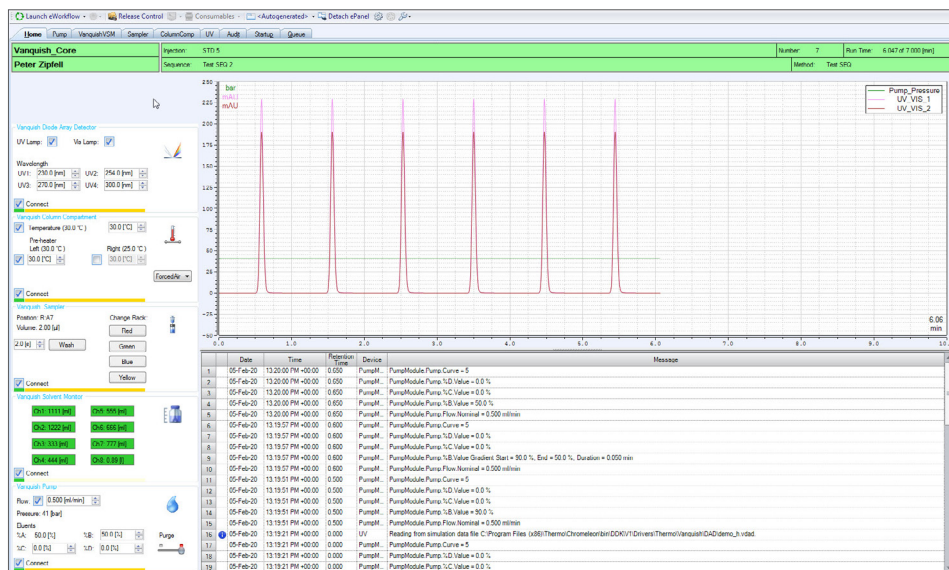

Figure 1. ePanels for instrument control and monitoring

If multiple instruments are controlled at the same time, the Instruments Overview (Figure 2) provides a real-time high-level status of all favorite instruments.

This same integrated control extends to Thermo Scientific™ Mass Spectrometry (MS) instruments, allowing for one software platform to remotely control both chromatography and MS instrumentation.
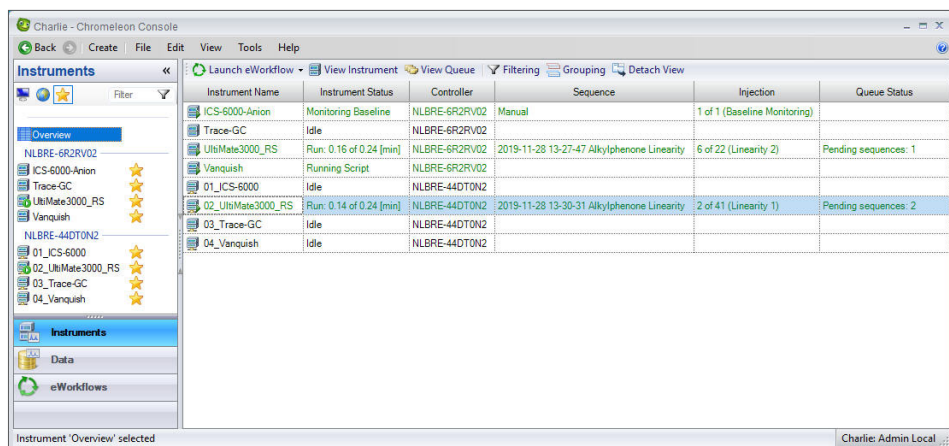

Figure 2. Instrument Overview

Data acquisition

Though instrument preparation and sample loading require presence in the laboratory, instruments and sequences can be controlled remotely. The Chromeleon Console (Figure 3) allows users to clearly identify sequence progress, spot issues and even insert injections, either manually or in an automated fashion with Intelligent Run Control (IRC). MiniPlots™ (Figure 3A) provide an at-a-glance preview of how the analysis progresses and even final results (Figure 3B), like pass/fail results of system suitability tests or component amounts, can be shown directly in the sequence table, without even opening the Chromatography Studio.
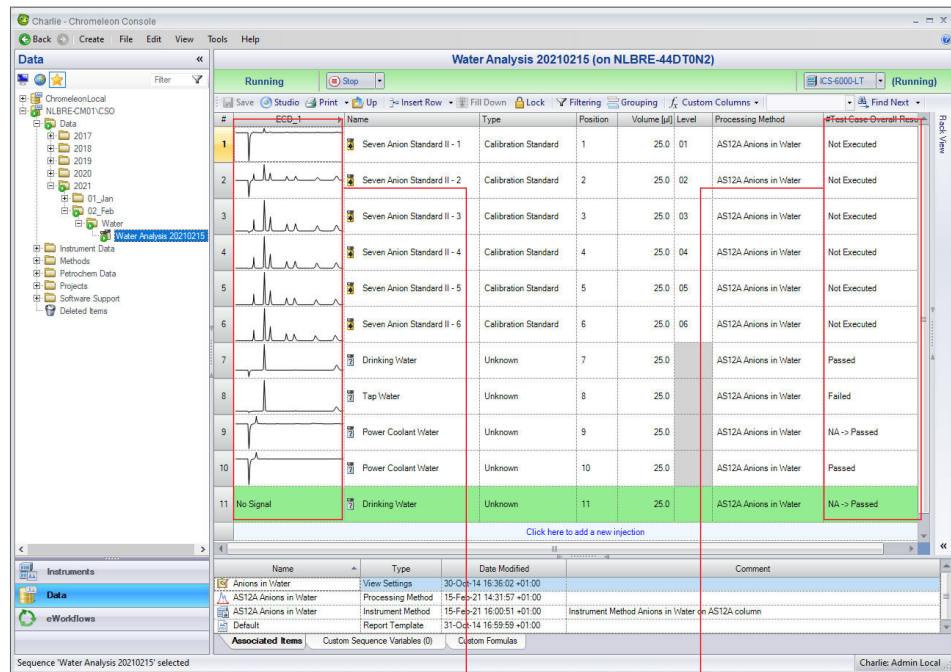

Figure 3. Chromeleon Console

The Instruments category also gives access to the queue tab (Figure 4), which shows finished, currently running and scheduled sequences and the option to re-order, start, and stop. In addition, you can also directly work with the recent sequences (Figure 4A).

The Chromeleon Ready Check automatically checks instrument configuration, methods, and the sequence for any associated issues and ensures that a sequence will run first time without errors.
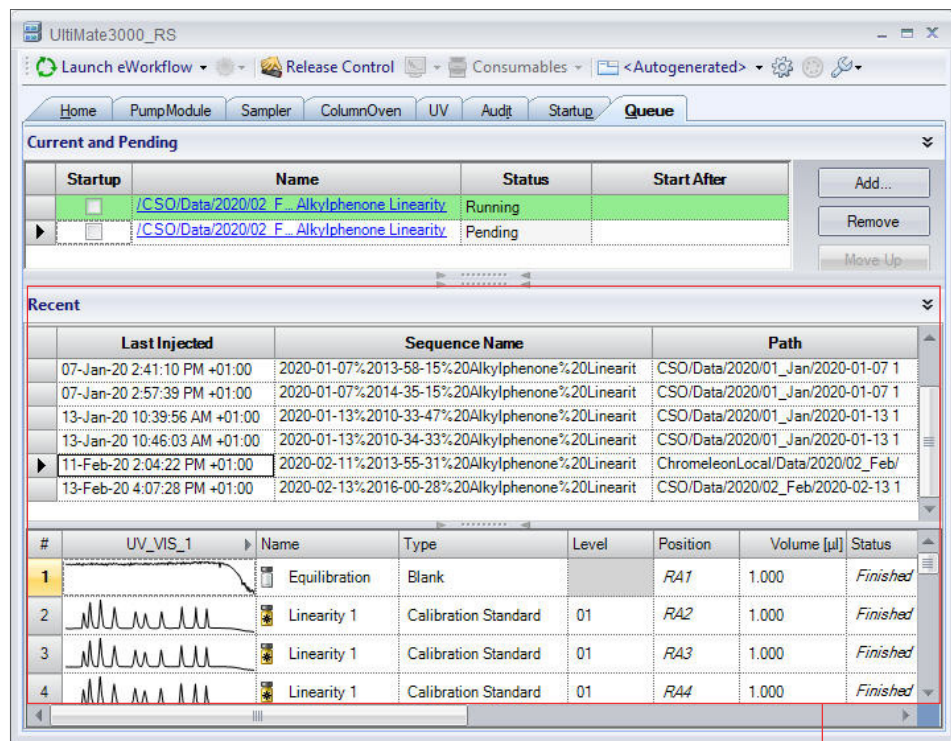

Figure 4. Queue tab with access to recent sequences

Remote data access

With all data centrally stored, it is possible to have access to data from anywhere, not just onsite in the lab or office. The software architecture provides visibility of all data, centrally stored or, if needed, on local instrument controllers, and makes it available for processing, review and reporting. Independent from which location the data is approached, access can be controlled using a privilege-based setup to define what users can and cannot do (Figure 5) with all user actions recorded in Chromeleon software's comprehensive set of audit trails.

When working remotely via the Chromeleon Console and Chromatography Studio you can leverage all intelligent tools without any restriction, further increasing productivity.
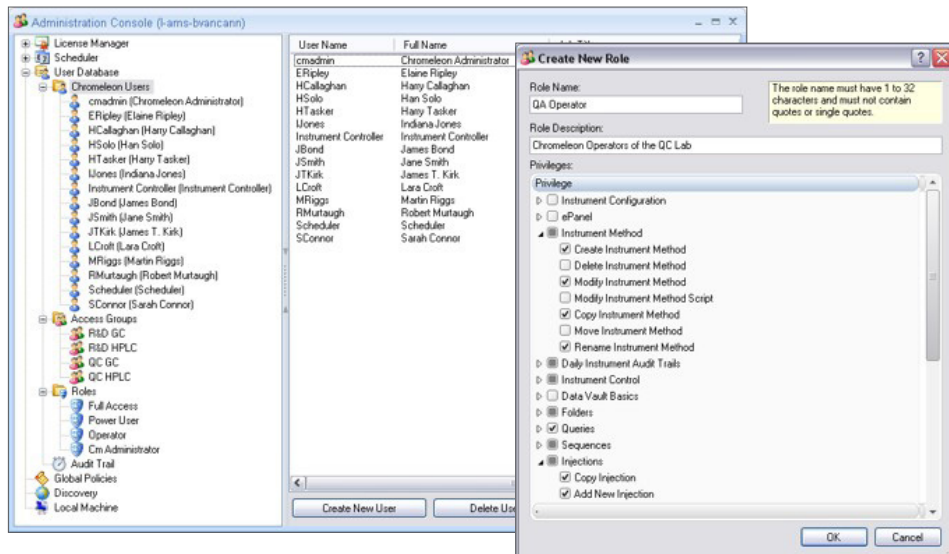

Figure 5. Chromeleon User Management

Built for IT

Remote system access

Chromeleon software is a fully scalable software solution from workstation to global enterprise, and anything in between, with remote access possible at all times. Even for a workstation (Figure 6) connected to the company's network, a remote client can directly connect to the instrument controller PC over the network—within the building or site or remotely, for example via a VPN connection.
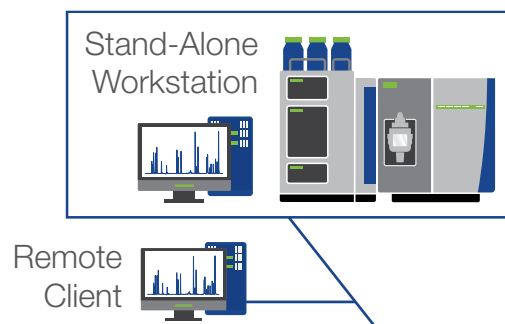

Figure 6. Workstation configuration with remote client

For enterprise installations (Figure 7) the focus is on implementing a central infrastructure and data storage location, providing security and resilience in case of outages. Chromeleon CDS has been optimized to work in such an environment using modern protocols and mechanisms to improve performance when interacting with the data. The Chromeleon Domain Controller is the central point, broadcasting all available resources within the Chromeleon Domain, and making them accessible for daily operation and administration from any location. Hosted shared application server solutions can distribute the Chromeleon Client across the network and unique network failure protection (NFP) capabilities keep the Chromeleon software running for 7 days.
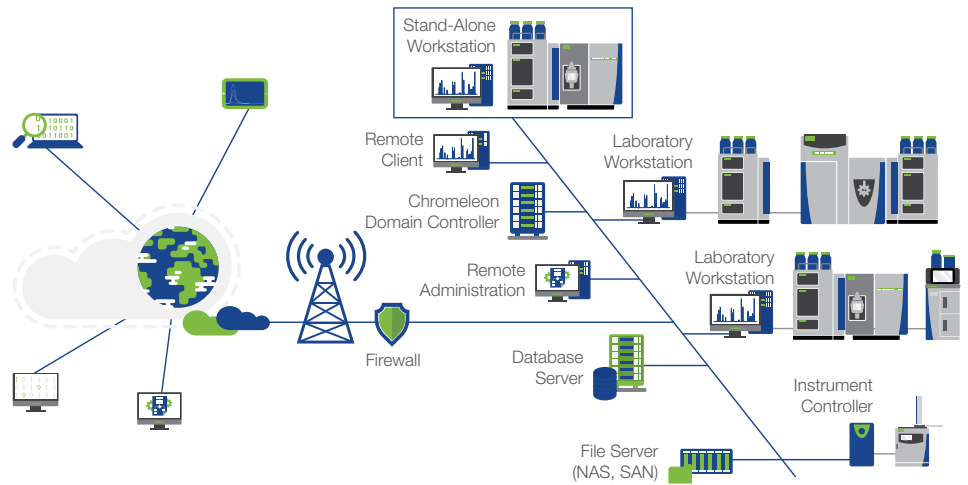

Figure 7. Enterprise configuration

Leveraging the cloud

Remote working requires reliability, which can be achieved by shifting central resources, like the Chromeleon Domain Controller, data storage and terminal services to support thin clients, to the cloud (Figure 8). Utilizing a cloud-based approach reduces costs associated with servers and negates the process of managing a data center.
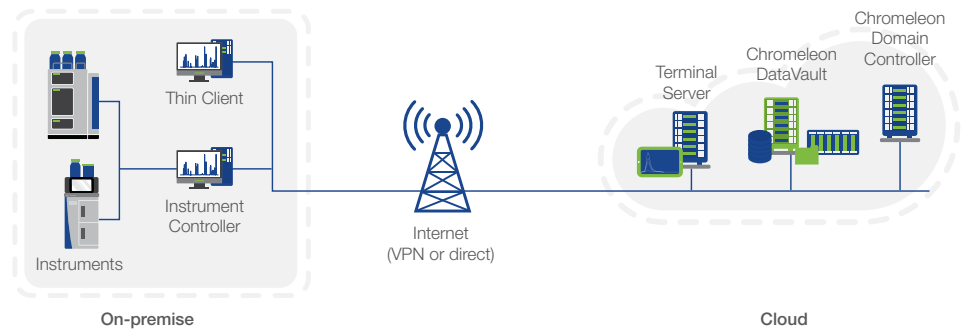
Another important advantage is that this provides increased security to ensure business continuity. Every business can get the security level that fits the organization and cloud service providers take serious care of their data centers and ensure that they are protected both virtually and physically. By utilizing the cloud businesses get inherent data security and failover resilience, as resources are mirrored. Finally, data is accessible from anywhere, particularly useful if users can't get to the office.

Figure 8. Central Chromeleon CDS resources in the cloud

Remote administration

Within a centralized CDS environment, administration can be done from any location on any PC, local or remote. With the Chromeleon Administration Console (Figure 9) an administrator can perform all administrative tasks from anywhere; managing licenses, scheduling tasks, for example for data archival, setting global policies, managing users and domain resources, and configuring discovery services.

Within the Resources node it's easy to see at a glance how many Chromeleon CDS sessions are open, who the operators are, how many instruments are running or whether an instrument controller is on or offline.
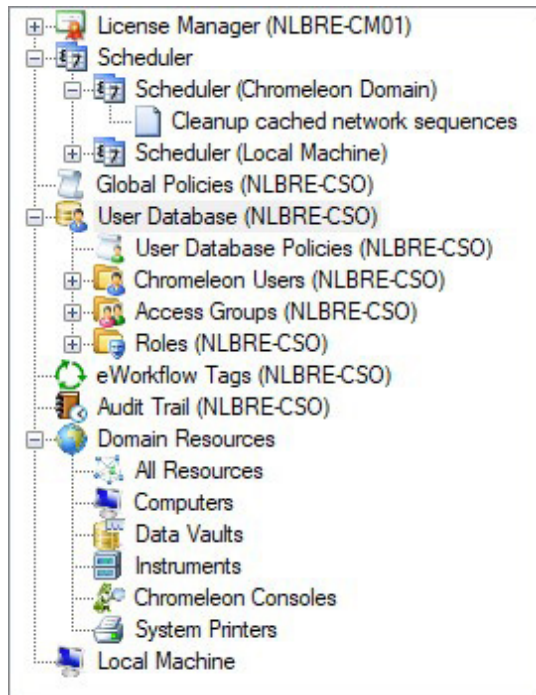

Figure 9. Chromeleon Administration Console nodes

Remote system maintenance

As part of remote administration, it is possible to perform remote system maintenance (Figure 10). The Administration Console provides the ability to allocate time for system maintenance and automatically schedule and rollout software updates, as well as installation qualifications. This makes administration easy, reduces time spent on performing these tasks and minimizes downtime in the laboratory, lowering the administration cost.
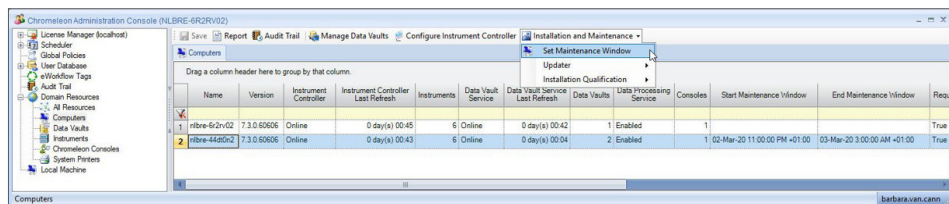

Figure 10. Remote system maintenance

Summary

Chromeleon CDS provides the capabilities to enable remote working from the office, home or any other location. Controlled access to the software enables full use of built-in intelligent tools, which ensure more right-first-time results and increased productivity, while security is maintained to prevent unauthorized access together with continuous operation. Remote access enables the IT and system administrators to perform all administrative tasks, including updates and system maintenance from anywhere, ensuring reliable software operation. This scalable solution adapts to any business's evolving infrastructure, without the need to change software or licensing, ensuring a cost-effective solution for remote operation and administration.

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