Remote Access to a Scanning Electron Microscope using Science Studio

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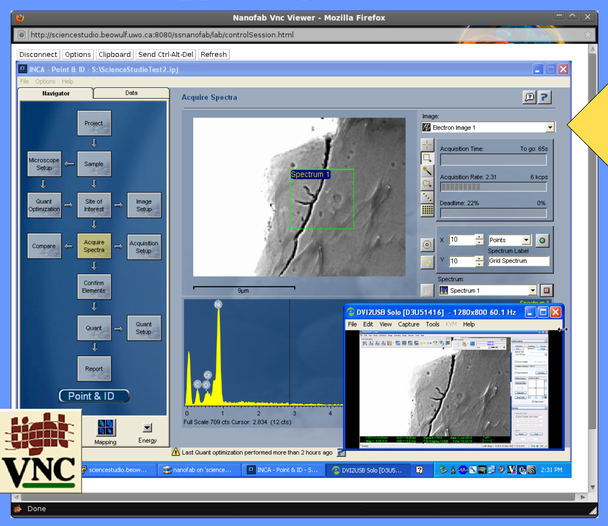
Remote Access

Web Application

Remote Desktop (Java Applet TightVNC Client)



Web Application
The web application provides integration with Science Studio. It is a rich interface implemented using the Ext JavaScript framework. The web application allows users to initiate a remote desktop session with either view-only access or full access to the XRMA computer. Secondly, it allows users to upload experimental data from the XRMA computer to the Science Studio experiment management system. When the user acquires data on the XRMA computer using INCA, they save the experimental data files to a Samba share that is hosted on the Science Studio server. Then the web application is used to select the files from this share for upload into Science Studio. This will create a scan object within the experiment model. Members of the project team can then access these files by selecting this scan in the project navigator. The project navigator is shown in the screen capture on the left side of the web application.

Remote Desktop
The TightVNC remote desktop software is used for this project because it has excellent performance and a Java Applet VNC client. Remote desktop performance on Microsoft Windows is improved by using the DemoForge Mirage video driver. The screen capture shows the INCA software with a region of interest defined by a green rectangle on an image of the sample.

Science Studio
The Science Studio web portal is an extensible platform that allows scientists to collaborate on research projects, and provides remote access to scientific resources. Science Studio is also a framework that can be used to more easily enable remote access to other devices. This framework provides session and experiment management features. Session management allows for remote access to be scheduled. Experiment management allows for the organization and sharing of experimental data. Within the framework is a customizable web portal that provides users a single consistent entry-point for remote access and other services. Security features, such as single sign-on and access control, are also included.

Science Studio Server

HTTP

INTERNET

RFB

Tunnel

Apache Tomcat Web Server

Science Studio Servlets

Spring iBATIS

JDBC

DB
MySQL

Samba File Server

Remote Desktop Security

A special tunnel is used to link a random unprotected port, to the protected VNC server port. The tunnel will only listen for a short time (10s) for the VNC client to connect, and it will only accept one connection. The tunnel is controlled by a servlet, so the link can be forcibly closed at any time.

UWO NETWORK

RFB over SSH

SMB over SSH

PuTTY SSH Client

TightVNC Server

File Browser

The Western Nanofabrication Facility is an open user facility at the University of Western Ontario for the fabrication of micro- and nano-structures. This facility has an assortment of equipment and instrumentation that provides its users with a wide range of capabilities; including lithography, deposition, etching and characterization. An instrument of particular interest to users is the LEO (Zeiss) 1540XB Scanning Electron Microscope (SEM) with an integrated Oxford Instruments X-Ray Microanalysis (XRMA) system.

The XRMA system provides elemental mapping and chemical analysis of the sample *in-situ*. The data acquisition and analysis software for the XRMA system is called INCA. INCA is a powerful application for both acquisition and analysis of experimental data. This software is a highly capable spectral analysis tool, with a well designed, user-friendly, graphical interface.

Western Nanofabrication Facility

Oxford Instruments X-Ray Microanalysis System

INCA