A Tale of Three Hospitals

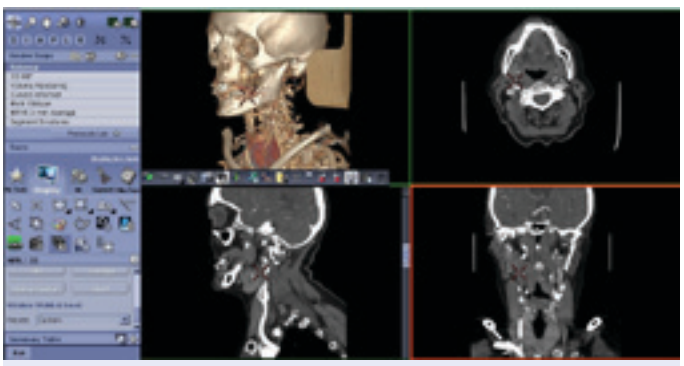
How thin-client technology is streamlining clinical workflow and enhancing patient care

For more than 20 years, GE's Advantage Workstation (AW) engineers have developed diagnostic applications that have lead to a robust clinical workstation across all areas of care—oncology, cardiac, neurology, gastroenterology, orthopedic and vascular. Radiologists' and clinicians' desire for a deeper understanding of pathological processes has led to a shift from a mere anatomical approach to medical imaging, to one that includes functional and quantitative analysis. This approach to diagnostic imaging has led to an explosion in the quantity of data clinicians must review, manage, and interpret. Recent information technology advances can help address the challenges of large image data management by offering new opportunities for the mobility of data, remote consultations, and access to information from virtually anywhere there is an available internet connection.

Embracing these advancements, the AW team developed a thin-client based server that allows access to the advanced applications of the Advantage Workstation from PCs streaming computed data from a centralized server. This new model is changing the way radiologists and clinicians work, analyze CT images, report cases, and collaborate with other physicians and hospitals.

Odense University Hospital

At University Hospital of Odense, Denmark's third largest city, post-processing CT images on AW Server helps neuroradiologist Jorgen Nepper Rasmussen, MD, evaluate and diagnose patients. "With AW Server we have the ability to reformat or view images from different angles right on PACS workstations. This provides flexibility and leads to higher diagnostic confidence.



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Jorgen Nepper Rasmussen, MD

Dr. Rasmussen explains that Odense Hospital has five CT systems installed in different areas. "Before we implemented AW Server, we had to go to the workstation closest to the scanner to perform our reformations. This is a large hospital, and that would often take a lot of time." While he would be bound to the AW to perform the additional image analysis on complex cases, he now enjoys more freedom with advanced processing software and applications available as a thin client solution.

With the thin client AW Server, GE's advanced CT post-processing software is available on PACS workstations throughout the hospital and even at the physician's office and home PCs. "We are processing more CT angiographies because it is so easy to perform no matter where we located," he explains. Continued enhancements to internet access, such as higher speed, further promotes the use of the software applications that reside on the server.

He also believes he is doing more advanced analysis with the AW Server than he did before when the software resided only on a dedicated workstation. While he would perform basic reformats prior to AW Server implementation, now he performs more complex reformats.

There is an economic and patient-care value to this, Dr. Rasmussen adds. "We can extract more information from the images we acquire, so we don't need large volumes of images or repeat studies." Plus, he can perform reformats at home, and travels less to the hospital in the evening for some emergency cases.

The AW Server also offers collaborative platforms to hospitals and doctors. Other hospitals in the area are sending their cases to Odense. "They don't perform as many CTAs as we do, and the clinicians may not have the same experience as us," he explains. On occasion, other hospitals will send images acquired from various CT systems to Odense and these images are reformatted on the GE AW Server.

"This solution works very well for us," Dr. Rasmussen says. "As a university hospital, we train clinicians and radiographers to conduct the reformats. we can provide a better patient diagnosis with them. The AW Server provides the tools necessary to achieve this."

"AW Server's collaborative platform works very well for us," Dr. Rasmussen says. "As a teaching hospital we train clinicians and radiographers to conduct reformats and provide more confident diagnosis and patient care. AW Server provides the tools necessary to achieve this." ■

DOCTOR BIO AND FACILITY INFO

The Odense University Hospital (OUH) is one of Denmark's largest teaching hospitals with 1,300 beds. The hospital comprises 50 clinical departments located at Odense and Svendborg. The radiology department performs approximately 250,000 exams each year. Odense University Hospital is the workplace of 10,000 medical professionals including 1,300 doctors and 3,800 nurses, while 4,000 medical students complete their clinical rotations at OUH every year.

Radiology Associates of Ridgewood and Waldwick

Thin-client technology is enabling the radiologists of Radiology Associates of Ridgewood and Waldwick (NJ) to perform advanced image analysis and post-processing from remote locations with the speed and functionality similar to a dedicated workstation. The group recently implemented the AW Server at their office and in the local hospital for which they read—The Valley Hospital (Bergen County, NJ).

According to Edward Lubat, MD, Managing Partner, the group has long used the AW for reading advanced imaging studies. "We had two workstations in the reading room at the hospital, and one in our office," he explains. "If more than two radiologists needed the AW at the hospital, then we had an issue."

With the growth of higher-end CT studies at the hospital, particularly CT angiography (CTA) of the head and body, the issue became more pronounced. "The AWs were in the body reading room, so our neuroradiologists would have to get up and walk down the hall. The problem was the body radiologists would often already be on the AW." This also caused numerous radiology reading interruptions throughout the day, limiting clinical efficiency.

In July 2010, AW Server was implemented throughout The Valley Hospital, the Radiology Associates' offices and even at the radiologists' home offices. With AW Server, a single server is connected to PACS, so advanced processing applications that were formerly only available on the AW are now available on every connected PACS workstation. Even PCs in the CT room have access to advanced applications.

With access to advanced post-processing from any connected PC or workstation, Dr. Lubat has seen an increase in conducting these type of studies during the evening hours. "Each night that I am on call, I typically have one or two CTAs from the ER," he explains. "With this capability to process the images remotely, we are utilizing 3D modeling more often in the evenings."

In fact, Dr. Lubat notes that the volume of CTA studies being conducted annually is increasing by approximately 10% each year—from 1,977 in 2008 to just under 2,600 in 2011. "These are good, worthwhile studies to conduct, and with the AW at our fingertips, we have an efficient and easy way to analyze the imaging data."

The software is available wherever needed and further facilitate clinical workflow. Dr. Lubat even points out that a leading cardiothoracic surgeon is performing review and analysis using AW Server tools on his office PC. "The responsiveness of AW Server is very good in the reading room, office, and at home," notes Dr. Lubat. "No one needs to go to the stand-alone workstation anymore." The software is accessible to technologists who have shown interest in performing 3D modeling; their reformations and processing is then saved using the "save state" feature so the clinician can review.

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Dr. Edward Lubat

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Dr. Lubat also finds the "save state" feature on AW Server useful when conducting his own post-processing. He can build the 3D model, save the images, go into PACS and read them. Sometimes, however, he discovers something on the source data that he didn't notice in the model, and therefore wants to revise the 3D model. With the "save state" feature, he doesn't have to repeat that 3D modeling work—which can take time to complete. Rather he simply goes back to the save state, makes his edit, and then resumes.

The bottom line is greater efficiency when radiologists don't get up and move to the dedicated workstation. With AW Server, images are distributed everywhere, simplifying workflow and enabling higher clinical productivity. ■

Edward Lubat, MD, is Managing Partner of Radiology Associates of Ridgewood, P.A. and former Director of Diagnostic Imaging at The Valley Hospital in Bergen County, NJ, US. Dr. Lubat completed his residency and fellowship training at New York University Medical Center, where he also served for two years as Assistant Professor of Clinical Radiology in the abdominal imaging division. He specializes in body, musculoskeletal, and nuclear imaging.

Radiology Associates of Ridgewood, P.A. is a 16 member group that performs approximately 300,000 procedures each year, serving The Valley Hospital in Ridgewood, NJ, US and a full service outpatient imaging center in Waldwick, NJ, US.

Son Espases University Hospital

At Son Espases University Hospital on the picturesque Balearic island of Mallorca in Spain, gone are the days when Carolina Nieto-Garcia, MD, would read 20 or more radiographic films to report a thoracoabdominal CT. Modern CT systems generate hundreds—even thousands—of images for each study. With the volume of data presented to clinicians, image post-processing is an essential diagnostic tool, she says. Yet with 40 radiologists and four CT workstations, accessibility to these software tools was limited, resulting in a delay in reading and reporting, particularly for the most complicated cases.

"I always hoped to have a single workstation that integrated all the possible tools a radiologist may need--clinical records, images, and post-processing applications—to improve our performance," says Dr. Nieto-Garcia. Today, her wish is a reality with the implementation of the AW Server on the hospital's PACS workstations.

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Carolina Nieto-Garcia, MD

As an interventional radiologist, Dr. Nieto-Garcia finds great value in multiplanar reformat (MPR) of vascular studies to either plan an intervention or provide pre-surgical planning advice to surgeons. With a large volume of vascular studies performed in her institution, many of which require extensive processing and analysis, Dr. Nieto-Garcia finds she is saving time and increasing the number of reconstructions.

"Above all, I was able to do it easily from my own office, with no queues or pressure from anyone else needing to use the same workstation," she says.

With the ability to read remotely, Dr. Nieto-Garcia sees new opportunities to consult on therapeutic decisions even when she's not physically present in the hospital. "This has made it possible for clinicians throughout the Balearic Islands to consult us," she explains. "The smaller hospitals in Menorca or Ibiza rely on us to help them treat some of their patients."

The positive impact of remote consultation is also felt by patients. While complex cases still require a patient transfer to Son Espases, Dr. Nieto-Garcia notes that a significant number of cases, such as draining an abdominal abscess percutaneously, can be performed right on site. By sharing information and expertise, resources are optimized and decisions made wisely based on the availability of clinical imaging data, she adds.

"A common phone consult involves reviewing the indications for a certain procedure, and evaluating the images to see if the procedure in question is technically feasible," she explains. "Now we just open the laptop and have access not only to the images but also to MPR reconstructions. The patient doesn't move from his/her bed, the surgeon has a quick response to questions from the radiologist and, last but not least, we don't have to commute to the hospital, which significantly improves the radiologist's quality of life."

With continued advances in technology, Dr. Nieto-Garcia sees a future where mobile devices—smartphones and tablets—will also be utilized for viewing, manipulating, and consulting by accessing AW Server.

"AW Server implementation across our workstations and computers is one of the major advancements in our hospital since we installed PACS," she says. "With AW Server, we have access to all the imaging, regardless of the modality, from every location where there is a computer and internet access. These factors significantly facilitate the process of reporting and create a more dynamic patient care environment. Radiologists can view, process, and report images more quickly, so patients get their results sooner." ■

Dr. Nieto-Garcia acknowledges the assistance of Aisling Snow, MD, radiologist, for assistance in English writing.

Carolina Nieto-Garcia, MD, is an interventional radiologist in the Vascular and Interventional Radiology Unit at Hospital Universitari Son Espases in Palma de Mallorca, Spain. Dr. Nieto-Garcia received her medical degree from the Autonomous University of Barcelona (Spain) and completed her residency in Diagnostic Radiology in Hospital Universitari Son Dureta.

Son Espases University Hospital is a new teaching hospital located in the capital city of Palma on the island of Mallorca, the largest of the four Balearic Islands. The hospital is the result of a 235 million Euros investment by the region and Spanish government to serve the region's 330,000 inhabitants. Son Espases is also a reference hospital for residents of the three other Balearic islands. The facility provides routine, emergency, and specialized healthcare services and has 1,020 beds.