CUSTOMER SUCCESS STORY | NETHERLANDS CANCER INSTITUTE

# ACCELERATING CANCER RESEARCH, DIAGNOSIS, AND QUALITY OF CARE


Image courtesy of Netherlands Cancer Institute

NVIDIA

# VIRTUAL GPUS PROVIDE COMPUTING POWER, SECURITY, AND FLEXIBILITY IN THE SEARCH FOR A CURE.

Image courtesy of Netherlands Cancer Institute

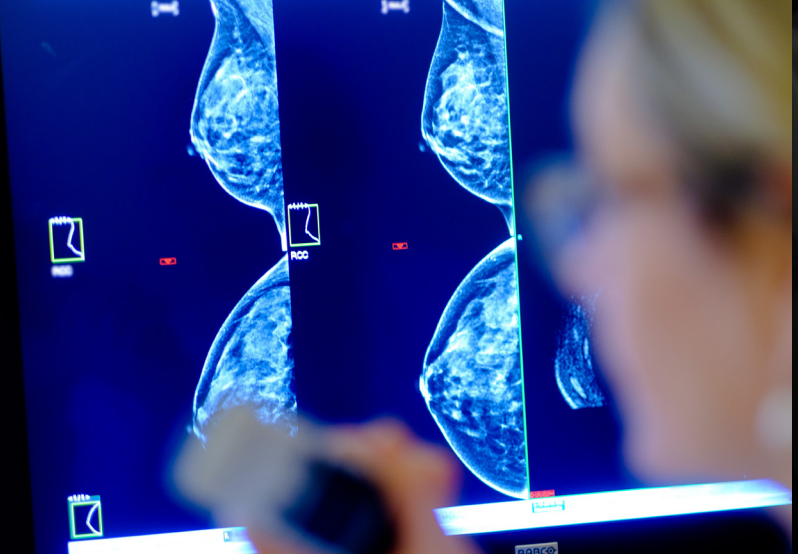
## INTRODUCTION

The Netherlands Cancer Institute (NKI) has a mission to defeat cancer. For more than 100 years, NKI has led the world in cutting-edge research to increase global understanding of the disease. Sharing facilities with a state-of-the-art cancer clinic, NKI offers researchers the opportunity to get closer to the problems they study, while also bringing patients closer to groundbreaking treatments. Recently, the institute undertook a project to upgrade their shared IT infrastructure using virtual GPUs (vGPUs) to expedite research and streamline patient care.

## CUSTOMER PROFILE

ANTONI VAN LEEUWENHOEK
NEDERLANDS KANKER INSTITUUT

| Organization | Industry | Founded | Location | Size | Website |
|---|---|---|---|---|---|
| Netherlands Cancer Institute (NKI) | Healthcare | 1913 | Amsterdam, the Netherlands | 783 researchers, 3,000 clinicians | www.nki.nl |



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## SUMMARY


- NKI wanted to build a brand-new IT foundation.
- The infrastructure needed to support HPC and virtualization to serve two groups with very different computing requirements.
- The IT team deployed new servers installed with NVIDIA T4 Tensor Core GPUs.
- NVIDIA T4 GPUs were virtualized with NVIDIA vGPU software to maximize resource utilization and accelerate performance.
- In the near future, researchers will be able to make new discoveries faster and physicians will be able to spend more quality time with their patients.


## SOFTWARE

- **Hypervisor:** VMware Workspace ONE and VMware Horizon 7
- **Graphics Acceleration:** NVIDIA® Quadro® Virtual Data Center Workstation (Quadro vDWS) and NVIDIA GRID® Virtual PC (GRID vPC)

## HARDWARE

- **Server:** HPE DL380 Gen10
- **GPU:** NVIDIA T4

## REASONS FOR NVIDIA VIRTUAL GPU

- Deliver high-performance virtual machines (VMs)
- Improve server resource utilization around the clock
- Extend GPU resources to more researchers
- Ensure infrastructure is future-proof

## CHALLENGE STATEMENT

When it comes to stopping cancer, time is of the essence. The faster researchers make new discoveries, the more quickly physicians can administer life-saving treatments. Thankfully, recent digital innovations in microscopy and bioimaging are helping to speed the path to a cure. Not only can researchers now watch exactly what's happening inside live cancer cells, they can also capture highly detailed images. Behind the scenes, high-performance computing (HPC) is playing an increasingly important role. "There's still quite a lot of innovation in microscopy, but even more innovation is happening in the processing and analysis of the data with computers," said Bram van den Broek, advanced microscopy specialist and bioimage analyst at NKI.

To make the most of the latest digital innovations, NKI needed an IT update. NKI's researchers use a variety of software, including Huygens Professional to analyze images and SPSS Statistics for statistical data analysis. Capturing and analyzing terabytes of data is computationally very demanding, and researchers' local GPU-powered workstations often took too long to deliver results. "We have a couple of very powerful desktops that can handle some of [the data and image processing]. But at some point, these are clogged by continuous use," said van den Broek. "We needed stronger, faster computers to be able to cope with this data."

Meanwhile, clinicians at NKI's hospital relied on the same traditional IT environment. Upwards of 20 times per day, medical staff needed to log in to the HiX Electronic Health Record (EHR) system to look up patient data. They were also reviewing medical scans in the diagnostic imaging environment Carestream Vue PACS. While these technologies helped with internal organization, slow PCs meant physicians' precious time was being wasted on basic administrative and repetitive tasks. They wanted to refocus their attention on patients.

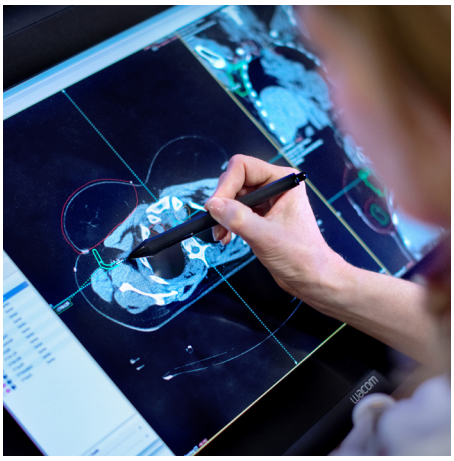

Image courtesy of Netherlands Cancer Institute

On a single networked system, NKI's old infrastructure served two groups with very different computing needs. "Researchers needed a safe yet flexible environment that allowed them to install new applications and analyze extremely large datasets. They also needed the freedom to securely share their data with researchers across the globe," said Roel Sijstermans, the head of IT for NKI. "In contrast, clinicians needed a standardized platform that they could access anytime, anywhere, which kept patient data safe and secure." To meet the requirements of both groups, NKI needed to build a new target-specific infrastructure.

## SOLUTION STATEMENT

NKI took their first step toward a new digital foundation in 2016 with the creation of an IT roadmap. "We called it 'Workspace and Infrastructure 3.0' because we were planning state-of-the-art infrastructure from the ground up," said Sijstermans. "To provide the best user experience, it needed to be fast, simple, secure, and flexible. So our plan included a high-speed network, a software-defined data center, and upgraded firewalling. To ensure it never went down, it needed 100 percent redundancy." Because it would serve clinicians and researchers, the project's budget combined IT funds from NKI's 54 research departments and the hospital.

When evaluating equipment options, NKI's team decided on NVIDIA T4 GPUs and HPE DL380 Gen10 servers. "NVIDIA is the leader in GPU technology. We chose NVIDIA because we wanted the best, and the T4s were the most powerful cards suitable for virtualization," said Sijstermans. In the end, NKI's new infrastructure featured a total of 78 HPE servers installed with three NVIDIA T4 cards per server.

On the software side, NKI selected VMware for their hypervisor; to virtualize the T4 GPUs, they chose NVIDIA Quadro vDWS and GRID vPC. NKI wants to give users the best user experience possible. They achieved this by providing GPU profiles based on user needs. Initially, NKI provisioned 1Q and 1B profiles based on the application needs. In total, NKI purchased 2,200 concurrent licenses: 1,100 for Quadro vDWS and 1,100 for GRID vPC. At the end of 2019, the project was undergoing testing with the IT team's 80 users. After experiencing the performance firsthand, the IT team was confident the environment would be ready for hospital administrative users, and later physicians and researchers.

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**Roel Sijstermans**
Head of IT
Netherlands Cancer Institute

## RESULTS STATEMENT

NKI's new, software-defined data center significantly speeds up the innovation cycle. "NKI has very short lines between our research laboratories and clinic, so we can innovate quickly," said Sijstermans. New research findings and breakthroughs can be brought to the clinic even faster. "In the past, our researchers would send images to our bioimaging facility for analysis and it would take a week to get results. With our new infrastructure, images are sent in the evening, and by the next morning, the analyzers are done." This considerable boost in computing performance is possible thanks to the flexibility provided by NVIDIA vGPUs.

Most organizations have expensive data center resources that are underutilized. NVIDIA technology virtualizes GPUs in the data center and effectively eliminates the problem of underutilization. By enabling every server in the data center to run every workload in a VM, servers can run both virtual desktop infrastructure (VDI) and the most compute-intensive workloads, including HPC, artificial intelligence (AI), deep learning, and data science.

During the day, NKI runs as many as 2,000 VMs for clinical and research users. At night, unused VMs are scaled down and consolidated and new ones are spun up and put to work processing important jobs, like doing computations on DNA or analyzing patient medical scans. With the help of a strategic partner, ITQ Consultancy, NKI have built an infrastructure in which repurposing of data center resources can be automated. This lowers the total cost of ownership (TCO) of the platform and offers a great place for every workload, even complex ones, to run. "We have leveraged the power and versatility of NVIDIA's vGPU technology to enable a great diversity of use cases on the platform," says Johan van Amersfoort, technologist at ITQ Consultancy and architect on the project.

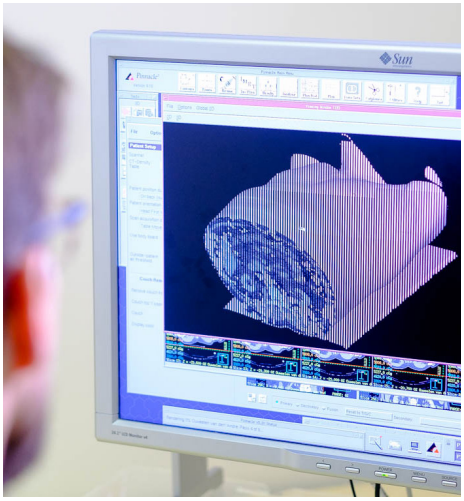

Image courtesy of Netherlands Cancer Institute

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Scripts written by NKI's IT team inform the servers how to prioritize tasks. For example, if users log in to their VMs after 5:00 p.m., NKI's servers can balance those VMs with HPC workloads, using redundant servers if necessary. Said Sijstermans, "We call our NVIDIA vGPU-powered infrastructure 'VDI by day, and compute by night.' But really, it's VDI by day and night, and compute by day and night."

Not only are NKI's data center resources efficiently utilized, they're also easily accessible to researchers and clinicians alike. In the hospital, physicians and nurses now have quick access to apps with fast user switching and tap-and-go functionality. Users can initiate a virtual desktop session in one part of the hospital, and then move to another area and get right back into their session with a swipe of their badge and pin code. In the laboratories, researchers enjoy accessing extra compute resources whenever they need them. "On the old infrastructure, when researchers had a big compute job, they notified the IT team, and we put their job in a queue for a few weeks until extra capacity was available," said Sijstermans. "In the near future, researchers control their own resources. IT only facilitates."

As automation and self-service free up extra time, the IT team is learning that innovation can now be a priority. "When maintenance isn't the main focus, we can ask users to tell us about their needs and design new automated solutions," said Sijstermans. There's also more time to plan for future AI use cases. "Whether its analysis of cancer cells or patient scans, NKI strongly believes that innovations like AI will play an increasingly important role in the future of cancer research, diagnostics, and treatment. To stay at the leading edge, we need to proactively plan to optimally manage compute resources. Today, we can do so much more than we could before. Our new technology has helped us greatly."