PC EXPERT

TECH GUIDE

ACCELERATED COMPUTING
Robust hardware and software business solutions

CLOUD BY CARRI
A wide range of customized offers at the cutting edge of technology

WORK-STATIONS
A long tradition of innovation for enhanced performance
AMD FirePro™ W9100

Professional Graphics

Features

- 16GB 512 bit GDDR5 memory
- 5.24 TFLOPS peak single-precision floating-point performance
- Six mini DisplayPort 1.2 outputs
  Maximum DisplayPort 1.2 resolution 4096x2160
- DirectX® 11.1, OpenGL 4.3, OpenCL™ 2.03
  Shader model: 5.0, AMD Eyefinity multi-display technology support AMD HD3D Pro support via stereoscopic 3-pin mini DIN4
- DirectGMA and SDI support

- Leading-edge graphics and GPU compute performance
- Industry's first 16GB GDDR5 card
- Support for up to six 4K displays

The ultimate 4K experience for next-generation workstations

Work at a whole new level of detail, speed, responsiveness and creativity with super computing-class performance at your fingertips. Tackle the most complex modeling and simulation projects with speed and agility, or fly through edits, filters and color corrections, and process multiple effects in real-time.

Enabling today. Inspiring tomorrow.
This TechGuide offers me the opportunity to introduce the long and rich story of CARRI Systems, and also explain the major axes of the company that can already presage tomorrow’s advanced IT.

Back to its creation in 1992, CARRI Systems had already founded the same values that are still promoted today, 22 years later. Our success-story is based on 4 pillars described in this TechGuide, which all have the same central element in common: carefully listening our customers to study and design the best solutions to answer their most demanding needs.

CARRI Systems demonstrates also a rich ecosystem of expertise at our customers’ service. With the support of our partners, we are able to tender for challenging projects requiring high skills in technological design and architecture. In order to fulfill our technological architect mission over the years, we always strive to go further and design unprecedented solutions on the global market, such as our XLR4 Blade described in these pages.

I let you now discover with great pleasure our offers built today for tomorrow challenges.

Enjoy this TechGuide,

Franck Darmon
General Manager
CARRI Systems
As of 2014, CARRI Systems’ values remain the same as at its founding in 1992. These principles have always been in the top management’s priorities which believes in technology as well as in human beings building and using it.

ABOUT THE COMPANY

CARRI Systems’ technological expertise has been acquired using a constant watch allowing its pre-sales engineers to carefully and thoroughly analyze each customer’s needs in terms of hardware, software, network infrastructure, training and setup. CARRI Systems’ services range has been enriched over years since the founding in 1992. Its offers are flexible and can answer any kind of situation in any IT environment.

KEY FIGURES

1992
Founding of CARRI Systems and launch of the first product series

6000 Customers trust CARRI Systems since its beginnings

1000 square meters dedicated to its premises in Noisy-le-Sec

3 Production lines reaching a 30 machines/day manufacturing capacity

40 Awards rewarding CARRI Systems’ products since the company was created

MAJOR MILESTONES

1992
Creation of the trademark CARRI Systems

2000
The company becomes accredited supplier to the French National Assembly

2005
The “Direction Générale de l’Armement” (French Defense Procurement Agency) orders 1,500 CARRI Systems workstations
CARRI SYSTEMS,
a French manufacturer working closely with businesses

That is less well-known, but CARRI Systems is the last remaining French IT manufacturer! Its servers and workstations are designed and assembled at Noisy-le-Sec, near Paris. The assembly line allowing a 300 machines/month manufacturing capacity is located into the 1,000 m² premises. The company is a member of the European High Performance Digital Simulation Expertise Pole (Ter@Tec) since 2011.

CERTIFICATIONS

1997
CARRI Systems earns the Intel Processor Integrator certification

2002
CARRI Systems becomes Intel Premier Provider

2007
CARRI Systems becomes NVIDIA Tesla Preferred Provider

2011
CARRI Systems becomes a Ter@Tec member

2012
CARRI Systems is Adobe Pro Video certified

2014
CARRI Systems becomes Autodesk bronze reseller and earns AMD Workstation Specialist Integrator certification

2008
A 400-nodes cluster is deployed at Lorraine INRIA and Rennes INRIA (French National Institute For Research in Computer Science)

2009
Supélec Metz (French graduate school of engineering) is equipped with a 256-nodes calculation cluster designed by CARRI Systems

2011
Official launch of CARRI Systems Clusters with preconfigured TESLA GPU SimCluster

2014
Creation with Gigabyte of the world’s first supercomputing dedicated Blade
ABOUT THE COMPANY CARRI SYSTEMS

The 4 business values

Value 1
A careful customer need analysis
This type of analysis is a long-time tradition at CARRI Systems. It is not rare that the French manufacturer’s technical teams collaborate to a customer’s requirements to enhance, refine and validate the best solution to fulfill its needs.

Value 2
Belief in business knowledge
CARRI Systems’ experts and engineers are in constant training and are receiving certifications from their tech-partners (Intel, NVIDIA, AMD, Adobe, and Autodesk) to maintain a technological cutting-edge and be able to meet the demands.

Value 3
A state-of-the-art knowledge to encourage innovation
CARRI Systems’ engineers always keep in touch with the industry leaders to test and validate hardware components and platforms in order to create the services and products catalog, and design proofs of concept for tailor-made solutions.

Value 4
Balanced choices for more performances
This reflects CARRI System’s engineer’s motto during the analysis and study steps. Beyond the components selection, they ensure the platform is homogeneous in order to meet the requirements.

CARRI Systems’ 6 service assets

Purchasing a solution from CARRI Systems means an investment in a high quality service provided by technicians with a strong field expertise. The French manufacturer is particularly close from its customers. They give priority to human relationships rather than volume sales. Each project is thoroughly analyzed before execution. CARRI Systems technical teams are well-known for their expertise allowing them to operate on any IT brand.

Asset 1
Pre-sale and audit services

Asset 3
External IT assets governance

Asset 5
Customized financing offers

Asset 2
Deployment and migration missions

Asset 4
A large panel of after-sale services

Asset 6
Short, middle and long term on-demand lease services
WORKSTATIONS MARKET

CARRI Systems workstations are designed with the highest care in order to meet precise specifications and fulfill various and high-end business needs. The final objective is always performance at business service.

The workstations activity is the most known because it’s the oldest. Awarded many times by IT press, CARRI Systems technical teams’ approach has been proven successful. Whether it’s a configurable or a laptop, all workstations are designed to fulfill the most critical missions. As Adobe and Autodesk certified manufacturer, CARRI Systems is able to supply engineering and design departments, architects, and all businesses in graphics and 3D design market.

Certified platforms for robust business tools

The manufacturer pays a particular attention to the design phase of its workstations but also to their certification (see box). The Virtual Designer workstation series is certified for Autodesk CAD/CAM applications. Other solutions are also Adobe certified for video, graphic arts, 3D, professional photographers, web agencies and web designers. The businesses who entrusted them are guaranteed to acquire professional hardware validated by the developers creating the software suite they are using for their day-to-day activity.

Workstations built and tailor-made to fulfill their missions

Individual technical advices or nothing!

CARRI Systems’ workstations are designed in accordance with the missions they must fulfill. In addition to certifications covering a wide panel of professional activities, the French manufacturer is able to create tailor-made solutions with certified hardware components dedicated to specific applications and businesses. For instance, for video surveillance activity a pre-study will take all parameters into account in order to ensure the adequate response time and smoothness on the selected hardware configuration: connection number and video channels inputs will allow choosing the most appropriate CPU, memory and video card. These studies are performed case-by-case depending on the business needs in order to validate the technical choices, possibly with the creation of a pre-deployment proof of concept.
CUSTOMER CASE 1
BANQUE DE FRANCE

The Banque de France (Central Bank of France) had very specific needs in order to complete intensive financial risk computing in the context of risk management. The solution retained was built around workstations integrating 4 to 5 NVIDIA Tesla cards each to achieve the required computing objectives. The main challenge was ensuring a sufficient bandwidth on the PCI Express bus in order to reach optimal performances.

CUSTOMER CASE 2
PRÉSAGIS FOR EUROCOPTER

Eurocopter needs were very strictly controlled. Within the context of renewing the company’s flight simulators’ technical platform, CARRI Systems has partnered with Presagis, one of the main simulation and modelling software solutions suppliers for avionics systems and combat simulation laboratories. In fact, it consisted in an end-to-end design of 4U rackable workstations equipped with Intel Core i7 CPUs, PNY Quadro K 5000 cards and Sync in order to display highly realistic real-time environments with a stereoscopic view.
Certifications: a warranty for business activity

As manufacturer, CARRI Systems is part of an ecosystem made of business partners and industry members. Having double-certified workstations (at hardware and software levels) is a warranty for companies to ensure unrivalled efficiency and productivity. That’s the main objective of partnerships with companies such as AMD or NVIDIA: the pre-qualification work on drivers and professional cards integrated to workstations is a direct benefit to customers. The manufacturer could use mainstream products and pretend they are working the same way, but this would be against its values, and furthermore a non-sense considering the lack of actual hardware certifications. R&D teams prefer basing their solutions on Quadro or FirePro cards, and rely on software certifications done upstream by NVIDIA and AMD, hence providing to a customer using 3D Studio Max or Photoshop the adequate station without any additional cost or oversized hardware according to its needs. In certain conditions, the performances/cost ratio may imply the usage of mainstream graphic cards like NVIDIA’s Geforce Titan. In such context, it is modified at BIOS level if necessary in order to ensure it can deliver 100% of the required power.

If we are working since 2005 with CARRI Systems, it’s because of their workstations’ quality, the flexibility allowed when choosing customized configurations, the possibility to have test machines and their service desk efficiency. Combined with very competitive prices, we decided to choose them to acquire our Cluster.”

PASCAL RAY Institut Jean
Le rond d’Alembert LMM Jussieu
More and more applications are requiring high performance computing (HPC, also called intensive computing). CAD, simulation of materials, drug design, HD digital contents creation, Big Data management... They now touch a wide range of activities in private or public organizations. Until now, to reach the required power level for these applications, the solution was to use multiple computing servers. This time is now over. From now on, parallel accelerators can reach extremely high performance levels with unrivaled density, reliability and cost-effectiveness. They act as autonomous multicore mini-servers, affordable for any professional budget.

Parallelism as the key of intensive computing

Regardless of the accelerator type, the principle remains the same: they parallelize repetitive tasks. This parallelization leads to acceleration factors reaching 100x on specific applications, whether they are executed on workstations or within servers. CARRI Systems does not oper-
ate in silos. Instead, collaboration and synergies have proven their efficiency while initiating wide scale projects in accelerated computing context. Besides hardware skills under constant watch, CARRI Systems has developed solid partnerships and made its platforms and engineers certified in order to have the best knowledge in this area. As a result, its experts are highly qualified to design turnkey solutions fulfilling precisely the specifications according to budget, power and energy efficiency constraints.

**CARRI Systems’ secret: high value added customized advices**

For digital simulation, Big Data or any other HPC application, a successful project involves value added customized advices. Whether it relates to servers, clusters or workstations, CARRI Systems offers its experience, expertise and guarantee from the French tailor-made accelerated computing solution architect through its XLR series. While freeing up CPU resources, accelerators also make infrastructure resources available for other purposes. As a result, users remain fully productive while energy, infrastructure and maintenance costs are reduced to a minimum.

Looking for a consistent architecture is not just a catchword. A proof of concept allows validating architecture choices in terms of system bandwidth and energy consumption before deployment. It may look anecdotal on a single machine, but it’s a very different challenge on a cluster composed of hundreds of machines! Tracking any kilowatt or millisecond is a benefit for everyone. And when market solutions - even designed on specific demand - do not answer the need, CARRI Systems will design a proof of concept in order to test new options. A good example is the ultra-compact XLR Blade server, an accelerated calculation bay unequalled in the world!
“With its level of professionalism and performance, this company has been validated for a 3-year public contract. Their pre-sales commitment, with a perfect knowledge of the most advanced technologies, has allowed us smart and competitive acquisitions. Their high availability level and service desk thoroughness allow us to easily and efficiently manage our infrastructure.”

A. FILLEBOIS, Development Manager at INRIA Nancy Est

Since the early 2000, CARRI Systems has worked together with universities, research centers and the CNRS (French National Scientific Research Council) to design accelerated computing solutions. Starting with dual CPU, then multi-CPU, and finally InfiniBand clustering, these solutions have evolved to increase their performances without losing sight of their first goal: defining a balanced and consistent system architecture to maximize performances. The INRIA Lorraine has hosted the first wide-scale cluster with 400 servers, designed and built by CARRI Systems technical teams and Infiniband interconnected. Density being a key factor, as much for energy consumption as heating dissipation and ground and rack occupied space, the French manufacturer defined a unique architecture allowing to organize PCI cards in a “butterfly mode” around a PCI Express riser, and studied the air flow to replace some aluminum heatsinks by copper.
Designed by CARRI Systems and built by Gigabyte, the XLR4 Blade includes 4 Blade servers within a 2U bay. Each blade is equipped with four 2.5” drive bays, a Xeon E3-1200 v3 CPU and a dedicated accelerator card. As a result a 2U bay has 16 cores and 4 GPU (1 per blade). The accelerator card can be selected from various models from the NVIDIA GRID and Tesla series. This innovative solution is made possible thanks to a mini-ITX motherboard designed by Gigabyte and equipped with the Lynx Point PCH C222 chipset, 2 Intel Gigabit Ethernet controllers, 2 DDR3 slots with 16GB per blade and a PCI-E 3.0 16x slot in order to connect the selected accelerator computing card. The XLR4 Blade has been certified for four cards with a maximum power of 300W each. The XLR4 Blade is available worldwide.
CARRI Systems has taken the Cloud computing turn since years. The final objective was to create business offers for companies with very specific needs to which the French manufacturer pays a particular attention.

As for its other activities, a very careful study of customers’ needs is at the center of the relationship between CARRI Systems and its customers. Besides the hardware aspects requiring a deep knowledge of latest technologies, its technical teams master all virtualization platforms: Microsoft Hyper-V, VMware ESX and Horizon, Citrix Xen Server. Their skills in terms of installation and deployment are extended to the software level with Microsoft certified partners for Azure, Office 365 and Lync solutions for example.

A single detail can change everything... positively!

It’s often with premium partners that CARRI Systems knows how to reply to extremely precise specifications, and also suggest options to enhance the design, the energetic efficiency or the performances of a given solution. A homogeneous and consistent hardware platform can benefit to customers at all levels... without necessarily increasing costs. The careful study of each need and the target solution does most of
MyCloud 3D and Scalable Graphics, pioneers in building 3D tour

MyCloud 3D is a startup specialized in building 3D tour and one of CARRI Systems’ partners. Its offer is technically based on Unity game engine and an accelerated server designed and sized with CARRI Systems’ teams, with a NVIDIA K540 card equipped with two GPUs. In addition to the building modelling, it can be displayed through a simple web browser to allow a live 3-dimensions visit. Thus, 5 to 7 users are able to perform a 3D tour smoothly. According to Cédric Jutteau, General Manager of MyCloud 3D, this solution package including broadcasting options was made possible only thanks to its partners Scalable Graphics (for the GPU sharing system) and CARRI Systems (for the server architecture).
the time allow identifying which elements must be modified to enhance the whole solution.

Some applications require far greater computing power than usual hardware platforms. All situations requiring on-demand power can benefit from a Cloud approach. Among problems provided by CARRI Systems’ customers, a good example is the rendering to measure wind stress effects on wind pumps on different points. Or a better simulation of climatological assumptions.

**Cloud, a machine to materialize projects**

Cloud by CARRI means high availability, being able to act as test bed to validate entire solutions combining infrastructure, hardware architecture and software expertise. Thanks to the flexibility provided by virtualization solutions based on Hyper-V, VMware or Citrix Xen, any type of process can be implemented for testing or production purpose. The manufacturer can become a real service provider hosting and remotely managing complex application environments on demand remotely accessed by its customers.

A very concrete example of Cloud contribution: CARRI Systems has assisted its partners Scalable Graphics and MyCloud 3D to select the optimal hardware platform in order to run the broadcasting and display middleware from Scalable Graphics. This middleware is in charge of executing a business application on a server or a Cloud cluster while focusing on the best display quality and the lowest latency. On the client side, the video stream is decoded and displayed live on screen and user actions are sent back to the server. It allows a smooth display allowing actual entire building 3D visits for Bouygues Immobilier through MyCloud 3D solution (see box).
Bouygues Immobilier is MyCloud 3D’s first customer, who has been entrusted to realize the modelling of two of their Green Office buildings. Their most distinctive feature is the fact they are producing more power than they are consuming. As a result of a successful partnership between CARRI Systems, Scalable Graphics and MyCloud 3D, this solution was designed for promotional and marketing purpose. It was a great achievement as the first building, with a cost of 90 million euro, has been purchased less than 6 months after the first demonstration. This solution has also proven its robust design architecture, being able to sustain a load of 700 visits during the first month. This innovation is now expected to be widely used among Bouygues’ engineering departments. Most impressively, even such a complex 3D model is not frozen. This is the story of a customer from London who wanted to move a room from the basement to the ground floor. After a modification performed in a couple of days, the customer was able to visit reconfigured spaces according to his requirements.
3 QUESTIONS TO...

Xavier Cavin, CEO of Scalable Graphics

**PC EXPERT** What is your area of competence?
**Xavier Cavin:** Scalable Graphics has designed a middleware able to stream 3D HD graphics from a Cloud. Complex models can so be displayed through a light client at the other end of the world. We recently realized a 4K display demonstration remotely from 8,000 km away without lag. Thus, our expertise can be spread in any region of the world and is applicable to entertainment and business areas for which we currently have a lot of ongoing projects.

**PCE** How do you estimate the required Cloud servers power hosting your middleware?
**XC:** It’s a combined work with our partner to meet the application requirements in terms of bandwidth when high resolutions are used (4K and multi 4K) or CPU power (for data compression). In other situations, we will adjust memory quantity according to the required data volume.
NVIDIA Tesla K40

Exécutez les simulations scientifiques les plus complexes grâce au GPU NVIDIA Tesla K40 et ses 12 Go de mémoire dédiée, qui permettent de traiter deux fois plus d’informations que les GPU de la génération précédente.

Grâce à la technologie GPU Boost, la puissance disponible est ajustée pour vous permettre de personnaliser les performances graphiques. De plus, ce nouveau GPU NVIDIA est jusqu’à 10 fois plus performant qu’un simple CPU.

Résolvez d'importants défis en matière de calcul haute performance et d'analyse de données, directement depuis votre station de travail personnelle.

En savoir plus: www.nvidia.com/tesla et www.pny.eu/tesla

Suivez-nous: @PNYProFR
Conceuteur d’Architectures Rationnelles pour la Recherche et l’Industrie

« Créée en 1992 par des passionnés, CARRI Systems est le dernier fabricant français informatique haut de gamme sur-mesure. Basée à Noisy-le-Sec, près de PARIS, la société est, depuis quelques années, devenu un acteur majeur sur le marché du GPU Computing et du calcul intensif. CARRI Systems est membre du Pôle européen de compétence en simulation numérique haute performance (Ter@tec) depuis 2011. »

Franck Darmon
CEO CARRI Systems

Découvrez toutes nos solutions XLR sur www.carri.com