Composable High-Performance Workstations

Key Benefits

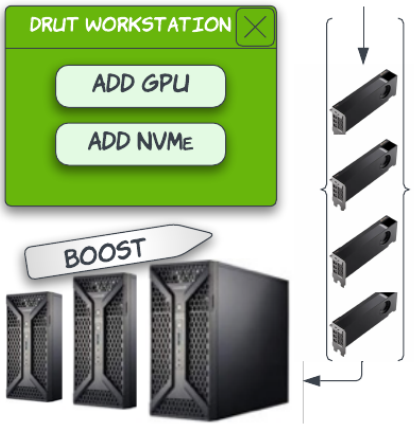
- Accelerates a wide range of workstation applications by allowing users to compose workstation nodes with a hardware boost
- Drut's dynamic attach and detach capability allows workstations to be given additional hardware resources in a non-disruptive manner
- Scales easily allowing IT managers to add more resources to workstation groups as needed
- Fully disaggregated solution allowing for high performance workstations to be augmented with higher density of resources on demand
- Use of photonics removes physical rack locality requirements
- Better TCO by decoupling workstation resources from the workstation upgrade cycle. IT managers can upgrade GPUs/NVMe drives independent of the workstation upgrade

Disaggregation has applications beyond the modern data center. Most often we hear the term disaggregation used in reference to a server, but we can also apply the benefits of disaggregation to the modern workstation.

Consider users who cannot do their work on the traditional desktop / workstation, or virtual desktop that a lot of organizations use today, such as 3D animation, or Geophysics developers. These users need additional power directly on their workstations in the form of GPUs and NVMe drives.

Organizations that have advanced workstation users spend an inordinate amount of money on the workstation and extra time and money building server infrastructure to alleviate the limitations of a single workstation.

The primary challenge that organizations experience with the modern workstation use case is that they cannot know how much GPU and storage is required when they purchase the devices. They have to make a compromise and get a "standard GPU workstation build", but this ends up wasting a lot of money on unused resources and the advanced workstation users find that the system still does not satisfy their needs.



What Drut can offer is a solution that takes a basic workstation at a lower cost point and turns it into an advanced user workstation with resources available on demand.

How does Drut do this?

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Use Cases

3D Animation Developer

Animation developers require extra GPU for accelerated rendering. They also need extra local storage to store the 3D models, textures, and other data used in the rendering process

Oil & Gas Modelling

Geoscience Software Developers require large and fast local storage, as Geophysics data sets can be quite large, with the trend to use more and more NVMe drives.

CAD/CAM Engineer

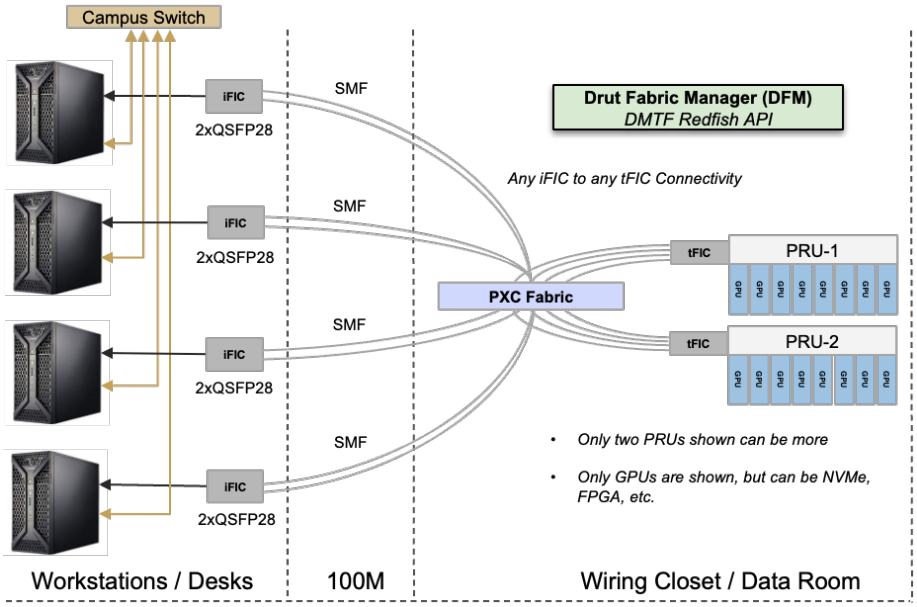
Developers in a variety of industries that use CAD/CAM use GPU to improve the speed and quality of 3D modeling and rendering, allowing for faster and more accurate visualization of complex designs.

Gaming Application Developer

Game developers use workstations with high-end hardware specifications including GPU to handle the demanding requirements of game development, which include 3D modeling, texturing, animation, programming, and testing.

Drut has already built a disaggregated datacenter server solution, and we found that the modern workstation running a Linux operating system is the same as a server in rack located in a data center, except for the cool monitor, keyboard.

Building on the notion that a workstation is a server, workstations can be disaggregated and software can be used to define the hardware composition of the workstation node. We use the term node at Drut to imply a collection of resources used to create the machine. The following diagram shows four workstations photonically connected to Drut's Photonic Resource Unit (PRU). From these PRUs, workstation users can augment their workstations with GPUs and NVMe drives as needed to create a node.



Sample HPW BOM for Above Diagram

- 4 x Bring Your Own Workstation (BYOW)
- 4 x FIC 1000s for Workstations
- 2 x FIC 1000s for PRUs
- 2 x PRU 1000
- 32 Single Width Slots or 16 Double Width Slots
- Bring your own resources (BYOR) such as GPUs, FPGAs, NVMe
- 1 x PXC (32 Port)
- DFM for 32 Ports
- *N*xOptics (4x25G to 100G QSFP28)
- Bring your own campus switch

Ordering Information

Product:	FIC 1000
Code:	DRT-HW-iFIC-1000 DRT-HW-tFIC-1000
Description:	Fabric Interface Cards

Product:	PRU 1000
Code:	DRT-HW-PRU-1000
Description:	Photonic Resource Unit (PRU)

Product:	Drut Photonic Fabric Kit
Code:	DRT-HW-PXC-FABRIC-32P
Description:	32-Port Drut Photonic fabric including switch, cables and optics.

Product:	Drut Fabric Manager (DFM)
Code:	DRT-SW-DFM-STD-RTU
Description:	Photonic fabric manager

Design Summary and Benefits

In the above design, four workstations are shown connected via a photonic fabric to two PRU-1000s. 100G QSFP-28 optics are used in the design. The Drut Fabric Manager allows users to request, add and compose workstation nodes from the available hardware resource pool. By decoupling resources from the workstation, users can upgrade resources such as GPUs and NVMe drives independent of the workstation. These resources are not deployed in every machine all the time whether in use or not but are deployed as a pool that can be better cost managed to meet demand. Depending on how resources are allocated, workstation nodes can be composed of up to 32 resources per workstation, which means 32xGPUs, or 4xGPUs and 4xNVMe or 4xGPUs for 8xCPUs. The power and flexibility to compose hardware nodes best suited for the user is in the hands of the workstation user.

The Power of PCIe over Photonics

The introduction of PCIe over Photonics by Drut Technologies enables new design architectures for workstations in the campus environment. The power of Drut's PCIe over Photonics is revealed to the user in the ability to dynamically attach and detach resources from workstations in real time without a reboot. By using Drut's drivers and photonic fabric, users can configure their workstations with additional GPUs or FPGAs or NVMe for local storage. When these resources are no longer required, they can be released back into the resource pool for other workstations to use. This dynamic attach and detach capability is completed in a non-disruptive manner to the workstation.

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