



Tech Preview

# Elastic Memory

Memory capacity **automatically provisioned** from **CXL pools** based on **application demand**

# What is Elastic Memory

- The **MemVerge Elastic Memory Service** provisions and releases memory from a CXL memory pool on-demand to the hosts
- Prevents a host from swapping or applications being terminated by the Out-Of-Memory (OOM) Killer
- Solves the stranded memory problem

# H3 Platforms CXL Memory Pool Demo

A Single Intel Server with  
Samsung MX CXL devices

# Elastic Memory Demo using H3P CXL Memory Pools

Global Fabric Dashboard View

Available Memory

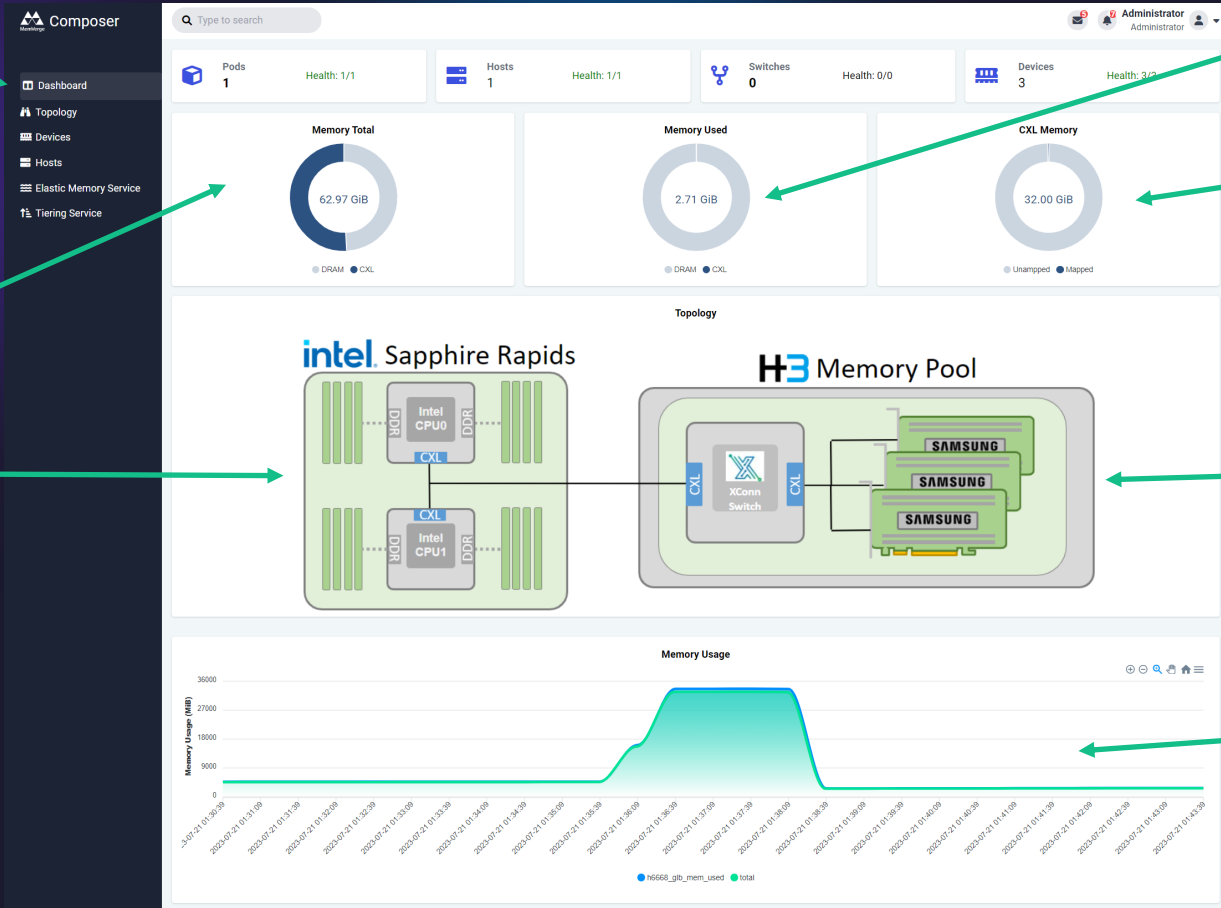
CXL 1.1 Server

DRAM & CXL Usage

CXL Pool Memory [un]mapped to host

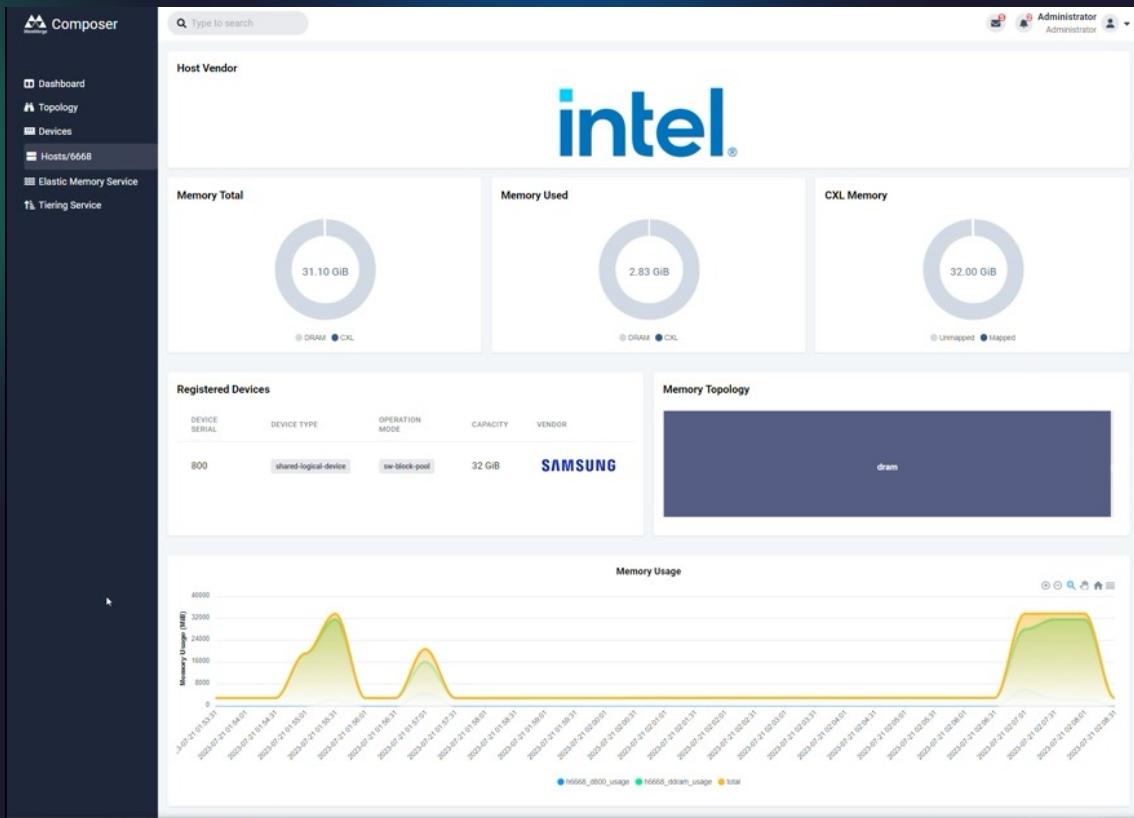
CXL 2.0 Pool

Historical Memory Usage





# Elastic Memory using an XConn Switch with Intel



```
root@ubuntu2204:~# memhog -r20 36g
```

```
Every 0.5s: numactl --hardware | g... ubuntu2204: Fri Jul 21 02:13:53 2023
node 2 cpus:
node 2 size: 128 MB
node 2 free: 127 MB
```

# Elastic Memory Demo using H3P CXL Memory Pools

The screenshot displays the MemVerge Composer interface. At the top, there are summary cards for Pods (1), Hosts (1), Switches (0), and Devices (3). Below these are three donut charts: 'Memory Total' (62.97 GiB), 'Memory Used' (28.71 GiB), and 'CXL Memory' (32.00 GiB). The 'Memory Used' chart is highlighted with a green arrow. The 'Topology' section shows a diagram of the hardware: Intel Sapphire Rapids CPUs (CPU0 and CPU1) connected to DDR memory and CXL switches, which are in turn connected to an H3 Memory Pool containing Samsung CXL memory modules. At the bottom, a 'Memory Usage' line chart shows a spike in usage over time, with a tooltip that says 'Looks like you could use more RAM. Download some?'. A green arrow points from the right side of the image to this chart.

DRAM is ~90% used

Fabric Topology

The host needs more Memory to avoid swapping or triggering the OOM Killer

# Elastic Memory Demo using H3P CXL Memory Pools

The screenshot displays the MemVerge Composer dashboard with the following components:

- Navigation Menu:** Dashboard, Topology, Devices, Hosts, Elastic Memory Service, Tiering Service.
- Summary Cards:** Pods (1, Health: 1/1), Hosts (1, Health: 1/1), Switches (0, Health: 0/0), Devices (3, Health: 3/3).
- Memory Metrics:**
  - Memory Total:** 62.97 GiB (Donut chart showing DRAM and CXL).
  - Memory Used:** 2.65 GiB (Donut chart showing DRAM and CXL).
  - CXL Memory:** 32.00 GiB (Donut chart showing Unmapped and Mapped). A green arrow points to this chart from the text on the right.
- Topology Diagram:** Shows the connection between Intel Sapphire Rapids (with Intel CPU0 and CPU1, DDR, and CXL) and the H3 Memory Pool (containing an XConn Switch and Samsung CXL memory modules).
- Memory Usage Graph:** A line chart showing memory usage (MiB) over time. The y-axis ranges from 0 to 36,000 MiB. The x-axis shows timestamps from 2023-07-21 10:13:00 to 2023-07-21 10:45:00. Two distinct peaks in usage are visible, reaching approximately 30,000 MiB.

CXL Memory is provisioned from the pool

# Elastic Memory Demo using H3P CXL Memory Pools

Host View

Composer

- Dashboard
- Topology
- Devices
- Hosts/6668
- Elastic Memory Service
- Tiering Service

Available Memory  
DRAM + CXL

Host Vendor: intel

Memory Total: 31.10 GiB (DRAM, CXL)

Memory Used: 2.78 GiB (DRAM, CXL)

CXL Memory: 32.00 GiB (Unmapped, Mapped)

Registered Devices:

DEVICE SERIAL	DEVICE TYPE	OPERATION MODE	CAPACITY	VENDOR
800	shared-logical-device	sw-block-pool	32 GiB	SAMSUNG

Memory Topology: dram

Memory Usage (MiB) graph showing usage over time for h6668\_800\_usage, h6668\_odram\_usage, and total.

CXL Pool Memory mapped to host

Available CXL  
Devices

# Elastic Memory Demo using H3P CXL Memory Pools

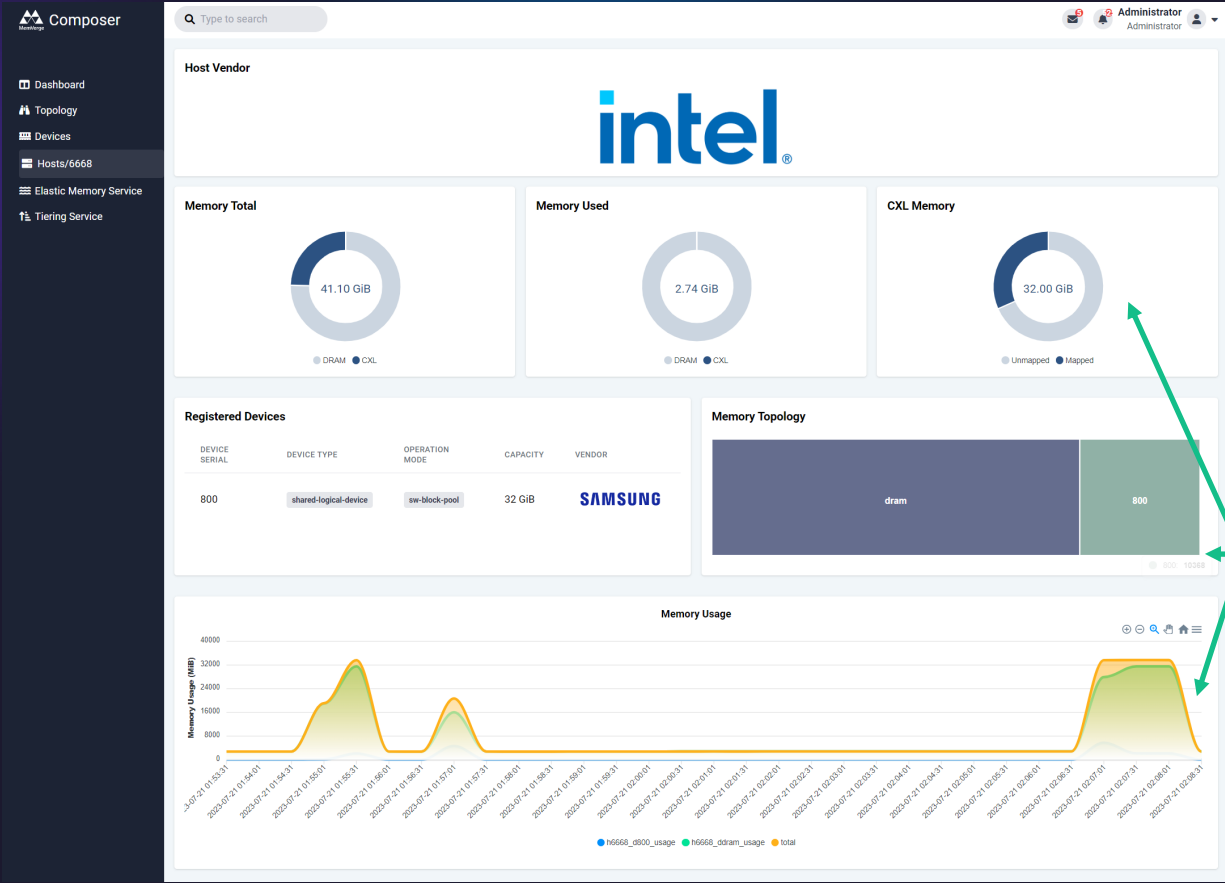
Memory usage exceeds DRAM capacity (32GiB). CXL memory mapped to host to cope with demand

The screenshot displays the MemVerge Composer interface. At the top, it identifies the host vendor as Intel. Three donut charts provide a snapshot of memory: 'Memory Total' shows 47.10 GiB (mostly DRAM), 'Memory Used' shows 32.92 GiB (mostly DRAM), and 'CXL Memory' shows 32.00 GiB (all mapped). Below these, a table lists 'Registered Devices' with columns for Device Serial, Device Type, Operation Mode, Capacity, and Vendor. A 'Memory Topology' bar chart shows 'dram' and '800' (representing CXL memory). At the bottom, a 'Memory Usage' line graph plots usage in GiB over time, showing a peak that exceeds the 32 GiB DRAM capacity.

Device Serial	Device Type	Operation Mode	Capacity	Vendor
800	shared-logical-device	sw-block-pool	32 GiB	SAMSUNG

CXL Pool Memory mapped to host

# Elastic Memory Demo using H3P CXL Memory Pools



CXL Memory is released back to the pool when demand subsides

# **XConn CXL Memory Pooling Demo**

**A Single AMD Genoa Server with  
Montage CXL Devices**

# Elastic Memory Demo using an XConn Switch

Global Fabric Dashboard View

Available Memory

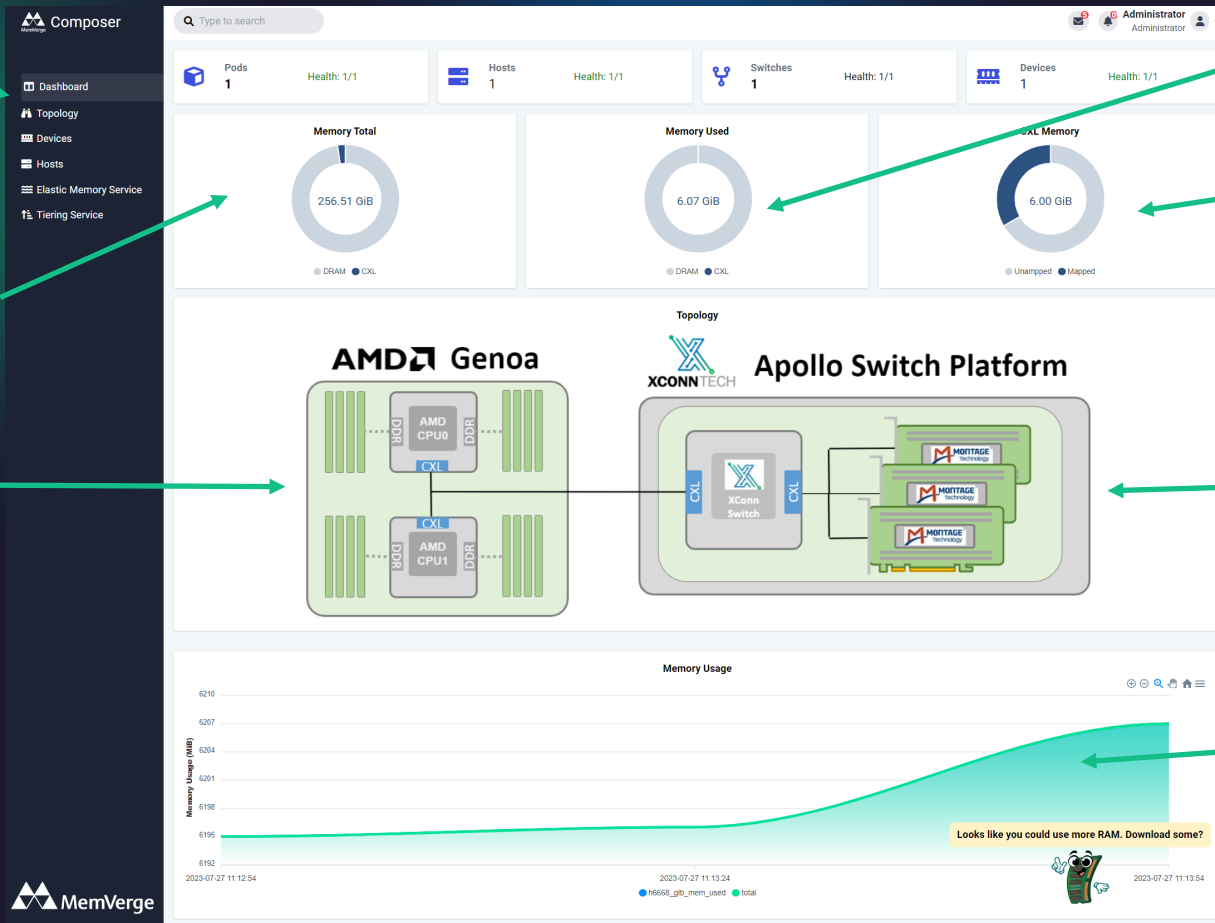
CXL 1.1 Server

DRAM & CXL Usage

CXL Pool Memory [un]mapped to host

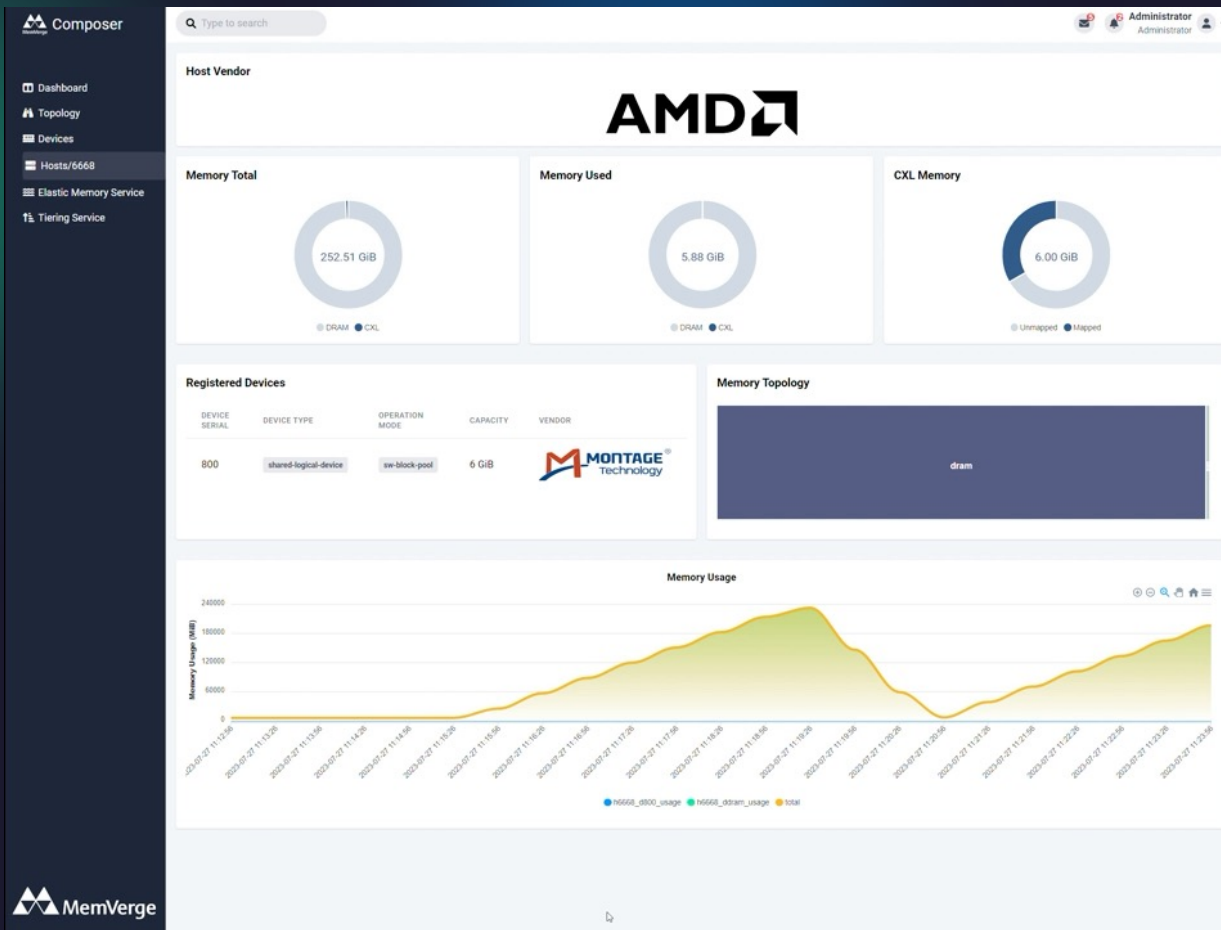
CXL 2.0 Pool

Historical Memory Usage

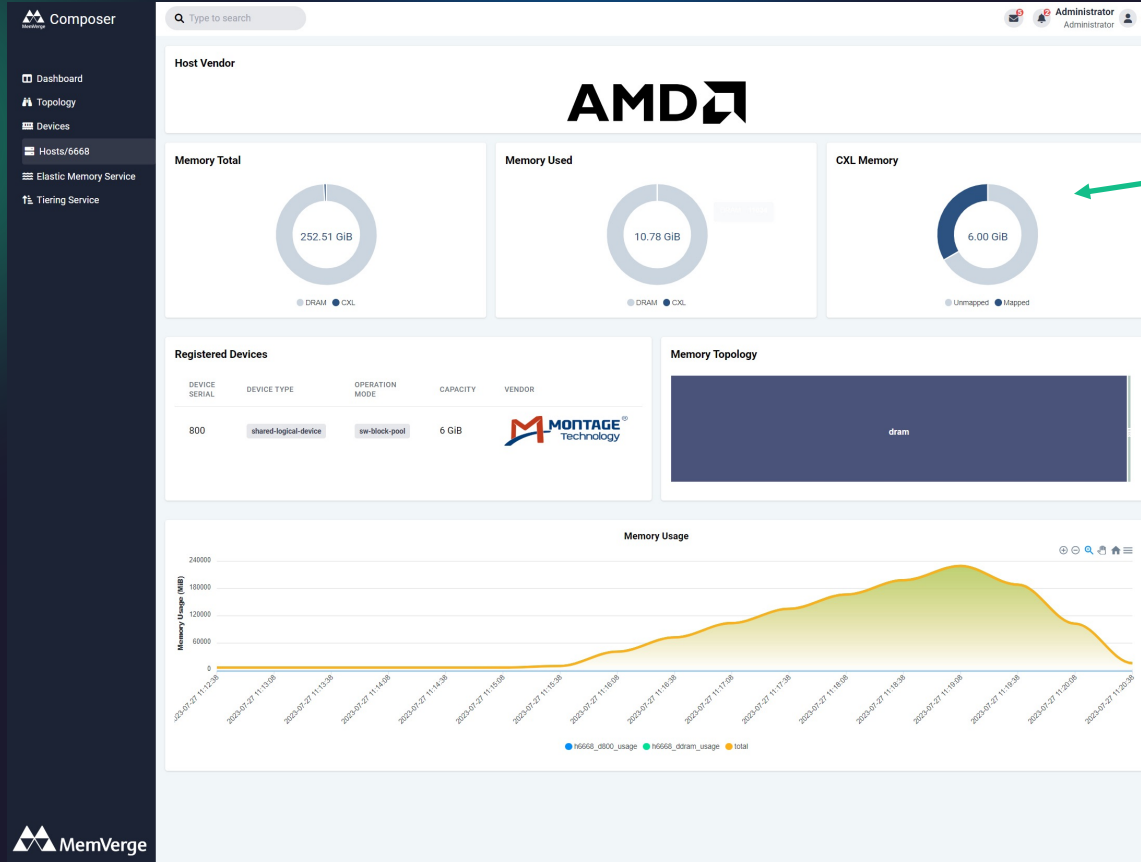




# Elastic Memory using an XConn Switch with AMD

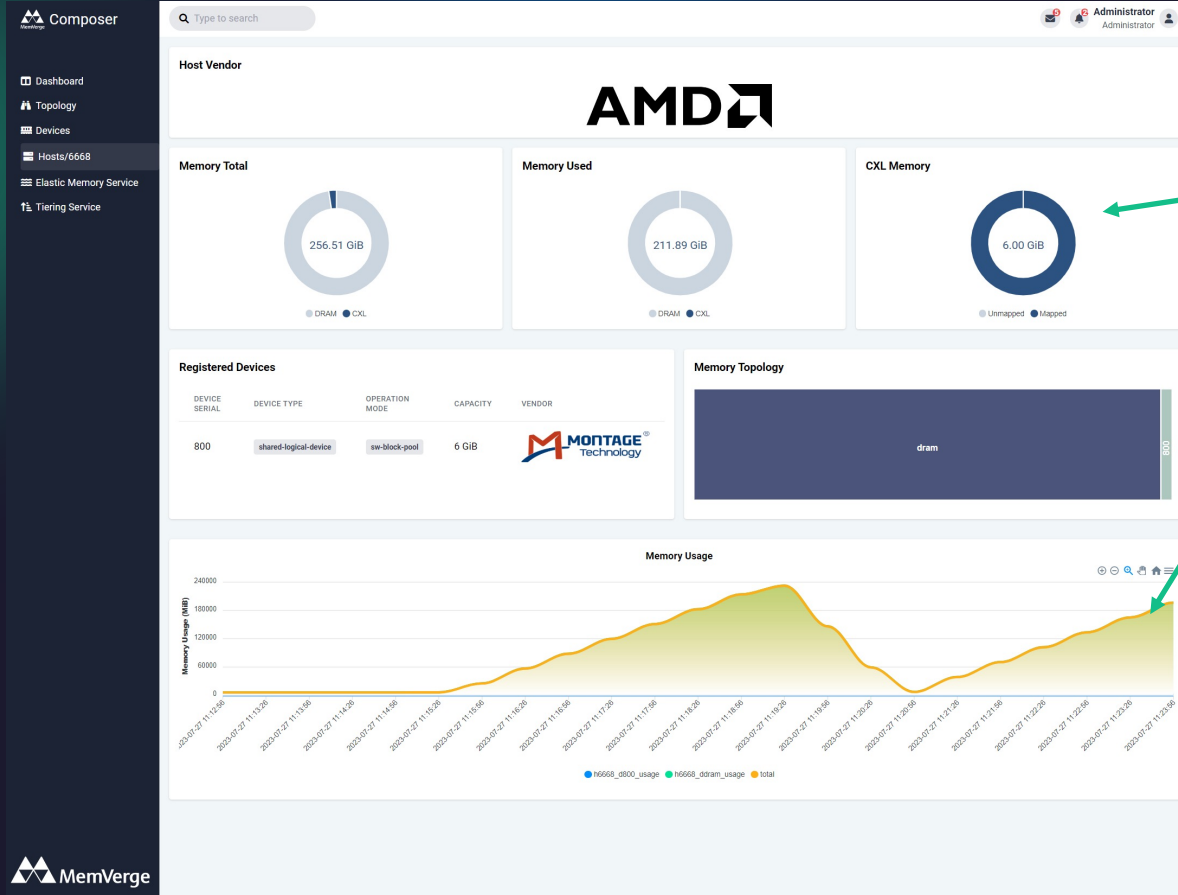


# Elastic Memory Demo using an XConn Switch



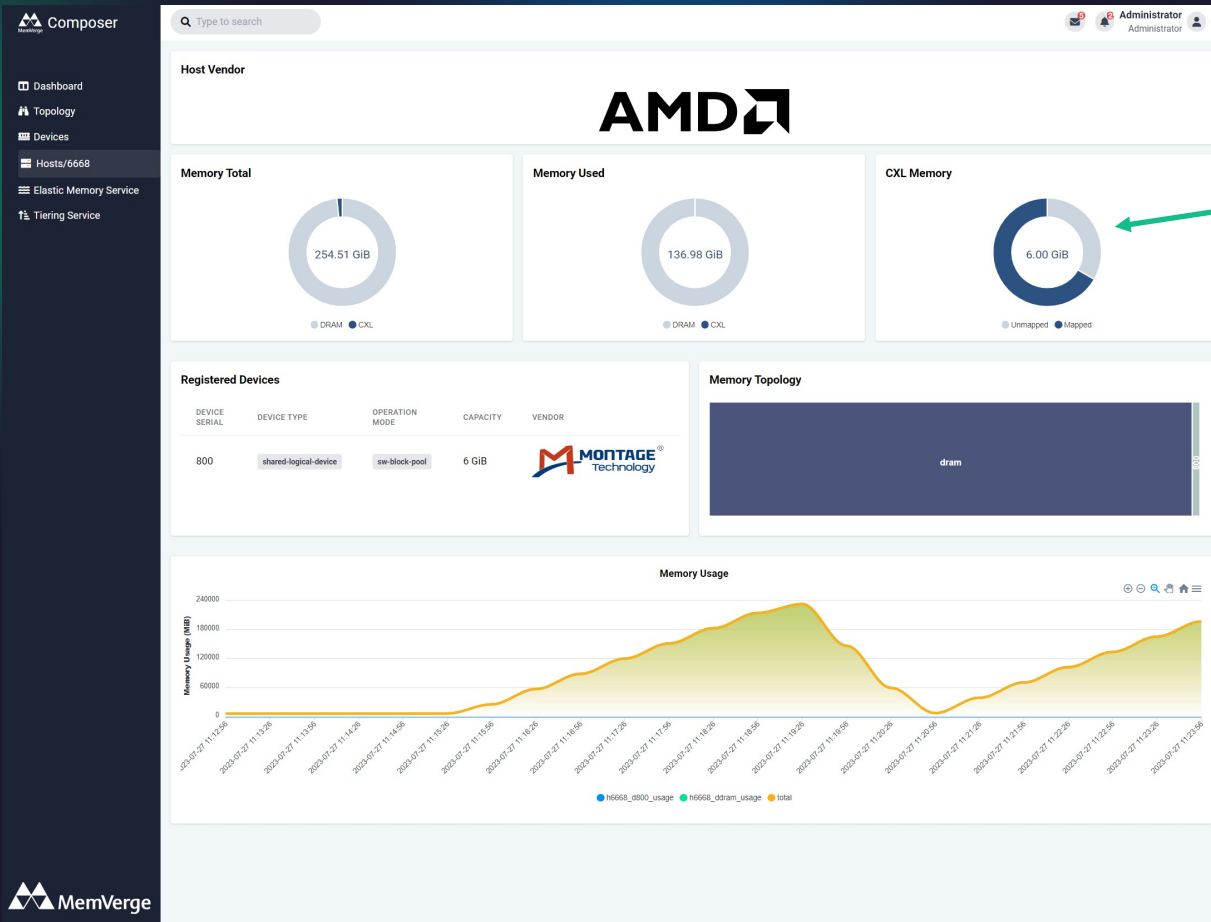
CXL Pool Memory [un]mapped to host

# Elastic Memory Demo using an XConn Switch



More CXL Pool Memory is mapped to the host because Memory demand grows

# Elastic Memory Demo using an XConn Switch



As memory demand reduces, memory is released back to the pool

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