ACTiManager: An end-to-end interference aware cloud resource manager

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Methodology

ACTiCLOUD

- 4 dual-socket x86 servers
  - Intel Xeon CPU E5-2630 @ 2.2GHz
  - 10 cores per socket
  - 32KB L1 cache
  - 256KB L2 cache
  - 25MB L3 cache
- OpenStack Pike
  - KVM/QEMU 2.11.1
  - Libvirt 4.0.0

- Execution scenarios
  - Based on properties form Azure traces *[SOSP'17]*
  - 4 different VM flavors
    - 1 core with 2GB RAM
    - 2 core with 4GB RAM
    - 4 core with 8GB RAM
    - 8 core with 16GB RAM
  - Spec2006 benchmark suite

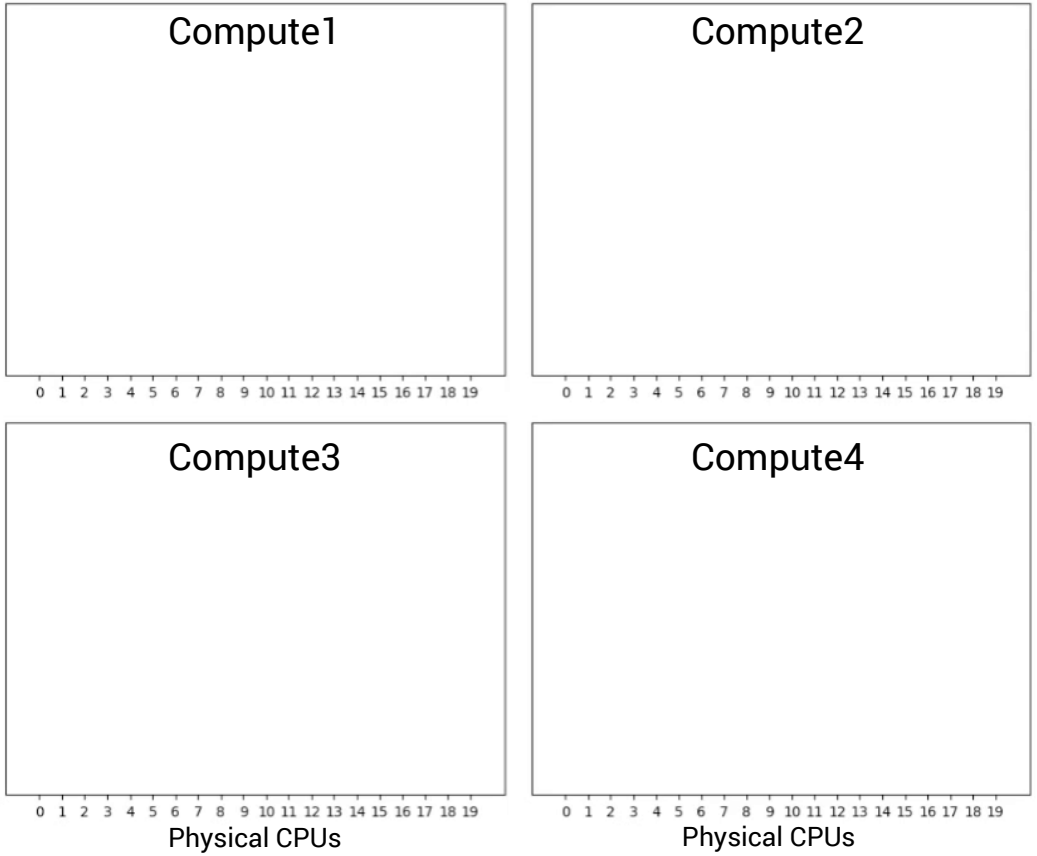
Demonstration Scenarios

ACTiCLOUD

1. Full ACTiManager Demo
   - **ACTiManager.External** → chooses the appropriate physical server
   - **ACTiManager.Internal** → chooses the appropriate VCPU -> PCPU mapping
   - Demonstrates the overall functionality

ACTiManager Demonstration

4 20-core nodes cluster



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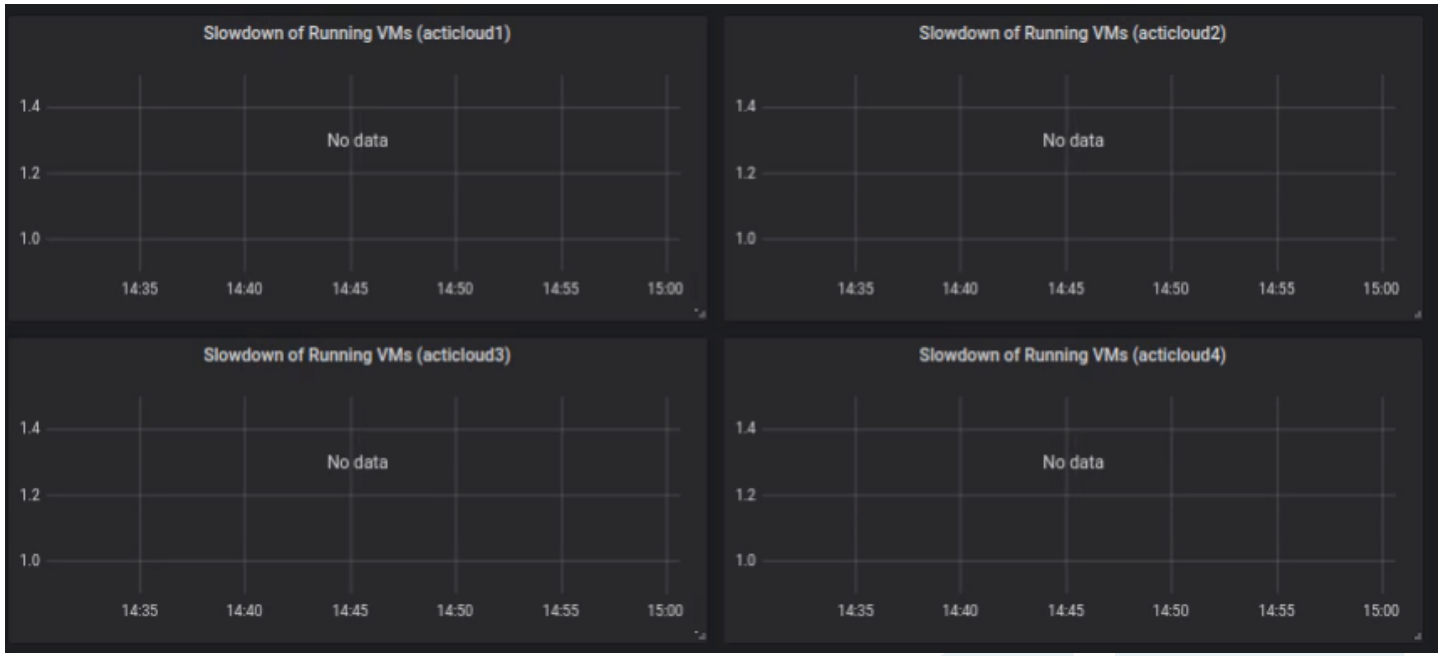

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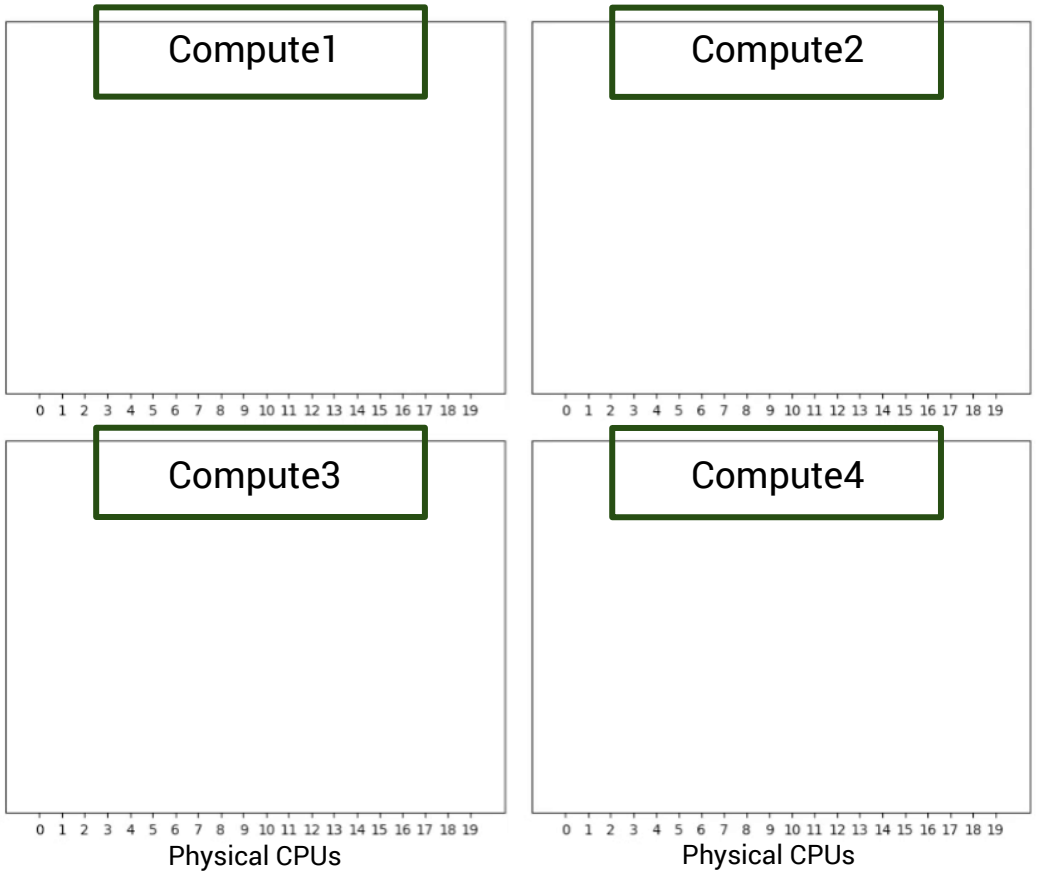

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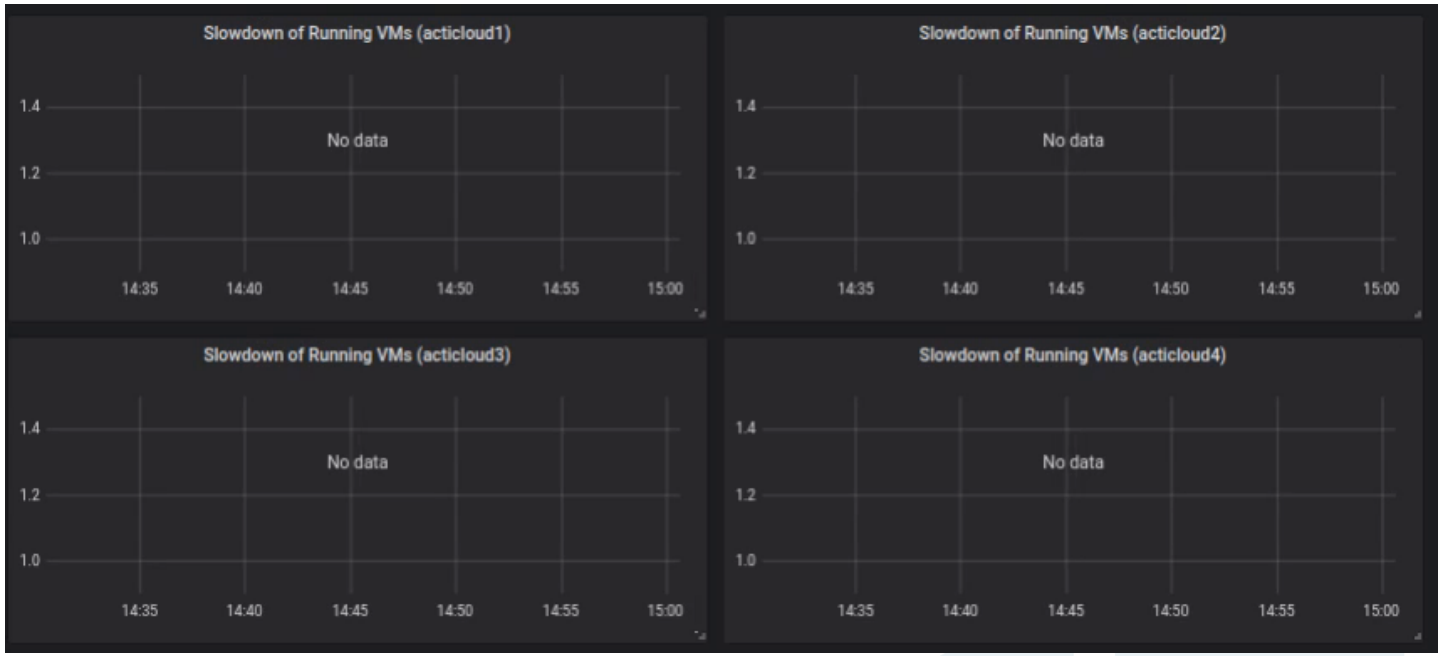

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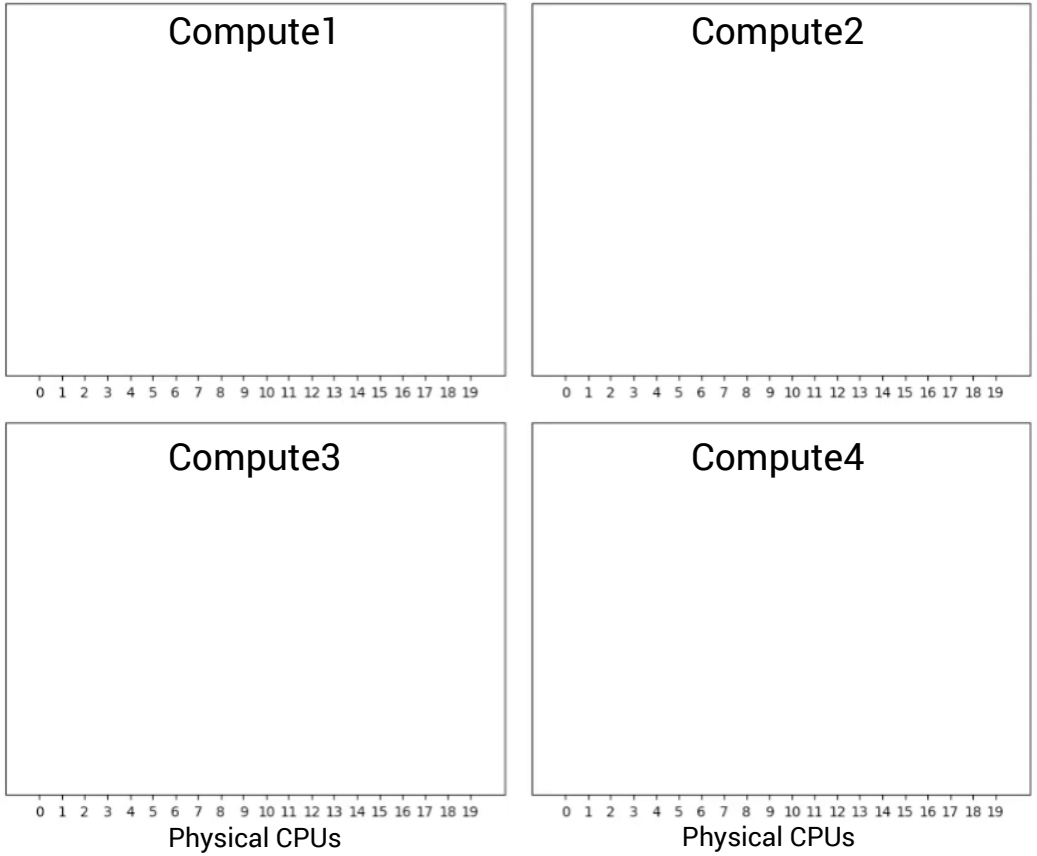

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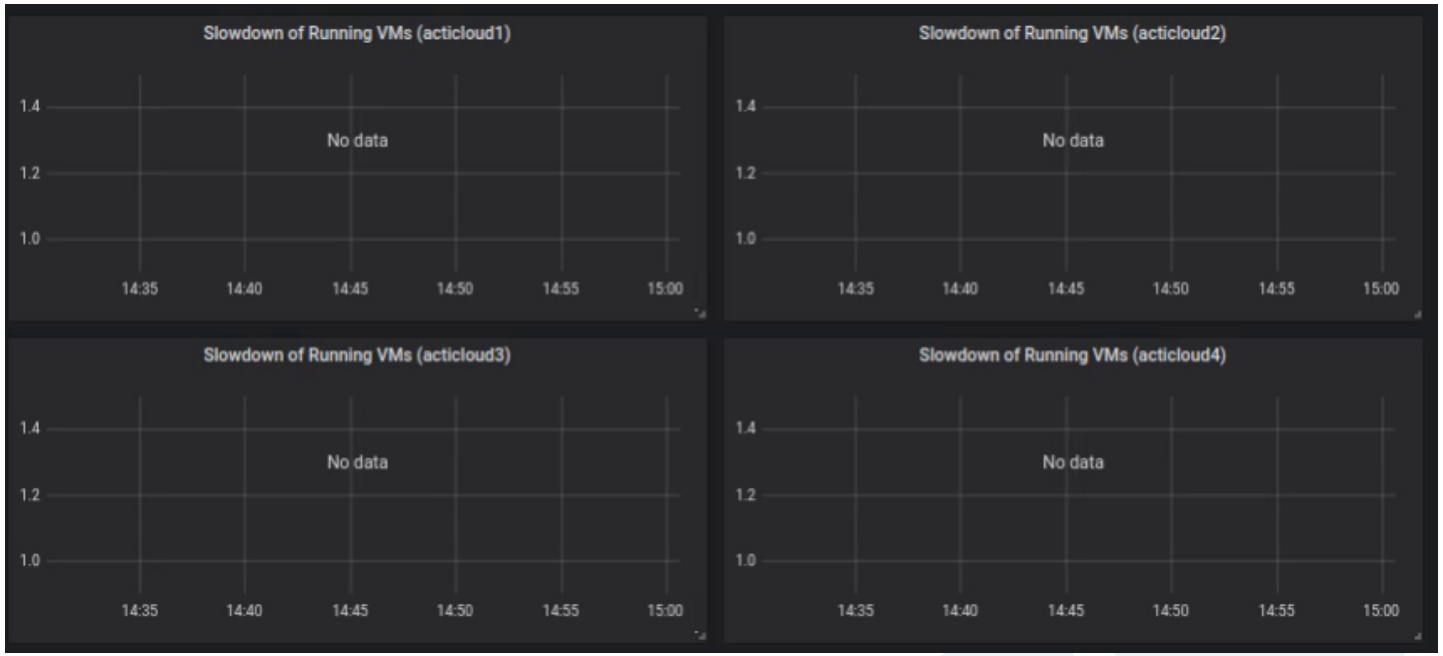

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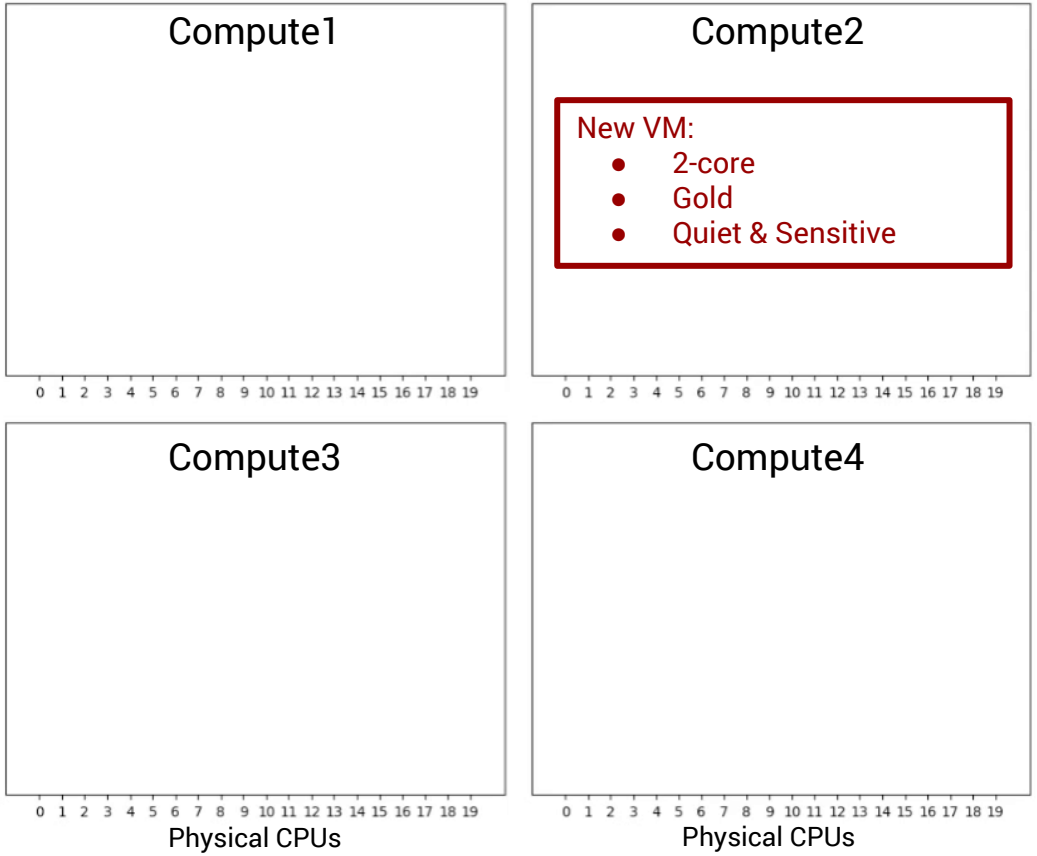

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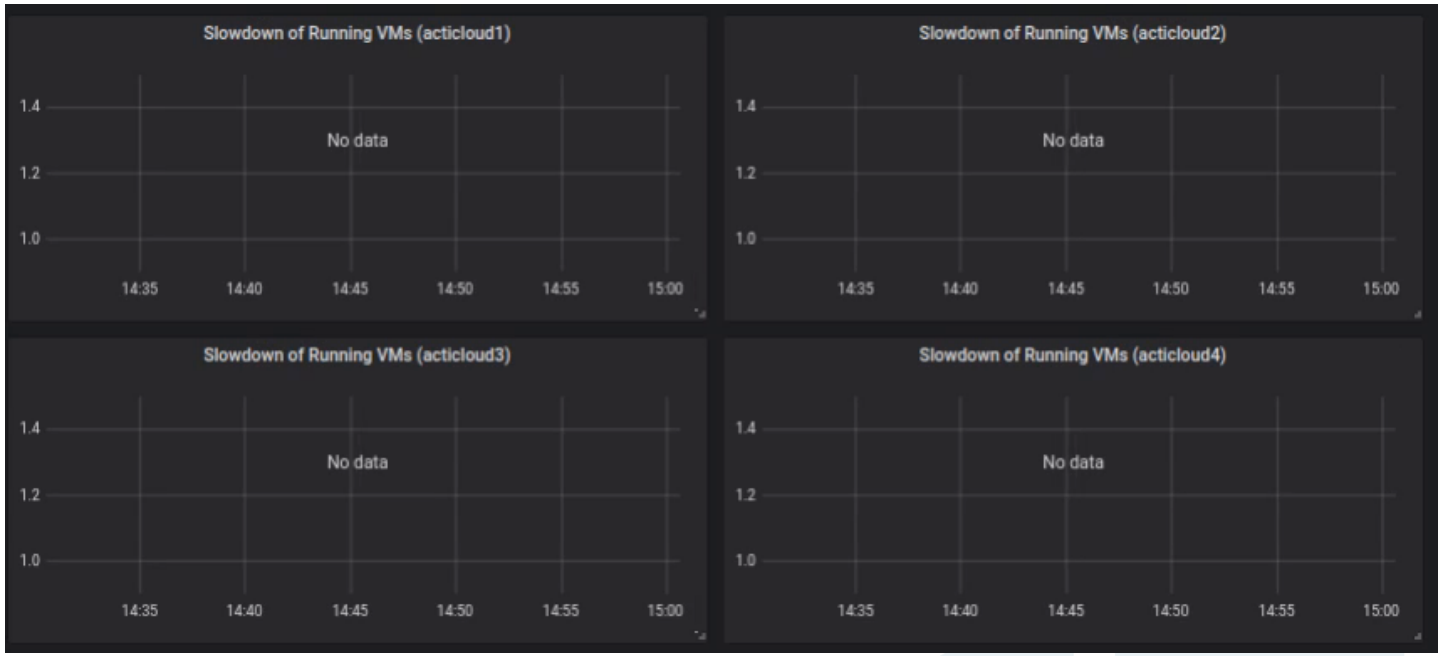

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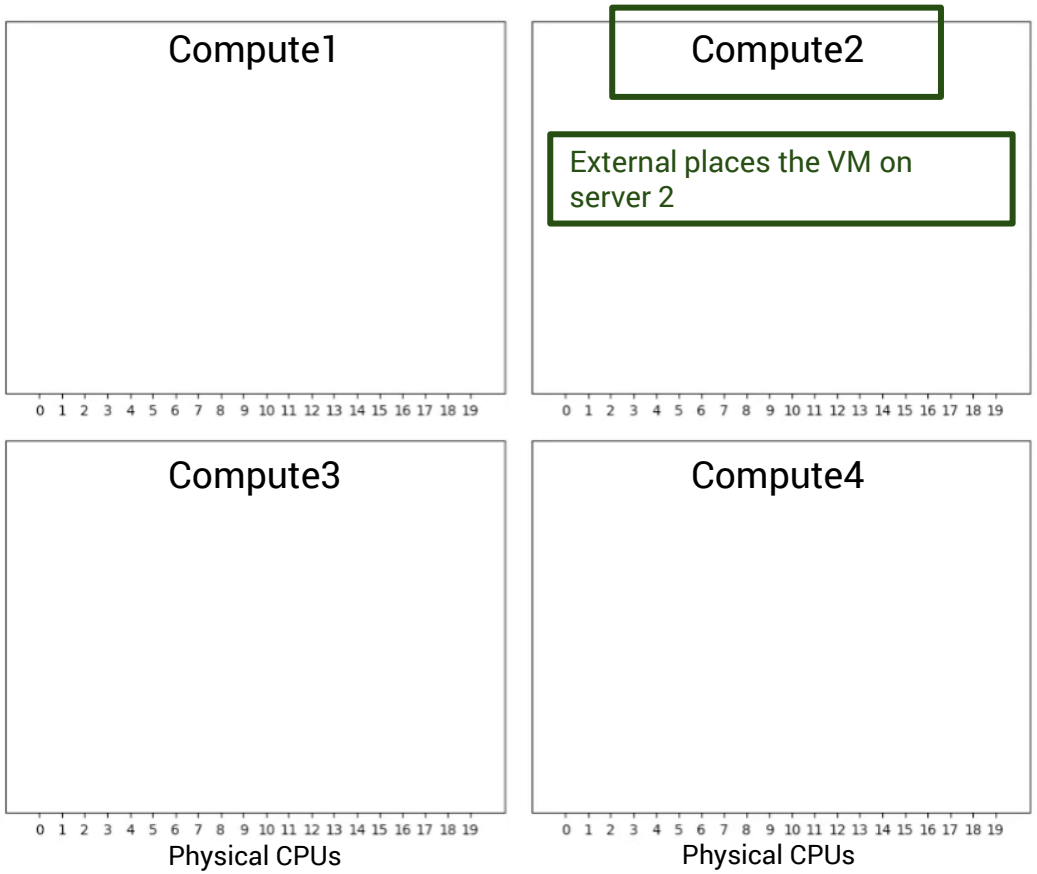

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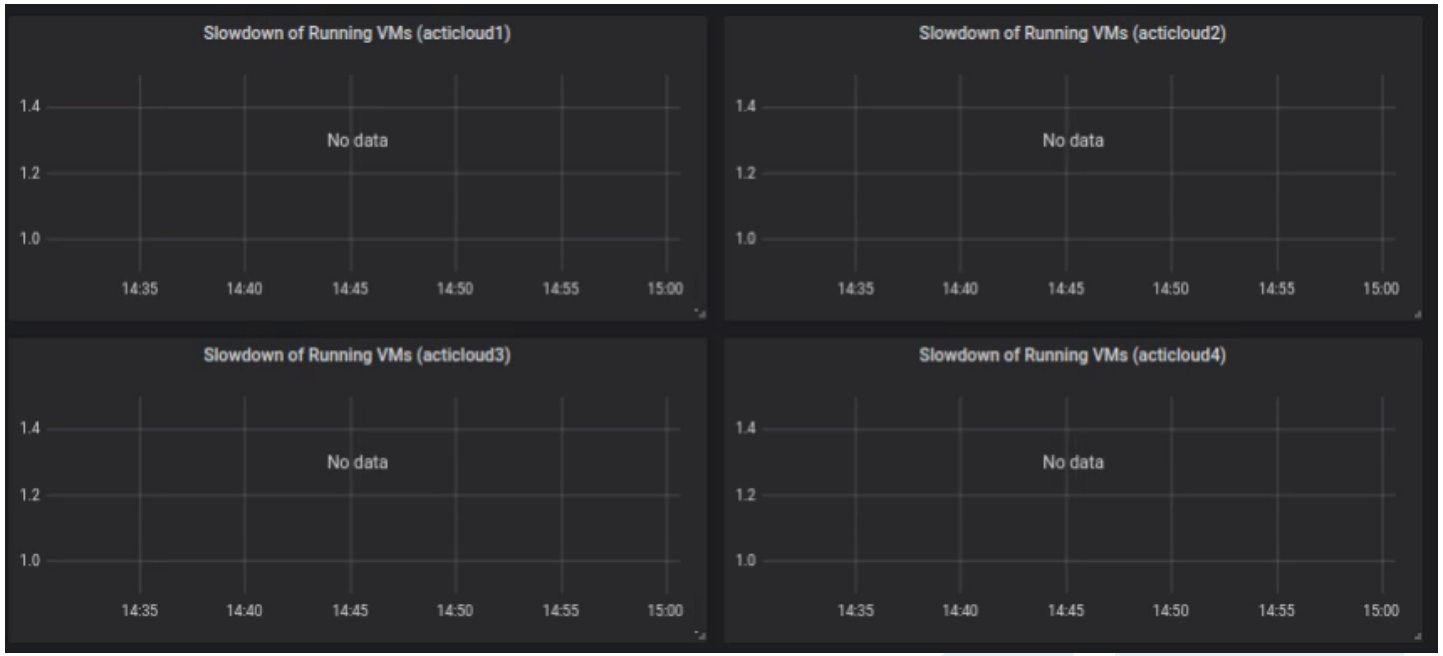

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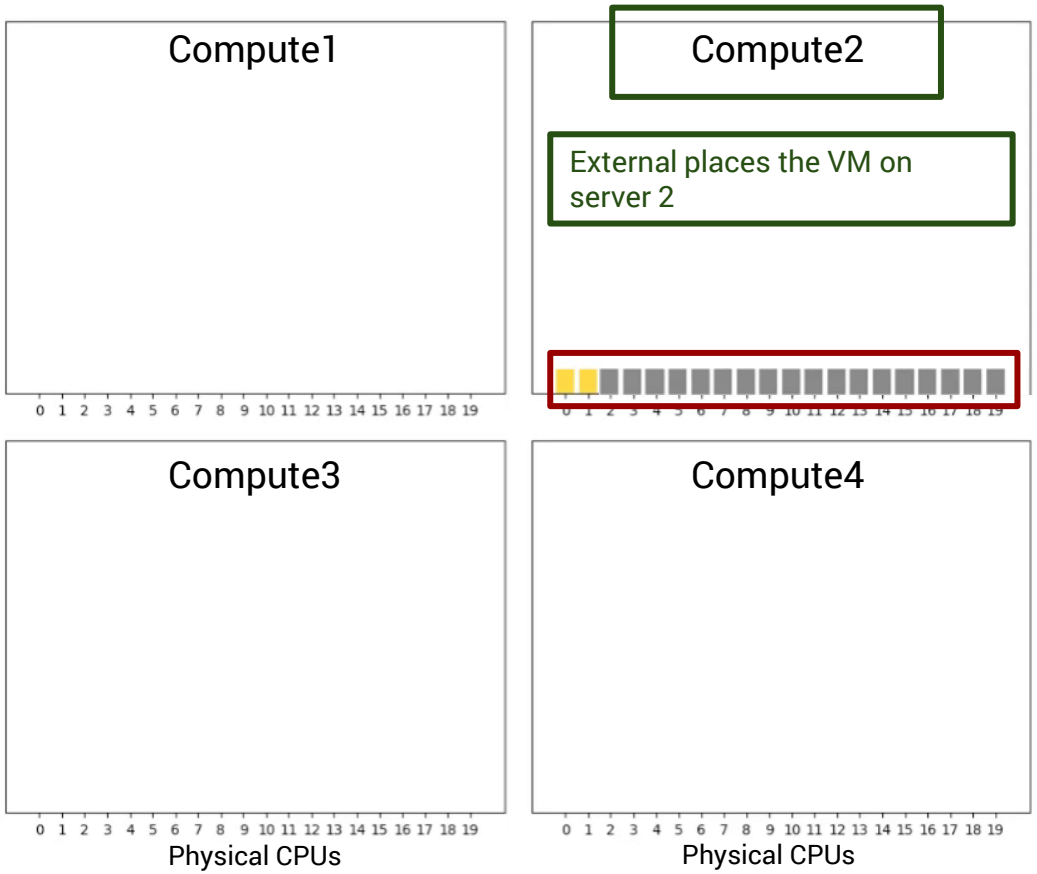

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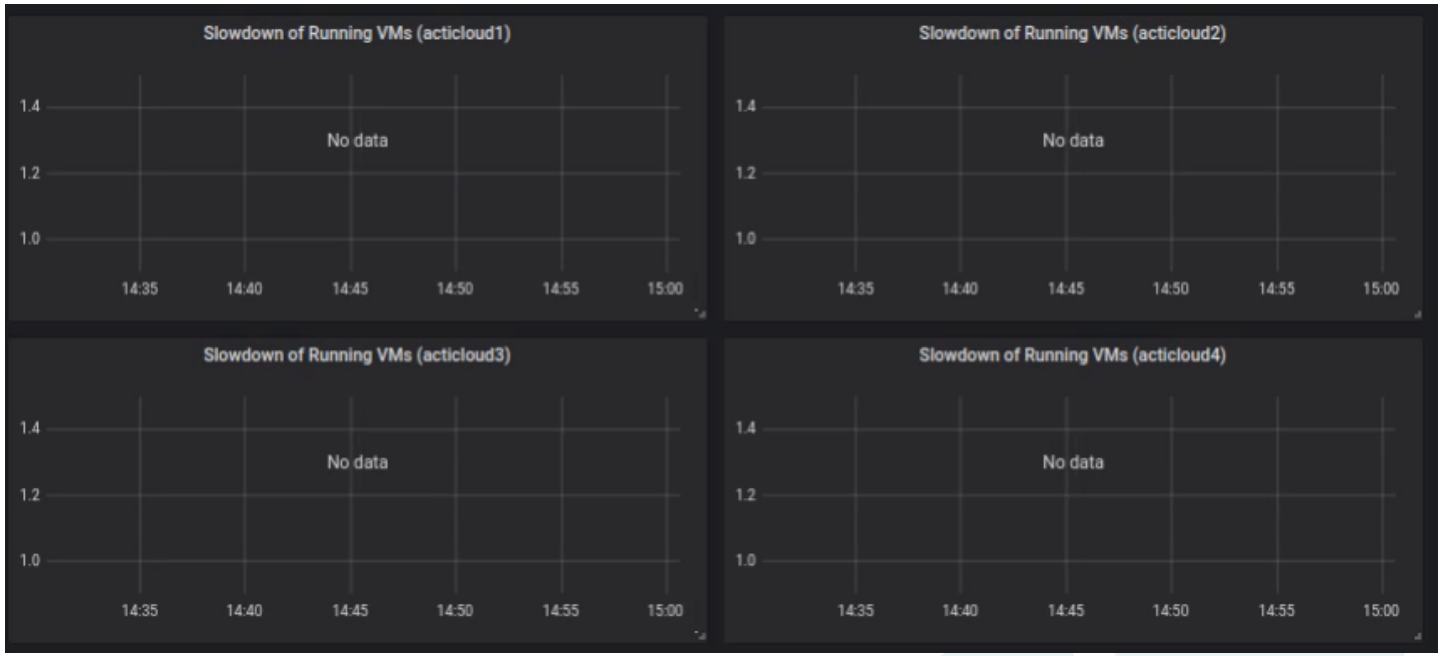

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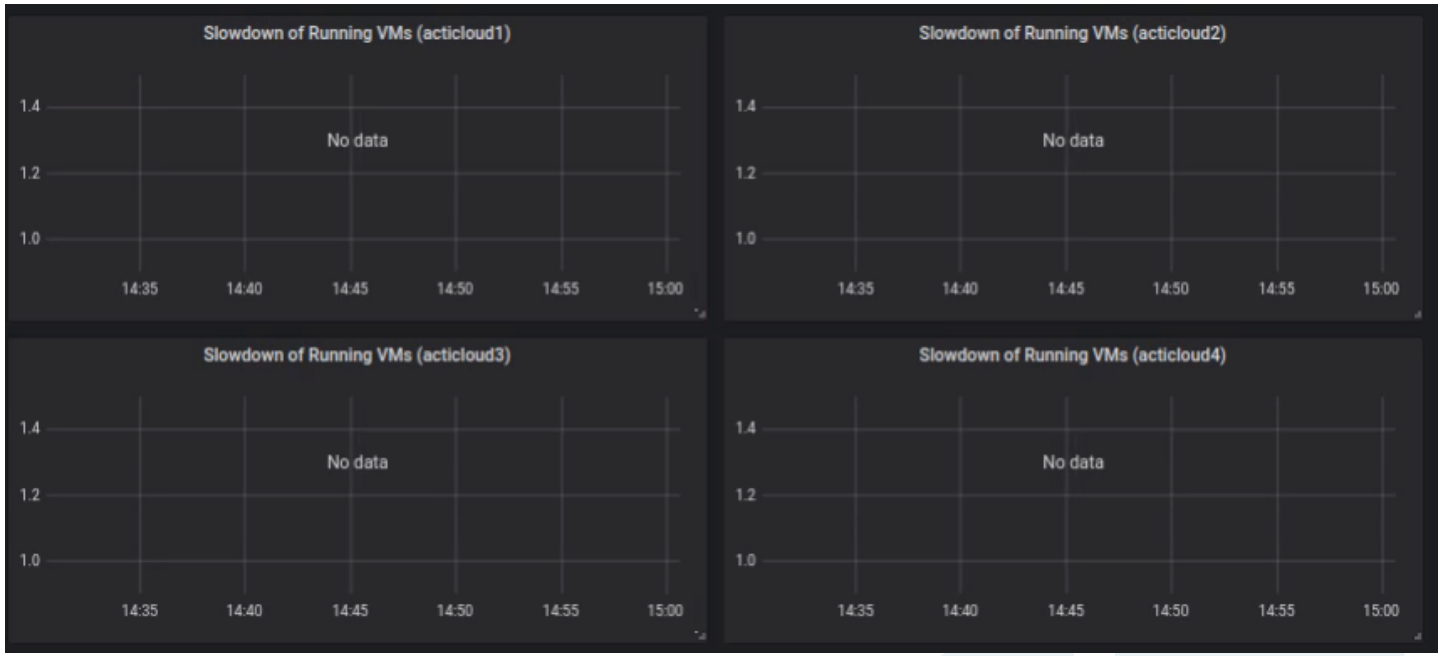

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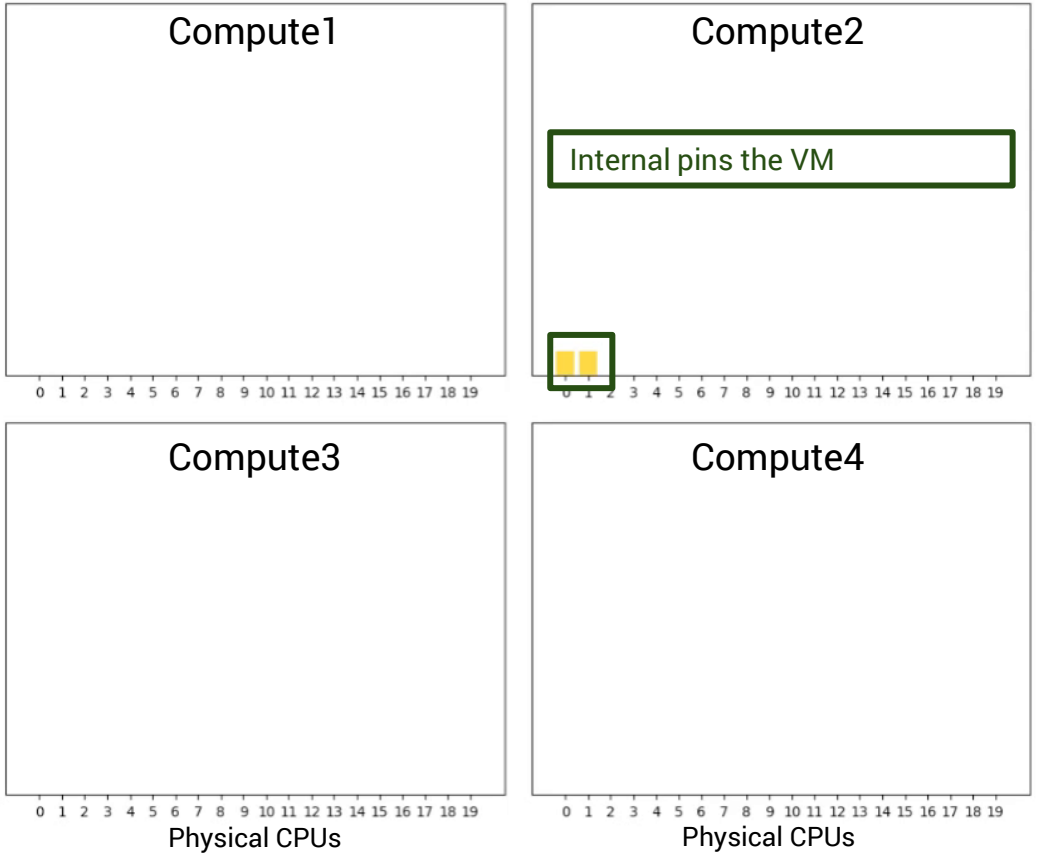

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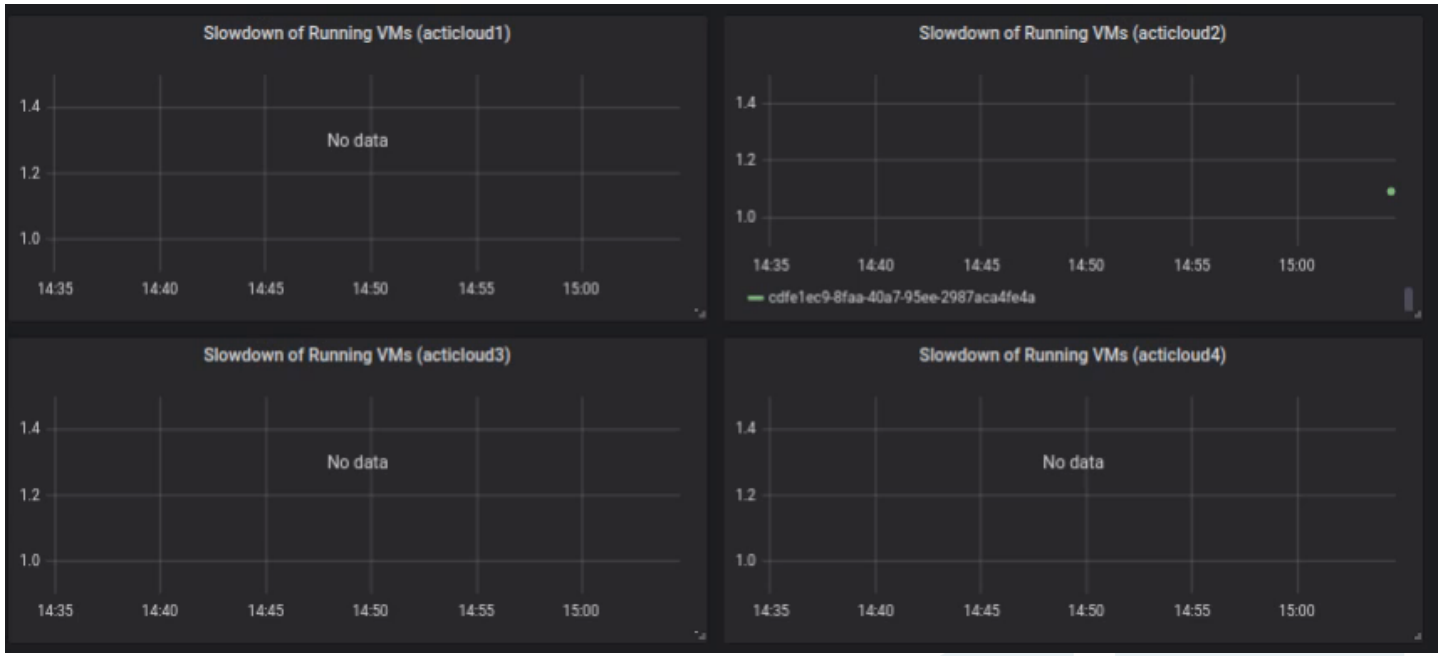

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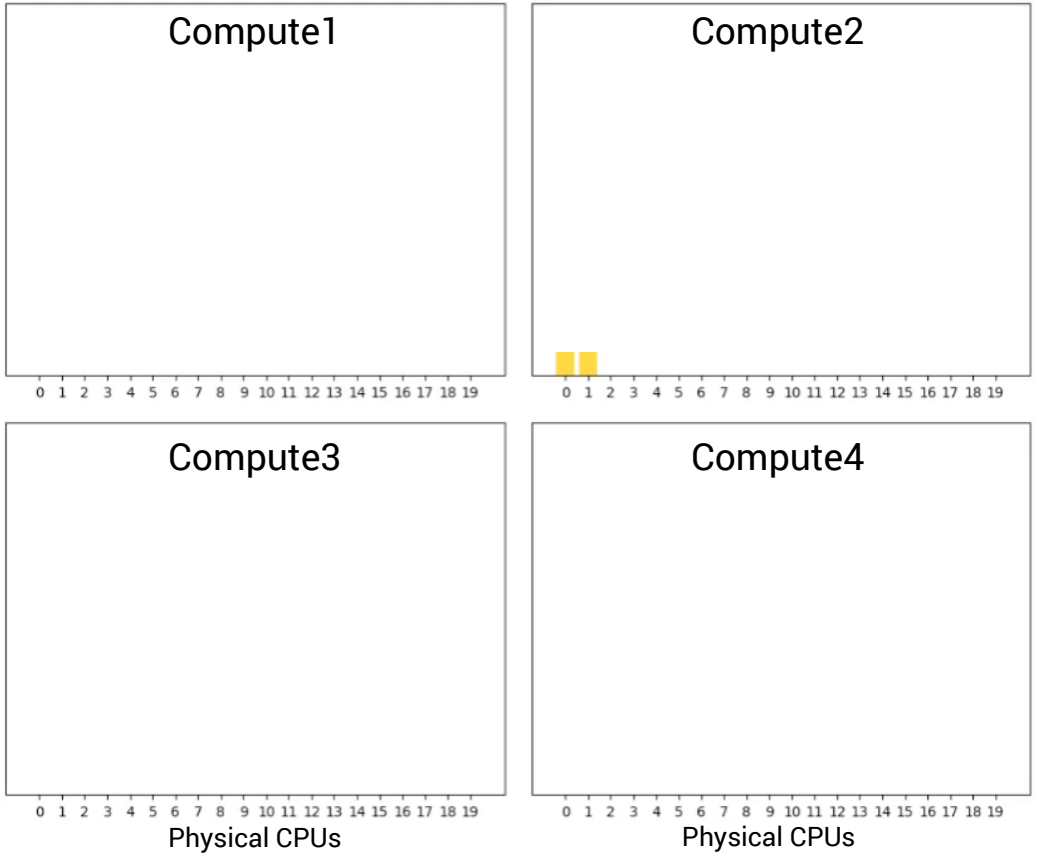

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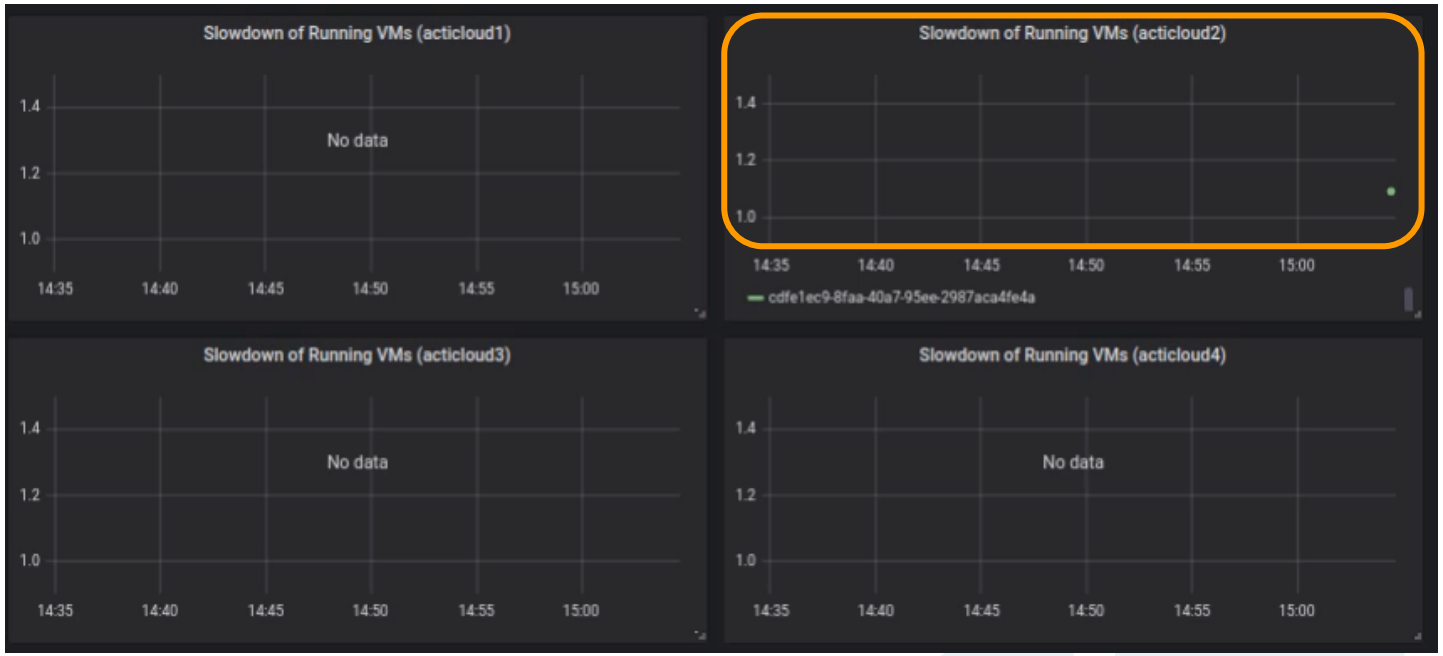

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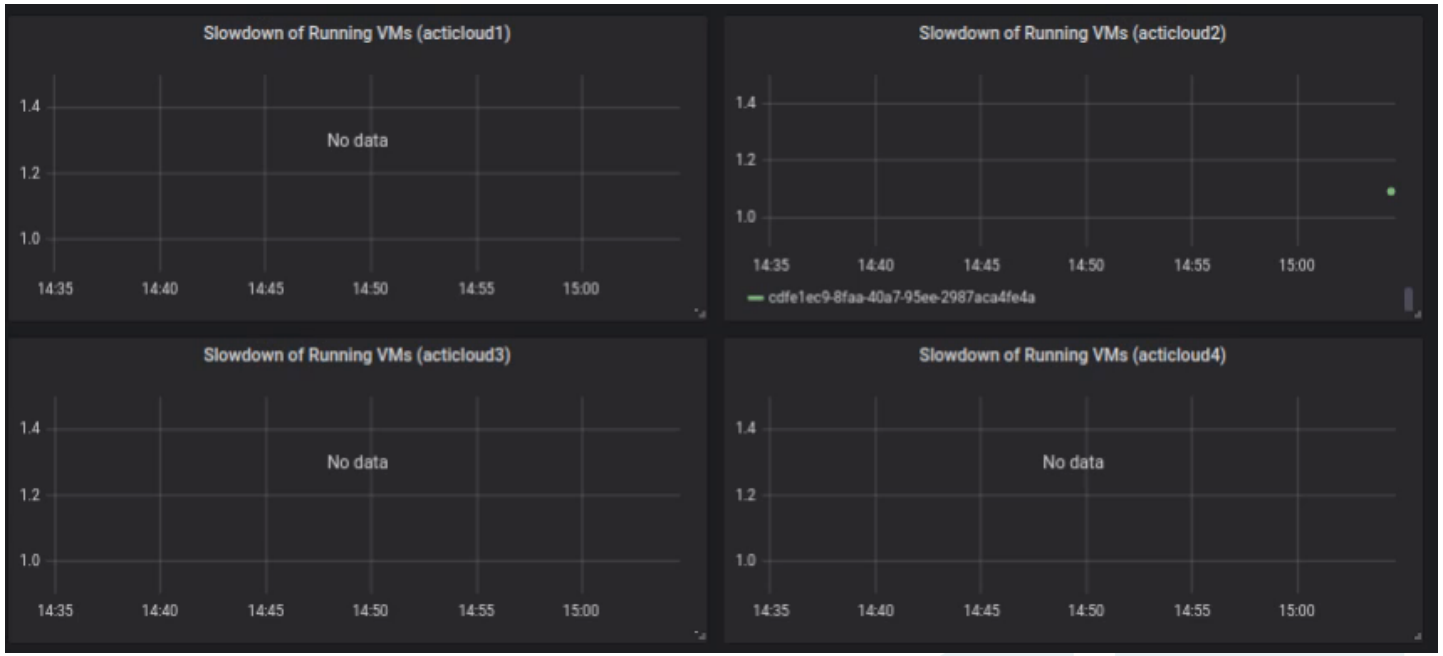

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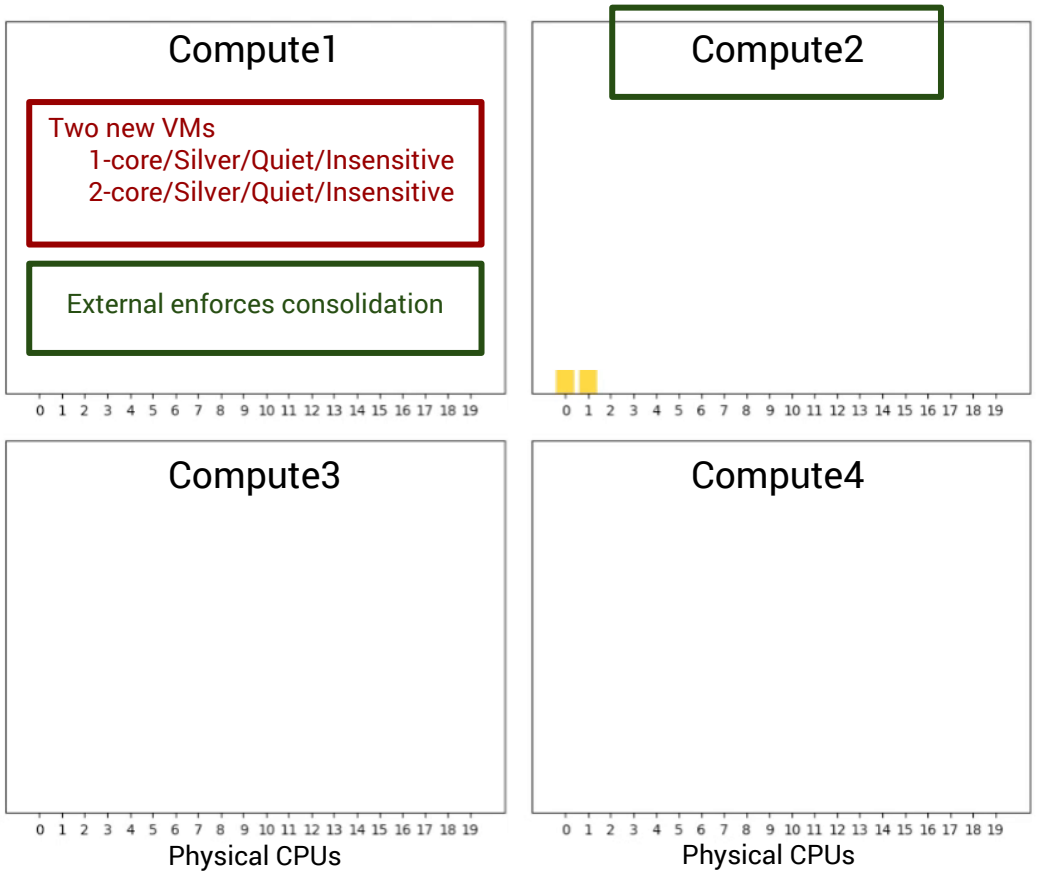

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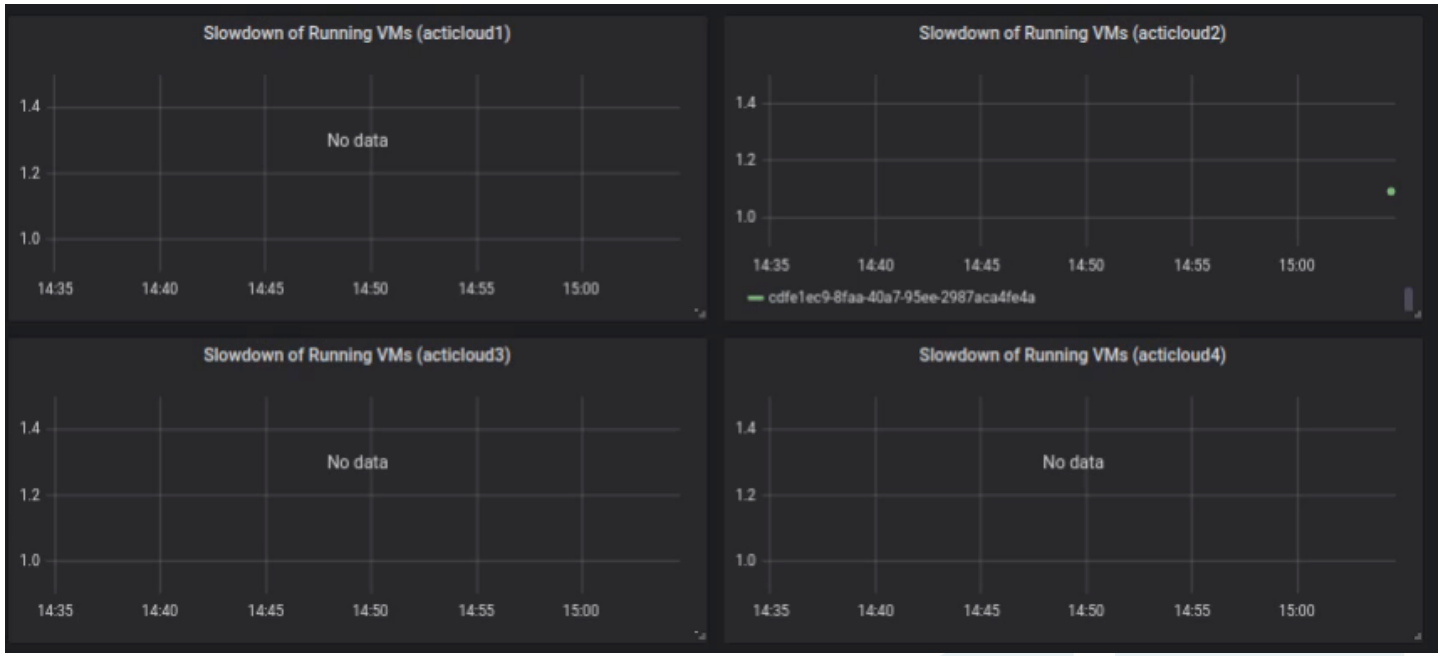

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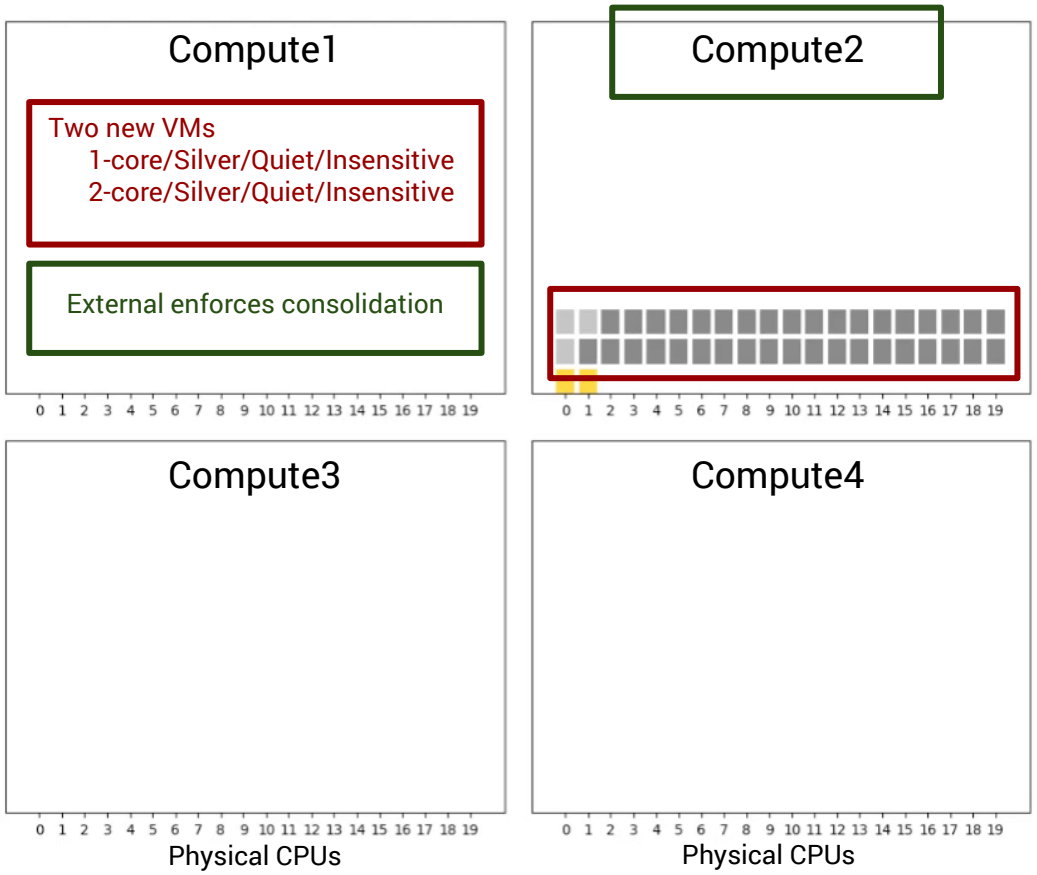

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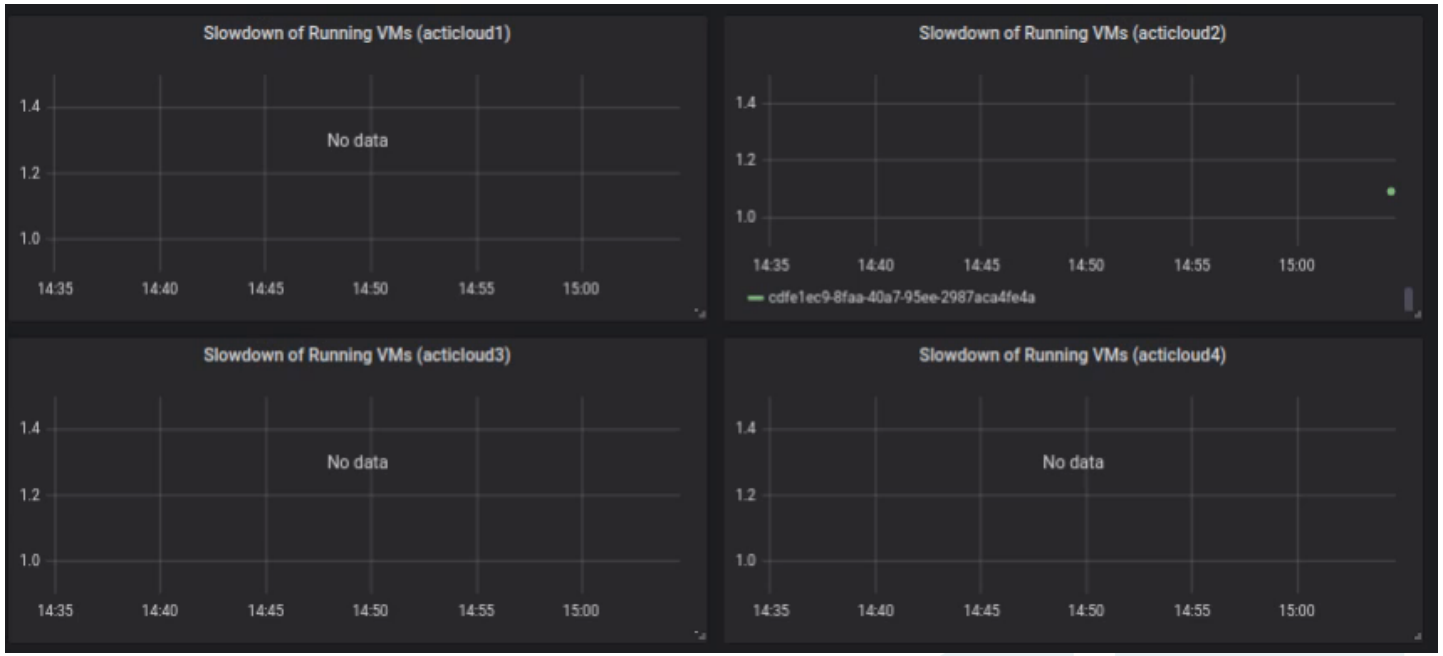

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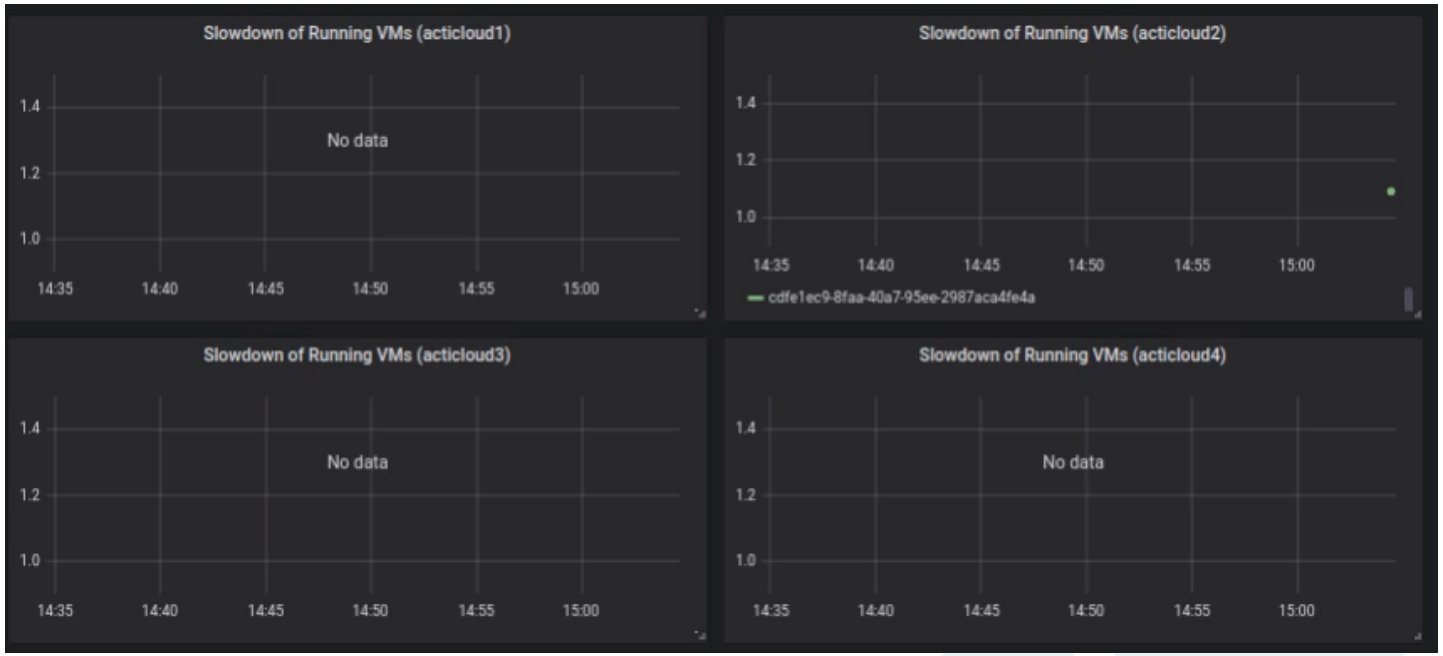

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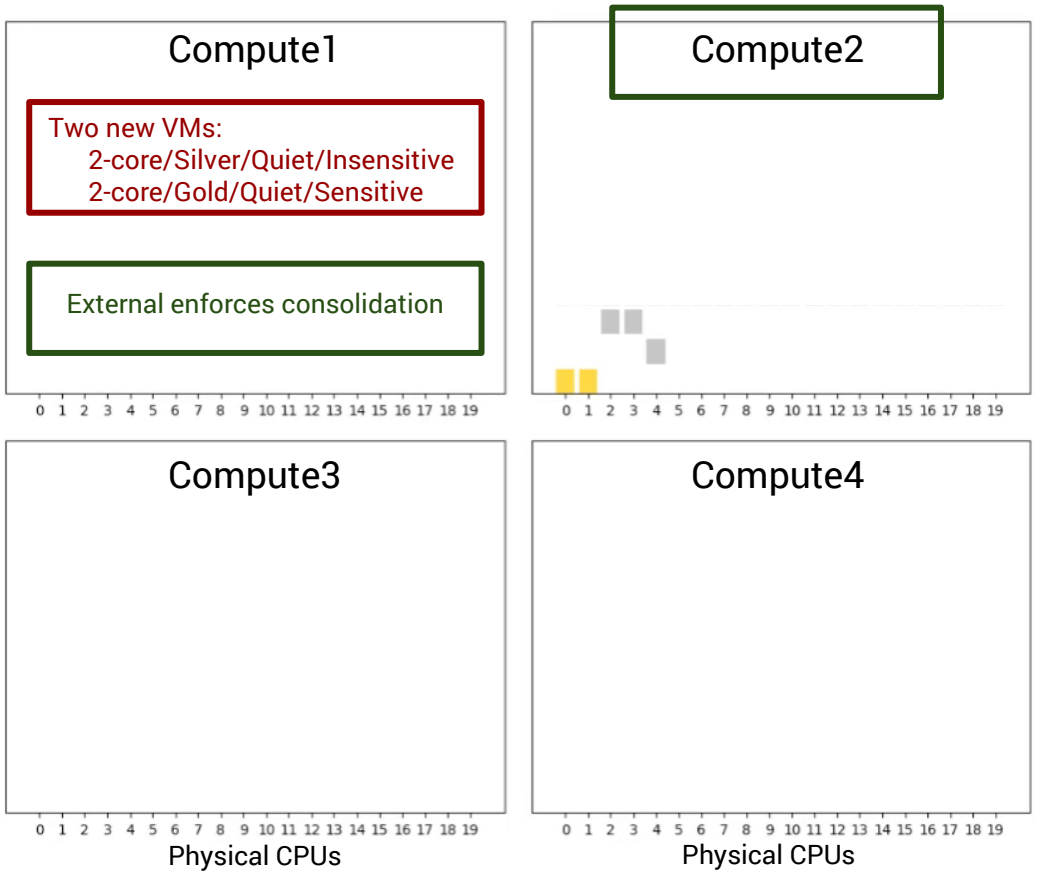

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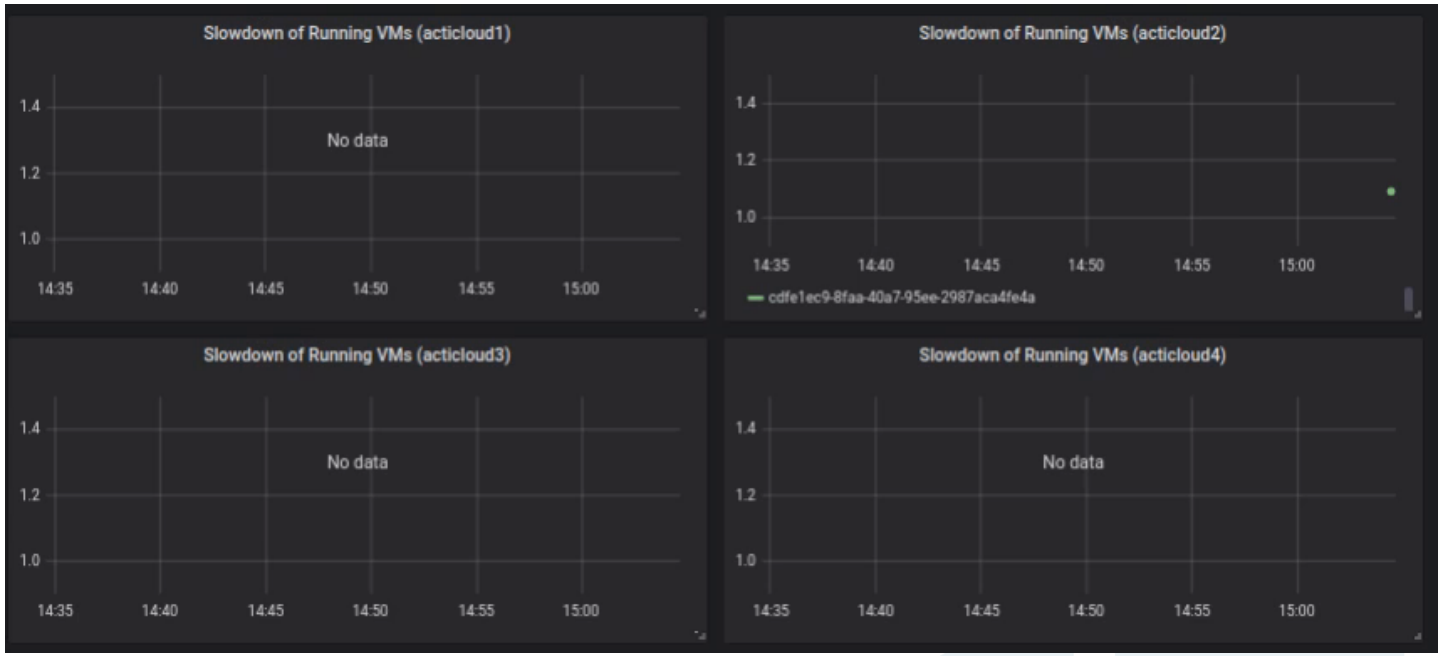

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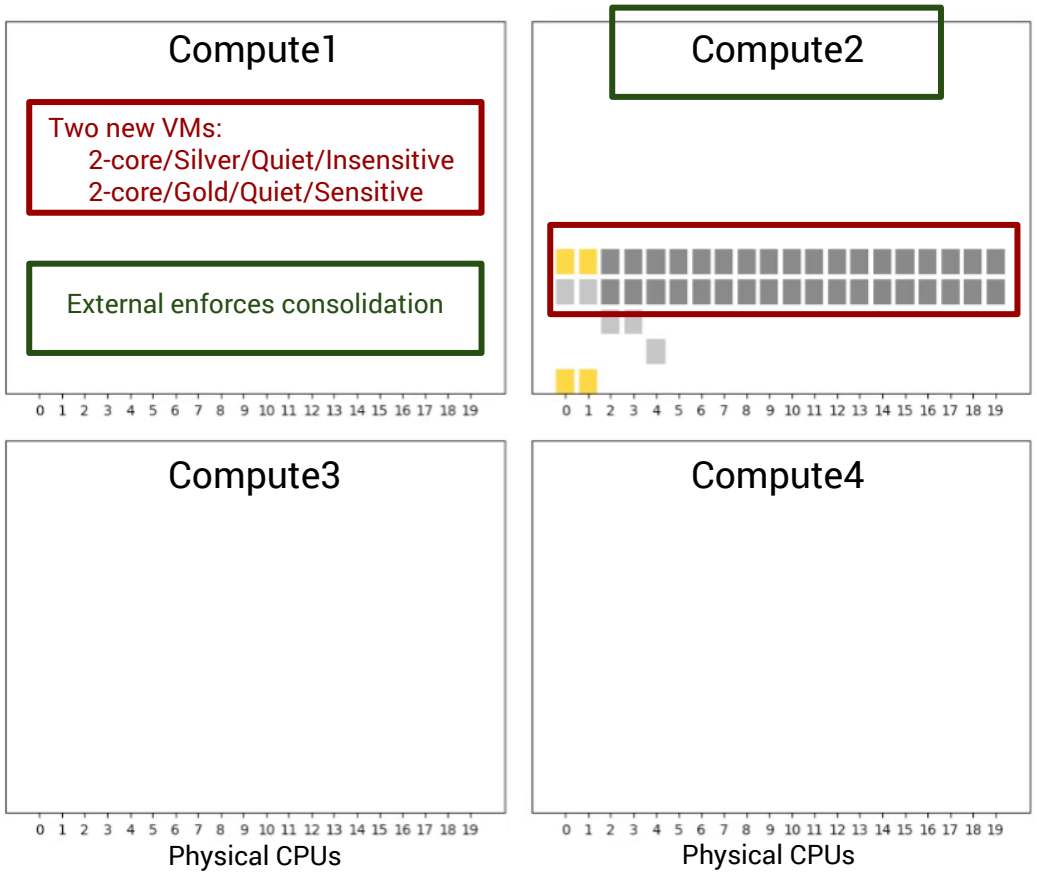

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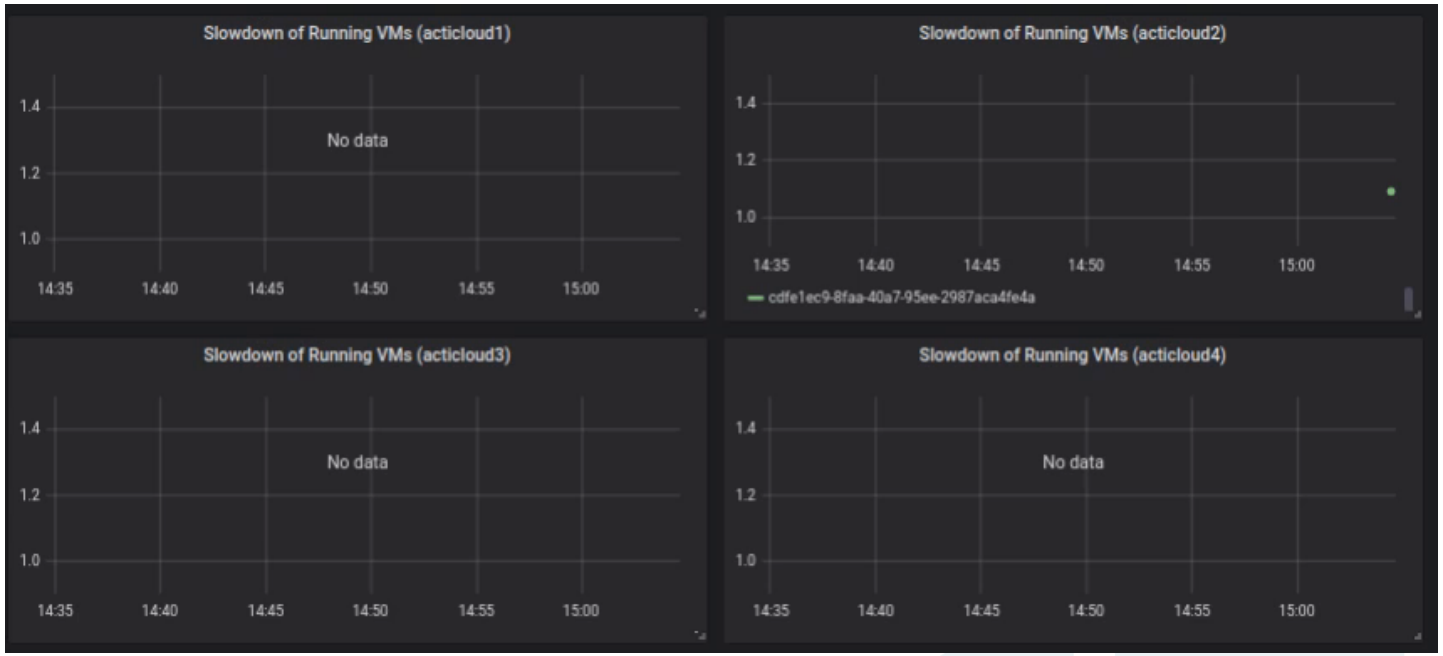

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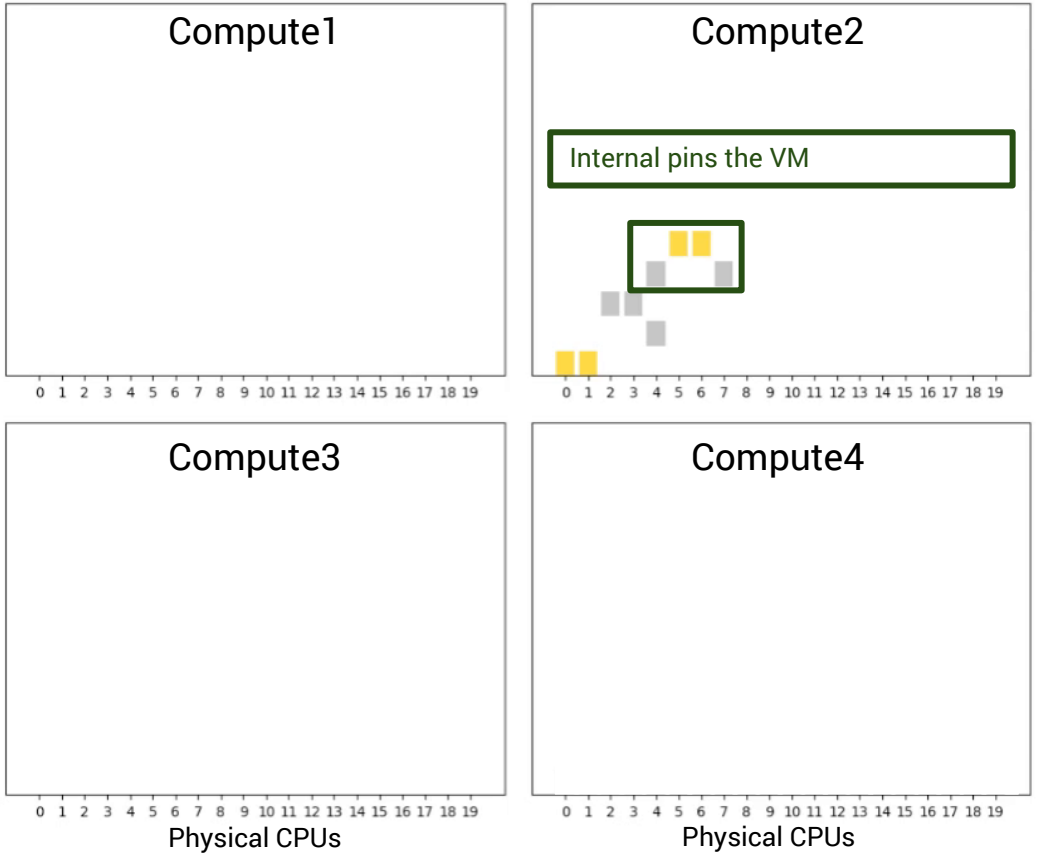

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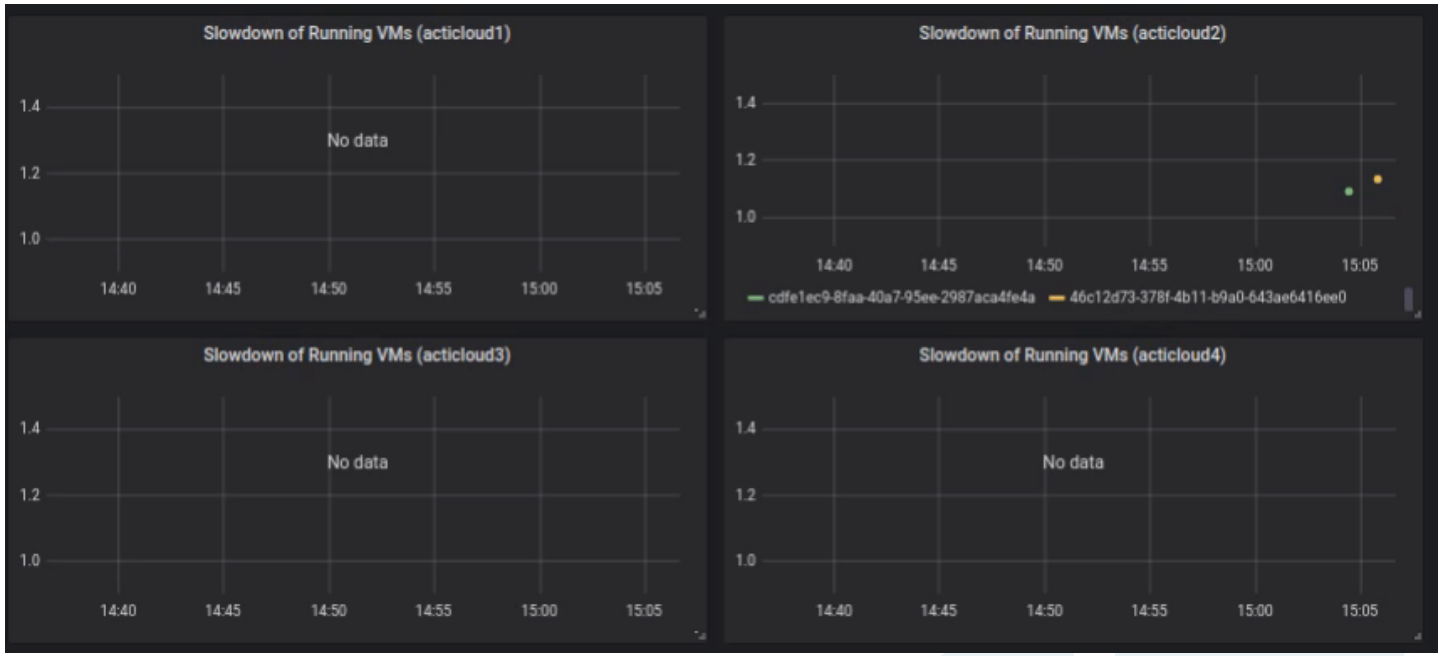

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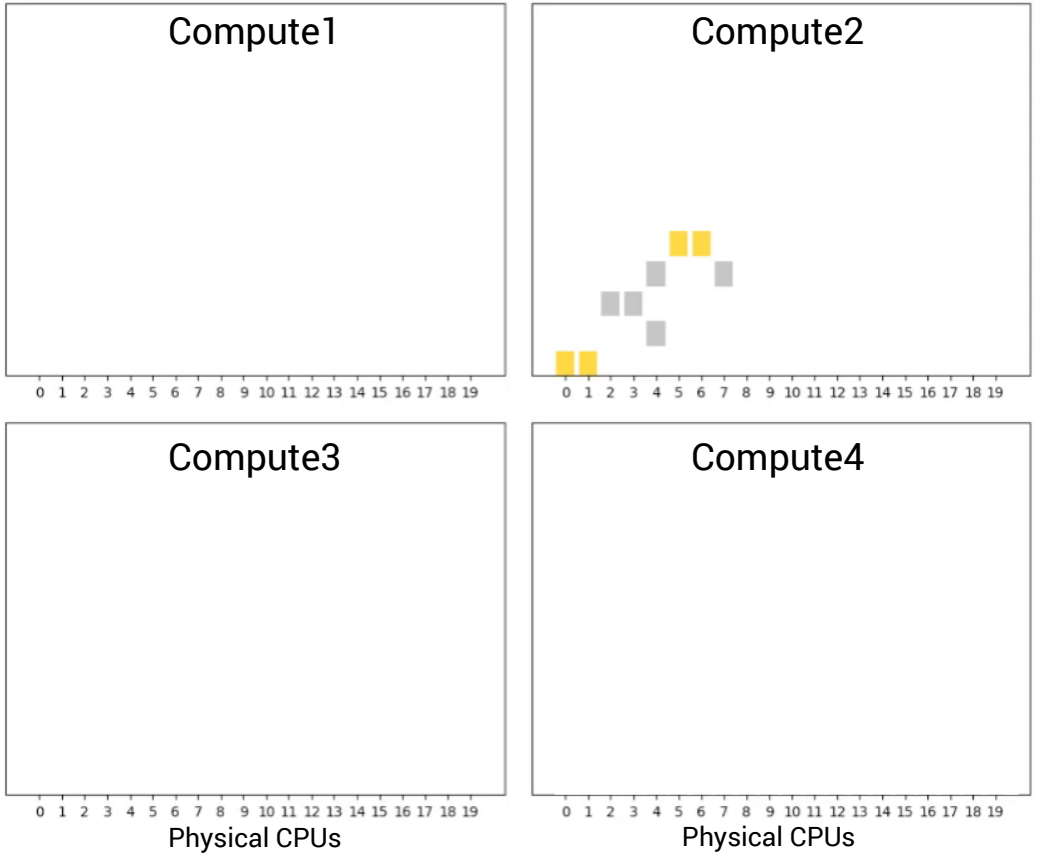

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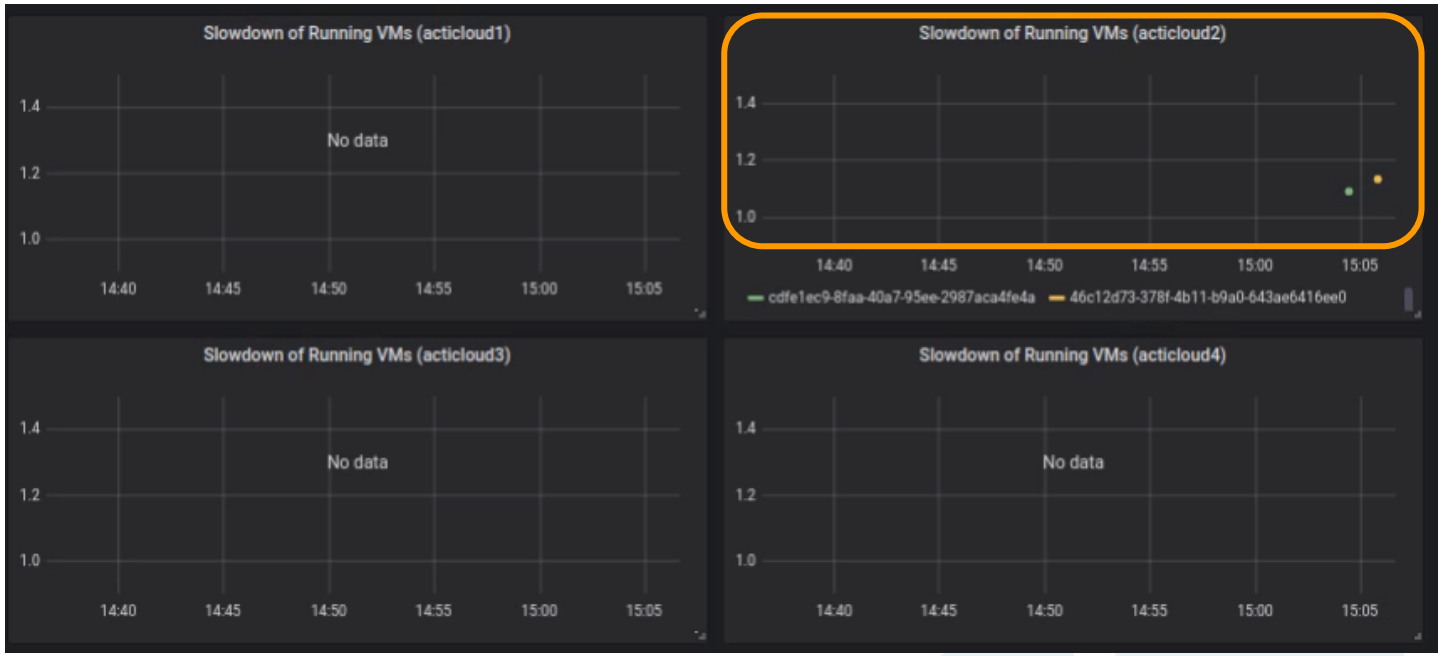

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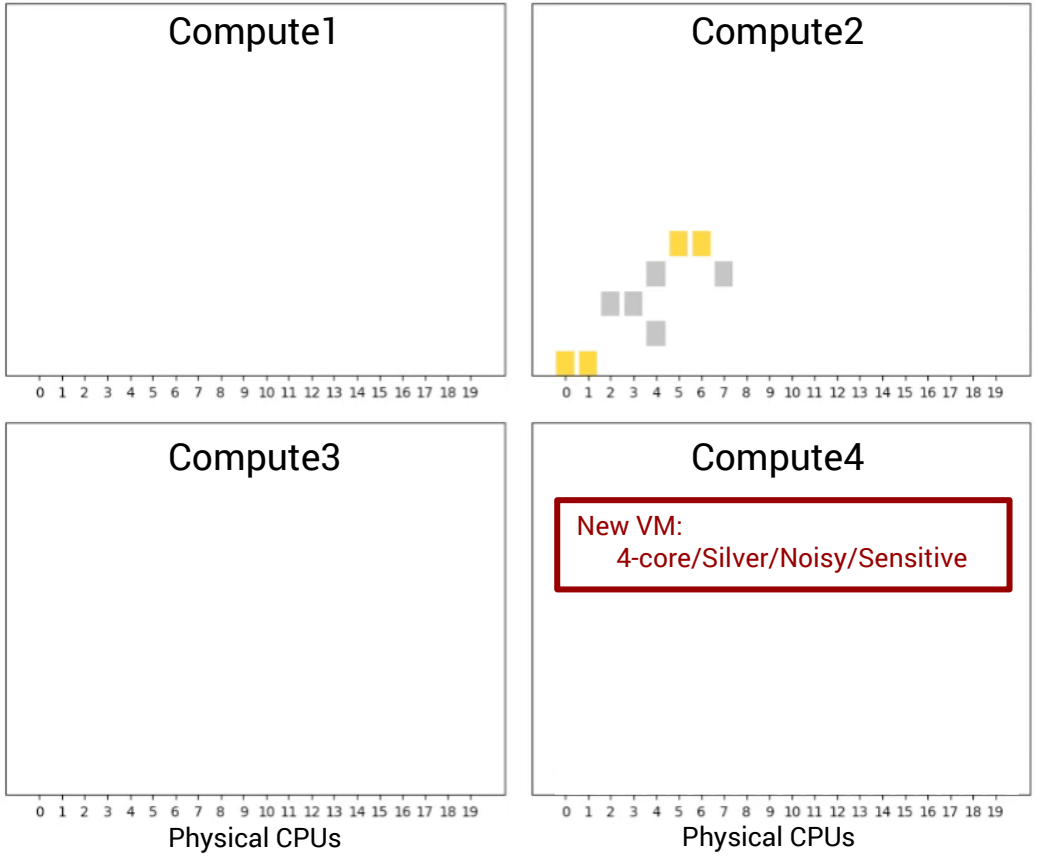

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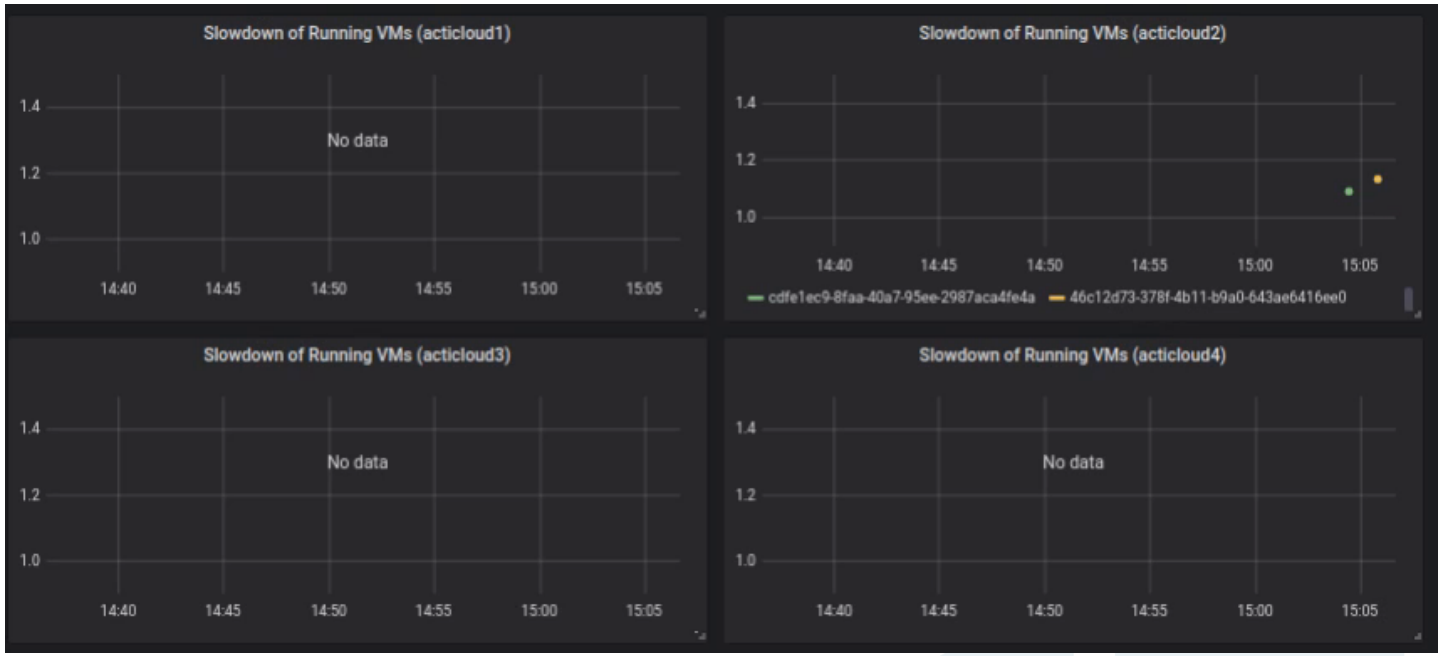

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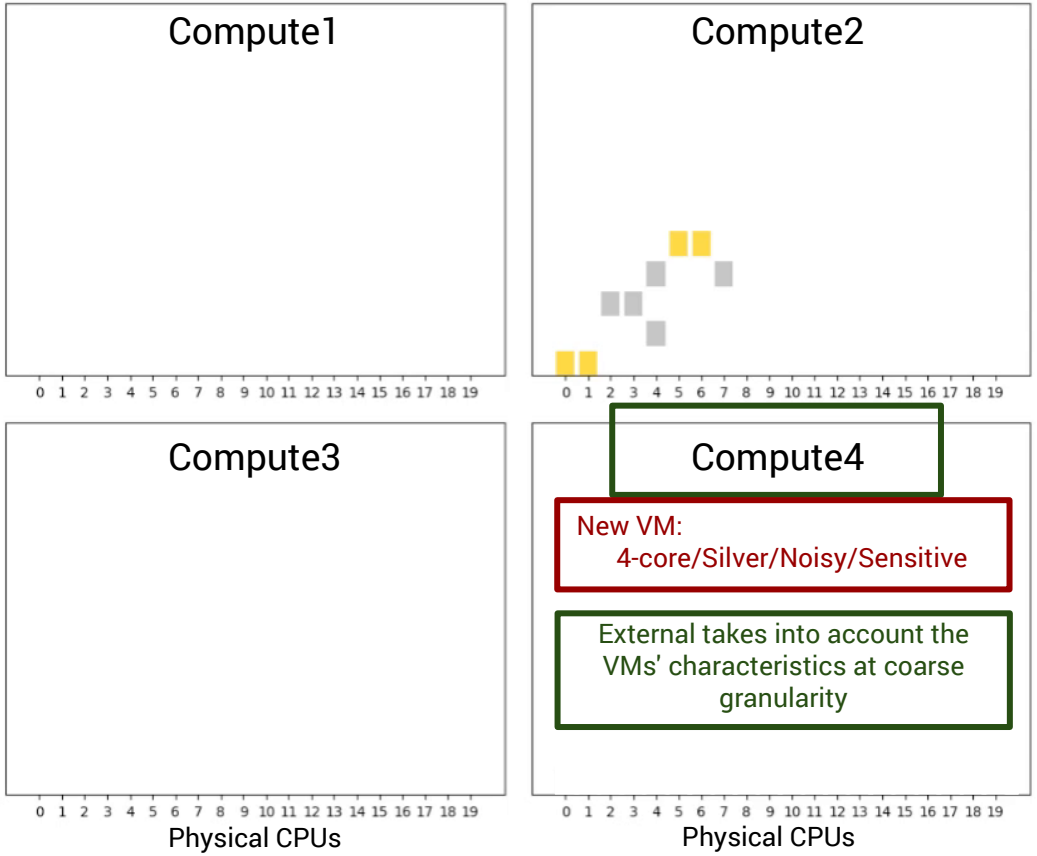

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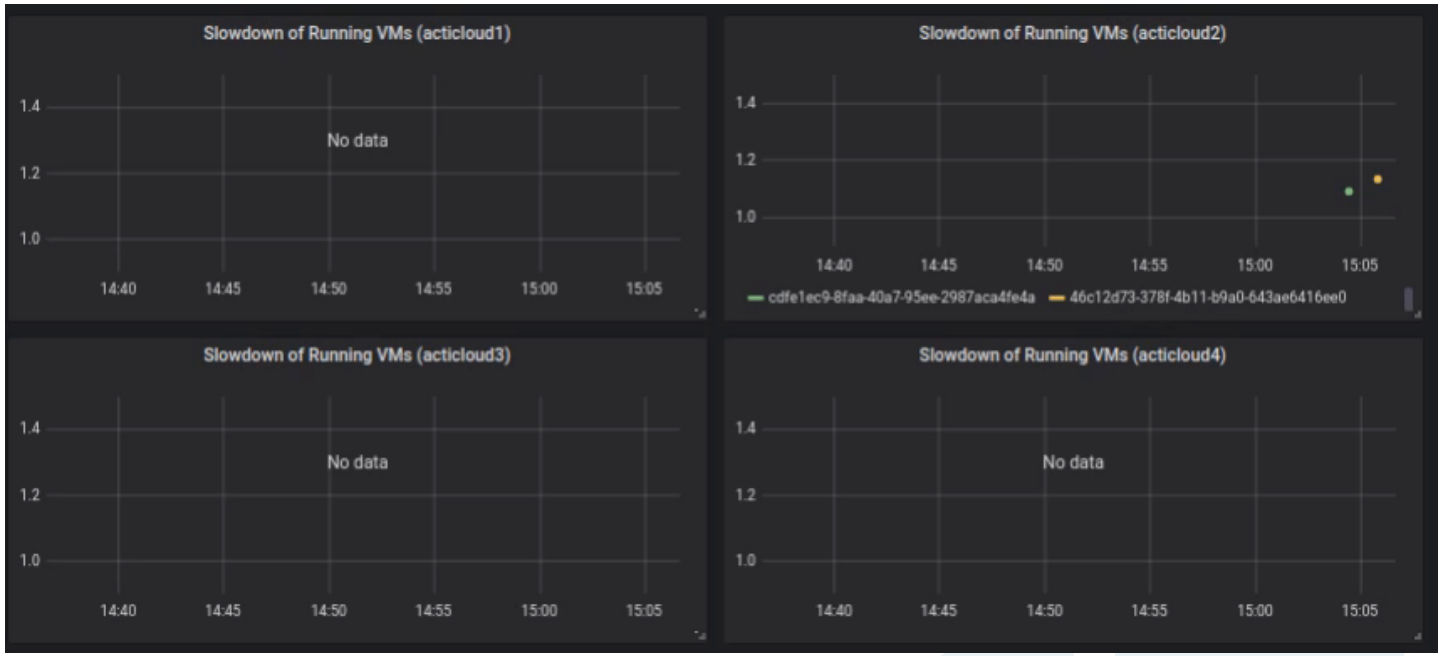

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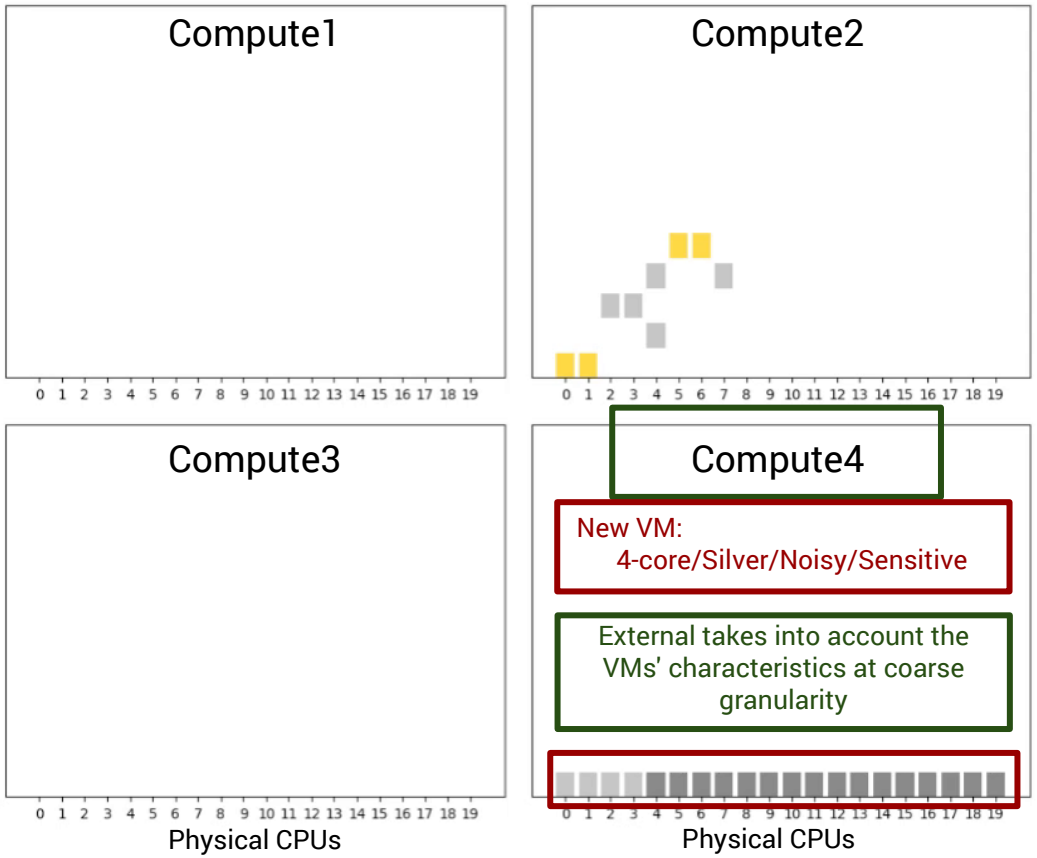

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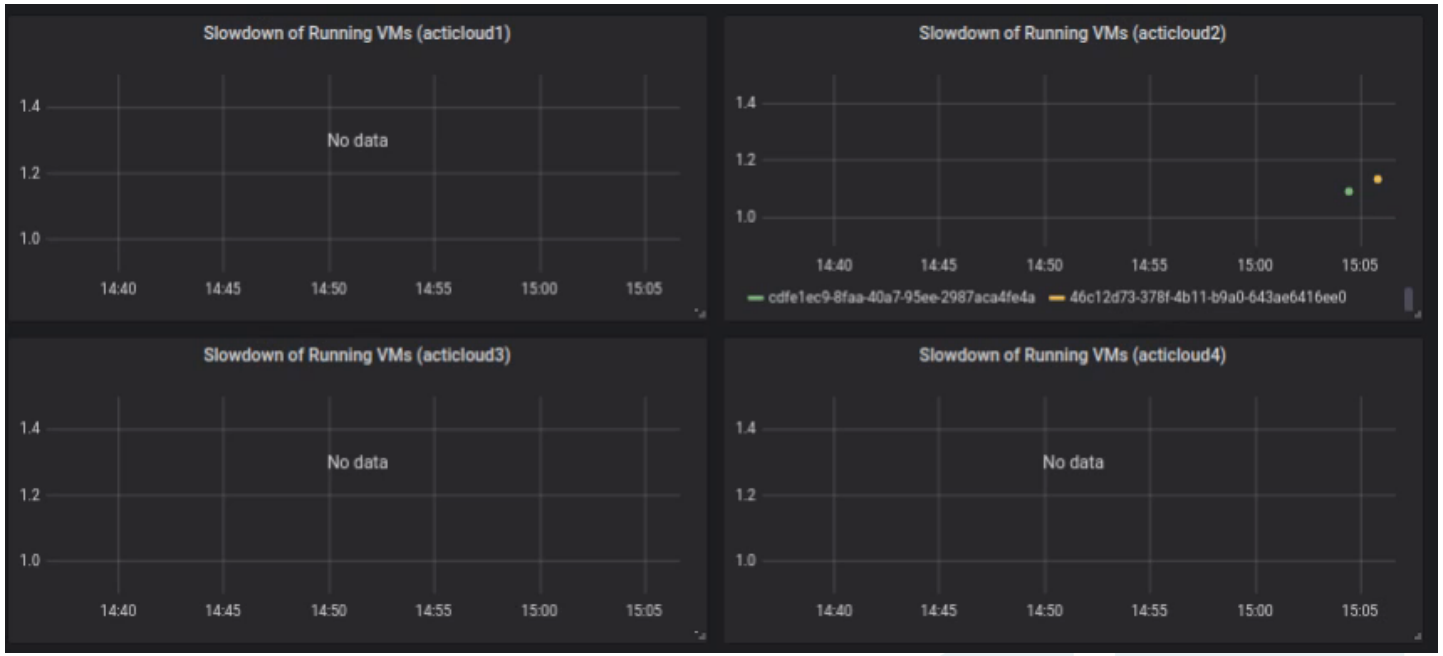

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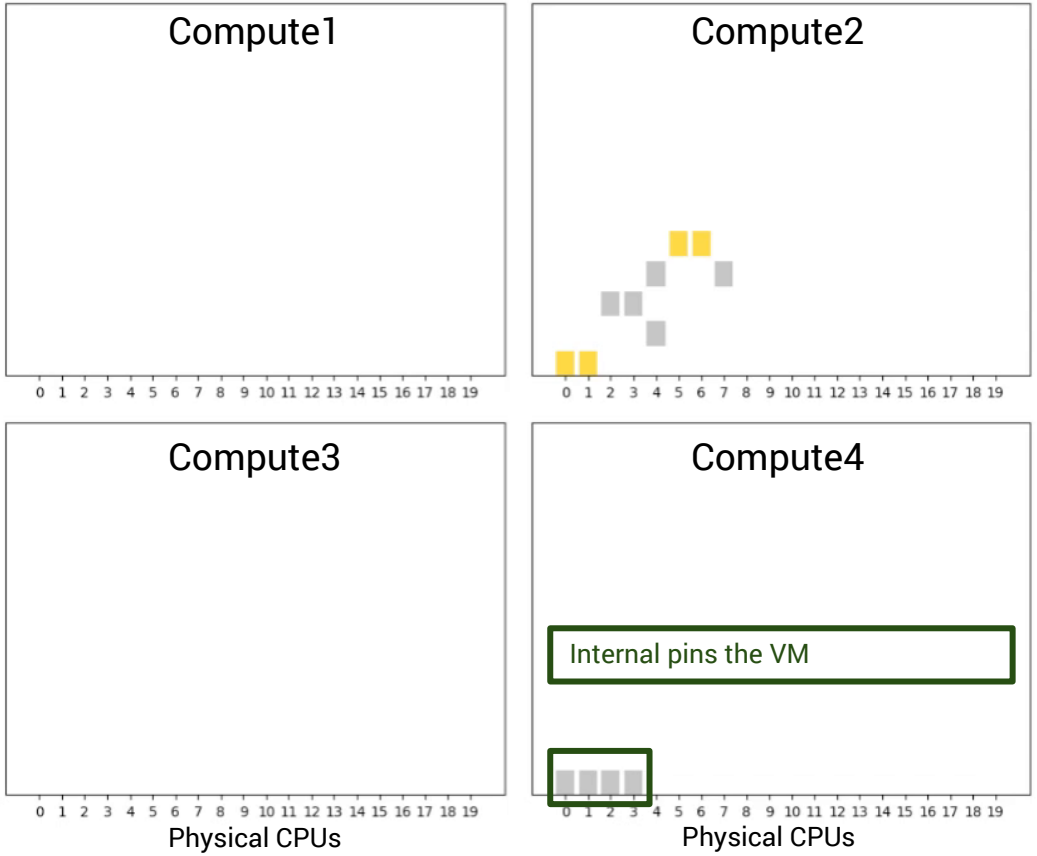

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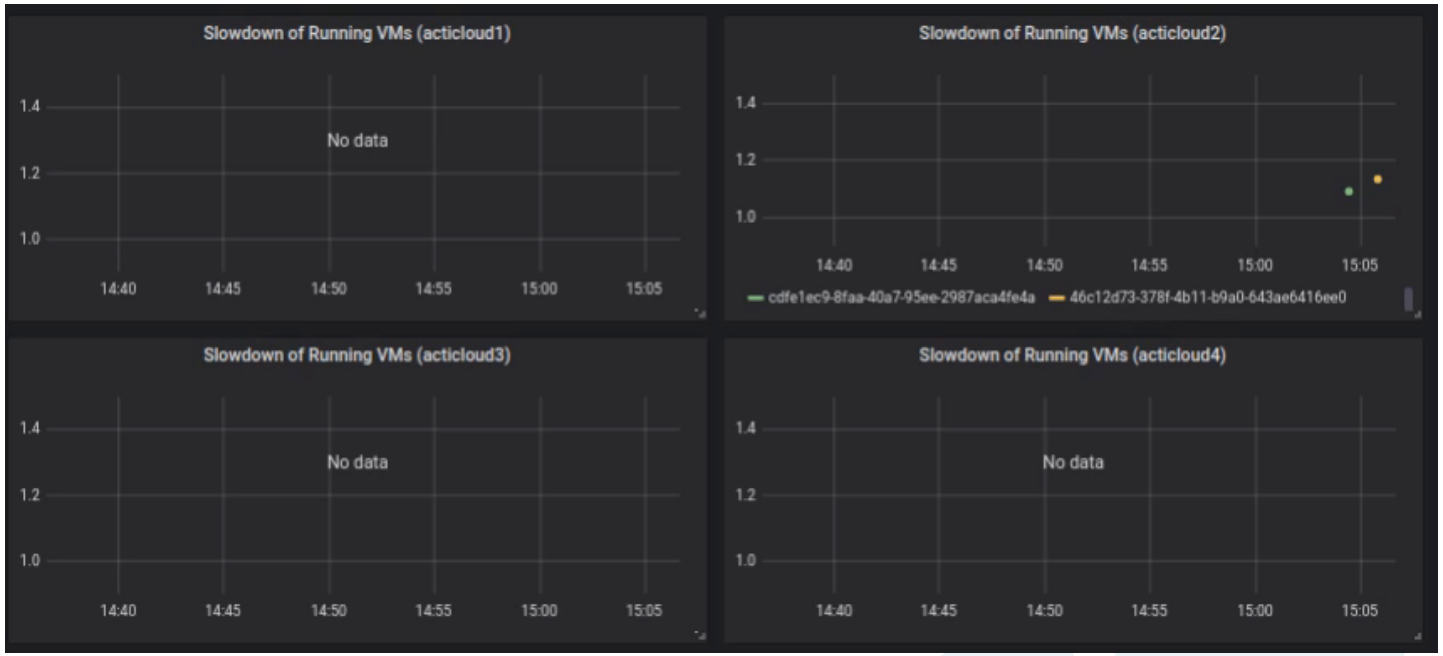

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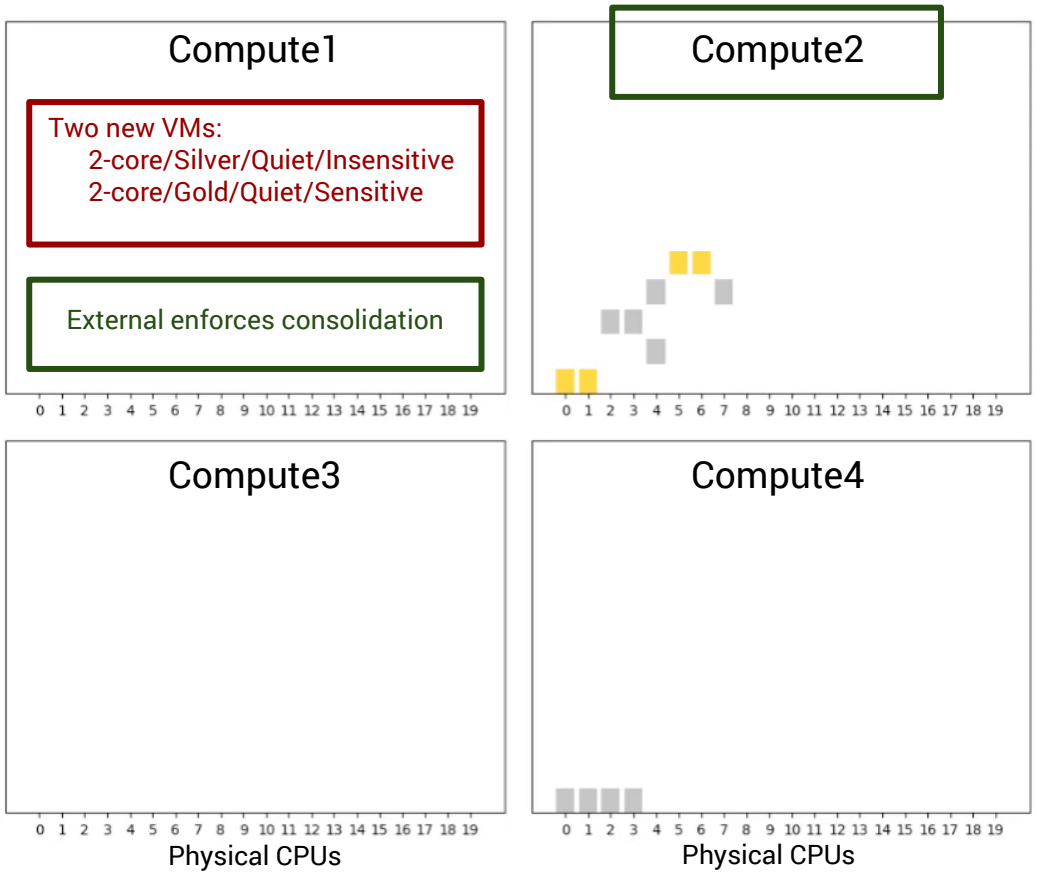

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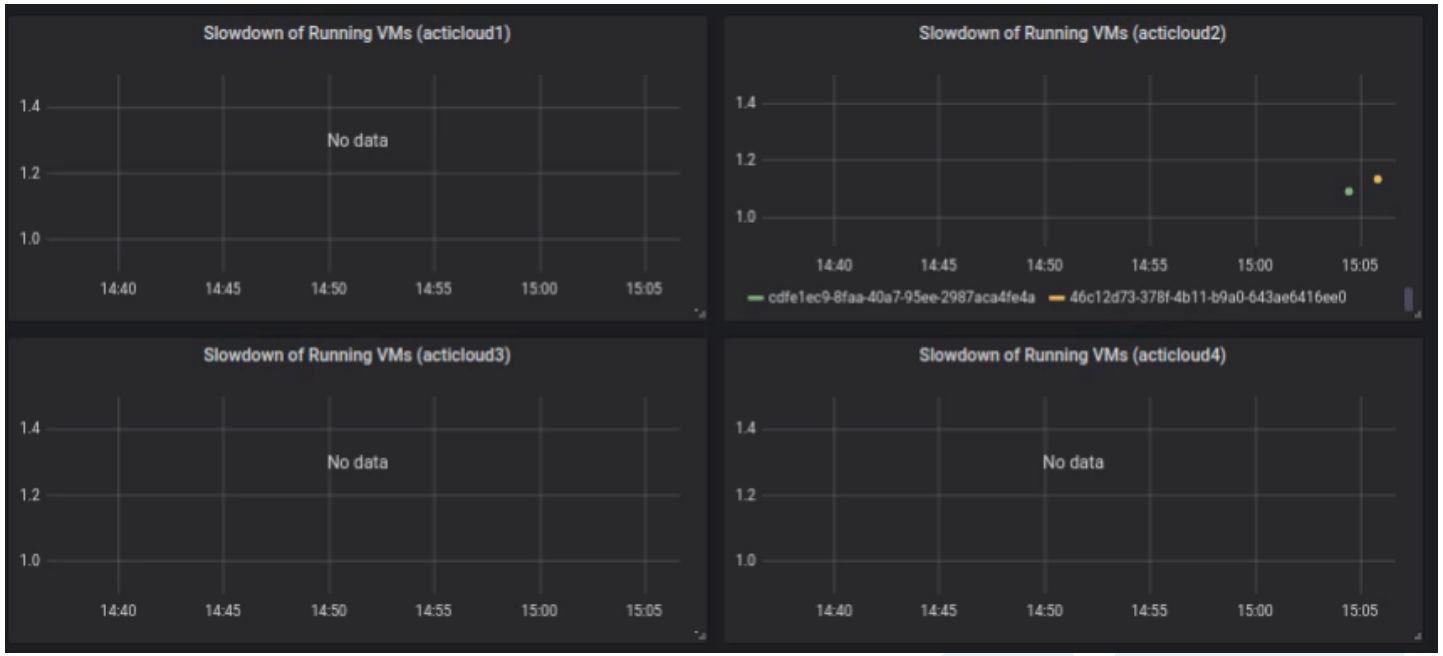

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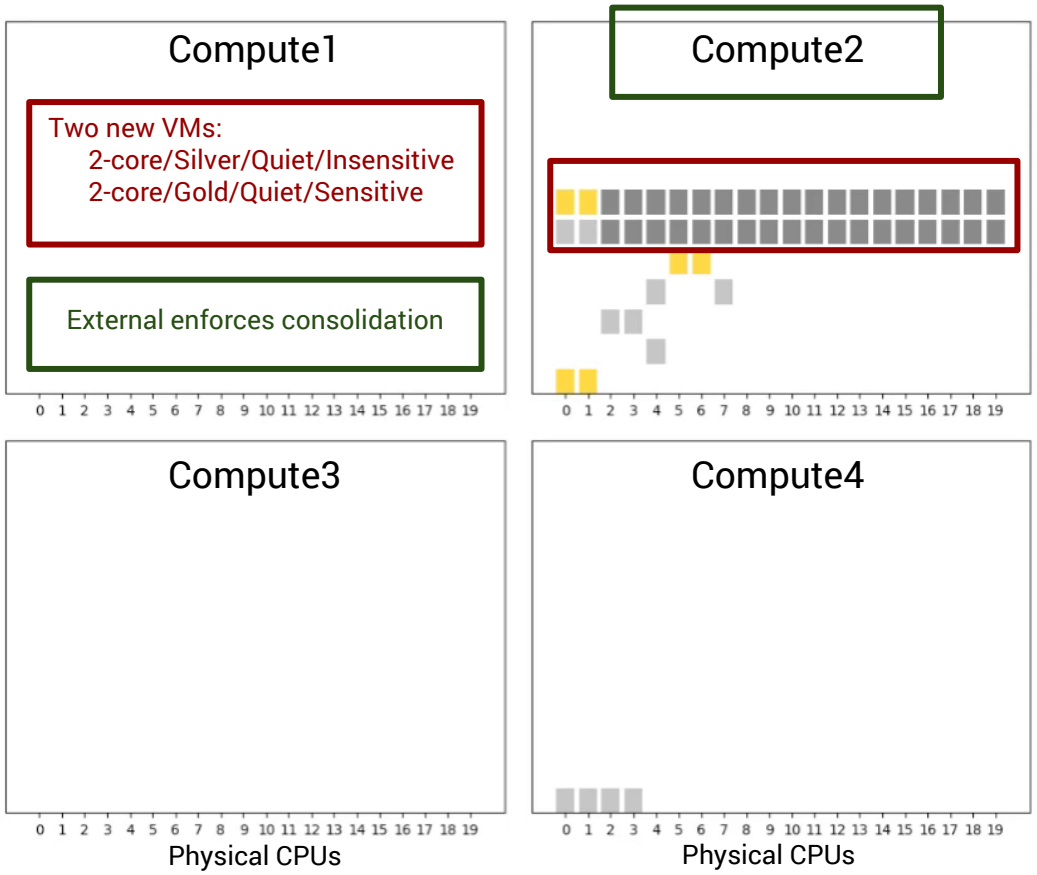
ACTiManager Demonstration

4 20-core nodes cluster



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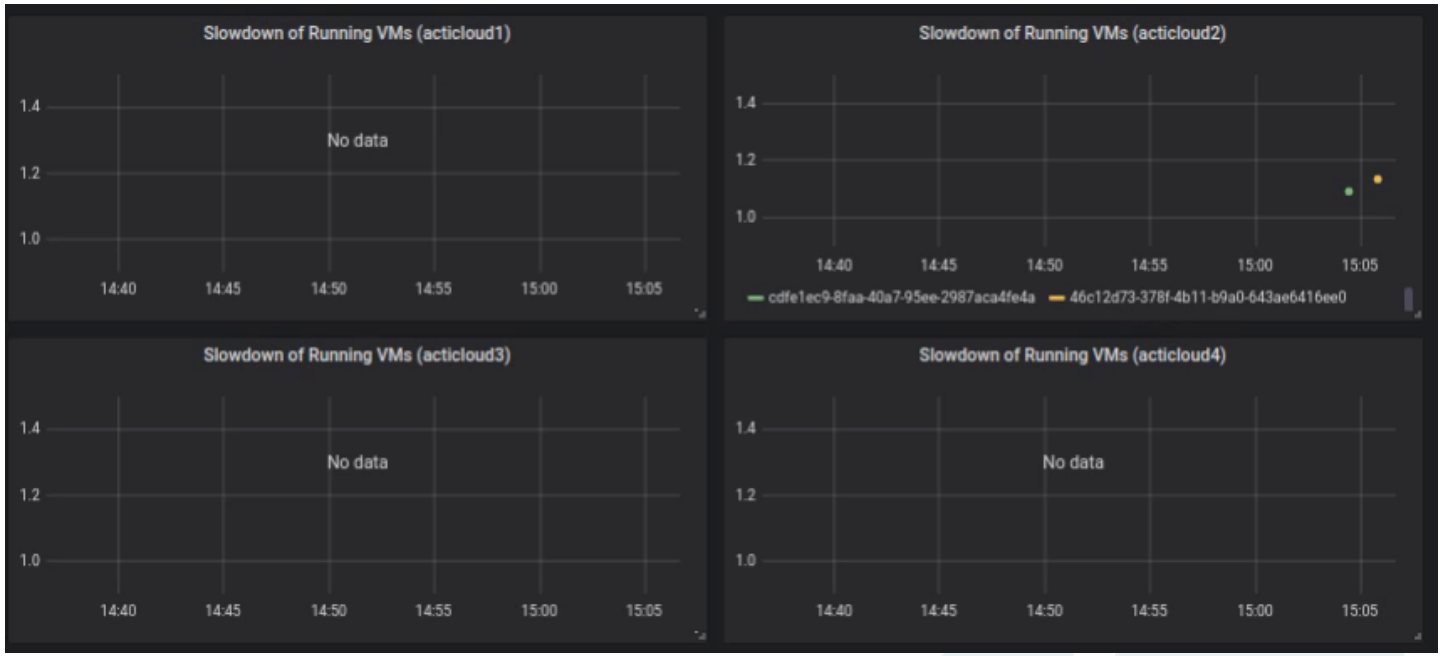

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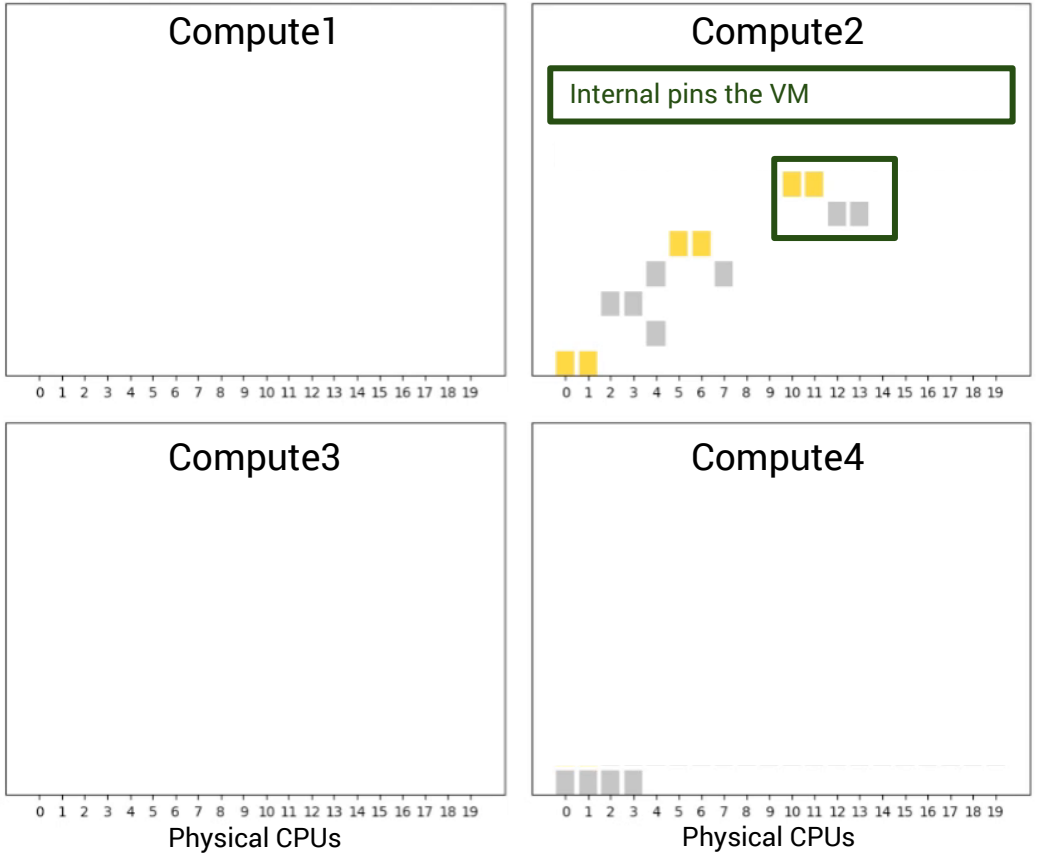

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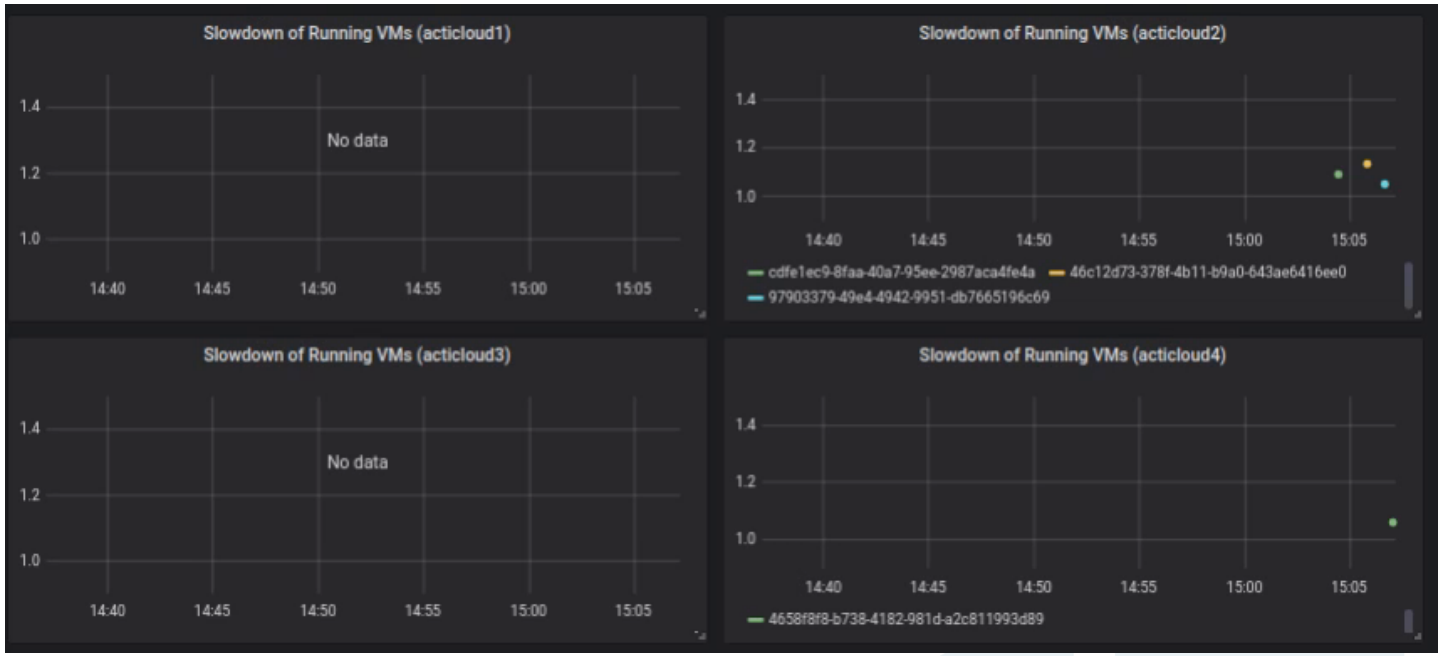

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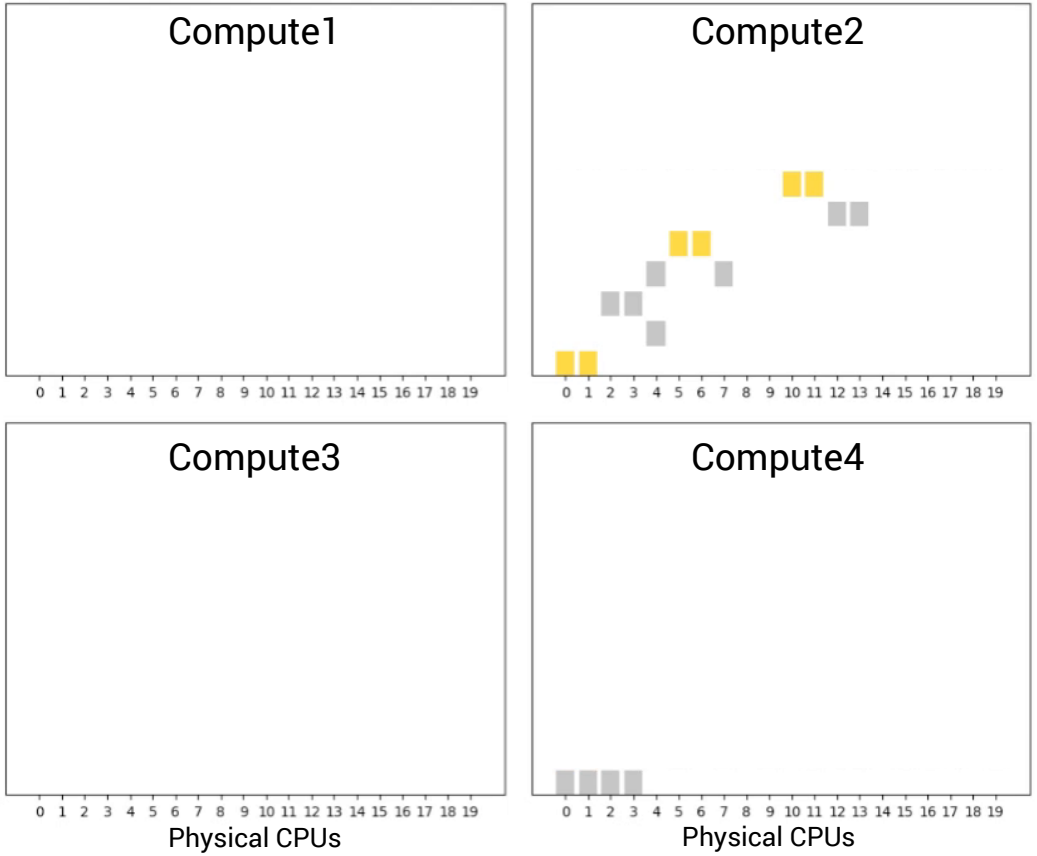

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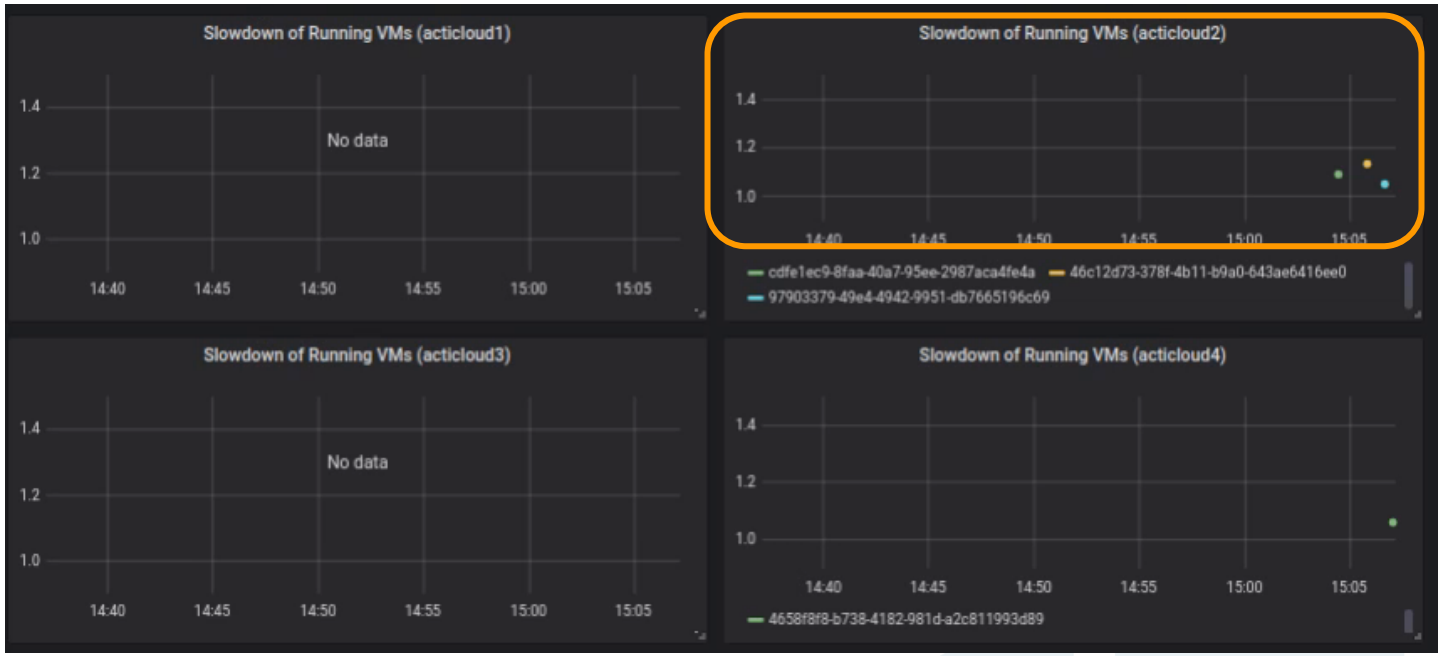

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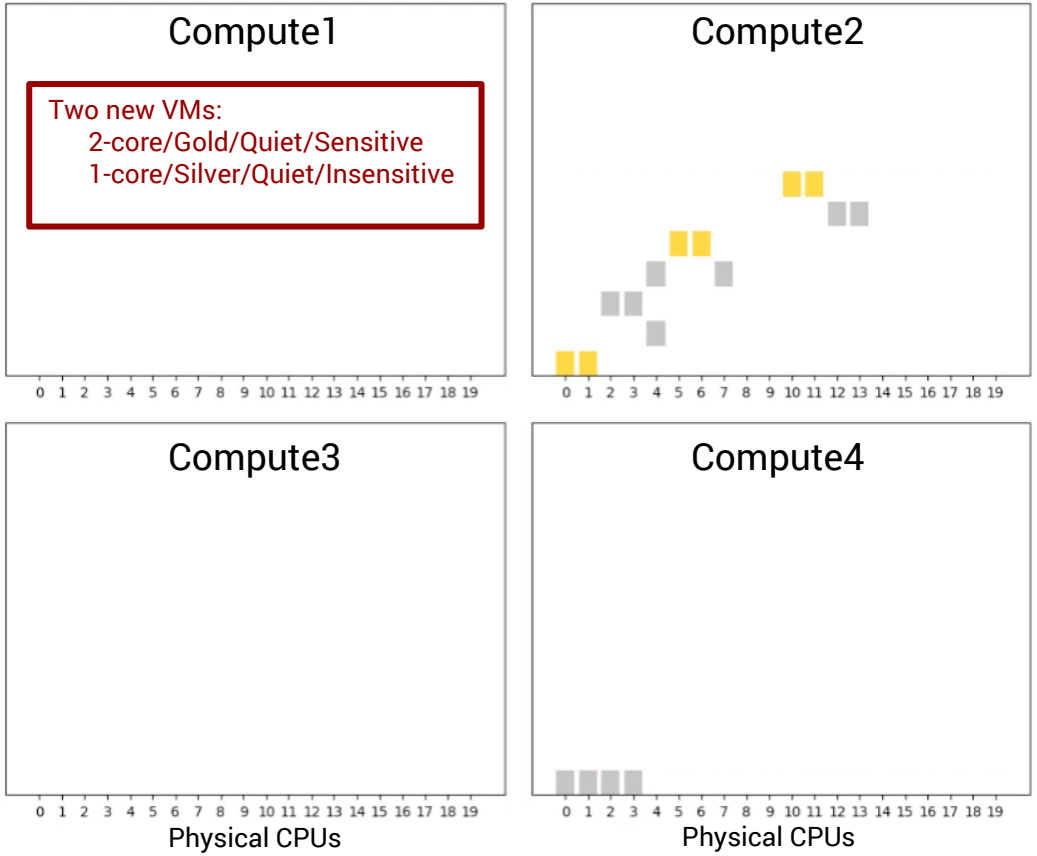

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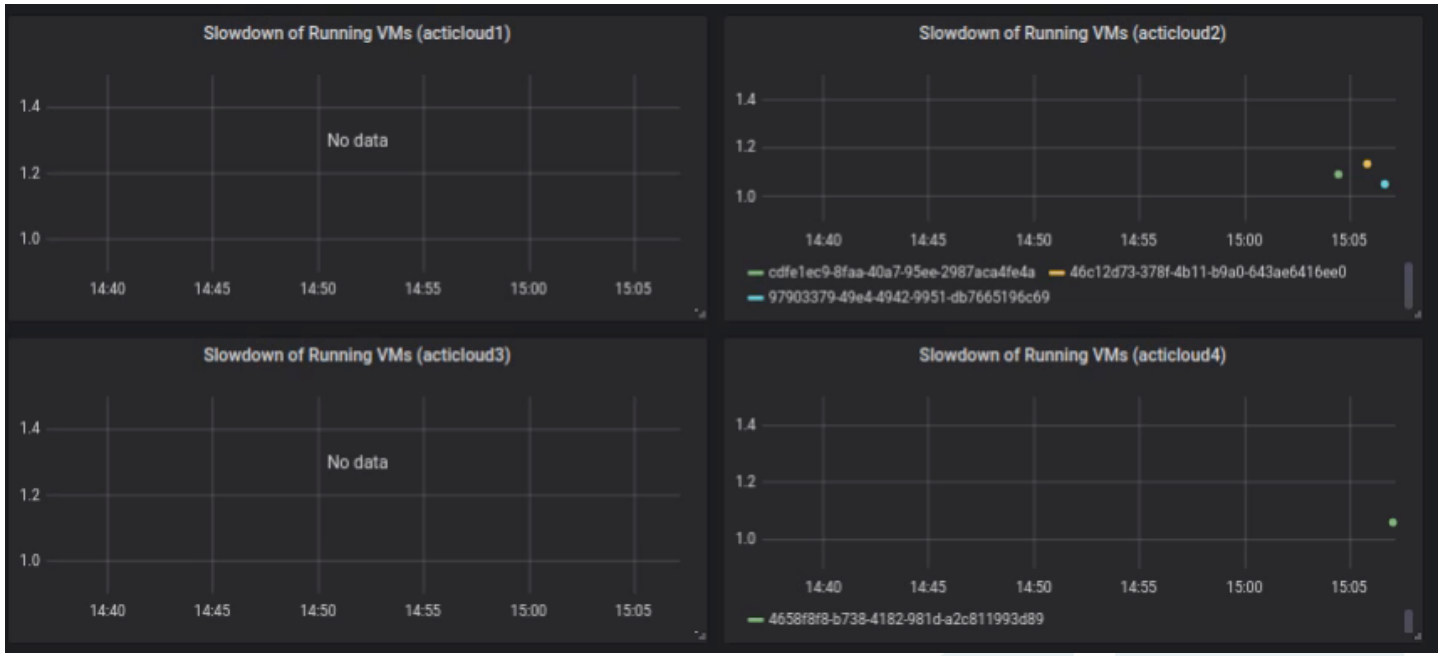

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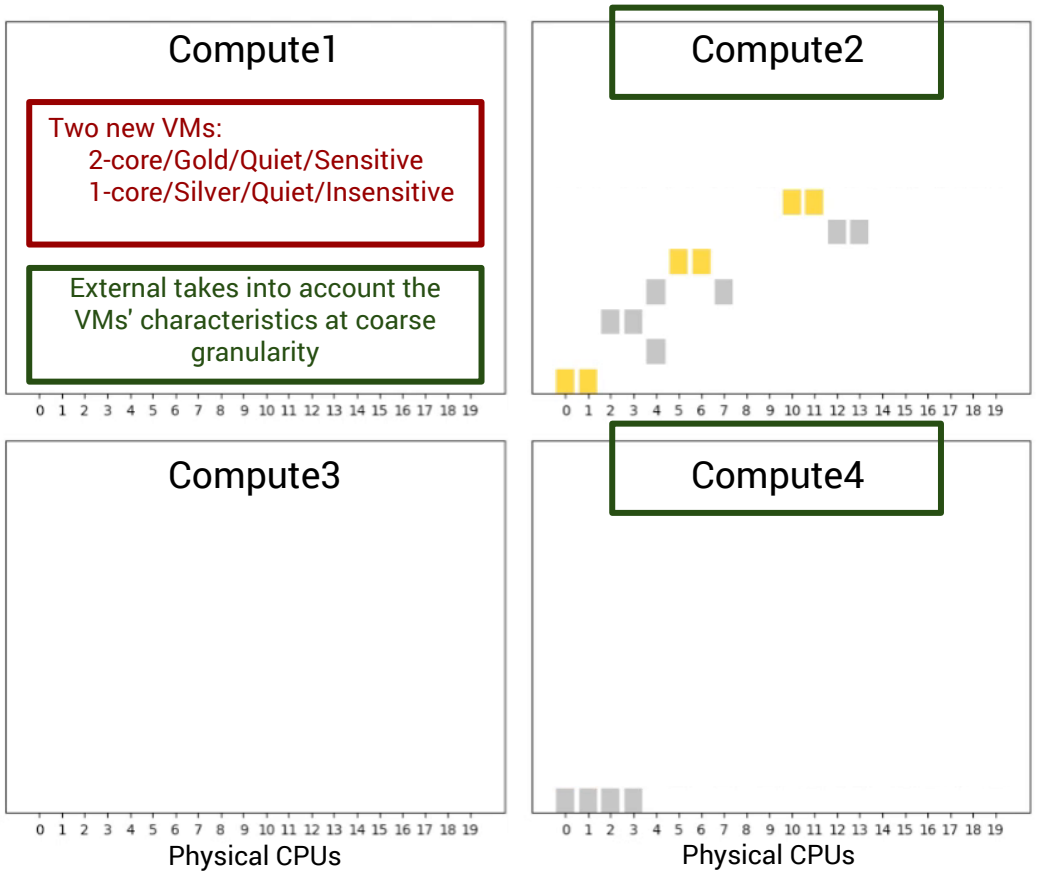

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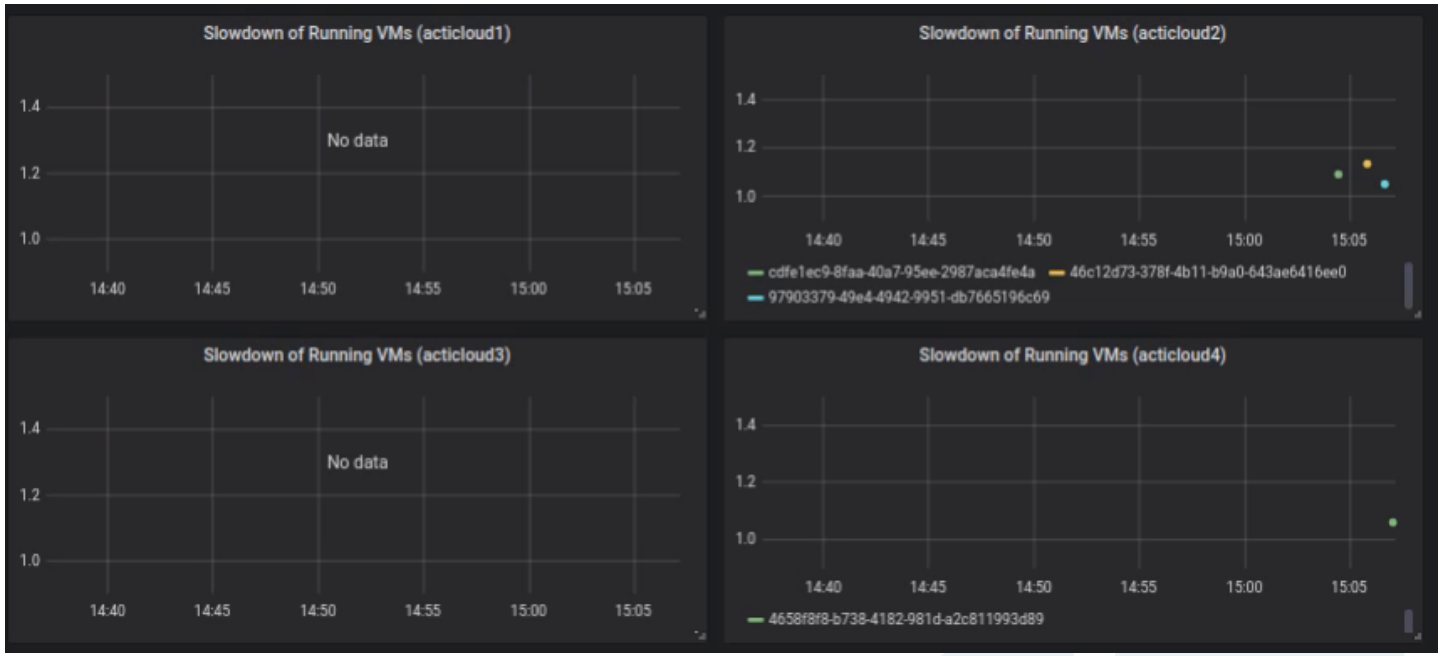

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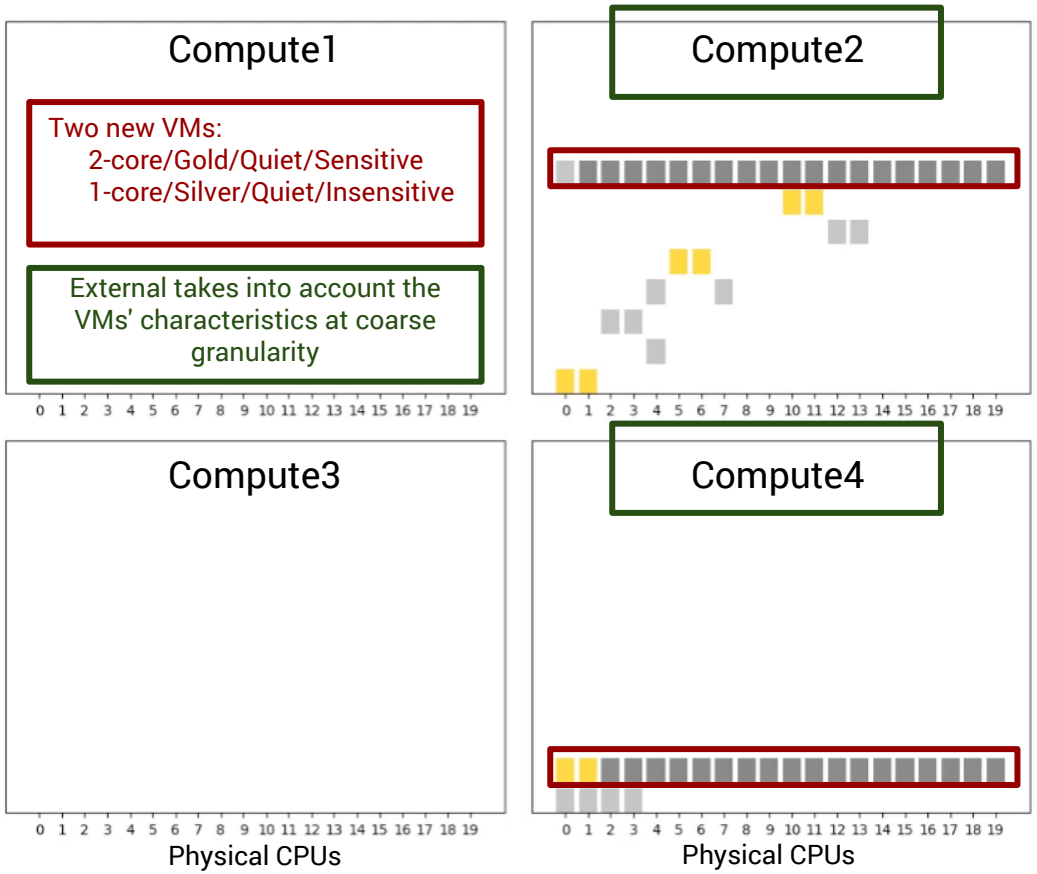

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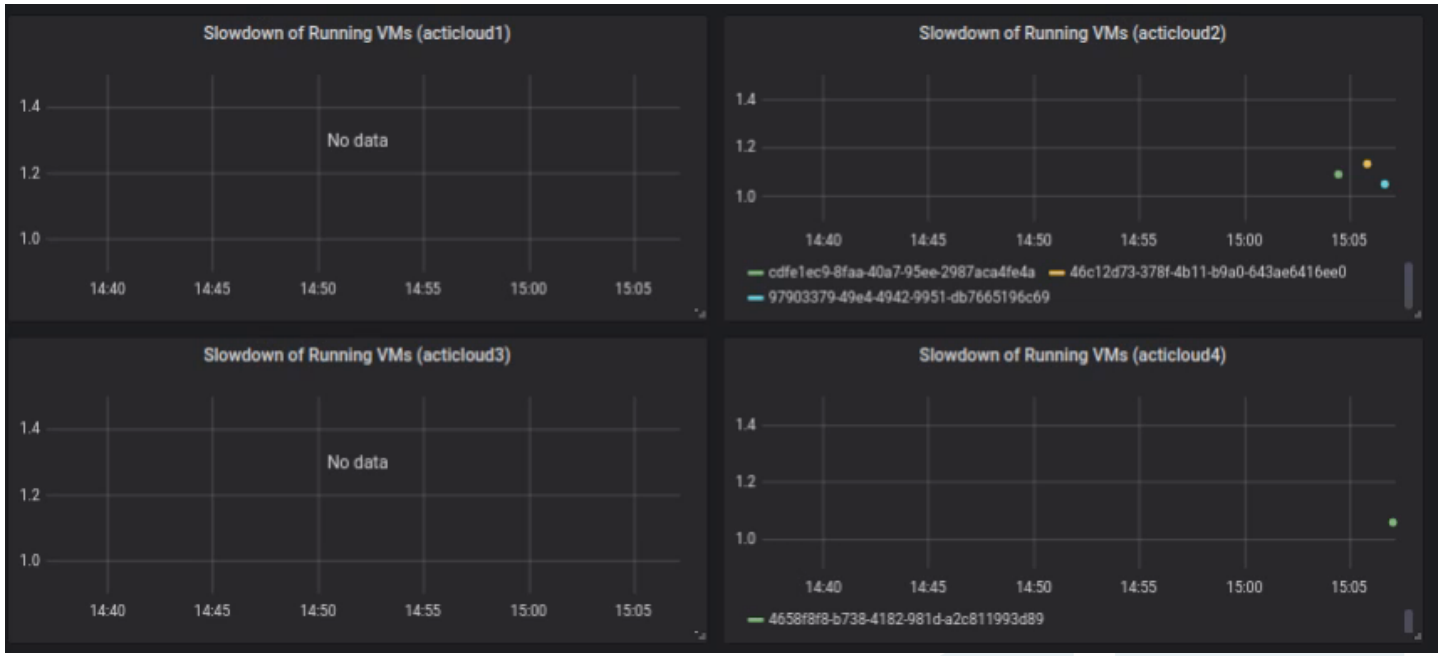

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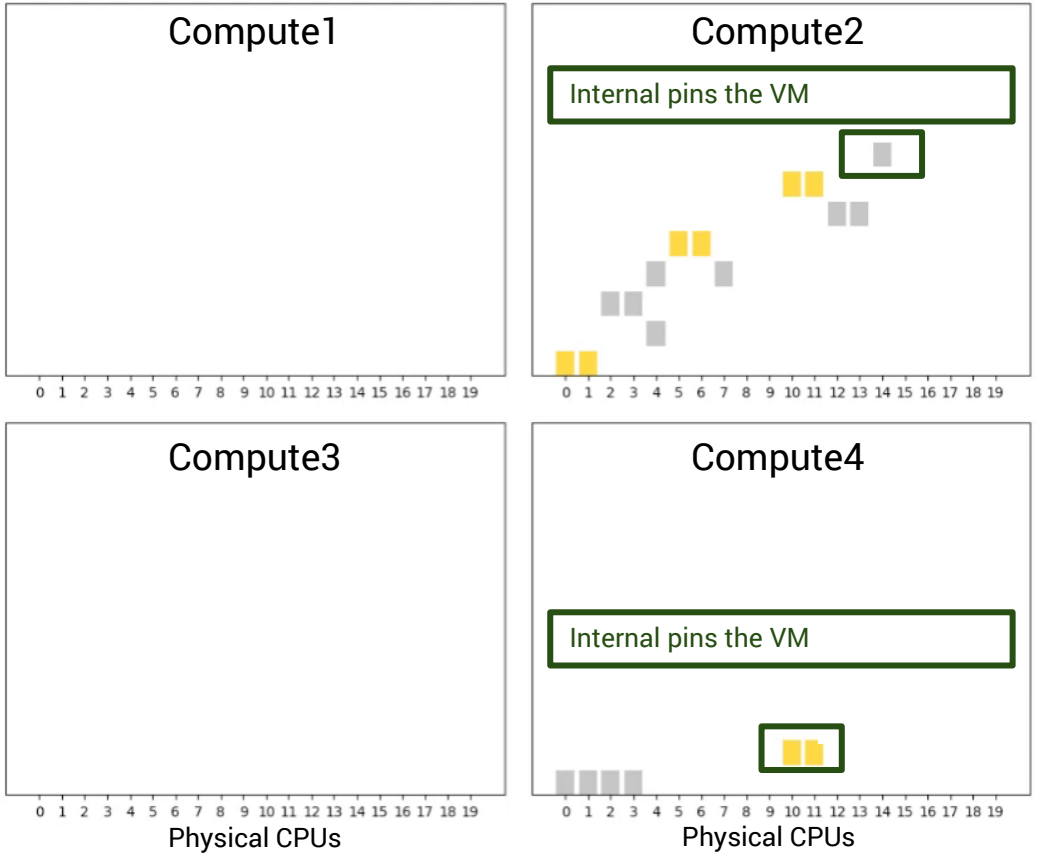

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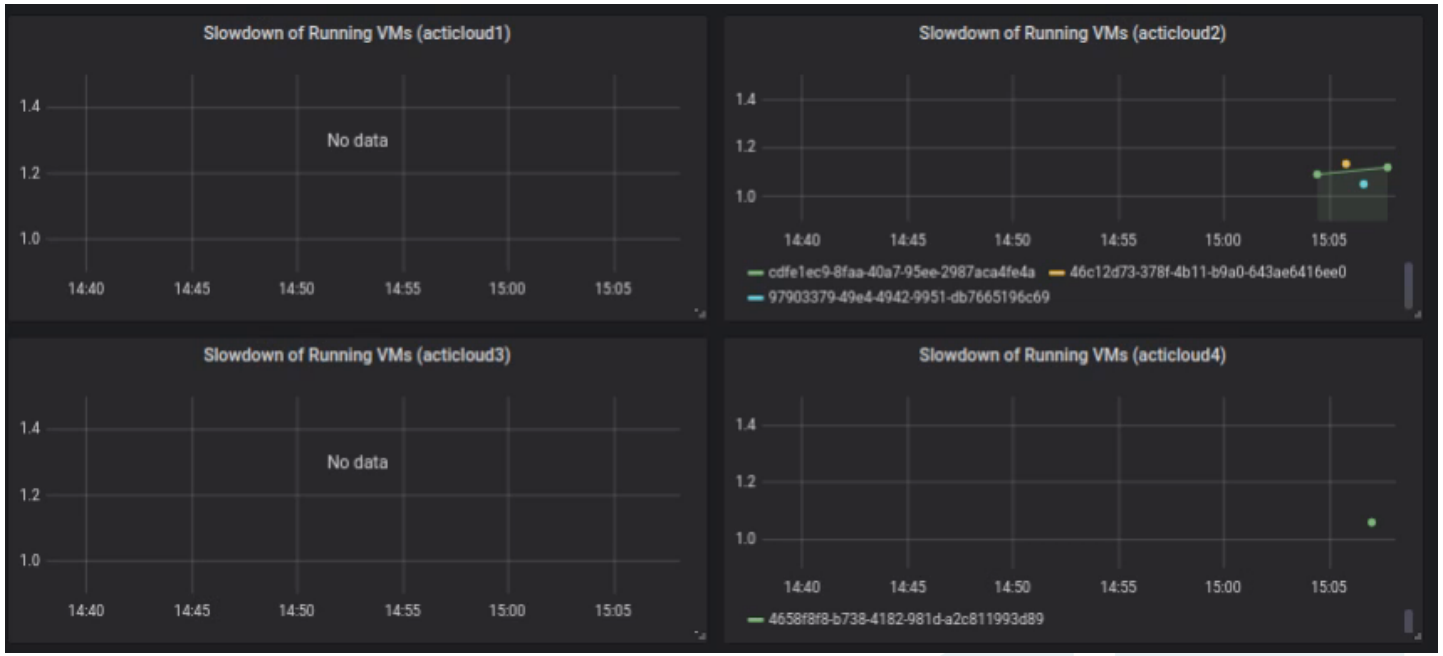

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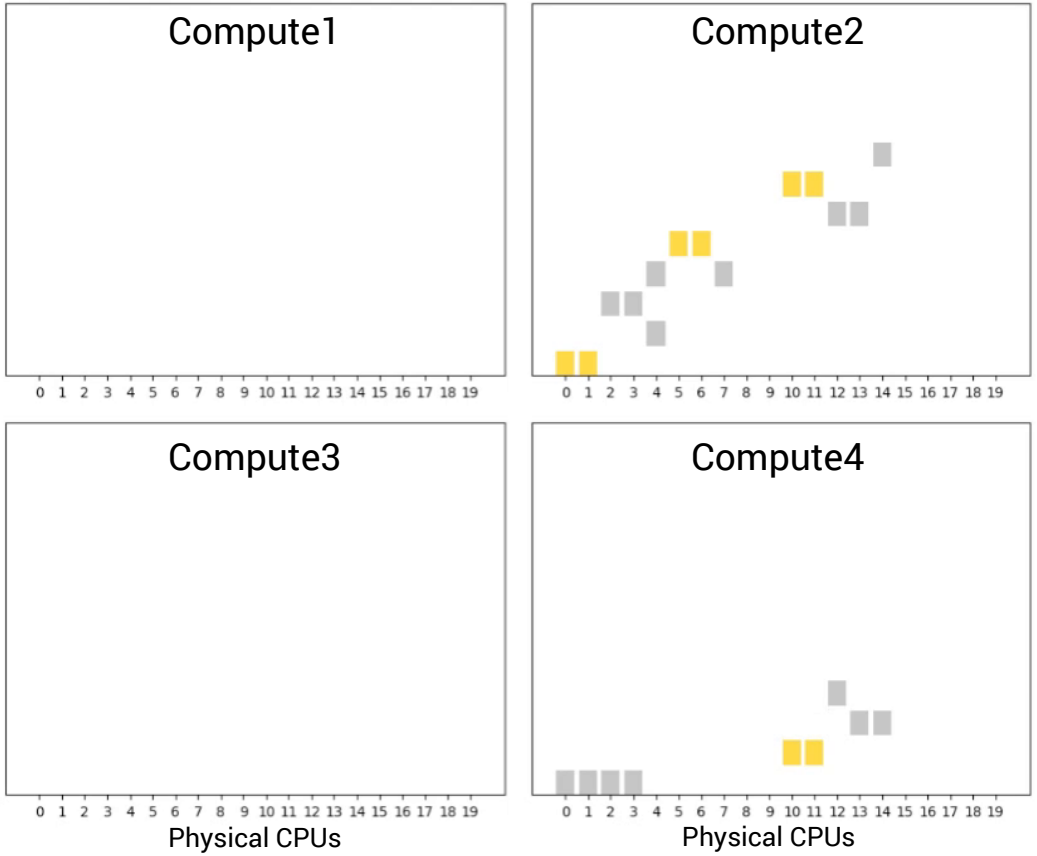

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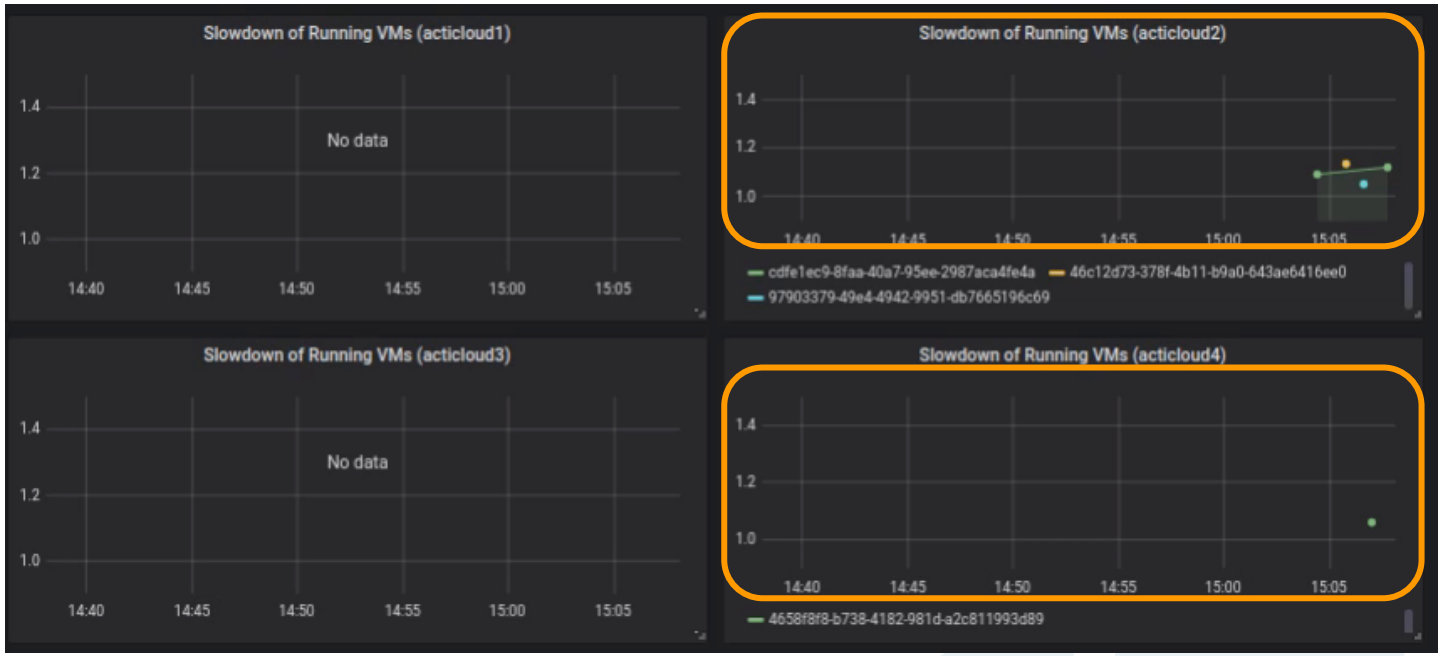

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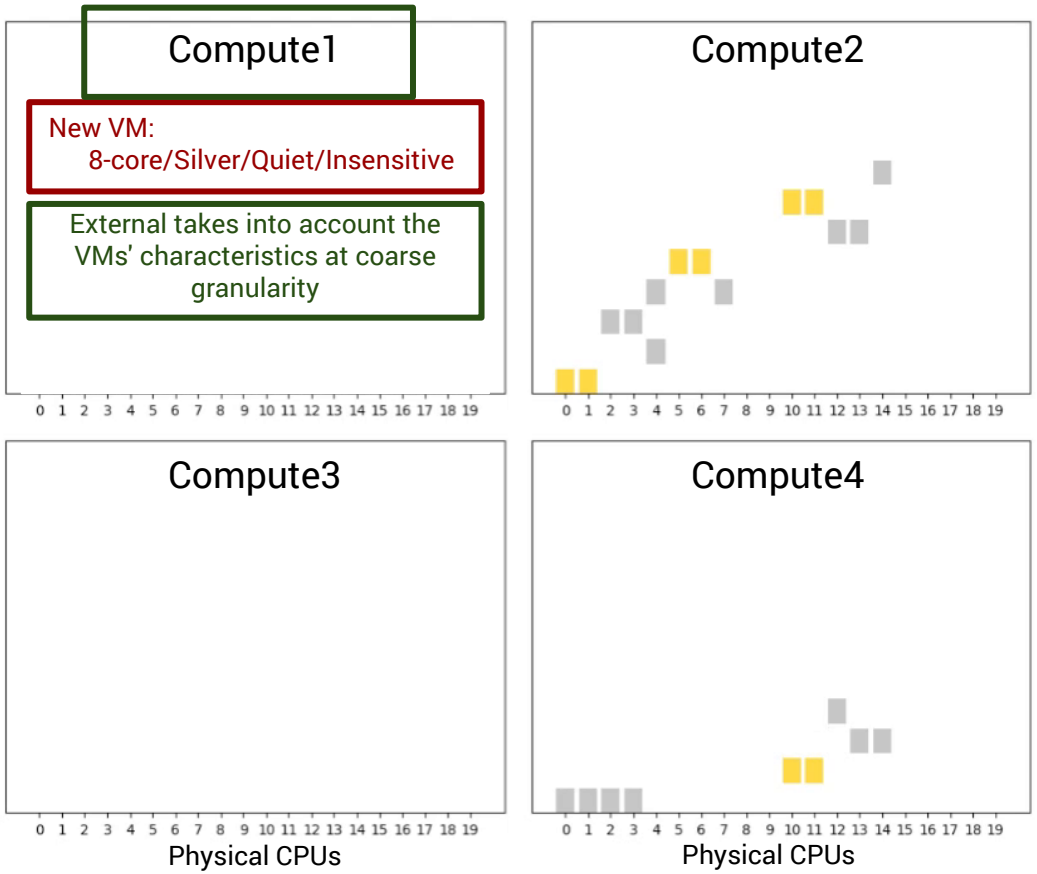

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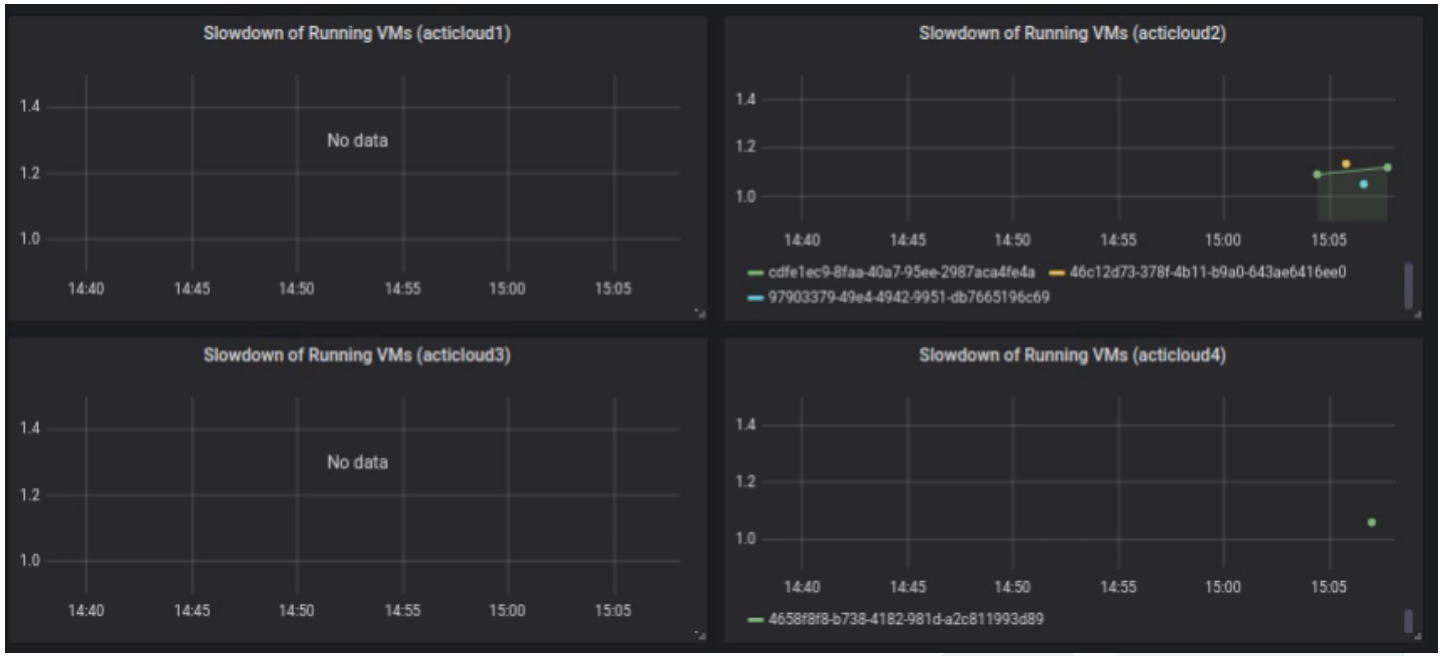

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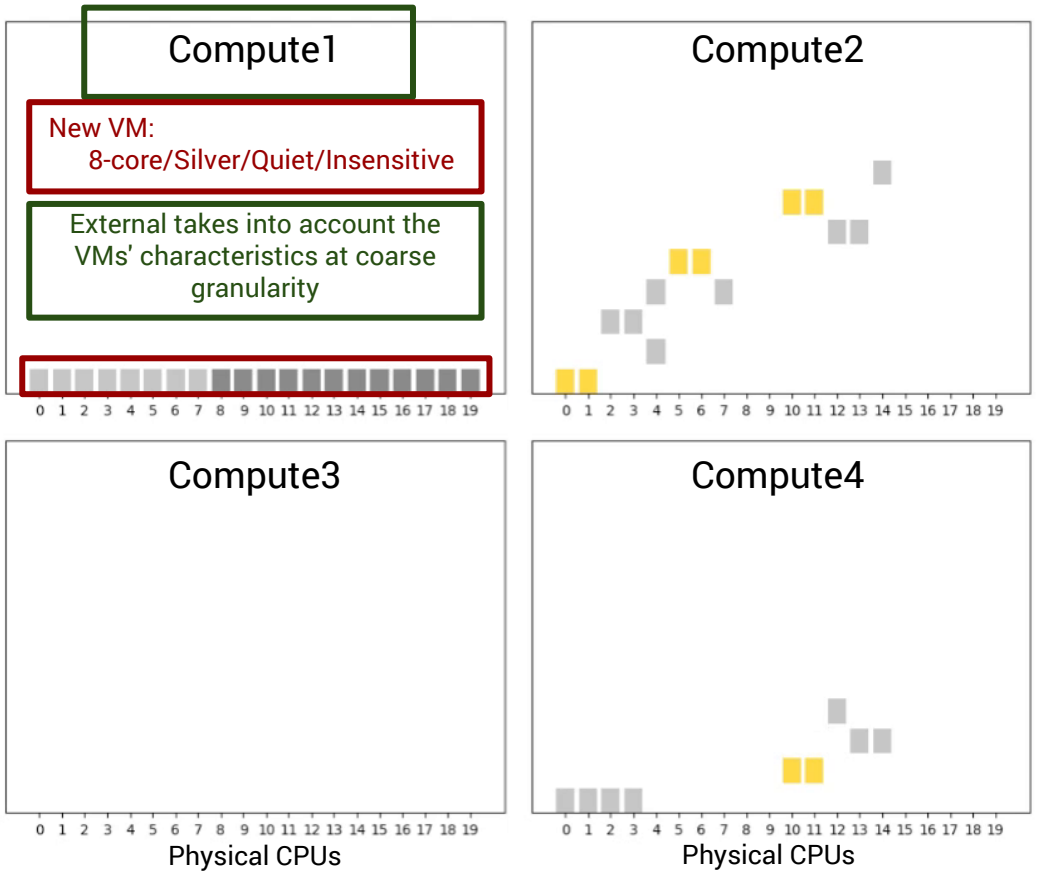

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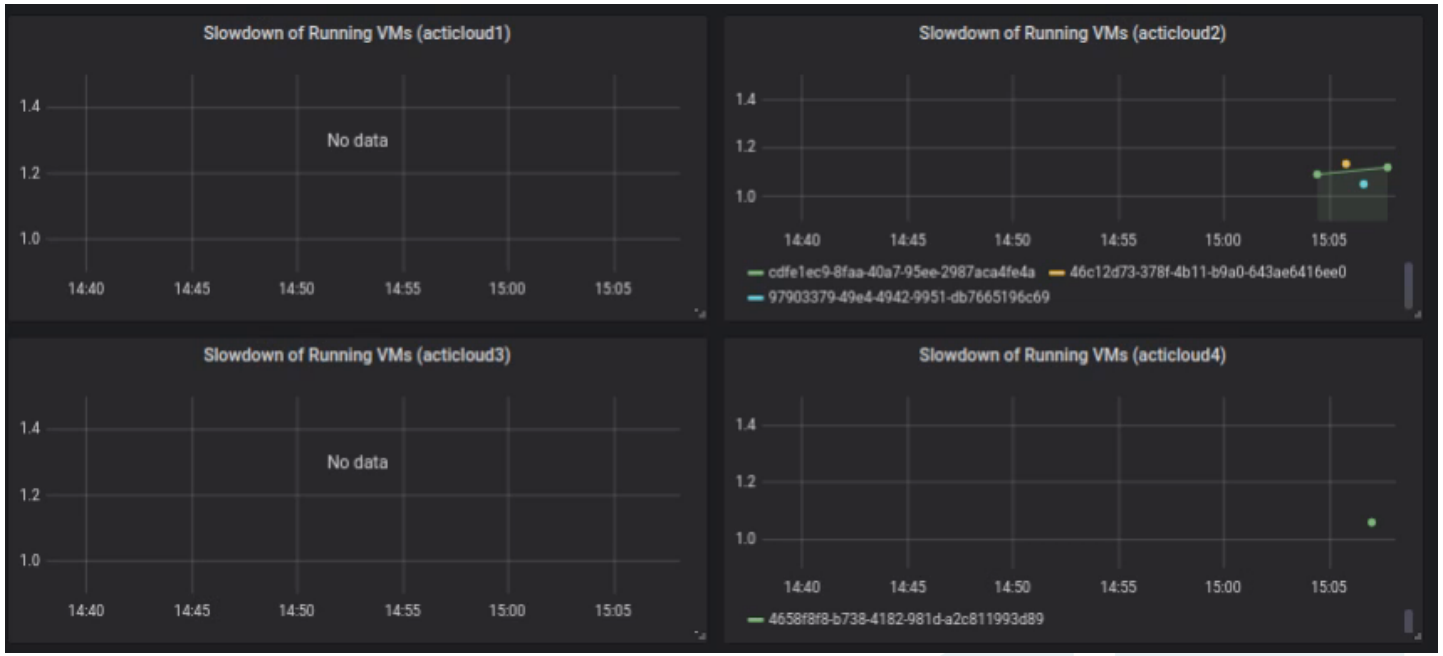

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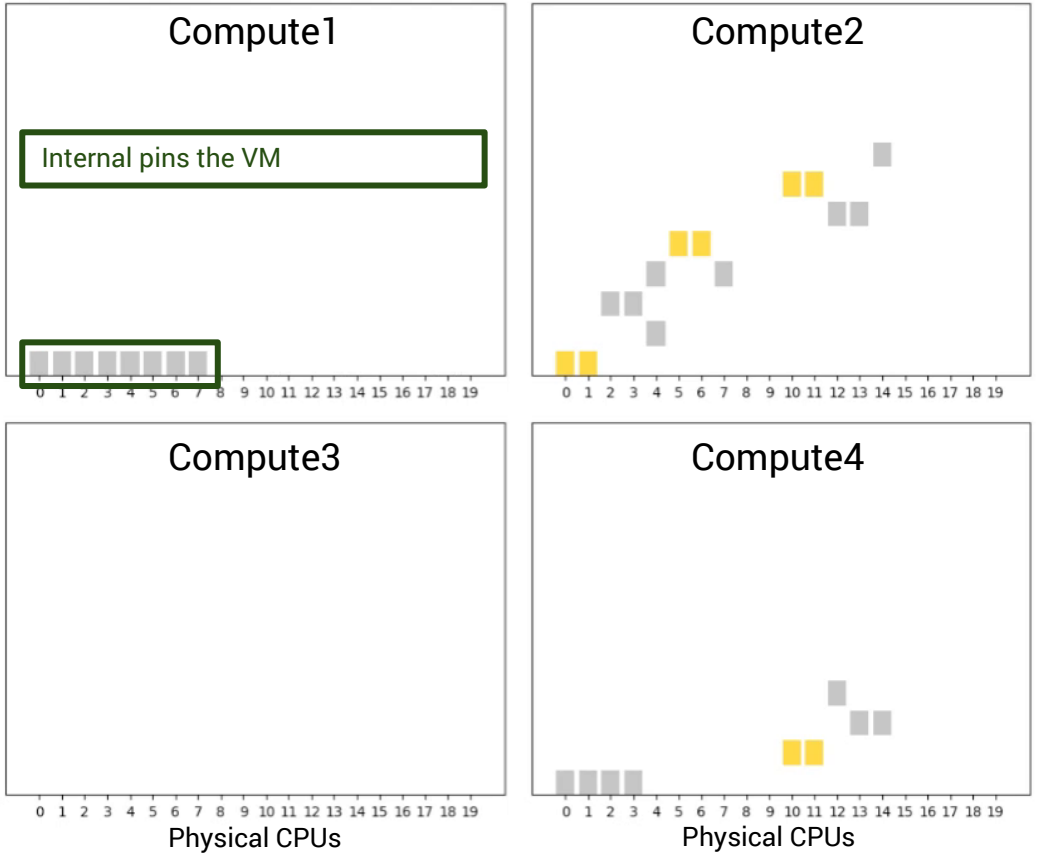

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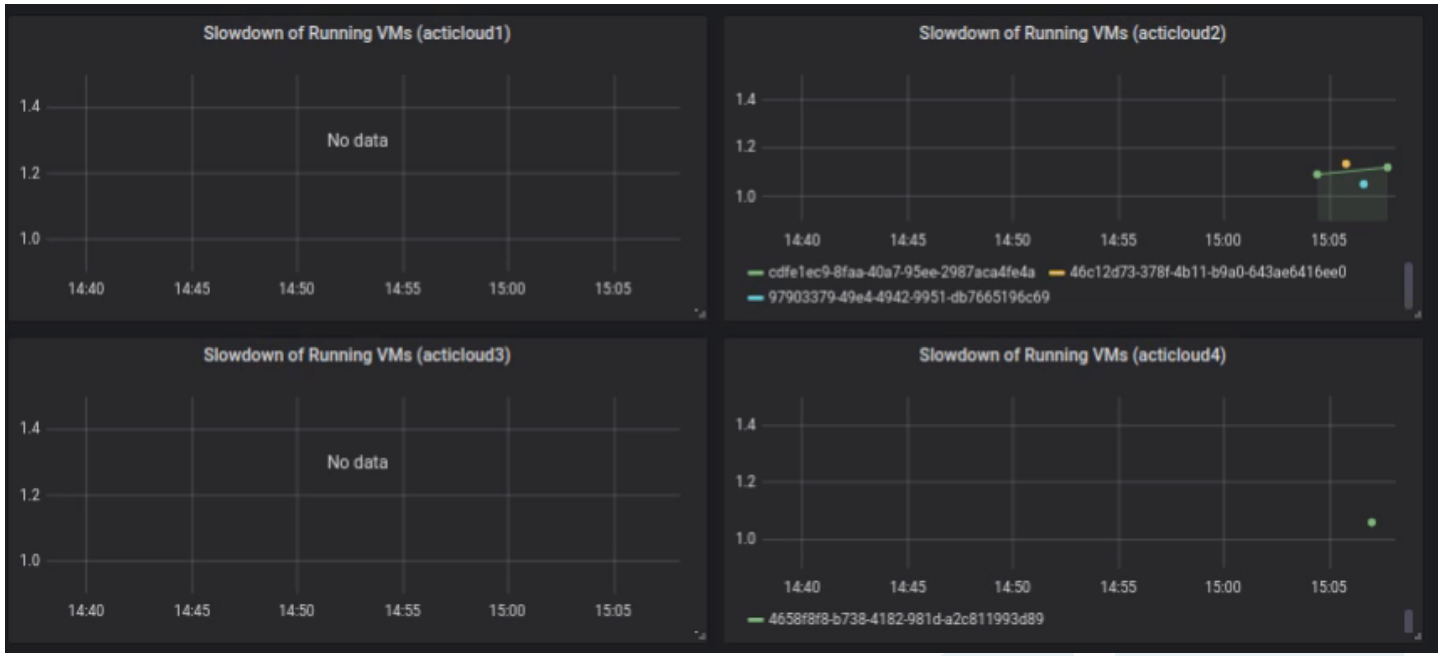

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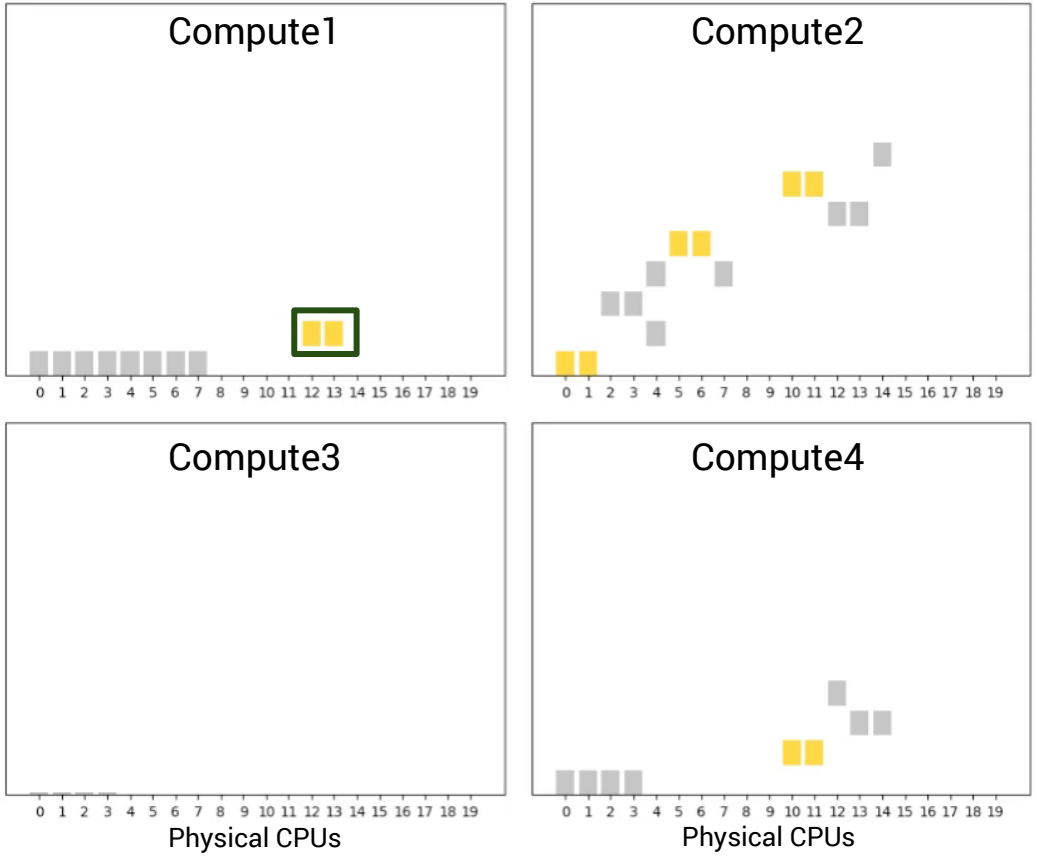

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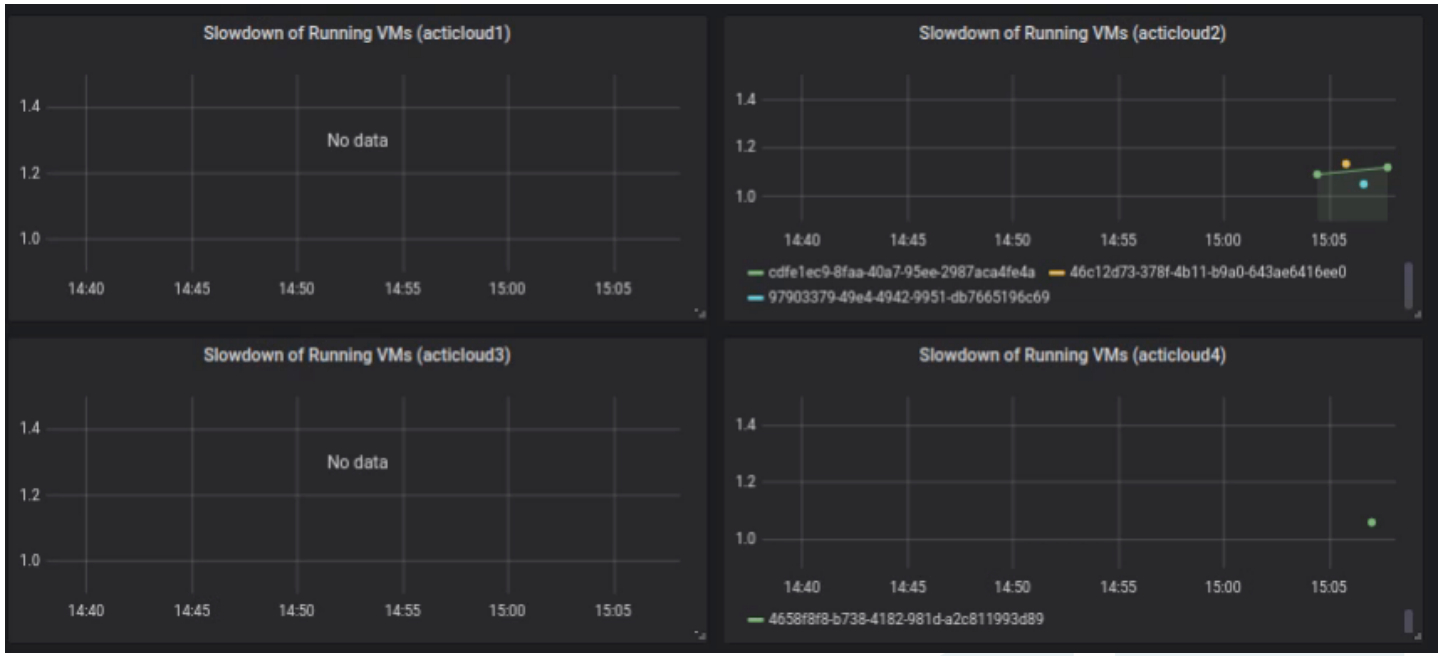

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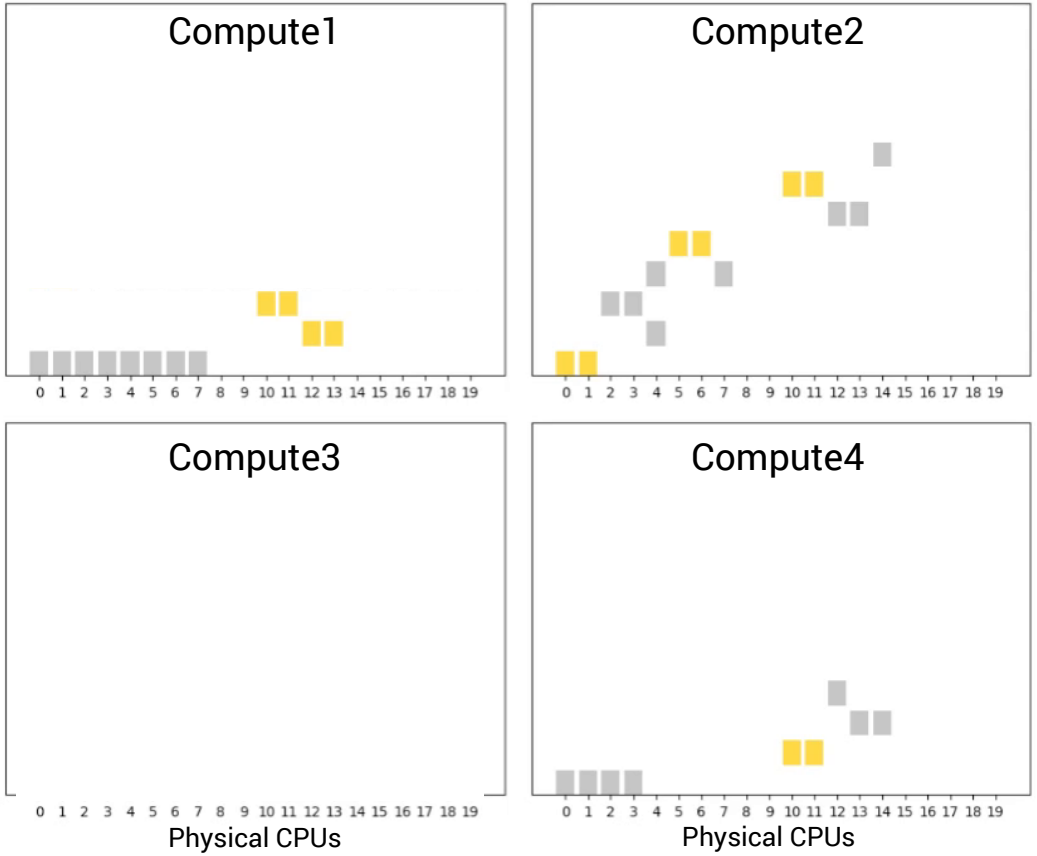

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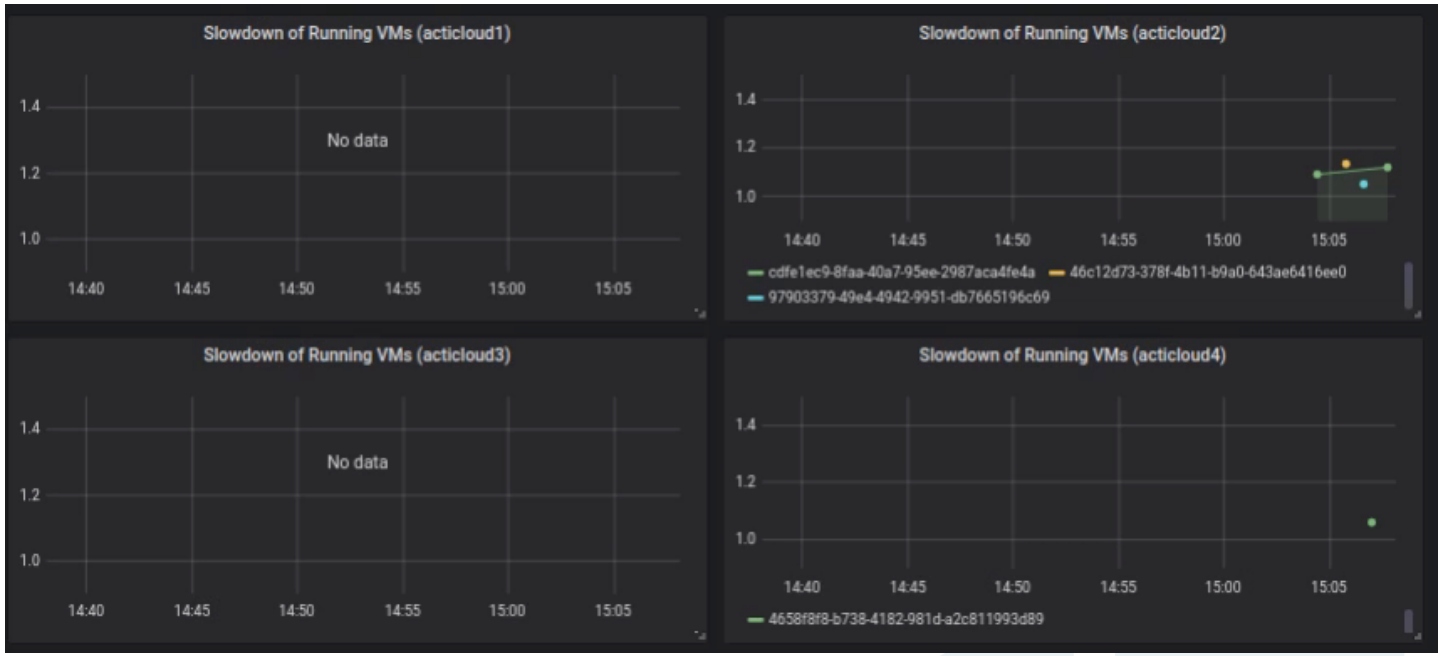

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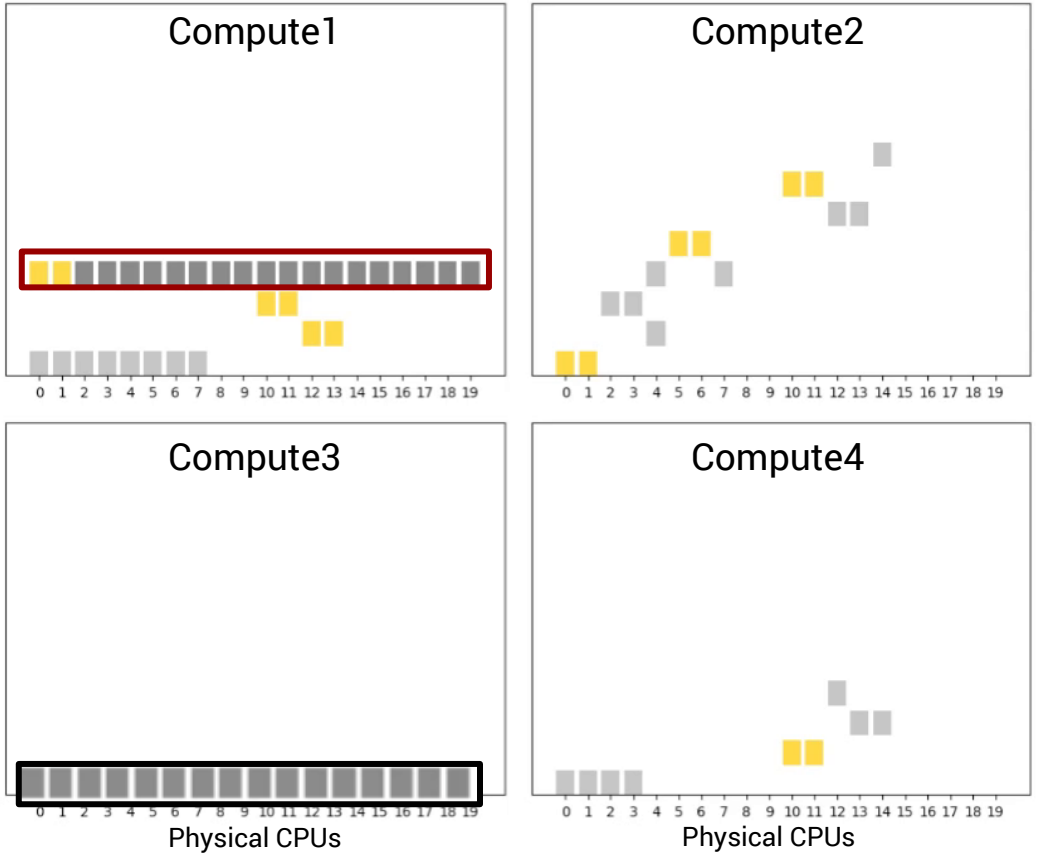

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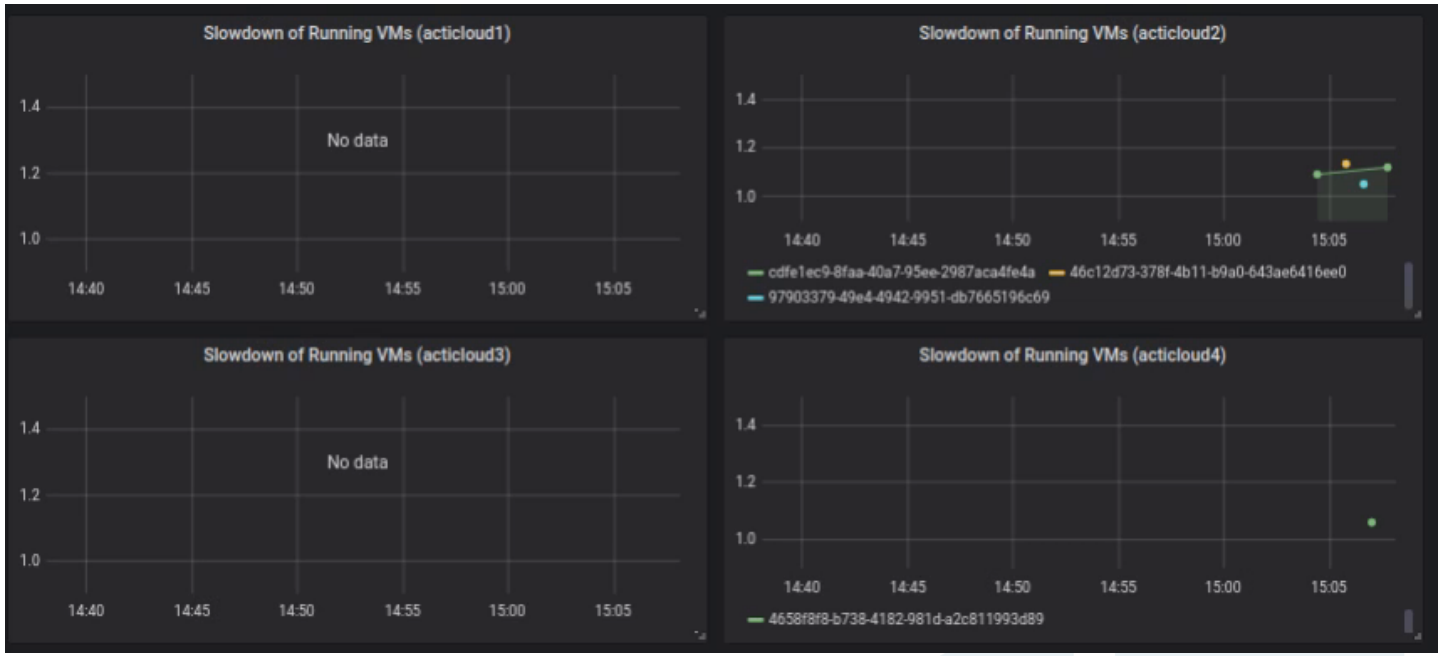

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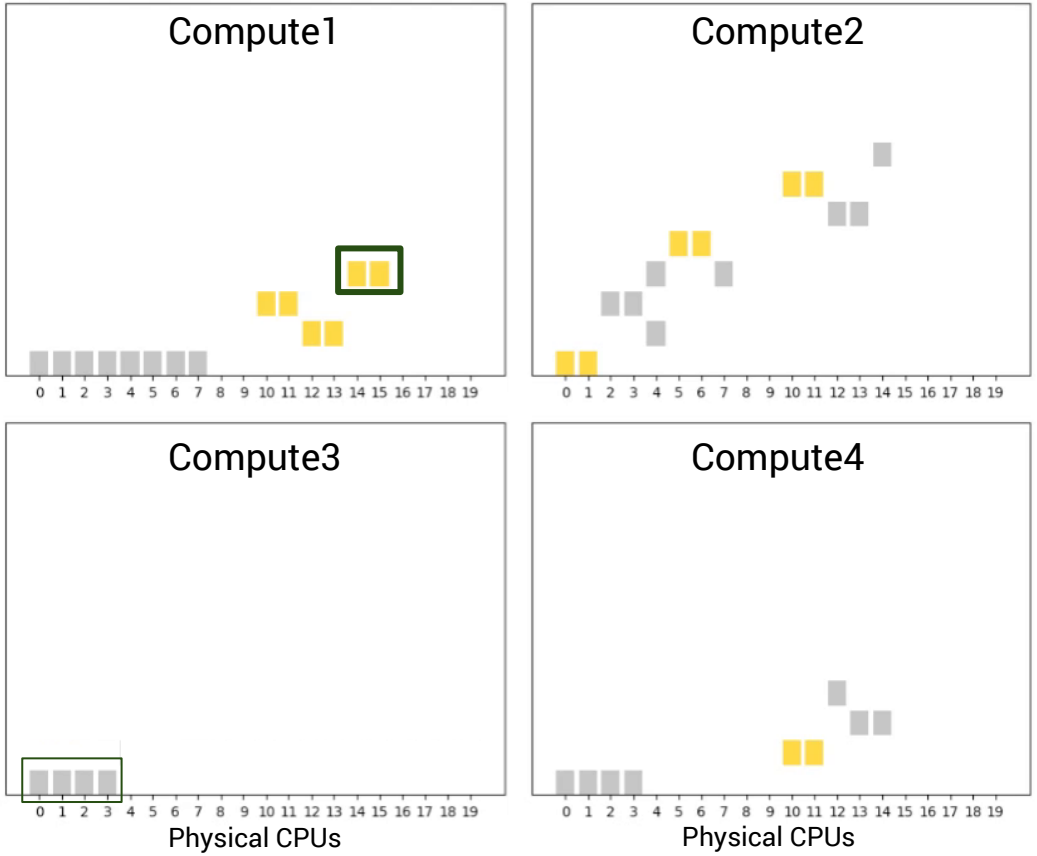

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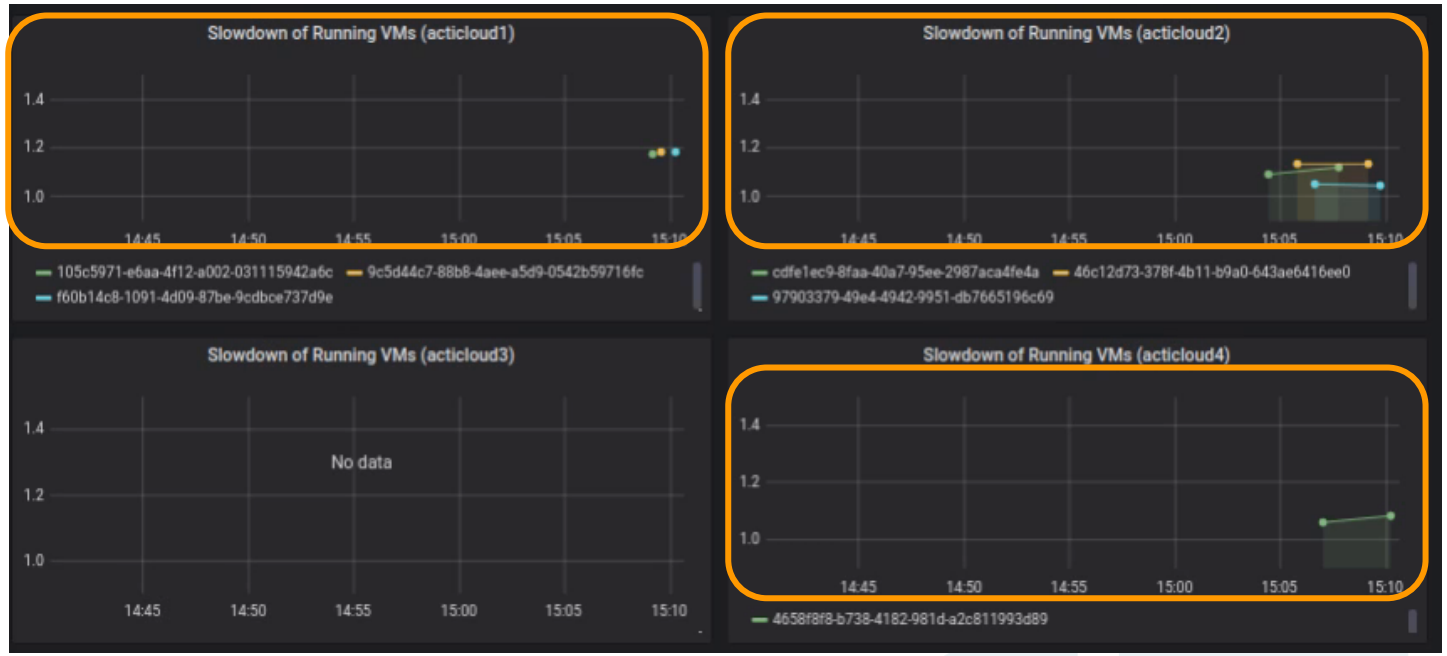

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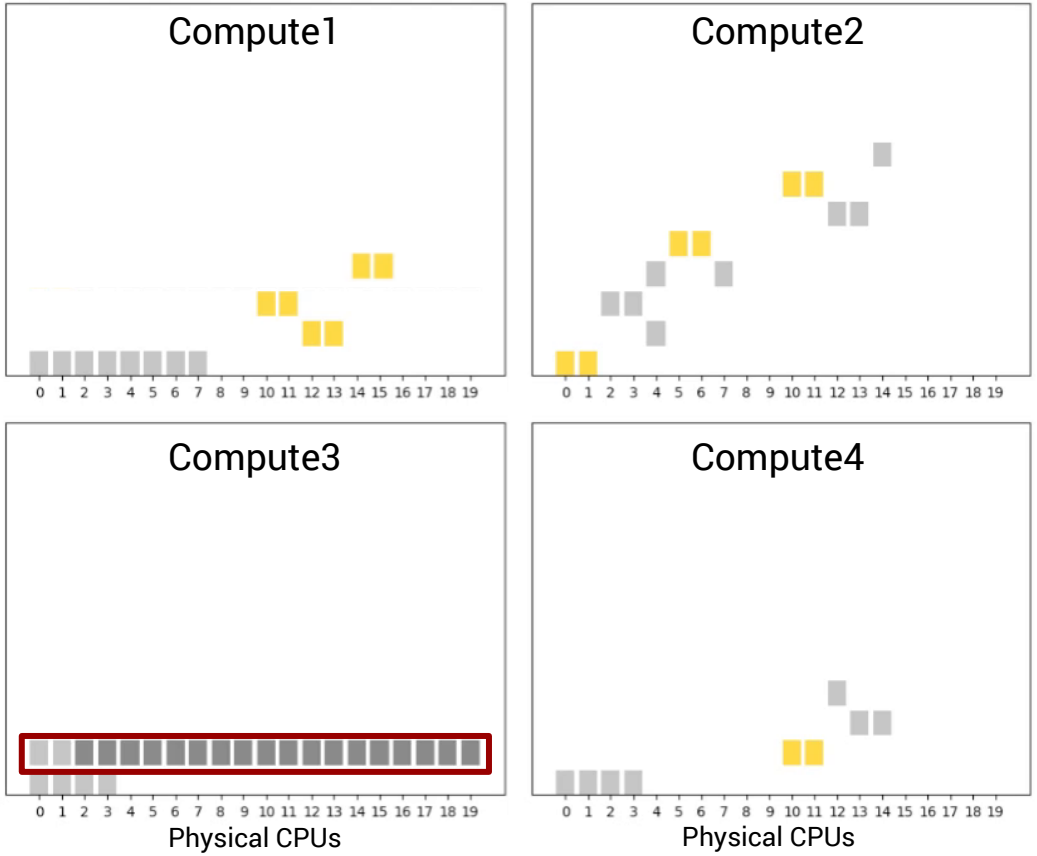

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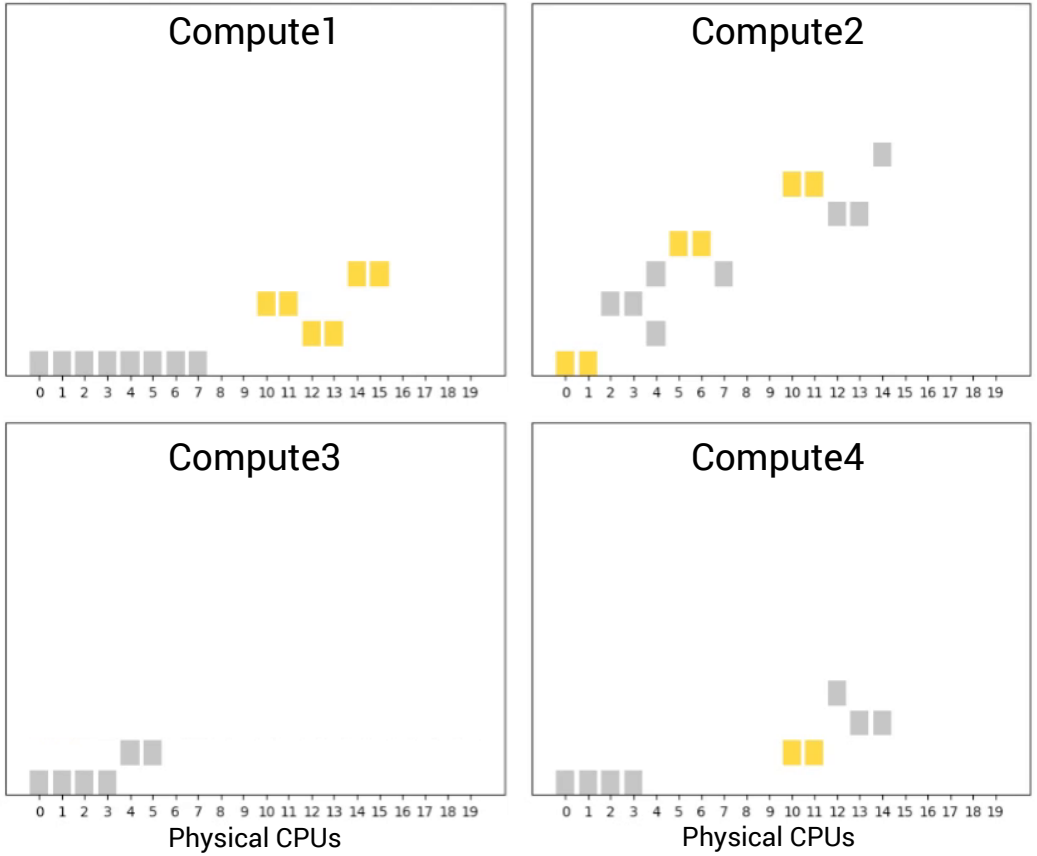

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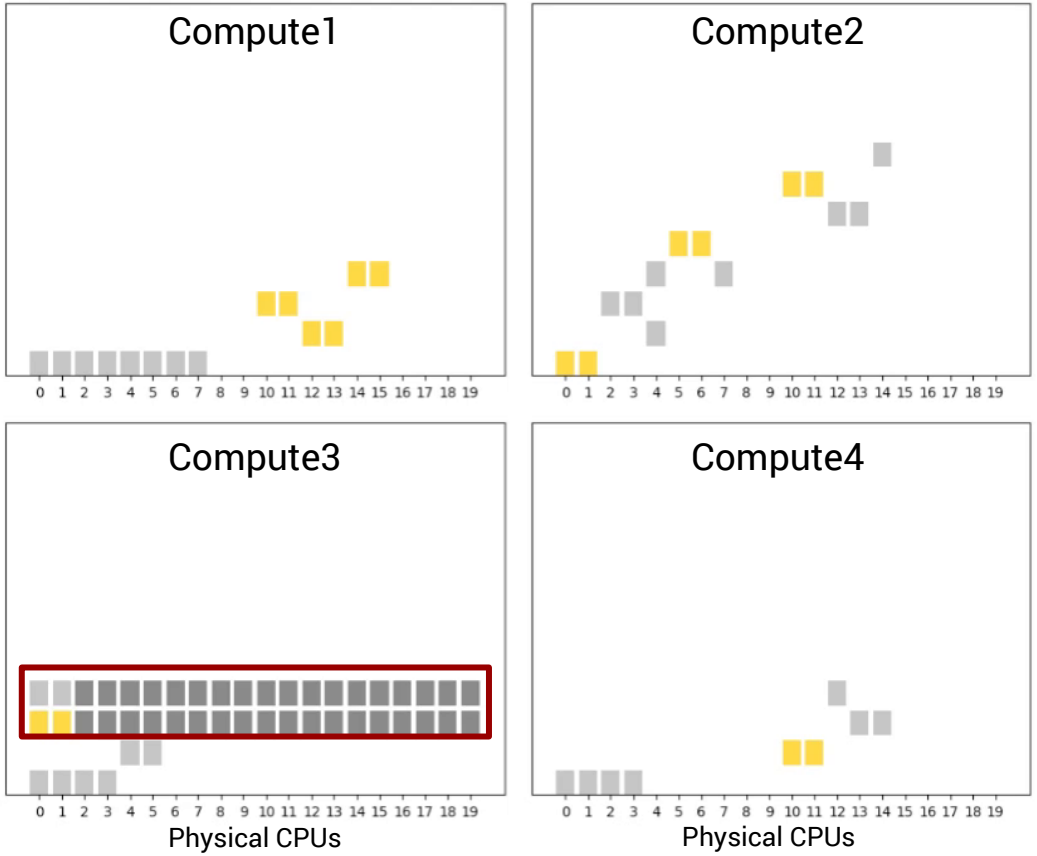

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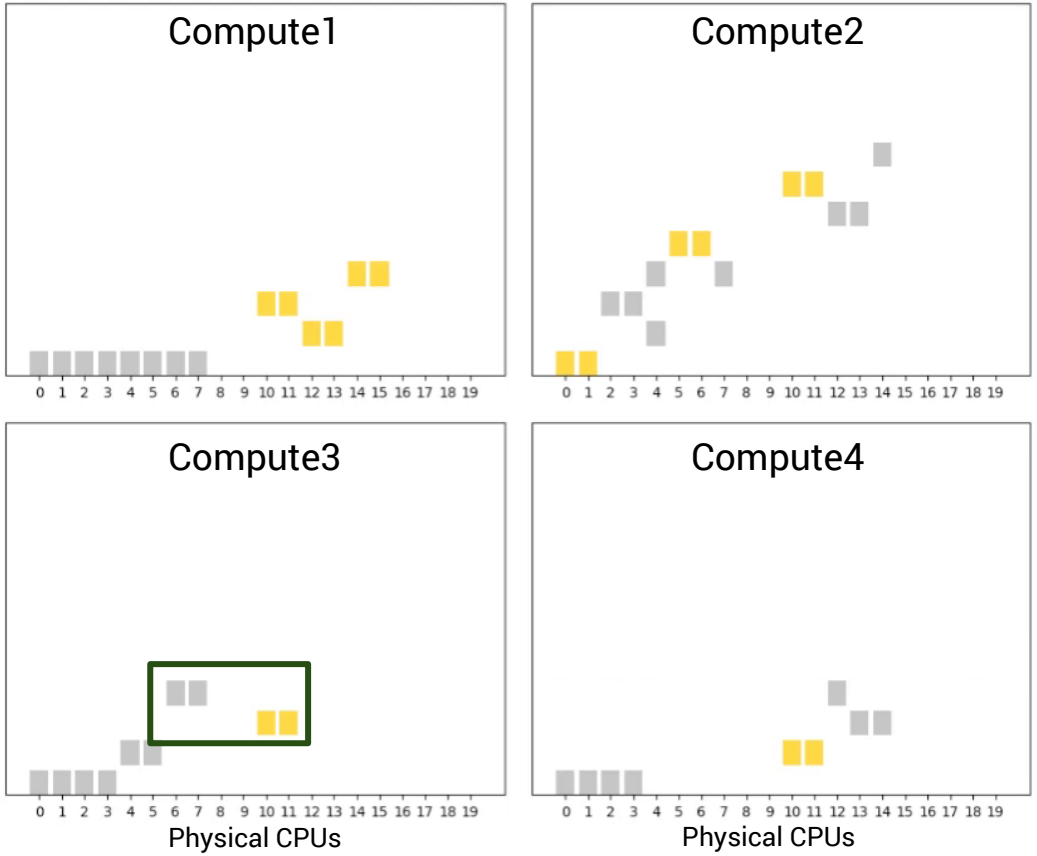

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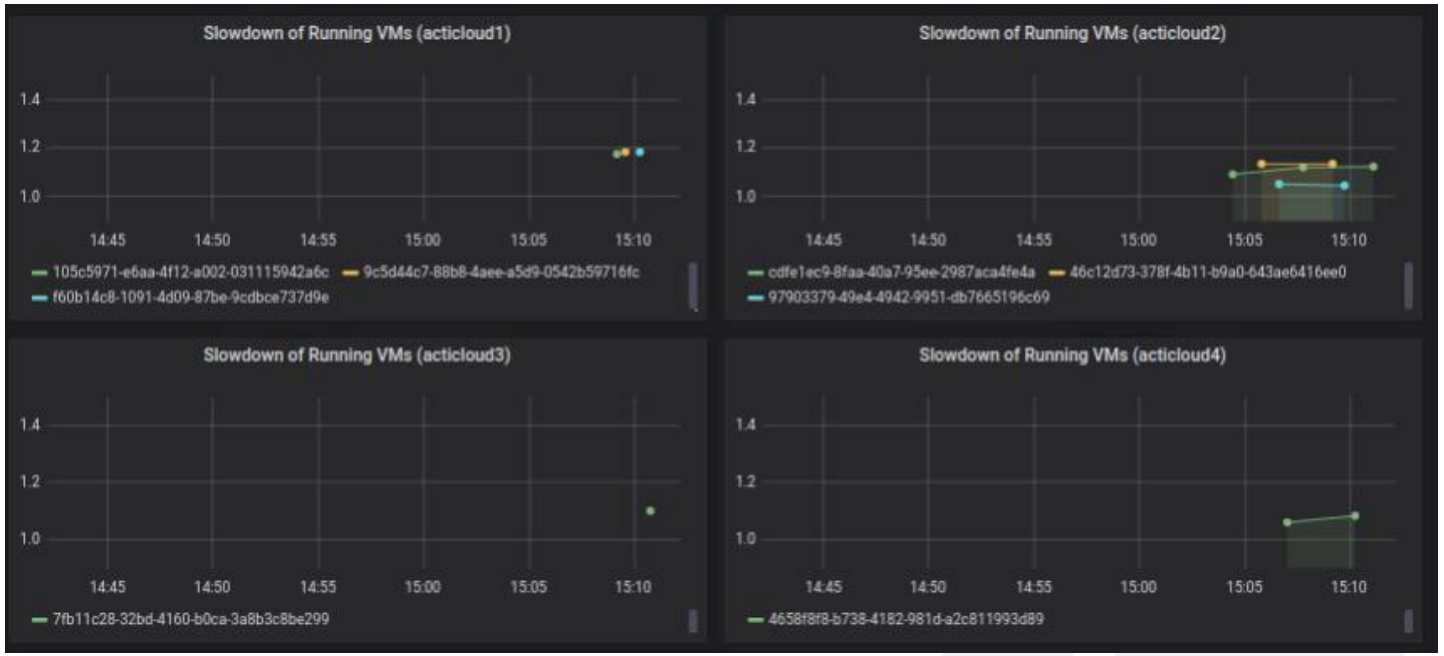

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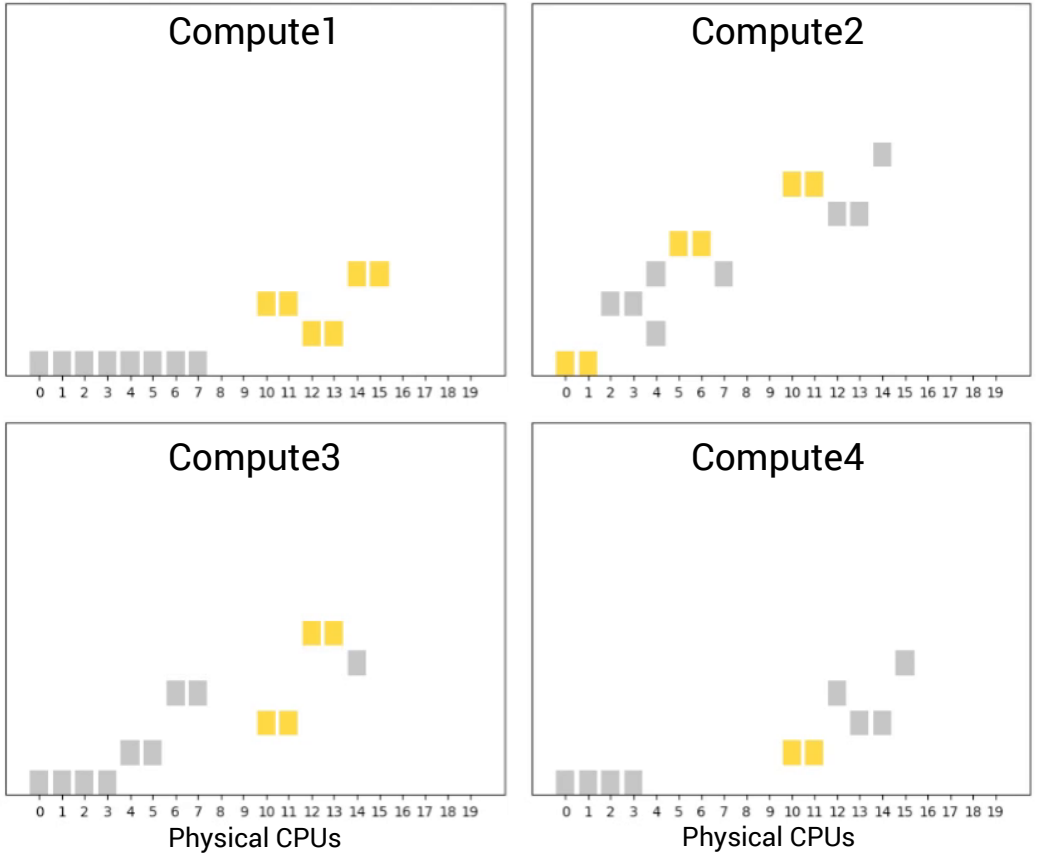

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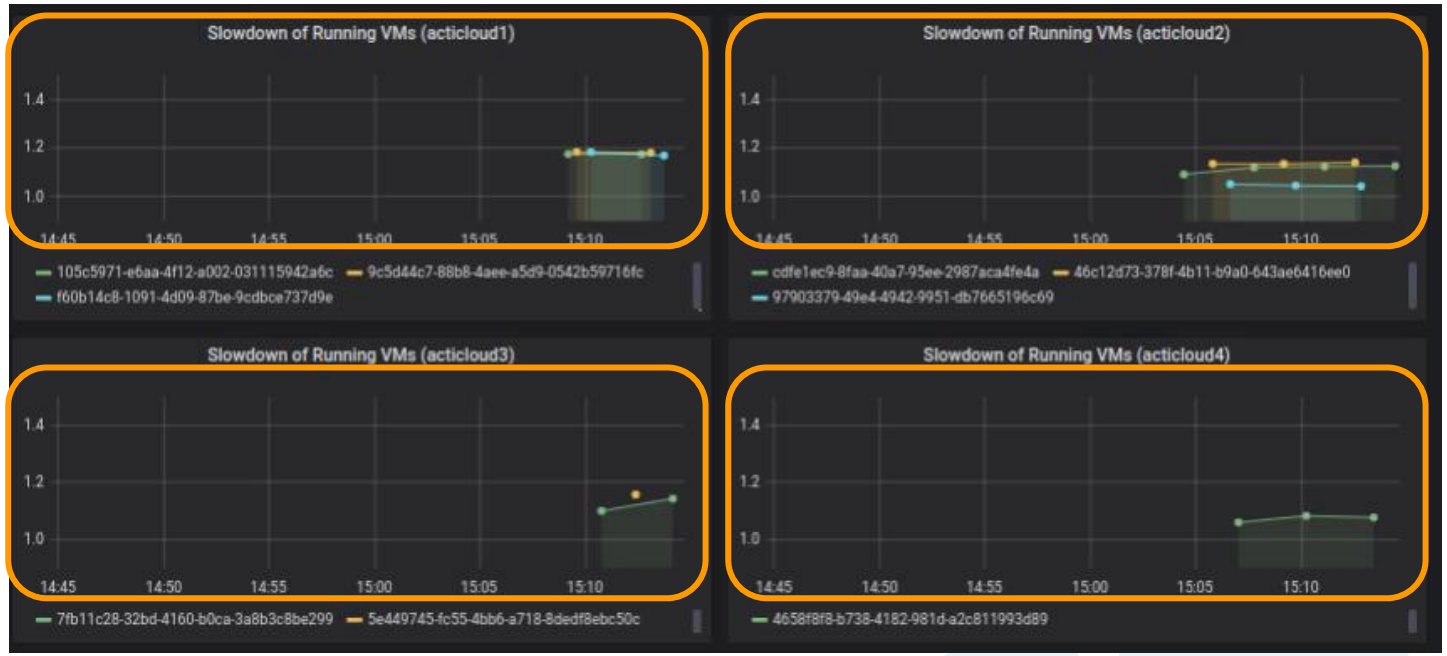

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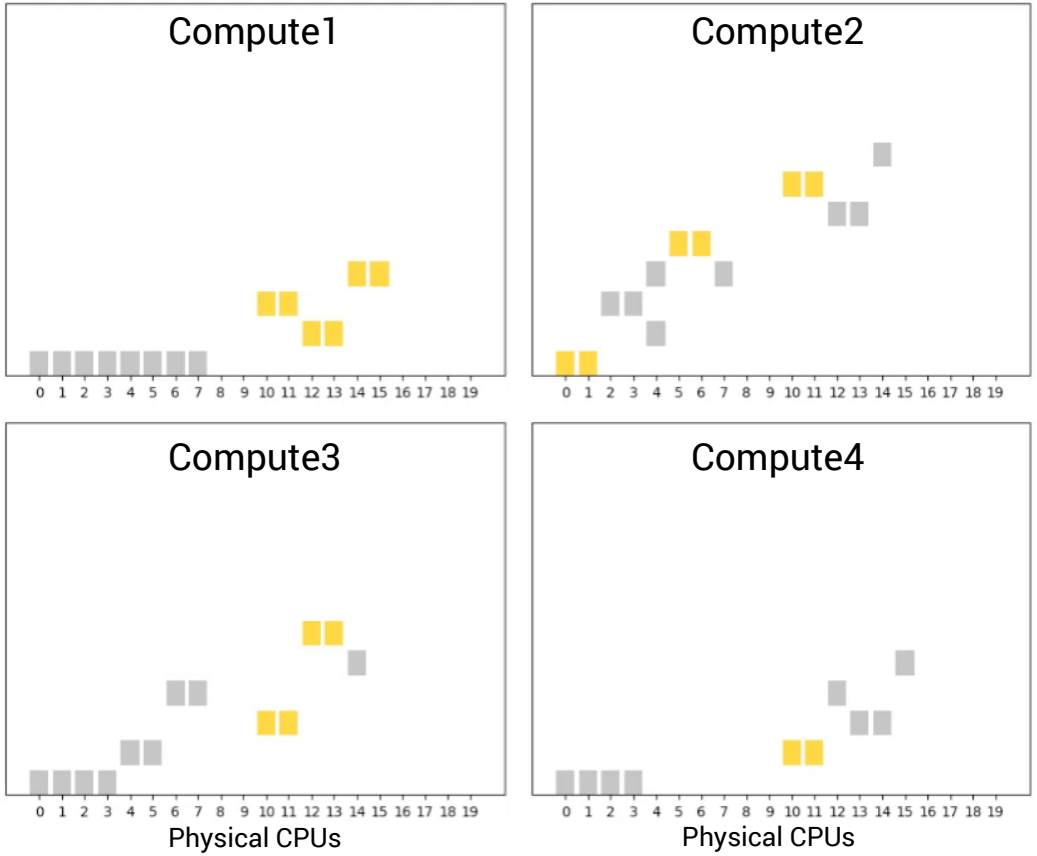

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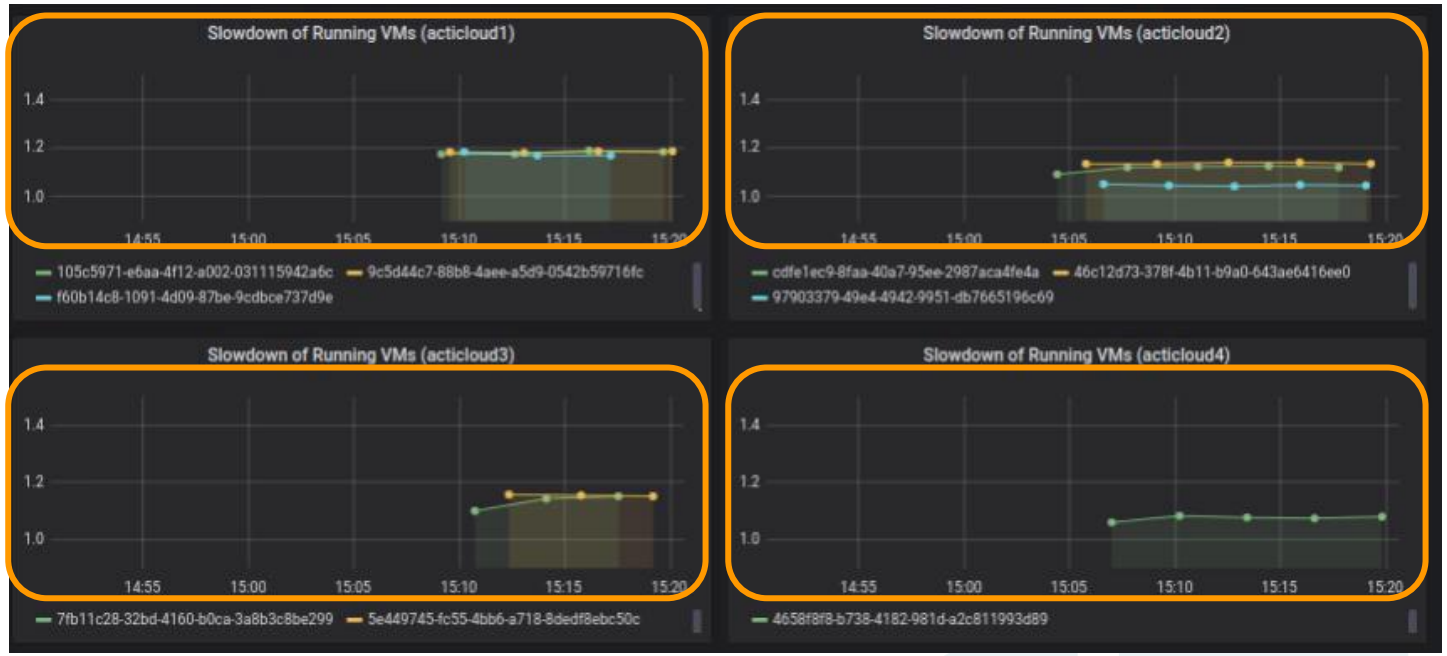

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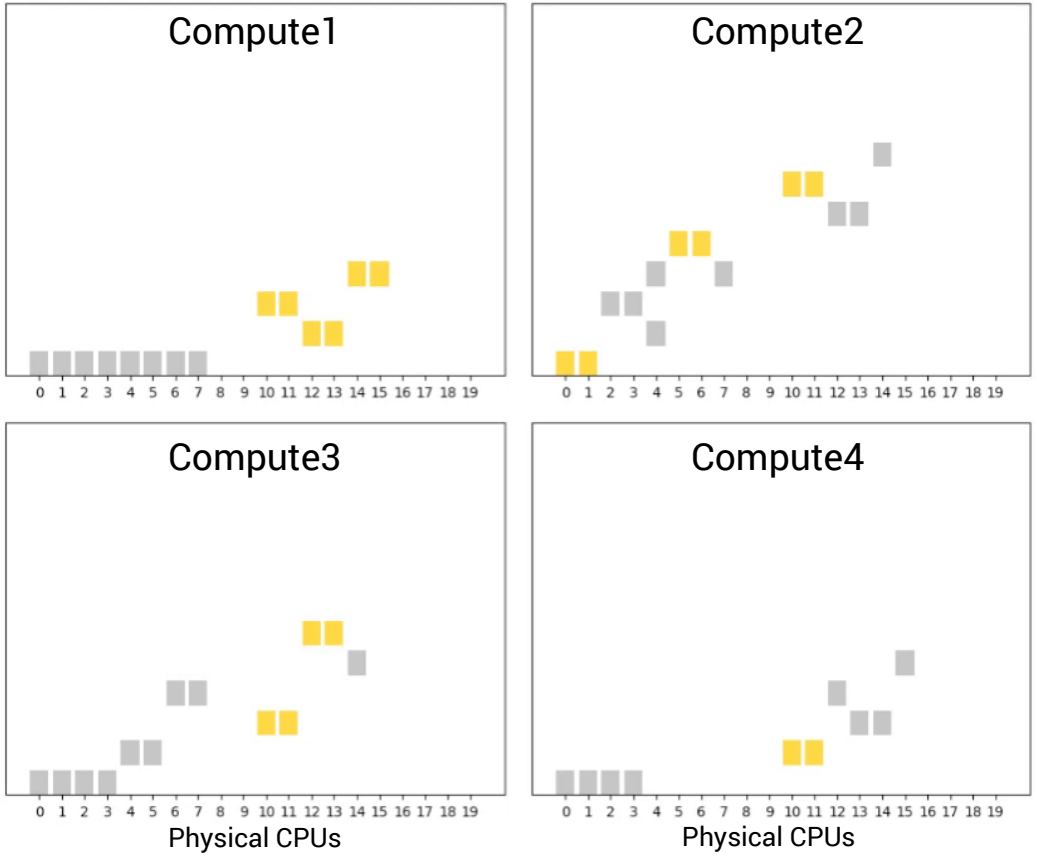

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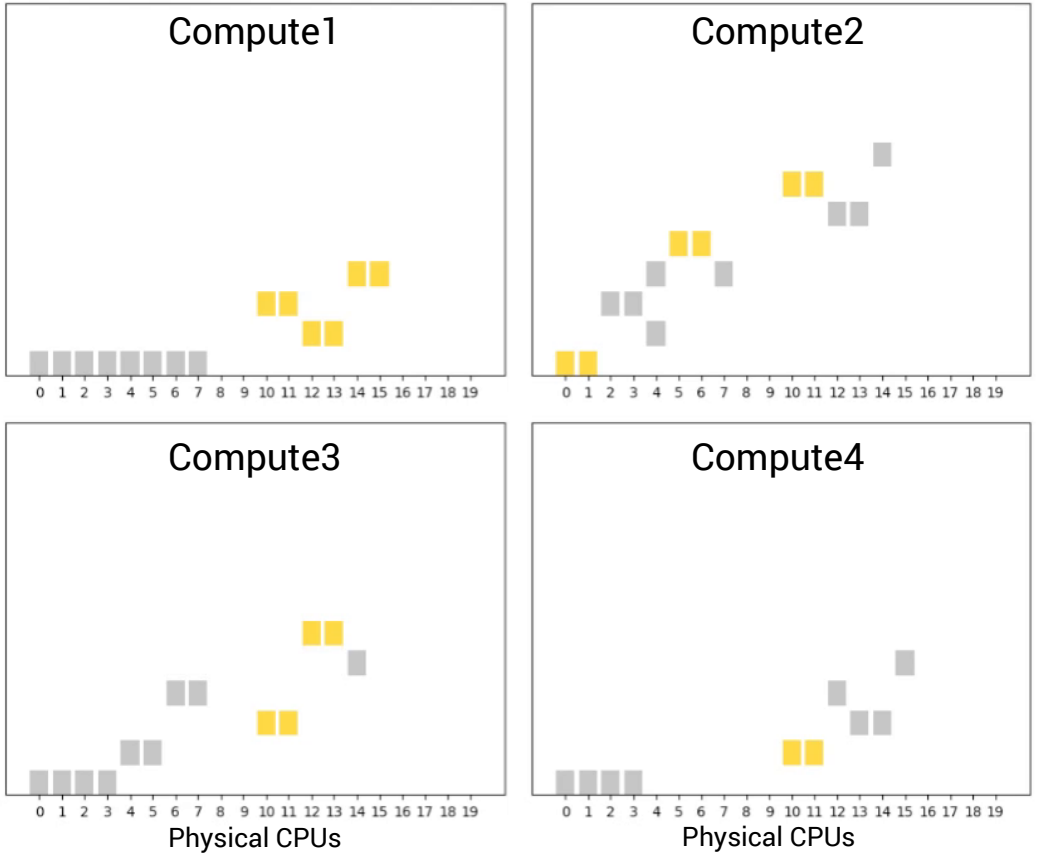

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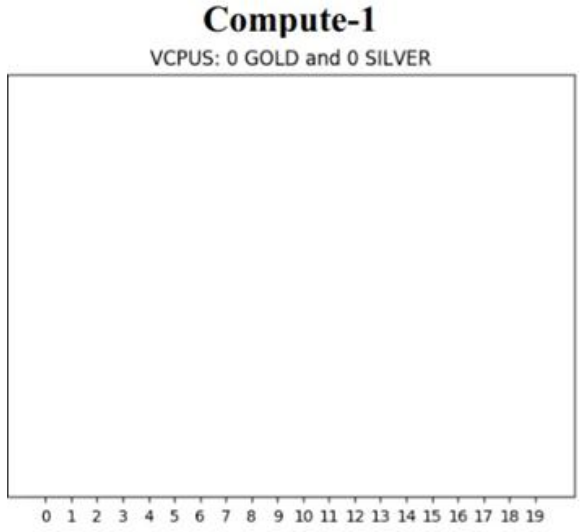
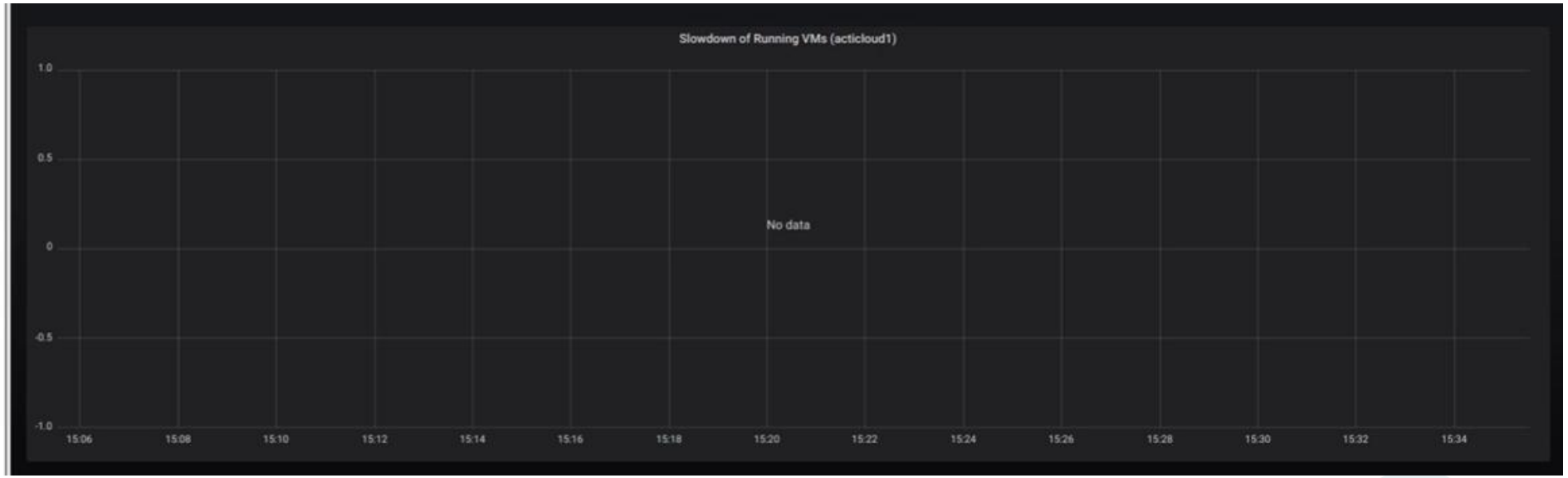
Demonstration Scenarios

ACTiCLOUD

2. Internal component (vs. Linux scheduler)
    - Server level
    - Pinning of VMs to cores
    - Detects interference

ACTiManager.Internal





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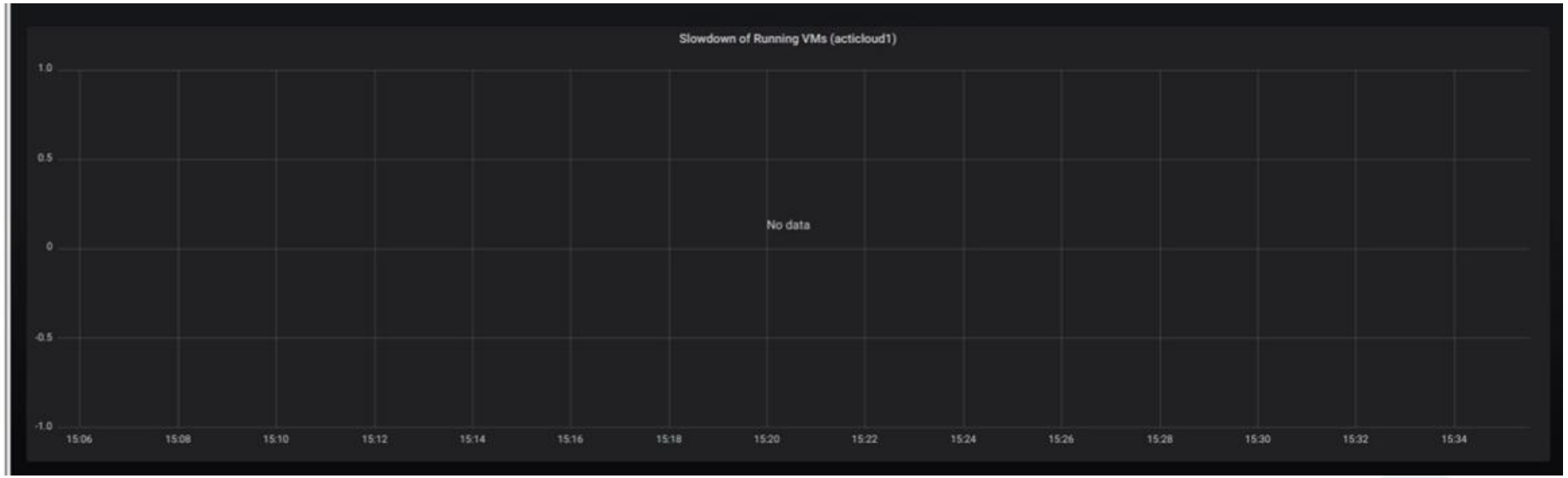

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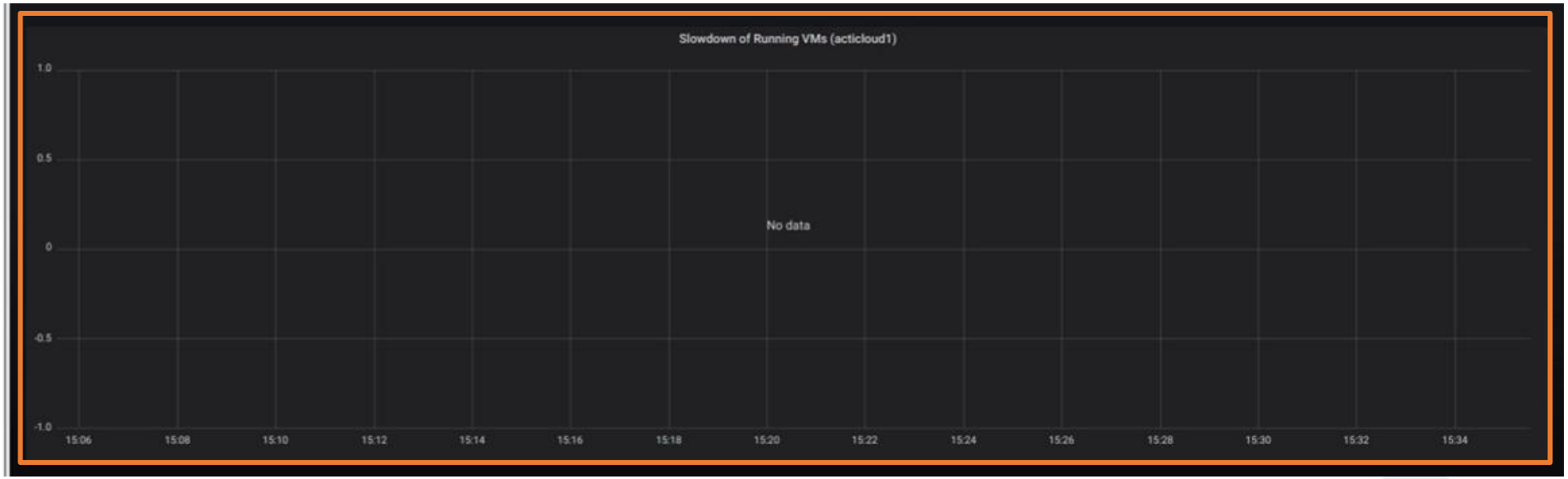

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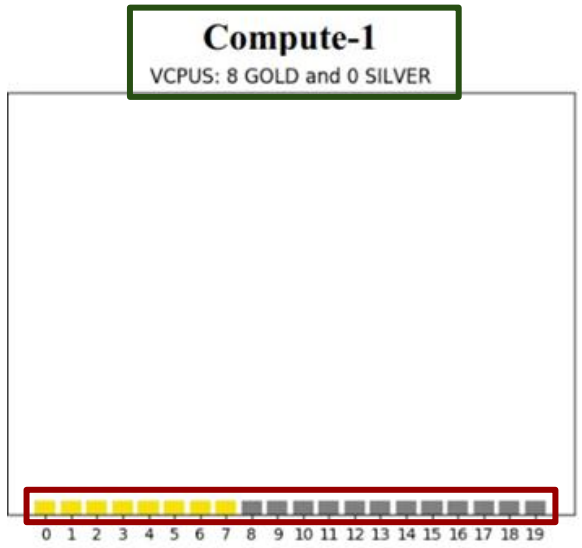

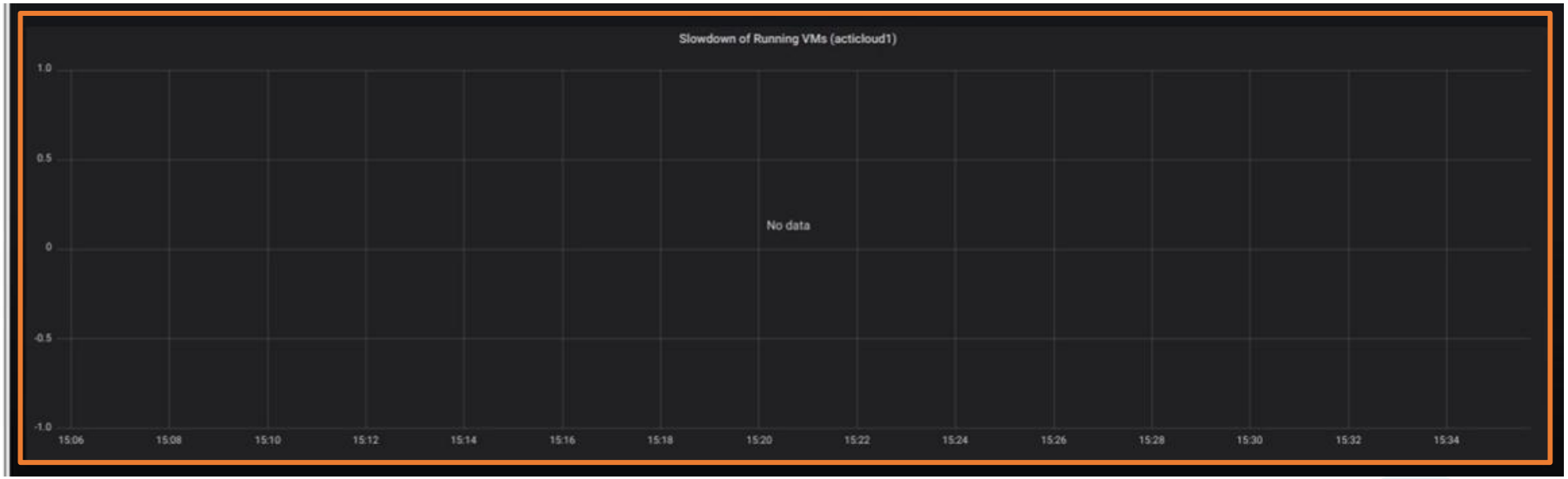

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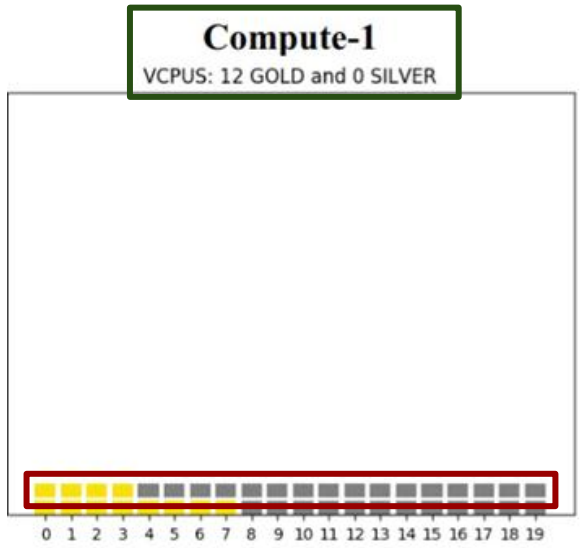

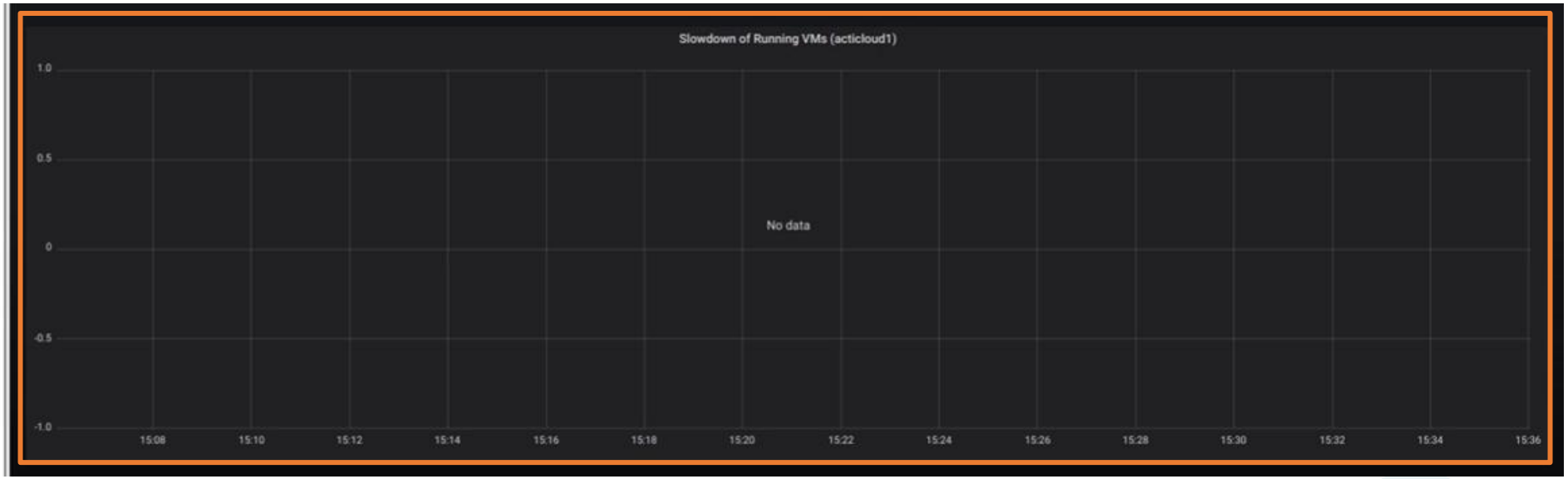

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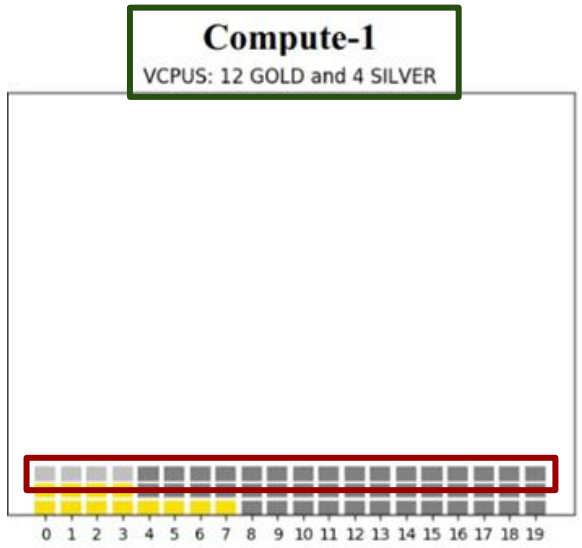

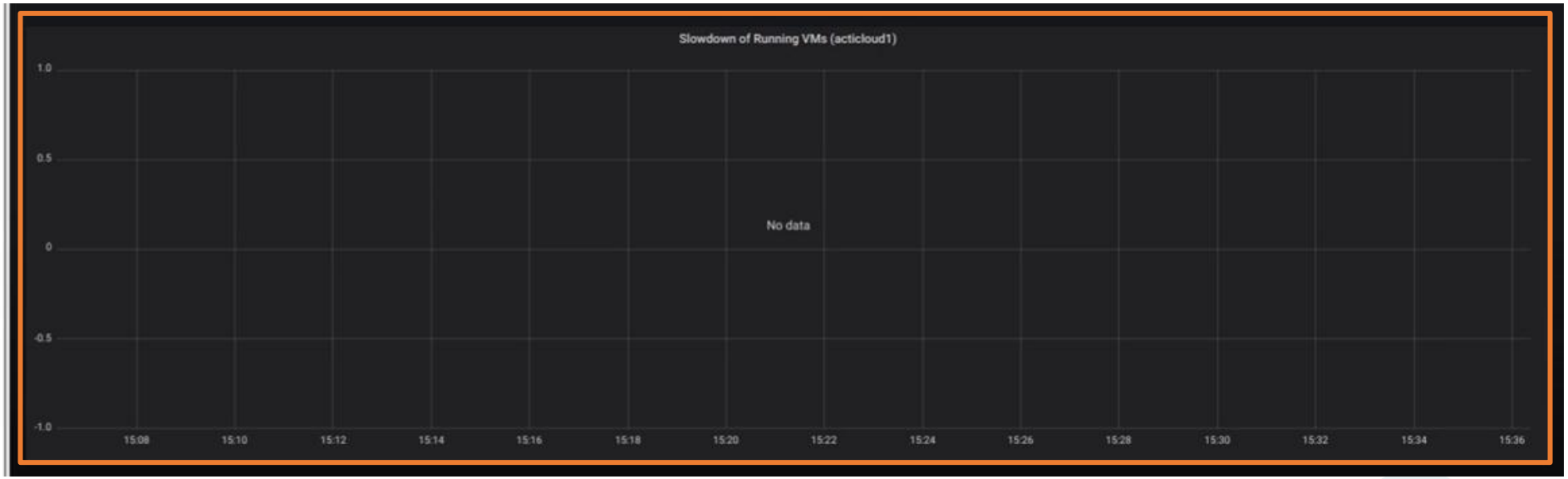

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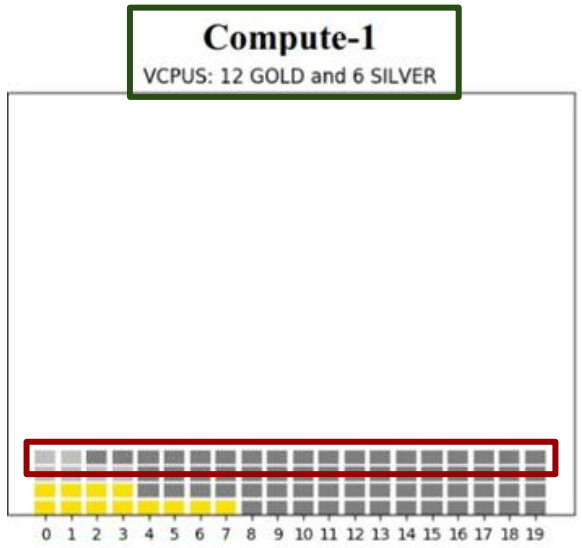

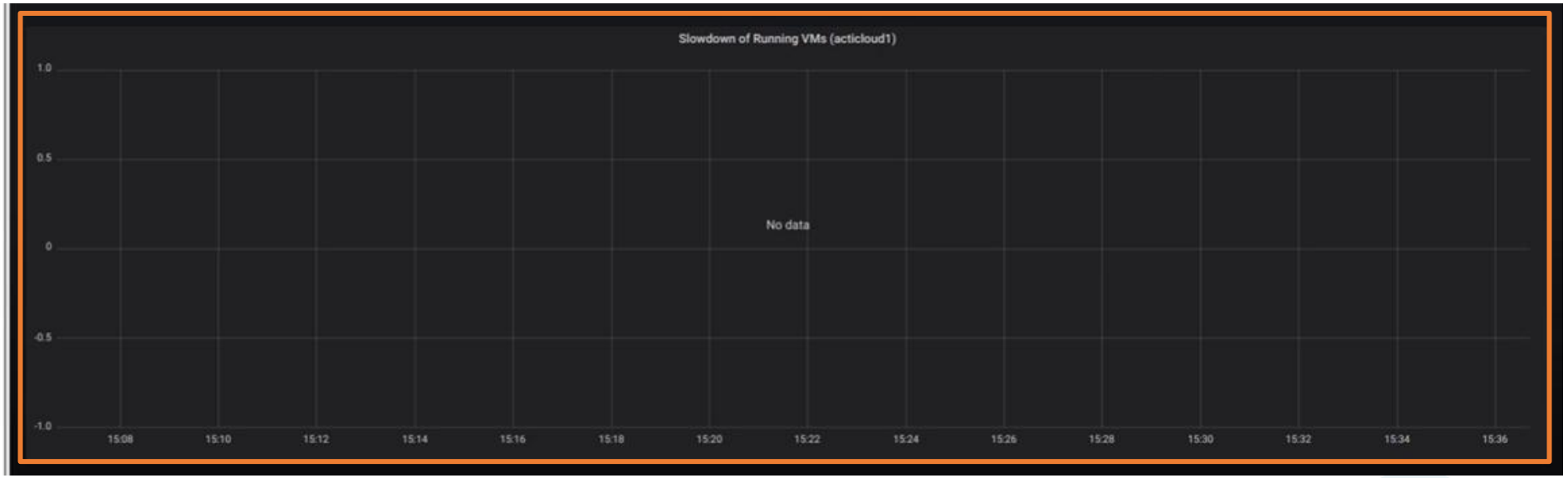

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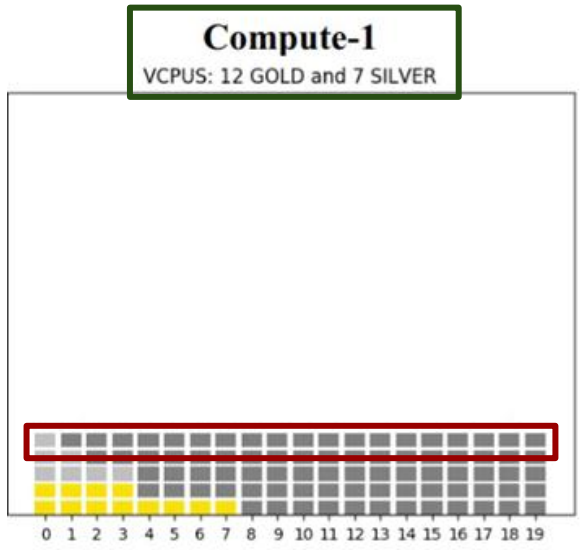

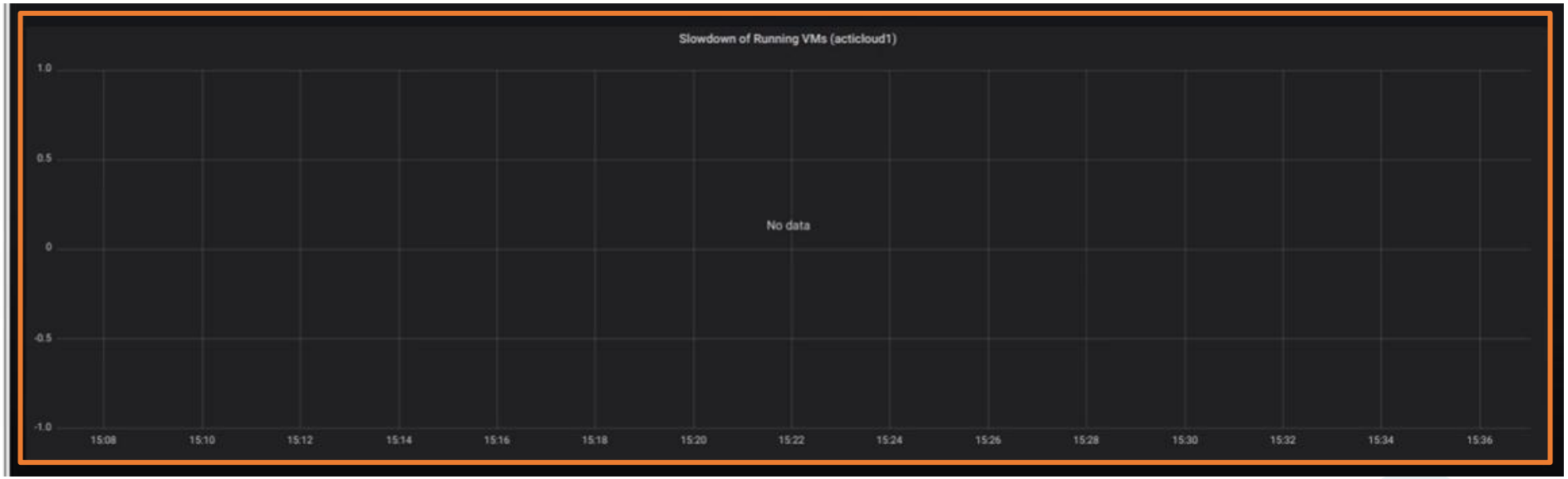

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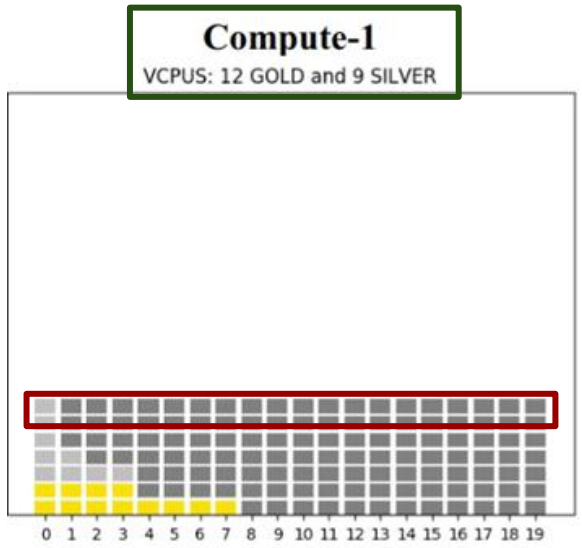

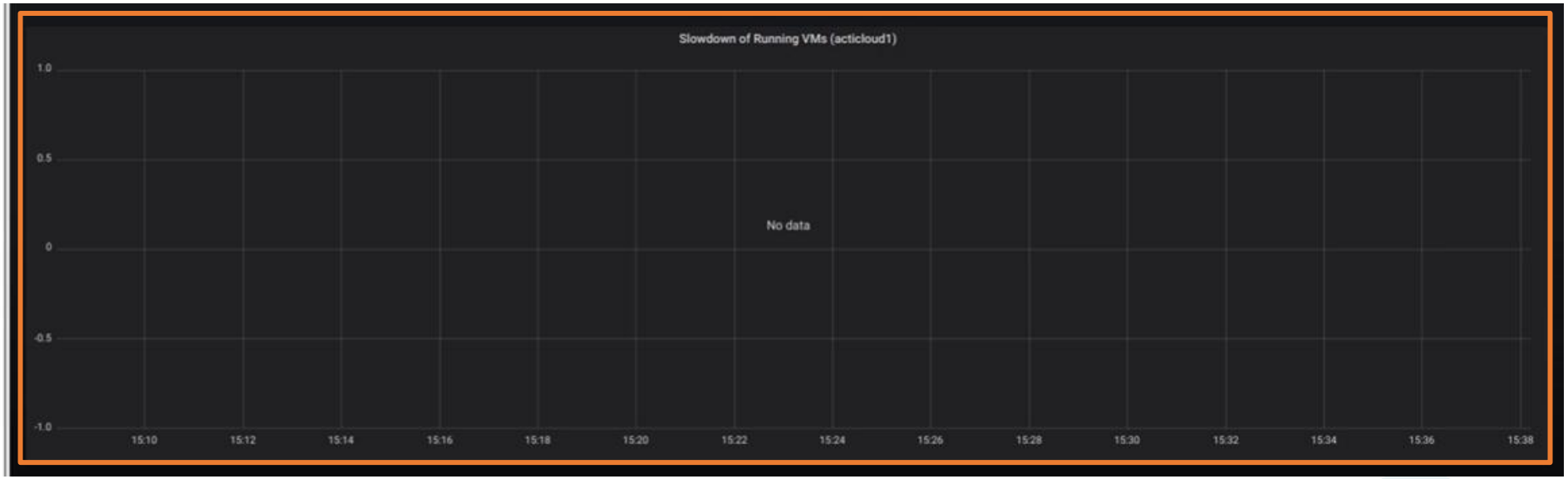

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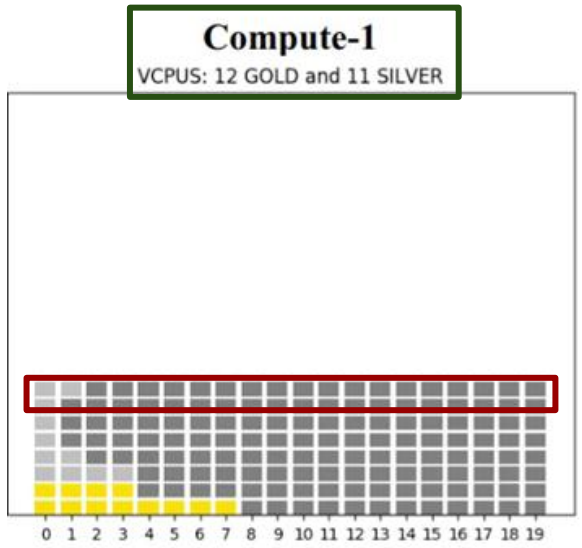

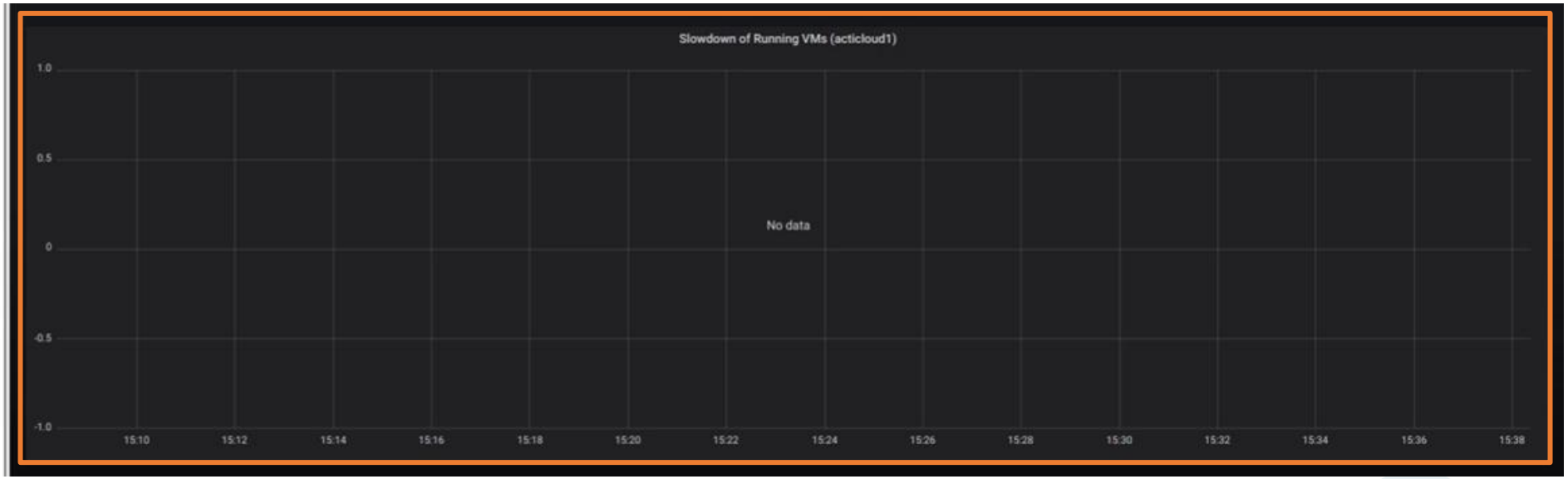

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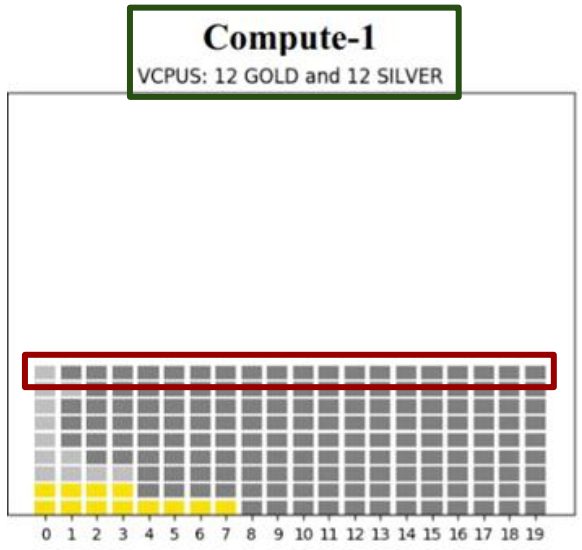

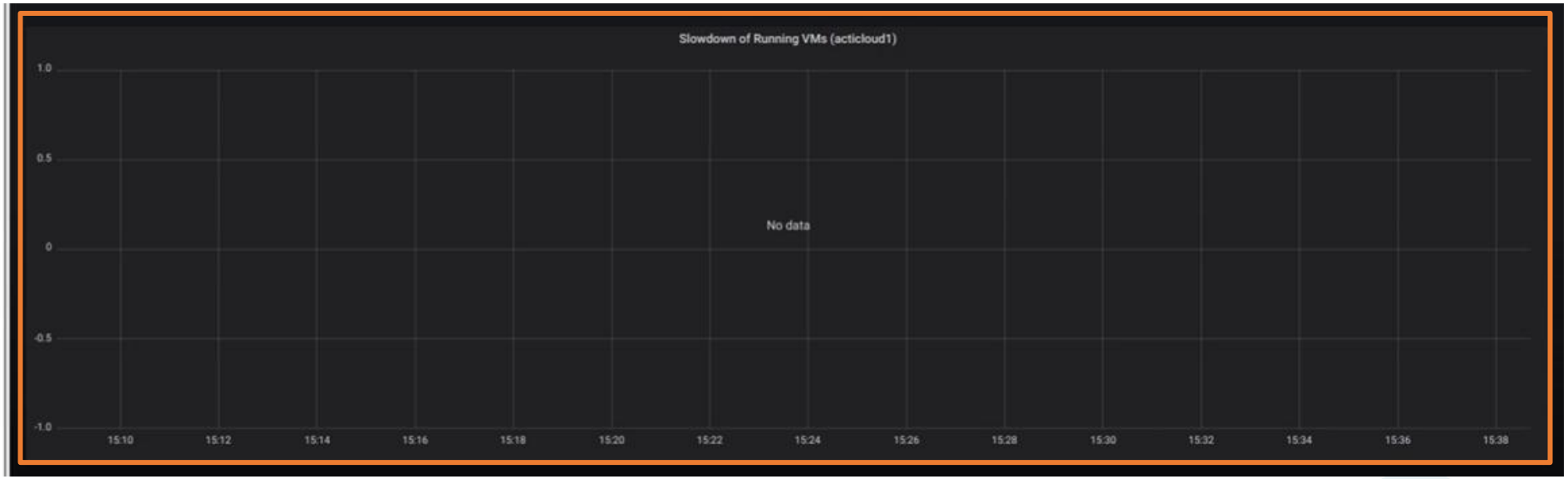

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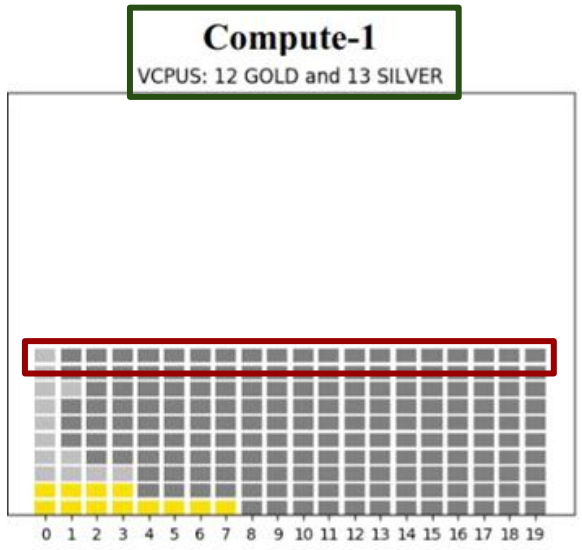

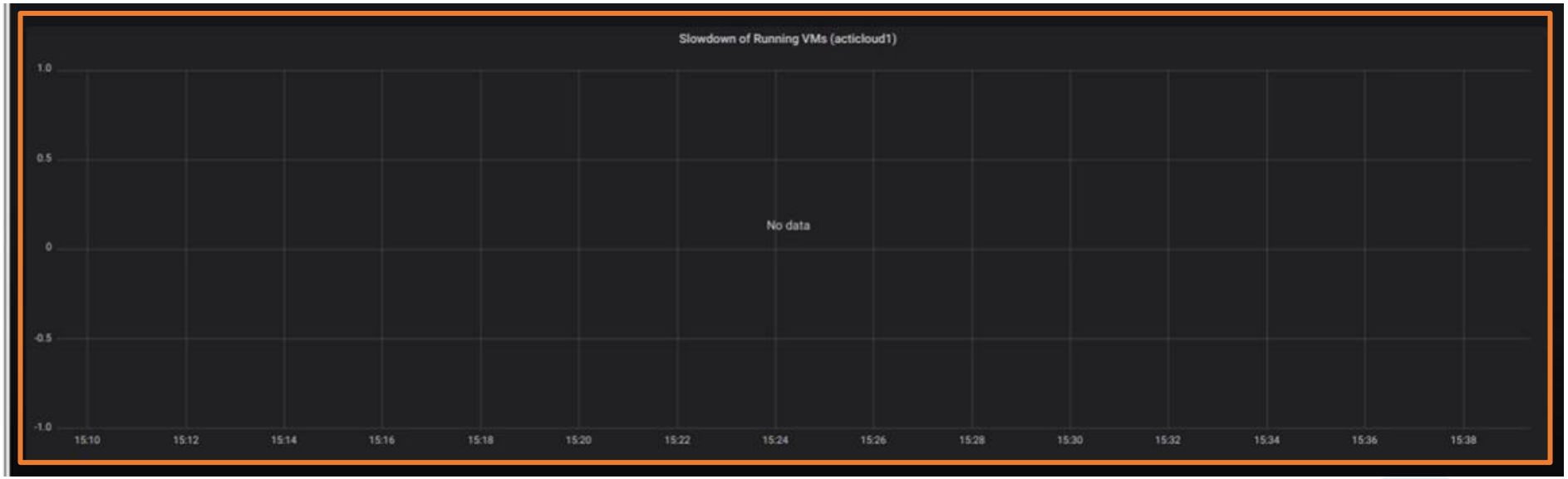

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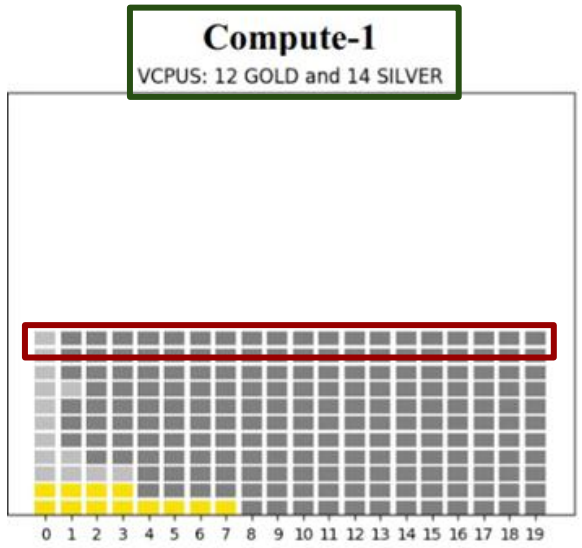

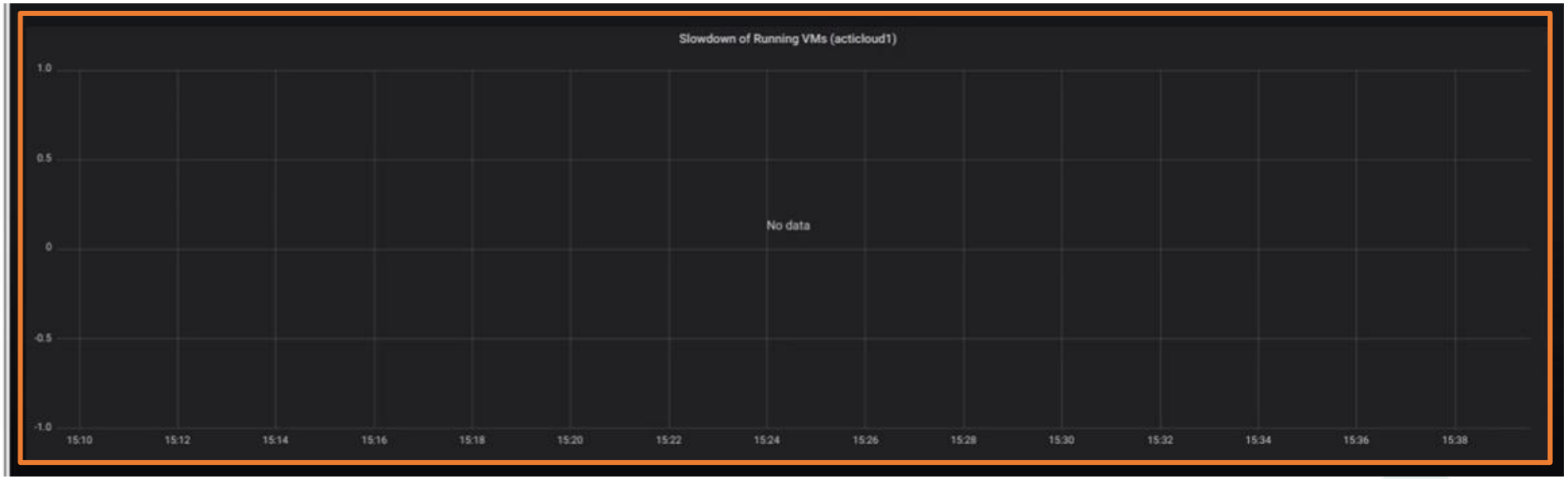

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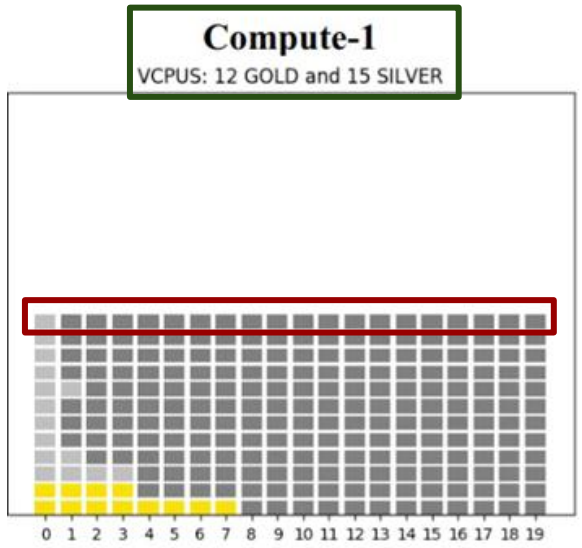

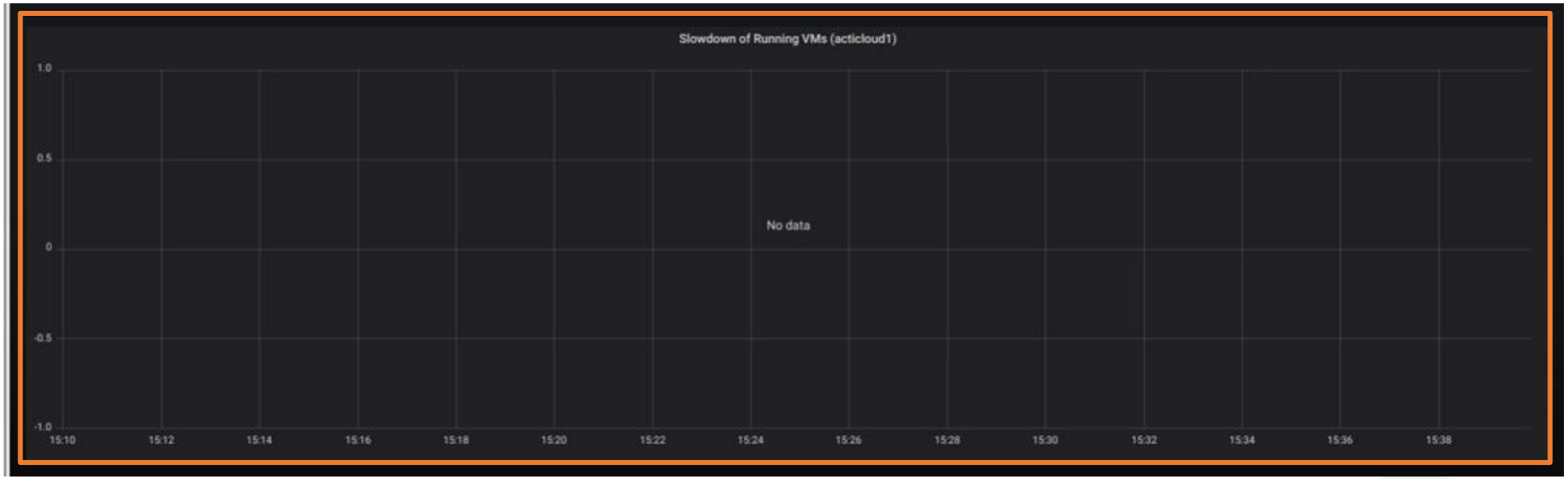

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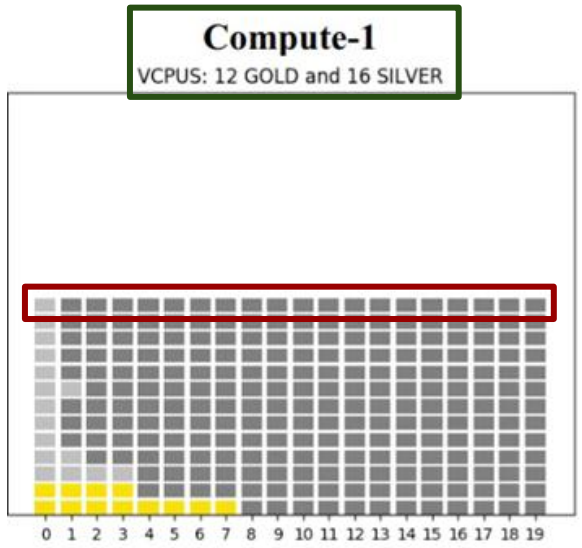

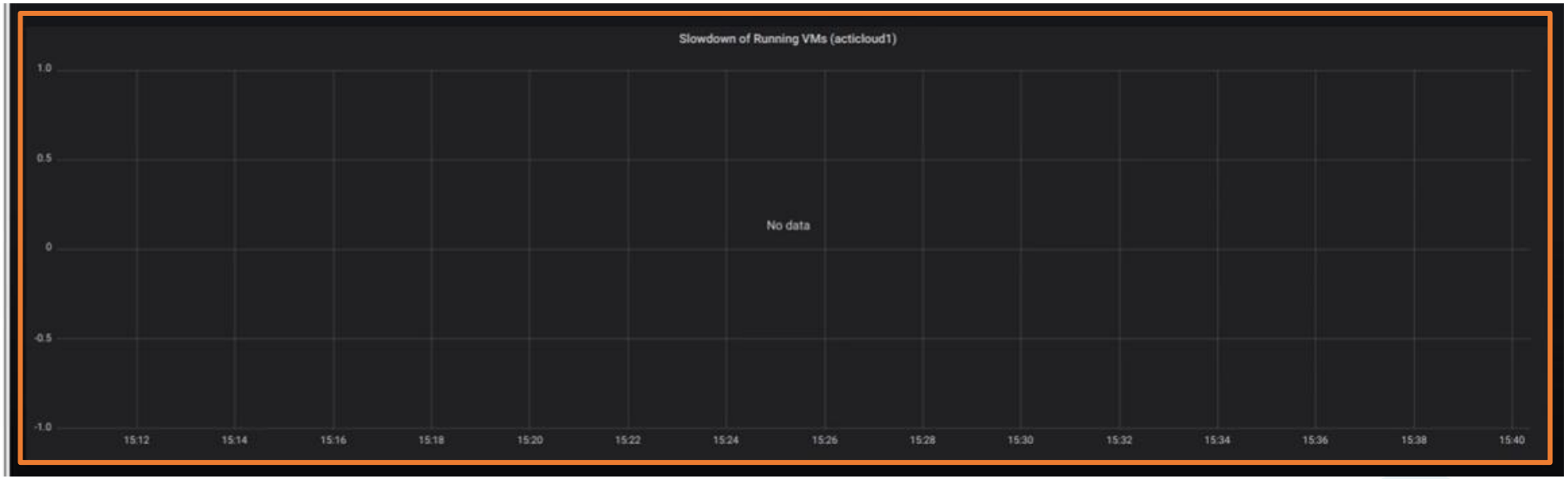

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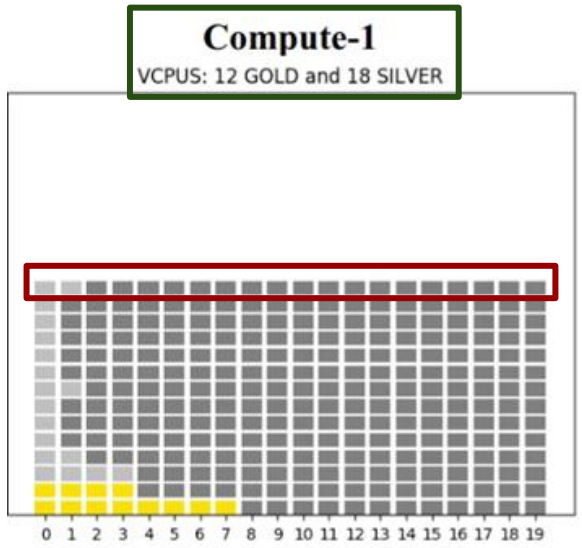

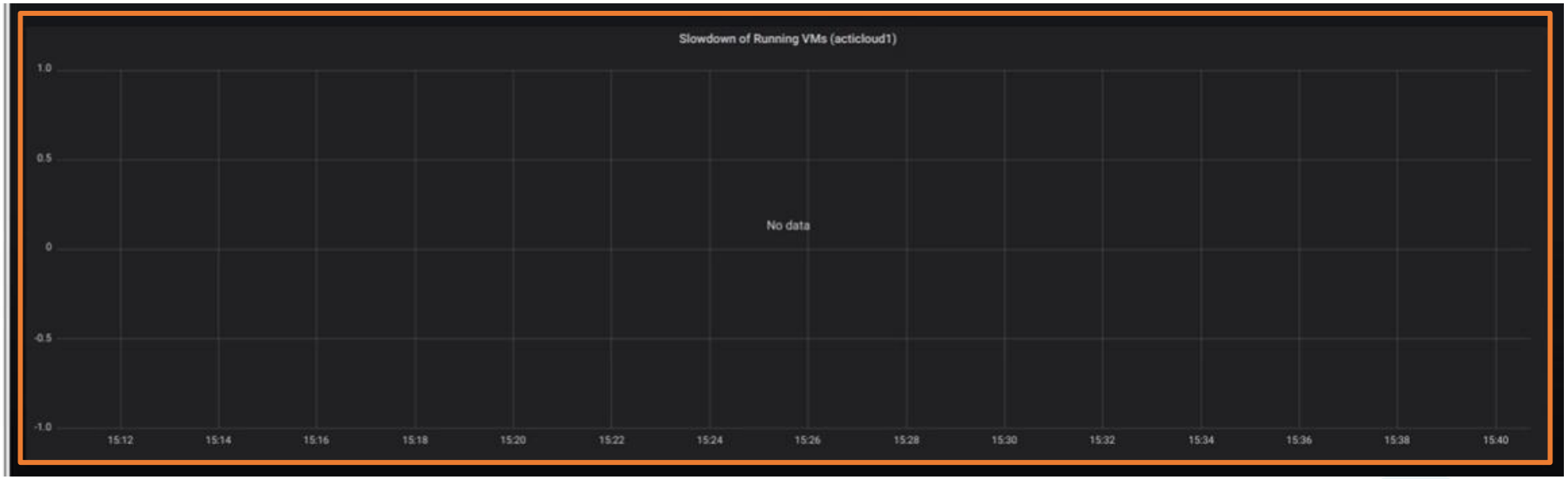

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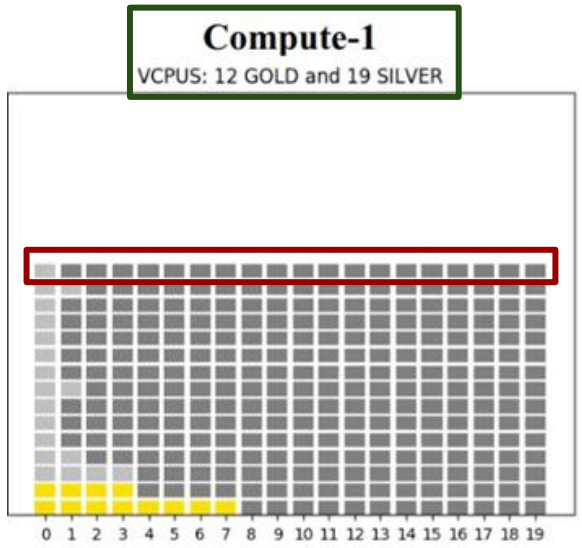

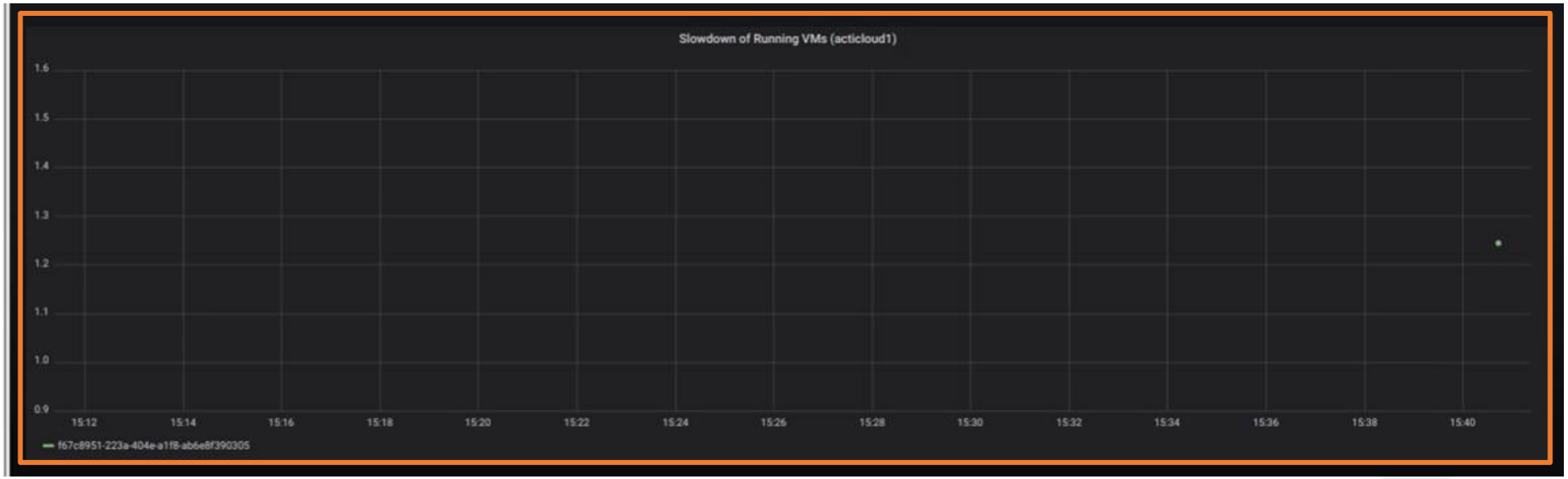

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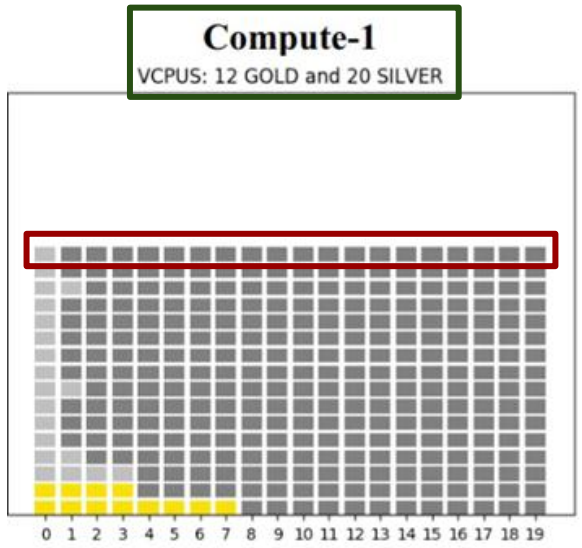

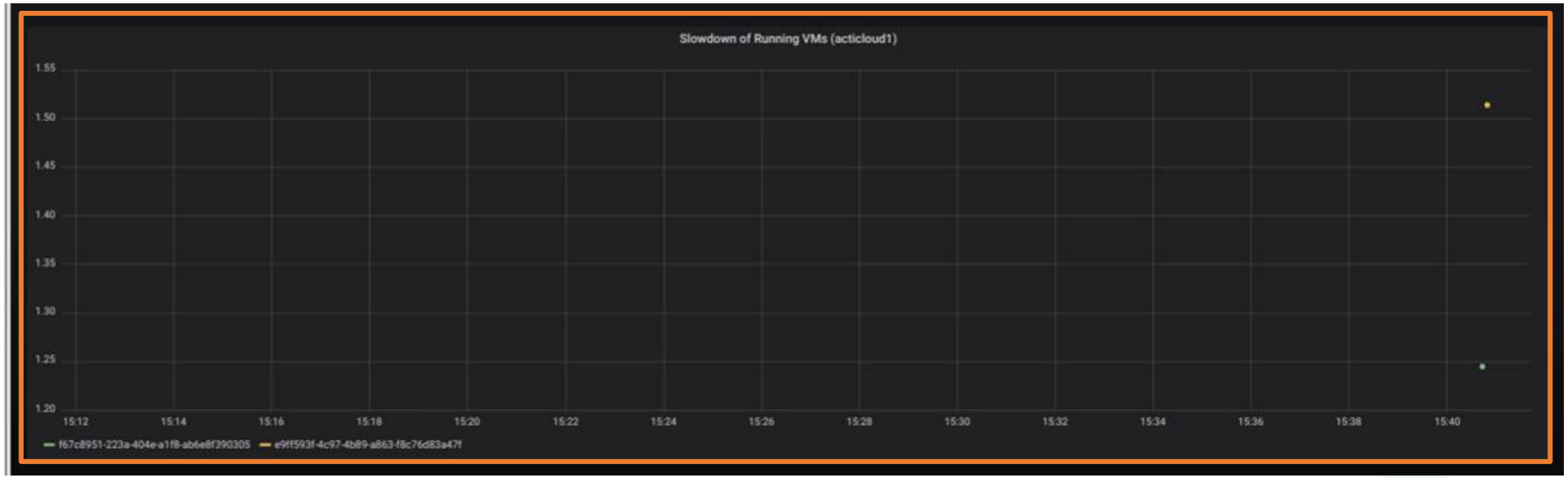

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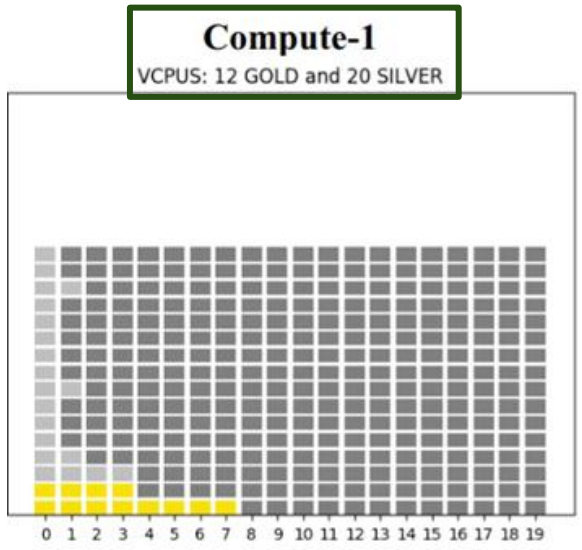

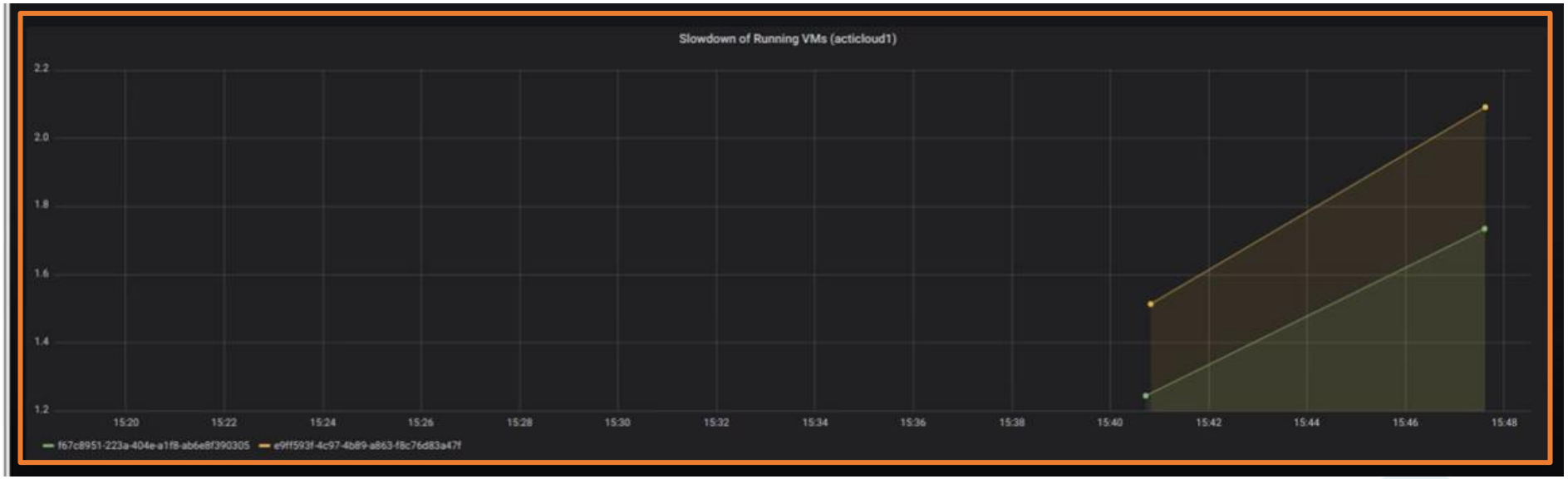

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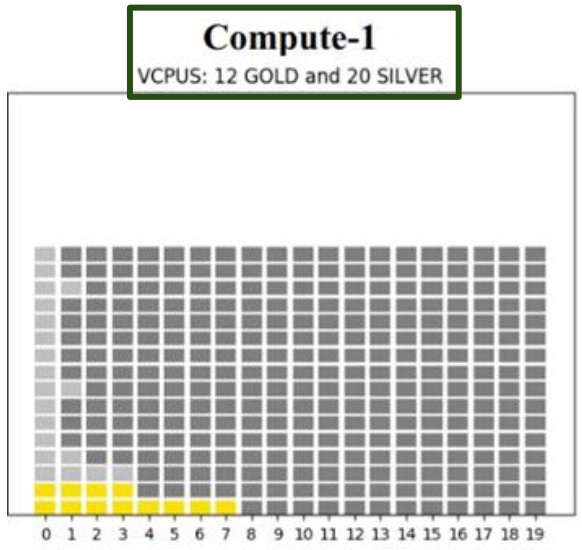

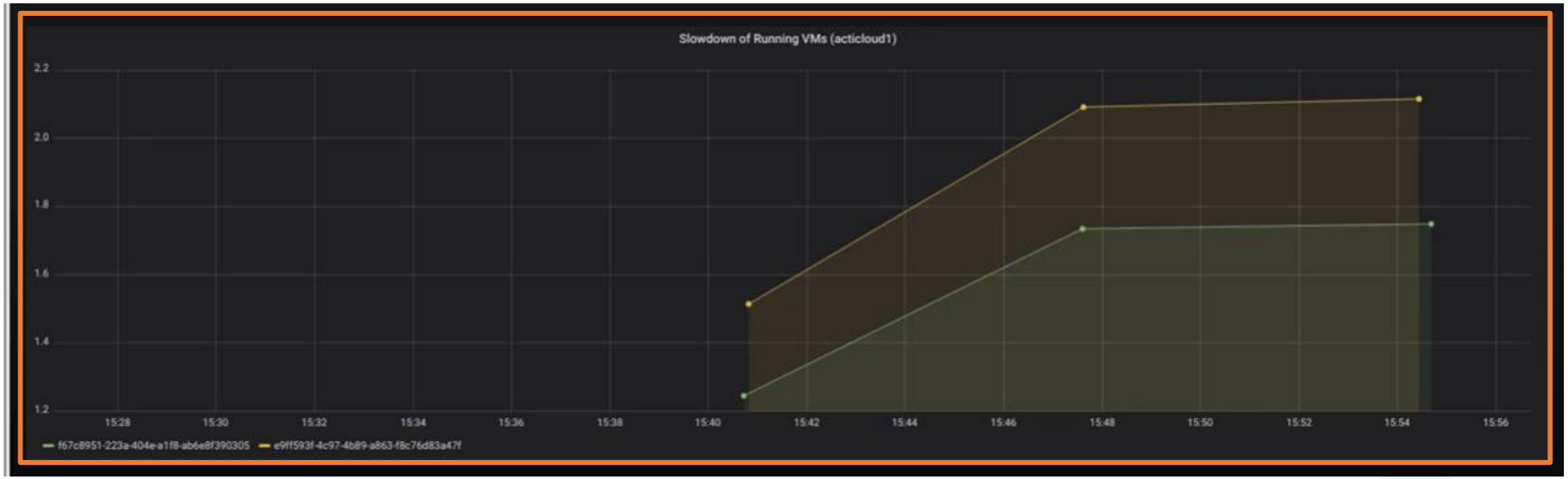

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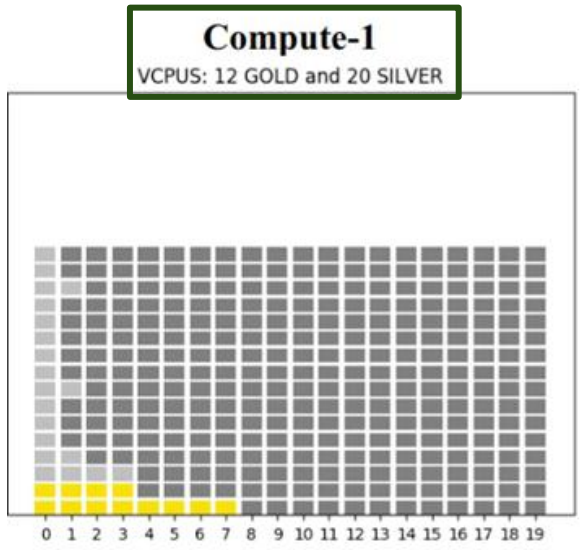

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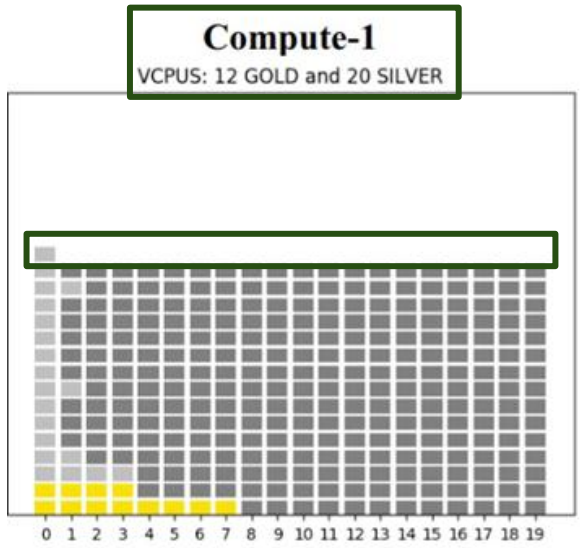

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- Pins the VMs' virtual cpus to servers' physical cpus
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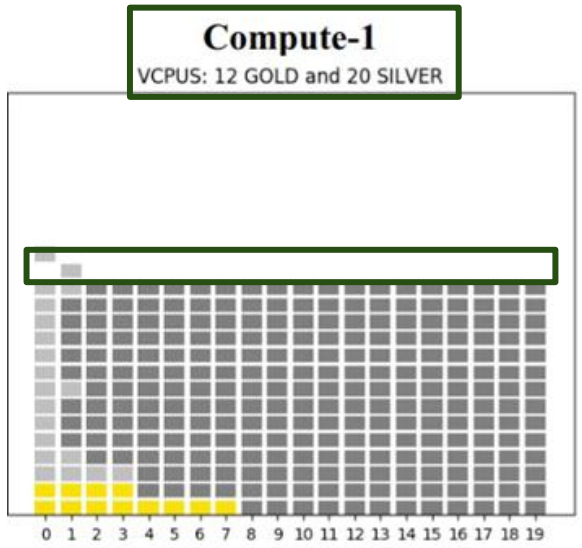

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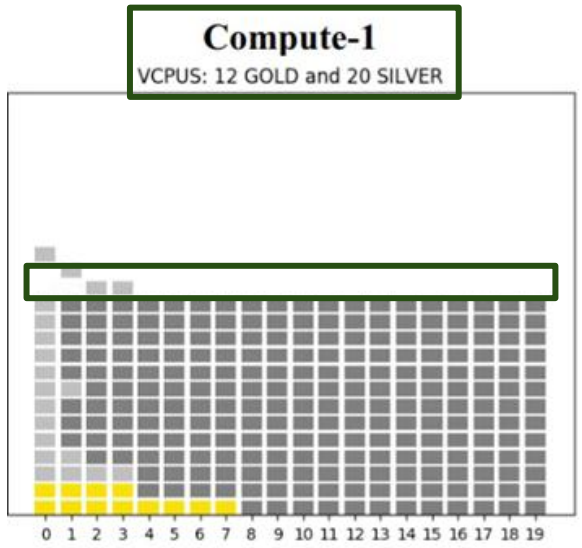

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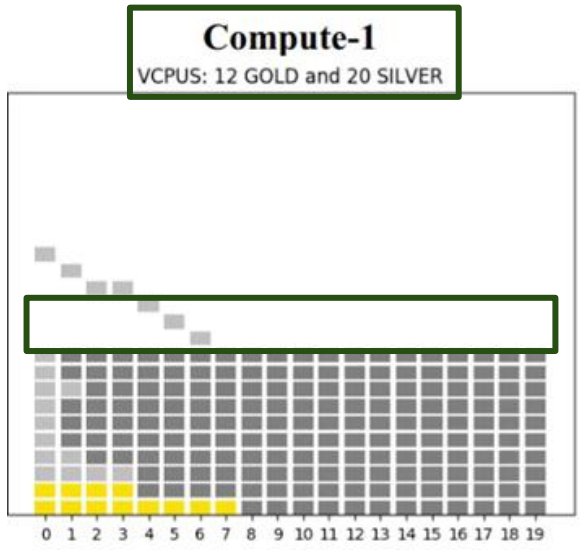

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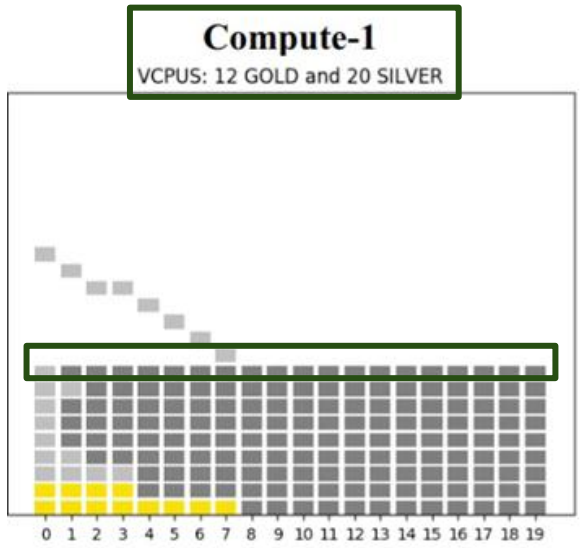

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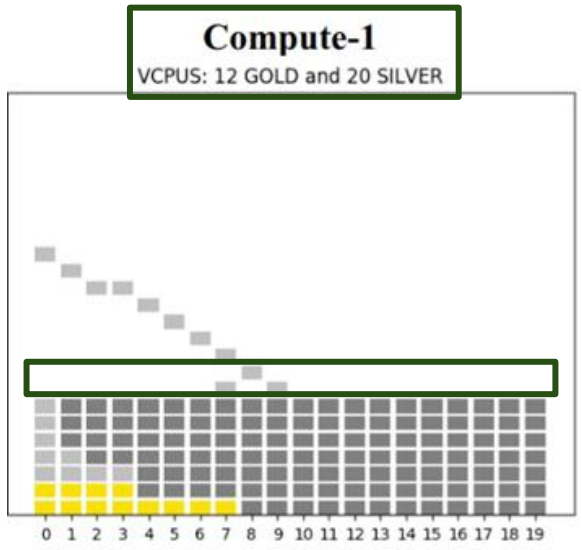

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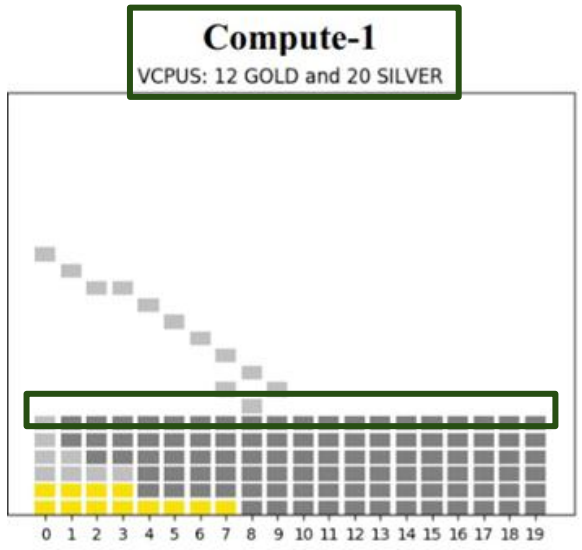

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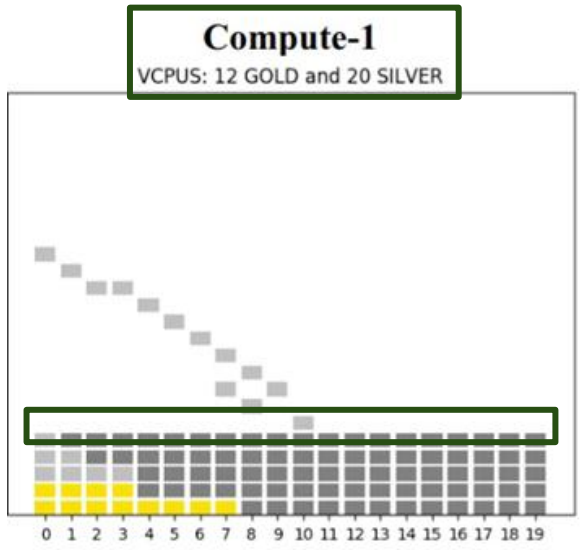

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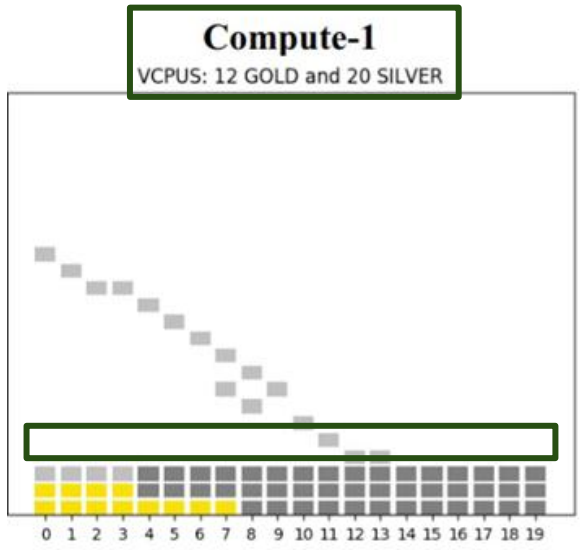

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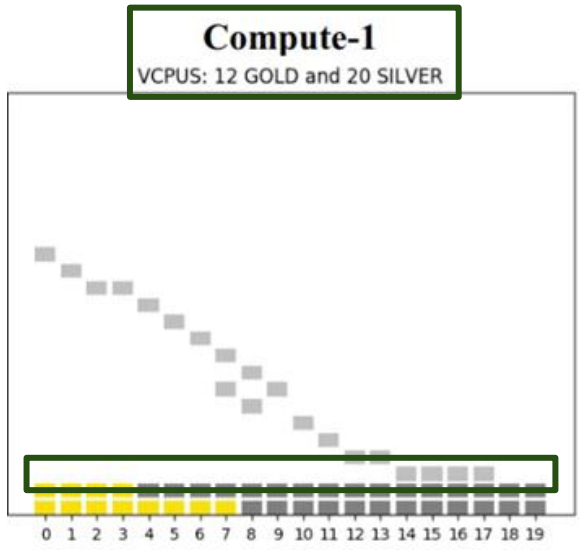

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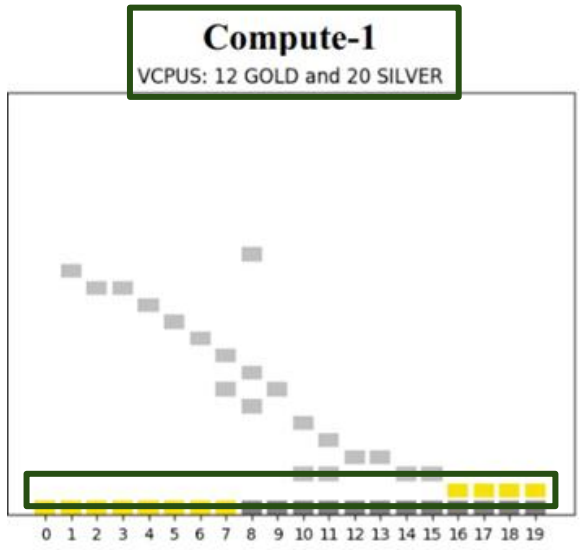

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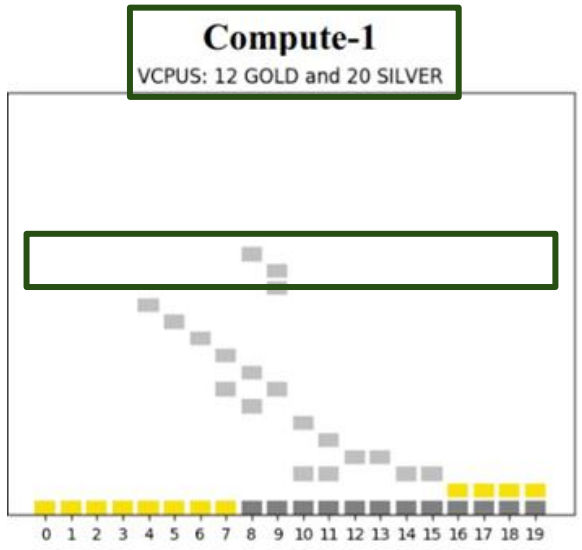

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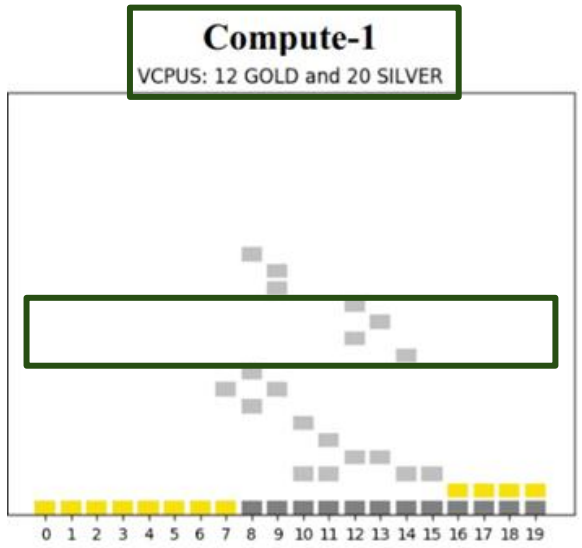

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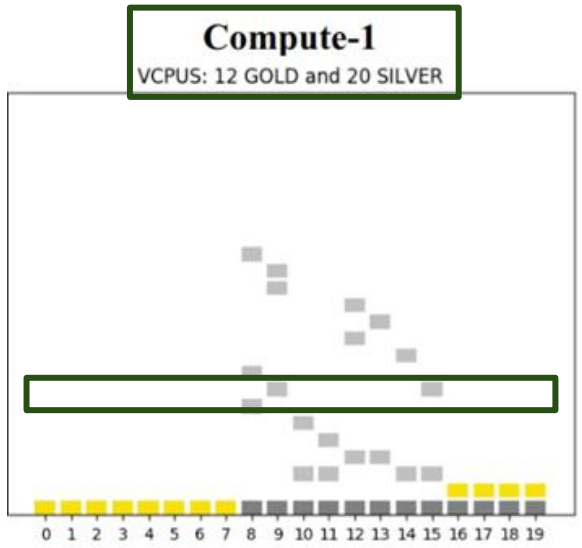

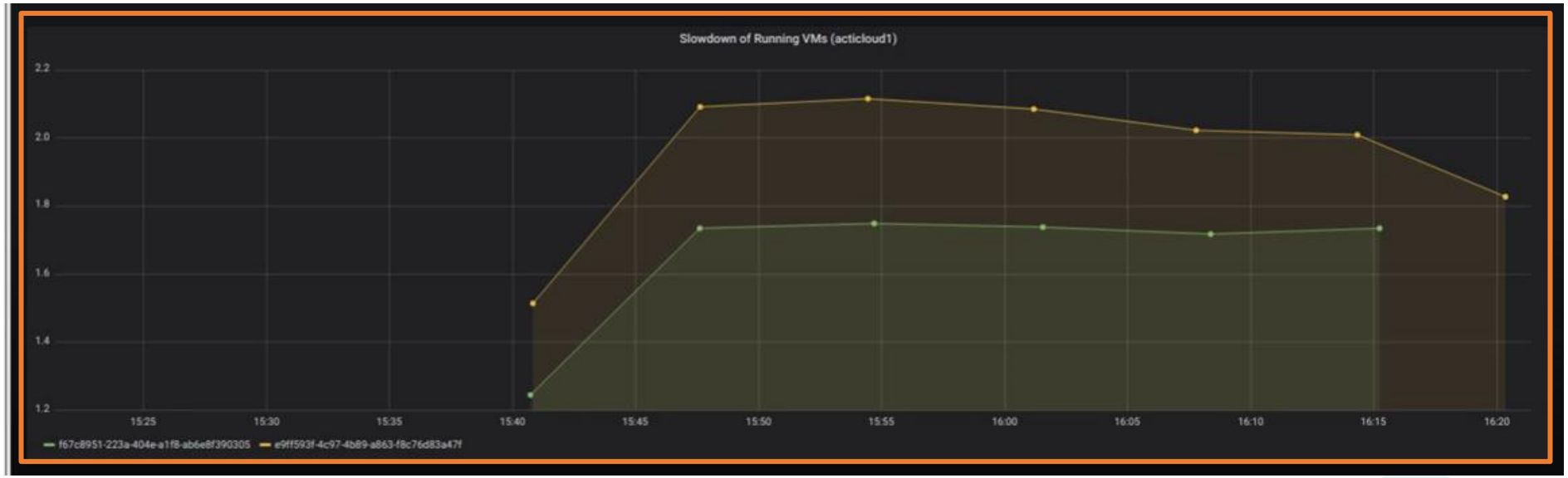

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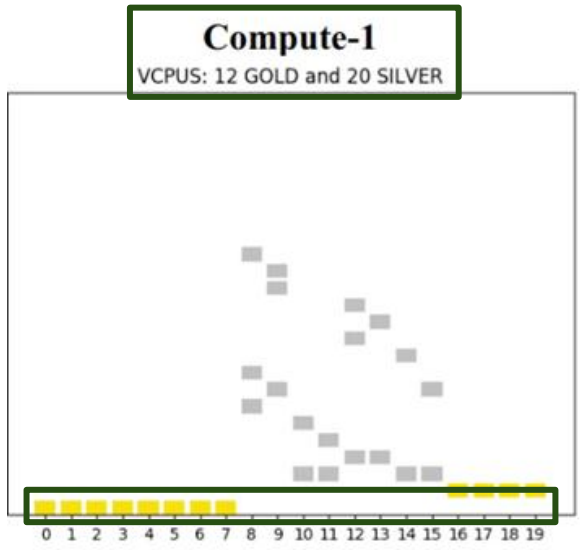

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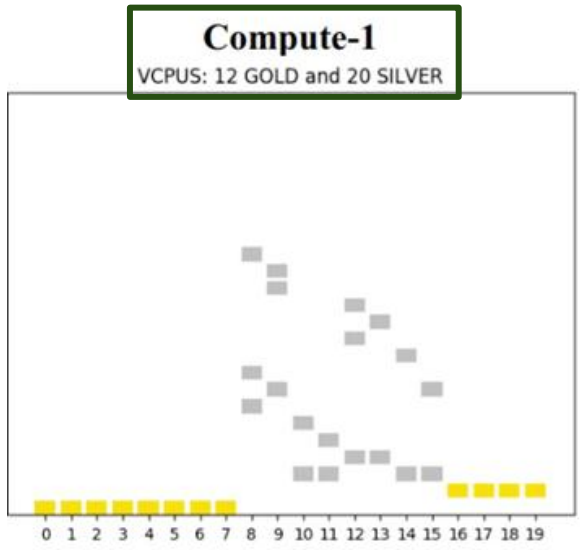
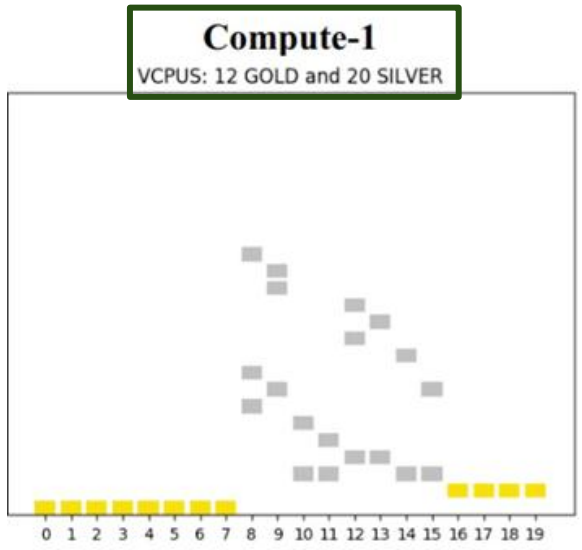
ACTiManager.Internal



ACTiManager.Internal:

- Pins the VMs' virtual cpus to servers' physical cpus
- Considers VMs' **prioritization** - Gold/Silver VMs
- Considers VMs' **characterization** - Noisy/Quiet and Sensitive/Insensitive VMs

ACTiManager.Internal



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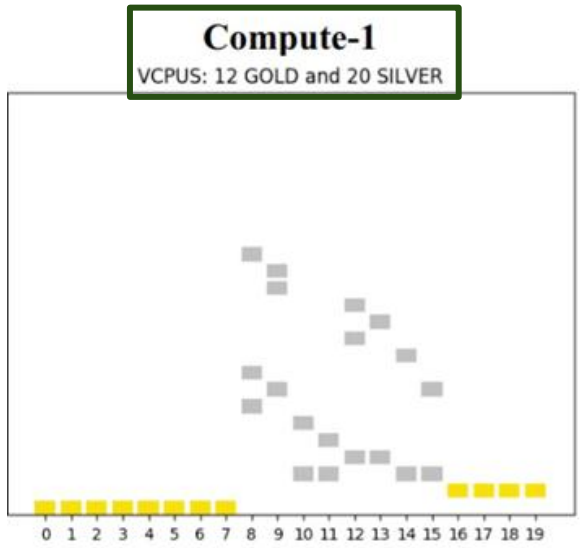
ACTiManager.Internal



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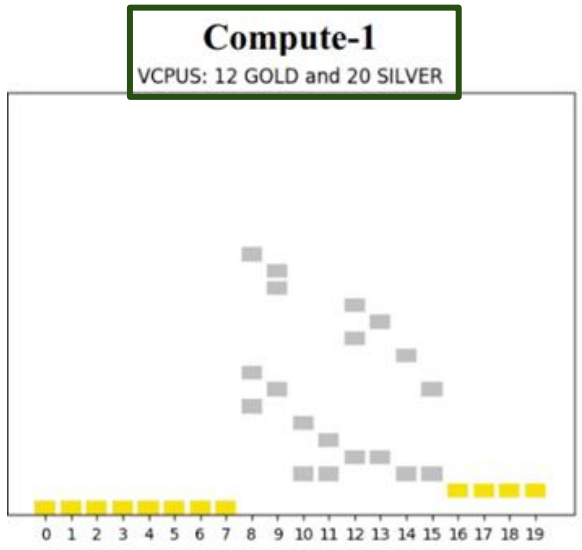

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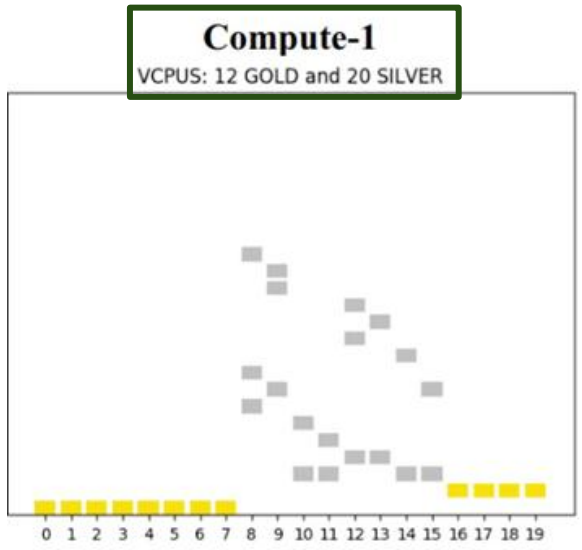

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