Curie™ Minimum Server Specifications

Software Version 1.1

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Revision History

Date	Revision	Description
October 17, 2021	A	Initial Document Release
April 26, 2022	B	Post-Release Updates
August 31, 2022	C	Post-Release Refinements
September 7, 2022	D	Post-Release Refinements

Server Operating System

Supported OS environment: Ubuntu 20.04

External Ports Required

443	Curie-arc HTTPS
8443	Curie-arc HTTPS
8643	Kibana
8843	Keycloak HTTPS
8993	Keycloak Management HTTPS
9993	Curie-arc admin
11112	Curie-arc DICOM

Curie™ Web Client

Operating Systems	Microsoft® Windows® 7-11	Mac OS® X 10.9+
Processor	Modern x64 Consumer CPU Intel i5 or equivalent[1] 4+ Cores @ 1.5Ghz+	
Memory	8192MB of RAM	
Graphics Memory	Dedicated Graphics Card (Nvidia or ATI)	
Network	30Mbit or Higher	
Network (Cell)	4G/LTE+, 5G	
Supported Browsers	Safari® 12+, Firefox 80+, Chrome 70+, Microsoft Edge 80+, Latest iOS Safari, Android Chrome	

[1] Mobile or low voltage class CPUs require on-site validation to be performed by customer prior to use.

Curie™ Workstation

(Jump Box for Implementation Engineer & Tech Support)

The following table defines the minimum hardware requirements necessary for a Curie™ Technical Workstation used by Implementation Engineer and Technical Support Specialists to connect to the Curie™ Test Servers.

System	CPU	vMemory	Disk
Microsoft Windows 10/11	2 vCPU Cores[2]	8GB RAM	80GB SSD8

Curie™ Test Server

The following table defines the minimum hardware requirements necessary to run the Curie™ *Standardize* server. These requirements are a starting point and will need to be adjusted to institution size or expected load.

System	CPU	vMemory	Disk
Curie™ Test	16 vCPU Cores[2]	32GB RAM	240GB SSD, 300GB SSD

[2]Refers to virtual or physical "computational units" such as CPUs or CPU cores. Virtual core number assumes a host with at least as many physical cores (hyperthreaded cores don't count) and a host that isn't overprovisioned. 1 GB Network connectivity is required between servers. OS/DB Physical Disk requirement for optimal performance is 394 MB/s. Example: SSD Disk, RAID6, Block Size 4 KiB, Actual IOPS: Min 17500, Median 96250, Max 175000 IOPS. Note: Inference Containers require 8 GB RAM per container.

Server Profiles by Study Volume

These sample profiles outline the hardware requirements for standard small, medium, large, and enterprise systems based on study volume per year.

Please Note: Additional servers would be required to provide high-availability across data centers, not necessarily for performance reasons.

Small: Less Than 150,000 Studies Per Year

System Component	vCPU	vMemory	Disk
Curie Arc / DB Node	Modern Server-Class CPU, 16+ Cores[2]	16GB+ of RAM	300 GB OS/DB Drive, SSD Disk Share, SSD
Inference Node (Two Inference Containers)	Modern Server-Class CPU, 8+ Cores[2]	24GB+ of RAM	100 GB OS Drive, SSD Disk Share, SSD

Medium: 150,000 - 500,000 Studies Per Year

System Component	vCPU	vMemory	Disk
Curie Arc / DB Node	Modern Server-Class CPU, 16+ Cores[2]	16GB+ of RAM	400 GB OS/DB Drive, SSD Disk Share, SSD
Inference Node (Two Inference Containers)	Modern Server-Class CPU, 16+ Cores[2]	24GB+ of RAM	100 GB OS Drive, SSD Disk Share, SSD
Inference Node (Two Inference Containers)	Modern Server-Class CPU, 16+ Cores[2]	24GB+ of RAM	100 GB OS Drive, SSD Disk Share, SSD

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[2]Refers to virtual or physical "computational units" such as CPUs or CPU cores. Virtual core number assumes a host with at least as many physical cores (hyperthreaded cores don't count) and a host that isn't overprovisioned. 1 GB Network connectivity is required between servers. OS/DB Physical Disk requirement for optimal performance is 394 MB/s. Example: SSD Disk, RAID6, Block Size 4 KiB, Actual IOPS: Min 17500, Median 96250, Max 175000 IOPS. Note: Inference Containers require 8 GB RAM per container.

Large: 500,000 - 1,000,000 Studies Per Year

System Component	vCPU	vMemory	Disk
Curie Arc / DB Node	Modern Server-Class CPU, 24+ Cores[2]	24GB+ of RAM	500 GB OS/DB Drive, SSD Disk Share, SSD
Inference Node (Three Inference Containers)	Modern Server-Class CPU, 16+ Cores[2]	32GB+ of RAM	100 GB OS Drive, SSD Disk Share, SSD
Inference Node (Three Inference Containers)	Modern Server-Class CPU, 16+ Cores[2]	32GB+ of RAM	100 GB OS Drive, SSD Disk Share, SSD

Enterprise: 1,000,000+ Studies Per Year

System Component	vCPU	vMemory	Disk
Curie Arc / DB Node	Modern Server-Class CPU, 32+ Cores[2]	32GB+ of RAM	600 GB OS/DB Drive, SSD Disk Share, SSD
Inference Node (Four Inference Containers)	Modern Server-Class CPU, 24+ Cores[2]	48GB+ of RAM	100 GB OS Drive, SSD Disk Share, SDD
Inference Node (Four Inference Containers)	Modern Server-Class CPU, 24+ Cores[2]	48GB+ of RAM	100 GB OS Drive, SSD Disk Share, SSD

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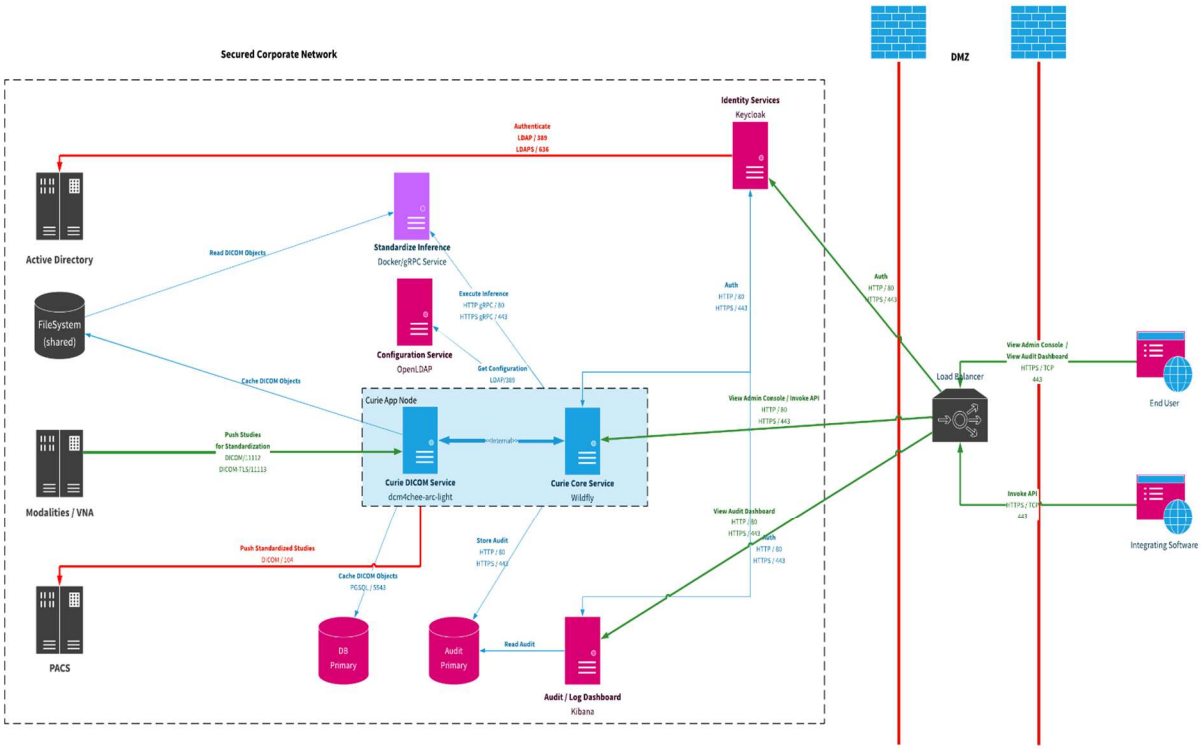
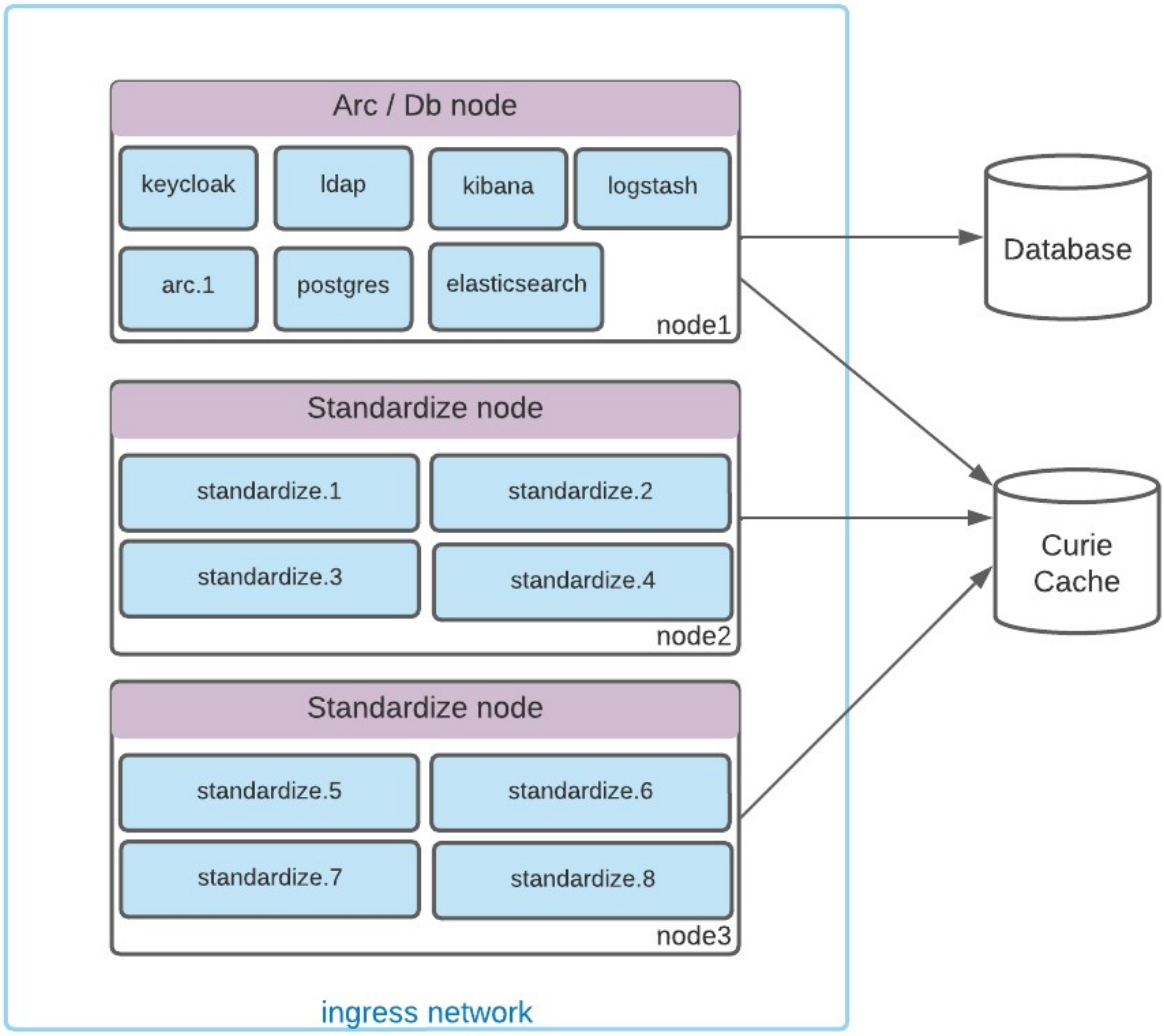
[2]Refers to virtual or physical "computational units" such as CPUs or CPU cores. Virtual core number assumes a host with at least as many physical cores (hyperthreaded cores don't count) and a host that isn't overprovisioned. 1 GB Network connectivity is required between servers. OS/DB Physical Disk requirement for optimal performance is 394 MB/s. Example: SSD Disk, RAID6, Block Size 4 KiB, Actual IOPS: Min 17500, Median 96250, Max 175000 IOPS. Note: Inference Containers require 8 GB RAM per container.

Curie™ System Architecture



Docker Swarm Deployment



Standardize Performance Metrics

The following table provides detail regarding the processing performance and turnaround time when standardizing studies. For each supported modality, the target turnaround time describes the expected number of seconds between when a study is received by Curie™ and when a resulting standardized study is returned. The average times per study and per image describe measured results from a recent benchmark using external customer with *slower than recommended disk* (SAS 15K RPM).

Modality	Target	Assumptions	Measured Average Time/Study	Measured Average Time/Image
XR	< 30 seconds	4 images of 2,000 x 2,500-pixel resolution per study	3.475 seconds	0.869 seconds
CT	< 120 seconds	1,000 images of 512 x 512-pixel resolution per study	90.4 seconds	0.099 seconds
MR	< 60 seconds	1,000 images of 256 x 256-pixel resolution per study	32.861 seconds	0.125 seconds