IE

NetBrain® Integrated Edition 8.0

System Specification

Introduction

NetBrain Integrated Edition features an entirely new system architecture to enable robust scalability and flexibility. The architecture is horizontally scalable, allowing for servers to be added, subtracted, or consolidated according to customer requirements. For larger network environments or if you need help in defining specs for high availability (HA) environments, please contact [NetBrain Support Team](#) for further assistance.

This document introduces the system overview and requirements in terms of:

- [System Architecture](#)

- [Considerations for System Scalability](#)

- Reference Specifications:

  > **Note:** This table shows the number of reference machines that you need to deploy the NetBrain system, depending on the number of devices and concurrent users.

| Node and Seat Size	Number of Physical Machines
≤1000 Nodes ≤10 Seats	[2 Machines](#)
1001~2000 Nodes ≤10 Seats	[2 Machines](#)
2001~5000 Nodes ≤20 Seats	[4 Machines](#)
5001~10000 Nodes ≤50 Seats	[6 Machines](#)
10001~50000 Nodes ≤200 Seats	[>8 Machines](#)

- [Deployment Prerequisites](#)

System Architecture

NetBrain Integrated Edition is an adaptive automation platform, where you can integrate with your existing NMS tools and IT workflows to automate documentation, troubleshooting, network change, and defense. It serves as an operating system of your whole network to relieve network professionals from manual CLI-digging and also empowers team collaboration to elevate productivity.

The browser-based interface of NetBrain Integrated Edition is backed by a full-stack architecture, adopting advanced distributed technologies to support large-scale networks with more expansion possibilities.

The distributed system architecture is as follows:
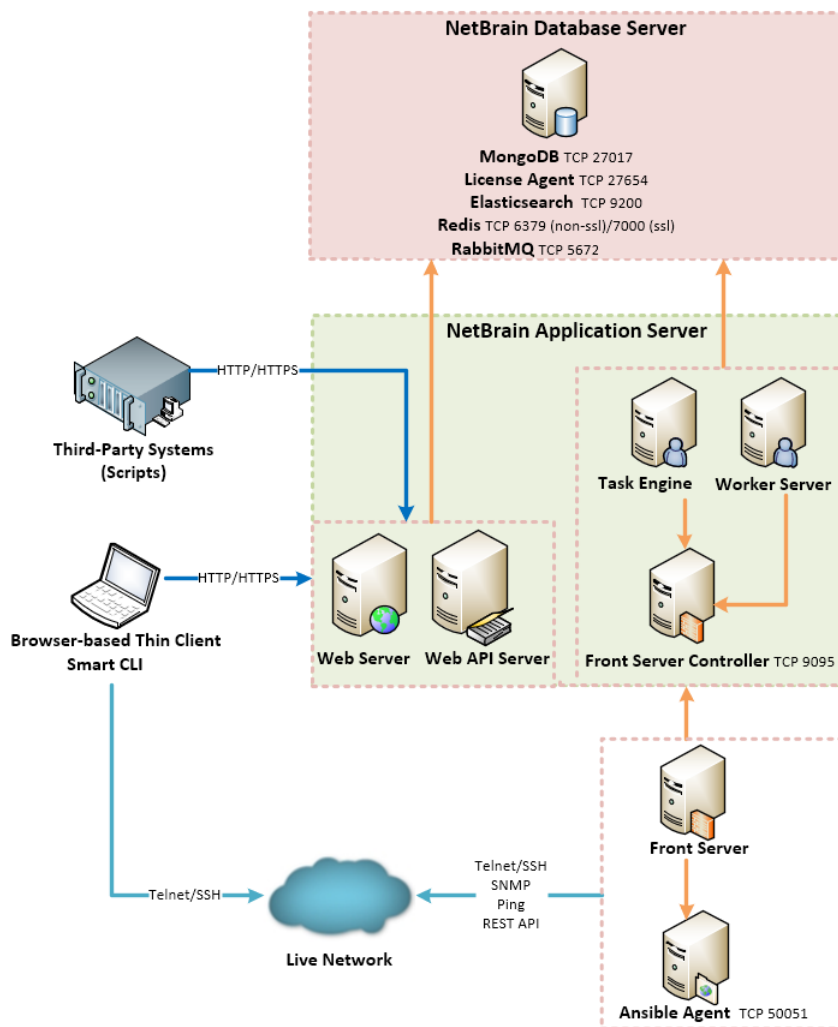
> **Note:** The port numbers listed in the above architecture diagram are defaults only. The actual port numbers used during installation might be different.

The system components include:

Component	Description
Browser-based Thin Client	provides a user interface for end users to access the system.
MongoDB	serves as a system data repository.
License Agent	provides services that validate and activate licenses.
Elasticsearch	serves as a full-text search and analytics engine in a distributed multi-user environment.
Redis	provides memory cache for the system.
RabbitMQ	prioritizes and forwards requested tasks.
Web Server	serves static content such as HTML, JavaScript, and CSS resources, which serves as the user interface of the Thin Client.
Web API Server	provides the front-end web applications to support the browser-based Thin Clients and serves RESTful API calls from third-party applications for integration.
Worker Server	serves as a resource manager to support computing tasks. It relies on both Redis and RabbitMQ to work.
Task Engine	coordinates computing tasks.
Front Server Controller	serves to coordinate and communicate with Front Servers and other components.
Front Server	serves as a polling server to collect and parse live network data. It is the only component required to access the live network.
Service Monitor Agent	monitors the health of your NetBrain Servers with operations management of related services.
Ansible Agent (add-on)	integrates with Ansible to define, execute playbooks and visualize results in Change Management Runbooks. See Ansible Integration for more details.
Smart CLI (add-on)	provides a Telnet/SSH client to connect to devices from Windows and can be integrated with NetBrain workflows. See Smart CLI for more details.

Considerations for System Scalability

The following table introduces the considerations for system scalability:

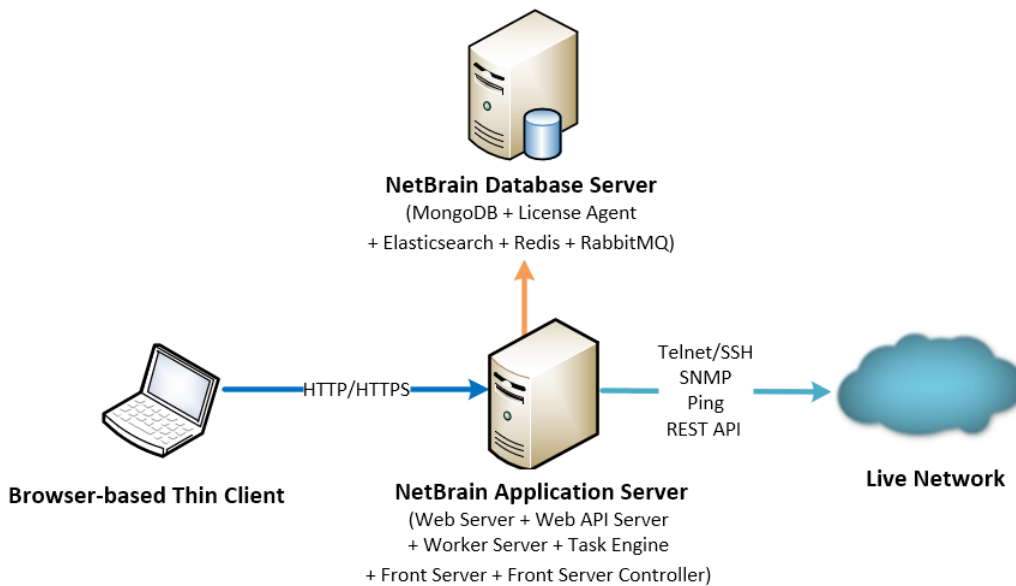| Server	Scalability
Web Server Web API Server	▪ Deploying more Web Servers as per data center locations is recommended to ensure the response time for accessing web pages of Thin Client.

Server	Scalability
	▪ Deploying more Web API Servers is recommended when there is a large number of API calls for intensive API triggered diagnosis in large networks.
Worker Server	Deploying more Worker Servers is recommended for a large number of back-end network automation tasks, such as network monitoring, path discovery, runbook execution, triggered diagnosis.
Task Engine	Supports high availability with active/standby nodes.
RabbitMQ	Supports high availability with master/slave nodes.
Redis	Supports high availability with master/slave/sentinel nodes.
MongoDB	Supports high availability with primary/secondary/arbiter nodes.
Elasticsearch	Supports high availability with master/master-only nodes.
Front Server	Deploying more Front Servers is recommended for a large number of network nodes. Each Front Server is recommended to manage at most 5,000 nodes.
Front Server Controller	Supports high availability with active/standby nodes.

Reference Specifications

The following specifications are only for reference. Make your selections based on your network scale and use case.

Reference Specification for ≤1,000 Nodes & ≤10 Seats

This deployment requires one Windows server for applications and one Linux server for the database. Both physical machines and virtual machines are supported.

NetBrain Database Server
(MongoDB + License Agent
+ Elasticsearch + Redis + RabbitMQ)

Telnet/SSH
SNMP
Ping
REST API

Live Network

HTTP/HTTPS

Browser-based Thin Client

NetBrain Application Server
(Web Server + Web API Server
+ Worker Server + Task Engine
+ Front Server + Front Server Controller)

Environment	NetBrain Component	Machine Count	CPU	Memory	Hard Disk	Operating System
≤1,000 nodes ≤10 users	Application Server	1	4 Core/ 8 vCPU	16GB	200GB [1]	▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit ▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit
	Database Server	1	4 Core/ 8 vCPU	16GB	300GB [2]	▪ Red Hat Enterprise Linux (RHEL) 7.5/7.6/7.7, 64-bit ▪ CentOS 7.5/7.6/7.7, 64-bit

Notes:

[1] To get good performance for data processing and data caching when managing up to 5000 nodes, Application Server is recommended to be installed on a machine equipped with Solid State Drive (SSD).

2) The required hard disk space must be exclusively reserved for NetBrain. For better performance, MongoDB is recommended to be installed on a machine equipped with Solid State Drive (SSD), or Hard Disk Drive (HDD) RAID-10.
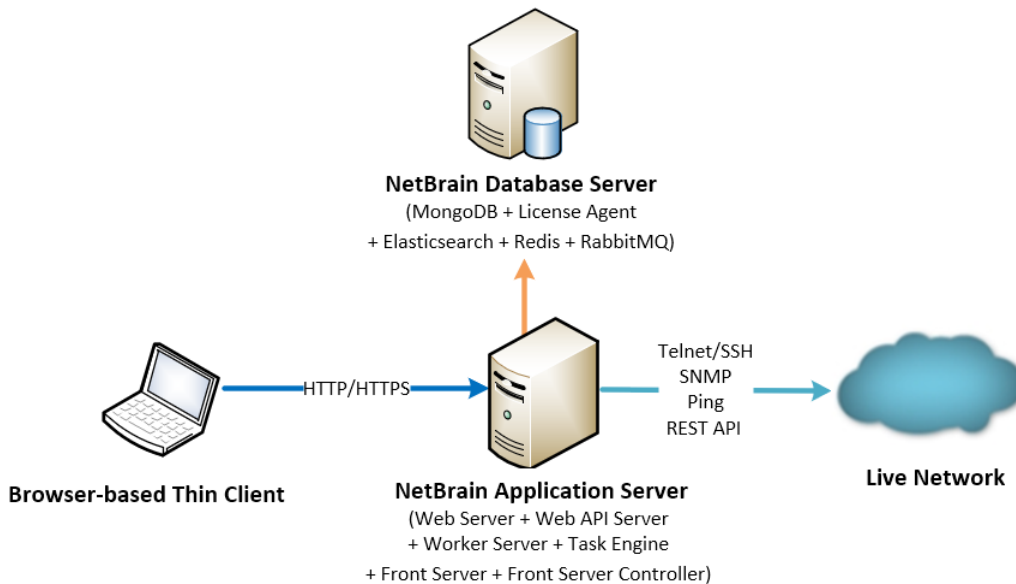
Network connectivity requirements for ≤1,000 nodes

Source	Destination	Protocol and Port Number *)
Thin Client Service Monitor Agent	Application Server	HTTP/HTTPS (80/443)
Application Server	Knowledge Cloud Domain (https://knowledgecloud.netbraintech.com/)	HTTPS (443)
Application Server	Database Server	TCP 5672/9200/27017/27654 TCP 6379 (non-ssl)/7000 (ssl)
Application Server	Ansible Agent (add-on)	TCP 50051
Application Server	Live Network	ICMP/SNMP/Telnet/SSH/REST API

Note: *) The port numbers listed in this column are defaults only. The actual port numbers used during installation might be different.

Reference Specification for 1,001~2,000 Nodes & ≤10 Seats

This deployment requires one Windows server for applications and one Linux server for the database. Both physical machines and virtual machines are supported.

NetBrain Database Server
(MongoDB + License Agent
+ Elasticsearch + Redis + RabbitMQ)

HTTP/HTTPS

Telnet/SSH
SNMP
Ping
REST API

Browser-based Thin Client

NetBrain Application Server
(Web Server + Web API Server
+ Worker Server + Task Engine
+ Front Server + Front Server Controller)

Live Network

Environment	NetBrain Component	Machine Count	CPU	Memory	Hard Disk	Operating System
1,001~2,000 nodes ≤ 10 users	Application Server	1	4 Core/ 8 vCPU	32GB	200GB [1]	▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit ▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit
	Database Server	1	4 Core/ 8 vCPU	32GB	300GB [2]	▪ Red Hat Enterprise Linux (RHEL) 7.5/7.6/7.7, 64-bit ▪ CentOS 7.5/7.6/7.7, 64-bit

Notes:

[1] To get good performance for data processing and data caching when managing up to 5000 nodes, Application Server is recommended to be installed on a machine equipped with Solid State Drive (SSD).

[2] The required hard disk space must be exclusively reserved for NetBrain. For better performance, MongoDB is recommended to be installed on a machine equipped with Solid State Drive (SSD), or Hard Disk Drive (HDD) RAID-10.

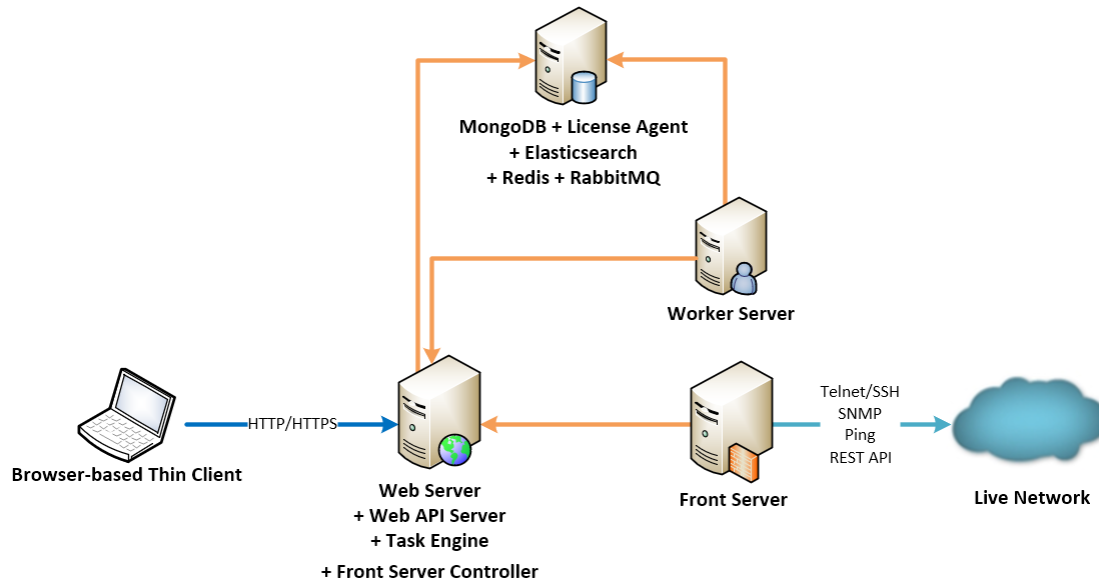## Network connectivity requirements for 1,001~2,000 nodes

Source	Destination	Protocol and Port Number [*]
Thin Client Service Monitor Agent	Application Server	HTTP/HTTPS (80/443)
Application Server	Knowledge Cloud Domain (https://knowledgecloud.netbraintech.com/)	HTTPS (443)
Application Server	Database Server	TCP 5672/9200/27017/27654 TCP 6379 (non-ssl)/7000 (ssl)
Application Server	Ansible Agent (add-on)	TCP 50051
Application Server	Live Network	ICMP/SNMP/Telnet/SSH/REST API

Note: [*] The port numbers listed in this column are defaults only. The actual port numbers used during installation might be different.

Reference Specification for 2,001~5,000 Nodes & ≤20 Seats

As the number of network devices and concurrent users increase, the system requires a distributed environment, which requires more machines to provide resiliency and scale-out flexibly based on your network scale. Both

physical machines and virtual machines are supported.

Environment	System Component	Machine Count	CPU	Memory	Hard Disk	Operating System
2,001~5,000 nodes ≤ 20 users	Web Server Web API Server Task Engine Front Server Controller	1	4 Core/ 8 vCPU	32GB	200GB	▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit ▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit
	Worker Server	1	8 Core/ 16 vCPU	32GB	200GB	
	Front Server	1	4 Core/ 8 vCPU	8GB	200GB [1]	▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit ▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit ▪ Red Hat Enterprise Linux (RHEL) 7.5/7.6/7.7, 64-bit ▪ CentOS 7.5/7.6/7.7, 64-bit
	MongoDB License Agent Elasticsearch Redis RabbitMQ	1	4 Core/ 8 vCPU	32GB	500GB [2]	▪ Red Hat Enterprise Linux (RHEL) 7.5/7.6/7.7, 64-bit ▪ CentOS 7.5/7.6/7.7, 64-bit

Notes:

[1] To get good performance for data processing and data caching when managing up to 5000 nodes, Front Server is recommended to be installed on a machine equipped with Solid State Drive (SSD).

2) The required hard disk space must be exclusively reserved for NetBrain. For better performance, MongoDB is recommended to be installed on a machine equipped with Solid State Drive (SSD), or Hard Disk Drive (HDD) RAID-10.
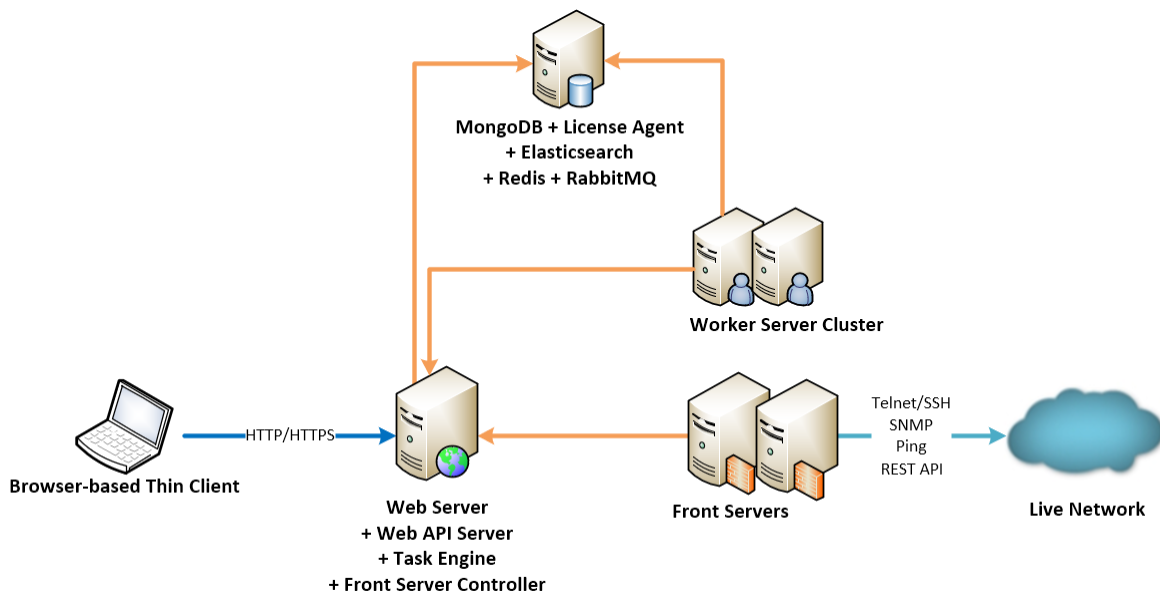
Network connectivity requirements for 2,001~5,000 nodes

Source	Destination	Protocol and Port Number *)
Thin Client	Web Server Web API Server	HTTP/HTTPS (80/443)
Service Monitor Agent	Web API Server	HTTP/HTTPS (80/443)
Web API Server	Knowledge Cloud Domain (https://knowledgecloud.netbraintech.com/)	HTTPS (443)
Web API Server Worker Server Task Engine Front Server Controller	MongoDB RabbitMQ	TCP 27017 TCP 5672
Web API Server Worker Server	Elasticsearch License Agent	TCP 9200 TCP 27654
Web API Server Worker Server Front Server Controller	Redis	TCP 6379 (non-ssl)/TCP 7000 (ssl)
Worker Server Task Engine Front Server	Front Server Controller	TCP 9095
Front Server	Live Network	ICMP/SNMP/Telnet/SSH/REST API
Front Server	Ansible Agent (add-on)	TCP 50051

Note: *) The port numbers listed in this column are defaults only. The actual port numbers used during installation might be different.

Reference Specification for 5,001~10,000 Nodes & ≤50 Seats

As the number of network devices and concurrent users increase, the system requires a distributed environment, which requires more machines to provide resiliency and scale-out flexibly based on your network scale. Both physical machines and virtual machines are supported.

Environment	System Component	Machine Count	CPU	Memory	Hard Disk	Operating System
5,001~10,000 nodes ≤ 50 users	Web Server Web API Server Task Engine Front Server Controller	1	8 Core/ 16 vCPU	32GB	200GB	▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit ▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit
	Worker Server	2	8 Core/ 16 vCPU	32GB	200GB	
	Front Server	2 [1]	4 Core/ 8 vCPU	8GB	200GB [1]	▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit ▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit ▪ Red Hat Enterprise Linux (RHEL) 7.5/7.6/7.7, 64-bit ▪ CentOS 7.5/7.6/7.7, 64-bit
	MongoDB License Agent Elasticsearch Redis RabbitMQ	1	8 Core/ 16 vCPU	64GB	1TB [2]	▪ Red Hat Enterprise Linux (RHEL) 7.5/7.6/7.7, 64-bit ▪ CentOS 7.5/7.6/7.7, 64-bit

Notes:

[1] Each Front Server is recommended to manage 5,000 network nodes at most. To get good performance for data processing and data caching when managing up to 5000 nodes, Front Server is recommended to be installed on a machine equipped with Solid State Drive (SSD).

2) The required hard disk space must be exclusively reserved for NetBrain. And MongoDB must be installed on a machine equipped with Solid State Drive (SSD).
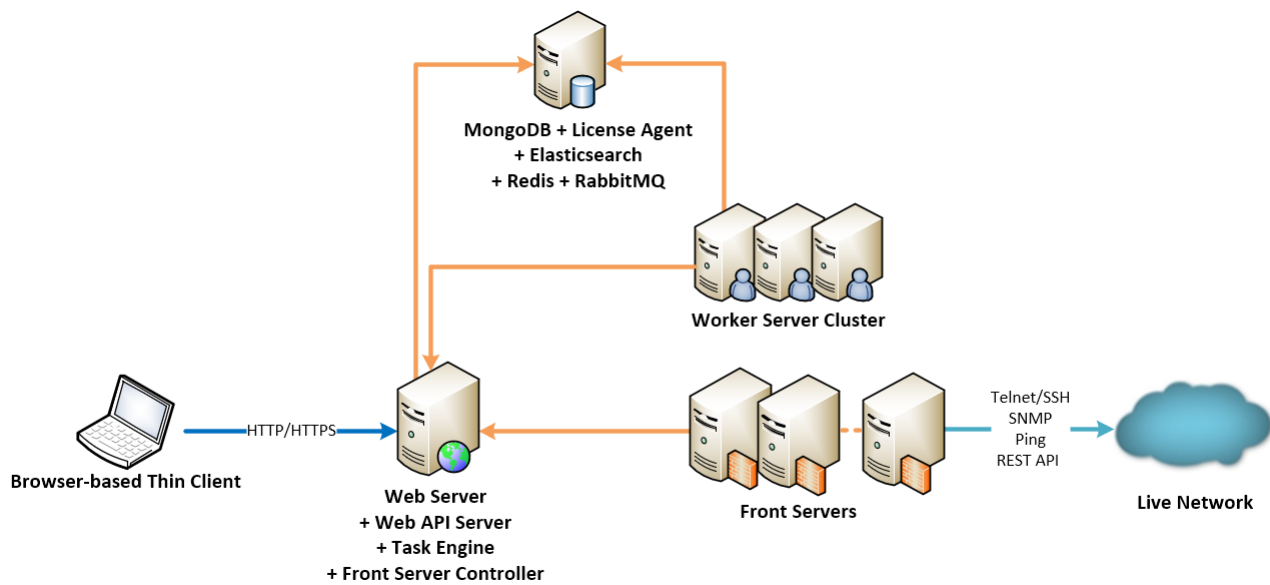
Network connectivity requirements for 5,001~10,000 nodes

Source	Destination	Protocol and Port Number *)
Thin Client	Web Server Web API Server	HTTP/HTTPS (80/443)
Service Monitor Agent	Web API Server	HTTP/HTTPS (80/443)
Web API Server	Knowledge Cloud Domain (https://knowledgecloud.netbraintech.com/)	HTTPS (443)
Web API Server Worker Server Task Engine Front Server Controller	MongoDB RabbitMQ	TCP 27017 TCP 5672
Web API Server Worker Server	Elasticsearch License Agent	TCP 9200 TCP 27654
Web API Server Worker Server Front Server Controller	Redis	TCP 6379 (non-ssl)/TCP 7000 (ssl)
Worker Server Task Engine Front Server	Front Server Controller	TCP 9095
Front Server	Live Network	ICMP/SNMP/Telnet/SSH/REST API
Front Server	Ansible Agent (add-on)	TCP 50051

Note: *) The port numbers listed in this column are defaults only. The actual port numbers used during installation might be different.

Reference Specification for 10,001~50,000 Nodes & ≤200 Seats

As the number of network devices and concurrent users increase, the system requires a distributed environment, which requires more machines to provide resiliency and scale-out flexibly based on your network scale. Both physical machines and virtual machines are supported.

Environment	System Component	Machine Count	CPU	Memory	Hard Disk	Operating System
10,001~50,000 nodes ≤ 200 users	Web Server Web API Server Task Engine Front Server Controller	1	8 Core/ 16 vCPU	32GB	200GB	▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit ▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit
	Worker Server	3	8 Core/ 16 vCPU	32GB	200GB	
	Front Server	3~10 [1]	4 Core/ 8 vCPU	8GB	200GB [1]	▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit ▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit ▪ Red Hat Enterprise Linux (RHEL) 7.5/7.6/7.7, 64-bit ▪ CentOS 7.5/7.6/7.7, 64-bit
	MongoDB License Agent Elasticsearch Redis RabbitMQ	1	8 Core/ 16 vCPU	128GB	2TB [2]	▪ Red Hat Enterprise Linux (RHEL) 7.5/7.6/7.7, 64-bit ▪ CentOS 7.5/7.6/7.7, 64-bit

Notes:

1) Each Front Server is recommended to manage 5,000 network nodes at most. To get good performance for data processing and data caching when managing up to 5000 nodes, Front Server is recommended to be installed on a machine equipped with Solid State Drive (SSD).

2) The required hard disk space must be exclusively reserved for NetBrain. And MongoDB must be installed on a machine equipped with Solid State Drive (SSD).

Network connectivity requirements for 10,001~50,000 nodes

Source	Destination	Protocol and Port Number *)
Thin Client	Web Server Web API Server	HTTP/HTTPS (80/443)
Service Monitor Agent	Web API Server	HTTP/HTTPS (80/443)
Web API Server	Knowledge Cloud Domain (https://knowledgecloud.netbraintech.com/)	HTTPS (443)
Web API Server Worker Server Task Engine Front Server Controller	MongoDB RabbitMQ	TCP 27017 TCP 5672
Web API Server Worker Server	Elasticsearch License Agent	TCP 9200 TCP 27654
Web API Server Worker Server Front Server Controller	Redis	TCP 6379 (non-ssl)/TCP 7000 (ssl)
Worker Server Task Engine Front Server	Front Server Controller	TCP 9095
Front Server	Live Network	ICMP/SNMP/Telnet/SSH/REST API
Front Server	Ansible Agent (add-on)	TCP 50051

Note: *) The port numbers listed in this column are defaults only. The actual port numbers used during installation might be different.

Deployment Prerequisites

The following requirements must be satisfied before setting up your NetBrain system:

- The operating system must be installed with an English-language version (not language packs).
- When installing NetBrain servers, comply with your company security policy to set the passwords and archive them for further reference.
- NetBrain servers use hostnames to identify and communicate with each other. Make sure each server has a unique hostname.
- If the machine's firewall is turned on, make sure the firewall rules allow traffics to all the ports and protocols that will be used by the NetBrain system.
- **Special Requirements for Windows Server**

  o Users with administrative privileges of the machine are required to implement the installation.

  o NetBrain Integrated Edition should not be installed on the same server as an existing NetBrain Enterprise Edition (6.2 or earlier version), except that Front Server and Network Server (EEv6.2) can be installed on the same machine.

  o There must be more than 3GB free space in the system drive (for example, C drive) to complete the installation no matter which drives the NetBrain system will be installed on.

  o Temporarily disable antivirus software during the installation process.

- **Special Requirements for Linux Server**

  o Users with root privileges of the machine are required to implement the installation.

  o It is highly recommended to store the data files and log files of NetBrain servers into separated disk partitions. Make sure each partition has enough disk space.

    ✓ More than **100GB** free space in the directory where the data files of MongoDB/Elasticsearch will be saved.

    ✓ More than **50GB** free space in the directory where the log files of MongoDB/Elasticsearch will be saved.

Supported Web Browsers

- Google® Chrome™ version 51 or higher.
  Note: Using Chrome version 78 may encounter compatibility issues with tables.
- Apple® Safari® version 10.0.1 or higher on macOS.
- Mozilla® Firefox® version 57 or higher.

Third-Party Dependencies

The following table lists the third-party dependencies that must be pre-installed before NetBrain components are installed.

System Component	Third-party Dependencies
MongoDB (Linux)	- Systemd
License Agent (Linux)	- Systemd
Elasticsearch (Linux)	- OpenJDK 12.0.1
Redis (Linux)	- Logrotate, Systemd, and Firewalld must be pre-installed on the same machine before Redis is installed.
RabbitMQ (Linux)	- Erlang-21.2.4 - Logrotate, Socat, and Systemd must be pre-installed on the same machine before RabbitMQ is installed.
Web Server Web API Server Worker Server	- Microsoft Visual C++ 2017 Redistributable - IIS 8/10 - Python 3.7.2 - Microsoft .NET Framework 4.7.2
Task Engine	- Microsoft Visual C++ 2017 Redistributable - OpenJDK 12.0.1 - Microsoft .NET Framework 4.7.2
Front Server Controller	- Microsoft Visual C++ 2017 Redistributable
Front Server (Windows)	- Microsoft Visual C++ 2017 Redistributable
Front Server (Linux)	- glibc.x86_64 - glibc.i686 - libstdc++.x86_64 - libstdc++.i686 - libuuid.x86_64 - libuuid.i686 - pam.x86_64 - pam.i686
Service Monitor Agent	- Python 3.7.2
Ansible Agent (add-on)	- Ansible Engine 2.5 or higher versions - Git - Paramiko 2.6.0