



# NetBrain<sup>®</sup> Integrated Edition 10.0 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](#)
- [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<br>≤10 Seats        | <a href="#">2 Machines</a>     |
| 1001~2000 Nodes<br>≤10 Seats    | <a href="#">2 Machines</a>     |
| 2001~5000 Nodes<br>≤20 Seats    | <a href="#">4 Machines</a>     |
| 5001~10000 Nodes<br>≤50 Seats   | <a href="#">6 Machines</a>     |
| 10001~50000 Nodes<br>≤200 Seats | <a href="#">&gt;8 Machines</a> |

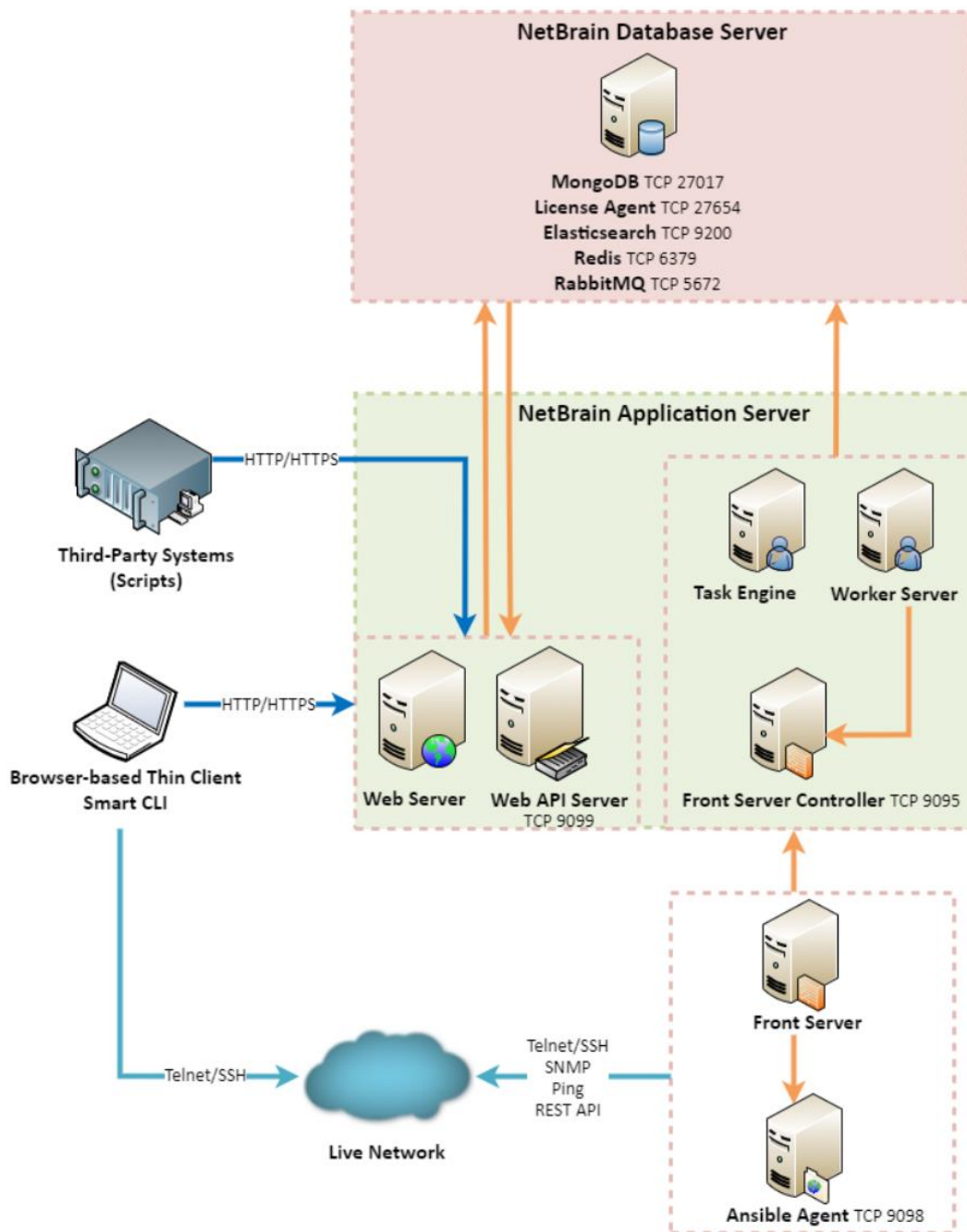
- [Deployment Prerequisites](#)

# System Architecture

NetBrain Integrated Edition is an adaptive automation platform, where you can integrate with your existing Network Management System (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:

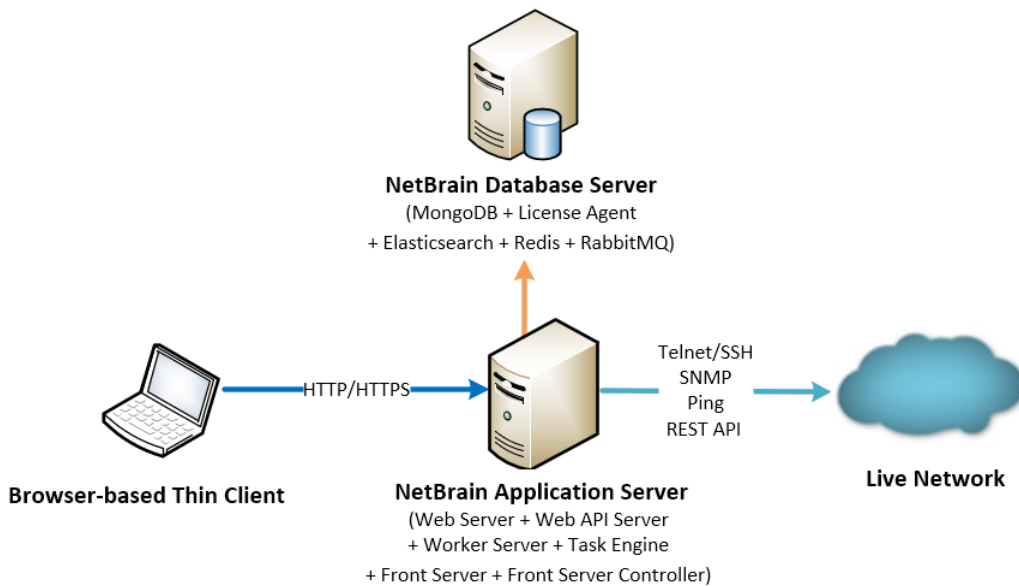
| Component                        | Description   |
|----------------------------------|---|
| <b>Browser-based Thin Client</b> | provides a user interface for end users to access the system.   |
| <b>MongoDB</b>                   | serves as a system data repository.   |
| <b>License Agent</b>    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

# 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.



| Environment               | NetBrain Component | Machine Count | CPU                            | Memory             | Hard Disk   | Operating System  |
|---------------------------|--------------------|---------------|--------------------------------|--------------------|---|---|
| ≤1,000 nodes<br>≤10 users | Application Server | 1             | 4 Physical Cores <sup>1)</sup> | 16GB               | 200GB<br><ul style="list-style-type: none"> <li>▪ HDD <sup>3)</sup></li> <li>▪ SSD <sup>5)</sup></li> </ul> | <ul style="list-style-type: none"> <li>▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit</li> <li>▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit</li> </ul>                                   |
|                           | Database Server    | 1             | 4 Physical Cores <sup>1)</sup> | 16GB <sup>2)</sup> | 300GB<br><ul style="list-style-type: none"> <li>▪ HDD <sup>4)</sup></li> <li>▪ SSD <sup>5)</sup></li> </ul> | <ul style="list-style-type: none"> <li>▪ Red Hat Enterprise Linux Server 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ CentOS 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ Oracle Linux 7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul> |

**Notes:**

- 1) If hyper-threading is enabled, one physical core equals to two logical processors; in a virtual environment, the number of vCPUs required is twice the number of physical cores (as listed in the table).
- 2) Allocating at least half of the RAM amount for swap space on your Linux server is required to provide the necessary additional memory when the RAM space has been exhausted.
- 3) For good performance of data processing and caching, it is recommended to install the Application Server on a machine equipped with Solid State Drive (SSD) when managing up to 5000 nodes.
- 4) The required hard disk space must be exclusively reserved for NetBrain. For better performance, it is recommended to install the MongoDB on a machine equipped with Solid State Drive (SSD), or Hard Disk Drive (HDD) RAID-10.
- 5) If the Intent Based Automation (IBA) license is activated, both Application Server and Database Server must be equipped with Solid State Drive (SSD).

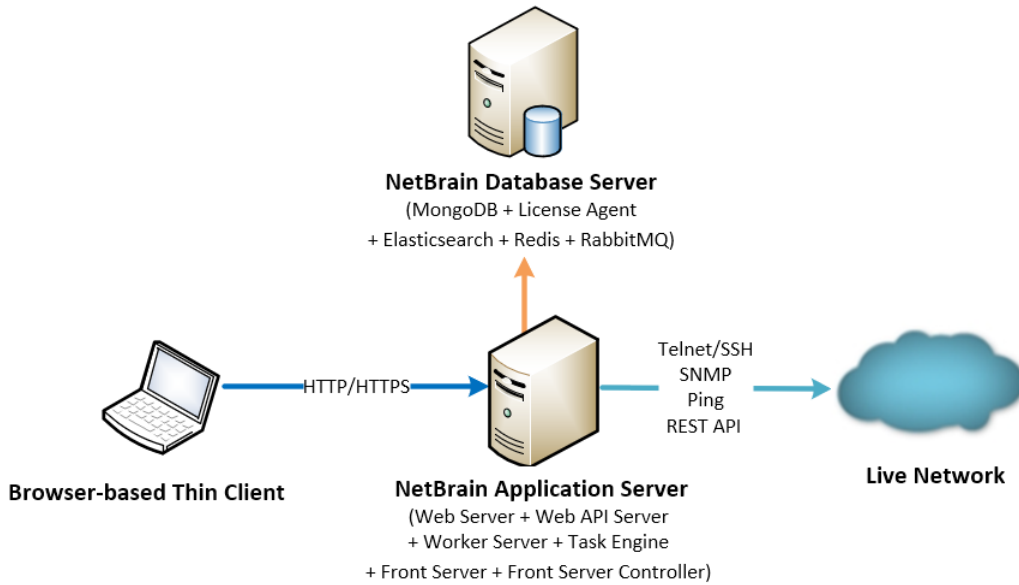
**Network connectivity requirements for ≤1,000 nodes**

| Source                            | Destination            | Protocol and Port Number *)    |
|-----------------------------------|------------------------|--------------------------------|
| Thin Client Service Monitor Agent | Application Server     | HTTP/HTTPS (80/443)            |
| Application Server                | Database Server        | TCP 5672/6379/9200/27017/27654 |
| Application Server                | Ansible Agent (add-on) | TCP 9098                       |
| Application Server                | Live Network           | ICMP/SNMP/Telnet/SSH/REST API  |
| Database Server                   | Application Server     | TCP 9099                       |

**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.



| Environment                     | NetBrain Component | Machine Count | CPU                            | Memory             | Hard Disk  | Operating System  |
|---------------------------------|--------------------|---------------|--------------------------------|--------------------|--|---|
| 1,001~2,000 nodes<br>≤ 10 users | Application Server | 1             | 4 Physical Cores <sup>1)</sup> | 32GB               | 200GB <ul style="list-style-type: none"> <li>▪ HDD <sup>3)</sup></li> <li>▪ SSD <sup>5)</sup></li> </ul> | <ul style="list-style-type: none"> <li>▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit</li> <li>▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit</li> </ul>                                   |
|                                 | Database Server    | 1             | 4 Physical Cores <sup>1)</sup> | 32GB <sup>2)</sup> | 300GB <ul style="list-style-type: none"> <li>▪ HDD <sup>4)</sup></li> <li>▪ SSD <sup>5)</sup></li> </ul> | <ul style="list-style-type: none"> <li>▪ Red Hat Enterprise Linux Server 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ CentOS 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ Oracle Linux 7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul> |

### Notes:

<sup>1)</sup> If hyper-threading is enabled, one physical core equals to two logical processors; in a virtual environment, the number of vCPUs required is twice the number of physical cores (as listed in the table).

<sup>2)</sup> Allocating at least half of the RAM amount for swap space on your Linux server is required to provide the necessary additional memory when the RAM space has been exhausted.

3) For good performance of data processing and caching, it is recommended to install the Application Server on a machine equipped with Solid State Drive (SSD) when managing up to 5000 nodes.

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

5) If the Intent Based Automation (IBA) license is activated, both Application Server and Database Server must be equipped with Solid State Drive (SSD)

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

| Source                               | Destination            | Protocol and Port Number *)    |
|--------------------------------------|------------------------|--------------------------------|
| Thin Client<br>Service Monitor Agent | Application Server     | HTTP/HTTPS (80/443)            |
| Application Server                   | Database Server        | TCP 5672/6379/9200/27017/27654 |
| Application Server                   | Ansible Agent (add-on) | TCP 9098                       |
| Application Server                   | Live Network           | ICMP/SNMP/Telnet/SSH/REST API  |
| Database Server                      | Application Server     | TCP 9099                       |

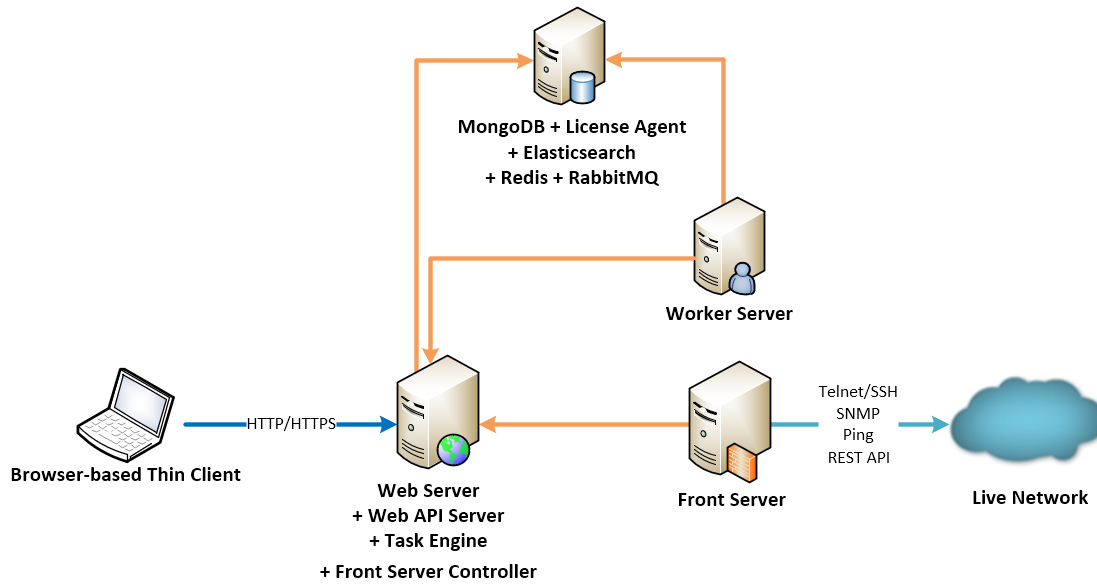
**Note:** \*) The port numbers listed in this column are defaults only. The actual port numbers used during installation might be different.

### 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 <sup>2)</sup> | Hard Disk  | Operating System   |
|---------------------------------|---|---------------|--------------------------------|----------------------|--|--|
| 2,001~5,000 nodes<br>≤ 20 users | Web Server<br>Web API Server<br>Task Engine<br>Front Server Controller<br>Service Monitor | 1             | 4 Physical Cores <sup>1)</sup> | 32GB                 | 200GB  | <ul style="list-style-type: none"> <li>Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit</li> <li>Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit</li> </ul>  |
|                                 | Worker Server<br>Service Monitor  | 1             | 8 Physical Cores <sup>1)</sup> | 32GB                 | 200GB  |  |
|                                 | Front Server<br>Service Monitor   | 1             | 4 Physical Cores <sup>1)</sup> | 8GB                  | <ul style="list-style-type: none"> <li>200GB (HDD) (Essential Mode; node # ≤5000) <sup>3)</sup></li> <li>300GB (HDD) (IBA Mode; node # ≤2000) <sup>6)</sup></li> <li>300GB (SSD) (IBA Mode; node # ≤5000) <sup>6)</sup></li> </ul> | <ul style="list-style-type: none"> <li>Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit</li> <li>Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit</li> <li>Red Hat Enterprise Linux Server 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>CentOS 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul> |

| Environment | System Component  | Machine Count | CPU                            | Memory <sup>2)</sup> | Hard Disk           | Operating System  |
|-------------|---|---------------|--------------------------------|----------------------|---------------------|---|
|             |   |               |                                |                      |                     | <ul style="list-style-type: none"> <li>▪ Oracle Linux 7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul>  |
|             | MongoDB<br>License Agent<br>Elasticsearch<br>Redis<br>RabbitMQ<br>Service Monitor | 1             | 4 Physical Cores <sup>1)</sup> | 32GB                 | 500GB <sup>4)</sup> | <ul style="list-style-type: none"> <li>▪ Red Hat Enterprise Linux Server 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ CentOS 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ Oracle Linux 7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul> |

**Notes:**

<sup>1)</sup> If hyper-threading is enabled, one physical core equals to two logical processors; in a virtual environment, the number of vCPUs required is twice the number of physical cores (as listed in the table).

<sup>2)</sup> Allocating at least half of the RAM amount for swap space on your Linux server is required to provide the necessary additional memory when the RAM space has been exhausted.

<sup>3)</sup> For good performance of data processing and caching, it is recommended to install the Front Server on a machine equipped with Solid State Drive (SSD) when managing up to 5000 nodes.

<sup>4)</sup> 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).

<sup>5)</sup> Minimum bandwidth requirement between Front Server Controller and each Front Server: 10Mbps.

<sup>6)</sup> If the Intent Based Automation (IBA) license is activated, it is recommended to install the Front Server on a machine equipped with:

- Solid State Drive (SSD) when managing up to 5000 nodes
- Hard Disk Drive (HDD) when managing up to 2000 nodes

<sup>7)</sup> In order to achieve the best performance, it is recommended that the network delay between the Front Server Controller and the Front Server be within 30ms.

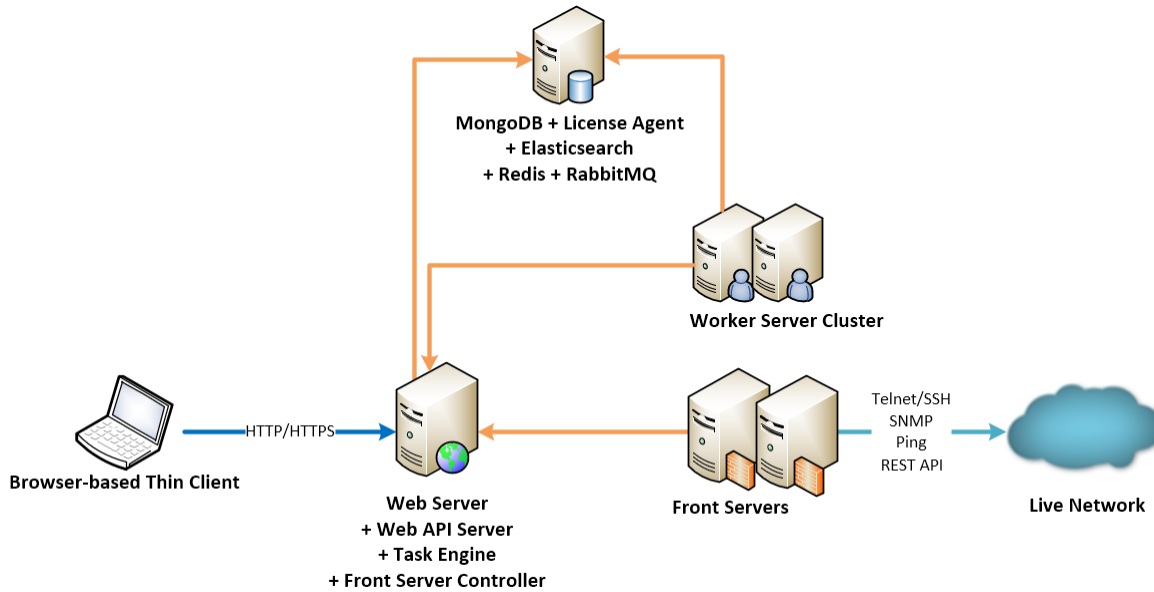
**Network connectivity requirements for 2,001~5,000 nodes**

| Source  | Destination                  | Protocol and Port Number *)   |
|---|------------------------------|-------------------------------|
| Thin Client   | Web Server<br>Web API Server | HTTP/HTTPS (80/443)           |
| Service Monitor Agent   | Web API Server               | HTTP/HTTPS (80/443)           |
| Web API Server<br>Worker Server<br>Task Engine<br>Front Server Controller   | MongoDB                      | TCP 27017                     |
| Web API Server<br>Worker Server   | Elasticsearch                | TCP (HTTP/HTTPS) 9200         |
| Web API Server  | License Agent                | TCP 27654                     |
| Web API Server<br>Worker Server<br>Front Server Controller  | Redis                        | TCP 6379                      |
| Web API Server<br>Worker Server<br>Task Engine<br>Front Server Controller   | RabbitMQ                     | TCP 5672                      |
| Worker Server<br>Task Engine<br>Front Server  | Front Server Controller      | TCP 9095                      |
| Front Server  | Live Network                 | ICMP/SNMP/Telnet/SSH/REST API |
| Front Server  | Ansible Agent (add-on)       | TCP 9098                      |
| MongoDB<br>License Agent<br>Elasticsearch<br>Redis<br>RabbitMQ<br>Web Server<br>Worker Server<br>Task Engine<br>Front Server<br>Front Server Controller | Web API Server               | TCP 9099                      |

**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 <sup>2)</sup> | Hard Disk  | Operating System  |
|----------------------------------|---|---------------|--------------------------------|----------------------|--|---|
| 5,001~10,000 nodes<br>≤ 50 users | Web Server<br>Web API Server<br>Task Engine<br>Front Server Controller<br>Service Monitor | 1             | 8 Physical Cores <sup>1)</sup> | 32GB                 | 200GB  | <ul style="list-style-type: none"> <li>Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit</li> <li>Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit</li> </ul> |
|                                  | Worker Server<br>Service Monitor  | 2             | 8 Physical Cores <sup>1)</sup> | 32GB                 | 200GB  |   |
|                                  | Front Server<br>Service Monitor   | 2             | 4 Physical Cores <sup>1)</sup> | 8GB                  | <ul style="list-style-type: none"> <li>200GB (HDD) (Essential Mode; node # ≤5000) <sup>3)</sup></li> <li>300GB (HDD) (IBA Mode; node # ≤2000) <sup>6)</sup></li> </ul> | <ul style="list-style-type: none"> <li>Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit</li> <li>Windows Server 2016/2019</li> </ul>                                       |

| Environment | System Component  | Machine Count | CPU                            | Memory <sup>2)</sup> | Hard Disk  | Operating System   |
|-------------|---|---------------|--------------------------------|----------------------|--|--|
|             |   |               |                                |                      | <ul style="list-style-type: none"> <li>300GB (SSD) (IBA Mode; node # &lt;=5000) <sup>6)</sup></li> </ul> | <ul style="list-style-type: none"> <li>(Standard/Datacenter Edition), 64-bit</li> <li>Red Hat Enterprise Linux Server 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>CentOS 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>Oracle Linux 7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul> |
|             | MongoDB<br>License Agent<br>Elasticsearch<br>Redis<br>RabbitMQ<br>Service Monitor | 1             | 8 Physical Cores <sup>1)</sup> | 64GB                 | 1TB <sup>4)</sup>  | <ul style="list-style-type: none"> <li>Red Hat Enterprise Linux Server 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>CentOS 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>Oracle Linux 7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul>  |

**Notes:**

<sup>1)</sup> If hyper-threading is enabled, one physical core equals to two logical processors; in a virtual environment, the number of vCPUs required is twice the number of physical cores (as listed in the table).

<sup>2)</sup> Allocating at least half of the RAM amount for swap space on your Linux server is required to provide the necessary additional memory when the RAM space has been exhausted.

<sup>3)</sup> Each Front Server is recommended to manage 5,000 network nodes at most. For good performance of data processing and caching, it is recommended to install the Front Server on a machine equipped with Solid State Drive (SSD) when managing up to 5000 nodes.

<sup>4)</sup> 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).

<sup>5)</sup> Minimum bandwidth requirement between Front Server Controller and each Front Server: 10Mbps.

<sup>6)</sup> If the Intent Based Automation (IBA) license is activated, it is recommended to install the Front Server on a machine equipped with:

- Solid State Drive (SSD) when managing up to 5000 nodes
- Hard Disk Drive (HDD) when managing up to 2000 nodes

<sup>7)</sup> In order to achieve the best performance, it is recommended that the network delay between the Front Server Controller and the Front Server be within 30ms.

### Network connectivity requirements for 5,001~10,000 nodes

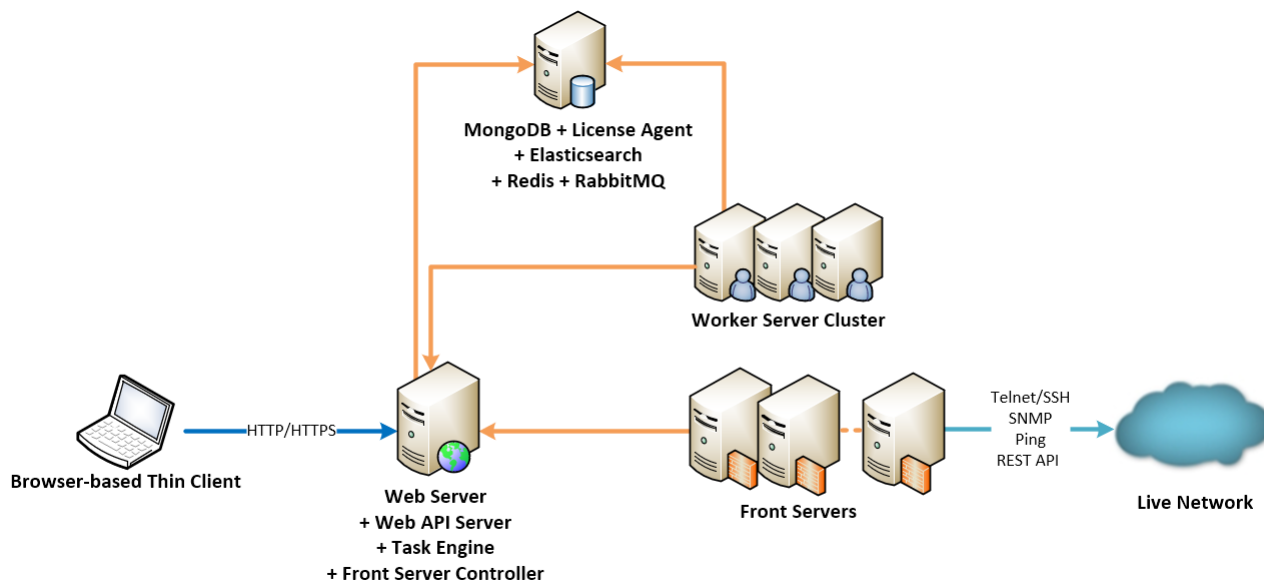
| Source  | Destination                  | Protocol and Port Number <sup>*)</sup> |
|---|------------------------------|--|
| Thin Client   | Web Server<br>Web API Server | HTTP/HTTPS (80/443)                    |
| Service Monitor Agent   | Web API Server               | HTTP/HTTPS (80/443)                    |
| Web API Server<br>Worker Server<br>Task Engine<br>Front Server Controller | MongoDB                      | TCP 27017                              |
| Web API Server<br>Worker Server   | Elasticsearch                | TCP (HTTP/HTTPS) 9200                  |
| Web API Server  | License Agent                | TCP 27654                              |
| Web API Server<br>Worker Server<br>Front Server Controller                | Redis                        | TCP 6379                               |
| Web API Server<br>Worker Server<br>Task Engine<br>Front Server Controller | RabbitMQ                     | TCP 5672                               |
| Worker Server<br>Task Engine<br>Front Server                              | Front Server Controller      | TCP 9095                               |
| Front Server  | Live Network                 | ICMP/SNMP/Telnet/SSH/REST API          |
| Front Server  | Ansible Agent (add-on)       | TCP 9098                               |
| MongoDB<br>License Agent<br>Elasticsearch<br>Redis<br>RabbitMQ            | Web API Server               | TCP 9099                               |

| Source                  | Destination | Protocol and Port Number *) |
|-------------------------|-------------|-----------------------------|
| Web Server              |             |                             |
| Worker Server           |             |                             |
| Task Engine             |             |                             |
| Front Server            |             |                             |
| Front Server Controller |             |                             |

**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 <sup>2)</sup> | Hard Disk | Operating System  |
|------------------------------------|---|---------------|--------------------------------|----------------------|-----------|---|
| 10,001~50,000 nodes<br>≤ 200 users | Web Server<br>Web API Server<br>Task Engine<br>Front Server Controller<br>Service Monitor | 1             | 8 Physical Cores <sup>1)</sup> | 32GB                 | 200GB     | <ul style="list-style-type: none"> <li>Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit</li> <li>Windows Server 2016/2019</li> </ul> |

| Environment | System Component  | Machine Count | CPU                            | Memory <sup>2)</sup> | Hard Disk  | Operating System   |
|-------------|---|---------------|--------------------------------|----------------------|--|--|
|             | Worker Server<br>Service Monitor  | 3             | 8 Physical Cores <sup>1)</sup> | 32GB                 | 200GB  | (Standard/Datacenter Edition), 64-bit  |
|             | Front Server<br>Service Monitor   | 3~10          | 4 Physical Cores <sup>1)</sup> | 8GB                  | <ul style="list-style-type: none"> <li>▪ 200GB (HDD) (Essential Mode; node # &lt;=5000) <sup>3)</sup></li> <li>▪ 300GB (HDD) (IBA Mode; node # &lt;=2000) <sup>6)</sup></li> <li>▪ 300GB (SSD) (IBA Mode; node # &lt;=5000) <sup>6)</sup></li> </ul> | <ul style="list-style-type: none"> <li>▪ Windows Server 2012/2012 R2 (Standard/Datacenter Edition), 64-bit</li> <li>▪ Windows Server 2016/2019 (Standard/Datacenter Edition), 64-bit</li> <li>▪ Red Hat Enterprise Linux Server 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ CentOS 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ Oracle Linux 7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul> |
|             | MongoDB<br>License Agent<br>Elasticsearch<br>Redis<br>RabbitMQ<br>Service Monitor | 1             | 8 Physical Cores <sup>1)</sup> | 128GB                | 2TB <sup>4)</sup>  | <ul style="list-style-type: none"> <li>▪ Red Hat Enterprise Linux Server 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ CentOS 7.5/7.6/7.7/7.8/7.9/8.2/8.3, 64-bit</li> <li>▪ Oracle Linux 7.7/7.8/7.9/8.2/8.3, 64-bit</li> </ul>  |

**Notes:**

<sup>1)</sup> If hyper-threading is enabled, one physical core equals to two logical processors; in a virtual environment, the number of vCPUs required is twice the number of physical cores (as listed in the table).

<sup>2)</sup> Allocating at least half of the RAM amount for swap space on your Linux server is required to provide the necessary additional memory when the RAM space has been exhausted.

<sup>3)</sup> Each Front Server is recommended to manage 5,000 network nodes at most. For good performance of data processing and caching, it is recommended to install the Front Server on a machine equipped with Solid State Drive (SSD) when managing up to 5000 nodes.



4) 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).

5) Minimum bandwidth requirement between Front Server Controller and each Front Server: 10Mbps.

6) If the Intent Based Automation (IBA) license is activated, it is recommended to install the Front Server on a machine equipped with:

- Solid State Drive (SSD) when managing up to 5000 nodes
- Hard Disk Drive (HDD) when managing up to 2000 nodes

7) In order to achieve the best performance, it is recommended that the network delay between the Front Server Controller and the Front Server be within 30ms.

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

| Source  | Destination                  | Protocol and Port Number *) |
|---|------------------------------|-----------------------------|
| Thin Client   | Web Server<br>Web API Server | HTTP/HTTPS (80/443)         |
| Service Monitor Agent   | Web API Server               | HTTP/HTTPS (80/443)         |
| Web API Server<br>Worker Server<br>Task Engine<br>Front Server Controller | MongoDB                      | TCP 27017                   |
| Web API Server<br>Worker Server   | Elasticsearch                | TCP (HTTP/HTTPS) 9200       |
| Web API Server  | License Agent                | TCP 27654                   |
| Web API Server<br>Worker Server<br>Front Server Controller                | Redis                        | TCP 6379                    |
| Web API Server<br>Worker Server<br>Task Engine<br>Front Server Controller | RabbitMQ                     | TCP 5672                    |
| Worker Server<br>Task Engine<br>Front Server                              | Front Server Controller      | TCP 9095                    |

| Source  | Destination            | Protocol and Port Number *)   |
|---|------------------------|-------------------------------|
| Front Server  | Live Network           | ICMP/SNMP/Telnet/SSH/REST API |
| Front Server  | Ansible Agent (add-on) | TCP 9098                      |
| MongoDB<br>License Agent<br>Elasticsearch<br>Redis<br>RabbitMQ<br>Web Server<br>Worker Server<br>Task Engine<br>Front Server<br>Front Server Controller | Web API Server         | TCP 9099                      |

**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.
- Add all the NetBrain installation folders and files (on both Windows and Linux) to the allow list of antivirus software for routine scans and keep the TCP connections unblocked between NetBrain components.
- 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 Client Machine**
  - It is recommended to deploy the NetBrain Smart CLI on the same machine where the browser-based thin client is used, and the machine needs to meet the following minimum system specifications:
    - ❖ **4 Physical CPU Cores** (If hyper-threading is enabled, one physical core equals to two logical processors; in a virtual environment, the number of vCPUs required is twice the number of physical cores)

- ❖ 8GB RAM

- Ensure to reserve at least 50% system capacity for the satisfactory performance of NetBrain Browser-based Thin Client and Smart CLI Application.

- **Special Requirements for Windows Server**

- Users with administrative privileges of the machine are required to implement the installation.
- 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.
- 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.
- Temporarily disable antivirus software during the installation process.

- **Special Requirements for Linux Server**

- Users with root privileges of the machine are required to implement the installation.
- 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.
- More than **180GB** free space for the Front Server PostgreSQL data path.

## Supported Web Browsers

The system supports the following web browsers:

- Chrome version 79.0.3945 and higher
- Safari version 13.0.0 and higher on macOS
- Firefox version 68.0.0 and higher
- Microsoft Edge version 83.0.478.54 and higher based on Chromium

**Note:** The system is designed to work with a minimum screen resolution of 1440x900 pixels.

## 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)                               | <ul style="list-style-type: none"> <li>Systemd</li> </ul>  |
| License Agent (Linux)                         | <ul style="list-style-type: none"> <li>Systemd</li> </ul>  |
| Elasticsearch (Linux)                         | <ul style="list-style-type: none"> <li>OpenJDK 11.0.9</li> <li>Systemd</li> </ul>  |
| Redis (Linux)                                 | <ul style="list-style-type: none"> <li>Logrotate</li> <li>Systemd</li> </ul>   |
| RabbitMQ (Linux)                              | <ul style="list-style-type: none"> <li>Erlang-22.1.7</li> <li>Socat</li> <li>Systemd</li> </ul>  |
| Web Server<br>Web API Server<br>Worker Server | <ul style="list-style-type: none"> <li>Microsoft Visual C++ 2017 Redistributable</li> <li>IIS 8/10</li> <li>Python 3.7.10</li> <li>Microsoft .NET Framework 4.8</li> </ul> |
| Task Engine                                   | <ul style="list-style-type: none"> <li>Microsoft Visual C++ 2017 Redistributable</li> <li>OpenJDK 11.0.9</li> </ul>  |
| Front Server Controller                       | <ul style="list-style-type: none"> <li>Microsoft Visual C++ 2017 Redistributable</li> <li>Python 3.7.10</li> </ul>   |
| Front Server (Windows)                        | <ul style="list-style-type: none"> <li>Microsoft Visual C++ 2017 Redistributable</li> <li>Python 3.7.10</li> </ul>   |
| Front Server (Linux)                          | <ul style="list-style-type: none"> <li>Systemd</li> <li>Python 3.7.10</li> <li>glibc libstdc++ libuuid pam</li> </ul>  |
| Service Monitor Agent (Windows)               | <ul style="list-style-type: none"> <li>Python 3.7.10</li> </ul>  |
| Service Monitor Agent (Linux)                 | <ul style="list-style-type: none"> <li>Python 3.7.10</li> <li>Systemd</li> </ul>   |

| System Component       | Third-party Dependencies  |
|------------------------|---|
|                        | <ul style="list-style-type: none"> <li>▪ zlib-devel readline-devel bzip2-devel ncurses-devel gdbm-devel xz-devel tk-devel libffi-devel gcc</li> </ul>   |
| Ansible Agent (add-on) | <ul style="list-style-type: none"> <li>▪ Ansible Engine 2.5 or higher versions</li> <li>▪ Git</li> <li>▪ Paramiko 2.6.0</li> <li>▪ zlib-devel readline-devel bzip2-devel ncurses-devel gdbm-devel xz-devel tk-devel libffi-devel</li> </ul> |