



I. Netbus Pro System Software Setup

Ver.1.3

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I. Netbus Pro System – Software Setup

Netbus Pro System is a cloud software platform which contains several services such as “data acquisition, collection, management, storage, presentation” which supports “modern data exchange protocols” as well as “conventional automation protocols” to provide a “modern, flexible, scalable and effective” solution.

This document explains step by step setup of required software to a Linux system.

1. System Requirements

To setup Netbus Pro System to computer / embedded platform and run it effectively, The following minimum system requirements should be fulfilled for proper operation :

Operating System : Linux 16.04⁽¹⁾ LTS minimum⁽²⁾

Computer : AMD64 / ARM64⁽³⁾ processor

Memory : 4 GB RAM

Storage⁽⁴⁾ : 64 GB SSD

Note (1) : It is very important which Linux release is used in your system.

To determine the Linux release of your computer, please follow the instructions below:

```
# To check the installed Linux release in an Ubuntu system please enter:
lsb_release -a

#The result:
No LSB modules are available.
Distributor ID: Ubuntu
Description: Ubuntu 20.04 LTS
Release: 20.04
Codename: focal
```

Linux release should be a stable release for proper execution of required software.

For details please see the section “**2.1. Setup Microsoft Net Core**”.

Note (2) : Linux 20.04 LTS is tested release, upgrading to the latest LTS is suggested.

Note (3) : For ARM systems, CPU model specific Netbus Pro release is required.

Note (4) : SSD is required for Netbus Storage service.

2. Netbus Pro System Auto Setup (Preferred Method)

Netbus Pro System automatic software setup will be explained here. Automatic setup executed using the **Netbus Utility for Setup and Removal Extraction Tool (Nusret)**.

2.1. Download Netbus Pro Setup File

First of all please go to the Netbus web site <https://netbus.io/downloads> and download the tar file containing Nusret utility and setup data. Please click the download link and choose option save to file. The download link is given below for your reference:

<http://www.okosis.com/Downloads/SW/Netbus/Pro/NetbusProSetup.tar.xz>

2.2. Execute Netbus Pro Setup Script

Please go to the “Downloads” folder and right click the “NetbusProSetup.tar.xz” file and click the option “extract here”. The extracted folder contains following files:

File Name	Explanation
ReadMe.md	The simple explanation text file for setup / removal operations
install.sh	The Shell script file for installation - This is the Setup script file
remove.sh	The Shell script file for removal - This is the Removal script file
Nusret.jar	The Nusret utility, It is executed automatically by sh files given above
nusret.json	The Nusret procedures as json file (Please do not edit this file)

Please do not change the contents of these files. In the NetbusProSetup folder, right click space and click “Open Terminal” to write following setup / removal commands:

- **Setup** : Write following command to **install** Netbus Pro System:

```
# To install Netbus Pro System
sudo ./install.sh
```

The setup procedures executed automatically, please be patient until setup finishes.

- **Removal** : To **remove** Netbus Pro System from your computer, write this command:

```
# To install Netbus Pro System
sudo ./remove.sh
```

2.2.1. Netbus Pro System Directory and File Structure

Nusret automatic setup utility copies all the software required for **Netbus Pro System** in the Netbus folder with a **ReadMe.md** file providing basic information.

- Please Check the following folders exists in the folder : **“/home/root/Publish/Netbus”**

Netbus System Manager & Configuration Folders:	
The following folders should be kept as it is, Please do not change manually or move any text file inside the folders.	
config	This folder contains JSON configuration files for services.
docs	This folder contains documentation as PDF files.
Netbus System Manager Service and web site for system management :	
NetbusSystemManager	This folder contains necessary files for the web server of Netbus System Manager Service
Netbus Pro Core & Storage & Link Services :	
NetbusPro	This folder contains several files required for the service.
NetbusStorageServer	This folder contains several files required for the service.
NetbusS7Link	This folder contains several files required for the service.
NetbusModbusLink	This folder contains several files required for the service.
Auxiliary Simulation Services :	
S7PLCSimulator	This folder contains Siemens S7 PLC Simulator service
StarComModbusSlaveSim	This folder contains Modbus Slave Simulator service.

- Also, Nusret utility copies following files to the given folders for proper execution :

File Name	Copied To	Explanation
NetbusSystemManager.service	/etc/systemd/system	Linux service for this web page
libsnap7.so	/lib	Siemens S7 Protocol library

2.2.2. Netbus Pro System Linux Services

Nusret utility copies **Netbus Pro System** configuration and application files to the system as explained above. Besides, Nusret utility introduces following linux services to the host:

- **NetbusSystemManager.service (main web server at <http://localhost>)**

The Netbus System Manager service is the management, configuration and diagnostic tool of the Netbus Pro System. The web server is presented as the host's main web page at <http://localhost> address. If you go to the <http://localhost> web site and see the **Netbus System Manager** pages properly, that means the service is working properly.

```
# Please write Following Command to check if the service is running properly
sudo systemctl status NetbusSystemManager.service
• NetbusSystemManager.service - NetbusSystemManager service
  Loaded: loaded (/etc/systemd/system/NetbusSystemManager.service; enabled; >
  Active: active (running) since Tue 2020-07-14 22:23:40 +03; 2h 59min ago ...
```

- **Mongodb.service (Persistent Storage with mongodb)**

The mongodb linux service is used by Netbus Pro Core & Netbus Pro Storage applications. It provides mongodb permanent storage opportunities to Netbus Pro System. If you go to the Netbus Pro Core service's API page and can see the "**Parameters**" and "**Records**" properly, that means the Netbus Pro System can access the **mongodb** service.

```
# Please write Following Command to check if the service is running properly
sudo systemctl status mongodb.service
• mongodb.service - LSB: An object/document-oriented database
  Loaded: loaded (/etc/init.d/mongodb; generated)
  Active: active (running) since Mon 2020-07-13 15:11:49 +03; 1 day 11h ago ...
```

- **mosquitto.service (Mqtt Broker from eclipse)**

Mosquitto MQTT Broker is used by Netbus Pro Core service to be able to provide MQTT interfacing with third party systems.

```
# Please write Following Command to check if the service is running properly
sudo systemctl status mosquitto.service
• mosquitto.service - Mosquitto MQTT v3.1/v3.1.1 Broker
  Loaded: loaded (/lib/systemd/system/mosquitto.service; enabled; vendor pre>
  Active: active (running) since Sat 2020-07-25 15:54:10 +03; 3 days ago
```

2.2.3. Netbus Pro System software platform check

Nusret utility performs the installation of the following software platform components automatically. Please follow the instructions and check if each of them is running properly:

Software component	Check	Confirmation Result
Microsoft Net Core 3.1	<code>dotnet --version</code>	3.1.301
mongodb	<code>mongo --version</code>	MongoDB shell version v4.2.8
java openjdk-11	<code>java -version</code>	openjdk version "11.0.7" 2020-04-14
sysstat (for mpstat)	<code>mpstat -V</code>	sysstat version 12.2.0
mosquitto mqtt broker	<code>mosquitto -h</code>	mosquitto version 1.6.9
NetbusSystemManager.service		
<code>sudo systemctl status NetbusSystemManager.service</code>		
<ul style="list-style-type: none"> NetbusSystemManager.service - NetbusSystemManager service Loaded: loaded (/etc/systemd/system/NetbusSystemManager.service; enabled; > Active: active (running) since Tue 2020-07-14 22:23:40 +03; 2h 59min ago ... 		
mongodb.service		
<code>sudo systemctl status mongodb.service</code>		
<ul style="list-style-type: none"> mongodb.service - LSB: An object/document-oriented database Loaded: loaded (/etc/init.d/mongodb; generated) Active: active (running) since Mon 2020-07-13 15:11:49 +03; 1 day 11h ago ... 		
mosquitto.service		
<code>sudo systemctl status mosquitto.service</code>		
<ul style="list-style-type: none"> mosquitto.service - Mosquitto MQTT v3.1/v3.1.1 Broker Loaded: loaded (/lib/systemd/system/mosquitto.service; enabled; vendor pre> Active: active (running) since Sat 2020-07-25 15:54:10 +03; 3 days ago 		

The minor software versions may differ with the releases that exist on the date you install.

3. Netbus Pro System Manual Setup (Not Preferred)

If you cannot install the Netbus Pro System software automatically by using Nusret utility or any platform / utility is unable to work properly, you may install required software manually by following the setup instructions given below.

3.1. Setup Prerequisite Auxiliary Programs

Netbus Pro Software services require auxiliary software to be able to run correctly. Required software varies according to the services planned to be executed in the host. The required auxiliary software and setup instructions are given below.

3.1.1. Determine your Linux Release

To determine the Linux release of your computer, please follow the instructions below:

```
# To check the installed Linux release in an Ubuntu system please enter:
lsb_release -a

#The result:
No LSB modules are available.
Distributor ID: Ubuntu
Description: Ubuntu 20.04 LTS
Release: 20.04
Codename: focal
```

3.1.2. Setup java

Java platform **openjdk-11** is necessary for execution of simulation programs and execution of Nusret utility. Normally it's installation is performed by executing the install.sh script which exists in the NetbusProSetup.tar.xz file. If it cannot install properly you may try this method. To install java to your system please enter the following lines :

```
# To install java
sudo apt-get install openjdk-11-jre

# After installation to check java and version
java -version
```


3.1.3. Setup Microsoft Net Core

Every Netbus System requires Microsoft Net Core 3.1 software platform.

Microsoft guide for installing .NET Core to Linux is given on the following link:

<https://docs.microsoft.com/en-us/dotnet/core/install/linux-ubuntu>

Check your Linux release compatibility with **.NET Core 3.1** in the following table:

Ubuntu	.NET Core 2.1	.NET Core 3.1	.NET 5 Preview (manual install only)
✓ 20.04 (LTS)	✓ 2.1	✓ 3.1	✓ 5.0 Preview
✓ 19.10	✓ 2.1	✓ 3.1	✓ 5.0 Preview
✗ 19.04	✓ 2.1	✓ 3.1	✗ 5.0 Preview
✗ 18.10	✓ 2.1	✗ 3.1	✗ 5.0 Preview
✓ 18.04 (LTS)	✓ 2.1	✓ 3.1	✓ 5.0 Preview
✗ 17.10	✓ 2.1	✗ 3.1	✗ 5.0 Preview
✗ 17.04	✓ 2.1	✗ 3.1	✗ 5.0 Preview
✗ 16.10	✗ 2.1	✗ 3.1	✗ 5.0 Preview
✓ 16.04 (LTS)	✓ 2.1	✓ 3.1	✓ 5.0 Preview

To setup **Net Core 3.1** into host please follow the instructions given below :

```
# On the following "wget" line, your Linux release should be in the red marked area:
wget https://packages.microsoft.com/config/ubuntu/20.04/packages-microsoft-prod.deb -O
packages-microsoft-prod.deb

# Install using dpkg
sudo dpkg -i packages-microsoft-prod.deb

# Install the SDK Net Core 3.1
sudo apt-get update
sudo apt-get install -y apt-transport-https
sudo apt-get update
sudo apt-get install -y dotnet-sdk-3.1

# After installation you can check the installation
dotnet --version
# Result: 3.1.300
```

3.1.4. Setup MongoDB Persistent Storage

Netbus Pro System services stores their data persistently using the Mongo DB platform. MongoDB setup is necessary in the computer which runs **Netbus Pro Core** application and the **Netbus Storage Server** application.

To set up MongoDB please follow the instruction given below :

```
~$ systemctl status mongod.service
● mongod.service - MongoDB Database Server
   Loaded: loaded (/lib/systemd/system/mongod.service; enabled; vendor preset: e
   Active: active (running) since Mon 2019-12-30 08:05:48 MST; 1min 7s ago
   ...
```

3.1.5. Setup sysstat (for mpstat)

Netbus System Manager service uses the “**mpstat**” command to fetch system diagnostic values from the host computer to show in web pages.

To be able to use “**mpstat**” command, Linux system requires “**sysstat**” utility to be installed from Linux store, to install “**sysatt**” please run following command:

```
# To setup sysstat
sudo apt install sysstat

# After installation of "sysstat", you may diagnose it using "mpstat" command:
mpstat -P ALL 1 1
Linux 5.4.0-39-generic (MCUBU09) 30-06-2020 _x86_64_ (4 CPU)

17:51:59  CPU  %usr  %nice  %sys %iowait  %irq  %soft  %steal  %guest  %gnice  %idle
17:52:00  all  1,53  0,00  0,25  0,00  0,00  0,00  0,00  0,00  0,00  98,22
17:52:00   0  2,04  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  97,96
17:52:00   1  2,04  0,00  1,02  0,00  0,00  0,00  0,00  0,00  0,00  96,94
17:52:00   2  1,02  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  98,98
17:52:00   3  1,01  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  98,99

Average:  CPU  %usr  %nice  %sys %iowait  %irq  %soft  %steal  %guest  %gnice  %idle
Average:  all  1,53  0,00  0,25  0,00  0,00  0,00  0,00  0,00  0,00  0,00  98,22
Average:   0  2,04  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  97,96
Average:   1  2,04  0,00  1,02  0,00  0,00  0,00  0,00  0,00  0,00  0,00  96,94
Average:   2  1,02  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  98,98
Average:   3  1,01  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  0,00  98,99
```

3.1.6. Setup mosquitto (mqtt) broker

Netbus Pro System requires “mosquitto mqtt broker” for interfacing with mqtt messaging protocol. To install mosquitto broker manually, please run following commands:

```
# To install mosquitto
sudo apt-get update
sudo apt-get install mosquitto

# To see the status of mosquitto service
$ systemctl status mosquitto
• mosquitto.service - Mosquitto MQTT v3.1/v3.1.1 Broker
   Loaded: loaded (/lib/systemd/system/mosquitto.service; enabled; vendor
  preset: enabled)
   Active: active (running) since Sat 2020-07-25 15:54:10 +03; 3 days ago
     Docs: man:mosquitto.conf(5)
          man:mosquitto(8)
  Main PID: 1554 (mosquitto)
    Tasks: 3 (limit: 4520)
   Memory: 1.1M
   CGroup: /system.slice/mosquitto.service
           └─1554 /usr/sbin/mosquitto -c /etc/mosquitto/mosquitto.conf
```

Optionally if you want to test the mqtt messaging, please download the utility “mosquitto clients” with the following commands:

```
# To install mosquitto clients (optional)
sudo apt-get install mosquitto-clients
```

For more information about mqtt & mosquitto clients please visit the web site: <https://mosquitto.org/>
To send a value to Netbus Pro system through mqtt protocol, you may write the following command:

```
$ mosquitto_pub -t IOChange -m
'{"TagName":"Busbar2.Voltage","TagId":1001,"Value":"132.55","Quality":80,"IdSrc":0,"TS":"2019-08-19 19:56:06.889","TSDest":"2019-08-19 19:56:06.889","Extra":"OK","ExtraDest":"OK","EMQTT":0,"TopicId":2,"IOA":"","Cloud":"Y","OPCUA":"Y","Command":"Y"}'
```

To check the transaction, go to Netbus Pro API page, variables tab and check the variable named “Busbar2.Voltage” have the value “132.55” and “System.MQTT.ChangesCounter” counts up.

3.1.7. Setup Netbus System Manager Web Server Manually

Netbus System Manager Web Server is the Graphical User Interface (GUI) which is prepared as a **Web Server** for Management & Configuration & Diagnostics for the **Netbus Pro System**. Please be sure that you have completed the actions given in section “3.1.3.Setup sysstat (for mpstat)”. Please follow the instructions given below.

- **Option-1. Setting up as a Linux service using systemctl utility: (Preferred)**

Here is the contents of “**NetbusSystemManager.service**” file:

“**/home/root/Publish/Netbus/00_Installation/default/NetbusSystemManager.service**”

```
[Unit]
Description=NetbusSystemManager service
After=network.target

[Service]
ExecStart=/usr/bin/sudo /usr/bin/dotnet
/home/root/Publish/Netbus/NetbusSystemManager/NetbusSystemManager.dll
WorkingDirectory=/home/root/Publish/Netbus/NetbusSystemManager
Restart=on-failure
RestartSec=500
StartLimitInterval=1000
StartLimitBurst=3

[Install]
WantedBy=multi-user.target
```

To install as a Linux service please execute following commands on terminal:

```
# Change directory to sh service file dir:
cd /home/root/Publish/Netbus/00_Installation/service/default
# Copy this file to system folder using following command:
sudo cp NetbusSystemManager.service /etc/systemd/system
# Start Service:
sudo systemctl start NetbusSystemManager.service
# Enable Service ( To be able to start on boot up of system )
sudo systemctl enable NetbusSystemManager.service
# Check Status
sudo systemctl status NetbusSystemManager
# After successful installation and enabling the service you should see as follows:
• NetbusSystemManager.service - NetbusSystemManager service
Loaded: loaded (/etc/systemd/system/NetbusSystemManager.service; enabled; vendor preset>
Active: active (running) since Tue 2020-06-30 00:38:47 +03; 15h ago
```

- **Option-2. Setting NetbusSystemManager with PM2 utility (Not preferred)**

Please firstly install nodejs and npm utility from Linux repository using following script:

```
sudo apt install nodejs
sudo apt install npm
```

Please install PM2 utility from Linux repository using following script:

```
sudo npm install pm2@latest -g
```

After PM2 please proceed with the installation of Netbus System Manager.

Here is the contents of NetbusSystemManager.sh file:

“/home/root/Publish/Netbus/00_Installation/service/PM2/NetbusSystemManager.sh”

```
#!/bin/bash
#####
# NetbusSystemManager Application
# To access the service go: http://localhost
#####
cd /home/root/Publish/Netbus/NetbusSystemManager
sudo /usr/bin/dotnet exec
/home/root/Publish/Netbus/NetbusSystemManager/NetbusSystemManager.dll
```

Execute following actions to save PM2 configuration with this sh file and reboot.

```
# Change directory to sh files
cd /home/root/Publish/Netbus/00_Installation/service/PM2
# Start the NetbusSystemManager service using sh file
pm2 start NetbusSystemManager.sh
# Save configuration in PM2 repository
pm2 save
# Get the PM2 startup string using following command
pm2 startup
# Here is the result for this command:
Init System found: systemd
[PM2] To setup the Startup Script, copy/paste the following command:
sudo env PATH=$PATH:/home/mc/.nvm/versions/node/v12.16.2/bin
/usr/lib/node_modules/pm2/bin/pm2 startup systemd -u mc --hp /home/mc
## Please copy the above yellow marked reply of your system and paste in the terminal
window and press enter to proceed the startup command in your system.
```