Joule® System Requirements and Performance Guidelines

This document describes Trayport's key system recommendations when using Joule; provides some suggestions on how to potentially improve Joule performance and; describes how to set up your system to successfully connect to your Trayport environment.

Important

The specifications shown below are intended as a guideline. It is possible that Joule users with a suboptimal setup may experience acceptable performance, however unexpected behaviour may result. Likewise, factors other than those listed below may cause degraded performance, even with a recommended setup. This is not intended to be an exhaustive list of system specifications and resources that may affect Joule performance.

Specifications		Operating System	.NET Framework	CPU	RAM Available to Joule	Graphics Card (GPU)
🟢	**Recommended** Joule is capable of delivering optimal performance	Microsoft Windows 8.1 Microsoft Windows 10	4.7.2 Also supported: 4.7.1 4.7 4.6.2	Better than Intel Xeon W3520 processor (2.66 GHz or above), Intel i5-570, or equivalent processor	More than 2GB available to Joule and more than 25% of the machine's RAM available at all times.	Better than NVidia NVS 310 video card
🟡	**Minimum** Joule performance may suffer. Trayport recommends upgrading any components that fall in to this category		4.6.1	Intel Xeon W3520 processor (2.66 GHz or above), Intel i5-570, or equivalent processor	2GB available to Joule and more than 25% of the machine's RAM available at all times.	NVidia NVS 310 video card

Operating System

Joule is a Windows Presentation Foundation (WPF) .NET application which is designed to operate on Windows. Trayport does **not** test Joule on server-based operating systems or on deployments using a virtual environment or virtualised hardware. Trayport only tests and offers full functionality for dedicated hardware running Windows 10 or Windows 8.

.NET Framework

Performance and Diagnostics

Later .NET versions have improved garbage collection algorithms and other performance improvements which should benefit Joule. Trayport recommends upgrading to the most recent version of .NET to take advantage of these improvements. Some highlights include:

- .NET 4.6 - Significant improvements to the overall speed of the .NET application running on 64-bit machines (and also 32-bit in even more recent releases) by a factor of between 1.2x and >20x.

  https://blogs.msdn.microsoft.com/dotnet/2013/09/30/ryujit-the-next-generation-jit-compiler-for-net/

- .NET 4.7.1 - Garbage Collection improvements making a smoother experience.

  https://blogs.msdn.microsoft.com/dotnet/2017/09/28/net-framework-4-7-1-runtime-and-compiler-features/

Security and Stability

Many security fixes are included in each .NET update. Microsoft's monthly .NET framework 'Security and Quality Rollup' patches can be reviewed on the MSDN .NET blog. For example:

- https://blogs.msdn.microsoft.com/dotnet/2018/08/14/august-2018-security-and-quality-rollup/

Available Memory (RAM)

The amount of memory (RAM) used by Joule varies based on the individual user's behaviour and settings. A typical Joule session uses 2.5GB. Trayport recommends having over 2GB of memory available.

Due to windows paging and memory management across all applications; it is advised that 25% or more of the machines RAM is always available. When less than 25% of the RAM is available windows may retrieve data from secondary storage, slowing down the performance of applications including Joule.

The following factors can cause increased memory requirements beyond the above amount:

- high levels of market activity
- having a large number of market sheets configured
- using a large number of tools
- using advanced functionality, like implied prices or an Excel data link.

Managing Memory Usage

If you are experiencing poor Joule performance, you may find the following steps effective in reducing memory usage:

- Reduce the number of implied price calculations being carried out, or disable Joule implied price calculation entirely. To configure implied price calculation within Joule:

    1. Click **Joule > Options**. The Joule Options window displays.

    2. On the *Trading* tab, find the **Implied Price Max Generations** option.
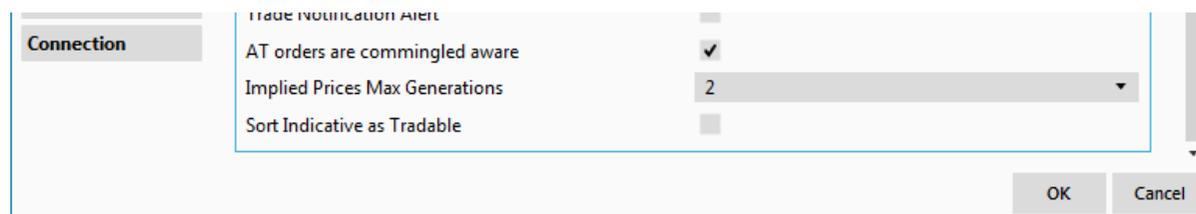
    3. Trayport recommends that this option should be set no higher than '2'. If you continue to experience poor performance, set it to '0' to disable Joule implied price calculation.

- Close any unused marketsheets.

- Upgrade to the latest version of Joule to take advantage of the latest performance improvements and optimisation. A notification displays at the bottom of your Joule screen whenever a new version is available; simply click on the notification, and then click **Update and Restart Joule** to download and install the latest version.

Excel Links

In order to set up a live data link between Joule and an Excel spreadsheet using the *Copy Live* feature, Trayport recommends using Microsoft Excel 2010 or later, and the latest version of the Joule Excel add-in. An earlier version of the Joule Excel add-in is compatible with Excel 2007, however continuing to use this version may result in degraded performance.

The Joule Excel add-in can be installed from within Joule itself by clicking the **?** option in the top-right corner of the screen and selecting **Install Excel Add In**; this automatically installs the correct version of the add-in for your version of Excel. You can also download the add-in from the *Using Joule with Microsoft Excel* topic of the Joule Help.

The following additional components are also required:

- .NET Programmability Support

- Visual Basic for Applications

Connectivity Requirements

> **Note**
>
> These connectivity requirements only apply to Trayport SaaS Trading Gateway clients. Joule Direct users should consult the *Joule Direct Connectivity Guide* document.

Ports 11994 and 440 should be open between your desktop and your Trayport server. If you wish to connect using an alternative port, or if you would like to discuss using a proxy configuration, please contact Trayport Support on +44 (0) 20 7960 5555 or support@trayport.com.

Joule uses Microsoft ClickOnce technology to install and automatically update. In order to allow this, your Firewall must permit access for the following types of files:

- *.deploy
- *.dll
- *.exe
- *.ico
- *.manifest.

The Joule software itself is digitally signed. For further information, please contact Trayport Support.

In order for crash reports to be successfully sent, your firewall must allow access to the URL *https://support.trayport.com/* (IP Address: 91.233.153.18; Port: 443). Crash reporting is activated by default and can be de-activated using the *Report crashes to Trayport* option on the *General* tab of the Joule Options window. For more information, see the *Joule User Guide*.

Installing Joule

Trayport Support will provide you with a unique Joule installation link in an email.

Connecting to Joule

When you open Joule, the login window displays.
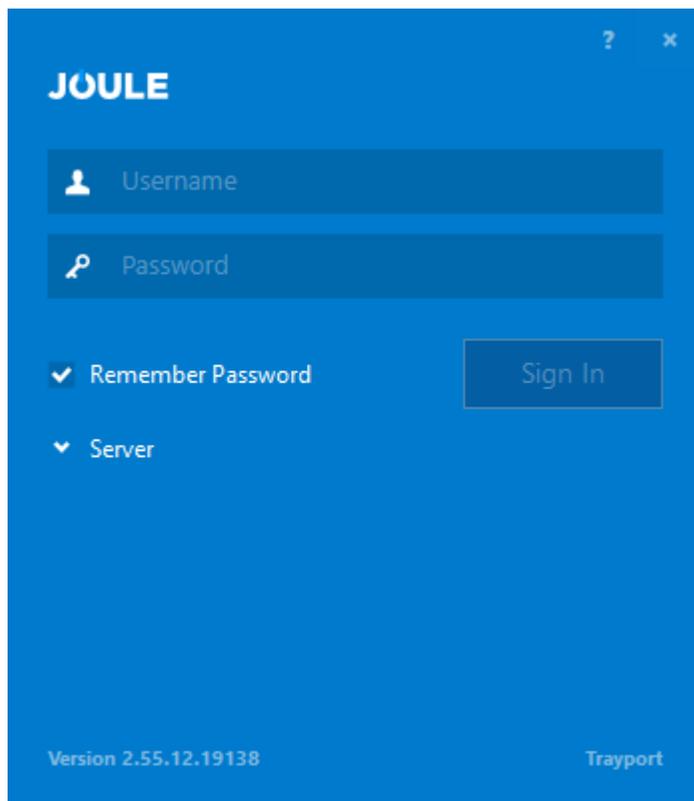
To log in:

1. Click **Server** to display the server address field, then enter the following connection string:

   rpss://server_address:443

   Where *server_address* is the Fully Qualified Domain Name for your Trayport server (this will be provided to you by Trayport Support).

   > **Note**
   >
   > If you wish to connect using an alternative port, contact Trayport Support to discuss your requirements. For information on how to connect using a proxy, see the sections below.

2. Enter your **Username** and **Password** and click **Sign In** to open Joule.

Connecting via a Proxy

If you wish to connect via a proxy server you should specify the proxy server address before the server address, separated by a slash (/). For example, *http://proxy.server.com/rpss://server_address*.

By default, when connecting via a proxy server, Joule attempts to connect to port 443 on the target server and port 8080 on the proxy server. If you wish to use another port for the proxy server, you should specify the port number following the proxy server address, separated by a colon. For example, *http://proxy.server.com:20000/rpss://server_address*.

Connecting to Joule Direct via a Proxy

Joule supports connection via proxy. The proxy address should be specified when you log in to Joule, before the server address, separated by a slash (/). For example: *http://**proxy.server.com/**joule.customer_name.trayport.com*.

By default, when connecting via a proxy, Joule Direct attempts to connect via port 443 on the target and port 8080 on the proxy. If you wish to use another port for the proxy , specify the port number following the proxy server address, separated by a colon. For example, *http://**proxy.server.com:20000/**joule.customer_name.trayport.com*.