



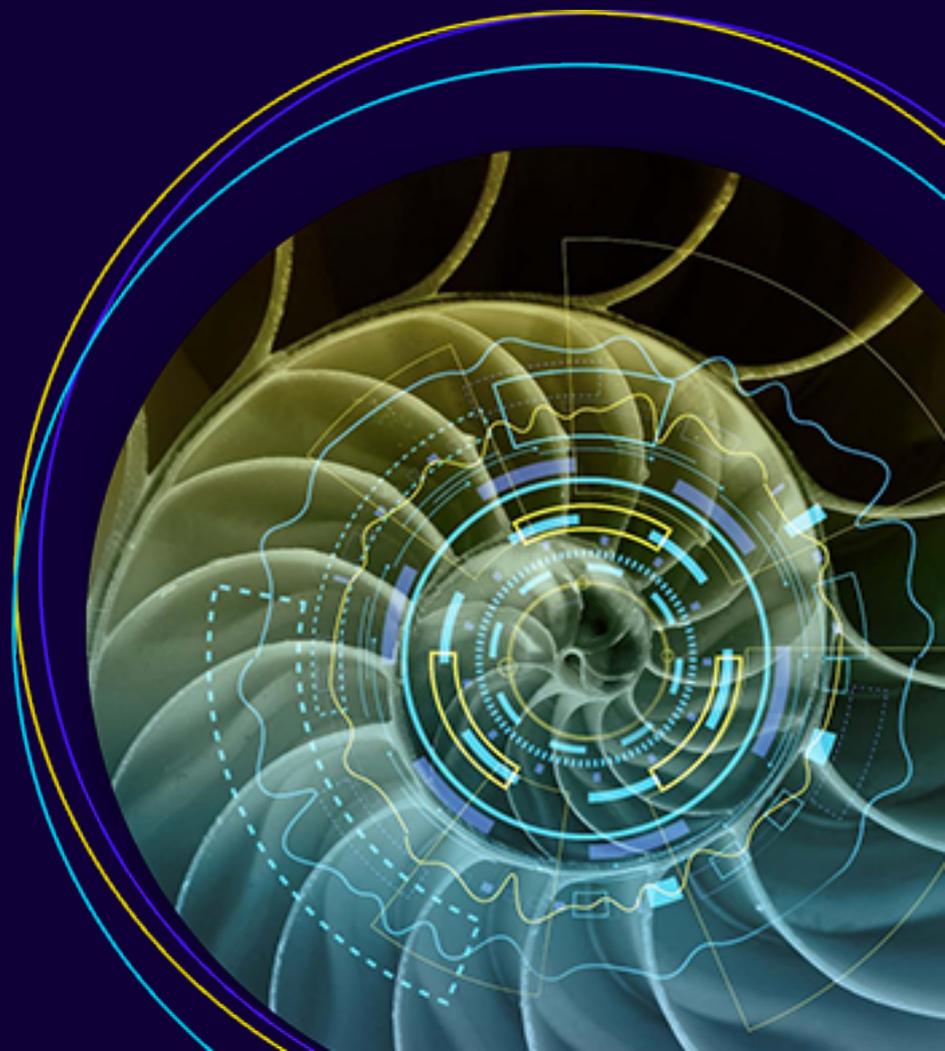
System Architecture & Requirements

Kryon RPA Platform v19.5.1

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Introduction

This document provides an overview of the Kryon RPA Platform: its components, architecture, deployment, and system requirements.

The Kryon RPA Platform offers a number of solutions, designed to enhance efficiency in different automation contexts:

Unattended automation (creating a virtual workforce)

Kryon unattended robots run on virtual machines, working 24/7 behind the scenes to automate high-volume, repetitive, time-consuming business processes. In an unattended automation context:

- Robots are assigned tasks via Kryon Console (or via the Kryon API)
- Each task invokes a wizard, which provides the robot with a precise set of instructions for completing the task
 - The wizard runs automatically in robotic mode, without the need for human intervention

Attended automation (empowering the human workforce)

Kryon attended robots run in the background on employee desktops, enabling employees to request guidance as needed or automate tasks on demand. There are two different methods for invoking a Kryon attended robot (which can be used separately or in combination):

1. When an employee needs support in completing a task, he simply brings up the robot and finds the wizard he needs in the catalog
 - A wizard can be run in **Do It** mode (in which the robot actually performs actions for the employee) or in **Guide Me** mode (in which the robot navigates the employee through the task by pointing to each location where he needs to click the mouse or enter text)
- or –
2. The robot waits silently in the Windows taskbar, using predefined sensors to detect when the employee has launched a specific application or reached a specific screen
 - When the sensor is triggered, the robot comes to life, providing context-sensitive assistance and/or data validation exactly when and where it is needed

Hybrid automation (combining the best of both worlds)

Humans and robots work efficiently together, automating business processes from end-to-end.

Unless otherwise indicated, the information in this document applies to all automation contexts. In situations for which requirements/considerations differ, the following labels appear:

Unattended Only

Attended Only

The Kryon RPA Platform

The Kryon RPA Platform consists of the following components:

- [Kryon Robots](#) (unattended/attended)
- [Kryon Studio](#)
- [Kryon Console](#) **Unattended Only**
- [Kryon RPA Server & Database](#)

Kryon Robots

Unattended robot **Unattended Only**

A client installed on a virtual machine that runs wizards (i.e., sequences of instructions) on target applications with no human intervention. For additional details, see [Unattended automation \(creating a virtual workforce\)](#).

Attended robot **Attended Only**

A desktop client that runs wizards and sensors on the target applications of end-user desktops. For additional details, see [Attended automation \(empowering the human workforce\)](#).

Kryon Studio

Wizards and sensors are built in Kryon Studio, with a complete set of tools that make it easy for both business users and developers to create automated workflows – from the simplest to the most sophisticated. Studio includes:

- Kryon Recorder, which enables automation developers to record and edit the keystrokes and mouse movements required to perform a specific task (in a single application or across many)
- A robust toolbox of actions for editing recorded wizards or creating complete wizards from scratch. These actions can be used to retrieve data, interact directly with applications and UI elements, call up scripts, add business logic, and much more.

Kryon Console Unattended Only

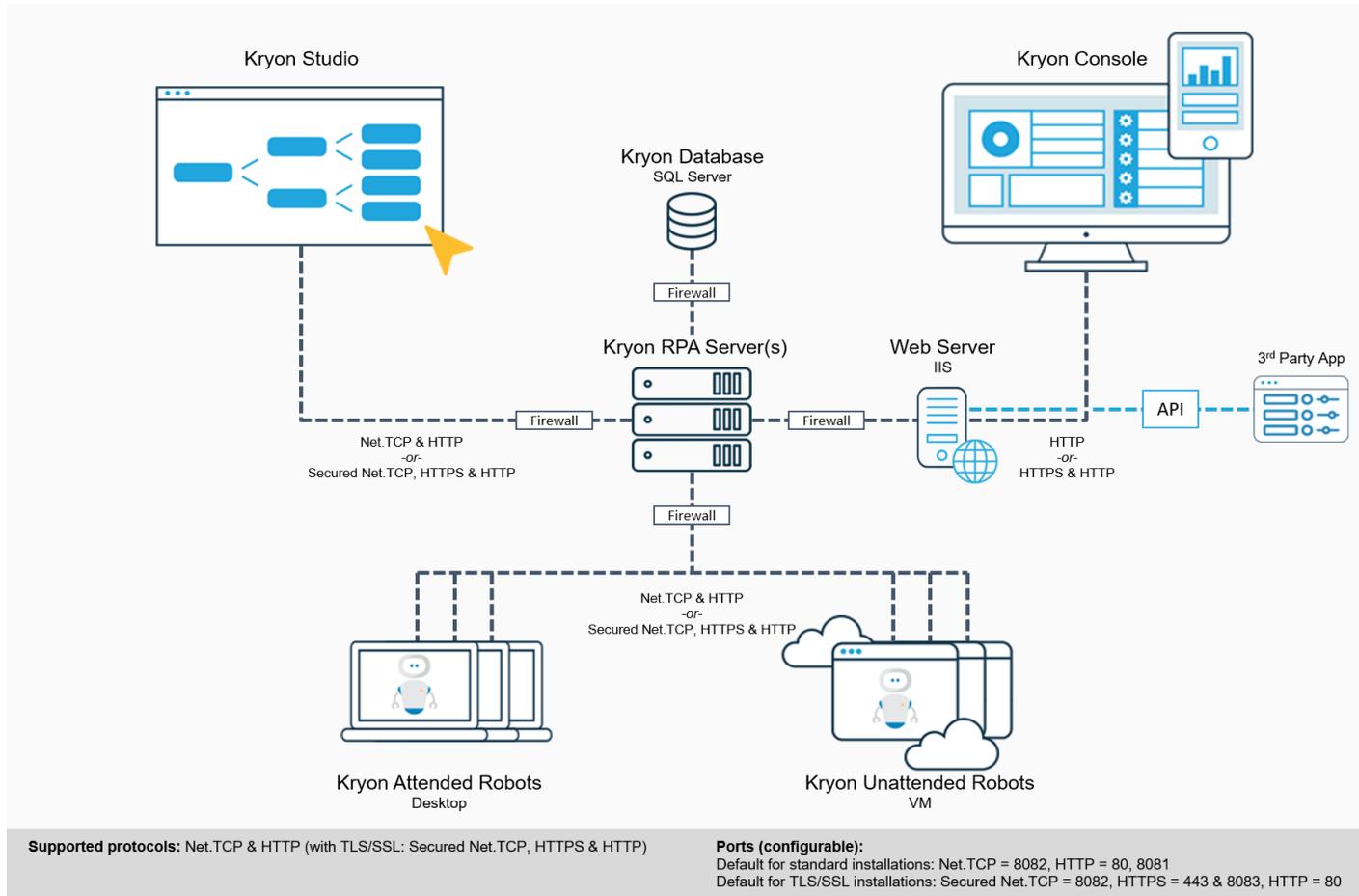
The "command and control" center in the [unattended automation](#) context, Kryon Console is a browser-based application that provides automation managers the tools to setup, manage, and monitor the virtual workforce (i.e., unattended robots). Kryon Console includes sophisticated, yet easy-to-use, modules for:

- setting up and managing the unattended automation environment (robots and robot groups, robot credentials, system notifications, etc.)
- scheduling and triggering tasks and assigning them to robots/groups
- monitoring and analyzing robot/task performance with Smart Analytics

Kryon RPA Server & Database

The central repository that stores all wizards (including automatic backups and version history), collects usage statistics, and manages licenses and permissions. The client-server architecture of the Kryon RPA Platform provides a truly collaborative, enterprise-ready, and multi-tenant enabled solution – easily scalable across organizations of all sizes.

System Architecture



Network Considerations

Protocols

By default, the Kryon RPA Platform utilizes the Net.TCP and HTTP protocols. The platform includes the option to secure communications using TLS/SSL, in which case the primary protocols are Secured Net.TCP and HTTPS.

- When deployed with TLS/SSL, one of Kryon's Windows services utilizes the HTTP protocol. The communication for this service uses a secured channel, with security implemented at the message level rather than at the transport level.



NOTES

When installing with TLS/SSL, the customer must provide the required certificate. Note that encrypting communications at the transport level may influence communication speed between the Kryon Server and clients.

Ports

Kryon's default port configuration is as follows. Server-side ports are fully and easily configurable. For standard deployments (those not using TLS/SSL):

| Friendly name | Protocol | Server-side inbound port (configurable) | Client-side outbound port |
|---------------------|----------|---|---------------------------|
| <i>HTTP port</i> | HTTP | 8081 | dynamic |
| <i>Net.TCP port</i> | Net.TCP | 8082 | dynamic |
| <i>NGNIX port</i> | HTTP | 80 | N/A |

TLS/SSL For TLS/SSL deployments:

| Friendly name | Protocol | Server-side inbound port (configurable) | Client-side outbound port |
|-----------------------|-----------------|---|---------------------------|
| <i>HTTPS port</i> | HTTPS | 8083 | dynamic |
| <i>Net.TCP port</i> | Secured Net.TCP | 8082 | dynamic |
| <i>NGNIX port</i> | HTTPS | 443 | N/A |
| <i>Discovery port</i> | HTTP | 80 | N/A |

Unattended Only Port 8090 is used when installing more than one Kryon RPA Server.

Traffic

Downloading wizards from the Kryon Server to robots has minimal impact on overall network traffic.

Load Balancing Attended Only

Kryon supports active-active redundancy for attended automation deployments with multiple servers. Customers can choose to implement this capability either: (i) through Kryon's internal load balancing mechanism; or (ii) by utilizing an external load balancer.

See [Appendix A](#) for an illustration of external load balancer architecture.

System Requirements – Server

| | Test Server | Production Environment (minimum) | Production Environment (recommended) | |
|---------------------|---------------------------------|--|--|---|
| | Single Server | Single Server | RPA Servers | Database Server |
| Machine role | RPA Server + Database + Console | RPA Server + Database + Console | RPA Server + Console | Database |
| # of servers | 1 physical or VM server | 1 physical or VM server | 2 | According to organization policy – redundant or cluster |
| CPU | 4 cores | 4 cores + 1 core for each 1,000 concurrent attended or 50 unattended robots | 4 cores + 1 core for each 1,000 concurrent attended or 50 unattended robots | 4 cores |
| Memory | 8 GB | 8 GB | 8 GB | 8 GB |

| | Test Server | Production Environment (minimum) | Production Environment (recommended) | |
|-----------------------|---------------|--|--|-----------------|
| | Single Server | Single Server | RPA Servers | Database Server |
| Robot capacity | | <p>According to number of CPU cores –</p> <p><i>With 4 cores (minimum architecture):</i></p> <p>Max # of concurrent attended robots = 1,000</p> <p>- or -</p> <p>Max # of concurrent unattended robots = 100</p> <p><i>With 4 additional cores:</i></p> <p>Max # of concurrent attended robots = 5,000</p> <p>- or -</p> <p>Max # of concurrent unattended robots = 300</p> | <p>According to number of CPU cores –</p> <p><i>With 4 cores (minimum architecture):</i></p> <p>Max # of concurrent attended robots = 1,000</p> <p>- or -</p> <p>Max # of concurrent unattended robots = 100</p> <p><i>With 8 additional cores:</i></p> <p>Max # of concurrent attended robots = 9,000</p> <p>- or -</p> <p>Max # of concurrent unattended robots = 500</p> | |
| Disk size | 250 GB | 250 GB | 500 GB | 500 GB |

| | Test Server | Production Environment (minimum) | Production Environment (recommended) | |
|--------------------------|---|--|---|--|
| | Single Server | Single Server | RPA Servers | Database Server |
| Network | 2 MB in/out | 2 MB in/out | 2 MB (in/out) per 5,000 concurrent attended or 300 concurrent unattended robots | |
| OS | Windows Server 2012 R2 or higher | Windows Server 2012 R2 or higher | Windows Server 2012 R2 or higher | |
| Database software | <p>Microsoft SQL Server 2012 or higher (Express edition, NO license required), including these components:</p> <ul style="list-style-type: none"> • Database Engine Services • Basic Management Tools <p><i>** In test environments, Microsoft SQL Server 2017 Express Edition can be optionally installed by the RPA server installation package.</i></p> | <p>Microsoft SQL Server 2012 or higher (Standard edition or higher, license required), including these components:</p> <ul style="list-style-type: none"> • Database Engine Services • Basic Management Tools <p><i>** In production environments, database software must be installed prior to RPA server installation</i></p> | | <p>Microsoft SQL Server 2012 or higher (Standard edition or higher, license required), including these components:</p> <ul style="list-style-type: none"> • Database Engine Services • Basic Management Tools <p><i>** In production environments, database software must be installed prior to RPA server installation</i></p> |

Additional software & Windows components installed by RPA server installation package

Automatic installation

The following software is automatically installed by the RPA server installation package if not previously installed:

- Microsoft .NET Framework 4.7.2
- Microsoft .NET Core 2.2 – Windows Server Hosting
- Microsoft .NET Core 3.1 – Windows Server Hosting
- Microsoft Visual C++ 2015-2019 Redistributable (x64)
- Windows PowerShell update to version 5.1
 - Relevant only to servers running Windows Server 2012 R2
- OpenSSL
- RabbitMQ Server (the queue manager for communications between Kryon RPA Server and Console)
- Erlang OTP (the programming language on which RabbitMQ is built)

Optional installation

The following software can be optionally installed by the RPA server installation package:

- Microsoft SQL Server 2017 Express Edition
- Seq (centralized logging package)
- Notepad++
- Google Chrome

- Heidi SQL
- Softerra LDAP Browser
- **Unattended Only** Internet Information Services (IIS)
 - The IIS Windows component will be installed automatically if the option to install the Console website is selected and the server has Internet access during installation. If the server does **NOT** have access to the Internet during installation and you want the RPA installation package to install Console, [all required IIS components](#) must be manually installed prior to RPA server installation. Otherwise, installation will fail.

Unattended Only Required IIS components

Kryon Console requires the following IIS components:

Common HTTP Features

- Default Document
- Directory Browsing
- HTTP Errors
- Static Content
- HTTP Redirection

Health and Diagnostics

- HTTP Logging
- Custom Logging

- Logging Tools
- Request Monitor

Performance

- All available options

Security

- Request Filtering
- Basic Authentication
- Client Certificate Mapping Authentication
- Digest Authentication
- IIS Client Certificate Mapping Authentication
- IP and Domain Restrictions
- URL Authorization
- Windows Authentication

Application Development

- .NET Extensibility 4.5 (or above)
- ASP.NET 4.5 (or above)
- ISAPI Extensions
- ISAPI Filters

Management Tools

- IIS Management Console
- IIS Management Scripts and Tools
- Management Service

TLS/SSL TLS/SSL certificate requirements

Customers who wish to install the Kryon RPA Platform using TLS/SSL must provide a certificate that meets the following requirements:

| | |
|------------------------------------|--|
| File format | PKCS #12 is PFX format (bundles a private key with its X.509 certificate) If PFX file is secured with password, customer must know it Certificate must be capable of being installed locally on server machine's personal certificate repository |
| Issuer | Signed by known, valid certificate authority: public CA or private CA |
| Public key | RSA 2048+ |
| Signature hash | SHA256 |
| Enhanced key usage | <i>Server Authentication or Multipurpose</i> |
| Certificate expiration date | It is the customer's responsibility to make sure certificates are kept up to date |

System Requirements – Clients

| | Unattended Robot | | Attended Robot | | Kryon Studio | |
|---------------------------|------------------------------------|------------------------------|--|------------------------------|------------------------------|-------------|
| | minimum | recommended | minimum | recommended | minimum | recommended |
| Machine type | physical or virtual | | physical or virtual | | physical or virtual | |
| CPU | Intel® Core Duo 2 GHz (or similar) | Intel® i3/i5/i7 (or similar) | Intel® Core Duo 2 GHz (or similar) * Intel® i3/i5/i7 (or similar) – if using Kryon's sensor/push technology | Intel® i3/i5/i7 (or similar) | Intel® i3/i5/i7 (or similar) | |
| RAM | 2 GB | 4 GB | 2 GB * 4 GB – if using Kryon's sensor/push technology | 4 GB | 4 GB | 8 GB |
| Free memory | 200-300 MB (or higher) | | 200-300 MB (or higher) | | 200-300 MB (or higher) | |
| Minimum disk space | 200 MB | | 200 MB | | 200 MB | |

| | Unattended Robot | | Attended Robot | | Kryon Studio | |
|---------------------------|--|-------------|--|-------------|---|-------------|
| | minimum | recommended | minimum | recommended | minimum | recommended |
| OS | Windows 7 SP1/8.1/10 (most recent update – 64 bit Windows Server 2008 R2 SP1/2012/2016 – 64 bit | | Windows 7 SP1/8.1/10 (most recent update) – 32/64 bit Windows Server 2008 R2 SP1/2012/2016 – 64 bit | | Windows 7 SP1/8.1/10 (most recent update) – 64 bit Windows Server 2008 R2 SP1/2012/2016 – 64 bit <i>* Best practice is for the Studio machine's OS to match as closely as possible the OS of the robot machine(s) on which the automation workflows will run.</i> | |
| Other requirements | | | | | Minimum video resolution: 1024x768 | |

Additional software installed by Kryon Studio & Robot installation packages

The following software is automatically installed if not previously installed:

- Microsoft .NET Framework 4.7.2
- Microsoft Visual C++ 2015-2019 Redistributable (x86/x64 as appropriate)



NOTE

Consider the apps!

Remember that Kryon unattended and attended robots work directly on their machines' applications. Therefore, robot machines' specifications must also meet the minimum requirements for the applications themselves.

Additional Information

Kryon Robot performance & resource consumption

- Kryon robots (both unattended and attended) are designed to consume minimum system resources when idle: 0 CPU time and approximately 2-3 MB of memory
- When a wizard is running, a robot consumes CPU resources as required, and memory consumption could increase to 250-300 MB
 - Sufficient resources to run the target application(s) are also required
- Resources are automatically released when the robot returns to idle (i.e., the wizard has completed)

Installation considerations

Kryon clients (unattended/attended robots and Studio) must be installed on machines that have direct access to the target applications on which the wizards will run.

- Local applications → Kryon clients should be installed on the same machine on which the applications are installed
- Web applications → Kryon clients should be installed on a machine with access to the Internet and the website(s) used by the applications

Supported applications & technologies

The Kryon RPA Platform supports the automation of any application, regardless of the underlying technology/platform:

- Desktop and web applications
- Legacy systems
- Green screen emulators
- Proprietary and off-the-shelf systems
- Citrix and other virtualization technologies

Supported browsers for web applications

The following browsers are supported for wizards running on web applications:

- Internet Explorer 11 and above
- Google Chrome 72 and above
- Mozilla Firefox 53 and above

APPENDIX A: External Load Balancer Architecture

