Kryon RPA

VERSION 20.9

System Architecture & Requirements

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Contents

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

THIRD PARTY COMPONENTS

Third party software provided as part of or with the Licensed Product is solely governed by its respective license terms as set forth in:

https://www.kryonsystems.com/Documents/3rdParty/Kryon_RPA_20-9_3rd-party_list.xlsx

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.
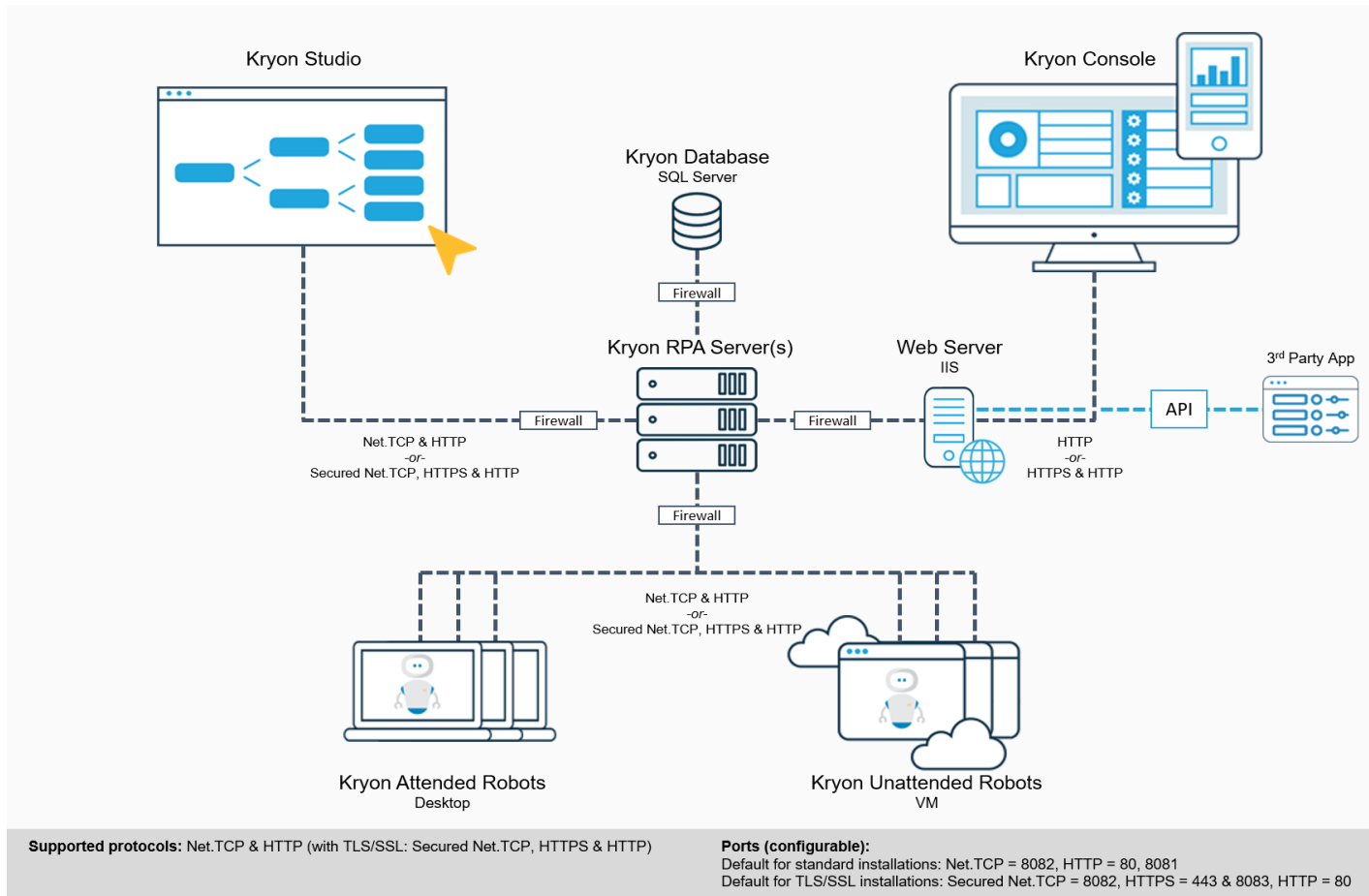
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Kryon ConsoleX `Unattended Only`

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

Kryon Studio

Kryon Console

Kryon Database
SQL Server

Firewall

Kryon RPA Server(s)

Web Server
IIS

3rd Party App

API

Firewall

Firewall

Firewall

Net.TCP & HTTP
-or-
Secured Net.TCP, HTTPS & HTTP

HTTP
-or-
HTTPS & HTTP

Firewall

Net.TCP & HTTP
-or-
Secured Net.TCP, HTTPS & HTTP

Kryon Attended Robots
Desktop

Kryon Unattended Robots
VM

Supported protocols: Net.TCP & HTTP (with TLS/SSL: Secured Net.TCP, HTTPS & HTTP)

Ports (configurable):
Default for standard installations: Net.TCP = 8082, HTTP = 80, 8081
Default for TLS/SSL installations: Secured Net.TCP = 8082, HTTPS = 443 & 8083, HTTP = 80

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 SSL/TLS , in which case the primary protocols are Secured Net.TCP and HTTPS.

- When deployed with SSL/TLS , 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 SSL/TLS , 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.
>
> Only SSL/TLS v1.2 is supported.

Ports

Kryon's default port configuration is as follows. Server-side ports are fully and easily configurable.

For standard deployments (those not using SSL/TLS):

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

TLS/SSL For SSL/TLS deployments:

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

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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.

CHAPTER 5: System Requirements – Server

	Test Server	Production Environment (minimum)	Production Environment (recommended)		
	Single Server	Single Server	RPA Servers	Database Server	Centralized Log Repository Server (SEQ) *
Machine role	RPA Server + Database + Console	RPA Server + Database + Console	RPA Server + Console	Database	SEQ
# of servers	1 physical or VM server	1 physical or VM server	2 physical or VM servers	According to organization policy – redundant or cluster	According to organization policy – redundant or cluster
CPU	4 cores	4 cores + 2 cores 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 + 1 core for each 1,000 concurrent attended or 50 unattended robots	4 cores
Memory	8 GB	8GB + 512MB for each 1,000 concurrent attended or 50	8GB + 512MB for each 1,000 concurrent	8GB + 512MB for each 1,000 concurrent	16 GB RAM

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	Test Server	Production Environment (minimum)	Production Environment (recommended)		
	Single Server	Single Server	RPA Servers	Database Server	Centralized Log Repository Server (SEQ) *
		unattended robots	attended or 50 unattended robots	attended or 50 unattended robots	
Robot capacity		**According to number of CPU cores –** *With 4 cores (minimum architecture)*: Max # of 1000 concurrent attended robots - or - Max # of 50 concurrent unattended robots *With 8 additional cores*: Max # of 1000 concurrent attended robots - or -	**According to number of CPU cores –** *With 4 cores (minimum architecture)*: Max # of 1,000 concurrent attended robots - or - Max # of 50 concurrent unattended robots *With 12 additional*	**According to number of CPU cores –** *With 4 cores (minimum architecture)*: Max # of 1,000 concurrent attended robots - or - Max # of 50 concurrent unattended robots *With 12 additional cores*:	

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	Test Server	Production Environment (minimum)	Production Environment (recommended)		
	Single Server	Single Server	RPA Servers	Database Server	Centralized Log Repository Server (SEQ) *
		Max # of 350 concurrent unattended robots	*cores*: Max # of 15,000 concurrent attended robots - or - Max # of 500 concurrent unattended robots	Max # of 15,000 concurrent attended robots - or - Max # of 500 concurrent unattended robots	
Disk size (Local hard disk *only*)	250 GB	250 GB (minimum 100 GB required by the installer)	500 GB	500 GB	256 GB SSD
Network	20 Mbps in/out	20 Mbps in/out	Average of 30 Mbps (in/out) per 5,000 concurrent attended or 167 concurrent		

	Test Server	Production Environment (minimum)	Production Environment (recommended)		
	Single Server	Single Server	RPA Servers	Database Server	Centralized Log Repository Server (SEQ) *
			unattended robots		
OS	Windows Server 2012 R2 or higher	Windows Server 2012 R2 or higher	Windows Server 2012 R2 or higher		
Database software	Microsoft SQL Server 2012 or higher (Express edition, *NO license required*), including these components: • Database Engine Services • Basic Management Tools *** In test environments, Microsoft SQL Server 2017 Express Edition can be optionally installed by the RPA server installation*	Microsoft SQL Server 2012 or higher (Standard edition, *license required*), including these components: • Database Engine Services • Basic Management Tools *** In production environments, database software must be installed prior to RPA server installation*		Microsoft SQL Server 2012 or higher (Standard edition or higher, *license required*), including these components: • Database Engine Services • Basic Management Tools *** In production environments, database*	

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	Test Server	Production Environment (minimum)	Production Environment (recommended)		
Log	Single Server	Single Server	RPA Servers	Database Server	Centralized Log Repository Server (SEQ) *
	package.			*software must be installed prior to RPA server installation*	

*The information is based on SEQ System Requirements.

CHAPTER 6: System Requirements – High Scale Server

	High Scale Production Environment 30K Attended/Server UP TO 60k/System		
	RPA Servers	**Database Server**	**Centralized Log Repository Server (SEQ) ***
Machine role	RPA Server + Console	Database	SEQ
# of servers	2 physical or VM servers	According to organization policy – redundant or cluster	According to organization policy – redundant or cluster
CPU (See the next table for CPU reference)	16 cores Intel® Xeon® Scalable Processors/AMD EPYC™ 2nd generation *or;* 24 cores Intel® Xeon® Processor E5 v4 Family *or;* 32 cores AMD EPYC™ 1st generation	16 cores Intel® Xeon® Scalable Processors/AMD EPYC™ 7002 series processor *or;* 24 cores Intel® Xeon® Processor E5 v4 Family *or;* 32 cores AMD EPYC™ 7001 series processor	8 cores
Memory	16 GB RAM	32 GB RAM	16 GB RAM
Robot	**According to number of CPU cores:**	**According to number of CPU cores:**	

	High Scale Production Environment		
	30K Attended/Server UP TO 60k/System		
	RPA Servers	**Database Server**	**Centralized Log Repository Server (SEQ) ***
capacity	*Up to 15K concurrent Attended/500 Unattended Robots:* • 8 x cores Intel® Xeon® Scalable /AMD EPYC™ 7002 series processor • 12 x Intel® Xeon® Processor E5 v4 Family • 16 x cores AMD EPYC™ 7001 series processor *Up to 30K concurrent Attended/1K Unattended Robots:* • 16 x cores Intel® Xeon® Scalable /AMD EPYC™ 7002 series processor • 24 x Intel® Xeon® Processor E5 v4 Family • 32 x cores AMD EPYC™ 7001 series processor	*Up to 15K concurrent Attended/500 Unattended Robots:* • 8 x cores Intel® Xeon® Scalable /AMD EPYC™ 7002 series processor • 12 x Intel® Xeon® Processor E5 v4 Family *Up to 30K concurrent Attended/1K Unattended Robots:* • 16 x cores Intel® Xeon® Scalable /AMD EPYC™ 7002 series processor • 24 x Intel® Xeon® Processor E5 v4 Family *Up to 60K concurrent Attended/2K Unattended Robots:* • 32 x cores Intel® Xeon® Scalable /AMD EPYC™ 7002 series processor	

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	High Scale Production Environment 30K Attended/Server UP TO 60k/System		
	RPA Servers	**Database Server**	**Centralized Log Repository Server (SEQ) ***
		• 48 x Intel® Xeon® Processor E5 v4 Family	
Disk size (Local hard disk _only_)	500 GB	500 GB	256 GB SSD
Network	Average of 90 Mbps (in/out) per 15,000 concurrent attended or 500 concurrent unattended robots		
OS	Windows Server 2012 R2 or higher		
Database software		Microsoft SQL Server 2012 or higher (**Enterprise** edition, _license required_), including these components: • Database Engine Services • Basic Management Tools **IMPORTANT:**	

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	High Scale Production Environment 30K Attended/Server UP TO 60k/System		
	RPA Servers	**Database Server**	**Centralized Log Repository Server (SEQ) ***
		In production environments, database software ***must*** be installed prior to RPA server installation. Max degree of parallelism ***must*** be set to 1 at database level (Kryon Database options - Max Dop set to 1).	

*The information is based on SEQ System Requirements.

High Scale Production Environment CPU Reference	
CPU Series	RPA Server + Console
Intel® Xeon® Scalable Processors	Xeon Platinum 8259CL (AWS EC2 M5 instance)
	Xeon Platinum 8275CL (AWS EC2 C5 instance)
	Xeon Platinum 8124M (AWS EC2 C5n instance)
	Xeon Platinum 8180
AMD EPYC™ 7002 series	Epyc 7R32 (AWS EC2 C5a instance)
Intel® Xeon® Processor E5 v4 Family	Xeon E5-2686 v4 (AWS EC2 M4 instance)
AMD EPYC™ 7001 series	Epyc 7571 (AWS EC2 M5a instance)
	Epyc 7601

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CHAPTER 7: 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	50 MB		50 MB		50 MB	

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	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 SP1/2012/2016/2019 – 64 bit		Windows 7 SP1/8.1/10 (most recent update) – 32/64 bit Windows Server 2008 R2 SP1/2012/2016/2019 – 64 bit		Windows 7 SP1/8.1/10 (most recent update) – 64 bit Windows Server 2008 R2 SP1/2012/2016/2019 – 64 bit ** 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.*	
Other requirements					**Minimum video resolution:** 1024x768	

APPENDIX 8: SSL/TLS Requirements

If you want to install the Kryon RPA Platform using SSL/TLS , you have two options:

Option 1: Let the RPA installer generate the CA and certificate for you on the fly.

Option 2: Provide the organization's certificate. The certificate must meet 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 certifcate authority: public CA or private CA
Public key	RSA 2048+
Signature hash	SHA256
Enhanced key usage	*Server Authentication* or *Multipurpose*
Certificate expiration date	It is the customer's responsibility to make sure certificates are kept up to date

NOTE: Only SSL/TLS v1.2 is supported.

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

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APPENDIX A: External Load Balancer Architecture