blueprism®

6.8 User Guide

Remote Desktop Services

Document Revision 2.0

Trademarks and copyrights

The information contained in this document is the proprietary and confidential information of Blue Prism Limited and should not be disclosed to a third party without the written consent of an authorised Blue Prism representative. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying without the written permission of Blue Prism Limited.

Blue Prism Limited, 2 Cinnamon Park, Crab Lane, Warrington, WA2 0XP, United Kingdom
Registered in England: Reg. No. 4260035. Tel: +44 870 879 3000. Web: www.blueprism.com

Contents

Introduction

Blue Prism® is commonly installed and run on a virtualised infrastructure with virtual desktop Images being used for Blue Prism Runtime Resources. This remains the recommended deployment approach as it offers users flexibility and control, and provides identical user interfaces for human users, developers, and the digital workforce.

For users with specific IT infrastructure requirements or for reducing costs, it may be desirable to deploy Blue Prism on a Remote Desktop Services (RDS) environment, employing the Remote Desktop Session Host (RDSH) technology in Microsoft's Windows Server operating system (formerly known as Terminal Services).

Using RDS to host Blue Prism can dramatically increase the number of virtual workers which can be deployed per server, as no additional overhead is required for the virtual infrastructure software or for the OS on each VDI. It also simplifies maintenance because only a single server and operating system has to be managed rather than several images each with their own operating system.

Its disadvantage in comparison to a virtualised infrastructure is that the sessions do not have dedicated and predictable resources in the way that VDIs do: for example if an application is heavily utilising the CPU in one session, that may impact performance in other sessions. There is also a risk that actions taken in one session may impact another session for certain applications, although this is very rare.

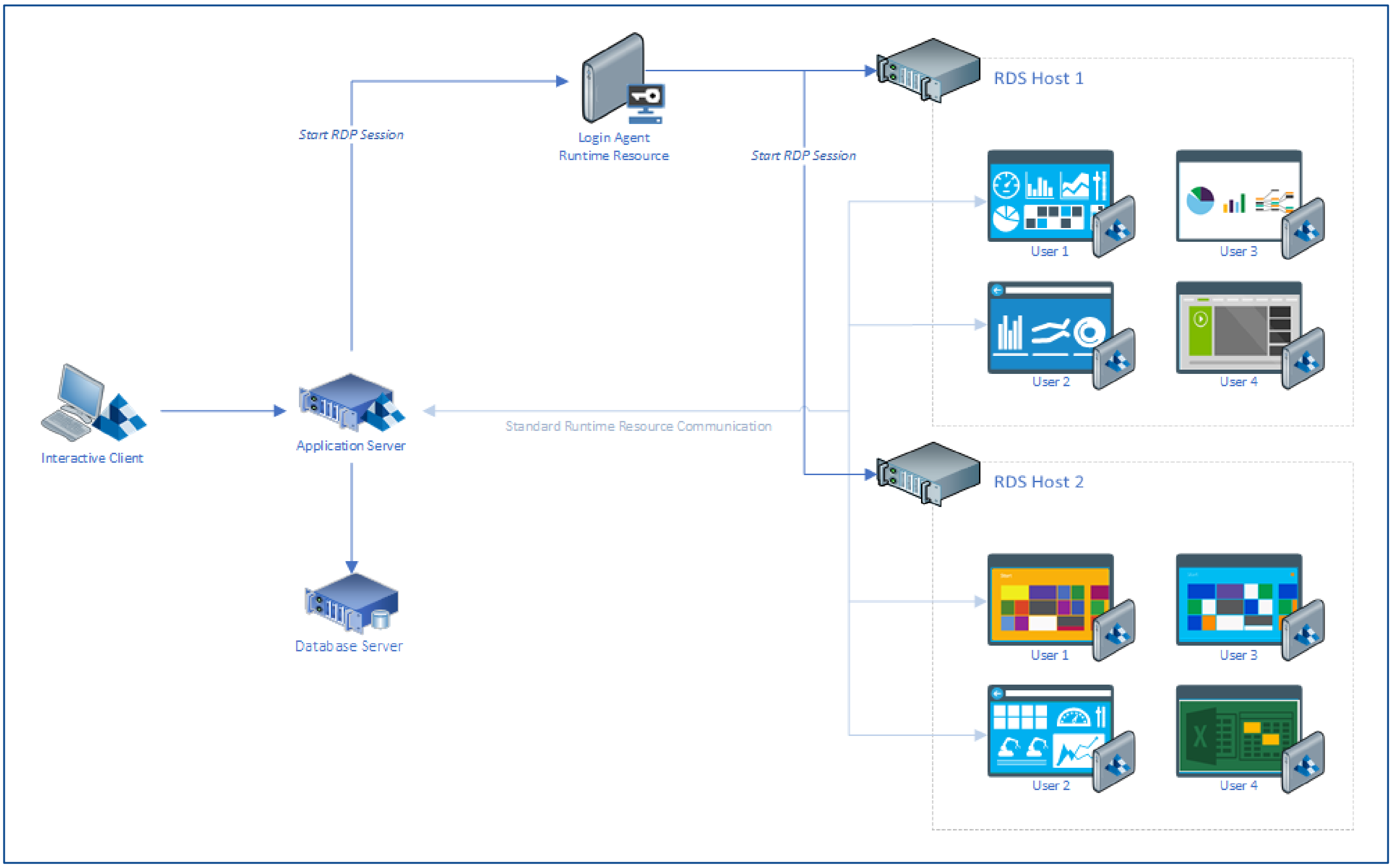
Many of the concepts and guidance described in this document require in-depth knowledge of IT systems and RDS architectures, it is expected that the user will either have this knowledge or have access to such expertise.

Solution Overview and Configuration

This section describes the necessary steps to configure and use RDS within Blue Prism.

Component Diagram

An example set up is depicted below. In this example, the Start RDP Session action is being executed on a logged-out Login Agent Runtime Resource, running as a service. It would alternatively be possible to execute this action on a regular Blue Prism Runtime Resource, running as a process.



Session Creation

Creating Sessions

There are numerous ways to create user sessions on an RDS server, the simplest being to interactively log in to the server from a remote location - which is the expected model for which RDS was designed. However, this approach is not suited to unattended automation in an RPA context because a human user has access to the windows session while a digital worker is executing tasks, providing the potential to disrupt the process or observe sensitive information on the screen.

To mitigate against these risks, the Blue Prism Remote Desktop Services VBO contains an action called *Start RDP Session* which, when executed, creates a new RDS session from one runtime resource (the “client”) to another (the “server”). This can be locally on the same machine, or on a remote machine. The *Start RDP Session* action also makes the Remote Desktop Connection window invisible. This means that a user on the client cannot view or interact with the remote Runtime Resource(s) as processes are executed.

The *Start RDP Session* action must be executed on a Runtime Resource to begin the RDS session. Alternatively it is also possible to initiate the RDS sessions from a logged out runtime resource running Login Agent, allowing the client machine to run as a Windows Service if desired, even though there is no user logged into the machine and no user interface is visible: i.e. the RDP sessions can be initiated without a user desktop on the client machine. It should be noted that if any user signs into any machine which is running Login Agent, the Login Agent service will stop.

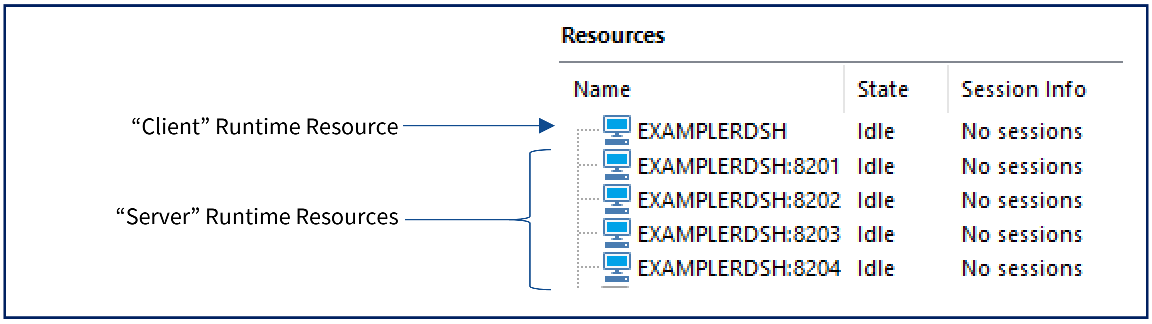
All sessions must always be started with a unique user account: it is not possible for a single user to have multiple RDS sessions on a single machine or single RDSH collection.

Starting Runtime Resources

When new Windows sessions are created using the *Start RDP Session* action, a Blue Prism Runtime Resource is not automatically started by default. Instead it should be started in the normal way, with a batch file, Task Scheduler task, or similar, used to start Automate.exe when a particular user logs in.

In this configuration it is necessary to specify a port for the Runtime Resource to listen on. It is therefore recommended that each user be assigned a specific port: whenever that user signs in on that RDSH server, the listening port is predictable. This facilitates the use of the scheduler and prevents port conflicts.

The resulting control room will look similar to this, in this example both the client and the server are running on the same machine:



Resources

Name	State	Session Info
EXAMPLERDSH	Idle	No sessions
EXAMPLERDSH:8201	Idle	No sessions
EXAMPLERDSH:8202	Idle	No sessions
EXAMPLERDSH:8203	Idle	No sessions
EXAMPLERDSH:8204	Idle	No sessions

Closing Sessions

There is an important distinction in Windows between disconnecting a session and a user signing out.

When a session is disconnected accidentally, or when a user chooses to disconnect, the session stays alive on the server and the user remains logged in, but the UI is suspended. Therefore, resources are not commonly released in this situation and any Blue Prism activity related to the UI layer starts to fail. For this reason it is strongly recommended that the disconnect feature is not used.

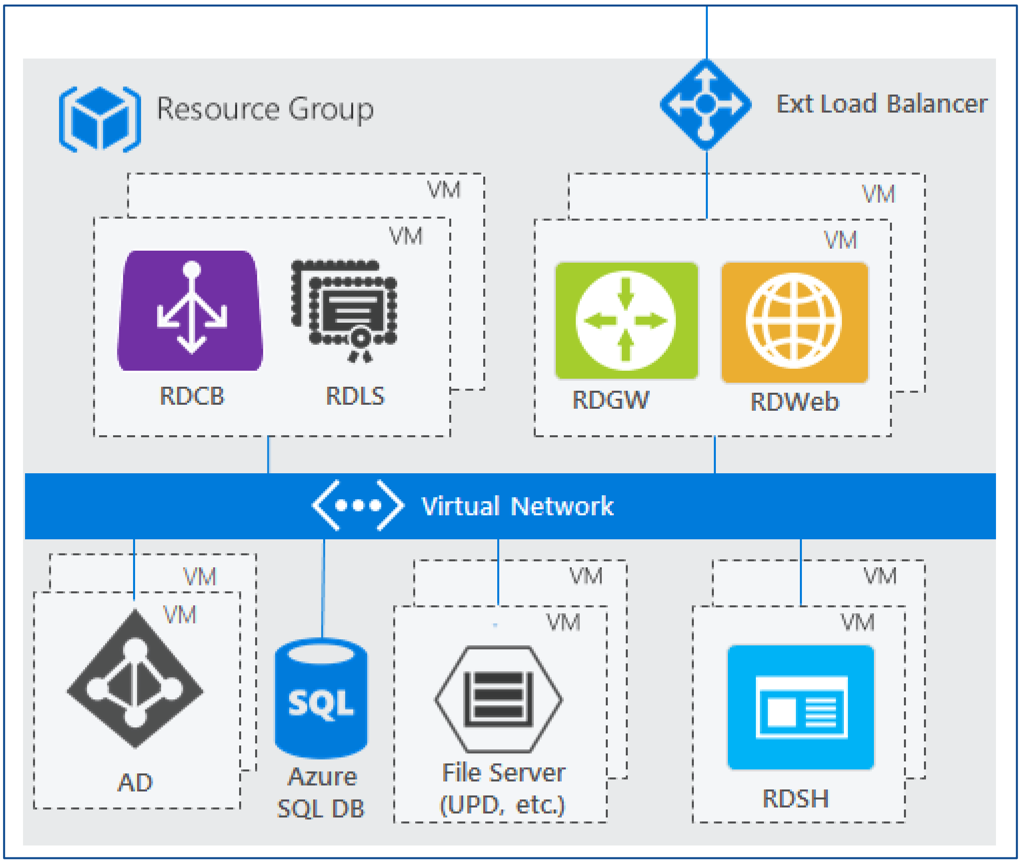
When a user signs out, the session is destroyed and all resources are released. The Runtime Resource running inside the session will disconnect from the application server. This is the cleanest exit from an RDS session and is the recommended way of closing sessions when not in use. The Blue Prism Remote Desktop Services VBO contains two actions which will achieve this:

- *Log Off Current* should be executed from inside the RDS session to be disconnected and will log that user out.
- *Log Off User* can be executed from any session on the RDSH server, where the user has admin rights, and takes a session ID as the input. The session ID for a particular user can be obtained using the *Get Logged In Users* or *Get Current Session ID* actions.

High Availability

Microsoft's RDS technology comes with numerous features to make it highly available and resilient, including Connection Brokers, Gateways, RDSH Collections, and more. Between them these services can automatically balance sessions over multiple servers, store user folders on network locations, allow users to resume sessions, and more.

Setting up such an infrastructure is beyond the scope of this guide, and requires dedicated expertise, however this VBO and reference architecture have been tested successfully in a variety of highly available configurations. This is one example configuration, taken from https://docs.microsoft.com/en-us/windows-server/remote/remote-desktop-services/desktop-hosting-logical-architecture:



Additional details can be found on that site and these pages: https://docs.microsoft.com/en-us/windows-server/remote/remote-desktop-services/rds-scale-rdsh-farm.

Limitations

Windows Process Stack

Applications opened in one user session are visible in the process stack of other sessions. The UI of these applications is hidden as they are Background processes, and the processes cannot typically be controlled by other users without elevating permissions due to the user context. For example, sending a “Kill Process” action in Blue Prism to Internet Explorer will kill it only in the current user context, not for all user contexts.

Although this limitation is mitigated for the reasons above, there are two major risks that still persist:

- Some applications will not behave correctly in this context. For example, they may only allow one instance to be running per machine or, if they are located elsewhere on the network, it may not be possible to make simultaneous connections to them from a single machine under different user contexts. It is expected that these cases will be rare, however all line of business applications expected to be used in an RDS context should be tested for compatibility first.

- The full process stack is visible to other processes running on the same server. In practical terms this can make it difficult to attach by Window Title. To mitigate this where possible, applications should be launched by the Runtime Resource which will be using them (in which case no attach stage is necessary), or attachment should be by Process ID. This is not always feasible however and Solution Designers should keep this context in mind when designing Blue Prism processes. The attach stage also includes a User Name option, and using this also helps; if using the User Name option it should be noted that the Process Name needs to include the ".exe" suffix.

Environmental Prerequisites and Configuration

This section provides an overview of the prerequisites and necessary configuration of the Windows platform on which RDS operates. It is expected that users wishing to deploy to an RDSH environment will have in-house expertise to provision such an environment.

RDSH Environment

There are numerous steps that must be taken to set up a single Windows Server for RDSH or to create an RDSH farm. These steps are documented in full by Microsoft, however the following steps are usually required:

- The Windows Server must have the Remote Desktop Session Host role installed.
- Microsoft RDS CAL licences are required on either a per-user or per-device basis. Microsoft provide a free 120 day trial of the RDSH role on any Windows Server, meaning it can be configured and used for 120 days without any license server or licences in place.
- Microsoft's Remote Desktop Connection software must be configured to allow saved credentials to be used for connections to "localhost", and the identity certificate permanently accepted.
- As described in Starting Runtime Resources, Task Scheduler or similar must be configured for each user to start Automate.exe on a specific port when that user signs in.
- All ports which might be used by Runtime Resources on the server must be open, without firewalls or similar blocking them.
- Additional RDS services (RD Gateway, RD Web Access, RD Connection Broker, RD Licensing, RDSH Collection) set up as required for high availability as required.

Performance and Scaling

Idle RDS sessions with a Blue Prism Runtime Resource running consume negligible CPU and around 80mb of RAM. Therefore, it is possible to deploy dozens or even hundreds of Runtime Resources on even a modestly sized server.

Of course any line of business applications running on the server will also consume resources, as will active Blue Prism processes running on each session. Therefore, it is necessary to test the actual performance and resource consumption of processes to determine the necessary scaling of the RDSH server.

Troubleshooting

One error which is sometimes seen when executing the Start RDP Session action is:

*Internal : Could not execute code stage because exception thrown by code stage: Process with an Id of *** is not running.*

This error often occurs when the *Use WOW64 Redirection?* parameter is set incorrectly. Reversing this parameter may resolve the issue.

Using the Remote Desktop Services VBO

Users who are planning to run Blue Prism on an RDSH infrastructure can use the following actions in the Remote Desktop Services VBO to control the RDS sessions. In some cases these need to be run from inside RDS sessions, in other cases they can be run in a different session on the same server.

The runmode of the VBO is “background”.

Start RDP Session

Initiates a Remote Desktop Connection on the local machine.

Parameter	Direction	Data Type	Description
Username	In	Text	The username to log in with
Password	In	Password	The password to log in with
Delay	In	Number	A delay (in seconds) between starting the Remote Desktop session and deleting the cached credentials. This can prevent the credentials being deleted before the remote session is able to use them. Default is 2 seconds.
Use WOW64 Redirection?	In	Flag	Defaults to False. This should be set to True when running on a 64-bit server operating system if WOW64 Redirection is not already in place on the server.
Host	In	Text	Hostname (if an RDP file is provided, this should match the host specified in the RDP file)
RDP File	In	Text	The full filepath for an RDP file (required if no Host provided)
Process ID	Out	Number	The Process ID for the Remote Desktop Connection

Get Logged In Users

Returns a collection containing all the users currently logged into this server, with the session ID and current state of each.

Parameter	Direction	Data Type	Description
Users	Out	Collection	A collection containing all the users currently logged into this machine, with the session ID and current state of each

Get Current Session ID

Retrieves the session ID of the user context in which this action is executed.

Parameter	Direction	Data Type	Description
SessionID	Out	Number	The session ID of the user in whose context this action was executed

Log Off User

Logs off the user in a specified RDP Session. Please note that this will only work when run on a runtime resource on the same server as the session to be logged out, and the runtime resource must have administrator rights on the server.

Parameter	Direction	Data Type	Description
Session ID	In	Number	The session ID of the user to be logged off
Success	Out	Flag	Indicates whether the user was successfully logged out

Log Off Current

Sends a log off command in the current RDP Session. This should be run from inside the session to be logged off.

Launch With PID

Launches an application and returns its PID. Parameters are optional.

Parameter	Direction	Data Type	Description
Application	In	Text	Full file path of the application launch file, e.g. C:\Program Files\internet explorer\iexplore.exe
Application Parameters	In	Text	(Optional) Any parameters you want to pass to the application as part of the launch e.g. https://www.blueprism.com/
PID	Out	Number	The Process ID for the launched application