Parallels Remote Application Server

SKALA-R Hyper Convergence Reference Architecture

Reducing cost, complexity and hardware footprint to deliver virtual applications and desktops

Contents

CHAPTER 1

Executive Summary

Application and desktop publishing can help many large-scale businesses and organizations simplify application and image management, improve data security, enable remote connectivity from any device, anywhere while keeping costs to a minimum. However, the initial up-front cost of implementing the hardware, such as servers, robust storage, and networking required to support hundreds or thousands of concurrent users, can be substantial. Additionally, most traditional application and desktop publishing technologies are very complex, requiring several weeks to implement as well as full-time or third party dedicated system administrators to manage.

Considering the initial capital expense and overall complexity involved with implementing a traditional virtualization solution, it's no wonder that many cost-conscious customers, particularly small and medium businesses, have failed to adopt this traditional approach. However, with the emergence of software-defined, hyper-converged platforms, such as the SKALA-R platforms, and affordable comprehensive virtual desktop and application publishing solutions using Remote Desktop Session Hosts (RDSH) such as Parallels® Remote Application Server (RAS), the cost and complexity of application and desktop publishing has been greatly reduced.

Stress and validation tests were performed with Parallels RAS on Skala-R hyper-converged solution with the aim of highlighting the optimal configuration for the integration of components that make up the overall solution. Compared to traditional solutions, implementing Parallels RAS, along with a hyper-converged infrastructure, can save most organizations up to 70% in overall infrastructure and annual licensing costs.

Figure 1: Parallels Remote Application Server: Access from any device

In This Chapter

Target Audience

This document is intended for IT decision makers as well as architects and implementation personnel who want to understand the Parallels and SKALA-R approach to application and desktop virtualization and benefit from a pretested solution. The reader should have a solid understanding of application and desktop virtualization, familiarity with both Parallels RAS and SKALA-R hyper-converged system along with their related technologies including the Rosplatforma hypervisor, network, hardware components, and Microsoft services such as Active Directory, DNS, DHCP, and Microsoft Windows Server operating systems. In addition, readers should be aware of sizing/characterization concepts and any limitations surrounding client virtualization environments.

Purpose

The purpose of this document is to describe a reference configuration of Parallels RAS on SKALA-R hyper-converged system. This is to highlight recognizable benefits to technical audiences by providing deployment configuration and information that describes the architecture for this Parallels solution which is based on Parallels RAS Hosted Shared Applications and Desktops running on Remote Desktop Session Host (RDSH), on the SKALA-R running on Rosplatforma to support the server virtualized environment.

This guide describes the solution testing that was performed in January 2017.

CHAPTER 2

Solution Overview

Read this chapter for an overview of the SKALA-R platform and Parallels Remote Application Server.

In This Chapter

SKALA-R Platform

SKALA-R is the first Russian hyper-converged platform delivered as a preconfigured complex including hardware and software for information virtualization, control, and security.

Hyper-converged platform SKALA-R can be used for a wide range of applications such as ERP systems, databases, ECM systems, VDI solutions, analytical systems, e-mail and communication systems, backup systems, etc.

For specialized applications you can use a certain series of SKALA-R. For example, for high load analysis application there is a series of SKALA-R that allows you to perform calculations on the specialized GPU.

SKALA-R uses virtualization technology from Rosplatforma. The decision to use R-Virtualization was made by reason of balance between cost, functionality, and security of this hypervisor compared with similar products. The price of R-Virtualization is about 30% lower than functional equivalents.

In addition, R-Virtualization is initially tightly integrated with software-defined storage — R-Storage. R-Storage allows you quickly and easily create a distributed, performance, fault tolerance storage with tiering from commodity servers with local disks.

Hyper-converged platform is important to control as a whole solution. To do this, SKALA-R uses a specialized monitoring system — IBS Monitoring. IBS Monitoring is able to monitor performance, transactions, services, events, data, interfaces, interconnection systems — you need only once to configure it to work with your software.

IBS Monitoring can be used as a source of consolidated information for large "umbrella" monitoring. Included connectors allow you to connect our monitoring to IBM Tivoli, HP OpenView, Microsoft SCOM, Zabbix and other systems.

The table below highlights SKALA-R available platforms:

SKALA-R Series 300 Universal	SKALA-R Series 500 High Load	SKALA-R Series 700 Super calculator
Universal platform for applications that do not require significant computational resources and large storage capacity (databases, Exchange, VDI, and so on). Built on a 2 -processor servers in a 2U form.	This platform is optimized for applications that use significant computing resources but not _demanding storage capacity. Built on a 2 -processor servers in a 1U form factor.	A specialized platform for applications requiring extremely large amount of computing power and large storage capacity. Built on 4 -processor servers in a 2U form factor.

Key features of hyper-converged platform SKALA-R are:

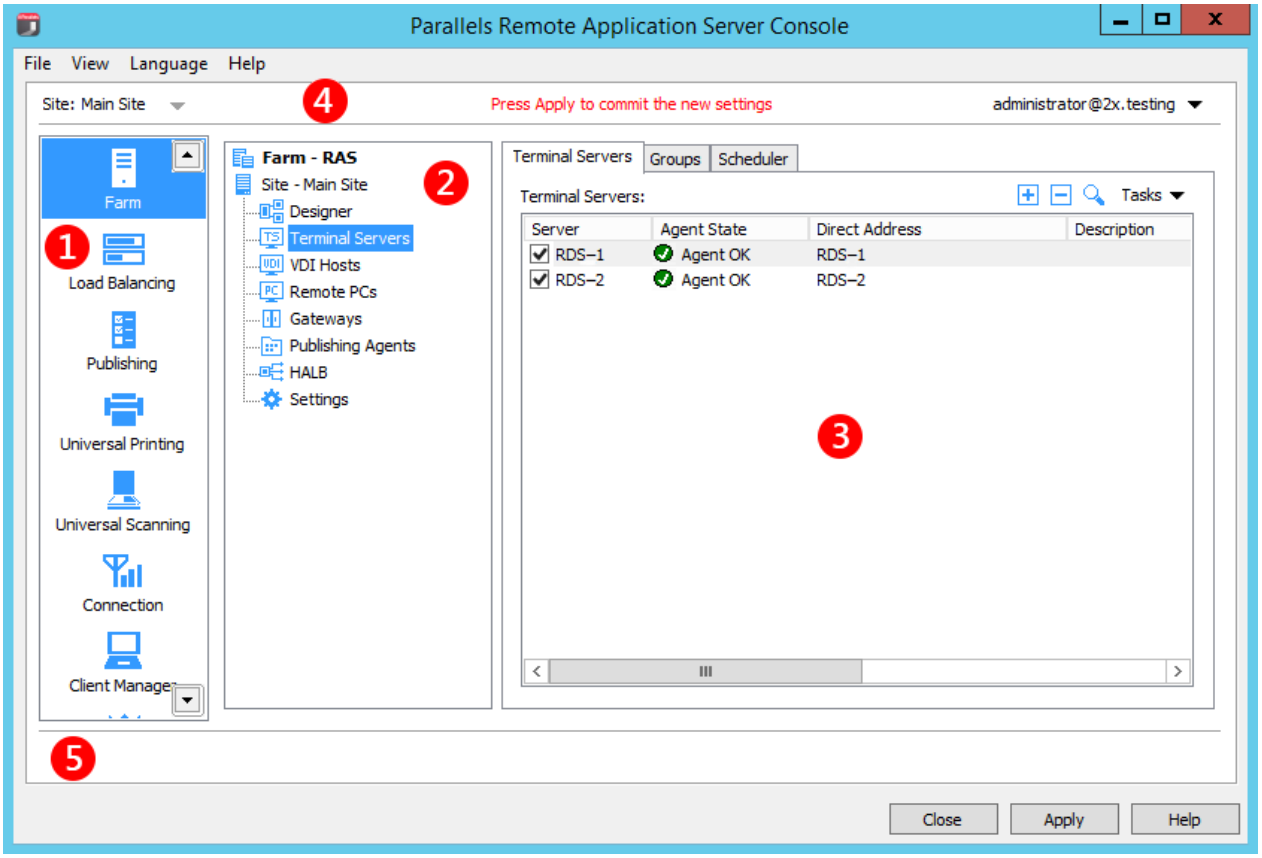
- Cost effectiveness. Price of SKALA-R significantly lower than existing alternatives.
- Fault tolerance. Virtualization environment provides multiple copies of data and automatically restore virtual machines.
- Built-in backup system.
- Limitless scalability.
- Equipment and tech provided by global scale producers.
- Adaptation to Russian legislation.
- Guaranteed deployment within few hours.
- Can be installed in unprepared areas.
- Unified control and monitoring interface.
- Common proactive support service operating 24/7 across Russia.

Parallels Remote Application Server

Parallels RAS was specifically designed with hyper-converged platforms in mind. It delivers virtual desktops and applications from a centralized location, providing continuous availability from any device running virtually any platform, resource-based load balancing, universal printing and scanning and complete end-to-end reporting and network transparency. Parallels RAS is easy to install and configure enhancing the native Microsoft Remote Desktop Services. By centralizing virtual application and desktop control, Parallels Remote Application Server enables IT staff to provide seamless mobile access while increasing security and reducing IT costs. Parallels Remote Application Server is a comprehensive all-in-one solution that can provide any organization with a simple turnkey solution and implementation methodology.

Parallels RAS Console

Parallels RAS Console is a Windows application that provides a centralized graphical user interface and enables configuration and maintenance of Parallels Remote Application Server.



Key elements of the Parallels Remote Application Server Console as shown in the figure above:

1. This section lists categories. Selecting a category will populate the right pane with elements relevant to this category.

2. This section becomes available only for the **Farm** and the **Publishing** categories. The navigation tree allows you to browse through the objects related to that category.

3. This section displays the selected object or category properties, such as servers in a farm or published application properties.

4. This information bar displays the site you are currently logged into and the user account being used for the connection. Please also note the "Press Apply to commit the new settings" message in the middle (in red). The message is displayed when you made changes to one or more objects/items, but did not commit them to Parallels Remote Application Server. Click the **Apply** button (at the bottom of the screen) to commit the changes. If there are no currently pending changes, the message is not displayed.

5. The information bar at the bottom of the screen is used to display the most recent console notification (if one is available).

Parallels RAS Designer

One of the features or Parallels RAS Console is a Parallels RAS Designer which is an automated tool that shows the solution topology, including Publishing Agents, Gateways, Remote Desktop Session Hosts (RDSH), and other components. It is accessed by selecting the **Farm** category in the left pane and then selecting **Designer** in the middle pane.

Solution Components and Terminology

The components used for the Parallels RAS on Skala-R hyper-converged system are described in the following table:

Component	Icon	Description
Farm		A farm is a collection of RAS components maintained as a logical entity with a unique database and licensing. A Remote Application Server farm can contain multiple sites, which can be administered by different administrators.
Site		A site is a managing entity usually based on a physical location. Each site consists at least of a Publishing Agent, a Secure Client Gateway (or multiple gateways), and agents installed on Terminal Servers, VDIs, and PCs.
Master & Secondary Publishing Agents		Publishing Agent is a required component in every site of a RAS farm that provides access to published applications and desktop load balancing. It also keeps the farm configuration database and farm licensing if it has a master role in the first site of the farm. High availability is accessible by adding multiple (ideally not more than 3)

		publishing agent in each site which will broker users connections in active/active.
Primary & Secondary Parallels Secure Client Gateways (w/ HTML5 node)		Parallels Secure Client Gateway is a required component of Parallels RAS. It tunnels all traffic between itself and the Parallels Client into SSL and forwards Microsoft Remote Desktop Protocol (RDP) traffic to the Publishing Agent and HTML5 Client which is also hosted on it. Several Secure Client Gateways can work in high availability mode with Parallels high availability load balancer (HALB).
Microsoft Remote Desktop Session Hosts		Parallels Terminal Server Agent is an application installed on a Microsoft Remote Desktop Session Host that enables publishing of the host resources (applications and desktops). The Terminal Server Agent collects information needed by the Publishing Agent from the Microsoft RDSH and transmits to it when required.

CHAPTER 3

Architecture Overview

One of the aims of evaluating Parallels RAS hosted on a SKALA-R hyper-converged system is to provide IT organizations with the ability to:

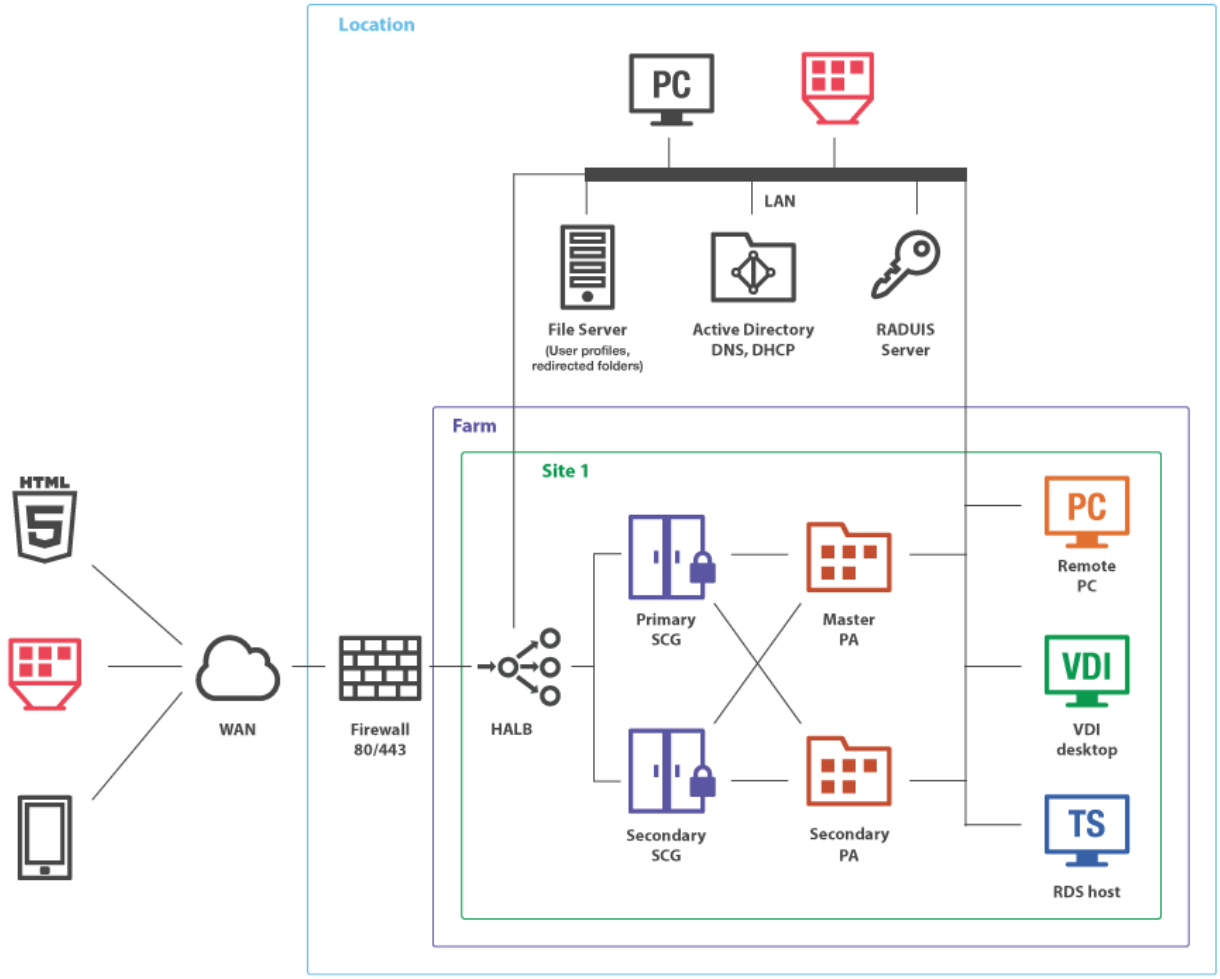
- Experience a high performance applications and virtual desktops on a variety of endpoint devices, including thin clients, Windows workstations, Mac computers, tablets and other mobile devices running iOS and Android, Linux machines and Chromebook;
- Gain understanding of how Parallels RAS components interact with virtualization infrastructures;
- Learn how application and desktop virtualization can ease application and OS management, deployment, and upgrades;
- Gain understanding of how Parallels RAS can easily integrate with and extend the value of existing investments in an existing infrastructure;
- Objectively compare Parallels RAS from an Application and Desktop publishing perspective with other solutions in the marketplace.

In This Chapter

Logical Solutions Diagram

The solution presented in this section is ideal for high availability environments hosting up to 1500 concurrent users spread on four nodes securely connected using the Secured Socket Layer (SSL) mode. Each client gateway instance should optimally handle up to 500 concurrent users. This can be scaled horizontally accordingly.

Both LAN and WAN users connect to the virtual address of a high availability and load balancing virtual appliance in an internal network. The diagram below maps out a typical deployment hosted on SKALA-R systems serving all on-premise Parallels RAS modules.



VM deployment — SKALA-R Rosplatforma

Node 1	Node 2	Node 3	Node 4	Windows OS
DC1/DNS1/DHCP	DC2/DNS2/DHCP2	SCG3	SCG4	Windows 2012R2
PA1	PA2	PA2	TS/RDSH	Windows 2012R2
SCG1	SCG2	TS/RDSH	TS/RDSH	Windows 2012R2
SQL	SQL	TS/RDSH	TS/RDSH	Windows 2012R2
FS1	FS2	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2

TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2

VM Deployment

SKALA-R — Rosplatforma

Node 1	Node 2	Node 3	Node 4	Windows OS
DC1/DNS1/DHCP	DC2/DNS2/DHCP2	SCG3	SCG4	Windows 2012R2
PA1	PA2	PA2	TS/RDSH	Windows 2012R2
SCG1	SCG2	TS/RDSH	TS/RDSH	Windows 2012R2
SQL	SQL	TS/RDSH	TS/RDSH	Windows 2012R2
FS1	FS2	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2
TS/RDSH	TS/RDSH	TS/RDSH	TS/RDSH	Windows 2012R2

Hardware Specifications

Skala-R hardware specifications are shown in the tables below.

Compute

Intel(R) Xeon(R) CPU E5-2680 v3 @ 2.50GHz	
CPU(s)	48
Core(s) per socket	12
Socket (S)	2

Network

Mellanox SX1012

Storage

HGST HUC101890CSS204 2.5" 900 GB	2
HGST HUS724020ALS640 3.5" 2000 GB	1
Seagate ST1000NX0333 2.5" 1000 GB	1
Toshiba MG03ACA1 3.5" 1000 GB	4
HGST HUSMM1620ASS204 200 GB	3
INTEL SSDSC2BB12 2.5" 120 GB	1
HGST HUC101860CSS204 2.5" 600GB	4

	SKALA-R Series 300 Universal	**SKALA-R Series 500 High Load**	**SKALA-R Series 700 Super calculator**
Place for installation disks (on the server)	24	8	24
The number of servers (nodes)	From 4	From 4	From 4
In the complex	Bare metal hypervisor, software defined storage, management and monitoring system, warranty and technical support 9 × 5 × next working day for the whole complex.		
Options	Classical storage (up to 500 TB), advanced backup, fault tolerance (uninterruptible power supply).		

Software configuration

Parallels RAS is designed to support two common virtualization methods. The architecture for each application and desktop type is described to support over 1500 concurrent users using:

- Hosted Shared Applications
- Hosted Shared Desktops

Parallels RAS Virtual Desktop Types

This guide references Parallels Remote Application Server Hosted desktops and Applications as follows:

- **Hosted Shared Desktop on a Remote Desktop Session Host (RDSH)**. A Windows Remote Desktop Session (RDS) Host using Parallels Remote Application Server to deliver Hosted Shared Hosts in a locked down, streamlined, and standardized manner with a core set of applications. Using a published desktop on the Remote Desktop Session Host, users are presented a desktop interface similar to a Windows 7 look and feel. Each user runs in a separate session on the RDS server.
- **Hosted Shared Applications on Remote Desktop Session Host (RDSH)**. A Windows Remote Desktop Session (RDS) Host using Parallels Remote Application Server to deliver Hosted Shared Applications in a locked down, streamlined, and standardized manner.

Pre-requests and Assumptions

The following assumptions have been made:

- Required Parallels and Microsoft licenses and agreements are available.
- Required power, cooling, rack, and data center space is available.
- There are no network constraints that would prevent the successful deployment of this design.
- Microsoft Windows Active Directory Domain services are available.
- Microsoft SQL Database platform is available (optional for reporting).
- MS Windows Server 2012 R2 with two virtual processors and a minimum of 4GB of virtual hardware memory.
    - Local administrator credentials must be available.
    - Must be able to install RDS.
    - Must be able to access the Internet.
- Extra Virtual IP Address Needed HALB (High Availability Load Balancer) — optional.
- A current and supported version of Parallels RAS must be deployed to ensure all features and components of the solution are at a supported level. Please refer to the following link for the latest Parallels Remote Application Server client download: https://www.parallels.com/products/ras/download/client/. Alternatively, Parallels RAS offers HTML5 access without local software installed.
- The User layer in the context of this document is for reference only. User analysis, definition, and segmentation for the use of VDI desktop types is out of scope for this document.
- Firewall ports opened as shown in the section that follows this one.

Firewall Ports

Component	Ports	Protocols
Firewall (Remote Install Push/Takeover of Software)	135, 445, 49179	TCP
HALB	112	VRRP
HALB	31006	TCP, UDP
Secure Gateway, HALB	80, 443	TCP, UDP
Secure Gateway, HALB, Terminal Server Agent, Guest Agent, Remote PC agent	3389	TCP, UDP
Secure Gateway	20000, 20020	
Publishing Agent	20001, 20002	TCP
Terminal Server Agent, Publishing Agent	20003	UDP
Secure Gateway, HALB, Publishing Agent (RAS Console and Client Manager, including shadowing)	20009	TCP, UDP
Terminal Server Agent, Guest Agent, Remote PC agent	30004	TCP, UDP
Terminal Server Agent, Guest Agent, Remote PC agent	30005	TCP
VDI Agent	30006	TCP, UDP
VDI Agent	30008	TCP
Publishing Agent (RAS Console and Reporting)	30008	TCP
Parallels Client (Client Manager, shadowing)	50005	TCP

CHAPTER 4

Validation Testing

This chapter describes the test plan, configuration of the system that was used for testing, and application considerations.

In This Chapter

Test Plan

The following test plan was followed in order to get the results sought after:

1. Install Parallels RAS version 15.5 and do the following:
   - Re-Configure Self-Signed SSL.
   - Confirm usability of HTML5 Gateway.
   - Verify that RAS Publishing Agent is running.
   - Verify that RAS Redundancy Service is running.
   - Verify that RAS Secure Client Gateway is running.
2. Add a Terminal Server to farm.
   - Verify that Terminal Server Agent is running.
3. Publish an application that is already installed on the server, as described in the **Application Consideration** section (p. 18).
4. Test the Parallels RAS Client.
5. Test the HTML5 Gateway.
6. Test a published application from mobile devices that we have available (Android & iOS).
7. Publish Shared Desktops on Virtuozzo.
8. Install a second RAS Secure Client Gateway:

- Verify that RAS Publishing Agent is running.
- Verify that RAS Redundancy Service is running.

9 Install and configure HALB (optional):

- Import a HALB appliance.
- Verify that HALB is working.

10 End to end user testing.

11 Client simulator to stress test Node 1 from a separate server.

Hardware Used for Testing

Node1 (VMS) — testing server. A separate server should be implemented to run a client simulator for stress testing.

VM Templates

Template 1

Windows 2012R2. For generic purpose VMs.

Template 2

Windows 2012R2. With applications for TS/RDSH.

VM Sizing

Evaluation sizing as shown in the following table:

Server	HDD1	HDD2	RAM (GB)	vCPU
TS/RDSH (each)	60	20	16	4
DC/DNS/DHCP	60		4	2
FS (optional)	60	500	8	4
PA1	60		4-8	4
SCG1	60		4-8	4

RAS Configuration Details

Internal	Non segregated network
Connection Mode	Direct SSL / Gateway SSL
Certificates	Self-signed
Storage	Local storage

Application Considerations

Application Name	Architecture/Server OS	**Delivery method**
Word 2016	Windows Server 2012 R2	Hosted on TS/RDSH
Excel 2016	Windows Server 2012 R2	Hosted on TS/RDSH
PowerPoint 2016	Windows Server 2012 R2	Hosted on TS/RDSH
IE11	Windows Server 2012 R2	Hosted on TS/RDSH
Google Chrome	Windows Server 2012 R2	Hosted on TS/RDSH
Adobe Reader	Windows Server 2012 R2	Hosted on TS/RDSH

A Medium Workload User profile

CHAPTER 5

Results and Summary

This chapter describes the test results and provides summary information.

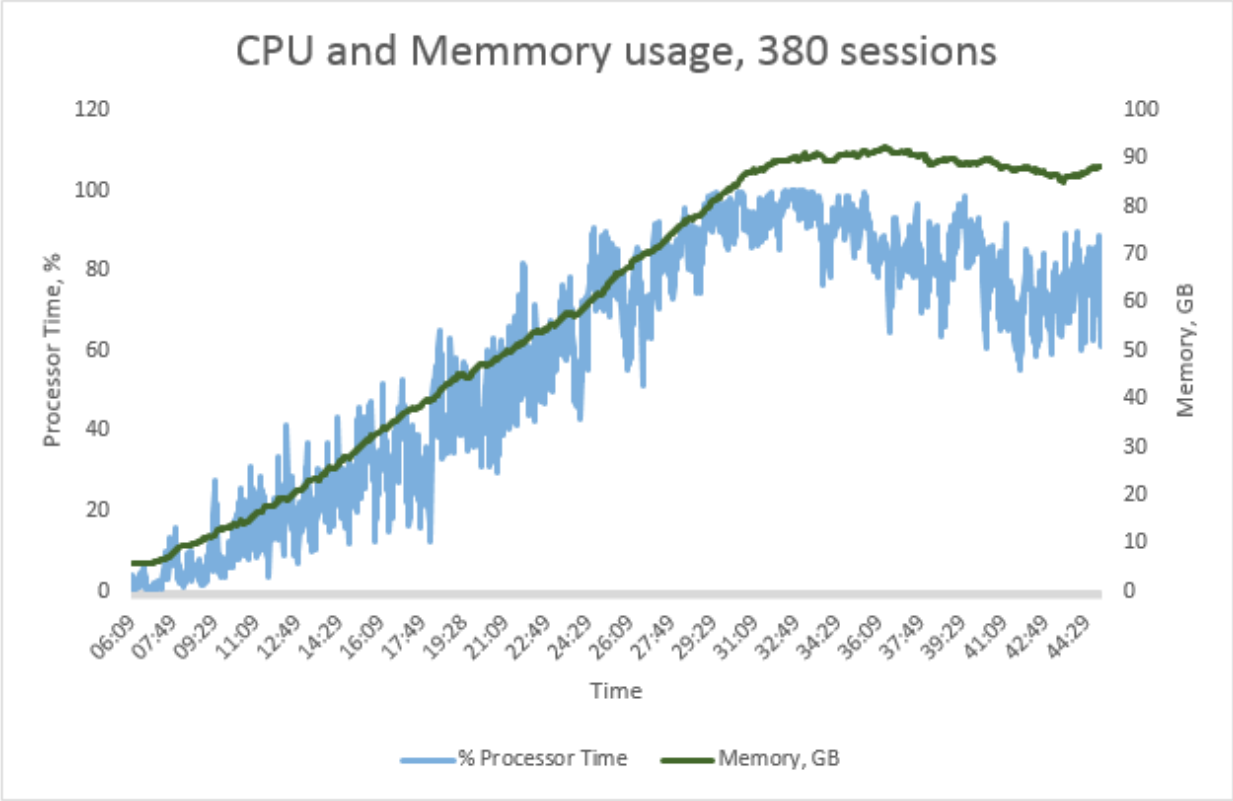
In This Chapter

Results

An in-house Client Simulator was used to simulates login, application listing, and opening of published desktops from an RDSH host. Inside every session the client simulator launched scripts to emulate a real user behavior. That script simulates a user performing clerical duties includes creating, editing, and reading office documents, surfing the web, viewing online videos, opening pdf documents and others activities with 9 different applications. We believe that this workload could provide a similar load compared to an average remote office user.

On a single node, Parallels RAS on SKALA-R hyper-converged system with infrastructure components such as Microsoft Active Directory, DNS, File Services and SQL servers was able to cater for 380 active concurrent sessions based on a knowledge worker user profile. These sessions were running on 10 RDSH with 4 vCPUs and 16 GB of RAM each.

The following chart shows CPU and memory usage during that test.



This means that 380 sessions could be successfully launched and handled on Node 1 and Node 2 which were also hosting other infrastructure components. As Node 3 and Node 4 were hosting only RDSH servers and a RAS Secure Client Gateway each, they were able to handle 418 concurrent users each. The table below highlights the final results attained.

Servers	Concurrent Users	No of TS/RDSH
Node 1	380	10
Node 2	380	10
Node 3	418	11
Node 4	418	11
Total	**1596**	

Summary

The decentralization of resources, including applications and devices, has caused customers to rethink how to deliver an optimal end-user experience. Beyond this, user behaviors have also changed, including where they work and on which devices they prefer to work. Skala-R and Parallels RAS have addressed these challenges. This SKALA- R Configuration for Remote Application Server builds off the strength and versatility of the Remote Application Server technology. The SKALA-R hyper-converged solution is ideally suited for the performance and scalability requirements of Parallels Remote Application Server deployments requiring architectural flexibility, performance, and rapid and simple scaling.

For customers looking to achieve superior VDI performance without the high cost and complexity of traditional hardware and software, the SKALA-R combined with Parallels Remote Application Server provides a turnkey approach. This combined solution provides businesses with a cost-effective methodology to scale their environments quickly and easily. Benefits are especially highlighted for organizations looking to host between 500 and 1500 concurrent users in an easy and efficient way while minimizing hardware footprint. From the validation test, results show that one SKALA-R node hosting both RAS and Microsoft related services was able to cater for 380 concurrent users averaging 38 knowledge users for each TS/RDSH.

When compared to the cost of traditional virtual desktop and application publishing solutions, Parallels RAS can reduce overall licensing costs by up to 70 percent, further increasing ROI. In a very short time frame, IT managers can publish applications and desktops using intuitive configuration wizards, and manage RDSH and VDI-hosted sessions, all from a single pane of glass. Built-in high availability load balancing features provide continuous availability, resource-based load balancing, and complete end-to-end reporting. Parallels RAS Client supports a wide range of Windows, macOS, Linux, iOS, Android, and Google Chrome client operating systems, enabling end users to access any application or file from any device anywhere.

CHAPTER 6

Resources and Additional Links

- **Parallels**

  http://www.parallels.com
- **Parallels Remote Application Server**

  http://www.parallels.com/products/ras/remote-application-server/
- **Parallels Remote Application Server trial versions**

  http://www.parallels.com/products/ras/download/choose-trial/
- **Link(s) to the Parallels RAS Administrator's Guide**

  http://download.parallels.com/ras/v15.5/docs/en_US/Parallels-RAS-v15-5-Administrators-Guide.pdf
- **Link to Parallels RAS Solutions Guide**

  http://download.parallels.com/ras/docs/v15.5/en_US/Parallels-RAS-v15-5-Solutions-Guide.pdf