

# THINSCALE



Scapa<sup>®</sup>  
Technologies

# THREADLOCKER

Performance Testing – White Paper

Demonstrating & Measuring the Positive Impact  
ThreadLocker has on End User Experience & Server  
Capacity in RDS Environments

WHITE • PAPER

# INTRODUCTION



Systems Administrators and IT Managers face many challenges. Principal among them is ensuring that the high expectations of enterprise users are met whilst at the same time reducing server costs by getting more from their current infrastructure.

Even the best resourced end user computer environments can be brought to a crawl by the incorrect or overzealous use of applications like Microsoft Excel, Internet Explorer add-ons etc.

ThreadLocker puts manners on misbehaving applications. With ThreadLocker 3.0 it is possible to:

- Monitor and control applications individually or across the entire system
- Ensure there is always CPU resource available when required
- Prevent sluggishness, lags, pauses and hanging of applications
- Deliver a better end user experience

## **ThreadLocker does this through:**

- Utilising new System Wide monitoring capabilities allowing the application of ThreadLocking algorithms when the overall system CPU usage reaches a configured threshold
- Intelligent CPU isolation formula's targeting specific misbehaving application instances
- Giving the systems administrator the ability to control the amount of CPU cores a misbehaving application can consume

ThreadLocker allows you to win the 'server resource contention battle' and helps you deliver the type of experience that enterprise end users have come to expect and demand.

Through the use of industry leading testing products from Scapa Technologies, this paper will help you understand how that battle is won in three ways.

1. It will outline an exercise that shows the measurable improvements to users of a Remote Desktop Services (RDS) server both before and after ThreadLocker is installed
2. It will demonstrate in a quantifiable way the increase in the End User Experience (EUE)
3. It will accurately measure the associated server side performance and capacity improvements

## Scapa Test and Performance Platform (TPP)

Scapa TPP is the only testing tool available that can provide end-to-end application performance testing and benchmarking for applications running over RDS. Scapa TPP allowed the optimisations achieved by ThreadLocker to be quickly and accurately quantified in terms of EUE.

### Testing Approach

The approach we took was to test a number of users running a typical set of Microsoft Office activities. The amount of users repeating the activity was increased to note any differences in response times. Finally, users running a known 'resource intense' activity (in this case, loading a PDF known to take a large amount of resources) were introduced in order to measure the effect on the original Microsoft Office users.

The tests were completed firstly without ThreadLocker installed to establish a baseline measurement and again with ThreadLocker installed with a default configuration to ascertain any improvement in EUE. In short the steps were;

1. Determination of the initial EUE in the scenario by injecting a server with load, driven by Scapa Test and Performance Platform
2. Installation of ThreadLocker with both Per Process and System Wide monitoring modes enabled
3. Repeating step one to determine the new EUE, as well as any user capacity changes

### Test Environment

Testing was performed on a single Remote Desktop Services host with simulated users connecting from the Scapa Test Client using the RDP display protocol.

RDS Test Server	Scapa Test Client
4 x CPU	2 x CPU
8GB RAM	2GB RAM
Windows Server 2008 R2	Windows Server 2008 R2
Remote Desktop Services	Scapa TPP 3.3.2
ThreadLocker 3.0	
Microsoft Office	
Adobe Reader	

## Testing Tool and Scripts

The test itself involved a range of typical user activities. The application selected for this exercise were not a critical element.

The activities were performed by a test user and captured by the WinTask GUI scripting tool. Two scripts were prepared:

1. Some typical Microsoft Office operations and then
2. One that opened a resource intensive PDF file in Adobe Reader

The Microsoft Office script was instrumented with 'Sub Sequence Timers' (SST) to time operations within the script – in the results section a sample SST was used for comparison purposes.

The WinTask test scripts were encapsulated into repeatable Scapa TPP Control Sequences. These logged in the users and ran the tests in a pre-defined sequence. While Scapa tests can be run dynamically; it was important here that tests were run on a 'like for like' basis so that we ensured a comparison could be made against observed measurements.

## Determine the Initial EUE

The test scripts were run in 3 incremental stages:

1. Initially the Microsoft Office scripts were allowed to run for 10 minutes at the initial load of 20 users.
2. At the second stage the load was increased to 40 users.
3. The third stage was to introduce 10 'resource intensive' users of the heavy PDF loading and unloading. We expected this activity to consume a large percentage of CPU per user.

**End user timing measurements from this run are shown below:**

- Login Time (average seconds): 6.775
- 20 Concurrent Users:
  - The average execution time for the script was 24.396 seconds
  - Our section timer at this level was 3.283 seconds
- 40 Concurrent Users:
  - The average execution time for the script was 24.173 seconds
  - Our section timer at this level was 3.395 seconds
- 50 Concurrent Users – Including ten users running 'resource intensive' PDF activities:
  - The average script execution time significantly increased to 40.35 seconds
  - Our section timer at this level was 4.173 seconds
- At peak load the server CPU utilisation percentage flatlined at 100

## Determination of Initial EUE

Stage	MS Office Users	Acrobat Users	MS Office EUE	SST EUE (secs)	Acrobat EUE (Secs)	CPU %
1	20	0	24.396	3.283	-	10.83
2	40	0	24.173	3.395	-	35.73
3	40	10	40.35	4.173	60.118	100

**End user timing measurements from this run are shown below:**

## Install ThreadLocker

ThreadLocker was installed and configured with a default configuration. Both Per Process and System Wide Enterprise Modes were enabled.

### **New End User Experience (EUE)**

The Scapa Control Sequence executed the tests as before. End user timing measurements from this run are shown below:

- Login Time (average seconds): 6.741 - Negligible difference
- 20 Concurrent Users:
  - The average execution time for the script was 24.449 seconds - Negligible difference
  - Our section timer at this level was 3.506 seconds - Negligible difference
- 40 Concurrent Users:
  - The average execution time for the script was 23.76 seconds - Slight improvement
  - Our section timer at this level was 3.24 seconds - Slight improvement
- 50 Concurrent Users - Including ten users running 'resource intensive' PDF activities
  - The average execution time for the script was 29.668 seconds - Dramatic improvement
  - Our section timer at this level was 3.401 seconds - Dramatic improvement
  - This dramatic improvement was 25% faster
- At peak load, the CPU Utilization was 53% (down from 100% without ThreadLocker)

## New End User Experience (EUE)

Stage	MS Office Users	Acrobat Users	MS Office EUE	SST EUE (secs)	Acrobat EUE (Secs)	CPU %
1	20	0	24.449	3.506	-	8.97
2	40	0	23.76	3.24	-	36.01
3	40	10	26.668	3.401	55.483	53.814

**The table above shows the overall metrics at each of the three stages after ThreadLocker was turned on**

The results show that at the high load (stage 3) ThreadLocker was able to apply its ThreadLocking algorithms ensuring the most CPU 'resource intensive' applications were not impacting all other running applications – dramatic improvements were noted in the Microsoft Office script as well as minor improvements in the deliberately heavy Acrobat Script.

## Stage 3 'Resource Intense' Comparison

Metric	Without ThreadLocker	With ThreadLocker	Difference	% Improvement
Resource Intense' EUE (Secs)	40.35	29.666	10.684	36
Resource Intense' EUE - SST (Secs)	4.173	3.4	0.773	23
Resource Intense' CPU (%)	100	53	47	89
Peak User capacity	72	86	14	19

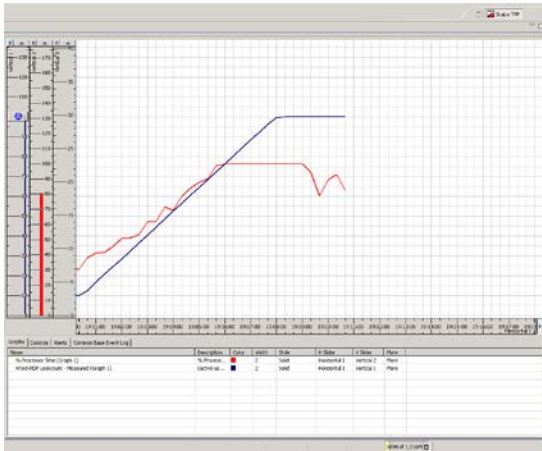
**The table above shows the Stage 3 comparison i.e. without and with ThreadLocker after the 'resource intensive' applications were introduced**

The ThreadLocker algorithms identified the 'resource intensive' applications thus ensuring there was always available CPU resource for all other running applications.

A straightforward capacity test was run, initially without ThreadLocker installed to get a baseline measurement and then again with ThreadLocker installed with the same Enterprise configuration. The Microsoft Office users were ramped up at a rate of introducing an additional user to the overall population (post login) every five seconds.

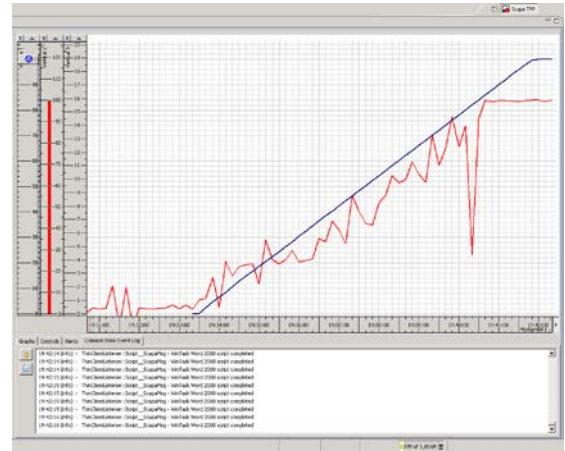
Mapping the increasing user count against CPU utilisation showed another distinct improvement when ThreadLocker was running.

In the first base line test, the server was able to support 72 users before exhausting the CPU resource. The steady blue line shows the increasing user count and is read from the first vertical scale. The red line shows the percentage CPU used and is read from the second scale. The 100% mark can clearly be seen as a flat line.



## ***Without* ThreadLocker**

we achieved *72 concurrent users* before flat lining CPU and achieving full capacity of that resource.



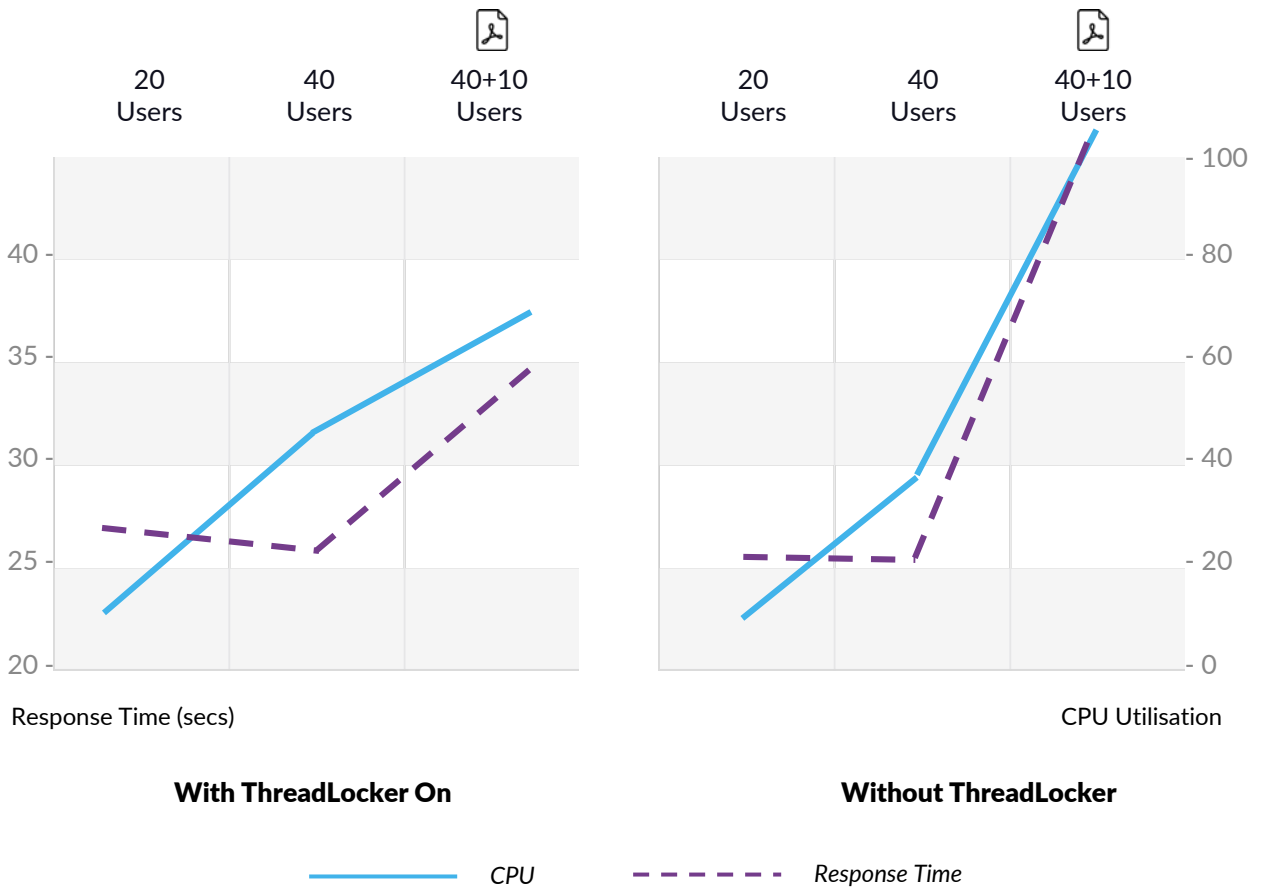
## ***With* ThreadLocker**

enabled, the exact same scenario delivered a *further 14 users* – almost a 20% increase in user density

— User Count  
— CPU Capacity

# Conclusions

The deployment of ThreadLocker clearly demonstrated a significant increase in 1) User Experience and 2) Server Capacity.



With ThreadLocker On	Without ThreadLocker
'Normal' users only slightly affected	'Normal' users saw increased response times 24 -> 40 seconds
'Resource Intensive Users' did not impact the overall end user experience of all other users	There was no CPU capacity to service users after 'Resource Intensive' Users were introduced
An average CPU utilisation of 53% was achieved	CPU utilization 'flat-lined' at 100%
CPU utilisation was exhausted at 86 concurrent users. An increase of 19% adding 15 more users to the server	CPU utilization was exhausted at 72 concurrent users



## 1. End User Experience (EUE)

**Without ThreadLocker** installed the system provided consistent user experience for 'normal' users. When 'resource intense' users were introduced:

- Performance for all users worsened - Response times went from 24 seconds to 40 seconds
- CPU utilisation 'flat lined' at 100% - The server could not provide further resources to users, worsening the response times.

**With ThreadLocker** installed, the user experience was consistent for 'normal' users at their usual levels of load. However, this time once the 'resource intense' users were introduced:

- ThreadLocker was able to contain the processes that consumed the most CPU cycles, with the result that the overall response times for the 'normal' users were only slightly affected.
- This could also be seen from the server perspective in an improved CPU profile, averaging 53% during this period.

## 2. Server Capacity

Similarly, a user capacity test conducted like for like against a server configured with and without ThreadLocker, showed a basic increase of 20% in user capacity with ThreadLocker present.



Scapa Technologies ran these tests on an independent basis and fully stands over the results. Scapa TPP drove repeatable and accurate tests that allowed the exact measurement of the end user response time. We highly recommend ThreadLocker from ThinScale Technology and we are available to run similar tests against your environment

### More Information about Scapa Technologies

*Scapa specializes in the reduction and removal of business risks resulting from the development and deployment of IT systems – such as Citrix, VMware and other VDI solutions, BMC Remedy ITSM, PeopleSoft, Oracle Forms, SAP based solutions and generic web applications – providing best of breed testing and monitoring software tools, consulting services and a complete testing methodology to help you identify issues before they have a negative impact on your business*

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# THINSCALE

ThinScale creates solution driven products that meet the challenges in the Windows based Thin Client Software, Desktop Virtualization, VDI & Server Based Computing space.

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