

# Performance Optimization of the IBM Rational Change and Configuration Management Products: ClearQuest

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# Rational Performance Engineering (RPE) Team Mission

- The **Rational Performance Engineering** is part of the IBM Rational CCM development team and we collaborate with
  - ▶ **IBM Rational Development**
    - to establish baselines for product performance, reliability and scalability
    - to focus on improving overall product performance
  - ▶ **Customers / IBM Field Teams**
    - to help deliver high-performing, reliable and scalable configurations and deployments
    - to help troubleshoot deployment issues
  - ▶ **Partners / IBM Research**
    - to find innovative performance solutions for our products
    - to build relationships which in turn support our customers
  
- **Rational Performance Engineering** publishes at
  - ▶ <http://www.ibm.com/developerworks/rational/performance/> and <http://www.jazz.net/>





# Rational CM Server 7.1.x



- CM Server Supports your GDD Goals
  - ▶ Centralized Tuning and Monitoring
  - ▶ Flexible Deployment Options
  - ▶ WebSphere & Database Updates

## Rational Change Management (CM) Server Administration

- Browser-based monitoring / configuration tool delivered in CM Server 7.1.0.2
  - ▶ Installed automatically
  - ▶ Not related to ClearCase Global Monitoring, MultiSite admin, or any Tivoli add-ons
  - ▶ <https://www.ibm.com/support/docview.wss?uid=swg21377925>
- Administration / Configuration / Server Monitoring
  - ▶ Central point for both ClearQuest and ClearCase server status
  - ▶ Refresh data on-demand or based on schedule
  - ▶ Change server behavior real-time without restarting CM Server
  - ▶ Active User Statistics
  - ▶ Real-time license server data
  - ▶ <http://<server-name>:12080/TeamAdminWeb/>
    - Then enter <host-name>
    - <SOAP Port Number> (typically 12880 or 8880)
    - This access can be secured



# Rational Change Management Server Administration

Rational Change Management Server Administration

Welcome | sus-ma1rat1t1:12880 | Disconnect

Site Administration | Help

Number of active sessions: 18  
 Number of HTTP sessions created: 240  
 Total number of Web service calls: 214  
 Total number of RPC calls: 25840  
 Total number of RPC servers: 1

Refresh  
 Refresh every 1 minute(s)  
 Last updated at 10:26:42

Server Monitoring | Login Statistics | License Monitoring

ClearCase | ClearQuest

### ClearQuest Backend RPC Servers Status

Server ID	Server State	Host Name	Port	RPC Calls	Worker Thread Count	Total HTTP Sessions	Active HTTP Sessions	Active Stateful HT Sessions	
1	ClearQuest - 2.4656	Running	sus-ma1rat1t1	3884	4251	30	40	18	1

### Active Users Status

	Creation Date	Number of Sessions	Number of Web Service Calls	Number of RPC Calls
1	n.ibm.com May 26, 2011 9:49:08 AM	1		188
2	n May 26, 2011 9:03:31 AM	1		185
3	n May 26, 2011 9:52:12 AM	1		871
4	om.com May 26, 2011 10:07:14 AM	1		31
5	m.com May 26, 2011 9:45:58 AM	1		43
6	om May 26, 2011 9:55:32 AM	1		68
7	ibm.com May 26, 2011 9:13:23 AM			40
8	om May 26, 2011 9:25:39 AM			
9	r May 26, 2011 10:06:08 AM			
10	m May 26, 2011 10:21:41 AM			
11	m.com May 26, 2011 10:14:46 AM			
12	May 26, 2011 8:48:03 AM			
13	May 26, 2011 9:59:41 AM			

### ClearQuest License Status

Imutil - Copyright (c) 1989-2007 Macrovision Europe Ltd. and/or Macrovision Corporation. All Rights Reserved.  
 Flexible License Manager status on Sun 11/8/2009 17:42

[Detecting lmgrd processes...]  
 License server status: 27000@wsbulicensesrep.lexma.ibm.com  
 License file(s) on wsbulicensesrep.lexma.ibm.com: E:\Program Files\IBM\Rational\SDLC\common\rational\_server\_perm.dat;E:\Program Files\IBM\Rational\SDLC\common\rational\_server\_temp.dat:

wsbulicensesrep.lexma.ibm.com: license server UP (MASTER) v11.5  
 wsbulicensesrep: license server UP v11.5

Vendor daemon status (on wsbulicensesrep.lexma.ibm.com):

rational: UP v11.5  
 Feature usage info:

Users of ClearQuest: (Total of 5000 licenses issued; Total of 10 licenses in use)

"ClearQuest" v1.10000, vendor: rational  
 floating license

SYSTEM 9.32.155.16 smarattst10 (v1.1) (wsbulicensesrep.lexma.ibm.com/27000 8250), start Fri 11/6 8:45  
 SYSTEM 9.34.70.15 sus-ma1rat1t3 (v1.1) (wsbulicensesrep.lexma.ibm.com/27000 29428), start Sun 11/8 17:24  
 bjones 9.34.106.54 BJONES-20008 (v1.1) (wsbulicensesrep.lexma.ibm.com/27000 32049), start Sun 11/8 16:49  
 bjones#CQMS.RATIONALC.LEXINGTON2 sus-ma1rat1t1 sus-ma1rat1t1 (v1.1) (wsbulicensesrep.lexma.ibm.com/27000 14130), start Sun 11/8 17:07

## 7.1.x CM Server Offers Flexible Deployment

- Out-of-the-box deployments
  - ▶ Single-server default installation and configuration
  - ▶ Load-balancing with IHS or WAS EdgeServer <http://www.ibm.com/support/docview.wss?uid=swg21377478>  
<http://www-01.ibm.com/support/docview.wss?uid=swg27017051>
  
- Customized deployments
  - ▶ Updating WAS  
<http://www.ibm.com/support/docview.wss?uid=swg21390803>
  - ▶ Replace IHS with Apache  
<http://www-01.ibm.com/support/docview.wss?uid=swg21418731>
  - ▶ Separate WAS from CM Server  
[https://publib.boulder.ibm.com/infocenter/cqhelp/v7r1m0/index.jsp?topic=/com.ibm.rational.clearquest.webadmin.doc/topics/t\\_cqw\\_on\\_was\\_deploy.htm](https://publib.boulder.ibm.com/infocenter/cqhelp/v7r1m0/index.jsp?topic=/com.ibm.rational.clearquest.webadmin.doc/topics/t_cqw_on_was_deploy.htm)
  - ▶ Separate WAS from IHS  
<http://www-01.ibm.com/support/docview.wss?uid=swg21414418>



## Updating WebSphere

- WAS installed with 7.1 CM Server permits independent updates
  - ▶ Customers can update WAS and IHS at any time according to their needs
  - ▶ Upgrade WAS / IHS for app server and http server defect fixes, security fixes, etc.
  - ▶ Note: Upgrading WAS independently may complicate CQ Web update process
  
- Technote with instructions:
  - ▶ <http://www.ibm.com/support/docview.wss?uid=swg21390803>
  
- WAS Fix Pack information
  - ▶ <http://www.ibm.com/support/docview.wss?uid=swg27007951>
  
- Fix Pack 25 currently recommended
  - ▶ <http://www.ibm.com/support/docview.wss?uid=swg21392959>
  - ▶ 7.1.1 release installs Fix Pack 25 (6.1.0.25)



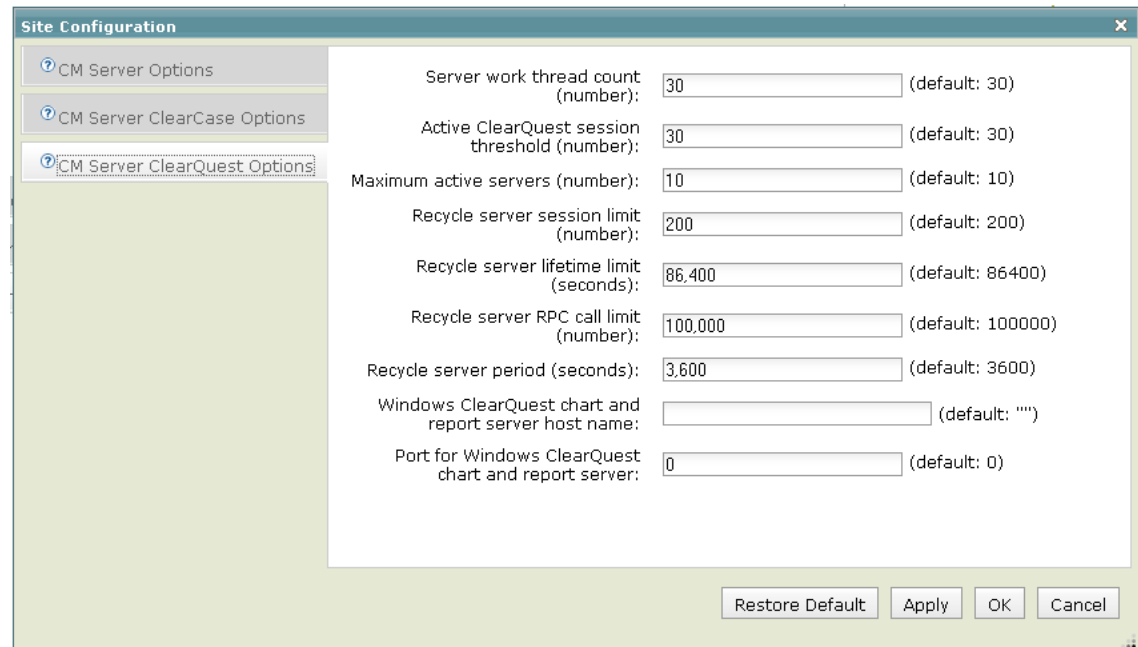


# Rational ClearQuest 7.1.x Performance Update



# CM Server ClearQuest Web Options

- Using Rational Change Management Server Administration
  - ▶ Site Administration > Configuration > CM Server ClearQest Options
- Logged in to CQ Web as Admin
  - ▶ Site Administration > Configuration > CM Server Options



- These options are sometimes called “MBean attributes”
- Click the (?) for help

## 7.1 CM Server CQ Web Tuning Options

	Default	Should you modify it?
<b>Session Timeout</b> <i>(user's session timeout)</i>	30 minutes (1,800 seconds)	Longer timeouts can improve the user experience, but inactive sessions consume more memory and can slow overall performance.  However, the 7.1 timeout behavior is improved, and users don't lose work when sessions timeout and are re-established.
<b>Server Work Thread Count</b> <i>(# threads per CQRPC server)</i>	<b>30*</b>	Best to leave alone; modify the others first <b>*after 7.1.1 this defaults to same as ACQST</b>
<b>Active ClearQuest Session Threshold</b> <i>(max # concurrent sessions per CQRPC server)</i>	30	Can be modified Suggested range: integers between 15 and 40
<b>Maximum Active Servers</b> <i>(max # CQRPC servers per box)</i>	<b>10*</b>	Can be modified Suggested range: integers between 4 and 16
<b>Recycle Server Session Limit</b> <i>(total # sessions before recycle)</i>	200	Can be modified Suggested range: integers between 50 and 200
<b>Recycle Server Lifetime Limit</b> <i>(total time before recycle)</i>	24 hours (86,400 seconds)	Best to leave alone; modify the others first (cqrpc servers' start time is tracked)
<b>Recycle Server RPC Call Limit</b> <i>(total # RPC calls before recycle)</i>	100,000	Best to leave alone; modify the others first (there are counters to track RPC calls)

\* Defaults changed since initial 7.1 release

## 3 Important CM Server ClearQuest Web Options

- Active ClearQuest Session Threshold
- Maximum Active Servers
- Recycle Server Session Limit

The screenshot shows a 'Site Configuration' window with a sidebar on the left containing three menu items: 'CM Server Options', 'CM Server ClearCase Options', and 'CM Server ClearQuest Options'. The main area displays several configuration parameters with their current values and default values in parentheses. The values for 'Active ClearQuest session threshold', 'Maximum active servers', and 'Recycle server session limit' are highlighted with colored circles (blue, green, and orange respectively).

Parameter	Current Value	Default Value
Server work thread count (number):	30	30
Active ClearQuest session threshold (number):	30	30
Maximum active servers (number):	10	10
Recycle server session limit (number):	200	200
Recycle server lifetime limit (seconds):	86,400	86400
Recycle server RPC call limit (number):	100,000	100000

## Adjust These Two First

- **Active ClearQuest Session Threshold**
  - ▶ Maximum number of concurrent sessions supported by a CQRPC server (default: **30**)
- **Maximum Active Servers**
  - ▶ Maximum number of CQRPC servers active on a CM Server instance (default: **10**)
- It is better to increase **Maximum Active Servers** than to increase **Active ClearQuest Session Threshold**
  - ▶ **Active ClearQuest Session Threshold = 30** and **Maximum Active Servers = 12** is usually better than **Active ClearQuest Session Threshold = 40** and **Maximum Active Servers = 10**
- Also can decrease **Active ClearQuest Session Threshold**
  - ▶ **Active ClearQuest Session Threshold = 20** and **Maximum Active Servers = 12** can be better than **Active ClearQuest Session Threshold = 30** and **Maximum Active Servers = 10**



## Think of it Like a Restaurant...

- **Active ClearQuest Session Threshold** is the number of tables in a dining room
- **Maximum Active Servers** is the number of dining rooms
  - ▶ **Server Work Thread Count** is the number of waiters in each dining room (default: 30)
- Patrons in a dining room with 30 tables (**Active ClearQuest Session Threshold**) and 30 waiters (**Server Work Thread Count**) will receive better service than the same dining room with 40 tables
- If you want to feed more people, then don't put more tables in each dining room: Instead increase the number of dining rooms (**Maximum Active Servers**)



## If you make changes...

- If you change **Active ClearQuest Session Threshold** or **Maximum Active Servers**
  - ▶ Pay close attention to:
    - Process memory consumption
    - Percentage of CPU utilization
    - User experience
  
- More CQRPC servers require more server memory
  - ▶ Defaults were determined on basis of minimum-supported hardware, moderate user workload and moderate schema complexity
  
- Increasing **Maximum Active Servers** will use more memory
  
- Lowering **Active ClearQuest Session Threshold** may increase CPU%
  
- Maximum number of users supported by a server
  - ▶ **Active ClearQuest Session Threshold** X **Maximum Active Servers**

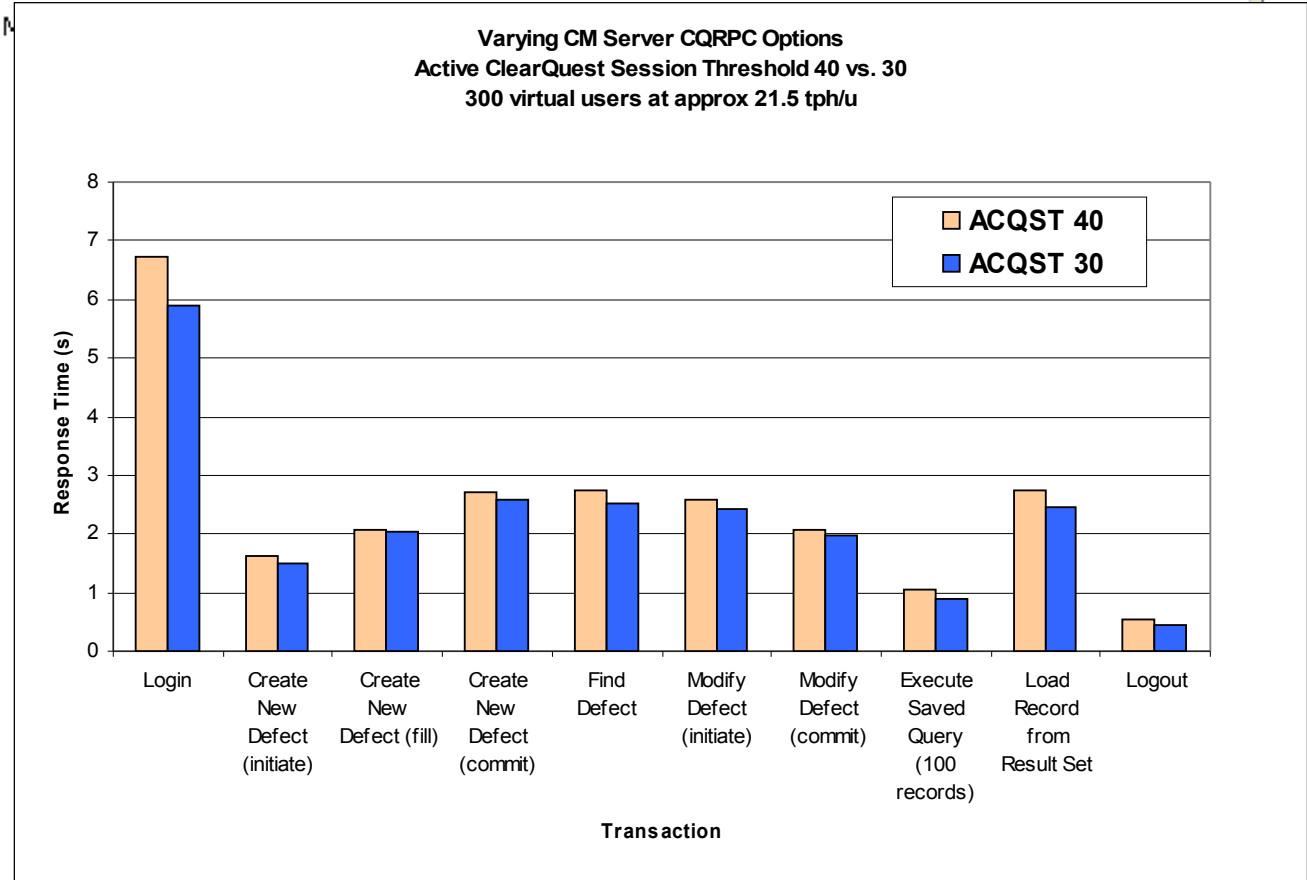
# Adjusting 7.1 CQRPC settings

**Site Configuration** X

- CM Server Options
- CM Server ClearCase Options
- CM Server ClearQuest Options**

Server work thread count (number):  (default: 30)

Active ClearQuest session threshold (number): 30 (default: 30)





## CQRPC server lifetime limits

- CQRPC server recycle criteria
  - ▶ Sessions (**Recycle Server Session Limit**, default is 200 sessions; usually reached first)
  - ▶ Time (Recycle Server Lifetime Limit, default is 24 hours)
  - ▶ Work (Recycle Server ONC RPC Call Limit, default is 100,000 calls)
- Together these three settings offer increased control and tuning of CQRPC server recycling
- Modify **Recycle Server Session Limit** before modifying the other two server recycle limits
  
- **Recycle Server Session Limit**
  - ▶ Total number of sessions a CQRPC server will handle during its lifetime
  - ▶ Setting **Recycle Server Session Limit** too low (200 is default) can increase the amount of churn as sessions are continually moved to new CQRPC servers
  - ▶ If you change **Recycle Server Session Limit** monitor CPU%, process memory and user experience



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