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Tuning the File Management System (FMS)

Briefly: The guide discusses steps for evaluating network infrastructure performance and configuring the FMS subsystem to achieve maximum efficiency in its operation.

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Introduction

By default, FMS Teamcenter operates in a non-optimized mode, ensuring system functionality under the worst conditions that may occur in the network infrastructure. However, this comes at the expense of performance. This is not the fault of the developers, as it is difficult to predict the specific network hardware and configurations you might have.

The purpose of this guide is to assist Teamcenter administrators in improving overall system performance, particularly when working with large assemblies in CAD systems. In one real-life example, it was possible to reduce the loading time of an aircraft cabin from 26 minutes to 4–6 minutes.

The procedures described in this guide will cause the FMS subsystem to consume memory measured in gigabytes. It is difficult to predict the exact amount required. For example, in a real-life scenario, an FSC configured for a local network performance of 150 Mbps (with a 1 Gbps uplink) and approximately 400 simultaneous users consumed around 10 GB of RAM.

The configuration primarily applies to the FSC serving the volumes.

If the server with FSC does not have a significant reserve of RAM, the proposed configuration cannot be implemented!

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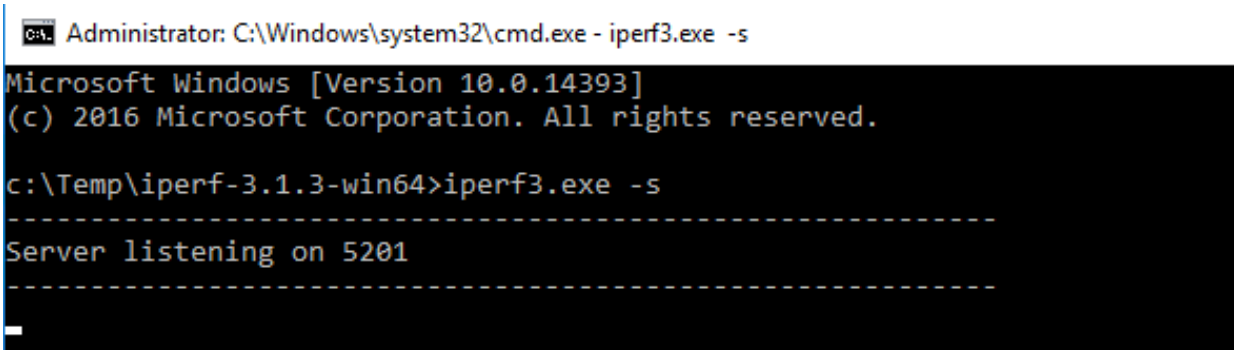
Evaluating Network Infrastructure Performance

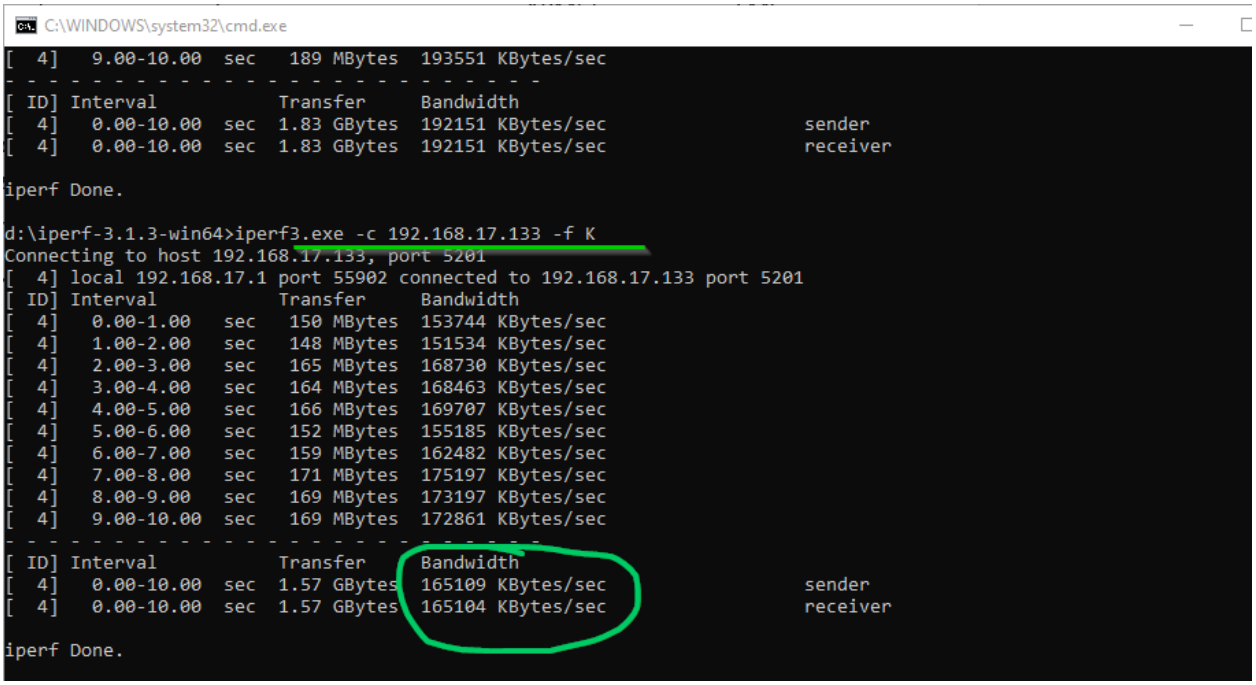
To measure bandwidth, you need to download the iperf utility from https://iperf.fr/download/windows/iperf-3.1.3-win64.zip . Alternatively, you can use any other similar tool without issues.

1. Run **iperf** with the -s flag on the FSC server.



iperf will operate in server mode and wait for connections on port 5201. This port must be allowed through the firewall!

2. Run **iperf** with the -c flag followed by the IP address or network name of the FSC server and -f K on the workstation. This will initiate a packet exchange (by default, with a packet size of 10 MB) with the FSC server.

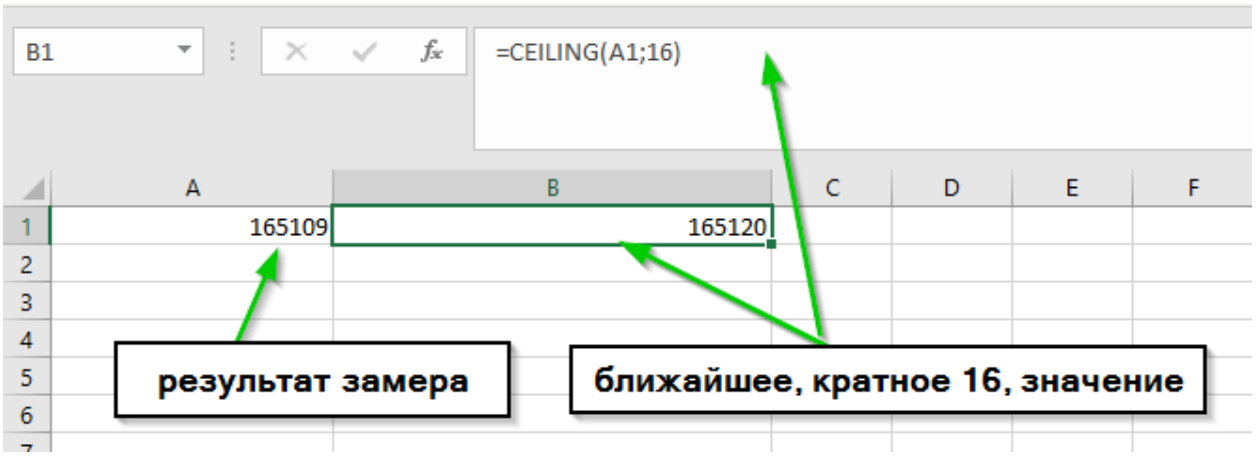


*Ideally, calculate the average size of files with the extension **.prt** (or **.CATPart**, or other formats used by the CAD system connected to Teamcenter) in the Teamcenter volumes. Use this average size as the packet size for testing bandwidth.*

Upon completion, the utility will provide the bandwidth for sending and receiving packets in KB. Ideally, conduct similar tests from multiple workstations (on different floors or in different buildings) and calculate the average of the obtained values.

The obtained results for the sender and receiver should not show significant discrepancies. If noticeable differences are present, it is advisable to consult network infrastructure specialists.

3. The bandwidth value must be rounded to the nearest multiple of 16!
   For example, use Excel to find the closest multiple of 16 for **165109**.



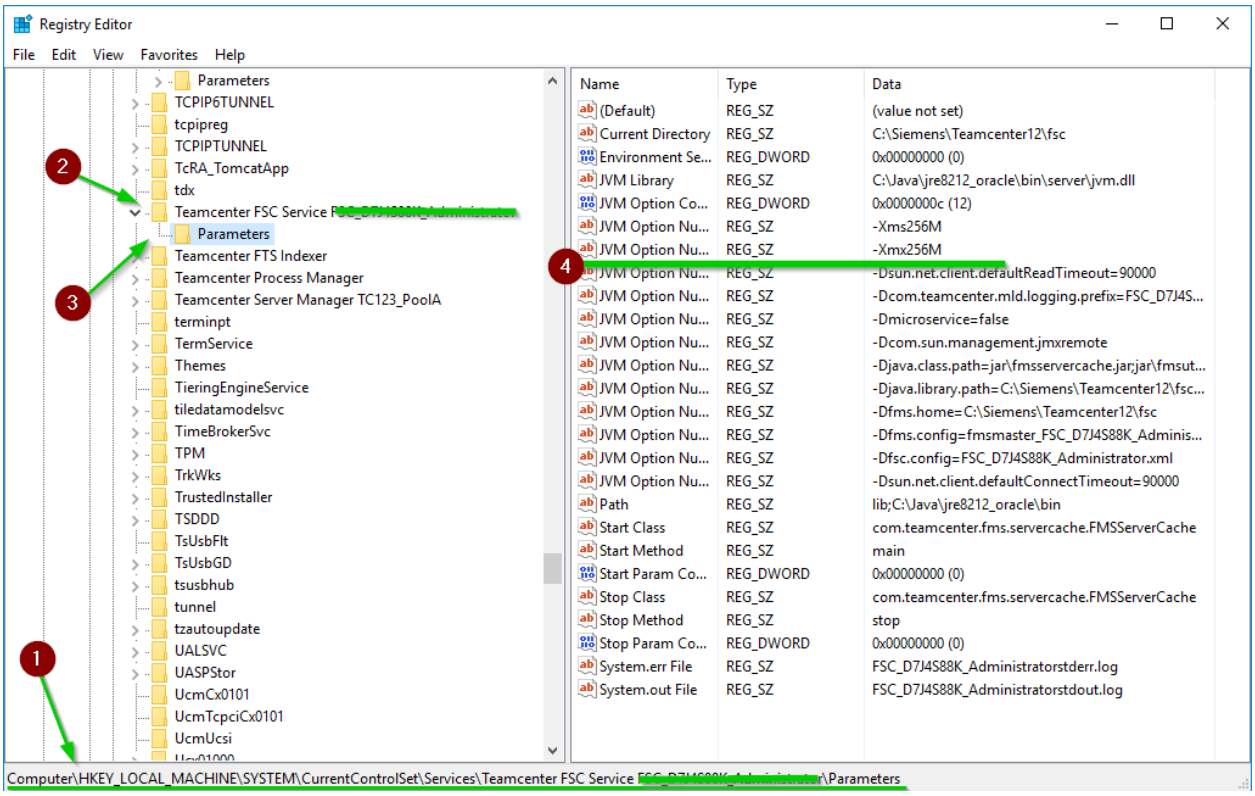
This is **165120**

4. Navigate to the directory ....\FSC
5. Open the file: **fsc.properties.template**
6. Locate the line: #com.teamcenter.fms.servercache.FSCConstants.buffSize=64K
7. Uncomment it by removing the **#** symbol
8. Replace the current value **64K** with **165120K** (your value WILL differ).
9. Locate the line: #com.teamcenter.fms.servercache.FSCConstants.sockBuffSize=129K
10. Uncomment it by removing the **#** symbol
11. Multiply **165120** by **2** and add **1024** to the result. In this case, the calculation gives **331264**
12. Replace the current value **129K** with **331264K** (your value WILL differ).

13. You should end up with something like the following configuration

```
#
# FSC internal buffer size.
# Default value is 64K.
# Value should be in 16K increments.
# Minimum is 16K.
#
com.teamcenter.fms.servercache.FSCConstants.buffSize=165120K
#
# Socket buffer size override.
# Default value is (com.teamcenter.fms.servercache.FSCConstants.buffSize * 2) + 1024.
# The value 0 disables setting the socket buffer sizes (uses system default).
# Minimum value is 8K (excluding the 0 case).
#
com.teamcenter.fms.servercache.FSCConstants.sockBuffSize=331264K
#
#These are required for the DSS cloud volume support
#
# Keystore filename. Use 'keygen -importdsscreds -keystore {keystore} -storepass {storepass} -keyname {keyname
#com.teamcenter.fms.servercache.dss.keystore.file=<CHANGE ME>
# Obfuscated keystore storepass. Use 'passwordtool -encrypt {password}' to obfuscate passwords.
```

14. Save the changes made to the file.
15. Rename the edited file from **fsc.properties.template** to **fsc.properties**.
16. Launch **regedit** (Registry Editor).
17. Navigate to the registry entry responsible for the **Teamcenter FSC** service.



18. Edit the registry entry **JVM Option Number 1** to set the maximum allowable upper limit for the amount of RAM allocated to the FSC service. There is no precise calculation algorithm, so start with a large value, such as -Xmx10G, which will allow the FSC service to use 10 GB of RAM.

    In your environment, 10 GB of RAM might not be sufficient, which could cause FSC to stop functioning under load. In such cases, the FSC log files will contain error messages like: java.lang.OutOfMemoryError: Java heap space

    In this case, you will need to increase the allocated RAM. Adjust the -Xmx parameter to a higher value and monitor the FSC service's performance.

19. After making the changes, restart the Teamcenter FSC Service ~~FSC_D7J4S88K_Administrator~~.
20. Allow users to start working in Teamcenter and monitor the RAM usage by FSC. If RAM is insufficient, repeat step 18 to increase the allocated memory.

21. **After these adjustments, it is advisable to monitor RAM usage over the course of a workweek to determine the optimal value. If you over-allocated RAM, adjust the allocation to a more appropriate level.**

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Other FMS settings

Disabling Compression for .prt files:

1. Navigate to the directory ...\FSC
2. Open the file FSC_~~D7J4S88K_Administrator~~.xml
3. Locate the following parameter:

   <!-- **<property name="FSC_DoNotCompressExtensions"** value="bin,bz,bz2,cab,deb,docm,docx,ear,gif,gz,jar,jpeg,jpg,jt,lha,lzh,lzo,mp3,mp4,mpg,rar,rpm,sit,tar,taz,tgz,war,xlsm,xlsx,z,zip" overridable="true"/> -->
4. Remove the comment markers <!-- and --> at the start and end of the parameter
5. In the value attribute, add prt to the list. After the update, it should look like this:

```
88      <!-- downloader parameters  -->
89      <!-- <property name="FSC_WebRaidThreshold" value="32K"
        overridable="true"/> -->
90      <property name="FSC_DoNotCompressExtensions" value=
        "prt,bin,bz,bz2,cab,deb,docm,docx,ear,gif,gz,jar,jpeg,jpg,jt
        ,lha,lzh,lzo,mp3,mp4,mpg,rar,rpm,sit,tar,taz,tgz,war,xlsm,xl
        sx,z,zip" overridable="true"/>
91      <!-- webraid instance cache parameters -->
92      <!-- <property name="FSC_MaximumIdleWebRaidDownloaders"
        value="20" overridable="true"/> -->
```

6. Save the changes to the file.
7. Restart the Teamcenter FSC Service ~~FSC_D7J4S88K_Administrator~~ service

Proper Shutdown of Client File Caches (FCC):

To reduce instances of corrupted client file caches, it is advisable to ensure proper termination of FCC sessions when shutting down workstations.

Use a **Log-off script** to execute the following utility during user log-off: (for details: https://www.ntweekly.com/2017/11/14/configure-logon-logoff-scripts-group-policy-windows-server-2016/)

Add the following call of fccstat: …..tccs\bin\fccstat -stop

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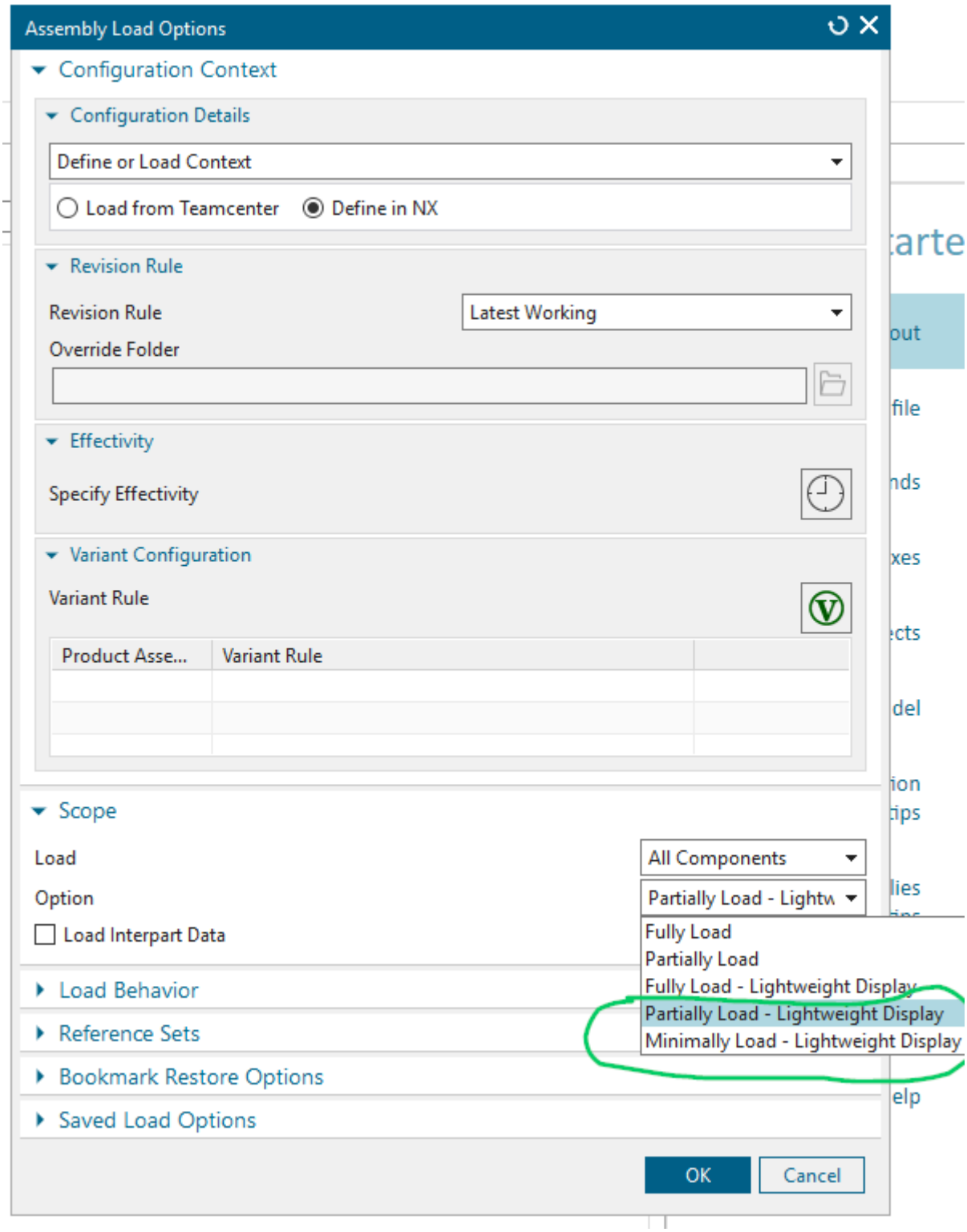
Loading Modes for Large Assemblies in NX

For users working with modern versions of NX (above version 12), it is advisable to consider using the new assembly loading modes: **Partially Load** и **Minimally Load**



Additionally, it is recommended to set one of these modes as the default through the NX configuration files to streamline the workflow and enhance performance when working with large assemblies.