JUDCon

JBoss Users & Developers Conference

Boston:2010

Performance Tuning JBoss AS 6

AS Tuning

- Connection pooling.
- Thread pools.
- Object/component pools.
- Logging.
- JVM Tuning.

Connection Pooling

Database connections are expensive to setup and tear down...

- I have seen applications that created new connections with every query or transaction, and then closed that connection.
- You should monitor your connection usage to determine proper sizing.
- You can monitor the connection pool utilization from the admin console as well as with database specific tools.

Example Data Source

```
<datasources>
   <local-tx-datasource>
      <jndi-name>MySQLDS</jndi-name>
      <connection-url>jdbc:mysql://[host]:3306/[database]</connection-url>
      <driver-class>com.mysql.jdbc.Driver</driver-class>
      <user-name>someuser</user-name>
      <password>somepassword</password>
      <exception-sorter-class-
name>org.jboss.resource.adapter.jdbc.vendor.MySQLExceptionSorter</exception>
      <min-pool-size>75</min-pool-size>
      <max-pool-size>100</max-pool-size>
      <prefill>true</prefill>
      <transaction-isolation>TRANSACTION_READ_COMMITTED</transaction-isolation>
      <prepared-statement-cache-size>100</prepared-statement-cache-size>
   <share-prepared-statements>true</share-prepared-statements>
   </local-tx-datasource>
</datasources>
```

Thread Pooling

Thread pools need to be sized appropriately for the workload...

- The httpd thread pool in JBoss Web is defined in server.xml file under <server>/deploy/jboss-web-sar.
  - Used when making HTTP requests directly to EAP.
- The AJP thread pool is also defined in the same file, just in its connector section.
  - Used when making HTTP requests through mod_jk.
- When using mod_cluster, you setup a listener in JBoss Web, but it uses the AJP and/or HTTPD connector, and corresponding thread pool.

Thread Pooling

Thread pools need to be sized appropriately for the workload...

- The JCA thread pool is used in conjunction with JMS.
  - This can be configured in <server>/deploy/jca-jboss-beans.xml, and is called WorkManager thread pool.
- There is also a TCP thread pool for remote clients.
  - For those remote clients, the thread pool is specified in <server>deploy/remoting3-jboss-beans.xml.
  - There is now only one configuration for remote clients, versus one for each type of component, such as remote JMS clients, remote EJB 3 clients, etc.

Object/Component Pools

There are a variety of other pools that need to be sized...

- For EJB 3, there are pools defined in the ejb3-interceptors-aop.xml. You fine this file in <server>/deploy.
  - There are two types of pools for EJB 3, one is called the ThreadLocalPool, and the other is called the StrictMaxPool.
  - The defaults are for Stateless and Stateful Session Beans to use the ThreadLocalPool.
  - The defaults for Message Driven Beans is the StrictMaxPool.
  - These pools can be monitored through the JMX console.

Logging

- The default configuration is appropriate for development, but not for a production environment...
  - In the default configuration, console logging is enabled.
  - In a production environment, console logging is very expensive.
  - Turn down the verbosity level of logging if its not necessary.
    - The less you log, the less I/O will be generated, and the better the overall throughput will be.

Logging Continued

- New JBoss Logging implementation.
  - Configured in deploy directory (not conf), and was designed to meet performance and usability requirements.
  - Most log statements don't have to be wrapped with ifXXXEnabled()...
    - Those boolean checks are still there for the cases where the construction of the log statement is expensive.

JVM Tuning

- Use large memory page support (HugeTLB in Linux).
  - Default memory page size is typically 4KB.
  - Large memory page support usually starts with 2MB memory pages, and can be as large as 256MB on some architectures.
  - All the major JVM's support large memory pages on Linux.
  - Besides the system overhead of mapping so many memory pages, large memory pages on Linux cannot be swapped to disk.

JVM Tuning Continued

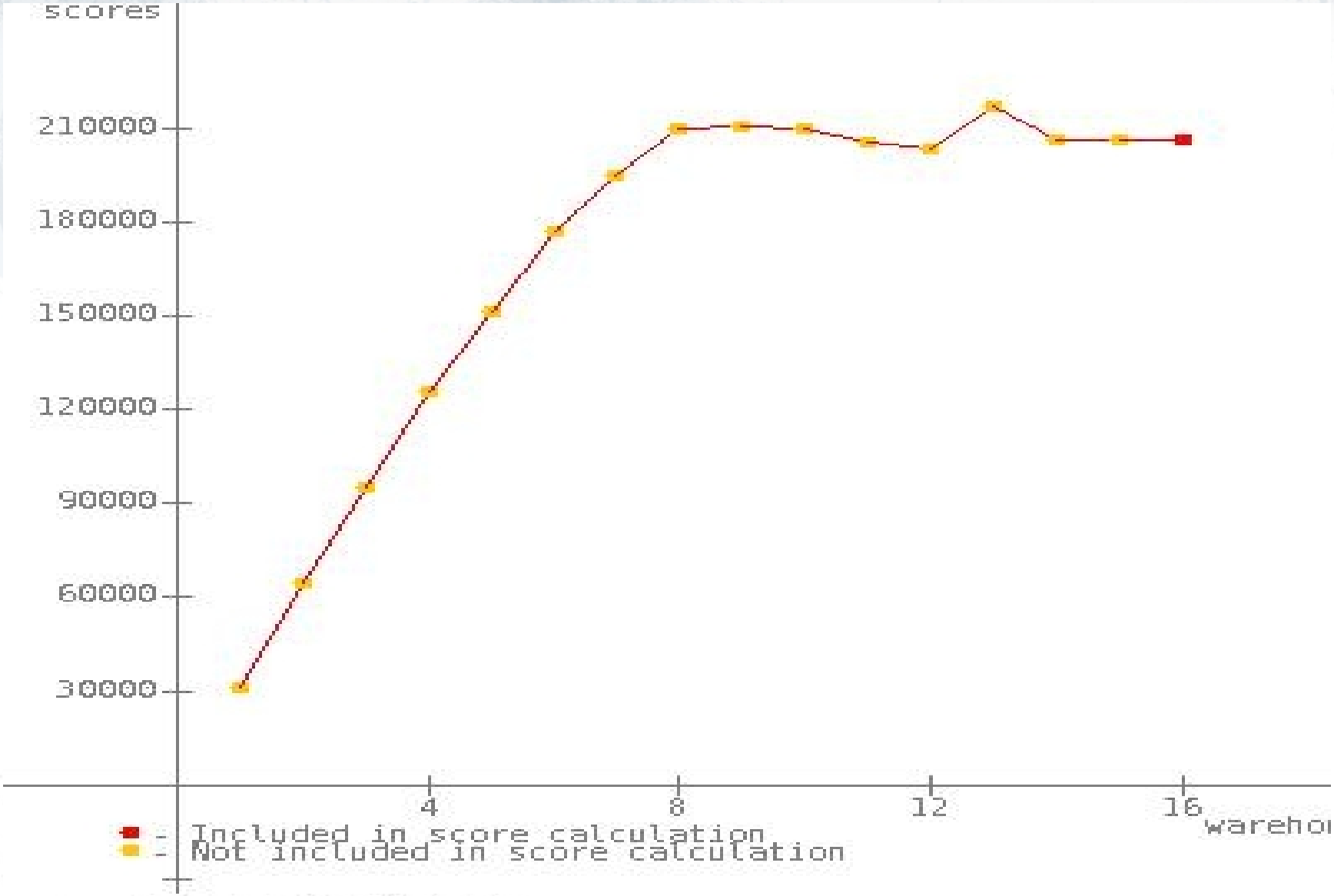
- Use large memory pages with the 64-bit JVM.
  - Use the 64-bit JVM whenever you have a more than 4GB of memory available to you.
    - Large page memory is not available on the 32-bit JVM.
    - RHEL does let you allocate large pages on the 32-bit OS, but you get an illegal argument when starting the JVM.
- The Sun JVM, as well as OpenJDK, requires the following option, passed on the command-line, to use large pages:
  - -XX:+UseLargePages

JVM Tuning Continued

- Turn on aggressive optimizations.
  - -XX:+AggressiveOpts.
    - This option on the Sun and OpenJDK 1.6 JVM's turns on additional HotSpot optimizations that have yet to be made default.
    - Reduced response times on my test workload by 8%.
- Use Escape Analysis with an EJB 3 workload.
  - -XX:+DoEscapeAnalysis.
    - Not a general optimization that I would rely on for anything outside of the EAP without testing it first.
      - Escape Analysis determines if objects are accessed in multiple threads or a single thread. If a single thread, then it “escapes” the object making it local.
      - This has the affect of reducing locking in many cases (improving multi-core throughput), and reducing garbage collection overhead.
      - Reduced response times by 40% on my test workload!!!!

JVM Tuning Continued

- So, what about the 32-bit vs. 64-bit JVM?
  - So, I did some simple workload testing to compare the two.
  - Nehalem 8 core system with 16 GB's of RAM, and Hyper-threading turned on.
    - Looks like a 16 CPU system to the OS.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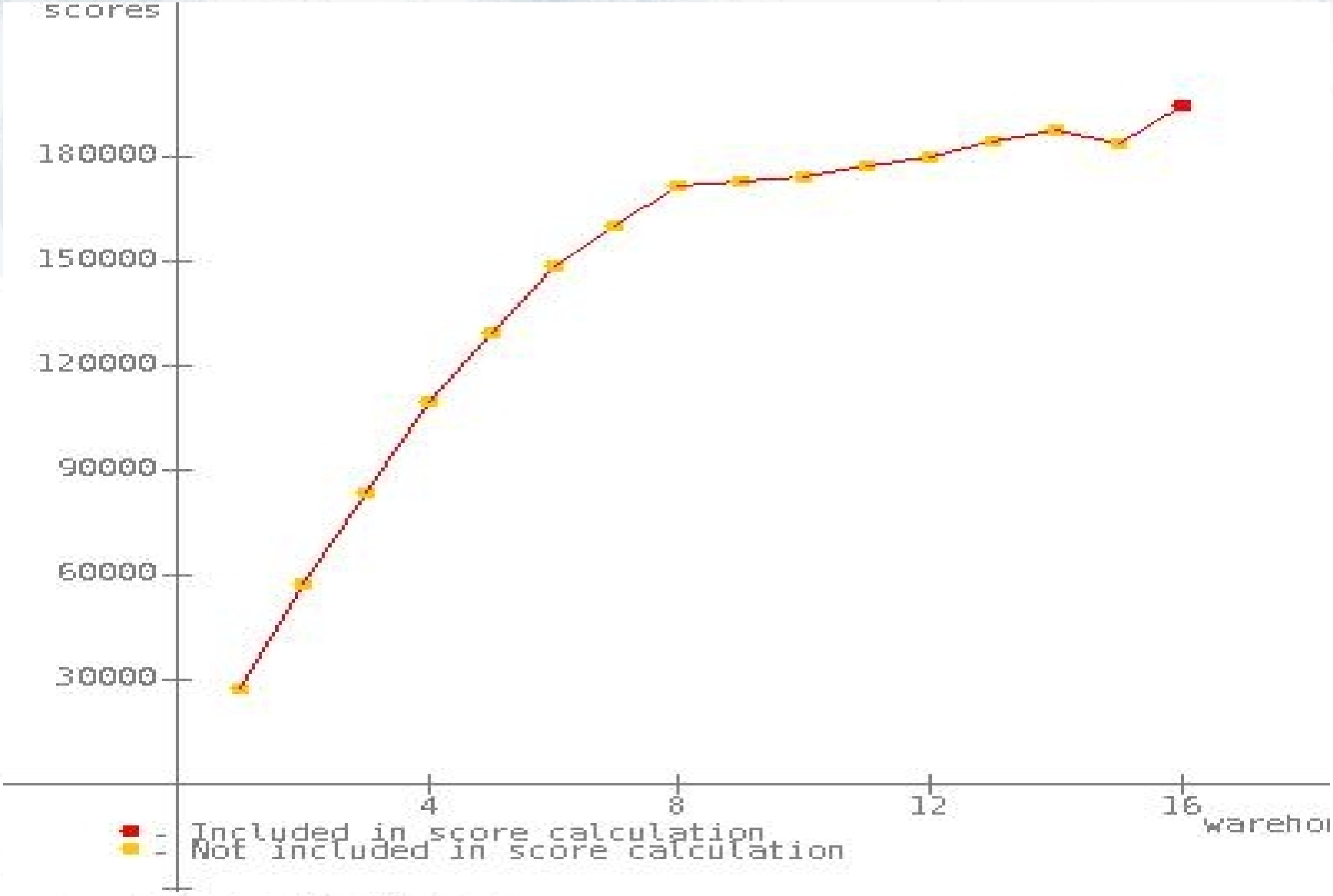
150000
120000
90000
60000
30000
4
8
12
16
warehou
Included in score calculation
Not included in score calculation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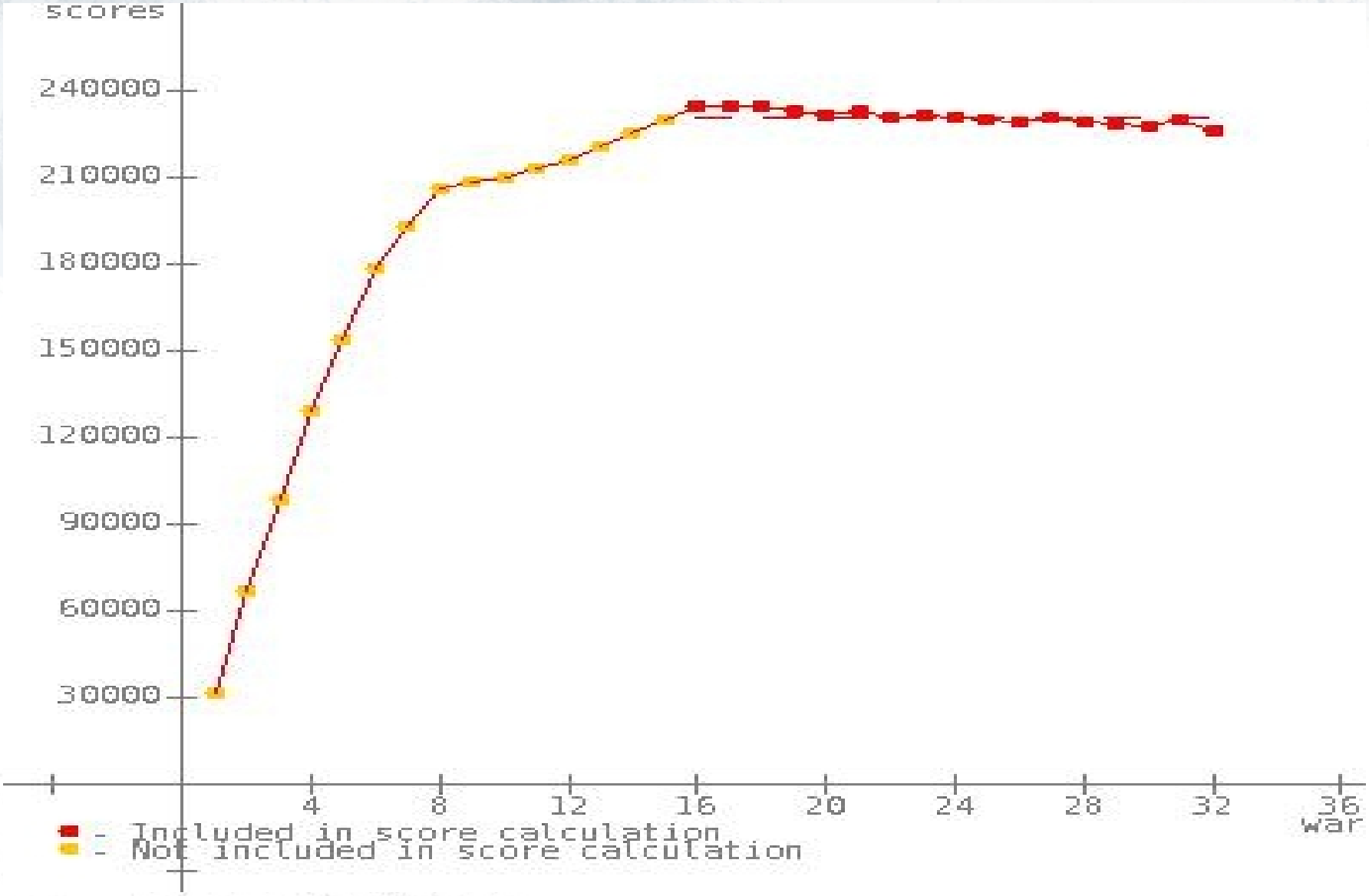
scores
240000
210000
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120000
90000
60000
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4
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16
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24
28
32
36
war
- Included in score calculation
- Not included in score calculation

NUMA

- The latest x86_64 systems from Intel, and all the AMD systems are NUMA.
- JVM supports NUMA.
  - -XX:+UseNUMA
- On Linux start the JVM via numactl.
  - Lots of options to pin the JVM process to specific NUMA nodes, etc.
  - We have seen improvements in experiments.

Q&A