

Sizing

SAP Central Process Scheduling 8.0 by Redwood

Released for SAP Customers and Partners

January 2012



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SAP Library document classification: CUSTOMERS & PARTNERS

Documentation in the SAP Service Marketplace

You can find this documentation at the following address:
<http://service.sap.com/sizing>



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1 Introduction

SAP® Central Process Scheduling 8.0 by Redwood is an adaptive, scalable application that provides the real-time, event-driven scheduling and process automation you need to manage background processing across multiple systems and applications.

Through a central point of control, it enables organizations to orchestrate automation of the IT workload generated by modern business practices and to manage efficiently the compound processes this orchestration demands.

With its comprehensive automation rules, SAP Central Process Scheduling (SAP CPS) manages both routine and predictable workload as well as the ad hoc tasks that can be generated at any time by applications such as e-commerce, business-to-business transfers, and do-it-yourself end-user interfaces. The scheduling application treats both planned and unplanned workloads as “events” and builds relationships between these events to create dependencies where appropriate.

1.1 Functions of SAP Central Process Scheduling

The main capabilities of SAP CPS include:

- **Central Management of the IT Workload Required by Business Processes**

SAP CPS provides a single interface for management of all IT workload, simplifying cross-enterprise management and automating business processes across the SAP landscape and (optionally) non-SAP environments. By automating execution of the IT workload, SAP CPS increases operational efficiency and improves productivity.

- **Seamless Integration with SAP Business Applications**

SAP CPS enables unique low level integration with SAP business applications such as SAP NetWeaver BI and the SAP Closing Cockpit, allowing transparent automation of IT.

- **Optimized Use of IT Resources**

By controlling execution of business process related IT tasks, SAP CPS enables workload to be distributed across systems and run at appropriate times to maximize resource utilization, smoothing out processing peaks and reducing the impact of background tasks on on-line response times.

- **Event Driven Process Management**

SAP CPS allows workload to be managed and controlled on the basis of occurrence of real-time events, such as the arrival of an order file from a customer. This event-driven approach allows more flexibility and responsiveness than basic time based approaches.

1.2 Architecture of SAP Central Process Scheduling

SAP CPS consists of three main components:

- **SAP CPS Central Server**

The Central Server is the focal point of SAP CPS. It contains all the critical information relating to what processes are run, when, under what conditions and following which events. The Central Server also maintains historical run-time data, audit information and critical information for support and maintenance purposes. This configuration and run-time information relates to all processes and therefore makes the Central Server a very powerful component in the centralized management, monitoring and analysis of enterprise wide processing. From a technical perspective the Central Server is a schema within the SAP NetWeaver database.

- **SAP CPS Scheduler System**

The Scheduler System is system where the main web application is running, for example NW AS Java. This is usually the same system as the Central Server.



▪ Target Systems

Target systems are the remote servers, for example SAP application servers, on which the background workload being managed by SAP CPS is executed.

1.3 Factors that Influence Performance

SAP CPS is designed to ensure that processes are automated efficiently to maximize resource utilization. It cannot have a bearing on job performance once the process starts executing. This is down to the underlying hardware on which the application or process is executing. SAP CPS has no control over speed of task execution itself, other than ensuring the most appropriate system is selected for execution in the first place.

2 Sizing Fundamentals and Terminology

SAP provides general sizing information on the SAP Service Marketplace. For the purpose of this guide, we assume that you are familiar with sizing fundamentals. You can find more information at <http://service.sap.com/sizing> → Sizing → General Sizing Procedures.

This section explains the most important sizing terms as defined by SAP, as some of these are used in this document.

Sizing

Sizing means determining the hardware requirements of an SAP application, such as the network bandwidth, physical memory, CPU processing power, and I/O capacity. The size of the hardware and database is influenced by both business aspects and technological aspects. This means that the number of users using the various application components and the data load they put on the server must be taken into account.

Benchmarking

Sizing information can be determined using **SAP Standard Application Benchmarks** and scalability tests (www.sap.com/benchmark). Released for technology partners, benchmarks provide basic sizing recommendations to customers by placing a substantial load upon a system during the testing of new hardware, system software components, and relational database management systems (RDBMS). All performance data relevant to the system, user, and business applications are monitored during a benchmark run and can be used to compare platforms.

SAPS

The SAP Application Performance Standard (SAPS) is a hardware-independent unit that describes the performance of a system configuration in the SAP environment. It is derived from the Sales and Distribution (SD) Benchmark, where 100 SAPS is defined as the computing power to handle 2,000 fully business processed order line items per hour. (For more information about SAPS, see <http://www.sap.com/benchmark> ➤SAPS).

Please note that the SAPS approach is designed for use in sizing requirements for SAP application environments and is not appropriate SAP CPS server sizing.

Initial Sizing

Initial sizing refers to the sizing approach that provides statements about platform-independent requirements of the hardware resources necessary for representative, standard delivery SAP applications. The initial sizing guidelines assume optimal system parameter settings, standard business scenarios, and so on.

Expert Sizing

This term refers to a sizing exercise where customer-specific data is being analyzed and used to put more detail on the sizing result. The main objective is to determine the resource consumption of customized content and applications (not SAP standard delivery) by comprehensive measurements. For more information, see <http://service.sap.com/sizing> → Sizing Guidelines → General Sizing Procedures → Expert Sizing.



Configuration and System Landscaping

Hardware resource and optimal system configuration greatly depend on the requirements of the customer-specific project. This includes the implementation of distribution, security, and high availability solutions by different approaches using various third-party tools. In the case of high availability through redundant resources, for example, the final resource requirements must be adjusted accordingly.

There are some "best practices" which may be valid for a specific combination of operating system and database. To provide guidance, SAP created the NetWeaver configuration guides (<http://service.sap.com/instguides> → SAP NetWeaver).

Hardware Minimum Requirements

Unless otherwise indicated, the sizing guidelines specify the net requirements of the business application. The minimum requirements for installing an "empty" system are specified in the respective implementation guides (<http://service.sap.com/instguides>, in the section for hardware and software requirements). The same applies for front-end PC minimum and optimal requirements.

3 Initial Sizing for SAP Central Process Scheduling

3.1 Assumptions

1) The centralized control provided by SAP CPS means that, typically, only a single Central Server is required for a production environment. Furthermore, processing effort itself is carried out by remote systems running the SAP CPS agent software or by the servers that host the business applications for which workload is being managed. The server on which the Central Server resides does not run the actual background tasks; therefore it is not necessary to deploy multiple Central Servers to achieve high levels of throughput and scalability. It is rare for a customer to run multiple production SAP CPS Central Servers.

2) Although the SAP CPS Central Server does not have to run on a stand alone server, most customers do provide a separate machine. It is recommended that SAP CPS is installed into a dedicated SAP NetWeaver instance in order to minimize downtime imposed by other components in the environment.

3) These guidelines are based on the use of a single Central Server running on a standalone server in a dedicated SAP NetWeaver instance managing all SAP systems.

Note that sizing and tuning of the underlying SAP NetWeaver environment is not covered by this document. Please refer to the appropriate SAP information for these aspects.

3.2 Sizing Guidelines

Base Line Used for Guidelines

These guidelines use the following base line workload:

- 1) Up to 25 simultaneous SAP CPS users.
- 2) Up to 100k SAP CPS jobs running per day.
- 3) Retention of history data for up to 10 million jobs.
- 4) Each concurrent (logged on) SAP CPS user will use about 20MB of RAM.
- 5) Jobs have an average log file size of 16kb.

Basic Guidelines for SAP CPS Central Server Memory Requirements

The memory requirements for the SAP CPS Central Server will be influenced by many factors including the number of SAP systems managed, the number of jobs that are to be submitted and the frequency of access to historic data.



In 64 bit operating system environments a minimum of 4GB of RAM is required for the SAP CPS Central Server and the SAP NetWeaver Java stack. *No other applications should run in this environment.*

If a 64 bit environment is not available, 32 bit operating system environments should have a minimum of 4GB of RAM.

Basic Guidelines for SAP CPS Central Server CPU Requirements

It is extremely difficult to be specific about CPU requirements for the Central Server. Factors such as performance requirements, nature of the workload (how many parallel jobs will run), the number of SAP systems and the number of expected active users will all have an effect. What can be stated is:

- 1) Multiple CPUs can be exploited where there are multiple remote agents as they can execute in parallel.
- 2) It is, however, more effective to have fewer faster CPUs than a larger number of older, slower ones.
- 3) Experience shows that a 2 or 4 CPU server will be able to manage the loads required by most customers.
- 4) Central Server job submission rates have been benchmarked at between 40 - 50 jobs per second on standard server platforms.
- 5) Typically a dual 2.0Ghz Intel system (or equivalent) will be sufficient to meet SAP CPS processing demands based on the baseline described above.

Basic Guidelines for SAP CPS Central Server Disk Space Requirements

As with all aspects of SAP CPS sizing, the amount of disk storage space required for the Central Server will vary depending on many factors. In this case the factors to consider are:

- 1) The number of objects defined in the Central Server (i.e. the number jobs, scripts, calendars, users, applications and so on).
- 2) The number and length of retention of job log files held in the Central Server.
- 3) The amount of disk space required for job output files on the central server. This depends on the number and length of retention of job output files that are transferred to the Central Server from remote managed systems. Operating system job output is held on the remote systems where the jobs actually run. For jobs run in SAP CCMS or BI, SAP CPS will copy the output (spool data) to the scheduler system.
- 4) The number of generations or versions of a job's historical runtime data retained in the Central Server.

Note: These guidelines do not allow for the space required by the Web Application Server Java stack used for the installation or the database software itself. These will vary dependent on database and Java stack used. Approximately 100Mb of disk space is required for the SAP sca file used to deploy SAP CPS.

The following can be applied to arrive at an approximate disk space requirement figure for the Central Server:

- 1) Assume base database size of 32MB.
- 2) Allow 4k per job in held in history data.



- 3) Allow 1MB for every 5,000 job definitions in the Central Server.
- 4) Average log file size of 16k is used for these examples – this will vary from customer to customer and job to job.

The following can be used to help calculate disk space requirements for the Scheduler System and the systems on which the jobs are to run (the Target Servers):

- 1) 100Mb for the scheduler software on the Scheduler System.
- 2) 16Mb for the agent software on any Target Systems where it is deployed
- 3) 16Mb for the SAP CPS SAP transports where they are applied .
- 4) 32k per job for job log and spool files (16k for job log and 16k for spool).
- 5) Allow for size of SAP NetWeaver Java stack and large ABAP spool files (application dependent).

3.3 Sizing Summary

To manage a base line workload of 100k jobs per day, with 10 million jobs retained in the history data, more than 95% of jobs producing average log file size of 16k and no large output files:

- 1) CPU: 2 x 2.0Ghz Intel processors (or equivalent)
- 2) Memory: 4GB
- 3) Disk storage:
 - i) Central Server: $32\text{Mb} + (4\text{k} * \text{history size})$.
 $= 32\text{Mb} + (4\text{k} * 10,000,000)$
 $= 32\text{Mb} + 40\text{Gb}$
 45 – 50 Gb will suffice for SAP CPS but need to allow for Java Stack and database software.
 - ii) Scheduler System: $100\text{Mb} + (20\text{k} * \text{history size})$.
 $= 100\text{Mb} + (20\text{k} * 10,000,000)$
 $= 100\text{Mb} + 200\text{Gb}$
 250 Gb will suffice for SAP CPS and history but need to allow for Java Stack and any large ABAP spool files.
 - iii) Target Server: $32\text{k} * \text{history size for log and spool files}$
 $= 32\text{k} * 10,000,000$
 $= 320\text{Gb}$

Total disk storage = approximately 600 - 800 Gb for SAP CPS and history data for 10 million jobs, including logs and spool data from the target systems. This calculation assumes that the



Target Server is not the same as the Scheduler System and therefore SAP output data is copied from the Target to Scheduler System.

Notes:

- i) In most implementations the Central Server and the Scheduler System will be installed on the same server, in which case these two figures can be added together.
- ii) Most installations will have more than one target server.

4 General Comments for Deploying SAP CPS 8.0 by Redwood

4.1 Minimum SAP system software requirements for SAP Central Process Scheduling:

- 1) SAP NetWeaver AS Java 7.00 SP 14. Note that this defines the SAP NetWeaver environment into which the SAP CPS central scheduling component is installed. This does not mean that the systems whose workload is to be managed must be at the same level. The managed workload can be on earlier or later releases.
- 2) Any database supported by SAP AS Java (where SAP CPS is SAP NetWeaver deployed). Also see section 4.3 below.

4.2 Dedicated SAP NetWeaver Instance

The recommendation is to deploy the production SAP CPS installation into its own, dedicated SAP NetWeaver instance. While it is technically possible to co-exist with another application, this exposes the SAP CPS environment to risk as failures in the other application could compromise reliability.

If a dedicated SAP NetWeaver instance is not possible, SAP CPS should be installed into an environment that is least likely to be impacted by heavy demands on resources or by infrastructure failures. It is *not recommended* that SAP CPS be co-hosted on the same systems as production SAP applications such as SAP ERP.

Note also that development and test instances of SAP CPS should not be installed on the same system as the production environment for similar reasons.

4.3 Single or Dual Java Server Node

The general SAP recommendation is to use two Java server nodes, however for SAP Central Process Scheduling 8.0 by Redwood the recommendation is to deploy on a single Java server node in most situations as a single server node can access more memory. Since SAP CPS makes extensive use of memory caching, this usually results in increased performance on the same hardware.

The SAP NetWeaver Java Stack has a multi-process architecture. In SAP NetWeaver 7.00 each application server has multiple nodes:

- A single dispatcher node
- One or more server nodes

The dispatcher node is responsible for distributing work to the server nodes. The dispatcher node handles network connections and load balancing and uses an internal queuing mechanism to assign work to server nodes.

SAP Central Process Scheduling makes extensive use of memory caching in order to reduce database load and increase performance. Hence its performance improves as the cache size is increased. If there are multiple server nodes then:



- a) Each node has its own cache, so there will be two or more copies of frequently accessed data in memory (one for each server node).
- b) Extra communication is required to keep the caches synchronized across the different server nodes.
- c) Each server node of a Java Virtual Machine has an SAP NetWeaver Application Server and the SAP Central Process Scheduling application loaded.

With a single server node, there is less duplication of objects in memory and the available memory can be used more efficiently.

Running with two or more server nodes has some advantages:

- Faster failover in the case of a server node failure, as the second node is already online.
- Users will be load balanced across the multiple server nodes.

The point at which adding a second server node effects performance depends on both the foreground workload (users) and the background workload (jobs). In general, customers running less than 100,000 jobs per day, with less than 10 concurrent users, or those running on less powerful hardware will get maximum performance out of a single server node (due to increased memory efficiency). Customers with larger workloads and more memory should consider adding a second server node.

4.4 SAP NetWeaver Web Application Server HTTP Worker Threads

As with all aspects of SAP CPS sizing, the number of HTTP worker threads required in the underlying web application server is impacted by variable factors, such as the number of users. The recommended number of Java threads can be calculated as follows:

Minimum number of HTTP worker threads should be set to 50, or

$20 + (2 \times \text{the number of planned Cronacle users})$, for example if the number of Cronacle users is 20 the number of HTTP worker threads will be 60.

Please also see SAP notes 1169442 and 1469844.

4.5 Database Licensing Considerations

SAP CPS will utilize the underlying database that the SAP NetWeaver environment uses.

The recommendation is that SAP CPS is deployed into a completely separate, dedicated SAP NetWeaver stack. In this case the necessary database license to support the environment will be required. SAP CPS licensing does not include either the database or SAP NetWeaver itself.

If SAP CPS is to co-exist on an existing SAP NetWeaver stack, for example with SAP Solution Manager, the existing database runtime license can be used.

5 Comments and Feedback

We are interested to receive comments and feedback on how useful these sizing guidelines have been. If you have any such feedback please send it to: SAPCPS@sap.com.

