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**Billing and Allocation Procedures**  
**for the Central Computing Systems and Services**  
**(valid from 1 July 2009)**

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## **1 Description of the procedures**

The billing procedure calculates the various resources that each user of the central computing systems and services has actually used in contingent units (KE). The calculation formulae and the resources to be settled for each system are specified below.

The allocation procedure sets a maximum for resources that may be used. The only persons excluded from this are external users who must pay for the resources they use within the framework of a contract with Forschungszentrum Jülich. In such cases, consumption within the contractually agreed limits is generally not subject to quota allocation.

Quotas can be granted to individual users as well as to groups of users. In order to ensure that all users have access to the computer services, user quotas or group quotas are divided evenly across the months of use. This monthly quota (MQ) and any time left over from the previous month (PQ) is calculated as the amount in the quota account (CQ) for the current month:

|                                       |
|---------------------------------------|
| $CQ = PQ + MQ$ (of the current month) |
|---------------------------------------|

Any hours not used from the quota of the month preceding the previous month is forfeited. During a changeover to a new allocation period, any remaining quota is forfeited independent of the runtime of the project. No hours may be taken over into the new allocation period.

After each job, the quota used is debited to the current quota account (CQ). This account may be overdrawn to the amount of the monthly quota of the following month (up to -MQ) without affecting the processing priority of the job. Only when the MQ of the following month has also been used up all subsequent jobs will be assigned lowest priority for the rest of that month.

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Using the monthly quota (MQ) of the following month is only possible if the user's allowance for computing resources includes the following month. In the last month of an allocation period, access to the monthly quota (MQ) of the following month is not possible.

An overdrawn account in the preceding months is carried over into the current quota (CQ) as a negative quota.

Another allocation procedure is realized by means of fixed quotas (in the case of JUGENE for annual quotas  $\leq 1$  rack month; in the case of JUROPA, for  $< 12500$  node-h). The quota used is debited to the one-time approved quota account. Once the account has been exhausted, all associated users are blocked.

The head of a project will be informed monthly by email about the current quota status. The members of a project receive an information if the project quota is used up or is again balanced. In case of a monthly quota the email informs about the total and the monthly allocation. Here the described three month window has to be taken into account. In the current month the members of the project have an amount of -100% up to +200% available. The percentage value is based on the allocation of one month. Only in case the usage exceeds the -100% the status of the project will change. In case of the fixed quota mode the email informs about the total quota and the overall consumption. Here the percentage is based on the total quota.

## 2 Billing formula for the JUROPA and HPC-FF supercomputers

Usage is calculated according to the length of wall clock time for which the allocated nodes are occupied. Each JUROPA and HPC-FF node is composed of 8 cores.

$$\text{Contingent Units (KE)} = f_c * NN * \text{TIME}$$

Resource parameters are:

NN: number of allocated nodes  
TIME: wall clock time for which the job occupies the nodes (h)

Factors:

$f_c$ : 0.39 (KE/h)

### 2.1 Overdrawn quota accounts

If the current quota account (CQ) is overdrawn by more than one month's quota ( $CQ < -MQ$ ), then all subsequent batch jobs for all users from the same group or organizational unit will be put on hold until CPU capacity is free. The maximum time that can be requested to process jobs is reduced to 4 hours. Jobs that require more computing time will be refused.

The time used by the jobs will still be debited to the quota account as described above.

### 3 Billing formula for the JUGENE supercomputer

Usage is calculated according to the length of wall clock time for which the allocated nodes are occupied. Each JUGENE node comprises 4 cores.

$$\text{Contingent Units (KE)} = f_c * NN * \text{TIME}$$

Resource parameters are:

NN: total number of nodes in the requested partition  
TIME: wall clock time for which the job occupies the nodes (h)

Factors:

$f_c$ : 0.039 (KE/h)

#### 3.1 Overdrawn quota accounts

If the current quota account (CQ) is overdrawn by more than one month's quota ( $CQ < -MQ$ ), then all subsequent batch jobs for all users from the same group or organizational unit will be put on hold until CPU capacity is free. The maximum time that can be requested to process jobs is reduced to 6 hours. Jobs that require more computing time will be refused.

The time used by the jobs will still be debited to the quota account as described above.

### 4 Billing formula for IP addresses

The costs associated with the provision and use of central IT infrastructure services (e.g. operation of JuNet, name service, backup and restore, support, etc.) are split between the organizational units (OU) at Forschungszentrum Jülich.

In order to avoid more expensive individual invoices for services used and to allow the provision of innovative services that are initially rarely used, the total costs for the IT infrastructure operated by JSC will be divided between the number of IP addresses provided for the OU. The reasoning behind this simple model is that OUs with multiple IP addresses make more use of the infrastructure than those with fewer IP addresses.

The use of services in contingent units (KE) is calculated using the following formula:

$$\text{Usage (KE)} = f_c * AP * \text{NIP}$$

Resource parameters are:

NIP: max. number IP addresses for an OU in an allocation period (AP)

Factors:

|     |               |
|-----|---------------|
| fc: | 10 (KE/month) |
| AP: | 1 (month)     |

Quota allocation does not occur in this case.

## 5 Prices for external users (outside of projects)

Resources are not limited through a quota system for external users.

### 5.1 Price according to usage

The price for usage (excluding VAT) as determined by using the accounting formula for the consumed resources is calculated according to the formula:

$$\text{Price(€)} = \text{Usage (KE)}$$

Prices for external commercial users are available on request to Mrs Marga Wenzel (mailto:m.wenzel@fz-juelich.de;phone:02461/613770).

### 5.2 Basic amount

As compensation for the provision of disk space, software, etc., a minimum of 25 KE/month will be billed to each contractual partner who works with one or more JSC computer(s). This minimum amount will be offset against the actual total monthly usage on all systems.