

White Paper

Fujitsu Software BS2000 VM2000

Virtualization of BS2000 within the Dynamic Data Center - the virtual infrastructure Fujitsu Software BS2000 VM2000 reduces IT costs by increasing efficiency, flexibility and response capability. It provides IT resource allocation on-the-fly in response to new business requirements and service requests. Extremely high levels of server utilization are a byproduct.

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Introduction

VM2000 supports the simultaneous operation of different, totally segregated system environments on one server. The operating resources (CPU power and main memory) of one real server can be distributed across up to 32 BS2000 guest systems. This distribution can be modified dynamically. The configuration of peripherals, including their connections (channels), and other devices can be modified or extended during live operation.



The advantage of using VM2000 as compared with the use of multiple servers is the possibility of consolidation with the aim of providing more efficient use of hardware resources, human resources and infrastructure.

VM2000 as base for different system environments

Customers are increasingly faced with the need to handle different system environments simultaneously on one server in order to cope most effectively with the wide variety of IT tasks they have to deal with.

The reasons are:

- Optimization of costs
- Simple and uniform handling and administration
- Parallel operation of production, development, test and version updates
- Automation and operational reliability
- Differentiated systems, for example for service data centers
- Availability of backup systems
- Separation of sensitive applications

The provision of different system environments fulfills VM2000 in a flexible manner by the following features:

Simultaneous operation of many guest systems

On Server Unit x86 up to 32 BS2000 guest systems (incl. monitor system) can run simultaneously (on Server Unit /390 the number of guest systems is limited to 15).

Full separation of guest systems

Access to memory areas and devices of other guest systems is not possible. Faults in operation on one guest system do not affect the other guest systems, even if these errors cause the system to crash.

Flexible assignment of resources to the guest systems

Memory, devices, CPU power and global store can be assigned to guest systems "on the fly". The granularity of assignment is optimally small.

The Capacity-on-Demand feature is offered: through connection of extra CPUs on the fly, CPU power can be increased for a certain time.

Increased reliability and availability

When the guest system (or the monitor system) fails, it can be automatically restarted. A manual restart of the monitor system can also be initiated. This does not affect the remaining guest systems. When one CPU fails, VM2000 automatically activates the available spare CPU (on server unit /390), system performance remains unchanged. The same applies to possible affected guest systems: a virtual spare CPU will be switched on – the guest system performance remains the same. With this technique, the availability of mono guest systems is equal to the availability level of multiprocessor guest systems.

BS2000 guest systems have the same functionality as systems in native mode

The instruction set, network communication options as well as test and diagnostic utilities of all guest systems running under VM2000 correspond to operation without VM2000.

Performance of guest systems is comparable with native mode

The guest systems access the CPUs directly, with only minor emulation required.

The memory is assigned permanently to the guest system and necessary address conversion is done by hardware.

The guest systems execute the IO's normally directly.

Simple system operation and configuration

Important guest systems can be prioritized, thus enabling a flexible response to customer requirements.

The management of I/O peripherals can be done VM2000 spanning: the reconfiguration and the dynamic expansion of peripheral objects is done in common for all guest systems from the monitor system.

Optimal use of resources with VM2000

VM2000 allows data center service providers to install one or a small number of high-performance servers that can run several operating systems for a variety of external customers.

This enables detailed capacity planning throughout the organization. Obvious knock-on effects of this include cost savings in relation to operating staff and space requirements for computers. The virtualization of resources such as CPU, main memory and global storage guarantees a high level of efficiency and optimum use of resources.

The billing of the consumed CPU power can be done in two different ways:

- Usage based
VM2000 writes VM-specific accounting records. They show the consumed CPU and the time periods of resource assignment.
- Service level agreements
the customer is guaranteed a certain CPU power, for which an RPF-based constant pricing is determined. The amount of CPU power used can be limited using the VM2000 function MAX-CPU-UTILIZATION.

Formation of CPU pools

CPUs can be combined dynamically CPU pools. For such a pool VMs can be determined, which only can use this pool. The CPUs and VMs of the pool form a part of the Server Unit, which is provided to a customer.

Dedicated CPUs

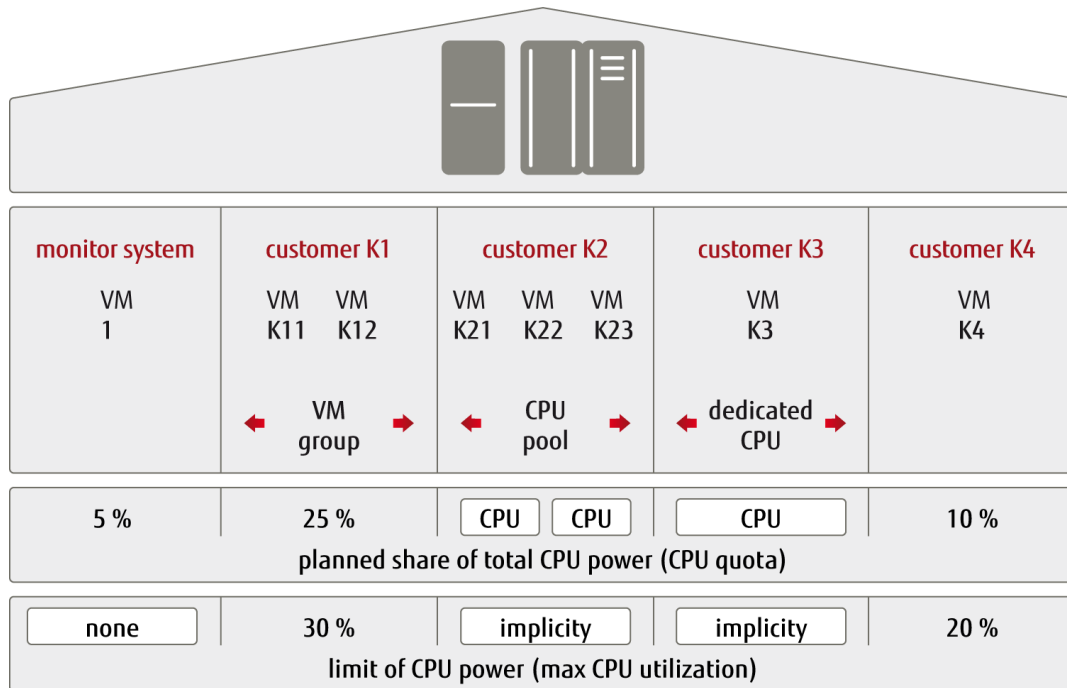
If the number of connected real CPUs in a CPU pool of a Server Unit /390 is greater or equal to the sum of connected virtual CPUs, then VM2000 assigns each virtual CPU of a VM one real CPU. The solid CPU assignment is optimal for a sufficient number of real CPUs in terms of performance, because each virtual CPU is always running on one and the same real CPU.

Limitation of the CPU power for a group of guest systems

Multiple VMs on a Server Unit /390 can be combined into a VM group for which CPU scheduling specifications (CPU-QUOTA and MAX-CPU-UTILIZATION) can be effected comprehensive. The first step is to determine which CPU performance and CPU power limitation receives the VM group. In the second step, the power distribution within the VM group is determined. VM2000 provides for priority allocation of the group planned CPU power within the group. Service data centers can thus organize guaranteed computing performance for customers with multiple VMs.

Granularity setting of CPU-QUOTA and MAX-CPU-UTILIZATION

The two attributes for controlling the VM's performance can be specified with two decimal places. This means that for very big Server Units definitions are possible in the one-digit RPF area up to one percent of the CPU capacity.



Operation of several guest systems under VM2000 on Server Unit /390 (example)

Support of Live Migration

Live Migration provides on SE servers an uninterrupted relocation of a running BS2000 guest system from one Server Unit to another. This enables a simple relocation of the guest systems with running applications to another server, for example prior to planned maintenance work respectively updates for hardware or firmware, including the reverse relocation of the systems or changing the load distribution between two servers. Those take place without affecting the users.

With the new VM2000 command MIGRATE-VM (as of VM2000 V11.5) a virtual machine (BS2000-VM) can be relocated from the local Server Unit to another Server Unit (target SU) of the same SU cluster in a running guest system operation while maintaining the operating resources.

The Live Migration of a BS2000-VM between two Server Units /390 in SE network is fully executed by VM2000. The target SU is still located in another SE server. The LM functionality of Xen/X2000 in SU x86 is encased by VM2000 commands and messages. During VM migration of an SU x86 the target SU can be located in the same or a different SE server.

In addition to the Live Migration of BS2000-VM (VM status RUNNING or INIT-ONLY/DOWN) VM2000 V11.5 also supports the migration of a VM definition (VM status DEFINED-ONLY) between two Server Units of a SU cluster using the command MIGRATE-VM-DEFINITION.

The command CHECK-VM-INTEGRATION can check if a Live Migration of a VM is currently feasible.

Summary of VM2000 benefits

- Parallel operation of several BS2000 systems on one server
- Support for version upgrades of the operating system, system-specific software and application systems
- More flexible resource distribution than is possible on multi-server configurations
- Provision of backup systems
- Price advantages compared to several servers (consolidation)
- Minimization of planned downtimes by uninterruptable relocation of running BS2000 guest systems

VM2000 - Combinations of supported versions

VM2000	Server Unit	SE-SW	Monitor system		Guest system	
		M2000/X2000/HNC	OSD/XC V11.0B	OS DX V1.0	OSD/XC V11.0B	OS DX V1.0
V12.0	SU7/330	V6.5		x	x	x
	SU320	V6.4/V6.5		x	x	x
	SU7/310	V6.4/V6.5		x	x	x
	SU7/5/300B	V6.4		x	x	x
V11.5	SU320	V6.4	x		x	x
	SU7/310	V6.4	x		x	x
	SU7/5/300B	V6.4	x		x	x

Legend:

x supported configuration

About Fujitsu

In addition to Fujitsu Software BS2000, Fujitsu provides a range of platform solutions. They combine reliable Fujitsu products with the best in services, know-how and worldwide partnerships.

Fujitsu Portfolio Built on industry standards, Fujitsu offers a full portfolio of IT hardware and software products, services, solutions and cloud offering, ranging from clients to datacenter solutions and includes the broad stack of Business Solutions, as well as the full stack of Cloud offerings. This allows customers to select from alternative sourcing and delivery models to increase their business agility and to improve their IT operation's reliability.

Learn more about Fujitsu Software BS2000, please contact your Fujitsu sales representative or Fujitsu Business partner, or visit our website.

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