

# White paper

## FUJITSU Server PRIMEQUEST Extended Partitioning

High availability, fault resilience and unprecedented performance for business-centric computing require mainframe-like, flexible and reliable platform and features: FUJITSU Server PRIMEQUEST with Extended Partitioning.



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**Introduction**

In a fast-paced world for IT environments, ever changing requirements seek for continuity – to smoothly run business without interruption. This continuity does not necessarily need to be fixed to a certain system design and configuration. With FUJITSU Server PRIMEQUEST 2000 series first and second generation, continuity is given in terms of mission-critical computing capabilities but not a fixed set-up. This white paper deals with the advanced functionality of “Extended Partitioning”, a function unique to FUJITSU Server PRIMEQUEST 2x00E/2x00E2 enterprise systems.

**Partitioning functions of PRIMEQUEST at a glance**

**Physical Partition – The RAS Highlight**

As the main reliability, availability and serviceability (RAS)-feature, the PRIMEQUEST 2x00E/2x00E2 systems are capable of providing physical partitioning (PPAR). It allows for full electrical isolations of physical hardware resources so that high reliability is guaranteed - all in one chassis. The system design features two system boards in the PQ 2400E/2400E2 model and up to four system boards in the PQ 2800E/2800E2 model, respectively. A PPAR configuration thus allows for max two or four partitions within one system that can run different operating systems and applications as required. Each partition works as an independent server, making it ideal to set free from risks and more complex virtualization deployments.

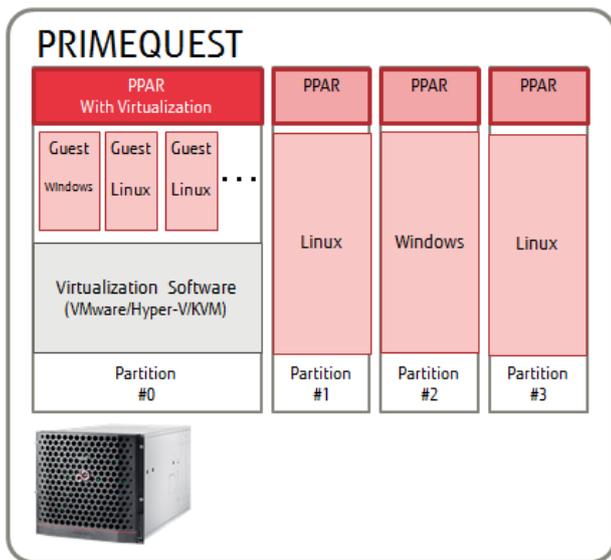


Image 1: A PRIMEQUEST with PPAR and Virtualization

Thanks to the certification and extensive testing, each PPAR can also be effectively combined with virtualization software such as VMware vSphere, Microsoft Hyper-V and RedHat Linux as well as SUSE Linux virtual machines to get the most out of a PRIMEQUEST system and optimize a scale-up approach even further. All management functions regarding PPAR are included in the so called management board (MMB) for ease of use and maintenance. The MMB is delivered on standard with each FUJITSU Server PRIMEQUEST.

**Extended Partitioning – Partitioning taken one step ahead**

License fees eat up an extensive amount of IT budgets. The consolidation of existing server systems following a scale-up approach into one performant and highly available machine become more and more interesting for IT leaders. Saving license cost for hypervisors and

related expenditures as well as to merge more servers in one PRIMEQUEST can be overcome using Extended Partitioning.

With PPAR, consolidation of four systems (PRIMEQUEST 2800E/2800E2; two for PRIMEQUEST 2400E/2400E2) can be implemented. With Extended Partitioning, now a consolidation of up to eight systems (PRIMEQUEST 2800E/2800E2; four for PRIMEQUEST 2400E/2400E2) can be performed, to effectively utilize the given resources in a single system. Based upon the physical partition, a more granular partition can be built without the need for dedicated virtualization software. One PRIMEQUEST 2800E/2800E2 can thus consolidate even “mixed configurations”, meaning at maximum a combination of 3 PPAR + 8 ExPAR (total: 11 independent systems) within 10U is possible. Each partition operates independently similar to a physical partition while keeping the isolation between the different partitions. This keeps the aspiration for high reliability.

On top of Extended Partitioning, a function named Extended Socket<sup>1</sup> will be available for PRIMEQUEST. This feature allows each extended partition to access system internal networks to reach throughputs of max 20Gbps. At the same time, an external network switch is not necessary anymore and makes computing more powerful and secure.

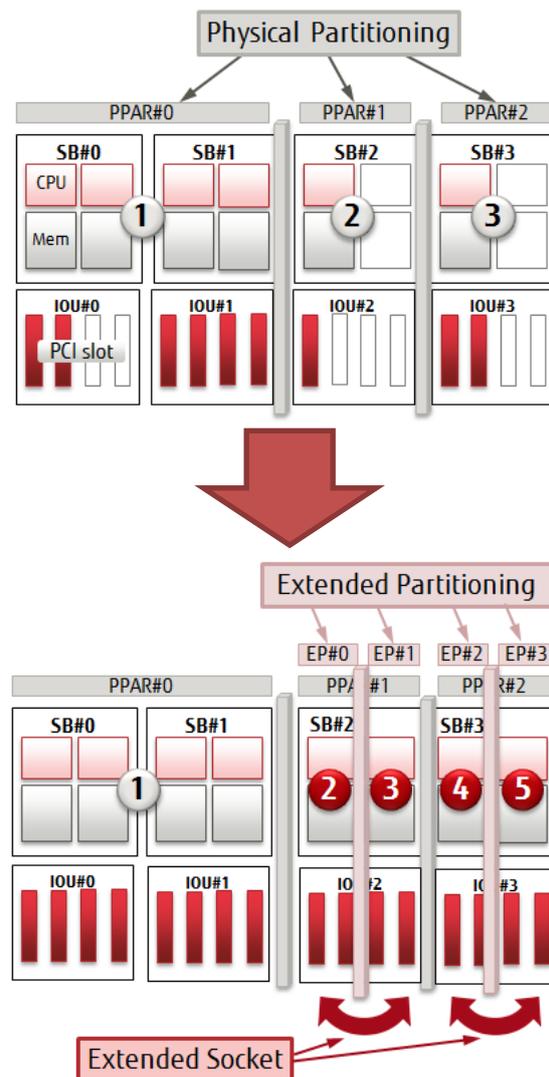
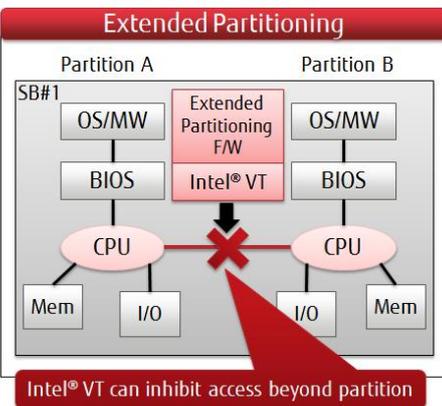
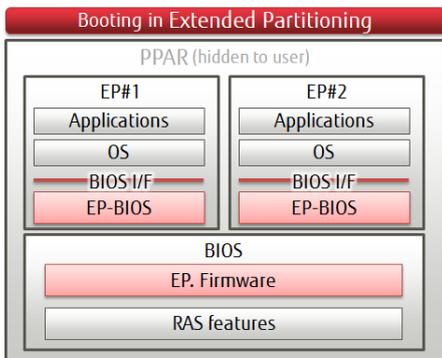


Image 2: Evolving from PPAR to ExPAR

<sup>1</sup>Supported by Red Hat Enterprise Linux (RHEL) 7.1 and later only.

**How Extended Partitioning boots to ensure isolation**

As mentioned before, each Extended Partition operates independently without any interaction. Fujitsu developed a dedicated firmware for PRIMEQUEST enterprise models to specifically control this function. This function is stored in the BIOS ROM of each Physical Partition. This ensures, that each Extended Partition also delivers its "own" BIOS to the operating system installed to ensure compatibility at best.



**Benefits of Extended Partitioning**

**Cost savings**

Installation and operational cost (OPEX) can be reduced very effectively as each Extended Partition has its' own resources in terms of processors, memory, disk drives and IO-interfaces. Thanks to the integration in the MMB, neither the installation of a dedicated hypervisor nor a virtual server management console is required – a reduction in both OPEX and CAPEX is the result. Additionally, as another tool is not required, operational tasks are lowered so that knowledge for such tools can be neglected. The Extended Socket function helps to save OPEX and CAPEX as well, due to the fact that an external network can be avoided.

**Performance**

In contrast to virtualization, real physical devices are associated to the logical partition, without defining virtual devices. Overheads generated by virtualization layers can thus be reduced.

**High security**

High security is ensured with Extended Partitioning and system attacks do not need to be feared. Any malicious attacker will attack hypervisor or VMs which is connected to network. However, the Extended Partitioning firmware is neither software nor network connected entity. This makes attacker quite difficult to threat virtualization mechanism.

**Fault isolation**

Thanks to the isolation between different extended partitions, similar to physical partitions, risks for downtime due to hardware failures can be minimized.

When compared to virtualization, you can find slight differences between Extended Partitioning and virtualized environments, exemplary VMware environments. In case of a failure in the application or the operating system, both techniques are the same: other ExPAR or VMs are not affected and remain operating.

A difference can be seen when it comes to hardware failures with ExPAR, you have the chance to assign components to dedicated partitions physically. A VM does this "just" virtually. For failures in components not shared between partitions with ExPAR, only the affected application goes down, however, a hypervisor would terminate the all VMs run on the same hardware components, causing a stoppage other other applications.

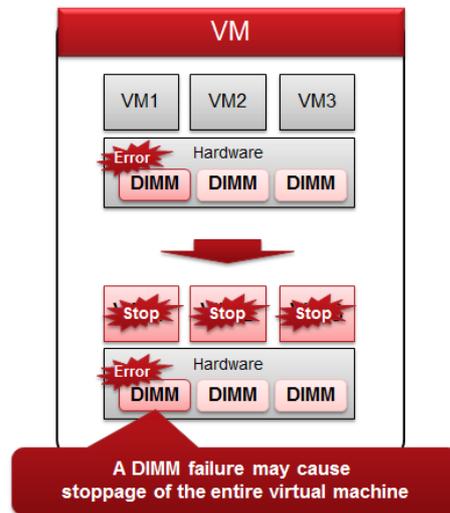


Image 3: DIMM failure and effect on a system with virtual machines.

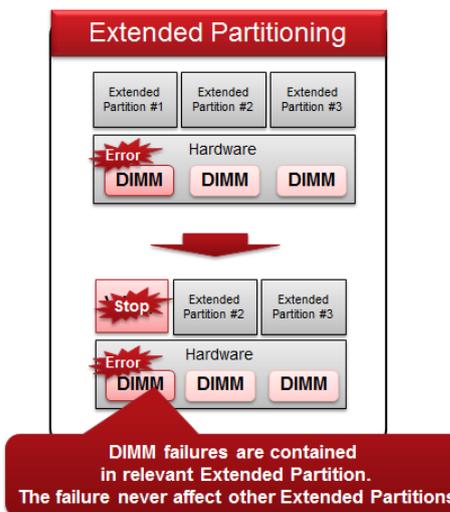


Image 4: DIMM failure and its effect on a system using Extended Partitioning

Specifications		
Supported OS	Red Hat Enterprise Linux 6 (w/o KVM) Red Hat Enterprise Linux 7 (w/o KVM)	
System	Max. Number of Extended Partitions	
PRIMEQUEST 2400E/2400E2	4	
PRIMEQUEST 2800E/2800E2	8	
Components	Minimum per Extended Partition	Maximum per Extended Partition
System Board	1	2
CPU	1	4
CPU cores	1	Maximum of PPAR – 1 (1 core is dedicated for management)
Memory Mezzanine Card	0	4
DIMM	2	96
Memory	4GB	Max. of PPAR – 2GB (2GB is dedicated for management)
Disk Unit	0	2
IO Unit	1	4
PCIe slots	0	Max. of PPAR
PCI-Box	0	4

## Further References

### Datasheet

PRIMEQUEST 2800E2

<http://docs.ts.fujitsu.com/dl.aspx?id=23a2a18a-5243-42db-bf55-489615fb8009>

PRIMEQUEST 2400E2

<http://docs.ts.fujitsu.com/dl.aspx?id=b776af7f-23a4-4c3d-a611-e22f205414ad>

PRIMEQUEST 2800E

<http://docs.ts.fujitsu.com/dl.aspx?id=8a542600-b628-421b-9cf7-19c47507543a>

PRIMEQUEST 2400E

<http://docs.ts.fujitsu.com/dl.aspx?id=88ddb5c2-ff30-4183-bfd1-2664a4efa45e>

### Manual

FUJITSU Server PRIMEQUEST 2000 series General Description

<http://docs.ts.fujitsu.com/dl.aspx?id=25a60f6e-a61e-456a-9347-c19b7219b2e4>

FUJITSU Server PRIMEQUEST 2000 series Installation Manual

<http://docs.ts.fujitsu.com/dl.aspx?id=08bfd005-903a-41bf-9084-aac03481f230>

FUJITSU Server PRIMEQUEST 2000 series Administration Manual

<http://docs.ts.fujitsu.com/dl.aspx?id=ddcbc317-57d6-4cf3-b060-d0606a125aec>

FUJITSU Server PRIMEQUEST 2000 series Tool Reference

<http://docs.ts.fujitsu.com/dl.aspx?id=aed9a38b-f4dc-4424-b377-b9b522780747>

FUJITSU Server PRIMEQUEST 2000 series Message Reference

<http://docs.ts.fujitsu.com/dl.aspx?id=ea17297e-f612-47ce-8a61-1bd23b40a2af>

### Guide

FUJITSU Server PRIMEQUEST 2000 series Design Guide

<http://docs.ts.fujitsu.com/dl.aspx?id=f3984195-8397-4379-89ad-31a23c341943>

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