

## 1.2.1 Processor and memory

IBM continues its technology leadership with the z14 server. The z14 server is built by using the IBM modular multi-drawer design that supports 1 - 4 processor drawers per CPC. Each processor drawer contains five or six Central Processor (CP) single-chip modules (SCMs) and one Storage Controller (SC) SCM. Both SCMs are redesigned by using 14 nm FINFET SOI technology.<sup>3</sup> Each CP SCM has 10 processor units (PUs, or cores). In addition to SCMs, CPC drawers host memory DIMMs, connectors for I/O, oscillator interface, Flexible Service Processors (FSPs), and cooling manifolds.

The superscalar processor implements second-generation SMT<sup>4</sup> now enabled for System Assist Processors (SAPs). It also implements redesigned caches and translation lookaside buffer (TLB), optimized pipeline, and better branch prediction. Also featured is an expanded instruction set with Vector Packed Decimal Facility, Guarded Storage Facility, Vector Facility enhancements, Semaphore Assist Facility, Order Preserving Compression, and Entropy Encoding for Co-processor Compression for better performance in several different areas.

Depending on the model, the z14 server can support 256 GB - 32 TB of usable memory, with up to 8 TB of usable memory per CPC drawer. In addition, a fixed amount of 192 GB is reserved for the hardware system area (HSA) and is not part of customer-purchased memory. Memory is implemented as a redundant array of independent memory (RAIM) and uses extra physical memory as spare memory. The RAIM function accounts for 20% of the physical installed memory in each CPC drawer.

New with z14, Virtual Flash Memory (VFM) feature is offered from the main memory capacity in 1.5 TB units and replaces the Flash Express adapters, which were available on the zEC12 and z13. VFM provides much simpler management and better performance by eliminating the I/O the adapters in the PCIe drawers. VFM does not require any application changes when moving from IBM Flash Express.

## 1.2.2 Capacity and performance

The z14 server provides increased processing and enhanced I/O capabilities over its predecessor, the z13 system. This capacity is achieved by increasing the performance of the individual PUs, increasing the number of PUs per system, redesigning the system cache, increasing the amount of memory, and introducing new and I/O technologies.

The increased performance and the total system capacity available (with possible energy savings) allow consolidating diverse applications on a single platform with significant financial savings. The introduction of new technologies and an expanded and enhanced instruction set ensure that the z14 server is a high-performance, reliable, and rich-security platform. The z14 server is designed to maximize the use of resources and allows you to integrate and consolidate applications and data across the enterprise IT infrastructure.

z14 servers are offered in five models, with 1 - 170 configurable PUs. Models M01, M02, M03, and M04 have up to 41 PUs per CPC drawer. The high-capacity model (the M05) has four processor (CPC) drawers with 49 PU per drawer. Model M05 is estimated to provide up to 35% more total system capacity than the z13 Model NE1, with the same amount of memory and power requirements. With up to 32 TB of main storage and enhanced SMT, the performance of the z14 processors deliver considerable improvement. Uniprocessor performance also increased significantly. A z14 Model 701 offers average performance improvements of 10%<sup>5</sup> over the z13 Model 701.

<sup>3</sup> FINFET is the industry solution; SOI is the IBM solution for SER.

<sup>4</sup> Simultaneous multithreading is two threads per core.

<sup>5</sup> Observed performance increases vary depending on the workload types.