AccessionIndex: TCD-SCSS-T.20150116.001
Accession Date: 16-Jan-2015
Accession By: Dr.Michael Manzke
Object name: IBM BladeCenter chassis with seven BladeCenter QS20 blades
Vintage: c.2006
Synopsis: IBM blade product using the same IBM/Sony-designed Cell Broadband Engine (Cell BE) processor as in the Sony PlayStation 3 (PS3).

Description:
In 2006 IBM introduced the IBM *BladeCenter* QS20 [1], a product using the same IBM/Sony-designed *Cell Broadband Engine* (Cell BE) processor [2] as in the Sony *PlayStation 3* (PS3) [3]. The QS20 extended the IBM BladeCenter portfolio by providing parallelism and performance for targeted workloads, including image processing, signal processing, and graphics rendering applications.

Based on IBM's *Power Architecture* (PA), the Cell BE processor was originally developed by IBM, Sony Corporation, Sony Computer Entertainment Inc, and Toshiba Corporation. The Cell BE processor was an advanced microprocessor optimized for compute-intensive workloads, with multiple cores and high-speed communications, designed to deliver real-time response for entertainment and rich media applications. It effectively delivered supercomputer-like performance by incorporating advanced multiprocessing technologies used in IBM's sophisticated servers. Cell BE was expected to be suitable for high-performance workloads across a number of industries, including digital media, medical imaging, aerospace and defense, seismic computing, communications, and the high-performance computing industry. In particular the QS20 Cell BE was designed for businesses that needed the dense computing power and unique capabilities of the Cell BE processor to tackle tasks involving graphic-intensive, numeric applications. The system relied on the Cell BE processor to help accelerate key algorithms like 3D rendering, compression, and encryption, to help enable companies to create and run highly visual, immersive, real-time applications.

The QS20 required a BladeCenter chassis and a Linux Fedora Core5 operating system. Each chassis could be populated with seven double-width QS20 blades, which could not be intermixed with other blades within a chassis but could be networked with other blades within a rack or multi-rack system configuration. The QS20 itself provided two sockets for 3.2GHz Cell BE chips, each with one *Power Processing Element* (PPE) plus eight *Synergistic Processing Elements* (SPE) for a total of 9 cores per processor [1], 18 cores per blade, yielding up to 410GFlops per blade, 2.8TFlops per chassis, and up to 17TFlops in a 42U rack.

Trivia1: The BladeCenter used the same Cell BE as SONY's PS3 (see elsewhere in this catalog), but only used fully-working chips with eight SPEs, whereas the PS3 used selected chips with only seven working SPEs.

Each QS20 blade had two 3.2GHz Cell BE processors, 1 GB XDRAM (512 MB per processor), a 40GB IDE hard disk drive, two 1Gbps Ethernet controllers that provided connectivity to the BladeCenter chassis midplane and switches, an interface that provided *Blade Power System* and *Sense Logic Control*. There was an InfiniBand (IB)

option for up to two Mellanox IB 4x Host Channel Adapters (external IB switches were then required).

In 2007 IBM gave a half-height rack with two BladeCenter chasses to the GV2 research group in the Dept.Computer Science, Trinity College Dublin. The upper chassis provided fourteen traditional HS21 blade processors, while the lower chassis provided seven QS20 Cell BE blades, which were among the first QS20 blades manufactured. Subsequently a fault was found in the original blade design that made them prone to catching fire. At this point IBM sent seven new blades, and were supposed to collect the seven originals, but they never did.

The IBM QS20 Cell BE system is a unique product, and this example is preserved in this collection.

Many thanks to Michael Manzke for donating this item.

Many thanks also to the Chief Technician, Tom Kearney, and the technicians, Ronan Healy, Wayne Clifford and Shane Greenan (especially Ronan and Wayne), for doing the arduous task of disassembly, removal to archive, and reassembly of this extremely heavy piece of equipment.

Trivia2: In May-2008 the IBM Roadrunner (Opteron + PowerXCell 8i) supercomputer was the world's first system to achieve one petaFLOPS

The homepage for this catalog is at: https://www.scss.tcd.ie/SCSSTreasuresCatalog/
Click *'Accession Index'* (1st column listed) for related folder, or *'About'* for further guidance. Some of the items below may be more properly part of the other categories of this catalog, but listed here for convenience.

Accession Index	Object with Identification
TCD-SCSS-T.20150116.001.01	IBM BladeCenter chassis with seven BladeCenter QS20 blades, IBM blade product using the same IBM/Sony-designed Cell Broadband Engine (Cell BE) processor as in the Sony PlayStation 3 (PS3), c.2006.
TCD-SCSS-T.20150116.001.02	IBM Cell BE BladeCenter chassis P/N: M/T-M8677-3RG, S/N: 99ZA491
TCD-SCSS-T.20150116.001.03-09	7 x IBM QS20 Cell BE blades S/N:
TCD-SCSS-T.20150116.001.10	IBM CPU BladeCenter H chassis S/N:
TCD-SCSS-T.20150116.001.11-24	14 x IBM HS21 CPU blades S/N:
TCD-SCSS-T.20150116.001.25	IBM eServer xSeries 336 server P/N: MT-M8837-1RY, S/N: KDPFXT2
TCD-SCSS-T.20121208.106	csTCDie PS3 Cluster, Ten nodes from a 16-node Sony Playstation PS3 cluster using 1Gbps Ethernet interconnect and running Yellow Dog Linux, c.2009.

References:

1. Wikipedia, *Cell (microprocessor)*, see:
   https://en.wikipedia.org/wiki/Cell_(microprocessor)
   Last browsed to on 24-Jun-2018.

2. IBM, *IBM BladeCenter QS20 blade with new Cell BE processor offers unique capabilities for graphic-intensive, numeric applications*, see:
   https://www-01.ibm.com/common/ssi/rep_ca/7/897/ENUS106-677/index.html
   Last browsed to on 24-Jun-2018.

3. Wikipedia, *PlayStation 3*, see (last browsed to 18-Jan-2016):
   https://en.wikipedia.org/wiki/PlayStation_3

4. IBM, *Cell Architecture*, IBM Systems and Technology Group, 2006.
   See in related folder in this catalog:
   https://www.scss.tcd.ie/SCSSTreasuresCatalog/hardware/TCD-SCSS-T.20150116.001/Day1-03-CourseCode-L1T1H1-10-CellArchitecture.pdf

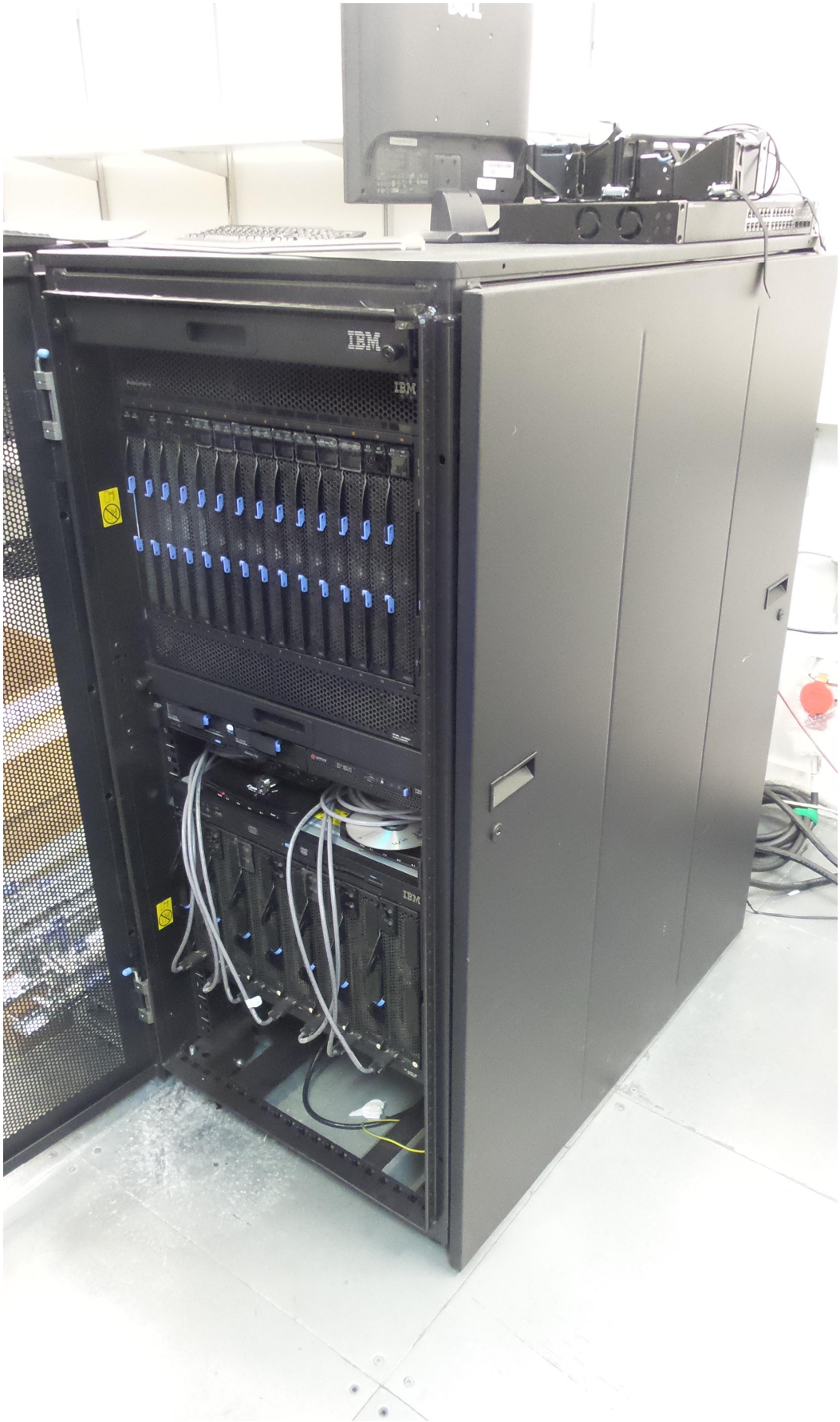

Figure 1: IBM BladeCenter QS20 three-quarter front view

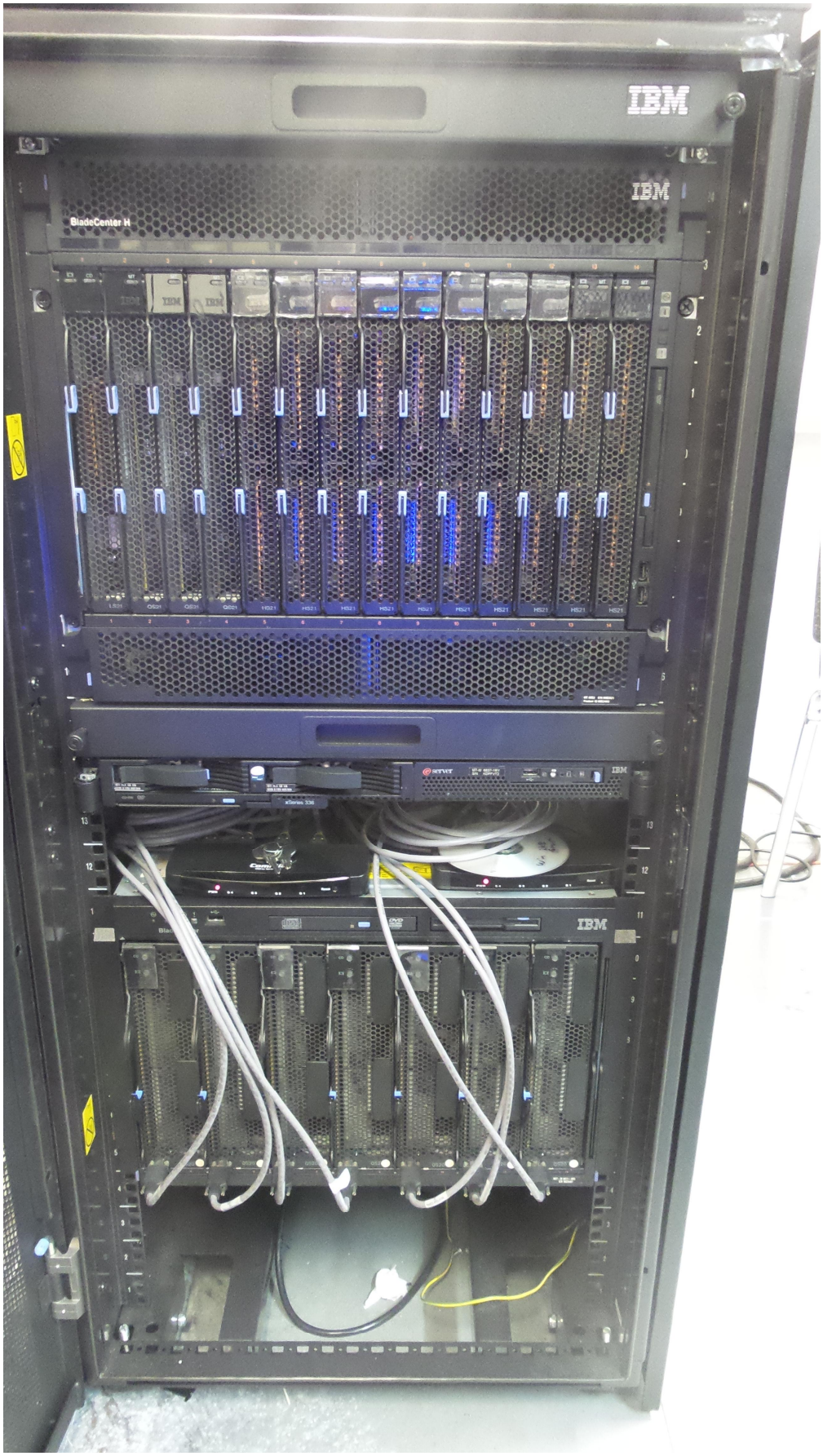

Figure 2: IBM BladeCenter QS20 front view

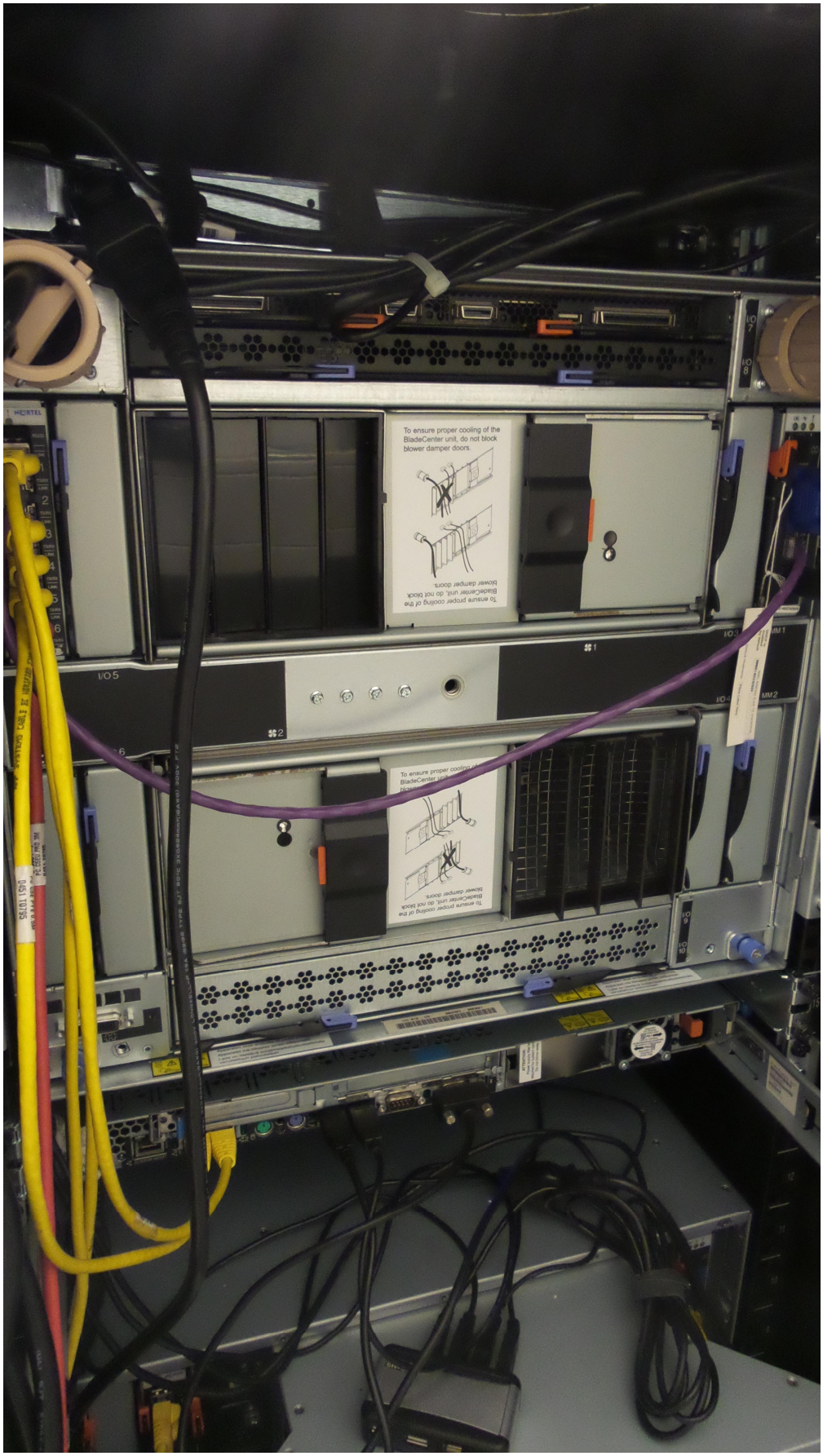

Figure 3: IBM BladeCenter QS20 rear view

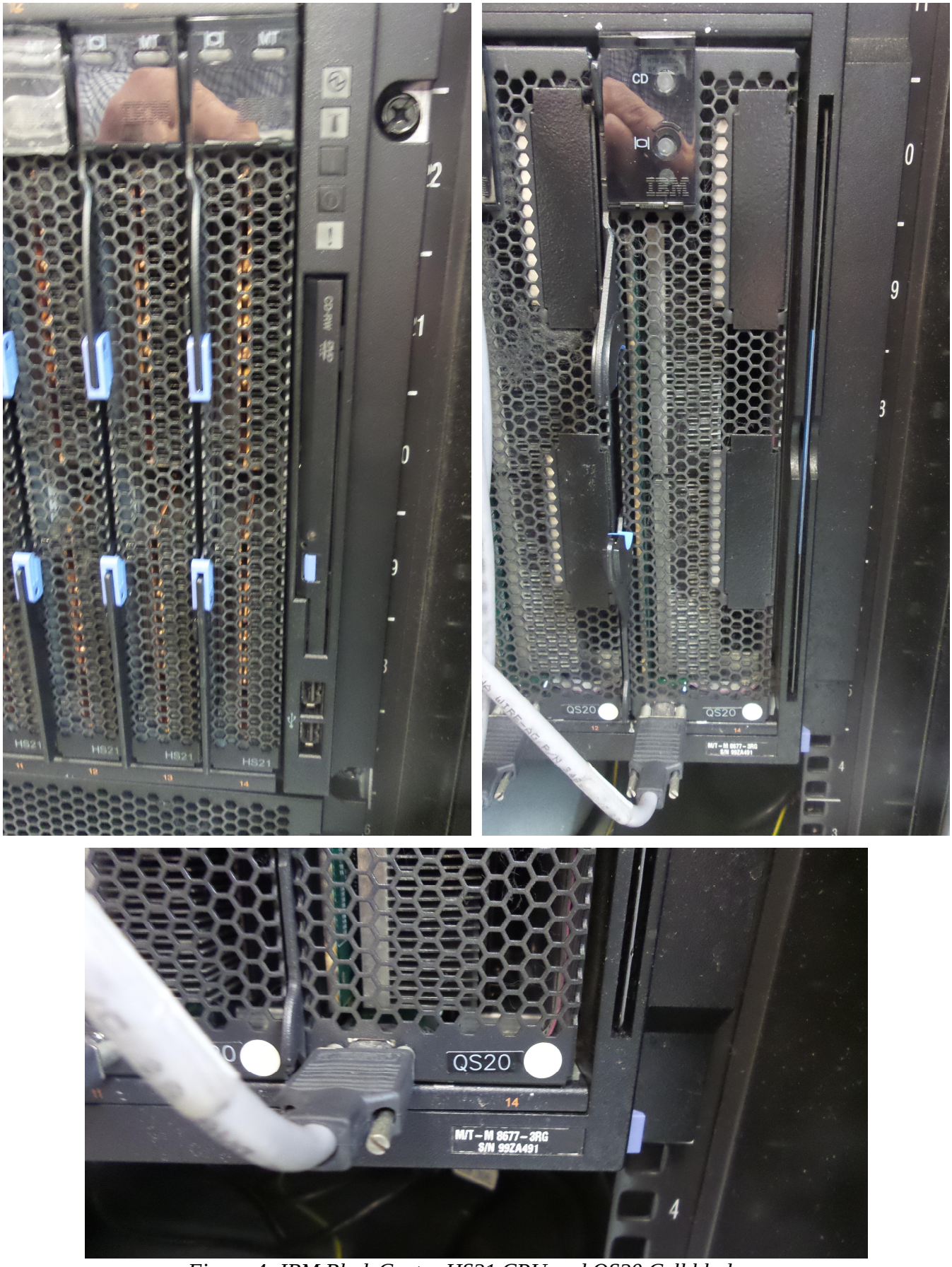

Figure 4: IBM BladeCenter HS21 CPU and QS20 Cell blades

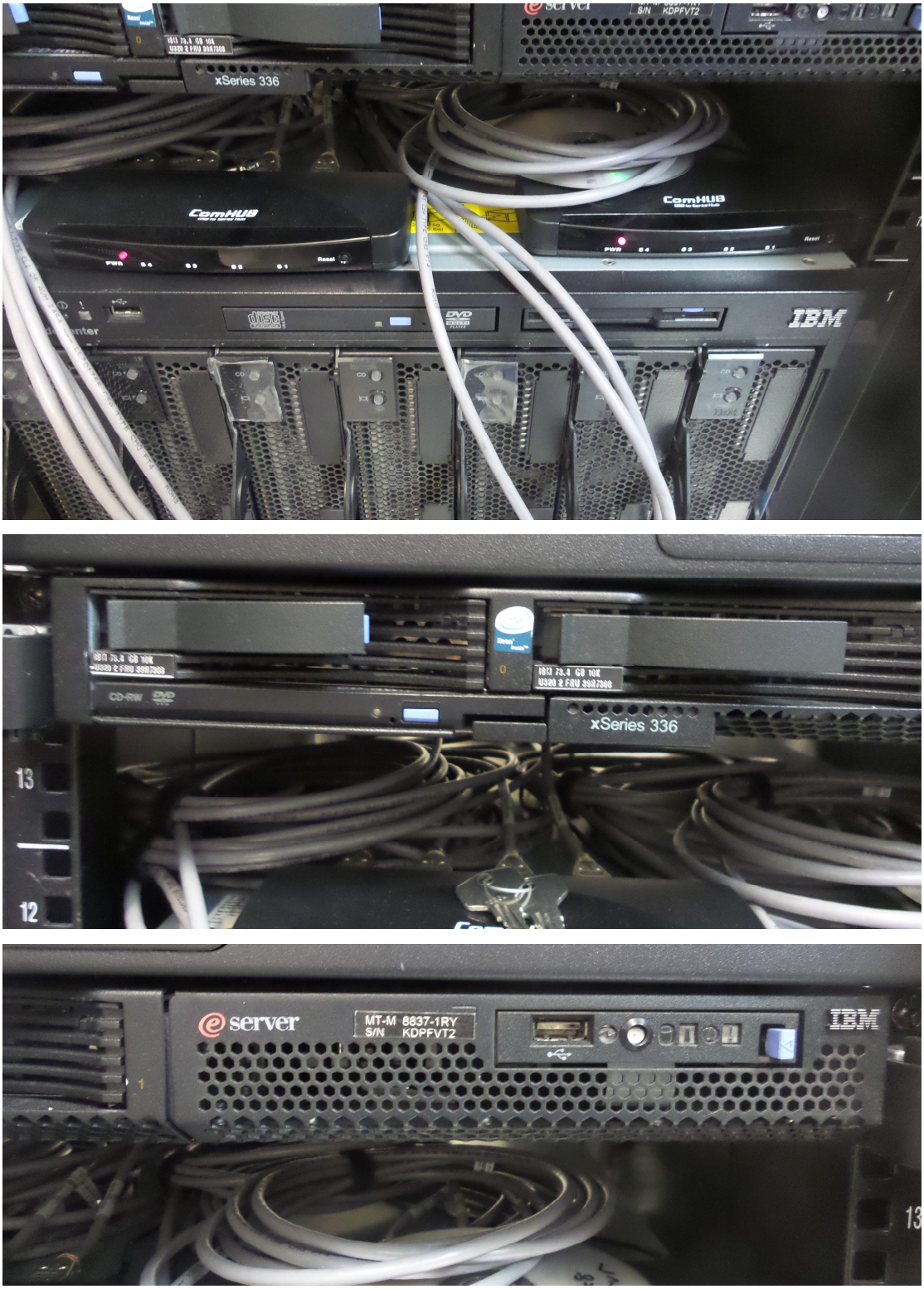

Figure 5: IBM BladeCenter USB-to-serial Hubs and eServer xSeries 336 server