

Supercomputing and Data at DKRZ

„Blizzard“ - an IBM Power6-system

„Blizzard“, the IBM Power6 supercomputer at DKRZ, is probably the only high-performance computer worldwide being used exclusively for climate research. The design of the system guarantees optimal performances and efficiency for sophisticated simulation experiments with numerical climate models.



Figure 1: Infiniband switch

In addition to operating state-of-the-art high-performance computing facilities, DKRZ also provides a full portfolio of services required for the efficient use of these valuable resources.

Numbers

The IBM Power6 computing system delivers more than 150 TeraFlop/s in peak performance. Every person on this planet needs to multiply 20,000 floating point numbers per second so that all people together reach an equivalent computing performance.

The aggregated transfer rate between all compute nodes adds up to 7 TeraByte/s, i.e. every second 150 Blue-ray discs can be transferred.

The IBM Power6 is set up with 264 compute nodes being connected with each other by 51 km of cable. The computing system bears a weight of approximately 35 tons.

Blizzard at a glance

- Peak performance: 158 TeraFlop/s (158 trillion floating point operations per second)
- 264 IBM Power6 nodes
- 16 dual core CPUs per node (altogether 8,448 compute cores)
- more than 20 TeraByte memory
- 7,000 TeraByte of disk space until 2011
- Infiniband network: 7.6 TeraByte/s (aggregated)



Figure 2: High performance computing system „Blizzard“ at DKRZ - compute nodes (orange), infiniband switch (red), disks (green)

High Performance Storage System

Climate modelers generate extremely large amounts of data. DKRZ is one of very few computing centres worldwide which both have the technical facilities to store this data volume and the scientific knowledge to manage it. DKRZ possesses one of the world's largest data archives – in 2009 ten PetaByte of simulation results from the past two decades were already stored. The performance of every new generation of supercomputers increases exponentially and therefore also boosts the amount of data produced. During the life of DKRZ's current computing system, approximately 10 PetaByte of data will be produced every year.



Figure 3: View into one of DKRZ's tape libraries

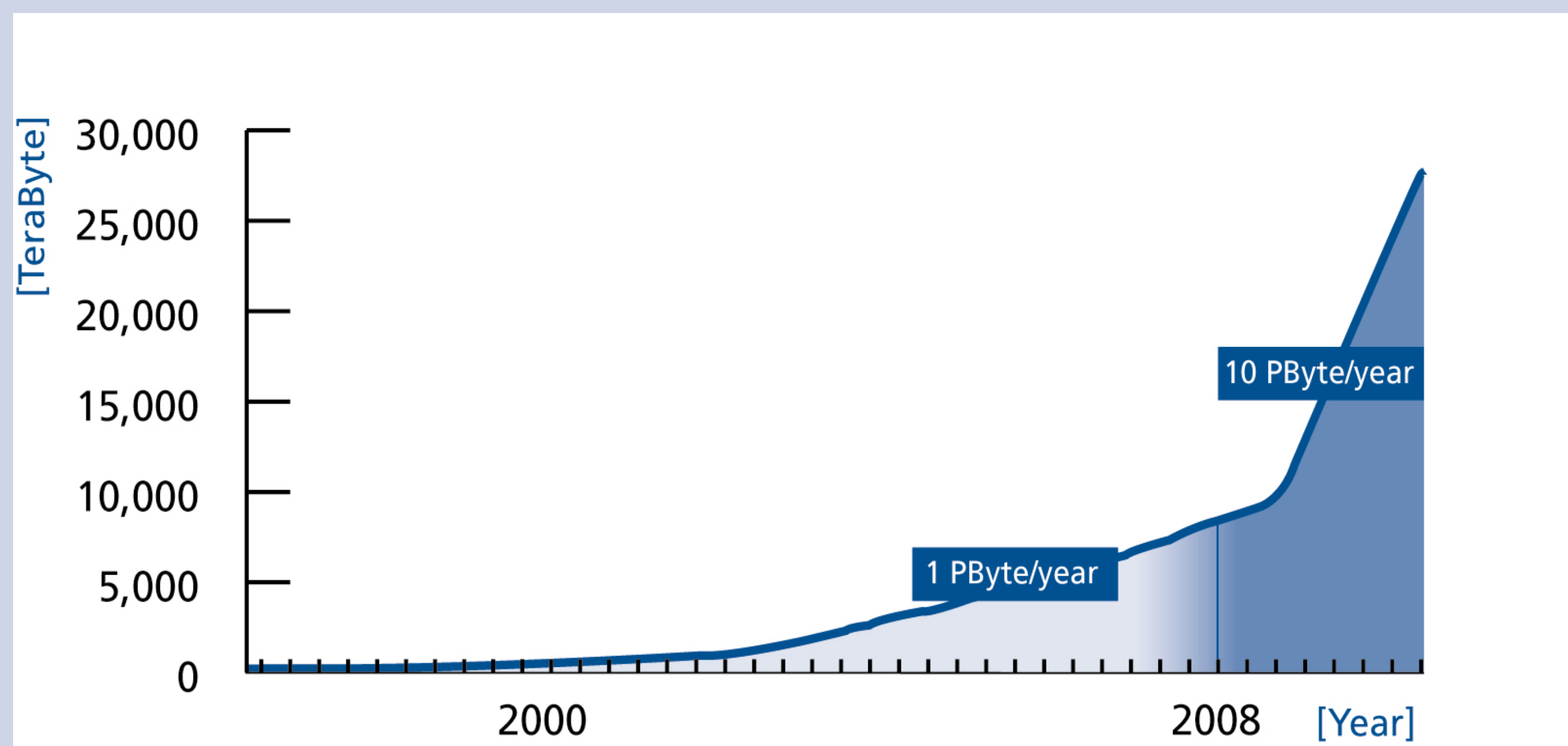


Figure 5: Exponential data growth at DKRZ

The DKRZ archive at a glance

- 7 automatic Sun StorageTek SL8500 tape libraries
- 8 robots per library
- more than 65,000 magnetic cartridges
- 78 tape drives
- total capacity: over 65 PetaByte
- bandwidth 5 GigaByte/s (bidirectional)

Numbers

Currently DKRZ produces 10 PetaByte, i.e. 10,000 TeraByte of data per year. This corresponds to two million video-DVDs. The data can be written and read with a bandwidth of 5 GigaByte/s, i.e. every second the content of one DVD can be transferred from disk to tape.



Figure 4: Three of the seven StorageTek tape libraries at DKRZ