

## Exercise Sheet 2

Common assumptions about data: It is easy to store, transmit and transport data today. In this exercise sheet, we verify the correctness of these assumptions.

### Exercise 1 (Amounts of Data – Storing Data)

In the LHC Computing Grid, 15 PB data are created per year. These data need to be stored. What is the height of a stack of storage media, if for storing the data...

- CDs (capacity: 600 MB, thickness: 1.2 mm) are used?
- DVDs (capacity: 4.3 GB, thickness: 1.2 mm) are used?
- Blu-ray discs (capacity: 25 GB, thickness: 1.2 mm) are used?
- HDDs (capacity: 2 TB, thickness: 2.5 mm) are used?

### Exercise 2 (Amounts of Data – Transmitting Data)

The data in the LHC Computing Grid is transmitted via networks that use fiber-optic cables and provide a bandwidth of 40 Gbit/s.

- How long does it take to transfer the 15 PB via a 40 Gbit/s network?
- How long does it take to transfer the 15 PB via a 100 Mbps Ethernet?

### Exercise 3 (Amounts of Data – Transporting Data)

Calculate for each one of these three HDDs, the time which is required to fill the drive completely with data:

- Western Digital AC-2700 3,5" HDD (IDE) from 1994
  - Capacity: 730 MB
  - Transfer rate: 5 MB/s
- 3,5" HDD (SATA-2) from 2009/2010
  - Capacity: 2 TB
  - Transfer rate: 100 MB/s
- 3,5" HDD (USB 2.0) from 2009/2010
  - Capacity: 2 TB
  - Transfer rate: 25 MB/s