Introduction to HPC

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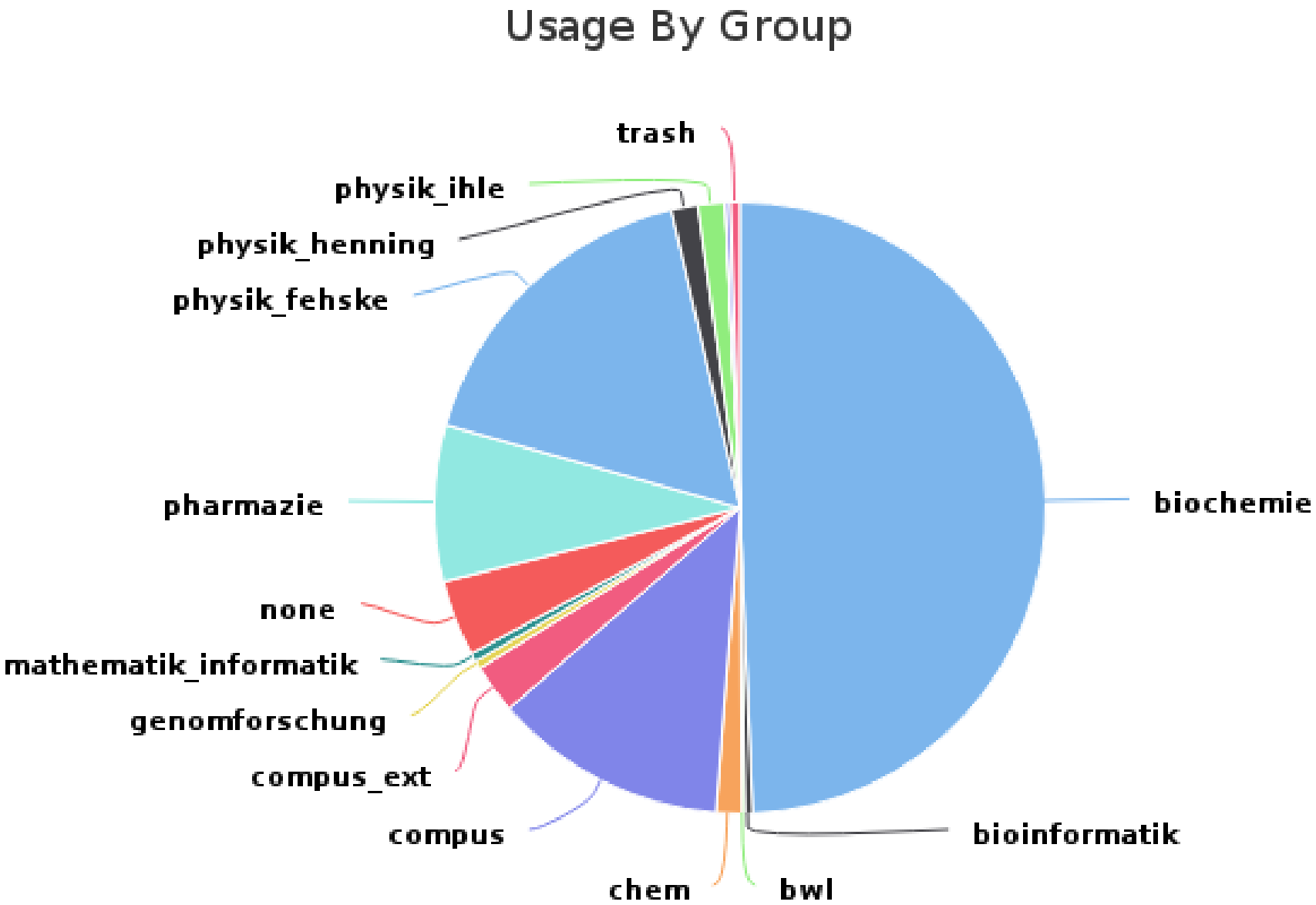
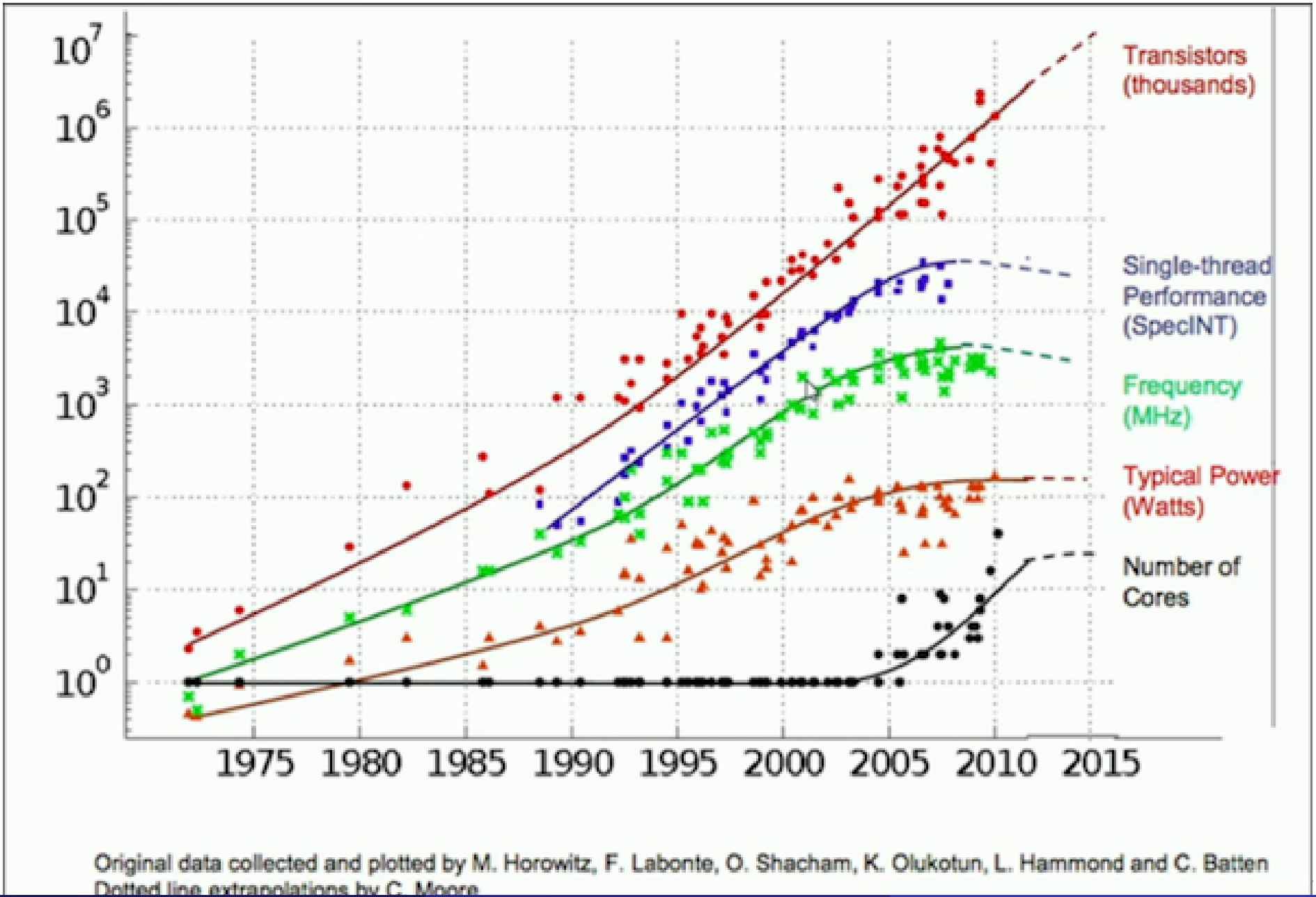
Motivation


Usage By Group
trash
physik_ihle
physik_henning
physik_fehske
pharmazie
biochemie
none
mathematik_informatik
genomforschung
compus_ext
compus
bioinformatik
chem
bwl
Highcharts.com

Big Problem


10^7
10^6
10^5
10^4
10^3
10^2
10^1
10^0
1975 1980 1985 1990 1995 2000 2005 2010 2015
Transistors (thousands)
Single-thread Performance (SpecINT)
Frequency (MHz)
Typical Power (Watts)
Number of Cores
Original data collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond and C. Batten
Dotted line extrapolations by C. Moore

Introduction

structure of this course:

- Linux
  - command line
  - environment
  - vim
  - bash
  - ssh/sshfs
  - git
  - slurm
- HPC-hardware
  - node setup
  - network setup
  - cooling
- Introduction to C++
  - simple application
  - how does the compiler work
  - project management with cmake
  - how to use git with it
  - how to submit an application

Introduction ctd

- single threaded problems
  - simple graphical problem
  - simple statistical problem
  - simple solver problem
- how to translate into multi-threaded solution
  - split into sub-problems
  - is synchronization needed
- from single-system to multi-system applications
  - transfer data via MPI
  - how to write the work sharing directive