**IPDPS Panel -** *Attracting the Underrepresented: Can Parallel and Distributed Computing Community Foster Social Change?*

Anne

**Edinburgh, UK**
**2003-2005: Post-doc**
*Algorithmic skeletons*

**ENS Lyon, France**
**2005-Present: Associate Prof.**
*Multi-criteria scheduling, resilience, energy, memory, …*
*Georgia Tech, Atlanta, USA*
*2017-2018: Visiting Ass. Prof.*

**Grenoble, France**
**1995-1997: Math studies**
**1997-2000: Engineer school**
**2000-2003: PhD thesis**
*Performance evaluation, Markov chains*

Julie, 2012    Sophie, 2014

**8 PhD students, 25% female**

**Program (Papers) Chair for HiPC'16, ICPP'17, SC'17, IPDPS'18**
**Head of Fundamental CS Master @ ENS Lyon (2015-2017)**
**AE of JPDC & TPDS**
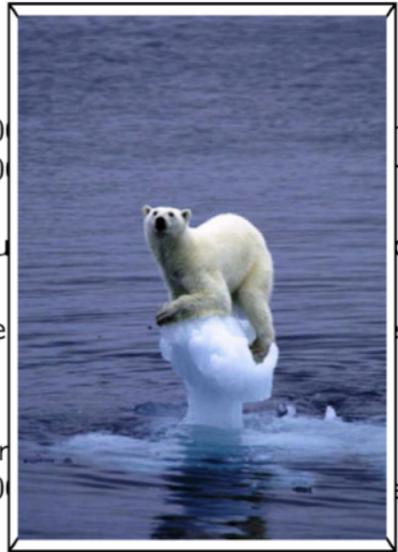
My research in one slide

**Scheduling**

**Algorithms**

- Stream of data to process: images, frames, matrices, etc.
- Encode images, factorize matrices
- Structured applications: several steps to process one data set
- Many processing resources: work on different data in parallel

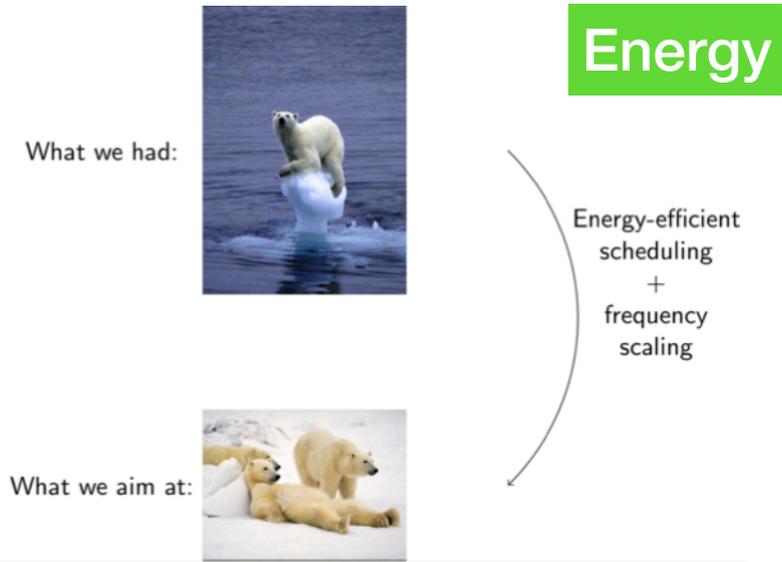Original images → Pre-processing → Encoding → Final result
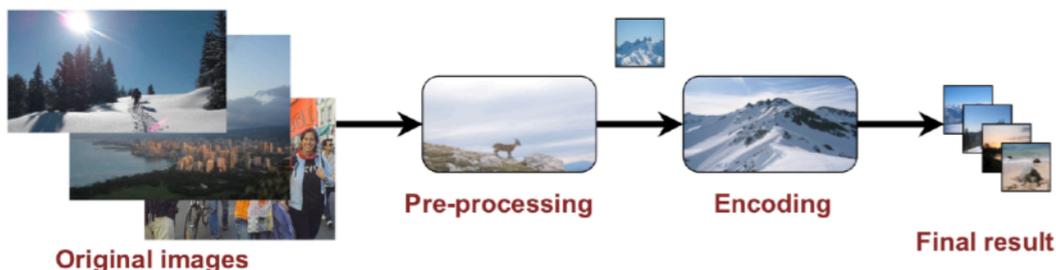
Large class of applications
Need to efficiently use computing resources

- Data centers
  - 330,000,00...                    ...ore than France
  - 533,000,00...                    ...n countries
- Exascale compu...                  ...ons per second)
  - Need effort
  - 1% of powe...                    ...r year
- Lambda user
  - 1 billion pe...
  - 500,000,00...                    ...ear
- ⤳ crucial for both environmental and economical reasons

**Energy**

What we had:

What we aim at:

Energy-efficient
scheduling
+
frequency
scaling

**Multi-criteria**

Top ranked supercomputers in the US (June 2017)

| Rank | Name | Laboratory | Technology | Processors | PFlops/s | MTBF |
|------|------|-----------|-----------|-----------|----------|------|
| 4 | Titan | ORNL | Cray XK7 | 37,376 | 17.59 | ≈ 1 day |
| 5 | Sequoia | LLNL | BG/Q | 98,304 | 17.17 | ≈ 1 day |
| 6 | Cori | LBNL | Cray XC40 | 11,308 | 14.01 | ≈ 1 day |
| 9 | Mira | ANL | BG/Q | 49,152 | 8.59 | ≈ 1 day |

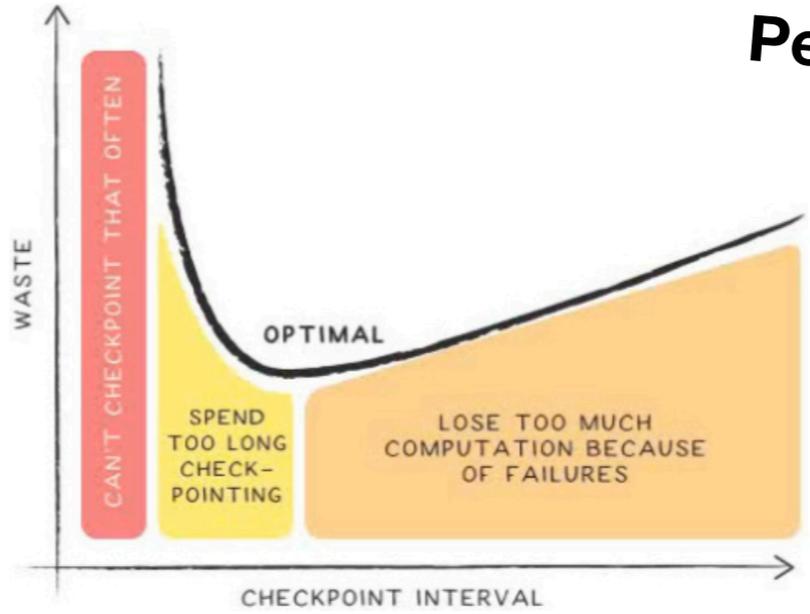The first exascale computer ($10^{18}$ FLOPS) is expected by 2020:

- Larger processors count: millions of processors
- MTBF is expected to drop dramatically
- Down to **the hour** or even worse

Coping with faults:

- Make applications more fault tolerant, design better resilience techniques...

**Reliability**

**Performance**

WASTE

CAN'T CHECKPOINT THAT OFTEN

OPTIMAL

SPEND TOO LONG CHECK-POINTING

LOSE TOO MUCH COMPUTATION BECAUSE OF FAILURES

CHECKPOINT INTERVAL

**NP-completeness Approximation**

**Data, Memory**

- **IPDPS: 11.94% of female attendees**

- **Are females feeling comfortable in CS?**
**Not always… Possible solution: events**
**to discuss problems and solutions**

- **Inconscient bias in selection committees?**

- **More and more parity rules**
  - **May be burden for female researchers (in particular in France)**

- **In France: Associations to motivate young girls to go into science (mathematics and computer science)**

- **Too many stereotypes for young girls**

- **Some statistics:**
  - **Girls do better in middle-school and high school**
  - **University: only 27,6% of female in fundamental sciences**
  - **Advanced math undergraduate studies: 22,3% in MP, 15,5% in MP***
  - **Engineer schools: 28.1% (less in math/CS!)**
  - **Associate professors: 31% / Professors: 11%**