ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Introduction to Parallel Computing

Parallel Programming in Scala

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What is Parallel Computing?

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Assumption: we have parallel hardware at our disposal, which is capable of executing these computations in parallel.

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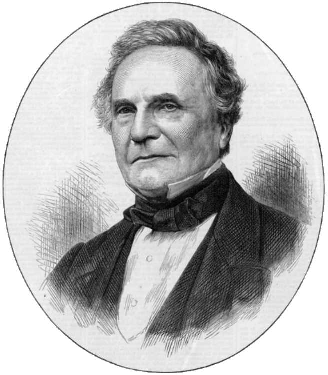

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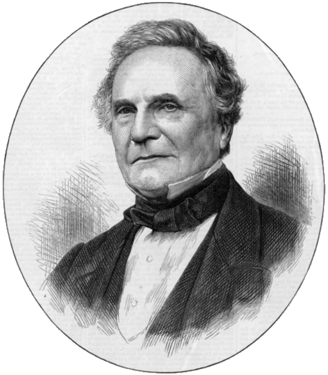

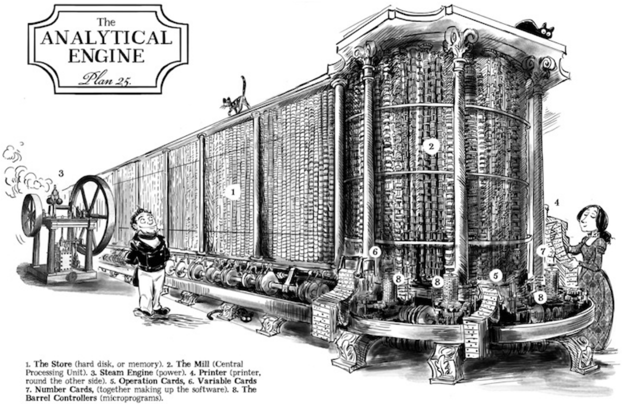

1. **The Store** (hard disk, or memory). 2. **The Mill** (Central Processing Unit). 3. **Steam Engine** (power). 4. **Printer** (printer, round the other side). 5. **Operation Cards,** 6. **Variable Cards** 7. **Number Cards,** (together making up the software). 8. **The Barrel Controllers** (microprograms).

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At the time, parallel computing was confined to niche communities and used in high performance computing.

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Common theme: parallel computing provides computational power when sequential computing cannot do so.

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Speedup is the only reason why we bother paying for this complexity.

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Concurrent program – *may* or *may not* execute multiple executions at the same time. Improves modularity, responsiveness or maintainability.

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In this course, we focus on task-level parallelism.

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Our focus will be programming for multi-cores and SMPs.

Summary

Course structure:

- week 1 – basics of parallel computing and parallel program analysis
- week 2 – task-parallelism, basic parallel algorithms
- week 3 – data-parallelism, Scala parallel collections
- week 4 – data structures for parallel computing