The ACAT Workshop series

ACAT 2010,Jaipur,
Feb 22, 2010

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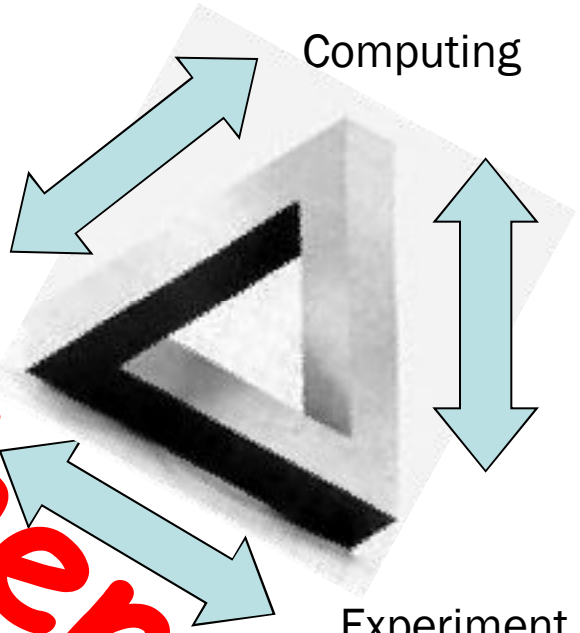
ACAT IAC Chair

"Raison d'être"

ACAT Zeuthen 2005

MODERN RESEARCH RELIES ON THE VIRTUOUS TRIANGLE



PUTTING "INTELLIGENCE" INTO SYSTEMS

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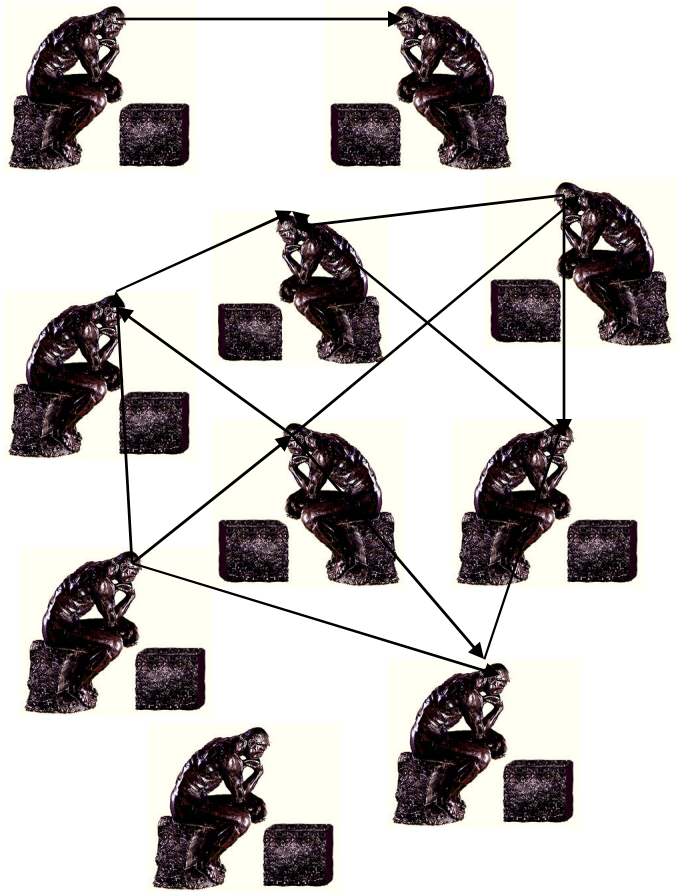
Communication

Communication is 21st century Keyword



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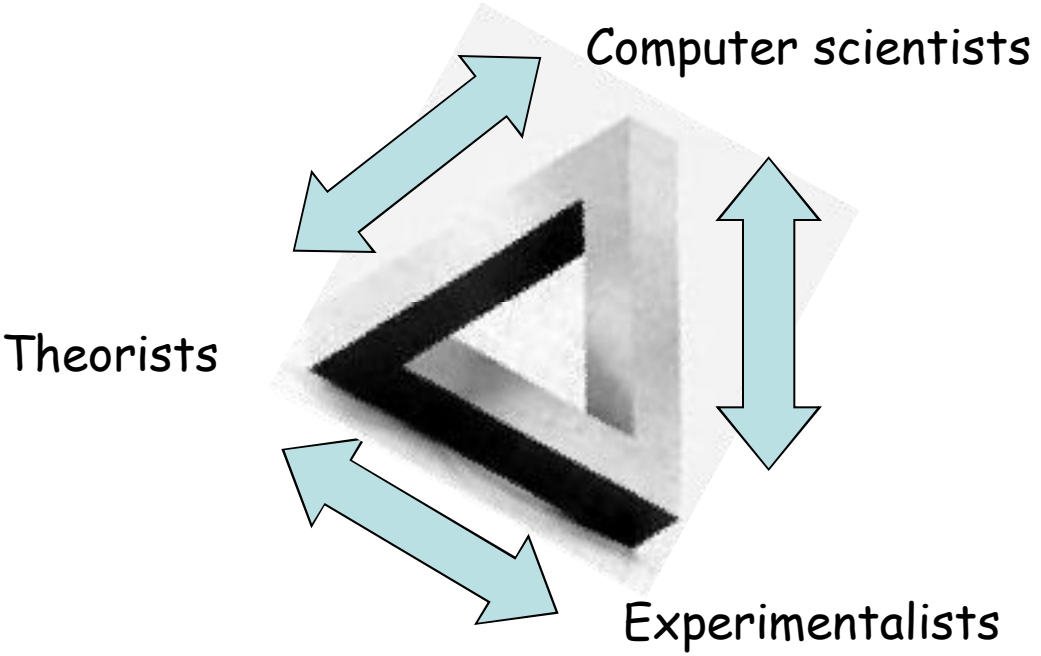

Putting "intelligence" into Communication

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A Short History

AIHENP

"Artificial Intelligence in High Energy and Nuclear Physics"

1. Lyon 1990, France
2. La Londes-Les-Maures 1992, France
3. Oberammergau 1993, Germany
4. Pisa 1995, Italy
5. Lausanne 1996, Switzerland
6. Heraklion 1999, Greece

ACAT

"Advanced Computing and Analysis Techniques in Physics"

7. Chicago 2000, USA
8. Moscow 2002, Russia
9. Tsukuba 2003, Japan
10. Zeuthen 2005, Germany
11. Amsterdam, 2007, Netherlands
12. Erice 2008, Italy
13. Jaipur 2010, India

Jaipur, ACAT 2010: 13th

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Initial motivations 1990

- Benefits from Artificial Intelligence to physics research
- Computing beyond mere number crunching in:
  - Software Development: CASE,
  - Data analysis: neural net, evolution/genetic algorithms, expert systems
  - Theoretical computations: Symbolic algebraic manipulation, Automatic calculation

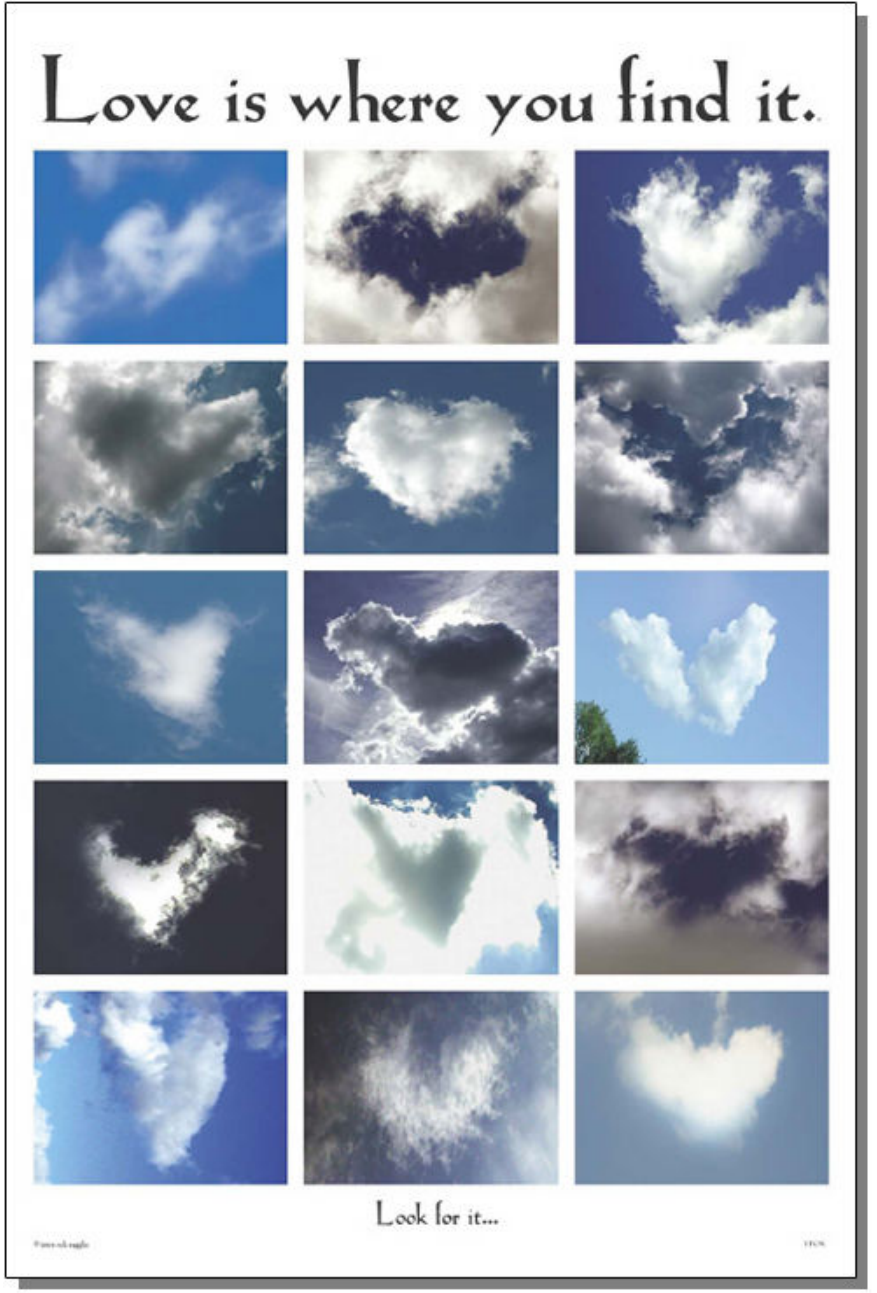
First Meeting of the HEP symbolic/automatic calculation community

WWW, ROOT, …

- 1992: La Londes-les-Maures
  - WWW first talk to a wide audience (250) by Tim Berners Lee (CERN) --> US discovers the WEB
- 1993: Oberammergau: multi-loops
- 1995: Pisa, Neural nets, evolutionary algo., ROOT → …
- 1996: Lausanne, Parallel and distributed Computing
- 2000: Chicago:large scale simulation in Astro/HEP and World-Wide Computing
- 2007: Amsterdam, Quantum Computing
- 2009: Erice, Many cores

ACAT 2010
"Cores in clouds"

Core: *from old french: Coeur,*
See also Cuore, Coraźon, Coração,…



Transparency made on Valentine's day

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Track 1: Computing Technology for Physics Research

- Languages, Software quality, IDE and User Interfaces
  - Languages (new C++ standard, Java, ...)
  - Software quality assurance; code reflection; documentation, performance and debugging tools
  - IDE and frameworks
  - User Interfaces, Common Libraries.
- Distributed and Parallel Computing
  - Multilevel parallelism
  - Distributed computing
  - GRID and Cloud computing
- New architectures, many and multi-cores
  - Many-core
  - accelerator-based computing (GPU, etc)
  - High precision computing (hardware)
- Virtualisation
- Online Monitoring and Control
  - High Level Triggering (HLT)

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Track 2:
Data Analysis–Algorithms and Tools

- Machine Learning
  - Neural Networks and Other Pattern Recognition Techniques
  - Evolutionary and Genetic Algorithms
  - Automation of Science: Data to formula
- Advanced Data Analysis Environments
  - Statistical Methods, Multivariate analysis
  - Data mining
- Simulation, Reconstruction and Visualisation Techniques
  - Detector and Accelerator Simulations, MC and fast MC
  - Reconstruction Algorithms
  - Visualization Techniques; event displays
- Advanced Computing
  - Quantum Computing
  - Bio Computing: life process simulation, brain simulation, Quantum biology

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Track 3:
Computations in Theoretical Physics: Techniques and Methods

- Automatic Systems
  - Automatic Computation Systems: from Processes to Event Generators
  - Multi-dimensional Integration and Event Generators
  - Intensive High Precision Numerical Computations: Algorithms and Systems
- Higher orders Calculations
  - One-loop event generators
  - Multi-loop Calculations and Higher Order Corrections
- Computer Algebra Techniques and Applications

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ACAT 2008

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In memoriam: Thomas Binoth

ACAT Deepest Condolence to his family and
dear partner and collaborator **Gudrun Heinrich**

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ACAT 2010 Conveners

- **Track conveners**
- Track 1 - "Computing Technology for Physics Research"
  - Axel Naumann
  - Jerome Lauret
- Track 2 - "Data Analysis - Algorithms and Tools"
  - Thomas Speer
  - Liliana Teodorescu
- Track 3 - "Methodology of Computations in Theoretical Physics"
  - Peter Uwer
  - Fawzi Boudjema
- Multicore-related subjects
  - Sverre Jarp

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Thank you ….