

**Fifth INFN International
School on: "Architectures,
tools and methodologies for
developing efficient large scale
scientific computing
applications" ESC13 -
Bertinoro (Forlì-Cesena) Italy
20-26 October 2013**

Report of Contributions

Contribution ID: 0

Type: **not specified**

Welcome and opening remarks

Monday 21 October 2013 08:30 (30 minutes)

Presenter: MORANDIN, Mauro (PD)

Session Classification: Session 1

Contribution ID: 1

Type: **not specified**

Concepts of performance and efficiency

Monday 21 October 2013 09:00 (45 minutes)

Presenter: Dr ELMER, Peter (Princeton University)

Session Classification: Session 1

Contribution ID: 2

Type: **not specified**

Modern processors and related optimisation topics - Part 1

Monday 21 October 2013 09:50 (45 minutes)

Presenter: Mr JARP, Sverre (CERN)

Session Classification: Session 1

Contribution ID: 3

Type: **not specified**

Modern processors and related optimisation topics - Part 2

Monday 21 October 2013 11:00 (45 minutes)

Presenter: Mr JARP, Sverre (CERN)

Session Classification: Session 1

Contribution ID: 4

Type: **not specified**

Introduction to Performance tuning tools

Monday 21 October 2013 11:50 (45 minutes)

Presenter: Dr ELMER, Peter (Princeton University)

Session Classification: Session 1

Contribution ID: 5

Type: **not specified**

Floating point computation: accuracy, optimization, vectorization (with exercises)

Monday 21 October 2013 14:15 (45 minutes)

Presenter: INNOCENTE, Vincenzo (CERN)

Session Classification: Session 1

Contribution ID: 6

Type: **not specified**

Floating point computation: accuracy, optimization, vectorization (with exercises)

Monday 21 October 2013 15:00 (45 minutes)

Presenter: INNOCENTE, Vincenzo (CERN)

Session Classification: Session 1

Contribution ID: 7

Type: **not specified**

Floating point computation: accuracy, optimization, vectorization (with exercises)

Monday 21 October 2013 16:00 (45 minutes)

Presenter: INNOCENTE, Vincenzo (CERN)

Session Classification: Session 1

Contribution ID: 8

Type: **not specified**

Floating point computation: accuracy, optimization, vectorization (with exercises)

Monday 21 October 2013 16:45 (45 minutes)

Presenter: INNOCENTE, Vincenzo (CERN)

Session Classification: Session 1

Contribution ID: 9

Type: **not specified**

Exercises (Floating Point, Memory use, C++)

Wednesday 23 October 2013 08:30 (45 minutes)

Presenters: Dr GIACOMINI, Francesco (CNAF); Dr ELMER, Peter (Princeton University); INNOCENTE, Vincenzo (CERN)

Session Classification: Session 3

Contribution ID: **10**

Type: **not specified**

Exercises (Floating Point, Memory use, C++)

Wednesday 23 October 2013 09:20 (45 minutes)

Session Classification: Session 3

Contribution ID: **11**

Type: **not specified**

Exercises (Floating Point, Memory use, C++)

Wednesday 23 October 2013 10:30 (45 minutes)

Session Classification: Session 3

Contribution ID: 12

Type: **not specified**

Exercises (Floating Point, Memory use, C++)

Wednesday 23 October 2013 11:20 (45 minutes)

Session Classification: Session 3

Contribution ID: 13

Type: **not specified**

Exercises (Floating Point, Memory use, C++)

Contribution ID: 14

Type: **not specified**

Exercises (Floating Point, Memory use, C++)

Contribution ID: 15

Type: **not specified**

Exercises (Floating Point, Memory use, C++)

Contribution ID: **16**

Type: **not specified**

Efficient C++ coding (with exercises)

Tuesday 22 October 2013 08:30 (45 minutes)

Presenter: Dr GIACOMINI, Francesco (CNAF)

Session Classification: Session 2

Contribution ID: 17

Type: **not specified**

Efficient C++ coding (with exercises)

Tuesday 22 October 2013 09:20 (45 minutes)

Presenter: Dr GIACOMINI, Francesco (CNAF)

Session Classification: Session 2

Contribution ID: **18**

Type: **not specified**

Efficient C++ coding (with exercises)

Tuesday 22 October 2013 10:30 (45 minutes)

Presenter: Dr GIACOMINI, Francesco (CNAF)

Session Classification: Session 2

Contribution ID: **19**

Type: **not specified**

Efficient C++ coding (with exercises)

Tuesday 22 October 2013 11:15 (45 minutes)

Presenter: Dr GIACOMINI, Francesco (CNAF)

Session Classification: Session 2

Contribution ID: 20

Type: **not specified**

The Memory Crisis

Tuesday 22 October 2013 14:15 (45 minutes)

Presenter: Dr ELMER, Peter (Princeton University)

Session Classification: Session 2

Contribution ID: 21

Type: **not specified**

How memory allocation works

Tuesday 22 October 2013 15:00 (45 minutes)

Presenter: Dr ELMER, Peter (Princeton University)

Session Classification: Session 2

Contribution ID: 22

Type: **not specified**

Exercises - Memory Allocations

Tuesday 22 October 2013 16:00 (45 minutes)

Presenter: Dr ELMER, Peter (Princeton University)

Session Classification: Session 2

Contribution ID: 23

Type: **not specified**

Exercises - Memory Allocations

Tuesday 22 October 2013 16:45 (45 minutes)

Presenter: Dr ELMER, Peter (Princeton University)

Session Classification: Session 2

Contribution ID: 24

Type: **not specified**

Student lightning presentations

Tuesday 22 October 2013 17:30 (1 hour)

Session Classification: Session 2

Contribution ID: 25

Type: **not specified**

Introduction to OpenCL

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 26

Type: **not specified**

Introduction to OpenCL

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 27

Type: **not specified**

Introduction to OpenCL

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 28

Type: **not specified**

Introduction to OpenCL

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 29

Type: **not specified**

I/O Efficiency

Presenter: VAGNONI, Vincenzo Maria (BO)

Contribution ID: **30**

Type: **not specified**

I/O Efficiency

Presenter: VAGNONI, Vincenzo Maria (BO)

Contribution ID: **31**

Type: **not specified**

Announcements

Presenter: MORANDIN, Mauro (PD)

Contribution ID: 32

Type: **not specified**

Parallel programming theory

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 33

Type: **not specified**

An introduction to OpenMP

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 34

Type: **not specified**

Synchronization in OpenMP

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 35

Type: **not specified**

Work sharing constructs

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 36

Type: **not specified**

The OpenMP data environment

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 37

Type: **not specified**

OpenMP tasks

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: **38**

Type: **not specified**

OpenMP Memory model

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 39

Type: **not specified**

A survey of programming models

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 40

Type: **not specified**

A survey of programming models

Presenter: Dr MATTSON, Tim (Intel)

Contribution ID: 41

Type: **not specified**

Evening Lecture: "SEJITS: embedded specializers to turn patterns-based designs into optimized parallel code" - Timothy G. Mattson (Intel)

Contribution ID: 42

Type: **not specified**

Students feedback

Saturday 26 October 2013 08:30 (30 minutes)

Session Classification: Session 9

Contribution ID: 43

Type: **not specified**

Final examination

Saturday 26 October 2013 09:00 (2 hours)

Session Classification: Session 9

Contribution ID: 44

Type: **not specified**

Delivery of certificates of attendance

Saturday 26 October 2013 11:30 (30 minutes)

Session Classification: Session 9

Contribution ID: 45

Type: **not specified**

Shuttle departure (to Forli' railway station)

Saturday 26 October 2013 14:00 (20 minutes)

Session Classification: Session 9

Contribution ID: 46

Type: **not specified**

Evening Lecture: "Getting it all with C++: Abstraction, Reusability, Performance and Future-Safety"

Presenter: DREPPER, Ulrich (Red Hat)

Contribution ID: 47

Type: **not specified**

Evening Lecture: "High throughput data trasmission through network links"

Presenter: GALLI, Domenico (BO)

Contribution ID: 48

Type: **not specified**

Evening lecture: Virtualization, Grid, Cloud: Integration Paths for Scientific Computing

Presenter: SALOMONI, Davide (CNAF)

Contribution ID: 49

Type: **not specified**

Evening Lecture: "How to program a 1000 core processor" (Timothy G. Mattson, Intel Corp.)

Contribution ID: 50

Type: **not specified**

Evening Lecture: Multicores, GPUs, FPGAs and custom processors for scientific computing: a delicate tradeoff”

Presenter: TRIPICCIONE, Raffaele (FE)

Contribution ID: 51

Type: **not specified**

Motivation.... The power wall and the emergence of ubiquitous heterogeneous computing

Wednesday 23 October 2013 14:00 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 4: Introduction to parallel computing

Contribution ID: 52

Type: **not specified**

Parallel Computing: basic concepts and vocabulary

Wednesday 23 October 2013 14:45 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 4: Introduction to parallel computing

Contribution ID: 53

Type: **not specified**

Parallel hardware: from SMP to GPU to clusters to massively parallel supercomputers

Wednesday 23 October 2013 16:00 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 4: Introduction to parallel computing

Contribution ID: 54

Type: **not specified**

Core design patterns of parallel algorithms

Wednesday 23 October 2013 16:45 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 4: Introduction to parallel computing

Contribution ID: 55

Type: **not specified**

Multithreaded programming with OpenMP: The SPMD pattern on the CPU

Thursday 24 October 2013 08:30 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 5: Hands on introduction to parallel programming with OpenMP

Contribution ID: 56

Type: **not specified**

Parallel loops with OpenMP

Thursday 24 October 2013 09:30 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 5: Hands on introduction to parallel programming with OpenMP

Contribution ID: 57

Type: **not specified**

The divide and conquer pattern with OpenMP tasks

Thursday 24 October 2013 11:00 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 5: Hands on introduction to parallel programming with OpenMP

Contribution ID: 58

Type: **not specified**

GPU architectures

Thursday 24 October 2013 14:20 (45 minutes)

Session Classification: Session 6: Hands on introduction to GPU programming with compiler directives

Contribution ID: 59

Type: **not specified**

Core design patterns for the GPU programmer

Thursday 24 October 2013 15:15 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 6: Hands on introduction to GPU programming with compiler directives

Contribution ID: **60**

Type: **not specified**

Programming GPUs with directives: OpenACC and OpenMP 4.0

Thursday 24 October 2013 16:45 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 6: Hands on introduction to GPU programming with compiler directives

Contribution ID: **61**

Type: **not specified**

Evening lecture: Exploiting vector units

Thursday 24 October 2013 18:30 (1 hour)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 6: Hands on introduction to GPU programming with compiler directives

Contribution ID: 62

Type: **not specified**

The kernel parallelism pattern

Friday 25 October 2013 08:30 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 7: Hands on introduction to GPU programming with CUDA and OpenCL

Contribution ID: 63

Type: **not specified**

Basics of kernel programming

Friday 25 October 2013 09:30 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 7: Hands on introduction to GPU programming with CUDA and OpenCL

Contribution ID: 64

Type: **not specified**

GPU memory hierarchy and reductions

Friday 25 October 2013 11:00 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 7: Hands on introduction to GPU programming with CUDA and OpenCL

Contribution ID: 65

Type: **not specified**

MPI and the concept of message passing

Friday 25 October 2013 14:30 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 8: Hands on introduction to cluster computing

Contribution ID: **66**

Type: **not specified**

The SPMD pattern in MPI

Friday 25 October 2013 15:30 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 8: Hands on introduction to cluster computing

Contribution ID: 67

Type: **not specified**

Programming highly scalable systems: "MPI+X"

Friday 25 October 2013 17:00 (45 minutes)

Presenter: Dr MATTSON, Tim (Intel)

Session Classification: Session 8: Hands on introduction to cluster computing

Contribution ID: **68**

Type: **not specified**

Student lightning presentations

Monday 21 October 2013 17:30 (1 hour)

Session Classification: Session 1