TECHNISCHE UNIVERSITÄT DARMSTADT

Parallel Debugging in TotalView®

TotalView®

TECHNISCHE UNIVERSITÄT DARMSTADT

is a

- multi-process, multi-thread
- graphical user interface (GUI) -based
- program source (*C, C++, Fortran*)
- and machine level (*Assembler code*)

code defect analysis tool

HRZ Hochschulrechenzentrum

Supported platforms

TECHNISCHE UNIVERSITÄT DARMSTADT

- Operating systems: Linux, Mac OS X, Unix (…)
- Processor architecture: x86 (32-bit, 64-bit)
- Networks: InfiniBand, Ethernet
- Accelerators and coprocessors:

  GPU (Nvidia Tesla, Fermi),

  Xeon Phi (Intel MIC)
  (early access, special licence)

Languages and extensions

TECHNISCHE UNIVERSITÄT DARMSTADT

- C, C++
- Fortran (77, 90)
- Assembler
- MPI (Open MPI, etc.) (*multi-process*)
- OpenMP (*multi-thread*)
- CUDA, OpenACC (*GPU, Xeon Phi*)
- UPC, Global Arrays

Compiling a program

TECHNISCHE UNIVERSITÄT DARMSTADT

produce debugging information
and turn off optimizations, e.g.:

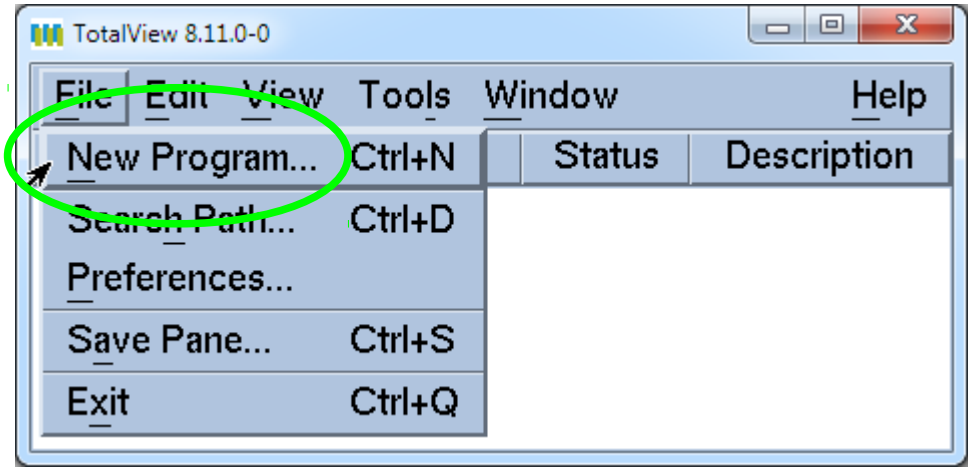
- > gcc -O0 -g -fopenmp ... (*OpenMP, C*)
- > mpicc -O0 -g ... (*Open MPI, C*)
- > mpicxx -O0 -g ... (*Open MPI, C++*)
- > mpif77 -O0 -g ... (*Open MPI, Fortran 77*)
- > mpif90 -O0 -g ... (*Open MPI, Fortran 90*)

Loading a program

TECHNISCHE UNIVERSITÄT DARMSTADT

e.g.:

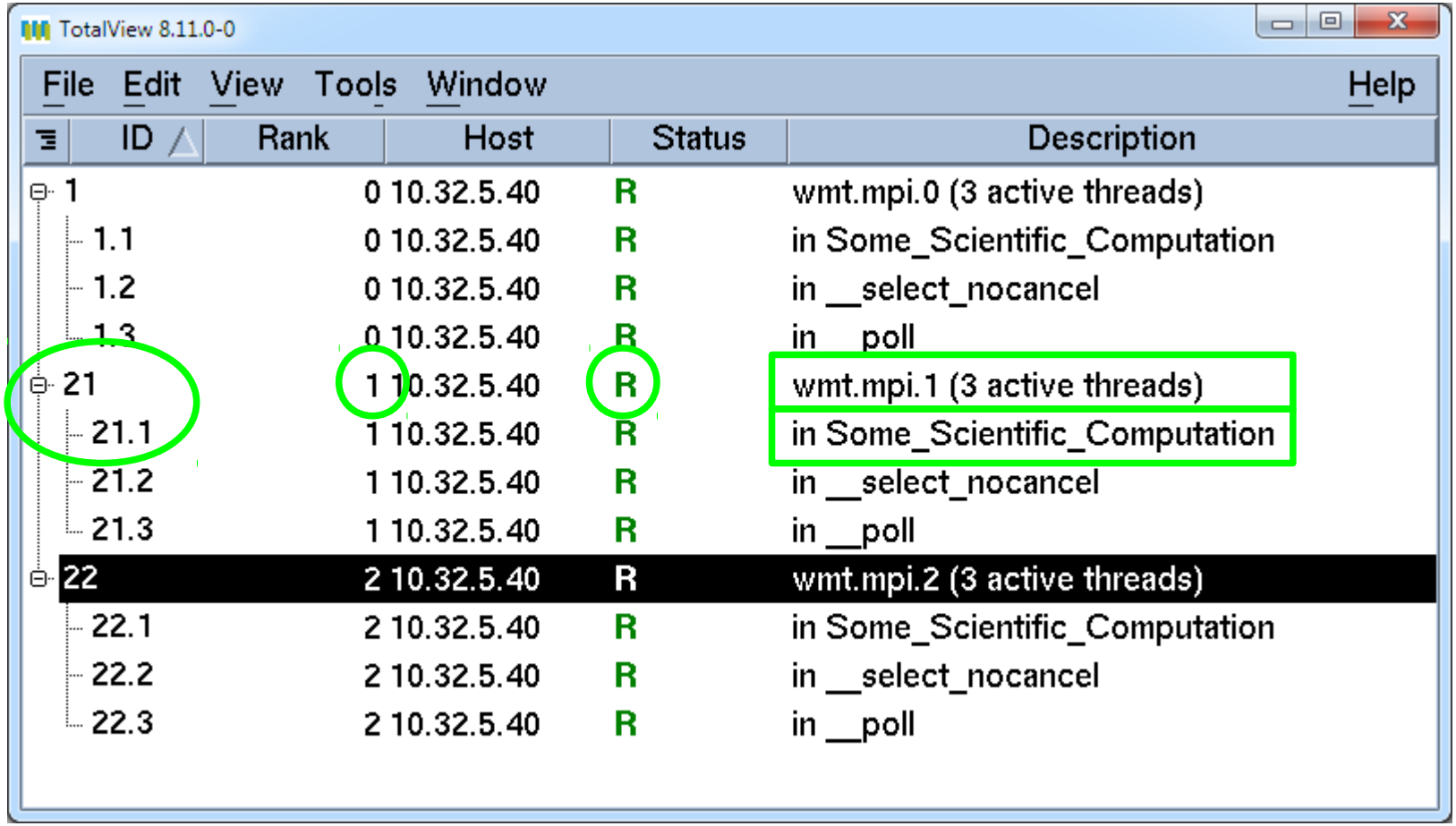
- > totalview OMP_Program [-a ...]
- > totalview -np ... MPI_Program [-a ...]
- or open it from a root window:



HRZ Hochschulrechenzentrum

Root Window: global view

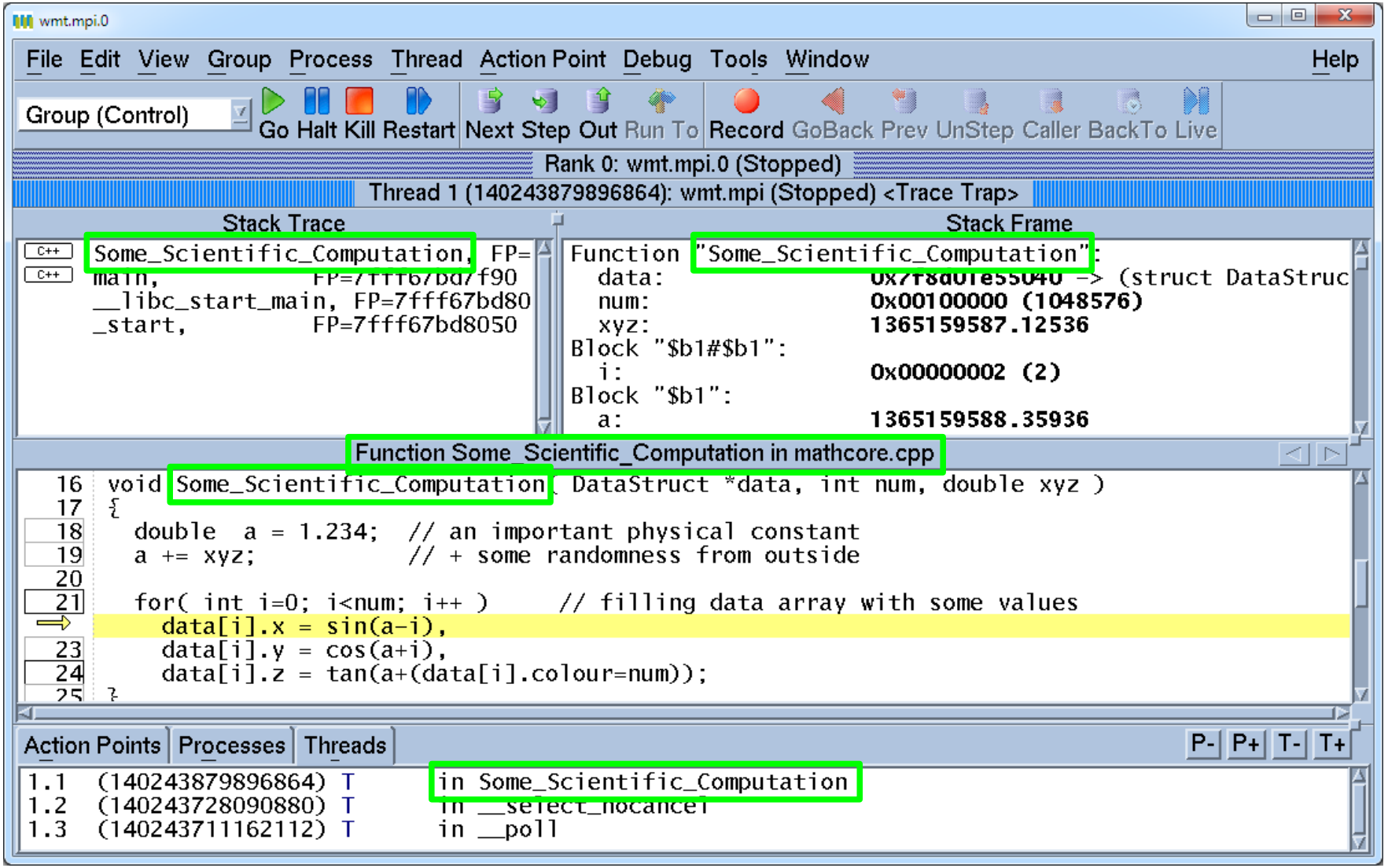
TECHNISCHE UNIVERSITÄT DARMSTADT



HRZ Hochschulrechenzentrum

Process Window: detailed view

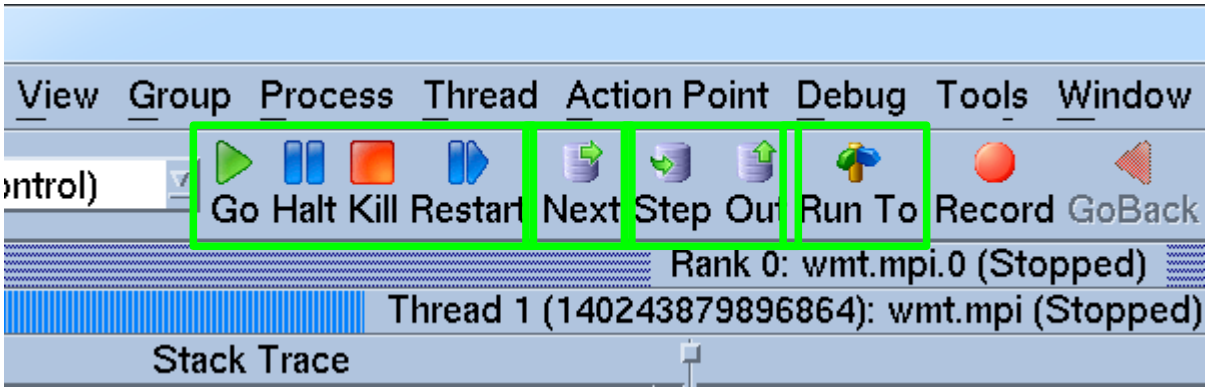
TECHNISCHE UNIVERSITÄT DARMSTADT



HRZ Hochschulrechenzentrum

Basic controls

TECHNISCHE UNIVERSITÄT DARMSTADT

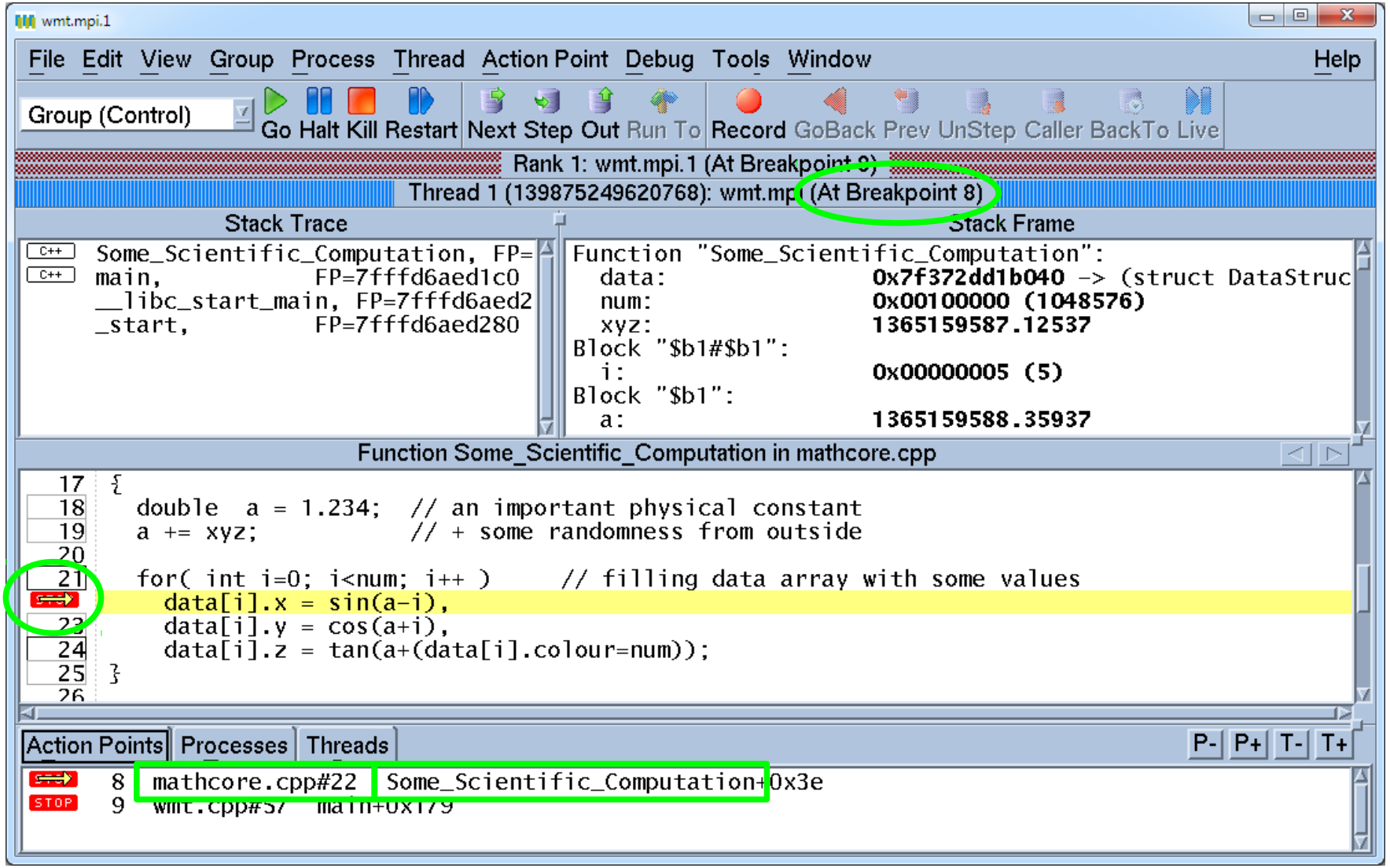


- run, stop, kill, restart (kill+run)
- step by step (line by line) execution
- move in and out of functions
- run up to a selected point

HRZ Hochschulrechenzentrum

Setting (multiple) breakpoints

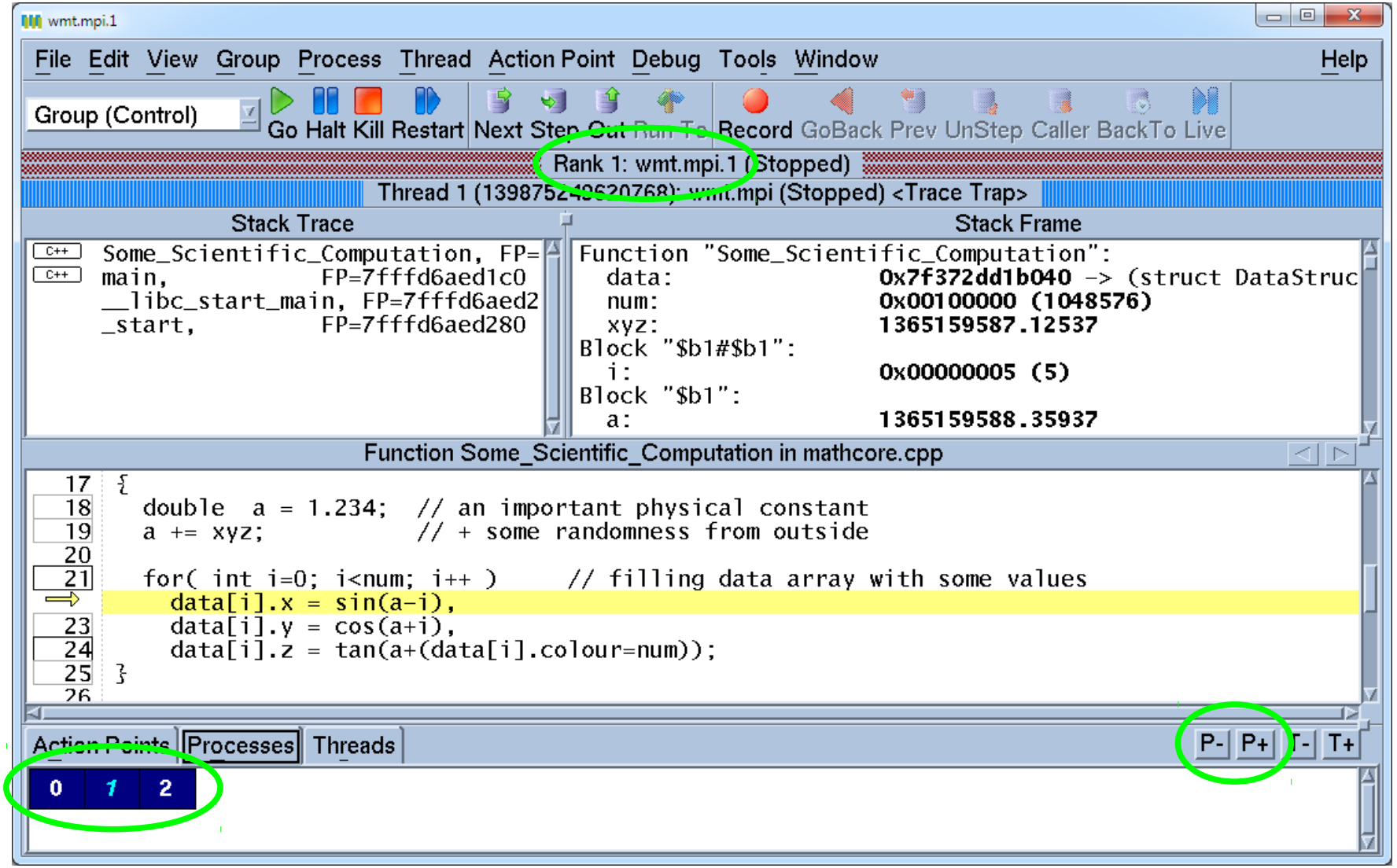
TECHNISCHE UNIVERSITÄT DARMSTADT



HRZ Hochschulrechenzentrum

Switching between processes

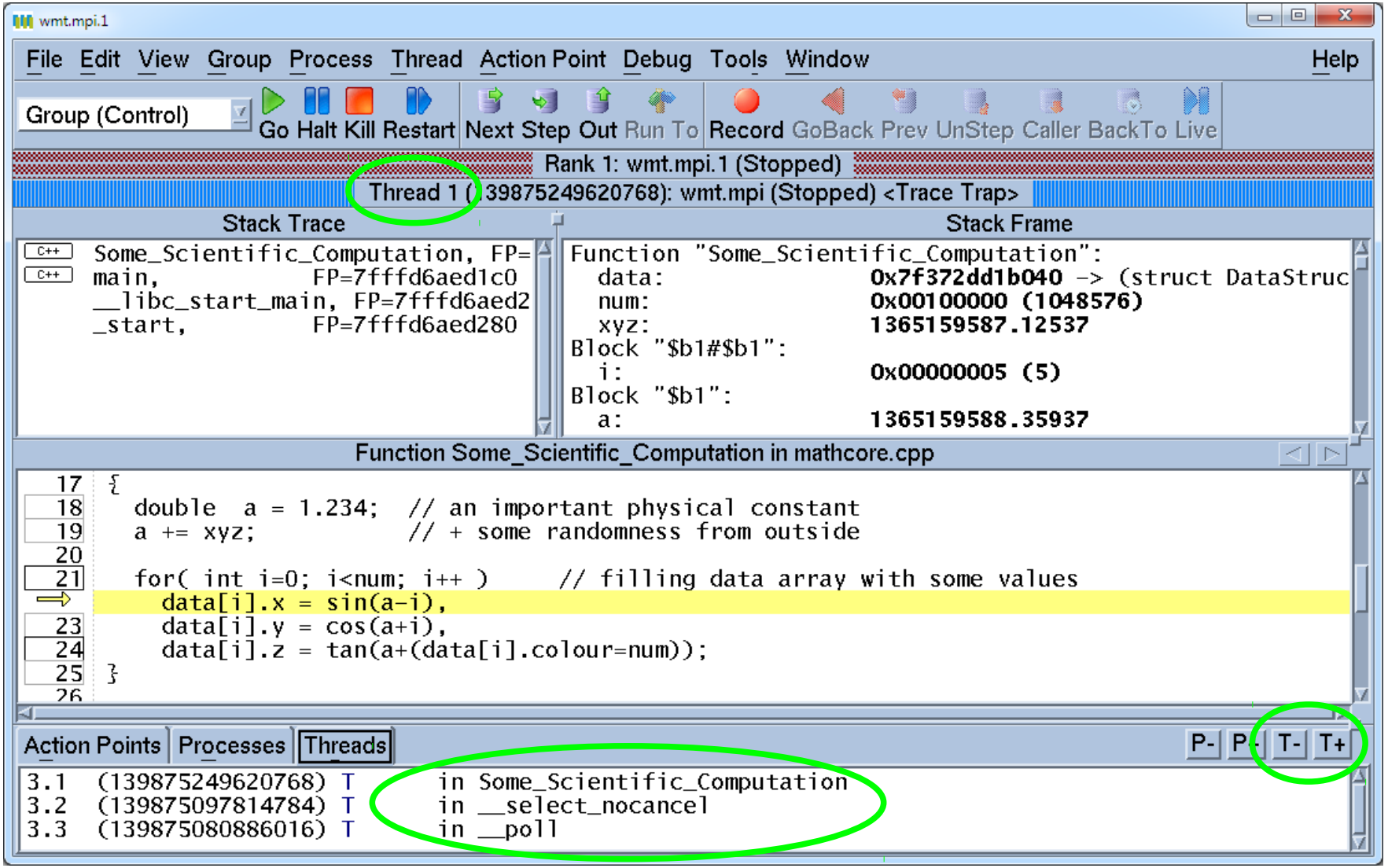
TECHNISCHE UNIVERSITÄT DARMSTADT



HRZ Hochschulrechenzentrum

Switching between threads

TECHNISCHE UNIVERSITÄT DARMSTADT



HRZ Hochschulrechenzentrum

Watching data

TECHNISCHE UNIVERSITÄT DARMSTADT

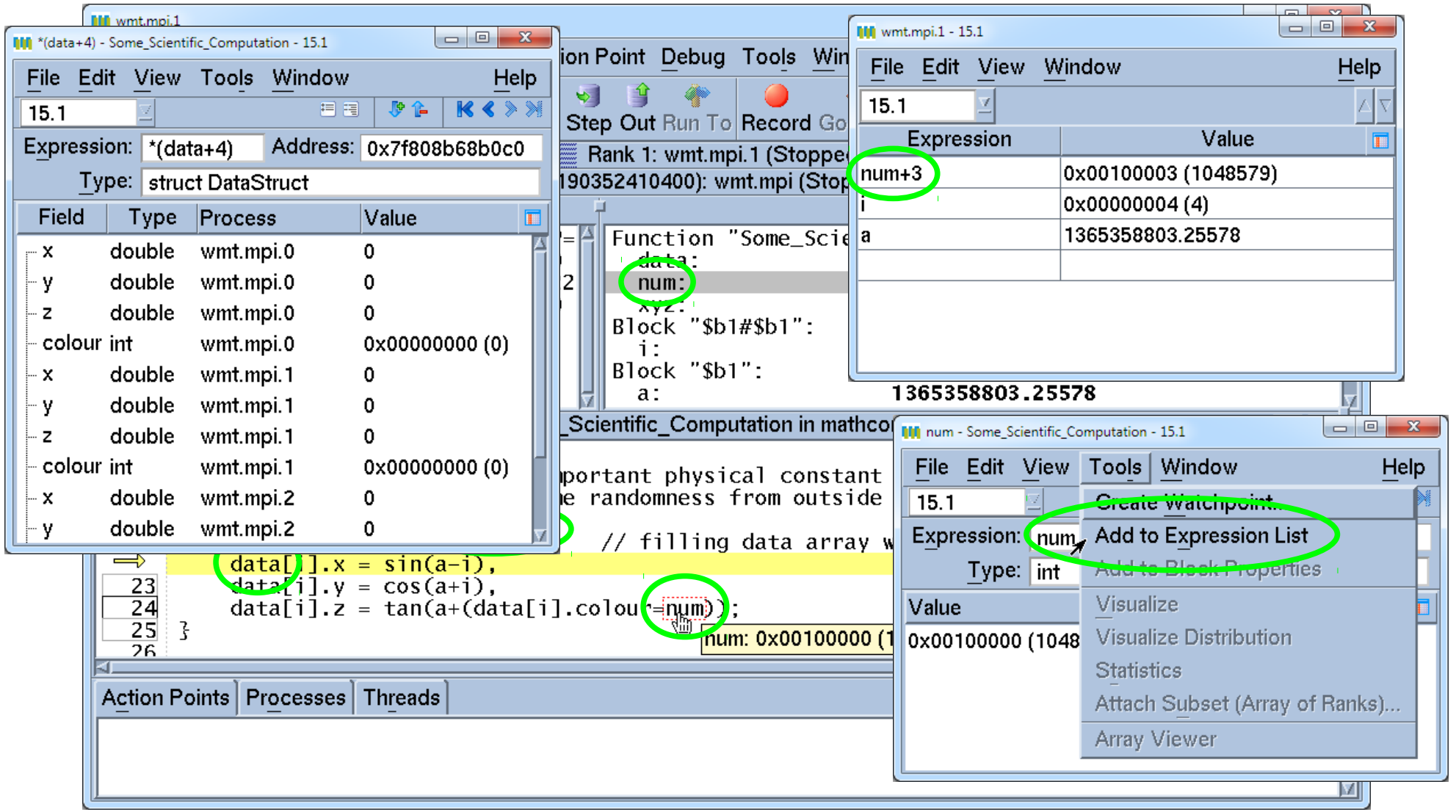
- in the Stack Frame
- in context tooltips
- in a Variable Window
- added to the Expression List
- in arrays and structures
- across processes and threads

(no more need to „printf“)

HRZ Hochschulrechenzentrum

Watching data

TECHNISCHE UNIVERSITÄT DARMSTADT



HRZ Hochschulrechenzentrum