CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

ETH zürich

Summer School 2015

MPI Debugging
http://github.com/eth-cscs/SummerSchool2015/wiki - DAY3
July 2015

Summary

- Debugging 02.MPI_pt2pt/C/6.bugs_buffer.c
  - with gdb
  - with ddt

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02.MPI_pt2pt/C/6.bugs_buffer.c

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The problem

- When ran with >=11 MPI tasks, the program crashes.

The crash

```
course51@daint103:~ aprun -n16 6.exe
Hello! This rank 1 has the data computed with root 1.0000.
Hello! This rank 2 has the data computed with root 1.4142.
...
Hello! This rank 15 has the data computed with root 3.8730

_pmiu_daemon(SIGCHLD): [NID 00013] [c0-0c0s3n1]
[Tue Jul 21 11:14:52 2015] PE RANK 10 exit signal Aborted
[NID 00013] 2015-07-21 11:14:52
Apid 166999: initiated application termination
Application 166999 exit codes: 134
Application 166999 exit signals: Killed
Command exited with non-zero status 137
```

The error message

```
Rank 13 [Tue Jul 21 11:14:52 2015] [c0-0c0s3n1]
Fatal error in MPI_Recv: Message truncated, error stack:
MPI_Recv(199): MPI_Recv(buf=0xab0700, count=58, MPI_CHAR,
               src=0, tag=1, MPI_COMM_WORLD, status=0x1) failed
MPIDI_CH3U_Receive_data_found(144):
Message from rank 0 and tag 1 truncated; 59 bytes received
                                    but buffer size is 58
```

Debugging with gdb

Compiling with debug flags

```
GNU:   CC -O0 -g                        6.bugs\_buffer.c -o 6.exe
INTEL: CC -O0 -debug all -g             6.bugs\_buffer.c -o 6.exe
PGI:   CC -O0 -dynamic -traceback -g 6.bugs\_buffer.c -o 6.exe
CCE:   CC -G0                           6.bugs\_buffer.c -o 6.exe
```

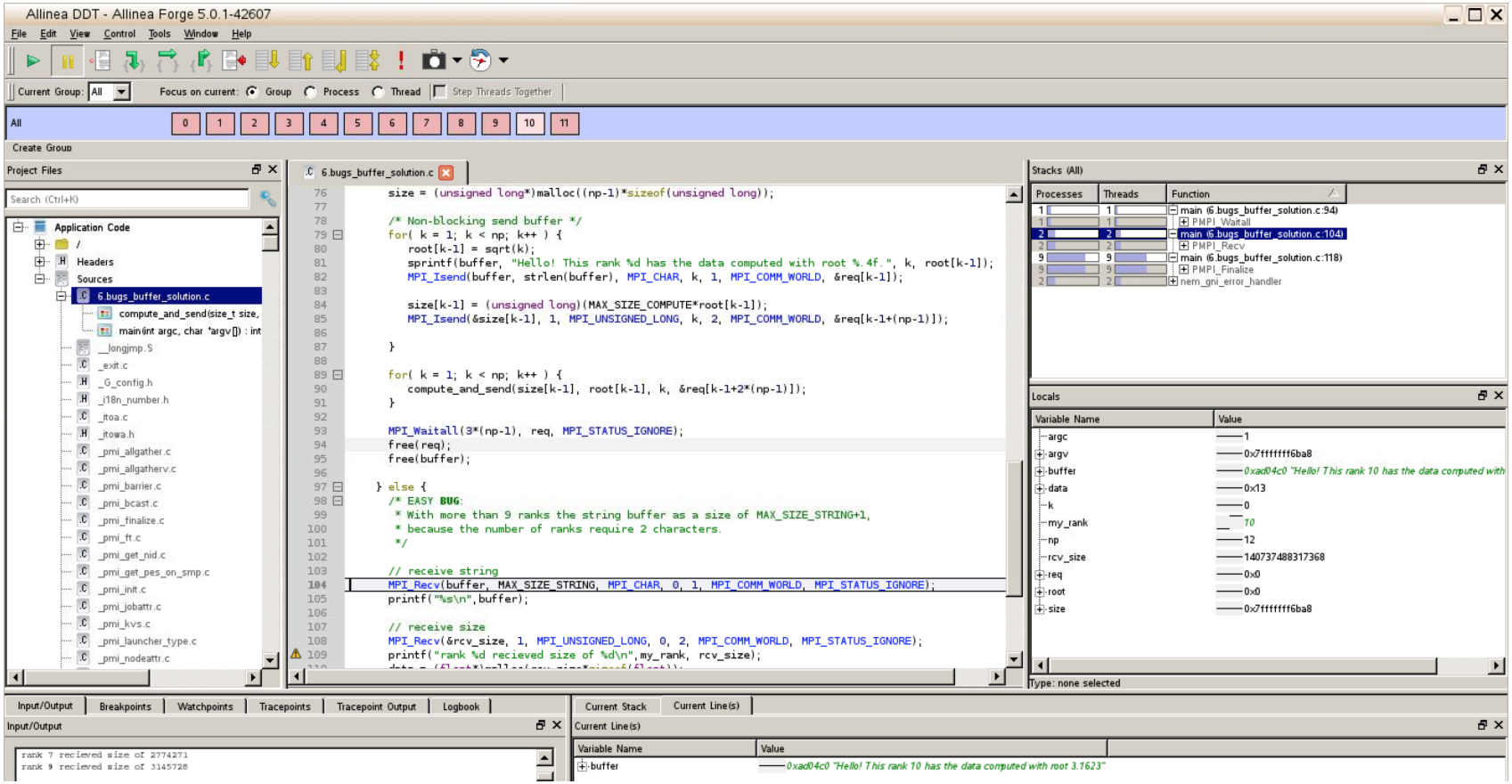
Crashing will dump the corefile

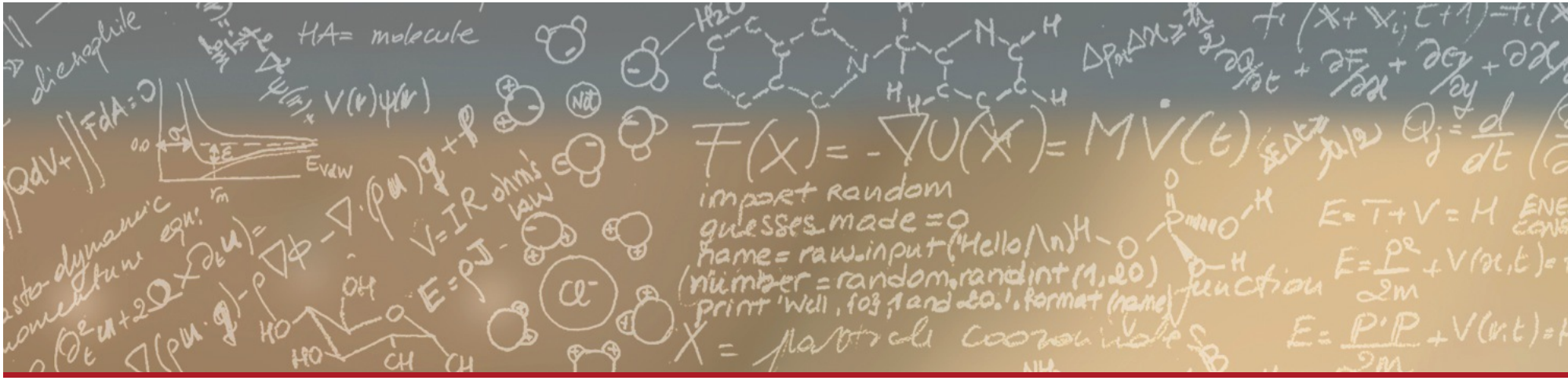
```
course51@daint103:~ aprun -n16 6.exe
   Command exited with non-zero status 137
course51@daint103:~ file core
   core: ELF 64-bit LSB core file x86-64 from '6.exe'
```

Reading the corefile with gdb

```
course51@daint103:~ gdb -c core -e 6.exe
% GNU gdb (GDB) 7.6.2-5.0.1-42607
% Program terminated with signal 6, Aborted.
% (gdb) bt
#1 0x00002aaaacefee61 in abort from /lib64/libc.so.6
#2 0x00002aaaab095c36 in MPID_Abort from libmpich_pgi.so.3
#3 0x00002aaaab0461a2 in handleFatalError from libmpich_pgi.so.3
#4 0x00002aaaab04635f in MPIR_Err_return_comm from lmpich_pgi.so.3
#5 0x00002aaaaafe34a1 in PMPI_Recv from libmpich_pgi.so.3
#6 0x0000000000402b60 in ??      ***
#7 0x0000000000000001 in ??      ***
        % (gdb) quit
```

Debugging with ddt (demo)





Thank you for your attention.