

Welcome - Debugging Challenging Memory and GPU Problems with TotalView



May 13, 2024

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User Engagement Group

Tutorial on Using TotalView

- Instructors:
Larry Edelstein, John DelSignore and Bill Burns (Perforce Software)
- Change Zoom name: ‘GivenName LastName’
 - Click “Participants”, then “More” next to your name to rename
- Training agenda and presentation slides, videos, etc. available at <https://www.nersc.gov/users/training/events/2024/debugging-challenging-memory-and-gpu-problems-with-totalview-may-13-2024/>
- **Gdoc for Q&A** (instead of Zoom chat): <https://tinyurl.com/3bx5bfsf>
- **Survey**: <https://tinyurl.com/mrt66mkp>
- Planning an **Office Hours** session on Debugging with TotalView

Exercises

- Example codes in /global/cfs/cdirs/training/2024/TotalView_May2024

```
$ cp -r /global/cfs/cdirs/training/2024/TotalView_May2024 .
```

- Perlmutter CPU and GPU nodes are reserved for today's tutorial (8:30-11:30 am)

```
$ salloc -C gpu -N 1 --gpus-per-node=4 -q interactive -t 30 \  
-A ntrain7 --reservation=tv_g
```

```
$ salloc -C cpu -N 1 -q interactive -t 30 \  
-A ntrain7 --reservation=tv_c
```

- If all the reserved nodes are taken, use your own project account or submit a non-interactive batch job

X Window GUI over Internet Is Painfully Slow...

- NoMachine (formerly NX)
 - Improves X window performance - X window “accelerator”
 - Install & configure: <https://docs.nersc.gov/connection/nx>
- TotalView software for Remote Connections
 - Download: <https://totalview.io/success/downloads>
 - Configure:
<https://docs.nersc.gov/tools/debug/totalview/#remote-connections>

Using NoMachine (NX)

(1) Connect to Perlmutter



(2) Run on Perlmutter



(3) TotalView window



Processes and Th.

Description	# P	# T	Members
TotalView 15	1	1	16.1
TotalView 16	1	1	17.1
TotalView 19	1	1	18.1
TotalView 21	1	1	19.1
TotalView 23	1	1	20.1
TotalView 27	1	1	21.1
TotalView 29	1	1	22.1
TotalView 31	1	1	23.1
TotalView 32	1	1	24.1
TotalView 33	1	1	25.1
TotalView 34	1	1	26.1
TotalView 35	1	1	27.1
TotalView 36	1	1	28.1
TotalView 37	1	1	29.1
TotalView 38	1	1	30.1
TotalView 39	1	1	31.1
TotalView 40	1	1	32.1
TotalView 41	1	1	33.1
TotalView 42	1	1	34.1
TotalView 43	1	1	35.1
TotalView 44	1	1	36.1
TotalView 45	1	1	37.1
TotalView 46	1	1	38.1
TotalView 47	1	1	39.1
TotalView 48	1	1	40.1
TotalView 49	1	1	41.1
TotalView 50	1	1	42.1
TotalView 51	1	1	43.1
TotalView 52	1	1	44.1
TotalView 53	1	1	45.1
TotalView 54	1	1	46.1
TotalView 55	1	1	47.1
TotalView 56	1	1	48.1
TotalView 57	1	1	49.1
TotalView 58	1	1	50.1
TotalView 59	1	1	51.1
TotalView 60	1	1	52.1
TotalView 61	1	1	53.1
TotalView 62	1	1	54.1
TotalView 63	1	1	55.1
TotalView 64	1	1	56.1
TotalView 65	1	1	57.1
TotalView 66	1	1	58.1
TotalView 67	1	1	59.1
TotalView 68	1	1	60.1
TotalView 69	1	1	61.1
TotalView 70	1	1	62.1
TotalView 71	1	1	63.1
TotalView 72	1	1	64.1
TotalView 73	1	1	65.1
TotalView 74	1	1	66.1
TotalView 75	1	1	67.1
TotalView 76	1	1	68.1
TotalView 77	1	1	69.1
TotalView 78	1	1	70.1
TotalView 79	1	1	71.1
TotalView 80	1	1	72.1
TotalView 81	1	1	73.1
TotalView 82	1	1	74.1
TotalView 83	1	1	75.1
TotalView 84	1	1	76.1
TotalView 85	1	1	77.1
TotalView 86	1	1	78.1
TotalView 87	1	1	79.1
TotalView 88	1	1	80.1
TotalView 89	1	1	81.1
TotalView 90	1	1	82.1
TotalView 91	1	1	83.1
TotalView 92	1	1	84.1
TotalView 93	1	1	85.1
TotalView 94	1	1	86.1
TotalView 95	1	1	87.1
TotalView 96	1	1	88.1
TotalView 97	1	1	89.1
TotalView 98	1	1	90.1
TotalView 99	1	1	91.1
TotalView 100	1	1	92.1

```
15 real :: tol           ! convergence tolerance threshold
16 real :: omega        ! relaxation parameter
17 integer i, j, k
18 real h, utmp, diffnorm
19 integer np, myid
20 integer js, je, js1, je1
21 integer nbr_down, nbr_up, status(mpi_status_size), ierr
22
23
24 call mpi_init(ierr)
25 call mpi_comm_size(mpi_comm_world, np, ierr)
26 call mpi_comm_rank(mpi_comm_world, myid, ierr)
27
28 nbr_down = mpi_proc_null
29 nbr_up = mpi_proc_null
30 if (myid >= 0) nbr_down = myid - 1
31 if (myid < np - 1) nbr_up = myid + 1
32
33 ! Read in problem and solver parameters.
```

Name	Type	Value
diffnorm	real(kind=4)	0
f	real(kind=4), all...	(real(kind=4), allocatable: (:,:) (...))
h	real(kind=4)	0
i	integer(kind=4)	0 (0x00000000)
ierr	integer(kind=4)	0 (0x00000000)
j	integer(kind=4)	0 (0x00000000)
je	integer(kind=4)	0 (0x00000000)
je1	integer(kind=4)	0 (0x00000000)
js	integer(kind=4)	0 (0x00000000)
js1	integer(kind=4)	0 (0x00000000)
k	integer(kind=4)	268435456 (0x10000000)

Remote Connections

- Full installation of the tool on a local machine
- Use it for establishing remote connections

- **Connection Name:** perlmutter
- **Remote Host(s):**
<account_name>@perlmutter.nersc.gov
- **TotalView Remote Installation Directory:**
/global/common/software/nersc9/toolworks/
totalview.default/bin
- Use sshproxy's keys for password-less ssh

The screenshot shows the 'Preferences' dialog box for 'Remote Connections'. The dialog has a sidebar on the left with icons for DISPLAY, ACTION POINTS, SEARCH PATH, PARALLEL, REMOTE CONNECTIONS (highlighted), TOOL BAR, and LABS. The main area is titled 'Remote Connections' and contains the following fields:

- Connection Name:** perlmutter (REQUIRED)
- Remote Host(s):** elvis@perlmutter.nersc.gov (REQUIRED)
- Private Key File:** /my/path/my_key.pem (BROWSE... button)
- TotalView Remote Installation Directory:** /global/common/software/nersc9/toolworks/totalview.default/bin
- Remote Command(s):** module load totalview
- Remote TotalView Arguments:** remote totalview arguments

At the bottom right, there are buttons for 'OK', 'APPLY', and 'CANCEL'.



Thank You!

