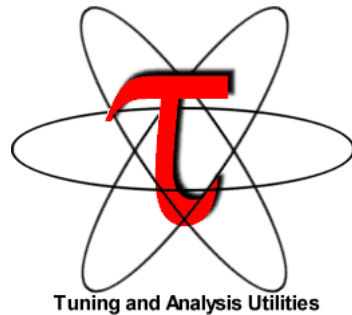


## TAU Performance System® Hands-On



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[http://tau.uoregon.edu/TAU\\_TW43\\_Handson.pptx](http://tau.uoregon.edu/TAU_TW43_Handson.pptx)



# TAU: Quickstart Guide

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## Profiling:

```
MPI: % mpirun -np 16 tau_exec -ebs ./a.out
```

- Pthread: % mpirun -np 16 tau\_exec -T mpi,pthread -ebs ./a.out
- CUDA: % mpirun -np 16 tau\_exec -T cupti,mpi -cupti -ebs ./a.out
- Score-P: % mpirun -np 16 tau\_exec -T scorep,mpi ./a.out

```
Analysis: % pprof -a -m | more; % paraprof (GUI)
```

## Tracing:

- Vampir: MPI: % export TAU\_TRACE=1; export TAU\_TRACE\_FORMAT=otf2  
% mpirun -np 16 tau\_exec ./a.out; vampir traces.otf2 &
- Chrome/Jumpshot: % export TAU\_TRACE=1; mpirun -np 64 tau\_exec ./a.out  
% tau\_treemerge.pl;

```
Chrome: % tau_trace2json tau.trc tau.edf -chrome -ignoreatomic -o app.json
```

```
Chrome browser: chrome://tracing (Load -> app.json) or Perfetto.dev
```

- Jumpshot: tau2slog2 tau.trc tau.edf -o app.slog2; jumpshot app.slog2

---

# TAU Hands-On

# Hands-On Exercises on Turpan

---

```
source /tmpdir/vi-hps/opt/setup.sh
tar zxf /tmpdir/vi-hps/material/handsons/workshop-tau.tgz
cd workshop-tau
cat README
module load tau
```

---

# Exercise 1: CoMD

# Hands-On Exercises: Using TAU with an un-instrumented MPI app

---

```
workshop-tau; cd CoMD; cat README  
cd src-mpi; ./compile.sh; cd ../bin  
sbatch run.sbatch  
cat slurm*  
sbatch tau.sbatch  
pprof -a | more  
paraprof &
```

---

# Exercise 2: CoMD with TAU and Score-P

# Using PDT to instrument source code with TAU and Score-P

---

```
cd ../src-mpi
./compile.scorep.sh
cd ../bin
sbatch run.sbatch
cd scorep*;
paraprof profile.cubex &
paraprof --dump profile.cubex; cd MULTI__Time
pprof -a | more
```

**More Score-P examples:**

[http://tau.uoregon.edu/cubex\\_ex.tgz](http://tau.uoregon.edu/cubex_ex.tgz)



---

# Exercise 3: CUDA with TAU without MPI

# Hands-On Exercises

---

```
cd workshop-tau/cuda  
cat README
```

---

# Exercise 4: CUDA with TAU and MPI

# Hands-On Exercises

---

```
cd workshop-tau/TeaLeaf_CUDA
cat README
./compile.sh
cd bin; sbatch ./run.sbatch
sbatch ./tau.sbatch
paraprof &
pprof -a | more
```

# ParaProf: TeaLeaf\_CUDA

The screenshot displays the ParaProf analysis interface for TeaLeaf\_CUDA. It consists of several windows:

- Call Graph:** A tree view showing the execution flow of the application. The root node is ".TAU application" with an Exclusive TAUGPU\_TIME of 0.003 and an Inclusive TAUGPU\_TIME of 47.092. Major children include "taupreload\_main" (6.154), "cudaMemcpy" (29.198), and "MPI\_Waitall()" (8.663).
- 2D Bar Chart:** A horizontal bar chart showing the TAUGPU\_TIME for various threads (node 0, thread 0 to node 7, thread 1). The bars are color-coded by function. The maximum value is 12.526 seconds.
- 3D Bar Chart:** A 3D visualization of the same data, showing the distribution of TAUGPU\_TIME across threads and functions.
- Function Data Window:** A window showing the function "device\_tea\_leaf\_ppcg\_solve\_calc\_sd\_new(kernel\_info\_t, double const\*, double\*, double const\*, double const\*, double const\*, double const\*, double const\*, double const\*, double const\*, double const\*, int)" with an Exclusive TAUGPU\_TIME of 6.252 seconds.
- Bottom Window:** A window showing the TAUGPU\_TIME for the ".TAU application" node, with a value of 20.154 seconds.

# Performance Research Lab, University of Oregon, Eugene, USA



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- Department of Defense (DoD)
  - PETTT, HPCMP
- National Science Foundation (NSF)
  - Glassbox, SI-2
- NASA
- CEA, France
- Partners:
  - University of Oregon
  - ParaTools, Inc., ParaTools, SAS
  - The Ohio State University
  - University of Tennessee, Knoxville
  - T.U. Dresden, GWT
  - Juelich Supercomputing Center



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**ParaTools**



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THE UNIVERSITY OF TENNESSEE **UT**



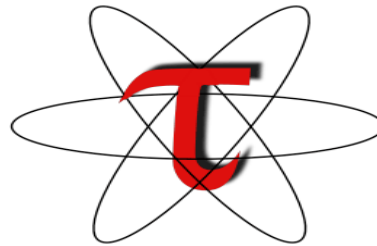
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# Download TAU from U. Oregon

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<http://tau.uoregon.edu>

<http://www.hpclinux.com> [LiveDVD, OVA]

<https://e4s.io> [Containers for Extreme-Scale Scientific Software Stack]

**Free download, open source, BSD license**