# Running DDT, MAP and PR jobs on Cheyenne

The Arm Forge tools, DDT and MAP, are installed on Cheyenne for debugging, profiling, and optimizing code.

Follow the procedures below to configure the DDT and MAP client interface on your local machine and then start your debugging and profiling jobs. We recommend using the client software to get the best performance, but the tools also run from the Cheyenne command line interface.

**Performance Reports** is another Arm tool for Cheyenne users. It summarizes the performance of HPC application runs. Get details and a sample batch script for generating reports below.

#### Note

The default configuration of MPT on Cheyenne can lead to launch timeouts when using these Arm Forge tools, including Performance Reports. CISL recommends setting the environment variables **MPI\_SHEPHERD=true** and **MPI\_INIT\_LATE=false** in any job that uses them with the MPT MPI library.

Your job's memory footprint increases when you use these tools, especially when you use MAP. If your job normally uses most of the memory on a node, you might need to distribute your cores across more nodes to avoid running out of memory.

Arm Forge was formerly known as Allinea Forge, and "allinea" remains in use in some cases.

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## Preparing your code

Include the -g option when you compile your code for debugging with DDT or profiling with MAP. See our Compiling code documentation for the compilation commands to use.

Do not move or remove the source code, binary, or executable files from the directory or directories in which you compiled them.

Review the following Cheyenne-specific documentation and the Arm Forge User Guide.

## Client interface setup

The client software version that you use locally and the server version that you use on Cheyenne must be the same. We recommend using the latest version that is available on Cheyenne. Run **module av arm-forge** to identify the latest version.

#### Procedure

Download the client software from the Arm site.

Install and start the client on your local machine.

From the "Remote Launch" menu (see image), select Configure.

Arm DDT - Arm Forge 2	2.0.2	—		×
<u>File Edit View Control Tool</u>	s <u>W</u> indow <u>H</u> elp			
<b>arm</b> Forge	<u>R</u> UN Run and debug a program.			<u> </u>
arm DDT	ATTACH Attach to an already running OPEN CORE Open a core file from a previous			
arm MAP	MANUAL LAUNCH (ADVANCEI Manually launch the backend OPTIONS			
<u>Support</u> <u>Tutorials</u> <u>arm.com</u>	Remote Launch: Off Off Configure	Ū	Arm Forae	22.0.2

Configure as shown in the following image. The configuration will apply to both DDT and MAP, so you only need to do it once.

Enter your username followed by @ and the connection name (cheyenne.ucar.edu) in the "Host Name" field.

Then, fill in the "Remote Installation Directory" field. You can copy the text from here and change the version number to match the version you are using:

/glade/u/apps/opt/arm-forge/22.0.2

Leave the "Remote Script" field blank.

📟 Remote Launch Setting	s	?		×
Connection Name:	cheyenne.ucar.edu			
Host Name:	bjsmith@cheyenne.ucar.edu			
	How do I connect via a gateway (multi-hop)?			
Remote Installation Directory:	/glade/u/apps/opt/arm-forge/22.0.2			
Remote Script	Optional			
	Always look for source files locally			
KeepAlive Packets:	Enable			
Interval:	30 seconds			÷
	Proxy through login node			_
		Test Rem	iote Lai	unch
Help	ОК		Cance	I

Click OK.

## Running DDT and MAP

Prepare a job script. Specify the regular queue and customize the script with your own project code, job name, and so on.

On the last line of your script, replace mpiexec\_mpt with ddt --connect (or map --connect).

ddt --connect ./myjob\_f

Submit your job when indicated below.

#### Procedure

Start the client interface on your local machine.

From the "Remote Launch" menu, select your personal host name.

🚟 Arm DDT - Arm Forge 2	2.0.2	_		×
<u>File Edit View Control Tools</u>	<u>W</u> indow <u>H</u> elp			
<b>arm</b> FORGE	<u>R</u> UN Run and debug a program.			<u> </u>
arm DDT	ATTACH Attach to an already running OPEN CORE Open a core file from a previous			
Support Tutorials arm.com	MANUAL LAUNCH (ADVANCEI Manualy launch the backend OPTIONS Remote Launch: Off   Off  Off  Configure  cheyenne.ucar.edu			T
		1	rm Forae	22.0.2

When the following dialog box appears, authenticate as usual. (It may be necessary to click Show Terminal to see the authentication window.)

🚟 Connect to Remote Host	?	
Connecting to bjsmith@cheyenne.ucar.edu		
	<< Hide Termi	nal
CMD.EXE /Q /C " "C:\Program Files\Arm Forge Client 22.0.2\libexec\remote-exec.cm d" -C bjsmith@cheyenne.ucar.edu /glade/u/apps/opt/arm-forge/22.0.2/libexec/ddt- remoted "   Token_Response: Keyboard-interactive authentication prompts from server:		<b></b>
		-
	Cancel	

After logging in, return to your normal terminal window and load the modules that you need. (We recommend including the **module load** commands in your job script.)

module load arm-forge/22.0.2

#### Submit your job script on your command line.

qsub myscript.bash

When your job starts, the Forge GUI will show that a "Reverse Connect Request" has been made. Accept the request to continue.

Reve	erse Connect Request	?	×
	A new Reverse Connect request is available from r13i0	)n4 for A	rm DDT.
Command Line:connect ./hw_mpi_ch.exe			
	Do you want to accept this request?		
	Help Accept Reject		

A "Run" window will open, displaying settings imported from your job script. Review the settings. If your program uses MPT, specify the MPI implementation as HPE MPT 2.18+. (See Run window.)

#### Click Run.

The DDT (or MAP) window will open.

🚟 Arm DDT - Arm Forge 22.0.2			×
<u>File Edit View Control Tools Window H</u> elp			
Focus on current:   Process  Thread  Step Threads Together			
Threads 1			
Proj   Fortran   『hw_mpi_ch.f90 ⊠   Project Elles	Lo	Cu	
Search (Ctrl+K) Search (Ctrl+K) A character (128) :: pname Search (Ctrl+K) A character (128) :: pname Search (Ctrl+K) A character (128) :: pname Search (Ctrl+K) Call MPI Init (err) Call MPI Comm size (MPI COMM WORLD, nt call MPI Comm rank (MPI COMM WORLD, it if (it.eq.0) buff = 1234 Call MPI Get processor name (pname, le Call MPI Bcast (buff, 1, MPI INTEGER, )	Name		<u> </u>
Inpu         Bre         Wat         St         Tra         Tracepoin         Lo         Evaluate           Stacks         Image: Stacks         Image: Stacks         Image: Stacks         Name         Value			₽ ×
Function	venne 3+43	101 -> r11	3i0n4

Quit when you're finished so the license is available to other users.

## Performance Reports

To generate a report on the performance of your program, submit a batch job to run it. You do not need to compile it with the -g debug option first.

Modify your batch script to load the arm-forge module that you want to use and include perf-report as shown in the sample scripts below.

When your job runs, the output will include both text and HTML report files.

See the Arm product documentation for additional information.

#### Sample bash script

#!/bin/bash #PBS -N prjob **#PBS** -A project\_code #PBS -1 walltime=01:00:00 #PBS -q regular #PBS -j oe #PBS -k eod #PBS -1 select=2:ncpus=36:mpiprocs=36 #PBS −m abe #PBS -M email\_address module load arm-forge/22.0.2 export MPI\_SHEPHERD=true export MPI\_INIT\_LATE=false export TMPDIR=/glade/scratch/\$USER/temp mkdir -p \$TMPDIR ### Run the executable perf-report --mpi -n 72 ./executable\_name.exe

#### Sample tcsh script

#!/bin/tcsh #PBS -N prjob **#PBS** -A project\_code #PBS -1 walltime=01:00:00 #PBS -q regular #PBS -j oe #PBS -k eod #PBS -1 select=2:ncpus=36:mpiprocs=36 #PBS -m abe **#PBS** -M email\_address module load arm-forge/22.0.2 setenv MPI\_SHEPHERD true setenv MPI\_INIT\_LATE false setenv TMPDIR /glade/scratch/\$USER/temp mkdir -p \$TMPDIR ### Run the executable perf-report --mpi -n 72 ./executable\_name.exe