

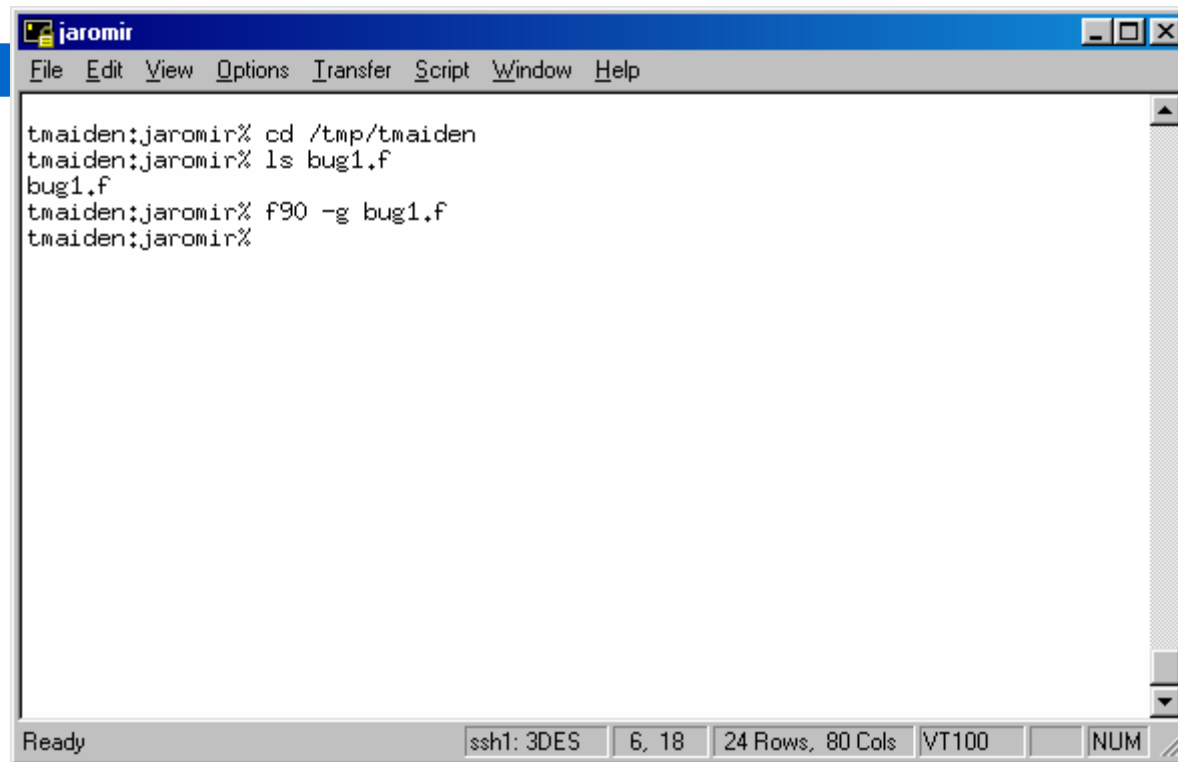
# TotalView Debugger

April 24, 2002



# Compile and Run

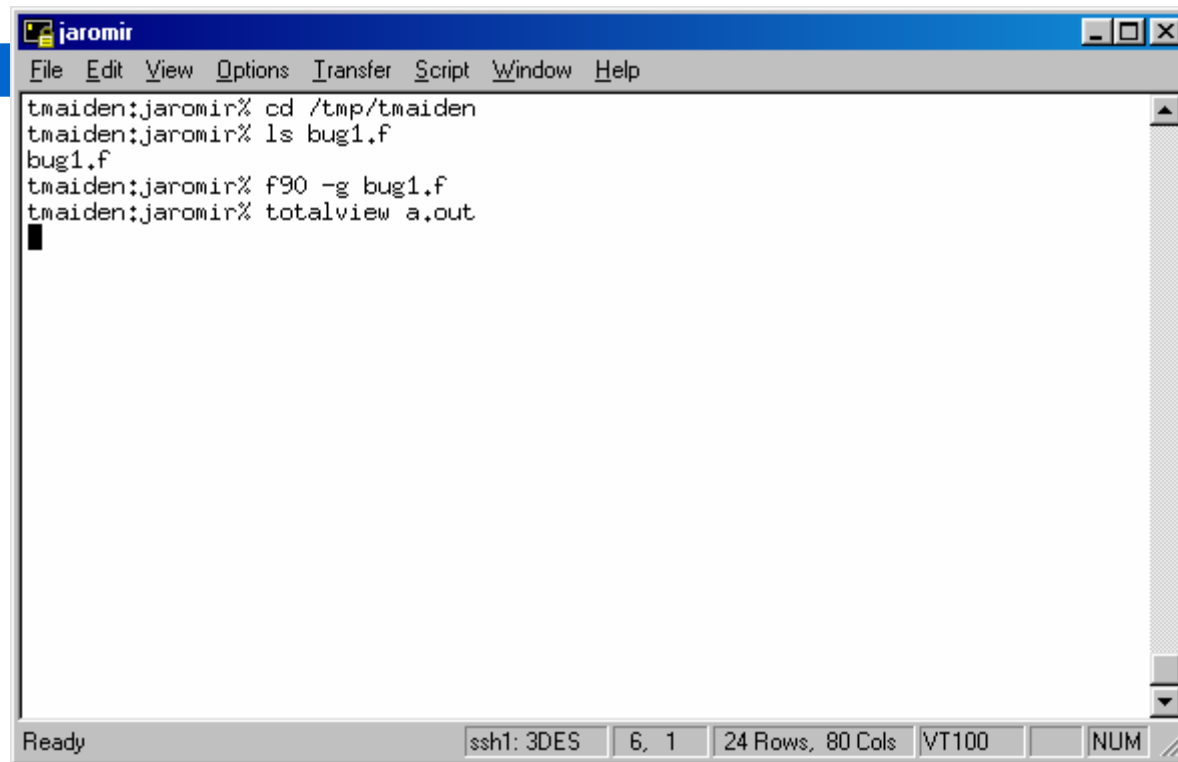
- Copy bug1.f from /tmp/training to your /tmp/username directory
- Compile with the -g option



```
jaromir
File Edit View Options Transfer Script Window Help
tmaiden:jaromir% cd /tmp/tmaiden
tmaiden:jaromir% ls bug1.f
bug1.f
tmaiden:jaromir% f90 -g bug1.f
tmaiden:jaromir%
```

Ready ssh1: 3DES 6, 18 24 Rows, 80 Cols VT100 NUM

April 24, 2002



A terminal window titled 'jaromir' with a menu bar containing 'File', 'Edit', 'View', 'Options', 'Transfer', 'Script', 'Window', and 'Help'. The terminal shows the following commands and output:

```
tmaiden:jaromir% cd /tmp/tmaiden
tmaiden:jaromir% ls bug1.f
bug1.f
tmaiden:jaromir% f90 -g bug1.f
tmaiden:jaromir% totalview a.out
```

The terminal status bar at the bottom indicates 'Ready', 'ssh1: 3DES', '6, 1', '24 Rows, 80 Cols', 'VT100', and 'NUM'.

## Run the file with Totalview

April 24, 2002

process\_window

File Control Events Display Source Search PSet Help

Status Exited or Never Created PID 0 PE 0 PSet ALL

Null stack pointer Process does not exist.

Run Cont Cont to Next Step Interrupt Print...

a.out, Function BUG1 in bug1.f

```
1 program bug1
2 parameter( idim=16 )
3 real a(idim), b(idim), c(idim)
4
5 n = idim
6 do 100 i=1,idim
7     a(i) = i
8     b(i) = 10. * i
9 100 continue
10
11
12 b(idim/2) = 0.
13
14 do 120 i=1,n
15     c(i) = a(i) / b(i)
16 120 continue
17
18 write(6,*) c(1),c(2)
19
20 stop 'all ok'
```

Type 'help' for a summary of commands supported

April 24, 2002

Click Run

```
process_window
File  Control  Events  Display  Source  Search  PSet  Help
Status Error <Floating point exception-d  PID 39576  PE 0  PSet ALL
BUG1 (startc%:475)
$START$
Function "BUG1": calling parameters
No parameters.
Local variables:
A: (Array)
B: (Array)
C: (Array)
I: 8
IDIM: 16
N: 16
Run  Cont  Cont to  Next  Step  Interrupt  Print...
a.out, Function BUG1 in bug1.f
1  program bug1
2  parameter( idim=16 )
3  real a(idim), b(idim), c(idim)
4
5  n = idim
6  do 100 i=1,idim
7      a(i) = i
8      b(i) = 10. * i
9  100 continue
10
11
12  b(idim/2) = 0.
13
14  do 120 i=1,n
15      c(i) = a(i) / b(i)
16  120 continue
17
18  write(6,*) c(1),c(2)
19
20  stop 'all ok'
Type 'help' for a summary of commands supported
Running: a.out
PE 0 received signal SIGFPE (Floating point exception-division by zero)
^
```

April 24, 2002

process\_window

File Control Events Display Source Search PSet Help

Status Error <Floating point exception-d> PID 39681 PE 0 PSet ALL

BUG1 (startc:c;475) Function "BUG1": calling parameters  
\$START\$ No parameters.  
Local variables:  
A: (Array)  
B: (Array)  
C: (Array)  
I: 8  
IDIM: 16  
N: 16

Run Cont Cont to Next Step Interrupt Print...

a.out, Function BUG1 in bug1.f

```
1 program bug1
2 parameter( idim=16 )
3 real a(idim), b(idim), c(idim)
4
5 n = idim
6 do 100 i=1,idim
7     a(i) = i
8     b(i) = 10. * i
9 100 continue
10
11
12 b(idim/2) = 0.
13
14 do 120 i=1,n
15     c(i) = a(i) / b(i)
16 120 continue
17
18 write(6,*) c(1),c(2)
19
20 stop 'all ok'
```

Type 'help' for a summary of commands supported  
Running: a.out  
PE 0 received signal SIGFPE (Floating point exception-division by zero)  
^

Right click b

April 24, 2002

data\_object\_window

File Edit Display Units Search Help

Variable B

PID 39681 PE 0

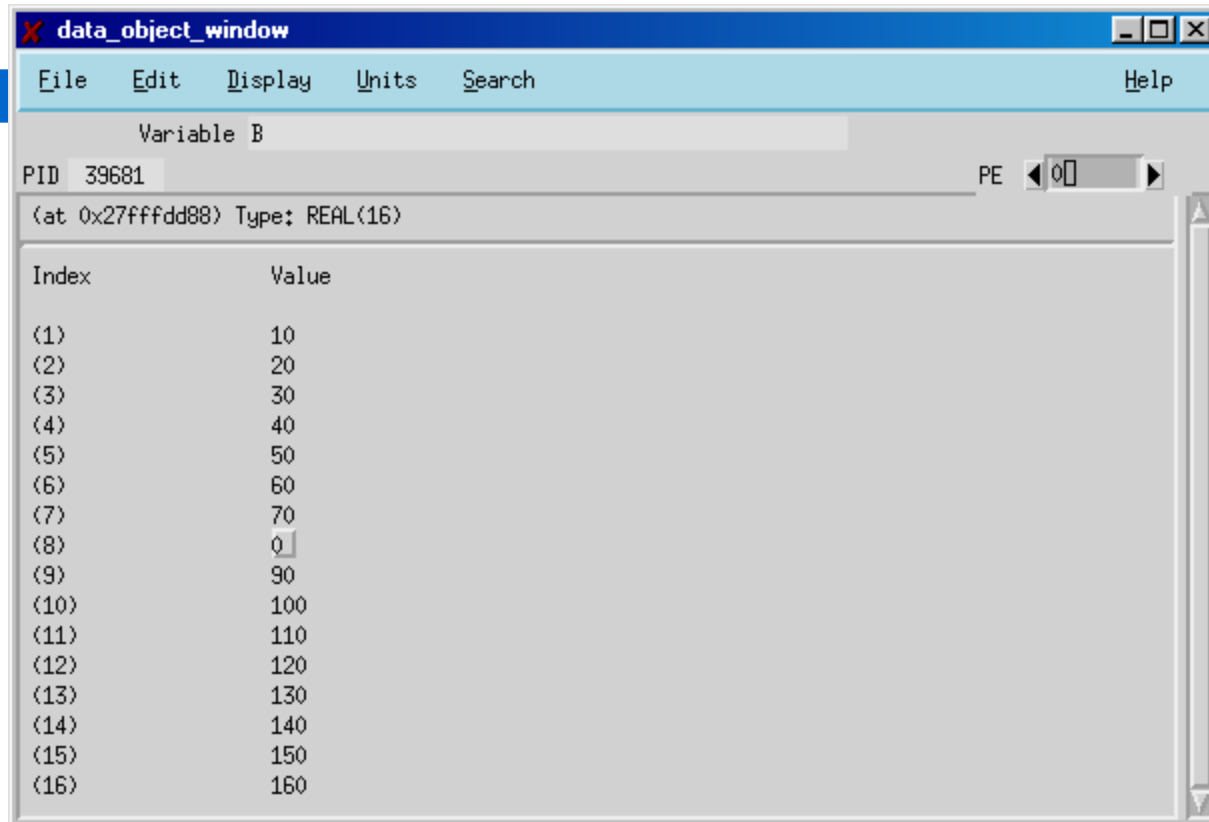
(at 0x27ffdd88) Type: REAL(16)

Index	Value
(1)	10
(2)	20
(3)	30
(4)	40
(5)	50
(6)	60
(7)	70
(8)	0
(9)	90
(10)	100
(11)	110
(12)	120
(13)	130
(14)	140
(15)	150
(16)	160

April 24, 2002



# Select the 0



data\_object\_window

File Edit Display Units Search Help

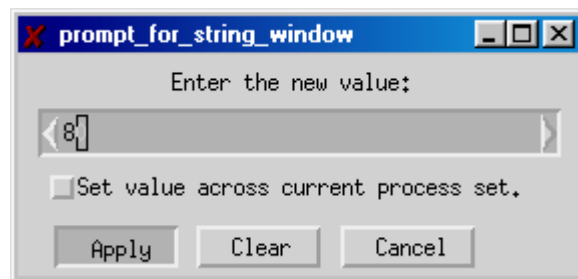
Variable B

PID 39681 PE 0

(at 0x27ffdd88) Type: REAL(16)

Index	Value
(1)	10
(2)	20
(3)	30
(4)	40
(5)	50
(6)	60
(7)	70
(8)	0
(9)	90
(10)	100
(11)	110
(12)	120
(13)	130
(14)	140
(15)	150
(16)	160

April 24, 2002



April 24, 2002

data\_object\_window

File Edit Display Units Search Help

Variable B

PID 39681 PE 0

(at 0x27ffdd88) Type: REAL(16)

Index	Value
(1)	10
(2)	20
(3)	30
(4)	40
(5)	50
(6)	60
(7)	70
(8)	80
(9)	90
(10)	100
(11)	110
(12)	120
(13)	130
(14)	140
(15)	150
(16)	160

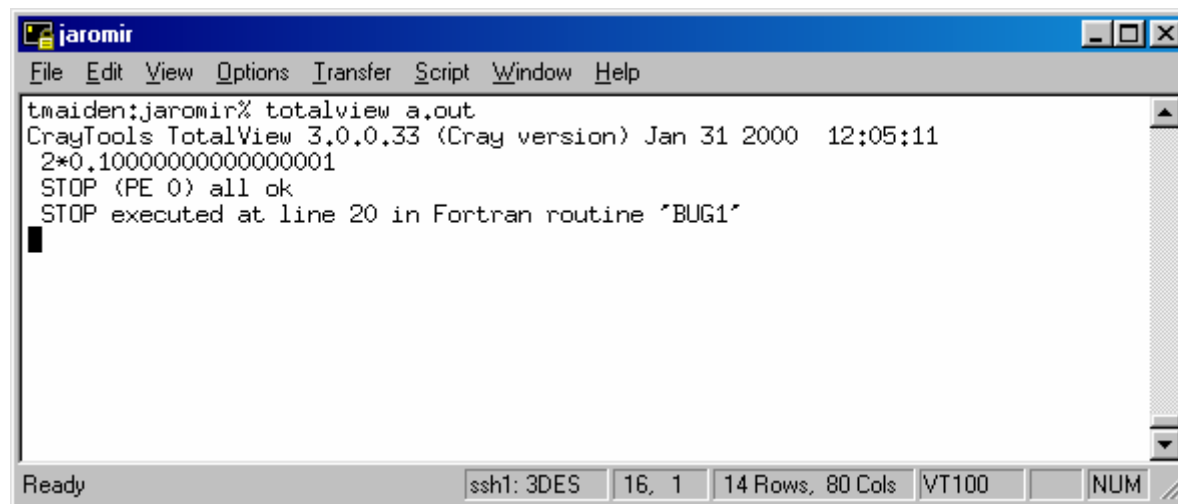
April 24, 2002

```

process_window
File  Control  Events  Display  Source  Search  PSet  Help
Status Error <Floating point exception-d  PID 39681 PE 0 PSet ALL
BUG1 (startc:c;475) Function "BUG1": calling parameters
$START$ No parameters.
Local variables:
A: (Array)
B: (Array)
C: (Array)
I: 8
IDIM: 16
N: 16
Run  Cont  Cont to  Next  Step  Interrupt  Print...
a.out, Function BUG1 in bug1.f
1  program bug1
2  parameter( idim=16 )
3  real a(idim), b(idim), c(idim)
4
5  n = idim
6  do 100 i=1,idim
7      a(i) = i
8      b(i) = 10. * i
9  100 continue
10
11
12  b(idim/2) = 0.
13
14  do 120 i=1,n
15      c(i) = a(i) / b(i)
16  120 continue
17
18  write(6,*) c(1),c(2)
19
20  stop 'all ok'
Type 'help' for a summary of commands supported
Running: a.out
PE 0 received signal SIGFPE (Floating point exception-division by zero)
^

```

Click Continue



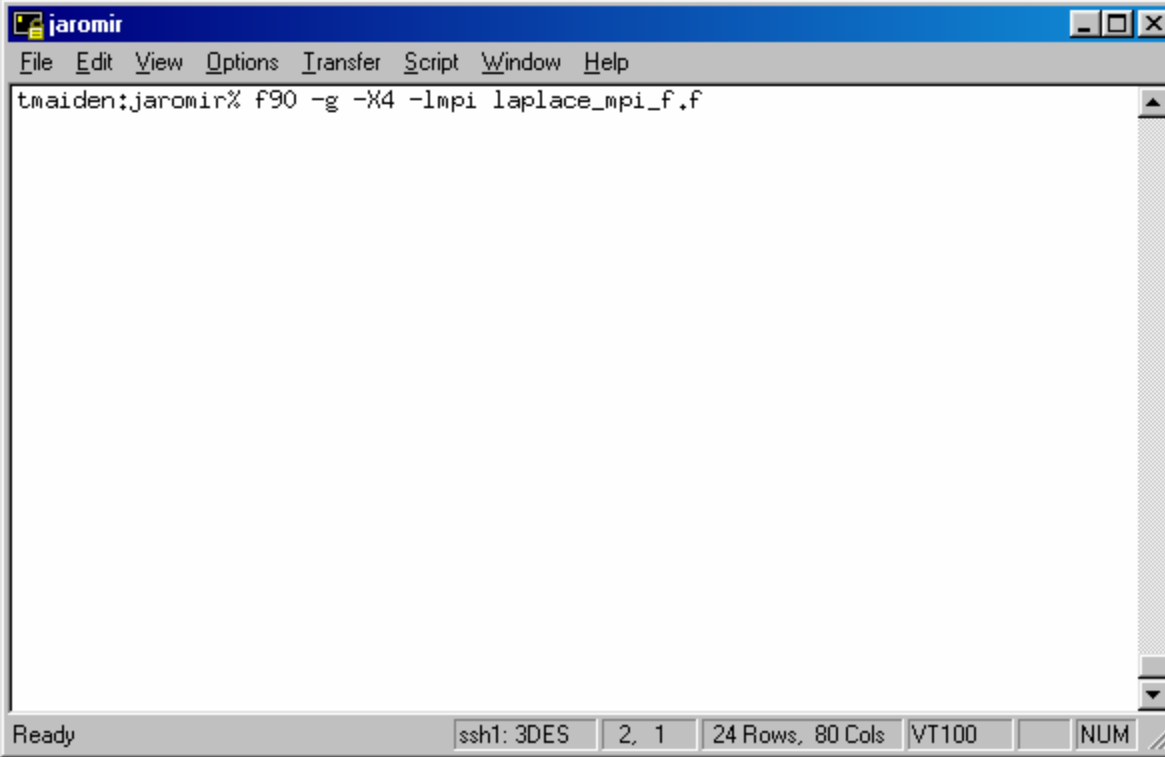
The image shows a terminal window titled "jaromir" with a menu bar containing "File", "Edit", "View", "Options", "Transfer", "Script", "Window", and "Help". The terminal content shows the following text:

```
tmaiden:jaromir% totalview a.out  
CrayTools TotalView 3.0.0.33 (Cray version) Jan 31 2000 12:05:11  
2*0.100000000000000001  
STOP (PE 0) all ok  
STOP executed at line 20 in Fortran routine "BUG1"
```

The status bar at the bottom of the window displays "Ready", "ssh1: 3DES", "16, 1", "14 Rows, 80 Cols", "VT100", and "NUM".

April 24, 2002

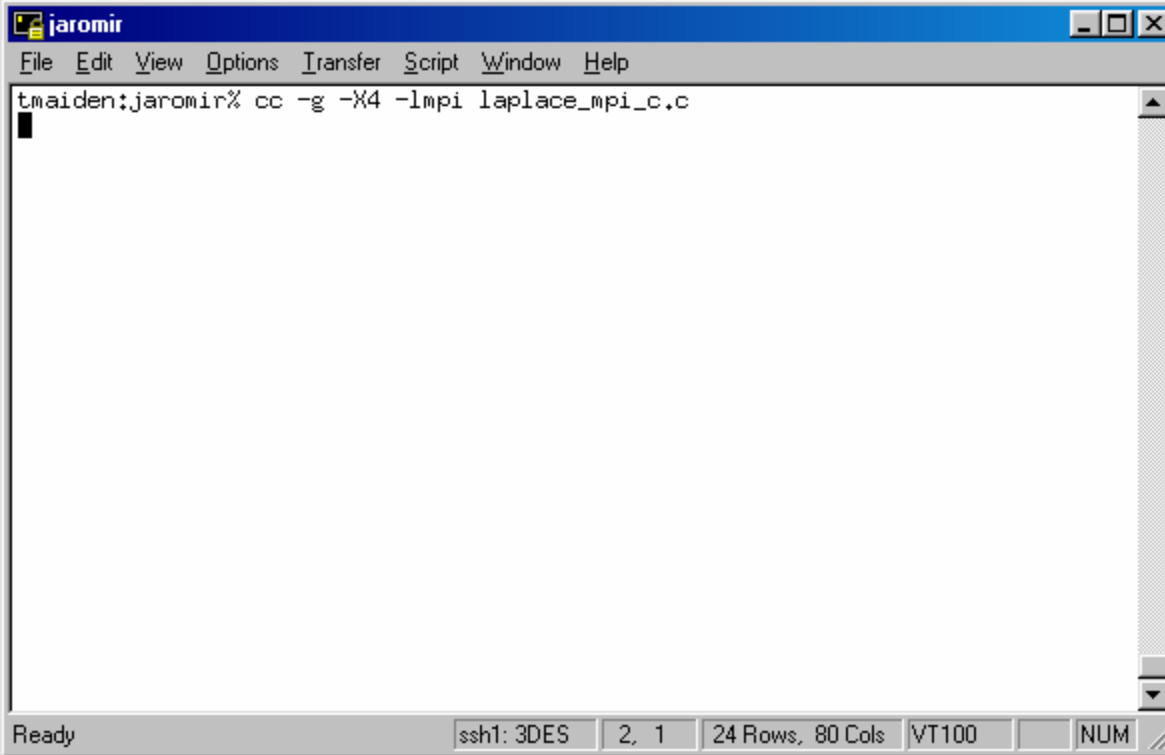
# Compile the laplace example



A terminal window titled "jaromir" with a menu bar containing "File", "Edit", "View", "Options", "Transfer", "Script", "Window", and "Help". The terminal content shows the command: `tmaiden:jaromir% f90 -g -X4 -lmpi laplace_mpi_f.f`. The status bar at the bottom indicates "Ready", "ssh1: 3DES", "2, 1", "24 Rows, 80 Cols", "VT100", and "NUM".

April 24, 2002

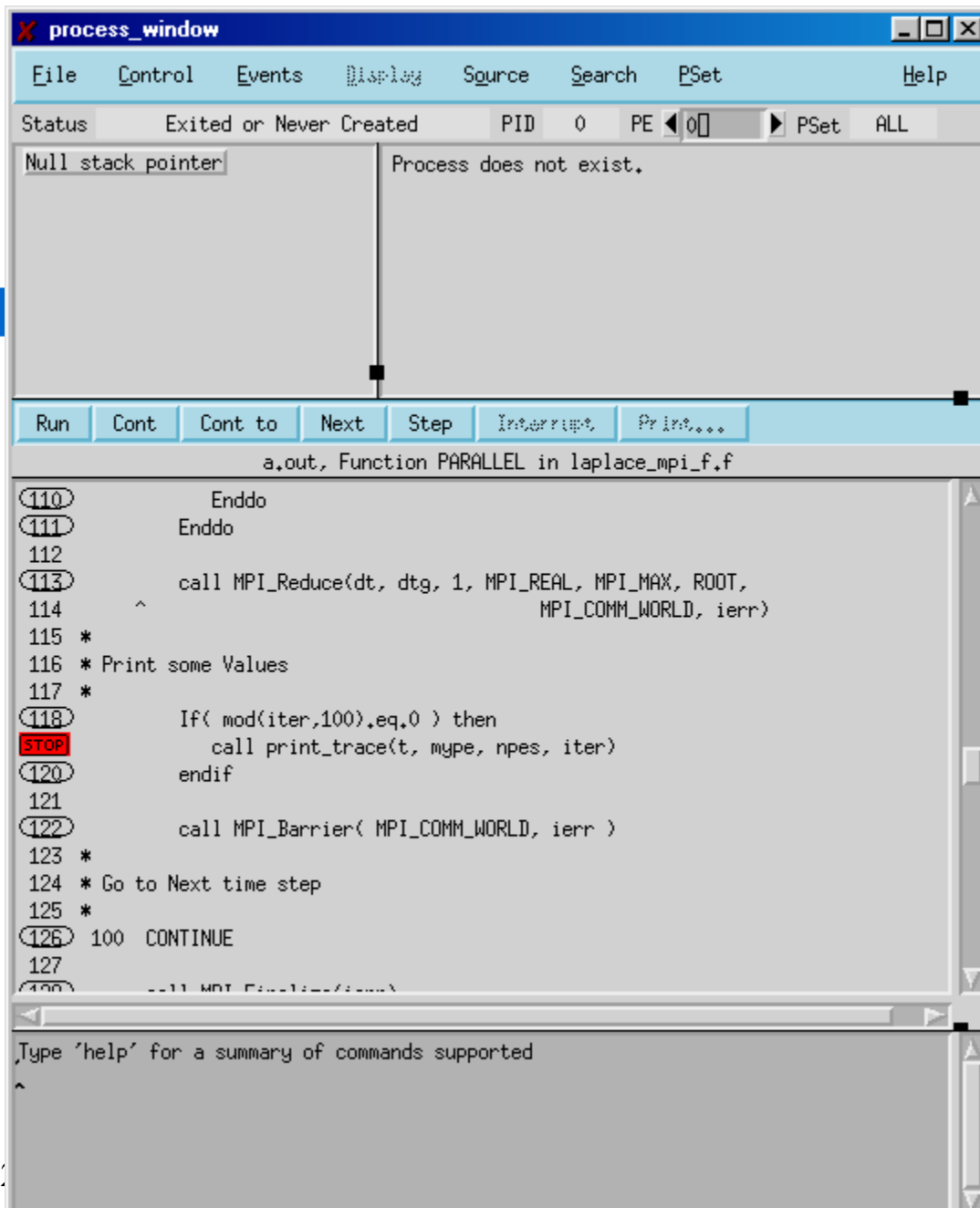
# C version



A terminal window titled "jaromir" with a menu bar containing "File", "Edit", "View", "Options", "Transfer", "Script", "Window", and "Help". The terminal content shows the command `tmaiden:jaromir% cc -g -X4 -lmpi laplace_mpi_c.c` followed by a cursor. The status bar at the bottom indicates "Ready", "ssh1: 3DES", "2, 1", "24 Rows, 80 Cols", "VT100", and "NUM".

```
tmaiden:jaromir% cc -g -X4 -lmpi laplace_mpi_c.c
```

April 24, 2002



Insert a breakpoint

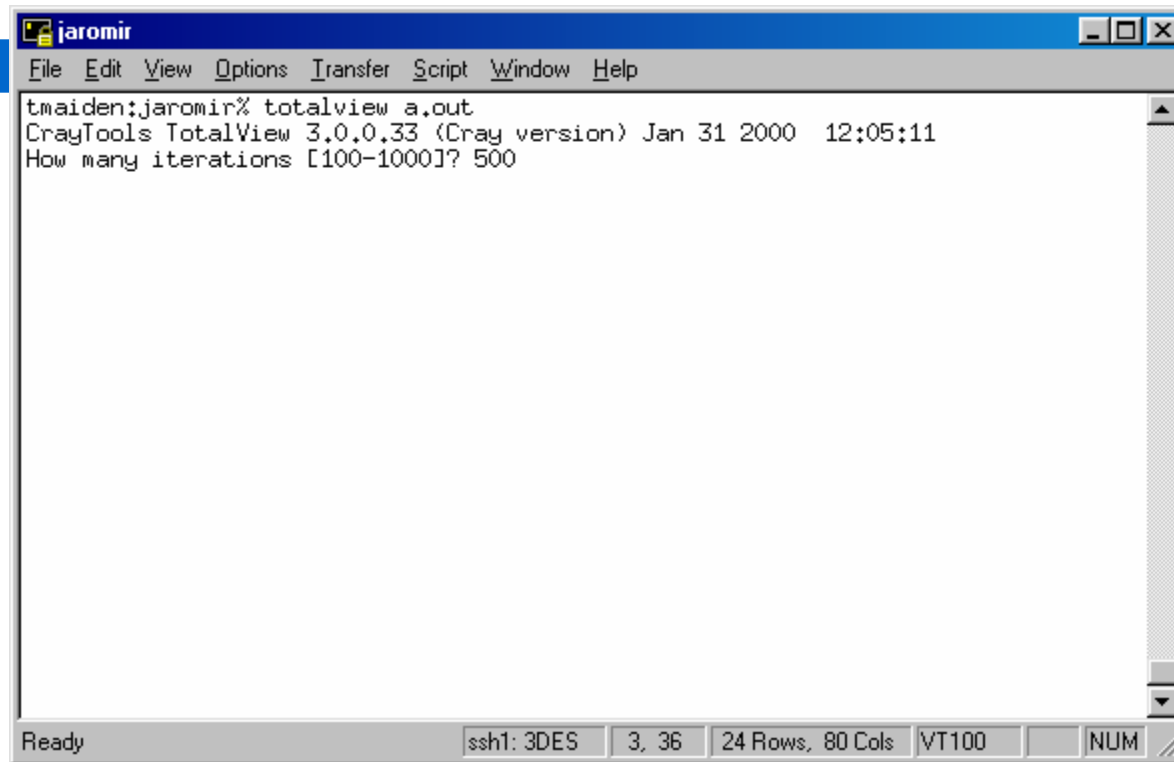
April 1



```
process_window
File Control Events Display Source Search PSet Help
Status Exited or Never Created PID 0 PE 0 PSet ALL
Null stack pointer Process does not exist.
Run Cont Cont to Next Step Interrupt Print...
a.out, Function main in laplace_mpi.c
91 dt = MAX( fabs(t[i][j]-told[i][j]), dt);
92 told[i][j] = t[i][j];
93 }
94
95 MPI_Reduce(&dt, &dtg, 1, MPI_FLOAT, MPI_MAX, ROOT, MPI_COMM_WORLD);
96
97 /* Print some test Values */
98
99 if( (iter%100) == 0 ) {
STOP print_trace( t, mype, npes, iter );
101 }
102
103 MPI_Barrier( MPI_COMM_WORLD );
104
105 } /* End of iteration */
106
107 MPI_Finalize();
108
109 } /* End of Program */
Type 'help' for a summary of commands supported
^
```

C version

April 1



```
jaromir
File Edit View Options Transfer Script Window Help
tmaiden:jaromir% totalview a.out
CrayTools TotalView 3.0.0.33 (Cray version) Jan 31 2000 12:05:11
How many iterations [100-1000]? 500
Ready ssh1: 3DES 3, 36 24 Rows, 80 Cols VT100 NUM
```

Enter the number of iterations

April 24, 2002

process\_window

File Control Events Display Source Search PSet Help

Status At Breakpoint PID 43885 PE 0 PSet ALL

main (startc%c:475) Function "main": calling parameters  
 \$START\$ argc: 1  
 argv: 0x27fffffb8  
 Local variables:  
 dt: 0.0607777  
 dtg: 0.355755  
 i: 252  
 iter: 100  
 j: 1001

Run Cont Cont to Next Step Interrupt Print...

a.out, Function main in laplace\_mpi.c

```

91 dt = MAX( fabs(t[i][j]-told[i][j]), dt);
92 told[i][j] = t[i][j];
93 }
94
95 MPI_Reduce(&dt, &dtg, 1, MPI_FLOAT, MPI_MAX, ROOT, MPI_COMM_WORLD);
96
97 /* Print some test Values */
98
99 if( (iter%100) == 0 ) {
100     print_trace( t, ntype, npes, iter );
101 }
102
103 MPI_Barrier( MPI_COMM_WORLD );
104
105 } /* End of iteration */
106
107 MPI_Finalize();
108
109 } /* End of Program */

```

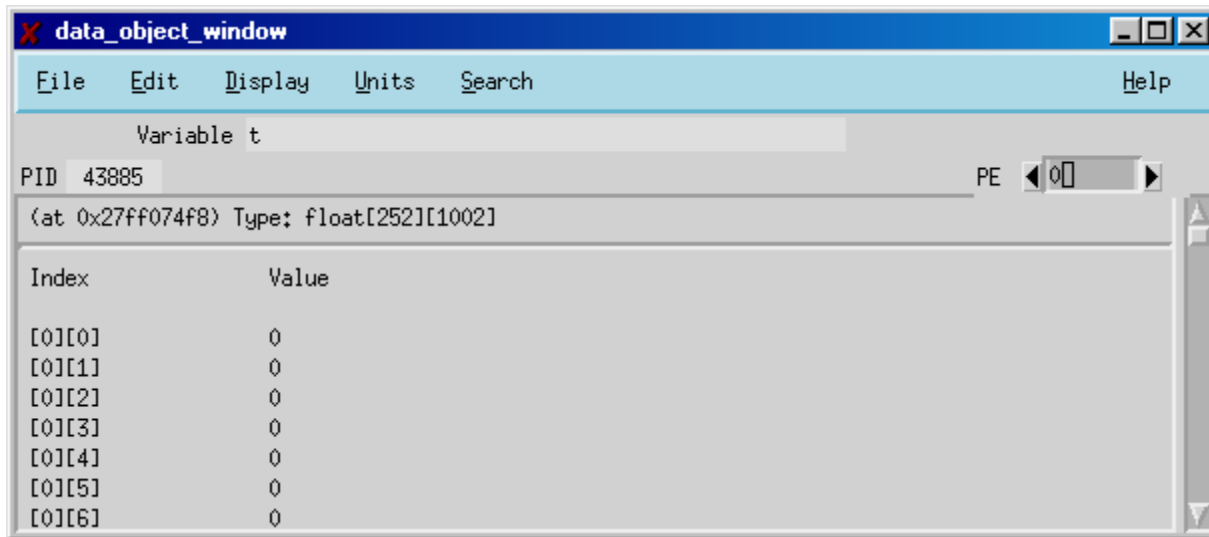
Type 'help' for a summary of commands supported  
 Running: a.out  
 ^

April 24, 2002

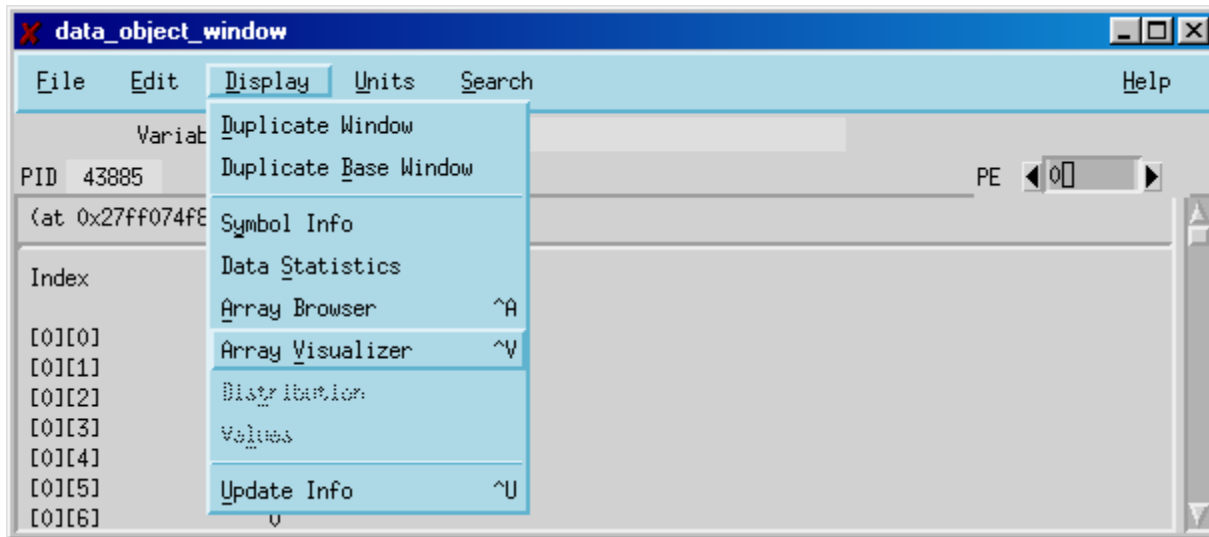
Right click t

```
process_window
File Control Events Display Source Search PSet Help
Status At Breakpoint PID 43885 PE 0 PSet ALL
main (startc$c;475) Function "main": calling parameters
$START$ argc: 1
argv: 0x27fffffb8
Local variables:
dt: 0.0607777
dtg: 0.355755
i: 252
iter: 100
j: 1001
Run Cont Cont to Next Step Interrupt Print...
a.out, Function main in laplace_mpi.c
91 dt = MAX( fabs(t[i][j]-told[i][j]), dt);
92 told[i][j] = t[i][j];
93 }
94
95 MPI_Reduce(&dt, &dtg, 1, MPI_FLOAT, MPI_MAX, ROOT, MPI_COMM_WORLD);
96
97 /* Print some test Values */
98
99 if( (iter%100) == 0 ) {
100     print_trace( t, mype, npes, iter );
101 }
102
103 MPI_Barrier( MPI_COMM_WORLD );
104
105 } /* End of iteration */
106
107 MPI_Finalize();
108
109 /* End of Program */
Type 'help' for a summary of commands supported
Running: a.out
^
```

April 24, 2002

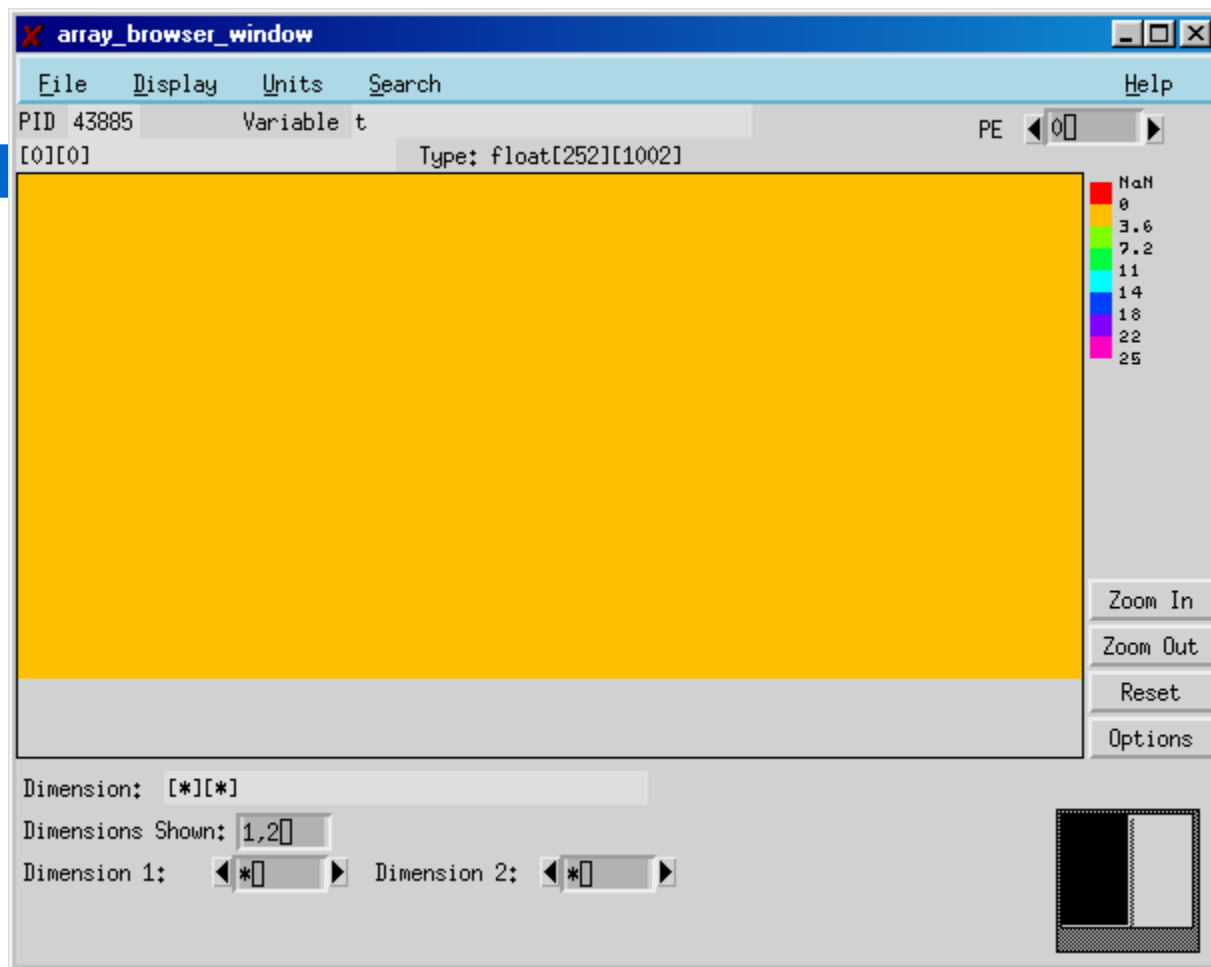


April 24, 2002

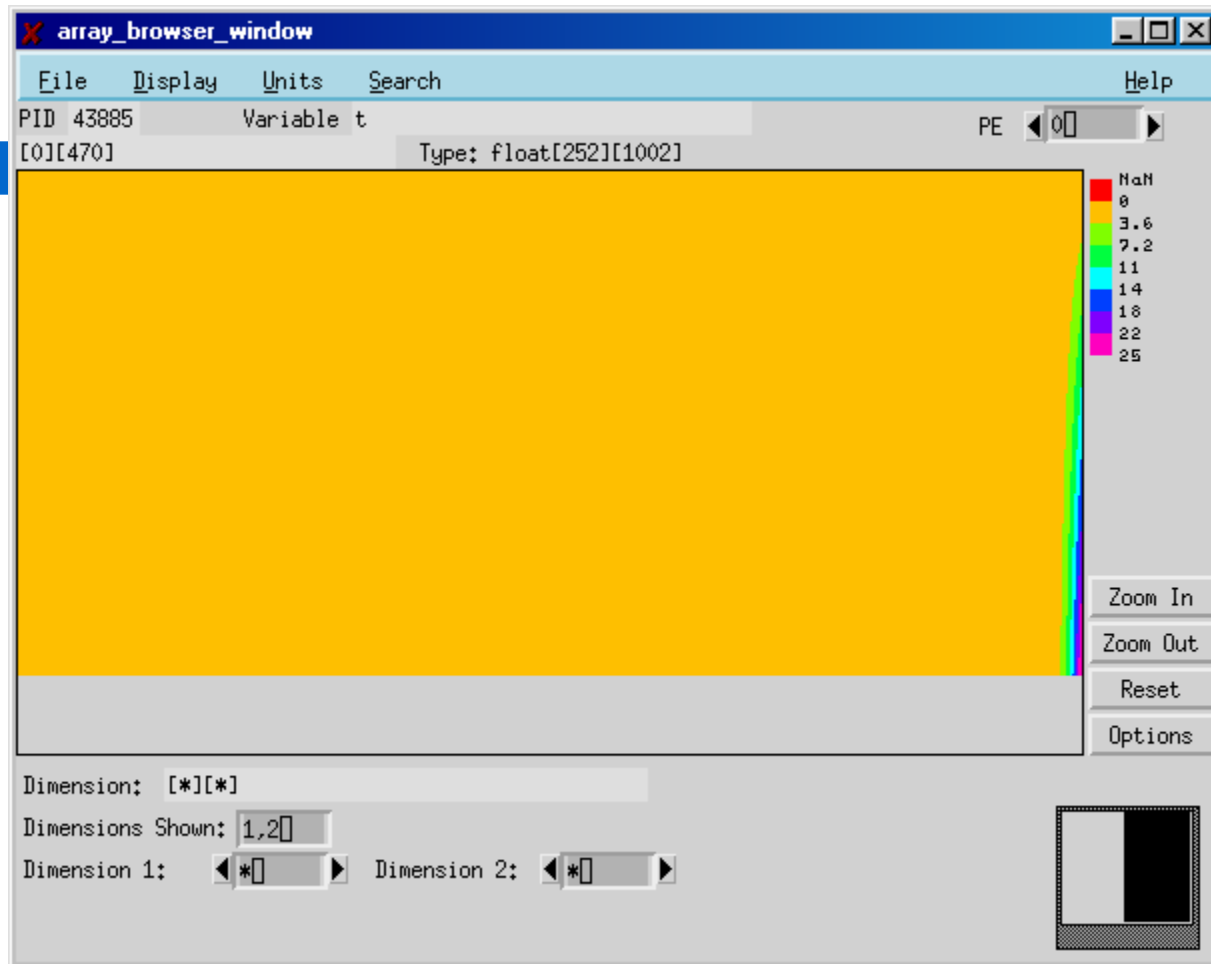


## Display Array Visualizer

April 24, 2002



April 24, 2002

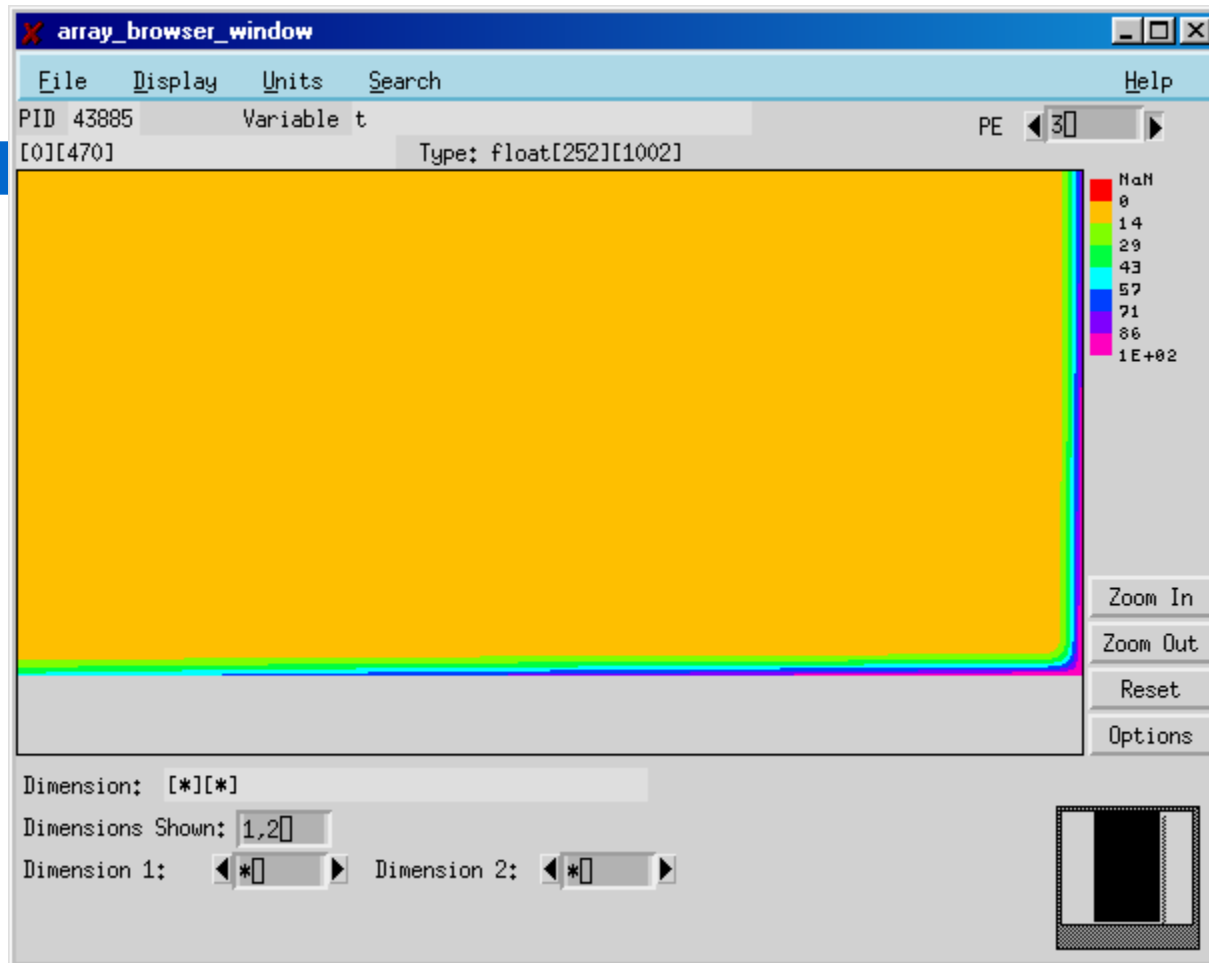


Slide

April 24, 2002



# Choose PE 3



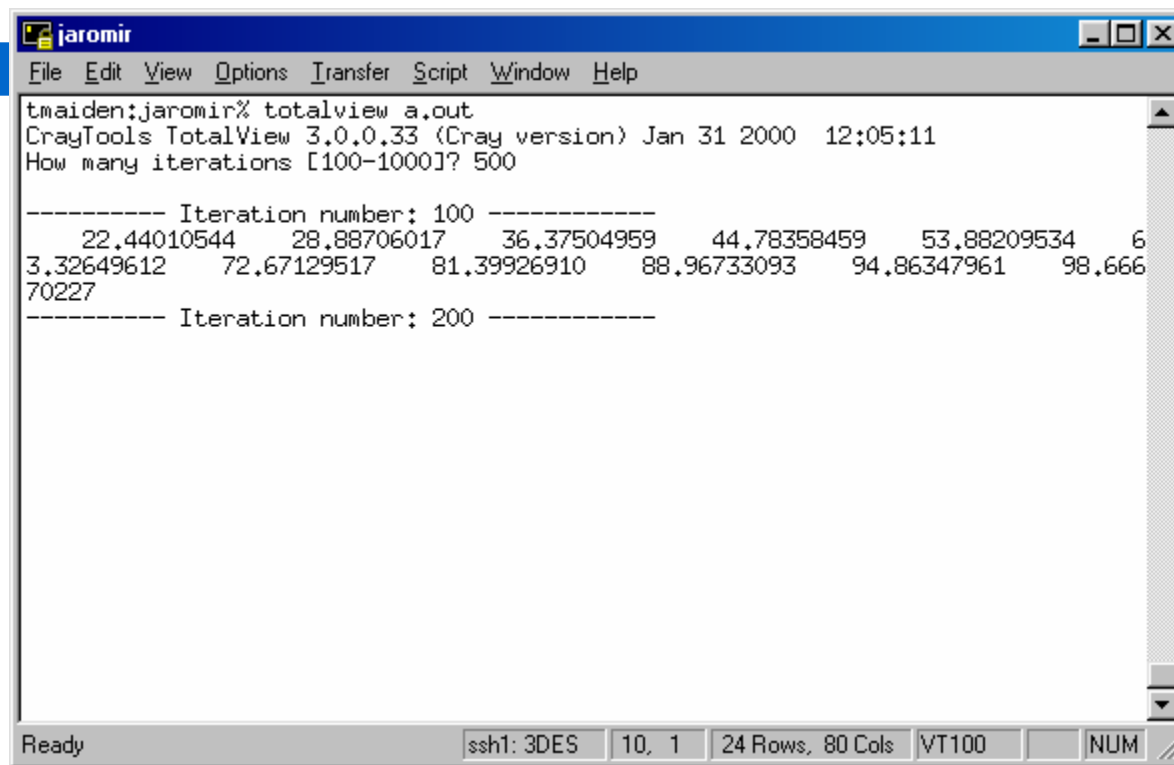
April 24, 2002

# Continue

```
process_window
File Control Events Display Source Search PSet Help
Status At Breakpoint PID 43885 PE 0 PSet ALL
main (startc%c:475) Function "main": calling parameters
$START$ argc: 1
argv: 0x27ffffefb8
Local variables:
dt: 0.0607777
dtg: 0.355755
i: 252
iter: 100
j: 1001
Run Cont Cont to Next Step Interrupt Print...
a.out, Function main in laplace_mpi.c
91 dt = MAX( fabs(t[i][j]-told[i][j]), dt);
92 told[i][j] = t[i][j];
93 }
94
95 MPI_Reduce(&dt, &dtg, 1, MPI_FLOAT, MPI_MAX, ROOT, MPI_COMM_WORLD);
96
97 /* Print some test Values */
98
99 if( (iter%100) == 0 ) {
100     print_trace( t, mype, npes, iter );
101 }
102
103 MPI_Barrier( MPI_COMM_WORLD );
104
105 } /* End of iteration */
106
107 MPI_Finalize();
108
109 } /* End of Program */
Type 'help' for a summary of commands supported
Running: a.out
^
```

April 24, 2002

# Check the progress



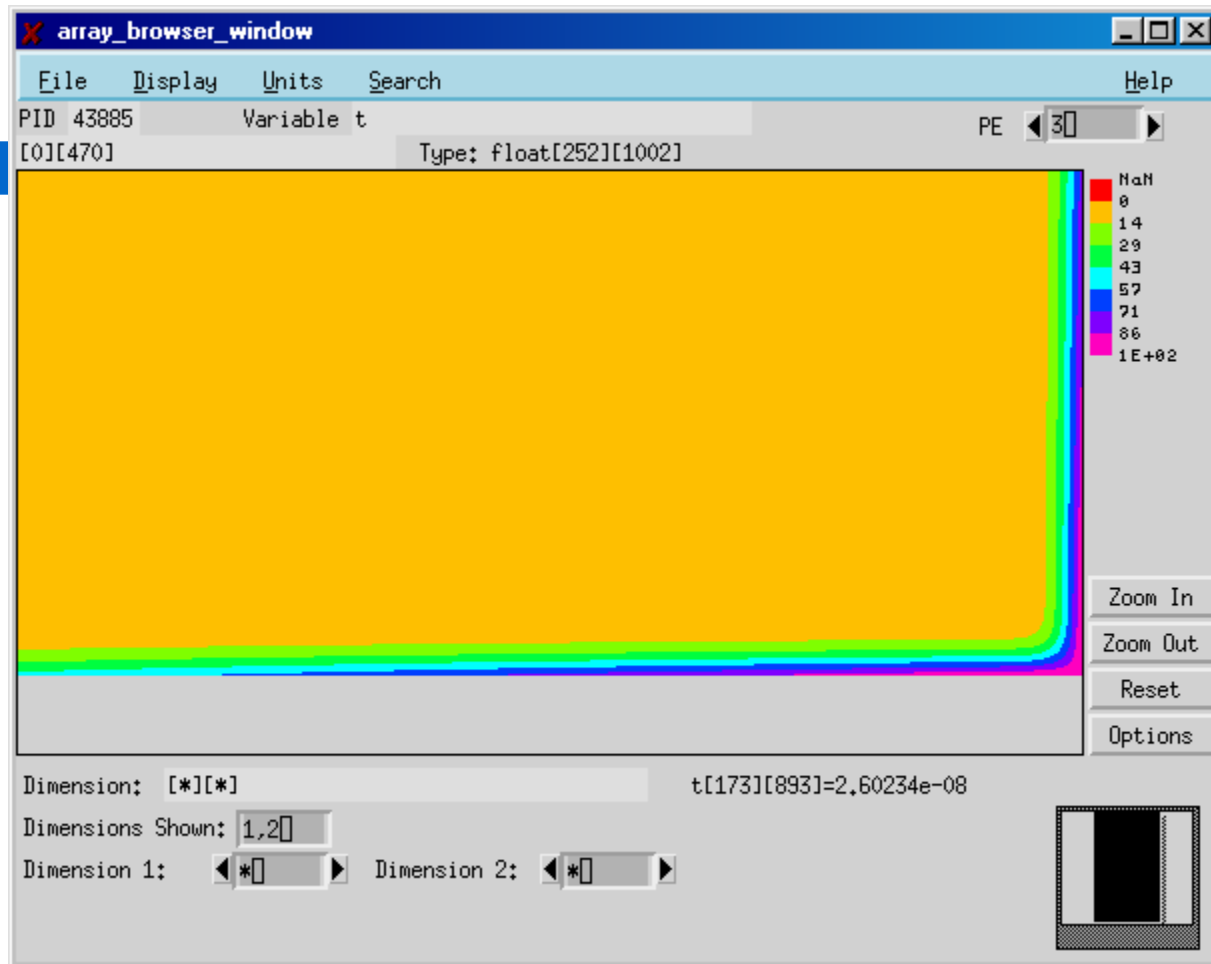
The screenshot shows a terminal window titled 'jaromir' with a menu bar (File, Edit, View, Options, Transfer, Script, Window, Help). The terminal content is as follows:

```
tmaiden:jaromir% totalview a.out
CrayTools TotalView 3.0.0.33 (Cray version) Jan 31 2000 12:05:11
How many iterations [100-1000]? 500

----- Iteration number: 100 -----
      22.44010544    28.88706017    36.37504959    44.78358459    53.88209534    6
3.32649612    72.67129517    81.39926910    88.96733093    94.86347961    98.666
70227
----- Iteration number: 200 -----
```

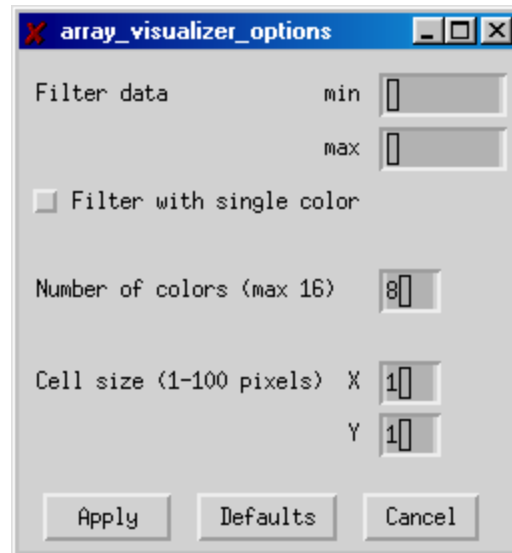
The status bar at the bottom of the window displays: Ready | ssh1: 3DES | 10, 1 | 24 Rows, 80 Cols | VT100 | NUM

# Notice the change

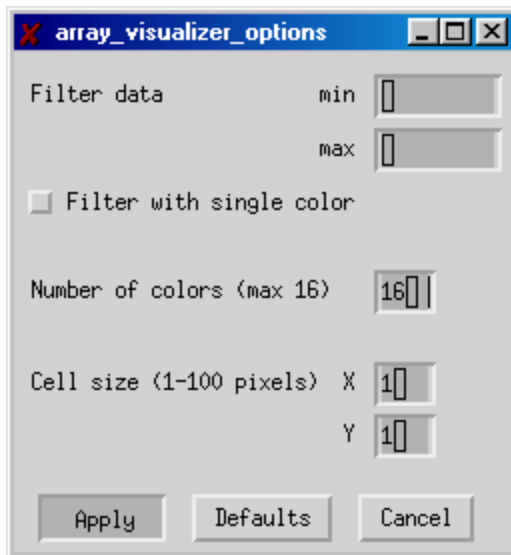


April 24, 2002

# Visualizer options

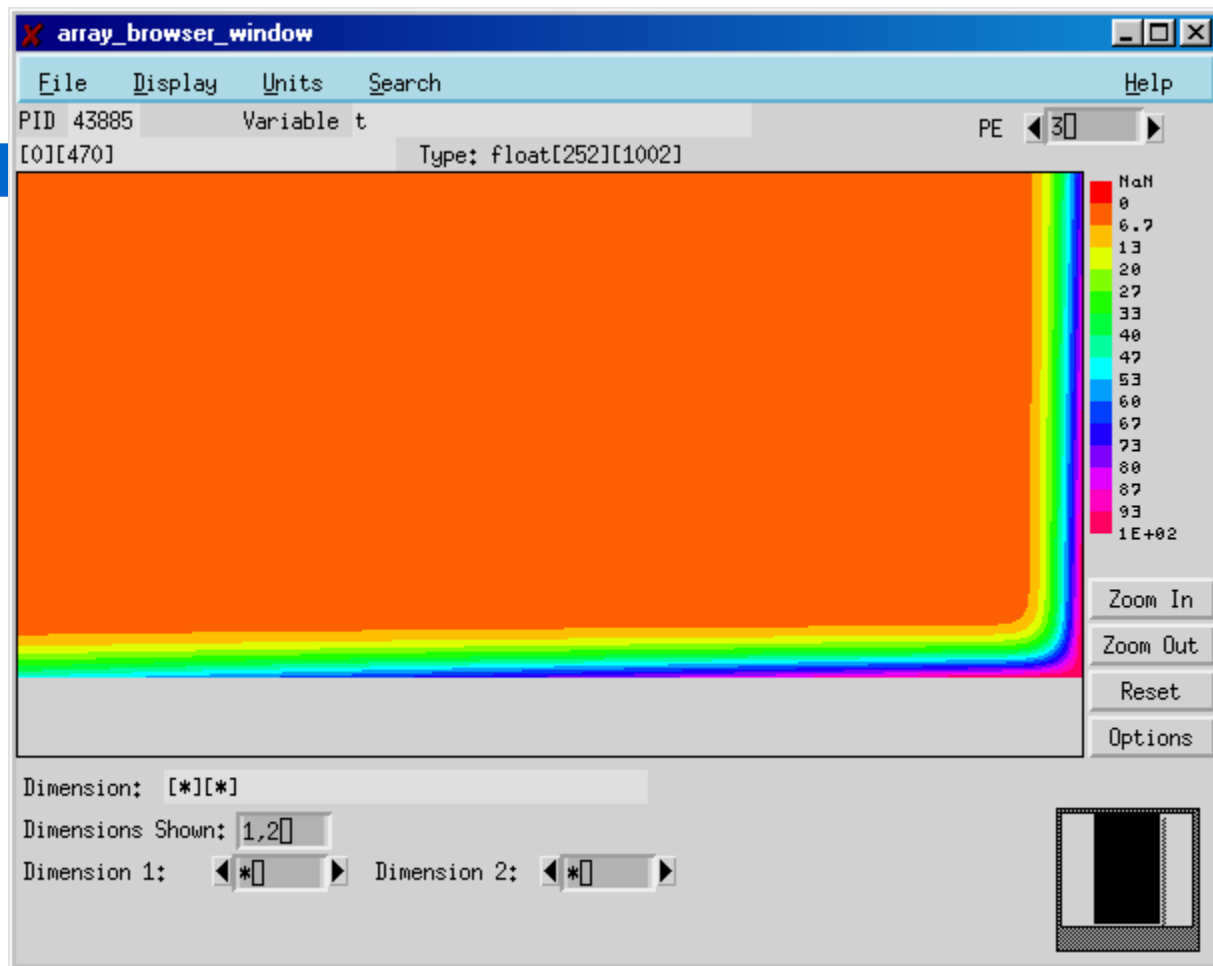


April 24, 2002



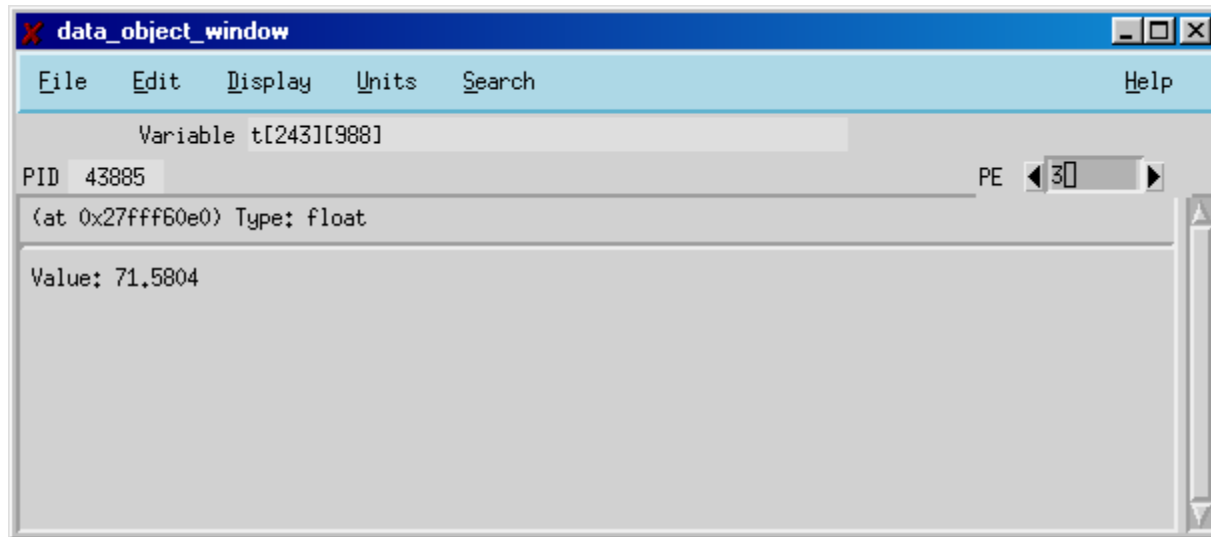
Change number of colors

April 24, 2002



April 24, 2002

Click on any point to get exact value



April 24, 2002