

Integrated Performance Analysis of Distributed Computer Systems

Results : Performance Prediction
I/O Benchmarks

IPACS : Benchmark Environment

Aims:

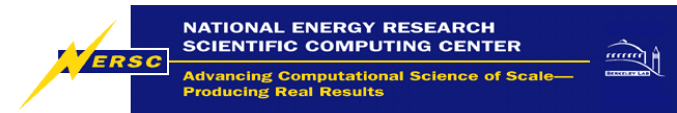
- **Development and distribution of scalable, portable and realistic benchmarks for todays and future parallel computers**
- **Benchmark environment** supports the user in selecting, downloading, executing and displaying results of benchmarks
- **Low Level Benchmarks** to characterize computer architectures
- **Application Benchmarks** and **Benchmarks of commercial software** to characterize performance in real use
- **Performance modeling and prediction**



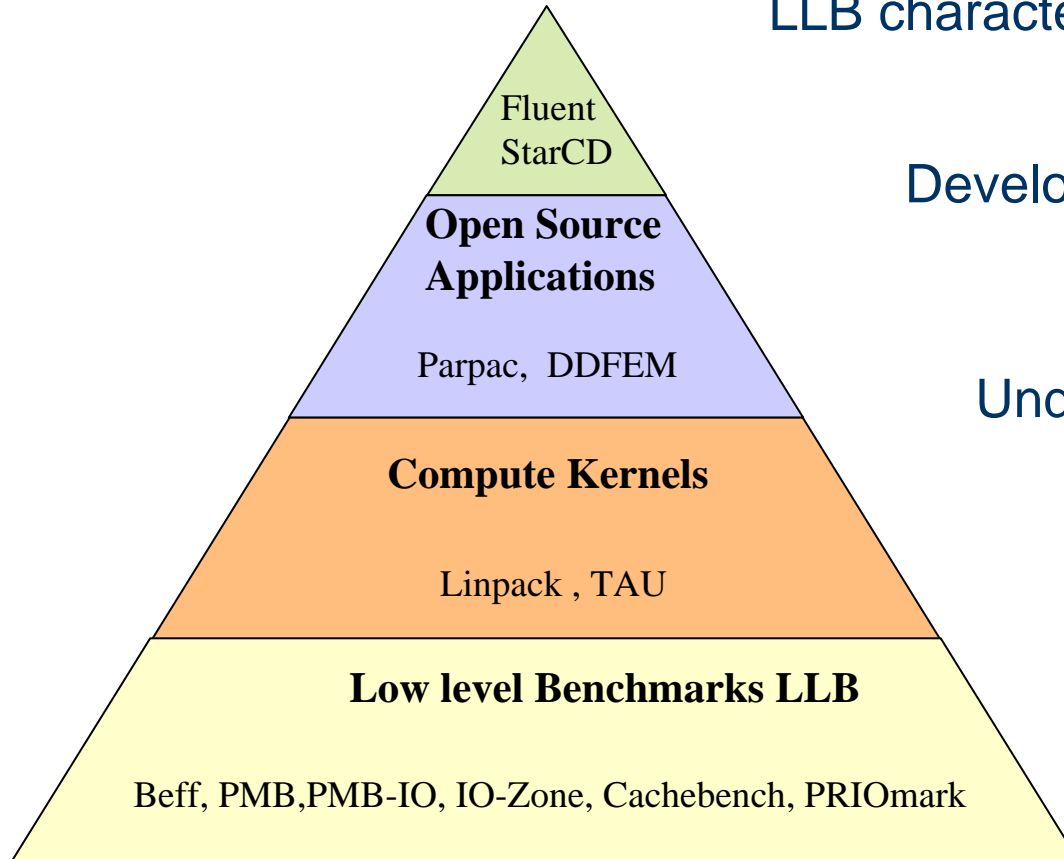
Fraunhofer Institut
Techno- und
Wirtschaftsmathematik

...T...Systems...

and supported by



Benchmark Pyramid



LLB characterize the distributed system



Develop real app's that scale



Understand their performance

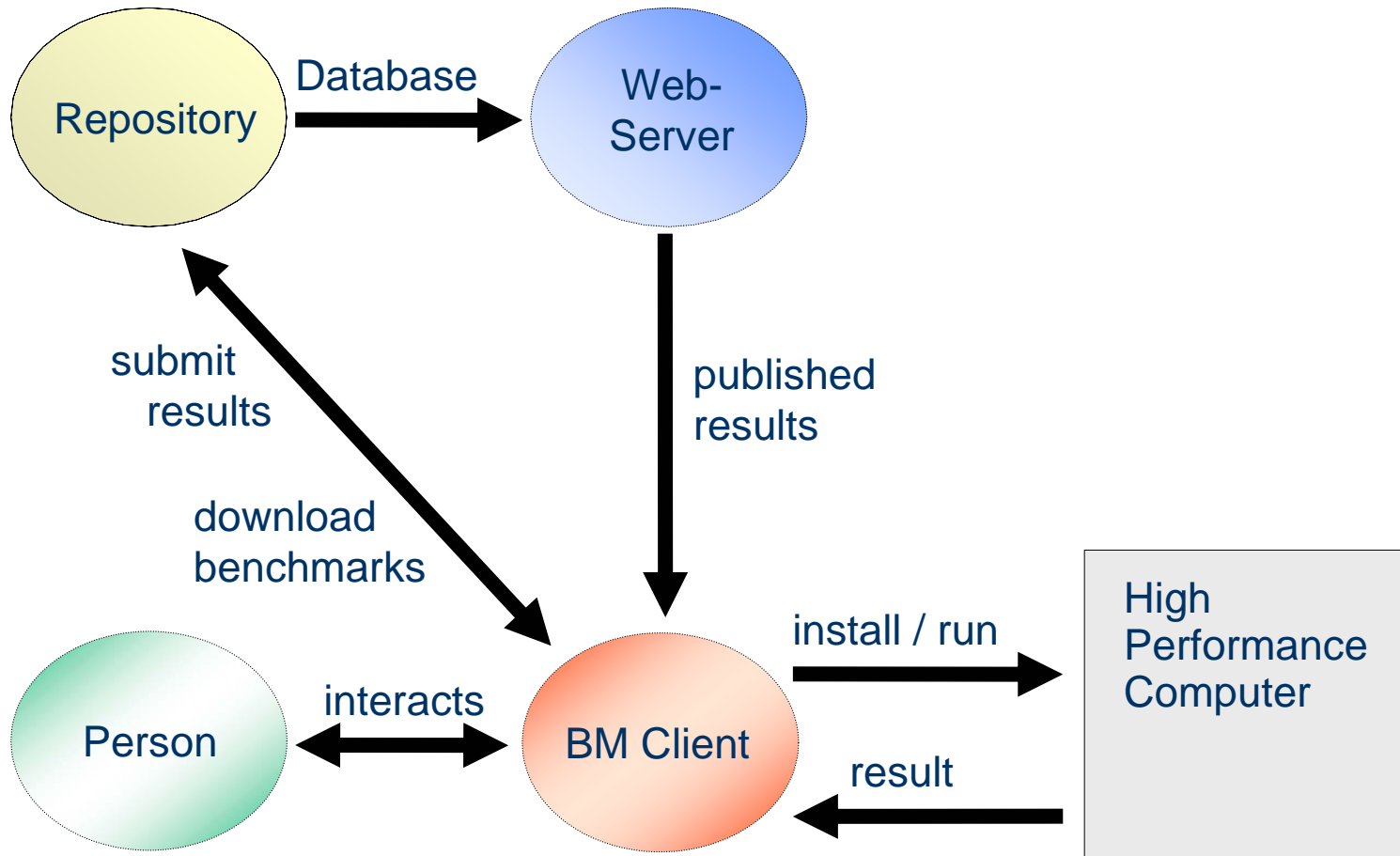


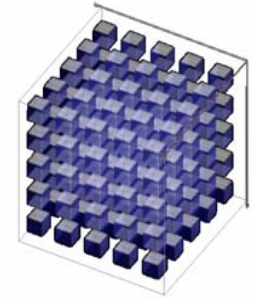
Performance Prediction



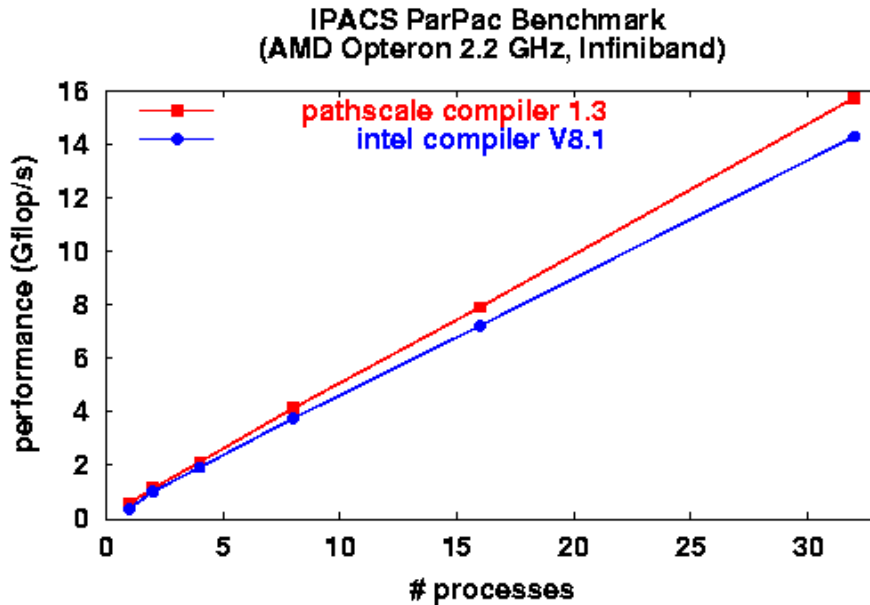
Verify prediction quality
for commercial codes

Benchmark Pyramid





AMD Opteron 2.2 GHz, Infiniband:



- 16 dual Knoten a 2.2 GHz
- Infiniband interconnection

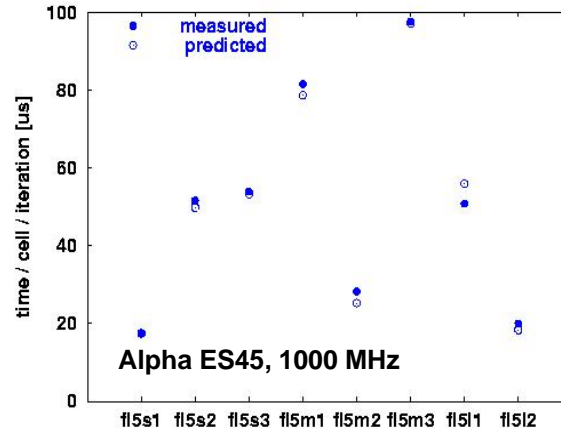
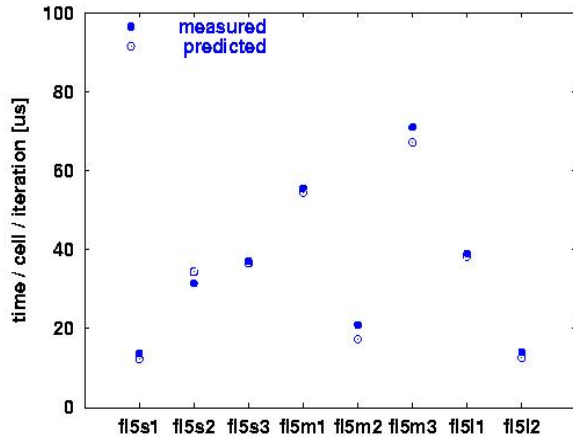
Compiler	Effizienz
Pathscale V1.3	11.1% vom Peak
Intel Compiler V 8.1	10.1% vom Peak

- Xeon 2.4 GHZ, Myrinet : 3.6% Peak

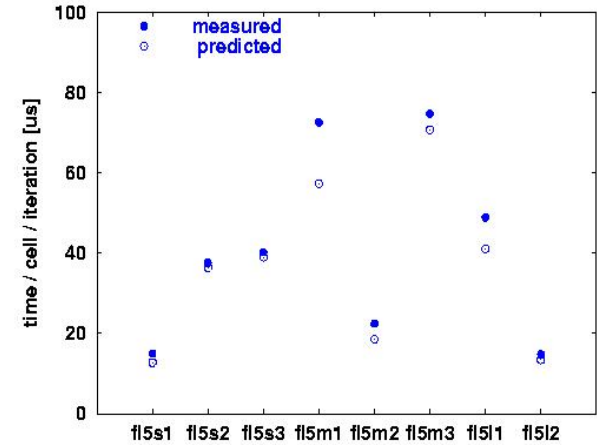
under development
Parpac 2.0 > 20% peak

FLUENT: Performance Prediction

Itanium2, 1500 MHz



IBM pSeries690, Power4, 1300 MHz



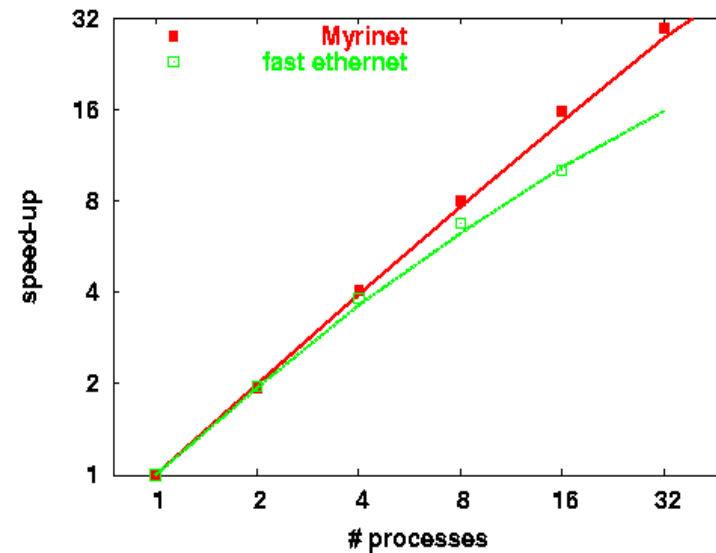
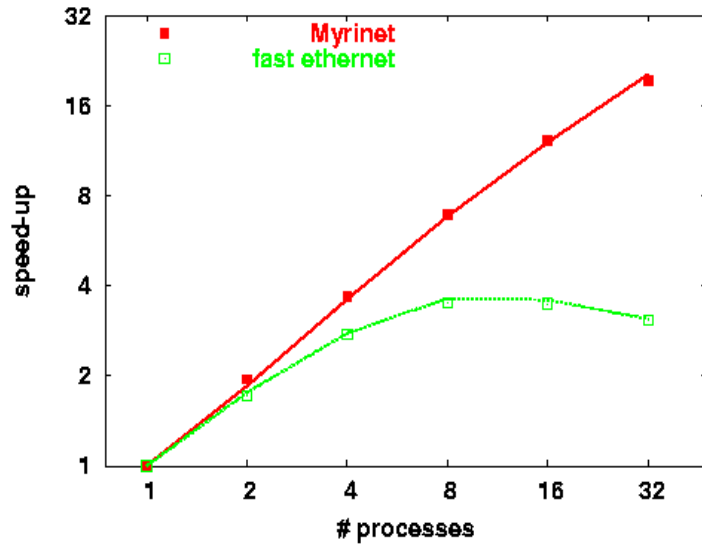
Based on a single run
on a dual XEON
Blade

published Fluent benchmarks

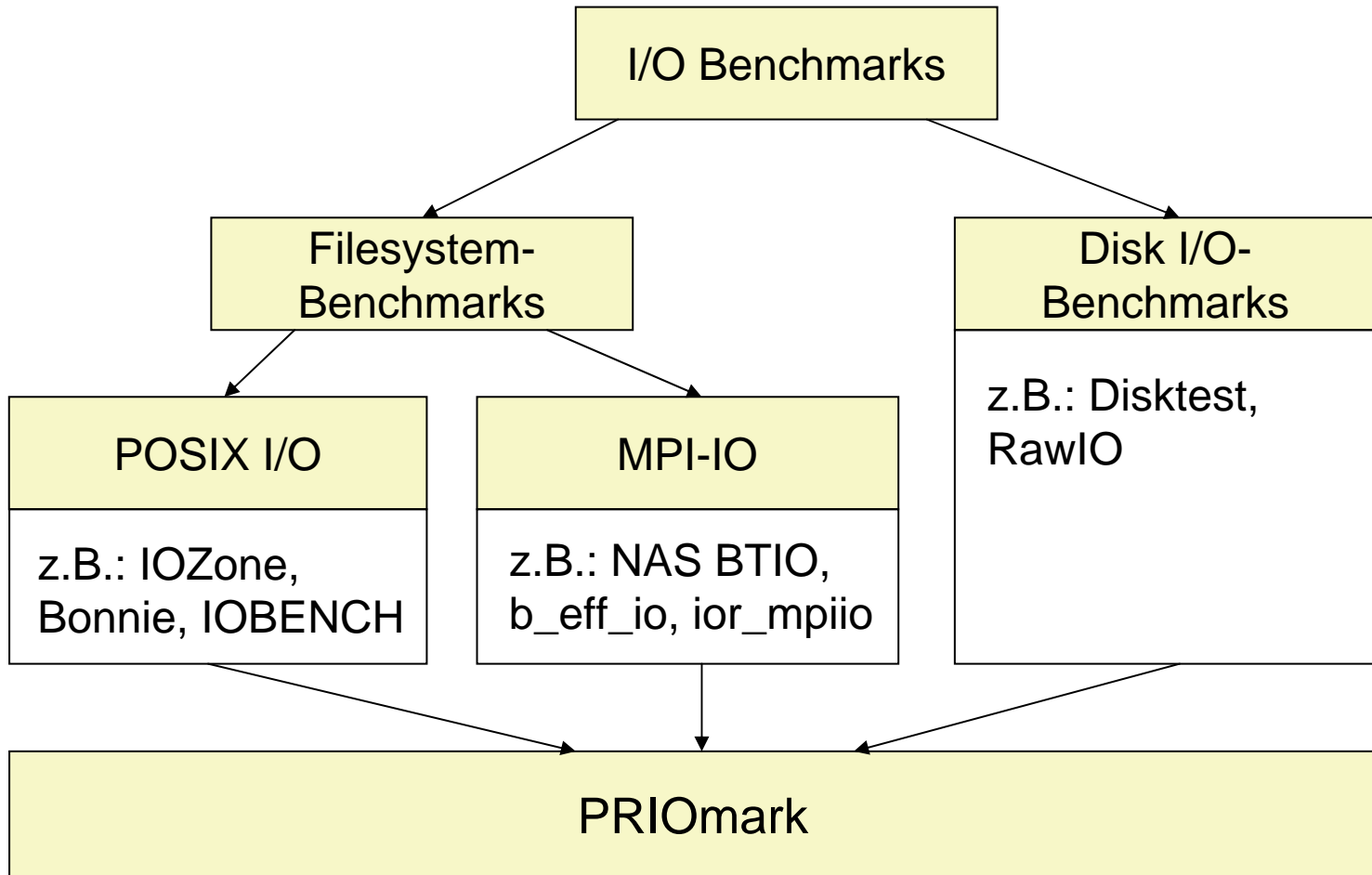
FLUENT parallel execution

- Flow in atomotiv valve port
- Implicit method
- 250000 hybrid cells

- exterior flow field around car
- Implicit method
- 3.6 mio hybrid cells



Measurements against prediction on dual Xeon cluster



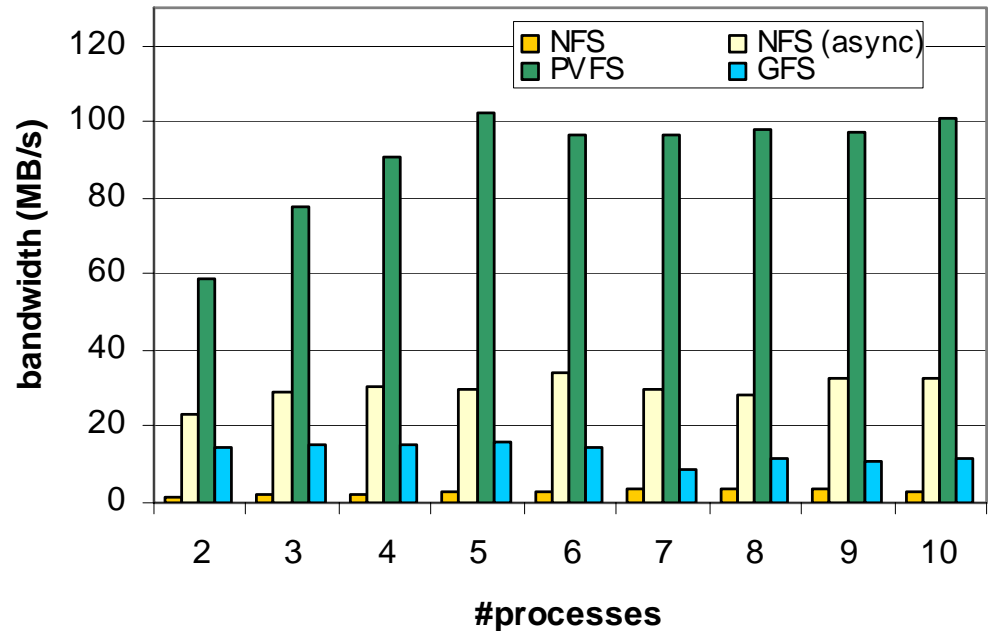
PRIOMark features, results

Workload definition

- OLTP apps
- webserver
- file I/O

PRIOMark uses plugins:

- POSIX or MPI I/O
- single process or parallel
- raw I/O
- aggregated results

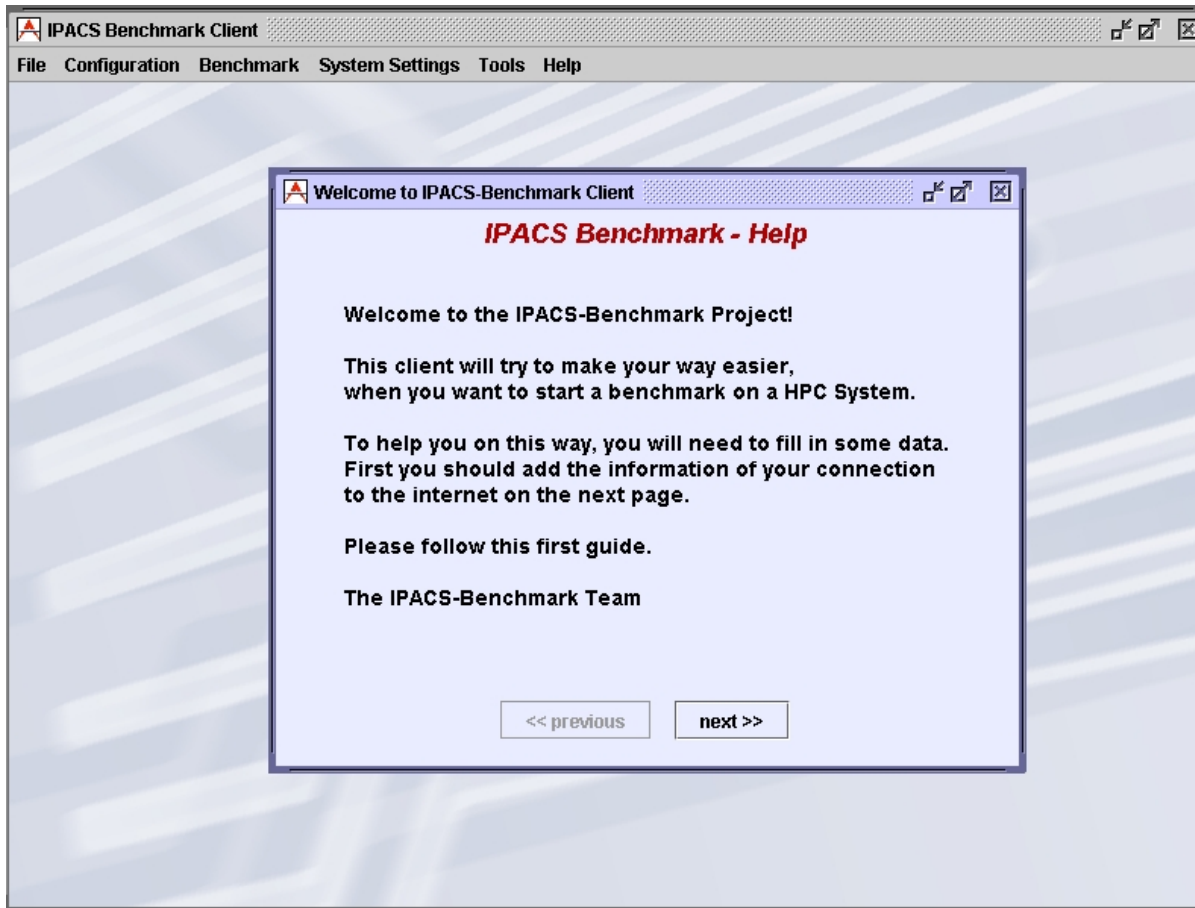


Measured on 5 Dual PIII
Network GigE

soon results for Lustre and Terrascale

DOWNLOAD : www.ipacs-benchmarks.org

Benchmark Environment



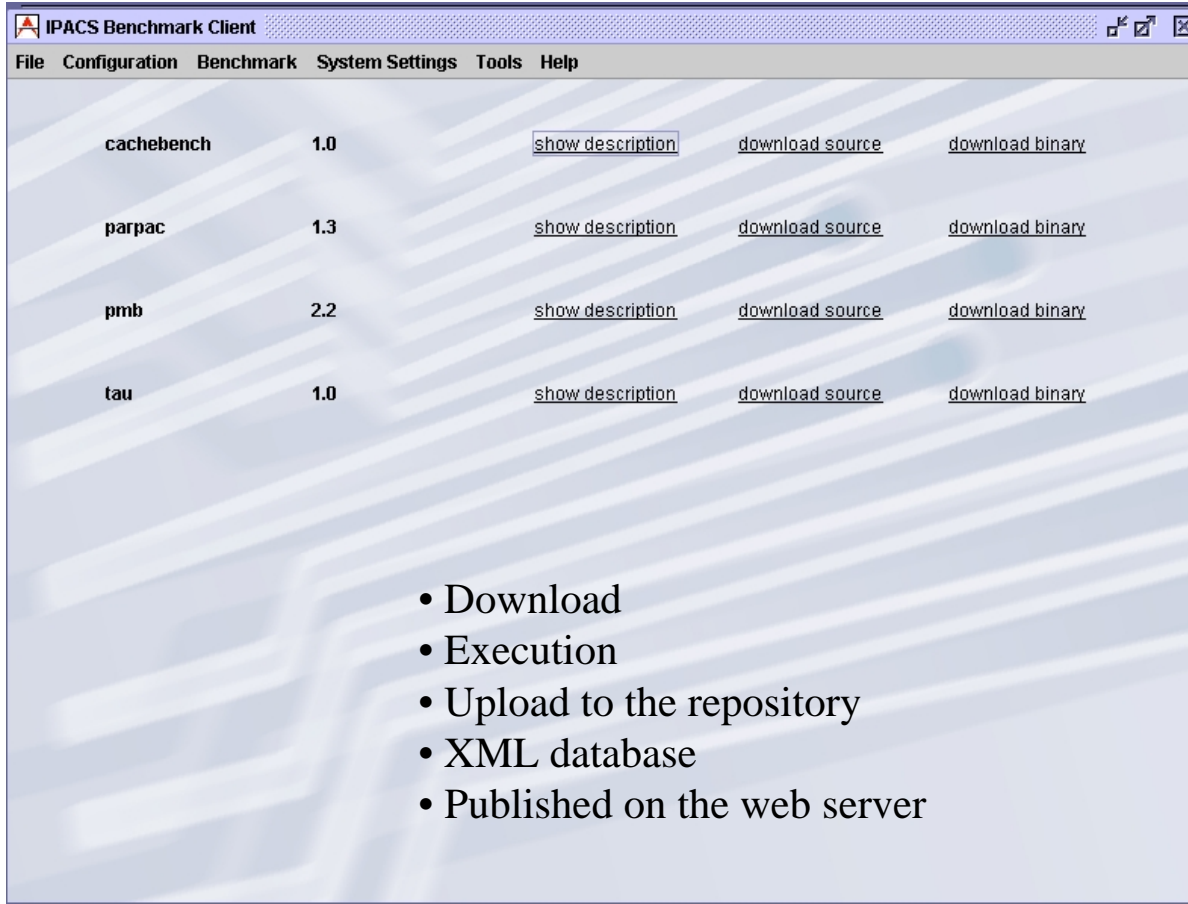
Benchmark Environment

The screenshot shows the IPACS Benchmark Client application window. The title bar reads "IPACS Benchmark Client" and the menu bar includes "File", "Configuration", "Benchmark", "System Settings", "Tools", and "Help". A dialog box titled "Welcome to IPACS-Benchmark Client" is open, displaying the following configuration options:

- Use HTTP Proxy
- Proxy Server Hostname:
- Proxy Server Port:
- Authentication Required
- Username:
- Password:
- remember Authentication

At the bottom of the dialog, there are three buttons: "<< previous", "Test Connection", and "next >>".

Benchmark Environment




The screenshot shows the IPACS Benchmark Client application window. The title bar reads "IPACS Benchmark Client". The menu bar includes "File", "Configuration", "Benchmark", "System Settings", "Tools", and "Help". The main content area displays a list of benchmarks with their versions and associated actions:

Benchmark Name	Version	show description	download source	download binary
cachebench	1.0	show description	download source	download binary
parpac	1.3	show description	download source	download binary
pmb	2.2	show description	download source	download binary
tau	1.0	show description	download source	download binary

- Download
- Execution
- Upload to the repository
- XML database
- Published on the web server

http://www.ipacs-benchmark.org/index.php?s=internal&unterseite=rep_test

Lexika SAP IPACS IT private_Links JDO UB Corba Pittsburgh Linux Java



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[Description | Working Packages]

Please select benchmark results to display

- ParPac Solver
- ParPac Solver w. parallel IO
- ParPac Solver w. serial IO
- PMB PingPong
- PMB SendRecv
- PMB Allreduce
- PMB Bcast
- TauBench
- Linpack
- CacheBench

Please select restrictions to create a list


All	Manufacturer
All	Computer Type
All	Computer Architecture
All	Software OS
All	Hardware Class

Show Reset

Copyright © 2002-2004 ipacs-benchmark.org

Benchmark Environment

Computer	Details	Site Name	PingPong Max. Bandwidth (MB/sec)	Solver Total Simulation Time (sec)	TauBench FP Operation Rate
krum2	view	n/a	n/a	819.33	n/a
G+S noname PC, Single CPU 2004-07-29					
Strider	view	n/a	n/a	40.91	n/a
AMD Opteron, Cluster 2004-06-22					
helics1.d1	view	n/a	216.74	634.22	270.352
n/a Dual AMD Athlon 1,4 Ghz, Myrinet NIC M3F-PC164B-2 2004-06-21					
Seaborg	view	n/a	n/a	733.48	n/a
IBM SP POWER3, IBM SP 2004-06-09					
virgo	view	n/a	n/a	488.08	n/a
n/a Linux cluster, Intel Xeon 2004-06-03					
szama	view	n/a	n/a	n/a	509.839
NEC SMP, ia64 2004-06-07					
strider	view	n/a	n/a	n/a	762.352
Cray Cray Strider 0, Linux Cluster 2004-06-07					
szama	view	n/a	n/a	n/a	1933.78
NEC NEC SX6+, Vector 2004-06-07					
hwp690	view	n/a	n/a	n/a	415.392
IBM SMP, power 4 - Regatta 2004-06-07					
hwudu	view	n/a	n/a	n/a	517.711
Fujitsu Siemens Linux Cluster, Xeon Linux Cluster 2004-06-07					
hwudu	view	n/a	n/a	n/a	466.031
Fujitsu Siemens Linux Cluster, Xeon Linux Cluster 2004-06-07					



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[Description](#) | [Working Packages](#)

Computer Characteristics

Computer Description

Name	helics1.d1
Manufacturer	n/a
Computer Type	Dual AMD Athlon 1.4 Ghz
Computer Architecture	Myrinet NIC M3F-PCI64B-2
Site Name	Helics
Date of Registration	2004-06-21

Computer Configuration

Software OS	Linux
Software OS Version	2.4.21
Hardware Class	i386
MPI Library	mpich-gm
C Compiler	gcc, PGI
F77 Compiler	n/a
F90 Compiler	n/a
Last Change	2004-06-21 16:20:30

Available Benchmark Results

ParPac Solver (Result details)

# Processors	8
Solver Total Simulation Time (sec)	631.25
Solver Fluid Grid Point Calculation Rate (millions/sec)	1.902
Solver Floating Point Operation Rate (Gflop/s)	1.135

Results are available for the following number of processors: 16 | 32 | 128 | 256

PMB PingPong (Result details)

# Processors	8
PingPong Max. Bandwidth (MB/sec)	216.89
PingPong Latency (usec)	1.92
PingPong Bandwidth at 4MB (MB/sec)	206.79
Execution Date	2004-09-06 11:32:19

Results are available for the following number of processors: 16 | 32 | 64 | 128

PMB SendRecv (Result details)

# Processors	8
SendRecvMax. Bandwidth (MB/sec)	170.49



Benchmark Details

```

-----
HPLinpack 1.0a -- High-Performance Linpack benchmark -- January 20, 2004
Written by A. Petitet and R. Clint Whaley, Innovative Computing Labs., UTK
-----

```

An explanation of the input/output parameters follows:

```

T/V : Wall time / encoded variant.
N   : The order of the coefficient matrix A.
NB  : The partitioning blocking factor.
P   : The number of process rows.
Q   : The number of process columns.
Time : Time in seconds to solve the linear system.
Gflops : Rate of execution for solving the linear system.

```

The following parameter values will be used:

```

N       : 3000  6000  8000  10000
NB      : 1     2     3     4
PMAP    : Row-major process mapping
P       : 2     1     4
Q       : 2     4     1
PFACT   : Left  Crout  Right
NBMIN   : 2     4
NDIV    : 2
RFACT   : Left  Crout  Right
BCAST   : lring
DEPTH   : 0
SWAP    : Mix (threshold = 64)
LL      : transposed form
U       : transposed form
EQUIL   : yes
ALIGN   : 8 double precision words

```

```

-----
- The matrix A is randomly generated for each test.
- The following scaled residual checks will be computed:
  1) ||Ax-b||_oo / ( eps * ||A||_1 * N )
  2) ||Ax-b||_oo / ( eps * ||A||_1 * ||x||_1 )
  3) ||Ax-b||_oo / ( eps * ||A||_oo * ||x||_oo )
- The relative machine precision (eps) is taken to be 1.110223e-16
- Computational tests pass if scaled residuals are less than 16.0
-----

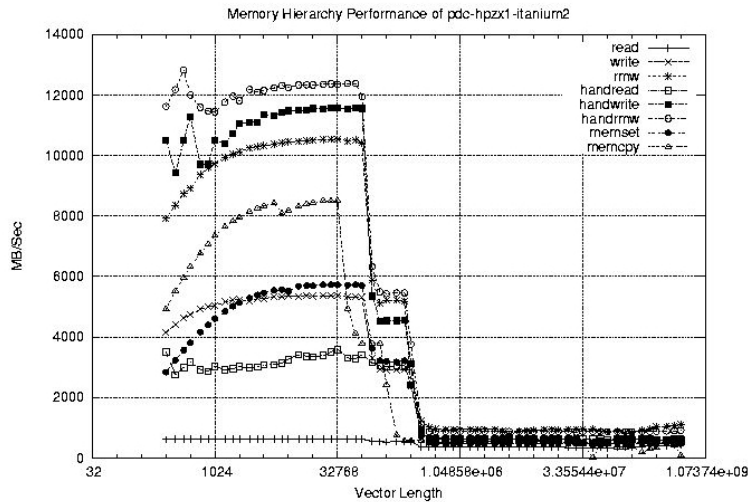
```

IPACS
Benchmark

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[Description | Working Packages]

Benchmark Details



[View graphic as postscript](#)

```
pdc-hpzx1-itanium2_cache_handread.dat
256 3518.007446
336 2753.081813
424 2983.888984
512 3187.002503
```

More Infos and
Live demos at booth
Nr. 813

By Matthias Merz
Top 500 booth