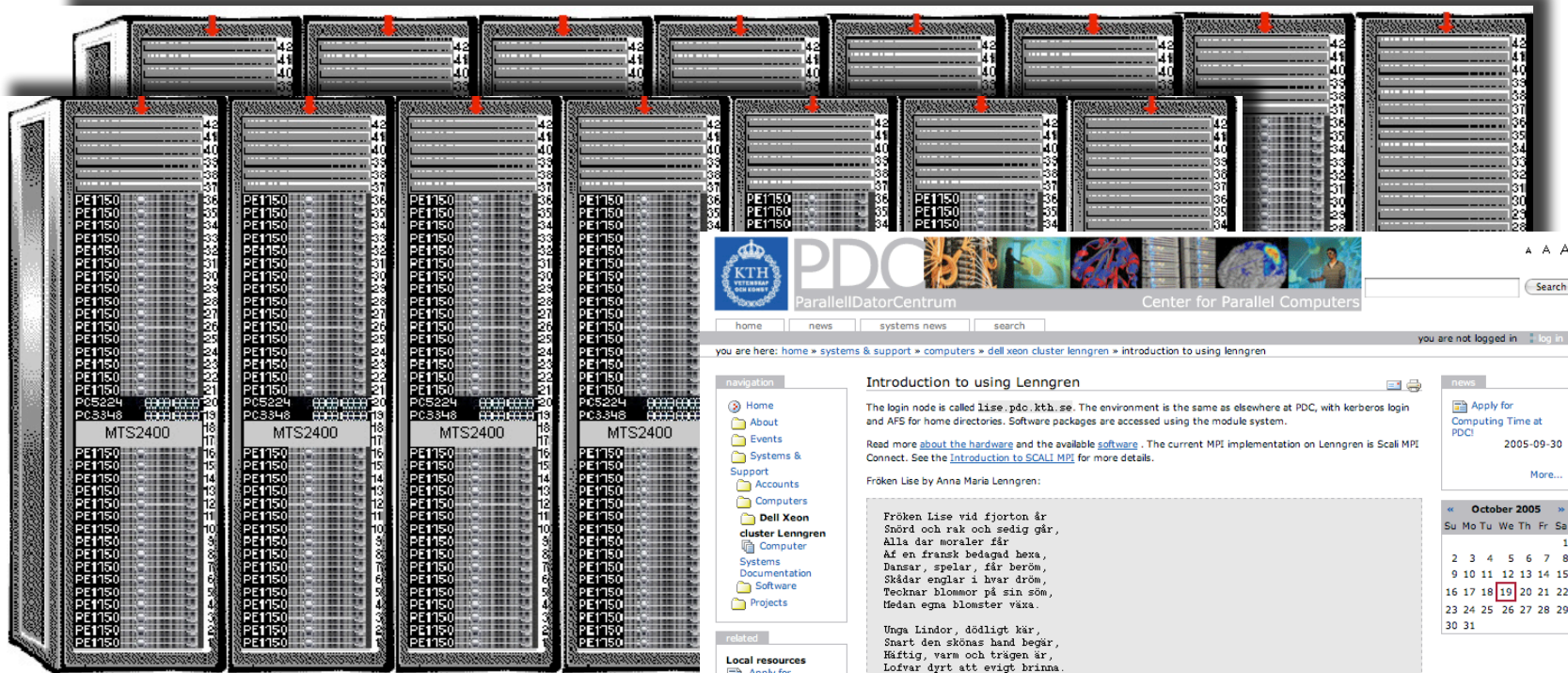


Eight Months with Lenngren



Paralleldatorcentrum



Per Öster per@pdc.kth.se

PDC

Kungl Tekniska Högskolan

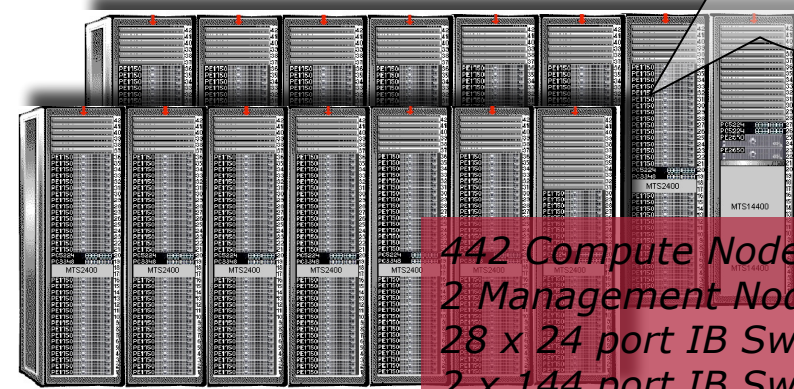
Computing resources

Lenng
Dell Intel

HP Itanium2
Cluster25



180 processors
0.6 Tflop/s
0.5 Tbyte memory



442 Compute Nodes
2 Management Nodes
28 x 24 port IB Switches
2 x 144 port IB Switches
14 x 1 Gbit switches
100 Mbit management

Power: 154kW



Paralleldatorcentrum



12 processor
sgi Origin 2000
used as
graphics engine
for the VR-CUBE



KTH
Linux

Linux-Lab PC Cluster
16 processors IBM PIII

IBM SP (KALLSUP2)
Computer for
research and education
at KTH, 32 processors

Stockholm Bioinformatics Centre
+350 nodes (P4 and Athlon)

SWEGRID
100 nodes (Intel P4)

Claimed (and questioned)
at LCSC 2004
October 19

User Performance Increase



Paralleldatorcentrum

Machine	Nodes	Available Batch Nodes	"1/3" Rule	Actual Job Size
Strindberg	154	130	43	32
Lucidor	90	85	28	16
New Dell Cluster	444	300	100	64

Machine	Actual Job Size	TPP/Node (GFlop/s)	Memory/Node (GByte)	Typical TPP/Job (GFlop/s)	Typical Memory/Job (GByte)
Strindberg	32	0.64	0.25	7	3
Lucidor	16	7.2	6	38	32
New Dell Cluster	64	13.6	8	290	171

Cluster Configuration

32 x PE1850	32 x PE1850	32 x PE1850	32 x PE1850	32 x PE1850	32 x PE1850	32 x PE1850	1 x PE2850
2 x MTS2400	2 x MTS2400	2 x MTS2400	2 x MTS2400	2 x MTS2400	2 x MTS2400	2 x MTS2400	1 x PE1850
1 x PC3348	1 x PC3348	1 x PC3348	1 x PC3348	1 x PC3348	1 x PC3348	1 x PC3348	2 x MTS14400
1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848



- 442 Compute Nodes
- 2 Management Nodes
- 28 x 24 port IB Switches
- 2 x 144 port IB Switches
- 14 Gbit switches
- 100 Mbit management I



Paralleldatorcentrum

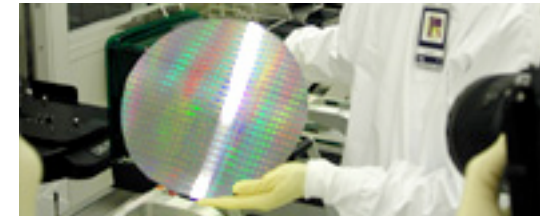
32 x PE1850	32 x PE1850	32 x PE1850	32 x PE1850	32 x PE1850	32 x PE1850	26 x PE1850
2 x MTS2400	2 x MTS2400	2 x MTS2400	2 x MTS2400	2 x MTS2400	2 x MTS2400	2 x MTS2400
1 x PC3348	1 x PC3348	1 x PC3348	1 x PC3348	1 x PC3348	1 x PC3348	1 x PC3348
1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848	1 x 3COM 3848



- Power: 154kW

CPUs

- Intel 3.4 GHz Xeon EM64T (Extended Memory 64 Technology)
- TPP 6.8 Gflop/s
- 90 nm technology 300 mm wafers
- 800 MHz system bus
- DDR2 Memory
- Streaming SIMD Extension 3 (SSE3)
8 more Streaming SIMD registers
(and 8 more general purpose registers)



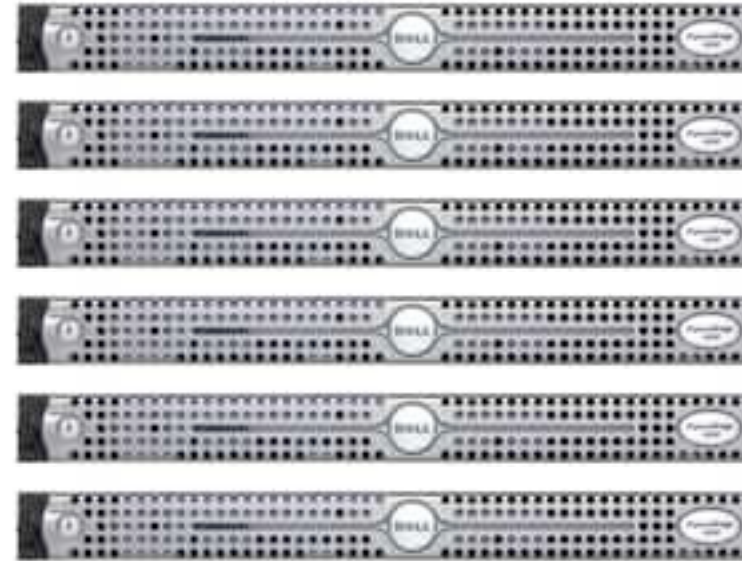
Paralleldatorcentrum



Paralleldatorcentrum

Nodes

- Dell 1850 server
- 2 x 3.4 GHz Xeon EM64T
- 1MB L2 Cache
- 8 GB DDR2
- 36 GB 10' rpm SCSI disk
- Intel 7520 Chipset
PCI-Express 4x, 8x
DDR2 (BW: 6.4GB/s)
- 2 x 1 Gbit integrated Intel NIC's



Interconnect

- PCI Express 8x HCA
- 4 links (4x) 10Mbit/s

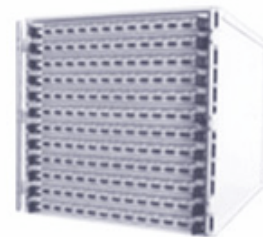


- Bandwidth: 919 Mbyte/s
- Latency: 3.6 μ s
(Switch 1hop. Benchmarking
Jens Simon, Paderborn)



Paralleldatorcentrum

- 2 x 120 Port Switches
- 28 x 24 Port Switches



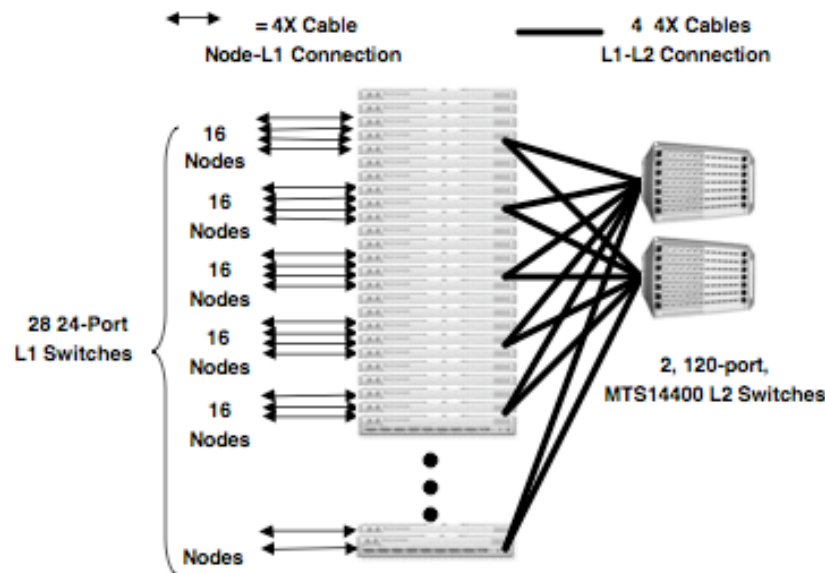
Interconnect

442-Node Cluster half CBB

- 442-port fabric with MTS2400 L1 Switches and MTS14400 L2 Switches
- 442 Servers with InfiniHost HCA
- Ultra-low latency: only 5-hops worst case
- In-band Switch Management from single remote host



Paralleldatorcentrum



Qty	Description	Part Number
28	MTS2400 24-Port Switch	MTS2400-24
2	120-Port MTS14400	MTS14400-120
442	InfiniHost HCA	
666	*4X Copper Cable	multiple vendors

*Cable lengths are estimated. Customer must calculate true lengths based on individual installation.

Mellanox Technologies Confidential

The Lot

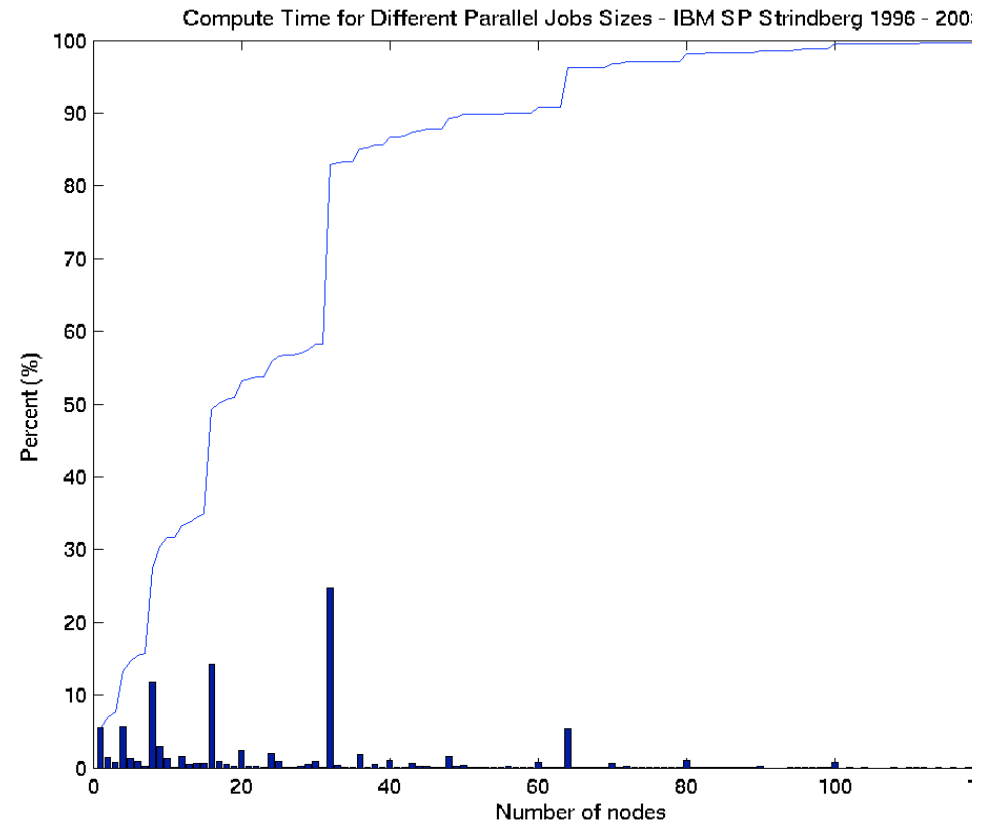
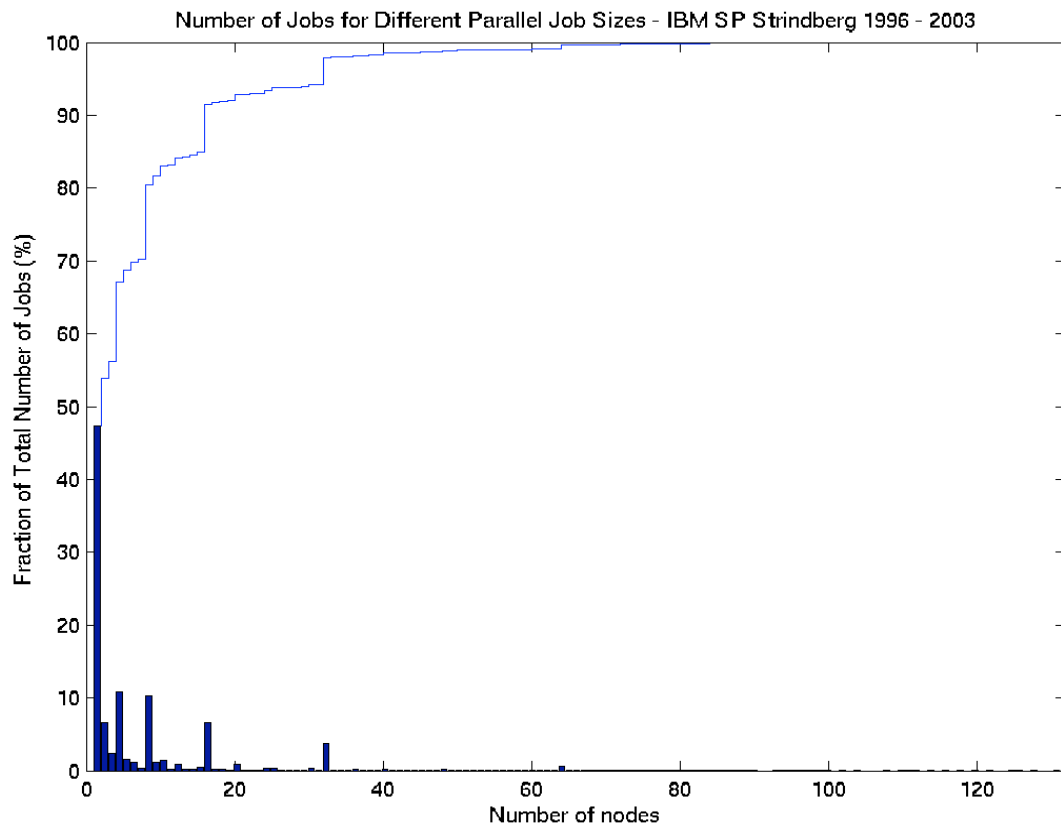
- 442 Compute nodes (+2 other)
- TPP: 6 TFlop
- Aggregate memory: 3.5TByte
- 288 000 US\$/Tflop (all included)



Paralleldatorcentrum

IBM SP Strindberg – Job distribution

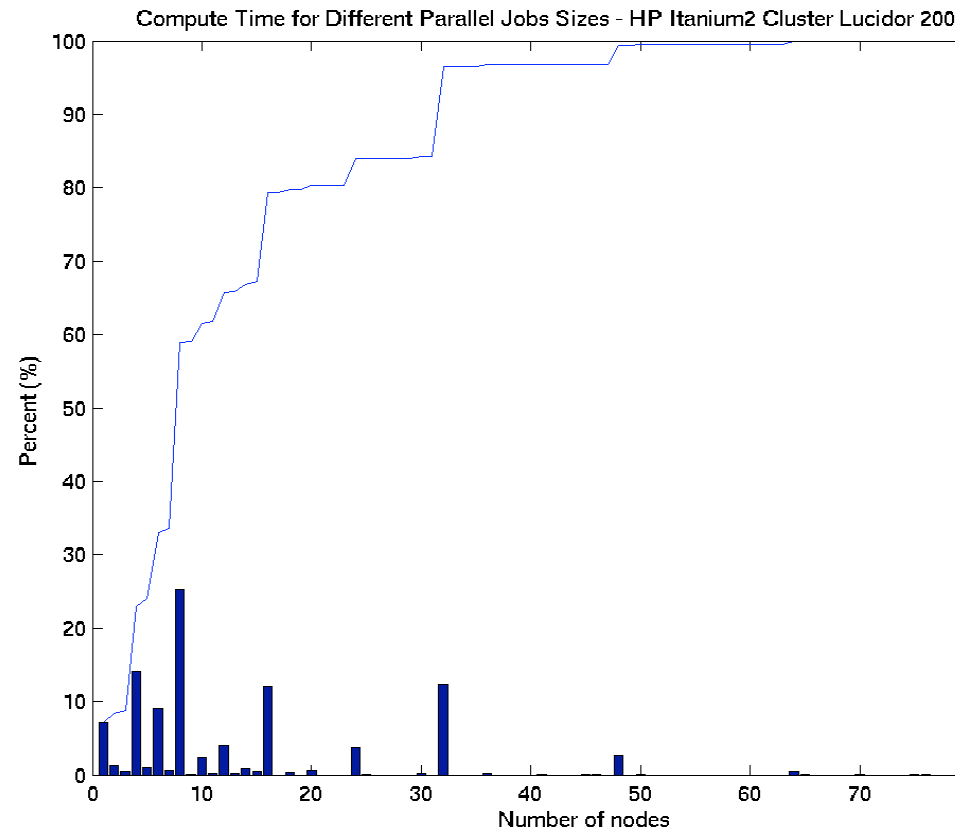
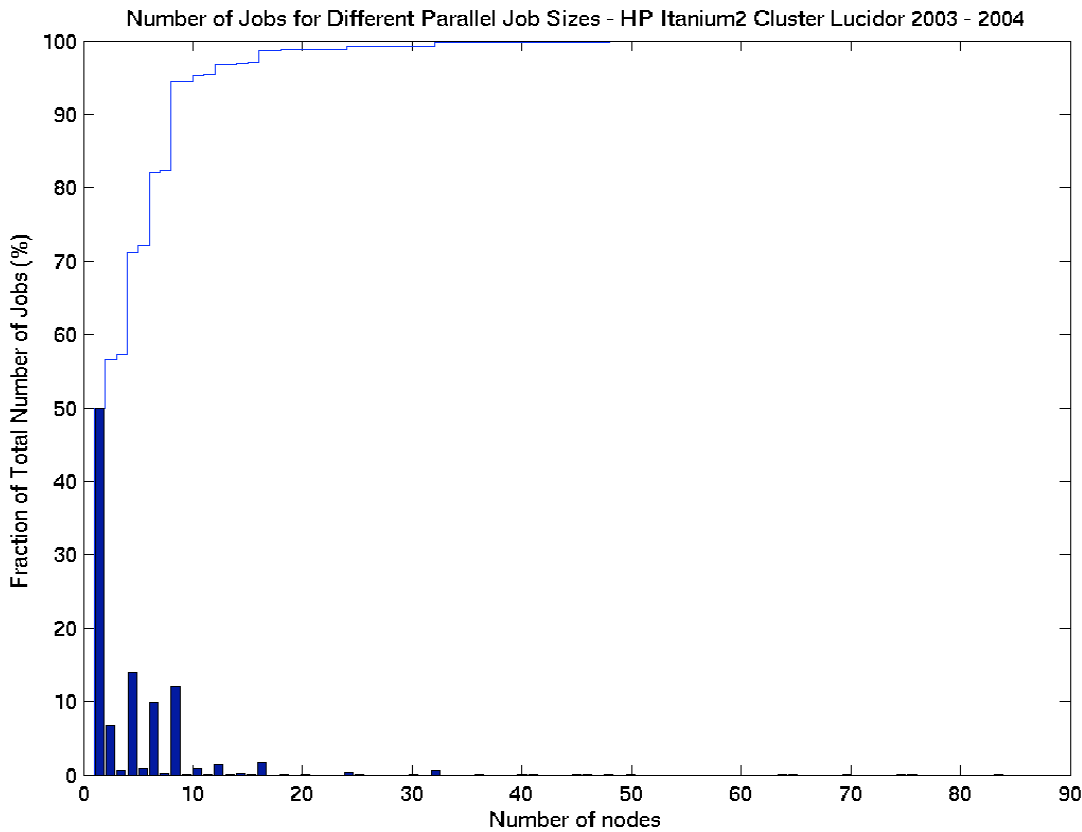
Mostly 0.64 Gflops nodes with 0.256 GB



“Typical” job $\sim 1/3^{\text{rd}}$ of nodes available

HP Itanium2 Cluster – Job distribution

7.2 GFlops 6 GB nodes

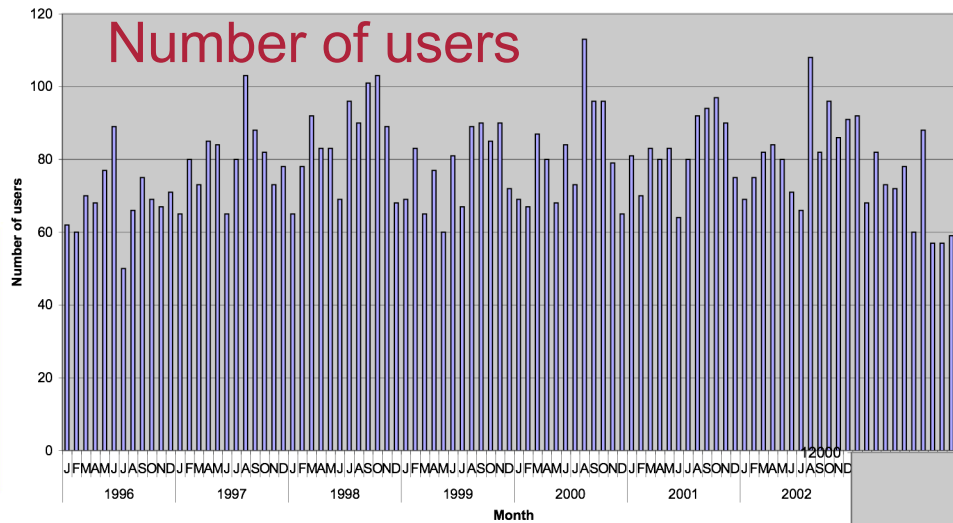


IBM SP Strindberg Usage

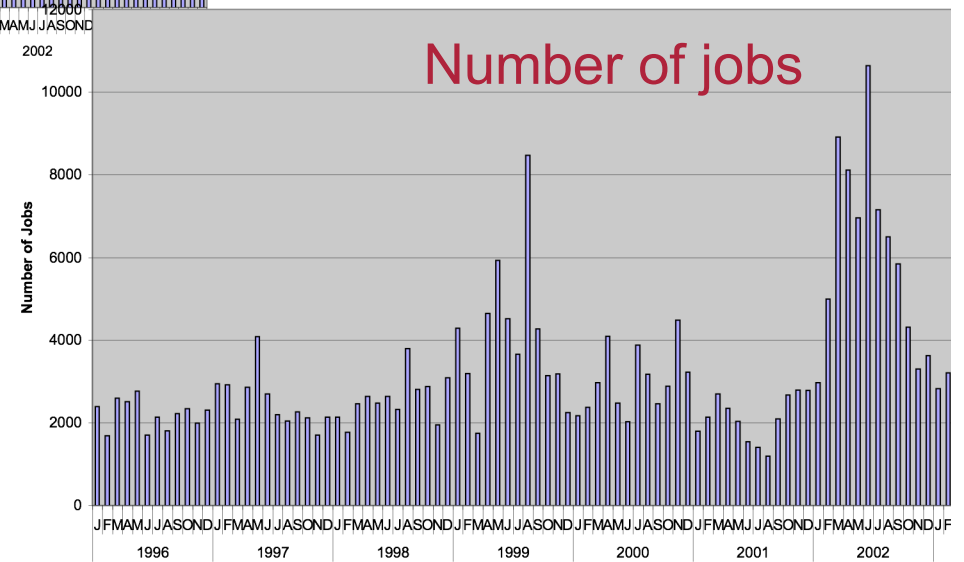


Paralleldatorcentrum

Users Running Jobs on the IBM SP



Number of Jobs on the IBM SP

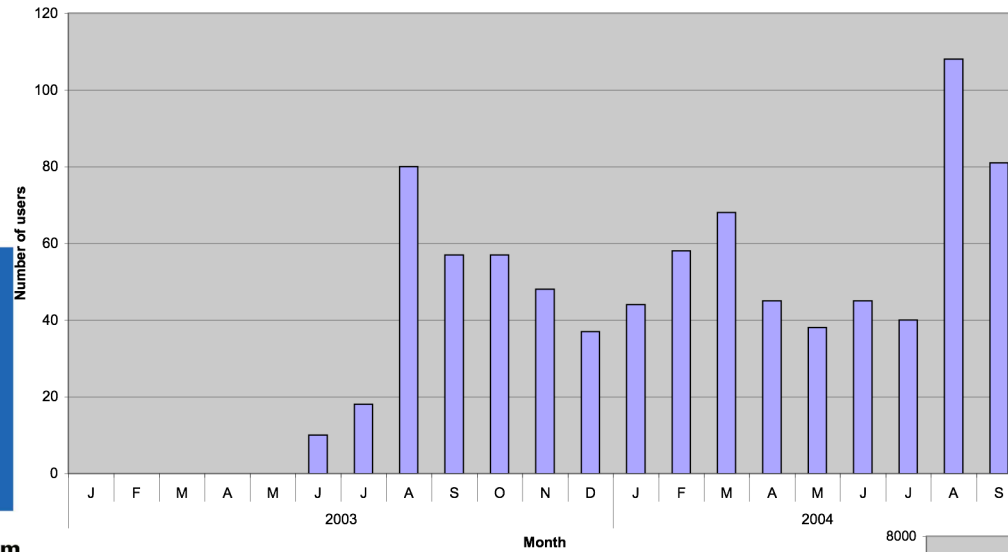


HP Itanium2 Usage

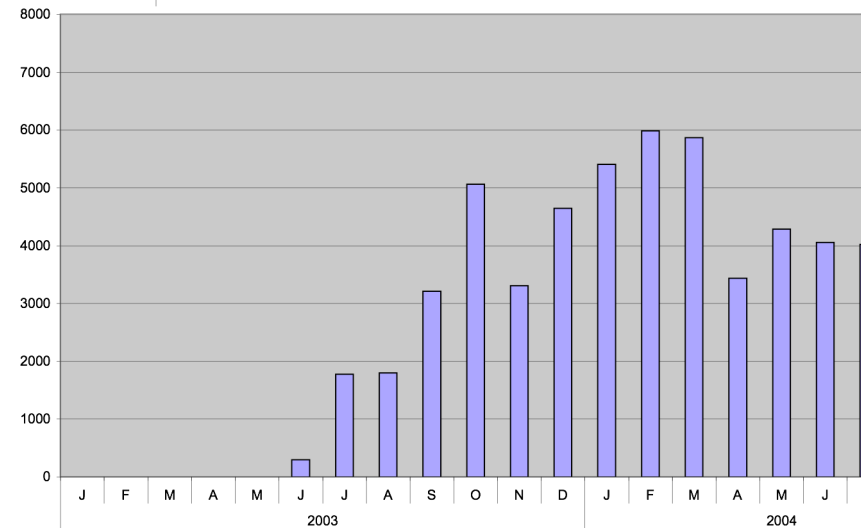


Paralleldatorcentrum

Number of Users on the HP Itanium2 Lucidor Cluster



Number of Jobs on the HP Itanium2 Lucidor Cluster



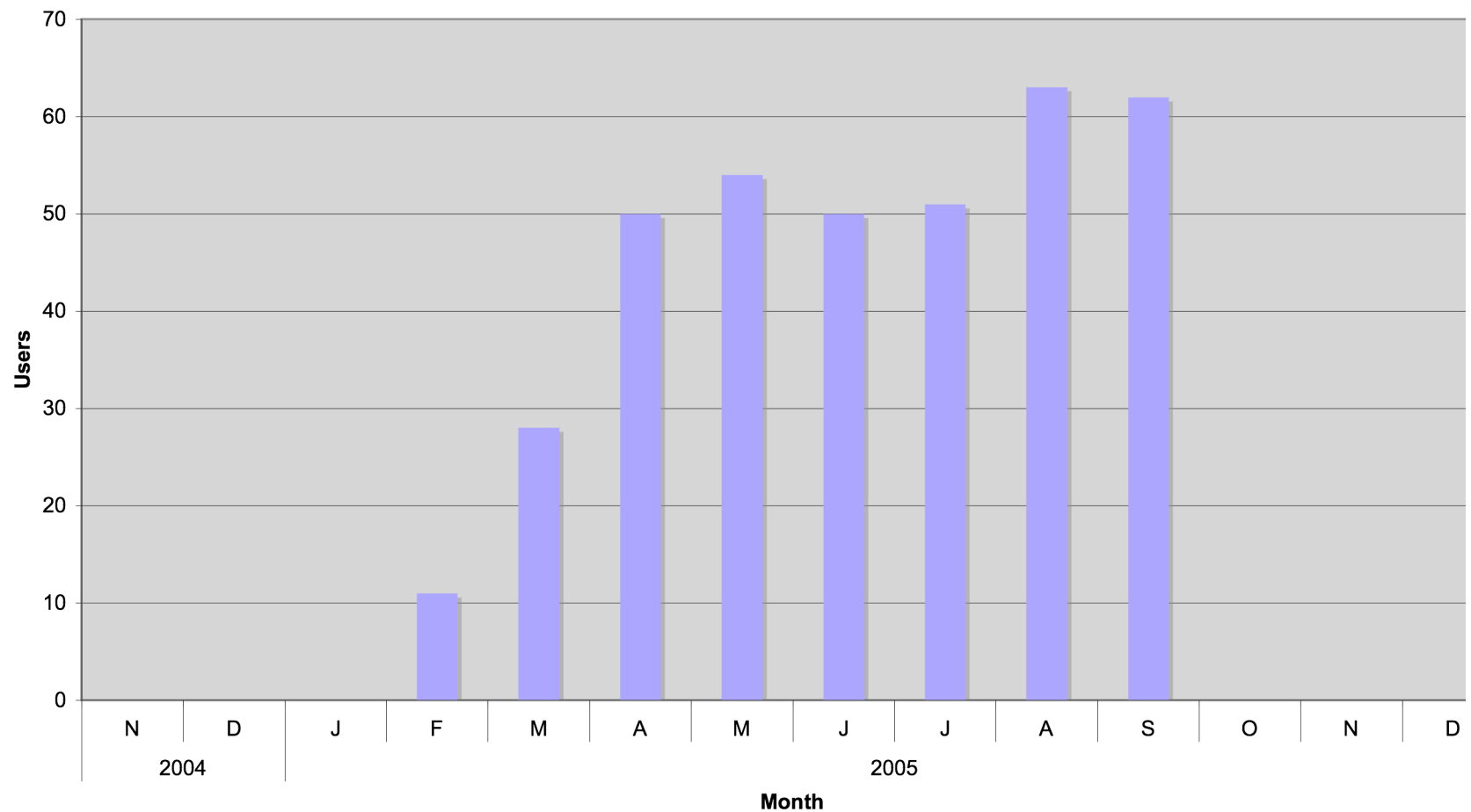
LCSC 2005
Linköping, October 20, 2005

Lenngren: Number of Users per Month

Number of Users per Month on Dell EM64T Xeon Cluster Lenngren



Paralleldatorcentrum

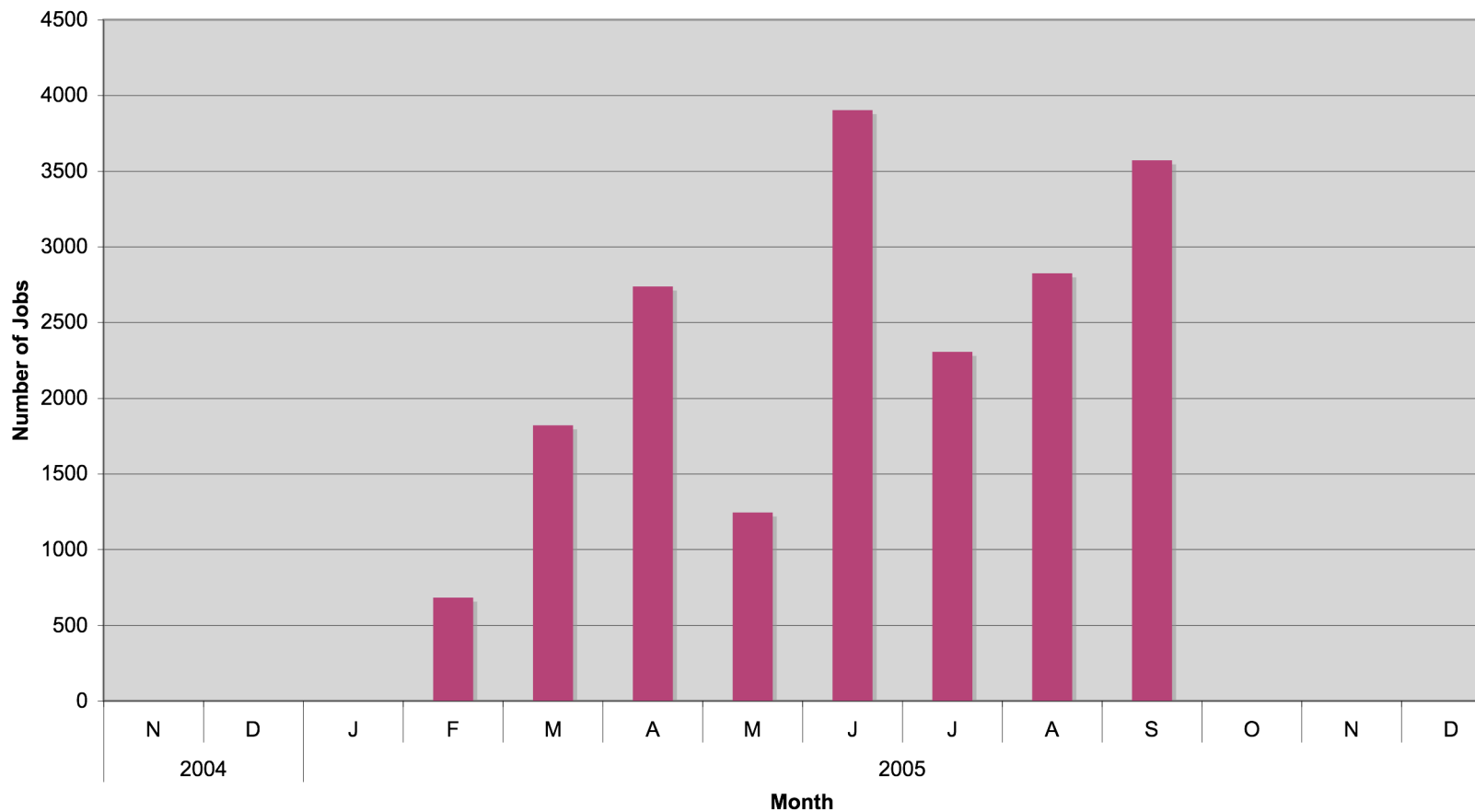


Lenngren: Number of Jobs per Month

Jobs per Month on the Dell EM64T Xeon Cluster Lenngren



Paralleldatorcentrum

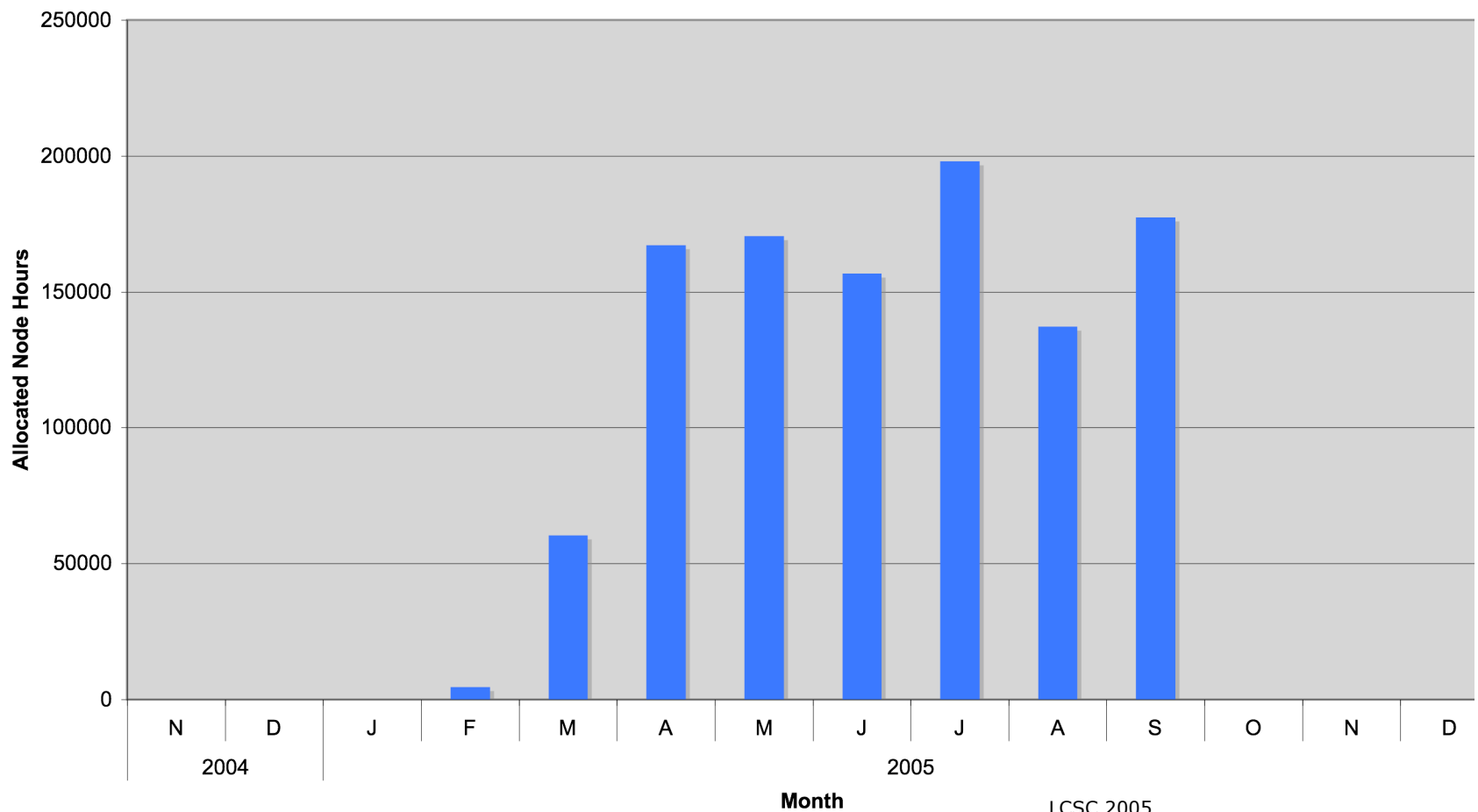


Lenngren: Compute Time per Month

Used Compute Time per Month on the Dell EM64T Cluster Lenngren



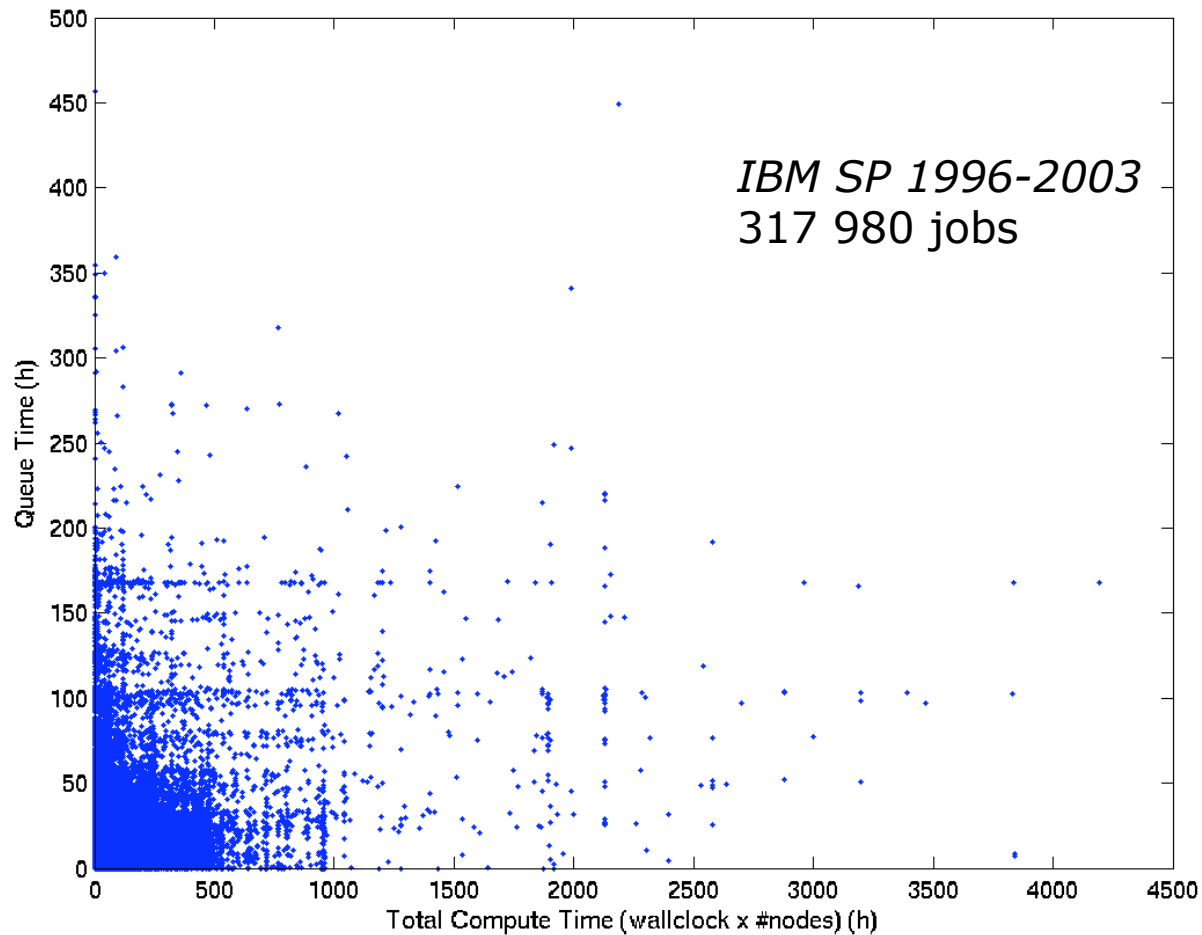
Paralleldatorcentrum



IBM SP Strinberg Queuing



Paralleldatorcentru

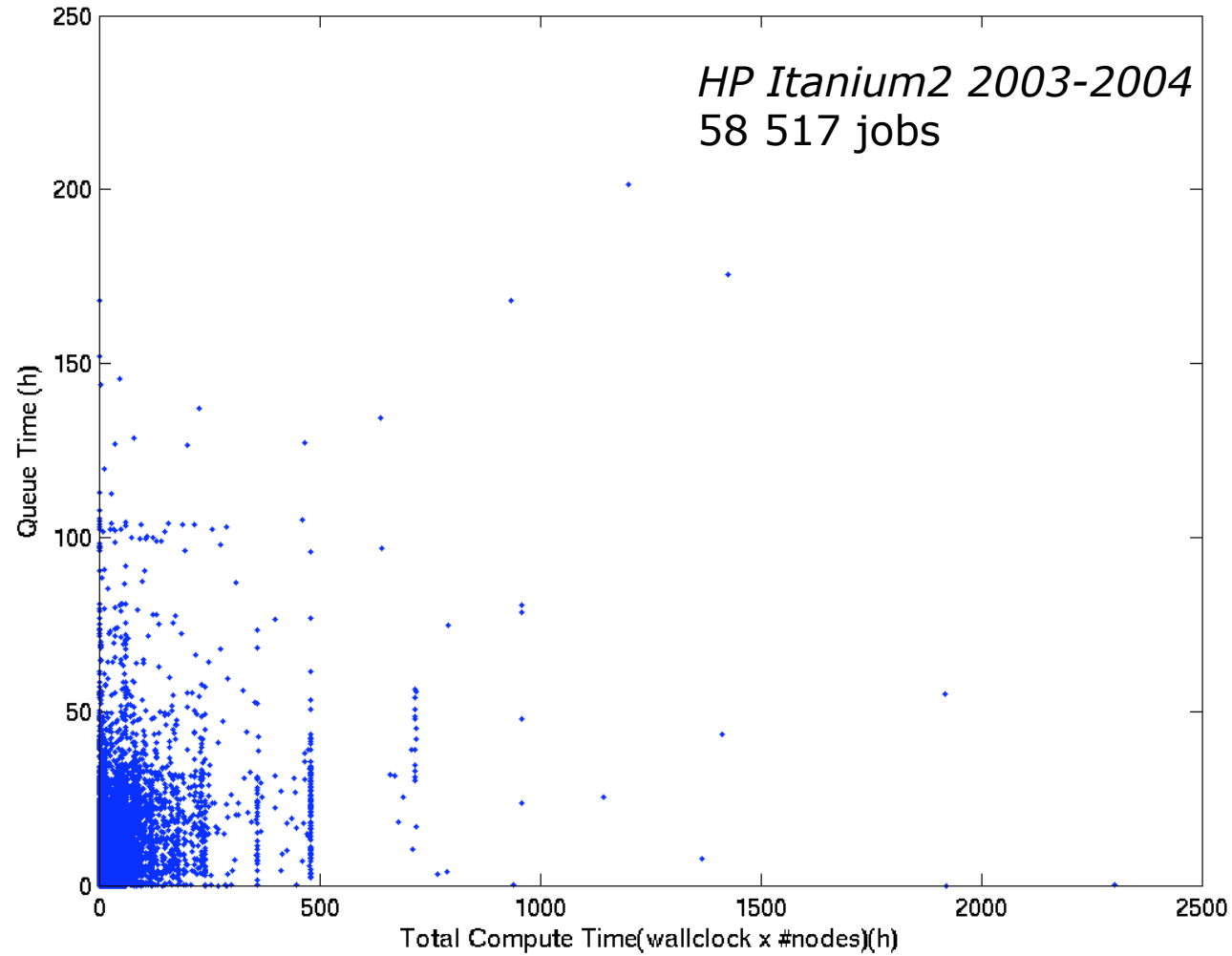


No Penalty for Large

Lucidor HP Itanium 2 Cluster Queuing

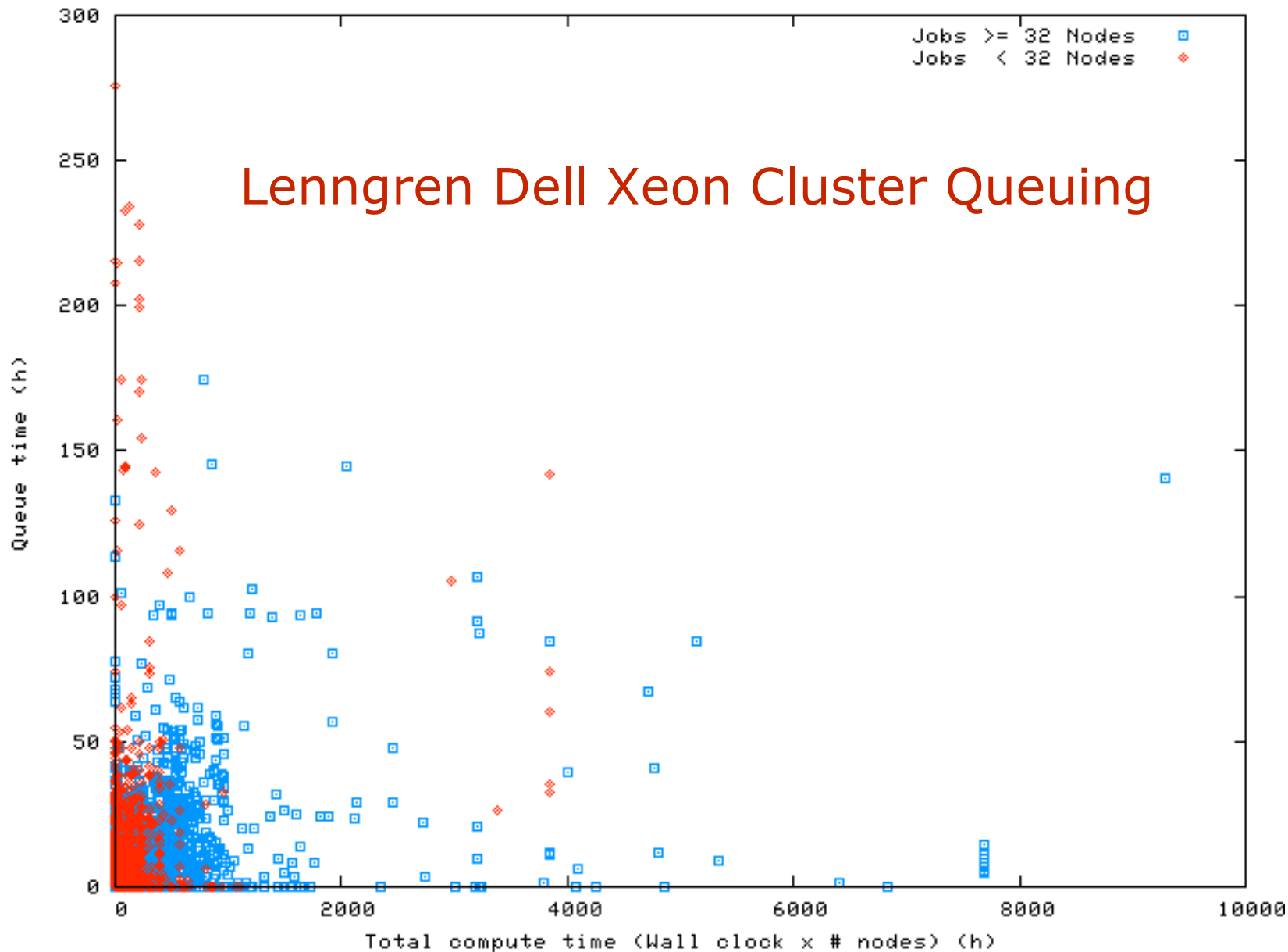


Paralleldatorcentrum



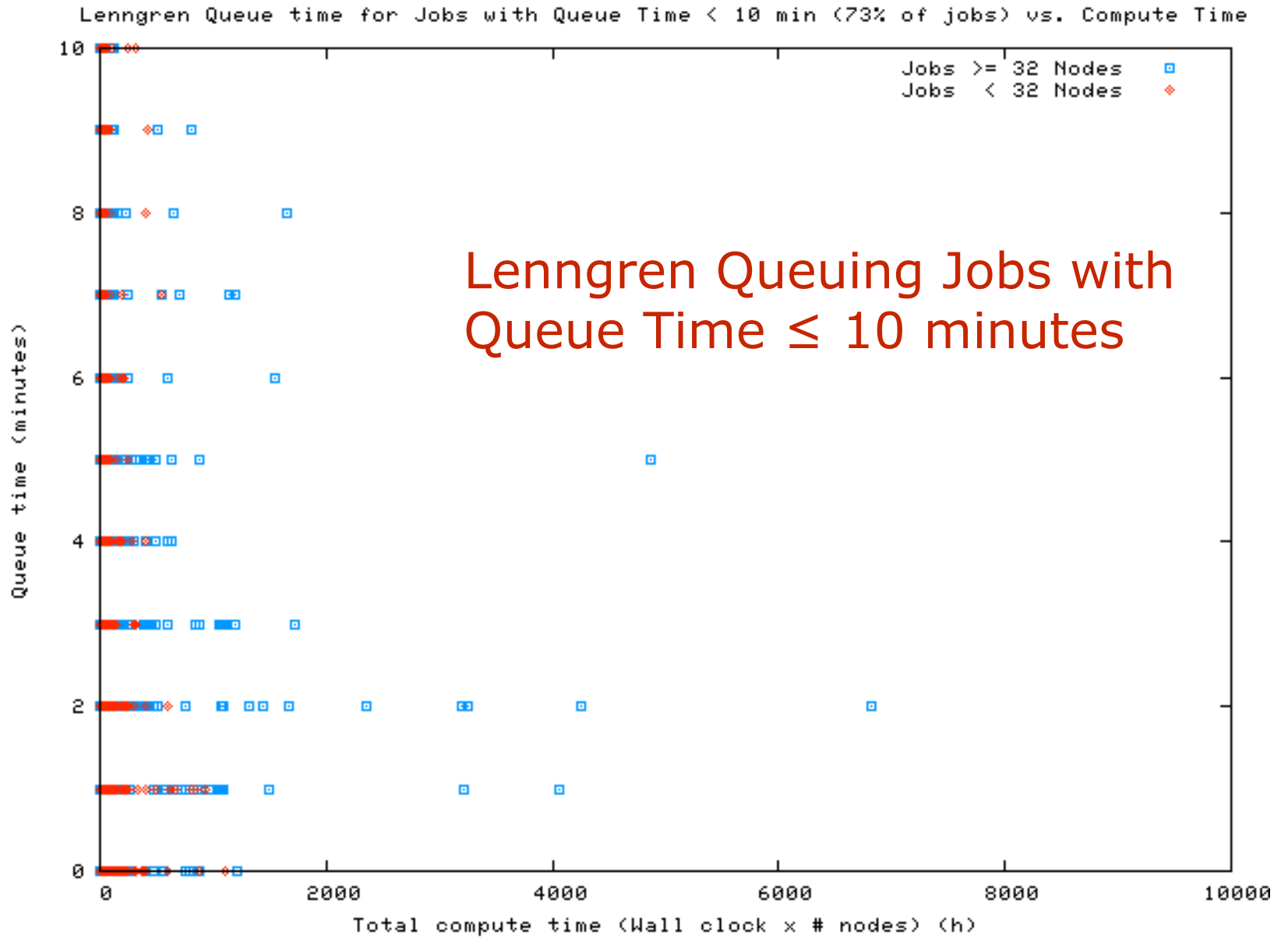


Paralleldatorcentrum



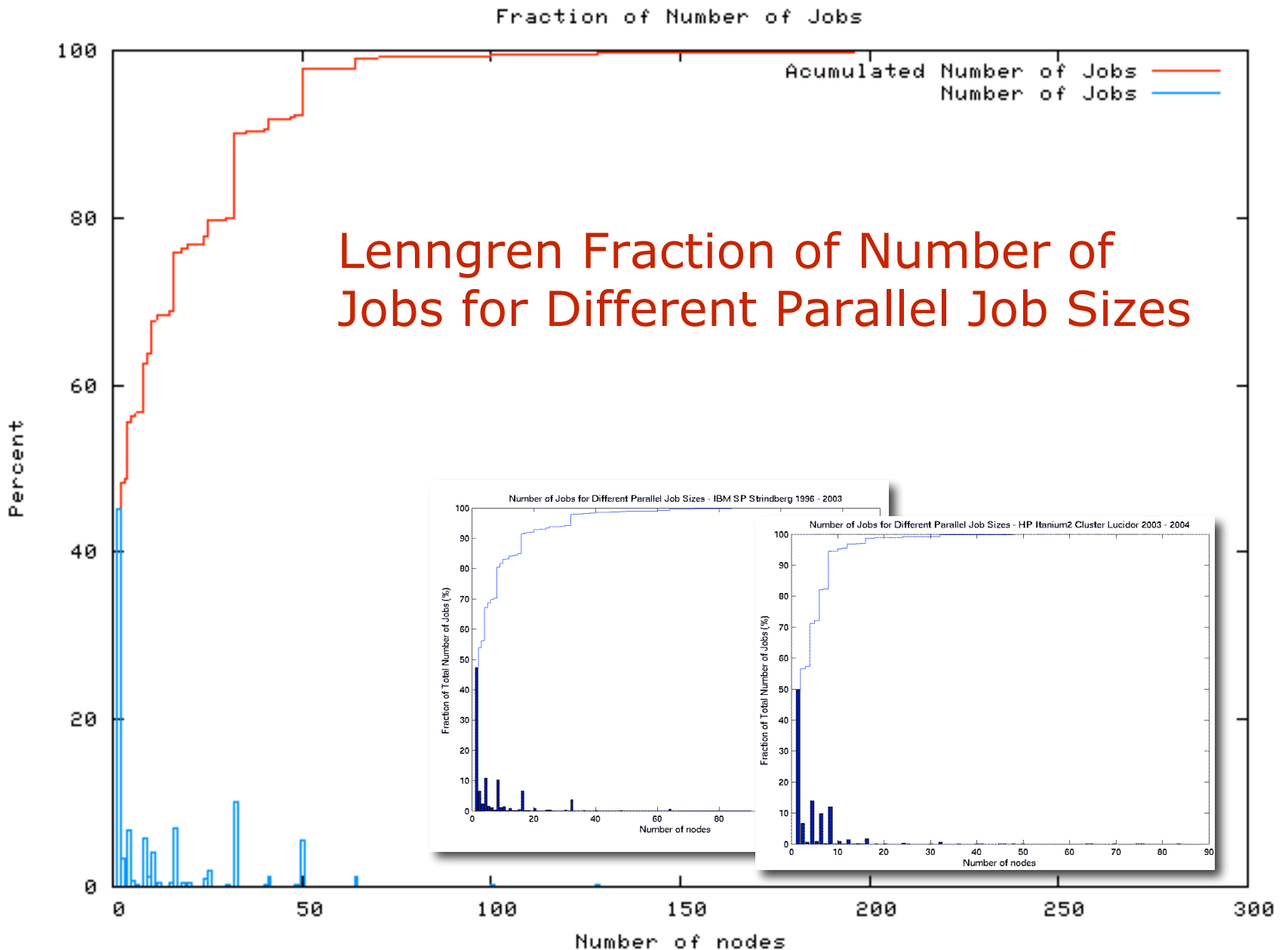


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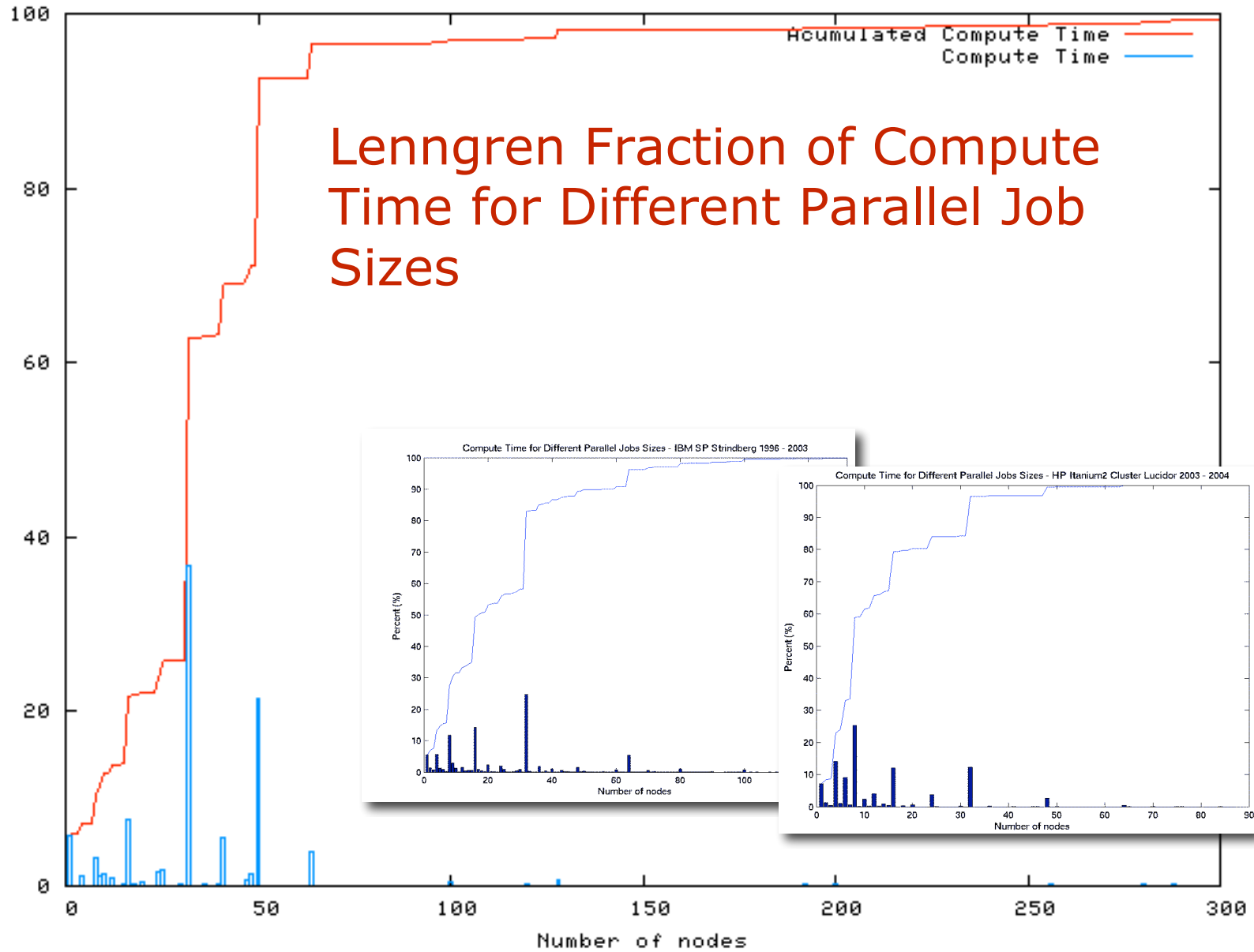


Paralleldatorcentrum



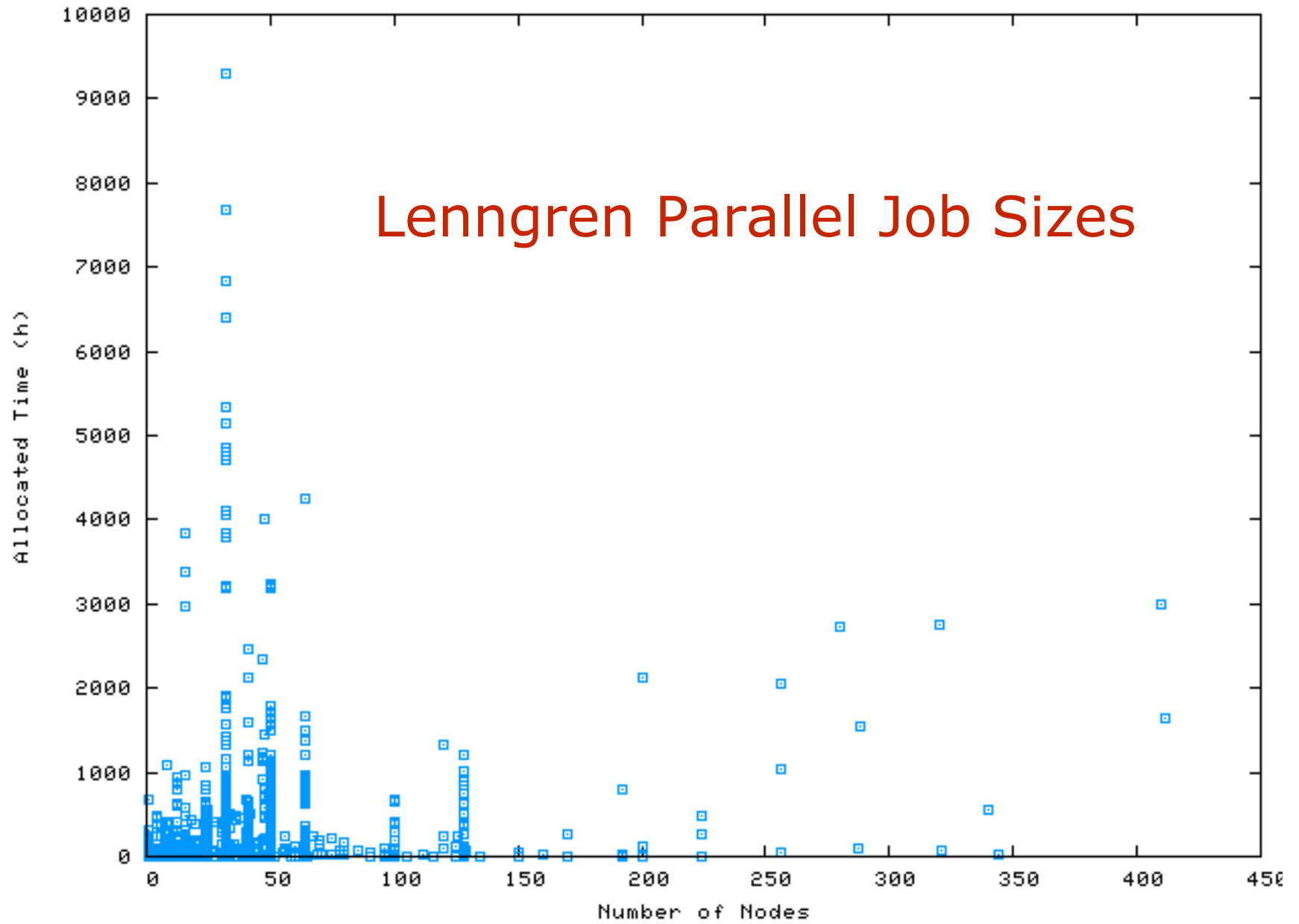


Paralleldatorcentrum



Lenngren February to September 2005

Lenngren Parallel Job Sizes



Paralleldatorcentrum



Paralleldatorcentrum

Lenngren usage - unchanged since 2005/10/18 16:44

	Frame 1	Frame 2	Frame 3	Frame 4	Frame 5	Frame 6	Frame 7	Frame 8	Frame 9	Frame
42	service	tolja	elenius	arkady	olofg	open	open	open	open	
41	service	tolja	elenius	arkady	olofg	elenius	open	open	open	
40	service	tolja	elenius	arkady	olofg	elenius	open	open	open	
39	interactive	tolja	salci	arkady	olofg	elenius	service	open	open	
38	interactive	tolja	service	arkady	olofg	elenius	open	open	open	
37	interactive	tolja	olofg	arkady	olofg	service	open	open	open	
36	interactive	tolja	olofg	arkady	olofg	elenius	open	open	open	log-in
35	service	tolja	patrikj	arkady	olofg	elenius	open	open	open	log-in
34										
33										
32	service	tolja	patrikj	arkady	olofg	elenius	open	open	open	open
31	service	tolja	mikun	arkady	olofg	elenius	open	open	open	open
30	service	tolja	mikun	arkady	olofg	elenius	service	open	open	open
29	service	tolja	mikun	arkady	olofg	service	service	open	open	open
28	service	tolja	mikun	arkady	olofg	elenius	open	open	open	open
27	service	tolja	carstenm	arkady	olofg	elenius	open	open	open	open
26	service	down	tolja	arkady	olofg	elenius	open	open	open	open
25	service	tolja	tolja	arkady	olofg	elenius	open	open	open	open
24										
23										
22										
21										
20	tolja	tolja	down	arkady	olofg	elenius	open	open	open	open
19	tolja	tolja	tolja	arkady	olofg	elenius	open	down	open	open
18	service	tolja	tolja	arkady	olofg	elenius	open	open	open	cwmo
17	tolja	tolja	carstenm	arkady	olofg	elenius	open	open	open	cwmo
16	tolja	tolja	carstenm	arkady	olofg	elenius	open	service	open	cwmo
15	tolja	tolja	carstenm	arkady	olofg	elenius	open	open	open	cwmo
14	tolja	tolja	carstenm	arkady	olofg	elenius	open	open	open	open
13	tolja	mikun	carstenm	service	olofg	elenius	open	open	open	open
12										
11										
10	tolja	mikun	carstenm	arkady	arkady	elenius	open	open	open	open
9	service	mikun	carstenm	arkady	arkady	elenius	open	open	open	open
8	tolja	mikun	tolja	patrikj	arkady	elenius	open	open	open	open
7	tolja	tolja	tolja	service	arkady	elenius	open	open	open	open
6	tolja	tolja	tolja	elenius	arkady	olofg	open	open	open	open
5	tolja	tolja	tolja	elenius	arkady	olofg	open	open	open	open
4	mikun	tolja	tolja	elenius	service	olofg	open	open	open	open
3	mikun	service	tolja	elenius	arkady	olofg	open	service	open	system
2										
1										

Lenngren usage - unchanged since 2005/10/19 00:58

	Frame 1	Frame 2	Frame 3	Frame 4	Frame 5	Frame 6	Frame 7	Frame 8	Frame
42	service	tolja	pmitev	open	elenius	heden	aodell	aodell	nilssi
41	service	tolja	pmitev	open	elenius	open	aodell	aodell	nilssi
40	service	tolja	pmitev	henrikg	elenius	davida	aodell	aodell	nilssi
39	interactive	tolja	heden	henrikg	elenius	open	service	aodell	nilssi
38	interactive	tolja	service	henrikg	elenius	davida	aodell	aodell	nilssi
37	interactive	tolja	pmitev	henrikg	elenius	service	aodell	aodell	nilssi
36	interactive	tolja	pmitev	henrikg	elenius	davida	aodell	aodell	nilssi
35	service	tolja	patrikj	henrikg	elenius	davida	aodell	aodell	nilssi
34									
33									
32	service	tolja	patrikj	henrikg	elenius	davida	aodell	aodell	nilssi
31	service	tolja	mikun	henrikg	elenius	davida	aodell	aodell	nilssi
30	service	tolja	mikun	henrikg	elenius	davida	service	aodell	nilssi
29	service	tolja	mikun	henrikg	elenius	service	service	aodell	nilssi
28	service	tolja	mikun	henrikg	elenius	davida	aodell	aodell	nilssi
27	service	tolja	henrikg	henrikg	elenius	davida	aodell	aodell	nilssi
26	service	down	tolja	henrikg	elenius	davida	aodell	aodell	nilssi
25	service	tolja	tolja	henrikg	elenius	elenius	aodell	aodell	aode
24									
23									
22									
21									
20	tolja	tolja	down	henrikg	elenius	elenius	aodell	aodell	aode
19	tolja	tolja	tolja	henrikg	elenius	elenius	aodell	down	aode
18	service	tolja	tolja	henrikg	elenius	elenius	aodell	aodell	aode
17	tolja	tolja	henrikg	henrikg	elenius	elenius	aodell	aodell	aode
16	tolja	tolja	henrikg	henrikg	elenius	elenius	aodell	service	aode
15	tolja	tolja	henrikg	henrikg	elenius	elenius	pmitev	aodell	aode
14	tolja	tolja	henrikg	henrikg	elenius	elenius	pmitev	aodell	aode
13	tolja	mikun	henrikg	service	elenius	elenius	pmitev	aodell	aode
12									
11									
10	tolja	mikun	henrikg	henrikg	open	elenius	pmitev	aodell	aode
9	service	mikun	henrikg	henrikg	open	elenius	pmitev	aodell	aode
8	tolja	mikun	tolja	patrikj	open	elenius	pmitev	aodell	aode
7	tolja	tolja	tolja	service	open	elenius	pmitev	aodell	aode
6	tolja	tolja	tolja	henrikg	open	elenius	pmitev	aodell	aode
5	tolja	tolja	tolja	pmitev	open	elenius	heden	aodell	aode
4	mikun	tolja	tolja	pmitev	service	elenius	heden	aodell	aode
3	mikun	service	tolja	pmitev	open	elenius	heden	service	aode
2									
1									

261 batch nodes used out of 278 available.

2005-10-10 18:14

	1(u,i,d)	2(u,i,d)	3(u,i,d)	4(u,i,d)	5(u,i,d)	6(u,i,d)	7(u,i,d)	8(u,i,d)	9(u,i,d)	10(u,i,d)	11(u,i,d)	12(u,i,d)	13(u,i,d)	14(u,i,d)
n42	IB†	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
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n40	IB†	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n39	IB†	IB	IB	IB	IB	IB	IB†	IB	IB	IB	IB	IB	IB	system
n38	IB†	IB	up†	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	system
n37	IB†	IB	IB	IB	IB	IB†	IB	IB	IB	IB†	IB	IB	IB	
n36	IB†	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	up
n35	IB†	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n32	IB†	IB	IB	up	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n31	IB†	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n30	IB†	IB	IB	IB	IB	IB	IB†	IB	IB	IB	IB	IB	IB	
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n20	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n19	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n18	IB†	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n17	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n16	IB	IB	IB	IB	IB	IB	IB	IB†	IB	IB	IB	IB	IB	
n15	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n14	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n13	IB	IB	IB	IB†	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n10	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n09	IB†	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n08	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n07	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n06	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n05	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	IB	
n04	IB	IB	IB	IB	IB†	IB	IB	IB	IB	IB	IB	IB	IB	
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Last update: 2005-10-19 01:30

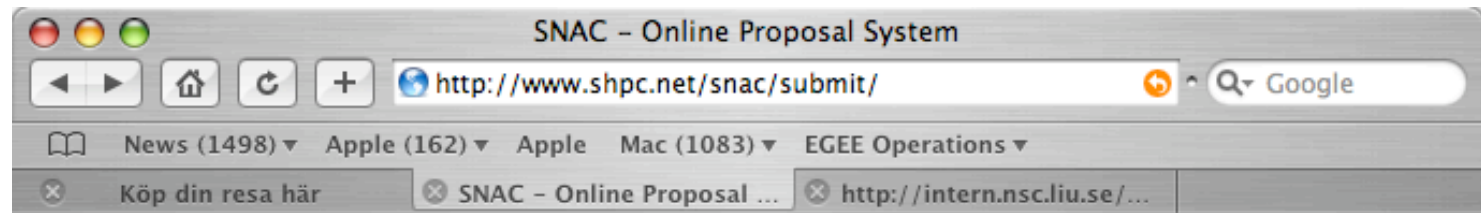
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n40	23	19	18	21	18	18	22	23	19	19	23	
n39	23	20	18	21	18	18	22	23	19	19	22	
n38	22	20	18	21	19	19	22	23	19	19	22	
n37	23	19	18	21	19	18	21	23	18	19	22	
n36	23	19	18	21	19	18	21	22	19	19	22	
n35	23	19	19	22	20	18	21	24	18	20	23	
n34												
n33												
n32	23	20	19	21	20	18	20	23	19	19	23	
n31	23	20	18	22	20	18	21	23	19	20	23	
n30	23	19	19	22	19	18	20	23	18	19	23	
n29	23	19	19	22	20	18	20	23	18	19	24	
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n19	23	19	19	21	22	18	19	23	18	20	25	
n18	23	19	19	21	22	19	19	23	19	20	27	
n17	24	19	19	22	22	18	20	23	19	21	27	
n16	23	20	19	21	22	18	20	23	19	20	26	
n15	23	19	20	21	23	19	19	23	20	20	26	
n14	23	19	19	21	22	18	19	23	19	21	26	
n13	23	20	21	22	23	20	20	23	20	22	25	
n12												
n11												
n10	22	20	21	20	23	20	20	23	21	21	25	
n09	off	20	21		23	21	20	23	21	22	25	
n08	22	21	22	18	23	22	20	23	21	21	24	
n07	23	21	23	17	23	21	21	22	20	21	24	
n06	22	19	23	18	21	21	20	21	18	20	23	
n05	21	18	24	18	19	20	21	19	18	19	20	
n04	20	18	25	19	18	19	22	18	17	19	19	
n03	19	19	24	21	20	21	24	19	19	19	19	



Paralleldatorcentrum



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[Call for proposals](#)

Deadline for proposals: 2 November 2005 at 16:00 hours

[The SNAC policy](#)

[Committee members](#)

[Available resources](#)

[Project Catalogue](#)

[Online submission questions](#)

Welcome to SNAC's online proposal system!

You must complete all three of the following steps by the deadline in order to complete the submission process. **Deadline for proposals is 2 November 2005 at 16:00.** At that time, all access to the online application system will be closed.

- Before submitting your application please read the [detailed instructions](#).
- Projects requesting smaller allocations should contact the centers directly (current limits are 1000 CPU hours/month for most systems). See the [detailed instructions](#).
- If you are awarded time by SNIC, you agree to the [policy on online information](#).

Step 1: [Register](#)

You register each of your proposals one time. To complete this step, you only need the principal investigator's name, email address, and the project title. As a result of registering your proposal, you will receive a login name and password, which you use to complete the proposal submission process.

Step 2: [Edit](#)

Under this step you work with an already-registered proposal. You need the login name and password provided when you registered your proposal to enter this part of the submission process. You can come back to this step to edit your proposal as many times as you like. The system remembers what you entered during previous sessions.

Step 3: [Finalize](#)

You take this step only once, when you are done editing your proposal and want to submit it to SNAC for consideration. You need the login name and password provided when you registered your proposal to enter this part of the submission process. The system automatically checks to see if all required parts of your proposal are included.

Last modified: \$Date: 2005/09/30 07:32:37 \$