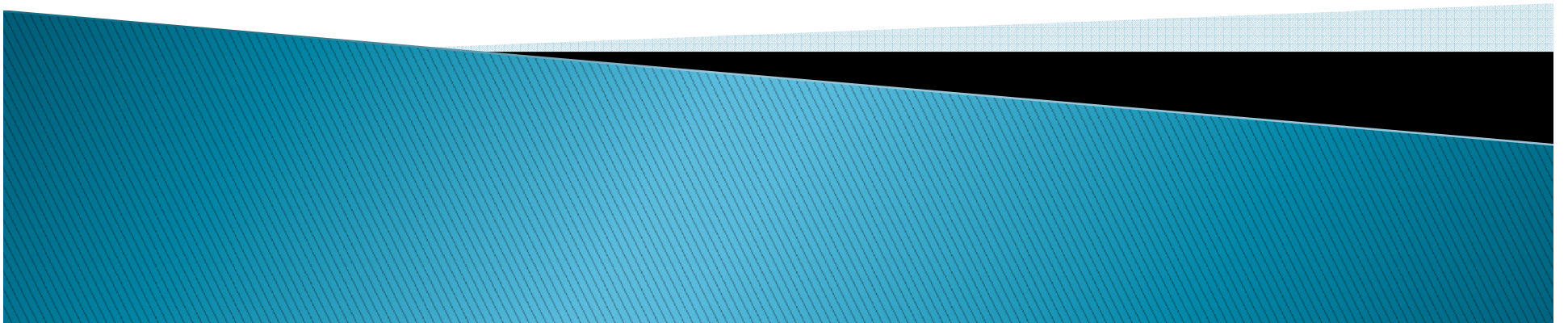


BLUE GENE/L

Maíra Saboia da Silva

RA: 098338



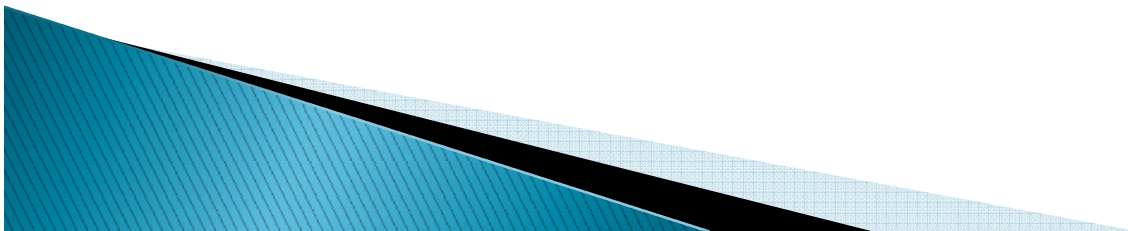
Blue Gene

- ▶ Arquitetura de computadores projetada para produzir Supercomputadores



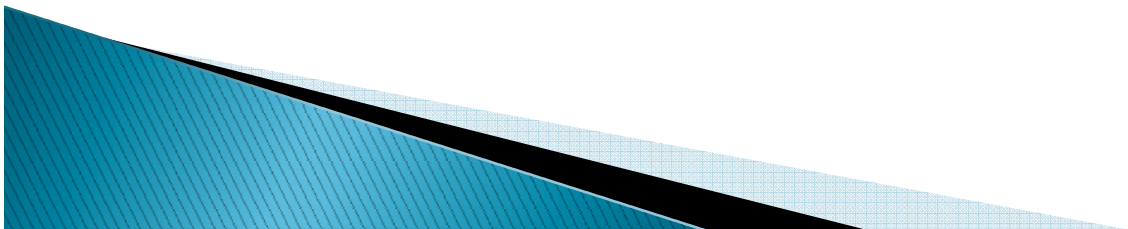
Origem do nome “Blue Gene”

- ▶ “Blue”: cor da IBM
- ▶ “Gene”: Finalidade do projeto



História

- ▶ 1999 – IBM anuncia verba de \$100M para construir um supercomputador
- ▶ Dois objetivos principais do projeto:
 - Máquina de arquitetura e software massivamente paralelos
 - Promover avanço no entendimento dos mecanismos moleculares
- ▶ 2001 – parceria com Lawrence Livermore National Laboratory (LLNL)



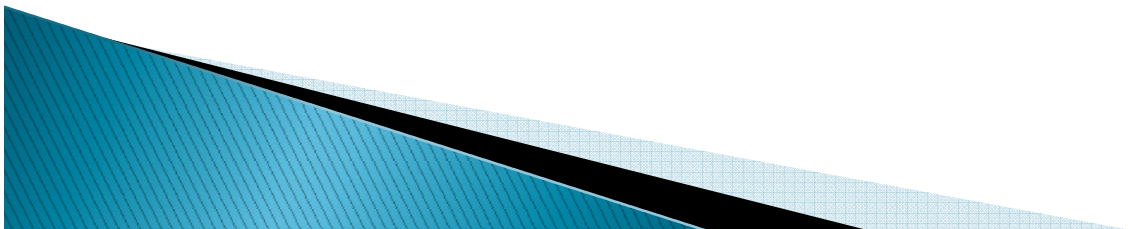
Resultado

► Top 500

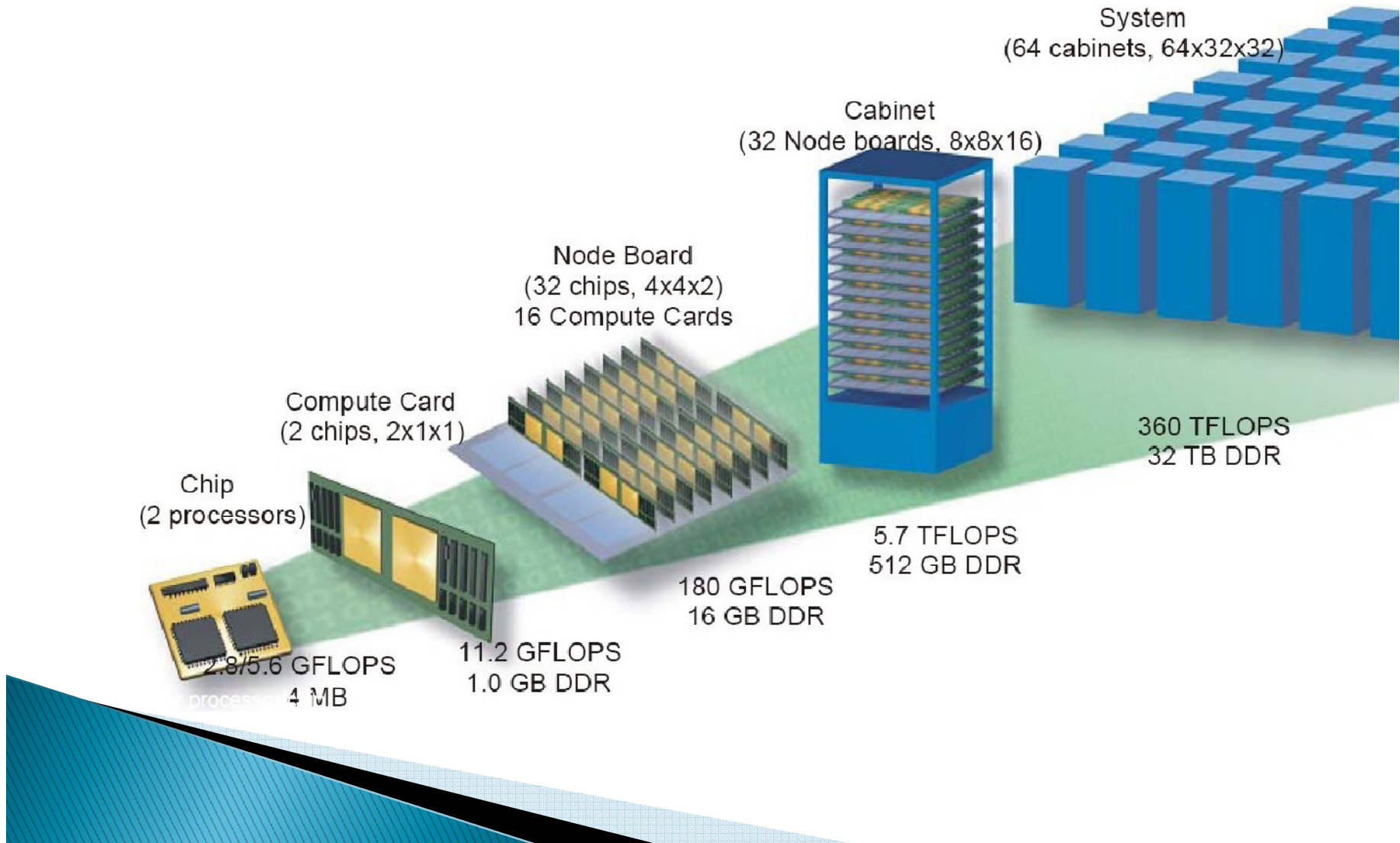
Rank	Site	Computer	Processors	Year	R _{max}	R _{peak}
1	DOE/NNSA/LLNL United States	BlueGene/L - eServer Blue Gene Solution IBM	131072	2005	280600	367000
2	IBM Thomas J. Watson Research Center United States	BGW - eServer Blue Gene Solution IBM	40960	2005	91290	114688
3	DOE/NNSA/LLNL United States	ASC Purple - eServer pSeries p5 575 1.9 GHz IBM	12208	2006	75760	92781
4	NASA/Ames Research Center/NAS United States	Columbia - SGI Altix 1.5 GHz, Voltaire Infiniband SGI	10160	2004	51870	60960
5	Commissariat a l'Energie Atomique (CEA) France	Tera-10 - NovaScale 5160, Itanium2 1.6 GHz, Quadrics Bull SA	8704	2006	42900	55705.6
6	Sandia National Laboratories United States	Thunderbird - PowerEdge 1850, 3.6 GHz, Infiniband Dell	9024	2006	38270	64972.8
7	GSIC Center, Tokyo Institute of Technology Japan	TSUBAME Grid Cluster - Sun Fire X64 Cluster, Opteron 2.4/2.6 GHz, Infiniband NEC/Sun	10368	2006	38180	49868.8
8	Forschungszentrum Juelich (FZJ) Germany	JUBL - eServer Blue Gene Solution IBM	16384	2006	37330	45875
9	Sandia National Laboratories United States	Red Storm Cray XT3, 2.0 GHz Cray Inc.	10880	2005	36190	43520
10	The Earth Simulator Center Japan	Earth-Simulator NEC	5120	2002	35860	40960

Blue Gene/L

- ▶ O Primeiro Blue Gene da série:
 - Blue Gene/L, Blue Gene/C, Blue Gene/P, Blue Gene/Q
- ▶ Configuração final em 2005



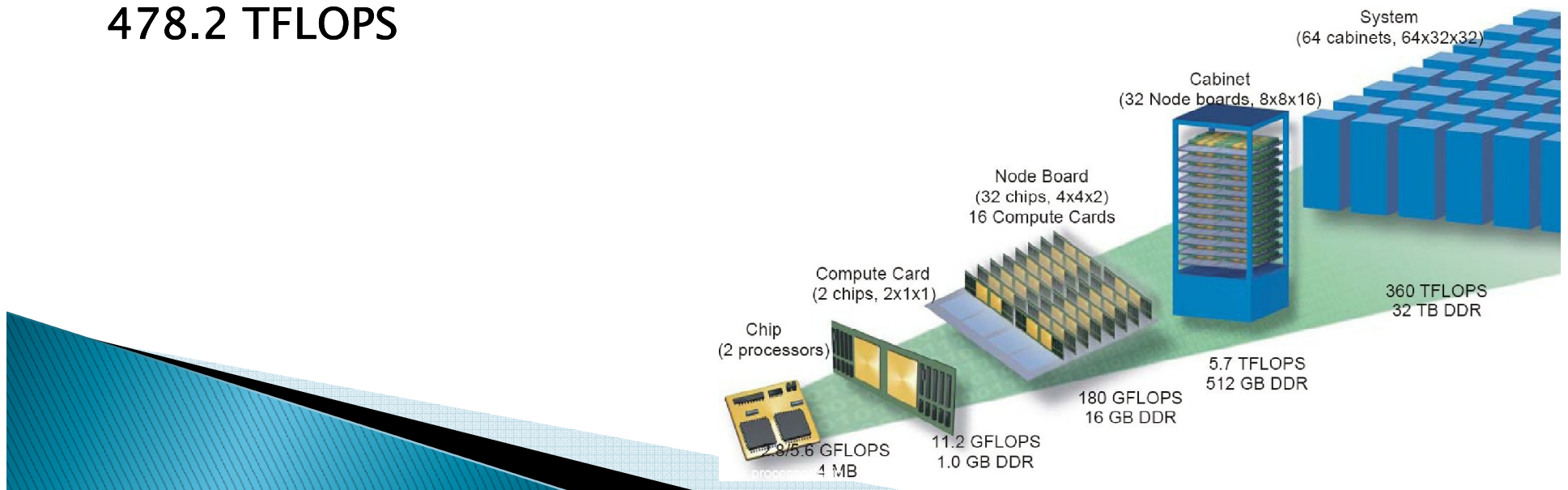
Arquitetura do Blue Gene/L



Arquitetura do Blue Gene/L

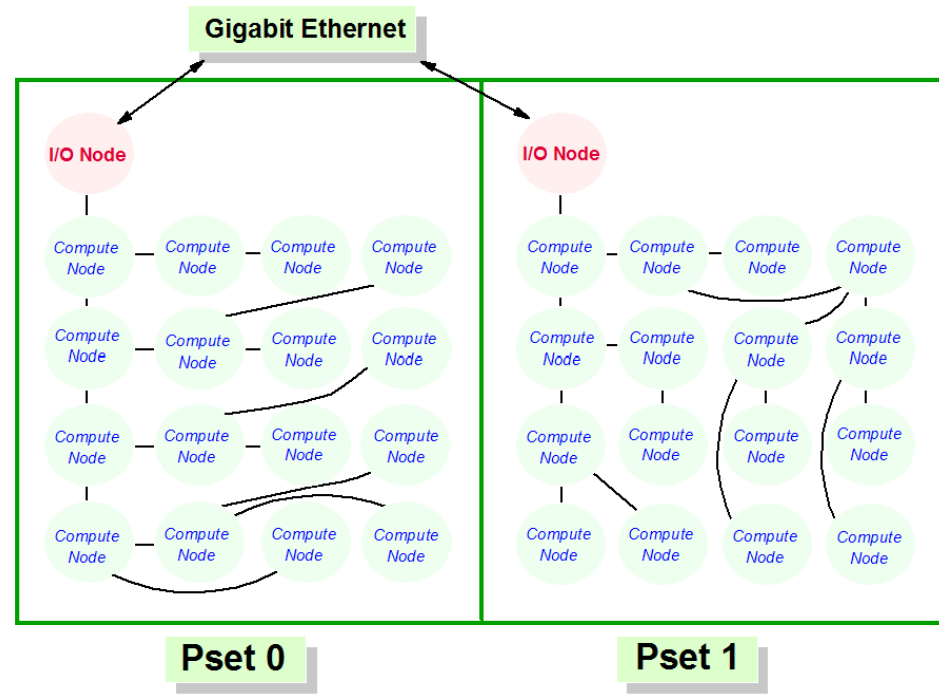
- ▶ Chip ASIC contém dois processadores
- ▶ Computer Card: dois nós ASIC
- ▶ Node Card: 16 computer card
- ▶ Midplane: 16 node card
- ▶ Hack: 2 midplane
- ▶ Sistema: 64 hacks

Total: $64 * 2 * 16 * 16 * 2 * 2 = 2^{16} = 65536$ cores
478.2 TFLOPS



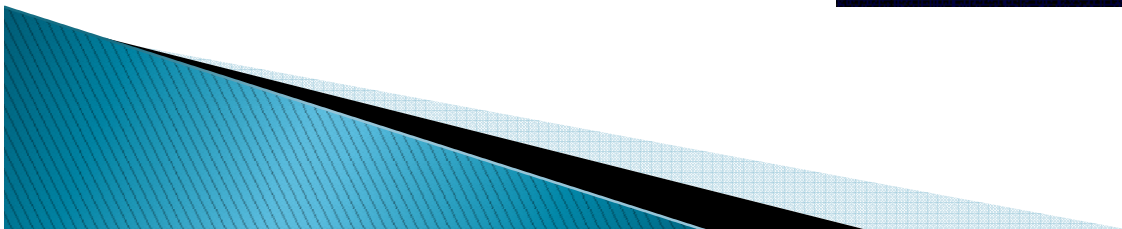
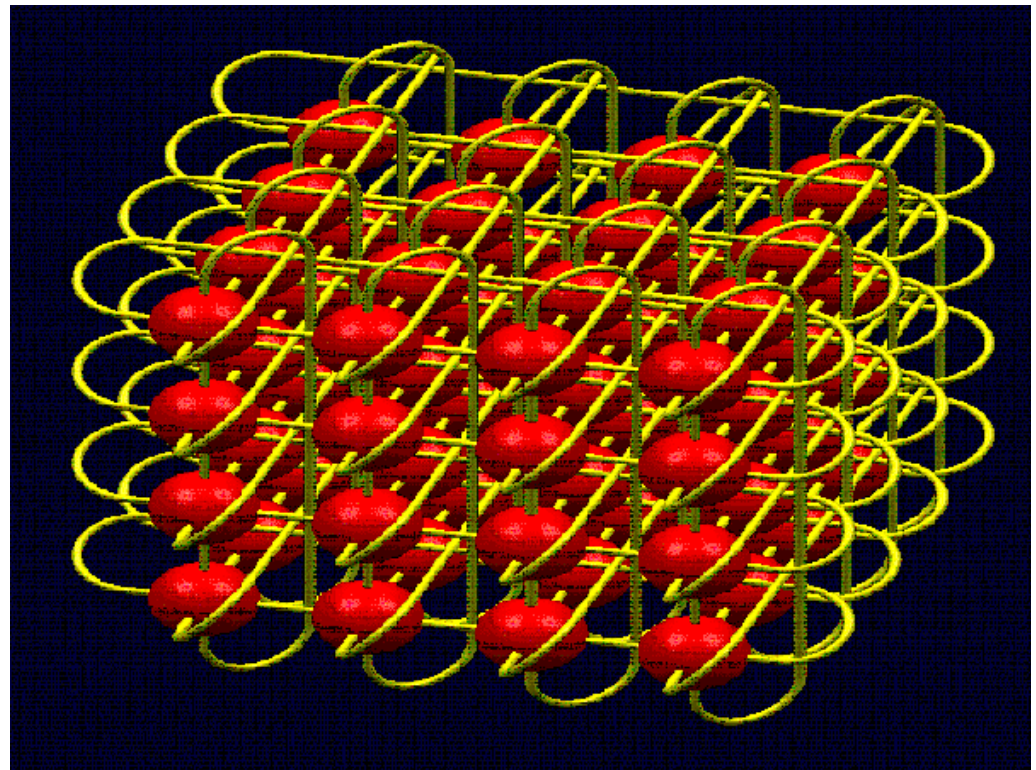
Nó do Blue Gene

- ▶ System-on-a-chip
- ▶ ASIC
 - Nó de computação e nó de I/O
 - 2 processadores PowerPC 440 com taxa de 700 MHz
 - Caches L1 e L2
 - 4MB DRAM
 - Interface DDR DRAM



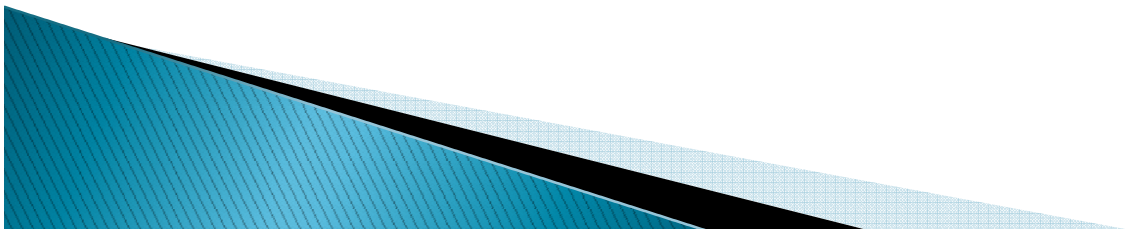
Rede do Blue Gene/L

- ▶ Cinco Redes:
 - 3D Torus*
 - Coletiva
 - Ethernet
 - JTAG
 - Interrupção Global

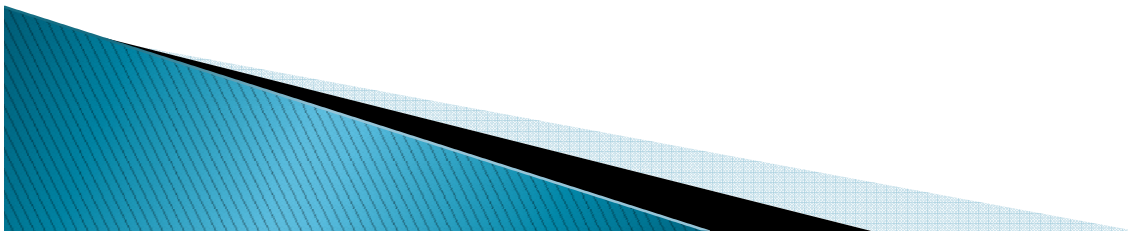


Software do Blue Gene/L

- ▶ CNK (Compute Node Kernel)
 - Linux modificado
 - Executa no nó de computação
 - Monousuário
 - Monotarefa
 - MCP (Mini – Control Program)
 - Executa no nó de I/O
 - Linux com funcionalidades adicionais específicas do BG



Conclusão



BLUE GENE/L

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