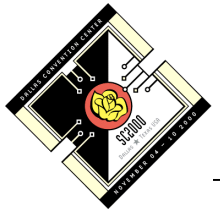
Cray SV1, SV1e, SV1ex Overview

SC2000 - Dallas Texas, November 2000



Cray SV1 Product Roadmap

SV1

SV1 CPU
- **300 MHz CPU**
- **~22 GB/s Sustained Memory Bandwidth**
- **CPU field upgrade option for all J90 Systems**

SV1

Enhanced system
- **Improved cache**
- **Increased memory throughput**

SV1e

New **SV1e CPU**
- **500 MHz clock**
- **Improved cache**
- **CPU field upgrade option for J90 & SV1 series systems**

SV1ex

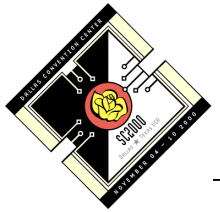
New **Memory Subsystem**
SV1e CPU
- **40+ GB/s Sustained Memory Bandwidth**
- **32 or 96 GBytes internal SSD**
- **CPU & Memory field upgrade option for SV1 3000 series systems**

Dec 98 | **March 00** | **1Q01** | **2Q01**

CRAY

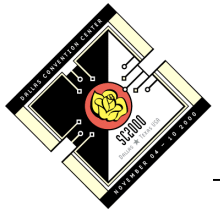
Cray SV1 Highlights

- High Performance vector CPUs
  - 1.2 GFLOPS CPU today with the SV1
- Architectural innovations:
  - *Vector caches*
  - *Multi-Streaming Processors (MSP)*
    - Four tightly-coupled 2 pipe vector processors executing as a single 8 vector pipe CPU
- CMOS, air-cooled packaging
  - 8 to 32 CPUs per system
  - 32 GBytes of memory
  - Several SV1 systems can be clustered together for additional capacity



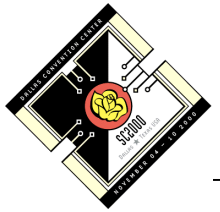
Cray SV1 Highlights

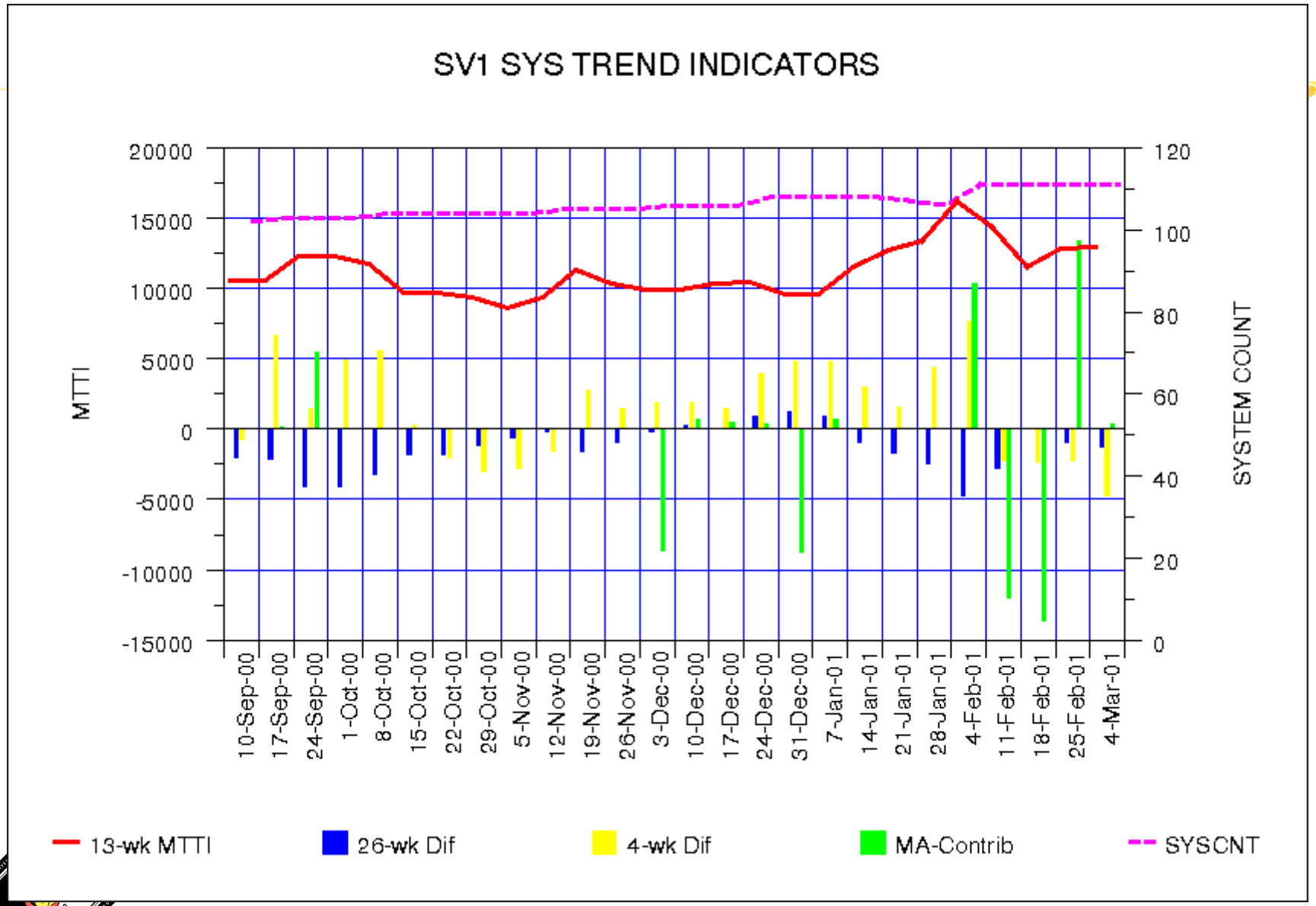
- Proven Reliability
  - Over 10,000 hours system MTTI
- Cray UNICOS operating system
  - UNICOS ease-of-use and compatibility
  - Production data center features and quality
  - Y-MP instruction set compatible
  - Binary compatible with the J90 series systems
- Support for standard programming models
  - PVM, MPI, SHMEM, Autotasking, OpenMP



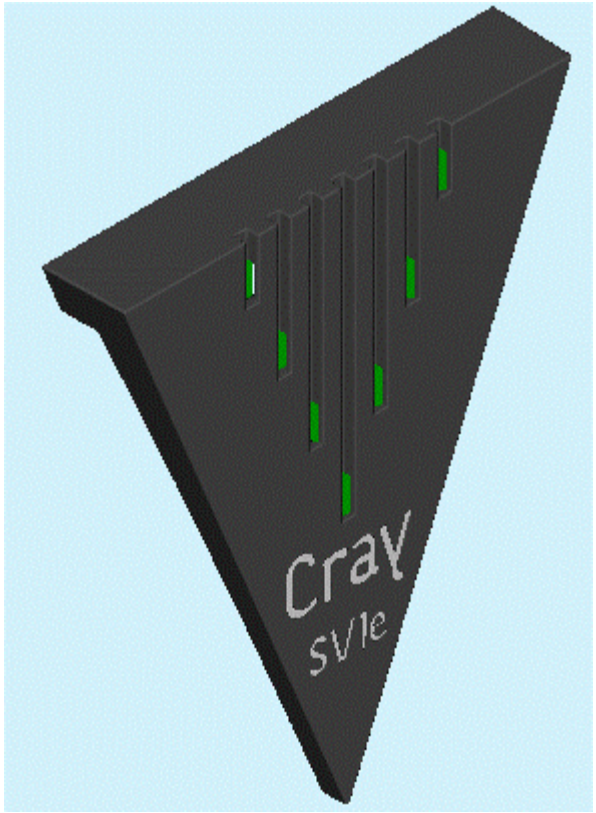
Cray SV1 Install base update

- 59 new SV1 systems installed
  - 19 SV1-1As
  - 38 SV1-1s
  - 2 SV1-4Ns (4-node clusters)
- 59 J90 systems upgraded with SV1 CPUs
- Over 2400 SV1 CPUs installed
  - Including 32 SV1e CPUs

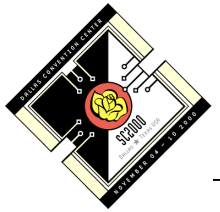



SV1 SYS TREND INDICATORS
MTTI
SYSTEM COUNT
20000
15000
10000
5000
0
-5000
-10000
-15000
120
100
80
60
40
20
0
10-Sep-00
17-Sep-00
24-Sep-00
1-Oct-00
8-Oct-00
15-Oct-00
22-Oct-00
29-Oct-00
5-Nov-00
12-Nov-00
19-Nov-00
26-Nov-00
3-Dec-00
10-Dec-00
17-Dec-00
24-Dec-00
31-Dec-00
7-Jan-01
14-Jan-01
21-Jan-01
28-Jan-01
4-Feb-01
11-Feb-01
18-Feb-01
25-Feb-01
4-Mar-01
13-wk MTTI
26-wk Dif
4-wk Dif
MA-Contrib
SYSCNT

Introducing the CRAY SV1e/SV1ex

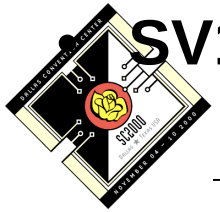


- The Next Generations of Cray SV1

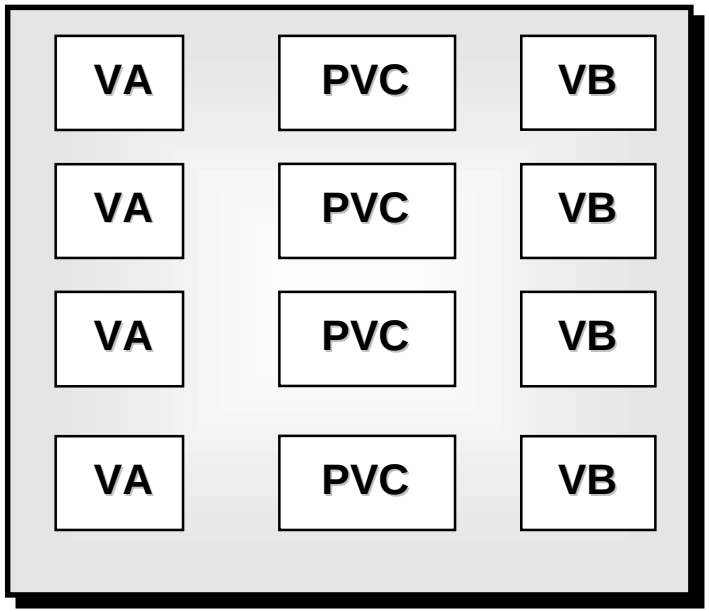


Cray SV1e/SV1ex Highlights

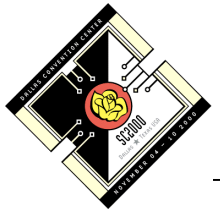
- **High Performance vector CPUs**
  - 2.0 GFLOPS SV1e CPU
    - First Customer Shipment 3/9/2001
  - Configurable as a 8.0 GFLOPS MSP
  - Increased Cache bandwidth
  - Reduced Cache latency
- **Significant increase in memory bandwidth in Q2CY01**
  - 40+ Gbytes/second system memory bandwidth
- **New SSD capability with SV1ex memory**
  - 32 or 96 GBytes of internal SSD
- **High Reliability CMOS/SDRAM Technology**
  - Over 10,000 Hours hardware MTTI for SV1 systems
- **SV1 systems can be clustered for additional capacity**



Cray SV1e Processor Enhancements

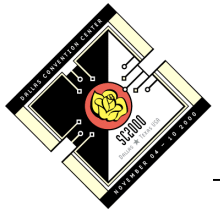


- **Combines CPU & cache onto one ASIC (PVC ASIC)**
  - Increases cache bandwidth by 67%
  - Reduces cache latency by 50%
- **8.0 GFLOPS on a Module**
  - 4 Dual-Pipe Vector Processors
  - 500 MHz Clock rate
  - 0.12 micron Copper CMOS technology
  - 1 GigaRing IO channel per module
- **Cache**
  - 256 Kbyte cache for instructions, vector, and scalar data
- **Field upgrade for J90se and SV1**

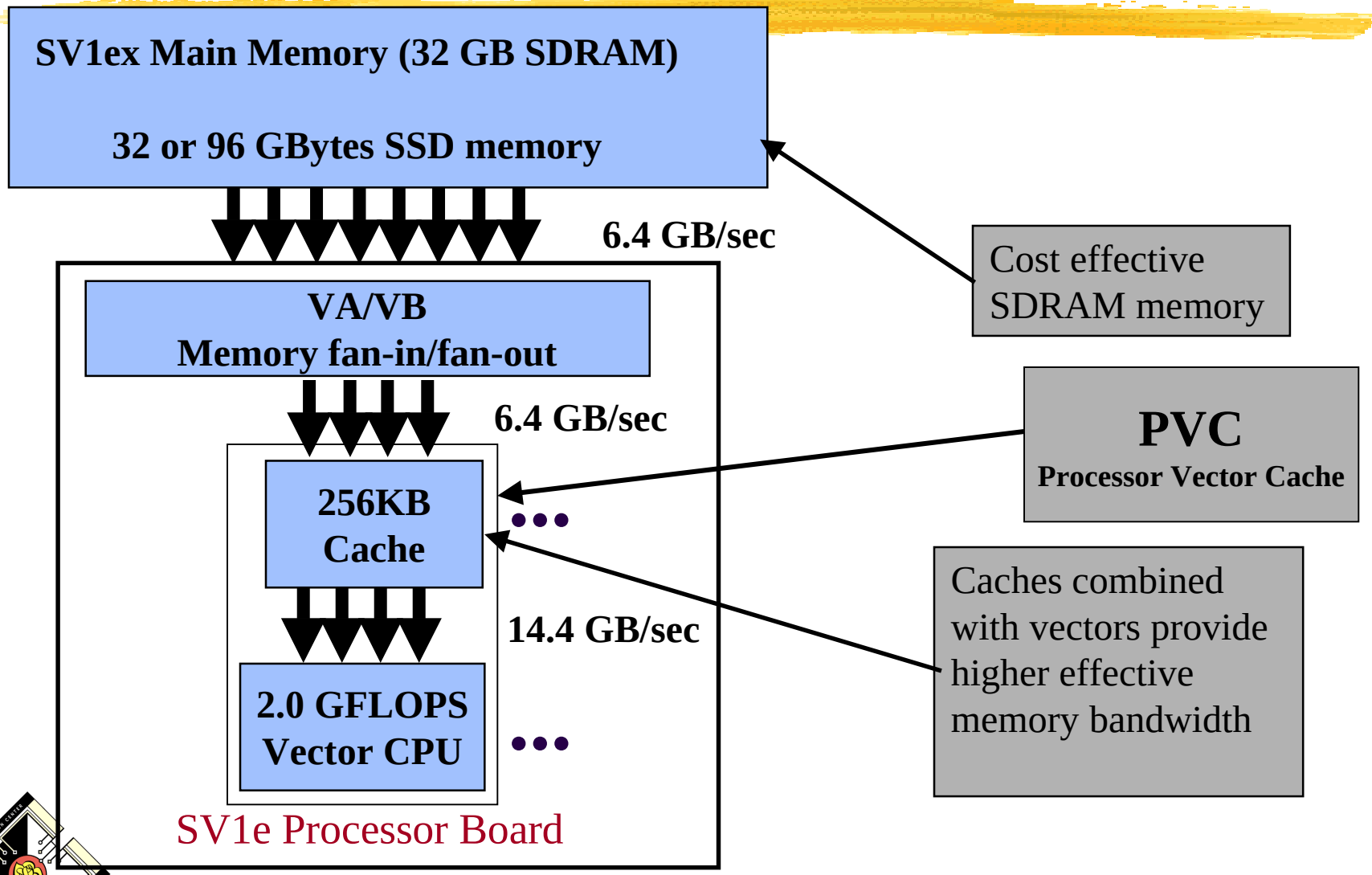


Cray SV1ex Memory Enhancements

- **Redesign of the SV1e memory subsystem**
  - Eliminates current memory design bottlenecks
  - Leverages today's SDRAM DIMM technology
- **Provides ~1.5 to 2X sustained aggregate memory bandwidth improvement**
  - ~1.25 to 1.6X single CPU memory bandwidth improvement
- **Addition of SSD capability**
  - Up to 96 GBytes of SSD on a SV1ex-1 system

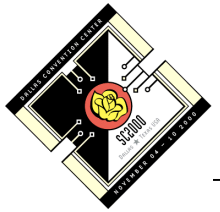


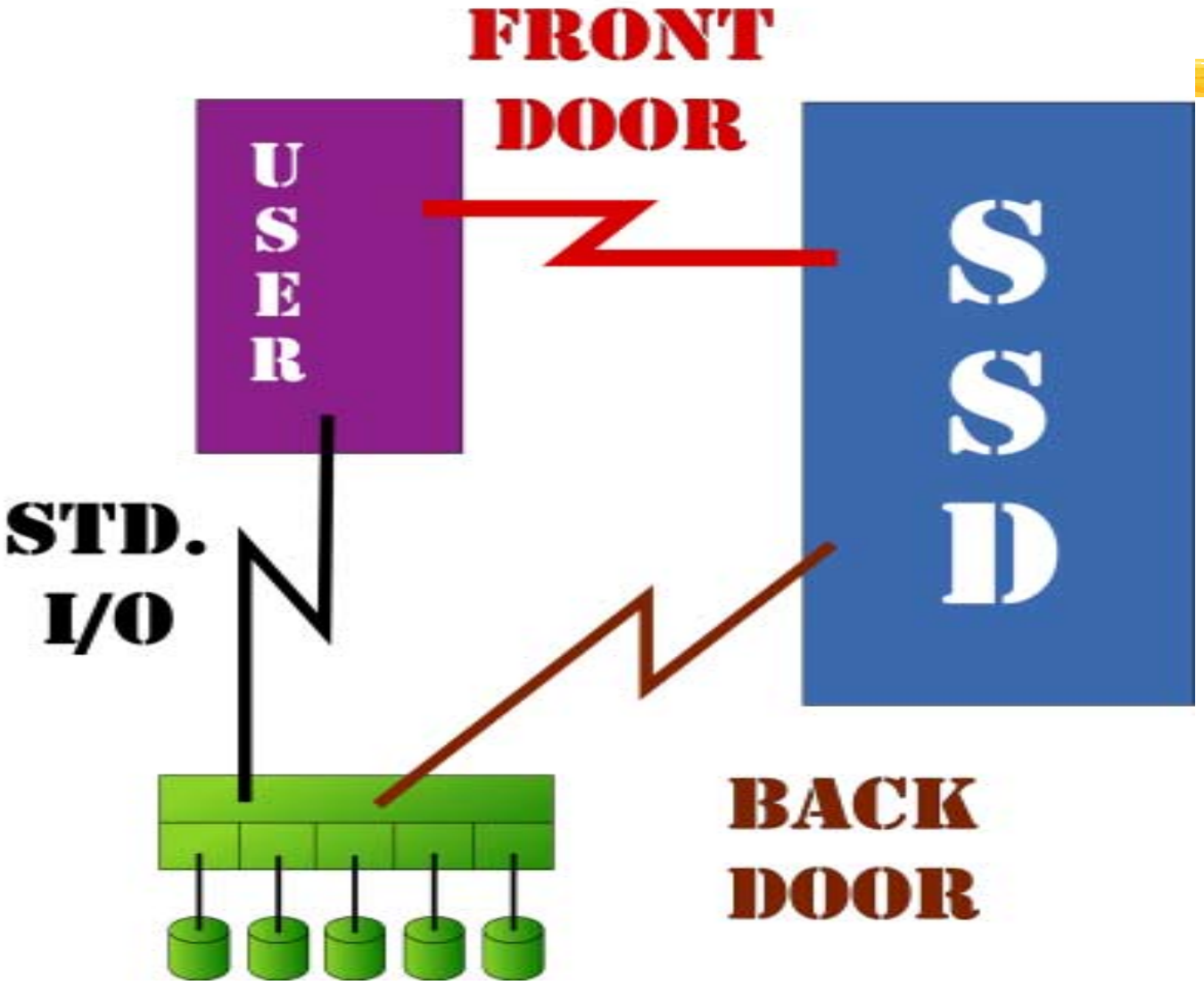
Cray SV1ex Memory/CPU



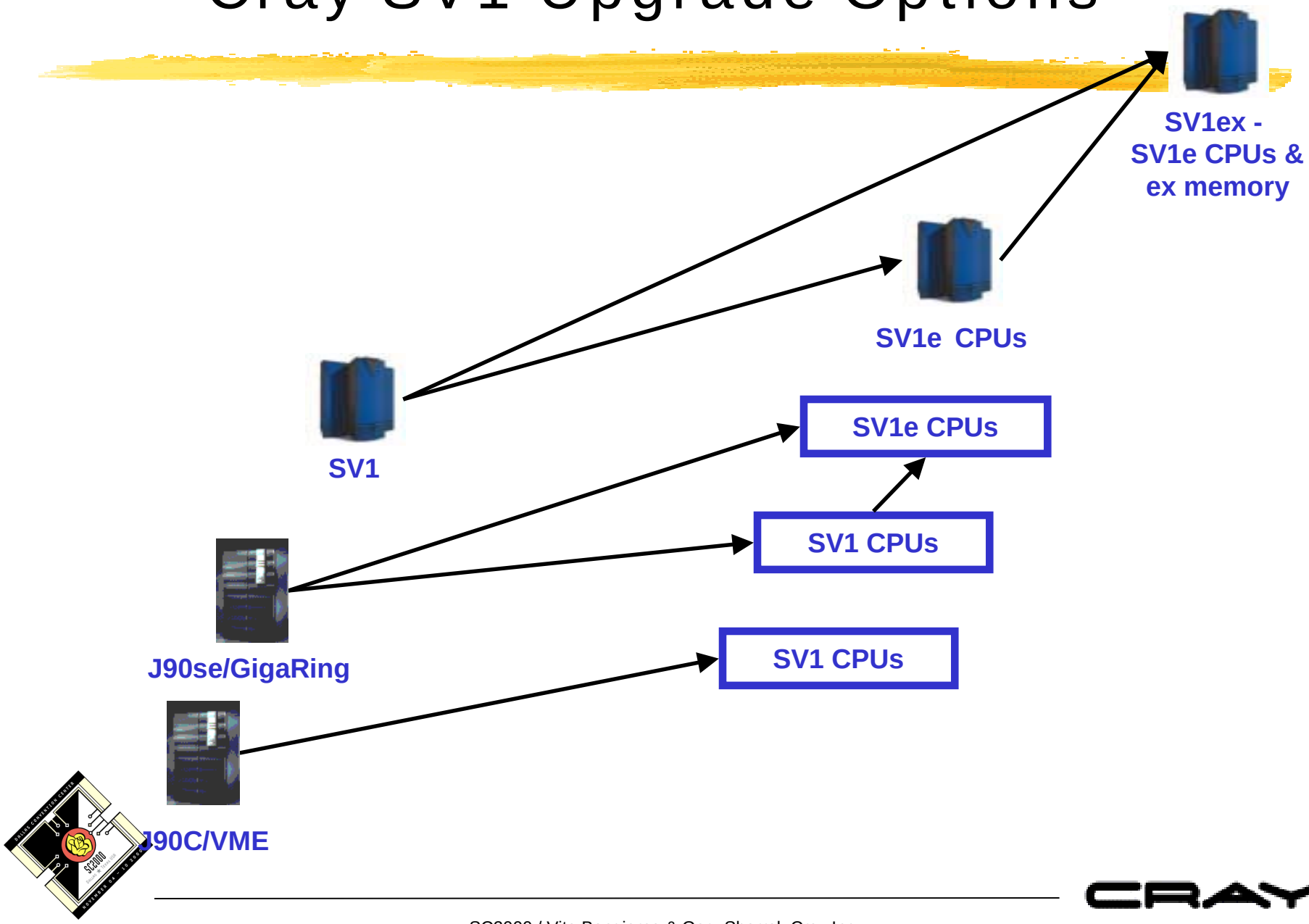
Cray SV1ex SSD

- **Standard configuration can utilize SSD as:**
  - swap device
  - SSD filesystem
- **Optional larger configuration has full Model-E SSD functionality, with enhanced performance!**
  - Uses include:
    - SDS space, LDCACHE, SSD filesystem, swap device
    - SuperRing required for backdoor capability
- **Data movement between main memory and SSD is ~30+ GBytes/sec**




FRONT
DOOR
USER
SSD
STD.
I/O
BACK
DOOR

Cray SV1 Upgrade Options



A Cool License Plate