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# HPSS User Forum - Site Report

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# BaBar & The B-Factory

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- Use big-bang energies to create B meson particles
  - ◆ Look at collision decay products
  - ◆ Answer the question “where did all the anti-matter go?”
- 800 physicists collaborating from >80 sites in 10 countries
  - ◆ USA, Canada, China, France, Germany, Italy, Norway, Russia, UK, Taiwan
- The experiment produces large quantities of data
  - ◆ 200 - 400 TBs/year for 10 years
  - ◆ **Data stored as objects using Objectivity**
- Heavy computational load
  - ◆ ~15,000+ SpecInt95's needed



# BaBar HPSS Software Levels

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<u>Date</u>	<u>Machine</u>	<u>OS</u>	<u>DCE</u>	<u>Encina</u>	<u>HPSS</u>
Jul 98	F40	4.1.5	2.1	2.1	3.2
Sep 99	F50	4.2.1	2.1	2.5	4.1
Jan 01	F50	4.3.3	2.2.0.8	4.2.0.14	4.1.1.4
Aug 03?	???	8 or 9	3.2.0.3	5.0	4.5.0.1

- No changes to software levels in past year
- BaBar operation makes major software upgrades difficult
- Want to convert from AIX to Solaris core servers



# Public HPSS Software Levels

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<u>Date</u>	<u>Machine</u>	<u>OS</u>	<u>DCE</u>	<u>Encina</u>	<u>HPSS</u>
<b>Solaris core server and movers</b>					
May 01	420R	7	3.1	4.3.0.3	4.2
Dec 01	420R	8	3.1	4.3.0.4	4.3
Oct 03?	420R	8 or 9	3.2.0.3	5.0	4.5.0.1



# HPSS Milestones

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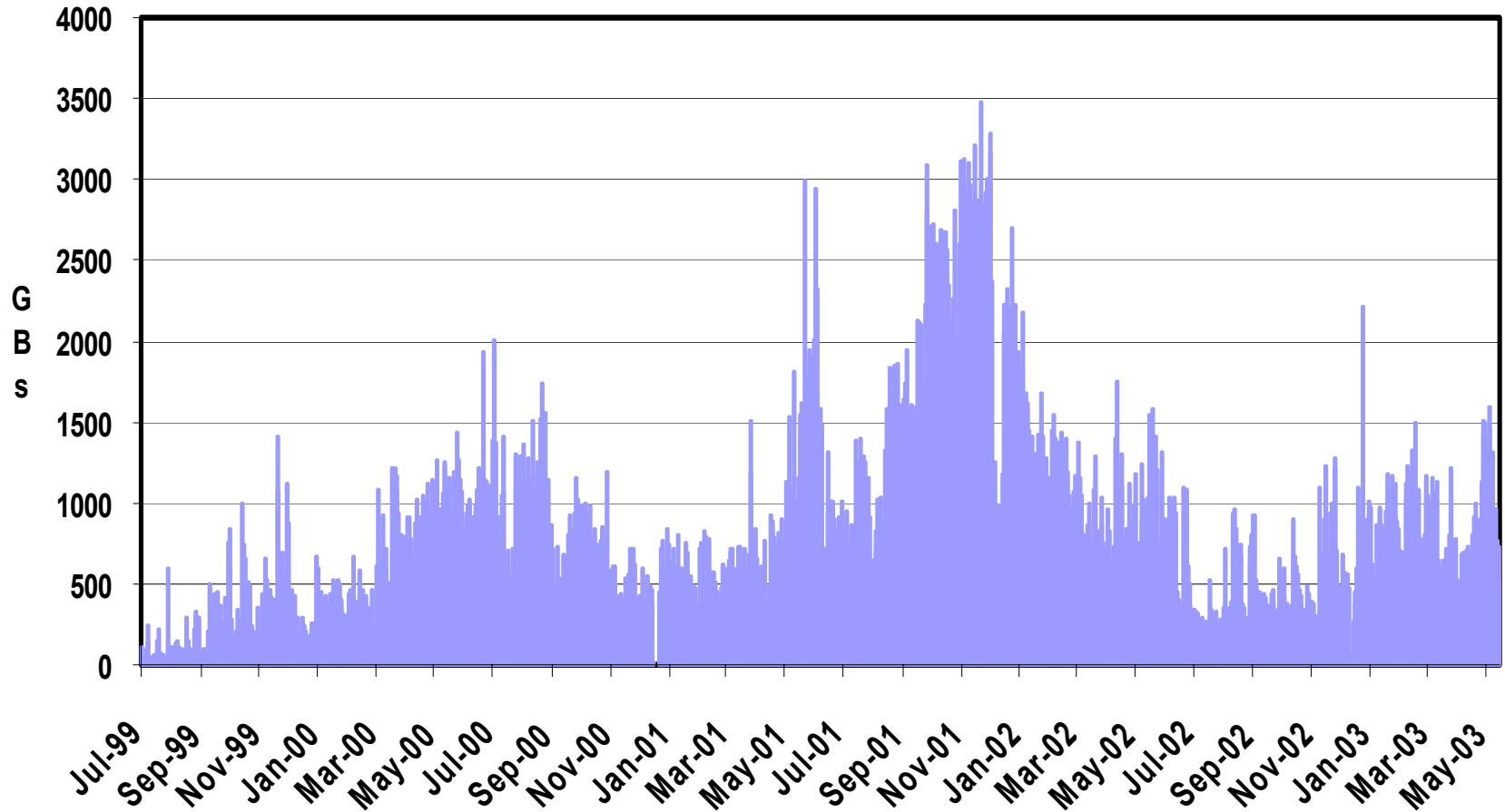
- BaBar HPSS has over 1PB stored

	2002	2003
TB Read	384	698
TB Write	518	245
TB Total	902	943

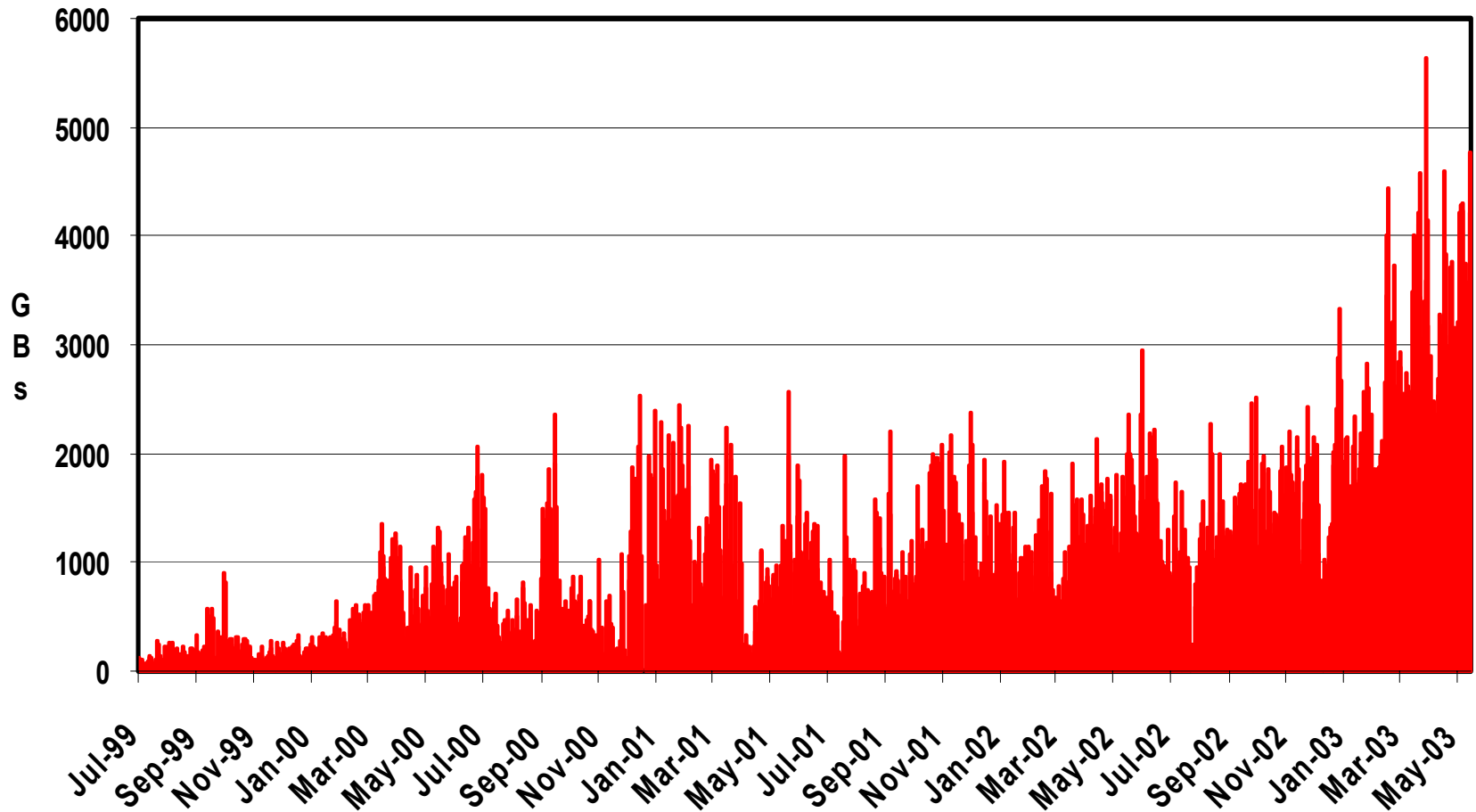
- Public HPSS 4.3 Solaris system
  - ◆ Non-BaBar experimental data
  - ◆ 13TB data stored



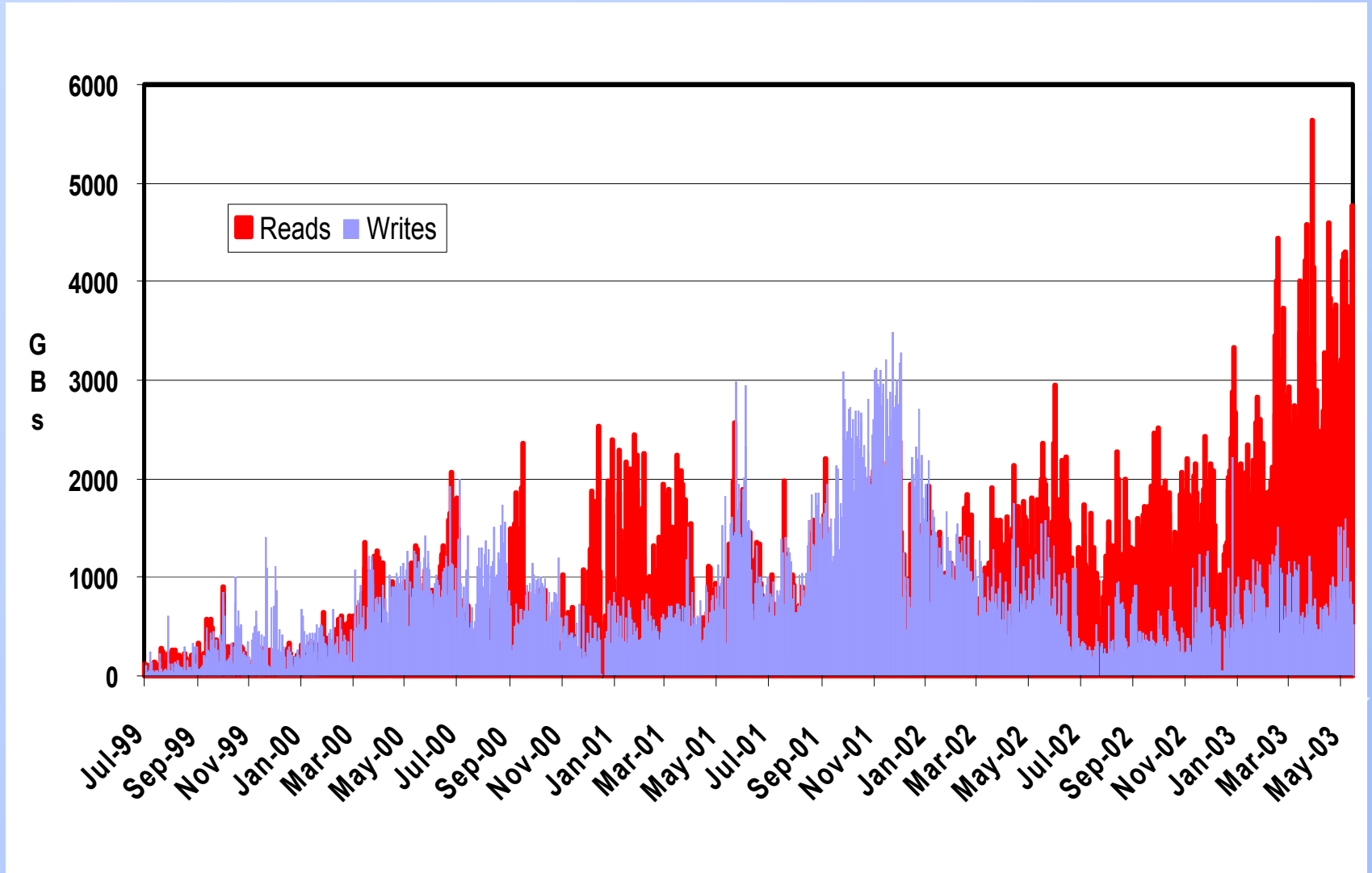
# HPSS Bytes Written per Day



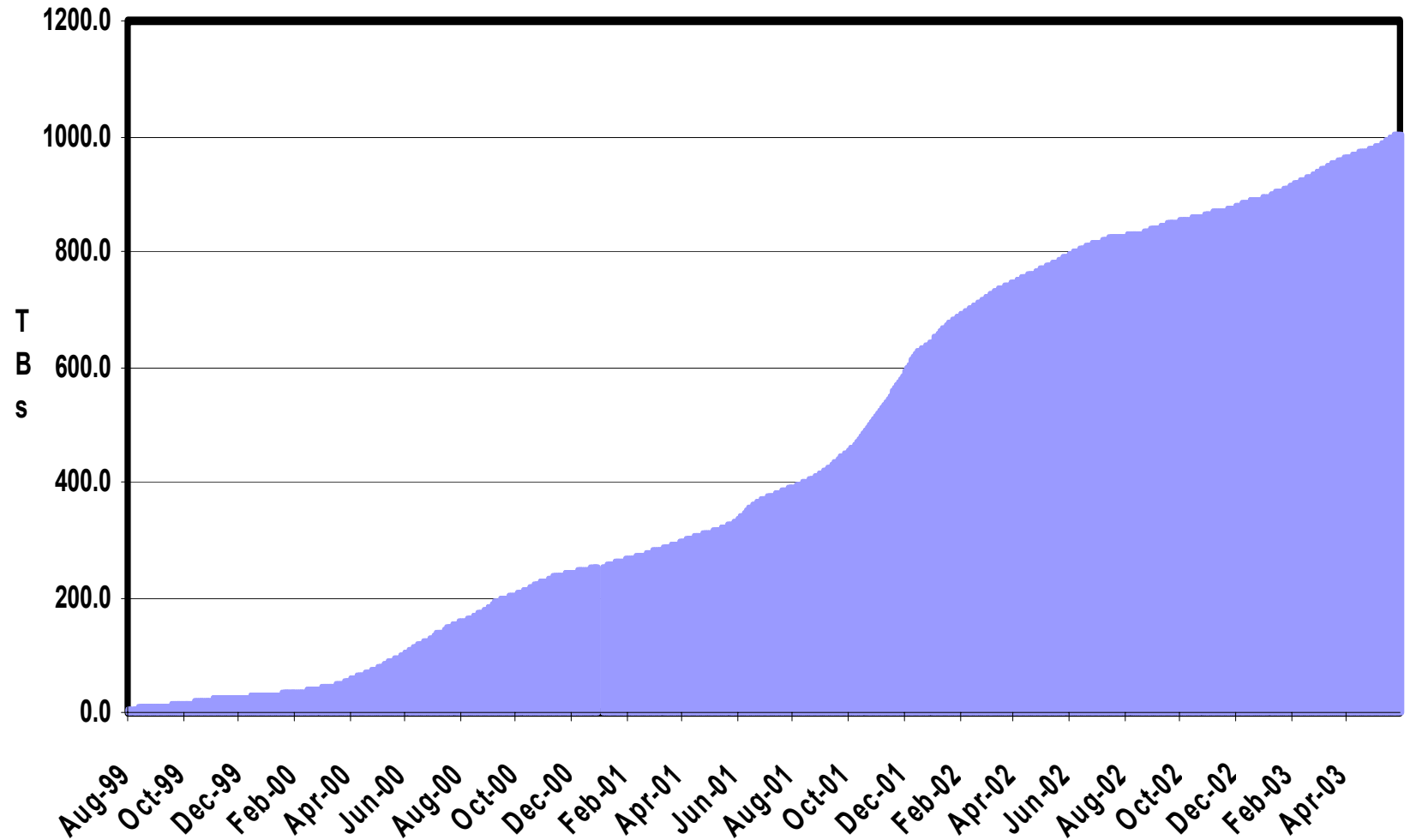
# HPSS Bytes Read per Day



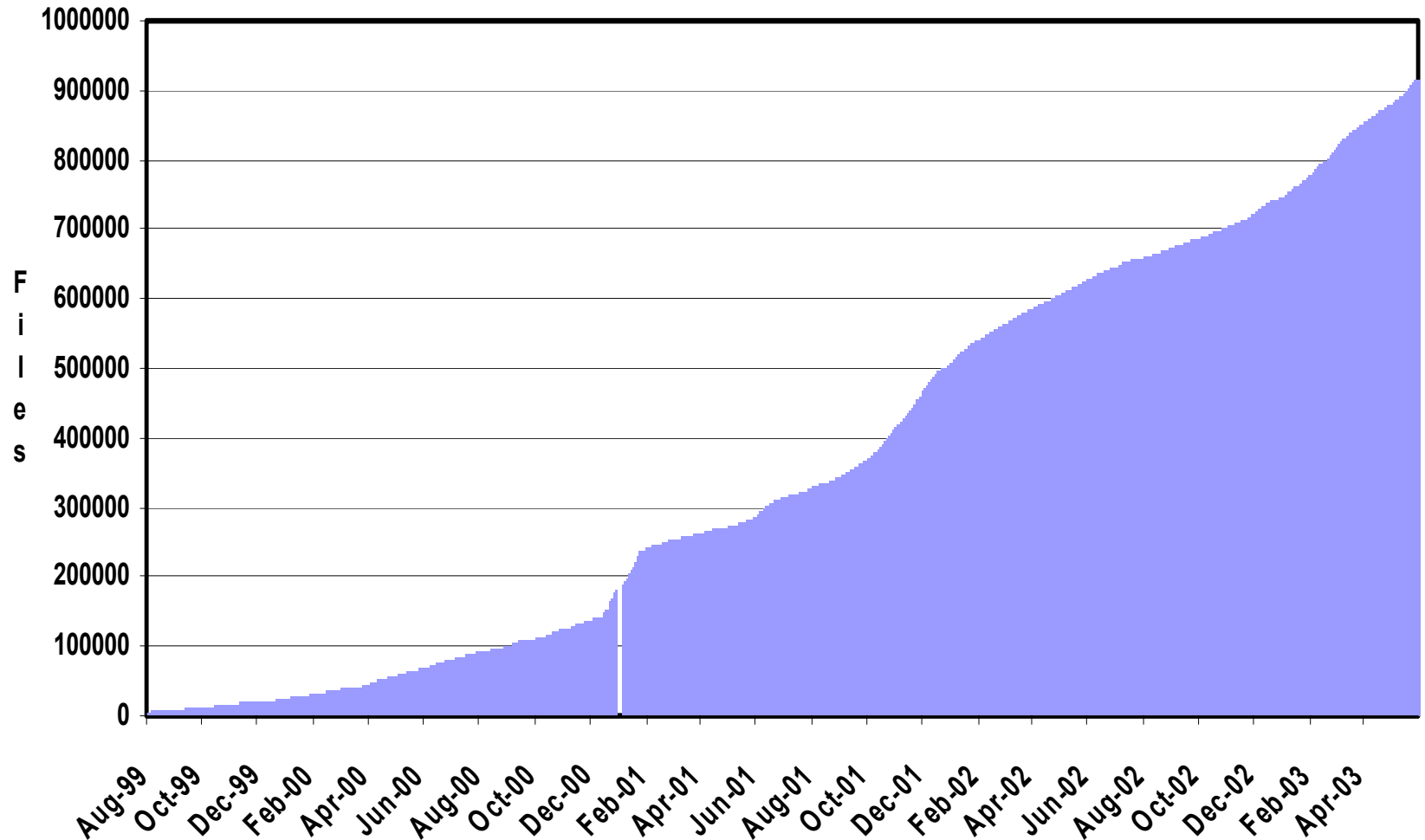
# HPSS Bytes Processed per Day



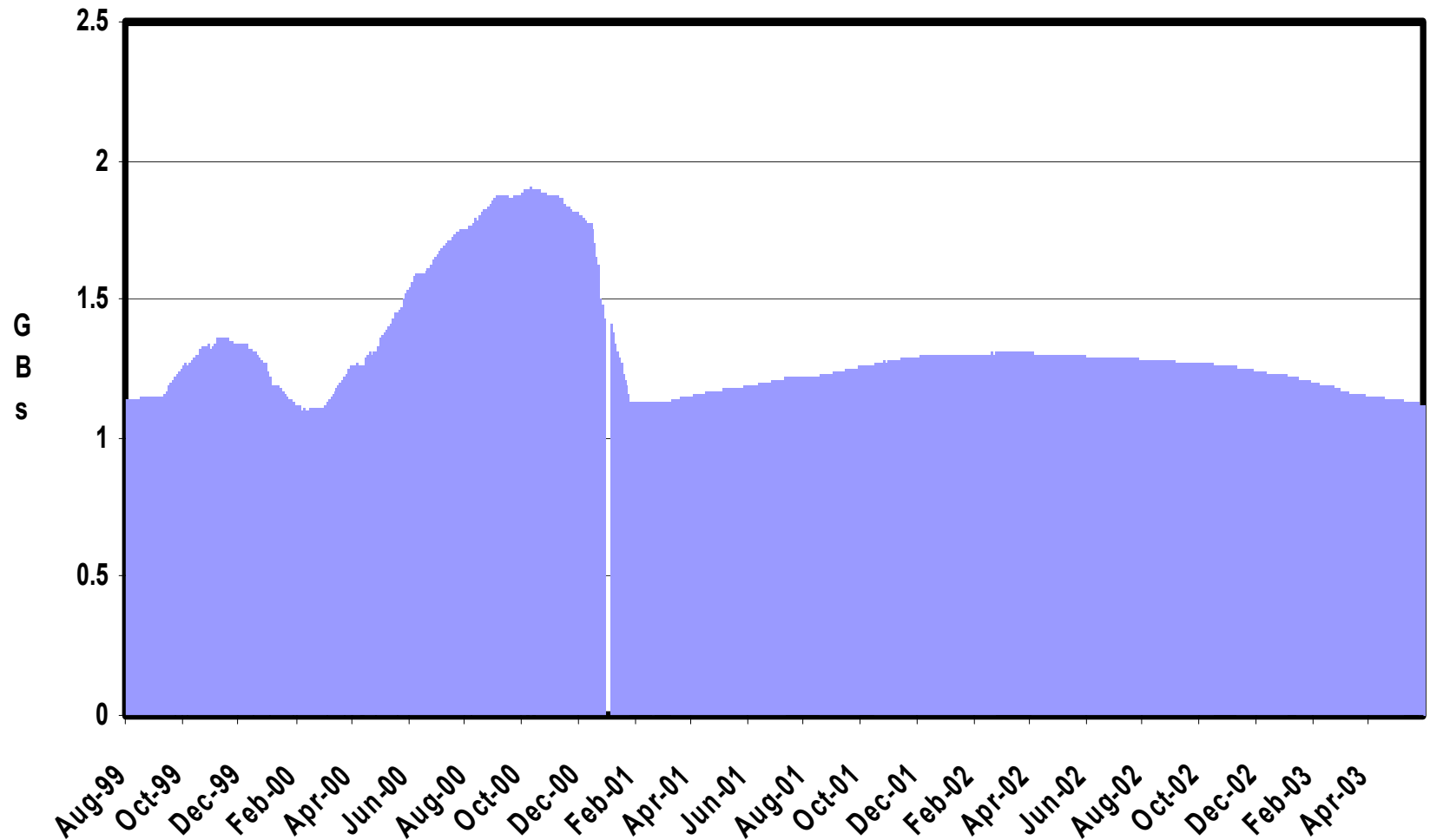
# HPSS Total Space Used



# HPSS Total Files



# HPSS Average File Size



# HPSS Reliability

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- Service outages since June 2002
  - ◆ 12 Separate outages, total down time 92 hours
  - ◆ 11 Unscheduled outages
    - ✦ 5 Power outages (19 hours)
    - ✦ 3 STK silo problems (18 hours)
    - ✦ 1 AIX crash (1 hour)
    - ✦ 3 HPSS software problems (2 hours)
  - ◆ 1 Scheduled outage
    - ✦ Building power outage (52 hours)
- System available 98.9% of real time



## 9940 Statistics

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- 740TB stored on 7089 tapes
- Tapes are 93% full
- Write errors on 108 tapes, 1.5% of tapes written
- Read errors on 74 tapes
- Drives replaced 24 times
- One tape has 709GB stored, compression ratio 11.8:1



# HPSS Problems

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- SSM System Manager crashes
  - ◆ Happens 4-7 times per month
  - ◆ Often Metadata Monitor also crashes
  - ◆ No resolution in sight
- Pftp login fails with “could not load thread state”
  - ◆ Transient problem, load dependent?
  - ◆ Upgrade from 4.1.1.4 to 4.5 may fix problem?



# HPSS Problems (continued)

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## ■ Tape Handling problems

- ◆ PVRS0174 STK drive in use or locked ...
- ◆ PVRS0251 Mount failed, no drives in robot are empty ...
  - ◆ HPSS out of synch with ACSLS, check for drives in use
- ◆ PVLS0090 Dismount failed, Elevate failed ...
  - ◆ Timing problem delays dismount
- ◆ PVL ss\_MountCallback hangs
  - ◆ Increase connection and thread count for Storage Server
- ◆ Tape mounting strategy when system over-committed
- ◆ Response time issues communicating with ACSLS



# HPSS Wish List

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- Migrate from 9940A to 9940B tape drives
- Dynamic device reconfiguration
  - ◆ PVL, PVR outages too disruptive
- Conversion from AIX to Solaris core server



# Summary

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- HPSS is reliable
- HPSS tape handling is a concern
- Software upgrades will always be a problem

