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HP 9000/E-Class

Quick Facts	
CPU	1 PA-7100LC 48-96MHz
Caches	64KB-1MB L1
RAM	512MB
Drives	5 SCSI
Expansion	2 HP-PB
Bandwidth	System 128MB/s I/O 32MB/s
I/O	10E SCSI MUX parallel

Overview

The E-Class "Wright Brothers" are low-cost PA-RISC servers from the mid-1990s and the replacements for the older F and G-Class Nova servers. Designed for reduced manufacturing cost they were developed in parallel to the HP 9000/712 workstations. The case was taken over almost unchanged from the F-Class, with the CPU/memory and part of the I/O systems being new designs. From the integrated LASI chipset only the networking and several other functions were used — due to time constraints a modified version of the F-Class HP-PB "Personality boards" was used for SCSI, serial MUX and parallel.

Model numbers, introductions dates and prices:

System	Model number	Introduced	Price
E25	HP 9000/806	1994	$6,000
E35	HP 9000/816	1994	
E45	HP 9000/826	1994	$11,320
E55	HP 9000/856	1995?	

Internals

CPU

- E25: PA-7100LC 48MHz with 1KB on-chip I L1 and 64KB off-chip unified I/D L1 cache
- E35: PA-7100LC 64MHz with 1KB on-chip I L1 and 256KB off-chip unified I/D L1 cache
- E45: PA-7100LC 80MHz with 1KB on-chip I L1 and 256KB off-chip unified I/D L1 cache
- E55: PA-7100LC 96MHz with 1KB on-chip I L1 and 1024KB off-chip unified I/D L1 cache

Notes

1. The 1KB on-chip L1 cache is not really a true cache.

Chipset

- LASI as central I/O chipset (not all functions are used)
- Wax ASIC
- HP-PB bus converter
    - 8MHz HP-PB frequency
    - Implemented from the HP_PB converter of the old HP 9000 F and G servers
    - GSC to HP-PB clock ratio from 3:1 to 5:1 synchronous with 32MHz GSC frequency
    - GSC to HP-PB clock ratio asynchronous with GSC frequency between 32 to 40MHz
    - 0.8µ in 208-pin MQFP

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- Several HP ASICs, controlling the HP-PB SCSI and MUX port

Buses

- GSC system level I/O bus (128MB/s)
- HP-PB additional I/O bus (32MB/s)
- SCSI-2 Fast-Narrow single-ended bus; main storage I/O

Memory

- 72-pin ECC SIMMs
- Takes 8-64MB modules
- Eight slots
- 16MB (2×8) minimum, 512MB (8×64) maximum

Expansion

- Two slots for HP-PB cards

Drives

- One tray for two 3.5″ Fast-Narrow SE 50-pin SCSI hard drives
- One tray for three half-height 5.25″ Fast-Narrow SE 50-pin drives, externally accessible

External connectors

- 50-pin HD SCSI-2 single-ended
- high-pin-count MUX connector
- TP/RJ45 10Mbit Ethernet[1]
- 15-pin AUI 10Mbit Ethernet[1]
- DB25 female parallel

Notes

1. The system automatically detects the used port.

ROM update

There is a firmware update available for the E25, E35 and E45, which contains the latest version (*1.3*).

- PF_CWBR0013.txt[Link 1] has details about the contents and installation of the patch.
- PF_CWBR0013[Link 2] contains the patch.

References

Articles

- Development of a Low-Cost, High-Performance, Multiuser Business Server System[Link 3] (PDF, HP Journal 4/95)
- HP 9000 E-Class Servers Product Brief[Link 4] (.pdf) Hewlett-Packard Company (1993: Hewlett-

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Packard)

Operating systems

- HP-UX: every 32-bit release from 10.20-11.00 works.
  - 10.20 for 800s servers: runs nicely.
  - 11.00: runs nicely.
  - 11i: officially unsupported but some releases work. Faster than 11.00 on the same hardware.
- Linux: works, but the hardware support for the E-class is very limited, *i.e.*, the SCSI subsystem does not work.
- NetBSD: experimental support as of 5/2005, however some I/O devices are not supported (*e.g.*, SCSI).

Benchmarks

Model	SPEC92, int	SPEC92, fp
E25	45.0	66.7
E35	65.6	98.5
E45	82.1	122.9
E55	108.0	163.4

Links on this page

Link 1: `ftp://ftp.itrc.hp.com/firmware_patches/hp/cpu/PF_CWBR0013.txt`

Link 2: `ftp://ftp.itrc.hp.com/firmware_patches/hp/cpu/PF_CWBR0013`

Link 3: `http://www.hpl.hp.com/hpjournal/95apr/apr95a10.pdf`

Link 4: `http://www.hpmuseum.net/document.php?hwfile=3745`

OpenPA is an independent resource for information on PA-RISC computers with in-depth technical descriptions and background information. Paul Weissmann is the main author and holds the Copyright © 1999-2010. His other interests include the current state of IPv6 implementations at IPv6 Intelligence. Openpa.net ISSN 1866-2757.

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