

**FHP vs Intel 432
Competitive Analysis**

PROCESSOR PERSPECTIVE

FHP ARCHITECTURAL ADVANTAGES OVER IAPX 432

Data services

- Much larger object size limit (FHP: 256Mb, IAPX 432: 64Kb).
- Memory management policies totally hidden.
- Ability to access files as objects.
- Totally separate addressing and protection models.
- Object identifiers wide enough to be true UIDs.
- Object identifiers not scarce, so no need to reclaim them.
- Bit-granular addressing supported directly.

Instruction services

- Very regular and predictable I-stream.
- Operand addressing has NO side effects.
- Single-instruction compare/branch and loop control.
- Direct support of string data through Name Table.
- Direct support of non-homogeneous arrays (tables).
- Full decimal repertoire (all types and lengths).
- Multiple S-languages.

Process services

- Extraordinarily fast Neighborhood Call.
- Accelerated argument transmission.
- Not limited to one static data segment per process.

PROCESSOR PERSPECTIVE

FHP ENVIRONMENTAL ADVANTAGES OVER IAPX 432

Maturity

- Architecture has had two major iterations.
- SPL is an effective systems programming language with a mature compiler that produces excellent code.
- Effective SPL coding practices have been defined.
- Performance metrics and tools are defined and available.

Traditional programming support

- Objects function well as large address spaces.
- IBM-format floating point preserves DG compatibility.
- Language breadth: FORTRAN, COBOL, PL/I
- State-of-the-art compilers and binders

Performance support

- Possibility of user microprogramming
- Wide range of binding options for performance

System issues

- Paged VM and object growth implemented
- OS scheduling and synchronization tools less rigid

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PROCESSOR PERSPECTIVE

ADVANTAGES COMMON TO FHP AND iAPX 432

Data services

- Segmented address space, as opposed to flat address spaces (M68000, VAX, MV/8000).
- Totally shared address space. Neither machine is confined to a per-process or per-processor address space.
- Robust (though very different) protection schemes. FHP uses Access Control Lists, iAPX 432 capabilities.

Instruction services

- Three-address, memory-to-memory architecture.
- Wide variety of signed and unsigned integer data types.
- Operators and operand addressing totally orthogonal.

Environmental issues

- System primitives accelerated into microcode.
- Very high-level systems language. iAPX 432 will use Ada. FHP uses SPL (similar to Ada).

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PROCESSOR PERSPECTIVE

COMPETITIVE POSITIONING

Competition	Complexity (No. of devices)	Chip Set Performance	Product Status
Fujitsu (16-bit μ proc)	40,000		Production in 1980
Motorola (16-bit μ proc)	70,000	16-bit multiply, 32-bit result in 9.75 μ sec	Production in 1980
VLSI FHP (32-bit μ proc)	100,000	32-bit multiply in 2.25 μ sec; accumulator to memory add in 0.5 μ sec	1985?
HP (32-bit μ proc)	450,000	32-bit multiply in 1.8 μ sec	Experimental
Bell Labs (32-bit μ proc)	100,000	reg. to reg. add in .375 μ sec	Soon
Intel 432 (32-bit μ proc)	50,000- 100,000	32-bit multiply in 6.25 μ sec	Samples

ANALYSIS

- VLSI FHP is competitive with both the Bell Labs and HP experimental products.
- Primary visible competition is the Intel 432. Based on device level performance, VLSI FHP is more than competitive with the current 432.

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