
HP: The Best
Alternative to
Mainframe Computing
The New Demands
Introduction

For several years, Management Information Systems (MIS) executives have increasingly acknowledged the need for more cost-effective computing than mainframes. Unfortunately, acceptable alternatives to mainframe-based computing have been lacking—until now. Today, many IT executives hold the opinion that future IT environments must be user based. With the rapid emergence of technologies like client/server, the question is how to get to there?

A Brief History

Most current mainframe environments are based upon hardware and software philosophies that rose in the late 1950s and 1960s. The applications were primarily batch processing. Data processing was the domain of small groups of `elite' technicians, while users had little or no access to the computer. The 1960s and 1970s gave us progressively larger batch processing computer systems that emphasized the automation of repetitive tasks to process progressively larger amounts of data. Computing was still tied inextricably to mainframes, but slowly the pool of users with access was broadening as the cost of computing came down. At the same time, the requirements for transaction processing applications appeared. These were implemented on top of the batch processors.

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Figure 1: The Emergence of a "New" Data Center

The late 1970s and the 1980s saw the emergence of "mini" or midrange computers—multiuser systems that brought computer resources to the department level and closer to the user. These systems were sold by vendors directly to functional user managers, bypassing the MIS departments. Hence, midrange computers did not have special requirements, water-cooling environmental, complex administration, etc. The early 1980s saw the emergence of the personal computer (PC). PCs furthered the evolution towards decentralized computing and the inherent loss of control by the

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corporate information technology (IT) department. PCs could act as terminals to a host and shuttle data back and forth. The empowerment of the user began.

In the 1990s with the emergence of powerful RISC-based systems that scale from the desktop to the data center and powerful, new software or "middleware" (where systems share the work of data processing, each doing what they do best), we see the realization of user-based computing accelerating. Users, whether managers, builders of applications, or end users, will have the ability to cost-effectively and transparently access information across the entire enterprise. Today, with these new RISC-based commercial business systems, there is a significant opportunity to deliver much more efficient IT solutions. Further, it is this revolution that is a significant factor in pushing the traditional mainframe into obsolescence.

COOPCOM.PLT;4.565";3.356";HPGL

Figure 2: HP: Cooperative Computing for the User

As user-based computing grows, mainframe-based data centers will undergo dramatic changes. Gartner Group predicts ". . . the mainframe segment of the Online Transaction Processing (OLTP) market will decrease from 55% to 43% by 1993." Additionally, over the last three years, the number of MVS sites has declined by 18%. Mostly due to support of "legacy" or older applications, mainframes will be here for quite some time; however, their market share decrease is only beginning and will accelerate as migration/conversion tools and services become more powerful on alternative platforms, like HP.

The Economic Shift

Five powerful and accelerating business forces will recast the role of information technology (IT) and its historical dependence on the large central mainframe systems.

‡ *Worldwide competition* is increasing in all industry segments. This demands absolute improvements in an organization's cost structure, quality and service. Time to market must be compressed dramatically; this requires much greater shared information across corporate boundaries. Heightened global competition also means tighter budgets. IS (Information Systems) organizations must be more aligned

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with the business.

‡ *Organizational flattening* makes companies leaner, more cost-effective, and more responsive to customer and market needs. Hence, the traditional support staff infrastructures are being eliminated. This will require changes and re-engineering of business processes to support the organization. During these changes, IS can have a very significant impact. Traditionally, the mainframe has served to fossilize the very business processes that managers want to change. This has helped to erode IS's ability to manage in a rapidly changing world, according to IDC, 1992 ". . . the relative influence of MIS in purchase decisions has dwindled from 85% in the 1960s to 40% in the early 1990s." However, as a facilitator of change, along with the new technologies of the 1990s, IS can help to lead and manage in the restructuring that is occurring.

‡ *Economic, political and technological unpredictability* necessitates flexible business units that can respond rapidly to change. IS must be able to facilitate and manage change. Standards, particularly interoperability of networks, databases and applications, and modularity of systems will enable flexible business restructuring upon demand. Actually, much of the growth in open standards and peer-to-peer infrastructures is in response to the massive changes happening around the world today.

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† *A focus on core business competencies* will be critical to the sustained success of an organization. It means companies must concentrate on what they do best. Increasingly, organizations are forming alliances to complement their core competencies. These alliances or partnerships are generating the need for new levels of inter-enterprise interfaces to support external data exchange and business transactions. For example, a customer transaction at a car rental company may also coordinate with the promotions or products of other companies based on the customer's past travel-related buying patterns.

† *Customer service and satisfaction* is becoming the new battleground for competitive advantage. As the example above shows, greater focus on the customer can mean more revenue, more revenue per transaction, and greater customer satisfaction that enhances customer loyalty. Since the end user is the interface with the customer, it is important for IS to have an aggressive stance to user-based computing.

The Technology Shift

Access to new, more cost-effective technology is inspiring the shift from mainframe-based to user-based computing. In a June 4, 1990, *COMPUTERWORLD* survey (194 IS Chiefs), "48% of the respondents said they were considering mainframe alternatives." Greater flexibility, reduced cost, and greater user access were recognized as the principal benefits. As little as two years later, a 1992 Forrester survey shows this trend is rapidly accelerating, ". . . a staggering 80% of the 75 Fortune 1000 firms interviewed are looking to break the mainframe's grip on application processing."

Hewlett-Packard today has the technology and support structure to allow progressive enterprises to adopt cooperative computing information architectures to effectively manage these shifts. While still using mainframe-based computing, newer, more strategically-based systems are user-based—adopting HP computer systems in many cases. With huge investments in current computing assets, any step forward has to protect those investments. The ability to initially co-exist in this fashion, while evolving to more cost-effective, user-based computing is HP's vision, direction, and delivery. This process allows customers to modify and re-systemize their business in an evolutionary, non-disruptive fashion.

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The technology issues that drive interest in mainframe alternatives include:

‡ *Older mainframe models are prohibitively expensive.* There are well over 20,000 43XX, 308X and low-end 3090 mainframes that are no longer cost effective and are lagging technological advancements. Conversely, midrange systems, like the HP 3000/9000, have cost effectively grown in performance and capabilities. HP's newest class of systems today provide similar performance to IBM's water-cooled ES/9000-660 at 1/5 the cost, and this is just the first step in HP's systems performance growth . . . the gap is closing!

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Figure 3: The Gap is closing between the Midrange and Mainframes

Gartner Group/LCS, 1991, predicts that intermediate mainframe shops will increasingly seek alternatives. ". . . *The effect of compound growth rates over the last five years has created a wider disparity between 'large' IBM mainframe shops and 'intermediate' mainframe shops. As most of the new functionality focuses on the large shops, the widening performance band increasingly exposes IBM to losing its intermediate-size shops. Once lost to back-level machines (43XX, 308X, 3090-IXX/ 2XX/ 3XX), it will be exceedingly difficult for IBM to shoehorn new technology into user budgets. Without differentiation and out of the IBM mainstream, intermediate-size shops will increasingly turn to alternatives.*" The cost to stay current in the mainframe environment is rapidly escalating.

CGAP.PLT;4.565";3.356";HPGL

Figure 4: In the future, the Cost Gap will Rapidly Grow

‡ *Many mainframe-based applications sorely need updating.* These applications either represent aged technology—primarily batch processing with limited OLTP—or simply do not meet today's business requirements. In contrast, early adopters of client/server computing, by providing a graphical user interface (GUI) client, ". . . *have seen*

>35% more tasks completed,
>16% fewer errors,
>51% lower frustration and
>23% more tasks attempted"

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(Source: Temple Barker & Sloan, GUI Research Study, 1991). More importantly, by making the proper capital investment today, early adopters are best positioned to competitively meet tomorrow's business needs. As well, they can evolve towards a more complete client/server topology for even greater productivity gains with no or little new capital investment.

Additionally, in 1992 many new enterprise-wide client/server based applications are coming to the market—SAP, Dun & Bradstreet, PeopleSoft, Datalogix, Collier-Jackson, Mitchell Humphrey, DRC, Software AG, etc. In most cases, HP was the first platform of choice by these application providers. Gartner Group, 1991, suggests ". . . *there is a 70% probability (the highest of any platform) that midrange systems (e.g., HP) will evolve to become Enterprise Server Platforms (ESPs).*" Many of the reasons Gartner Group uses to substantiate their conclusions include investments HP is making in

- open systems
- a next generation "middleware"
- scalability from the desktop to the data center
- lower cost of processing
- flexibility in application deployment
- development of enterprise-class resource management

† *New technologies are robust enough to handle most enterprise-class applications.* Functionality, availability, serviceability and tools (FAST) have grown dramatically for HP systems—whether it is managing the resources of the systems (e.g., integrated management, backup/restore, scheduling, printing), providing high availability (e.g., mirrored disk, disaster tolerant configurations), or enhanced enterprise-class service and support. Additionally, the standards are based on "middleware" (e.g., DCE, DME, DOMF, OpenODB, Transarc/Encina) that is being driven by HP and other vendors and will

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enhance the robustness and capabilities of user-based networked computing. This "middleware" will significantly enhance IS's ability to become even more an integral part of the organization. It will provide for flexible, transparent, available access to information across the enterprise in a secure and manageable manner, while ensuring data integrity and performance scalability from the desktop to the data center.

The Process: How To
Get There From Here

What is "Rightsizing," "Downsizing," or "Mainframe Alternative?"

HP has "coined" the term mainframe alternative. It is used as an umbrella term to describe the various alternative scenarios:

- a. *"Replacing"* of a mainframe outright (typically a 43XX, 308X, or 3090- 1XX/2XX/3XX class system)
- b. *"Downsizing"* to smaller, replicated systems (actually as less expensive large systems emerge, for example, HP's Corporate Business System, downsizing will lose momentum and be seen primarily as a short-lived phenomenon)

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c. "Rightsizing" to a system of the appropriate capacity, or

a fourth approach, "**Offloading**" (typically from a 3090-3XX+ class system) an application(s) to a more economical HP system, eliminating the need for expensive mainframe upgrades and laying the foundation for eventually eliminating the mainframe entirely.

Mainframe alternatives may include smaller and/or larger systems and centralized and/or distributed systems; the common thread is that the solution has superior economics and superior end-user function and service.

If we use "offloading" and "replacement" as representing the definition of mainframe alternatives, HP, has worked with well over 100 customers over the past 18 months in successfully moving them to HP. Roughly 40% were "offloads," while 60% were "replacements." Additionally, the majority were new customers to HP.

The Steps . . . Moving from the Mainframe to HP

† **Step 1. Assess the status quo.** The following are a few considerations to examine:

General—find the incentive(s)

- Is the organization under profitability and competitive pressures?
- Is senior management educated as to how IT is or can be a strategic part of the business?
- What is the degree of management and user satisfaction?
- Would the business benefit from better functionality and improved response time?

Cost justification

- IS organization budget pressures?
- Is it time to upgrade or renew a system lease?

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- How much higher are your support/maintenance costs for hardware and software against those of a comparable midrange computer (for example, HP 3000/9000)?
 - How do your software license fees compare against those of a comparable midrange computer?
 - Are over 30% of your programming staff dedicated to maintenance of current systems?
 - How does the cost-per-MIP or \$-per-transaction compare?
 - What is the cost of maintaining your current computer facility, including power usage, cooling units, cost per square foot? Is it an expansion of the physical facility needed?

Application effectiveness today

- Do existing applications adequately meet current business needs?
- How large is your development backlog and how productive is your current development staff?
- Do future applications call for client/server or distributed computing?
- What are the criteria in determining which applications to offload or replace first?
- Does compiling programs compete with production resources?
- Are your systems mainly batch?

† **Step 2. Evaluate your information architecture from an objective, top-down viewpoint.**

How can it give your enterprise an operational advantage over the competition (reshaped business processes)? How can it lower cost/increase functionality? What are the priorities for change?

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‡ **Step 3. Develop an architecture from the bottom up.**

Where is data generated? What functions must be performed on it?
Where must the information go?

‡ **Step 4. Gain top-level management commitment.**

This is important. What are the tangible benefits (for example, IT ROI)?
What are the intangible benefits (for example, business processes'
improvements)? Are the "users" involved? (They can be strong allies
or strong foes.)

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Step 5. Assess your migration strategy.

When moving applications from a mainframe, there are five implementation approaches. Any strategy may include one or all of the approaches. The combination of approaches is dependent upon a customer specific environment. The descriptions that follow are in order of increasing migration complexity.

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Figure 5: HP's Mainframe Alternative Solution: Five Implementation Methods

1. **Transfer.** Many mainframe software providers have ported their products to the HP environment. Application vendors include, but are not limited to, IBI, Software AG, CINCOM, Dun & Bradstreet, SAP, SAS, Computer Associates (CA), PeopleSoft, Lawson and Cyborg. These vendors' applications and associated data provide the easiest migration or porting path to HP systems to reap cost and quality benefits.

2. **Surround.** Some organizations face a dilemma, they realize their mainframes are not cost effective but their outdated applications are deeply entrenched making migration difficult. In these cases, many choose to surround the systems and applications with newer technology to add new functionality. This is usually based on the client/server model involving HP 3000s or HP 9000 Series 800s as servers and/or HP 9000 Series 700 workstations as high-function clients. Though application functionality moderately improves through a graphical user interface (GUI), more importantly a flexible client/server infrastructure is established in which to evolve applications towards.

3. **Replace.** In many cases, the mainframe applications are outdated and require a high level of maintenance or have large backlogs of enhancements requested. HP has many enterprise-class solutions that have, in many cases, superior functionality (for example, ASK, Datalogix, DRC, BSA, Mitchell Humphrey, Collier-Jackson, VTLS, Inlex, Uniplex, R&D, Brock, Fourgen). Customers choosing to update an application or move to next generation client/server applications should analyze a replace strategy.

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4. **Convert.** Flat files, that is, VSAM, can migrate over as is. Relational databases, as well, provide a relatively straightforward migration, particularly when DB2 or SQL/DS databases on the mainframe have kept their adherence to the ANSI SQL standard. CICS/COBOL, which represents roughly 83% of all OLTP code, can be converted. With little effort, HP partners, Infsoft, Integris, Zortec (Unisys), VI Systems and Jacksonville Software, provide conversion tools. As an example, Infsoft Conveyor product provides for 95%+ CICS/COBOL conversion, leaving only items like error codes, etc., to be customized to each customer's requirements. Partners like Infsoft have a relationship with IISI, a system integrator (see Integrators below), to provide a "one-stop" migration/conversion services. Additionally, other tools exist to ease the migration from mainframes to HP.

5. **Rewrite.** Customers with customized mainframe applications frequently have chosen to rewrite their applications to take advantage of new functionality, business re-engineering, or new technology (for example, client/server). Though "off-the-shelf" solutions are increasingly preferred, many times customized solutions can increase environments, for example, CASE tools, to assist in these situations.

† **Step 6. Assess the technology change.**

It is important to assess the change to minimize disruption and reduce transition cost. The following types of questions should be reflected upon:

- Whether centralized or distributed, have you determined the right size system(s)?
- DASD space requirements? (HP systems tend to use 30% less DASD or disk than mainframes for the same amount of data.)
- Can you move away from heavy dependence on tape processing? (HP systems support devices like 3480/3490s; however, rather than be used as a production device, HP systems typically use tape as a backup or data transfer medium.)

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- What happens to 3270 devices? (PCs in many cases have better economies than 3270s due to high maintenance cost of the 3270.)
 - How many terminal/client devices are needed? (HP systems are highly interactive and the number of users tends to go up.)
 - How are existing print jobs going to be supported? (HP provides printing based on industry standard PCL from the desktop to the data center; additionally, firms like IDATA provide conversion tools from IBM's AFP and OGL to PCL.)

† **Step 7. Select partner(s) for each area that best meet(s) your requirements.**

- System provider/project manager (HP).
- Software solutions (applications, 4GLs, RDBMS, etc.).
- Application/system consultants (Innovative Information Systems [IISI], Cap Gemini, Andersen Consulting, etc.).
- Migration/conversion tools (Infosoft, Zortec, VI Systems, Jacksonville Software, etc.), if necessary.

† **Step 8. Develop project plan.**

What resources (for example, staff, data structure and flow, inventory of screens, reports, files, processes) are available? Timeframe? ROI? Pilot or test bed project? How will change and retraining be dealt with? What is the contingency plan? Does your plan include the "user"? This becomes the "roadmap" in moving from the mainframe to an HP type system. It also should be conservative in terms of timeframes, contingency issues, and so on.

† **Step 9. Execute.**

That's right . . . just do it. This is too large an opportunity not to gain the business results and the success that come with it. Work with technical consultants from HP's professional services organization and our partners to smooth the transition.

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Match the Business Structure

Business re-engineering has been one of the most broadly talked about concepts of the past few years throughout the business community. A survey by Index Group, Inc. 1991 indicates, " . . . *reshaping business processes has vaulted to become the No. 1 concern of 243 U.S. and Canadian IS executives.*" Enterprises are starting to refocus on fundamentally changing the way they approach traditional business functions. Being user focused is the key. The study goes on to suggest that ". . . *IS executives strongly believe that more user involvement in systems specification is needed. An overwhelming majority, 87% in Europe and 83% in North America, agreed that getting the systems requirements right is the key to producing successful IS.*"

HP has seen customers use "downsizing" or "rightsizing" as a way to pursue reshaping their business processes to gain many of the business benefits discussed earlier. The following is a list of re-engineering principles summarized from an article by Michael Hammer in *Harvard Business Review* that many HP customers have successfully employed.

1. *Organize around the outcome, not the tasks.* As we specify application functionality and technology alternatives, a first step should be the evaluation of the underlying business processes. In this evaluation, organizations, departments and workgroups should be reorganized to simplify processes and streamline outputs rather than tasks.

2. *Have those who use the output of the process perform the process.* A key to improvement is to empower those in a position to enhance the process. Wherever possible, management should empower the individual.

3. *Subsume information-processing work into the real work that produces the information.* The information automation model must reduce the passing of tasks between departments by a common information repository/database. Today, paper is passed between departments for signoff and processing. These processes reduce operating efficiency and can be eliminated with integrated systems.

4. *Treat geographically dispersed resources as though they were centralized.* Decentralization as a business theme for manufacturing

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should be modified to `decentralization to the appropriate level.' Guidelines and standards should be established by cross-divisional teams with the primary motivation being to reduce the burden rather than adding to it—this is the rule of `economies of scale.'

5. *Link parallel activities instead of integrating their results.* In manufacturing, this principle is being broadly applied in engineering as concurrent engineering.

6. *Put the decision point where the work is performed and build control into the process.* For several years now, manufacturing companies have used this principle to incorporate a quality ethic into the process rather than inspecting the final product. This principle again reiterates the need to empower the individual with information and decision-making capability.

7. *Capture information once at the source.* The key to the success of this endeavor is the establishment of a common core information technology (IT) architecture among the functional areas (for example, sales, finance, etc.).

In each of these principles, the change proposed can dramatically improve overall operating performance. However, these suggested changes are often radical, difficult to adopt, and virtually impossible to justify with traditional financial analysis. Therefore, many managers use the reduction of IT operating cost and long-term capital expenditures (mainframe alternative) to provide the tangible financial justification.

The Challenges

There are certain challenges that exist in virtually every mainframe migration that need to be considered and planned for.

† ***The Politics and the People.*** It is easy to become emotionally attached to technology and the status quo it represents. This often makes an objective mainframe alternative evaluation difficult. The very factors that make an alternative, like HP, an attractive business decision also make it difficult at times to sell and implement . . .

A. *Advanced architectural design.* The advanced architecture (for example, PA-RISC, single-level storage) of HP computers makes them

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different from mainframes. An effort is needed to understand the characteristics of HP systems and how they can benefit the organization at large.

B. *Programmer productivity.* Programmers support the concept of higher productivity—in the abstract. When the implementation threatens to disrupt their lives, they often find subtle ways to resist. HP systems, for example, can provide much greater productivity via products like HP's SoftBench that will yield more and better applications for the enterprise. The introduction and implementation of this new environment needs to be carefully managed.

C. *Ease of use.* The traditional mainframe environment is complex and presents IS management with a steady stream of difficult decisions. Mainframe professionals tend to feel that they are a necessary part of a complex process. However, the ease of use of HP-like systems can change these requirements. In turn, new opportunities and requirements arise for many individuals—better aligning the needs of the enterprise and users with new IT technologies, planning how to leverage new technologies and their benefits into the organization.

D. *Reduced costs and staffing.* Traditionally, many managers took pride in the size of their staff and budget. For good reason, historically, many companies have set pay and perk levels based on these criteria. A reduction in IS budget and staff is therefore not always welcome news to managers. However, HP case studies show getting more done with less via mainframe alternative solutions brings increased respect to IS and, in many cases, greater leverage over the organization. Typically, IS has better aligned with the users, enhanced the productivity of the organization, and shown new value in the use of information technologies.

How can senior management ensure a mainframe alternative (for example, HP) is given appropriate consideration?

1. Ensure that IS management is actively included in corporate planning. If IS management participates in the planning process for the organization, it is more likely to think in terms of what is best for the organization as a whole.

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2. Align IS goals with organizational priorities. Management must ensure that IS is focused on solving problems for other functional departments. IS should be measured on the cost-effectiveness and quality of the solutions it provides and on the satisfaction level of users it serves. The goals of IS should be stated in business and not technical terms.

3. Reward true cost savings. IS management must be provided with positive incentives to improve their productivity. Many organizations indirectly punish managers who reduce costs by basing compensation on budget and headcount. Senior management must be prepared to reward IS management directly for improving its productivity.

4. Increase the objectivity in the evaluation. It is more difficult to favor an approach that saves money if one's own salary might be a part of the savings. Since this process can represent dramatic change, one of the most difficult tasks is to proactively manage the evaluation so that individuals who feel threatened cannot act in a self-serving fashion.

5. Develop approaches to overcome staff resistance. Some personnel policies and strategies that have been successfully used:

- *No layoff assurances.* It is usually possible to accomplish any staff reduction goals through attrition. It can help to assure key technical personnel at the start of the evaluation that they will not be laid off. HP has seen that most customers redeploy some staff to user groups or applications development.
- *Fixed term agreements with bonuses.* A migration from mainframes to alternative systems can take months and sometimes longer. Many organizations starting a migration from a mainframe to HP have identified key people needed to support the mainframe and have offered them special bonus incentives to stay until the migration is complete.
- *Guaranteed retraining.* Computer professionals are usually concerned about building their professional skills. A commitment to train key personnel as part of the plan for migration can reduce the risk of losing them. With HP's focus on delivering open systems, this can

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actually enhance their marketable skills.

† **Determining the Role of the Client and the Role of the Server.**

Many organizations use mainframe alternative solutions as a transition stage or path to client/server computing. The challenge is to optimize on the key strengths of each component—the client and the server.

The desktop or client (for example, Windows, Motif based) role provides for greater "evolvability." For example, a workstation (e.g., PCs, HP 9000 Series 700s) in terminal emulation-mode can provide productivity gains (see *The Technology Shift Section*), while also establishing the infrastructure from which more complete client/server applications can be implemented "down the road" without necessarily making additional capital investments. Additionally, workstations have proven very effective in offloading decision support, office automation, and computer-aided design/engineering/manufacturing (CAE/D/M) applications from the mainframe to the desktop. The mainframe proves to be a very expensive and somewhat inflexible platform from which to build client/server based systems.

When distributing an application, the table below provides a basic framework on where the elements of the application are best served, that is, the optimal role of the server and the optimal role of the client.

C/S Style
Efficiency
Integrity
"Evolvability"
Manageability
Host/Server
Higher
Higher
Lower
Higher
Desktop
Lower
Neutral
Higher

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For example, centralized host control is critical if the efficiency, integrity, and manageability of the data are to be optimized. This is the role of the server. Further, it is easier to maintain (more cost effective, etc.) one or a few host-based systems than dozens or hundreds of desktop-based systems. For these reasons, systems like the HP 3000 are more ideally targeted for "mission-critical" applications— applications which serve core business functions. The value is that each (client and server) provides complementary strengths and much more cost-effective user-based computing.

The Results

The ROI

Alternatives to mainframe computing have brought users on ". . . average \$1.7 million per year . . . in savings" (Source: Forrester 1992) and ". . . as in some cases in excess of \$10 million" (HP 1991). The following exemplifies the tangible cost benefits a few HP mainframe alternative customers have witnessed:

† Excellon's goal was to ". . . reduce the IT budget from 2.5% of sales to 1.5% with no compromise in product quality or customer service." With HP 3000s they did.

† General Chemical reduced their ". . . IT operations costs by over 70% . . . this translates into \$2 million per year . . . within a 9 month timeframe."

† Foxboro "for a \$15 million capital investment" generated ". . . over \$10 million per year in operations savings." This was a 15 month payback period. Their decision to chose HP 3000s was based on the following criteria:

- Proven technical innovations over several years.
- Open architecture based on industry standards.
- Scalable solutions from the desktop to the data center over an integrated operating environment.
- Resources of a global supplier, with good local support and adaptation.

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- Broad third-party software solutions.
 - Excellent price/performance based on total cost-of-ownership, including purchase price, training, maintenance, supplies, software expense, power, air conditioning, floor space, and support staff.
 - Good purchase agreements and competitive terms.

† \$1 billion Agorpur/Natrel ". . . faced sales and billing problems that its mainframes couldn't solve. Four HP 9000s later, the company is saving \$1 million per year."

† Acustar (subsidiary of Chrysler), saw". . . better productivity, price/performance and lower maintenance cost" with HP.

† Macleod-Stedman saw ". . . \$400,000 annual savings in system software costs . . . \$300,000 annual savings in staff costs . . . \$500,000 annual savings in other areas, including hardware maintenance and support."

The following example illustrates the financial justification and savings potential. Whether a 43XX, 308X or 3090-class system, the financial analysis still applies. Additionally, depending on the complexity and size of the mainframe environment, the implementation timeframes may be longer or shorter.

ABC, Inc. (a real company, but, due to the sensitivity of specifics discussed, the name has been changed), a \$600 million discrete manufacturer, found themselves facing mounting cost pressures due to increased competition and a significant computer upgrade situation in early 1991. Their existing IBM 4381 would reach full capacity in six months and their HP systems in 18 months. Their decision had to be cost effective, cater to their computing requirements over the next five years, and provide them with an easy growth path. After an investigation, ABC, Inc. narrowed their choice to one of two options:

1. Upgrade the IBM 4381 now and the HP systems in two years' time. Upgrade the IBM 4381 again in five years' time to an IBM 3090-200J (or equivalent), or
2. Upgrade the HP system immediately and migrate

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applications running on the IBM 4381 onto the HP system. In five years' time, upgrade the HP 3000 system.

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Table 1: Option 1: Maintain and upgrade existing IBM and HP systems

Year 1	
Year 2	
Year 3	
Year 4	
Year 5	
Lease for IBM	\$228,702
	\$372,160
	\$410,085
	\$448,010
	\$760,505
hardware including upgrades	
IBM hardware and	
	581,967
	611,068
	641,622
	673,703
	781,125
software maintenance costs	
Lease for HP hardware	
	73,980
	90,973
	97,958
	122,722
	129,707
ware including upgrade and additional HP software	
HP hardware and	
	128,070
	134,475
	141,197
	148,275

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155,670
software costs
Facilities and

1,492,855

1,581,748

1,675,945

1,775,757

1,881,518
operations cost

Total Yearly

\$2,505,574

\$2,790,424

\$2,966,807

\$3,208,467

\$3,708,525

Costs

Table 2: Option 2: Migrate IBM applications to an upgraded HP system

Year 1

Year 2

Year 3

Year 4

Year 5

9 month lease for
IBM 4381 during
migration phase
9 month IBM hard-

\$171,527

436,477
ware and software
maintenance costs
Lease for HP hard-

344,272

\$334,170

\$342,897

\$368,998

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\$451,403 ware including upgrade

Lease for existing

50,363

50,363

50,363

50,363

50,363

HP hardware (peripherals, etc.)
HP hardware and

191,432

201,003

211,052

221,607

232,685
software maintenance costs
Facilities and op-

1,193,945

1,262,410

1,334,977

1,411,888

1,493,407 erations cost
Conversion of IBM

456,752

applications (including training, etc.)

Sale of existing

(181,818)

IBM 4381

Total Yearly Cost

\$2,662,950

\$1,847,946

\$1,939,289

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\$2,052,856

\$2,227,857

Table 3: Net Yearly Savings of Option 2 versus Option 1

Net Yearly Savings Option 2 versus Option 1
--

(\$157,376)

\$942,478

\$1,027,518

\$1,155,611

\$1,480,668

The second of the two options clearly showed that migrating the IBM applications to an HP system was the most cost-effective option. ABC, Inc. total net savings over the five year period will amount to almost \$4.5 million with an expected payback period of 31 months.

More than ROI

As discussed earlier, the benefits of user-based computing versus mainframe systems goes beyond a measurable return on investment.

† Corporations like Foxboro have seen how reshaping the business processes to meet changing and challenging environments has tremendous benefits ". . . *streamlined order flow . . . order entry manpower cut by 50% . . . on-time shipments and a 75% reduction in order cycle time . . . up to an 80-fold increase in engineering productivity. . .*"

† Again, Macleod-Stedman benefited from business processes being reshaped ". . . *access to information measured in minutes instead of days . . . substantial reduction in inefficient manual operations.*"

† Fuji Bank stated that HP delivered ". . . *cost-effective alternative to a mainframe while providing flexibility through open systems.*"

Forrester determined in a 1992 survey that the exodus from mainframe-based to user-based computing is being led by departments that need timely data for decision making. Comments

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include:

† Transportation company: *"We need to keep track of barges and the materials on them. When this was on the host, we were paper intensive and the information was two days old. Now, users manipulate data into color graphics to determine where the barge is and what it is carrying."*

† Scientific equipment company: *"Our interest in `downsizing' is increasing because our sales and distribution organizations want convenient access to data to develop their own reports."*

Currid & Company provides a summary of the mainframe alternatives benefits (84 respondents):

† 70% of sites achieved easier access to data
† 63% achieved improved flow of information
† 60% achieved significant cost reduction
† 56% achieved greater flexibility in developing applications

At HP, our current customers who have sought alternatives to mainframe computing have experienced benefits which far exceed even these dramatic results.

The Most Effective FAST Mainframe Alternative Program

Why is HP the best mainframe alternative? Because HP has the best and most cost-effective FAST program to support user-based computing. FAST is Functionality (for example, performance, scalability, systems management, configurability, networking), Availability, Service (service, support, maintenance and integrators), and Tools (for example, conversion/migration, CASE/4GLs, databases, application solutions, information access).

Functionality, Availability, Service, Tools (FAST)

Performance. Two recent benchmarks on a representative HP system, the HP 3000 Series 980/100, have shown superior performance relative to water-cooled mainframes.

- A batch benchmark showed a Series 980/100 (14.5 minutes elapsed time) to be similar in performance to an IBM 3090-180J (15.6

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minutes elapsed time) running MVS/ESA (the benchmark involved the batch processing of 1 million/400 byte order processing records).

- A client/server OLTP benchmark (PeopleSoft/HRMS application) showed a Series 980/100 (8,000 transactions per hour) provided 50% more throughput than an Amdahl 5990, equivalent to an IBM 3090-200J (5,360 transaction per hour), a two-way multiprocessor running MVS/ESA.

- At growth rates in excess of 75% per year, HP's Corporate Business Systems provide performance in excess of an IBM ES/9000-660 at 1/5th the system cost!

Scalability. HP offers the broadest scalable architecture. This enables applications to run on the desktop up through the data center. Further, scalability facilitates the control and manageability of implementing client/server applications across the enterprise and moving them to the appropriate platform and/or location as business needs dictate.

NATURAL.PLT;4.565";3.356";HPGL

Figure 6: A Natural Fit for Any Data Center Environment

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Systems Management. HP provides a broad array of products and services to manage computer resources, whether local or remote, whether desktop or data center. HP OpenView (the framework for OSF's Distributed Management Environment) provides an integrated environment from which systems, networks, and application resources can be managed. The objective is to provide a "lights-out" type environment: minimizing staff costs, increasing service quality/availability and increasing the IT architectural flexibility. Further, mainframe-class solutions from vendors like Computer Associates (CA) on the HP 9000 Series 800 offer a high degree of functionality in the UNIX environment, while minimizing potential retraining.

Configuration Scaling. HP provides for the ability to scale printing from the desktop (LaserJet) to the data center (HP 5000) or from 4ppm to over 200ppm in a production environment, while supporting the de facto standard for printer control language (PCL). Storage capacities exceed 1 Tbyte, while supporting well over 4,000 user sessions.

Networking. With complete support for SAA/SNA, HP provides strong interoperability and coexistence capabilities with mainframes. Additionally, broad support for various network standards exists—TCP/IP, OSI, Netware/LAN Manager, etc.

Functionality, **Availability**, Service, Tools (FAST)

Reliability. HP systems provide mean-time-between-failures (MTBFs) of over 4 years. Standard disk storage subsystems exceed MTBFs of 20 years. The recent introduction of increased system software resilience with MPE/iX includes, but is not limited to, application isolation and minimized system failures due to application aborts. MPE/iX in a 1991 Prognostics survey showed reliability of ". . . roughly one outage per year per system on average." This level of reliability is similar to IBM's MVS environment. Repeatedly, surveys by organizations like DataPro and *COMPUTERWORLD* have rated HP as the No. 1 quality computer manufacturer.

HI-AVAIL.PLT;4.565";3.356";HPGL

Figure 7: High Availability in the Data Center

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High Availability. A broad portfolio of products exists to increase the availability of systems to even higher degrees—in many cases approaching "fault tolerant" systems.

Fault Tolerance. The HP 9000 Series 1200 offers true fault-tolerant capabilities by providing complete redundancy in its components. Additionally, as HP's Corporate Business Systems 3000 and 9000 evolve over the next few years, fault resilient capabilities will be brought "online." The statement of direction (SOD) calls for features like fault-tolerant memory arrays, redundant power supplies, online component repair/replacement, etc.

Disaster Tolerance. The HP 3000 offers the SharePlex Facility/iX, which includes, Quest/Netbase, to provide "expanded data center" capabilities. Systems can be placed in geographically remote locations with the assurance that in the event of a disaster at one location the user (transparently) will not be impacted. Additional availability features provide for flexible, non-disruptive system growth by allowing for the dynamic addition or deletion of system processors.

Functionality, Availability, **Service**, Tools (FAST)

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Premium support. A new level of `proactive' support and maintenance has been ushered into HP environments. This provides complete coverage through a single comprehensive contract and annual account planning. The support "partnership" will provide onsite specialists, personalized service, and "business focused" support.

Enhanced breadth of solutions. Comprehensive support for 24 x 7 coverage is available. Solutions include disaster recovery planning, backup services, performance tools/consulting, and predictive hardware and software support for better problem resolution before problems occur.

Integrators. HP has had a great deal of success partnering with system integrators to facilitate migrations from mainframes to HP. A partial list of integrators include Innovative Information Systems, Inc. (IISI) in Norwood, MA; Andersen Consulting; CAP Gemini; Wesson, Taylor, and Wells; CT Partners; and SAIC.

BRIDGE.PLT;4.565";3.356";HPGL

Figure 8: HP Systems→Bridging from the Mainframe to the User

Functionality, Availability, Service, **Tools** (FAST)

CASE/4GLs. HP offers a broad range of enterprise-wide CASE and 4GL tools, many found on traditional mainframes as well as newer client/server generation tools.

Databases. Database support includes HP's Relational ALLBASE, Oracle, Ingres, Sybase, Informix, Software AG's ADATABASE, Progress and Unify.

Application solutions. HP is providing many traditional mainframe as well as newer client/server applications→allowing existing mainframe customers to bridge easily to an HP platform.

Information access. A broad offering of tools that can access production data are available→SAS, IBI, Pilot Executive, Lotus, Execucom, NewWave Office, Express, HP Desk, HP Openmail. Information access on HP systems has been, and is viewed to be, much easier and more responsive than traditional mainframe environments.

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