



hp e3000
solution transition
advisor

**technical
planning
guide**



white paper

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executive summary



In November of 2001, Hewlett-Packard recommended that users of its venerable HP e3000 platform begin planning to move to other HP platforms. If your company or organization uses the HP e3000, this recommendation has important implications for your future IT direction.

This white paper is the second in a series of white papers covering HP e3000 transitions. The focus of this paper is to discuss technical planning and set the context for the following more detailed technical white papers in this series.

There are a total of six white papers in the “HP e3000 Solution Transition Advisor” series. Each one addresses the subject of e3000 transitions from a different angle. The subjects of the six white papers are:

- Business Planning Guide
- Technical Planning Guide (this paper)
- Compilers and User Interfaces
- TurboIMAGE and Databases
- KSAM and the MPE File System
- MPE Commands and Networks

overview

At the time of the announcement, HP suggested that one of the first steps in any transition project should be a thorough inventory of your HP e3000 environment. This inventory should include such things as:

- The number of e3000 systems you are currently using
- The databases and applications that reside on each machine.
- If you also use other computing systems besides the HP e3000, you should document how they interact with your HP e3000 databases and applications.
- If you purchased any of your e3000 applications from an independent software vendor (ISV), you should contact the ISV and learn about their plans for their applications.

Once you have this base level of understanding you can use this information to help decide which of the five transitions options are best for your HP e3000 application; replacing, rewriting, moving, retiring, or keeping it. These options were described in a white paper entitled "HP e3000 Transition Considerations", which is available from HP's e3000 website at www.hp.com/go/e3000. In brief, they can be explained as follows:

1. **replacing**: Selecting a replacement application from an ISV. During the 1990s, many HP e3000 customers chose to migrate off of the HP e3000 using this route, and the majority replaced their e3000 applications with "shrink-wrapped" solutions running on HP-UX.
2. **rewriting**: If no "shrink-wrapped" replacement for an e3000 application can be found, then one alternative is to develop a replacement of your own. This can be quite an expensive undertaking.
3. **moving**: If the cost of rewriting an e3000 application is too high, then in most instances the existing application can be migrated to another HP platform. There are a wealth of tools and services available from HP and its partners for this purpose. There are two alternative ways of moving an e3000 application to another platform:
 - **emulating**: This option uses a software library that emulates some of the functionality of MPE/iX and the HP e3000. Emulators are available from a number of 3rd parties. The advantage of using an emulator is it greatly reduces the number of modifications that must be made to your application in order to enable it to run on another platform.
 - **translating**: This option involves translating the existing HP e3000 application source code into a language that can be used on the target platform. Note that even same language translations (e.g. HP/COBOL to ACUCOBOL) can involve a significant amount of work, depending on how many references to MPE-specific API's and features there are in the application source.
4. **retiring**: HP has announced that it will continue to support the HP e3000 through December 31, 2010. Some customers have determined that the applications that they are using on the e3000 will outlive their usefulness before that date. In this case, the applications can simply be "retired".
5. **keeping**: Some customers have indicated an interest in continuing to use the HP e3000 even after December of 2010. At this time, HP cannot recommend this course of action, as the company has not announced any intent to provide service or support for the e3000 beyond that date.

migration

This white paper series is primarily concerned with option 3 — moving the application or migrating it to another platform. Here, we'll provide guidance on how to address the following questions:

- What technical components of the application must be migrated?
- What are the different alternatives for the components?
- Which set of alternatives are the right choices for a given customer?

These papers are intended as a technical starting point. The non-technical aspects of managing a transition project, such as project planning, new platform training, testing, rollout and deployment will not be covered in these papers. This is not to imply that these aspects are not important. They can be critical to the success of your transition project. But they are beyond the scope of the current white papers.

These papers include references to a number of migration tools and vendors. These are included as examples and are not intended to represent a complete or comprehensive listing of tools that are available to you. New tools are continually being developed and brought to market by HP and its partners. See www.hp.com/go/e3000partners for a current listing of migration tools and partners.

It's important to understand the end of support dates for all the e3000 products that you are using. If your planning process reveals that your transition project will take longer to implement than the support life of any of the HP products that you're using, you may need to plan an upgrade to newer versions of the e3000 hardware or software. HP announced that support for the e3000 would end on December 31, 2010. However, depending on the particular model of the HP e3000 that you are using, and the particular release of MPE/iX that you are using, support for parts of your installation may be ending before that date. The Products section off the www.hp.com/go/e3000 web site can help you identify when your hardware and software is going out of support.



getting help

HP is providing programs and services to aid customers who are making the transition from the HP e3000 to another HP platform. The Services section off the www.hp.com/go/e3000 contains many of the details of these programs as well as pointers to the services that are available from Hewlett-Packard itself. North American Customers who require assistance in any aspect of the transition can also get help one of HP's "Platinum Partners". Each of these HP partners can provide a complete portfolio of tools and services for migrating HP e3000 business solutions to other HP platforms.

name	contact information	website
Lund Performance Solutions	240 Second Ave SW Albany, OR 97321 USA Phone: (541) 812-7600 Fax: (541) 812-7611	www.lund.com
Managed Business Solutions	12265 Oracle Blvd Ste 105 Colorado Springs, CO 80921 Phone: 1-800-421-1016	www.thinkmbs.com
MB Foster	82 Main Street South Chesterville, Ontario, Canada, K0C 1H0 Fax: 1-613-448-2588 Phone: 1-613-448-2333	www.mbfoster.com
Speedware	6380 Cote de Liesse Suite 110 St. Laurent, Quebec, Canada, H4T 1E3 Phone: (514) 747-7007 Fax: (514) 747-3380	www.speedware.com



first steps

When transitioning an HP e3000 based business solution to another platform, it's important that all the members of the transition team participate in a thorough investigation of the five transition options discussed earlier, (replacing, rewriting, moving, retiring or keeping the application.) Moving HP e3000 software to another platform, whether accomplished through emulation or translation, is not a trivial process, and should not be undertaken unless easier alternatives such as replacing it with an "off-the-shelf" ISV solution have been eliminated.

Once a decision has been made to move your existing HP e3000 based business solution to another platform, you can begin planning the project in earnest. In this white paper, we'll discuss the following planning areas in detail.

- Scoping the project by identifying the specific technical components of MPE/iX that your application uses on the e3000.
- Identifying a migration approach: This step involves determining whether it makes more sense to emulate the technical components that your business solution uses, or whether you should translate your business solution to utilize native components on the target platform.
- Identifying a target platform for your transition project.



scoping the project: component groups

HP e3000 component groups are defined as MPE/iX software components that manage a specific function as part of a complete HP e3000 solution. To the extent that your application makes explicit references to these components, special efforts will be required to migrate the application to another platform, where the component either doesn't exist, or exists in a form requiring that your application reference it differently.

To begin an examination of the HP e3000 component groups, see table 1. This table divides the HP e3000 component groups into six broad categories.

In this white paper, we'll examine each of these six categories of MPE components briefly. Each of these categories is discussed in more detail in the remaining white papers in this series. In addition to the components listed below, there is a table in Appendix B that identifies many commonly used HP e3000 products, and corresponding products for HP-UX.

table 1. HP e3000 component groups

component groups	component function	mpe/ix software used to implement the function
user interface (ui)	The UI is the component with which the end user interacts. May be a forms-based "green-screen" UI, or a graphical "GUI". Interface. Making radical changes to the UI can make it necessary to retrain the end user community.	On the e3000, most business solutions use a VPLUS interface. VPLUS is bundled with MPE/iX. Other solutions leverage user interface technology from the language compiler (see below)
language compiler	The language compiler is used to develop software in a programming language. It is used for the coding and processing of business logic. Compilers are not bundled with the HP e3000 - they are available as add-on products from Hewlett-Packard. Similarly, most compilers are not bundled with the target platforms. Generally, they are sold as add-on software, or as part of a development environment package.	Language compilers for development of HP e3000 software: <ul style="list-style-type: none"> • COBOL II • PASCAL • C • RPG • BASIC • FORTRAN • JAVA • SPL Programs written in these languages can be migrated to other platforms using compilers and migration tools from 3rd parties.
batch/command/interpreter/utilities/networking	For regularly scheduled unattended data processing, such as the preparation of large reports, and access to network resources, (servers, printers, clients, etc.)	These components are bundled with every HP e3000 - some target platforms will require additional software or migration tools to provide similar functionality. <ul style="list-style-type: none"> • Command Interpreter (CI) for JCL • Utilities FCOPY, SORT, SPOOLING • Networking functionality NS, DSCOPY, VT-API, NET-IPC, etc.
data management, data base management and file management	Data Management, File management, Account Management and data base management provide for the storage and retrieval of user data. MPE File type managers include support for special kinds of file handling: <ul style="list-style-type: none"> • Message files for interprocess communications • Temporary files for non-permanent storage. • Circular files for the maintenance of circular cues. 	These tools are bundled with the HP e3000 <ul style="list-style-type: none"> • Database management systems including TurboIMAGE, IMAGE/SQL, and ALLBASE. • Data management tools including the MPE files system, support for sequential, direct and keyed file access via KSAM, • File Type Managers (including message, temp, FIFO, circular,etc.) Corresponding technology on the target platform may involve add-on software.
intrinsic	Operating system libraries that provide the interface between application programs and the operating system. Each target platform has its own unique API.	MPE/iX Application Program Interface (API) libraries are bundled with every HP e3000. MPE emulators are available for each of the target platforms, allowing applications to use e3000 APIs on target platforms. Without one of these emulators, the application programs being migrated must be modified to use the target platform's own native API libraries.

user interface

user interface

Virtually all HP e3000 applications include a component that is used online — i.e. by an end user logged onto the HP e3000 via a desktop device (terminal or personal computer). Online usage of an application requires that the application have a “user interface” (UI).

The most common user interface found on HP e3000 applications is a so called “green-screen” interface. Named because of the green color used by the terminal displays that were common in the early days of the HP e3000, green screen interfaces are text based. They typically make extensive use of terminal-based forms. The end user interacts with a green-screen interface using the keyboard of his desktop device to select options from menus and fill out forms.



In the 1990s, some HP e3000 applications were enhanced to use a “graphical user interface” or GUI. GUI interfaces make use of graphical elements such as those found in Microsoft’s Windows® operating systems, and usually require the use of a mouse or similar pointing device.

On the HP e3000, there is a technical component called VPLUS which is used to create “green-screen” user interfaces for application programs. Because VPLUS is bundled with every HP e3000, many application developers working with MPE chose to take advantage of its presence. When VPLUS applications have been enhanced to use a GUI, the enhancement has often been achieved with a layer of software that runs “on top of” VPLUS. That is, in spite of the fact that VPLUS was designed to create “green screen” interfaces, it has been used in conjunction with products such as ScreenJet to implement GUI interfaces too.

There are two telltale signs that you can use to determine if your applications use VPLUS. One is the presence on your system of VPLUS FORMSFILES. A FORMSFILE is a special file type that is only used for one purpose - storing forms to be used in VPLUS green screen interfaces. If there are FORMSFILES on your system, then you have applications that are using VPLUS. Another telltale sign that your applications are using VPLUS is the presence of VPLUS intrinsic calls in your application programs. The third white paper in this series will discuss user interface issues in detail, and will show examples of applications that include VPLUS FORMSFILES and VPLUS intrinsic calls.

One of the disadvantages of using VPLUS is the fact that this component is proprietary to the HP e3000. Any application that takes advantage of VPLUS is linked to the HP e3000. For this reason, some application programmers chose to avoid VPLUS on the HP e3000, and use other user interface technologies. By and large, most other UI technologies are actually part of the language compiler used to create the application. Therefore we’ll turn our attention to compilers next.

compiler & language components

In order to write an application program for a computer system, a programmer typically creates **source code** for the program. The source code is a collection of instructions, written in a computer language such as COBOL, which collectively define the business logic of the program. A **compiler** is then used to translate this source code into an executable form.

On the HP e3000, Hewlett-Packard compilers are available for the following computer languages: COBOL, RPG, C, JAVA, PASCAL, SPL, and FORTRAN. There are also compilers available for a number of 4th Generation Languages, primarily supplied by third parties. Application programs have been created for the HP e3000 using all of these languages.

compiler and language components

compilers and user interfaces



In order to migrate an HP e3000 application to another platform, a compiler must be found for the target platform that will successfully compile the HP e3000 source code. Compilers exist for all of the HP e3000's supported languages on all of the recommended target platforms. However, it's important to realize that a COBOL program that compiles successfully using HP's COBOL compiler on the HP e3000 may not compile successfully using another compiler on another platform. Therefore, the source code may need to be modified significantly before it can be successfully compiled on the target platform.

In some instances, it may be undesirable to continue using the language that you're using on the HP e3000. For example, the SPL language is closely tied to the HP e3000 platform, and contains references to the "stack" and other constructs that are part of the e3000's architecture. Therefore, compiling and supporting SPL software on other platforms may be more trouble than it's worth. Fortunately, there are tools available through HP partners that can translate source code from one language to another.

compilers and user interfaces

All of these languages contain tools, (sometimes very rudimentary tools) which can be used to fashion application program user interfaces. For example, the industry standard for the COBOL language defines verbs called ACCEPT and DISPLAY. These can be used to display information on a terminal or personal computer, and accept responses from the user.

It is possible to construct a user interface using only industry standard COBOL statements. Such a user interface would be easily portable to virtually any target platform. But the source code would be extremely cumbersome and inefficient; for this reason, virtually all user interfaces on HP e3000 applications have been created using some kind of specialized library designed for the purpose — either the VPLUS library from HP, or another library from a third party.

When choosing a compiler to use on your target platform, you may want to evaluate what tools are available for it. In particular, be sure to ask about the following:

- What platforms can the compiler be used on? What industry standards does it conform to?
- What Tools does the compiler support that can be used to create a user interface?, and
- What Tools are available that can be used to convert your current source code to take advantage of the user interface tools on your target platform.

For example, many of the available COBOL compilers run on all of the recommended target platforms. They support all the industry standard COBOL syntax. This syntax now has a SCREEN SECTION in the DATA DIVISION that support PROCEDURE DIVISION screen level DISPLAYs and ACCEPTs. There are also tools available that can convert VPLUS FORMSFILES into COBOL SCREEN SECTION code. Some of the COBOL compilers support a screen painting toolkit that can make generating screen handling code automatic.

Choosing appropriate compilers and user interface tools for your transition project is a complex topic because of the many options that are available. It is covered in detail in the third white paper in this series: ***"HP e3000 Solution Transition Advisor — Compilers and User Interfaces"***.

batch components

batch components

In addition to an online component, most HP e3000 business solutions also include a batch component. The term “batch processing” dates back to the early days of IBM mainframes, which were used primarily for this purpose.

Batch Processing refers to regularly scheduled, unattended data processing. It may involve the preparation and printing of long reports, the sorting of large amounts of data, or the extraction of large amounts of data from a repository. It differs from online processing in that the user does not need to be logged onto the system for batch processing to take place. Typically, an online user initiates the batch processing by **streaming** a batch job into the system. Once this is done, the user can logoff the system; the batch job will proceed without any further intervention.

The components needed for batch processing are bundled with every HP e3000. MPE/iX includes a very robust environment for the management of batch processing, and a command language that is used in both online and batch environments. In addition, MPE/iX includes a number of utilities that are very useful in batch processing. These include:

- FCOPY (for copying files, and extracting data from a file),
- SORT (for sorting data in any order, and merging data from multiple files into a single file) and
- Spooling utilities such as SPOOLER and SPOOLF

How can you tell if your HP e3000 business solutions contain batch components? The telltale signs are the presence of batch jobs on your system. The `:SHOWJOB JOB=@J` command can be used to display any batch jobs that might be running. If a batch environment is part of your solution, then it will need to be migrated to the target platform along with the online environment. This topic is covered in detail in the sixth white paper in this series: “**HP e3000 Solution Transition Advisor — MPE Commands and Networks**”.

networking

Many HP e3000 applications were developed in the days before heterogeneous networks became a staple in the data center. In the 1970s and early 1980s, a typical HP 3000 system would not have been connected to a network at all — but would have operated as a standalone system. If your application dates back that far, then it is unlikely that it contains any reference to networking at all. If the application used network at all, it was likely that whatever networking functionality was needed was implemented outside of the application’s source code. Hence for these applications, networking is often a non-issue.

In the 1990s, HP bundled the ARPA Networking Services package with the HP e3000. This made it possible for the HP e3000 to participate in a corporate intranet, or be connected to the public internet. The ARPA package gave the HP e3000 an IP stack, the tools necessary to assign it an IP address, as well as commonly used networking tools such as ftp.



networking

data management & file management



Some HP e3000 applications were enhanced to take advantage of the ARPA Services technology. Because ARPA Services conforms to industry standards, this does not typically create a problem in terms of migrating these applications to other platforms. The logic that is built into HP e3000 applications to take advantage of ARPA Services is, by and large, the same logic that will be required on the target platform. Therefore, networking is typically a non-issue for applications that were enhanced to take advantage of ARPA Services on the HP e3000.

There is one exception to this rule, however. Before ARPA was available for MPE, HP provided a proprietary set of networking services and APIs called DS (later renamed to NS). Some HP e3000 applications were enhanced to use NS's proprietary networking commands and intrinsics. If your applications were enhanced to use NS, then those references may need to be changed to use the industry standard ARPA API's before the application can be migrated to another platform. This topic is covered in detail in the sixth white paper in this series: *"HP e3000 Solution Transition Advisor — MPE Commands and Networks"*.

data management & file management

Virtually all HP e3000 applications use files for data storage, at least part of the time. MPE/iX provides a file management system that is very resilient. It recovers automatically and quickly from corruption that can happen as a result of system failures.

This may not be the case on your target platform. Therefore, it may be desirable to modify your application when you migrate it to the target platform so that data that was kept in files on the HP e3000 is now kept in some more secure repository, such as a database.

How can you know if your application program uses files for data storage? Every computer language provides an industry standard way of reading and writing data to and from files. For example, in COBOL, the READ and WRITE verbs are used for this purpose. If you choose to leave your data in files when you migrate the application, you can continue using the industry standards READ and WRITE verbs. So this should not complicate your migration.

However, MPE provides a number of file management tools and facilities that go well beyond the industry standard tools and facilities found on the recommended target platforms. For example, the target platforms all provide support for a kind of file called a "byte-stream file". This kind of file is built on a very simple file architecture; it is essentially little more than a long string of bytes. MPE supports byte-stream files too. But in addition, it also provides support for files upon which it imposes a record structure. MPE's standard file type is based on an architecture in which data is organized into records, with a user-defined record structure. Although this record-oriented record structure is very useful (at least in commercial environments), it has never been widely accepted in the open systems community.

Similarly, MPE supports a number of different file types, which determine how the file should be accessed. For example, STD files can be accessed either sequentially, or directly (by relative record number). But files with a KSAM file type can be accessed using a key. Other file types are used for special purposes. For example, files with a MSG file type (called "message files") are used for interprocess communication.

database management



As we said earlier, the file management capabilities of the target platforms are quite simple, when compared to those offered by MPE. If your application program contains dependencies upon these specialized file types, this will create issues that must be addressed before these applications can be migrated to other platforms. These issues are addressed in the fifth white paper in this series: ***“HP e3000 Solution Transition Advisor — KSAM and MPE File System.”***

database management

The HP 3000 was the first minicomputer system to be sold with a fully functional database management system (DBMS). Over the years, it’s name has changed repeatedly. Originally called IMAGE, it was changed to TurboIMAGE in the 1980s, and later to IMAGE/SQL. Regardless of the name, this DBMS is the at the heart of most HP e3000 applications.

IMAGE is not a relational DBMS. In spite of this, it can be accessed using the SQL language used by virtually all Relational Database Products, including Oracle and SQL Server. Unfortunately, few HP e3000 applications take advantage of this capability. Most HP e3000 applications use proprietary languages to access and manage the data that is kept in databases on the HP e3000.

This creates issues for transition projects. The proprietary language used to create TurboIMAGE databases, and the APIs used to access them are not supported for use with the mainstream databases found on the recommended target platforms. Furthermore, there are fundamental incompatibilities between TurboIMAGE and the relational standards. For example, TurboIMAGE supports a number of data types which are not supported by the relational standards. The reverse is also true. Some of the most widely used relational data types are not used in the TurboIMAGE world.

Fortunately, there are solutions to these problems. A number of HP partners are providing tools to bridge the gap between the HP e3000 database world and the relational world that exists on the target platforms. For example, “IMAGE Wrappers” are software libraries that can be used with relational databases that address the language differences and incompatibilities, so that the migrated application can continue to behave as if it were using TurboIMAGE on the target platform. IMAGE Wrappers are available for use with all the mainstream RDBMS products, including Oracle, SQL Server, and even DB2.

Another solution is the Eloquence DBMS. Eloquence is a relational database management system that features native TurboIMAGE access compatibility. Available for all the target platforms, Eloquence databases can be accessed as if they were TurboIMAGE databases, thus simplifying the job of migrating TurboIMAGE applications.

This topic is discussed in detail in the fourth white paper in this series, ***“HP e3000 Solution Transition Advisor — TurboIMAGE and Databases.”***

intrinsic

intrinsic

Every operating system is characterized by its application programming interfaces, or APIs. An API is a well-defined and documented software routine that's part of the operating system, but which may be invoked (or "called") by user-written applications. On the HP e3000, the APIs are called "intrinsic". In application source code, most references to the HP e3000 technical components discussed above appear in the form of intrinsic calls.

Therefore, one way to begin identifying the MPE technical components that are used by your applications would be to identify the intrinsic calls that appear in your applications' source code. The specific intrinsic calls that are associated with each of the areas that we've discussed will be identified in the corresponding white papers in this series. For example, the following figure shows some sample COBOL code which uses a TurboIMAGE intrinsic to open a database:

figure 1. sample COBOL code using a TurboIMAGE intrinsic

```
025700
025800     MOVE "  ORDERS;" TO DB-NAME.
025900     MOVE ";" TO DB-PASSWORD.
026000     MOVE 3 TO DB-MODE.
026100
026200
026300*   Call a TurboIMAGE intrinsic to open the ORDERS database.
026400
026500
026600     CALL INTRINSIC "DBOPEN" USING DB-NAME,
026700                                     DB-PASSWORD,
026800                                     DB-MODE,
026900                                     STATUS-ARRAY.
027000
027100
027200*   Call IMAGE-ERROR if the intrinsic was NOT successful
027300*       (IMAGE-ERROR will also stop the program)
027400
027500
027600     IF CONDITION-CODE NOT= 0
027700         PERFORM IMAGE-ERROR.
027800
```

When migrating HP e3000 applications, the intrinsic calls that appear in your application source code are often the best place to begin identifying which technical components are used by your application.

Once you've determined which HP e3000 technical component are being used on the HP e3000 to implement each of the business solution's components, you're ready to begin determining how the business component will be implemented on the target platform. Fundamentally, there are two choices: emulation and translation.

identifying migration approaches



emulation

Most HP e3000 technical components can be emulated on the target platform using migration tools and libraries which are available from 3rd parties. Emulation reduces the effort and expense of migrating HP e3000 software to other platforms. Without emulation, every reference that your business solution software makes to an HP e3000 technical component must be changed to utilize a corresponding technical component that is native to the target platform. But with MPE emulation, references to these components can remain in your solution software source code. This will greatly reduce the programming effort necessary to migrate the software to the target platform.

It may not be necessary, or even possible to emulate the entire e3000 environment on the target environment. Therefore even with emulation, some custom engineering may still be required. Note too that none of the target platforms come with MPE emulation bundled in; it must be purchased separately. Most emulators require payment of licensing fees for as long as you continue to use the emulator. For these reasons, some transition projects treat emulation as an interim solution — a way to get software migrated quickly. Over the long haul, translation of software to use native technical components on the target platform usually represents a more cost-effective approach, in spite of the fact that it may be more expensive initially.

translation

Translation requires that all references to HP e3000 technical components in your HP e3000 business solution be found and replaced with corresponding references to native components of the target platform. If done manually, this can be a very time consuming task, involving a lot of expensive programming hours. Fortunately, there are migration tools available that can mechanize much of this activity, depending on the language that was used to create the e3000 software, and the specific technical components used by your business solution.

With translation, there is no need to emulate the HP e3000 environment on the target platform - and therefore no need to pay license fees for the emulator. Also, because a properly translated application interacts directly with native components of the target platform, it can usually provide better performance than an emulated solution.

The downside of the translation approach is that it can introduce a lot of complexity into the project. This, in turn, can open the door to errors.

Emulation provides the fastest way to get HP e3000 software migrated to another platform, with fewer opportunities to introduce errors into the system. There are long term risks inherent in the emulation approach that should not be ignored — such as the cost of the emulator — or the possibility that the company that provides your emulator could go out of business. Translation represents a more expensive and complex way to migrate your software. But over the long term, it can provide better performance and a lower cost of ownership.

The choice of hardware platform should be made based on a combination of technical and business considerations. The business considerations were discussed in the first white paper in this series: ***“HP e3000 Solution Transition Advisor — Business Planning Guide.”*** We’ll review the technical considerations now.

identifying a target platform



The recommended target hardware platforms and operating systems discussed in this white paper series will be limited to a subset of those offered by HP. Although other HP platforms can be migration targets (for example OpenVMS and NonStop), only three hardware platforms are being targeted by the majority of HP e3000 customers. Those based on Intel® IA32 processors, those based on HP PA-RISC processors, and those based on Intel Itanium® Processor Family-based Systems (IPF) processors.

1. **Intel IA-36 (x86).** This is the family of processors that have been used in personal computers since the 1980s. Its latest versions are 32 bit and can run at over 3 GHz .
2. **PA-RISC.** This is HP's own RISC based processor family. Both MPE/iX and HP-UX run on these processors. Its latest versions are 64 bit and run at just under 1 GHz.
3. **Intel Itanium Process Family-based Systems (IA-64).** This is the next pervasive computer architecture. It was co-developed by HP and Intel. Its latest versions are 64 bit and run at over 1GHz.

Running on these 3 different hardware platforms are 3 different operating systems; HP-UX, Windows and Linux®.

1. HP-UX is HP's version of Unix®. Open, flexible, and just as reliable as MPE, HP-UX is HP's recommended platform for highly available, business-critical applications. HP servers running HP-UX boast more than 1000 ISV applications, linear scalability-up to 40 processors and beyond, and 100% binary compatibility with the Intel Itanium Processor Family-based Systems.
2. Windows refers to various versions of the Windows OS from Microsoft, including Windows/NT, Windows/2000 and Windows/XP.
3. Linux is the open source version of Unix. It is available in a variety of distributions from a number of different suppliers.

The table below lays out which OSes are available on which hardware platform.

	ia-32	pa-risc	IPF
hp-ux		✓	✓
windows	✓		✓
linux	✓		✓

The fact that some Operating Systems are available on more than one hardware platform creates an issue for people who are migrating applications from the HP e3000. For example, HP-UX is available for PA-RISC servers and for IPF servers. Today, PA-RISC servers make up the majority of the HP-UX installed base. But in the future, it's likely that most HP-UX servers will use IPF processors instead. If you are porting to HP-UX today, you might want to consider IPF as your target platform.

If you are currently using an A-Class or N-class model of the HP e3000, then you may want to consider porting to a PA-RISC based HP-UX server. This strategy will allow you to convert your HP e3000 into an HP-UX server at no cost to you. However, it also means you'll have to port again in order to get to HP-UX on IPF in the future. In that case, it may make more sense to take your time and port to HP-UX and IPF at the same time. Similar issues exist for Windows and Linux, (each of which are predominantly IA-32 based platforms today, but expect to become predominantly IPF-based in the near future).

If you are developing in Windows you have three deployment options. Code developed for Windows on IA-32 can be deployed on IA-32 platforms and IPF platforms. The IPF version of Windows can run the IA-32 developed binaries. You can also develop native IPF Windows code that can take advantage of the full capabilities of the IPF processors. IPF Windows binaries cannot be run on IA-32 Windows platforms.

If you are developing in Linux you have many deployment options.

- If you develop on IA-32 Linux you can compile on IA-32 and deploy on IA-32.
- If you develop on IPF Linux you can compile on IPF Linux and deploy on IPF Linux and IPF HP-UX. IPF HP-UX can run IPF Linux binaries.
- If you develop using Linux on IA-32 or IPF you can compile on IA-32, PA-RISC and IPF using the same source code. HP-UX supports 96% of Linux core APIs so Linux developed source can be compiled on both PA-RISC and IPF versions of HP-UX.

Visit www.linux.hp.com for more information.



conclusion

Making the transition from the HP e3000 environment to HP-UX or other HP platforms is in the end a decision that can provide a solid return on investment. It will open the business/company to newer innovative technologies allowing the business to be more flexible and adaptive to change and growth opportunities. The material presented in this white paper should be used as a framework to enable those responsible for the migration efforts to decide on the appropriate solution that will meet the needs of the organization within an allocated budget and timeframe.

appendix a

hp-ux packaging



HP-UX offers different component packaging. The table below highlights what is contained in each package. For more information see www.hp.com/go/infrastructuresolutions

<u>package</u>	<u>application focus</u>	<u>features/components</u>
hp-ux 11i operating environment (oe)	Comes in 32 bit or 64 bit flavor	NFS support, CacheFS, JFS (Veritas), Linux APIs, intrusion detection, secure defaults and PRM features
enterprise operating environment (eoe)	Includes a large number of Web-focused applications	Base OE, plus Internet Grouping (Apache Web Server, Java Runtime Environment, Java API, Netscape Communicator browser, PAM kerberos, Server and Client support for CIFS), Service Control Manager
mission critical operating environment (mcoe)	Aimed at large enterprise computing that may require advanced systems management and recovery tools	TCOE, plus Mirror Disk/UX, Online JFS, OV GlancePlus Pak, Process Resource Manager, EMS High Availability Monitors
technical computing operating environment (tcoe)	Aimed at topmost Commercial applications. Employed in company-critical situations where yearly system downtime must be no more than a few minutes	EOE, plus ECM Toolkit, MC/ServiceGaurd, ServiceGaurd NFS, Workload Manager

appendix b

other mpe/ix native hp-ux software equivalencies



MPE/iX	
BRW	Use 3rd party report writers
DBChange	Nothing Available Databases have their own maintenance facility.
DCE	DCE
Debugging Tools	User space debuggers (DDE, WDB)
Developer Tools and Libraries	Compilers are optimized for 64-bit application development. Includes a 64- and 32-bit application development environment: <ul style="list-style-type: none"> • ANSI C compiler, tools (lint, lex, yacc), headers, libraries. • cfront and ANSI C++ compiler, headers, libraries. • ucomp stand-alone compiler backend for optimization. • Linker, SOM/ELF tools, headers, libraries. • SoftBench (C and C++, English and Japanese). • Open source tools- Perl, GCC, Python. Gnu development tools, including C, C++, and Gnu Emacs. • Tools for Java application deployment, including Java runtime environment, Java just-in-time compiler, Java optimization tools, jMeter, jConfig, jPatch. • Webgain Studio produces Java code optimized for HP-UX 11i; portability to HP-UX of applications from the Windows development environment. • Whisper Technology's Programmer Studio • Robelle's Qedit for Windows
EDIT/3000	EDIT, VI editors included with HP-UX
GlancePlus	GlancePlus for HP-UX
HP Browse/XL	Software Distributor (SD)
HP Easytime/XL	System Administration Management tool (SAM)
HP OpenView	OpenView for HP-UX
HP Search/XL	GREP HP-UX command
Link Editor/iX	ar & ld
MPE/iX Diagnostics	Same as Diagnostics on HP-UX
MPE/iX General Networking	HP-UX includes a variety of connectivity and networking tools, including BIND, DHCP, Kerberos, NCS, CIFS, NFS, Sendmail, Streams, and TCP/IP. Sockets Dynamic DNS updates- include DNS 8.x, DHCP, and calls in LIBC to facilitate the communication between DNS and DHCP.
MPE/iX High Availability	HP-UX includes the following high-availability features: <ul style="list-style-type: none"> • Dynamic processor and memory resilience, which deallocates faulty CPU and memory to prevent downtime or data corruption if memory is failing. • Dynamic tuning, including system/kernel parameters. • Journalled file system, which ensures file system integrity and fast recovery in the event of a system failure. • Dynamically loadable kernel modules (DLKM), which provide a modular kernel infrastructure. • Supports hot-swapping PCI I/O cards and network cards.
MPE/iX Internet and Interoperability	Web servers include Apache, iPlanet Enterprise Server (optional), BEA Weblogic Enterprise Server (optional), and OpenWave Smart Internet Messaging Solution (optional). Other features include Nokia Wireless Application Protocol (WAP) server, HP WebQOS Web traffic management software, Inktomi Web-caching and Web content distribution software, e-speak dynamic brokering services, Resonate and APA (Automatic Port Aggregation) load-balancing software, Infoseek Ultraseek search engine, iPlanet Directory Services, sendmail.

MPE/iX

MPE/iX OS Core

MPE/iX Systems
Management

ODBCLink/SE

Performance Tools and
Libraries

Programming

QUERY/iX

Security

HP-UX 11

See list of HP-UX Base Operating features

www.hp.com/go/unix

- ServiceControl Manager is a suite of manageability and control products. Up to 1,024 managed nodes per managed cluster.
 - Ignite/UX for downloading of the HP-UX operating system to other systems on the network.
 - System Administration Manager (SAM) with graphical- and browser-based management of system components and resources.
 - Software Distributor/UX for application and software distribution and updating across a network.
 - Event Monitoring Service (EMS) monitors and reports system failures in realtime.
 - System Configuration Repository incrementally captures system configuration parameters to facilitate troubleshooting.
 - Kernel logging to enable support engineers to quickly identify the root cause of a system problem. Collects kernel software messages, including disaster, errors, warnings.
-

ODBC available with other databases

- Cxperf performance analyzer
 - Diskbench
 - Glanceplus
 - Hp caliper performance analyzer
 - Hp mathematical software library
 - ttv 1.10: thread trace visualizer
-

HP-UX programming

Not applicable, part of 3rd party database

- Can be configured in one of two security modes- standard or trusted.
 - Trusted mode complies with U.S. and European C2 security requirements. Provides access control lists (ACLs), boot authentication, password management, and system auditing for user accountability.
 - HP's Praesidium (I thought we are not using this name anymore) IDS 9000 Intrusion Detection System- host-based intrusion detection for HP-UX. Monitors multiple systems simultaneously. It consists of two subsystems- Kernel Data Source for kernel audit data and ISU subsystem that correlates data from the kernel and other data sources to determine when attacks are mounted against HP-UX.
 - Authentication through LDAP, NTLM, Kerberos 5, and support for common authentication between Windows and HP-UX.
 - Common Data Security Architecture (CDSA) industry-standard framework that provides security services required for e-services applications.
 - Real-time host IDS (IDS 9000), IPSec with IKE (IPSec/9000), host firewall standard (IPfilter/9000), flexible buffer overflow protection (per binary override), iPlanet directory server.
-

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