



# Performance of Migrated HP e3000 Applications

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# Can Anybody Answer This Question???



What size system(s) will you need to run your migrated HP e3000 applications on a new platform?

# The Classic Answer

What size system(s) will you need to run your migrated HP e3000 applications on a new platform?

**It Depends!!!**

# Acknowledgments

- Thanks go to the following HP e3000 application software companies for contributing to this presentation:
  - AMISYS
  - Ecometry
  - eXegeSys
  - Navitaire Open Skies
  - ORDAT
  - Quintessential School Systems
  - Southeastern Data Cooperative
  - Summit Information Systems

# Overview

- “Migrating” Applications
- Hardware Considerations
- Software Considerations
- Other Performance Considerations
- Sizing Your New System

# “Migrating” Applications

- Move an MPE/iX application to a new platform by:
  - Replacing it
  - Rewriting it
  - **Migrating it**
- “Migrating” means modifying an existing application to run on hardware and software other than the HP e3000 and MPE/iX.
- There are two methods for migration:
  - Emulate
  - Transform

# Hardware Considerations

- Architecture
- Processor Speed
- Number of Processors
- Memory
- Disk Storage

# Architecture

- HP recommends three options:
  - **PA-RISC**            running HP-UX
  - **IA-32**                running Windows or Linux
  - **Itanium 2**            running HP-UX, Linux, or Windows



# What About Integrity (Itanium 2)?

- “The HP Server rx5670 has produced the world's best TPC-C score for a 4-way system, by a margin of over 40% compared to the next best 4-way system...”
- “The HP Server rx5670 delivers an incredible portion of power in a 4-way SMP and rivals the best results found on other 8-way servers.”  
<http://www.hp.com/products1/itanium/performance/commercial/tpcc.html>
- Itanium 2 is well-suited for large relational database servers and applications which access lots of data.

# What About Integrity (Itanium 2)?

- “The HP Integrity rx7620 provides leading midrange performance based on Intel Itanium 2 processors... [and] has already posted superior results for:
  - Java business applications
  - Web transactions
  - SAP R/3 sales and distribution
  - Compute intensive applications

“In fact, the HP Integrity rx7620 has outperformed systems with twice the number of processors. As these results illustrate, the Integrity rx7620 provides unmatched system performance gains to handle the most demanding business workloads...”

See [http://www.hp.com/products1/servers/integrity/mid\\_range/rx7620/performance.html](http://www.hp.com/products1/servers/integrity/mid_range/rx7620/performance.html)

# What About Integrity (Itanium 2)?

- Itanium 2 is well-suited for large relational database servers and applications which access lots of data.
- While typical MPE/iX applications may not show much performance improvement just from 64-bit processors...
- “The Intel Itanium architecture is built on the Explicit Parallel Instruction set Computing (EPIC) specifications that ... incorporate both hardware and software advances focused on enabling, enhancing, expressing, and exploiting **parallelism** by both the hardware and the software compiler.”

# What About Integrity (Itanium 2)?

- “Some performance-enhancing aspects of the design philosophy include:
    - Predication
    - Speculation
    - Software pipelining
    - Rotating registers and other processing efficiencies
    - Hardware enhancements, such as larger integer and floating point units.”
- <http://www.hp.com/products1/itanium/faq/index.html>
- These other enhancements in Itanium 2 may help improve performance of migrated MPE/iX applications.

# Architecture

- You should base this decision more on your future direction than on the processing requirements of your current HP e3000 applications.
- The **free conversion kits** for HP e3000 N-class and A-class systems may be a factor for some in choosing to continue on PA-RISC with HP-UX.

# Conversion Kits and Processor Speed



- High-end N4000 servers operate at the same CPU speeds after being converted to HP-UX (N4000-440, 550, and 750MHz).
- These three processors provide **about the same level of performance** before and after conversion from MPE/iX to HP-UX.
- Keep in mind that processor speed is only one of many factors in looking at the performance of migrated applications.

# Conversion Kits and Processor Speed



- Converted A-class systems will operate at full speed:
  - A400-110 and A500-140 convert to **440MHz**
  - A400-150 and A500-200 convert to **650MHz**
- Mid-range N4000 systems will operate at full speed:
  - N4000-220 and -330 convert to **440MHz**
  - N4000-380 and -500 convert to **750MHz**
- These systems will provide extra CPU cycles when converted to HP-UX, from **33% more** (N4000-330) to **over four times** as many (A400-150).

# Processor Speed

- You can get a **very rough estimate** of the processing speed equivalent for an older PA-RISC HP e3000 system by multiplying the “MPE/iX Relative Performance Units” of the HP e3000 server by 25.
- For example, a 979-300 is rated at 19.5 MPE/iX units. You can approximate it as 500MHz (19.5 times 25).
- If you migrated this system to a 750MHz HP-UX server, you should gain roughly 50% in raw processing speed.



# Processor Speed

- It is more difficult to compare HP e3000 server speeds to platforms that are not PA-RISC based (such as Intel), because the machine instruction sets are not the same.
- In the absence of any actual benchmarks, start by comparing the estimated HP e3000 speed (using the previous slide) with some HP-UX PA-RISC servers.
- You should then make adjustments based on published performance benchmarks between HP-UX servers and the processors you are comparing with the HP e3000.

# Number of Processors

- In general, each processor added to a server provides a little less additional processing power than the processor added before it.
- Here are some examples, with HP e3000 systems:
  - An N4000 2-way system performs at about 1.85 times the N4000 1-way system
  - An N4000 4-way system performs at about: 1.75 times the N4000 2-way system, and 3.25 times the N4000 1-way system

# Number of Processors

- The amount of diminished returns from adding processors may vary by operating system.
- An HP-UX rp7400 8-way server offers 5.44 times the OLTP performance of a 1-way rp7400 server.
- This is about what we would have expected to see if HP had offered an 8-way N4000 HP e3000 system.
- So the scaling on HP-UX PA-RISC is similar to MPE/iX.

# Memory

- You will require **more memory** on your new platform than you had on your HP e3000.
- Early benchmark results suggest you will want about **four times** as much memory:
  - One application using 1GB on an HP e3000 ran best with 4GB on HP-UX with an Eloquence DB
  - Another application using 8GB on an HP e3000 ran best with 32GB on HP-UX with an Oracle DB

# Disk Storage

- Generally, you will need about the same amount of disk space on your new system as on your HP e3000.
- Newer technologies such as Native FibreChannel and faster disk drives help performance greatly in this area.
- Disk array subsystems such as the XP128 improve processing times for both serial read access and write access through the use of their cache.
- Larger capacity disk drives may degrade performance in an OLTP environment, because many small random disk I/Os are competing for the same spindle.

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- **Software Considerations**
- Other Performance Considerations
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# Software Considerations

- Operating System
- Language
- Database
- I/O and Networking
- User Interface

# Operating System

- Early migration results show that the operating system itself does not tend to be much of a factor in the performance of migrated applications.
- HP recommends HP-UX for large, mission-critical applications. At the operating system level, early benchmarks show that performance seems to be about the same as MPE/iX.
- Both Windows and Linux are also viable options for many applications. A few benchmarks to-date indicate little performance difference from MPE/iX.



# Language

- COBOL has been the most commonly used language for HP e3000 application development.
- This again does not seem to be an area where much performance difference has been detected between the HP e3000 and other platforms.
- This should not be too surprising, as some vendors like AcuCorp offer the same COBOL compiler on the HP e3000 as they do on other platforms.

# Database

- An important database decision:
  - Use “IMAGE wrapper” technology to access a relational database?
  - Convert IMAGE database calls to native SQL calls?
  - Use the Eloquence database with its built-in conversions from IMAGE?

# Database

- One big area of concern is migrating the IMAGE construct DBFIND followed by a chained DBGET.
- If these calls are not migrated carefully, they can lead to unintentionally issuing SQL Select statements that read entire relational tables.
- In IMAGE terms, that would be doing a serial read instead of a chained read.

# Database

- Another area requiring attention is the locking strategy.
- Many IMAGE applications use predicate-level locking, and only lock around database modifications (not around reads).
- Relational databases may use page-level locking, and may also lock around read transactions.
- Both of these can have a negative performance impact on a migrated HP e3000 application.

# Database

- Early benchmarks suggest you need about twice as much processing power to run a relational database on HP-UX than to run IMAGE on MPE/iX.
- For example, if IMAGE calls are consuming 40% of the CPU cycles on your MPE/iX system, plan on THAT PART of your processing doubling.
- On a 500MHz system, you should plan to add at least another 40% of 500MHz, or 200MHz more.
- Early adopters strongly advise customers to get a data base administrator who knows how to tune the chosen relational database environment.

# I/O and Networking

- If you are moving from an older Series 900 HP e3000 system using NIO cards, you will get a big boost in I/O performance from the change to PCI.
- Native Fibre Channel provides big improvements in I/O bandwidth.
- Networking code has been more highly tuned over the years on platforms like HP-UX than on MPE/iX. Programs like ftp should perform better.

# User Interface

- Most applications are being migrated to a client-server environment, with the user interface going to a different computer than the application and database.
- Migrating the “screen handling” part of your application to a PC-based front-end or Internet browser will free up CPU cycles on your servers.
- The performance impact of most user interface code is small (unless you are doing extensive edits using VPLUS processing specs or a 4GL).

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# Other Performance Considerations

- Are you changing the business logic of your transactions, so they do more (or less) work?
- Are you changing the structure of your transactions, so work is done on multiple clients and/or servers?
- Are you changing the transaction volumes?

# Other Performance Considerations

- When you cut over to the new system, have you allowed enough time to migrate your live data?
- Have you completed a thorough test of the new application on its new platform, to know what its performance will really be like?

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# Sizing Your New System

- Putting all of this together is like solving an algebra problem with many variables.
- The most heavily weighted items should be processor speed and database software.
- Make sure you equip your new system with enough memory.

# Sizing Your New System

- Feedback from several early benchmarks showed that overall they needed about 125-250% of the processing power they had on their HP e3000 systems.
- Each site needs to approximate what will be needed, based on the guidelines found here.
- Verify your approximations with performance tests before you go live!

# Sizing Your New System

- A simplified guideline that is easy to remember for your initial estimates is:

- **TWO TIMES** the processing power

and

- **FOUR TIMES** the memory

that you had on your HP e3000 systems.

# Sizing Your New System

- As I stated at the beginning:

**“It Depends!!!”**





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