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!!!

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

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Hardware Options

- 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 running HP-UX, Linux, or Windows

What About Itanium?

- "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 ... "
  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 Itanium?

- While typical MPE/iX applications may not show much performance improvement just from running on 64-bit processors…
- "The Intel Itanium 2 processor is not only 64-bit, it is designed for parallel performance. It has a number of enhancements like data speculation, advanced prefetch and predication, and a very powerful floating point architecture to ensure it performs extremely well." http://www.hp.com/products1/itanium/performance/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

- To compare older HP e3000s with PA-RISC HP-UX servers, multiply the “MPE/iX Relative Performance Units” of the HP e3000 server by 25.
- This gives you a very rough estimate of the processing speed equivalent for the HP e3000 system.
- 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 server. See http://www.hp.com/products1/servers/rackoptimized/rp7400/specifications/index.html#perform
- 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

- Newer technologies such as Native FibreChannel and faster disk drives help 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 Options

- 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?

  - Use the Eloquence database with its built-in conversions from IMAGE?

  - Convert IMAGE database calls to native SQL calls?

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 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 500MHz MPE/iX system, plan on THAT PART of your processing doubling. So you need to add the equivalent of 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 going 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 that 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 some early benchmarks suggests that an overall increase of 25-50% in processing power was about the right amount for those benchmarks.
- 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

- As I stated at the beginning:

"It Depends!!!"

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