Understanding Server Hardware

Module 2: Hardware Identification

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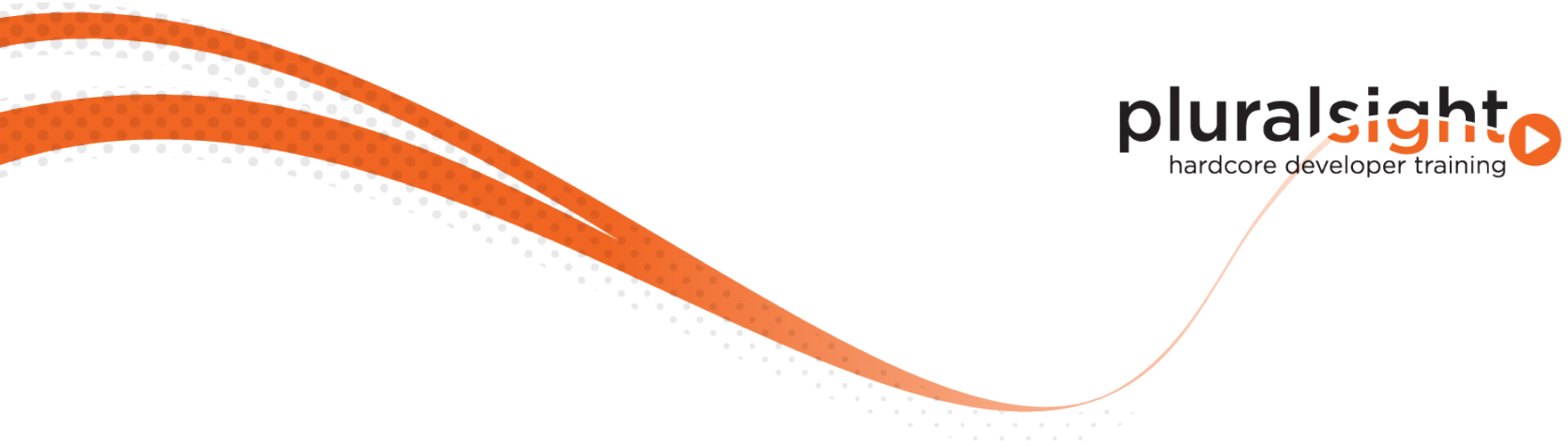

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Introduction

- **Gathering information about your hardware**
  - Very important to know type, configuration and status of components
- **Hardware identification tools**
  - msinfo32, CPU-Z
- **Using server management tools**
  - Dell Open System Management Administrator (OMSA)
- **Understanding server model numbers**
  - Dell, HP
- **Identifying Intel and AMD processors**
  - Current Intel and AMD processor numbering
- **Understanding your server's limits**
  - Licensing limits, physical limits

Gathering Information About Your Hardware

- **What brand and model of server do you have?**
  - Very important information
    - Lets you determine how many processor sockets are supported
    - Lets you determine number of memory and PCI-E slots
    - Lets you determine number of internal drive bays
- **What exact processor(s) are installed?**
  - Important measure of performance and scalability
  - Can be very important for software licensing purposes
    - Example: Oracle 11g, SQL Server 2012 Enterprise Edition
- **What expansion cards are installed?**
  - RAID controller, host bus adapter (HBA), network interface card (NIC)
  - Determines the ultimate input/output capability of the server

Hardware Identification Tools

- **Windows system properties dialog**
  - Included with all recent versions of Windows
    - Processor type and rated speed, amount of physical RAM
- **msinfo32**
  - Included with all recent versions of Windows
    - System manufacturer, model, main BIOS version
    - Processor model, speed, amount of physical RAM
- **CPU-Z**
  - Free tool to identify processor(s) and memory details
    - Shows current processor clock speed
    - Available from www.cpuid.com

Server Management Tools

- **Hardware vendors have proprietary server-management tools**
  - Dell Open Server Management Administrator (OMSA)
    - Must be installed on the host server,
    - Browser interface
    - Gives you exact details about server configuration and condition
      - What memory slots are populated with what size DIMM modules
      - What expansion slots are populated with what devices
      - Details about logical drives managed by RAID controllers
      - BIOS and firmware versions, service code
      - Temperature and operating status for components
  - HP Integrated Lights-Out (iLO)
    - Makes it possible to perform activities on a server from a remote location
      - The iLO card has a separate network connection and IP address
    - Lets you reset the server
    - Power up the server

Understanding Dell Server Model Numbers

- **Dell server model numbers**
  - First character is form-factor
    - R = Rack-mounted, T = Tower, M = Blade
  - Second character is position in server lineup
    - Higher numbers are higher-end server models
  - Third character is server generation
    - 1 is 11th generation, 2 is 12th generation
  - Fourth character indicates processor vendor
    - 0 is Intel, while 5 is AMD
- **Example: Dell PowerEdge R720**
  - R indicates rack-mounted
  - 7 indicates position in overall server lineup
  - 2 indicates 12th generation
  - 0 indicates Intel-based

Understanding HP Server Model Numbers

- **HP server model numbers**
  - First two characters are form-factor and product line
    - DL = Rack-mounted, ML = Tower, BL = Blade, SL = Specialized
  - Third character is number of sockets
    - 1 = 1 socket, 3 = 2 sockets, 5 = 4 sockets, 9 = 8 sockets
  - Forth character is position in family lineup
    - Higher number corresponds with higher position
  - Fifth character indicates processor vendor
    - 0 is Intel, while 5 is AMD
- **Example: HP DL580 G7**
  - DL indicates rack-mounted
  - 5 indicates four sockets
  - 8 indicates position in family lineup
  - 0 indicates Intel-based
  - G7 indicates 7th generation

Identifying Your Processor(s)

- **Use msinfo32, Windows system properties, or CPU-Z**
  - You need to know the processor vendor and exact model number
  - The exact details matter for evaluating the processor

- **Will be either Intel or AMD for Windows-based servers**
  - Once you know vendor/model number, find details on the vendor's web site
    - Intel
      - Intel Ark Database http://intel.ly/NERBsZ
    - AMD
      - AMD Opteron processor numbers http://bit.ly/NERJc8

Decoding Xeon E3, E5 and E7 Processor Numbers

- **Example: Intel Xeon E5-2690**
- **First two characters identifies the product line**
  - E3 is single-socket, E5 is dual or quad-socket
  - E7 can be two, four, eight, or more sockets
- **Third character is the "wayness"**
  - Wayness means maximum CPUs in a node.
    - Can be 1, 2, 4, or 8
- **Forth character is socket type**
- **Fifth and sixth character are processor SKU**
  - Higher numbers equate to higher position in product line
- **Optional seventh character of L means low-power processor**
- **Future V2 or V3 suffix identifies processor generation**
  - Example: Intel Xeon E3-1290V2

Intel Xeon E3-E7 Processor Number Examples

- **Xeon E3-1290V2**
  - Single-socket, 22nm Ivy Bridge processor
- **Xeon E5-2648L**
  - Two-socket, 32nm Sandy Bridge-EP processor, low-power version
- **Xeon E5-4650**
  - Four-socket, 32nm Sandy Bridge-EP processor
- **Xeon E7-2870**
  - Two-socket, 32nm Westmere-EX processor
- **Xeon E7-4830**
  - Four-socket, 32nm Westmere-EX processor
- **Xeon E7-8870**
  - Eight-socket, 32nm Westmere-EX processor

Decoding Intel Xeon Legacy Processor Numbers

- **Example: Intel Xeon X5570**
- **First character is processor description**
  - X is performance, E is mainstream, L is power-optimized
- **Second character is the product family**
  - 3 is single-processor, 5 is dual-processor, 7 is multi-processor
- **Third character is processor generation**
  - Higher numbers equate to newer generations
  - This is also related to the product family
- **Forth and fifth character indicate processor SKU**
  - Higher numbers equate to higher position in product line
  - Higher numbers generally mean higher performance

Intel Xeon Legacy Processor Number Examples

- **Xeon X3480**
  - One-socket, performance, 45nm Lynnfield processor
- **Xeon E5440**
  - Two-socket, mainstream, 45nm Harpertown processor
- **Xeon X5570**
  - Two-socket, performance, 45nm Nehalem-EP processor
- **Xeon L5640**
  - Two-socket, power-optimized, 32nm Westmere-EP processor
- **Xeon X7460**
  - Four-socket, performance, 45nm Dunnington processor
- **Xeon X7560**
  - Four-socket, performance, 45nm Nehalem-EX processor

References for Intel Xeon Processor Information

- **Intel Xeon processor numbering**
  - http://intel.ly/SUasp3
- **Intel ARK database**
  - Xeon E7 family
    - http://intel.ly/PzhEIb
  - Xeon E5 family
    - http://intel.ly/SUhKZY
  - Xeon E3 family
    - http://intel.ly/PzhlNy

Decoding AMD Opteron Processor Numbers

- **Modern AMD Opteron processors are in three series**
  - 3000 series
    - Entry-level, single-socket servers
  - 4000 series
    - Mid-range, one and two-socket servers
  - 6000 series
    - High-performance two, four, and higher socket servers
- **The processor number may also have a two-character suffix**
  - SE means performance optimized, high-powered
  - HE means low-power
  - EE means lowest-power
- **Example: Opteron 6284 SE**

AMD Opteron Processor Number Examples

- **Opteron 6284 SE**
  - Performance-optimized, 32nm Interlagos processor
- **Opteron 6262 HE**
  - Low-power, 32nm Interlagos processor
- **Opteron 6174**
  - 45nm Magny-Cours processor
- **Opteron 4256 EE**
  - Lowest-power, 32nm Valencia processor
- **Opteron 4184**
  - 45nm Lisbon processor
- **Opteron 3260 HE**
  - Low-power, 32nm Zurich processor

Understanding Your Server's License Limits

- **Windows license limits**
  - Tied to Windows version and edition
    - Maximum RAM
    - Maximum number of processor sockets
    - Maximum number of logical processor cores
- **Application license limits**
  - Tied to version and edition of application
    - Can limit RAM, processor sockets, number of processor cores
- **Stay aware of license limits as you size hardware**
  - Don't oversize hardware above license limits
    - Example: 128GB RAM on server with Windows Server 2008 R2 Standard
  - Don't undersize hardware under license limits
    - Example: 16GB RAM on server with SQL Server 2012 Enterprise Edition

Understanding Your Server's Physical Limits

- **Physical limits on several key items**
  - How many physical processor sockets does the server have?
    - Limits on performance and scalability
    - Limits how much RAM can be installed
  - How many memory slots does the server have?
    - Limits how much RAM can be installed
  - How many PCI-E expansion slots does the server have?
    - Limits total I/O capacity is available
    - Used for NICs, HBAs, RAID controllers, PCI-E storage devices
  - How many internal drive bays does the server have?
    - Limits on internal I/O performance and storage space
  - How much electrical power usage does the server require?
    - Can your rack or data center handle the electrical load and cooling load?

Summary

- **It is extremely important to understand how to identify hardware**
  - Helps you understand your current capacity, scalability, and performance
  - Helps you evaluate component upgrades and possible new purchases
- **Server vendor and model identification**
  - Important to help understand the age and capabilities of a server
    - Number and type of processors installed
    - Amount and type of RAM installed
    - Number and type of PCI-E expansion slots
    - Number and type of internal drive bays
- **Processor vendor and model identification**
  - Important to help understand the performance and scalability of a server
    - Can also be very important for software licensing purposes
    - Can help you justify purchasing a new server

What is Next?

- **Module 3 will cover hardware evaluation**
  - Understanding your workload
  - Application benchmarks
  - Component benchmarks
  - Understanding hardware tradeoffs