Intel Multi-Core Briefing
April, 2005
Intel Platform Strategy... and Multi-core

• Intel continues to drive platform strategies across segments
  – Driven by expanding end user needs
  – Platform advancements: Wireless, Manageability, Security, Form Factor, Battery life, Compute Capability,…

• Intel Multi-core platforms are means to deliver tremendous growth in compute capability
  – Builds upon the success of Hyper-Threading Technology
  – Multi-threaded application performance and Responsiveness in Multi-tasking environments

Intel Multi-core: Enabled by Intel Innovation and Moore’s Law
Fueled By Moore’s Law:
Continued Growth in User Experience

Next Wave Driven via Intel Multi-core/Threading

*Other names and brands may be claimed as the property of others
### The Move to IA Multi-core

<table>
<thead>
<tr>
<th>Platform</th>
<th>Current</th>
<th>2005</th>
<th>2006+</th>
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<td>Desktop Client</td>
<td>Pentium® 4 processor</td>
<td>Smithfield</td>
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<td>&gt;15 Multi-Core Projects</td>
<td>span all segments</td>
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</table>

### Desktop*
- Shipping
- >70%

### Server
- Shipping
- >85%

### Mobile*
- Shipping
- >70%

* Mobile & Desktop Pentium
** data is projected run rate exiting the year.

Source: Intel

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<td>Richford / Future Platform</td>
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<tr>
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<td>Intel® E8870 Chipset / Enabled</td>
<td>Paxville</td>
<td>Tukwila(’07) / Poulsone</td>
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<td>Millington / DP Montvale</td>
<td>Bensley Platform</td>
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<td>Greencreek Chipset</td>
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<td>Desktop Client -Home</td>
<td>Anchor Creek Platform</td>
<td>Bridge Creek Platform</td>
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<td>Pentium® Processor Extreme Edition</td>
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<td>Pentium® D Processor (Smithfield), Presler</td>
<td>Intel® 945/955X Express Chipsets</td>
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<td>Desktop Client -Office</td>
<td>Lyndon Platform</td>
<td>Averill Platform</td>
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<td>Mobile Client</td>
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<td>Yonah Processor</td>
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<td>Calistoga Chipset</td>
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<td>Golan Wireless LAN</td>
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Note: only multi-core processors listed.

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What is Multi-Core?

- Two or more independent execution cores in the same processor
- Specific implementations will vary over time - driven by manufacturing cost efficiencies
  - Best mix of product architecture and volume mfg capabilities
  - Designed to deliver performance, OEM and end user experience

<table>
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<tr>
<th>Single die (Monolithic) based processor</th>
<th>Multi-Chip Processor</th>
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<tr>
<td>Example: Smithfield</td>
<td>Ex: 65nm “Presler” or “Dempsey”</td>
</tr>
<tr>
<td>Example: Montecito</td>
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![Diagram showing single die and multi-chip processor examples](image-url)
Multi-Core Enhances and Enables Key Server Platform Usage Trends

Scale-up headroom with more threads per platform

Optimal platform for virtualized environments

Improving compute density in the datacenter

Dual-core is a natural evolution of Hyper-Threading Technology
Napa: Technology to Benefit the End User

**Performance**
Yonah: 1st mobile 65nm DC, Intel® Digital Media Boost
Calistoga: improved integrated graphics

**Thinner Lighter**
Golan: MiniCard
Small form factor GMCH
Intel® Advanced Thermal Manager

**Battery Life**
Intel Integrated Graphics
EBL techniques
Intel® Dynamic Power Coordination

**Wireless**
Support latest IEEE 802.11 standards
Cisco* Compatible Extensions

Runs multi-threaded, multiple intense applications, and background tasks with greater responsiveness, delivering a better on-the-go experience for the digital home & digital office

*New feature information – more details in Mobility Keynote & Briefings*
Parallelism in the Digital Home

Enhanced User Experience*
‘Enjoy’

Multimedia
• Edit, create, share: music, videos, and photos

Multi-Task
• Enjoy multimedia, gaming, IM, browsing, ...

...while

Content Management:
Transcode to different formats
Delivering multiple streams
Record content to the hard drive (PVR)

Protection:
Virus Scan
Firewall
Data backup
Data encryption

Platform
Health/Operation:
Automatic Downloads
OS Updates and services
Compression

*Performance improvements relative to single threaded CPUs in similar market segment
Intel Desktop Dual-core Platforms

Intel® Pentium® Processor Extreme Edition with Intel® 955X Express Chipset

Intel® Pentium® D Processor (Smithfield) with Intel® 945 Express Chipset Family

Coming in Q2 '05
Pentium® Processor Extreme Edition 840

Intel Dual-core with Hyper-Threading Technology

Summary:
- 3.2 GHz dual-core processor
- 2MB L2 Cache (1MB each core)
- 800 MHz FSB
- Intel® EM64T
- Execute Disable Bit
- Built on 90 nm process technology
- LGA775 package
- Die size: approx. 206 mm²
- Transistor count: approx. 230M
- Introduction Q2’05

Rich New Features Boosting Platform Experience

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**The Balanced Performance Platform**

**Intel® 955X Express Chipset Family**

- 800/1066MHz FSB
- 2-Channel DDR2-667
- Performance Memory Optimizations
- 8GB Memory Support
- ECC Memory Support
- 4-SATA ports
- Intel® Matrix Storage Technology (RAID 0,1,5,10 and AHCI)

- PCI-E* x16 Gfx Dual x16 with Bridge
- 6-PCI-E* x1 Expansion
- Intel® High-Definition Audio
- 8-Hi-Speed USB2.0

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*Features only available in value-add ICH7 SKUs*
Performance for an Extreme Experience

Don’t delay your departure: Convert digital movies for content on the go
High Definition Video Encoding with Adobe® Premiere® using Microsoft®
Windows® Media Encoder Advanced Profile

Quickly enhance your music mix: Enjoy custom music with superior sound quality
MP3 encoding (Razor Lame®) + Sound Normalization (MP3 Gain®)

Create digital content faster: Develop and render images with ease
Rendering 3D images with 3D Studio Max®

Do more while gaming: Play a game while recording multiple TV shows
Gaming with Need for Speed 2* and dual TV tuner using Snapstream® PVR

Source: Intel® Configuration: Intel® Pentium® Processor Extreme Edition 840 (2x1MB L2 Cache, 3.20 GHz, 800 MHz FSB) – Intel® pre-production Lakeport Chipset, 1GB DDR2 667 (2x512MB); Intel® Pentium® 4 Processor with HT Technology Extreme Edition 3.73 GHz (2MB L2 Cache, 1066 MHz FSB) – Intel® i925XE Chipset, Intel D925XECV2 Desktop Board. All Platforms – Intel® Chipset Software Installation Utility 6.10.1002, Intel Application Accelerator RAID Edition 4.5 with RAID ready; Memory: 1GB DDR2 533 (2x256MB); ATI® Radeon® X800 XT Platinum Edition PCIe, ATI Catalyst 4.11 Driver Suite: Display driver version: 6.14.10.6490, Seagate ST3160023AS Serial ATA 160GB 7200RPM, DirectX 9.0c, Operating System: Windows XP Professional Build 2600 SP2 NTFS, Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance.

1 When comparing a Intel® Pentium® Processor Extreme Edition 840 to an Intel Pentium 4 Processor with HT Technology Extreme Edition 3.73 GHz
Intel: A Total Platform Approach

- INTEL CAPITAL
- CHIPSETS/COMMS
- PLATFORM VALIDATION
- BOARDS
- SYSTEMS
- SOFTWARE VENDOR ALLIANCES
- SOFTWARE TOOLS
- DEVELOPER SERVICES
- INTEL® SOLUTIONS SERVICES
- SOLUTIONS BLUEPRINTS
- INDUSTRY STANDARDS
Intel Threading Enabling

Developer Platforms
- HT/ Dual-core platforms
- Remote Access

SW Tools and Expertise
- Intel Compilers
- Intel Threading Toolkit
- Performance Libraries
- Whitepapers
- SW Engineers

Extensive Support Services
- Early Access Program
- Threading Immersion Program
- Application Tuning Centers
- Intel Solution Services
- Intel Software College

Comprehensive Enabling: Accelerating the Ecosystem
Threading: Intel Working With ISVs
Intel 300mm Ramp Capability

Wafer Starts / Week (200mm Equiv.)

Worldwide Manufacturing and Sales Channels
Summary

• Intel is addressing expanding end user needs with advancements to the platform
  – Broad array of multi-core products

• Intel Multi-core: Enabled by Intel Innovation and Moore’s Law

• Intel accelerating value and deployment via a powerful enabling strategy