AMD vs. Intel
The Compiler as Referee

- pgf95 -tp k8-64
- pgf95 -tp p7-64

Parallel Ocean Program

Opteron
Woodcrest

75 80 85 90 95 100
-tp k8-64
-tp p7-64
AMD vs. Intel
The Compiler as Referee

- pgf95 -tp k8-64
- pgf95 -tp x64
- pgf95 -tp p7-64

Parallel Ocean Program

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-tp p7-64 -tp x64 -tp p7-64
PGI Unified Binary™

- Generate two versions of a function
- Select at run time which to run
- simple method
  -tp x64
- targeted method
  -tp k8-64,p7-64,core2-64
- tuned method
  #pragma pgi routine tp k8-64 core2-64
SPEC FP2006 Relative Performance
Opteron

-tp k8-64  -tp p7-64

80  85  90  95  100

410 bwaves
416 gamess
433 milc
434 zeusmp
435 gromacs
436 cactusadm
437 leslie3d
444 namd
447 dealII
450 soplex
453 povray
454 calculix
459 gemsFDTD
465 tonto
470 lbm
481 wrf
482 sphinx3
SPEC FP2006 Relative Performance
Opteron

Options:
-tp k8-64  -tp x64  -tp p7-64

80  85  90  95  100

- 410 bwaves
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- 482 sphinx3
SPEC FP2006 Relative Performance
Woodcrest

0  20  40  60  80  100

-tp k8-64  -tp p7-64

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SPEC FP2006 Relative Performance
Woodcrest

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Overhead and Cost

- Compile time
  - from 10%-90%
- Disk space
  - from 10% to 70%
- Memory
  - from 10% to 90%
- Run time
  - selection cost
Overhead and Cost

- Compile time
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Overhead and Cost

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Convergence or Divergence?

AMD64
- AMD64 Arch
- Hypertransport
- Dual Issue SSE
- Embedded

Both
- x86/x87
- Add’l Regs
- SSE1/2/3
- L2 Cache
- Multi-Core
- 64-bit
- MMX
- Mobile

EM64T
- MNI
- Core2 Arch
- Shared Cache
- Clock Rate
- L3 Cache
- HyperThread
PGI Unified Binary™ Executables

- A single x64 binary including optimized code sequences for both AMD64 and EM64T/Core2
- SW-enabled binary compatibility
- Reduce development, tuning, manufacturing, maintenance costs
- Maximize flexibility for end-users to deploy applications across platforms
- Exploit the innovations of both AMD and Intel without fear of losing binary compatibility
Future Work

- Reduce I-cache and Virtual Memory pollution
- Tune with profile feedback
- Reduce function selection cost

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