Experiments with running ALADIN on LINUX PC, using different FORTRAN compilers

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Why LINUX PC ?

- New high performance processors for PC-s

- PC-s are going to replace medium range work stations

- Full RAID disk subsystems

- Price – let's discuss this topic later…

- System parameters:
- Linux PC configuration:
- two Intel Xeon processors on 2.8 GHz
- 1 GB RAM
- Two disks 150 GB each - software RAID of the basic file systems
- Operational system - LINUX Red Hat 9 smp
- MPICH2 release 0.96p2
- Portland Group FORTRAN compiler 5.0
- Intel FORTRAN compiler 8.0.046
- ALADIN 15 IV export package

- Tuning parameters:
- PGF: -O3 -Mfree -mp -Mnoopenmp -Mextend -DMPI -pc 64 -Kieee -byteswapio
- IFORT:-O3 -xN -std90 -free -convert big_endian -pc 64 -traceback -static -assume byterecl
- MPICH2: --with-device=ch3:sshm --enable-f77 --enable-f90 -with-pm=forker --enable-timing=no
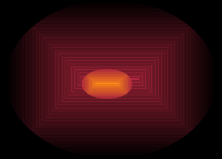
- Porting:
- Usual modifications in auxiliary library – facomp.h, lficom0.h, introducing proper timing routines.
- General
- both compilers give error message in case of duplicated items in USE statement.
- Large number of corrections in suafn1.F90, sucfu.F90, suxfu.F90 due to compilers sensitivity

Test results

- The tests performed with both binaries used the same initial and LBC-s for calculating 6 hours forecast with DFI.

- The domain is 90x72 points (79x63) with 31 levels on vertical

- The results, shown on the next slides are from single processor run

- **PGI**

- 15:48:07 STEP 0 H= 0:00 +CPU= 5.626
- 15:48:12 STEP 1 H= 0:10 +CPU= 5.038
- 15:48:17 STEP 2 H= 0:20 +CPU= 5.120
- 15:48:22 STEP 3 H= 0:30 +CPU= 5.022
- 15:48:27 STEP 4 H= 0:40 +CPU= 5.101
- 15:48:32 STEP 5 H= 0:50 +CPU= 5.075
- 15:48:37 STEP 6 H= 1:00 +CPU= 5.067
- 15:48:43 STEP 7 H= 1:10 +CPU= 5.056
- 15:48:48 STEP 8 H= 1:20 +CPU= 5.072
- 15:48:53 STEP 9 H= 1:30 +CPU= 4.989
- 15:48:58 STEP 10 H= 1:40 +CPU= 5.014
- 15:49:03 STEP 11 H= 1:50 +CPU= 4.994
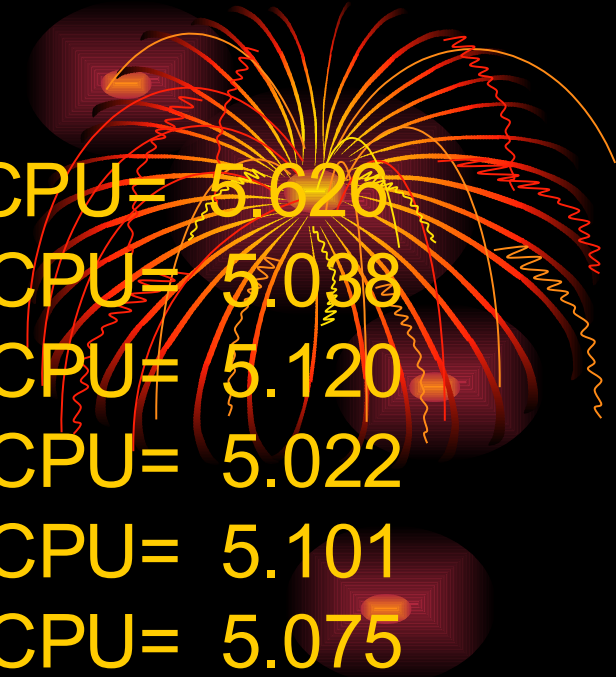
- **IFORT**
- 14:00:23 STEP   0 H=   0:00 +CPU= 2.967
- 14:00:26 STEP   1 H=   0:10 +CPU= 2.660
- 14:00:28 STEP   2 H=   0:20 +CPU= 2.654
- 14:00:31 STEP   3 H=   0:30 +CPU= 2.647
- 14:00:34 STEP   4 H=   0:40 +CPU= 2.656
- 14:00:36 STEP   5 H=   0:50 +CPU= 2.645
- 14:00:39 STEP   6 H=   1:00 +CPU= 2.649
- 14:00:42 STEP   7 H=   1:10 +CPU= 2.645
- 14:00:44 STEP   8 H=   1:20 +CPU= 2.653
- 14:00:47 STEP   9 H=   1:30 +CPU= 2.688
- 14:00:50 STEP   10 H=   1:40 +CPU= 2.660
- 14:00:52 STEP   11 H=   1:50 +CPU= 2.649

- Two processor runs, gave 1.72 to 1.92 better performance after running ten forecasts with different activity of the physics block.

- In cases of "wet" forecast the performance is relatively higher.

Some conclusions

- Intel compiler shows dramatically better performance on it's native platform and becomes better and better with every new release.

- If you have problems like "internal abort" of compiler on some routines you should report the circumstances to Intel premier support and to wait for new release, or to skip some of optimisation options and try to recompile the routine

- So about the price:
- On one hand the PC is cheaper then any work station
- On other hand you obtain w.w.w., which means work,work,work and
- ## To be c onti nued