Beskow runtime performance: EC-Earth 3.2 beta

Repository:

/ecearth3/branches/tuning/3.2beta/main

Compile options:

1. CRAY:
    - General F90 flags for compiling (Note a small number of subroutines compiled with -O0)
      -sreal64 -em -hnoomp -O2
    - General C flags for compiling
      -O3
    - Preprocessor defs for IFS source
      linux LINUX LITTLE LITTLE_ENDIAN POINTER_64 BLAS
    - *NEMO F90 flags*
      -em -s integer32 -s real64 -O2 -e0 -eZ
2. Intel:
    - General F90 flags for compiling
      -O2 -fp-model precise -xHost -g -traceback -r8
    - General C flags for compiling
      -O2 -g -traceback -xHost
    - Preprocessor defs for IFS source
      linux LINUX LITTLE LITTLE_ENDIAN POINTER_64 BLAS

See also EC-Earth Development Portal wikipage: *Building EC-Earth 3 on the PDC beskow system*

Coupled model:

- Coupled IFS+NEMO, launched using the *ece-ifs+nemo.sh* EC-Earth 3.2 run script.
- IFS (T255L91), NEMO (ORCA1L75_LIM3)
- Three month simulations starting 1990-01-01.
- Restart frequency: 1 year
- Coupling frequency: 2700 sec
- IFS timestep: 2700 sec
- NEMO timestep: 2700 sec
- LIM3 timestep: 2700 sec

Results:

IFS: 288 cores

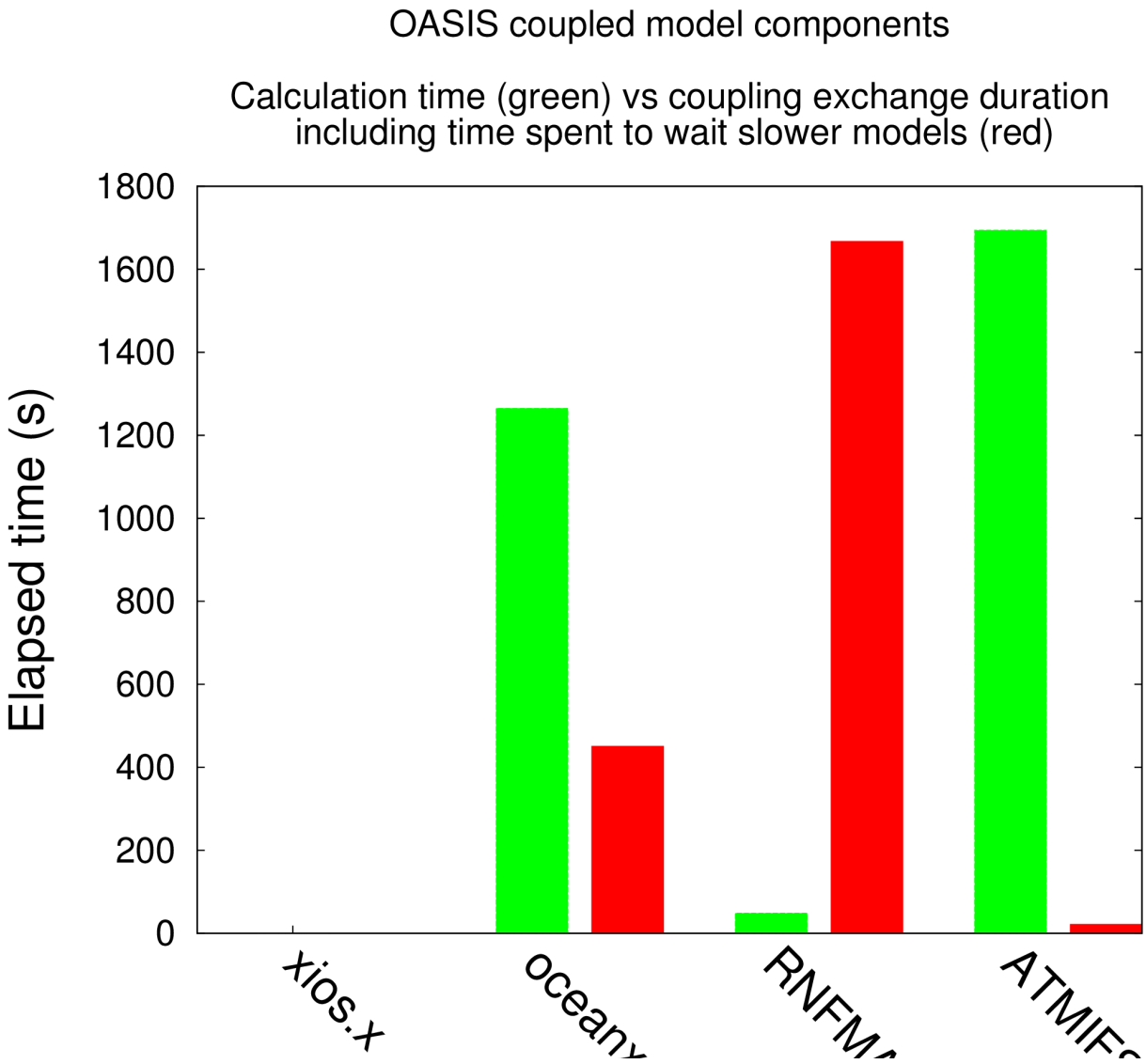
NEMO: 96 cores
Runoff-mapper: 1 core
xios: 1 core

SYPD

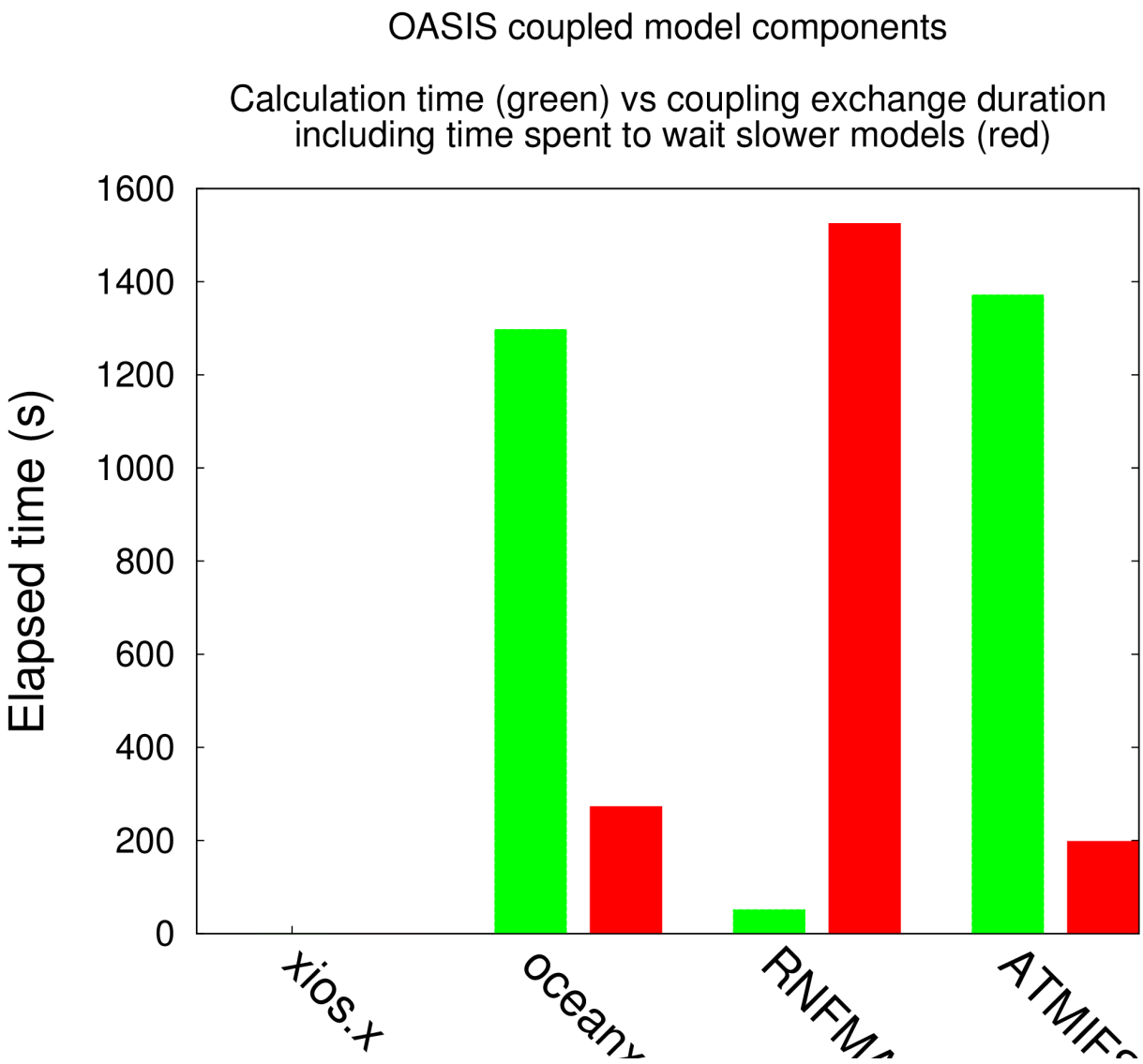
Intel: runtime 30 min 13 sec = 11.75 SYPD
Cray: runtime 26 min 39 sec = 13.32 SYPD

Lucea plots:

Intel



Cray



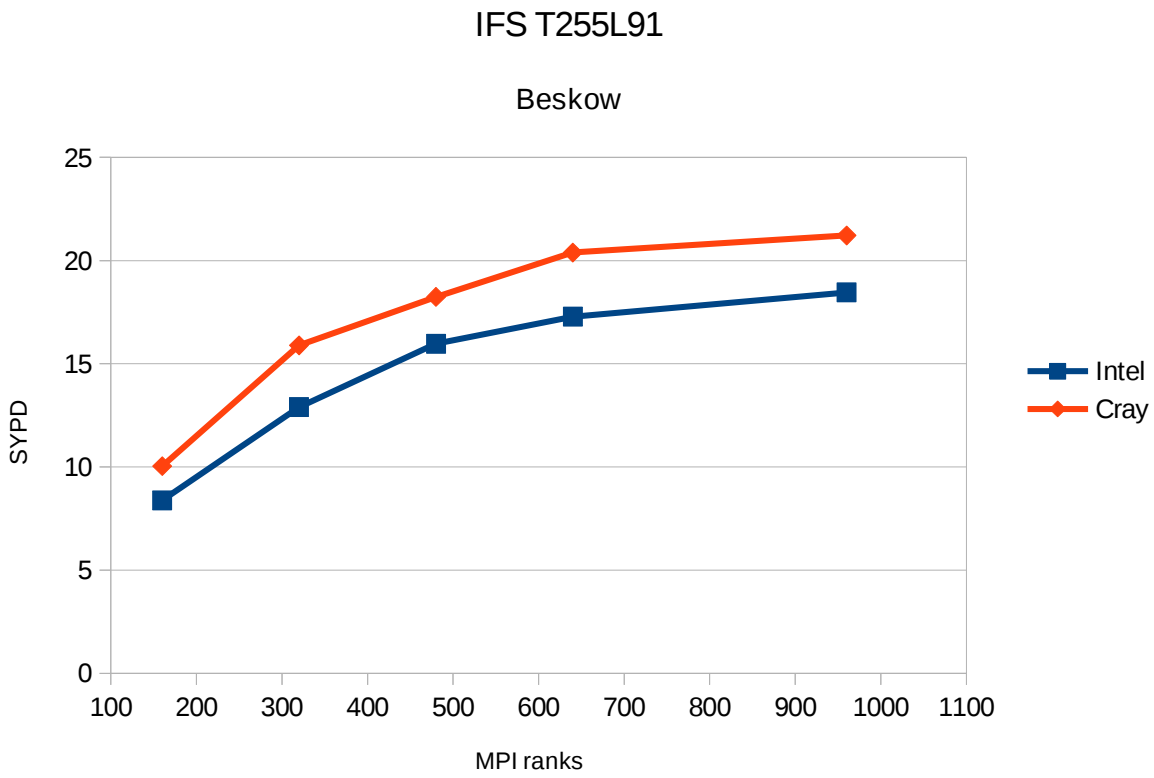
IFS Standalone:

- T255L91 IFS standalone. launched using the *ece-ifs.sh* EC-Earth 3.2 run script.
- Three month simulations starting 1990-01-01.
- Restart frequency: 1 year
- IFS timestep: 2700 sec

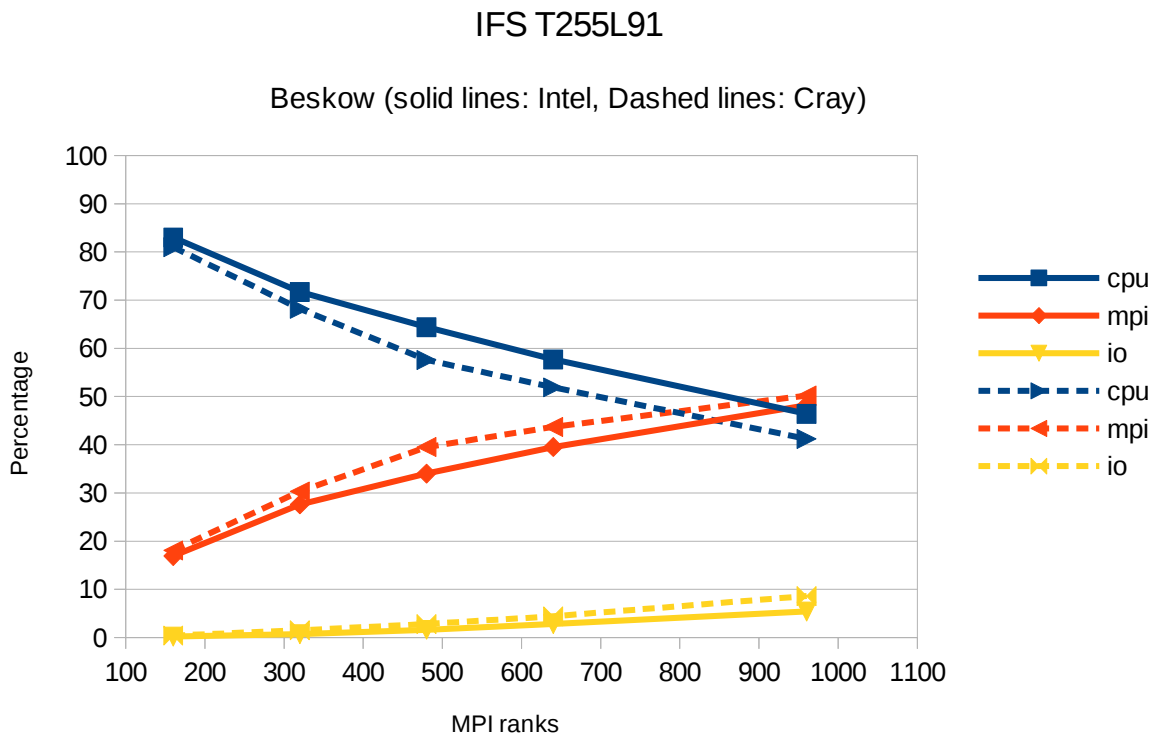
Results:

Scaling

	Intel		Cray	
#Nodes (cores)	sim. time	SYPD	sim. time	SYPD
5 (160)	42 min 21 sec	8.38	35 min 21 sec	10.04
10 (320)	27 min 31 sec	12.90	22 min 21 sec	15.89
15 (480)	22 min 14 sec	15.97	19 min 28 sec	18.24
20 (640)	20 min 33 sec	17.28	17 min 25 sec	20.39
30 (960)	19 min 14 sec	18.46	16 min 44 sec	21.22
40 (1280)				



perf-reports results

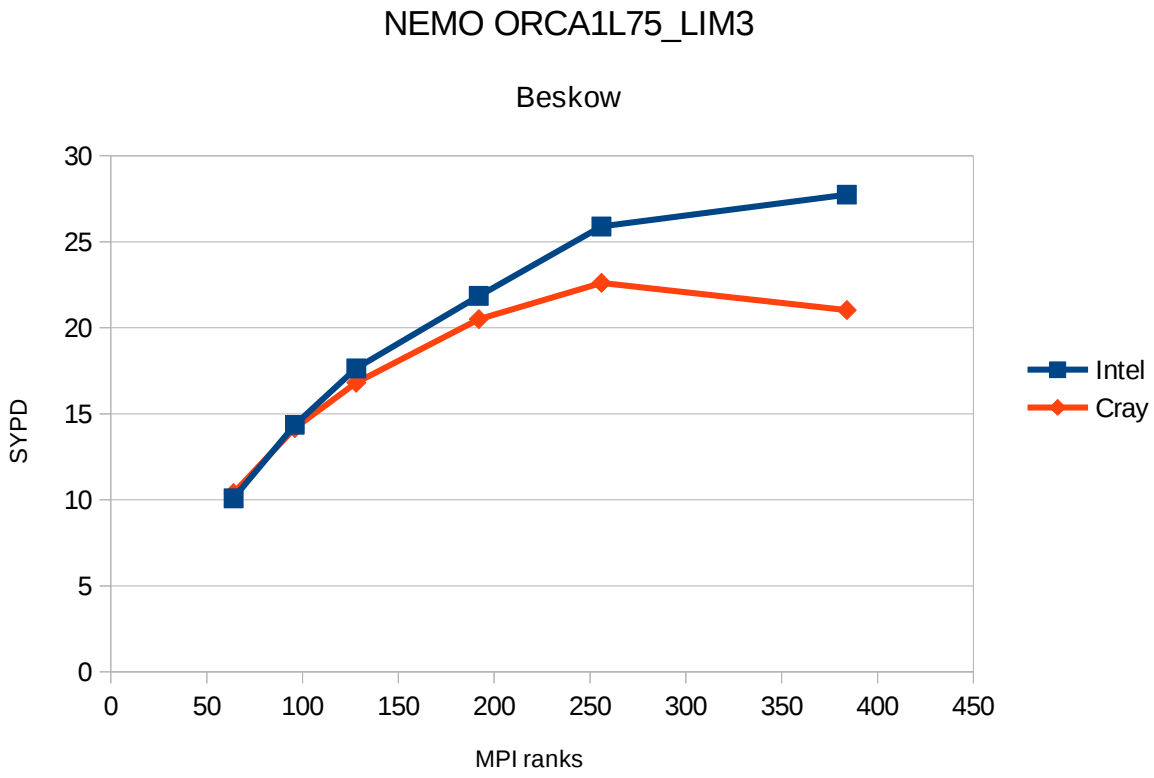


NEMO Standalone:

- ORCA1L75_LIM3 standalone. launched using the *ece-nemo.sh* EC-Earth 3.2 run script.
- No XIOS, key_iomput removed from NEMO cpp flags file and xios removed from launch/run script (perf-report cannot analyze multi-binaries)
- Three month simulations starting 1990-01-01.
- Restart frequency: 1 year
- NEMO timestep: 2700 sec

Scaling

	Intel		Cray	
#Nodes (cores)	sim. time	SYPD	sim. time	SYPD
2 (64)	35 min 11 sec	10.09	34 min 11 sec	10.39
3 (96)	24 min 44 sec	14.36	25 min 03 sec	14.17
4 (128)	20 min 08 sec	17.64	21 min 08 sec	16.80
6 (192)	16 min 15 sec	21.85	17 min 19 sec	20.50
8 (256)	13 min 43 sec	25.89	15 min 42 sec	22.61
12 (384)	12 min 48 sec	27.74	16 min 53 sec	21.03



perf-reports results