Palm : A computational Framework for Parallel Applications

Samuel Buis, Damien Déclat, Etienne Gondet, Sébastien Massart, Thierry Morel
Global Change and Climate modelling team, CERFACS, Toulouse, France
E-mail : palm@cerfacs.fr

Historic

PALM was originally designed to handle the **MERCATOR project's operational data assimilation system** in a **flexible** and **efficient** way.

It came out very quickly that the PALM concepts can also be applied to more general **applications.**

Today, PALM is involved in several projects, dealing with **data assimilation in oceanography**, **atmospheric chemistry**, but also **CFD coupled simulations**, etc…

Dogma

Flexibility & Modularity: independent components are assembled within PALM to create modular applications.
Performances: PALM allows to exploit easily and at a maximum level the parallelism of an application.
Portability: PALM is running on IBM, NEC, FUJITSU, SGI, COMPAQ, SUN, PC Clusters…

Concept

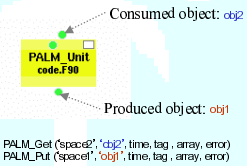
The **aim** of PALM is to **handle complex applications** in a **modular** and **parallel** way to ensure their evolutivity and guarantee their performances.

Applications are created by **assembling** independent **components (PALM Unit)**, possibly parallel, in sequences.

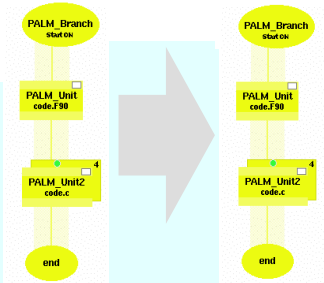
PALM is in charge of executing the sequences, possibly in parallel, and making the components exchange some data.

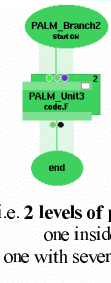
Philosophy

PALM Unit:
piece of code (fortran subroutine, C or C++ function), that can consume and produce data (**PALM Object**) by calling PALM primitives



These entities can be combined within a sequence of execution: **PALM Branch**





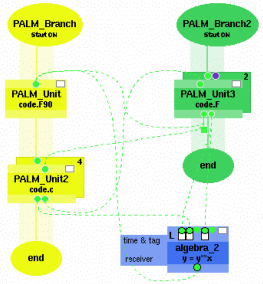
Several Sequences can be launched within the same application
i.e. **2 levels of parallelism**: one inside the Units, one with several branches.

Any Unit can send or receive an object to/from an other Unit.

An Object can be stored temporarily in a memory space managed by PALM (**PALM Buffer**).

PALM insures the remapping for an object differently distributed on the two sides of the communication.

An object can be combined or used within an algebraic operation provided by the **PALM Algebra toolbox**, relying on numerical libraries and user's routines.



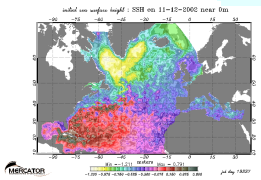
PALM Applications

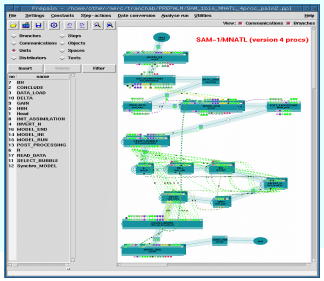
The MERCATOR operational data assimilation system based on PALM

http://www.mercator.com.fr

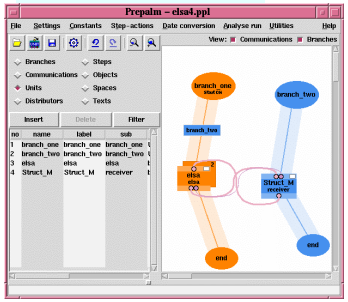
• MERCATOR is an oceanography project supported by:

•MERCATOR provides a weekly forecast bulletin.





CFD unsteady simulations with PALM



In the CFD domain, PALM is used as a coupler in order to couple elsA (**http://www.cerfacs.fr/cfd/CFDWeb.html**), an oriented object compressible flows simulation software with a structure code.