parallel tools platform

http://eclipse.org/ptp

PTP Overview

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SC13 PTP BOF
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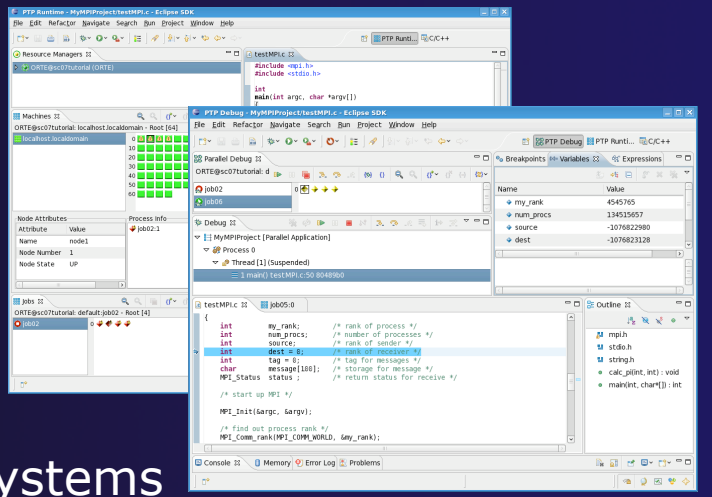
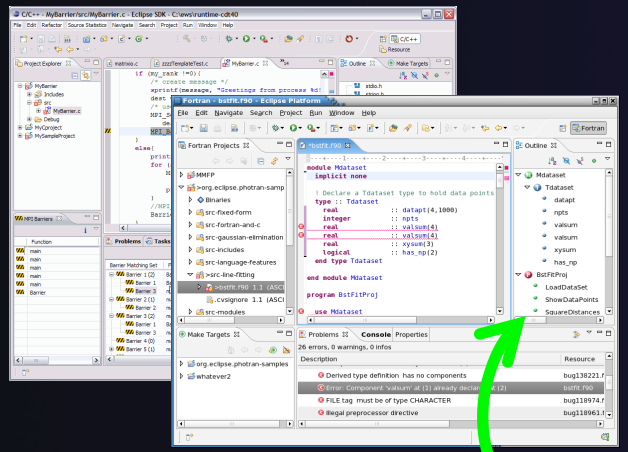
Parallel Tools Platform (PTP)

- The Parallel Tools Platform aims to provide a highly integrated environment specifically designed for parallel application development
- Features include:
  - An integrated development environment (IDE) that supports a wide range of parallel architectures and runtime systems
  - A scalable parallel debugger
  - Parallel programming tools (MPI, OpenMP, UPC, OpenSHMEM, OpenACC, etc.)
  - Support for the integration of parallel tools
  - An environment that simplifies the end-user interaction with parallel systems
- http://www.eclipse.org/ptp

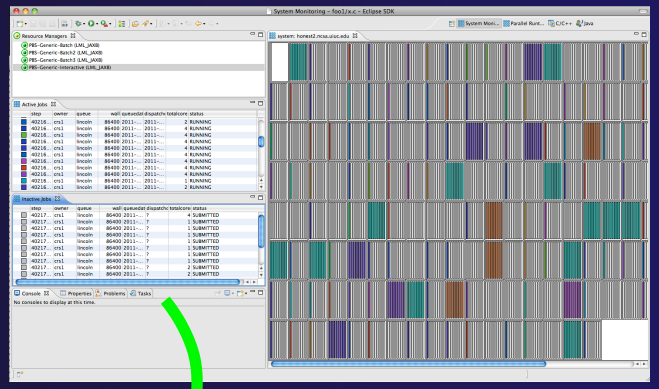


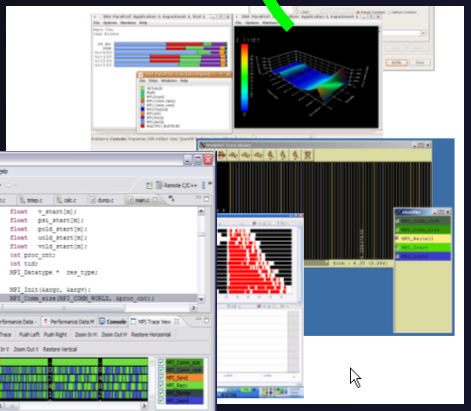
Eclipse PTP Family of Tools

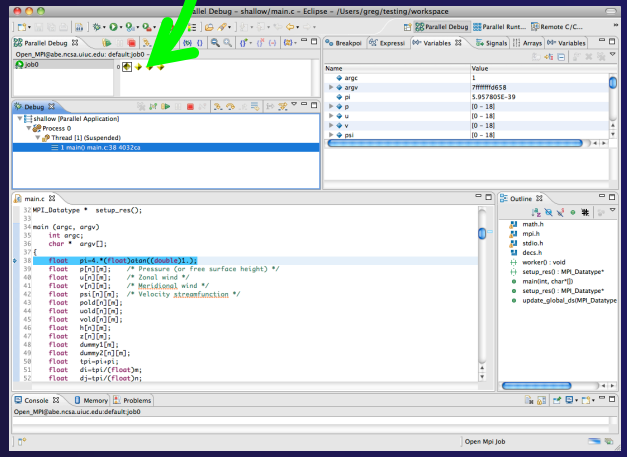
Coding & Analysis
(C, C++, Fortran)



Launching & Monitoring



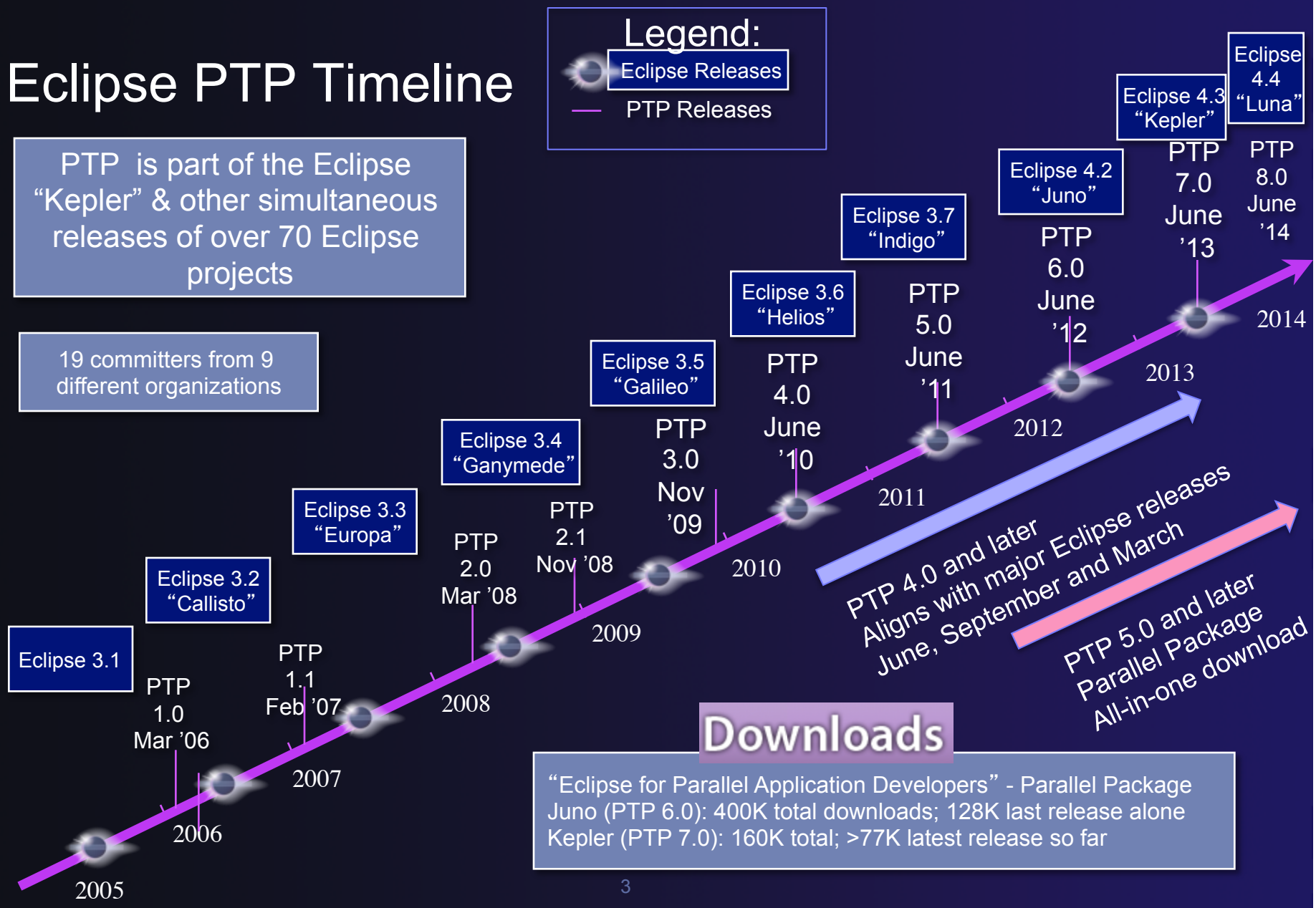




Performance Tuning & Analysis
(TAU, GEM, …)

Parallel Debugging

Eclipse PTP Timeline

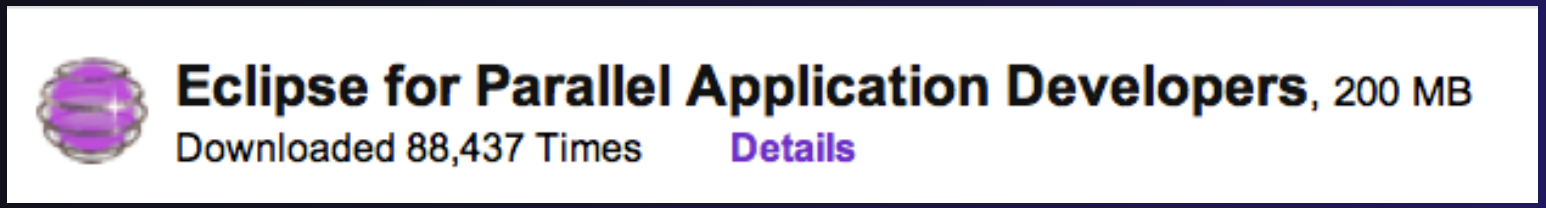


Downloads

"Eclipse for Parallel Application Developers" - Parallel Package
Juno (PTP 6.0): 400K total downloads; 128K last release alone
Kepler (PTP 7.0): 160K total; >77K latest release so far

Download PTP

- Eclipse is available in a number of different packages for different kinds of development
  - http://eclipse.org/downloads
- For PTP, we recommend the all-in-one download:
  - Eclipse for Parallel Application Developers



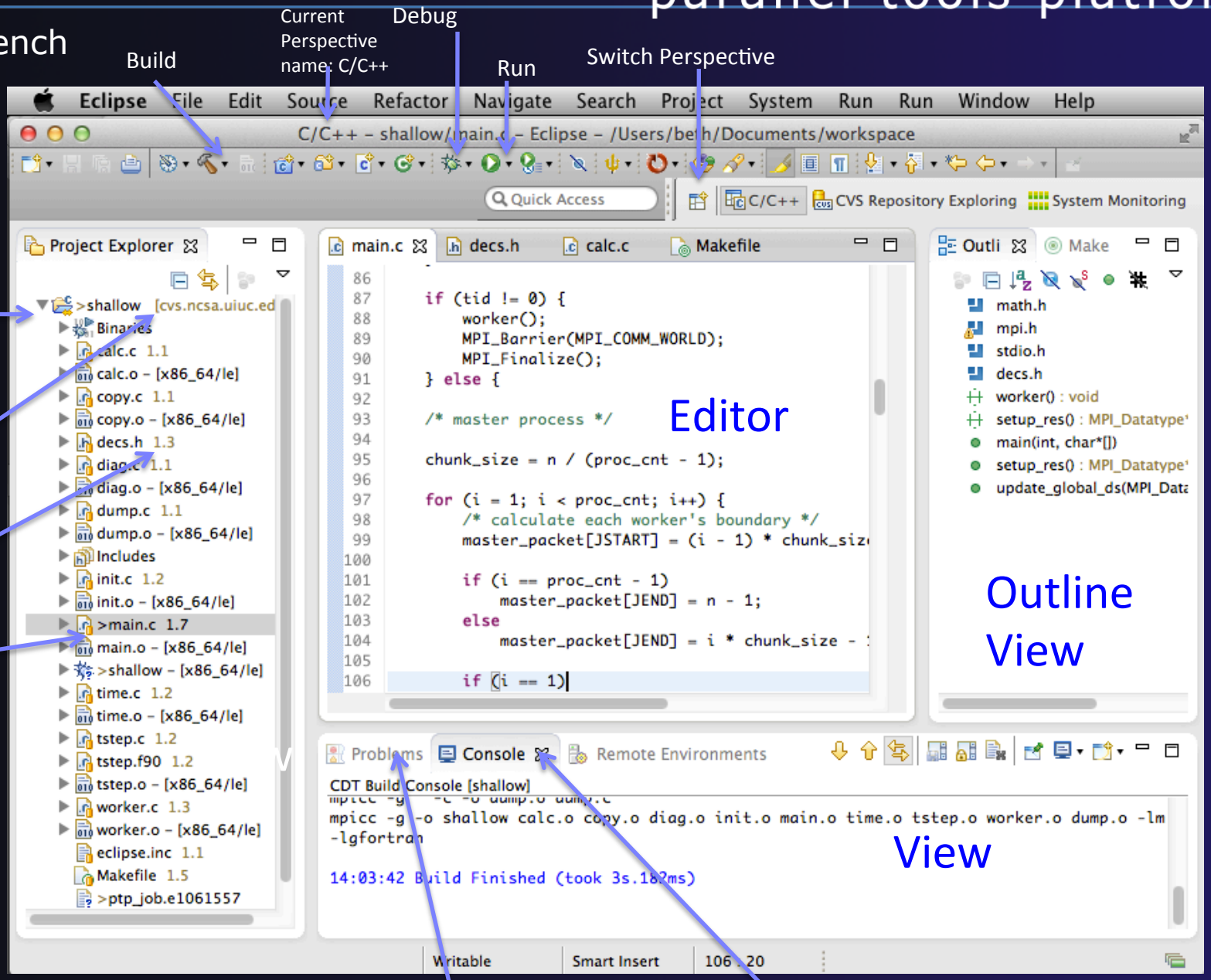
We often call this the “Parallel Package”

- Update the package to current PTP release via instructions at http://www.eclipse.org/ptp/downloads.php

Highlight of PTP Features

parallel tools platform

Workbench



Rightmouse for Project Properties

Source Code Repository

Version # in SCR

> Indicates change from SCR

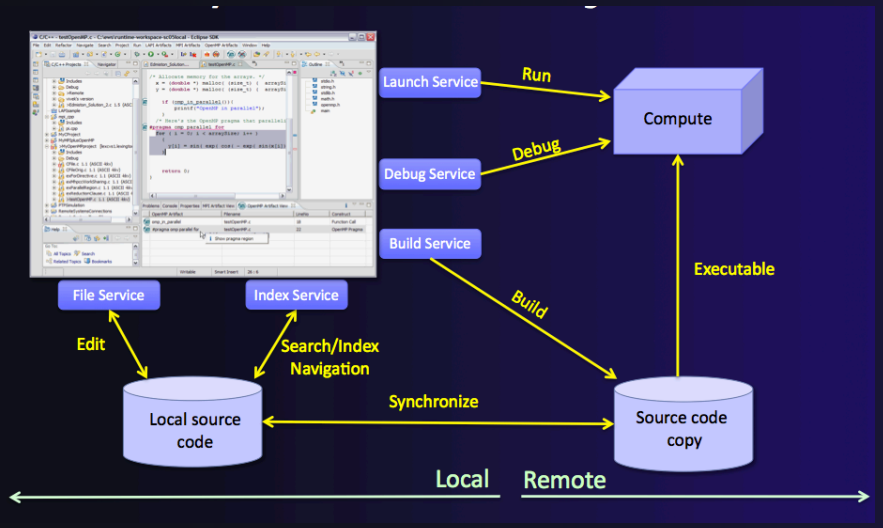
Preferences: Menu: Window>Preferences
Mac: Eclipse>Preferences

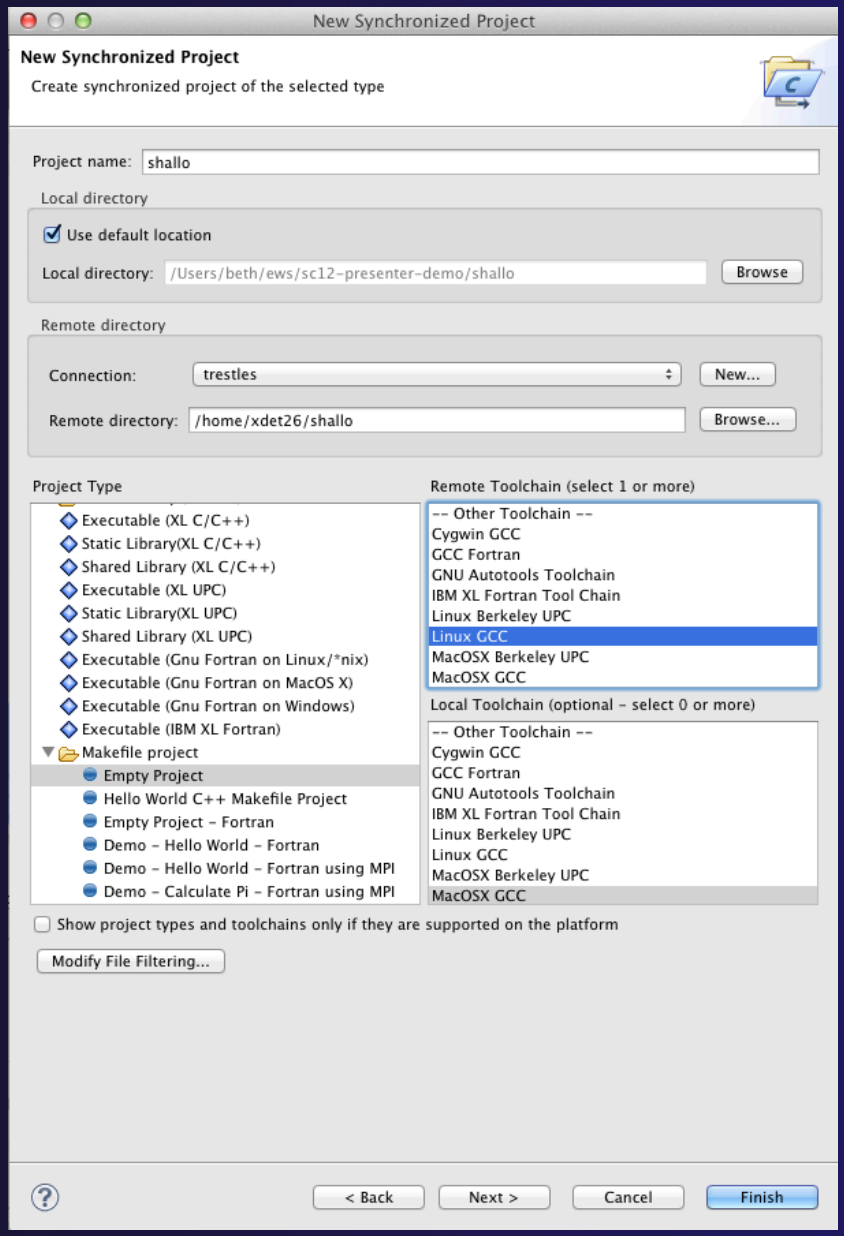
Problems view: Build errors etc.

Console view: Build output; Run output

Synchronized Projects

- Source is mirrored on local and remote host
  - Responsive editing and interactions on local
  - Build and run on remote
  - Generic: Not just C/C++/ Fortran

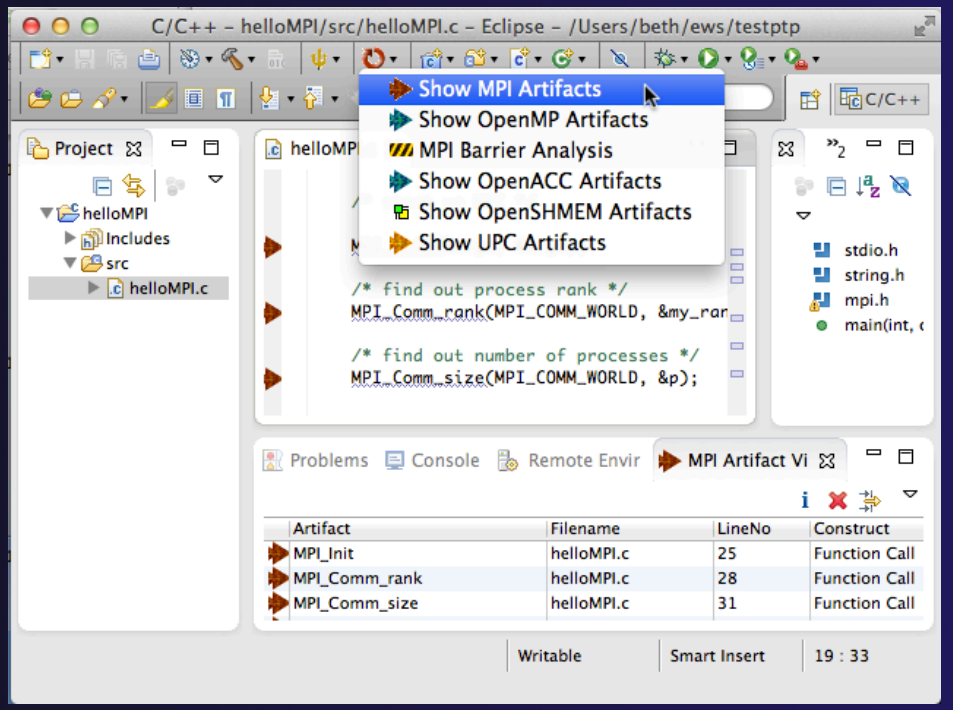




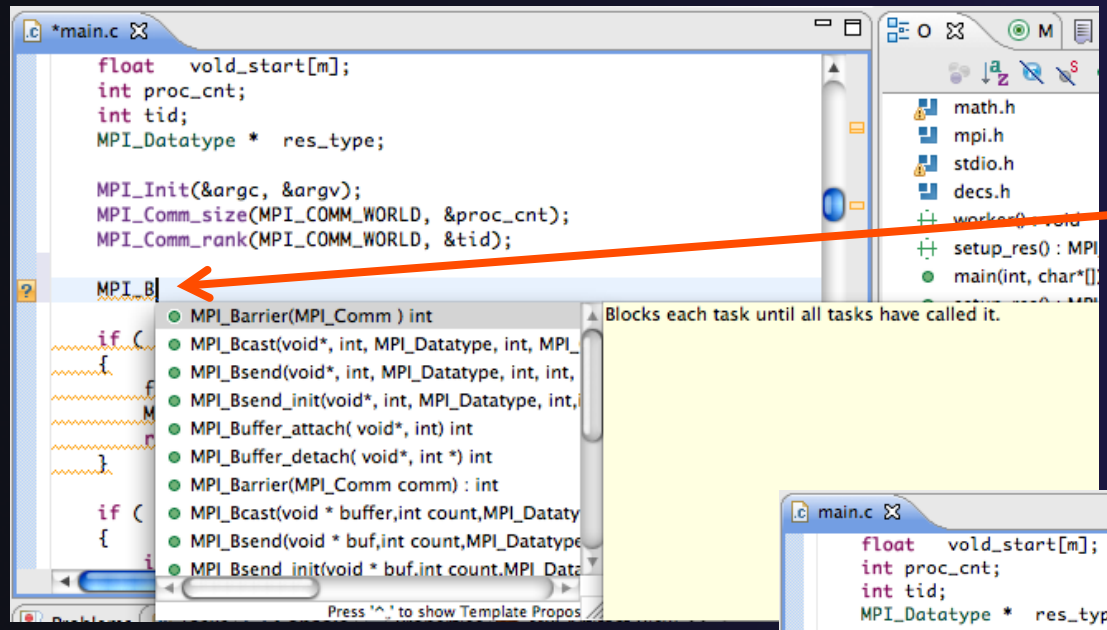
MPI, OpenMP, UPC, …. Support

Support for a variety of languages/APIs/ Libraries for parallel development

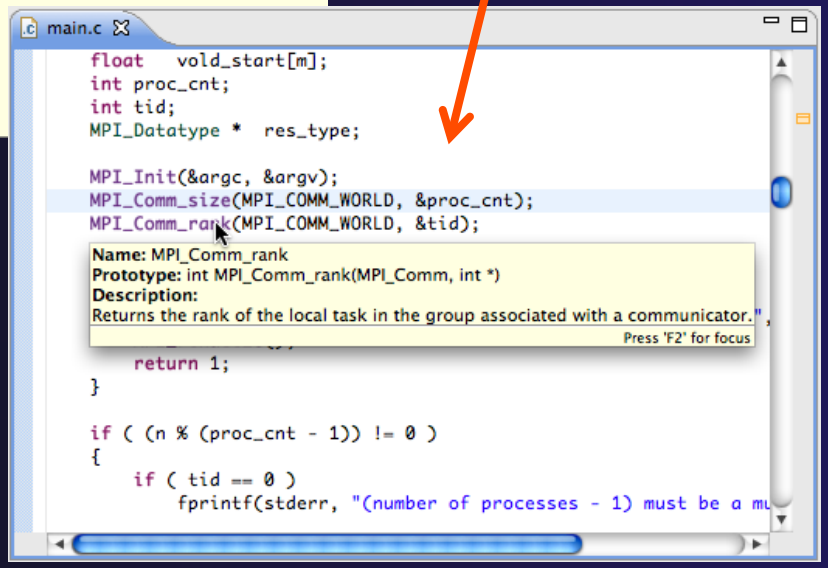
- MPI
- OpenMP
- OpenSHMEM
- OpenACC
- UPC



Editor Features for Parallel Development



- Code completion will show all the possible MPI keyword completions
- Enter the start of a keyword then press <ctrl-space>
- Hover over MPI API
- Displays the function prototype and a description



- MPI Barrier Analysis
- Code templates for common idioms
- Similar tools for OpenMP, UPC, OpenSHMEM, OpenACC

Fortran

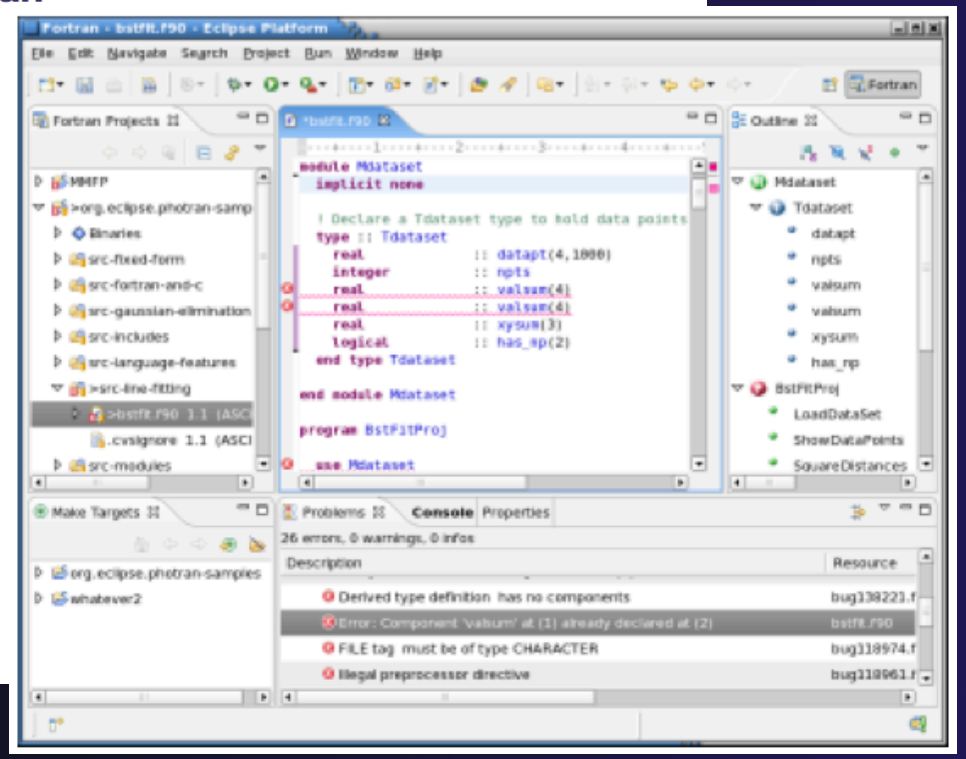
- Photran: http://eclipse.org/photran/

Photran - An Integrated Development Environment and Refactoring Tool for Fortran

Photran is an IDE and refactoring tool for Fortran based on **Eclipse** and the **CDT**. **Photran 8.0** was released with Eclipse 4.2 (Juno) on June 27, 2012.

Photran 8.0 supports Fortran 77-2008. It includes 39 refactorings (including Rename, Extract Procedure, and loop transformations), as well as the following IDE features:

- Syntax-highlighting editor
- Outline view
- Content assist*
- Open declaration*
- Declaration view and hover tips*
- Fortran language-based searching*
- Support for CVS & other VCS's**
- Interactive debugger (*gdb* GUI)
- Makefile-based compilation
- Optional Makefile generation

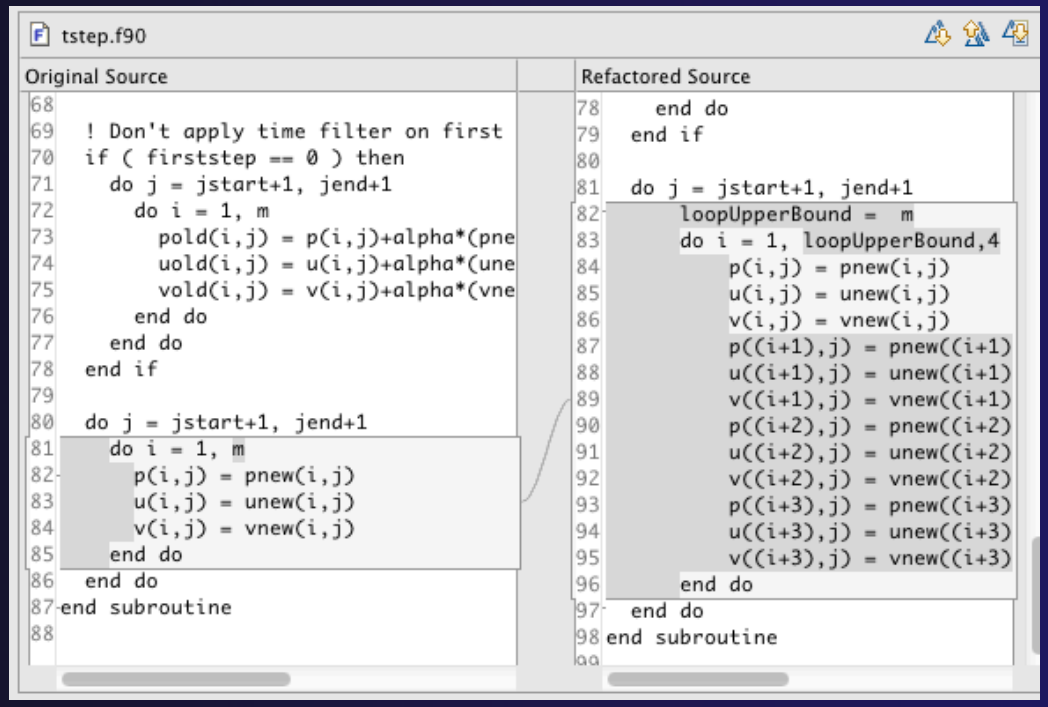


Refactoring Example: Fortran Loop Transformations

- **Unroll Loop**
- Select a loop, click **Refactor▸Do Loop▸Unroll Loop...**

```
do i = 1, 10
  print *, 10*i
end do
```

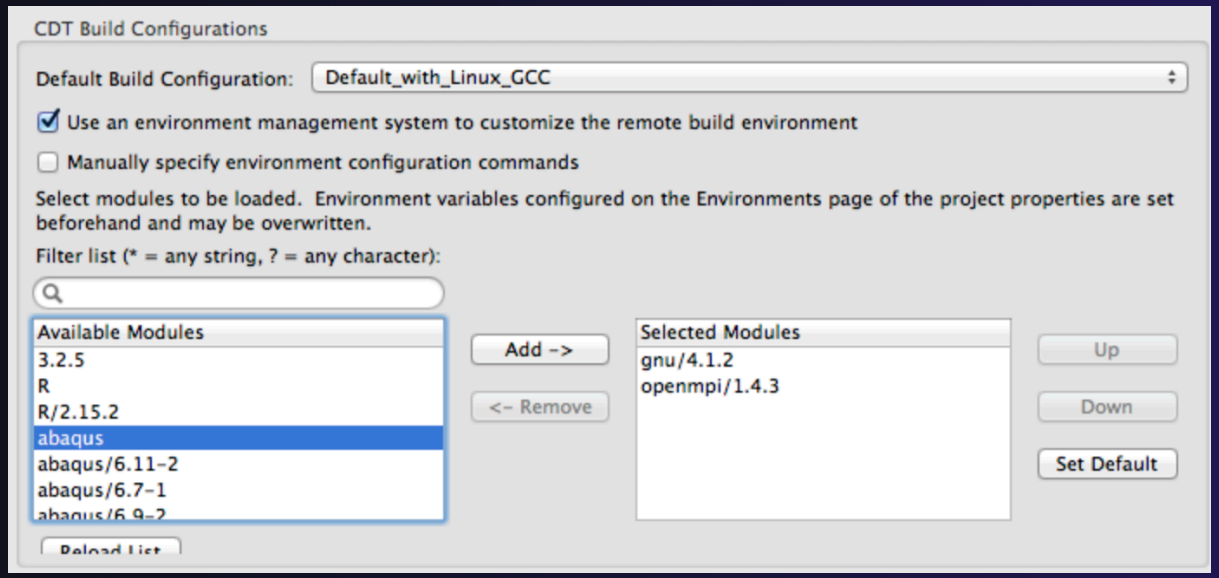

```
do i = 1, 10, 4
  print *, 10*i
  print *, 10*(i+1)
  print *, 10*(i+2)
  print *, 10*(i+3)
end do
```



Configuring Build Modules

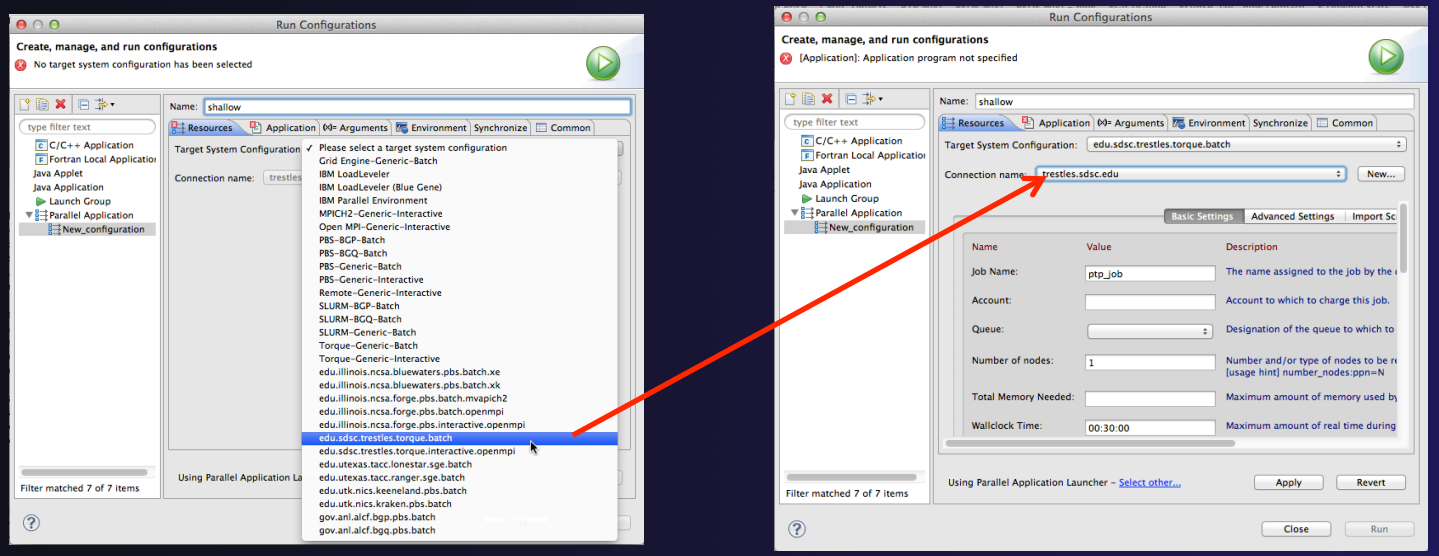
Environment Management

- If the remote system has Modules installed, a custom set of modules can be configured for building C/C++ projects
- On a per-build configuration, run & debug configurations
- Modules can be ordered



Launching

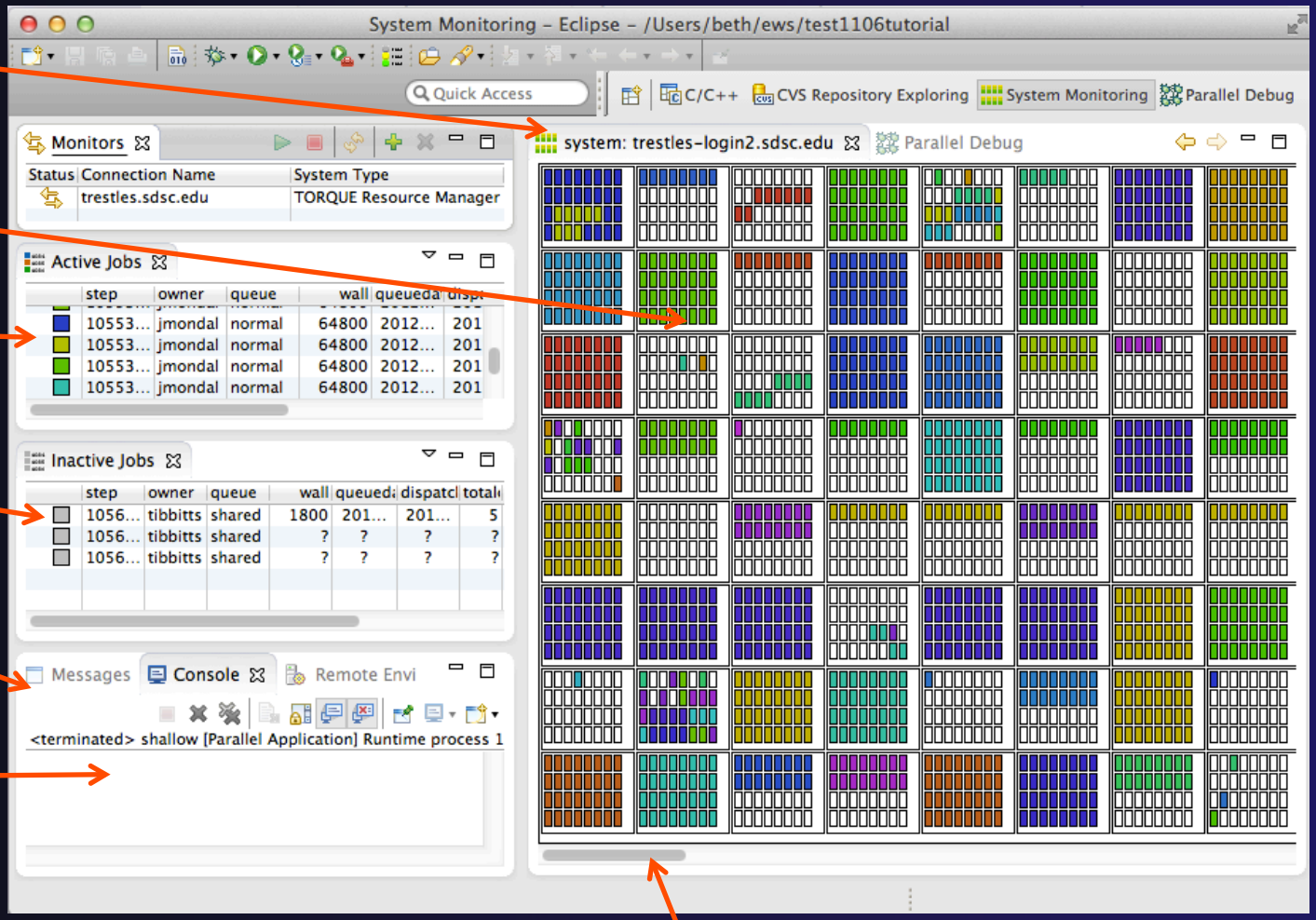
- Flexible Target System Configurations
- UI solicits input depending on remote target



- PTP Kepler added support for filtering, IBM Platform LSF & MPI,

Monitoring (incl. stand-alone "Sysmon")

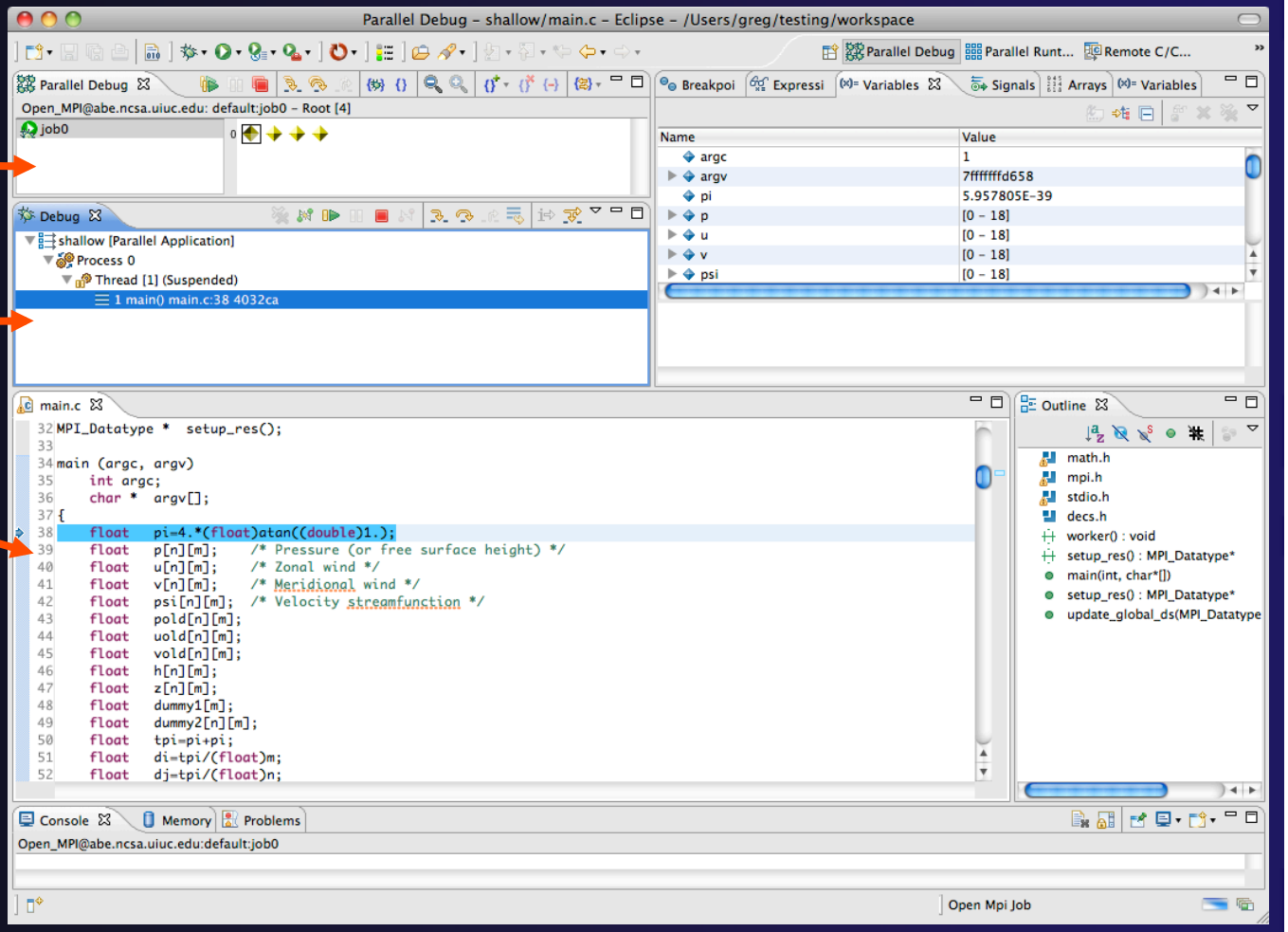
- System view
- Jobs running on system
- Active jobs
- Inactive jobs
- Messages
- Console



Scroll to see more

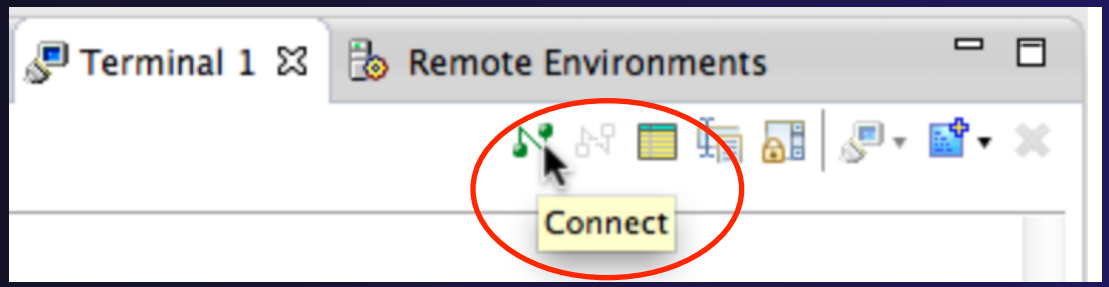
Parallel Debugger

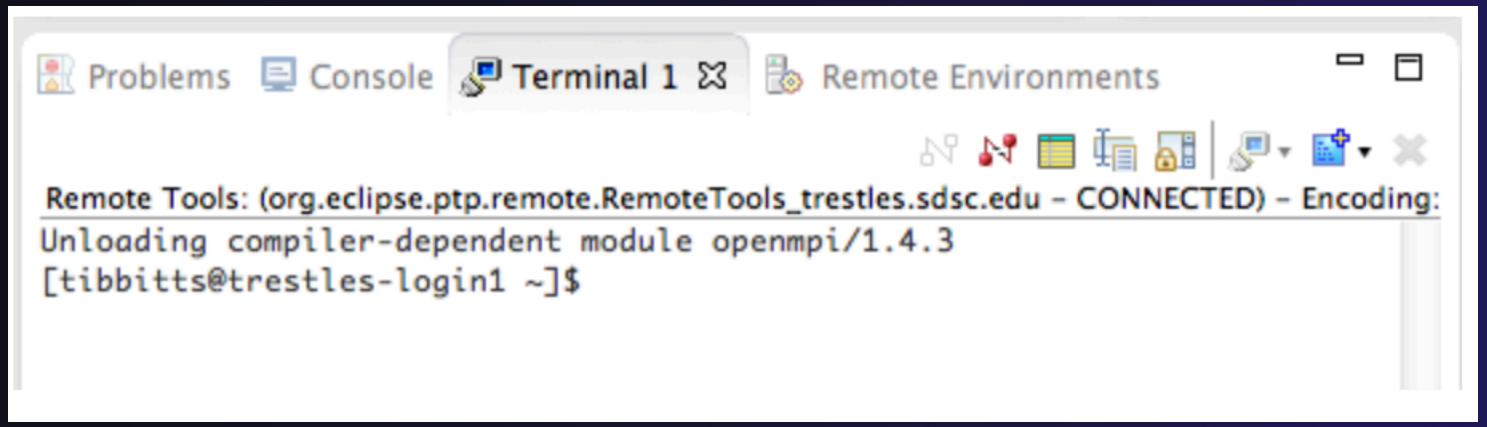
- **Parallel Debug view** shows job and processes being debugged
- **Debug** view shows threads and call stack for individual processes
- **Source** view shows a **current line marker** for all processes
- Automatic deployment of sdm on target machine



Built-in Terminal View

Issue commands on remote target using existing connection information





Tutorial, VM

- Tutorial slides
  - Most recent tutorial:
    http://wiki.eclipse.org/PTP/tutorials/XSEDE2013

Commercial Products that include PTP

Commercial Products that include PTP

- IBM Parallel Environment Developer Edition
  - Eclipse, PTP
  - Hardware Performance Counters
  - MPI/OpenMP tracing/profiling
  - Assistance tools for IBM PAMI
  - XLC Compiler Transformation Report viewer

- NVIDIA Nsight development environment
  - Includes portions of PTP

Online Information

- Information about PTP
  - PTP online help
    - http://help.eclipse.org
  - Main web site for downloads, documentation, etc.
    - http://eclipse.org/ptp
  - Wiki for designs, planning, meetings, etc.
    - http://wiki.eclipse.org/PTP
    - Newest features: “New and Noteworthy” link
- Information about Photran
  - Main web site for downloads, documentation, etc.
    - http://eclipse.org/photran

Mailing Lists

- User Mailing Lists
  - PTP
    - http://dev.eclipse.org/mailman/listinfo/ptp-user
  - Photran
    - http://dev.eclipse.org/mailman/listinfo/photran
  - Major announcements (new releases, etc.) - low volume
    - http://dev.eclipse.org/mailman/listinfo/ptp-announce
- Developer Mailing Lists
  - Developer discussions - higher volume
    - http://dev.eclipse.org/mailman/listinfo/ptp-dev

Getting Involved

- See http://eclipse.org/ptp
- Read the developer documentation on the wiki
  - http://wiki.eclipse.org/PTP
- Join the mailing lists
- Attend the monthly Developer Meetings
  - Conf Call Monthly: Second Tuesday, 1:00 pm ET
  - Details on the PTP wiki
- Attend the monthly User Meetings
  - Teleconf Monthly: 4th Wednesday, 1:00 pm ET
    - Move Nov-Dec meeting to early Dec?
  - Details on the PTP wiki
- Annual PTP User-Developer meeting