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JÜLICH FORSCHUNGSZENTRUM

Eclipse Parallel Tools Platform (PTP)

April 25, 2013 | Carsten Karbach

Content

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Part I: Parallel Tools Platform (PTP)

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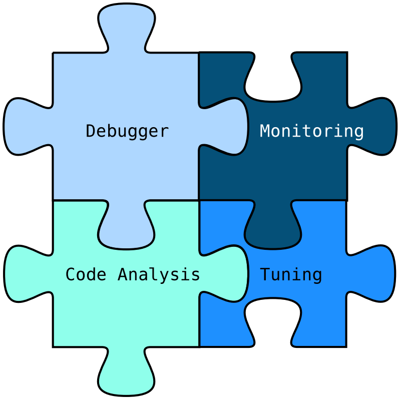
PTP – Parallel Tools Platform

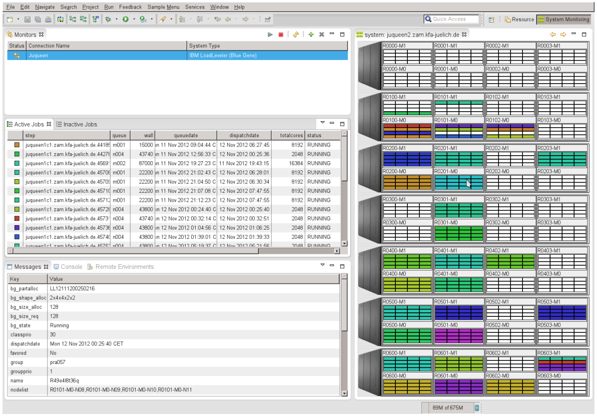
What is PTP?

- **IDE** for parallel application development
- Based on **Eclipse**
- **Open-source** project
- Developers: IBM, U.Oregon, UTK, Heidelberg University, NCSA, UIUC, JSC, ...



Monitoring

- Display current status of supercomputer, based on LLview
- Jobs, compute nodes, system architecture



Monitors

Status	Connection Name	System Type
	Juqueen	IBM LoadLeveler (Blue Gene)

Active Jobs | Inactive Jobs

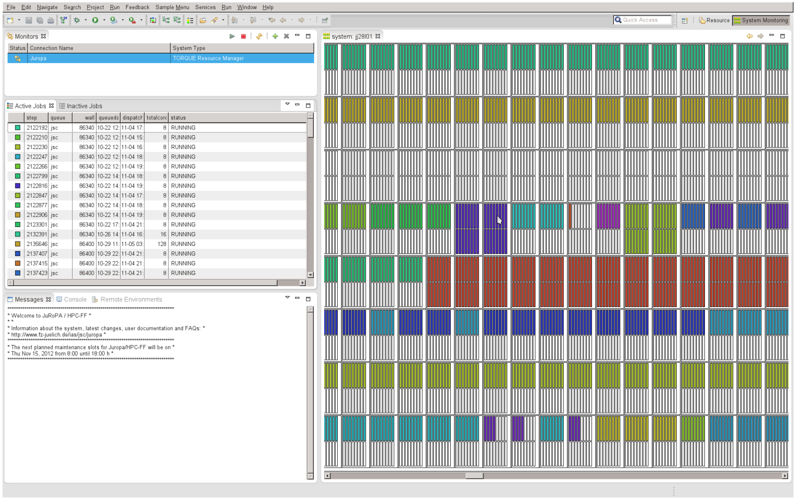
	step	queue	wall	queuedate	dispatchdate	totalcores	status
🟫	juqueen1c1.zam.kfa-juelich.de.44185	m001	15000	in 11 Nov 2012 09:04:44 C	12 Nov 2012 06:27:45	8192	RUNNING
🟩	juqueen1c1.zam.kfa-juelich.de.44278	n004	43740	in 11 Nov 2012 12:56:33 C	12 Nov 2012 00:25:36	2048	RUNNING
🟩	juqueen1c1.zam.kfa-juelich.de.4569	m002	87000	in 11 Nov 2012 19:27:23 C	11 Nov 2012 19:43:15	16384	RUNNING
🟩	juqueen1c1.zam.kfa-juelich.de.4570	m001	22200	in 11 Nov 2012 21:02:43 C	12 Nov 2012 06:28:01	8192	RUNNING
🟨	juqueen1c1.zam.kfa-juelich.de.4570	m001	22200	in 11 Nov 2012 21:04:50 C	12 Nov 2012 06:30:34	8192	RUNNING
🟩	juqueen1c1.zam.kfa-juelich.de.4571	m001	22200	in 11 Nov 2012 21:07:08 C	12 Nov 2012 07:47:55	8192	RUNNING
🟩	juqueen1c1.zam.kfa-juelich.de.4571	m001	22200	in 11 Nov 2012 21:12:23 C	12 Nov 2012 07:47:55	8192	RUNNING
🟨	juqueen1c1.zam.kfa-juelich.de.4572	n004	43800	on 12 Nov 2012 00:24:40 C	12 Nov 2012 00:25:40	2048	RUNNING
🟥	juqueen1c1.zam.kfa-juelich.de.4573	n004	43740	on 12 Nov 2012 00:32:14 C	12 Nov 2012 00:32:51	2048	RUNNING
🟪	juqueen1c1.zam.kfa-juelich.de.4573	n004	43800	on 12 Nov 2012 01:04:56 C	12 Nov 2012 01:06:25	2048	RUNNING
🟦	juqueen1c1.zam.kfa-juelich.de.4574	n004	43800	on 12 Nov 2012 01:39:01 C	12 Nov 2012 01:39:33	2048	RUNNING
🟩	juqueen1c1.zam.kfa-juelich.de.4575	n004	43800	in 12 Nov 2012 05:19:37 C	12 Nov 2012 05:21:56	2048	RUNNING

Messages | Console | Remote Environments

Key	Value
bg_partalloc	LL12111200250216
bg_shape_alloc	2x4x4x2x2
bg_size_alloc	128
bg_size_req	128
bg_state	Running
classprio	30
dispatchdate	Mon 12 Nov 2012 00:25:40 CET
favored	No
group	pra057
groupprio	1
name	R49e4l8t36q
nodelist	R0101-M0-N08,R0101-M0-N09,R0101-M0-N10,R0101-M0-N11

Monitoring example: JUQUEEN

Monitoring Example: JUROPA



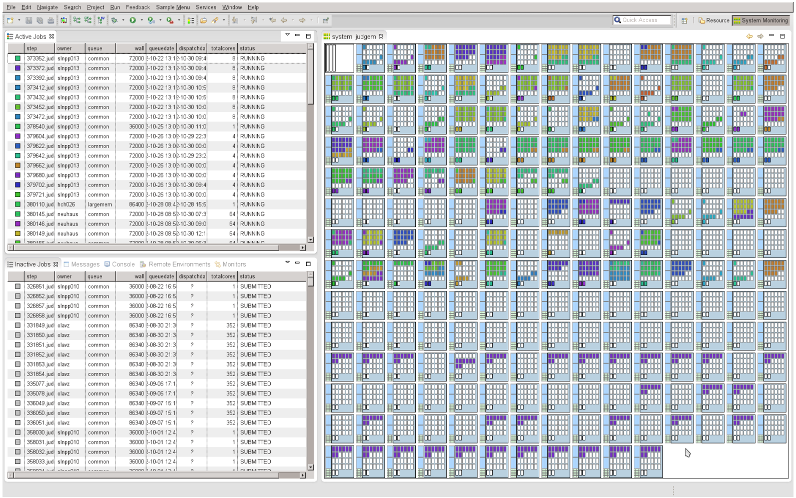
Status	Connection Name	System Type
	Juropa	TORQUE Resource Manager

	step	queue	wall	queueda	dispatch	totalcore	status
🟩	2122192	jsc	86340	10-22 12:	11-04 17:	8	RUNNING
🟩	2122210	jsc	86340	10-22 12:	11-04 15:	8	RUNNING
🟩	2122230	jsc	86340	10-22 12:	11-04 16:	8	RUNNING
🟦	2122247	jsc	86340	10-22 12:	11-04 18:	8	RUNNING
🟩	2122266	jsc	86340	10-22 12:	11-04 19:	8	RUNNING
🟩	2122799	jsc	86340	10-22 14:	11-04 18:	8	RUNNING
🟦	2122816	jsc	86340	10-22 14:	11-04 19:	8	RUNNING
🟩	2122847	jsc	86340	10-22 14:	11-04 17:	8	RUNNING
🟩	2122877	jsc	86340	10-22 14:	11-04 18:	8	RUNNING
🟨	2122906	jsc	86340	10-22 14:	11-04 19:	8	RUNNING
🟩	2123301	jsc	86340	10-22 17:	11-04 21:	8	RUNNING
🟩	2132391	jsc	86340	10-26 14:	11-04 16:	16	RUNNING
🟨	2135646	jsc	86400	10-29 11:	11-05 03:	128	RUNNING
🟦	2137407	jsc	86400	10-29 22:	11-04 21:	8	RUNNING
🟧	2137415	jsc	86400	10-29 22:	11-04 21:	8	RUNNING
🟦	2137423	jsc	86400	10-29 22:	11-04 21:	8	RUNNING

```
*****************************************************************************
* Welcome to JuRoPA / HPC-FF *
* *
* Information about the system, latest changes, user documentation and FAQs: *
* http://www.fz-juelich.de/ias/jsc/juropa *
*****************************************************************************
* The next planned maintenance slots for Juropa/HPC-FF will be on *
* Thu Nov 15, 2012 from 8:00 until 18:00 h *
*****************************************************************************
```

Torque/Moab, 3288 nodes, Intel Xeon Nehalem

Monitoring Example: JUDGE



Active Jobs

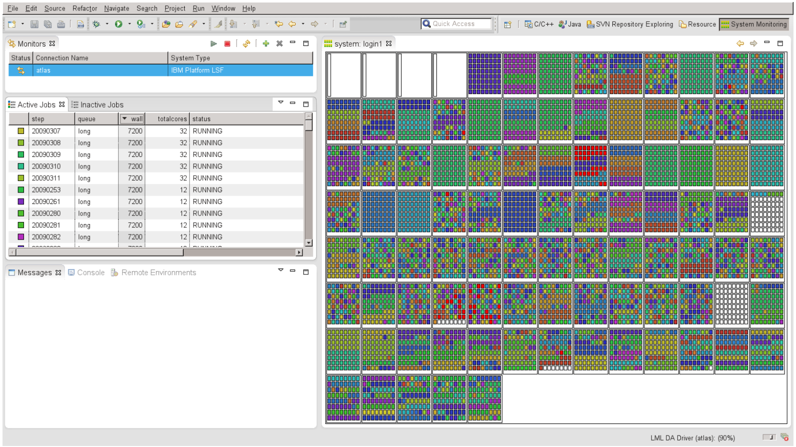
	step	owner	queue	wall	queuedate	dispatchda	totalcores	status
🟩	373352.jud	slnpp013	common	72000	2-10-22 13:1	2-10-30 09:4	8	RUNNING
🟪	373372.jud	slnpp013	common	72000	2-10-22 13:1	2-10-30 09:4	8	RUNNING
🟦	373392.jud	slnpp013	common	72000	2-10-22 13:1	2-10-30 09:4	8	RUNNING
🟦	373412.jud	slnpp013	common	72000	2-10-22 13:1	2-10-30 10:5	8	RUNNING
🟩	373432.jud	slnpp013	common	72000	2-10-22 13:1	2-10-30 10:5	8	RUNNING
🟩	373452.jud	slnpp013	common	72000	2-10-22 13:1	2-10-30 10:0	8	RUNNING
🟦	373472.jud	slnpp013	common	72000	2-10-22 13:1	2-10-30 10:0	8	RUNNING
🟩	378540.jud	slnpp013	common	36000	2-10-25 13:0	2-10-30 11:0	1	RUNNING
🟪	379604.jud	slnpp013	common	72000	2-10-26 13:0	2-10-29 22:3	4	RUNNING
🟦	379622.jud	slnpp013	common	72000	2-10-26 13:0	2-10-30 00:0	4	RUNNING
🟩	379642.jud	slnpp013	common	72000	2-10-26 13:0	2-10-29 23:2	4	RUNNING
🟧	379662.jud	slnpp013	common	72000	2-10-26 13:0	2-10-30 00:0	4	RUNNING
🟪	379680.jud	slnpp013	common	72000	2-10-26 13:0	2-10-30 00:0	4	RUNNING
🟦	379702.jud	slnpp013	common	72000	2-10-26 13:0	2-10-30 09:4	4	RUNNING
🟩	379721.jud	slnpp013	common	72000	2-10-26 13:0	2-10-30 00:0	4	RUNNING
🟩	380110.jud	hch026	largemem	86400	2-10-28 08:4	2-10-28 15:5	1	RUNNING
🟩	380145.jud	neuhaus	common	72000	2-10-28 08:5	2-10-30 07:3	64	RUNNING
🟪	380146.jud	neuhaus	common	72000	2-10-28 08:5	2-10-30 09:0	64	RUNNING
🟨	380149.jud	neuhaus	common	72000	2-10-28 08:5	2-10-30 12:1	64	RUNNING

Inactive Jobs

	step	owner	queue	wall	queuedate	dispatchda	totalcores	status
⬜	326851.jud	slnpp010	common	36000	2-08-22 16:5	?	1	SUBMITTED
⬜	326852.jud	slnpp010	common	36000	2-08-22 16:5	?	1	SUBMITTED
⬜	326857.jud	slnpp010	common	36000	2-08-22 16:5	?	1	SUBMITTED
⬜	326858.jud	slnpp010	common	36000	2-08-22 16:5	?	1	SUBMITTED
⬜	331849.jud	olavz	common	86340	2-08-30 21:3	?	352	SUBMITTED
⬜	331850.jud	olavz	common	86340	2-08-30 21:3	?	352	SUBMITTED
⬜	331851.jud	olavz	common	86340	2-08-30 21:3	?	352	SUBMITTED
⬜	331852.jud	olavz	common	86340	2-08-30 21:3	?	352	SUBMITTED
⬜	331853.jud	olavz	common	86340	2-08-30 21:3	?	352	SUBMITTED
⬜	331854.jud	olavz	common	86340	2-08-30 21:3	?	352	SUBMITTED
⬜	335077.jud	olavz	common	86340	2-09-06 17:1	?	352	SUBMITTED
⬜	335078.jud	olavz	common	86340	2-09-06 17:1	?	352	SUBMITTED
⬜	336049.jud	olavz	common	86340	2-09-07 15:1	?	352	SUBMITTED
⬜	336050.jud	olavz	common	86340	2-09-07 15:1	?	352	SUBMITTED
⬜	336051.jud	olavz	common	86340	2-09-07 15:1	?	352	SUBMITTED
⬜	358030.jud	slnpp010	common	36000	2-10-01 12:4	?	1	SUBMITTED
⬜	358031.jud	slnpp010	common	36000	2-10-01 12:4	?	1	SUBMITTED
⬜	358032.jud	slnpp010	common	36000	2-10-01 12:4	?	1	SUBMITTED
⬜	358033.jud	slnpp010	common	36000	2-10-01 12:4	?	1	SUBMITTED

Torque/Moab, 206 nodes, Intel Xeon Westmere, NVIDIA Tesla GPUs

Monitoring Example: Atlas



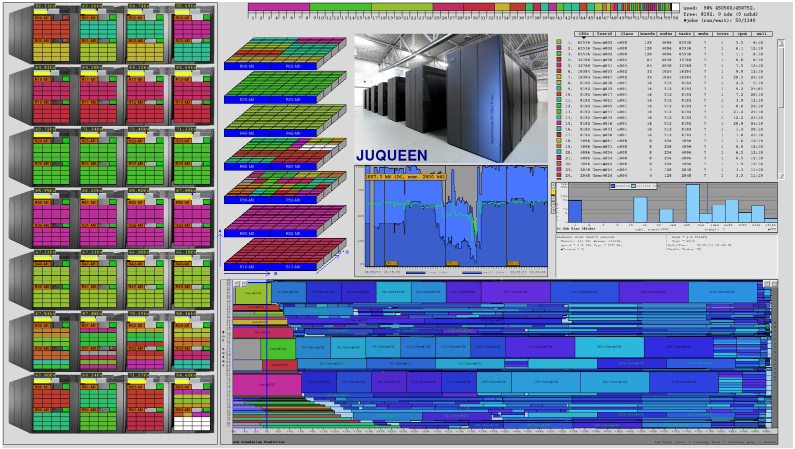
Status	Connection Name	System Type
	atlas	IBM Platform LSF

	step	queue	wall	totalcores	status
🟨	20090307	long	7200	32	RUNNING
🟩	20090308	long	7200	32	RUNNING
🟩	20090309	long	7200	32	RUNNING
🟩	20090310	long	7200	32	RUNNING
🟩	20090311	long	7200	32	RUNNING
🟩	20090253	long	7200	12	RUNNING
🟪	20090261	long	7200	12	RUNNING
🟩	20090280	long	7200	12	RUNNING
🟩	20090281	long	7200	12	RUNNING
🟪	20090282	long	7200	12	RUNNING

LSF, 92 nodes, AMD Opteron

LLview

→ Visualizes supercomputer status on a single screen



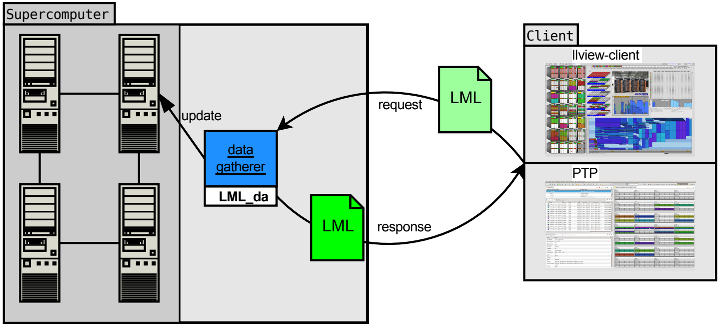
```
used:  98% 450560/458752,
free: 8192, 0 nds (0 nshd)
#jobs (run/wait): 50/1140
```

		CPUs	Userid	Class	boards	nodes	tasks	mode	torus	cpuh	wall
🟨	1.	65536	User#002	n008	128	4096	65536	?	1	5.5	6:10
🟪	2.	65536	User#002	n008	128	4096	65536	?	1	6.1	12:10
🟩	3.	65536	User#002	n008	128	4096	65536	?	1	1.1	6:10
🟥	4.	32768	User#050	n004	64	2048	32768	?	1	0.8	6:10
🟥	5.	32768	User#031	n004	64	2048	32768	?	1	7.5	12:10
🟥	6.	16384	User#053	n002	32	1024	16384	?	1	9.9	12:10
🟨	7.	16384	User#067	n002	32	1024	16384	?	1	20.5	24:10
🟨	8.	8192	User#030	n001	16	512	8192	?	1	2.2	5:10
🟩	9.	8192	User#035	n001	16	512	8192	?	1	9.2	24:05
🟥	10.	8192	User#017	n001	16	512	8192	?	1	7.2	20:10
🟩	11.	8192	User#021	n001	16	512	8192	?	1	3.9	12:10
🟩	12.	8192	User#005	n001	16	512	8192	?	1	0.6	24:10
🟩	13.	8192	User#047	n001	16	512	8192	?	1	21.2	24:10
🟩	14.	8192	User#045	n001	16	512	8192	?	1	12.2	24:10
🟪	15.	8192	User#016	n001	16	512	8192	?	1	20.9	24:10
🟩	16.	8192	User#033	n001	16	512	8192	?	1	1.2	20:10
🟥	17.	8192	User#058	n001	16	512	8192	?	1	7.8	24:10
🟨	18.	4096	User#061	n008	8	256	4096	?	1	1.0	12:10
🟧	19.	4096	User#051	n008	8	256	4096	?	1	0.9	12:10
🟩	20.	4096	User#054	n008	8	256	4096	?	1	6.5	12:10
🟥	21.	4096	User#054	n008	8	256	4096	?	1	6.5	12:10
🟧	22.	4096	User#062	n008	8	256	4096	?	1	1.9	12:10
🟪	23.	2048	User#024	n004	4	128	2048	?	1	4.3	11:10
🟥	24.	2048	User#024	n004	4	128	2048	?	1	3.5	11:10

```
Machine: Blue Gene/Q Juelich                 |  peak = 1.6 PFLOPS
  Memory: 131 TB, #cpus: 131072,             |  type = BG/Q
  speed = 1.6 GHz type = PPC A2,             |Date/Time:    03/01/13 16:04:02
  #frames = 8                                |Usable Nodes: 56
```

Source: Screenshot LLview for JUQUEEN

Monitoring Architecture I



Monitoring Architecture II

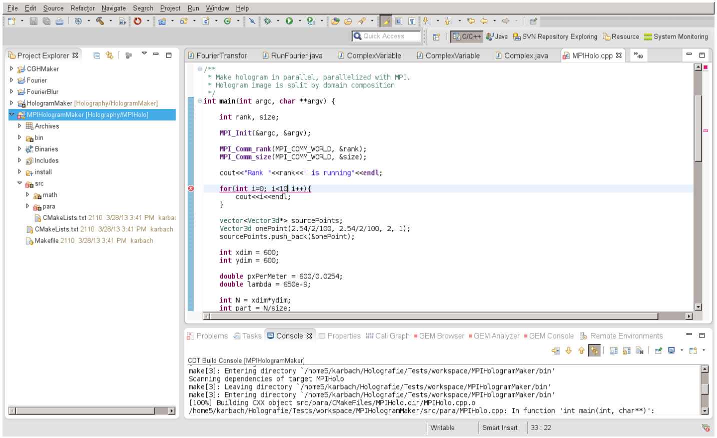
- **LML_da** gathers status information,
  calls target system's remote commands, written in Perl
- Automatic deploy of LML_da, no installation required

Large-scale system Markup Language (LML)

- Data format for status information of supercomputers
- **Request**: requested data and layout
- **Response**: contains the request and status information
- Abstraction layer
  $\rightarrow$ thin clients, **re-use** of LML_da functions

Code Analysis

- Code analysis as you type, on build
- Auto-completion, refactoring

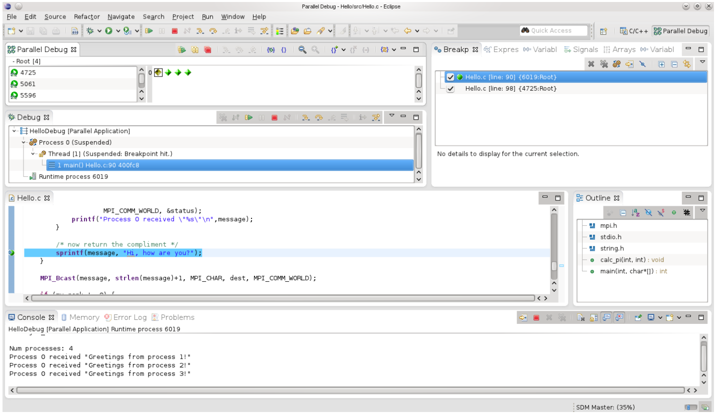


```
/**
 * Make hologram in parallel, parallelized with MPI.
 * Hologram image is split by domain composition
 */
int main(int argc, char **argv) {

    int rank, size;

    MPI_Init(&argc, &argv);

    MPI_Comm_rank(MPI_COMM_WORLD, &rank);
    MPI_Comm_size(MPI_COMM_WORLD, &size);

    cout<<"Rank "<<rank<<" is running"<<endl;

    for(int i=0; i<10 i++){
        cout<<i<<endl;
    }

    vector<Vector3d*> sourcePoints;
    Vector3d onePoint(2.54/2/100, 2.54/2/100, 2, 1);
    sourcePoints.push_back(&onePoint);

    int xdim = 600;
    int ydim = 600;

    double pxPerMeter = 600/0.0254;
    double lambda = 650e-9;

    int N = xdim*ydim;
    int part = N/size;
```

```
make[3]: Entering directory `/home5/karbach/Holografie/Tests/workspace/MPIHologramMaker/bin'
Scanning dependencies of target MPIHolo
make[3]: Leaving directory `/home5/karbach/Holografie/Tests/workspace/MPIHologramMaker/bin'
make[3]: Entering directory `/home5/karbach/Holografie/Tests/workspace/MPIHologramMaker/bin'
[100%] Building CXX object src/para/CMakeFiles/MPIHolo.dir/MPIHolo.cpp.o
/home5/karbach/Holografie/Tests/workspace/MPIHologramMaker/src/para/MPIHolo.cpp: In function 'int main(int, char**)':
```

Parallel Debugger

- Debugging of OpenMPI Applications
- Uses Scalable Debug Manager (SDM) and GNU Project Debugger (gdb)



```
- Root [4]
4725
5061
5596
```

```
HelloDebug [Parallel Application]
  Process 0 (Suspended)
    Thread [1] (Suspended: Breakpoint hit.)
      1 main() Hello.c:90 400fc8
  Runtime process 6019
```

```
Hello.c [line: 90] {6019:Root}
Hello.c [line: 98] {4725:Root}
```

No details to display for the current selection.

```
                MPI_COMM_WORLD, &status);
            printf("Process 0 received \"%s\"\n",message);
        }

        /* now return the compliment */
        sprintf(message, "Hi, how are you?");
    }

    MPI_Bcast(message, strlen(message)+1, MPI_CHAR, dest, MPI_COMM_WORLD);
```

```
mpi.h
stdio.h
string.h
calc_pi(int, int) : void
main(int, char*[]) : int
```

HelloDebug [Parallel Application] Runtime process 6019

```
Num processes: 4
Process 0 received "Greetings from process 1!"
Process 0 received "Greetings from process 2!"
Process 0 received "Greetings from process 3!"
```

SDM Master: (35%)

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Performance Analysis and Tuning

- Integration of Tuning and Analysis Utilities (**TAU**) into PTP job submission
- Automatic **instrumentation** of your application
- Job submission via PTP
- Attached **analyse** step for visualization of performance data
- Abstraction for integration of external tools in External Tools Framework (ETFw)

Part II: Eclipse Plug-in Development

April 25, 2013 | Carsten Karbach

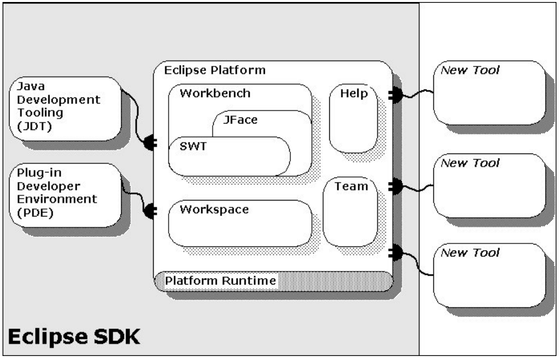
Eclipse

- **Open-Source**
- Initiated by IBM
- Current version is **Juno**
- Next release in June 2013 called Kepler
- IDE for multiple languages: Java, C, C++, Fortran, ...
- Platform independent

Source: `http://de.wikipedia.org/wiki/Eclipse_(IDE)`

Eclipse – Architecture

- **Equinox** as core platform for plug-in loading, installation and updates
- Most plug-ins are implemented in **Java**
- **SWT** and JFace for user interfaces



Source: `http://help.eclipse.org/juno`

Plug-In Development

- Extend Eclipse with your own **plug-in**
- Plug-in is a software component
- Example extensions:
  menu entry, toolbar, view, perspective
- Development with *Eclipse Plug-in Development Environment*, included in *Eclipse Classic* distribution
- Concept:
  - **Extension Point**: Contract on how to extend other plug-in
  - **Extension**: Implementation for an extension point, contribution to another plug-in

Plug-In Development – Implementation

- Plug-in is implemented as a plug-in project
- Configuration through **plugin.xml**
  - Plug-in **name** for referencing your plug-in
  - Dependencies to other plug-ins used by your plug-in
  - **Extensions** define, what (menu, view) is contributed and how (implementing class)
  - **Extension points**: allow other plug-ins to extend yours
- Export to deployable jar, installation by copying jar into *dropins* folder of Eclipse distribution
- Or create update site for your plug-in, users can then install via *Help* $\rightarrow$ *Install New Software...*

Plug-In Development – Example

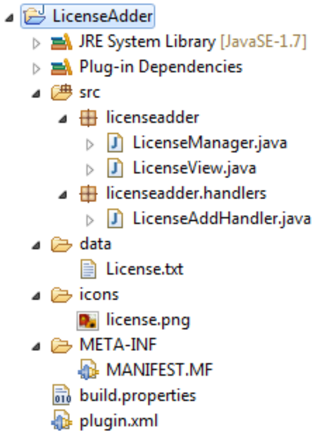
Example based on tutorial by Lars Vogel, see

`http://www.vogella.com/articles/EclipsePlugIn/article.html`

Idea: menu entry for adding license header to source file

1. Create new plug-in project, based on **Hello, World** template
2. Adapt plugin.xml: location of your extension, path to implementation classes, icons
3. Implement your extension, e.g. command handler, view construction
4. Test your plug-in via right-click on your project → Run As → Eclipse Application Starts a new Eclipse instance including your plug-in

Plug-In Project Structure

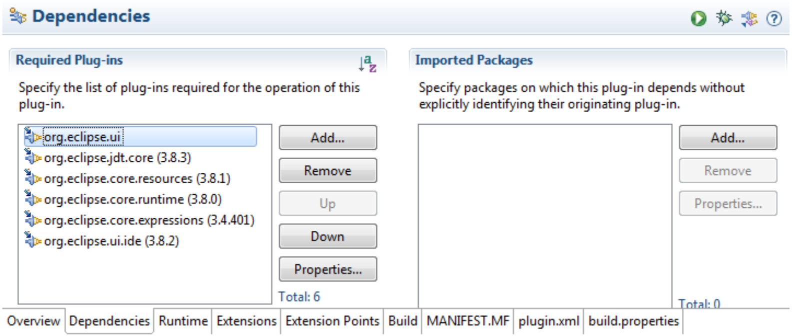


```
◢ LicenseAdder
   ▷ JRE System Library [JavaSE-1.7]
   ▷ Plug-in Dependencies
   ◢ src
      ◢ licenseadder
         ▷ LicenseManager.java
         ▷ LicenseView.java
      ◢ licenseadder.handlers
         ▷ LicenseAddHandler.java
   ◢ data
         License.txt
   ◢ icons
         license.png
   ◢ META-INF
         MANIFEST.MF
     build.properties
     plugin.xml
```

- **src** contains classes
- Additional data like icons are included in the plug-in bundle
- plugin.xml on top-level, configuration via GUI

Plug-In Dependencies

- List all plug-ins used by your plug-in
- Needed for accessing their API and for extending them


Dependencies

Required Plug-ins

Specify the list of plug-ins required for the operation of this plug-in.

- org.eclipse.ui
- org.eclipse.jdt.core (3.8.3)
- org.eclipse.core.resources (3.8.1)
- org.eclipse.core.runtime (3.8.0)
- org.eclipse.core.expressions (3.4.401)
- org.eclipse.ui.ide (3.8.2)

Total: 6

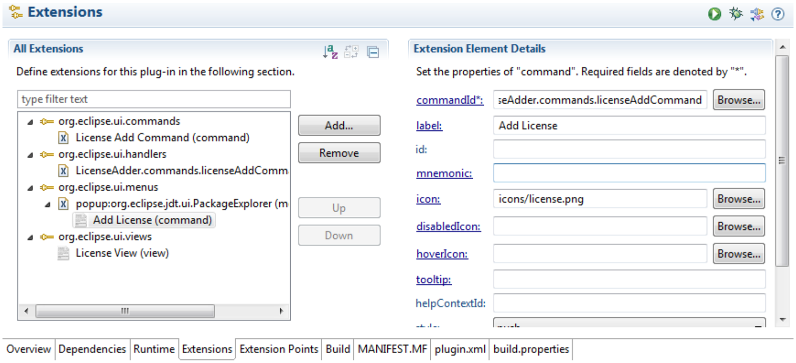
Imported Packages

Specify packages on which this plug-in depends without explicitly identifying their originating plug-in.

Total: 0

Extensions

- **Command** as declaration for any action
- **Handler** implements command's function, path to class
- Command is referenced in popup menu contribution
- New view for showing/changing the license text



Extensions

All Extensions

Define extensions for this plug-in in the following section.

type filter text

```
org.eclipse.ui.commands
    License Add Command (command)
org.eclipse.ui.handlers
    LicenseAdder.commands.licenseAddComm
org.eclipse.ui.menus
    popup:org.eclipse.jdt.ui.PackageExplorer (m
        Add License (command)
org.eclipse.ui.views
    License View (view)
```

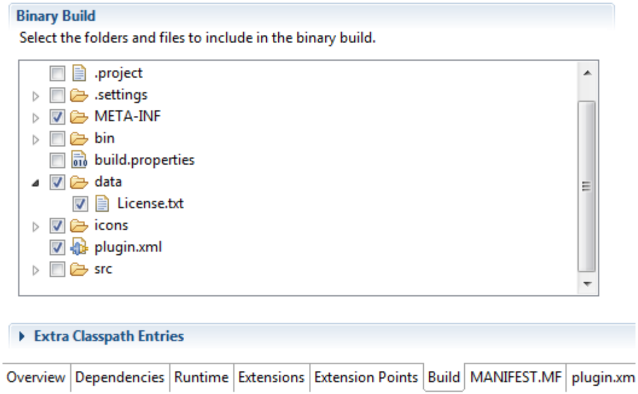
Extension Element Details

Set the properties of "command". Required fields are denoted by "*".

commandId*:	seAdder.commands.licenseAddCommand	Browse...
label:	Add License	
id:		
mnemonic:		
icon:	icons/license.png	Browse...
disabledIcon:		Browse...
hoverIcon:		Browse...
tooltip:		
helpContextId:		

Build configuration

- Define files included in compiled plug-in bundle
- Especially add **License.txt** to read at runtime

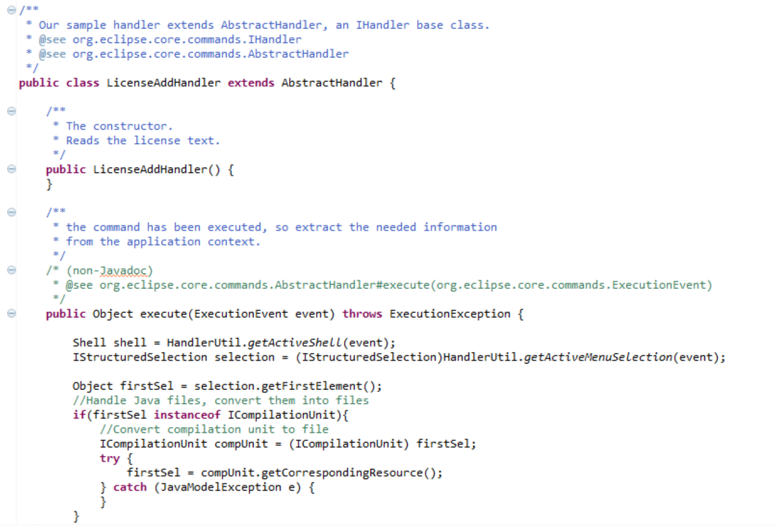


Binary Build

Select the folders and files to include in the binary build.

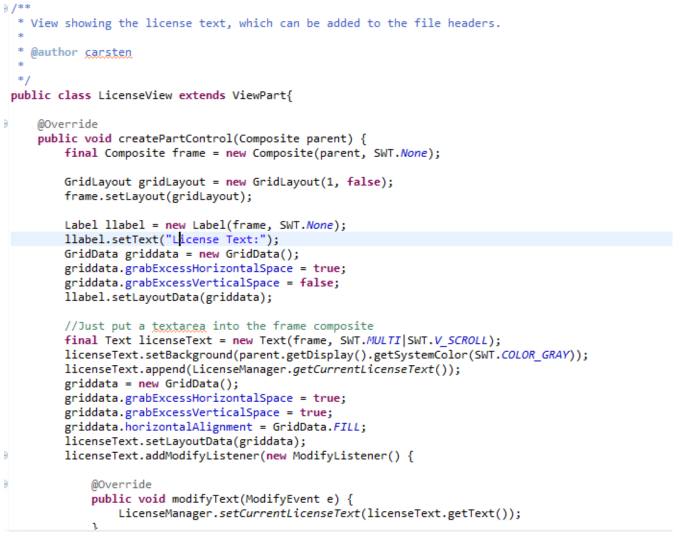
- ☐ .project
- ☐ .settings
- ✓ META-INF
- ☐ bin
- ☐ build.properties
- ✓ data
  - ✓ License.txt
- ✓ icons
- ✓ plugin.xml
- ☐ src

Handler implementation



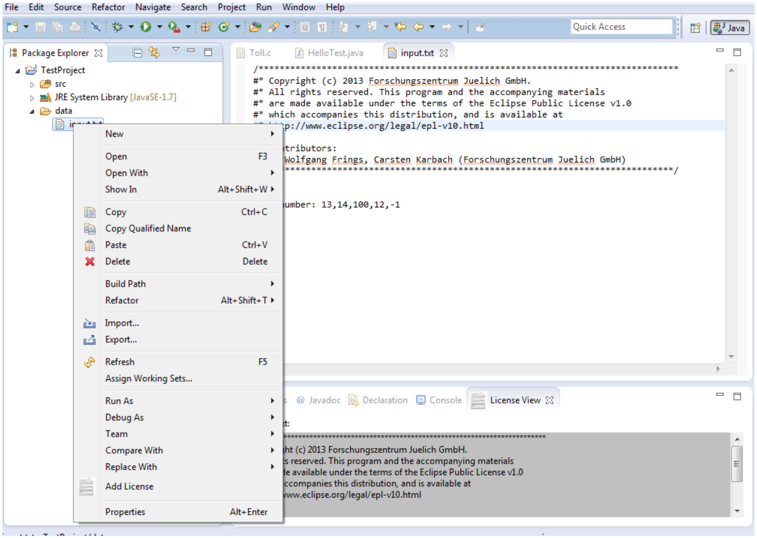
```java
/**
 * Our sample handler extends AbstractHandler, an IHandler base class.
 * @see org.eclipse.core.commands.IHandler
 * @see org.eclipse.core.commands.AbstractHandler
 */
public class LicenseAddHandler extends AbstractHandler {

    /**
     * The constructor.
     * Reads the license text.
     */
    public LicenseAddHandler() {
    }

    /**
     * the command has been executed, so extract the needed information
     * from the application context.
     */
    /* (non-Javadoc)
     * @see org.eclipse.core.commands.AbstractHandler#execute(org.eclipse.core.commands.ExecutionEvent)
     */
    public Object execute(ExecutionEvent event) throws ExecutionException {

        Shell shell = HandlerUtil.getActiveShell(event);
        IStructuredSelection selection = (IStructuredSelection)HandlerUtil.getActiveMenuSelection(event);

        Object firstSel = selection.getFirstElement();
        //Handle Java files, convert them into files
        if(firstSel instanceof ICompilationUnit){
            //Convert compilation unit to file
            ICompilationUnit compUnit = (ICompilationUnit) firstSel;
            try {
                firstSel = compUnit.getCorrespondingResource();
            } catch (JavaModelException e) {
            }
        }
```

License View implementation



```
/**
 * View showing the license text, which can be added to the file headers.
 *
 * @author carsten
 *
 */
public class LicenseView extends ViewPart{

    @Override
    public void createPartControl(Composite parent) {
        final Composite frame = new Composite(parent, SWT.None);

        GridLayout gridLayout = new GridLayout(1, false);
        frame.setLayout(gridLayout);

        Label llabel = new Label(frame, SWT.None);
        llabel.setText("License Text:");
        GridData griddata = new GridData();
        griddata.grabExcessHorizontalSpace = true;
        griddata.grabExcessVerticalSpace = false;
        llabel.setLayoutData(griddata);

        //Just put a textarea into the frame composite
        final Text licenseText = new Text(frame, SWT.MULTI|SWT.V_SCROLL);
        licenseText.setBackground(parent.getDisplay().getSystemColor(SWT.COLOR_GRAY));
        licenseText.append(LicenseManager.getCurrentLicenseText());
        griddata = new GridData();
        griddata.grabExcessHorizontalSpace = true;
        griddata.grabExcessVerticalSpace = true;
        griddata.horizontalAlignment = GridData.FILL;
        licenseText.setLayoutData(griddata);
        licenseText.addModifyListener(new ModifyListener() {

            @Override
            public void modifyText(ModifyEvent e) {
                LicenseManager.setCurrentLicenseText(licenseText.getText());
            }
```

Plug-in test



```
/****************************************************************************
#* Copyright (c) 2013 Forschungszentrum Juelich GmbH.
#* All rights reserved. This program and the accompanying materials
#* are made available under the terms of the Eclipse Public License v1.0
#* which accompanies this distribution, and is available at
#* http://www.eclipse.org/legal/epl-v10.html

ributors:
Wolfgang Frings, Carsten Karbach (Forschungszentrum Juelich GmbH)
****************************************************************************/

umber: 13,14,100,12,-1
```

```
ht (c) 2013 Forschungszentrum Juelich GmbH.
s reserved. This program and the accompanying materials
e available under the terms of the Eclipse Public License v1.0
ccompanies this distribution, and is available at
ww.eclipse.org/legal/epl-v10.html
```

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- **PTP Wiki** → `http://wiki.eclipse.org/PTP`
- **PTP Download** → `http://www.eclipse.org/downloads`
- **LML** → `http://llview.zam.kfa-juelich.de/LML`
- **LLview** → `http://www.fz-juelich.de/jsc/llview`