

Posidonia: A Tool for HPC and Remote Scientific Simulations

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13th International Workshop on Finite Elements for Microwave Engineering

17 May 2016



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Introduction (i)

- ▶ Demand of more and more computational resources for complex problems.
- ▶ Need to access to specialized HPC systems.
- ▶ Big barrier to entry for most users.
 - ▶ File transfers.
 - ▶ Batch system.
- ▶ Different programs: Matlab, electromagnetic simulators...
- ▶ HPCaaS.



Introduction (& ii)

The screenshot displays the HOFEM software interface. At the top, a navigation bar includes tabs for GEOMETRY, PARAMETER, MESH, CALCULATE, and RESULTS. The MESH tab is currently active. Below the navigation bar is a toolbar with various icons and a dropdown menu set to 'Original view'. On the left side, there is a 'Navigation tree' with the following structure:

- Geometry
 - Volumes
 - Surfaces
 - Lines
 - Points
- Mesh summary
 - Number of nodes: 11623
 - Number of Tetrahedra: 7149
 - Minimum angle: 7.355°
 - Maximum angle: 165.4°
 - Minimum edge: 0.05909 [m]
 - Maximum edge: 0.2661 [m]
 - Minimum jacobian: 0.0002431
- Mesh view
 - Volume: 1

The central workspace shows a 3D model of a rectangular block with a tetrahedral mesh. A login dialog box is overlaid on the model, titled 'posidonia H'. It contains the following fields and buttons:

- Remote host: (with a 'Show password' button)
- Username: (with a 'Submit' button)
- Password: (with a 'Connect' button)
- Status: The last job sendet was on sep 6, at 12:58:33

On the right side of the interface, there is a vertical menu with buttons for FILES, VIEW, MESH, CRITERIA, GENERATE, OPTIONS, HELP, and QUIT. At the bottom left, a status bar indicates '76 conditions read, 1 materials read mode has changed' and a 'Command:' field. At the bottom right, a message box says 'Job guia_hofem has been submitted.' The HOFEM logo is visible in the top right and bottom right corners.



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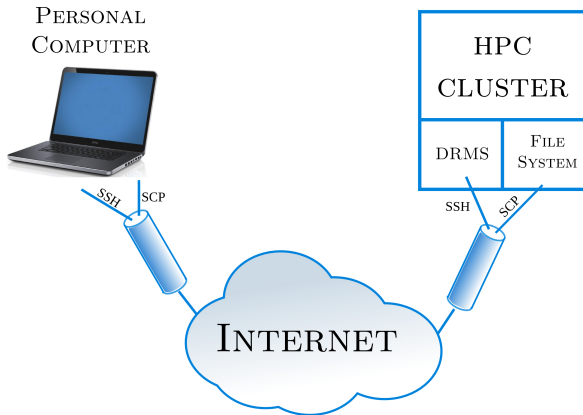
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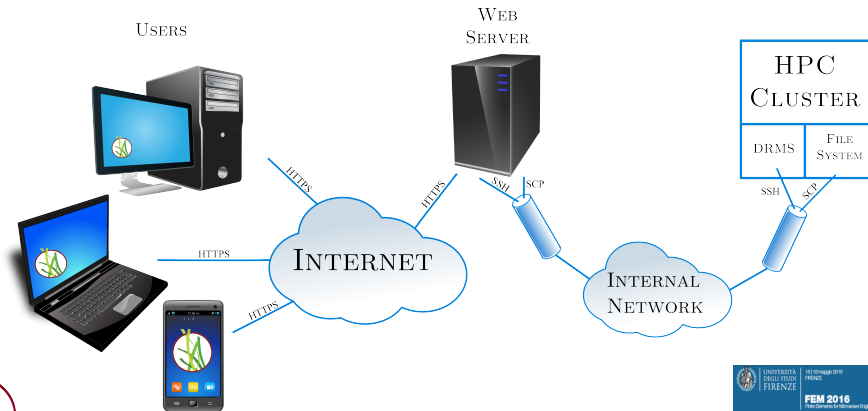
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Scenario (i)



Scenario (& ii)



Job Submission

The image illustrates the job submission workflow in Posidonia through three sequential screenshots:

- Top Window (Job Configuration):** Shows fields for Job Name (matlablob), Script Name (prof), Input files, Output files, Processes, and Mail Address (aamor@tsc.uc3m.es). Buttons for 'Examine', 'Save Changes', and 'Cancel' are visible.
- Middle Window (Remote Host Connection):** Shows 'Remote host' (aah25@tsc.uc3m.es), Username (aamor), Password, and buttons for 'Submit' and 'Connect'. The status is 'Not connected'.
- Bottom Window (Job Monitoring):** Displays a table of job execution results. A green box highlights the 'posidonia' logo and the text 'Results of your job matlablob are available.' Below the table, a 'RESULTS' icon is shown.

A 'CLUSTER' icon (three server racks) is positioned between the middle and bottom windows, indicating the target environment for the job submission.

Job Name	Start Time	End Time
matlablob	nov 26, at 18:39:50	nov 26, at 18:40:01
matlablob	dic 1, at 16:06:16	dic 1, at 16:06:28
matlablob	dic 1, at 16:06:50	dic 1, at 16:07:02



RESULTS

Repository and notifications

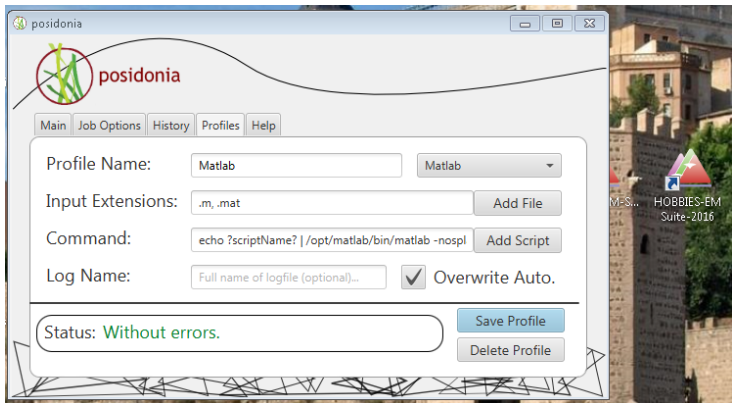
The screenshot shows the Posidonia application window. At the top left is the Posidonia logo (a green plant in a red circle) and the text "posidonia". Below the logo are tabs for "Main", "Nodes", "History", and "About". The "History" tab is active. Below the tabs are buttons for "Get Inputs", "Get Outputs", "Delete", "View Log", and "Refresh". A table displays the job history:

Job Name	Start Time	End Time
matlabJob	nov 26, at 18:39:50	nov 26, at 18:40:01
matlabJob	dic 1, at 16:06:16	dic 1, at 16:06:28
matlabJob	dic 1, at 16:06:50	dic 1, at 16:07:02

A green notification box in the bottom right corner contains the Posidonia logo and the text: "Results of your job matlabJob are available." The Windows taskbar at the bottom shows the system tray with icons for network, volume, and power, and the date/time "16:06 01/12/2014".



Profiles



Design features (i)

- ▶ *User friendliness.*
- ▶ Efficiency.
- ▶ Generality.
- ▶ Security.
- ▶ Mobility.



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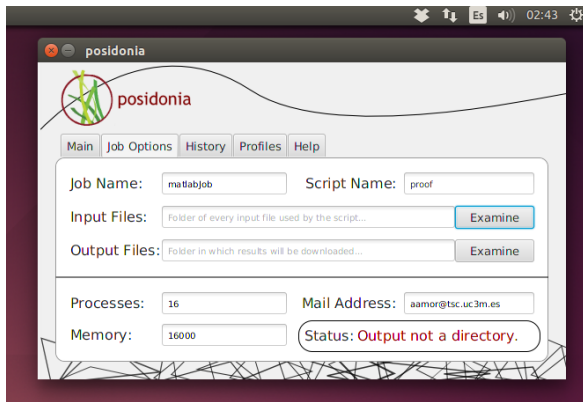
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Multiplatform



Android

Posidonia: Current jobs running in cluster

Delete job from cluster Refresh

Job Name	PID	Status	Submit Date	Submit Time	Queue	# Slots
EjemploTabl et	4123	r	07/04/2012	14:54:07	all. q@compute-0 -13.local	1

miércoles
4 de julio de 2012 14:54

ZacaWiFiFast 89%

Posidonia: job submitted. 14:54
Your job (EjemploTabl) has been submitted successfully. *)

Conectado como un dispositivo multimedia:
Tocar para acceder a otras opciones de USB

Dispositivo de depuración USB conectado
Seleccionar para inhabilitar la depuración USB

Back



Web

The screenshot shows the Posidonia web interface in a Firefox browser. The page title is "Posidonia -Private area-". On the left, there is a navigation menu with options: Home, Submit Jobs, Show Running Jobs, and Job History. The main content area displays a "Job History" table with columns for Job Name, PID, Submit Date, Submit Time, End Date, End Time, and Status. A "Descargas" (Downloads) window is open in the foreground, showing a list of files downloaded from "l6.tsc.uc3m.es".

Job Name	PID	Submit Date	Submit Time	End Date	End Time	Status
Job1	2990	09/04/2013	11:44:34	09/04/2013	12:03:45	Ended
Job2	2993	09/04/2013	13:04:04	09/04/2013	13:34:15	Ended
Job3	2995	09/04/2013	15:54:00	09/04/2013	16:03:15	Ended
Job4	2999	09/04/2013	18:44:34	09/04/2013	19:03:46	Ended
Job5	3009	10/04/2013	11:00:56	10/04/2013	12:13:42	Ended
Job6	3010	10/04/2013	16:38:59	10/04/2013	17:08:27	Aborted

Descargas

- HFSS_wgcombiner_gl.msh 468 KB — l6.tsc.uc3m.es 19:10
- HFSS_wgcombiner_gl.in 2,0 KB — l6.tsc.uc3m.es 19:10
- HFSS_wgcombiner_gl 36,2 MB — l6.tsc.uc3m.es 19:10
- HFSS_wgcombiner_gl.bc 91,6 KB — l6.tsc.uc3m.es 19:10



Integration

- ▶ Full integration: HOFEM.
- ▶ Generic interface: profiles.



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Design in layers

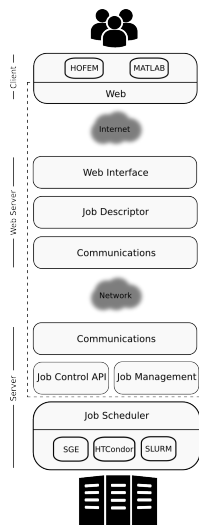
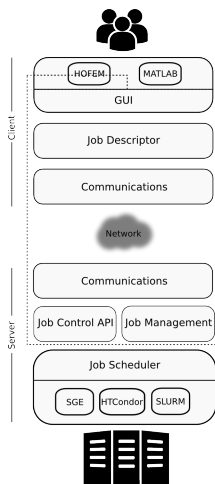


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Conclusions

- ▶ Software tool available for different programs.
- ▶ Efficient and automatic.
- ▶ Repository.
- ▶ Productivity.
- ▶ Free download at www.tsc.uc3m.es/posidonia or grema.webs.tsc.uc3m.es/research/computational-electromagnetics/posidonia.



AP Magazine

► Dec 2015

EM PROGRAMMER'S NOTEBOOK



David B. Davidson

Posidonia: A Tool for HPC and Remote Scientific Simulations

Adrian Amor-Martin, Ignacio Martinez-Fernandez, and L.E. Garcia-Castillo

This article presents a software tool named Posidonia. Posidonia removes the barrier to entry for the novice user of high-performance

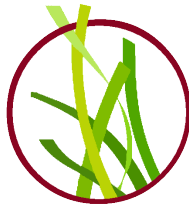
EDITOR'S NOTE

HPC plays a key role as an enabling technology in contemporary electromagnetic simulation practice, but as anyone who deals with such systems is well aware, HPC



Questions?

Posidonia



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