

harpoon

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Installation

Question

Why does Harpoon die at start-up?

Answer

1. Do you have a valid license key in the SHARC_HOME/license directory? If not contact your local [distributor](#).
2. At start-up, Harpoon tries to open a harp.cfg file for writing. If this fails, then Harpoon will fail to start. On Linux/Unix, if the directory where you start Harpoon doesn't have read/write permissions, or the existing harp.cfg file doesn't have read/write permissions, harpoon will fail to start.

You will get a message,

"Could not open config file - check write permissions".

You will need to start Harpoon from a different directory, or change the write permissions of the directory and/or the existing harp.cfg file.

On Windows, if you don't have read/write permission to the directory pointed to by the HOME environmental variable, then Harpoon will fail to start. If you don't have read/write permission to an existing harp.cfg file, then harpoon will fail to start. If you start by double-clicking an alias pointing to the executable, you may not see an error message, but harpoon will fail to start. To fix this problem, change your HOME environmental variable and/or your permissions to write to an existing harp.cfg file.

Installation

Question

How do I install the WALED2 license manager as a Service?

Answer

If your license key does not have the word 'float' in it and has the word 'node' in it, then you have a node-locked key. You can simply put your key into the \$SHARC_HOME/license directory and run harpoon.

If your license key has the word float in it then you have a floating key. You need to run the waled2 license manager.

Run the License manager

To start the license manager simply run

SHARC_HOME/license/machines/win32/waled2.exe

OR

INSTALL the Windows Service

SHARC_HOME/license/machines/win32/waled2_install.exe and choose install.

When you use our Windows installer it will install the service. It may not start the service. To start the service, you'll need to go to Admin Tools, Services, and right click start on the waled2 service. You should not need to reboot.

Installation

To UNINSTALL the Windows Service

Run

SHARC_HOME/license/machines/win32/waled2_install.exe
and choose uninstall.

Uninstall leaves it running but marks it disabled. You'll still be able to run harpoon even after an uninstall.

To stop the license manger you'll need to:

- a. Go to Admin Tools, Services and right click on the waled2 service and choose stop. You'll still see the service but it's marked disabled and stopped.
- b. logout and log back in - it will go away.

OR

- c. reboot and it will go away.

Installation

Question

WALED2 license manager fails to start as a service on Windows

Answer

If you try to start the WALED2 as a service and it fails with an error, check that the user attempting to start it has privileges to do so

Open the **Control Panel**, choose **Administrative tools** and then **services**.

This opens the services dialogue. In the dialogue scroll down and select the waled2_service, right click and select properties. Click on the **log on** tab. Click on **this account** and enter your username and password. hit apply

Restart the service.

Installation

Question

Can you explain how the license manager time-out value works?

Answer

Harpoon checks out a token from the license manager. Periodically it must send a "heart beat" message to the license manager to let it know that it is still using the token. Upon termination, Harpoon checks the token back in to the license manager.

Should Harpoon not be able to send a heart beat to the license manager, it will give a warning to the user and try one more time. If that fails, then Harpoon will abort. Should it succeed, then execution continues.

If the license manager does not receive a heart beat from Harpoon, within the time-out period, it will mark that token as available for use by others. Should some one else try to check out a token and no other free tokens are available, then this token will be used.

The time-out period used by the license manager and by Harpoon (for controlling heart beat frequency) can be modified by the system administrator. By default the time-out is 20 minutes. The value can range between 1 and 30 minutes. A lower value means more network traffic as the client and the license manager must communicate more often. A higher value means a longer wait for a dropped session to free the key.

The default is 1200 seconds and the minimum is 600 seconds.

On UNIX machines, the time-out value is set in the bin scripts area. Edit \$SHARC_HOME/bin/waled_start and search for TIMEOUT. The value is in seconds. On Windows machines, set the environment variable WALED2_TIMEOUT to the number of seconds.

Installation

Question

How do I check the status of the license manager?

Answer

Open a console window, then go to \$SHARC_HOME/license/machines
cd into the appropriate architecture directory. There should be a
waled2_status executable. Enter the following command.

```
waled2_status -v ../../wale2.key
```

```
waled2_status version 2.0. Getting waled2 status from host : Key  
expiration date: 12/31/2005 Feature 'sharc' total tokens 2 busy 0 idle 0  
free 2 maint date 12/31/2005. Feature 'harpoon' total tokens 2 busy 0 idle  
0 free 2 maint date 12/31/2005.
```

This output indicates that your two floating tokens are both checked out
and in use.

Importing

Question

I only get one part from my STL. I should have more?

Answer

Your CAD package probably exported a binary [STL](#). Binary STLs do not contain part information. Re-export the model as an ASCII STL.

Alternatively you can separate out the surfaces by region and/or feature angle using the **Geometry – Separate** command. Unwanted surfaces can then be merged back together using the **Geometry – Merge** command.

Importing

Question

How do I get the best STL file for import into Harpoon?

Answer

Currently the most common input format for harpoon is STL (stereolithography) format. These files are exported from 3D CAD programs. They are a series of small triangulated facets that approximate the surface of a 3D model.

Harpoon uses these discretized facets to map out the model surface(s). Harpoon can only mesh as finely as the STL file represents the surface. There are a number of issues that you should be aware of before you export your model. Spend some time understanding STL export issues and how to refine your output in your CAD package and you'll be way ahead in your harpoon experience.

Edge ratio

If two sides of a facet are much longer than the third the triangle has a large aspect ratio. Large aspect ratios are undesirable numerically from harpoon's perspective. Equiangle, equilateral triangle facets are much better numerically.

Chord Error

A curved surface with a line requires smaller line segments for a more curved surface. The amount that the line falls below the curve is called the Chord Error. Similarly the amount that the facet falls below the 3D curvature is the sag. A high Chord Error means a coarse tessellation of the surface. Harpoon cannot improve upon the Chord Error of your STL file when it meshes. The facets should be sized according to the curvature of the model, according to the overall size of the model, and according to intersections of faces.

Importing

Rounding Errors

When discretizing the CAD data there is always the likelihood of numerical truncation errors. Because STL nodes are matched not on integer indices but floating coordinates, numerical roundoff when writing the STL can create duplicate nodes. Duplicate nodes imported into harpoon can lead to extraneous feature lines, non-watertight geometry, and meshing problems.

Consider the following two facets. Compare the second vertex of the first facet to the third vertex of the second facet. The Z-coordinate roundoff causes these two nodes to be considered as different coordinates. A good STL exporter will avoid this pitfall.

```
facet normal -0.337752 -0.941235 0.000128
outer loop

vertex 6.764929e+01 9.725301e+01 3.000000e+02
vertex 6.764670e+01 9.724580e+01 2.403403e+02
vertex 6.630964e+01 9.772569e+01 2.412399e+02
endloop
endfacet
facet normal -0.337746 -0.941237 0.000128
outer loop
vertex 6.764929e+01 9.725301e+01 3.000000e+02
vertex 6.815260e+01 9.706421e+01 2.400000e+02
vertex 6.764670e+01 9.724580e+01 2.403404e+02
endloop
endfacet
```

Importing

All one part vs multiple parts

ASCII STL format should retain part/layer information. This allows you to define critical parts and control your mesh refinement and location in more detail. Binary STL format does not allow multiple parts.

Gaps

Prior to writing out the STL consider the small gaps in your geometry. Are they essential to the physics of your problem, or can you just do without them? Clean them up in your CAD package prior to exporting the STL. Don't leave the small gaps in your STL then try to use a coarse mesh in harpoon to fill them in. This can lead to unpredictable results.

Intersections

Sometimes you will have situations where one model geometry surface protrudes through another. Perhaps you have a bar protruding through a curved surface. It is best to clean this up in your CAD package, and create the conical intersection and then export your geometry with the STL surface triangle nodes lined up. It is less desirable to export the two geometries separately as STL's and let the somewhat unpredictable STL facet intersections define the intersection to Harpoon.

A well thought out STL export is always a good start to a useful harpoon mesh.

Importing

Question

I get no geometry when I import a Nastran file

Answer

Your Nastran file probably only has volume elements in Harpoon reads tris and quads by default. To extract the surface elements from a Nastran file, run with the command line option *-extractfaces*

Geometry Manipulation

Question

How can I select a part/line on the screen?

Answer

Simply double-click on the part of interest in the graphics window, and the corresponding part in the parts list will become highlighted.

Alternatively press **P** when hovering over the required part.

Geometry Manipulation

Question

How can I set a different centre of rotation

Answer

From the top menu select display and then pick rotation and press P when hovering over the location that you wish to reset the coordinates around.

Alternatively press **R** on the keyboard when hovering.

Geometry Manipulation

Question

How can I create a symmetry plane?

Answer

If you have a half model, simply snap the farwall provided in Harpoon to create a symmetry plane.

If you have a full model, just place the farwall in the middle of the geometry and Harpoon will restrict the mesh to that position.

Geometry Manipulation

Question

How can I set the boundary attributes on my geometry?

Answer

If your model consists of one part, or the parts are not correctly arranged then do the following:

Once the geometry is loaded, select a part in the Geometry folder. Then select **Separate** in the **Geometry** menu. This will create subparts, each of them being assigned a separate attribute that will be saved in the mesh.

You can also **Merge** these subparts at will to create larger subparts. You can then use these attributes to assign your boundary conditions.

The same can be done for lines and line segments using the Line menu

Geometry Manipulation

Question

I cannot seem to translate parts of my geometry

Answer

Make sure you select the part(s) you want translated. The translation is performed, but the bounding box is also automatically moved with the same translation. The geometry will however contain the new translated coordinates.

Geometry Manipulation

Question

How do I deal with small gaps using Harpoon?

Answer

There are two ways to deal with small gaps in Harpoon.

The first is to preserve the gaps in the exported STL and then refine your mesh so harpoon also preserves the gaps.

The second is to eliminate the gaps altogether using your CAD package and then export it as an STL.

In order to preserve your gaps, export your geometry into STL as multiple parts. Then import the geometry into Harpoon and make sure that the preference for minimum number of cells between two parts is set to something higher than one, for instance set this to 3. Also, make sure that the mesh in this critical area may not coarsen to a surface size that is greater than the smallest distance between the two model parts. Then mesh it in harpoon.

The second way to deal with gaps is to eliminate the gaps using your CAD software and export the STL without gaps.

If you wish to eliminate your gaps, you can export your geometry as a single part or multiple parts. Use your CAD package to clean up the model lines and to smooth geometry transitions, then export the STL. It is bad practice to export a model with small gaps then use a harpoon mesh refinement larger than the gap size. Using mesh coarseness to clean up STL geometry can result in unpredictable harpoon behaviour.

In summary, reduce your mesh size to capture the small details, but never coarsen your mesh to eliminate gaps. Use your CAD package to eliminate gaps prior to exporting the STL.

Geometry Manipulation

Question

How can I automatically fill holes in the geometry?

Answer

Harpoon has an automatic hole finding routine. Go to the **Modify/Fix** geometry dialogue, select the part with the hole and click **find holes**. Harpoon will then give you a list of Geometry Free Edges. Clicking the **Display Hole Labels** will number the holes on screen according to their part number.

You can then have a number of choices:

1. Fill the selected holes individually.
2. Fill all holes automatically.
3. Use the add Tri feature to manually fill in the gaps.
4. Now you have located the problem area(s) revert to the original CAD model and close the gaps in your CAD package.

Meshing

Question

Can you give me tips on best practice meshing?

Answer

Here are a few tips for general meshing.

1. It is best to assign single levels (cell sizes) to individual parts/lines in the parts list
2. Alternatively, (for example) assign level 3 to the surfaces and level 5 to the feature lines. Feature lines can be separated by feature and region just like the surfaces. You can then assign different levels to different feature lines. To select a feature line or surface from the screen, simply double-click the left mouse button on the surface or line and it will be highlighted in the parts list.
3. If you are using the multiple levels (Auto or manually assigned) in your model, limit the number of levels that the calculation will use. By default this is levels 1-5. It is perhaps better to use 3-5 or 2-4 along with a smaller base level. This helps convergence in the solvers and usually gives a similar number of cells

*e.g. use **base 10** with levels 1-3 instead of **base 20** with levels 1-4*

4. You will probably need to generate meshes that are larger than you would have previously created. This is a characteristic of automatic meshing. However, you will easily make up for the slightly longer solve time by the huge speed up in meshing time. In fact, due to the hex-dominant nature of Harpoon meshes, they will converge far quicker than conventional tet meshes and so your solve time may not increase even with a larger cell count.

Meshing

5. After meshing, it may be useful to clean the surface using the standard **surface clean** option.

6. To smooth use the the default of 0.98 skew for the target skew. If more smoothing is required then toggle on the "**Smooth All Cells**", do one smooth and then toggle off the "Smooth All Cells" and smooth the tets once more with the same target skew you used before smoothing all cells.

Meshing

Question

Should I use a smaller base level or more levels to get more accuracy?

Answer

For CFD, the best option is always to use a smaller base level and fewer levels than a large base level and lots of levels. This is especially the case when using turbulence models such as k- ϵ or when using boundary layer.

For FEA models, cell count is usually the important factor. Try and use a base level size which gives the lowest cell count but also gives good surface recovery.

Meshing

Question

**I am meshing internally, but Harpoon only meshes part of geometry.
What's wrong?**

Answer

There is a hole in your geometry!

The way to find out what is happening is to mesh it externally and use the **mesh trace**. Display a clip plane, go to the **Fix mesh** icon and select the **Trace** button. Select two points on the clip plane, one inside the model and one outside.

Hit **Get Route**.

This will show where there is a problem so that you can [fix it](#).

Meshing

Question

How can I automatically fill holes in the mesh?

Answer

Here are some tips to automatically remove holes

1. If you are meshing internally (or all), use the **-UTM** command line option. This invokes an internal flag to minimize the number of holes in a mesh. The mesh method must be set to **External** when using this option. Harpoon will keep all volumes as not just the external one.
2. Use the **-fillhole <number>** option. An automatic hole filling routine is used towards the end of meshing. The default value is 5. This means that all holes with edges less than 5 will be automatically filled (if possible). Changing this to , say, 10 would fix more holes and save manual fixing.
3. Some holes can be fixed by finding and filling holes a number of times. To do this use the **-fillall <number>** option. This will run the find/fill hole loop that number of times. The default is set to one

usage: *harpoon -UTM -fillhole 10 fillall 3*

Meshing

Question

How can I get less transitions between coarse areas and dense areas?

Answer

If you don't use a level per part which is the best way, you can use Auto, reduce the base level and restrict the range. eg: baselevel: 60 range 1-3 instead of baselevel: 120 range 1-4 This usually gives same number of cells but less transitioning.

This is good for k- ϵ solvers which do not like the levels changing a lot. This will also help with boundary layer generation.

You can also set the **expansion** on fast globally, and use the per part expansion in advanced to make it slower on different parts

Meshing

Question

Some features are not captured properly. What can I do?

Answer

There are several ways to achieve a better geometric accuracy without getting meshes too dense.

You can for instance either:

1. Put higher levels on the subparts which are too coarse for geometry accuracy: use mesh->advanced->levels, select the part from the Geometry folder on which to assign a higher level, then select a higher level in highlighted part.
2. Put higher levels on features: as above, but instead of setting the subpart, select the feature lines in the Lines folder. This will improve the accuracy on all feature lines.
3. Use the spray feature: use mesh->advanced->auto. Then click on interactive spray, and this will give you a map of the sizes on geometry, that you can change locally and interactively

Meshing

Question

I am struggling to set up a refinement box interactively

Answer

The refinement box must be placed before you can move it interactively. Make sure that the original geometry is visible and click on 3 points of the surface within the general area that you wish to have the box. Then resize it in turn for each axis, by clicking alternatively on +X, +Y or +Z and then move the relevant corner of the box.

Meshing

Question

I get random part assignment when I have overlapping geometry. Is there anything I can do?

Answer

Use either the **-firstgeom** or **-lastgeom** command line option. This will force Harpoon to assign the part ids to the first or the last geometry it comes across.

Meshing

Question

Should I use "double-sided" or "single-sided" in my Fluent export?

Answer

It depends whether you want your volumes to have porosity (eg heat exchanger). If you do not need this, then keep the default "double-sided".

If you need a heat exchanger, change to "single-sided".

Meshing

Question

I cannot create a porous radiator in Fluent?

Answer

Change your preference for Fluent thin wall treatment to "single-sided".

Tips On...

Question

How can I get the best mesh with dirty geometry?

Answer

There are a number of things that can be done. Here are some tips on how to deal with dirty geometry

1. Make sure you have intersections on in your preference file. If your geometry has lots of small holes in it, turn on the dirty preference.
2. Use the **-UTM** and **-fillhole** command line options.
3. Use the **Mesh Trace** if you get merged volumes to find out where the hole is.
4. For overlapping geometry, use the **-lastgeom** or **-firstgeom** command line option.

Tips On...

Question

How can I get the best mesh for UTM (Underhood Thermal Management)?

Answer

A big problem with UTM type meshes is volumes merging when they should not because of holes in the surface mesh. Here are some tips to get around this

1- Use the -UTM command line option. This invokes an internal flag to minimize the number of holes in a mesh. The mesh method must be set to External when using this option. Harpoon will keep all volumes as not just the external one.

2- Use the -fillhole <number> option. An automatic hole filling routine is used towards the end of meshing. The default value is 5. This means that all holes with edges less than 5 will be automatically filled (if possible). Changing this to , say, 10 would fix more holes and save manual fixing.
usage: harpoon -UTM -fillhole 10

N.B. At least one Harpoon farwall must be used for this option to work.

Tips On...

Question

How do I create a good boundary layer in harpoon?

Answer

1. Assign BL levels to geometry or surface parts. For best results keep Boundary Layer below 3x smallest cell height. No smoothing is required between meshing and BL creation
2. Reduce the number of level variations on surfaces where Boundary Layers will be created. Constant sizes are ideal. If several sizes are necessary, limit this to 1-2, or at most 1-3 levels of change.
3. Smooth and Clean surface mesh at end of meshing. "Smooth all cells" works well.
4. For cells with remaining high skews, try hand-adjustment of nodes, in mesh fixing options, "Adjust Cell Nodes"
5. Compute and display Mesh Quality histogram. Display Worst Skew and hand modify these as desired. Mesh without Boundary Layers first .

Tips On...

Question

I'm running out of memory in Windows using harpoon, what can I do?

Answer

When you allocate in Windows and then allocate more memory, Windows is prone to memory fragmentation, dividing the "available" memory into unusable chunks. There is a -winmem option accessible through the runtime preferences dialogue. The winmem option checks the available system memory up front then tries to allocate a single large chunk of memory to avoid fragmentation. The winmem option is to be used after you run harpoon and find that it runs out of memory as a second attempt at allocating memory.

If harpoon -winmem fails up front then it is trying to allocate "available" system memory which is probably overly optimistic given the existing fragmentation. So it is failing. If you are using other apps on Windows, then you may have already fragmented the memory space. Try harpoon -winmem after a fresh reboot with no other applications running.

Tips On...

Question

I have problems with convergence and I think it is because of skew?

Answer

There are a number of reasons why a mesh may not converge. Skew is often blamed for poor convergence, but in the case of Harpoon meshes, this is rarely the case. In fact, it depends on the cell type, shape and location. A mesh may solve with one set of boundary conditions, but fail with another.

We have spent a lot of time developing some optimisation routines which will help with convergence.

Here are some things to check before blaming skew

1. Use the "**Standard**" optimisation setting in the meshing preferences. If this does not work, change to "**Aggressive**".
2. If you do not require multiple volumes, delete all the ones not needed. Never set the max volume to 1 in the preferences. This will hide multiple volumes which will often give problems with convergence.
3. Make sure that cells are not where they should not be. A group of cells connected to the main volume by a single (or few) faces can cause convergence problems. Use the "**Find Baffles**" button in the fix cells area and/or the mesh trace (if needed) to find out where any holes may be.
4. Look for areas of one cell thick, say, between walls. You must allow Harpoon to resolve these areas by using more cells or do not mesh them at all. This can be done by editing your geometry or by using a larger local [cell size](#).

Tips On...

Question

I do not get the volume separation I want in CFX

Answer

Harpoon marks all cells next to the surface tris and quads. This will be put into a separate volume. If you want all volumes to be kept as they are in Harpoon use the command line option -cfxvol.

Tips On...

Question

Help! I'm still really stuck what can I do?

Answer

Contact your local distributor for support. That's what we're here for!

<http://www.sharc.co.uk/html/buy.htm>