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Lmod tools to check module syntax

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Outline

- How to check module syntax when building an RPM or other software packages
- How to check your sites' entire module tree.

Checking Modulefile Syntax

- We want to check the syntax
- Not the action!
- We ignore the actions of loads(), depends_on() ...
- How to evaluate all the syntax but not the action?

Quick Review: How Lmod evaluates modulefile functions

- Remember that commands like `setenv("ABC","3")` do different things
- On module load it sets ABC to 3
- On module unload it unsets ABC
- On module show it prints `setenv("ABC","3")`

src/modfuncs.lua: setenv()

- Almost all modulefile function work like setenv()
- They check the syntax
- Then they call a member function in the MainControl Class
- The mcp variable is global MainControl object
- mcp controls what mode Lmod is in.

```
function setenv(...)
   if (not l_validateArgsWithValue("setenv",...)) then
     return
   end
   mcp:setenv(...)
   return
end
```

Controlling Lmod Evaluation Mode

- The mcp object acts as a big switchboard.
- When loading: mcp constructs derived class MC_Load object.
- When unloading: mcp constructs derived class MC_Unload object.
- When checking syntax:mcp constructs derived class MC_CheckSyntax object.

src/MC_Load.lua

```
M.load                  = MainControl.load
M.myModuleName          = MainControl.myModuleName
M.prepend_path          = MainControl.prepend_path
M.prereq                = MainControl.prereq
M.setenv                = MainControl.setenv
M.set_alias             = MainControl.set_alias
M.unload                = MainControl.unload
M.unsetenv              = MainControl.unsetenv
```

- These are the normal mapping when loading

src/MC_Unload.lua

```
M.load                  = MainControl.unload
M.myModuleName          = MainControl.myModuleName
M.prepend_path          = MainControl.remove_path_first
M.prereq                = MainControl.quiet
M.setenv                = MainControl.unsetenv
M.set_alias             = MainControl.unset_alias
M.unload                = MainControl.unload
M.unsetenv              = MainControl.quiet
```

- These are the normal mapping when unloading

src/MC_CheckSyntax.Lua

```
M.load                  = MainControl.load
M.myModuleName          = MainControl.myModuleName
M.prepend_path          = MainControl.prepend_path
M.prereq                = MainControl.quiet
M.setenv                = MainControl.setenv
M.set_alias             = MainControl.set_alias
M.unload                = MainControl.quiet
M.unsetenv              = MainControl.unsetenv
```

- See that the actions of prereq() are ignored
- This way actions outside a module are ignored
- The syntax of all commands are checked.
- `MainControl.load` is a special case

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- Loading the module under test must use it
- So load_usr() function has this test
- This prevent module loading other modules
- Because the frameStk count will be > 1.

```
function M.load_usr(self, mA)
   local frameStk = FrameStk:singleton()
   if (checkSyntaxMode() and frameStk:count() > 1) then
      return
   end

   l_registerUserLoads(mA)
   local a = self:load(mA)
   return a
end
```

module --checkSyntax load bad/1.0

```
$ cat bad/1.0.lua
setenv("ONE")

$ module --checkSyntax load bad
Lmod has detected the following error:  setenv("ONE") is not valid;
a value is required.
While processing the following module(s):
    Module fullname  Module Filename
    ---------------  ---------------
    bad/1.0          /home/user/myModules/bad/1.0.lua
```

- We here at TACC use this when building module files in an RPM *.spec file
- Other build tools might find this useful

New command check_module_tree_syntax

- I wanted a way to check every modulefile in a site's tree.
- The command `module spider` used to do that.
- But sending site error to user is not a good idea.

New command check_module_tree_syntax (II)

- Site wanted to know when module directory had multiple files marking a default
- There are upto 4 ways to do this in a modulefile directory
  1. a default symlink
  2. a .modulerc.lua file
  3. a .modulerc file
  4. a .version file
- The priority is in this order.

History

- The site wanted to report to the user when this happened.
- I try hard not to report site errors to users.
- After all what are they suppose to do with this info?
- So I modified `$LMOD_DIR/spider` to walk the module tree.
- To make `$LMOD_DIR/check_module_tree_syntax`
- This reports both syntax error/warning and duplicate marked default files in a modulefile directory.
- This command uses the MC_CheckSyntax mode to eval each modulefiles.

Changes to spider cache format

- Added defaultA to remember all marked defaults in directory
- This array is process to use the highest priority marked default file.
- The old format just kept the highest priority marked default file in defaultT.

Changes to spiderT.lua

```
["ProjectDIR/rt/ck_mtree_syntax/mf"] = {
  A = {
    defaultA = {
      {
        barefn = "default",
        defaultIdx = 1,
        fn = "ProjectDIR/rt/ck_mtree_syntax/mf/A/default",
        ...
      },
      {
        barefn = ".version",
        defaultIdx = 4,
        fn = "ProjectDIR/rt/ck_mtree_syntax/mf/A/.version",
        ...
      },
    },
    defaultT = {
      barefn = "default",
      defaultIdx = 1,
      fn = "ProjectDIR/rt/ck_mtree_syntax/mf/A/default",
      ...
    },
```

Example results

```
The following directories have more than one marked default file:
-----------------------------------------------------------------
  /home/user/w/lmod/rt/ck_mtree_syntax/mf/A


The following modulefile(s) have syntax errors:
-----------------------------------------------
  ModuleName: A/1.0, Fn: /mf/A/1.0.lua
    Error: [string "setenv("MY_VERSION", myModuleVersion())..."]:2: unexpected symbol near
  ModuleName: A/2.0, Fn: /mf/A/2.0
     Error: /mf/A/2.0: (A/2.0): invalid command name "nonExistantCmd"
  ModuleName: hashrf/6.0.1, Fn: /mf/hashrf/6.0.1.lua
    Error: [string "local name = "hashrf"..."]:16: attempt to call a nil value (global 'WTF')
  ModuleName: papi/4.4.0, Fn: /mf/papi/4.4.0.lua
     Error: command: help, one or more arguments are not strings.
```

Conclusions

- Two ways to check for modulefile syntax errors.
- One for building modulefiles
- Another for checking site module tree.

Future Topics

- Unknown at the moment.
- Next Meeting will be March 7th at 9:30 Central (15:30 UTC)