Maple T.A. Tips and Techniques – Creating and Using Maple Repositories in Maple T.A.

Introduction

Maple T.A. can access Maple for creating algorithmic variables or plots and for grading certain questions. If you are a seasoned Maple user, you can create your own routines for creating specialized variables or performing programmatic grading of questions. If you save this code in a Maple repository, you can call it from within Maple T.A. and use it across questions or even across classes. This article outlines the procedure of creating a repository, uploading it and accessing it from within Maple T.A., and gives a concrete example at the end.

There are three main steps required to create and use Maple repositories inside Maple T.A.

1. Create your repository in Maple and save it to your local machine.
2. Upload the repository to the class Website in Maple T.A. or to the Maple lib folder.
3. Link to the repository from the algorithm designer or a Maple-graded question.

1. Creating a Repository in Maple

A Maple repository (or library) is a collection of Maple procedures, modules, and other data that are stored together. This collection can be either two files (.lib and .ind) or a single .mla file. This article outlines the procedure for creating and uploading a repository of two files (the .lib and .ind files).

For detailed instructions, see ?repository,management in Maple. The list below summarizes the main steps you would take to create a repository containing your Maple code.

1. Use either the Maple built-in command **mkdir**, or the facilities of your operating system, to create a new, empty directory in which to store your repository.
2. Use the **create** command to **march** to create an empty repository in this directory, specifying a suitable index size.
3. Define the Maple expressions that you want to save to the repository.
4. Set the global variable **savelibname** so it points to the new directory you have created for your repository.

5. Use **savelib** to save the expressions to the repository, passing their assigned names using unevaluation quotes.

6. Use the **list** command to **march** to verify the contents of the repository.

2. Uploading a Repository to Maple T.A.

Upload the repository to Maple T.A.

If you want the procedures in the repository to be available for your class only, you can upload the .lib and .ind files to the class Website in Maple T.A.

1. Log on as the instructor, click **System Tools**, then **Website Editor**.
2. Click the arrow beside **upload files to this point**, or create a subdirectory for the Maple files first, before uploading.
3. Browse to the location of the .lib and .ind files and upload both to the Website location.

You must then link to the repository in your Maple T.A. question so that Maple will find the customized routine.

Upload the repository to Maple

If you want the procedures in the repository to be available to multiple classes on the system, you can upload the .lib and .ind files into each class Website or, alternatively, you can copy the files into Maple's lib directory. This allows you to call the procedure without having to link to a repository first because Maple will search all libraries in the lib folder for the routine.

1. Place the .lib and .ind files in the lib directory of the Maple used by Maple T.A.

Note: If you have installed a full version of Maple on the same machine where Maple T.A. is installed, the lib directory in the full version of Maple will be used. Thus, you need to place your .lib and .ind files in the lib directory of the full install.

3. Linking to the Repository

Using the repository to create an algorithmic variable
1. Create a question. It can be of any type.
2. On the screen where you define your algorithms, show the designer and then click on Maple Repository.
3. Click on the icon beside the .lib file to link to the Maple repository. The path and filename will appear in the LIB Location field on the screen.
4. You can now use the procedures in your library to create an algorithmic variable based on them.

Using the repository in grading

1. Create a Maple-graded question.
2. On the screen where you define your question and answer text, click on Maple Repository (the button below the drop down menu for selecting formula or maple syntax).
3. Click on the icon beside the .lib file to link to the Maple repository. The path and filename will appear in the LIB Location field on the screen.
4. You can now use the procedures in your library in the answer and grading area of the question.

Example of Creating a Repository in Maple

The commands, specified in bold, would be issued at a Maple prompt.

1. Create a new empty directory
   mkdir("C:/LocalMaple");
   where LocalMaple is the name of the directory you want to create to store your repository.

2. Create an empty repository in this directory
   march('create',"C:/LocalMaple/MyLib.lib", 10):
   where MyLib.lib is the name of the library you want to create and 10 is the index size. The index size should be approximately equal to the number of items that will be stored.

3. Define the Maple expressions or procedures
   mysum:=proc(f,g)
   simplify(f+g);
   end proc:

   myprod:=proc(f,g)
   expand(f*g);
   end proc:

4. Set the savelibname variable to point to the repository created in Step 2
   savelibname:="C:/LocalMaple/MyLib.lib":

5. Save the Maple procedures above to this repository
   savelib('mysum'):
   savelib('myprod'):
   where mysum and myprod are the procedure names you want to save to the library.

6. List the items in the repository to verify your content
   march('list', "C:/LocalMaple/MyLib.lib");

Side Note:
If you want to use this procedure in a Maple session, you need to update the global variable libname so that it includes your local repository. List your local repository first and always include ,libname at the end to include Maple's main libraries.
libname:="C:/LocalMaple/MyLib.lib", libname;

Example of Using the Repository in Maple T.A.

Once you upload the repository to Maple T.A., you can then use it in an algorithm or a Maple-graded question. The following example uses the two procedures in a Maple-graded question.

First, upload the repository to Maple T.A.

1. Log on as an instructor
2. Click **System Tools**
3. Click **Website Editor**.
4. Click the arrow beside **upload files to this point**, or create a subdirectory for the Maple files first, before uploading.
5. Browse to the location of the .lib and .ind files created above, select one of the files, and click **Open**. You return to the Website Editor page, with the path to the file filled in.
6. Click the radio button beside **Single File – Save As:**. Make sure the text box contains the correct file name.
7. Click **OK**. The file is now saved to the Website Editor.
8. Repeat the process for the other file. Both the .lib and .ind files must be uploaded.

Now, we create a question that uses the repository.

1. Click **Add a question**, pick Maple-graded as the question type, and type a description of the problem: Sum and product.
2. Click **Add** next to the heading **Algorithm**. This will take you to a screen in which you define the random variables. Type the following algorithm definitions in the algorithm text box.

   $a=range(3,5);
   $b=range(2,4);
   $f=maple("randomize(): randpoly(x, degree=$a, terms=2)");
   $g=maple("randomize(): randpoly(x, degree=$b, terms=3)");
   $fdisplay=maple("printf(MathML[ExportPresentation]($f))");

$gdisplay=maple("printf(MathML[ExportPresentation]($g))");

You can check your algorithms by clicking **Refresh**. This will generate a value for each of the variables and display it in the box below the algorithm text area.
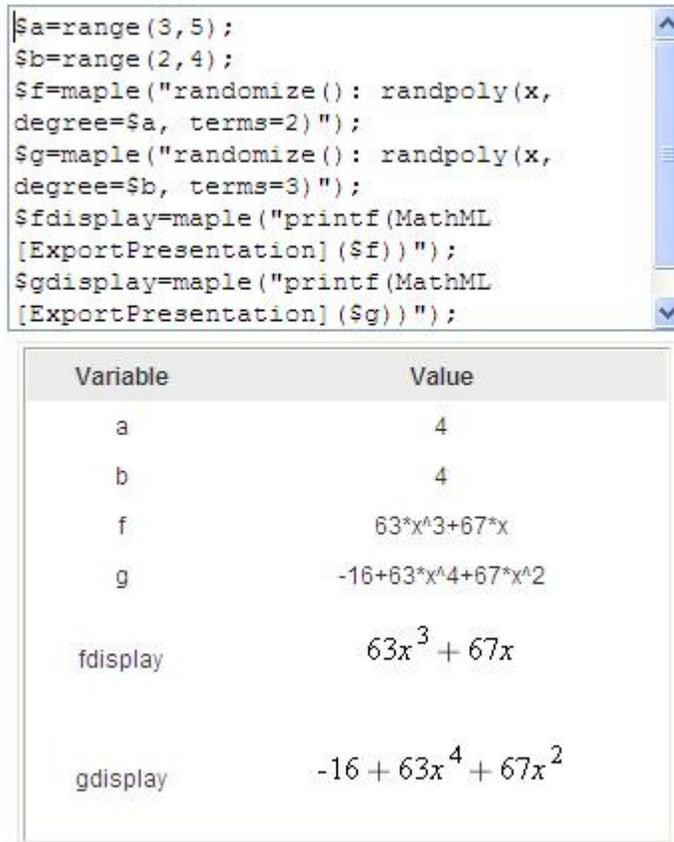
```
$a=range(3,5);
$b=range(2,4);
$f=maple("randomize(): randpoly(x,
degree=$a, terms=2)");
$g=maple("randomize(): randpoly(x,
degree=$b, terms=3)");
$fdisplay=maple("printf(MathML
[ExportPresentation]($f))");
$gdisplay=maple("printf(MathML
[ExportPresentation]($g))");
```

Variable	Value
a	4
b	4
f	63*x^3+67*x
g	-16+63*x^4+67*x^2
fdisplay	$63x^3 + 67x$
gdisplay	$-16 + 63x^4 + 67x^2$

Figure 1: The algorithm text editor and a sample representation of the variables.

3. Click **Save** to go back to the main question page.
4. Click **Next** to get to the question text area.
5. Link to the repository so the procedure mysum will be available to this question. Click **Maple Repository** (the button below the box for setting the type of expression that will be accepted). A list of uploaded files appears. Click the icon beside the .lib file.
6. In the text areas, fill in the following information.

Question text:
Given the polynomials $fdisplay and $gdisplay, calculate their sum.

Maple answer code:
mysum($f,$g);

Maple grading code:

evalb($RESPONSE-($ANSWER)=0);

7. Set the type of expression students will enter as **Formula e.g. x^2*sin(x)**.
8. Click **Finish** to see a preview of the question and verify that the procedure is being used.

Summary

Maple T.A. contains many routines for creating algorithmic variables and many question types that provide different grading routines. For more advanced questions or very specialized content, you may want to use customized Maple code to create variables or grade a student's response. Once you have written this code in Maple, you can create a repository so it can be used in subsequent Maple T.A. questions.

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