

M Language

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SUNY-Albany 2013

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Hello World

"A long time ago
in a galaxy far,
far away...."

Log in Class Server

**Click Here
for Instructions**

Set up your Environment

Using favorite text editor (Vim or Nano), open your file:

```
vim ~/.bashrc
```

Go to the end of the file, and add the line:

```
source /INF362-EWD/gtm/setup/add_to_bashrc.txt
```

save the file, quit the text editor

and from the command line do:

```
source ~/.bashrc
```

M: The Interpreter

Open the M interpreter, with the command

```
gtm
```

You will get the prompt:

```
GTM>
```

M: The Interpreter

Assign value to a Variable

```
GTM>set nemo="fish"
```

One and only
ONE space

NO Spaces

M: The Interpreter

Write the content of a Variable

```
GTM>write nemo
```

NO Spaces

One and only
ONE space

M: The Interpreter

Write a Message

```
GTM>write "hello"
```

Write a Message and a Variable

```
GTM>write "is a ", nemo
```


M: The Interpreter

Do Math

```
GTM>set a=5+7
```

Write a Message and a Variable

```
GTM>write "a= ", a
```

M: The Interpreter

New Lines and Multiple Messages

```
GTM>write "John", !, "Lennon"
```

One and only
ONE space

New Line
Symbol

M: The Interpreter

The Full Form

```
GTM>write "hello"
```

The **Short** Form

```
GTM>w "hello"
```

M: The Interpreter

The Full Form

```
GTM>set a=17
```

```
GTM>write a
```

The **Short** Form

```
GTM>s a=17
```

```
GTM>w a
```

M: The Interpreter

Many Commands in **One** Line

GTM> **s** a=19 **w** a

ONE
space

ONE
space

ONE
space

M: The Interpreter

FOR LOOP

```
GTM>for i=1:1:10 write i
```

ONE
space

ONE
space

ONE
space

M: The Interpreter

FOR LOOP: Try This !

```
GTM>for i=1:2:10 write i
```

ONE
space

ONE
space

ONE
space

Your Turn !

FOR LOOP: Try This !

```
Write a FOR loop  
that prints all even  
numbers between 10 and 20
```


M: The Interpreter

Quit the Interpreter

```
GTM>halt
```

This will return you to the Shell Prompt

```
$
```

M: The Compiler

**Compiling
and Running
M Programs**

Hello World

First, Go to the right Planet with the command

```
cd /INF362-EWD/gtm
```

Verify your location with the command

```
pwd
```

Hello World

Settle a Base for your Troops

```
mkdir myusername
```

Seriously !,
put **YOUR** username here

Hello World

Enter your Base

```
cd myusername
```

Seriously !,
put **YOUR** username here

Hello World

Verify **YOUR** location with

```
pwd
```

Hello World

Create Rooms

```
mkdir r
```

```
mkdir o
```

Verify your settings with the command

```
ls -l
```

Hello World

Create a Parallel Universe !

```
tmux
```

`CTRL+b` followed by the key `"c"`

Hello World

Enter your Routines Directory

```
cd r
```

Verify your location with the command

```
pwd
```

Hello World

Create a file: hello.m

```
vim hello.m
```

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

This SPACE is VERY Important !!

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

This SPACE is VERY Important too!!

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

There must be **ONE SPACE**
and **ONE SPACE ONLY**

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

There must be **NO** spaces before the label

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

There must be **ONE SPACE**
and **ONE SPACE ONLY**

Hello World

with the content

```
label1 ; my first M program  
write █ "Hello World"  
quit
```

There must be **ONE SPACE**
and **ONE SPACE ONLY**

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

This is a **label**.
It is a place where execution **STARTS**.

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

A semicolon ";" indicates
the beginning of a comment.

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

Yes, this is a comment !

Hello World

with the content

```
labell ; my first M program  
write "Hello World"  
quit
```

Writes a Message
to the Screen

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

Yes, THIS message

Hello World

with the content

```
label1 ; my first M program  
write "Hello World"  
quit
```

This end a Routine

Hello World

Let's do This !

Save the File

Quit the Editor

Hello World

Move to the Parallel Universe !

`CTRL+b` followed by the key `"n"`

Hello World

Go to the Directory
where we will put Object Files

```
cd .. /o
```

Space



Hello World

Compile your Program

```
mumps ../r/hello.m
```

Space

Notice,
there is .m
extension here

Hello World

Run your Program

```
mumps -run label1^hello
```

Space

Space

Notice,
there is **no** .m
extension here

Hello World

```
ibanez@ip-10-85-97-113: /INF362-EWD/gtm/ibanez/o
File Edit View Search Terminal Help
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/r$ cd ../o
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps ../r/hello.m
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps -run label1^hello
Hello Worldibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ █
```

Here is the Message

Hello World

```
ibanez@ip-10-85-97-113: /INF362-EWD/gtm/ibanez/o
File Edit View Search Terminal Help
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/r$ cd ../o
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps ../r/hello.m
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps -run label1^hello
Hello Worldibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ █
```

Annoyingly **attached**
to the next prompt

Hello World

```
ibanez@ip-10-85-97-113: /INF362-EWD/gtm/ibanez/o
File Edit View Search Terminal Help
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/r$ cd ../o
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps ../r/hello.m
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps -run label1^hello
Hello Worldibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$
```

Let's Fix That !

Hello World

Go back to the Parallel Universe where you were editing the hello.m file.

`CTRL+b` followed by the key `"n"`

Verify your location with the command

`pwd`

Hello World

Modify the file: `hello.m`

```
label1 ; my first M program  
write "Hello World",!  
quit
```

Add This

Hello World

Modify the file: `hello.m`

```
label1 ; my first M program  
write "Hello World",!  
quit
```

The "!" generates a new line
when printing a message

Hello World

Go back to the Parallel Universe where you were compiling and running the program

`CTRL+b` followed by the key `"n"`

Verify your location with the command

`pwd`

Hello World

Compile your Program

```
mumps ../r/hello.m
```

Space

Notice,
there is .m
extension here

Hello World

Run your Program

```
mumps -run label1^hello
```

Space

Space

Notice,
there is **no** .m
extension here

Hello World

```
ibanez@ip-10-85-97-113: /INF362-EWD/gtm/ibanez/o
File Edit View Search Terminal Help
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ vim ../r/hello.m
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ cat ../r/hello.m
label1 ; my first program
write "Hello World",!  
quit
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps ../r/hello.m
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps -run label1^hello
Hello World
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$
```

new line

With the "!" symbol
we now have a new line

Your Turn !

- Write a M program called: `exercise1.m`
- Make it print your name in one line, and
- A funny message in the next line
- Add it to your **Report in Blackboard**

Brave New World !

This is Easy !

Let's do More !

Yoda Likes Squares

Go back to the Parallel Universe where you were editing the hello.m file.

`CTRL+b` followed by the key `"n"`

Verify your location with the command

`pwd`

Do It !

Create a file: yoda.m

```
vim yoda.m
```

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

This is a function

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

This is the Argument

Compute a Square

with the content

```
square (v) ; computes square  
new v2  
set v2=v*v  
write "square of v," is ",v2,!"  
quit  
;
```

This is a Comment,
starts with the semicolon ";"

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

This Creates a New
local variable: **v2**

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

Assigns to **v2**
the value of **v** times **v**

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

Writes a
Message

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

Composing Strings and
Variables with "," commas

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

and a the "!" symbol
generates a new line

Compute a Square

with the content

```
square(v) ; computes square  
new v2  
set v2=v*v  
write "square of ",v," is ",v2,!  
quit  
;
```

Finishes the "square"
function

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square(2)  
do square(3)  
do square(4)  
quit
```

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square(2)  
do square(3)  
do square(4)  
quit
```

This is a function

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square (2)  
do square (3)  
do square (4)  
quit
```

Remember to use
ONE space here

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square(2)  
do square(3)  
do square(4)  
quit
```

This is a call
to another function

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square (2)  
do square (3)  
do square (4)  
quit
```

This **calls**
the function

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square(2)  
do square(3)  
do square(4)  
quit
```

This is **the**
function

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square (2)  
do square (3)  
do square (4)  
quit
```

This is the
argument
to the function

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square (2)  
do square (3)  
do square (4)  
quit
```

Calling the square
function with
another argument

Compute many Squares

Add this to the file: yoda.m

```
compute ; several squares  
do square(2)  
do square(3)  
do square(4)  
quit
```

...and **another**
argument

Compute many Squares

Go back to the Parallel Universe where you were compiling and running the program

`CTRL+b` followed by the key `"n"`

Verify your location with the command

`pwd`

Yoda Likes Squares

Compile your Program

mumps . . / r / yoda . m

Space

Notice,
there is .m
extension here

Compute many Squares

Run your Program

mumps -run compute^yoda

Space

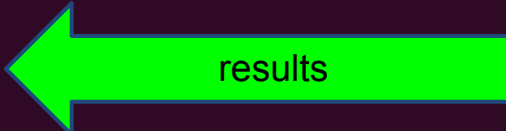
Space

Notice,
there is **no** .m
extension here

Compute Many Squares

```
ibanez@ip-10-85-97-113: /INF362-EWD/gtm/ibanez/o
File Edit View Search Terminal Help
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ cat ../r/yoda.m
square(v) ; computes square
new v2
set v2=v*v
write "square of ",v," is ",v2,!
quit
;

compute ; several squares
do square(2)
do square(3)
do square(4)
quit
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps ../r/yoda.m
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$ mumps -run compute^yoda
square of 2 is 4
square of 3 is 9
square of 4 is 16
ibanez@ip-10-85-97-113:/INF362-EWD/gtm/ibanez/o$
```



results

Your Turn !

- Write a M program called: tips.m
- Write a function to compute the 15% of its numerical argument (a typical tip)
- Call the function for the following values:
10, 20, 30, 50, 100
- Add it to your **report in Blackboard**

Brave New World !

This is Easy !

Let's do More !

What If....?

The **IF**
command

Get Food

Write this content in an M file.

```
feedMe(time) ;  
  if time<10 write "Breakfast",! quit  
  if time<13 write "Lunch",! quit  
  write "Dinner",!  
  quit  
  ;
```

What If....?

Compile and Run

To Quit or Not to Quit...

What does the "quit" command do ?

Add your answer to your
report in Blackboard

Your Turn !

- Write a M program called: `player.m`
- Write a function to display the title of the songs that you would like to hear at three different block times of the day.
- Call the function for the following tvme vs:
10, 7, 10, 14, 16, 20 (where 20 is 8pm)d it to
your **report in Blackboard**

Brave New World !

This is Easy !

Let's do More !

Do it Again, and Again...

The **FOR**
command

Let's Count

Write this content in an M file

ONE
Space

```
counting(n) ;  
new i  
for i=1:1:10 do  
  . write i, !  
quit  
;
```

This DOT
is important

ONE Space

Counting

Compile and Run

Loops are Fun !

Write this content in an M file

```
triangle
new i
new sum
set sum=0
for i=1:1 do quit:sum>100
. set sum=sum+i
. write i,"=",sum,!
quit
```

ONE
Space

This DOT
is important

This DOT
is important
too

TWO Spaces

Triangling !

Compile and Run

Walking a list

Write this content in an M file

```
walking
new i
set i=""
for do quit:i=""
    . set i=$order(^place(i))
    . write i,!
quit
```

TWO Spaces

**TWO
Spaces**

What If....?

Compile and Run

Your Turn !

- Write a M program called: **continent.m**
- That walks down the list of countries in the continent assigned to your TBL team
- Add this program to your **report in Blackboard.**

Your Turn !

- Write a M program called: **country.m**
- That walks down the list of cities in the country that you selected.
- Add this program to your **report in Blackboard.**

Welcome to M !

The END

for now...