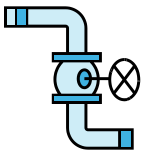
No runs, no drips, & no errors

Error recovery



CS112 Scientific Computation
Department of Computer Science
Wellesley College

Oops!

Even the most meticulous among us make mistakes

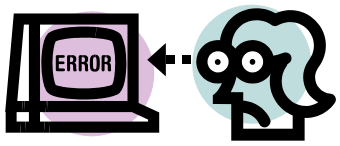
When life's inevitable little boo boos do occur... graceful recovery is key!

Warnings and errors

By now, we are all woefully aware of MATLAB's errors and warnings:

```
>> a = b
??? Undefined function or variable 'b'.

>> x = 1/0
Warning: divide by zero.
x =
      Inf
```



3

Warning!

We can add our own **warning messages** to code we write:

```
function result = squareRoot(num)
if (num < 0)
   warning (['taking squareroot of negative number ' ...
                                 num2str(num)]);
end
result = sqrt(num);
```

```
>> n = squareRoot(-3)
Warning: taking squareroot of negative number -3
n =
     0 + 1.7321i
```

4

Nicely formatted, useful warnings

```
function results = analyzeImage (image)
  [rows cols] = size(image);
  results = zeros(rows, cols, 'uint8');
  for row = 2:rows
     for col = 2:cols
        result =  <... some computation ...>
        if (result < 0)
           warning('negative result for row %u, col %u: %4.2f',
                    row, col, result);
        end
        results(row, col) = result;
     end
  end
```

5

Error!

In more dire circumstances we can issue our own **error messages** that halt execution of an M-file

```
function result = analyze(x, y, z)
if (nargin < 2)
    error ('At least two inputs are required');
elseif (nargin == 2)
  ...
end
```

```
>> n = analyze(3)
    ??? Error using ==> analyze
    At least two inputs are required
```

6

Nicely formatted, useful *error messages*

```
function results = analyzeImage (image)
   [rows cols] = size(image);
   results = zeros(rows, cols, 'uint8');
   for row = 2:rows
      for col = 2:cols
         result =  <... some computation ...>
         if (result < 0)
            error('negative result for row %u, col %u: %4.2f',
                  row, col, result);
         end
         results(row, col) = result;
      end
   end
```

7

Graceful recovery

We can prevent a MATLAB error from halting execution of an M-file by handling the error with a try-catch-end statement

```
try
   statements to execute
catch
   code to handle errors generated
      by above statements
end
```

8

When bad things happen to good programs

Some events are beyond our control:

```
try
    fid = fopen('data.txt');
    data = textscan(fid, '%s');
    fclose(fid);
catch
    disp('file read was not successful');
    data = rand(10,10);
end
result = analyze(data);
```

9

Error analysis using lasterr or lasterror

```
function result = matrixMultiply (A, B)
try
    result = A * B;
catch
    errormsg = lasterr;
    if (strfind(errormsg, 'Inner matrix dimensions'))
        disp('** Wrong dimensions for matrix multiplication')
    elseif (strfind(errormsg, ...
                'not defined for values of class'))
        disp('** Both arguments must be double matrices');
    end
    result = A;
end
disp('done');
```

10