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Structures by Example

This document attempts to teach the basics of MATLAB structures by showing a few examples of structures in use. For a more complete description see the MATLAB help manuals titled "Getting Started with MATLAB" and "Using MATLAB".

A structure is a MATLAB data type that lets you group related objects together. For example, when modeling a signal in MATLAB one normally creates two vectors. One vector holds the signal data while the other vector holds the axis values used when plotting the signal. A structure, which is similar in use to structures in the C language, can be created to group this data together. For example,

```
x.Axis = T*[0:99];                      % Time Axis
x.Data = sin( 2 * pi * f * x.Axis );    % Sinusoidal Data
x.Name = 'Sinusoidal Data';             % Signal Name
```

The above creates a structure x containing three fields called Axis, Data, and Name. Note that structure fields do not necessarily have to contain the same type of data. Fields can contain any valid MATLAB data type including other structures. This nesting capability makes creating custom complex data types relatively easy. As seen in the second line above, one retrieves a field value by calling it with the same syntax with which it was defined. Another example of retrieving a field value is given below.

```
plot( x.Axis , x.Data );
title( x.Name );
```

Arrays of structures can be created as well.

```
Student(1).Name = 'John';
Student(1).Grades = [95 92 94 96];
Student(2).Name = 'Henry';
Student(2).Grade = [92 85 nan 33];
```

The above code creates a length 2 array. Each element in the array is a structure called Student. Each of the Student structures contains the fields Name and Grade. Unfortunately, in some cases the colon operator cannot be used to operate on structures. In these cases one should write,

```
for i = 1:3
   Student(i).Name = 'John';   or  [Student.Name]=deal('John');
end
```

The information given in this document should be enough to accomplish complex tasks using structures. For more of the fine details see the manuals listed above and the following commands: STRUCT, ISFIELD, GETFIELD, SETFIELD, RMFIELD, FIELDNAMES, DEAL.