



General Computer Science for Engineers CISC 106 Lecture 11

James Atlas

Computer and Information Sciences

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Lecture Overview

- Review
 - Structures in MATLAB
- Advanced MATLAB
 - Classes
 - isa function
 - Cell Arrays
- Graphics
 - Function callbacks (passing functions to functions)
- Project 2
- Lab 07
- Team evaluations for Project 1



Structures in MATLAB



A Database Application

- Given:

Name: Chris
Credits: 27
Graduation: 12/15/2011

Name: Sola
Credits: 18
Graduation: 05/17/2011

Name: Roger
Credits: 55
Graduation: 06/10/2009

Name: Tom
Credits: 15
Graduation: 05/22/2012

A Database Application

Given:

Name: Chris
Credits: 27
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Name: Sola
Credits: 18
Graduation: 05/17/2011

Name: Roger
Credits: 55
Graduation: 06/10/2009

Name: Tom
Credits: 15
Graduation: 05/22/2012

We can implement it with arrays like this:

Name		Credits
Chris	27	12/15/2011
Sola	18	05/17/2011
Roger	55	06/10/2009
Tom	15	05/22/2012

3

4



A Database Application

Given:

Name: Chris
Credits: 27
Graduation: 12/15/2011

Name: Sola
Credits: 18
Graduation: 05/17/2011

Name: Roger
Credits: 55
Graduation: 06/10/2009

Name: Tom
Credits: 15
Graduation: 05/22/2012

OR we can do it like this an array with

Students (1). Name: Chris
Students (1).Credits: 27
Students (1). Graduation: 12/15/2011

Students (2).Name: Sola
Students (2).Credits: 18
Students (2).Graduation: 05/17/2011

Students (3). Name: Roger
Students (3). Credits: 55
Students (3). Graduation: 06/10/2009

Students (4). Name: Tom
Students (4). Credits: 15
Students (4). Graduation: 05/22/2012



Initializing a structure

- record1.name = 'Me';
record1.credits = 27;
record1.age = 10;
- record2.name = 'Not Me';
record2.credits = 30;
record2.age = 14;

```
function [] = displayRecordName(record)  
    disp(record.name);
```

```
displayRecordName(record1);  
displayRecordName(record2);
```



Classes

- Object-oriented Programming
- Classes represent types of Objects
- Similar to structs



Class definition

```
classdef dog
    properties
        name
        age
    end
end
```



Class definition (cont')

```
classdef dog
    properties
        name
        age
    end
    methods
        function obj=dog(name, age)
            obj.name = name;
            obj.age = age;
        end
    end
end
```



The isa function

- `isa(object, 'classname')`
- `isa(dog1, 'dog')`
- `isa(dog1, 'person')`



Arrays of classes?

- [dog1 dog2]
- [dog1 dog2 person1] ?



Cell Arrays

- Normal array:
 `zeros(1,5)` = 5 doubles
 `[1 2 3 4]` = 4 doubles
- Cell array:
 `{1 2 3 4}` = ???



Cell Arrays (cont)

`c = {1 2 3 4}`

`c{1} = 'hello'`

- Cell arrays store an object
 - Can be another array
 - Or a string
 - ... any struct/object/cell array



MATLAB Graphics

- Event-driven user interface
- A figure window contains:
 - axes, line, plot, image, and figure itself
 - controls such as buttons, menus, listboxes, textboxes
 - use uicontrol, and uimenu objects



MATLAB Simple GUI



Function callbacks

- Passing a function to another function

```
function []=functionPassTest(func, data)
    func(data)
```

```
function []=printName(obj)
    disp(obj.name)
```

```
cat.name = 'Fifi'
functionPassTest(@printName, cat);
```



Project 2

- Team project
 - 2-3 persons per team
 - No team members the same as Project 1
- Due Today
 - Team name, members
 - Choice of project focus
- Due Aug 3
 - Individual progress report
- Final Project 2 Due Aug 12



Project 2 Options

- Database (Matlab or C)
- Game
- Animation
- Text Editor
- Graphics Editing Functions (Matlab or C)



Lab 07

- Create some structures, classes
- Experiment with a cell array
- Modify the simple GUI to add a menu



Team Evaluations, Project 1