ELE101 Precept 3

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Arrays

Setup Instructions

- Download the precept 3 files from Blackboard and unzip precept3.zip into a new folder preferably somewhere on your H:\ drive.
- Open up ele101login.bat
- Use the 'cd' command to reach the new folder where you unzipped the contents of precept3.zip from within the shell.
- *NEW*: This time, open up the emulator with the following command:
 - bash.202\$ emulator_precept3.bat &

Review & Outline

- Last time:
 - Writing, compiling, and testing our own programs
 - Selection (Ch. 5)
 - if (a == 2) { /* .. */ } else {/* .. */ }
 - Loops (Ch. 6)
 - while (j > 0) { /* ... */ }
 - for (i = 0; i < 5; i += 1) { /* ... */ }
- Today:
 - Arrays

What are arrays and do we really need them?

- Open up the file Cmd-noarray.c with your favorite editor.
- To test it, just type the word **noarray** into the ELE101 prompt in the emulator. This time the programs have been preloaded.

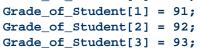
```
int Grade_of_Student_1;
int Grade_of_Student_2;
int Grade_of_Student_3;
int Grade_of_Student_4;
int Grade_of_Student_5;
```

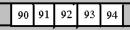
• Our program works, but it's a bit clunky isn't it? Imagine if we tried to scale it to handle a class of 100 students.

Setting up arrays

- Take a look at Cmd-array.c
- Apparently much more concise. Let's try running it to make sure it has the same behavior.
- Declaring and assigning arrays: int Grade_of_Student[5] = { 90, 91, 92, 93, 94 };
- OR this can be written as: int Grade of Student[5]; Grade_of_Student[0] = 90; Grade_of_Student[1] = 91;

Grade of Student[4] = 94;





```
printf("#2 got %d points.\n",
  Grade of Student[1]);
```

• What if we wanted to know the grade of only student #2?

• How to make some part of the program decide to give a C- to student #3?

```
Grade of Student[2] = 70;
```

Accessing arrays

 How to print the entire array? for (i = 0; i < 5; i++) { printf("%d\n", Grade_of_Student[i]);

Other tips

• Be careful not to try to access an array outside of its bounds. What do you see wrong with the following piece of code?

```
for (i = 1; i <= 5; i++) {
 printf("The grade of student %d is \
   %d\n", i, Grade_of_Student[i] );
```

- Multi-dimensional arrays
 - Won't cover this in detail today, but you can take a look at **Cmd-mdarray.c** for a Tic Tac Toe example.

Administrivia

- Homework assignment #2 due Tuesday Feb 24th
- Midterm on Thursday March 4th
- Done with homework assignment #2 already? Great job, and you don't need to stay for the next 20 minutes of precept.
- Article from Wednesday:



Google and Yahoo! are revving up their online search engines as the once-friendly business partners shift gears and prepare for what promises to be a fierce rivalry.

Review on bases

- Pop Quiz.
 - Convert 10101₂ into base 10.

$$1*2^4 + 0*2^3 + 1*2^2 + 0*2^1 + 1*2^0 = 21_{10}$$

- Convert 2D₁₆ into base 10,

$$2*16^1 + 13*16^0 = 45_{10}$$

Base conversion example

- Let's convert 62₁₀ into base 7
- In base 7, our available digits are: 0123456.

$$62 / 7^2$$
 = 1 remainder 13
 $13 / 7^1$ = 1 remainder 6
 $6 / 7^0$ = 6 remainder 0

• Final answer: $62_{10} = 116_7$

Sample Base-7 Conversion Program

Base conversion: what else do we need?

- Problems that you would need to fix with the code fragment on the previous slide:
 - Can't handle numbers greater than or equal to 7⁴ (2401₁₀)
 - If you enter a small number you get preceding zeroes in the output, e.g. 13₁₀ -> 0016₇
 - And what about overflow?
- But there are also some completely different ways of doing the conversion. Feel free to be creative.
- On top of that, for your homework assignment you'll need to implement support for bases 2-36 and error checking.
- Good luck!