CENTER FOR TEXTUAL STUDIES AND
DIGITAL HUMANITIES

DIGH 401 - Introduction to Computing

Fall Semester 2013

Week 7

Today's Class

- XML exercises
- variables (recap)
- data types
- programming basics
- manipulating data (intro)

To the Lighthouse

(Here Mr. Carmichael, who was reading Virgil, blew out his candle.)

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But what after all is one night? A short space, especially when the darkness dims so soon, and so soon a bird sings, a cock crows loudly, or a faint green quickens, like a turning leaf, in the hollow of the wave.

It seemed now as if, touched by human penitence and all its tool, divine goodness had parted the curtain and displayed behind it, single, distinct, the hare erect; the wave falling; the boat rocking, which, did we deserve them, should be

- Organisation details for a library catalogue, corpus of textual documents, or photographic archive.

Programming basics

Variables - Quick Recap

- program receives data and stores it in a variable
- a variable can store different types of data, including words and numbers
- variables make programs more flexible
- programs can retrieve, store, and respond to data from outside the program

Variables in PHP

- used to hold values or expressions

A few simple rules:

- variables start with $ sign
- must begin with a letter or _ character
- can only contain alphanumeric or underscore characters
- avoid spaces in the names
- names are case-sensitive

```
$course2 = "DIGH 401";
```

- PHP is a loosely typed language

PHP's Scalar Data types

Integer
Numeric values as a whole number, either positive or negative. Range of numbers varies by OS, but normally -2 billion to +2 billion.

eg: $value = 401;

Character String
Series of single characters, such as 'Hello World'. In theory, there is no limit on the length of a string.

eg: $value = 'DIGH 401';

Floating point number
Numeric values, normally excluding a whole number, that include decimal places. Often known simply as a 'float'.

eg: $value = 4.01;

Boolean
A True or False value. Two possible states represented as either true or false. Mainly used for comparing conditions in conditional statements.

eg: $value = TRUE;

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Java's Primitive Data Types

`boolean`
true or false - most important operators defined are 'and', 'or' and 'not'

byte
1 signed byte (two's complement). Covers values from -128 to 127.

short
2 bytes, signed (two's complement), -32,768 to 32,767

int
4 bytes, signed (two's complement). -2,147,483,648 to 2,147,483,647. Like all numeric types ints may be cast into other numeric types (byte, short, long, float, double). When *lossy* casts are done (e.g. int to byte) the conversion is done modulo the length of the smaller type.

long
8 bytes signed (two's complement). Ranges from -9,223,372,036,854,775,808 to +9,223,372,036,854,775,807.

float
4 bytes, IEEE 754. Covers a range from 1.40129846432481707e-45 to 3.40282346638528860e+38 (positive or negative)

double
8 bytes IEEE 754. Covers a range from 4.94065645841246544e-324d to 1.79769313486231570e+308d (positive or negative).

char
2 bytes, unsigned, Unicode, 0 to 65,535
Chars are not the same as bytes, ints, shorts or Strings.

Programming basics

Variables - Java

```
int a, b, c;
a = 1322;
b = 1673;
c = a + b;

String a, b, c;
a = "Hello, ";
b = "World";
c = a + b;
```

Programming basics

Variables - Retrieving data

- after data is stored in a variable it can be treated the same as fixed value
- you can also assign the value of one variable to another
- you can also modify a variable by itself

Programming basics

Using Constants in programming

- similar to variables that hold a single value that never changes
- eliminate fixed values and replace with a constant
- two advantages to constants, which allow you to
    - replace fixed values with descriptive constant names
    - change the value of a constant once and replicate change throughout

Programming basics

Using the 'Constants' concept in PHP programming

- identifier name for a simple value & cannot change during execution of a script
- constants are case-sensitive by default
- constant identifiers, eg; "START", are normally always uppercase
- naming follows standard PHP conventions
    - starts with a letter or underscore
    - followed by any number of letters, numbers, or underscores

```
define("START",     "something");

echo constant("START");
```

Programming basics

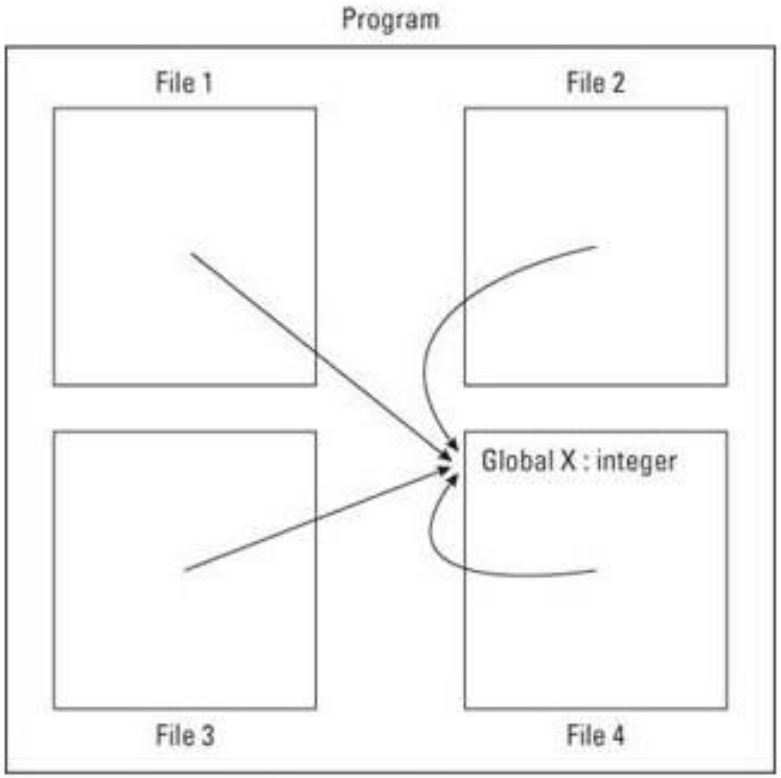
Scope and Variables - Quick recap

- the scope of a variable defines which part of your program can store and retrieve data in a variable
- the program must ensure that no data is accessed or modified accidentally
- conceptually, three possible scope levels for a declared variable
    - global
    - module
    - subprogram
- PHP has the following scopes
    - local
    - global
    - static
    - parameter

Programming basics

Global Variables - Handle with care

- global in name, global in nature
- any part of the program can access the variable including
    - storing new data
    - wiping out existing data
    - changing the data in the variable
    - simply wiping out all data in the variable
- global variables often make error checking and correction harder
- explicit declarations often required in languages to declare global variables



A global variable can be accessed by every part of a program, including subprograms stored in separate files.

Programming basics

Global Variables - PHP

- refers to any variable defined outside of a given function

- global variables can be accessed from anywhere outside of a function

- to access a global variable within a function use the 'global' keyword

```
<?php
$total = 0;
$booster1 = 50;
$booster2 = 100;

function rocketThrust()
{
global $total, $booster1, $booster2;
$total = $booster1 + $booster2;
}

rocketThrust();
echo 'Rocket thrust is currently stable at '.$total.' newtons';
?>
```

Example 1 | Example 2

Programming basics

Manipulating Data - intro

- numbers, text, input
- mathematical operations such as addition, subtraction, multiplication...
- string operations such as replace, concatenate, re-order, diff...
- operators such as +, -, and *
- functions are commands that perform more sophisticated calculations such as calculating the square root of a number