Intro to PHP

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About PHP

The Language

PHP PHP Hypertext Preprocessor

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- Recursive acronym

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- Open source
- Available on most OS
- Portable code

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  - Java

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  - Perl

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- Take some concepts with you or reuse existing
- Used to write dynamic server side web apps
  - Can be used to make cli scripts

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    `http://localhost/myFile.php`
  - Directly from the command line

    `php myFile.php`

Interpreted Language

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    - Can be mitigated via caching

Basic Syntax

PHP mode

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- Execution depends on code location
  - Inside is code to be run on the server
  - Outside is ignored by interpreter and outputted[1]
- It is good practice to leave off the closing tag in a PHP only file

[1] Exception is using conditionals for output, more on this later.

PHP mode

- PHP is most frequently combined with HTML/CSS/JS for making web apps

```
<!DOCTYPE html>
<html>
    <head>
        <title>First App</title>
    </head>
    <body>
        <?php echo "Hi CSCI241!"; ?>
    </body>
</html>
```

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Statements

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- Each statement **must** end with a semicolon ;[2]

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Comments

- Single line comments use //

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<?php
// This is a single line comment
echo "This line is run!";
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```
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 This is a multi line comment
 echo "These statements were commented out.";
 echo "So they will not be executed or output";
*/
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```

- A # can also be used but seldom is

```
<?php
# I'm not used often
```

Comments

Warning

- Do not nest the multi line comments they end at the first */

```
<?php
/*
    echo 'This will not end well!'; /* Do you see the p
*/
```

Variables

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- Which would you rather?

  `0x00BAB10C`

  `$uberBlock`

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  - `$this` is a reserved variable (more later)

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- Variables are always assigned by value (more later)

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Scalars

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- Differentiated from complex data types like `array` or `object`

Boolean

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- All others are considered `true` including `-1`

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integer $\mathbb{Z} = \{..., -3, -2, -1, 0, 1, 2, 3, ...\}$

```
<?php
$bin = 0b10100011; //163 in decimal
$oct = 0123; //83 in decimal
$dec = 123; //123 in decimal
$hex = 0x64; //100 in decimal

var_dump($dec == $oct); //is bool(false)
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  - Returns the number of bytes allocated for the variable
  - **Usually** 8 bytes on 64 bit machines and 4 on 32 bit machines
  - No "unsigned" integers in PHP
    - Signing uses the first bit to indicate positive or negative
    - What would happen if PHP did support them?

Integer

- Invalid octal specification results in stopping at bad digit

```
<?php
var_dump(011901); //Decimal 9!
```

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Integer

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- Variables do ~~not~~ need to be initialized
  - Always initialize your variables even though you dont "have to"

Integer Overflow

- Unlike other languages `integer` overflow results in using a `float` using E notation

Integer Overflow

- Unlike other languages `integer` overflow results in using a `float` using E notation
- Typed languages generally roll over because of 2's complement

Float

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- Can be specified by providing E notation or number with decimal place
- Floats like integers depend on the platform, a max of ~$1.8e308$ with ~14 digit precision per IEEE 64bit standard

Float

- Conversion to binary results in loss of precision for some numbers

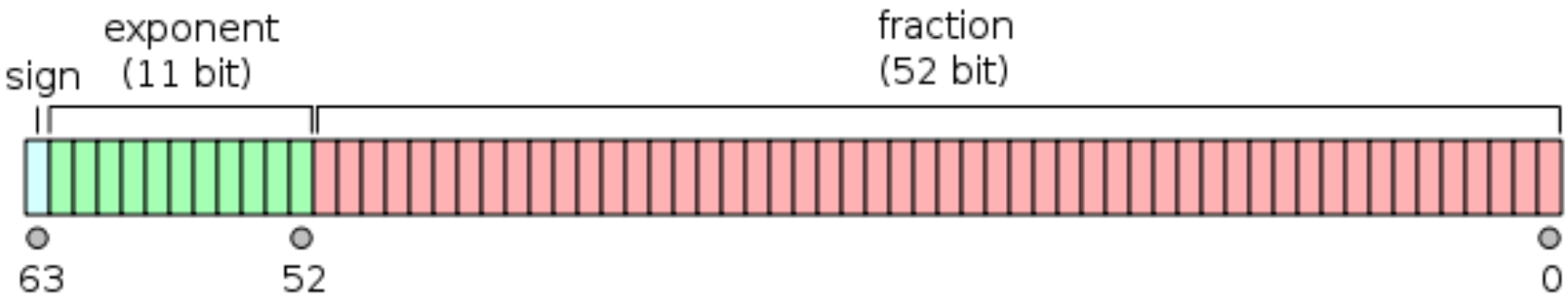

Figure : IEEE 754 Floating Point Format

This can lead to confusing results: for example, `floor((0.1+0.7)*10)` will usually return 7 instead of the expected 8, since the internal representation will be something like 7.9999999999999991118

Float

- Comparing floats for inequality can also be problematic

```
<?php
$a = 1.23456789;
$b = 1.23456780;
$epsilon = 0.00001;

if(abs($a-$b) < $epsilon) {
    echo "true";
}
```

[6] http://www.php.net

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  - Can specify precision of equality[6]

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- Can check for `NaN` using `is_nan()`

String

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- Native strings only support ASCII (no native Unicode)

```
<?php
$name = "Andrew Besmer"; //My name uses 13B
$name = "&rew Besmer"; //My 1337 name uses 11B
```

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```

- The max string length is 2GB in PHP

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  - Single quoted syntax
  - Double quoted syntax
  - heredoc syntax
  - nowdoc syntax
- Depending on the method used variables may be inserted into the string!

String

- Single quoted uses the ' character to start and end the string

```
<?php
$name = 'Andrew Besmer';
```

```
<?php
$greeting = 'Hello';
$name = '$greeting Andrew Besmer';
echo $name; //Outputs: £greeting Andrew Besmer
```

String

- Single quoted uses the ' character to start and end the string

```
<?php
$name = 'Andrew Besmer';
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- Variables are not inserted into the string with single quotes

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```
<?php
$name = 'Pat O\'Neal';
echo $name; //Outputs: Pat O'Neal
```

String

- A double quote " can also be used to specify start and end of strings

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<?php
$greeting = "Hello";
$name = "$greeting Andrew Besmer";
echo $name; //Outputs: Hello Andrew Besmer
```

String

- A double quote " can also be used to specify start and end of strings
- Variables are inserted into string

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- Other common escape characters

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- Other common escape characters
- Remember that a CRLF in HTML does nothing!

String

- You can also use heredoc syntax `<<<IDENTIFIER` which will accept a string until seeing the `IDENTIFIER;`

```
<?php
$greeting = "Hello!";
$longText = <<<EOF
$greeting
This is some longer text.
All of this will wind up in the string.
If can go on for many lines.
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- Since a double quote is not used to start and stop the string definition it is not necessary to escape them
- Can optionally be specified using `<<<"IDENTIFIER"` more explicitly explaining what will happen in the string

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- Nowdoc is similar to heredoc but is specified using `<<<'IDENTIFIER'` instead

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```

String

- Nowdoc is similar to heredoc but is specified using `<<<'IDENTIFIER'` instead
- The ' explicitly describes expected functionality

```
<?php
$greeting = "Hello!";
$longText = <<<'EOF'
$greeting
This is some longer text.
All of this will wind up in the string.
If can go on for many lines.
EOF;
```

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- Note that arrays are 0 based
- More on arrays later
- Strings serve as PHP's byte
- An empty string is `NULL`

```
<?php
$emptyString = ''; //NULL
```

String

Warning

- Strings are concatenated using the . operator NOT the + operator which many other languages use

Compound

- PHP has two compound data types

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  - `array`

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  - `object`

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  - `array`
  - `object`
- We will learn more about both of these later

Special

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  - `resource`

Special

- PHP has two special data types
  - `resource`
  - `NULL`

Resource

`resource` A variable to hold references to external resources, e.g. a opened files, database connections, etc. . .

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  - You explicitly assign `NULL`
  - If you have not set any value yet
  - The variable has been `unset()`
- `NULL` is not case senesitive
- Can check for it using `is_null()`

Type Juggling

Type Juggling

- PHP will auto convert the type depending on the context

```
<?php
$test = "100"; //A string
$test = $test + 10; //An integer
$test = $test + 10.5; //A float
$test = $test + "15 hundred"; //A float 135.5
$test = 100 + "15 hundred"; //An integer 115
```

Type Juggling

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- PHP does not change the variable itself but it's use in the expression and the resulting data type

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$test = $test + 10; //An integer
$test = $test + 10.5; //A float
$test = $test + "15 hundred"; //A float 135.5
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  - `(string)`

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  - `(array)`

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  - `(object)`

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- Cast by putting the data type you desire in parathensis
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  - `(bool)`, `(boolean)`
  - `(float)`, `(double)`, `(real)`
  - `(string)`
  - `(array)`
  - `(object)`
  - `(unset)`
  - `(binary)`

Casting

- For `boolean` see earlier for how values are determined to be `true` or `false`

[7] http://www.php.net

Casting

- For `boolean` see earlier for how values are determined to be `true` or `false`
- Examples[7]

```
<?php
var_dump((bool) "");          // bool(false)
var_dump((bool) 1);           // bool(true)
var_dump((bool) -2);          // bool(true)
var_dump((bool) "foo");       // bool(true)
var_dump((bool) 2.3e5);       // bool(true)
var_dump((bool) array(12));   // bool(true)
var_dump((bool) array());     // bool(false)
var_dump((bool) "false");     // bool(true)
```

[7] http://www.php.net

Casting

- When converting from `boolean` to `integer`

Casting

- When converting from `boolean` to `integer`
  - `false` becomes 0

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- When converting from `boolean` to `integer`
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  - `true` becomes 1

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- When converting from `boolean` to `integer`
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  - `true` becomes 1
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  - The number is rounded down **towards zero**

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  - The number is rounded down **towards zero**
  - Numbers to large are `undefined` or `NaN` no errors are thrown

Casting

- When converting from `boolean` to `integer`
  - `false` becomes 0
  - `true` becomes 1
- From `float` to `integer`
  - The number is rounded down **towards zero**
  - Numbers to large are `undefined` or `NaN` no errors are thrown
  - Warning!

```
<?php
echo (int) ( (0.1+0.7) * 10 ); //Is 7 not 8!
```

Casting

- From `object` to `float` results in a notice

Casting

- From `object` to `float` results in a notice
- From `integer` to `float` can result in loss of precision

Casting

- From `boolean` to `string`

Casting

- From `boolean` to `string`
  - `false` is `""`

Casting

- From `boolean` to `string`
  - `false` is `""`
  - `true` is `"1"`

Casting

- From `boolean` to `string`
  - `false` is `""`
  - `true` is `"1"`
- From `float` or `integer` to `string`

Casting

- From `boolean` to `string`
  - `false` is `""`
  - `true` is `"1"`
- From `float` or `integer` to `string`
  - Textual representation to string form with E notation

Casting

- From `boolean` to `string`
  - `false` is `""`
  - `true` is `"1"`
- From `float` or `integer` to `string`
  - Textual representation to string form with E notation
- From `object` to `string`

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  - Becomes `"Object"`

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  - Becomes `"Object"`
- From `array` to `string`

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  - Becomes `"Object"`
- From `array` to `string`
  - Becomes `Array`

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- From `float` or `integer` to `string`
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- From `object` to `string`
  - Becomes `"Object"`
- From `array` to `string`
  - Becomes `Array`
- From `NULL` to `string`

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  - `false` is `""`
  - `true` is `"1"`
- From `float` or `integer` to `string`
  - Textual representation to string form with E notation
- From `object` to `string`
  - Becomes `"Object"`
- From `array` to `string`
  - Becomes `Array`
- From `NULL` to `string`
  - Becomes `""`

Casting

- From `string` to `number`

String conversion to numbers from php 8

```
<?php
$foo = 1 + "10.5";                // £foo is float (11.5)
$foo = 1 + "-1.3e3";              // £foo is float (-1299)
$foo = 1 + "bob-1.3e3";           // £foo is integer (1)
$foo = 1 + "bob3";                // £foo is integer (1)
$foo = 1 + "10 Small Pigs";       // £foo is integer (11)
$foo = 4 + "10.2 Little Piggies"; // £foo is float (14.2)
$foo = "10.0 pigs" + 1;           // £foo is float (11)
```

Casting

- From `string` to `number`
  - If it does not have `.`, `e`, or `E` in it becomes `integer` otherwise `float`

String conversion to numbers from php [8]

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Casting

- From `string` to `number`
  - If it does not have `.`, `e`, or `E` in it becomes `integer` otherwise `float`
  - Valid part of `string` used then rest discarded

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```

Casting

- From `string` to `number`
  - If it does not have `.`, `e`, or `E` in it becomes `integer` otherwise `float`
  - Valid part of `string` used then rest discarded
  - Nothing valid means 0

String conversion to numbers from php [8]

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```

Superglobals

$_GET/$_POST

- The superglobals $_GET and $_POST contain the name value pairs sent as part of a GET/POST request from your form[9]

```
<?php
$firstName = $_POST["firstName"];
$lastName = $_POST["lastName"];
?>
<html>
    <head>
        <title>Hello <?php echo $firstName . $lastName . "
    </head>
    <body>


        <form method="POST" action="<?php echo $PHP_SELF;
```