PHP Code Count™

Counting Standard

University of Southern California

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Revision Sheet

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1. Definitions

1.1. **SLOC –** Source Lines of Code is a unit used to measure the size of software program. SLOC counts the program source code based on a certain set of rules. SLOC is a key input for estimating project effort and is also used to calculate productivity and other measurements.

1.2. **Physical SLOC –** One physical SLOC is corresponding to one line starting with the first character and ending by a carriage return or an end-of-file marker of the same line, and which excludes the blank and comment line.

1.3. **Logical SLOC –** Lines of code intended to measure "statements", which normally terminate by a semicolon (C/C++, Java, C#) or a carriage return (VB, Assembly), etc. Logical SLOC are not sensitive to format and style conventions, but they are language-dependent.

1.4. **Data declaration line or data line –** A line that contains declaration of data and used by a compiler or assembler to interpret other elements of the program.

Each variable is defined with a dollar sign ($) before the variable's name. In addition, a semicolon is used to denote the end of a line. Semicolons do not, however, need to be placed at the end of commented lines. Strings, or a sequence of characters, are defined with quotation marks around the value, while integers are not.

The following table lists the PHP keywords that denote data declaration lines:

$boolean	$integer	$float	$string	$array	$object	$resource	$NULL

Table 1 PHP Data Keywords

1.5. **Compiler Directives –** A statement that tells the compiler how to compile a program, but not what to compile.

The following table lists the PHP keywords that denote compiler directive lines:

define	declare
include	include_once
require	require_once

Table 2 PHP Compiler Directive

1.6. **Blank Line –** A physical line of code, which contains any number of white space characters (spaces, tabs, form feed, carriage return, line feed, or their derivatives).

1.7. **Comment Line –** A comment is defined as a string of zero or more characters that follow language-specific comment delimiter. PHP comment delimiters are "//", "#" and "/*…*/". A whole comment line may span one line and does not contain any compilable source code. An embedded comment can co-exist with compilable source code on the same physical line. Banners and empty comments are treated as types of comments.

1.8. **Executable Line of code –** A line that contains software instruction executed during runtime and on which a breakpoint can be set in a debugging tool. An instruction can be stated in a simple or compound form.

An executable line of code may contain the following program control statements:

- Selection statements (if, ? operator, switch)
- Iteration statements (for, while, do-while)
- Empty statements (one or more ";")
- Jump statements (return, goto, break, continue, exit function)
- Expression statements (function calls, assignment statements, operations, etc.)
- Block statements

An executable line of code may not contain the following statements:

- Compiler directives
- Data declaration (data) lines
- Whole line comments, including empty comments and banners
- Blank lines

2. Checklist for source statement counts

PHYSICAL SLOC COUNTING RULES			
MEASUREMENT UNIT	ORDER OF PRECEDENCE	PHYSICAL SLOC	COMMENTS
Executable lines	1	One per line	Defined in 1.8
Non-executable lines			
Declaration (Data) lines	2	One per line	Defined in 1.4
Compiler directives	3	One per line	Defined in 1.5
Comments			Defined in 1.7
On their own lines	4	Not included (NI)	
Embedded	5	NI	
Banners	6	NI	
Empty comments	7	NI	
Blank lines	8	NI	Defined in 1.6

LOGICAL SLOC COUNTING RULES				
NO.	STRUCTURE	ORDER OF PRECEDENCE	LOGICAL SLOC RULES	COMMENTS
R01	"for", "while" or "if" statement	1	Count once	"while" is an independent statement
R02	do {…} while (…); statement	2	Count once	Braces {…} and semicolon ; used with this statement are not counted
R03	Statements ending by a semicolon	3	Count once per statement, including empty statement	Semicolons within "for" statement are not counted. Semicolons used with R01 and R02 are not counted
R04	Block delimiters, braces {…}	4	Count once per pair of braces {…}, except where a closing brace is followed by a semicolon, i.e. }; or an opening brace comes after a keyword "else"	Braces used with R01 and R02 are not counted. Function definition is counted once since it is followed by {…}
R05	Compiler Directive	5	Count once per directive	

3. Examples

EXECUTABLE LINES

SELECTION Statement

ESS1 - if, else if, else and nested if statements

GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
if (<boolean expression>) <statements>;	if ($x != 0) echo "non-zero";	1 1

if (<boolean expression>):
  <statements>;
endif;
	if ($x != 0):
	  echo "non-zero";
	endif;
		1
		1
		0

if (<boolean expression>)
  <statements>;
elseif (<boolean expression>)
  <statements>;
…
else <statements>;
	if ($x == 0)
	  echo "zero";
	elseif (x > 0)
	  echo "positive";
	else
	  echo "negative";
		1
		1
		1
		1
		0
		1

if (<boolean expression>)
{
  <statements>;
}
else
{
  <statements>;
}
	if ($x != 0)
	{
	  echo "non-zero";
	}
	else
	{
	  echo "zero";
	}
		1
		0
		1
		0
		0
		0
		1
		0

if (<boolean expression>):
  <statements>;
else:
  <statements>;
endif;
	if ($x != 0):
	  echo "non-zero";
	else:
	  echo "zero";
	endif;
		1
		1
		0
		1
		0

NOTE: complexity is not considered, i.e. multiple “&&” or “||” as part of the expression.	if (($x != 0) && ($x > 0)) echo $x;	1 1

ESS2 - ?: operator

GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

Exp1 ? Exp2 : Exp3	$a = (x > 0) ? “+” : “-”;	1
ESS3 – switch and nested switch statements		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

switch (<expression>)
{
  case <constant 1>:
  <statements>;
  break;
  case <constant 2>:
  <statements>;
  break;
  case <constant 3>:
  <statements>;
  break;
  default
  <statements>;
}
	switch ($n)
	{
	  case 1:
	  foo1();
	  break;
	  case 2:
	  foo2();
	  break;
	  case 3:
	  foo3();
	  break;
	  default:
	  echo “invalid case”;
	}
		1
		0
		0
		1
		1
		0
		1
		1
		0
		1
		1
		0
		1
		0

ESS4 – try-catch blocks		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

try
{
  // code to throw an exception
}
catch(exception-declaration)
{
  // code that executes when
  // exception is thrown
}
	try
	{
	  echo “Calling func”;
	  throw Exception(“Error”);
	  echo “This will not execute.”
	}
	catch(IOException $e)
	{
	  echo “Error: ” .$e;
	}
		0
		0
		1
		1
		1
		0
		1
		0
		1
		0

ITERATION Statement		
EIS1 – for loops		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

for (initialization; condition;
increment)
  statement;
 	
for (initialization; condition;
increment) {
  <statements>
}
 	
for (initialization; condition;
	for ($i = 0; $i < 10; $i++)
	  echo $i.“
	”;
	
	for ($i = 0; $i < 10; $i++)
	{
	  echo $i.“
	”;
	}
	
	for ($i = 0; $i < 10; $i++):
		1
		1
		
		1
		0
		1
		0
		
		1
		1

increment): <statements> endfor;	echo $i.“ ”; endfor;	0
EIS2 - empty statements (could be used for time delays)		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
for ($i = 0; $i < SOME_VALUE; $i++) ;	for ($i = 0; $i < 10; $i++);	2
EIS3 – while loops		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

while (<boolean expression>)
{
<statements>;
}
 	
while (<boolean expression>):
<statements>;
endwhile
	while ($i < 10)
	{
	echo $i.“
	”;
	$i++;
	}
	
	while ($i < 10):
	echo $i.“
	”;
	$i++;
	endwhile
		1
		0
		1
		1
		0
		
		1
		1
		1
		0

EIS4 – do-while loops		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
do { <statements>; } while (<boolean expression>);	do { echo $i; $i++; } while ($i > 0);	0 0 1 1 1
EIS5 – foreach loops		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

foreach (array_expression as
$value) {
<statements>;
}
 	
foreach (array_expression as
$value):
<statements>;
endforeach;
 	
foreach (array_expression as $key
=> $value) {
	$arr = array(1, 2, 3, 4);
	foreach ($arr as &$value) {
	$value = $value * 2;
	}
	
	foreach ($arr as &$value):
	$value = $value * 2;
	endforeach;
	
	$employeeAges["Lisa"] = "28";
	$employeeAges["Grace"] = "34";
		1
		1
		1
		0
		
		1
		1
		0
		
		1
		1

<statements>;
}
	foreach ($employeeAges as $key
	=> $value) {
	echo "Name: $key, Age: $value
	
	";
	}
		1
		
		1
		
		0

JUMP Statement		
EJS1 – return statement		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
return expression	if ($i == 0) return;	2
EJS2 – goto and label statement		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
goto label;	loop1: $x++; if ($x < $y) goto loop1;	0 1 2
EJS3 – break statement		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
break;	if ($i > 10) break;	2
EJS4 – exit function		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
void exit (int return_code);	if ($x < 0) exit (“Exit!”);	2
EJS5 – continue statement		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

continue;	while (list($key, $value) =
	each($arr)) {
	if (!($key % 2)) {
	continue;
	}
	do_something_odd($value);
	}
		
		1
		1
		1
		0
		1
		0

EXPRESSION Statement		
EES1 – function call		
GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
<function_name> (<parameters>);	read_file ($name);	1

EES2 - assignment statement

GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
<name> = <value>;	$x = $y; $var = 'Joe'; $a = 1; $b = 2; $c = 3;	1 1 3

EES3 – empty statement (is counted as it is considered to be a placeholder for something to call attention)

GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
one or more ";" in succession	;	1 per each

BLOCK Statement

EBS1 – blocks = related statements treated as a unit

GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

/* start of block */
{
<definitions>
<statement>
}
/* end of block */
	/* start of block */
	{
	$i = 0;
	echo $i;
	}
	/* end of block */
		0
		0
		1
		1
		0
		0

DECLARATION OR DATA LINES

DDL1 - function prototype, variable declaration

GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT

function name
($var1,$var2,…,$varX)
{
<statements>;
}
 	
$<name>;
	function prod($a, $b)
	{
	$hello = "Hello World!";
	$a_number = 4;
	$anotherNumber = 8;
	}
	
	$hello;
		1
		0
		1
		1
		1
		0
		
		1

COMPILER DIRECTIVES

CDL1 – directive type

GENERAL EXAMPLE	SPECIFIC EXAMPLE	SLOC COUNT
include <library_name>	include(test.php);	1
include_once<library_name>	include_once(foo.php);	1
require<library_name>	require(testfile.php);	1
require_once<library_name>	require_once(filename.php);	1
bool define (string $name, mixed $value [, bool $case_insensitive])	define("CONSTANT", "Hello");	1
declare (directive) statement	declare(ticks=2) {	1
	for ($x = 1; $x < 50; ++$x) {	1
	echo similar_text(md5($x), md5($x*$x)), " ";	1
	}	0
	}	0

4. Complexity

Complexity measures the occurrences of different keywords in code baseline. Below table identifies the categories and their respective keywords that are counted as part of the complexity metrics.

Table 3 - Complexity Keywords List

Math Functions	Trig	Log	Calculations	Conditionals	Logic	Pre-processor	Assignment	Pointer
abs	acos	log	+	else	==	include	=	=>
base_convert	acosh	log10	-	else if	===	include_once	=>	
bindec	asin	log1p	*	elseif	!=	require		
ceil	asinh		/	for	<>	require_once		
decbin	atan		%	if	!==	define		
dechex	atan2		++	case	>	declare		
decoct	atanh		--	switch	<			
deg2rad	cos		<<	while	>=			
exp	cosh		>>		<=			
expm1	sin		!		and			
floor	sinh		&		or			
fmod	tan		|		xor			
getrandmax	tanh		~		not			
hexdec			^		&&			
hypot					||			
is_finite								
is_infinite								
is_nan								
lcg_value								
max								
min								
mt_getrandmax								
mt_rand								
octdec								
pi								
pow								
rad2deg								
rand								
round								
sqrt								
srand								

5. Cyclomatic Complexity

Cyclomatic complexity measures the number of linearly independent paths through a program. It is measured for each function, procedure, or method according to each specific program language. This metric indicates the risk of program complexity and also determines the number of independent test required to verify program coverage.

The cyclomatic complexity is computed by counting the number of decisions plus one for the linear path. Decisions are determined by the number of conditional statements in a function. A function without any decisions would have a cyclomatic complexity of one. Each decision such as an if condition or a for loop adds one to the cyclomatic complexity.

The cyclomatic complexity metric v (G) was defined by Thomas McCabe. Several variations are commonly used but are not included in the UCC. The modified cyclomatic complexity counts select blocks as a single decision rather than counting each case. The strict or extended cyclomatic complexity includes boolean operators within conditional statements as additional decisions.

Table 4 – Cyclomatic Complexity Risk Evaluation

Cyclomatic Complexity	Risk Evaluation
1 - 10	A simple program, without much risk
11 - 20	More complex, moderate risk
21 - 50	Complex, high risk program
> 50	Untestable program, very high risk

For PHP the following table lists the conditional keywords used to compute cyclomatic complexity.

Table 5 – Cyclomatic Complexity Counts

Statement	CC Count	Rationale
if	+1	if adds a decision
else if	+1	else if adds a decision
else	0	Decision is at the if statement
switch case	+1 per case	Each case adds a decision – not the

		switch
switch default	0	Decision is at the case statements
for	+1	for adds a decision at loop start
while	+1	while adds a decision at loop start or at end of do loop
do	0	Decision is at while statement – no decision at unconditional loop
try	0	Decision is at catch statement
catch	+1	catch adds a decision
ternary ? :	+1	Ternary ? adds a decision – : is similar to default or else