PHP funcional além do array_map

Jean Carlo Machado

Sobre

CompuFácil

⇢ php-src

⇢ git/git

⇢ torvald/linux

⇢ vim/vim

⇢ Doctrine

⇢ Zend Framework

⇢ phpunit


CODE WRITTEN IN HASKELL IS GUARANTEED TO HAVE NO SIDE EFFECTS.
...BECAUSE NO ONE WILL EVER RUN IT?

Haskell

1936: Imperativo

jumps: GOTO

1950: Estruturado

subrotinas: while, for, if

~~GOTO~~

Programação Funcional

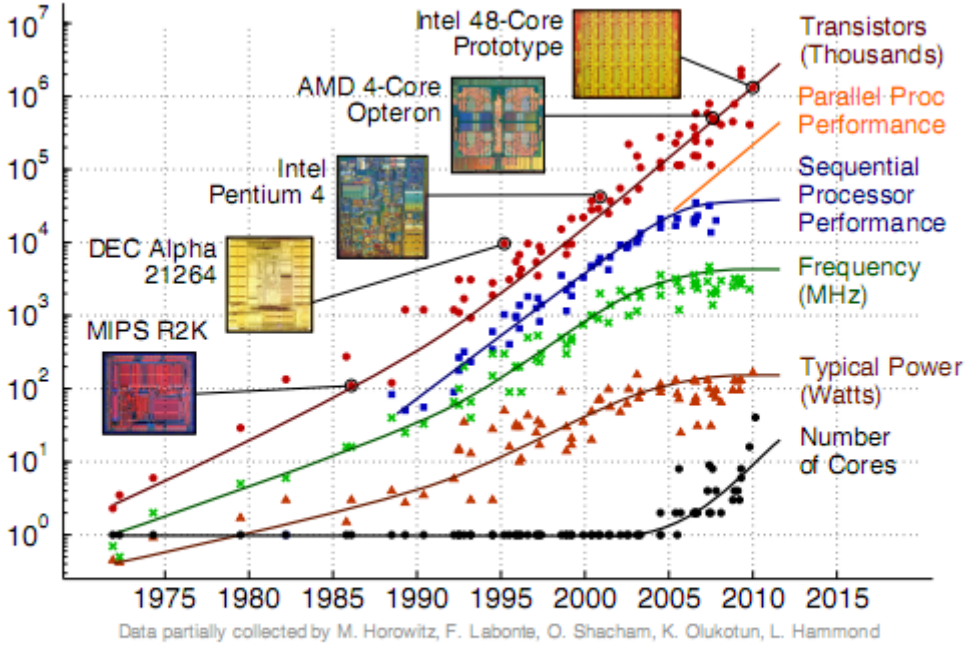
~~**mudança de estado**~~

Vantagens

Concorrência nativa

Facilita a modularização

Desacelera o apodrecimento



Prepared by C. Batten - School of Electrical and Computer Engineering - Cornell University - 2005 - retrieved Dec 12 2012 -

Prática

Estado === Impureza

```php
$inpureIncrement = function (&$count) {
    $count++;
};
for ($i = 0; $i < 3; $i++) {
    echo "Next:".$inpureIncrement($i);
}
//Next: 0
//Next: 2
//Next: 4
```

Pureza (relativa)

```php
function pureIncrement($count) {
    $myCounter = $count;
    $inpureIncrement = function(&$myCounter){
        $myCounter++;
    };
    $inpureIncrement($myCounter);
    return $myCounter;
}
//Next: 1
//Next: 2
//Next: 3
```

Impuros por natureza

IO

random

Funções de alta ordem

Retornáveis

```php
$sumPartial = function(int $a) {
    return function(int $b) use ($a) {
        return $a+b;
    }
};
$sumOne = $sumPartial(1);
$sumOne(7);
//8
$sumOne(5);
//6
```

Repassáveis

```
$incrementTwo = function ($n, $sumOne) {
    return $sumOne($sumOne($n));
};
```

Fold

Defina o básico

```
function sum($a, $b) {
    return $a + $b;
}
//function product($a, $b);
//function aORb($a, $b);
//function append($a, $b);
//function greater($a, $b);
```

Componha

```
$sumList = fold('sum', 0, [1,2,3]);
//6
$multiplyList = fold('product', 1, [2,2,2]);
//8
```

```
function fold(
    callable $f,
    $init,
    $list) {

    if (empty($list)) {
        return $init;
    }
    return $f(
        fold($f, $init, allbutlast($list)),
        last($list)
    );
};
```

Map

```
$double =  function($a) {
    return $a*2;
}

$map($double, [1, 2, 4]));
//[2,4,8]
```

```
$map = function($f, $list) {
    $applyAndAppend=function($f,$list,$b){
        $list[] = $f($b);
        return $list;
    };
    return fold($applyAndAppend,null)($list);
}
```

Árvores

```
$tree = [
    1 => [
        2,
        3 => [
            4,
        ],
    ]
];
foldTree($sum, $sum, 0, $tree)
//10
```

Map Tree

```
$tree = [
    3 => [1,4],
    1 => [1,5 => [1,2,3]]
];
$result  = mapTree($double, $tree);
//[
//    6 => [2,8],
//    2 => [2,10 => [2,4,6]]
//];
```

PHP functions

- ⇢ array_map
- ⇢ array_filter
- ⇢ array_reduce
- ⇢ array_sum
- ⇢ array_unique

g (f input)

⇢ começa f só quando g tenta ler algo

⇢ suspende f

⇢ g roda até precisar ler mais dados

Nth primes

```
getNthPrimes(10);
//[1,2,3,5,7,11,13,17,19,23]
```

Nth primes

```
function primes() {
    foreach (\f\infiniteSequence(1) as $i) {
        if (isPrime($i)) {
            yield $i;
        }
    }
}

print_r(\f\takefrom(primes(), 10));
//[1,2,3,5,7,11,13,17,19,23]
```

```
function isPrime($x) {
    $seq = \f\takeFrom(
        \f\infiniteSequence(),
        $x
    );
    $seq = \f\removeFirst($seq);
    $seq = \f\removeLast($seq);
    $multiple =  function($a) use ($x) {
        return ($x % $a == 0);
    }
    return \f\noneTrue(
        \f\map($multiple, $seq)
    );


}
```

Aplicação parcial

```
$append3 = function($a, $b, $c) {
    return [$a, $b, $c];
};
$append1And2 = \f\partial($append3)(1)(2);
$append1And2(5)
//[1,2,5]
$append1And2(9)
//[1,2,9]
```

```php
function partial(
    callable $callable, ...$args){
    $arity = (new \ReflectionFunction(
        $callable
    ))
    ->getNumberOfRequiredParameters();
    return $args[$arity - 1] ?? false
    ? $callable(...$args)
    : function (...$passedArgs)use($callable,
        return partial($callable,
            ...array_merge($args, $passedArgs)
        );
    };


}
```

Real: get-profile

Requisito v1

```
curl http://localhost:8000/profile/777
#{"id":777,"name":"Saruman"}
```

```
function getProfile(
    callable $query,
    $userId) {
    return $query(
        "Select * from User where id = %id ",
        $userId
    );
}
$realProfile = \f\partial
    ('getProfile')
    ([new Database, 'query']);
```

Requisito v2: cache

```
curl http://localhost:8000/profile/777
# go to database
#{"id":777,"name":"Saruman"}
curl http://localhost:8000/profile/777
# don't go to database
#{"id":777,"name":"Saruman"}
```

```
$memoize = function($func) {
    static $results = [];
    return function ($a) use (
        $func, &$results) {
        $key = serialize($a);
        if (empty($results[$key])){
            $results[$key]=call_user_func(
                $func, $a );
        }
        return $results[$key];
    };};
$memoizedProfile = $memoize($realProfile);
```

Requisito v3: log request

```
curl http://localhost:8000/profile/777
#{"id":777,"name":"Saruman"}
# also writes to file
cat /tmp/log
#getProfile called with params s:3:"777";
```

```php
function fileLogger($str) {
    file_put_contents(
         '/tmp/log',
        "FileLog: ".$str.PHP_EOL,
        FILE_APPEND
    );
}
```

```
function logService(
$logger, $serviceName,
callable $service) {
return function($args) use (
        $logger, $serviceName,
        $service) {
    $logger(
        "Service called ".  $serviceName.
        " with params ".serialize($args));
    return call_user_func($service, $args);
};
};
```

```
$loggedMemoizedGetProfile =
    \f\partial('logService')
        ($logger)
        ('getProfile')
        ($memoizedProfile);
```

Modularização

Mais que módulos

Decompor os problemas em partes menores

Re-compor com avaliação tardia e funções de alta orem

~~Apodrecimento~~

- Difícil adicionar efeitos sem quebrar as interfaces
  - Quão maior a interface mais feio o código
- Interfaces facilmente quebráveis com composicão
  - Quebrar encoraja reúso
- Complexidade horizontal ao invés de vertical

Conclusão

Imperativo quando necessário
Funcional quando possível

Para novos tipos

1 - defina as operações fundamentais

2 - junte funções

Seu trabalho não é resolver problemas

Definir problemas de uma forma que eles se resolvam

Ferramentas

- hlstrojny/functional-php
- functional-php/pattern-matching
- jeanCarloMachado/f
- pimple/pimple

Referências

⇢ Why functional programming matters

⇢ http://archive.li/uTYWZ#selection-407.912-407.919

⇢ https://medium.com/@jugoncalves/functional-programming-should-be-your-1-priority-for-2015-47dd4641d6b9

⇢ https://blog.inf.ed.ac.uk/sapm/2014/03/06/enemy-of-the-state-or-why-oop-is-not-suited-to-large-scale-software/

⇢ https://www.youtube.com/watch?v=7Zlp9rKHGD4

⇢ https://www.youtube.com/watch?v=q0HRCEKAcas

Dúvidas?

Github: https://github.com/jeanCarloMachado

Twitter: https://twitter.com/JeanCarloMachad

E-mail: contato@jeancarlomachado.com.br