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# Abstraction

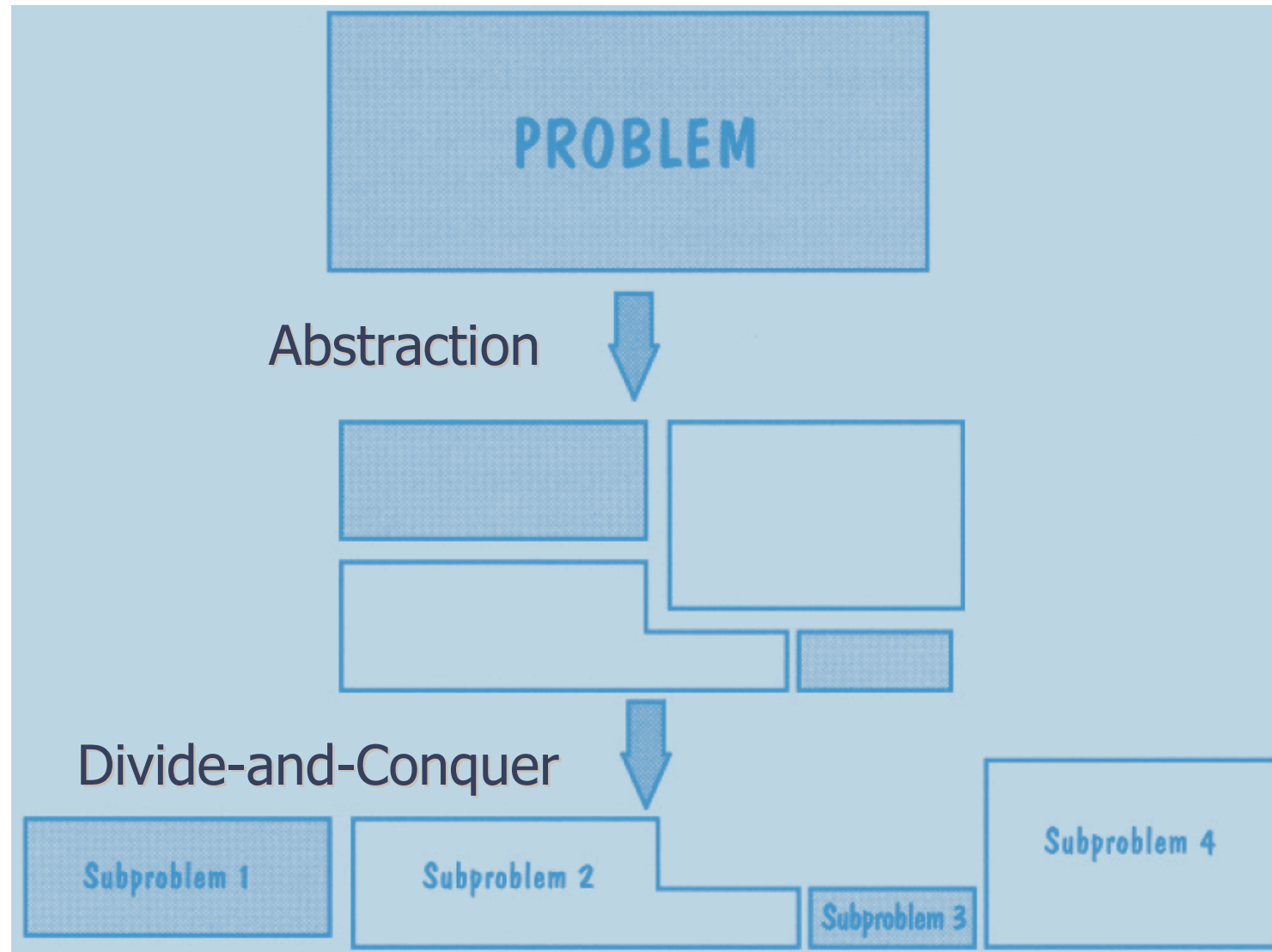
# Content

## ► Functions

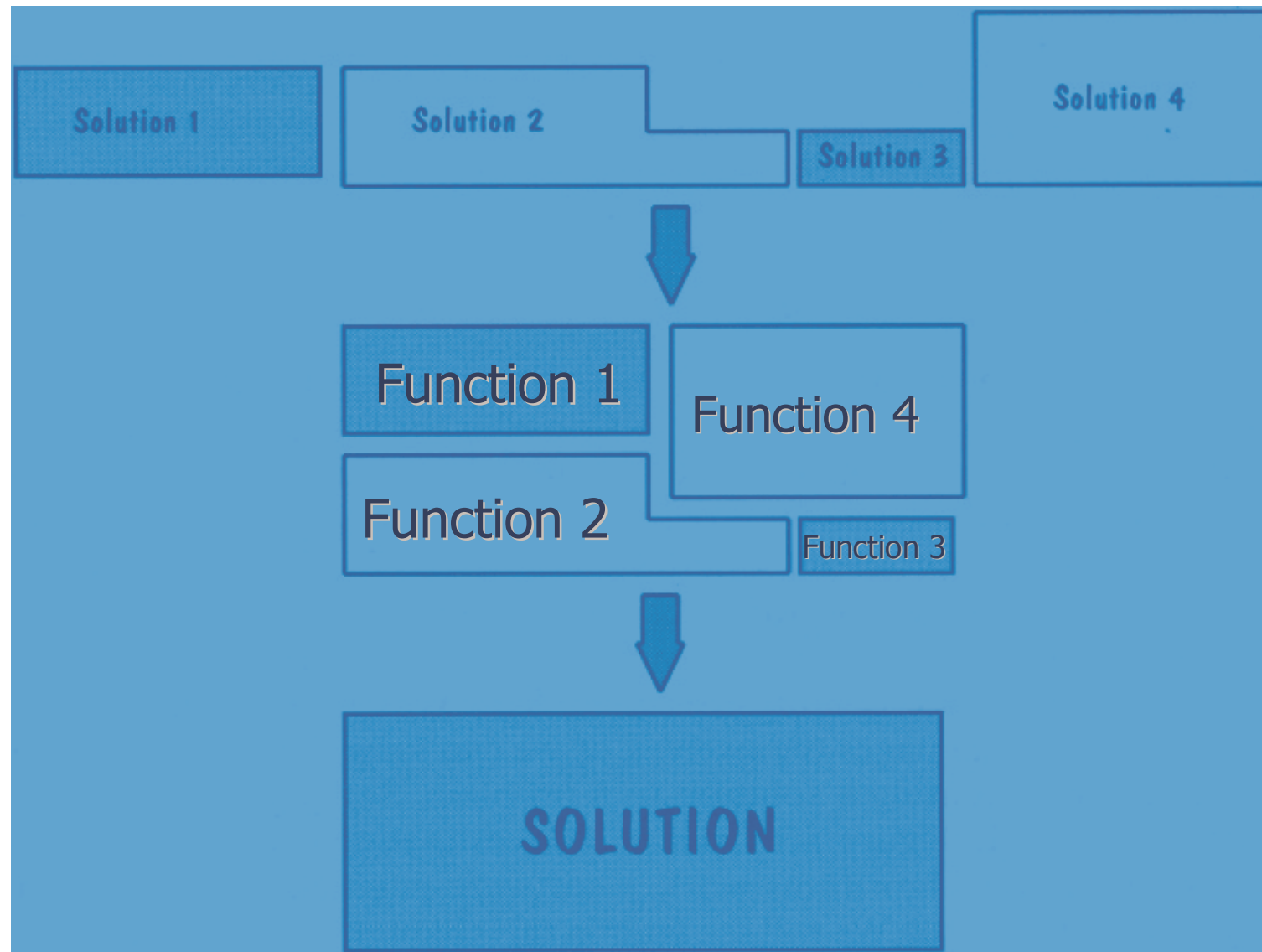
# Abstraction

- ▶ for larger tasks, task is divided into subtasks
- ▶ each (sub)task is implemented using a function

# Analysis



# Synthesis



## Sample Problem

- ▶ A mathematician lives on a street where house numbers are consecutive starting from 1. He says that the sum of the house numbers less than his house number is equal to the sum of the house numbers greater than his house number. Knowing that his house number contains 3 digits design an algorithm (represent it by a flowchart) and write a PHP script to find his house number.

# Solution # 1

```
<html><head><title>Sample Problem</title></head><body>
<?php
    for ($door=100;$door<=999;$door++){
        for ($left=0,$m=1;$m<$door;$m++)
            $left+=$m ;
        for ($right=0,$m=$door+1;$right<$left;$m++)
            $right+=$m ;
        if ($left==$right)
            echo "\n<h1>door number is $door</h1>";
    }
?>
</body></html>
```

# Analysis of Solution

```
<html><head><title>Sample Problem</title></head><body>
<?php
    for ($door=100;$door<=999;$door++){
        for ($left=0,$m=1;$m<$door;$m++)
            $left+=$m ;
        for ($right=0,$m=$door+1;$right<$left;$m++)
            $right+=$m ;
        if ($left==$right)
            echo "\n<h1>door number is $door</h1>";
    }
?>
</body></html>
```



# Solution with Functions–1

```
<html><head><title>Sample Problem </title></head><body>
<?php
function getLeftSum ( $number ) {
    for ($sum=0,$k=1;$k<$number;$k++)
        $sum+=$k ;
    return $sum;
}
for ($door=100;$door<=999;$door++){
    $left = getLeftSum ( $door ) ;
    for ($right=0,$m=$door+1;$right<$left;$m++)
        $right+=$m ;
    if ($left==$right)
        echo "\n<h1>door number is $door</h1>";
}
?>
</body></html>
```

# Function Components

- ▶ Function Name: WHAT does this function do?

```
function getLeftSum ( $number )
```

- name of function
- order of input parameters
- output parameter

- ▶ Function Body: HOW does this function work?

```
for ($sum=0,$k=1;$k<$number;$k++)
```

```
    $sum+=$k ;
```

```
return $sum;
```

- block of statements

# Solution with Functions–2

```
<?php
function getLeftSum ($number){
    for ($sum=0,$k=1;$k<$number;$k++)
        $sum+=$k ;
    return $sum;
}
function isSolution ( $number , $leftSum ){
    for ($rightSum=0,$j=$number+1;$rightSum<$leftSum;$j++)
        $rightSum += $j ;
    return ($leftSum==$rightSum);
}
for ($door=100;$door<=999;$door++){
    $left = getLeftSum ( $door ) ;
    if (isSolution ( $door , $left )==TRUE)
        echo "\n<h1>door number is $door</h1>";
}
?>
```