

CPSC 1150 - Assignment 2

Cordell Bonnieux

Counting Ones

This program reads a number, and displays it's binary representation and the number of 1s in that binary representation.

Blueprint:

Inputs: A user inputted integer, I will call it decimal.

Outputs: A Prompt asking for input from the user, and a prompt which displays the number of '1's in the binary representation of decimal.

Calculations: I will need to create a for loop which repeatedly divides decimal until it reaches 0. On each iteration I need to store the remainder in an array which I will call binary.

Variables: decimal(integer), binary(integer array), remainder(integer), counter(integer), i(integer)

Constants: n/a – none needed

Pseudocode:

Start

Print "Enter an integer between 0 and 99."

Read int to **decimal**

If **decimal** <= 0 *or* **decimal** > 99

Restart Program (or method/function)

Print **decimal** + " in binary is "

While **decimal** > 0

Compute int **remainder** = **decimal** % 2

Compute int **decimal** = **decimal** / 2

Compute int array **binary** += **remainder**

For (int **i** = **binary.length**) *as long as* (**i** > 0) *on each iteration* (**i**--)

Print **binary[i]**

If **binary[i]** == 1

Compute int **counter**++

Print “And there are “ + **counter** + “, 1s in the binary representation.”

End

Trace Tables:

Step #	Input	decimal	remainder	binary	counter	i	Output
0	-5						
1		-5					

Step #	Input	decimal	remainder	binary	counter	i	Output
0	14						
1		14					
2							“14 in binary is “
3		7	0	[0]			
4		3	1	[0],[1]			
5		1	1	[0],[1],[1]			
6		0	1	[0],[1],[1], [1]			
7					1	4	“1”
8					2	3	“1”
9					3	2	“1”
10					4	1	“0”
11							“And there are 4 1s in that binary representati on”

Step #	Input	Decimal	remainder	binary	counter	i	Ouput
1	100						
2		100					

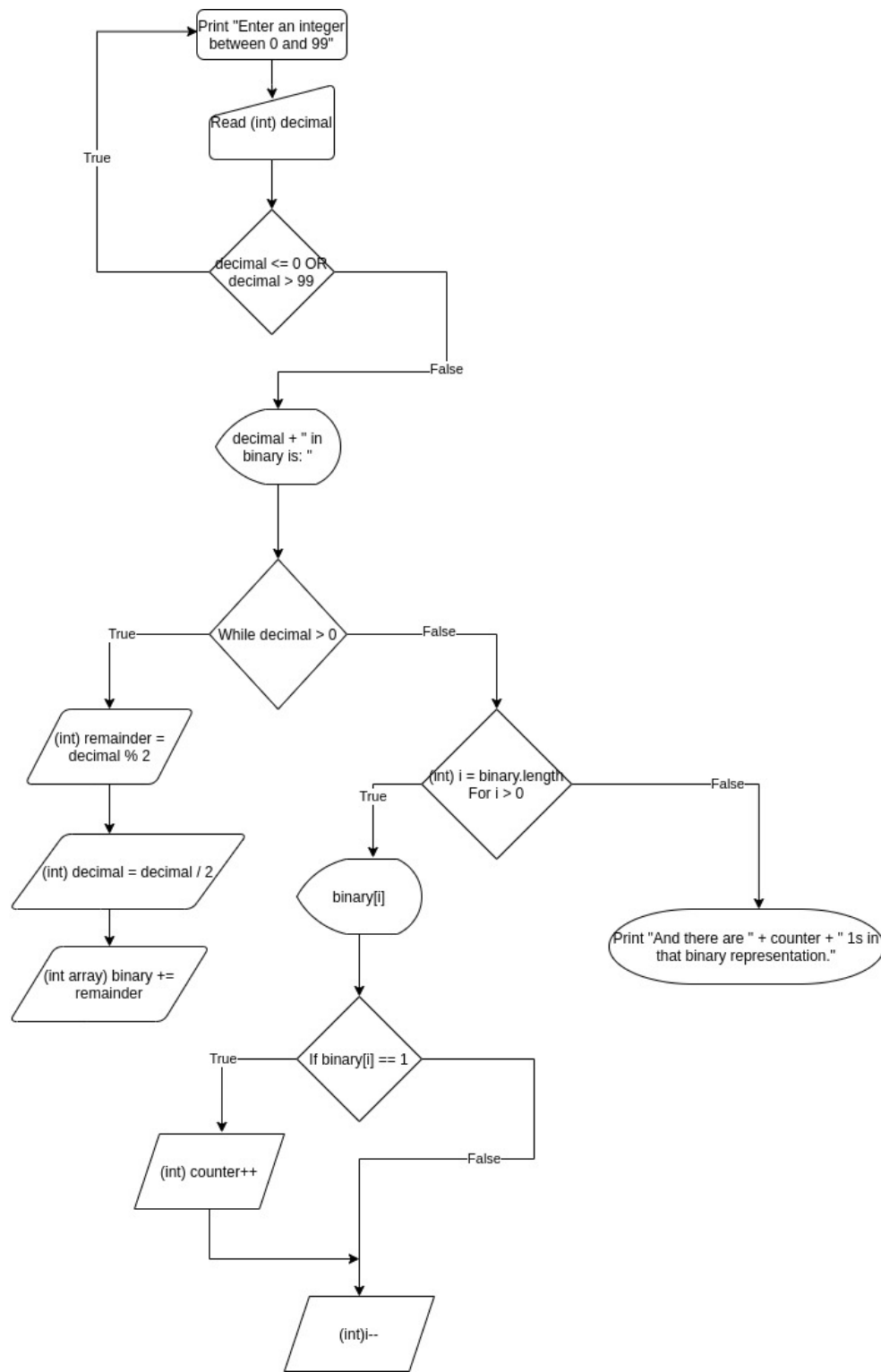
Step #	Input	Decimal	remainder	binary	counter	i	Ouput
1	0						

2		0					
---	--	---	--	--	--	--	--

Trace Table Notes:

- The algorithm loops if an invalid integer is entered

binary – This is an array of integers, that is used to hold the binary representation of decimal. However since this algorithm prints it backwards, the values in binary will also be stored backwards.



Palindrome

This program randomly generates a number and determines whether or not it is a plaindrome.

Pseudocode:

Start

Compute int **num1** (random int between/including 1 – 9)

Compute int **num3** (random int between/including 0 – 9)

If **num1 == num3**

Compute boolean **palindrome** = true

Compute int **num2** (random int between/including 0 – 9)

Print **num1 + num2 + num3**

If **palindrome**

Print “ is a palindrome.”

else

Print “ is not a palindrome.”

End

Trace Tables:

Step #	num1	num3	num2	palindrome	Output
1	4				
2		4			
3				true	
4			7		
5					“474 is a palindrome”

Step #	num1	num3	num2	palindrome	Output
1	8				
2		5			
3				false	
4			1		
5					“815 is not a palindrome”

Test Cases:

```
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
999 is a palindrome.  
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
649 is not a palindrome  
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
464 is a palindrome.  
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
206 is not a palindrome  
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
630 is not a palindrome  
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
957 is not a palindrome  
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
726 is not a palindrome  
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
448 is not a palindrome  
cordell@cordell-ROG-Zephyrus-G14-GA401IU-GA401IU:~$  
531 is not a palindrome
```

Card Game

This program generates a random number from 1 to 52. It then uses that number to determine which card from a deck of cards it represents.

Pseudocode

Start

Print “The card that has been picked is “

Compute int **card** (random int between/including 1-52)

If **card** == 1 or 14 or 27 or 40

Print “Ace”

Else if **card** == 2 or 15 or 28 or 41

Print “2”

Else if **card** == 3 or 16 or 29 or 42

Print “3”

Else if **card** == 4 or 17 or 30 or 43

Print “4”

Else if **card** == 5 or 18 or 31 or 44

Print “5”

Else if **card** == 6 or 19 or 32 or 45

```

    Print "6"
Else if card == 7 or 20 or 33 or 46
    Print "7"
Else if card == 8 or 21 or 34 or 47
    Print "8"
Else if card == 9 or 22 or 35 or 48
    Print "9"
Else if card == 10 or 23 or 36 or 49
    Print "10"
Else if card == 11 or 24 or 37 or 50
    Print "Jack"
Else if card == 12 or 25 or 38 or 51
    Print "Queen"
Else if card == 13 or 26 or 39 or 52
    Print "King"
If card % 4 == 0
    Print " of Clubs."
Else if card % 4 == 1
    Print " of Diamonds."
Else if card % 4 == 2
    Print " of Hearts."
Else if card % 4 == 3
    Print " of Spades."

```

Test Cases:

```

cordell@cordell-R0G-Zephyrus-G14-GA401IU-GA401IU:~$
The card that has been picked is King of Clubs.
cordell@cordell-R0G-Zephyrus-G14-GA401IU-GA401IU:~$
The card that has been picked is 8 of Spades.
cordell@cordell-R0G-Zephyrus-G14-GA401IU-GA401IU:~$
The card that has been picked is 5 of Clubs.
cordell@cordell-R0G-Zephyrus-G14-GA401IU-GA401IU:~$
The card that has been picked is 2 of Clubs.
cordell@cordell-R0G-Zephyrus-G14-GA401IU-GA401IU:~$
The card that has been picked is 5 of Diamonds.
cordell@cordell-R0G-Zephyrus-G14-GA401IU-GA401IU:~$
The card that has been picked is Ace of Diamonds.
cordell@cordell-R0G-Zephyrus-G14-GA401IU-GA401IU:~$
The card that has been picked is King of Hearts.
cordell@cordell-R0G-Zephyrus-G14-GA401IU-GA401IU:~$

```

Guessing Game

In this program, a random number is generated between 1 – 10. The user then makes a guess as to which number was generated. Then the user is prompted appropriately.

Pseudocode:

Start

Compute int **num** (random integer between 1 - 10)

Print “What is your guess?”

Read int **guess**

If **guess** > 10 *or* **guess** < 1

Print “Well if you’re not going to “try” I’m not playing.”

End

If **guess** *is equal to* **num**

Print “Horay you win”

Else

Print “The number was “ + **num**

If **guess** == **num** – 1 *or* **guess** == **num** – 2 *or* **guess** == **num** – 3 *or* **guess** == **num** + 1
 or **guess** == **num** + 2 *or* **guess** == **num** + 3

Print “It was close”

Else

Print “You missed it by miles”

Print “Better luck next time”

Test cases on next page...

```
cordell@cordell-ROG-Zephyrus-G14-GA4  
/lib/jvm/java-11-openjdk-amd64/bin/j  
essingGame  
What is your guess? 2  
The number was 3.  
It was close  
Better luck next time  
cordell@cordell-ROG-Zephyrus-G14-GA4  
/lib/jvm/java-11-openjdk-amd64/bin/j  
essingGame  
What is your guess? 9  
The number was 3.  
You missed it by miles  
Better luck next time  
cordell@cordell-ROG-Zephyrus-G14-GA4  
/lib/jvm/java-11-openjdk-amd64/bin/j  
essingGame  
What is your guess? 4  
Horay you win!  
cordell@cordell-ROG-Zephyrus-G14-GA4
```