Computer Science 50
Introduction to Computer Science I

Harvard College

Walkthrough 2

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Design and Style

Design

• What is good design?

Questions:
  • Is my code straightforward to read?
  • Am I wasting CPU cycles unnecessarily?
  • Is my code more complicated than it need be?
Design and Style

Style

• What is good style?
• Questions:
  • Comments
    • Is it clear what I am doing at each major step?
  • Variable names
    • Is it clear what each variable represents?
  • Prettiness
    • Is no line longer than 80 characters?
    • Did I indent uniformly?
Problem Set 2
Standard Edition

• Old Man song
  • Repetition…design decisions galore

• Caesar cipher
  • Command line arguments
  • Arrays

• Vigenère cipher
  • Arrays of arrays
Old Man’s Song
The Lyrics

This old man, he played one
He played knick-knack on my thumb
Knick-knack paddywhack, give your dog a bone
This old man came rolling home

This old man, he played two
He played knick-knack on my shoe
Knick-knack paddywhack, give your dog a bone
This old man came rolling home
oldman.c – several ways

- printf the entire song
  - bad design
- loop
  - good design
  - what kind?
- how do we store changing parts?
  - array
  - function + conditions
  - other ways?
Caesar Cipher

\[ c_i = (p_i + k) \% 26 \]
Command Line Arguments

• argc
  • when is it 1?
  • when is it 2?
• argv[]
  • argv[0]
  • argv[1]
caesar.c

• $c_i = (p_i + k) \% 26$
  • what is $p$?
  • what is $k$?
  • what is $\% 26$?
  • what is $c$?
Tools

- isdigit
- atoi
- GetString()
- strlen
- loop
- conditions
- ascii
- printf
Challenges

- how do we preserve case?
- how do we leave spaces unchanged?
Vigenère Cipher

\[ c_i = (p_i + k_j) \mod 26 \]

\begin{align*}
p & \quad HELLO, \quad WORLD \\
+ & \quad ++++++++ \\
k & \quad FOOBAR \quad FOOB \\
\downarrow & \quad \downarrow\downarrow\downarrow\downarrow\downarrow\downarrow\downarrow\downarrow\downarrow \\
c & \quad MSZMO, \quad NTFZE
\end{align*}
Differences

• key is alphabetical
  • use isalpha instead of isdigit
• find key’s numerical value
• must know when to advance key
  • not on spaces
• must worry about wrapping around key
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