

October 9, 2021

Supercomputing Challenge questions

Challenge Questions

Complete as many of the following as you can (in whatever order you would like). When you have an answer, private message Summer Bronson in the zoom chat the section and the question number.

Caesar Cipher Questions- Use the circular Caesar Cipher we have mailed you for this section. If you did not receive one, go to this website for this section:

<https://computerscienced.co.uk/site/caesar-cipher/>

Decryption questions: Answer the questions by making each of the following phrases into plain text by using the shift number given (15 points each):

1. What does one computer drink when it goes to a bar after a very tiring day? (Shift 7)
Aolf sprl ahrpun zjyllu-zovaz!
2. While visiting a zoo, which animal does a computer like watching the most? (Shift 13)
Gur ENZ!
3. What did the hat say to the hat rack? (Shift 15)
"Ndj hipn wtgt, X'aa vd dc p wtps"
4. Why did the PowerPoint presentation cross the road? (Shift 21)
Oj bzo oj ocz joczmg ngdyz
5. Why are all the workers who work at the keyboard factory extremely rich? (shift 3)
Ehfdxvh wkhh doo sxw lq kxjh qxpehuv ri vklwv
6. What did one eye say to the other eye? (Shift -6)
Vynqyyh sio uhx gy, migynbcha mgyffm

Encryption Questions: Answer each question by encrypting the phrase by the shift given (15 points each)

1. The national bird of Australia is the emu (Shift 6)
2. Octopi have three hearts (Shift 24)
3. Psycho was the first movie to show a toilet flushing (Shift 13)
4. The skin is the body's largest organ (Shift 4)
5. More people visit France than any other country (Shift 20)
6. Elephants can't jump (Shift 2)

More Decryption Questions: Decrypt the following phrases into plain text without being given the shift (try to use context clues or just try every option)(40 points)

1. Jxu rqdqdq belut yj'i hut isqhv
2. Uivg owiba twdm bw zmil apismaxmizm
3. Yjbn xvi nrhd avnozm ocvi adnc xvi mpi
4. Vjg ejkemgp nqqmgf dqvj ycau dghqtg etquukpi vjg tqcf
5. Jxqe kbbap ql dbq lsbo fq'p u

Programming puzzles

1. Brute Force Attack: Copy the following Java code and finish it to output a working brute force attack (200 points).

```
import java.nio.charset.StandardCharsets;
import java.security.MessageDigest;
import java.security.NoSuchAlgorithmException;
import java.util.Base64;

/**
 * @name BruteForceAttack.java
 *
 * Skeleton for a Brute Force Attack
 *
 * @author Summer Bronson, NMT Cyber Security Centers
 * @date March 18, 2021
 * @notes Please only edit the main method for full points
 */

public class BruteForceAttack {

    /**
     * Encodes inputted String using the SHA-256 hash
     * @param inputString
     * @return hashed String
     * @throws NoSuchAlgorithmException
     */
    public static String hashing(String inputString) throws NoSuchAlgorithmException {
        MessageDigest digest = MessageDigest.getInstance("SHA-256");
        byte[] hash = digest.digest(inputString.getBytes(StandardCharsets.UTF_8));
        String encoded = Base64.getEncoder().encodeToString(hash);
        return encoded;
    }

    public static void main(String[] args) throws NoSuchAlgorithmException {
        // You have hacked a website and have found the following hash:
        String foundHash = "ZwR2Gzy/gmDFVsPkE5mri83wtRqYk178BAW9nKCY3oc=";
        String foundPin;
        String example;

        // You know this hash is a 4 digit PIN
    }
}
```

```

// Write a brute force attack to find the original pin

//Example of using the "hashing" method
//Finds the SHA-256 hash of the PIN 0000
//Notice that the output is not the same as the "foundHash"
//Comment out the next two lines before running your code
example = hashing("0000");
System.out.println(example);

//Write code here!

// Uncomment following line for your final code
//System.out.println(foundPin);

}
}

```

2. Caesar Cipher Program: Copy the following Java code and finish it to output a working Caesar Cipher (200 points).

```

/**
 * @name CaesarCipher.java
 *
 * Skeleton for a Caesar Cipher Decoder
 *
 * @author Summer Bronson, NMT Cyber Security Centers
 * @date March 18, 2021
 * @notes Please only edit the shift method for full points
 */

public class CaesarCipher {

    public static String shift(String origString, int shift){

        String[] array = origString.split("");
        StringBuffer decodedArray = new StringBuffer();

        // Write code here!
    }
}

```

```
//The string of ciphertext is currently an array of characters.  
// You should iterate through the array and change each letter  
// so shift the number of letters given in the parameter "shift".  
// For more information on Caesar Ciphers, look at Background.txt
```

```
// This will convert the array of new characters into a single string again  
for(int f = 0; f < array.length; f++){  
    decodedArray.append(array[f]);  
  
}  
String decode = decodedArray.toString();  
return decode;  
}
```

```
public static void main(String[] args){
```

```
    System.out.println("Hey Officer, how did the hackers escape?");  
    String ciphertext = "Ab vqrn, gurl whfg enafbznjner";  
    String decoded = shift(ciphertext, 17);  
    System.out.println(decoded);  
  
}  
}
```

3. Write a program that takes goes through every word in a list (separated by line) and check if it matches the user input word (300 points)